USP
THE UNIVERSITY OF THE SOUTH PACIFIC

The University of the South Pacific

Campus Network Expectations and Challenges

Welcome

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IT Services

Agenda

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- About USP
- LAN & WAN Infrastructure
- Systems & Networks Infrastructure
- Cloud Services
- Challenges
- Future

About USP

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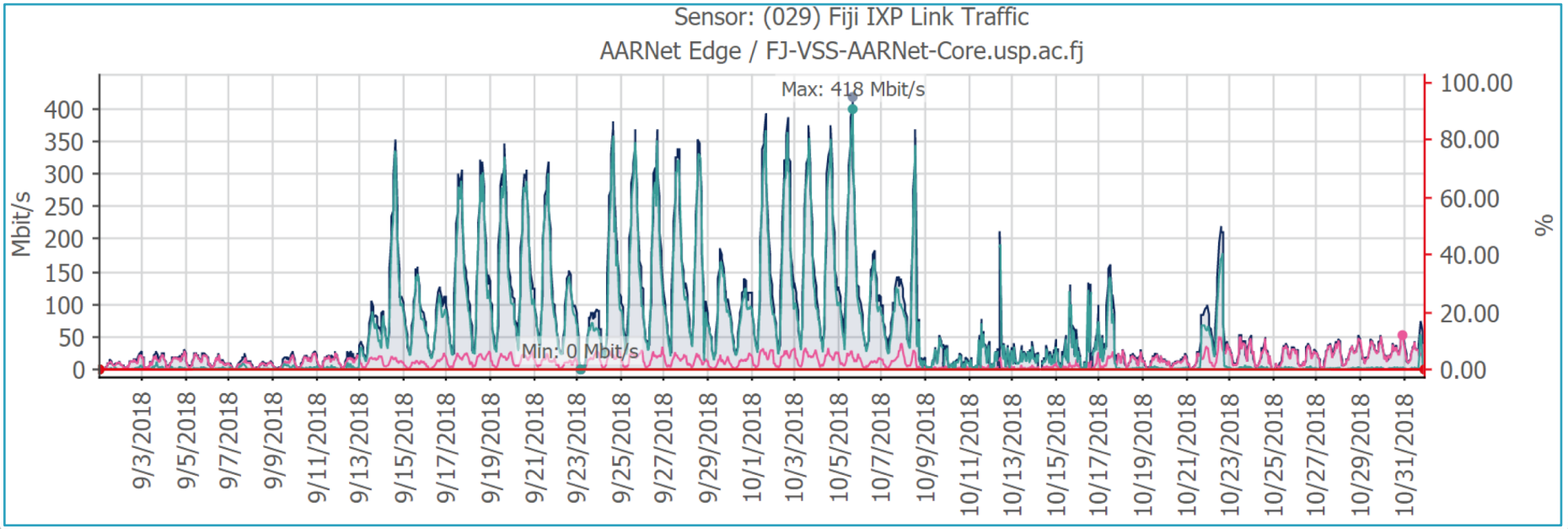
- USP established 1968 to serve 12 member countries.
  - Fiji, Samoa, Vanuatu, Solomons, Tonga, Kiribati, Tuvalu, Nauru, Marshalls, Niue, Cooks, Tokelau.
- Unique Regional Scope;
  - Covering thousands of islands over 33 million square km of ocean
  - Around 2 million people and hundreds of distinct cultures
  - 25,000+ students; 5-8% growth p.a. & 1500 Staff
- Connectivity
  - 26 Active Sites over 12 Countries
  - Satellite C & Ku Band (16 Sites – 28 Mbps)
  - Undersea & Terrestrial Fiber (Fiji Sub Sites, Tonga, Marshalls, Vanuatu & Samoa)
  - Upstream via Research & Education Network (AARNet)

Connectivity Cont….

- Fiji eXchange Point (IXP) Peering (Early 2018)
  - Better service access for Students & Staff
  - Better VPN Access (Work from Home)
  - Planning Stages: Livestream lectures for Fiji
- Future for IXP – Later Slide!



