IT NETWORK UPDATE

Capital Project Proposal

2015-2017

Active Minds Changing Lives

WESTERN
WASHINGTON UNIVERSITY

Institution
Western Washington University
Project Title
IT Network Update
Project Location (City)
Bellingham

1. Problem Statement

The IT Network Update will replace undersized and outdated equipment; increase the university's ability to utilize available Internet bandwidth; and enhance critical data security. Technology advances continue to increase the ability of user operated devices to do more, thereby increasing the demand for infrastructure resources and bandwidth. WWU is faced with the requirement to keep its infrastructure systems up to date in order to provide the services necessary for the university to function technically and keep pace with the ever increasing demand for data access. This project will replace equipment that will be close to 10 years old by the project completion, well beyond its projected life as pointed out in the engineering study (see Appendix B). Waiting another biennia for funding would put the university at significant risk for equipment and network failure.

Most of our academic work (students, faculty, and staff), emergency response to life safety and seismic events, ADA support, energy monitoring, utilities monitoring, transportation & parking operations, facilities development, facilities operations and facilities maintenance relies heavily on using our data network. This project would allow us to continue our progress towards all of our strategic goals as well as supporting the Governor's Results Washington Goal 1: World Class Education (see Appendix C). The goal for post-secondary education of increasing STEM and High Demand program students further burdens our existing data network as these types of programs depend on the ability to access and exchange large amounts of data and internet information. The data network is fundamental to our work and success. The IT Network Update will affect the following systems:

- **Core Router Systems**
    - Our current core router systems have been in place for nearly eight years, which according to industry standards is at, or beyond, typical end of life expectancy. Due to the system age, growth and changes in networking devices and protocols, these items must be upgraded for increased bandwidth and up-to-date protocol standards.
    - Due to the large investment in fiber optic modules providing connectivity to all campus buildings, we are planning to reuse most of the optics and interface cards we currently have. The update path will be in the form of a chassis, backplane and processor board upgrade, as well as, support for increased bandwidth to our main data center in the Administrative Services Building and our backup location in Bond Hall.
- **Edge Security Systems**
    - Over the past several years we have been seeing 9-fold increases in bandwidth usage to the internet. As we continue to move software services off-campus to the cloud, this bandwidth usage will increase at a rate we cannot readily predict. Even now we are reaching points of time

where the consistently high utilization is causing sluggishness and dropped packets of data. Even though dropped packets are automatically retried by the operating systems, it compounds the problems by requiring the data be sent multiple times. In 2013, we upgraded our internet bandwidth providing 10 GB/s primarily to support student residence needs, but we are still operating the academic side of the network with equipment that limits us and does not allow utilization of the additional bandwidth. Our intrusion protection system is the key system that prevents us from utilizing this additional bandwidth and a 10 GB capable system is needed to mitigate this bottleneck and provide better data security.

- Edge firewalls require additional 10 GB interfaces that can support long distance connections so our redundant firewall and intrusion protection systems can be located in different buildings in the event of a loss or fire to these main and backup network core locations.

- **Data Center Systems**

  - Like the core systems, the current data center switches are reaching or have reached eight years of use and are in need of upgrades.
  - Currently we operate two data centers where campus servers reside and connect to the network, one on-campus in Bond Hall and one off-campus in the Administrative Services Building. The data center in Administrative Services operates as the primary for most campus computing services while Bond Hall is a backup. Due to the types of network devices in use, we cannot make these two data centers function simultaneously where both data centers are active at the same time at the individual server level. The IT Network Update will provide the environment for both data centers to become active data centers with complete network level redundancy supporting the ability to move virtual servers at the individual server level between the two data centers dynamically.
  - In addition to the above mentioned limitations, we have two switches in our primary data center where all servers are either attached to one or the other rather than having the ability of dual connections to both switches. With this upgrade we can mitigate the risk of losing connectivity to all servers connected to a single switch, should it fail.

2. History of the project or facility

In the 2011-13 biennia, Western requested funds to upgrade its wireless network. This request was not funded. Since the 2011-13 request, the growth in demand for IT access and wireless devices has reached the point that Western's IT network cannot support increased access needs and the expansion of its compromised wireless network. The IT Network Update is required before the wireless network expansion can be implemented. Educause is the professional society for information technology in higher education and one of their programs is the Educause Center for Applied Research (ECAR). The most recent ECAR Student Technology Survey reports that the average number of wireless devices brought to campus is 2.8 for each student. This growth has placed significant demand on our wireless network and increased coverage and 'throughput' must occur to respond to these needs. (See Appendix D).

Western installed its core IT equipment eight years ago and it is reaching both the end of its vendor supported life and its functional life with the data bottlenecks and data security abilities that older data network equipment bring. Where possible we will reuse portions of the currently installed equipment to

provide efficiency and prevent service degradation yet meet the specifications of a modern data network.

3. University programs addressed or encompassed by the project

The University's computing infrastructure is essential to the University's mission. Large data sets, including high-bandwidth-consuming images are required in classes throughout the campus. Research and teaching labs require the ability to exchange, compile and store ever expanding volumes of work on the computer network. Almost all of the business and academic needs of the university utilize the data network in some form or fashion. The data network has evolved into foundational infrastructure that must be maintained to serve the students and faculty on campus and in off-campus, long distance learning situations.

4. Significant Health, Safety, and Code Issues:

a. The existing slow and overburdened network has a significant impact to emergency response to life safety and seismic events. Our public safety office utilizes our network both for internal communication and for connections to state and federal law enforcement resources. Emergency messages are broadcast over the network directly to devices, as well as, to our emergency vendor for SMS (text) messages. Federal law requires timely notification of emergencies on campus and a slow, or overburdened, network would affect our ability to react and notify. An unreliable network will result in unreliable notification.

A campus risk analysis was completed in 2014 with recommendations for expanding campus emergency notifications. A critical part of the campus notification system relies on a fully functioning IT system. (Appendix information is not provided due to confidentiality requirements related to this type of study).

Slowdowns due to an inadequate network can cause computer based ADA assisted learning devices used in classrooms and labs to be ineffective and useless.

b. The new equipment and installation will be compliant with current standard network protocols, and regulatory standards for network equipment safety, electromagnetic compatibility (EMC), and TIA/EIA telecommunications building wiring standards. Applicable current industry standards include IEEE 802.11a, b, g, n, ac; Wi-Fi Alliance Certified products; applicable TIA/EIA wireless standards, and FCC Wireless Communication Standards.

5. Evidence of increased repairs and/or service interruption:

The equipment is at its end-of-life which means that the vendor will no longer update or support the equipment. This will have significant data security implications if the firewalls are not updated. Every effort is made to prevent interruptions to the core IT systems. Maintenance costs continue to rise and once end-of-life is reached the costs become significantly higher. Current maintenance on this equipment is $94,000 per year. This amount would be saved during the new equipment warrantee period and used on future maintenance.

