LEARN
ANNUAL NOC MEETING
2023 –DEC-14

PRESENTER:

M M ZAHEER HUSSAIN

NETWORK MANAGER

MSC (READING) BSC (HONS) IT MCTP MCSE CCNA

AGENDA

- About OUSL
- About ITD
- IT Services
- Network Infrastructure
- Server Infrastructure
- Overview of the Data Center
- Desktop Computer Assemble
- Challenges
- Future Scope
- Network Team
- Q & A

ABOUT OUSL

Established: 1980

Focus: Specialization in Distance Education

Flexibility:

Offers flexible higher education for diverse student populations, including working professionals and remote learners.

Instructional Methods:

Utilizes print materials and online resources, allowing self-paced study.

Programs:

Features undergraduate and postgraduate programs across six faculties:

- Education
- Natural Science
- Engineering Technology
- Health Science
- Humanities and Social Sciences (HSS)
- Management Studies

Centres: 30

Current Vice-Chancellor:

- Professor P.M.C. Thilakerathne.

ABOUT IT DIVISION

Role:

Provide comprehensive technical support for departmental projects, events, and various technical needs at The Open University of Sri Lanka.

Collaboration:

Constant collaboration with university staff and students.

Responsibilities:

Maintaining IT strategies, policies, priorities, and resource allocations on time.

Providing direction on optimal utilization and integrating the university's IT infrastructure, resources, and services.

Team Structure:

- 01 - Director
- 26 - Permanent Staff
- 08 - Temporary Staff

Sections:

- Network
- Software
- Hardware Workshop

Current Director IT:

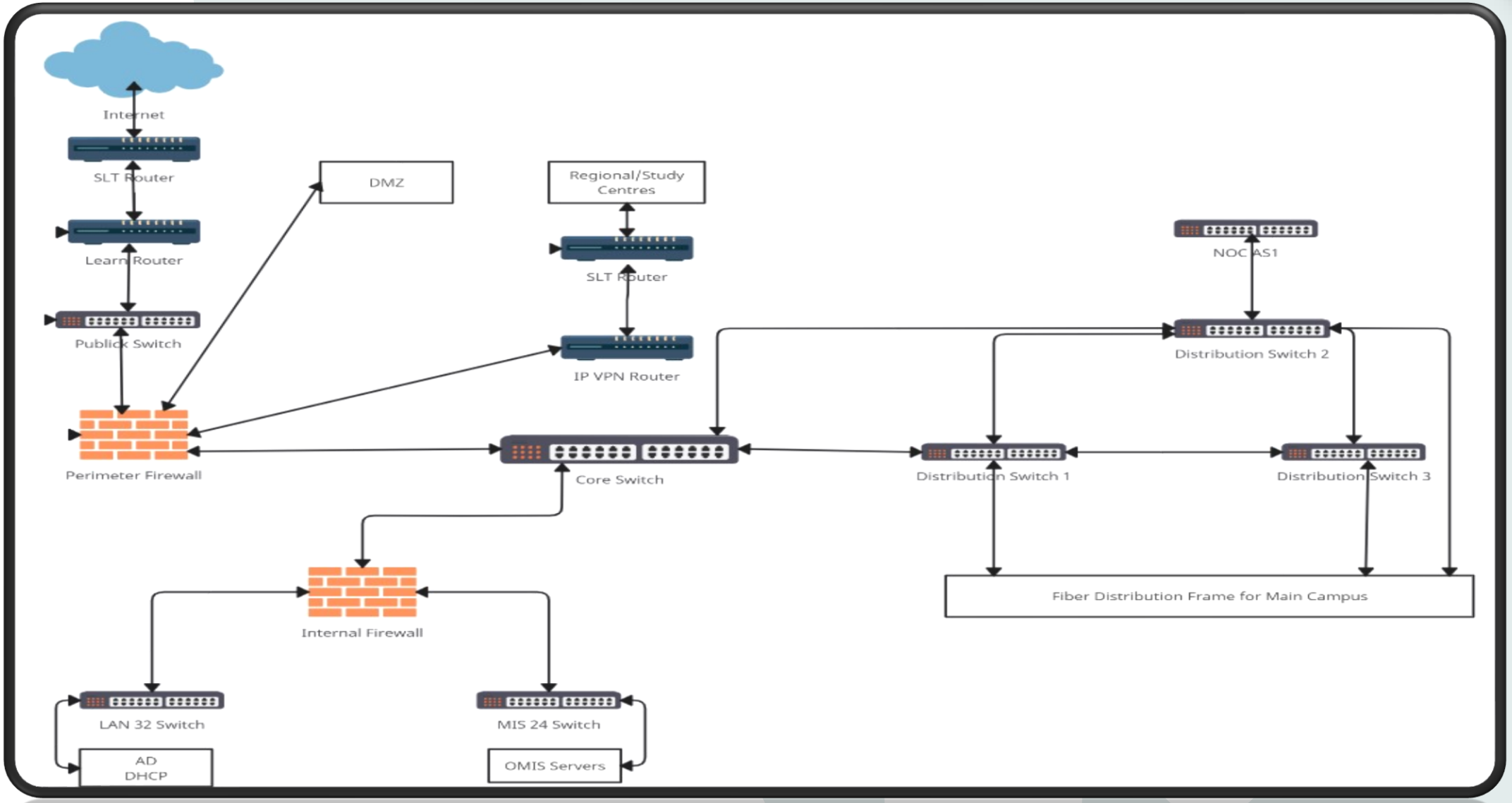
- Eng. C. J. Basnayakege

IT SERVICES

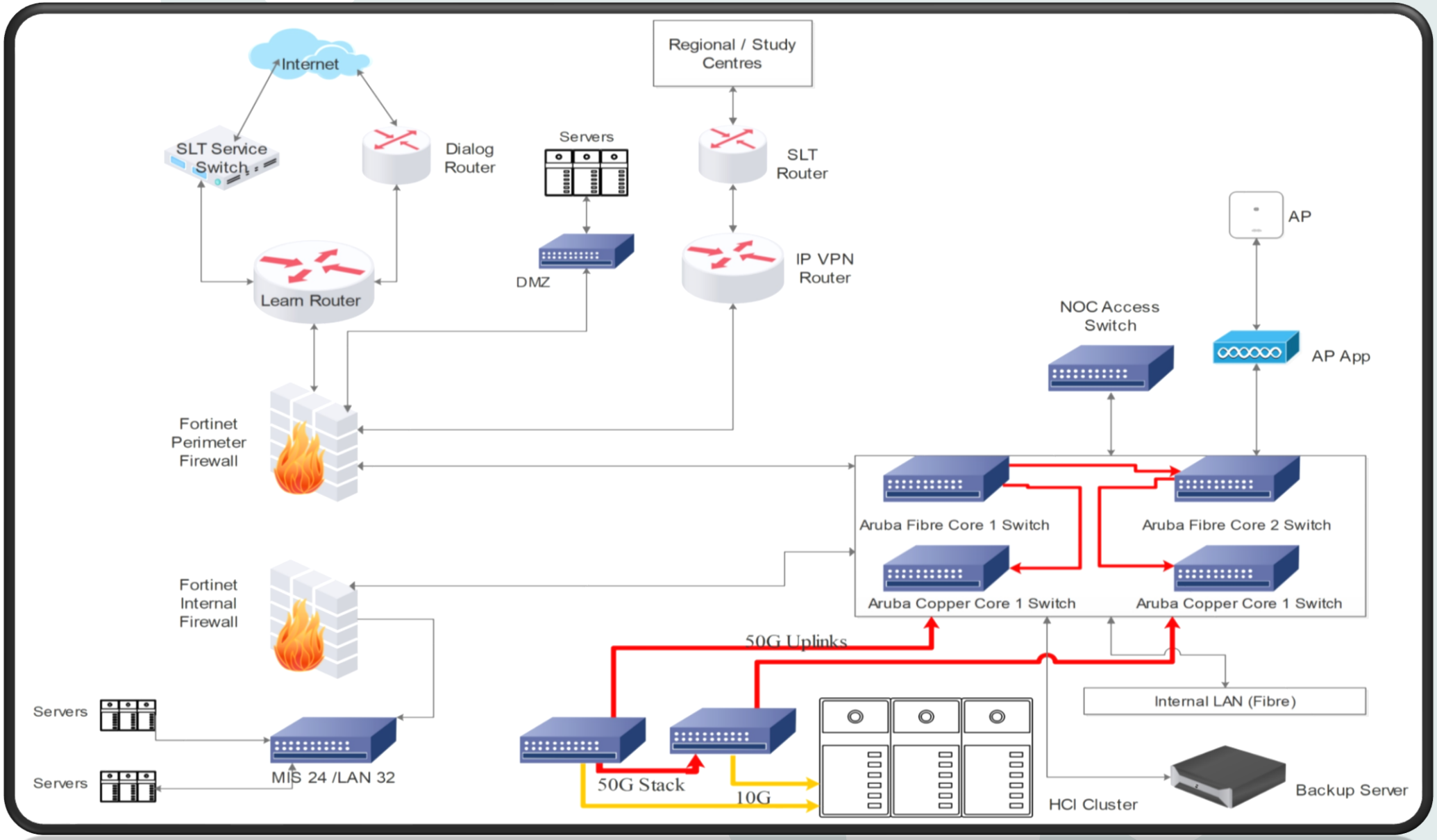
E-mail Services	WiFi Service	Student LMS Services
VPS Service	Student login service	Staff login service
SSO service	O365 service	Zoom video conference services.
MYOUSL for Student portal	LMS for each faculty.	Web Services
Anti-Virus Solutions - Sophos		Library – Koho