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LAN & WAN Infrastructure

Roads & Bridges

Satellite Platform Revamp

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- C Band Dishes Installed 1999 - 20 Years Old
  - EOL 15 to 20 Years
- Regional Dishes
  - 7 New Installs: 2 Non Penetrating & 5 Penetrating Mounts
  - 3 Refurbished plus non penetrating mount dishes
- Fiji Hub
  - Refurbish current
  - Build new antenna
- Enhanced IP Satellite System (iDirect)
  - 32% efficiency gains of current outbound Mbps
  - Better enhancements (DVBS-2X with ACM)
  - Enhanced Modem performance (32APSK Modcods)

Fiber Ring Journey

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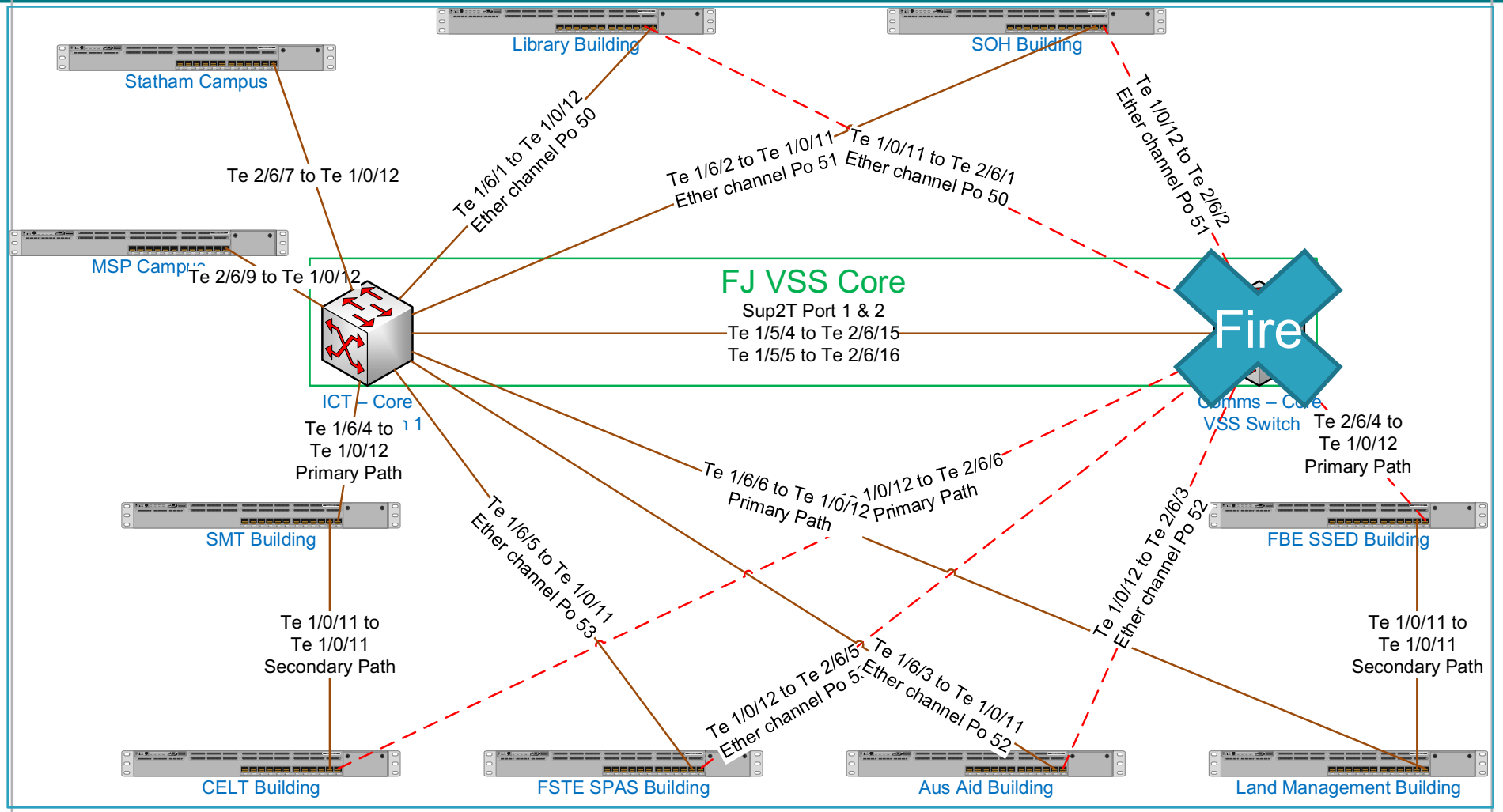
- Business Case Approved - 2008
  - Fiber Purchased Approved
- Trenching Works Completed - 2009
- Cabinet Cleanup & Auditing Completed - 2011
  - 70+ cabinets
  - 35 fiber terminals
- Fiber Pulling and Termination Completed - 2013
  - Documentation Update & As-Builds
- Cabinet Electrical Wiring & Grounding - 2015
- Fiber Ring Switches Purchase Approved - 2017
- Fiber ring Online & Operational - Oct 2018

