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South Plains College Requirements Analysis Report

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Disclaimer

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[1] https://escholarship.org/uc/item/9k29338w

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1 Executive Summary

Deep Dive Review Purpose and Process

EPOC uses the Deep Dive process to discuss and analyze current and planned science, research, or education activities and the anticipated data output of a particular use case, site, or project to help inform the strategic planning of a campus or regional networking environment. This includes understanding future needs related to network operations, network capacity upgrades, and other technological service investments. A Deep Dive comprehensively surveys major research stakeholders' plans and processes in order to investigate data management requirements over the next 5–10 years. Questions crafted to explore this space include the following:

- How, and where, will new data be analyzed and used?
- How will the process of doing science change over the next 5–10 years?
- How will changes to the underlying hardware and software technologies influence scientific discovery?

Deep Dives help ensure that key stakeholders have a common understanding of the issues and the actions that a campus or regional network may need to undertake to offer solutions. The EPOC team leads the effort and relies on collaboration with the hosting site or network, and other affiliated entities that participate in the process. EPOC organizes, convenes, executes, and shares the outcomes of the review with all stakeholders.

This Review

Between October 2021 and January 2022, staff members from the Engagement and Performance Operations Center (EPOC) met with researchers and staff from LEARN and South Plains College (SPC) for the purpose of a Deep Dive into scientific and research drivers. The goal of this activity was to help characterize the requirements for a number of campus use cases, and to enable cyberinfrastructure support staff to better understand the needs of the researchers within the community.

This review includes case studies from the following campus stakeholder groups:

- SPC Center for Clinical Excellence (CCE)
- SPC Department of Science
- SPC Information Services

Material for this event included the written documentation from each of the profiled research areas, documentation about the current state of technology support, and a write-up of the discussion that took place via e-mail and video conferencing.

The case studies highlighted the ongoing challenges and opportunities that SPC has in supporting a cross-section of established and emerging research use cases. Each case study mentioned unique challenges which were summarized into common needs.

The review produced several important findings and recommendations from the case studies and subsequent virtual conversations:

- The SPC CCE operates an immersive simulation environment that gives practical experience on medical training topics. These simulations collect data, typically TB on a weekly basis, from a number of sources (e.g., sensors, audio, and video) that must be stored and retained over time for each student

- SPC has several computer lab environments that students can use for educational purposes. These are critical resources for students that may not have access to technology outside of the college.

- SPC relies heavily on stable Wi-Fi networking to accomplish educational activities.

- The SPC Department of Science relies on a curriculum that encourages students to use a number of software packages to demonstrate aspects of the material: e.g., astronomical charts, trajectory calculations, and molecular simulations. There is a desire to explore ways in which the software and hardware resources can be made available to students when they are not on campus.

- The SPC Division of Information Services supports 4 campus environments via networking:
    - Levelland Campus (LL)
    - Reese Center (Reese)
    - Lubbock Center (Lub)
    - Plainview Center (PLV)

- The SPC Division of Information Services has 10Gbps connectivity between the campuses which travels along diverse paths. This connectivity provides access to LEARN as well as commercial internet peers and could be upgraded in future years to support emerging cloud resources.

2 Deep Dive Findings & Recommendations

The deep dive process helps to identify important facts and opportunities from the profiled use cases. The following outlines a set of findings from the SPC Deep Dive that summarize important information gathered during the discussions surrounding case studies, and possible ways that could improve the CI support posture for the campus:

- The SPC CCE operates an immersive simulation environment for students that gives practical experience on medical training topics. These simulations allow for concurrent experiences in a variety of real-world scenarios.

- The SPC CCE simulation environment collects data, typically TB on a weekly basis, from a number of sources (e.g., sensors, audio, and video) that must be stored and retained over time for each student. These data volumes will increase over time as more students enter and participate into the program.

- The SPC CCE has several computer lab environments that students can use for educational purposes.

- The SPC CCE relies heavily on stable Wi-Fi networking to accomplish simulation and regular educational activities.

- The SPC Department of Science relies on a curriculum that encourages students to use a number of software packages to demonstrate aspects of the material: e.g., astronomical charts, trajectory calculations, and molecular simulations.

- The SPC Department of Science use of software is limited to packages they can afford, along with availability for students who may not have access to personal computers that can be used outside of the college.

- The SPC Department of Science does not have significant data storage, or network bandwidth needs.

- The SPC Department of Science would like to explore making more software and hardware resources available to students when they are on campus. This can be done through computer labs, or loaned portable computers.

- The SPC Division of Information Services supports 4 campus environments:
    - Levelland Campus (LL)
    - Reese Center (Reese)
    - Lubbock Center (Lub)
    - Plainview Center (PLV)

- The SPC Division of Information Services has 10Gbps connectivity between the campuses which travels along diverse paths. This connectivity provides access to LEARN as well as commercial internet peers.

