

2020 ANNUAL REPORT



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Texas A&M University System
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President & CEO:

AKBAR KARA

LEARN
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MARK STONE

Texas A&M University System

Letter from the Chair

On behalf of the LEARN Board of Directors, I present to you LEARN's 2020 Annual Report. This report details many of LEARN's accomplishments in 2020. It is remarkable work, made even more notable considering much of it was done during a global pandemic. LEARN's strength as a collaborative, innovative, and supportive organization became apparent through the year and through each new challenge brought on by the pandemic. I commend LEARN staff and my colleagues on the Board of Directors for rising to the occasion in this new and uncertain time.

The year began with a leadership transition as Pankaj Shah moved back to Ohio to run their statewide network. The Board of Directors elected LEARN's long-time CTO, Akbar Kara, as LEARN's fourth President and CEO. The Board felt confident with Akbar's transition as he is a proven leader in the Research and Education community and has been a part of the LEARN team for over 14 years.

2020 was the 15th anniversary of First Light for LEARN. We didn't have the opportunity to celebrate this anniversary in person this year, but I want to take the time to recognize those who have been a part of LEARN since its early days. Your service to LEARN has been instrumental to fostering the sense of community that exists within the organization today.

In other noteworthy 2020 news, after many years of planning, the spur protection project in Beaumont finally came to fruition. In partnership with Louisiana Optical Network Infrastructure (LONI), this project will bring an additional layer of network protection to the LEARN POPs in Beaumont and Tyler, while allowing LONI to connect to the recently formed MUS-IX (Midsouth United States Internet Exchange) community. This project highlights LEARN's commitment to regional collaboration and encourages strategic alliances with our fellow Research and Education Networks (RENs) near Texas and beyond. LEARN believes that collaboration, resource sharing, and project partnerships not only benefit LEARN but also lead to more robust and resilient networking throughout the region.

I'd like to conclude by thanking my LEARN colleagues for the opportunity to serve as Board Chair. It has been an honor and privilege to fill this role.

Letter from the President & CEO

On June 24, 2005, the LEARN network marked its first passage of light between College Station and Houston. Established with the objective of providing network connectivity to the most esteemed higher education institutions in the state of Texas, LEARN has evolved beyond the statewide network, creating a community of public service partners from higher education, federal agencies, and other nonprofit realms. This forward-thinking community has guided LEARN's transformation as an organization. By having the foresight to add valuable services for members and explore funding opportunities with entities such as the National Science Foundation (NSF), LEARN has expanded its scope and solidified its role as a trusted partner to the organizations it serves. For LEARN's 15th Anniversary Annual Report, we look back at the growth and successes over the years while celebrating our more recent accomplishments.

Through new partnerships and projects, LEARN expanded its "people network" in Texas in 2020. Our NSF grants have given community colleges and universities throughout the state opportunities to support science and discovery using advanced networking, receive valuable training, and connect and collaborate with LEARN partner institutions. We have also expanded our engagement with Texas libraries through a grant to connect rural libraries to LEARN's statewide backbone, a partnership with the Texas State Library and Archives Commission. Fostering new relationships amongst these valuable institutions engaged in serving Texans was a priority for LEARN in 2020 and will remain so for years to come.

We also welcomed to the LEARN family a new CTO in 2020—Todd Horkman. Todd has already helped our organization continue its mission by prioritizing forward-thinking projects while maintaining progress with ongoing projects. We also promoted Byron L. Hicks, who has diligently served our members for over a decade. Byron is now LEARN's Chief Network and Systems Architect.

Toward the end of 2020, LEARN started a transition towards an updated Network Operations Center (NOC) with enhanced capacities. By moving away from a call center model to a new partnership with a managed service provider, LEARN's new NOC will feature automated network monitoring backed by industry leaders with

experience working with R&E and large broadband networks throughout the country.

LEARN continues to pilot new services driven by our member's requests. In 2020, LEARN rolled out a Telephony SIP service pilot over our carrier class IP network. By utilizing a new onboarding process developed internally to test services amongst members, we hope to be able to introduce new offerings through this pipeline in the future.

Our 15th Anniversary celebration was understandably affected by the global pandemic that continues to alter the way we use our networks and technology. At the outset of the pandemic, LEARN staff quickly mobilized to offer additional support to its member organizations. Through frequent calls with members and peers, involvement in conversations and initiatives at the national level, and a continuation of normal business operations throughout, LEARN remained a steady and reliable presence for its members at a most uncertain time for one primary reason, it is the dedication of our staff who carry out LEARN's mission on behalf of the members. I remain confident that with our strong team, we will continue to meet every challenge and take on every opportunity.

We welcome you to take the time to explore these accomplishments and more in the stories that follow.



AKBAR KARA
LEARN

Letter from the CTO

2020 was a year filled with unprecedented change for all of us. Being new to the LEARN family, I was quickly impressed with how the team worked with the membership to pivot rapidly to the changing landscape. While the traditional outbound traffic from our members was significantly reduced, we saw an equally increased amount of inbound traffic to our member institutions and content providers. I witnessed great flexibility, collaboration, and innovation between the LEARN Engineering Team and our member's technical staff. There was proactive dialogue regarding revised education delivery plans and brainstorming sessions to discuss potential impacts to each institution's network infrastructure. Together, LEARN and its members were able to plan, adjust, and monitor to ensure the network bandwidth would be available as needed.

In the midst of all the change, the LEARN Engineers also implemented the packet and optical network to support the Midsouth U.S. Internet Exchange (MUS-IX; www.mus-ix.net) collaboration which provides increased Internet connectivity, bandwidth, and content peering to participating members (LEARN in Texas (tx-learn.net), OneNet in Oklahoma (onenet.net), ARE-ON in Arkansas (areon.net) and LONI in Louisiana (loni.org)). The goal of MUS-IX is to maximize the mutual efforts of the regional partners to create a centralized collaboration hub. The partners chose Dallas because every major Internet and content provider has a presence in the city, making it a nucleus for Internet services for the south-central states. The LEARN Engineers implemented the network infrastructure to deliver ten 100 Gbps fiber connections to the regional partners at two shared facilities in the Dallas metroplex. Each partner has multiple 100 Gbps capabilities with Layer 2 and Layer 3 support. The MUS-IX collaboration is already delivering over 20 Petabytes of traffic per month. In 2021, we will continue to add additional content peers as they become available to further enhance the collaboration's value.

In addition, the LEARN Engineering Team was able to continue to deliver against these other projects: installation of a new optical and router node at the Southern Methodist University (SMU) datacenter in Dallas; new POP with router implementations at University of Texas System - Arlington Regional Data Center (ARDC); Richardson POP relocation;

Kendleton Amplifier relocation; implementation of a new Network Management System (NMS) & asset tracking system; partnering with GTT for enhanced DDoS mitigation services; and connecting new members and affiliates.

As we reflect on 2020 and look forward to 2021, we have several initiatives started that will bring great innovation to the services LEARN provides to its members. First, we are working on a pilot project to connect community libraries to the LEARN network. This will bring a new type of member connectivity which will require technical and operational innovation in order to bring high-speed Internet access to areas currently without. Second, LEARN has partnered with an external Network Operations Center (NOC) service provider to deliver an enhanced full-service NOC to our members by implementing their Network Monitoring and Tier-1 Outage Remediation services. Additionally, LEARN will be implementing enhanced tooling to improve overall infrastructure monitoring, automation of device configuration, performance trending visibility and enterprise-level dashboard metrics.

As I reflected on the past year, I'm proud of how the LEARN community reacted to the challenges of 2020 and how our established community of partners stood by us in a turbulent year. The experiences we've gained are positioning us well for the opportunities that await us in 2021.



TODD HORKMAN
LEARN

MEMBER ORGANIZATIONS

Angelo State University
Baylor College of Medicine
Baylor University
Blinn College
Lamar University
National Oceanic and Atmospheric Administration
Parker University
Prairie View A&M University
Rice University
Sam Houston State University
South Plains College
Southern Methodist University
Stephen F. Austin State University
Texas A&M Health Science Center
Texas A&M University
Texas A&M University - Corpus Christi
Texas A&M University System
Texas Association of Community Colleges
Texas Christian University
Texas Education Telecommunications Network (TETN)
Texas State Library & Archives Commission (TSLAC)
Texas State University
Texas Tech University
Texas Tech University Health Sciences Center
Texas Tech University Health Sciences Center El Paso
Texas Tech University System
Texas Woman's University
Trinity University
University of Houston System
University of North Texas System
University of Texas at Arlington
University of Texas at Austin
University of Texas at Dallas
University of Texas at El Paso
University of Texas at San Antonio
University of Texas Health Science Center at Houston
University of Texas Health Science Center at San Antonio
University of Texas Health Science Center at Tyler
University of Texas MD Anderson Cancer Center
University of Texas Medical Branch at Galveston
University of Texas Rio Grande Valley
University of Texas Southwestern Medical Center at Dallas
University of Texas System



OVERVIEW & HISTORY



WHO IS LEARN?

LEARN: Lonestar Education and Research Network (LEARN) is a consortium of 43 organizations throughout Texas that includes public and private institutions of higher education, community colleges, the Texas State Library and Archives Commission (TSLAC), the National Oceanic and Atmospheric Administration (NOAA), Texas Education Telecommunications Network (TETN), and K–12 public schools. The consortium, organized as a 501(c)(3) non-profit organization, connects its members and over 300 affiliated organizations to statewide resources through high-performance optical and IP network services to support their research, education, healthcare and public service missions. LEARN is also a leading member of a national community of advanced research networks, providing Texas connectivity to national and international research and education networks, enabling cutting-edge research that is increasingly dependent upon sharing large volumes of electronic data.

A BRIEF HISTORY OF LEARN



In early 2003, a series of meetings of research universities and health science centers in Texas were held to forge a shared vision of creating a unified high-performance optical network for higher education that could partner with an emerging national network dedicated to research. Overcoming the legacy of competition among the attendees with the fiscal and organizational challenges that laid ahead, the universities and health science centers soon reached a consensus that it was strategically important to create an organization dedicated to high-performance networking in Texas.

In the summer of 2003, the Texas Legislature endorsed the concept by proposing an initial investment of \$7.5 million dollars to construct the proposed optical network for Texas. That concept was fleshed out as LEARN worked with the offices of the Governor, Lieutenant Governor, Speaker of the House, and the Department of Information Resources (DIR) to study the merit of authorizing a Texas Enterprise Fund (TEF) grant for the optical network project.