Fiber Ring Infrastructure



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Systems & Networks Infrastructure

Layering on equipment!

General Networking

- Scale
  - 10 / 40 / 100 Gig
- Reduced Footprint
  - Less racks = Less Power
  - Smaller rooms
  - Less cooling
- Wireless Services
  - Centralized Management
  - No Cabling No Problems (Mesh)
    - 15000 Feet = 4572m
  - Over 350 AP's
  - 2000+ Connected Users
- Design is Essential
  - Redundancy & Resiliency
  - NSRC Engagement

Wireless Dashboard

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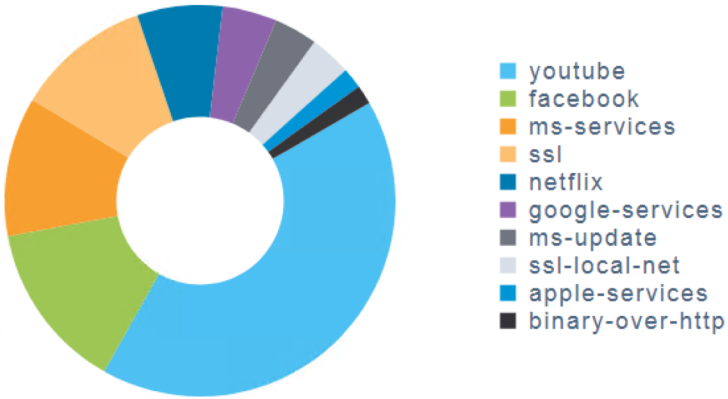
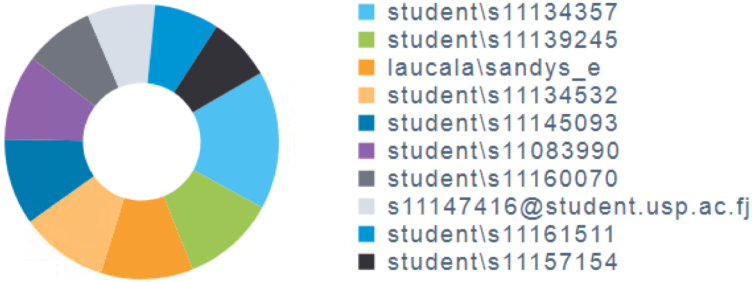
NETWORK SUMMARY