NETWORK INFRASTRUCTURE

EXISTING NETWORK INFRASTRUCTURE – DC



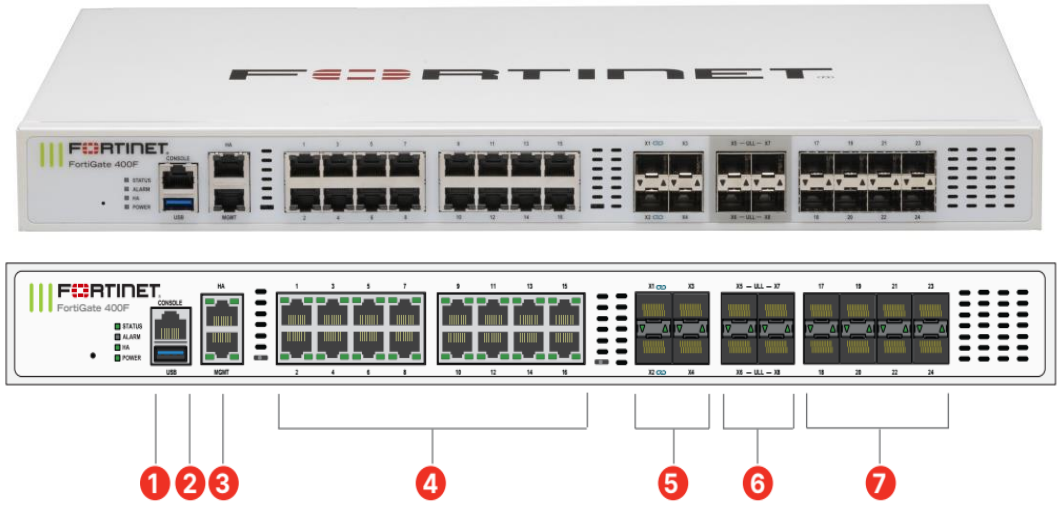
PROPOSED NETWORK INFRASTRUCTURE – DC



WHY WE CHOOSE ARUBA CX 6300 SWITCH SERIES FOR CS

- Stackable Layer 3 switches with BGP, EVPN, VXLAN, VRF, and OSPF with robust security and QoS
- High-performance 880 Gbps system switching capacity, 660 MPPS of system throughput, and up to 200 Gbps stacking bandwidth
- Compact 1U switches with full density HPE Smart Rate (1G/2.5G/5G/10GbE) multi-gigabit, up to 90W PoE (Class 8) and 10G LRM SFP+ available on select models
- Power-to-port switch bundle with back-to-front airflow ideal for data center 1GbE ToR and OOBM deployments
- Built-in high speed 1/10/25/50GbE uplinks
- 50GbE connectivity with 50GbE DACs1
- Intelligent monitoring, visibility, and remediation with Aruba Network Analytics Engine
- Manage via a single pane of glass with Aruba Central across wired, wireless, and WAN
- Dynamic Segmentation enables secure and simple access for users and IoT

WHY WE CHOOSE FORTIGATE 400F SERIES FOR FW



- 1- 1 x USB Port
- 2-1 x Console Port
- 3- 2 x GE RJ45 MGMT/HA Ports
- 4- 16 x GE RJ45 Ports
- 5- 4 x 1GE/10GE SFP+ Slots
- 6- 4 x 10GE SFP+ Ultra Low Latency Slots
- 7- 8x 1GE SFP Slots

- Next Generation Firewall (NGFW)
- High-performance protection Secure SD-WAN
- Universal ZTNA
- Web / DNS Security
- SaaS and Data Security
- Zero-Day Threat Prevention
- Network and File Security
- Hardware Accelerated GE RJ45 Interfaces 16
- Hardware Accelerated GE SFP Slots 8 / 10GE SFP+ Slots 4
- IPv4 Firewall Throughput 79.5 / 78.5 / 70 Gbps
- Firewall Throughput (Packet per Second) 105 Mpps
- Concurrent Sessions (TCP) 7.8 Million
- New Sessions/Second (TCP) 500 000
- Firewall Policies 10 000
- Concurrent SSL-VPN Users 5000
- High Availability Configurations Active-Active, Active-Passive, Clustering