In the fall of 2003, the nascent LEARN organization, realizing that it was imperative to have a legal structure around which to center its operations, decided to use the existing Houston-based Texas GigaPOP as the 501(c)(3) structure for the new statewide organization. The following January, officers of the new organization were installed at its first Board meeting on the Southern Methodist University campus in Dallas with the new organization being officially named “LEARN: Lonestar Education and Research Network.” Thus, LEARN was officially created with a 30-member Board of Directors.



BRIAN DOURTY
2020 TAG Chair

That year, the elected leadership officers announced that the State of Texas would fund a TEF grant to provide the initial capital funds to acquire dark fiber and equipment or leased wavelengths for a “triangle” backbone connecting Dallas, College Station, Houston, San Antonio, and Austin with additional connections to El Paso, Lubbock, Denton, Tyler/Longview, Beaumont, Galveston, and Corpus Christi.

On February 28, 2005, the Governor signed the TEF grant agreement to provide \$7.28 million in funding for the optical network project. LEARN now had the organizational, political, and financial means to begin deploying the optical network for Texas.

Since its founding, LEARN has expanded both its membership and services. It now connects hundreds of thousands of students enrolled in higher education and in Texas public schools. Over 300 organizations rely on LEARN, either directly or indirectly through LEARN partners, for vital connectivity to local, statewide, national, and international network services.

Organization & Governance

LEARN’s Board of Directors governs the overall affairs of the corporation, with committees advising the Board on specific operational and policy issues. The standing committees of the Board include Finance, Governance and Participation, and Operations and Services. Additionally, an Audit Committee consisting of three elected Board members and an independent advisor monitors the conduct of the annual independent audit. The Board also creates ad hoc committees when deemed necessary.

Within the authority delegated by the Board, the Executive Committee governs the affairs of LEARN in between the quarterly meetings of the full Board of Directors. The elected officers of the Executive Committee are comprised of the President and CEO, Chair, Chair Elect, Past Chair, Treasurer, and Secretary. Other than the President, the officers are elected from the members of the Board of Directors. The Executive Committee is also comprised of the Chairs of the three standing committees.

The day-to-day business of LEARN is managed by the President and CEO of the corporation, who is elected by the Board of Directors. The President and CEO employs and supervises professional, technical, and administrative staff to conduct and manage LEARN's operations, including a Chief Technology Officer who is responsible for the health of the network and Chief Financial Officer who is responsible for managing finances, compliance, and control functions.

The Technical Advisory Group (TAG) is comprised of technical experts from each of the organization's member institutions. TAG representatives are appointed by the LEARN Board member from the institution they represent, and the group elects a TAG Chair annually. TAG is an advisory body to the Board, LEARN's President, and Chief Technology Officer and serves an important role in helping shape LEARN's architecture, operations, and portfolio of services.

Network Infrastructure

LEARN's footprint spans over 3,200 miles across the state, connecting over 300 direct or affiliated organizations east to west from Beaumont to El Paso and north to south from Amarillo to Brownsville. LEARN is built on dense wavelength division multiplexing (DWDM) optical technology, providing the capability to transport multiple high-capacity signals over a shared optical fiber by using the different color wavelengths of laser light. DWDM is state-of-the-art technology that is very scalable, and permits LEARN to leverage its initial investment in optical fiber by adding additional capacity at marginal costs. LEARN has grown to 41 on-ramps within Texas.

LEARN's network relies on agreements with the private sector that provide the long-term use of optical dark fibers and/or long-term leases of optical wavelength capacity. When dark fiber is conveyed via an indefeasible right to use (IRU) agreement, LEARN provides the infrastructure to "light" the fiber and can add additional capacity as needed without having to revise a contract with the fiber owner. In wavelength capacity agreements, the service provider provisions the infrastructure and bandwidth under the terms and conditions of the agreement.

Deploying LEARN-owned high-performance routers at its 41 strategically located Points of Presence (POPs), LEARN makes it possible for its members and affiliates to bridge the last mile with their own network connections at minimal cost. In most cases, LEARN's network segments are protected through rings that ensure continued

operation of the network in case of a fiber cut or other disruption to a segment.

Several university members as well as the Texas Education Telecommunications Network (TETN) operate their own networks as overlay on LEARN, which in turn are linked into LEARN's statewide fiber and packet infrastructures at LEARN POPs. LEARN collaborates closely with those other organizations to ensure that high-performance networking is made available at the lowest cost, most reliable, and highest performance level possible.

Membership & Network Services

Voting member organizations are entitled to appoint an individual to the Board of Directors and to acquire network services from LEARN. Network services are designed and provisioned based on the needs of individual members through collaboration between members and LEARN staff.

Network services, which are funded by the members who consume the services at rates which are set by the Board, sustain current and future network requirements including capital refresh at periodic intervals to sustain the state-of-the-art network.

Network Services include:

- National Research and Education Network (NREN)
- Internet and Cloud Connectivity
 - › Blended & Resilient Commodity Internet
 - › Content Provider Peering and Caching
 - › Cloud Bridge
- Transport
 - › Dedicated Transport
 - › MPLS Transport
- Security
 - › Distributed Denial of Service (DDoS) Mitigation
- Other
 - › Cross-Connect & Colocation
 - › Local Switching
 - › Managed Services
 - › Texas Research & Education Intrastate
 - › Unmetered Network Services

LEARN is currently listed as a telecommunication/Internet service provider with the Universal Service Administration Company (USAC). Becoming a USAC telecommunications/Internet service provider allows LEARN's school, library,

and rural health members to receive significant discounts through the Universal Services Fund.

The Board and the staff are committed to ensuring LEARN remains the trusted and preferred means by which its members obtain network services in Texas. There is a broad consensus among LEARN members that the organization has a unique role to play in the state in providing highly reliable, cost-effective network services to higher education, K-12, research institutions, healthcare, city and county governments, libraries, museums, not-for-profits, and public service entities. LEARN is a trusted partner and convener in these communities.

Infrastructure Performance

LEARN deploys and operates a sophisticated state-of-the-art fiber-based optical and IP network throughout the large state of Texas. The “carrier grade” optical and packet switching technology is highly reliable and capable of provisioning high-speed bandwidth between LEARN members in Texas cities and smaller communities throughout the state. While bandwidth capacity is important, LEARN recognizes that the reliability of the network is just as important to the daily operation of its members who depend upon the network for most of their service functions.

To ensure that LEARN’s network operates at “five nines” or greater reliability, LEARN operates a Network Operations Center (NOC) under an agreement with Texas A&M University, 24 hours a day, 7 days a week, 365 days a year. During 2020, LEARN solicited bids for NOC services with plans to replace the existing agreement with Texas A&M University in 2021. The NOC serves as the central point for monitoring and managing the overall health and performance of the network. LEARN Engineers have a suite of network management tools at their disposal as well as the training they need to manage the configuration of the network, monitor the performance of the network segments and their components, diagnose and isolate the cause of performance issues, and manage incidents until they are resolved. LEARN staff works closely with its members to align the network management practices and performance with their needs.

A critical component of LEARN’s network reliability toolset is a comprehensive database of hardware assets, network configuration, circuits, and other strategically important data that is essential to LEARN’s overall strategy of continuously improving the operational performance and efficiency of its growing network. At the end of 2020,

that database had over 4,500 entries with information such as the physical location, acquisition date, service records, contract expiration dates, and projected replacement cycle. This information is also being used as the primary data source for our automation initiative to ensure accurate configurations across our network infrastructure.

The vast majority of LEARN’s network topology is designed to provide network rings which serve as protected paths for members in the event of a failure in the network infrastructure. If one leg of the ring suffers a fiber cut or equipment failure, the network automatically reconfigures itself to use the other leg of the ring to maintain connectivity. This redundant design is a key element of the network’s performance, but despite the network design, failures of a network segment do occasionally occur. In order to reduce the time required to get the segment back into operation, LEARN acquired and strategically deployed critical infrastructure spares throughout the network. Additionally, LEARN maintains maintenance and support agreements for its critical infrastructure with the vendors of both the fiber paths and the network gear.

The results of LEARN efforts to provide a highly reliable network to its members in 2020 were as follows:

- Layer 1 Dedicated Transport Services on LEARN’s Backbone
– **100% Uptime**
- Layer 2 IP/MPLS Transport Services on LEARN’s Backbone
– **99.99% Uptime**
- Routed Layer 3 IP Services on LEARN’s Backbone
– **99.999% Uptime**
- Connection Gateways to Internet2
– **100% Uptime**
- WaveNet Services on the Beaumont Spur
– **99.9% Uptime**
- Commodity Internet Services
– **100% Uptime**