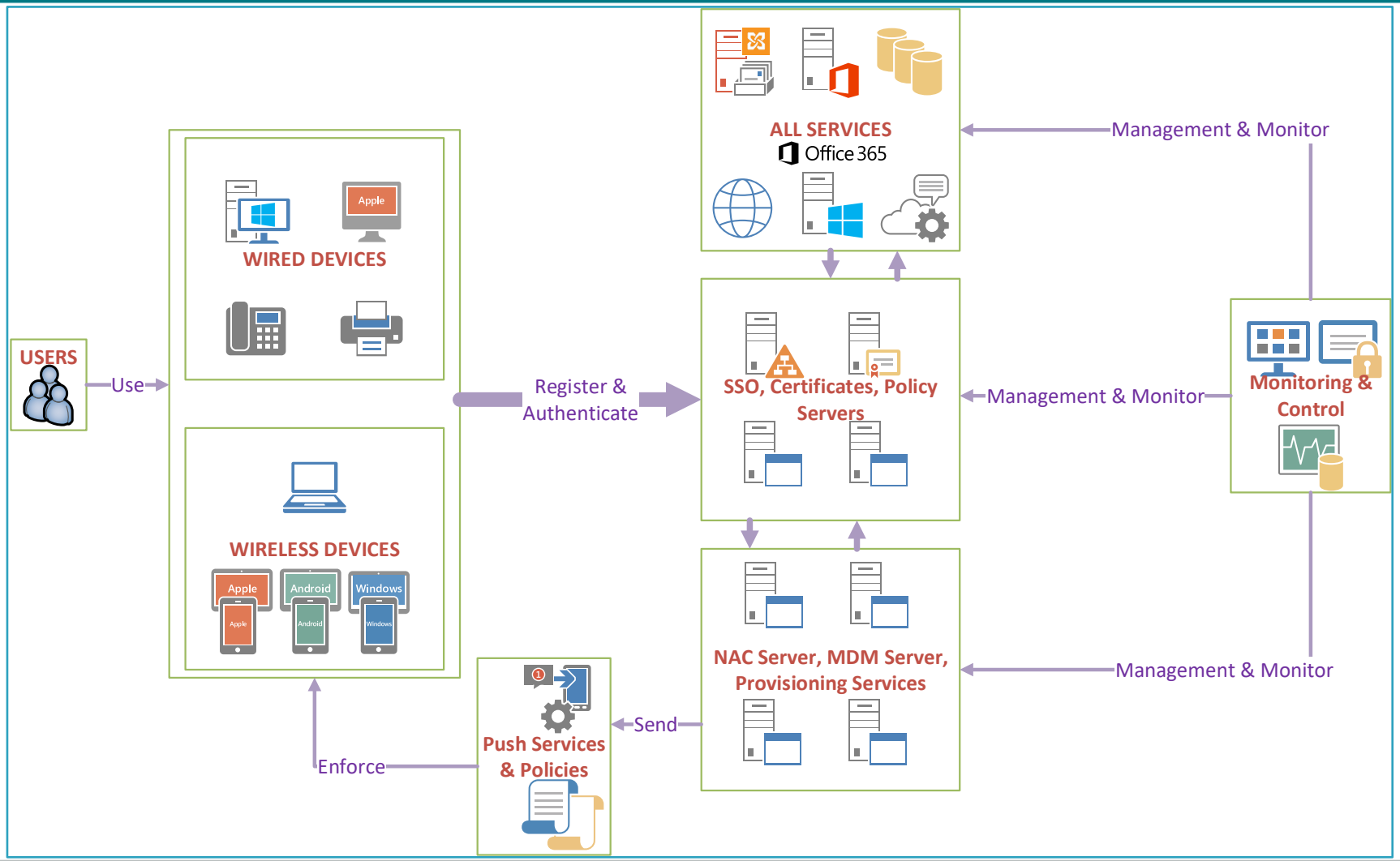
APPLICATIONS
BY USAGE



CLIENTS
BY USAGE

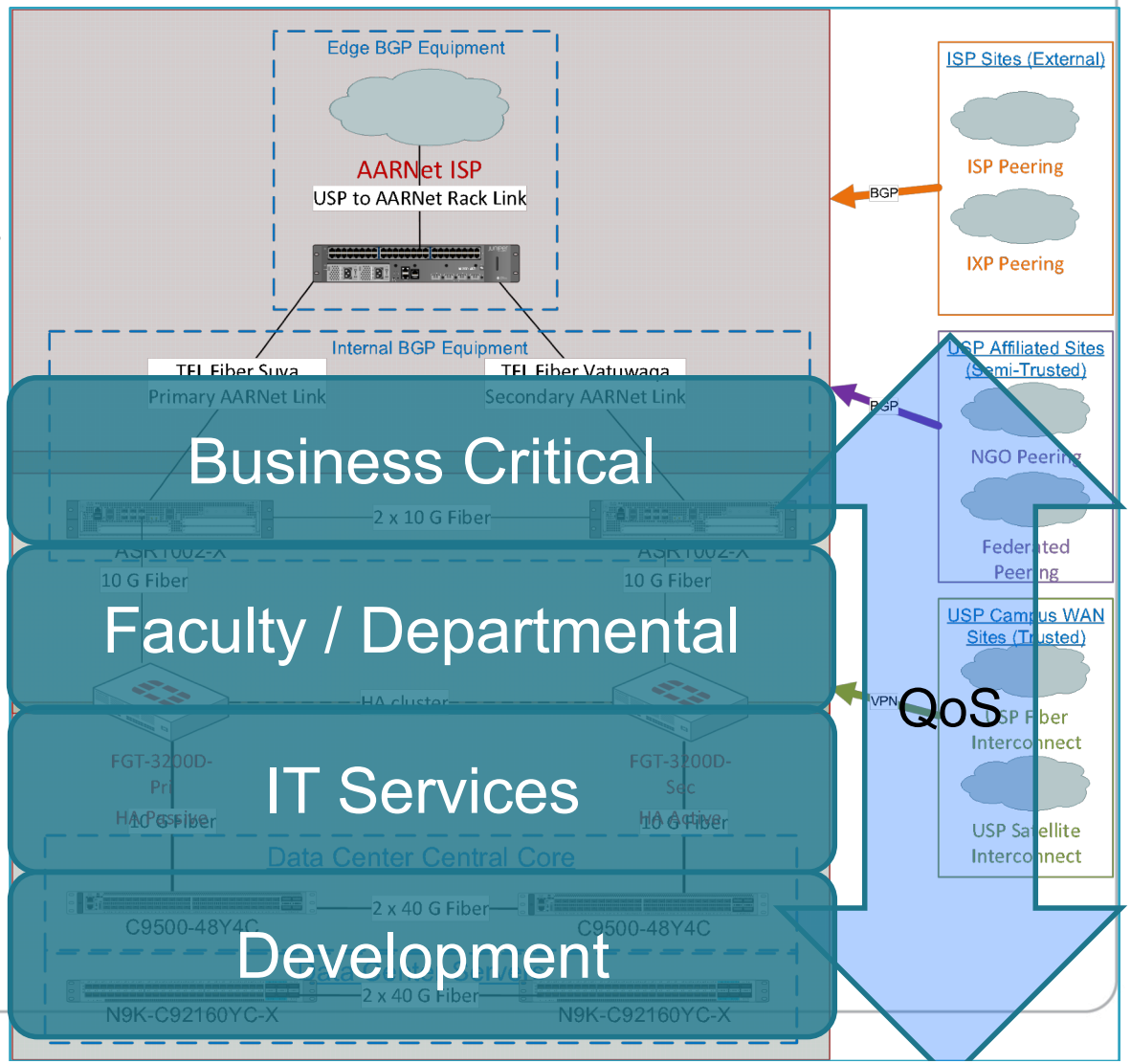


Design - Wireless



Design – Layered Approach

- Reference Point
- Endorsed Direction
- Easy Equipment Choices
- Application Provision
  - Business Critical
  - Faculty / Departmental
  - IT Services
  - Development
- QoS Tagging
  - End to End



Server Hyper Converge Infrastructure (HCI)