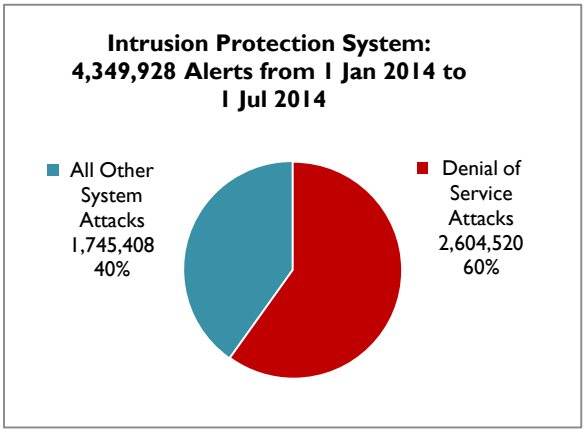
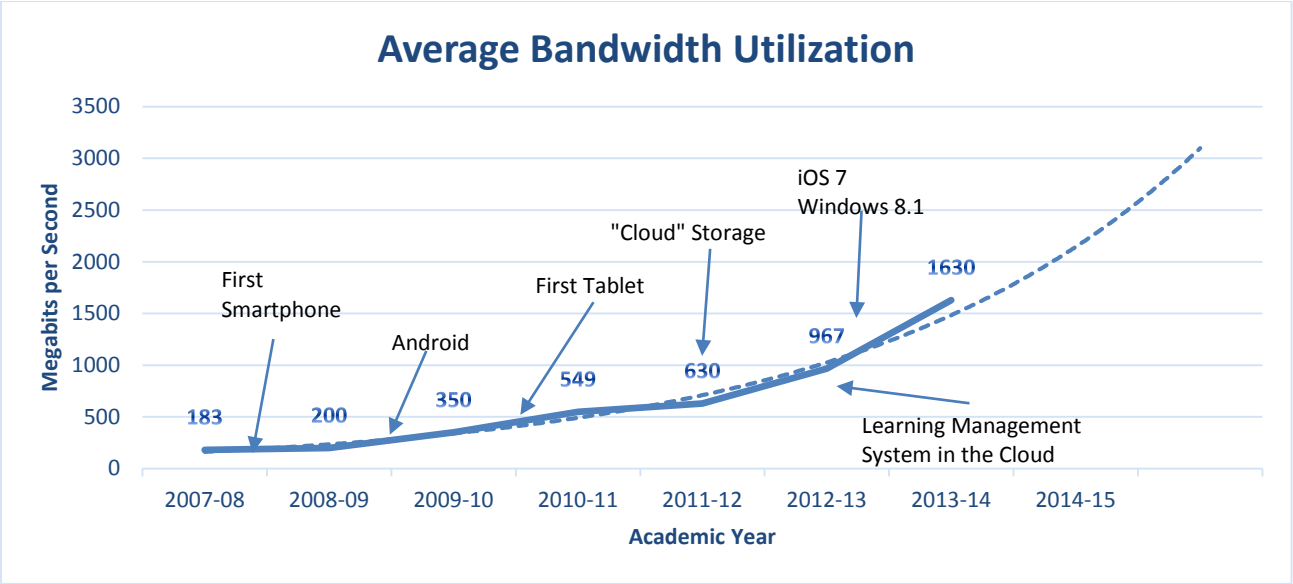


Figure 1. Denial of Service attacks can significantly impact network and internet speed.

Because this equipment is central to our data security, the firewalls and the Intrusion Detection and Prevention devices regularly stop attacks from malicious entities seeking access to our network. Should these attacks succeed, our network could be compromised and/or data stolen, as well as, possible interruptions to life safety systems. This cannot be allowed to occur. This new equipment will both increase capacity and security. As demonstrated in Figure 1 based on the "Intrusion Protection System Top 25 Signatures Report" (see Appendix E), in the first half of 2014 Western's network received 4,349,928 alerts (attacks), of which 2,604,520 were alerts for Denial of Service attacks which can significantly impact internet accessibility and network speed. Attacks such as this must be thwarted or connectivity to the Internet and network speed can be lost resulting in significant impact to administrative and academic work.

6. Impact on Institutional Operations without the Infrastructure Project:

Without a capable and stable data network, severe inefficiencies would occur with business processes and access to academic resources. A slow network affects our ability to attract and retain students due to the inability to access, and the frustration of trying to get to, academic resources such as our learning management system and research data. During the past seven years our bandwidth has grown nine-fold resulting in slowness in response times and potential loss of data.



We have recently moved our Exchange email environment to Office 365 “in the cloud”. We have also moved our learning management system to Canvas which is also housed “in the cloud”. Our external broadband connectivity is fine with room to grow, but our internal connectivity is limited. Limited data transmission will have significant impact on student learning if we cannot provide sufficient connectivity to the resources, both internal and external, that students and faculty are currently using. We expect continued growth as more and more video is incorporated in the teaching and learning process both on campus and off campus. Employee productivity would also suffer if email is slowed and access to files stored in Office 365 is hampered.

Western is in the process of converting its telephone system to Voice Over Internet Protocol (VOIP) which will reduce costs and provide additional productivity features. This system will also run over our internal network and require additional bandwidth. Because telephone is also life safety related, VOIP traffic would have a higher transmission priority which will result in more congestion for other operational and teaching/learning traffic. With the IT Network Update we can both prioritize VOIP traffic and have the capacity for other data traffic to be unimpeded.

Without an updated Intrusion Protection System and Internet Edge Firewall, Western will be more at risk for malware or malicious software attacks. Also, due to distance limitations of the fiber optic transceivers, our current Internet Edge Firewall installation does not allow the separation of the redundant firewalls in the two buildings where the core infrastructure resides. Should Western’s technology security systems fail due to software attacks or distance limitations, the risk for data loss and productivity loss would be extremely high and untenable for business operations (see Appendix F).

As the university continues to operate in a more complex and diverse environment, the ability to depend on, expand or enhance programs that require significant and stable bandwidth (like the University’s emergency response campus-wide notification system) will be limited without this IT Network Update project.

7. Reasonable Estimate:

In November of 2013, a preliminary estimate of the equipment costs (no installation costs) was completed by Certified CISCO engineers. That estimate was further refined by a professional estimator, the Wool-Zee Company, Inc., assisting in the development of the project budget. (See Appendix G)

8. Engineering Study:

An initial study, drawings, and equipment list was performed by certified CISCO engineers. That study was then reviewed and a comprehensive engineering study was completed by Bill Diephuis, P.E. RCDD, K-Engineers. The engineer’s study validated the existing IT network system was at or beyond the end of life per typical industry standards and that the proposed IT network design would alleviate network traffic bottlenecks that currently exist. (See Appendix B)

9. Supports Facilities Plan:

a. Campus/Facilities Master Plan
The IT Network is as vital a system as any other utility serving the campus. Every student, faculty, and staff member relies on the campus network to support their educational studies and their work. The IT network also supports life safety systems such as mass notification system. An important part of the campus master plan is assuring that utility services are available to support the mission of the university. (See Appendix H).

b. Ongoing academic and/or research program
The IT Network Update supports the IT needs of the entire Western Washington University campus. All academic and research programs rely upon a stable, secure, and sufficient data network. On-going research requires accessing, exchanging and compiling ever expanding large data sets on the University's computer networks.

c. This IT Network Update project is required before further network enhancements that would increase data traffic can be undertaken.