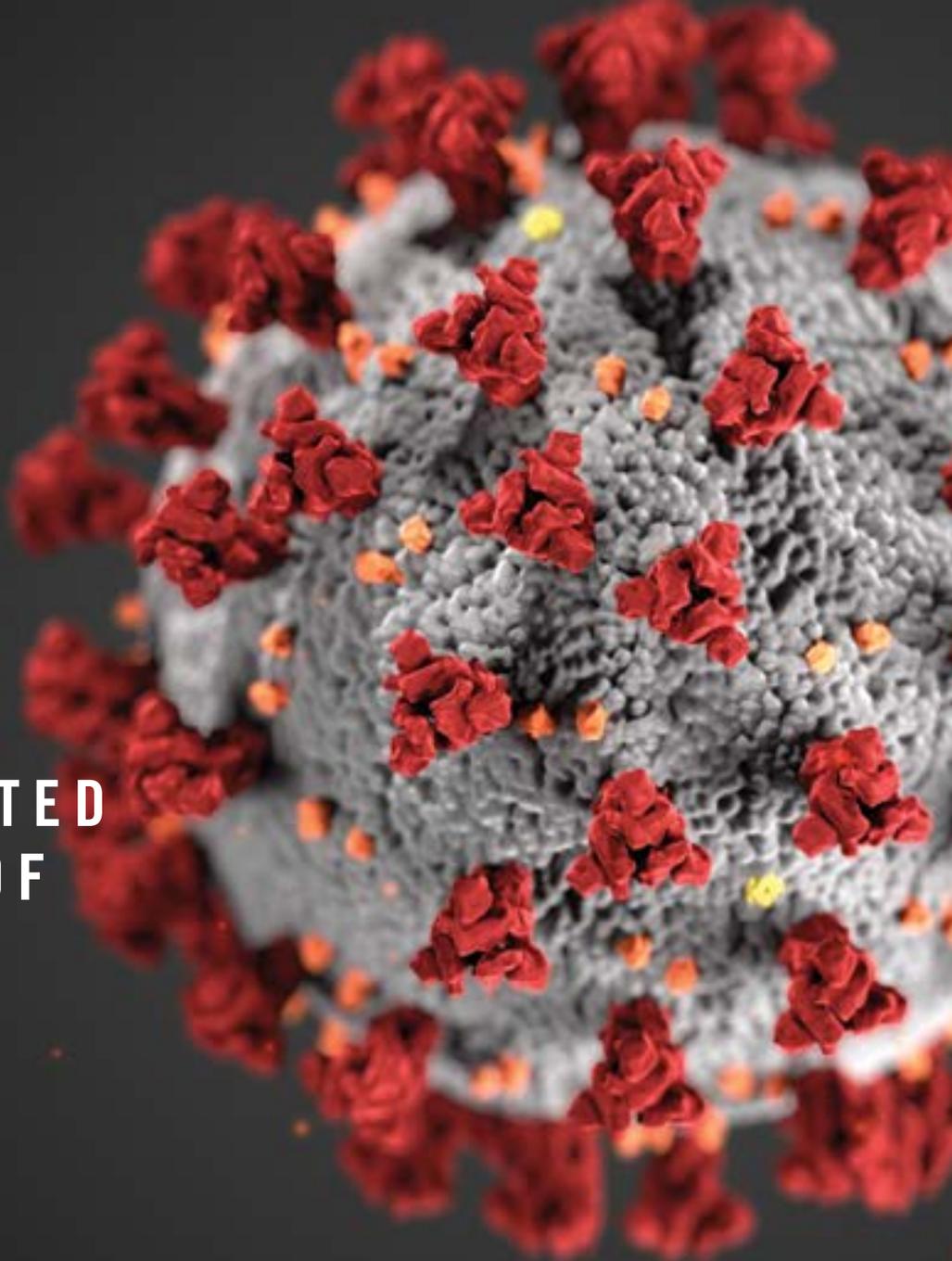
While these performance levels are very favorable compared with other telecommunications providers, LEARN’s goal is 100% reliability on all of its services. To that end, LEARN will continue to improve its technology, tools, training of its staff, and cooperation with its members/ partners and network staff as it has done since the organization’s inception.



ACTIVITIES & ACCOMPLISHMENTS

CREATING THE COVID PLAYBOOK: HOW RENS NAVIGATED THE UNCHARTED TERRITORY OF A PANDEMIC

By Mary Goldie



Reaction to an Unprecedented Storm

Disaster preparation and response is a component of every organization's standard operating procedures. Protocols are put into place to act as directives in the event of say a fire or tornado; mitigating risks remain at the forefront of all action plans. But what happens when an unforeseen disaster appears, one that has the power to upend the concept of "normal" throughout the world?

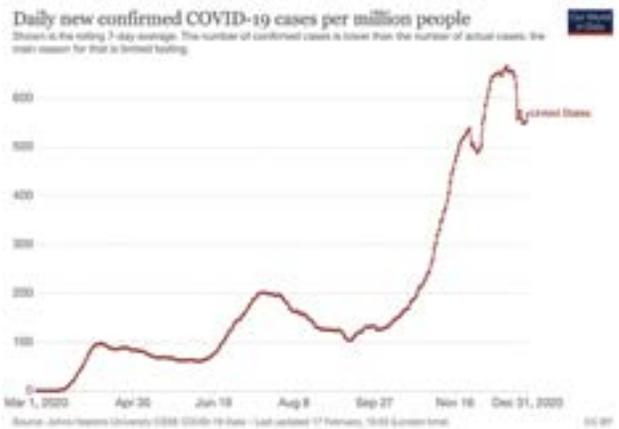
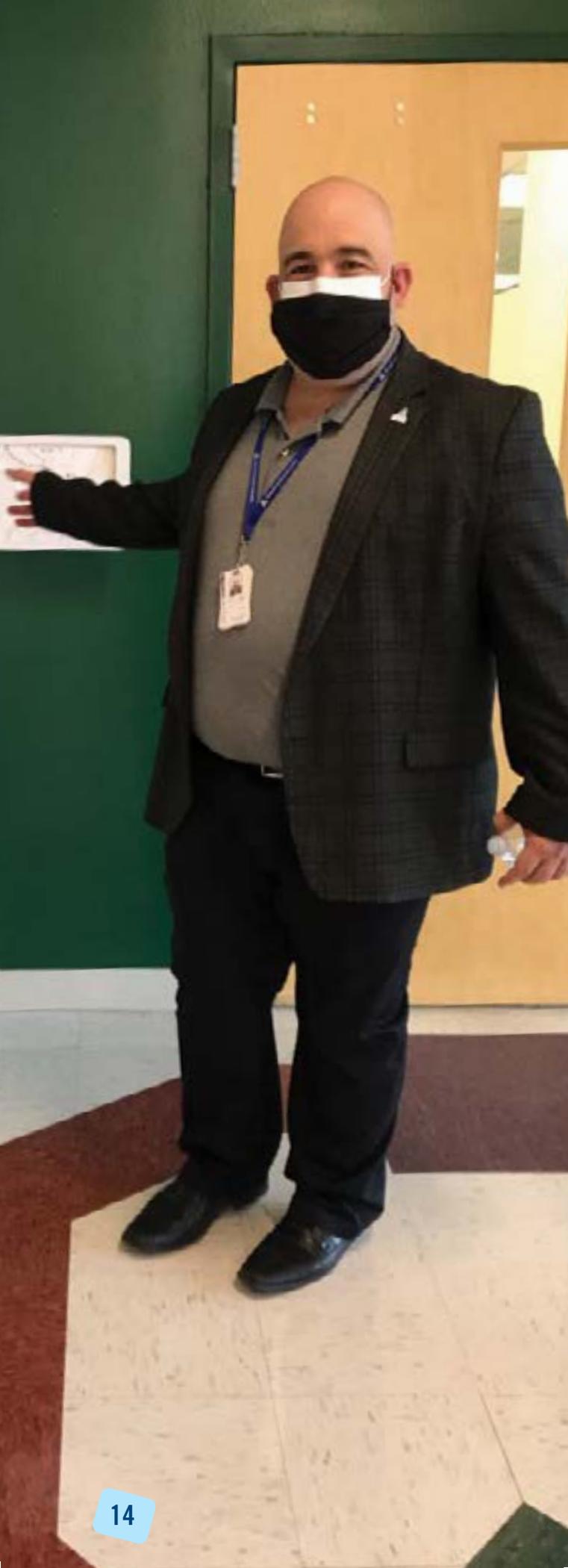
Unlike a natural disaster, the COVID-19 pandemic didn't come with a set of tested and approved procedures to follow in its wake. "If x happens, then do y" doesn't apply to a pandemic with a scale, scope, and longevity beyond

anything seen before. With no precedent to use as a navigational guide, responses to unfamiliar challenges developed in real time, all while the way people worked, lived, and interacted changed beyond recognition.

For Research and Education Networks (RENs), the pandemic led to an increased awareness of one of their central causes: Internet reliability and access. With the move of work and

Above: CDC illustration of a microscopic view of the novel coronavirus.

Illustration credit: CDC/ Alissa Eckert, MSMI; Dan Higgins, MAMS



World in Data visualization of daily confirmed COVID-19 cases per million people in the US from March 1, 2020–December 31, 2020

Graph credit: Our World in Data/John Hopkins University CSSE COVID-19 Data

schooling to the virtual realm, RENs were able to leverage their expertise and guide efforts related to expanded Internet access at the national level. By leaning into their strengths and relying on their community of cohorts, the pandemic response by RENs simultaneously benefited their members and the nation at large.

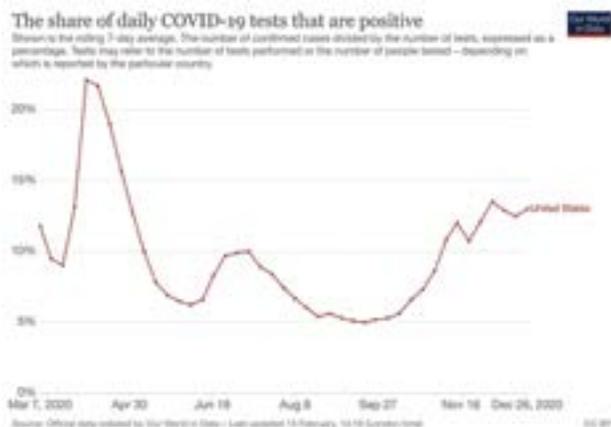
COVID's Impact on RENs: LEARN

In the early days of the pandemic, LEARN employees wanted to be prepared to provide whatever assistance was needed to its members so that they would have confidence that LEARN was standing by, according to Project Manager Tim Woodbridge. Not knowing what challenges to expect to come from the pandemic, Woodbridge reached out to all LEARN network vendors, updating support contact information in the event that it would be needed.

The rapid provisioning of resources, creation of information exchanges, and communication support became some of the ways that LEARN assisted its members, according to LEARN President and CEO Akbar Kara. LEARN quickly instituted an open bridge, dubbed "LEARN COVID Technical Coordination Bridge". The open meeting, available for members to drop in, gave the LEARN community an opportunity to chat about issues facing their institutions and receive assistance with COVID-related

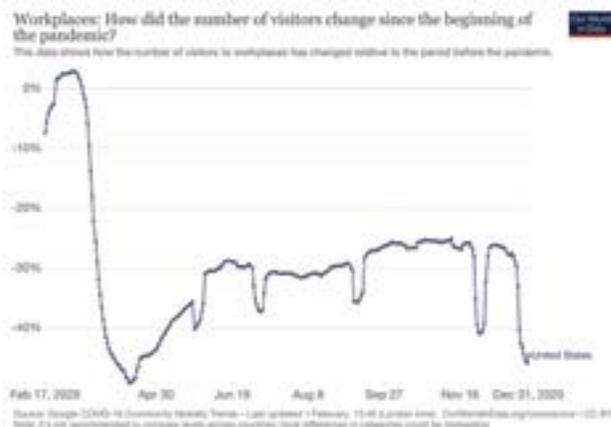
Left: Lucio Gonzales shows empty classroom at South Texas College in McAllen, Texas during the pandemic.