- The SPC Division of Information Services is responsible for providing technology to faculty, staff, and students (e.g., computers, software, cloud services).

- The SPC Division of Information Services is exploring options to upgrade certain aspects of their network with LEARN.

- The SPC Division of Information Services will be exploring campus upgrades of wireless, along with adoption of new tools for network measurement and monitoring.

The following outlines a set of recommendations from the SPC Deep Dive is as follows:

- SPC Information Services and the CCE will collaborate on ways to expand the operation and capabilities of the medical simulation environment by ensuring that all components have access to adequate wireless services, and additional storage for data as needed.

- SPC Information Services and the CCE will collaborate on ways to expand access to on-campus computing resources to support students. This includes but is not limited to updated computer labs, and software to support educational activities.

- SPC Information Services and the CCE will collaborate on upgrades to campus wireless in areas where students, faculty, and staff require stable networking capabilities.

- SPC Information Services and the Department of Science will collaborate on making software packages available that support the process of education. These could include commercial or open-source versions of tools that demonstrate aspects of the material: e.g., astronomical charts, trajectory calculations, and molecular simulations.

- SPC Information Services and the Department of Science will collaborate to ensure that campus computing resources are available to run educational software packages, in locations where students can benefit from access.

- SPC Information Services and the Department of Science will collaborate on ways to ensure that cloud services that facilitate data sharing and communication remain available to support educational needs.

- SPC Information Services and LEARN will collaborate on ways to increase connectivity to the SPC remote campus locations.

- SPC Information Services and LEARN will collaborate on methods to increase the network measurement and monitoring tools that are available to the campus.

- SPC Information Services and LEARN will collaborate on options for BGP peering relationships with critical cloud providers.

3 Process Overview and Summary

3.1 Campus-Wide Deep Dive Background

Over the last decade, the scientific community has experienced an unprecedented shift in the way research is performed and how discoveries are made. Highly sophisticated experimental instruments are creating massive datasets for diverse scientific communities and hold the potential for new insights that will have long-lasting impacts on society. However, scientists cannot make effective use of this data if they are unable to move, store, and analyze it.

The Engagement and Performance Operations Center (EPOC) uses the Deep Dives process as an essential tool as part of a holistic approach to understand end-to-end research data use. By considering the full end-to-end research data movement pipeline, EPOC is uniquely able to support collaborative science, allowing researchers to make the most effective use of shared data, computing, and storage resources to accelerate the discovery process.

EPOC supports five main activities

- Roadside Assistance via a coordinated Operations Center to resolve network performance problems with end-to-end data transfers reactively;
- Application Deep Dives to work more closely with application communities to understand full workflows for diverse research teams in order to evaluate bottlenecks and potential capacity issues;
- Network Analysis enabled by the NetSage monitoring suite to proactively discover and resolve performance issues;
- Provision of managed services via support through the Indiana University (IU) GlobalNOC and our Regional Network Partners; and
- Coordinated Training to ensure effective use of network tools and science support.

Whereas the Roadside Assistance portion of EPOC can be likened to calling someone for help when a car breaks down, the Deep Dive process offers an opportunity for broader understanding of the longer term needs of a researcher. The Deep Dive process aims to understand the full science pipeline for research teams and suggest alternative approaches for the scientists, local IT support, and national networking partners as relevant to achieve the long-term research goals via workflow analysis, storage/computational tuning, identification of network bottlenecks, etc.

The Deep Dive process is based on an almost 15-year practice used by ESnet to understand the growth requirements of Department of Energy (DOE) facilities[2]. The EPOC team adapted this approach to work with individual science groups through a set of structured data-centric conversations and questionnaires.

[2] https://fasterdata.es.net/science-dmz/science-and-network-requirements-review

3.2 Campus-Wide Deep Dive Structure

The Deep Dive process involves structured conversations between a research group and relevant IT professionals to understand at a broad level the goals of the research team and how their infrastructure needs are changing over time.

The researcher team representatives are asked to communicate and document their requirements in a case-study format that includes a data-centric narrative describing the science, instruments, and facilities currently used or anticipated for future programs; the advanced technology services needed; and how they can be used. Participants considered three timescales on the topics enumerated below: the near-term (immediately and up to two years in the future); the medium-term (two to five years in the future); and the long-term (greater than five years in the future).