10. Resource Efficiency and Sustainability:

Energy efficiency is an important aspect of Western's culture. Western as an institution purchases 100% green electrical power. The replacement switches and router proposed for the IT Network Update project will be more efficient than those being replaced. The procurement process that will be utilized will assure new equipment meets State of Washington energy efficiency goals and guidelines and that obsolete devices are recycled. Resource efficiency and sustainability will also be addressed by our planning to reuse most of the optics and interface cards we currently have in our core router.

IT Network Update

Appendix Contents

A. Office of Financial Management reports (CBS002 and CBS003)

B. K-Engineers Engineering Study

C. Results Washington Goal 1: World-Class Education

D. ECAR Study of Undergraduate Students and Information Technology, 2013 – Educause Center for Analysis and Research

E. IPS (Intrusion Protection System) Top 25 Signatures Report

F. Edge Security Systems In-house Document

G. The Wool-Zee Company, Inc. Cost Estimate

H. WWU Institutional Master Plan

Appendix A

OFM

380 - Western Washington University

Capital Project Request

2015-17 Biennium

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Version: WV 2015-17 Working Version

Report Number: CBS002
Date Run: 8/1/2014 9:16AM

Project Number: 30000599
Project Title: IT Network Update
Project Class: Preservation

Description

Starting Fiscal Year: 2016
Agency Priority: 5

Project Summary

The IT Network Update will replace undersized and outdated critical equipment; increase the university's ability to utilize available Internet bandwidth; and enhance critical data security.

Project Description

Western's core router systems, edge security systems and data center systems equipment are reaching their end of life cycle. The growth in demand for IT access and wireless devices has reached the point that Western's current IT network cannot support increased access needs and the expansion of its compromised wireless network without an infusion of new state-of-the-art technology. This project will replace old, outdated equipment to increase the university's ability to utilize available Internet bandwidth and to provide enhanced data security.

Technology advances continue to increase the ability of user operated devices to do more, thereby increasing the demand for infrastructure resources and bandwidth. Western Washington University is faced with the need to keep its infrastructure systems up to date in order to provide services necessary to function technically and keep place with the ever increasing demand for data access.

Most of our academic work (students, faculty, and staff), emergency response to life safety and seismic events, ADA classroom support, energy monitoring, utilities monitoring, transportation and parking operations, facilities development, operations and maintenance relies heavily on using our data network. A stable, updated data network is fundamental to the University's ability to successfully achieve its mission and strategic goals.

ECONOMIC IMPACT - See attachments for OFM Forecasting Division Economic Impact Spreadsheet.

Note: Extensive project detail is provided in the IT Network Update project proposal submitted under the Four-Year Higher Education Capital Projects Evaluation System (CPES).

Location

City: Bellingham **County:** Whatcom **Legislative District:** 040

Project Type

Intermediate

Funding

Acct Code	Account Title	Estimated Total	Expenditures Prior Biennium	Current Biennium	2015-17 Fiscal Period Reapprops	New Approps
057-1	State Bldg Constr-State	4,000,000				4,000,000
	Total	**4,000,000**	**0**	**0**	**0**	**4,000,000**

Acct Code	Account Title	Future Fiscal Periods 2017-19	2019-21	2021-23	2023-25
057-1	State Bldg Constr-State				
	Total	**0**	**0**	**0**	**0**

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380 - Western Washington University

Capital Project Request

2015-17 Biennium

*

Version: WV 2015-17 Working Version

Report Number: CBS002
Date Run: 8/1/2014 9:16AM

Project Number: 30000599
Project Title: IT Network Update
Project Class: Preservation

Schedule and Statistics

	Start Date	End Date
Predesign		
Design	9/1/2015	3/1/2016
Construction	7/1/2016	1/1/2017

	Total
Gross Square Feet:	0
Usable Square Feet:	0
Efficiency:	
Escalated MACC Cost per Sq. Ft.:	0
Construction Type:	Other Schedule B Projects
Is this a remodel?	Yes
A/E Fee Class:	B
A/E Fee Percentage:	12.38%

Cost Summary

		Escalated Cost	% of Project
Acquisition Costs Total		**0**	**0.0%**
Consultant Services			
Pre-Schematic Design Services		0	0.0%
Construction Documents		247,838	6.2%
Extra Services		66,968	1.7%
Other Services		119,618	3.0%
Design Services Contingency		44,561	1.1%
Consultant Services Total		**482,020**	**12.1%**
Maximum Allowable Construction Cost(MACC)	**2,728,048**		
Site work		0	0.0%
Related Project Costs		0	0.0%
Facility Construction		2,728,048	68.2%
GCCM Risk Contingency		0	0.0%
GCCM or Design Build Costs		0	0.0%
Construction Contingencies		272,805	6.8%
Non Taxable Items		0	0.0%
Sales Tax		261,074	6.5%
Construction Contracts Total		**3,261,926**	**81.6%**
Equipment			
Equipment		0	0.0%
Non Taxable Items		0	0.0%
Sales Tax		0	0.0%

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Capital Project Request

2015-17 Biennium

*

Version: WV 2015-17 Working Version

Report Number: CBS002
Date Run: 8/1/2014 9:16AM

Project Number: 30000599
Project Title: IT Network Update
Project Class: Preservation

Cost Summary

	Escalated Cost	% of Project
Equipment Total	0	0.0%
Art Work Total	0	0.0%
Other Costs Total	64,410	1.6%
Project Management Total	191,308	4.8%
Grand Total Escalated Costs	3,999,664	
Rounded Grand Total Escalated Costs	4,000,000	

Operating Impacts

No Operating Impact

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Cost Estimate Summary

2015-17 Biennium

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Cost Estimate Number: 249
Cost Estimate Title: IT Network Update
Report Number: CBS003
Date Run: 8/1/2014 9:34AM

Version: WV 2015-17 Working Version
Agency Preferred: Yes
Project Number: 30000599
Project Title: IT Network Update
Project Phase Title:

Contact Info **Contact Name:** Rick Benner **Contact Number:** 360.650.3550

Statistics

Gross Sq. Ft.:	0
Usable Sq. Ft.:	0
Space Efficiency:	
MACC Cost per Sq. Ft.:	0
Escalated MACC Cost per Sq. Ft.:	0
Remodel?	Yes
Construction Type:	Other Schedule B Projects
A/E Fee Class:	B
A/E Fee Percentage:	12.38%

Schedule

	Start Date	End Date
Predesign:		
Design:	09-2015	03-2016
Construction:	07-2016	01-2017
Duration of Construction (Months):	6	

Cost Summary Escalated

Acquisition Costs Total			**0**
Pre-Schematic Design Services		0	
Construction Documents		247,838	
Extra Services		66,968	
Other Services		119,618	
Design Services Contingency		44,561	
Consultant Services Total			**482,020**
Site work		0	
Related Project Costs		0	
Facility Construction		2,728,048	
Construction Contingencies		272,805	
Non Taxable Items		0	
Sales Tax		261,074	
Construction Contracts Total			**3,261,926**
Maximum Allowable Construction Cost(MACC)	**2,728,048**		
Equipment		0	
Non Taxable Items		0	
Sales Tax		0	
Equipment Total			**0**
Art Work Total			**0**
Other Costs Total			**64,410**
Project Management Total			**191,308**
Grand Total Escalated Costs			**3,999,664**
Rounded Grand Total Escalated Costs			**4,000,000**