Image credit: Mary Goldie



Our World in Data visualization of percentage of daily positive COVID-19 tests in the US from March 7, 2020–December 26, 2020

Graph credit: Our World in Data



Our World in Data visualization of change in numbers of visitors to workplaces in the US before and during COVID pandemic from February 17, 2020–December 31, 2020

Graph credit: Our World in Data/Google COVID-19 Community Mobility Trends

challenges they were facing. Additionally, LEARN created a Slack channel where members could collaborate, further solidifying LEARN's message of unity and community that was essential during the time.

By also looking to get involved in discussions happening at the national and federal levels, LEARN was able to advocate for their membership and for the REN community at large. Kara was part of The Quilt group related to grant relief for RENs and advocated rule changes at Federal agencies so that wireless and wireline capabilities could be leveraged to aid the pandemic response.

While the pandemic did not lead to severe network issues or other technological calamities, LEARN was nonetheless prepared to assist members through service.

COVID's Impact on National Coalitions: The Quilt, Internet2, and SHLB

For LEARN and the broader community of groups that support Research and Education entities, elements of their existing organizational structure became invaluable when navigating such a seismic shift of circumstances. Jen Leasure, President and CEO of The Quilt, a nationwide coalition of RENs, saw parallels early on. The Quilt sought ways to ensure that their partnering RENs could remain as resilient as their networks. "Resiliency is at the forefront of research and education network design. Our national Quilt community is resilient too," says Leasure. The Quilt increased the frequency of check-ins with RENs, creating a weekly Friday meeting that gave them the opportunity to share information with their cohorts. Discussions revolving

around operational strategies inspired The Quilt to create a repository of communications and information that all could access—guiding and inspiring approaches to sometimes difficult and uncharted subjects. Of all their measures, one stands out in Leasure's mind. "The Quilt also established a member mutual assistance pact supporting the temporary sharing of resources across Quilt member organizations in an emergency and through mutual agreement of parties. LEARN was one of the first to join the mutual assistance pact," she recalls.

Beyond creating avenues to support their REN members internally, The Quilt worked with another national network, Internet2, to write a letter to Senate leadership about the importance of RENs. "Following the Senate letter, we met with the senior staff of Senators, Congressional members, and Committee staff to follow up and share information. (With opportunities for) additional stimulus funding (coming up), we were reminding them of the important work of RENs," says Leasure.

Internet2, a nationwide high-speed network for organizations committed to research and education, took a similar approach to supporting its members. Stephanie Stenberg, Director of the Community Anchor Program (CAP) at Internet2, saw the importance of sustaining community during the move to the virtual realm that was necessitated by the pandemic. "We normally convene with RENs at a global summit (each year). The March Global CAP Summit didn't happen. We really had to rethink how we communicated with everyone and what we would do to approximate the in-person meeting and what makes it so special," says Stenberg.

As students were sent home, education became remote and virtual. This led to a shift in audience for CAP’s Primary Presidential Sources Project. “As the shutdown started happening, individual students were starting to tune into the programs. We really adapted how we were marketing those sessions and how we were reaching the students,” recalls Stenberg. “That led to a bigger partnership with the National Archives,” she adds. “Therese Perlowski (Program Manager at CAP) really spearheaded the project, making it something with special programming in the summer and professional development for teachers. It was even expanded into a fall session,” says Stenberg.

The Schools, Health, and Libraries Broadband Coalition (SHLB) considers itself a voice for the members it represents, says Executive Director John Windhausen. Based in Washington, DC, SHLB actively advocates for issues that are important to the Research and Education community such as broadband access. With education, work, and even healthcare dependent on reliable Internet access, more people became aware of the inadequacies and gaps in coverage that exist throughout the United States. “Broadband was more essential than ever when COVID hit. People were more left behind if they didn’t have it. Those working and schooling from home without broadband were severely disadvantaged,” says Windhausen. “It was a national broadband crisis like we’ve never seen before.”

In response, SHLB accelerated their efforts on Capitol Hill, lobbying for increased broadband bandwidth, infrastructure improvements related to networking, and funding to bring broadband into more homes. While some efforts succeeded and some stalled in Congress,

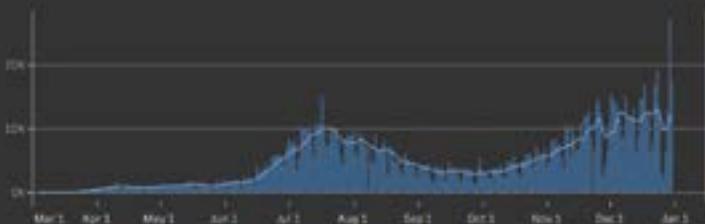
Windhausen saw RENS filling in the gaps. RENS were able to act quickly to respond to increased connectivity needs. “They (RENS) were “Johnny on the Spot” to provide immediate bandwidth increases and other IT support services to help deal with the crisis. Nobody talks about gold plating the network anymore (building more capacity than is needed). But we need it more than we have it today. I thank the RENS for having the foresight to anticipate this needed capacity before it became such a crisis,” notes Windhausen.

COVID Response as a United Front

It is apparent by the similarities in the approaches outlined above that the strength of the pandemic response by RENS and their partnering organizations came from the frequent alignment and intersection of their initiatives. The community, sharing common goals and working in tandem, were able to create their own disaster response plan. “I think our relationships strengthened in 2020,” says Leasure. “I think Quilt members found new relationships with other members, relationships that they may not have had before, and saw similar circumstances between organizations,” she adds. “RENS were giving each other advice on laptop lending, partnering with local governments and libraries to set up Wi-Fi hotspots and wire mobile hospital units. There was a big benefit in sharing stories,” says Stenberg.

The efforts and initiatives instigated as a response to the COVID-19 pandemic appear likely to continue to shape and direct RENS and their partner organizations well into the future.

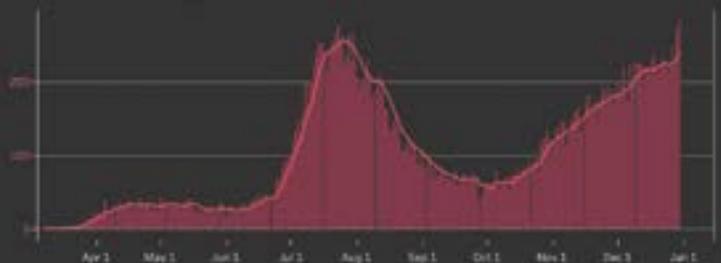
New Confirmed Cases in Texas



Confirmed COVID-19 cases in Texas March 1, 2020–December 31, 2020.

Image credit: Texas Department of State Health Services website, accessed 2/18/2021

New Fatalities in Texas



COVID-19 fatalities in Texas March 1, 2020–December 31, 2020.

Image credit: Texas Department of State Health Services website, accessed 2/18/2021



LEARN/TSLAC PARTNERSHIP BRINGS IMPROVED CONNECTIVITY TO RURAL LIBRARIES

By Mary Goldie

TSLAC Turns to LEARN to Address Digital Divide

According to Texas State Library and Archives Commission (TSLAC) Director and State Librarian Mark Smith, 60% of the population that does not have high-speed Internet at home turn to public libraries first for that access. With the COVID-19 pandemic increasing the demand for reliable Internet access outside of school and work, the need to improve the Internet capabilities of community anchor institutions, such as libraries, is more apparent than ever.

With \$2.6 million in CARES Act funding and a 2017 appropriation of \$1 million to increase broadband speeds at Texas libraries, TSLAC looked to use some of these funds to improve connectivity at rural libraries around the state. TSLAC's LEARN membership and Smith's role on LEARN's Board of Directors made the organization a logical trusted partner for the broadband initiative. This initiative began in 2020 and is scheduled to span over 12 months, with most of the project's objectives slated to be completed in 2021.

Impact of Project to Rural Libraries

There are 10 libraries throughout the state that will connect to the LEARN network in 2021 through the project. According to LEARN President and CEO Akbar Kara, some of these libraries will go from having broadband speeds similar to a cell phone to 100 times that with LEARN's offering.

"It is critical that libraries are recognized as key players in bringing these services and solutions to their communities," says Smith. "By bringing these high-speed fiber connections to these libraries, we are also building infrastructure in the community so that the library becomes a catalyst for community access to high-speed Internet," adds Smith.

"These locations are not in urban environments—getting the LEARN network extended requires cooperation with network providers (and) working through third parties," says Kara. TSLAC and LEARN executed an ambitious timeline, brainstorming additional ways they could help libraries maximize the community impact of their new connections.

Looking Ahead, Celebrating Successes

"Connectivity via LEARN represents a long-term, affordable, reliable connection to a very high-speed network," says Smith.

TSLAC's goal of achieving digital equity through libraries is one step closer to a reality through its partnership with LEARN. Even though there is much work ahead, LEARN, TSLAC, and their library partners have a lot to look forward to as the benefits of this project will continue to pay dividends for years to come.

Top: Muleshoe Area Public Library main desk in Muleshoe, Texas.

Image credit: Kelly Hays

CASA RADARS USE LEARN CONNECTIVITY TO SHORTEN WEATHER RESPONSE WINDOWS

By Zach Woodbridge

Collaborative Adaptive Sensing of the Atmosphere (CASA) at the University of Massachusetts Amherst Engineering Research Center, was originally granted by the National Science Foundation (NSF) in late 2003 and featured a network of Doppler radars that offered early detection of impactful weather. CASA radars were originally deployed in southwestern Oklahoma, where extreme weather such as tornadoes occur often. When the 10-year grant was completed, the CASA radar system was moved to the DFW area where it could be used in a heavily populated area to increase its impact and continue operations.

The CASA radar system has since become an integral tool for meteorologists and emergency managers across the DFW area, allowing for faster response times to extreme weather that affects millions of North Texans.

The data from these sensors requires large bandwidths, provided in part by connectivity through LEARN. "Without connectivity from LEARN, I don't think we'd have nearly the success we've had with the CASA radar system," says Douglas Rhue, Regional Networking and Program Manager for the National Weather Service's (NWS) Southern Region Headquarters (SRH).

Data generated from CASA radars is used nationally for research and modeling, including operationally by the Fort Worth/Dallas (FWD) National Weather Service forecast office and the National Oceanic and Atmospheric Administration (NOAA).

Rhue says, “There were issues getting data from all those sensors into a working environment and making it available. SRH has a partnership with LEARN and has been on the board for as long as I can remember. Since we are members of (and connected to) LEARN, we were able to get LEARN access for the CASA radars.”