The case study process tries to answer essential questions about the following aspects of a workflow:

- ***Research & Scientific Background***—an overview description of the site, facility, or collaboration described in the Case Study.
- ***Collaborators***—a list or description of key collaborators for the science or facility described in the Case Study (the list need not be exhaustive).
- ***Instruments and Facilities: Local & Non-Local***—a description of the network, compute, instruments, and storage resources used for the science collaboration/program/project, or a description of the resources made available to the facility users, or resources that users deploy at the facility or use at partner facilities.
- ***Process of Science***—a description of the way the instruments and facilities are used for knowledge discovery. Examples might include workflows, data analysis, data reduction, integration of experimental data with simulation data, etc.
- ***Computation & Storage Infrastructure: Local & Non-Local***—The infrastructure that is used to support analysis of research workflow needs: this may be local storage and computation, it may be private, it may be shared, or it may be public (commercial or non—commercial).
- ***Software Infrastructure***—a discussion focused on the software used in daily activities of the scientific process including tools that are used locally or remotely to manage data resources, facilitate the transfer of data sets from or to remote collaborators, or process the raw results into final and intermediate formats.
- ***Network and Data Architecture***—description of the network and/or data architecture for the science or facility. This is meant to understand how data moves in and out of the facility or laboratory focusing on local infrastructure configuration, bandwidth speed(s), hardware, etc.
- ***Resource Constraints***—non-exhaustive list of factors (external or internal) that will constrain scientific progress. This can be related to funding, personnel, technology, or process.
- ***Outstanding Issues***—Listing of any additional problems, questions, concerns, or comments not addressed in the aforementioned sections.

At a physical or virtual meeting, this documentation is walked through with the research team (and usually cyberinfrastructure or IT representatives for the organization or region), and an additional discussion takes place that may range beyond the scope of the original document. At the end of the interaction with the research team, the goal is to ensure that EPOC and the associated CI/IT staff have a solid understanding of the research, data movement, who's using what pieces, dependencies, and time frames involved in the Case Study, as well as additional related cyberinfrastructure needs and concerns at the organization. This enables the teams to identify possible bottlenecks or areas that may not scale in the coming years, and to pair research teams with existing resources that can be leveraged to more effectively reach their goals.

3.3 SPC Deep Dive Background

Between October 2021 and January 2022 EPOC organized a Deep Dive in collaboration with LEARN and SPC to characterize the requirements for several key science drivers. The representatives from each use case were asked to communicate and document their requirements in a case-study format. These included:

- SPC CCE
- SPC Department of Science
- SPC Information Services

3.4 Organizations Involved

The Engagement and Performance Operations Center (EPOC) was established in 2018 as a collaborative focal point for operational expertise and analysis and is jointly led by Indiana University (IU) and the Energy Sciences Network (ESnet). EPOC provides researchers with a holistic set of tools and services needed to debug performance issues and enable reliable and robust data transfers. By considering the full end-to-end data movement pipeline, EPOC is uniquely able to support collaborative science, allowing researchers to make the most effective use of shared data, computing, and storage resources to accelerate the discovery process.

The Energy Sciences Network (ESnet) is the primary provider of network connectivity for the U.S. Department of Energy (DOE) Office of Science (SC), the single largest supporter of basic research in the physical sciences in the United States. In support of the Office of Science programs, ESnet regularly updates and refreshes its understanding of the networking requirements of the instruments, facilities, scientists, and science programs that it serves. This focus has helped ESnet to be a highly successful enabler of scientific discovery for over 25 years.

Indiana University (IU) was founded in 1820 and is one of the state's leading research and educational institutions. Indiana University includes two main research campuses and six regional (primarily teaching) campuses. The Indiana University Office of the Vice President for Information Technology (OVPIT) and University Information Technology Services (UITS) are responsible for delivery of core information technology and cyberinfrastructure services and support.

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 National Weather Service, and K–12 public schools. The consortium, organized as a 501(c)(3) non-profit organization, connects its members and over 300 affiliated organizations 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 advance 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.

South Plains College (SPC) is a comprehensive, two-year community college that serves the greater South Plains area of Texas with innovative educational programs that span the arts and sciences, technical education, continuing education and workforce development. Serving a 14-county area that comprises the southern portion of the Texas High Plains, the college's main campus is located in Levelland. SPC also offers educational programs at two locations in Lubbock - the SPC Lubbock Center and the SPC Reese Center - as well as an extension center in Plainview.

4 SPC Case Studies

SPC presented a number use cases during this review. These are as follows:

- SPC CCE
- SPC Department of Science
- SPC Information Services

Each of these Case Studies provides a glance at research activities, the use of experimental methods and devices, the reliance on technology, and the scope of collaborations. It is important to note that these views are primarily limited to current needs, with only occasional views into the event horizon for specific projects and needs into the future. Estimates on data volumes, technology needs, and external drivers are discussed where relevant.

4.1 SPC CCE

Content in this section authored by Tanya Ward, and describes simulation with human patient simulators within the CCE.

4.1.1 Use Case Summary

Human patient simulators, also known as high-fidelity simulators, mimic the human body. The CCE uses them to teach and train health care students as a way to provide an immersive experience. These advanced simulators run on a proprietary software that requires network connectivity for the simulator to operate. All of the simulators are housed at the CCE.