Additional Details

Alternative Public Works Project: No

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Cost Estimate Summary

2015-17 Biennium

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Cost Estimate Number: 249
Cost Estimate Title: IT Network Update

Report Number: CBS003
Date Run: 8/1/2014 9:34AM

Version: WV 2015-17 Working Version
Project Number: 30000599
Project Title: IT Network Update
Project Phase Title:

Agency Preferred: Yes

Contact Info **Contact Name:** Rick Benner **Contact Number:** 360.650.3550

Additional Details

State Construction Inflation Rate:	3.08%
Base Month and Year:	03-2014
Project Administration By:	AGY
Project Admin Impact to DES that is NOT Included in Project Total:	$0

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Cost Estimate Detail

2015-17 Biennium

*

Cost Estimate Number:	249	**Analysis Date:**	March 13, 2014
Cost Estimate Title:	IT Network Update		
Detail Title:	Update IT Network		
Project Number:	30000599		
Project Title:	IT Network Update		
Project Phase Title:			
Location:			

Contact Info	**Contact Name:**	Rick Benner	**Contact Number:**	360.650.3550

Statistics

Gross Sq. Ft.:	
Usable Sq. Ft.:	
Rentable Sq. Ft.:	
Space Efficiency:	
Escalated MACC Cost per Sq. Ft.:	
Escalated Cost per S. F. Explanation	

Construction Type:	Other Schedule B Projects
Remodel?	Yes
A/E Fee Class:	B
A/E Fee Percentage:	12.38%
Contingency Rate:	10.00%
Contingency Explanation	

Projected Life of Asset (Years):	
Location Used for Tax Rate:	
Tax Rate:	8.70%
Art Requirement Applies:	No
Project Administration by:	AGY
Higher Education Institution?:	Yes
Alternative Public Works?:	No

Project Schedule	Start Date	End Date
Predesign:		
Design:	09-2015	03-2016
Construction:	07-2016	01-2017
Duration of Construction (Months):	6	
State Construction Inflation Rate:	3.08%	
Base Month and Year:	3-2014	

Project Cost Summary

MACC:	$ 2,522,000
MACC (Escalated):	$ 2,728,048
Current Project Total:	$ 3,705,555
Rounded Current Project Total:	$ 3,706,000
Escalated Project Total:	$ 3,999,664
Rounded Escalated Project Total:	$ 4,000,000

ITEM	Base Amount	Sub Total	Escalation Factor	Escalated Cost
CONSULTANT SERVICES				
Construction Documents				
A/E Basic Design Services				236,978
SubTotal: Construction Documents				**247,838**
Extra Services				
Commissioning (Systems Check)	10,000			
Testing	5,000			
Travel & Per Diem	30,000			
Document Reproduction	5,000			
Advertising	3,500			
Verifying Existing Conditions	10,000			
SubTotal: Extra Services		**63,500**	1.0546	**66,968**
Other Services				
Bid/Construction/Closeout				106,468
On-Site Rep.	5,000			
		111,468	1.0817	
SubTotal: Other Services				**119,618**
Design Services Contingency				
Design Services Contingency	41,195			
SubTotal: Design Services Contingency		**41,195**	1.0817	**44,561**
Total: Consultant Services		**453,141**	1.0637	**482,020**
CONSTRUCTION CONTRACTS				
Facility Construction				
Total Cost	2,522,000			
SubTotal: Facility Construction		**2,522,000**	1.0817	**2,728,048**
Maximum Allowable Construction Cost (MACC)		**2,522,000**	1.0800	**2,728,048**
Construction Contingencies				
Allowance for Change Orders	252,200			
SubTotal: Construction Contingencies		**252,200**	1.0817	**272,805**
Sales Tax		**241,355**	1.0817	**261,074**
Total: Construction Contracts		**3,015,555**	1.0817	**3,261,926**
OTHER COSTS				
Permits/Plan Check	40,000			
M&O Assist	20,000			
Total: Other Costs		**60,000**	1.0735	**64,410**
PROJECT MANAGEMENT				
Agency Project Management	176,859			
Total: Project Management		**176,859**	1.0817	**191,308**

Appendix B

ENGINEERS, INC.
ELECTRICAL ENGINEERING
208 Third Street, Lynden, WA 98264
Tel (360) 354-4757 Fax (360) 354-6794

July 14, 2014

Western Washington University
Facilities Development and Capital Budget
Bellingham, WA

Mr. Ed Simpson

Re: Core Infrastructure Upgrade Project

Introduction:

The purpose of this study is to provide an engineering analysis and report regarding the implementation of an upgrade to the campus data networking core equipment at Western Washington University campus.

Existing Conditions:

The existing core router equipment and data center switching equipment on campus is reported to be nearly 8 years old by WWU IT department. Typical industry standard for this type of equipment is approximately 5 years. Although WWU uses Cisco equipment, which is known for its longevity, 8 years is certainly near the end of useful life for this equipment. The existing equipment is too slow to meet the demand of ever increasing network bandwidth.

Upgrades:

The proposed upgrades have been designed by WWU IT department and are the basis of design for this report. Quantities and types of equipment are detailed in the design as well as interconnection of the equipment. It is strongly recommended that this design continue to be used as the basis of design for funding and implementing the project.

New equipment will have the capability of 40 Gigabit Ethernet connections, which is a significant upgrade to the existing equipment and will alleviate networking traffic bottlenecks that currently exist.

ENGINEERS, INC.
ELECTRICAL ENGINEERING
208 Third Street, Lynden, WA 98264
Tel (360) 354-4757 Fax (360) 354-6794

Consideration has been given to basing the cost estimate on equipment other than Cisco Systems, however, this is not recommended due to the prevalence of existing Cisco equipment on campus and the long standing relationship that the University has with Cisco. Also, WWU IT personnel have received extensive training on the use and maintenance of Cisco equipment. It would not be cost effective in the long term to use equipment other than Cisco Systems.

Cost Estimate:

The following cost estimate includes the routing and switching equipment identified in the basis of design. Installation would be by a vendor or contractor and includes physical mounting and network software configuration.