How CASA Works

There are seven CASA radars deployed around the Dallas/Fort Worth (DFW) area, including two on the LEARN network at the University of Texas at Arlington (UTA) and at the University of North Texas (UNT), where it is ported across the friction-free LEARN backbone to academic compute clouds at the University of Houston (UH) and at Texas A&M University (TAMU) for on-demand processing of weather workflows. In addition, LEARN has enabled access to Internet2’s Advanced Layer 2 services, which allows CASA to dynamically provision computing resources and bandwidth prioritized to meet the user needs as weather changes.

After the CASA radars generate data, it is first transported into the LEARN network at SRH for ingestion into the Weather Service’s Advanced Weather Interactive Processing System (AWIPS) and transported onward for further processing at data centers across the U.S. Products ultimately flow back to NOAA and out to the North Central Texas Council of Governments (NCTCOG) subscribers.

NCTCOG currently provides the majority of funding for the CASA DFW radar network. “When the NSF project was completed in 2013, the cities and towns in DFW stepped up and have continued to fund the project,” says Eric Lyons, Lead Systems Engineer and Lead of Radar Operations at UMass.

CASA Data Uses

The major impact of CASA radars in the DFW area are the weather alerts. The end users, primarily NCTCOG subscribers, receive images showing wind fields, precipitation, and other network products that help cities identify and respond to flash floods, hail, high winds, tornadoes, and more.

Another key use for the data is to trigger water measurements for environmental sampling. CASA has augmented the network with non-radar sensors such as disdrometers that use lasers to measure the exact shape of droplets and hail sensors to determine if the precipitation is rain, sleet, snow, hail, etc. “Precipitation data is one of, if not the most important factors for NCTCOG subscribers. It is used to measure stormwater and manage traffic for key city infrastructures. Rainfall estimates are very important,” says Lyons.

A phone app allows for community members in the DFW area to receive warnings on their phone of potential bad weather in their area. This can help the DFW population avoid traffic jams, flooded areas, and even tornadoes. “A member of a community that is subscribed can customize current locations and get targeted app updates and warnings. Rain warnings, thunderstorms, hail, and tornado warnings. They can even choose when to get alerted, such as rainfall over a certain amount or a tornado within a certain radius of their home or office,” says Lyons.

The data from this app is used by social scientist researchers in a variety of ways. “They do surveys, test verbiage and see people’s reactions,” says Lyons. “If they received a flood warning, did they avoid the flooded area? Did it affect traffic?”

Another major ongoing effort has been to provide weather information to low-flying aircraft such as helicopters and drones. More information allows for more safety for low-flying aircraft.

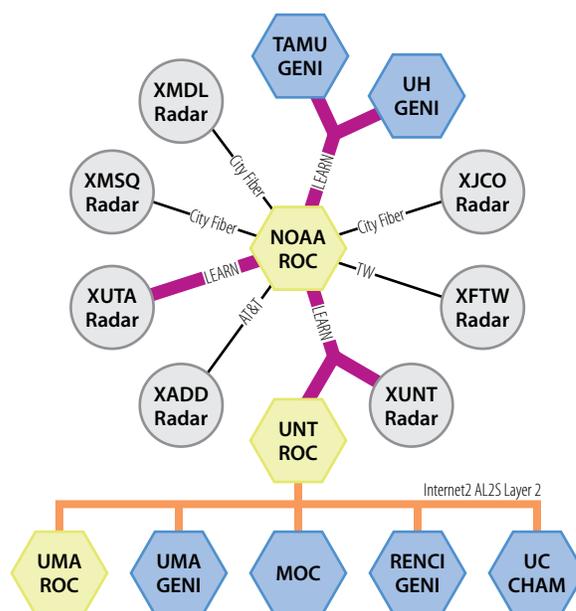
LEARN’s Role in CASA Connectivity

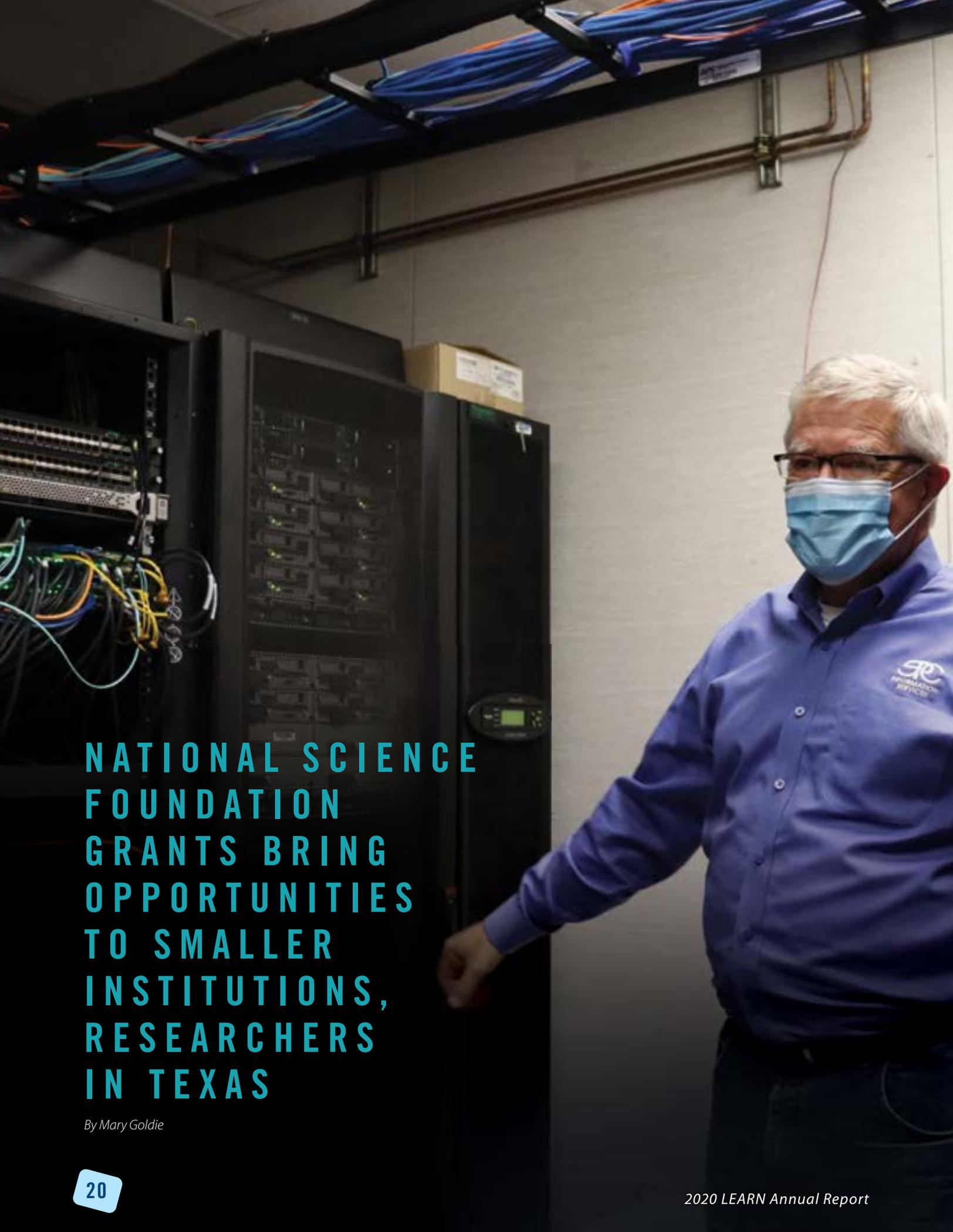
Lyons says, “Having LEARN at UNT and UTA is tremendously helpful. LEARN gives a number of options for data processing compared to most sites, where the last mile connection is usually a bottleneck. There can be huge costs for high-speed connections from other radars, where we have to pay for dedicated bandwidth to ensure a certain speed during extreme weather. With LEARN we can do so much more with the high-speed connectivity.”

In summer of 2020, there was a 10X increase in bandwidth to SRH. While each radar sensor has a dedicated connection, they converge on the LEARN network. Lyons says the total CASA radar data is around 75 mbps.

When CASA was deployed in Oklahoma, Lyons says some sensors used long-range wireless networks which became problematic during severe weather, slowing down the data transfer significantly.

In the future, there are plans for more radars in the DFW area. CASA currently manages seven radars, with plans drafted for up to 20 radars. “The current system covers portions of 17 counties from the Red River to Lake Whitney, and from Parker to Rockwall counties. With 20 radars we could expand across much of North Texas,” says Lyons.





**NATIONAL SCIENCE
FOUNDATION
GRANTS BRING
OPPORTUNITIES
TO SMALLER
INSTITUTIONS,
RESEARCHERS
IN TEXAS**

By Mary Goldie

Grant Participation Gives New Audiences an Introduction to LEARN

For LEARN CFO Kerry Mobley, being able to provide connectivity and technical training to smaller schools is a goal that comes from a personal place. “Since I grew up in a small rural community in west Texas, I always get excited about helping communities similar to the one I grew up in,” Mobley says. “I attended a smaller community college (Western Texas College in Snyder, Texas) and then a small public university (Tarleton State University in Stephenville, Texas) so any opportunity we have to increase broadband and resources to these types of members hits close to home for me,” she adds.

Looking for ways to give smaller institutions access to the same resources and opportunities, LEARN found research-focused universities to partner with through three National Science Foundation (NSF) grants to provide funding and technical training that will benefit colleges and universities in the state.

TRECIS: A Regional Cyber Training Hub

Advanced computing can be an invaluable resource to researchers if they know how to fully utilize its capabilities. NSF Award #2019135, CC* Team: Texas Education and Cybertraining Center (TERCC), aims to act as a regional hub to train, consult, and support postdoctoral researchers in cyberinfrastructure, allowing them to increase their computing knowledge in order to utilize technology and advance their research in new ways. The LEARN network will provide fast and reliable Internet connectivity capable of handling the large datasets produced and exchanged as part of the project.

Reconfigured to the catchy Star Trek-inspired acronym TRECIS (pronounced treh-keez, Texas Research and Education Cyberinfrastructure Services), Dr. Christopher Simmons, Principal Investigator of TRECIS, believes the grant program has the power to stop the brain drain out of academia. “When grad students decide they don’t want to be a faculty member, they leave academia and go into tech. We want to keep them in academia,” says Simmons. Training postdoctoral students in cyberinfrastructure and hiring them to teach other students will help raise awareness of IT resources available to researchers and bridge the gap between IT staff and the campus community utilizing the technology. As an outreach component of the grant, TRECIS will also make project-trained personnel available to underrepresented

Left: South Plains College Associate Dean of Information Services Dr. Van Howell gives LEARN staff a tour of the campus data center.