There are 5 simulators that can operate at one time. Each simulator has a "patient monitor" that records patient vital sign data. Within the patient room there is a static camera and a zoom/tilt camera that records the simulation in progress. There is an additional simulated "ambulance" environment that also houses 2 cameras. The nurse's station/medical room houses an additional 2 cameras and 4 desktop computers. In total, there are 14 cameras within the simulated hospital.

All of these cameras feed live video to 5 separate debrief or "break out" rooms throughout the building. Each of the debrief rooms contains a camera and laptop that runs the video feed of the simulation that is projected on a screen. At the "bedside" is a small laptop for student documentation. Lastly, the center hosts an on-premises computer lab that houses 24 desktop computers for student use.

4.1.2 Collaboration Space

There is a server on site managed by the Simulation Technologist, but data is not shared beyond the boundaries of the center.

4.1.3 Instruments & Facilities

All components of the simulation (e.g., instruments, cameras, servers, storage) are onsite. To accomplish operation for the simulation environment, there are 5 "access points" that manage operation of the environment.

Data storage, primarily for video and audio captured during each simulation, is accomplished through the use of external 3 and 4 TB storage drives.

Lastly, replaying the video on campus resources has become problematic due to the software player not being supported on certain operating systems and web browsers. This will impact future use of the simulation.

4.1.4 Data Narrative

The simulation system is fully contained, and data that is captured via the instrumentation, cameras, and other components remains within the environment. It is not shared beyond the campus.

4.1.4.1 Data Volume & Frequency Analysis

The video and audio data remains the largest component, and can produce TB scales on a weekly basis for all students.

4.1.4.2 Data Sensitivity

Data must be retained in accordance with campus policy for student records, but does not have any sensitivity associated with it beyond being tied to an individual student record.

4.1.4.3 Future Data Volume & Frequency Analysis

This is expected to grow as the use of the simulator (and number of students) increases; however, data can be deleted after a certain amount of time when students leave the program.

4.1.5 Technology Support

SPC Information Services provides basic internet connectivity (e.g., wireless networking) to support the simulation environment, and also supports the desktops and laptops that are used by students and staff.

4.1.5.1 Software Infrastructure

The software affiliated with the simulation is proprietary, and is available on personal computing resources that students and staff have access to.

4.1.5.2 Network Infrastructure

The simulation environment relies on 5 "access points" that control the simulator components, and generally allow them to communicate over the wireless infrastructure. The simulation environment does not offer remote capabilities, and does not share data beyond the local infrastructure.

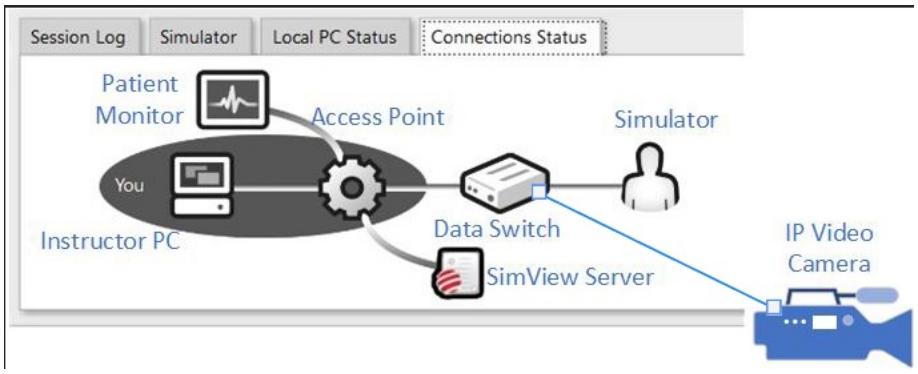

Figure 1 *– Simulation Block Diagram*

4.1.5.3 Computation and Storage Infrastructure

All data that is created by the simulator (e.g., instrument readings, video, audio) is stored within the servers that are a part of the environment. To make room for more recent data, it is possible, and common, to transfer older results to removeable media over time.

The use of personal computing resources by staff and faculty adjacent to the simulator is also regular, and should be upgraded and supported over time.

4.1.5.4 Data Transfer Capabilities

There are no data transfer requirements, or experiences, to report.

4.1.6 Internal & External Funding Sources

The simulation environment is funded via SPC's annual budget. No external funding is used to support this resource.

4.1.7 Resource Constraints

As the simulator is used by more students over time, and more frequently, data storage to retain results will become a factor in future years.

The ability to allow video playback on campus resources is being impacted by software incompatibility. This issue is critical, as being able to review video from simulations is important for the process of education.

4.1.8 Ideal Data Architecture

Due to the location and construction of the simulation environment, increasing the density of wireless coverage will be required in future years to increase throughput and reduce congestion.

Working with the simulation provider to also add more access points to reduce internal congestion between instruments and video, and the storage infrastructure.