COST ESTIMATE - CORE INFRASTRUCTURE UPGRADE

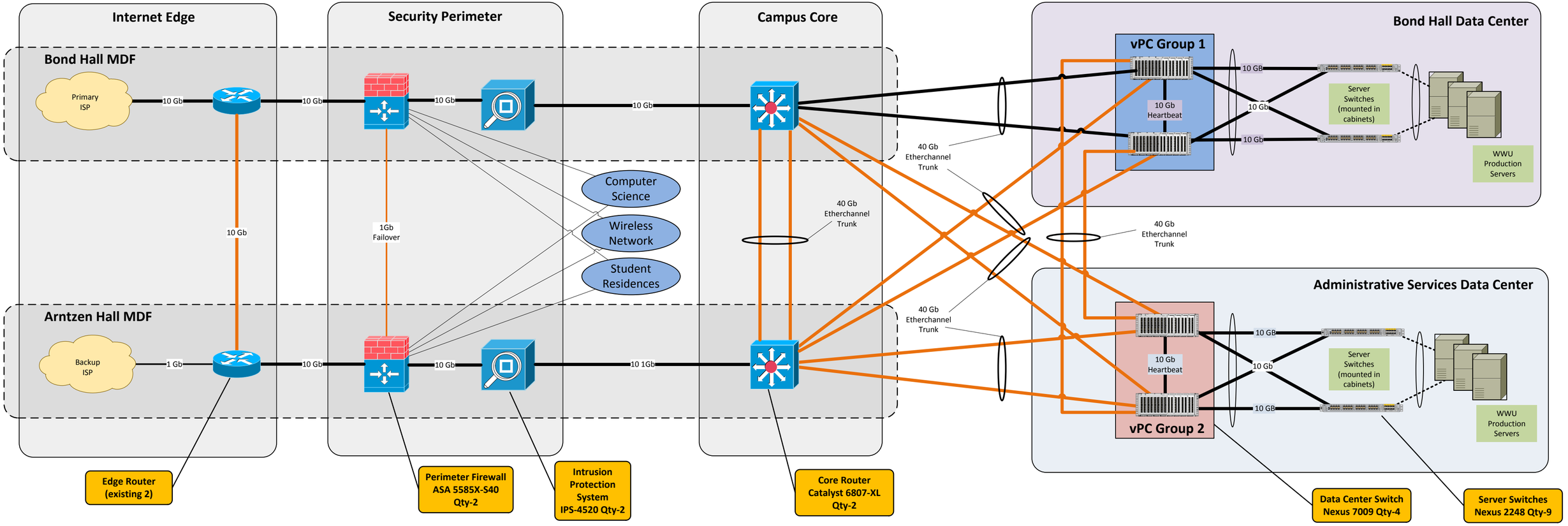
Description	Qty	Unit	Cost	Total
Perimeter Firewalls	2	EA	95,000.00	$190,000
Intrusion Protection Devices	2	EA	85,000.00	$170,000
Core Routers	2	EA	84,000.00	$168,000
Data Center Switches	4	EA	180,000.00	$720,000
Server Switches	9	EA	15,000.00	$135,000
Physical Connections	78	EA	1,500.00	$117,000
Installation	1	LS	350,000.00	$350,000
TOTAL				$1,850,000

Notes:
New equipment to replace existing.
Assumes existing racks and power supplies are adequate for new equipment.
Costs are intended to be contractor pricing only.
A&E fees and soft costs not included.
WWST not included.
No escalation is included

Sincerely,

Bill Diephuis, P.E., RCDD
K Engineers, Inc.

Core Infrastructure Upgrade Project



Appendix C

World-Class Education

GOAL 1: WORLD-CLASS EDUCATION

Expecting every child to receive a world-class education that prepares him or her for a healthy and productive life, including success in a job or career, in the community and as a lifelong learner

GOAL TOPIC

ACCESS

All Washingtonians have access to education that prepares them to transition to elementary, middle, high school, postsecondary, career and lifelong learning opportunities

SUCCESS

Washington's public schools provide innovative, high-quality opportunities and tools for every student to attain 21st century skills to succeed in school, job, career and community

SUB TOPIC

EARLY LEARNING

OUTCOME MEASURE

1.1. Increase the percentage of children enrolled in high-quality early learning programs from 2013 baseline to targets per program

LEADING INDICATORS

1.1.a. Increase state-funded preschool enrollment slots from the 2012-2013 baseline of 8,391 slots to 22,807 slots by 2018-19 school year to serve 100% of eligible children whose families choose to enroll

1.1.b. Increase number of children served in licensed child care settings and preschools participating in Washington's Quality Rating and Improvement System (QRIS) from December 2013 baseline of 60,719 children to 87,144 children by December 2015

1.1.c. Increase percentage of infants and toddlers, who due to developmental delays receive early intervention services from 2013 baseline of 2.2% to national average of 2.4% by December 2015

1.1.d. Increase the STEM math and science training opportunities for early learning professionals by 20% from 2013 baseline total by June 2015

1.1.e. Increase by 10% the number of parents/families who have access to support through voluntary home visiting services from June 2013 baseline by June 2015

Governor's Goal Council

- African American Affairs Commission – Ed Prince
- Arts Commission – Lisa Jaret
- Center for Childhood Deafness & Hearing Loss – Richard Hauan
- Community & Technical Colleges – Marty Brown
- Council of Presidents – Paul Francis
- Early Learning – Bette Hyde
- Education Ombuds – Stacy Gillett
- Office of Financial Management – Paula Moore
- Policy – Marcie Maxwell
- Results Washington – KayLyne Newell
- School for the Blind – Dean Stenehjem
- State Board of Education – Ben Rarick
- Student Achievement Council – Gene Sharratt
- Superintendent of Public Instruction – Alan Burke
- Workforce Training & Education Coord. Bd. – Eleni Papadakis

K-12

1.2 Increase the percentage of schools rated exemplary or very good on the Washington School Achievement Index by 10% by 2017

1.2.a. Increase percentage of children enrolled in state-funded full-day kindergarten from 22% to 100% by 2017-18 school year

1.2.b. Increase number of high school students who access high-quality online learning by 10% per year from 2013 to 2017

1.2.c. Increase access to effective dropout prevention programs offered by school districts and available to students from X to X by 20XX

1.2.d. Increase percentage of low-performing students receiving learning assistance intervention from X to X by 20XX

1.2.e. Increase percentage of public schools that provide access to all required subject areas (arts, world languages, career and technical education, fitness, social studies) from X to X by 20XX

1.2.f. Increase project-based, career, workplace, community learning opportunities that provide STEM and 21st century skills from X to X by 20XX

1.2.g. Increase percentage of National Board certified teachers who teach in a high-poverty school by 10% per year from 2013 to 2017

1.2.h. Increase percentage of first-year teachers with active, qualified mentor by 10% per year from 2013 to 2017

1.2.i. Increase percentage of sign language interpreters meeting newly established state performance standards from 33% in 2012-13 school year to 100% in 2016-17 school year

1.2.j. Increase percentage of teachers and principals rated distinguished from X to X by 20XX

POSTSECONDARY

1.3 Increase the percentage of population enrolled in certificate, credential, apprenticeship and degree programs from 13% in 2012 to 24.8% in 2023

1.3.a. Increase number of students enrolled in STEM and identified high-demand employment programs in public 4-year colleges from 31,282 to 32,642 by 2016-17

1.3.b. Increase the number of students who are enrolled in academic transfer STEM courses in public community and technical colleges from 41,936 in 2012-13 to 42,775 by 2016-17

1.3.c. Increase the number of students who are enrolled in high employer demand professional-technical programs in public community and technical colleges from 40,759 in 2012-13 to 41,574 by 2016-17

1.3.d. Increase percentage of eligible students who sign up for College Bound program from 80% to 92% by 2017

1.3.e. Increase percentage of eligible students who receive State Need Grant from 70% in 2013 to 85% in 2017

1.3.f. Increase number of families saving for postsecondary education and training expenses using the Guaranteed Education Tuition (GET) from 152,000 in 2012 to 182,000 in 2017

1.3.g. Increase project-based, career, workplace, community learning opportunities that provide STEM and 21st century skills from X to X by 20XX

1.3.h. Increase the number of students enrolled in online and hybrid courses in public 4-year colleges from 12,151 to 13,366 by 2016-17