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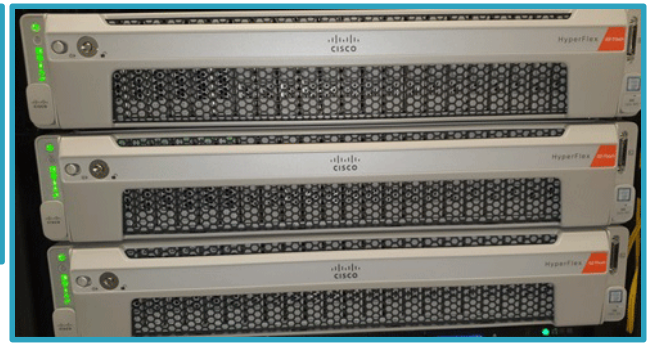
- Technology
  - Smaller
  - Faster
  - Compact
- Reduced Footprint
  - Less power
  - Less racks
  - Smaller rooms
  - Smaller cooling
  - Better Electrical



NUTANIX

HCI Server Compute

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- HCI Node Failover N+1

#	Technology	CPU (>2.0 Ghz)	Memory (TB)	Storage
1	Dell VX Rail G410 (6 Nodes)	5 Nodes x 14 Cores x 2 = 140 With HyperThreading = 280	2.5	65 TB Effective (All Flash)
2	Cisco HyperFlex HX240c (3 Nodes)	2 Nodes x 20 Cores x 2 = 80 With HyperThreading = 160	3	120 TB Effective (All Flash)
3	IBM ThinkAgile HX552x (8 Nodes)	7 Nodes x 20 Cores x 2 = 280 With HyperThreading = 560	2.8	480 TB Raw (Hybrid) 250 TB Effective

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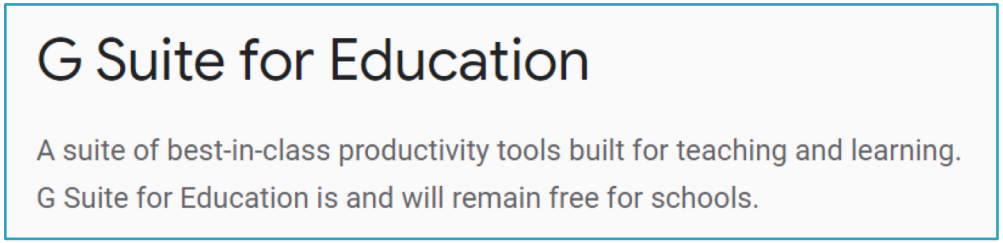
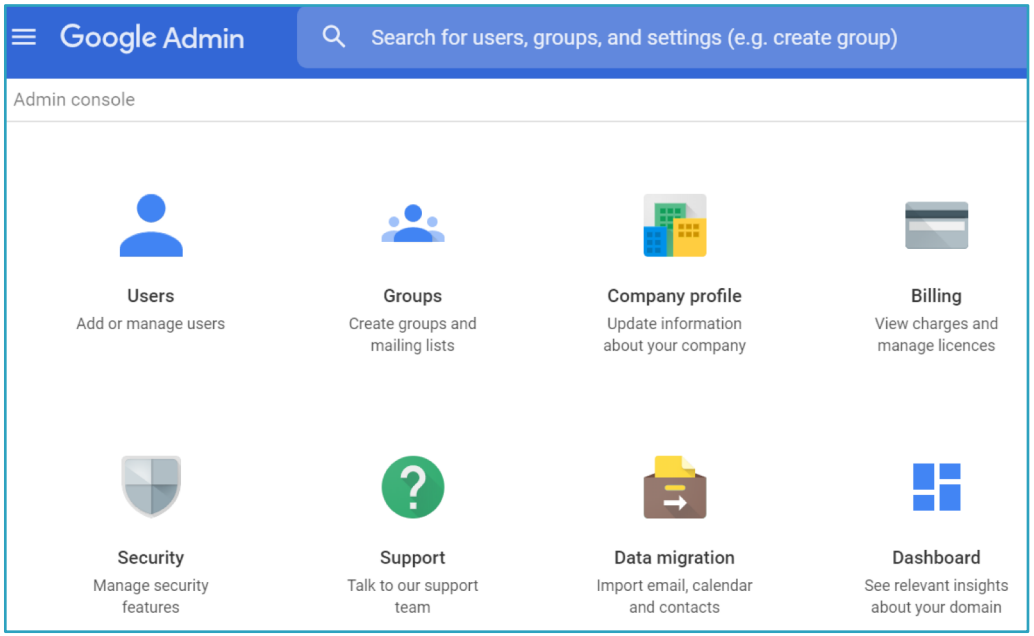
Cloud Services