4.1.9 Outstanding Issues

The most critical issues were already reported, but will be re-stated:

- Upgrading wireless coverage to reduce congestion and increase throughput
- Making more storage available to support the simulator
- Upgrading browsers and operating systems to support video playback

4.2 SPC Department of Science

Content in this section authored by John Heh

4.2.1 Use Case Summary

The SPC Department of Science relies on a curriculum that encourages students to use a number of software packages to demonstrate aspects of the material: e.g., astronomical charts, trajectory calculations, and molecular simulations.

- ChemSketch[3] or ChemDoodle[4] is desirable to use in Organic Chemistry and Introductory Chemistry
- IR and NMR predictor/simulation software (ACD Labs)[5], or modeling software to do other lessons in chemistry
- Physics software for projectile motion
- Astronomy Planetarium (Sky)[6] software

Licenses for these for use on campus, as well as options for students to use on personal resources, would greatly aid the educational use case.

4.2.2 Collaboration Space

There is no collaboration beyond students, faculty, and staff at SPC.

4.2.3 Instruments & Facilities

Most of the educational process relies on institutional personal computers, or in some cases the personal resources of students.

4.2.4 Data Narrative

None of the above software packages produce heavy amounts of data, some may require downloading external resources (e.g., star maps). Networking to support interactive tools (e.g., cloud-based simulations) could be required in the future.

4.2.4.1 Data Volume & Frequency Analysis

The data volumes to support student use of the software packages will be KB to MB, depending on if they are saving work for future use.

4.2.4.2 Data Sensitivity

There are no sensitive aspects to the use case's data.

4.2.4.3 Future Data Volume & Frequency Analysis

There is not expected to be any increase in data volumes to support this use case.

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[3] https://www.acdlabs.com/products/chemsketch/

[4] https://www.chemdoodle.com

[5] https://www.acdlabs.com/products/spectrus-platform/nmr-predictors/

[6] https://stellarium.org

4.2.5 Technology Support

SPC Information Services provides basic internet connectivity (e.g., wireless networking) and also supports the desktops and laptops that are used by students and staff.

4.2.5.1 Software Infrastructure

Some of the aforementioned software to support the educational use case can be found at the following locations:

- https://stellarium.org
- https://www.nmrdb.org
- https://www.acdlabs.com/products/adh/nmr/
- https://www.chemdoodle.com
- https://www.acdlabs.com/resources/freeware/chemsketch/index.php

4.2.5.2 Network Infrastructure

No additional networking support is required to support this use case.

4.2.5.3 Computation and Storage Infrastructure

No additional computing or storage support is required to support this use case.

4.2.5.4 Data Transfer Capabilities

There are no data transfer requirements, or experiences, to report.

4.2.6 Internal & External Funding Sources

The departments are funded via SPC's annual budget. No external funding is used to support this resource at this time.

4.2.7 Resource Constraints

Access to educational software is the most critical component. Professors would like to engage students through the use of these packages, and also encourage them to use the software outside of the class environment. Ensuring that the software is available for use on campus, or for download on personal resources, is critical.

4.2.8 Ideal Data Architecture

Networking is not a critical part of this use case, but having access to cloud storage and communication tools is a general requirement.

4.1.9 Outstanding Issues

Continued access to software that is being used in the educational environment, along with exploring new options over time.

4.3 SPC Information Services

Content in this section authored by Van Howell

4.3.1 Use Case Summary

SPC has four campuses connected via a 10GB MPLS circuit through Vexus Fiber[7]. Each campus has two diverse routes to Vexus. All routing on the campus backbone is handled by SPC IT staff. SPC is using LEARN as Primary internet access. LEARN is delivered to SPC at the Reese Campus via a direct fiber connection to TTU HSC Preston Smith Library[8].

The standard computer configuration for faculty is a Dell Latitude 7410 Laptop with Intel Core I7-10610U Processor (4 core 1.80GHz), 32 GB RAM, 512GB SSD. Faculty teaching CAD classes received a workstation class laptop. SPC also uses VMWare Virtual Desktop[9]. The VDI servers have GPUs installed and are capable of running CAD, MatLab[10], and other high performance software. The VDI is used in student labs and is available to students who do not have access to high performance hardware.

Each student and faculty member has 1TB of cloud storage through OneDrive[11]. The college has additional 28.8TB of on premise storage that can be provisioned for faculty or student use.

4.3.2 Collaboration Space

SPC Information Services does not collaborate with any external entities, aside from LEARN, at this time.

4.3.3 Capabilities & Special Facilities

There are none to report at this time.

4.3.4 Technology Narrative

SPC Information Services provides all aspects of technology (e.g., networking, computation, storage, and software support) for the faculty, students, and staff at the college.