1.3.i. Increase the number of students entering public higher education who access online learning (online and hybrid courses) in public community and technical colleges from 186,232 in 2012-13 to 189,957 in 2016-17

STEM: science, technology, engineering and mathematics

EARLY LEARNING

2.1 Increase the percentage of children entering kindergarten who demonstrate they are ready by 2% per year through 2015

2.1.a. Increase by 2% each year, 2012-13 through 2015, the percentage of children who demonstrate readiness skills for kindergarten in these areas: social-emotional, physical, language, cognitive, literacy, and math

2.1.b. Increase number of early learning providers who achieve level 3 or above in Early Achievers (voluntary quality rating and improvement system) from 2013 baseline of 253 programs to 1,471 programs by December 2015

NOTE: Data with a purple dotted line will be recalibrated after Common Core test results are available in 2015

Data separated by Native American, Asian, Pacific Islander, African American, Hispanic, Caucasian, English Language Learners, Students with Disabilities, Low Income

Data and metric will be available by October 2014

K-12

2.2 Increase the percentage of K-12 students who score proficient or better on statewide exams and graduate college- and career-ready from high school by 2% from 2013 to 2014

2.2.a. Increase percentage of students proficient in 4th grade reading and writing, 7th grade math and 8th grade science by 2% from 2013 to 2014

2.2.b. Increase percentage of students in a cohort who meet standards on all high school exit exams in or by 10th grade by 2% from 2013 to 2014

2.2.c. Increase percentage of high school students who graduate from high school in 4 years and 5 years by 2 percentage points per year from 2013 to 2018

2.2.d. Reduce opportunity gaps for all students through proficiency in reading, math, science (including biology for high school) by 2 percentage points from 2013 to 2014

2.2.e. Decrease percentage of recent high school graduates enrolled in pre-college or remedial courses in college from 40% to 35% by 2017

2.2.f. Increase number of K-12 schools recognized as innovative through meeting criteria listed in statute from 34 to 59 by 2017

2.2.g. Increase number of students who take high school courses to prepare them for STEM fields from X to X by 20XX

2.2.h. Increase percentage of high school graduates who during the 3rd quarter after graduation are either enrolled in post-secondary education or training or are employed in Washington from X% to X% by 20XX

2.2.i. Increase the percentage of entering 9th graders who after 4 years are either employed in Washington or enrolled in postsecondary education or training during the 3rd quarter from X% to X% by 20XX

POSTSECONDARY

2.3 Increase attainment of certificates, credentials, apprenticeships and degrees from 72,000 to 149,000 by 2023

2.3.a. Increase number of graduates in STEM and identified high-demand employment programs in public 4-year colleges from 10,726 to 11,661 by 2017-18

2.3.b Increase the number of graduates in academic transfer STEM in public community and technical colleges from 1,987 in 2012-13 to 2,027 in 2016-17

2.3.c Increase the number of students earning awards in high employer demand professional-technical programs in the public community and technical college system from 12,539 in 2012-13 to 12,790 in 2016-17

2.3.d Increase the percent of adult basic education and English as a second language students in public community and technical colleges who transition to pre-college or college-level within 2 years from 12% in 2010-11 to 15% in 2016-17

2.3.e. Increase percentage of postsecondary graduates from 4-year colleges who during the 4th quarter after graduation are either enrolled in post-secondary education or training or are employed in Washington from 80% to 82% in 2016-17

2.3.f. Increase the percentage of postsecondary graduates from public community and technical colleges who during the 3rd quarter after graduation are either enrolled in postsecondary education or training or are employed in Washington from 80% in 2012-13 to 82% by 2016-17

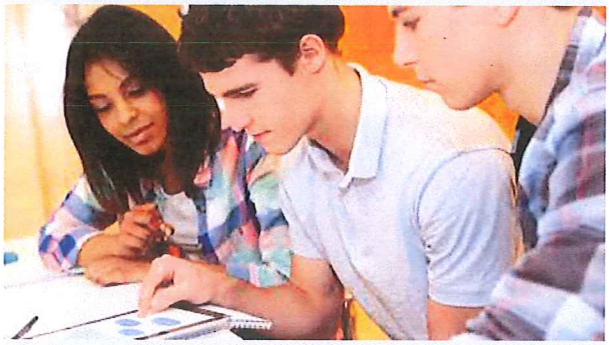
6/10/2014

Appendix D

EDUCAUSE CENTER FOR ANALYSIS AND RESEARCH

ECAR Study of Undergraduate Students and Information Technology, 2013

Contents



Authors

Eden Dahlstrom, EDUCAUSE Center for Analysis and Research

J.D. Walker, Research Associate, Office of Information Technology, University of Minnesota

Charles Dziuban, Director, Research Initiative for Teaching Effectiveness, University of Central Florida

Citation

Dahlstrom, Eden, J.D. Walker, and Charles Dziuban, with a foreword by Glenda Morgan. *ECAR Study of Undergraduate Students and Information Technology, 2013* (Research Report). Louisville, CO: EDUCAUSE Center for Analysis and Research, September 2013, available from http://www.educause.edu/ecar.

EDUCAUSE

EDUCAUSE is a nonprofit association and the foremost community of IT leaders and professionals committed to advancing higher education. EDUCAUSE programs and services are focused on analysis, advocacy, community building, professional development, and knowledge creation because IT plays a transformative role in higher education. EDUCAUSE supports those who lead, manage, and use information technology through a comprehensive range of resources and activities. For more information, visit http://www.educause.edu.

Foreword

Why do we study student technology choices and preferences? With the first student study launched in 2004 we had an instinctive sense of why the exercise was valuable. Several campuses had been collecting data on student technology use—some of them for quite a while—but this included little broad and generalizable data about how students in higher education were adapting to and using technology. There was speculation but little real data-driven insight. The first ECAR student study brought a larger perspective to what technologies students were using and to what they were thinking about and doing with respect to technology.

But at the time I am not sure that we fully understood just how valuable the product and the process that we created would become. The value has both grown and become more evident over time. The body of longitudinal data that we have built and the insight it brings us about trends reflect the rate at which technology has changed over the past decade. In 2004 there was no YouTube or easily accessible video, mobile devices had made little impact, *blended learning* was a relatively new term, the consumerization of technology had not really taken hold, and MOOCs (massive open online courses) and digital badges were yet to be encountered.

One feature common to all of these technology changes is the way they empower the individual user. This makes it imperative that we have the kind of data that the ECAR study gathers and with the large and varied sample that it is able to muster. If technology is personalized and if students are bringing their own devices and using consumer-grade tools, then we need to know what they use and to what ends. We need to think through some of the implications of this usage for faculty, administrators, and technology support staff.

While changes in technology over the decade chronicled by the ECAR student study have been profound, there is an amazing sturdiness to student attitudes and preferences about technology and in its corresponding patterns of use. From the beginning students saw promise and utility in technology (though perhaps less direct relevance to their academic success than we might like), but clearly they had some reservations about it and some clear boundaries for its use. Reviewing 10 years of the study shows how students are generally slow to adapt to new technologies and practices, especially where it relates to their academics. There is an apparent disconnect between the technology students have and use and the practical application of these technologies "in the classroom." Doing more to facilitate use of technology in creative and meaningful ways—ways that encourage and support the use of technology for academics—is something that each of us has a certain level of responsibility for to improve students' technology experiences.