Determine services that should be placed in the Cloud.

Student Gmail

- On Premise
  - Google Cloud Directory Sync
  - Users & Groups
- Cloud Security
  - Anti-SPAM
  - AV
  - IPS
- Students
  - 15 Gig mailbox per user
  - Unlimited Cloud Storage
  - 30,000 active users
  - 450 Terabytes of Data





Backup

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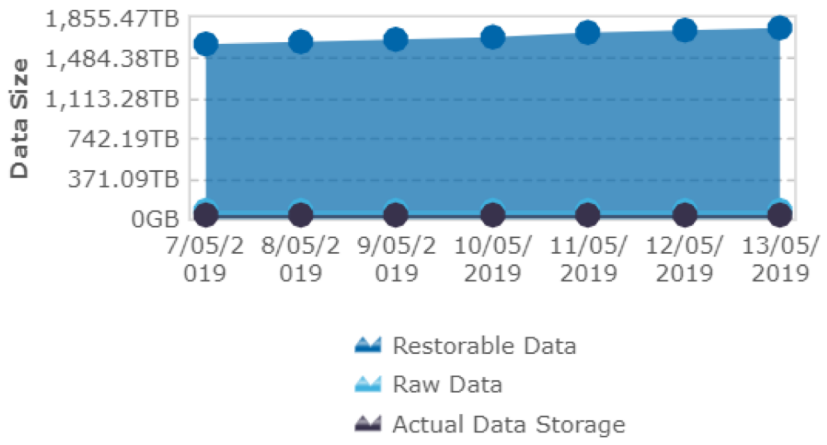
#	Service Classification	Backup Frequency	Recovery Testing Frequency	Retention Period
4	Development	None	None	n/a

Last Task Status

All Nodes | All Task Type:

Successful	150
Failed	0
Canceled	0
Missed	0
Not Connected	1
Incomplete	0

Actual, Restorable and Raw Data: Last 7 days



MANAGEMENT CONSOLE

Recovery

- 3rd Backup Repository
  - Cloud storage services.
  - Amazon AWS / MS Azure / Google / USP
  - Cost vs Features vs Ease
- Service Recovery
  - Spins services on the cloud
  - Business disaster options
  - No need for secondary data center

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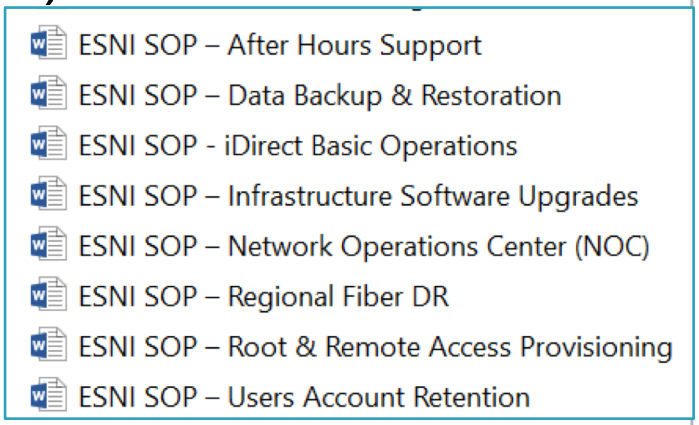
Challenges

What keep the cogs turning!