4.3.4.1 Network Infrastructure

Edge switches are Dell N3000[12] series 1Gb POE with 10Gb fiber uplink. Campus routers are Dell S series[13] routers with 100GB capabilities. SPC runs Spanning Tree at the edge and OSPF on the core. SPC has two Internet connections, each running BGP One to LEARN and one to Vexus Fiber. We have a planned maintenance to move from OSPF

[7] https://www.vexusfiber.com
[8] https://ttuhsc.libguides.com/about/lubbock
[9] https://www.vmware.com/products/horizon.html
[10] https://www.mathworks.com/products/matlab.html
[11] https://www.microsoft.com/en-us/microsoft-365/onedrive/online-cloud-storage
[12] https://www.dell.com/en-us/work/shop/productdetailstxn/networking-n3000-series
[13] https://www.dell.com/en-us/work/shop/productdetailstxn/networking-s-series-10gbe

between our Gateway Routers to using EBGP with a VXLAN overlay to better handle failover between ISP connections.

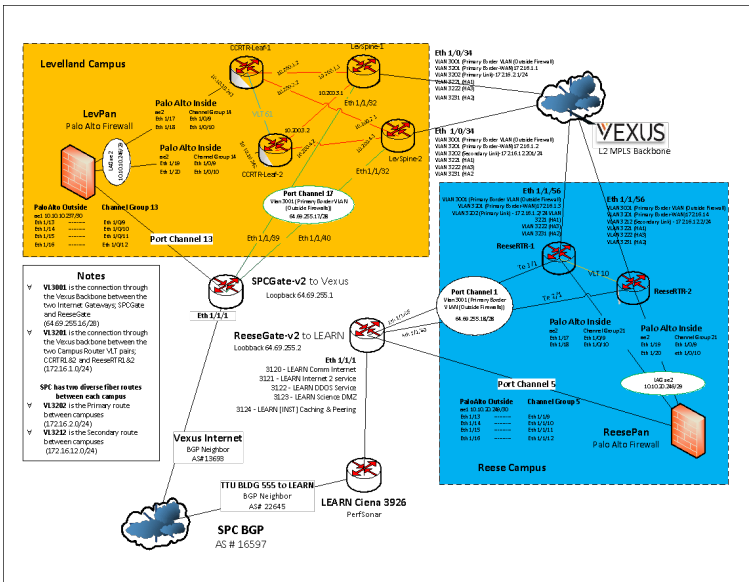

Figure 2 – *SPC Network Diagram*

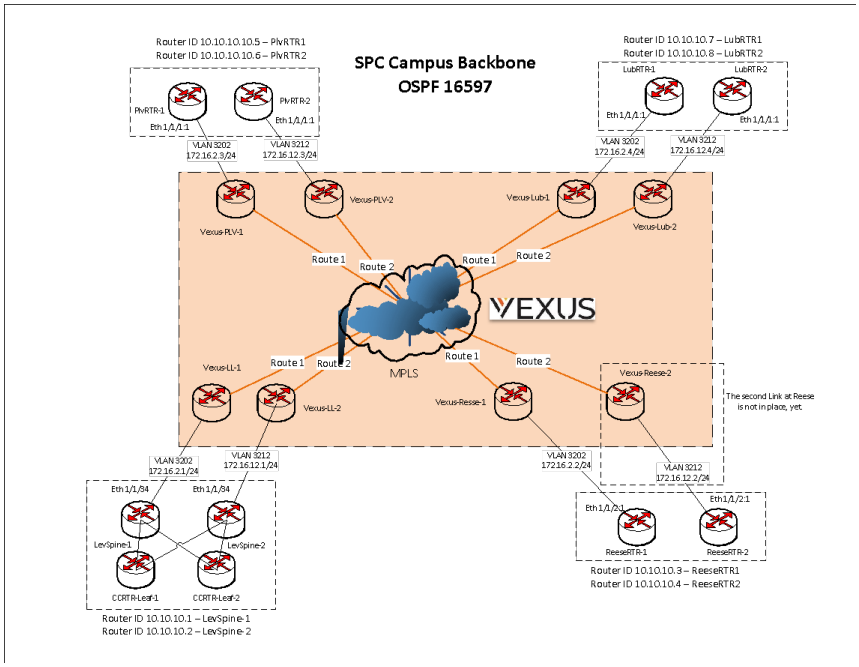

Figure 3 – *SPC Campus Backbone*

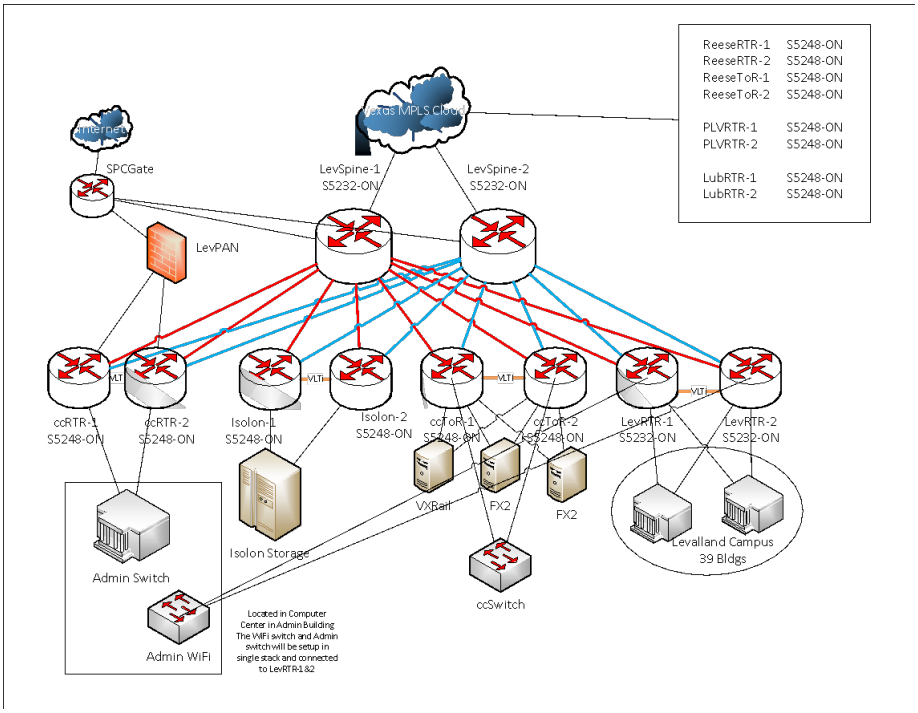

Figure 4 *– SPC Edge Network*

4.3.4.2 Computation and Storage Infrastructure

Microsoft OneDrive, 1TB for each account holder, 28.8TB on premise SSD storage available upon request.

4.3.4.3 Network & Information Security

SPC uses two Palo Alto PA-3250[14] firewalls. Each has 12 1GB copper and 8 1GB fiber connections. Sophos End Point Protection[15] on all college owned computers.

4.3.4.4 Monitoring Infrastructure

OpenNMS[16] setup to monitor switches using SNMP, LEARN has installed perfSONAR[17].

SPC Information Services would like assistance with monitoring and baseline performance, along with possible assistance with routing, EBGP and VXLAN for data centers.

4.3.4.5 Software Infrastructure

SPC math and engineering departments use Matlab and Autodesk AutoCAD.

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[14] https://www.paloaltonetworks.com/network-security/next-generation-firewall/pa-3200-series