Glenda Morgan, University of Illinois at Urbana-Champaign

Executive Summary

Since 2004, ECAR has partnered with higher education institutions to investigate the technologies that matter most to students by exploring technology ownership, use patterns, and perceptions of technology among undergraduate students. In 2013, the ECAR technology survey was sent to approximately 1.6 million students at 251 college/university sites, yielding 113,035 respondents across 13 countries. This year's findings are organized into four main themes to help educators and higher education institutions better understand students' current experiences:

- Students' relationship with technology is complex—they recognize its value but still need guidance when it comes to better using it for academics.
- Students prefer blended learning environments while beginning to experiment with MOOCs.
- Students are ready to use their mobile devices more for academics, and they look to institutions and instructors for opportunities and encouragement to do so.
- Students value their privacy, and using technology to connect with them has its limits.

These themes not only inform us about undergraduate students' opinions concerning technology, but they can also provide insight about the technology needs and expectations of tomorrow.

Summary of Findings

Students' relationship with technology is complex. They recognize its value but still need guidance when it comes to better using it for academics. The affinity of undergraduates for multimedia, mobile devices, and multitasking is well documented. What is less well recognized is the circumspect way in which students think about integrating technology into their academic lives, a characteristic of college students that has persisted for many years. Educational technology need not be flashy in order for them to value it (e.g., the course management system [CMS], asynchronous discussions, and online course content), and even the most dedicated technophiles want to know how the latest innovation will help them in their classes and in their undergraduate experience generally.

- Students value the ways in which technology helps them achieve their academic goals and prepares them for their future academic and workplace activities.
- Students are generally confident in their preparedness to use technology for coursework, but those who are interested in more technical training favor "in class" guidance over separate training options.
- Basic technology resources, such as the institution's website and the CMS, are the most pervasive and most valued.

- Freely available course content/open educational resources, e-books, simulations and education games, and e-portfolios are still in the experimental stages for most students.

Students prefer blended learning environments while beginning to experiment with MOOCs. When it comes to modality, college students seem to recognize effectiveness when they see it. Their preference for blended learning environments tracks well with the findings of recent large meta-analyses of the efficacy of different ways of integrating technology into higher education (e.g., the analysis by Barbara Means et al., 2010[1]). And students' long-standing desire to retain some degree of face-to-face contact with their professors persists, even with the increasing sophistication of online methods of interaction. Even for people who have never known a world without the Internet, the human touch is valuable.

- Although not fully mainstream, blended learning persists as the preferred modality.
- More students are taking online-only courses; however, few undergraduates have taken a MOOC.
- Few students say they'd use a digital badge (common in MOOC credentialing) in their application portfolio for an employment interview.

Students are ready to use their mobile devices more for academics, and they look to institutions and instructors for opportunities and encouragement to do so. Students and faculty gain sophistication with technology each year, and each year there is greater expectation for technology to be used as a teaching and learning tool. Students look to their instructors and their institutions for guidance about how to best use the technology they own to enhance their college/university experience, not only from an academic standpoint but also from an experiential standpoint. Finding how to best incorporate technology into the academic environment will require a partnership involving students, their instructors, and the institution. Mobile devices present a conundrum in this regard, because in the classroom, they can easily and indistinguishably be used for both class-related and extracurricular activities.

- Students hold high expectations for anytime, anywhere access to course materials and for leveraging the use of their personal digital devices inside and outside class.
- Undergraduates own two to three Internet-capable devices, and ownership of smartphones and tablets jumped the most (among all devices) from 2012 to 2013.
- Laptops are still cited as the most used and most important device for academics, but more students are beginning to use smartphones and tablets for academic purposes.
- In-class use of smartphones and tablets is not yet common; students say they are often prevented or discouraged from using these devices while in class.
- Mobile-device access to institutionally provided services, applications, and websites is up, though performance ratings are waning a bit compared with 2012.

Students value their privacy, and using technology to connect with them has its limits. The nature and degree of undergraduates' expectations of privacy is the subject of some debate. What is beyond doubt is that students are extremely sensitive to the boundaries between their personal and their academic lives. Even when safeguards are promised, students resist the integration into education of technologies that they perceive to be primarily personal, clearly indicating that because some technology is used widely by students does not mean that it should be leveraged for academic use.

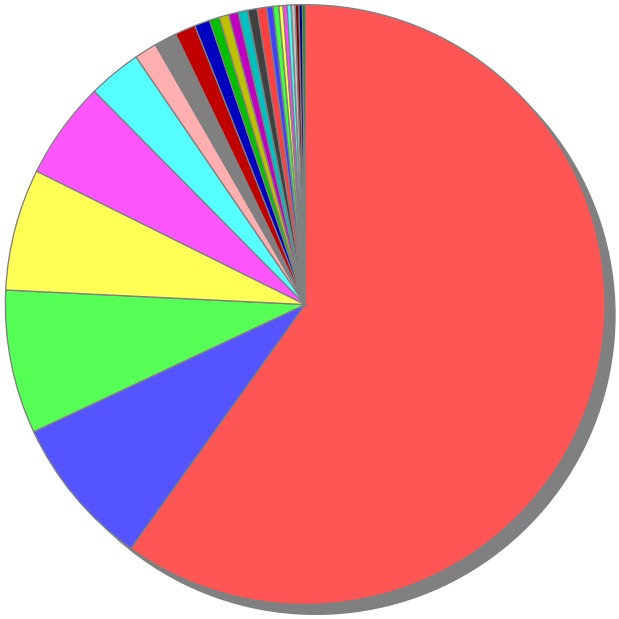
- Technology makes the connected age possible, but using technology to help students *feel* more engaged in their classes (or campus life) and connected with others on campus can be challenging.
- Students prefer to keep their social and academic lives separate, and they maintain those boundaries in their use of technology.
- Students are only moderately interested in early-alert learner analytics and guidance about course offerings.
- Students prefer face-to-face interactions, e-mail, and the CMS as ways to communicate more with their instructors.

The Connected Age

For higher education, the "connected age" describes the technology-assisted hyperconnectivity of learners, faculty, and institutions to those around them.