MIGRATION

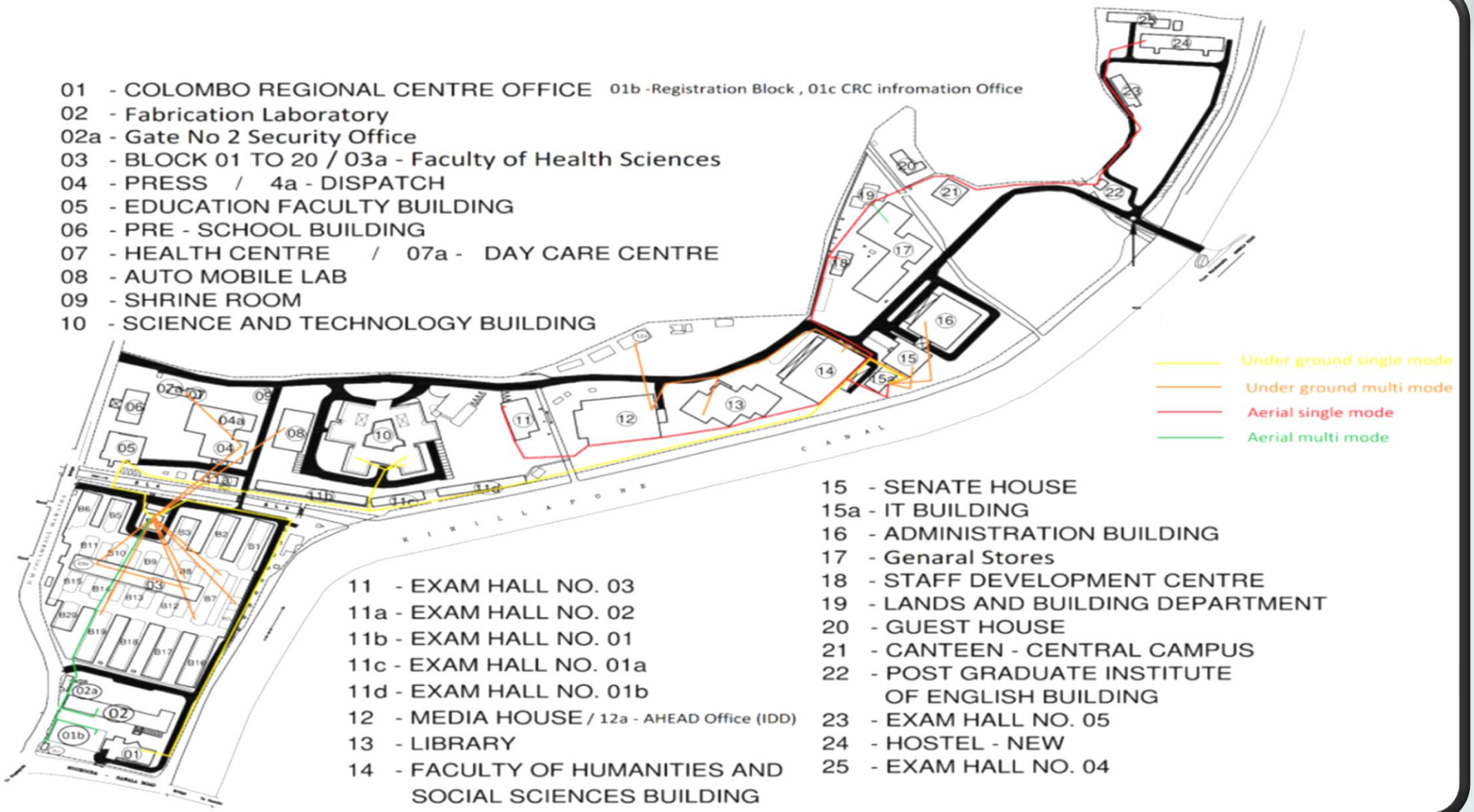
S/N	Description	Existing	Proposed & Ongoing
1	Domain Controller	MS Windows Serve 2003	MS Windows Serve 2022
2	All kinds of Open-source servers - LMS - ZOOM (Idp) - NMS - Utility - FTP - Web - SSO / IAM (Keycloak)	Ubuntu 16 & 20.04 LTS	Ubuntu 22.04 LTS
3	MIS Servers – APP / DB	MS Windows Serve 2003	MS Windows Serve 2022
4	HRM Servers – APP / DB	MS Windows Serve 2012	MS Windows Serve 2022
5	Fingerprint APP/DB	MS Windows Serve 2012	MS Windows Serve 2022