[15] https://www.sophos.com/en-us/products/endpoint-antivirus

[16] https://www.opennms.com

[17] https://www.perfsonar.net

4.3.5 Organizational Structures & Engagement Strategies

SPC Information Services works directly with faculty, staff, and students on technology needs. It does not have a research engagement strategy at this time.

4.3.5.1 Organizational Structure

SPC Information Services is organized as follows:

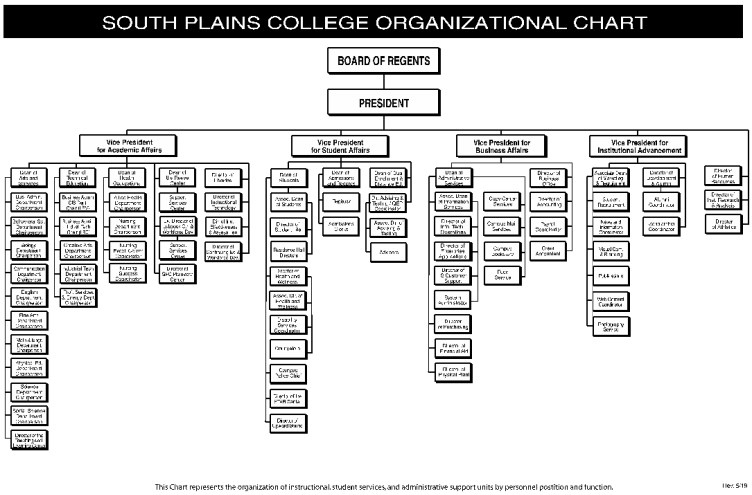

Figure 5 *– SPC IS Organizational Chart: http://www.southplainscollege.edu/about/SPCORgChart18-19.pdf*

4.3.5.2 Engagement Strategies

None to report at this time.

4.3.6 Internal & External Funding Sources

The department is funded via SPC's annual budget. No external funding is used to support this resource at this time.

4.3.7 Resource Constraints

None to report at this time.

4.3.8 Outstanding Issues

None to report at this time.

Appendix A – The Lonestar Education And Research Network (LEARN)

Introduction

The 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 National Weather Service, and K–12 public schools. The consortium, organized as a 501(c)(3) non-profit organization, connects its members and over 300 affiliated organizations 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 advance 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.

LEARN's Mission

Empower non-profit communities to execute their missions through technology and collaboration.

LEARN's Vision

LEARN will be the most efficient and effective enabler of research, education, healthcare, and public service communities in Texas using technology and shared services.

Network Services

Members are entitled to appoint an individual to the Board of Directors and to acquire network services from LEARN at member rates. Network services are designed and provisioned based on the needs of individual members through collaboration between those members and the 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 keep the network state-of-the-art.