Appendix E

IPS Top 25 Signatures Report



Report period: From Wed, 1 Jan 2014 00:00:00 PST to Tue, 1 Jul 2014 00:00:00 PDT

Data Filtering: ((severity = 'high' or severity = 'low' or severity = 'medium' or severity = 'informational'))

No.	Signature ID/Sub-ID	Signature Name	Alerts	Percentage
1	1090/1	NTP MODE_PRIVATE Denial of Service	2604520	59.88%
2	11022/1	Overnet Client Scan	354579	8.15%
3	3653/0	Multiple Rapid SSH Connections	336939	7.75%
4	7202/0	UDP eDonkey Activity	285572	6.56%
5	1306/0	TCP Option Other	228380	5.25%
6	5474/0	SQL Query in HTTP Request	125044	2.87%
7	1330/16	TCP Drop - Segment Out Of Order	53021	1.22%
8	1225/0	Fragment Flags Invalid	52733	1.21%
9	11030/0	Bittorrent Tracker Query	48344	1.11%
10	1203/0	IP Fragment Overwrite - Data is Overwritten	36151	0.83%
11	3041/0	TCP SYN/FIN Packet	23327	0.54%
12	18183/0	uTorrent Activity	22771	0.52%
13	11020/3	BitTorrent Client Activity	22731	0.52%
14	11020/2	BitTorrent Client Activity	22220	0.51%
15	5474/1	SQL Query in HTTP Request	22140	0.51%
16	11203/1	IRC Channel Join	22015	0.51%
17	28779/0	VxWorks Remote Debug Interface	15024	0.35%
18	11031/0	Bittorrent Tracker Scrape	13412	0.31%
19	5930/18	Generic SQL Injection	9785	0.22%
20	1311/0	TCP Packet Exceeds MSS	9493	0.22%
21	13000/0	AD - Internal TCP Scanner	9445	0.22%
22	1208/0	IP Fragment Incomplete Datagram	9317	0.21%
23	1204/0	IP Fragment Missing Initial Fragment	8513	0.20%

No.	Signature ID/Sub-ID	Signature Name	Alerts	Percentage
24	2271/0	PHP Remote Code Execution	8289	0.19%
25	24199/1	UDP Source Port 0	6163	0.14%
Total			**4349928**	**100%**

Appendix F

Edge Security Systems
Internal Document

Intrusion Prevention System

- Over the past several years we have been seeing 9-fold increases in bandwidth usage to the internet. As we continue to move software services off-campus to the cloud, this bandwidth usage will increase at a rate we cannot readily predict. Even now we are reaching points of time where the consistently high utilization is causing sluggishness and possible dropped packets of data and even though dropped packets are automatically retried by the operating systems, it compounds the problems by requiring the data be sent multiple times. In 2013 we upgraded our internet bandwidth providing 10Gb/s primarily to support student residence needs, but we are still operating the academic side of the network with equipment that limits us to only 1Gb/s of the 10Gb/s provided. Our intrusion protection system (IPS) is the key system that prevents us from utilizing this additional bandwidth and a 10Gb capable system is needed to mitigate this bottleneck.
  There are also many more features available, such as packet decryption and re-encryption to check for malicious data that may be hidden by being encrypted and more comprehensive attack vector reporting and mitigation. We will also be able to control access to more than 280 million URLs in over 80 categories. We will also be able to analyze and alert on the trajectory of malware to better mitigate the spread of malicious software.

  Other threat protection includes:
  • Worms
  • Trojans
  • Backdoor attacks
  • Spyware
  • Port Scans
  • VoIP attacks
  • IPv6 attacks
  • DoS attacks
  • Buffer overflows
  • P2P attacks
  • Statistical anomalies
  • Protocol anomalies
  • Application anomalies
  • Malformed traffic
  • Invalid headers
  • Blended threats
  • Rate-based threats
  • Zero-day threats
  • TCP segmentations and IP fragmentation

Edge Security Systems
Internal Document

Internet Edge Firewall

- Currently while our edge firewall pair can connect at 10Gb/s speeds, they cannot accommodate those speeds beyond a few hundred meters. This limitation does not allow us to separate the redundant firewalls in the two buildings where our core infrastructure resides due to distance limitations of the fiber optic transceivers. As the university continues to operate in a more diverse environment where applications and services are both served on and off-campus, these gateway components are critical for reliability and function since losing them to failure, not only impedes internet browsing, but critical business applications and communications.

  As technology advances over time, what were typically separate devices, firewall and IPS technologies are combining and will probably soon be single devices that perform both functions.

Appendix G

WWU CAPITAL IMPROVEMENTS, INTERMEDIATE- IT NETWORK UPGRADES

This is an Opinion of Probable Cost

DATE:	March 12, 2014
A/ E:	**RMC Architects**
ESTIMATE:	Conceptual Estimate
BY:	Matthew M. Woolsey, The Wool-Zee Company, Inc.
SPECIFICS:	**Update Existing IT Network**
LOCATION:	**Campus**

ITEM #	TITLE		TOTAL
1	A/S/C WORK (5% OF ELECTRICAL)		$100,000
2	ELECTRICAL		$1,850,000
3	MECHANICAL		$0
	PROJECT TOTAL Bare Costs		**$1,950,000**
	Estimate Contingency	10%	$195,000
	PROJECT SUBTOTAL		**$2,145,000**
	General Requirements	10%	$214,500
	PROJECT SUBTOTAL		**$2,359,500**
	GC Overhead & Profit	8%	$188,760
	PROJECT TOTAL		**$2,548,260**

Exclusions and Assumptions:

1 Estimate Does NOT Include State/Local Taxes

WWU Capital Project Request Budget Estimates

This is an Opinion of Probable Cost

DATE:	12-Mar-14
A/ E:	**RMC Architects**
BY:	K Engineers, Inc.
SPECIFICS:	**Intermediate Capital Project Project Estimates**

Item #	Description	Quantity	Units	UNIT & EXTEND COST Unit Cost	Extended	TOTALS
IT Network Update						
1	Core Routers	**6**	EA	75,000.00	**$450,000**	**$450,000**
2	Edge Firewalls	**20**	EA	25,000.00	**$500,000**	**$500,000**
3	Data Center Switches	**12**	EA	75,000.00	**$900,000**	**$900,000**
4						
5						
6						
7						
	SUBTOTAL (Electrical contractor)					**$1,850,000**

Commentary:
Costs include installation, connections, configuration, etc.
Assumes existing campus fiber optic network is adequate for added connections.

Appendix H

Western Washington University
Institutional Master Plan

An Addendum to the Western Washington University Neighborhood Plan

Adopted by the City of Bellingham, September 24, 2001
Ordinance #2001-09-068

Approved by WWU Board of Trustees, October 5, 2001

WESTERN
WASHINGTON UNIVERSITY

Parking and Transportation, Visitors Information Center, Alumni House, and High Street Hall.

- Steam is distributed primarily in the tunnel system with some radial feeds in utilidors.
- The Steam Plant has capacity for expected growth.
- The condensate system in many areas is at the end of its expected life and should be replaced within 20 years. (Condensate is the hot water return system for the steam.)
- The anticipated growth may require increasing steam pressure in the existing lines to meet future needs.
- Increasing pressure would increase maintenance requirements and may require changing condensate piping, insulation, and pressure reducing valve settings.
- It is recommended that buildings south of the Academic Zone District not be served with steam due to the decrease in efficiency levels.

Telecommunications

- The University is in the process of completing its Integrated Signal Distribution System (ISDS). This system is a fiber optic backbone for transporting information.
- The ISDS lines are fiber optic cables and carry data communications, fire and life safety communications, building controls and automation communication, and television.
- The telecommunication systems are run through campus in the tunnel system or ductbanks to all buildings.
- The telephone system (voice communications) runs on copper cable to a main switch in Bond Hall. Private companies currently provide public switched network access and long-distance carrier services.

- A satellite communication system is also located at the Physical Plant and connects to the ISDS system.
- The campus has an emergency telephone system throughout campus. The emergency phones use cell technology and connect to University Police.
- There is a need for cellular telephone and communication technology to serve the campus and neighbors.