Image credit: Mary Goldie

groups including Minority Serving Institutions (MSIs) and Historically Black Colleges and Universities (HBCUs).

Led by the University of Texas at Dallas, the TRECIS Principal Investigator (PI) is Dr. Christopher Simmons, Director of Cyberinfrastructure and Research Services in the Office of Information Technology at the University of Texas at Dallas. Co-PIs for the grant are Akbar Kara, President and CEO of LEARN, Jeff Neyland, Chief Information Officer at the University of Texas at Arlington, Frank Feagans, Chief Information Officer at the University of Texas at Dallas, and Kendra Ketchum, Vice President for Information Management and Technology at the University of Texas at San Antonio.

BRICCs: Building Research Innovation at Community Colleges

Small higher education institutions contribute greatly to the computing workforce of the country. In order to prepare students for the level of technical expertise expected in the field today, these schools must have access to the latest computing resources. NSF Award #2019136, CC* CIRA: Building Research Innovation at Community Colleges (BRICCs), aims to improve connectivity at participating colleges, provide training, and create an outreach program to expand the scope of the award.

One of BRICCs main objectives is to develop a cohesive Cyberinfrastructure (CI) framework that will improve Research and Education (R&E) CI capacity at two-year institutions of higher education (community colleges) nationwide. A few outputs of this grant are: 1) A package that can be offered to community colleges that explains campus computing opportunities in large scale computing; 2) Helping the upper administration at community colleges understand the benefits of improved campus networking and computing infrastructure; and 3) Virtual and in-person workshops offered to the surrounding community at-large. In years when the NSF CC* program, or similar NSF programs, accepts proposals, the BRICCs group will offer the community college campuses details about the proposal process.

Led by Texas A&M University, the BRICCs Principal Investigator (PI) is Dhruva Chakravorty, Associate Director for User Services and Research at High Performance Research Computing at Texas A&M University. Co-PIs for the grant are Sarah Janes, Vice President of Continuing and Professional Development at San Jacinto College, Timothy Cockerill, Director of User Services at the Texas Advanced Computing Center (TACC) at the University of Texas at Austin, and Honggao Liu, Director of High-Performance Computing at Texas A&M University.



A student at the South Texas College Virtual Reality Lab assists LEARN Manager of Administration Membership and Outreach Mary Goldie with a headset during an on-site visit.

Image credits: Amy Schultz

CC* Regional: Creating New Partnerships and Opportunities for Smaller Schools

Amy Schultz, LEARN Director of Administration Membership and Outreach, sees LEARN's first CC* Regional grant award as a way to engage colleges that are interested in joining the LEARN network but otherwise might not have the opportunity. NSF Award #1925553, CC* Regional: Accelerating Research and Education at Small Colleges in Texas via an Advanced Networking Ecosystem Using a Virtual LEARN Science DMZ, was the first award of its kind given to a 501(c)(3) Research and Education organization in the country in this category. By connecting participating schools to the LEARN network, providing technical training to staff, and offering opportunities for faculty and students to engage with experts in STEM fields, the grant goal is to create a collaborative community of smaller schools in Texas.

"Introducing emerging campuses to the LEARN community is an exciting aspect of this and other LEARN grants," says

Akbar Kara, President and CEO of LEARN. The award also connects participating schools to regional resources such as the Texas Advanced Computing Center (TACC) at the University of Texas at Austin and national ones such as the Engagement and Performance Operations Center (EPOC). Looking to expand the reach of the grant, in 2020, LEARN applied for and were granted a supplemental award to add St. Mary's University to the list of participating schools.

Led by LEARN, the Principal Investigator (PI) is Akbar Kara, President and CEO of LEARN. Co-PIs for the grant are Ryan Fitzgerald, Dean of Dual Enrollment & Distance Education/Director of Institutional Research at South Plains College, Curtis White, Chief Information Officer at St. Mary's University, and Amy Schultz, Director of Administration Membership and Outreach at LEARN. The participating schools are McLennan College, Midland College, South Plains College, South Texas College, St. Mary's University, and Trinity University.



Left: Amy Schultz presenting at South Texas College. Right: South Texas College Data Center.

Image credit: Mary Goldie

SPUR PROTECTION PROJECT ADDS REDUNDANCY TO LEARN NETWORK, CREATES NEW COALITIONS

By Mary Goldie

Spur Protection Project as Connectivity Solution

When the idea for spur protection in Beaumont emerged several years ago, it was intended to provide backup protection for one LEARN member. A variety of logistical setbacks extended the project timeline, but work continued throughout to ensure there were alternate connectivity paths in the rural area. While such issues normally have the power to derail the simplest of plans, the delays in this case expanded the scope of the project, providing opportunities for more entities to benefit, leading to new partnerships. In 2020, the spur protection project neared its much-anticipated conclusion.

As one of four schools on the southeast edge of Texas, Lamar University only had one provider that serviced LEARN in the area, according to Patrick Stewart, Senior Director of IT Infrastructure and Operations at Lamar University. “This put the university at a serious disadvantage and risk of becoming isolated without a secondary path out of Beaumont,” says Stewart.

Besides the limitations created by having only one provider in the area, the threat of natural disasters further necessitated the need for redundancy in the region. Proximity to the Gulf of Mexico means a higher probability of hurricane impact, which can disrupt connectivity for extended periods of time. “We needed a way to protect those (spurs) should there be a fiber cut between Houston and Beaumont,” says Byron Hicks, Chief Network and Systems Architect at LEARN.

Regional Partnership Adds Value, Extends Reach of Project

The search for a solution started with examining existing fiber in the region and attempting to map out an alternate path. However, that idea was quickly nixed. “On our end, there weren’t any good fiber paths that would work—all available ones would have doubled or tripled our costs,” says Hicks. Tim Woodbridge, LEARN Project Manager, recalls

researching fiber paths into Houston, Tyler, and as far afield as Dallas for an alternate route. The most distant path—up to Dallas—surprisingly turned out to be the lowest cost option, but it still wasn’t a viable long-term solution. In the meantime, Lamar University managed its own redundancy by executing a secondary circuit as a stopgap measure.

Lonnie Leger, Executive Director of Louisiana Optical Network Infrastructure (LONI), first heard about the idea for the project from retired LEARN President & CEO Mike Philips. Eventually, LONI would be asked to partner with LEARN to provide the fiber protection solution.

In order to create the new traffic route, LONI had to first get Louisiana fiber up to Beaumont. Finding appropriate contractors and vendors for the project contributed to delays. “We had to do construction, get AT&T to do a portion. I had to build three plus miles in Louisiana through Lake Charles,” says Leger.

The additional fiber being brought into Texas from Louisiana allows network traffic out of Beaumont to move north to Dallas or alternately to LONI’s Internet2 connection in Baton Rouge, Louisiana. Eventually, the plan is to shift the fiber protection routing to go through Shreveport and Tyler, creating redundancy for the Beaumont and Tyler spurs, according to Hicks.

“LEARN has been able to provide a resilient network between their central offices to make sure we stay connected. For decades, if a provider lost connectivity to their central office, we were down. Now we have multiple paths to keep our office and districts connected,” said Kyle Fisher, Director at Region 5 Education Service Center located in Beaumont.

Completion of Project Milestones Show Signs of Success

By pulling in LONI to assist with the new path, LEARN was able to solve its problem through collaboration, a creative way to address member connectivity challenges, says Todd Horkman, LEARN Chief Technology Officer. As a project benefit, LONI is able to connect to the Midsouth U.S. Internet Exchange (MUS-IX) with this new route. MUS-IX is a coalition of four regional Research and Education Networks (RENs) that includes LEARN in Texas, OneNet in Oklahoma, ARE-ON in Arkansas, and LONI in Louisiana.

Most recently, LEARN and LONI were able to celebrate a successful failover test of the circuit connecting Beaumont and Houston, putting the project end goal in clear sight. For those involved since the beginning, the milestone was a special moment. “I know that credit has to be given to the LEARN team. The past three or four presidents of LEARN... have worked tirelessly to get this deal completed,” says Stewart.

15 YEARS OF LEARN: LOOKING BACK ON A LANDMARK ACHIEVEMENT FOR TEXAS NONPROFITS

By Mary Goldie



Top: (People left to right) Mike Philips (Retired CEO, LEARN) and Kay Rhodes (Texas Tech University System); bottom: Kurt Freiburger (Retired, LEARN) and Michael O'Connor (Texas State University).

Image credit: Kerry Mobley and Amy Schultz

Forming a Statewide Network

In 2003, the University of Texas at Austin CIO and later the first chairman of the LEARN Board, Dan Updegrove, convened a meeting of Texas research institution CIOs at the Hilton Hotel in Austin-Bergstrom International Airport. After a series of meetings, in the fall of 2003, members of the Texas GigaPoP Board, based in Houston and consisting of CIOs and network engineers from institutions such as Texas A&M University, University of Houston, Rice University, Texas Tech University, and others, voted to dissolve the Texas GigaPOP Board and use its 501(c)(3) non-profit legal structure to establish LEARN. In January 2004, 30 Directors of the new organization were installed at its first Board meeting on the Southern Methodist University campus in Dallas with the new organization being officially named “LEARN: Lonestar Education And

Research Network”. Subsequently, the CIO of Baylor College of Medicine chaired the search committee to hire the first CEO of LEARN. Thanks to these visionary IT leaders, the early meeting of minds set off a new era of collaboration among Texas research and education entities that continues to this day.

Early LEARN Board Members recall the formation of LEARN fondly. With the passage of time, it may not be as obvious today the impact LEARN had in reshaping the higher education landscape in Texas. Maurice Leatherbury, a former LEARN Board Member for the University of North Texas System and University of Texas at Arlington, says the way colleges and universities interacted at that time was quite different than it is today. “LEARN brought all major universities together for the first time...before that, there was no organization or any collaboration between the major universities in Texas at all. We were competitive—



10th LEARN Anniversary

Board Members celebrated LEARN's 10th Anniversary at Southern Methodist University (SMU) in Dallas, TX. The meeting was held at the George W. Bush Presidential Center, which is a museum housing the archives of the George W. Bush presidency and houses a replica Oval Office. In January 2004, LEARN held its first Board Meeting on the SMU campus so celebrating the first decade of LEARN at SMU was very special to the community.