Network services include:

- Layer 1 Dedicated Transport Services Between LEARN Points-of-Presence (POPs),
- Layer 2 IP/MPLS Transport Services,
- Service Level Agreement (SLA) based Layer 2 connections to Cloud Service Providers (AWS, Google, & Azure),
- Routed Layer 3 IP Services,
- Connection Gateways to the National Research and Education Networks (Internet2 and Energy Sciences Network, and on 100G ramps to reach Pacific Wave International Exchanges),
- Seamless access to on-net data centers,

- Inter-POP Port aggregation & Co-location Services
- Commodity Internet Services (100G burst capacity spread across 4 POPs),
- Low-Latency High-Capacity Access to Content and Application Providers (Peering and Caching Services),
- DDoS Mitigation Service,
- Managed Network Service and Consultation, and
- Unmetered Network Service.

LEARN is currently listed as a telecommunication/Internet service provider with the Universal Service Administration Company (USAC). Becoming a USAC telecommunications/Internet service provider permits LEARN's school, library, and rural healthcare customers 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's members that the organization has a unique role to play in the state in providing highly reliable, cost-effective network services to the higher education, K–12, research institutions, healthcare, city and county governments, libraries and museums, and not-for-profits and public service entities. LEARN is a trusted partner and convener in these communities.

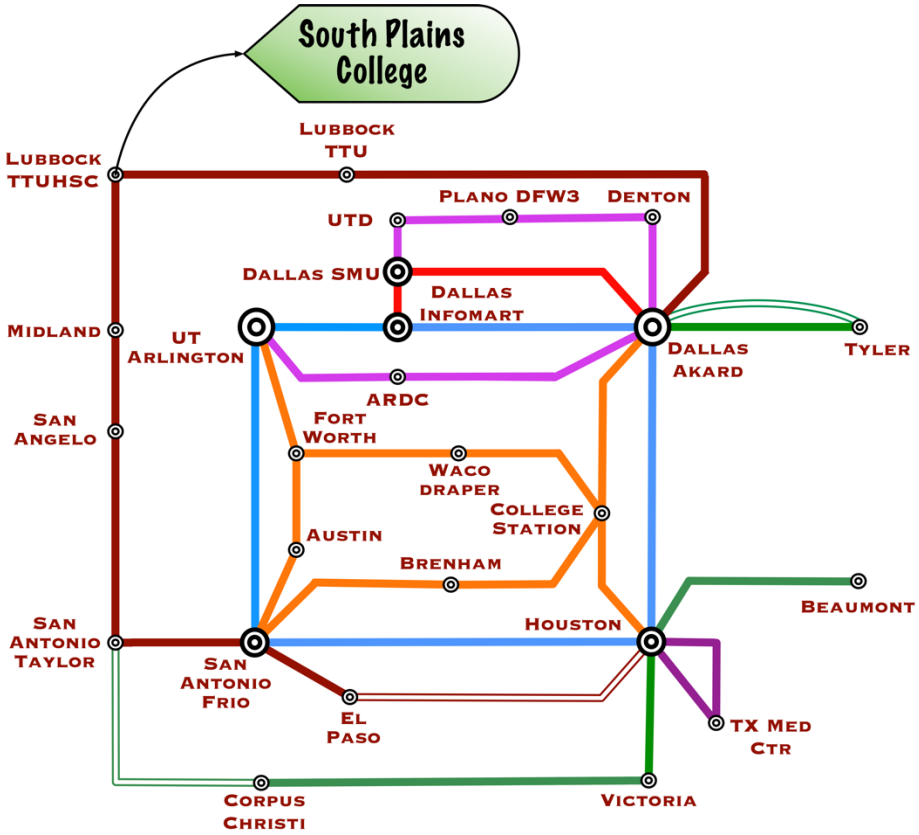

Figure 3: LEARN Connectivity Serving South Plains College

CC* Funding

In 2019, LEARN was awarded NSF Awards #1925553: "CC* Regional: Accelerating Research and Education at Small Colleges in Texas via an Advanced Networking Ecosystem Using a Virtual LEARN Science DMZ".

LEARN is partnering with national organizations in the implementation of this project. Projected impacts include increased opportunities for students to learn about and gain experience in advanced aspects of science, technology, engineering and mathematics (STEM) for which they might not otherwise have had an opportunity, for extension of the project to students and faculty at other campuses in Texas, and for the extension of the LEARN model to other regional networks and smaller campuses throughout the United States.

Objectives:

- Establish a small college collaborative environment within the LEARN community
- Improve network connectivity/services at each college campus for research and education
- Establish a network performance monitoring infrastructure
- Establish a means to facilitate the transfer of large data sets
- Deliver technical training to personnel at each campus
- Develop and implement an outreach program for informing/educating faculty, staff, and students at each college, and develop and disseminate project results