Challenges for Team

- Documentation
  - Maintaining records (meticulous)
- Standard Operating Procedures (SOP)
  - Process driven
  - Flow of events
- Automation & Central Management
  - 4 Systems Engineers
  - 5 Network Engineers
  - 3 Infrastructure Techs
- Infrastructure Patching vs Application Updates
  - Patching security platforms, networking gear, etc.
  - Updating application code and open source development.



Challenges Cont.…

- Construction / Landscaping
  - Fiber Cuts & Pit Damage
  - Redesign of contractor plans
- Technical Expertise
  - Constant training renewal
  - Recruiting appropriate personnel
  - Internal recruitment process
  - Maintaining market value
- Security
  - Securing people (Trust but Verify)
  - Securing infrastructure
  - Securing services
- Weather – No Control!

Bridging the Gaps

- NOC Monitoring
  - Interns with supervisory staff.
  - Weekday operations from 7am to 10pm
  - Weekend operations from 10am to 6pm
  - Other Hours: Automated Notifications
- Detailed Monitoring
  - Network Operations Center (NOC) – iCinga
  - Bandwidth Validation – Perfsonar
  - Network Monitoring – Cisco Prime
  - Systems Monitoring – vCenter
  - Security Monitoring – Firewall Analyzer

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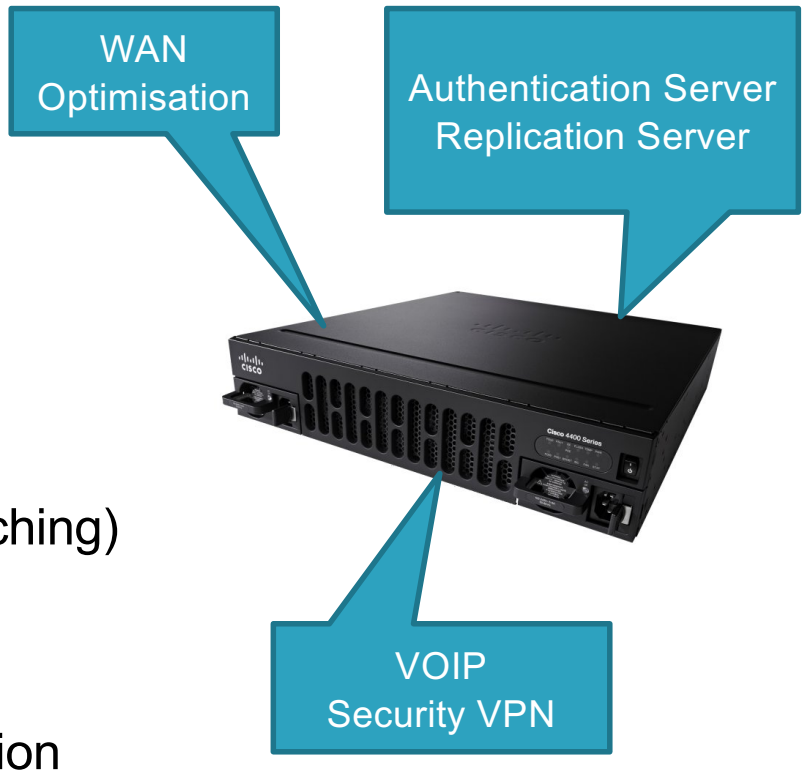
Future

What's next on the roadmap?

Future

- Connectivity
  - IPv6 Re-Deployment (/32)
  - Regional Fiber Connects (join Fiji eXchange Point)
  - Additional Satellite Providers
  - Wi-Fi 6 Road Map
  - Extend 10 Gig – Office Uplink
- Cloud
  - Office 365 & Disaster Recovery
- Infrastructure
  - Small is better so consolidate
  - Localise Content to remote sites (caching)
- Technology Trends
  - Keep track on current technologies
  - Extensive Automation & API Integration



Thank You & Questions

We do things right, our people stay connected!

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