Top left: (People left to right) Carol Willis (Retired, Texas Education Telecommunications Network), Lea Castillo (Texas Education Telecommunications Network), Steve Orr, and Pattie Orr (Retired, Baylor University); top right: Sam Segran (Texas Tech University) and Jamie Segran; bottom left: Dr. Jeff Graham (University of Texas at Rio Grande Valley) and Ken Pierce (Texas State University).

Image credit: Kerry Mobley and Amy Schultz

every university wanted to be the best—there was no sense of common purpose. LEARN (was that) common purpose,” says Leatherbury.

LEARN was established to provide a high-speed fiber optic network for Texas research and education institutions, but early on it became apparent that the impact of LEARN's formation would extend beyond the network. Besides uniting major universities in Texas for what many believe was the first time, the formation of LEARN also gave institutions of higher education outside of major cities a seat at the table. Steve Riter, former LEARN Board Member and retired Vice President for Information Resources and Planning at the University of Texas at El Paso, says involvement with LEARN opened a lot of doors for his university. “As a geographical outlier in Texas, we were able to acquire access to the telecommunications infrastructure we needed to grow and maintain our research and teaching programs at an affordable price.”

Bob Hartland, LEARN Board Member and Associate Vice President for IT Infrastructure at Baylor University, echoes Riter's sentiments regarding how valuable reliable network connectivity is to his institution. “We often hear about the difficulty of last mile connection. Our last mile was 90 miles,” he says. “Fortunately for Baylor, the eastern and western legs of the original LEARN (network) triangle went through Waco.” “For us, based on our locations, primarily being in the west half of Texas, LEARN is critical to serving our faculty, students, and staff. . .because we are not in metroplex areas,” adds Kay Rhodes, Associate Vice Chancellor and CIO at Texas Tech University System and LEARN Board Member.

The Early Years: Building a Community

During these early years, LEARN membership was being valued beyond its ability to connect far-flung institutions.



Top left: (People left to right) Sudarshan Gururaj, Akbar Kara, Kerry Mobley, Tim Woodbridge, Cheryl McDonald, Byron Hicks, Pankaj Shah (Formerly of LEARN), David Nichols, Amy Schultz, Kurt Freiberger (Retired, LEARN), Connie Luck (Formerly of LEARN), Ivan Amigo, and Sal Ghani at the December 2019 LEARN Board Meeting in Addison, Texas; top right: Michael O'Connor (Texas State University), Pankaj Shah (Formerly of LEARN), and Bob Hartland (Baylor University) at the December 2019 LEARN Board Meeting in Addison, Texas; bottom left: Don Lyons (Formerly of MD Anderson Cancer Center) and Akbar Kara (LEARN) at the April 2005 Board Meeting at Southern Methodist University in Dallas, Texas; bottom right: Eve Riter and Stephen Riter (Retired, University of Texas at El Paso) at the December 2019 LEARN Boarding Meeting in Addison, Texas.

Image credits: Amy Schultz

Now that higher education entities were finding common ground through their mutual LEARN memberships, relationships between members began to grow. Pattie Orr, Dean Emerita of University Libraries at Baylor University and former LEARN Board Member, saw that as a private institution, Baylor's LEARN membership allowed them to see what was going on at larger state universities and gave them the opportunity to run their own projects and ideas similar to these institutions. "They (state universities) were taking certain steps earlier and gave us good technical and vendor advice, what to ask for, what to get. . .that was so helpful," says Orr. During the construction of McLane Stadium, Baylor was able to reciprocate the goodwill. "Baylor was one of the first stadiums in Texas with Wi-Fi," says Bob Hartland. "We hosted a LEARN meeting during the construction of the stadium and gave a tour soon after its completion," adds Hartland. "We also benefited from interactions and information sharing with institutions across the state which were always there when we needed guidance or advice."

LEARN meetings at partnering campuses became one of the more significant ways relationships were cultivated between LEARN member institutions. "Some of the memorable things are the ability to meet at member campuses and see their campuses, be hosted by them. That has been a treat," says Kay Rhodes.

Rhodes and Sam Segran, Chief Information Officer and Vice President for Information Technology at Texas Tech University and LEARN Board Member, both cite LEARN's 10th anniversary celebration at the George W. Bush Presidential Library on SMU's campus as a banner event. Segran, the only remaining Board member from the first meeting that established LEARN, recalls a particularly funny story from that celebration: "One of the (LEARN) members left in a hurry, he didn't bring a tie or shirt for the formal event. When the evening event came up and pictures were happening, he ran to the nearest mall and grabbed a shirt in a hurry and didn't even check (the price on) it. . .(he realized later) he had paid a few hundred dollars for a shirt and tie!"



Board Meetings Through the Years

LEARN Board Meetings have long been a place for collaboration, innovation, and most importantly, community. As a member-governed organization, these meetings also serve as a time to conduct official LEARN business. The Board of Directors meets quarterly, generally with two virtual meetings and two in-person meetings held every year, with the exception of 2020. LEARN is proud to be a convener of the Texas community, bringing together higher education, K-12, and other community anchor institutions (such as libraries and cities) for more than 15 years.

Left: (People left to right) Jim Williams (Retired Executive Director, LEARN) and Dan Updegrave (Formerly of University of Texas at Austin) at the April 2005 Board Meeting at Southern Methodist University in Dallas, Texas; right: Terry Tatum (Texas A&M University System), M. Dee Childs (Texas A&M University), Kay Rhodes (Texas Tech University System), Chris Sedore (Formerly of University of Texas at Austin), Pankaj Shah (Formerly of LEARN), and Dr. Mark Stone (Texas A&M University System) at the June 2019 LEARN Board Meeting at Texas A&M University in College Station, Texas.

Image credits: Amy Schultz

Major LEARN Projects Support Members

Although LEARN focused on member relations and collaborations from the beginning, serious work was going on behind the scenes throughout to amplify LEARN's network presence in Texas. Tom Edmonson, LEARN Operations Manager, remembers several occasions when LEARN had to quickly pivot to ensure uninterrupted connectivity for its members. In one instance, LEARN was able to rebuild five or six shared Points of Presence (or POPs) within a firm time limit of 30 days.

Another milestone project came when LEARN updated its entire Optical (Nortel CPL) backbone—all 3,200 miles of it. Akbar Kara, who was LEARN's Chief Technology Officer at the time, considers it the most difficult project for LEARN to date. "It was difficult because it was equivalent to changing a plane's engine while it's in the air. We only had one set of fibers available to us—it's not like we could build a network and switch over. We had to do it

in a controlled fashion in sections during a set amount of time to reduce disruptions," says Kara. The replacement of the CPL backbone was completed in 2019, just in time for LEARN's 15-year anniversary.

Segran recalls the development and testing of Unmetered Network Services, or UNS, as another highlight in LEARN's mission to better support its members. By offering members a subscription to a whole range of LEARN services as a bundled package, the organization created an appealing new service model that has benefited LEARN and its members.

LEARN Looks Ahead

During LEARN's 15th anniversary year in 2020, members have taken the time to reflect on LEARN's accomplishments and its impact on networking and collaboration within the state of Texas. Where will LEARN



SuperComputing (SC)

LEARN has a long history and partnership with SuperComputing, which is an international conference for High Performance Computing, Networking, Storage, and Analysis. Since 2008 LEARN Engineers have worked with their peers to provide the fastest and most powerful volunteer-built network in the world, SCinet, for the SC Conference. In 2018, LEARN Staff received the inaugural Spirit of Innovation Award for embracing “the spirit of collaboration and cooperation that showcases the best there is to offer in demonstrating, implementing, and operating leading-edge solutions to challenging problems”.

Top left: (People left to right) Kerry Mobley (LEARN) at SuperComputing15 in Austin, Texas; right: Bob Hartland (Baylor University) and Byron Hicks (LEARN) at SuperComputing18 in Dallas, Texas; bottom left: back: Sal Ghani, Byron Hicks, Kurt Freiberger, Tim Woodbridge, David Nichols, Sudarshan Gururaj, Ivan Amigo; middle: Kerry Mobley, Nancy Stewart (Formerly of LEARN), Connie Luck (Formerly of LEARN), Cheryl McDonald, Amy Schultz; front: Pankaj Shah (Formerly of LEARN) and Akbar Kara at SuperComputing18 in Dallas, Texas.

Image credit: Kerry Mobley and Amy Schultz

be 15 years from now? There are many thoughts on the subject from those who have partnered and worked for and with LEARN.

“LEARN is really poised to be one of the top networks in the country. We need to build upon the success of LEARN, work together as a Texas team, collaborate, and create more trust,” says Pankaj Shah, former LEARN President & CEO and current Executive Director at OARnet in Ohio.

“The sky’s the limit. LEARN has to continually be open to their mission, to meeting their mission, to realizing the vision, and to staying within their bounds but continuing to meet the needs of who they service,” says Kay Rhodes.

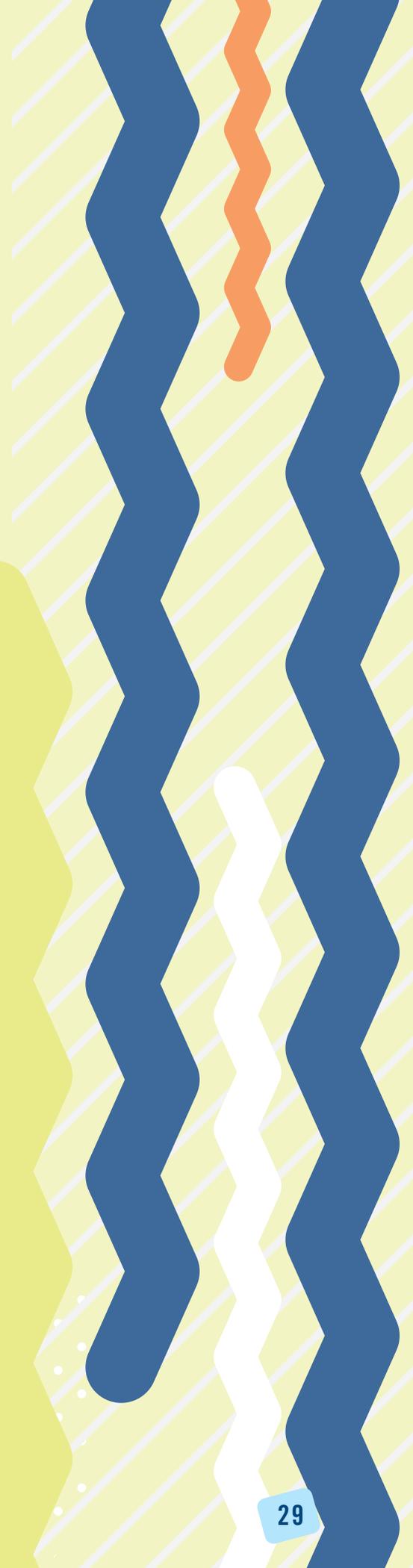
“15 years is a lifetime in the technology space. One thing is for sure, the LEARN we saw 15 years ago is not the same LEARN we have today and will not be the LEARN we have in 15 years. Not knowing what disruptive technologies will be in place, I truly believe LEARN can remain viable if we remain

collaborative (and) willing to adapt,” says Bob Hartland.

“I would imagine that if not now, then soon LEARN will be recognized as a world leader in networking and be able to provide a wide range of services to its members. I think it is also a great example of how a diverse set of institutions that compete vigorously can bury their differences and come together to support a greater good,” says Steve Riter.

“Technology will change a lot in 15 years. I hope that it remains a glue that joins the state’s universities together. The network is just the mechanism—the real winning sweet spot is for it to become a common communication point in place for different groups and universities to work together to get things done,” says Tom Edmonson.

APPENDICES



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Texas A&M University

EDWARD (ED) EVANS

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Texas A&M University - Corpus Christi

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Vice President, Information Technology & CIO
Texas A&M University System

VACANT

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Texas Christian University

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Manager of Information Technology
Texas Education Telecommunications Network (TETN)

MARK SMITH

Director & State Librarian
Texas State Library & Archives Commission (TSLAC)

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Texas State University

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University of North Texas System

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University of Texas System

AFFILIATED ORGANIZATIONS

Colleges

Austin Community College
 Brazosport College
 Del Mar College
 Galveston College
 Grayson College
 Hill College
 Houston Community College System
 Kilgore College
 Lamar Institute of Technology
 Lamar State College-Orange
 Lamar State College-Port Arthur
 McLennan Community College
 Midland College
 Northeast Texas Community College
 Panola College
 Paris Junior College
 South Texas College
 Tarrant County College District
 Texarkana College
 Trinity Valley Community College

Tyler Junior College
 Victoria College

ESCs

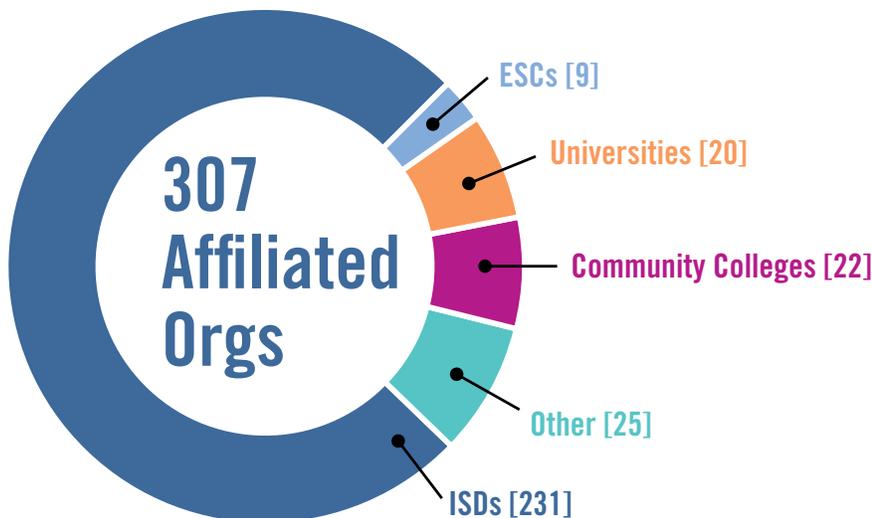
Region 3 Education Service Center
 Region 5 Education Service Center
 Region 6 Education Service Center
 Region 7 Education Service Center
 Region 9 Education Service Center
 Region 13 Education Service Center
 Region 14 Education Service Center
 Region 15 Education Service Center
 Region 16 Education Service Center

ISDs

Adrian ISD
 Albany ISD
 Alief ISD
 Angleton ISD
 Anson ISD
 Apple Springs ISD
 Ascension Academy
 Aspermont ISD
 Austin ISD
 Austwell-Tivoli ISD
 Baird ISD
 Bangs ISD
 Bartlett ISD
 Bellevue ISD
 Big Sandy ISD
 Blackwell CISD
 Blanco ISD
 Blanket ISD
 Bob Hope Charter School 1
 Boling ISD
 Booker ISD
 Borger ISD
 Bovina ISD
 Boys Ranch ISD
 Brady ISD
 Brazos ISD
 Breckenridge ISD
 Bronte ISD
 Brookeland ISD
 Brookesmith ISD
 Brownwood ISD

Buna ISD
 Burkburnett ISD
 Burkeville ISD
 Burton ISD
 Canadian ISD
 Canyon ISD
 Centerville ISD (Trinity County)
 Channing ISD
 Chester ISD
 Childress ISD
 Chillicothe ISD
 Christoval ISD
 Cisco ISD
 Clarendon ISD
 Claude ISD
 Clyde CISD
 Coldspring-Oakhurst CISD
 Coleman ISD
 Colmesneil ISD
 Colorado ISD
 Comanche ISD
 Comfort ISD
 Comstock ISD
 Crockett County CSD
 Cross Plains ISD
 Crowell ISD

Cypress-Fairbanks ISD
 Dallas ISD
 Darrouzett ISD
 DeLeon ISD
 Denton ISD
 Deweyville ISD
 Dime Box ISD
 Dimmitt ISD
 Doss CSD
 Early ISD
 Eastland ISD
 Eden CISD
 Ehrhart School
 Electra ISD
 Eula ISD
 Evadale ISD
 Flatonia ISD
 Follett ISD
 Fort Elliott CISD
 Giddings ISD
 Gold Burg ISD
 Gonzales ISD
 Goodrich ISD
 Gorman ISD
 Grandview-Hopkins ISD
 Granger ISD
 Grape Creek ISD
 Grapeland ISD
 Groom ISD
 Gruver ISD
 Gustine ISD
 Hamlin Collegiate ISD
 Happy ISD
 Hardin-Jefferson ISD
 Harper ISD
 Harrold ISD
 Hart ISD
 Hartley ISD
 Haskell CISD
 Hawley ISD
 Hedley ISD
 Henrietta ISD
 Hermligh ISD



AFFILIATED ORGANIZATIONS (CONTINUED)

Highland ISD	New Braunfels ISD	Shepherd ISD
Highland Park ISD	Newton ISD	Shiner ISD
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Ira ISD	Normangee ISD	Silverton ISD
Irion County ISD	Northside ISD	Snyder ISD
Jacksboro ISD	Nueces Canyon CISD	Sonora ISD
Jarrell ISD	Nursery ISD	Spearman ISD
Jim Ned CISD	Olfen ISD	Spring Creek ISD
Johnson City ISD	Onalaska ISD	Spurger ISD
Kelton ISD	Orangefield ISD	Stamford ISD
Kirbyville CISD	Paint Creek ISD	Sterling City ISD
Knox City-O'Brien CISD	Paint Rock ISD	Stratford ISD
Kountze ISD	Pampa ISD	Sunray ISD
Kress ISD	Panhandle ISD	SUPERnet
La Grange ISD	Panther Creek CISD	Sweet Home ISD
Lake Travis ISD	Plemons-Stinnett-Phillips CISD	Sweetwater ISD
Latexo ISD	Port Arthur ISD	Texas Leadership Charter Academy
Lefors ISD	Prairie Lea ISD	Texas School for the Blind
Leggett ISD	Prairie Valley ISD	Texhoma ISD
Leon ISD	Pringle-Morse CISD	Texline ISD
Lexington ISD	Quannah ISD	The Raven School (Gulf Coast Trade Center)
Little Cypress-Mauriceville CISD	Ranger ISD	Thorndale ISD
Lockhart ISD	Richland Springs ISD	Thrall ISD
Loraine ISD	Rising Star ISD	Trent ISD
Lovelady ISD	River Road ISD	Tulia ISD
Lueders-Avoca ISD	Robert Lee ISD	Vega ISD
Luling ISD	Roby CISD	Veribest ISD
Madisonville CISD	Rochelle ISD	Victoria ISD
Mason ISD	Rockdale ISD	Vidor ISD
May ISD	Rocksprings ISD	Vysehrad ISD
McDade ISD	Roscoe Collegiate ISD	Waelder ISD
McLean ISD	Rotan ISD	Walcott ISD
Memphis ISD	Round Rock ISD	Wall ISD
Menard ISD	Round Top-Carmine ISD	Warren ISD
Merkel ISD	Rule ISD	Water Valley ISD
Meyersville ISD	Runge ISD	Wellington ISD
Miami ISD	San Saba ISD	West Orange-Cove CISD
Midway ISD	Sanford-Fritch ISD	Westbrook ISD
Miles ISD	Santa Anna ISD	Westhoff ISD
Moran ISD	Schleicher ISD	Wheeler ISD
Munday CISD	Schulenburg ISD	White Deer ISD
Navarro ISD	Shamrock ISD	

Wildorado ISD
Wimberley ISD
Woodson ISD
Woodville ISD
Wylie ISD
Zephyr ISD

Universities

St. Mary's University
Sul Ross State University
Sul Ross State University Rio Grande College
Tarleton State University
Texas A&M Galveston
Texas A&M International University
Texas A&M Kingsville
Texas A&M University Central Texas
Texas A&M University Commerce
Texas A&M University San Antonio
Texas A&M University Texarkana
University of Houston Clear Lake
University of Houston Downtown
University of Houston Victoria
University of Mary Hardin-Baylor
University of North Texas at Dallas
University of North Texas Health Science Center
University of Texas at Tyler
University of Texas Permian Basin
West Texas A&M University

Other

Brazos Valley Council of Governments
Citizens Medical Center
City of Austin
City of San Angelo
Department of Information Resources
Duncanville Public Library
Guadalupe Valley Hospital
Houston Methodist Hospital
Houston Museum of Natural Science
Lower Colorado River Authority
Metropolitan Transit Authority of Harris County
Mission Hospital
Orange County
Parkland Memorial Hospital
Project Unity
Texas Agrilife Extension Service
Texas Children's Hospital
Texas Engineering Experiment Station
Texas Engineering Extension Service
Texas Forest Service
Texas Transportation Institute
Texas Veterinary Diagnostic Lab
Travis County
University Medical Center
Wharton County Library