DETAILS OF NETWORK INFRASTRUCTURE

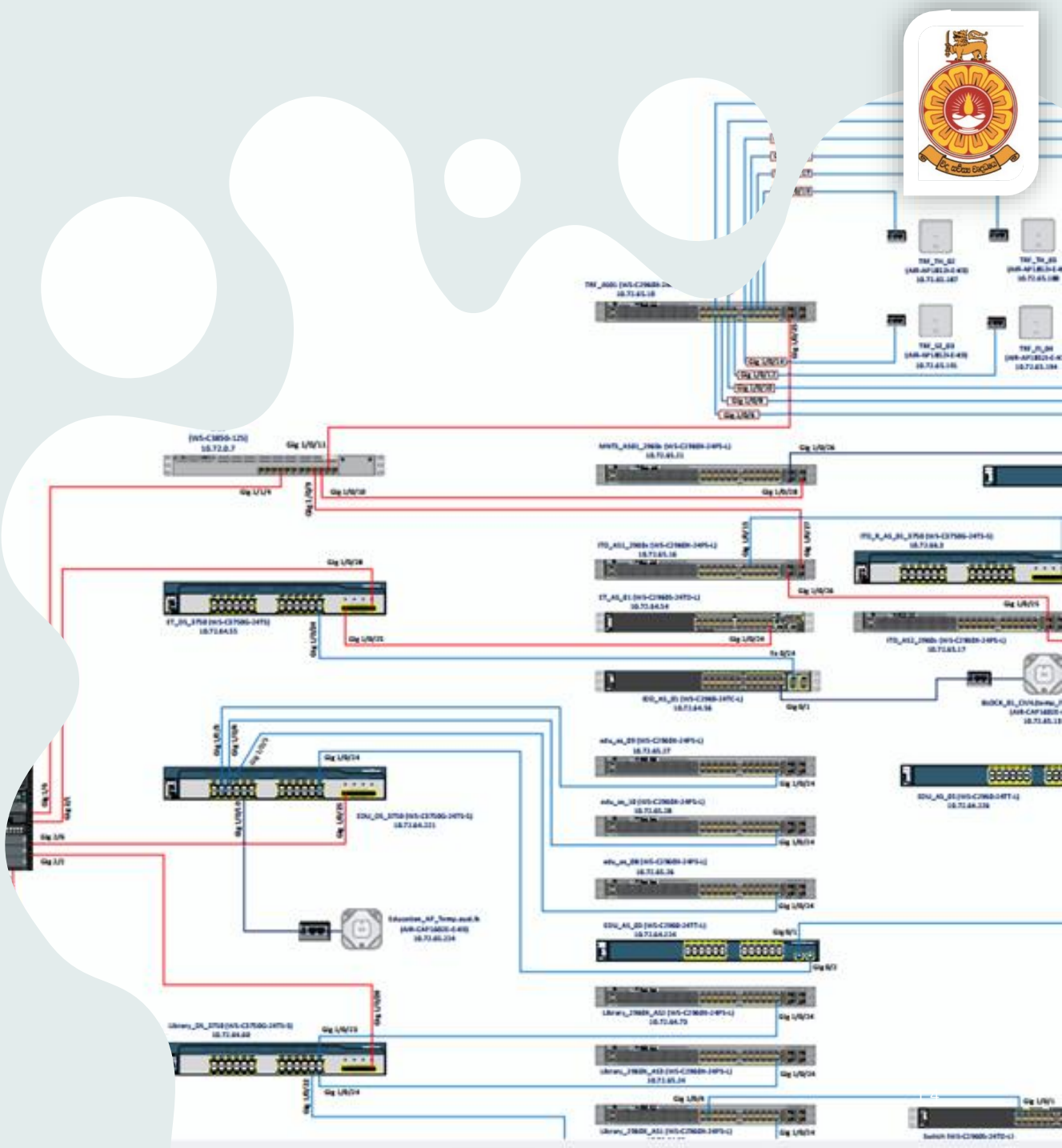
VLAN ID	Description	IP Slot
XX	DMZ	1X.7X.8x.XXX
XX	LAN - Network – Devices	1X.7X.3x.XXX
XX	LAN - System – Devices	1X.7X.2x.XXX
XX	CCTV	1X.7X.5x.XXX
XX	Management Devices	1X.7X.6x.XXX
XX	Staff – Admin	1X.7X.8x.XXX
XX	Staff – General	1X.7X.8x.XXX
XX	Wi-Fi - Student	1X.7X.7x.XXX
XX	Wi-Fi – Staff	1X.7X.7x.XXX
XX	Student - labs	1X.7X.9x.XXX
XX	IP Phone	1X.7X.1xx.XXX
XX	Exam	1X.7X.1xx.XXX
XX	Fingerprint	1X.7X.1xx.XXX
XX	Test / UAT / Dev	1X.7X.1xx.XXX

Service's	Description
Domain Name	ousl.lk
DNS	LEARN DNS
VM Servers	100 +
E-mail Services	Google / Office 365
Zoom Users	450
Monitoring Services	Libra / Zabbix
Operating System	Win 2022 / Ubuntu 22
Platform	VMWare- vCenter -8.0
Backup Solutions	Nakivo – DAC storage
Backbone Bandwidth	300 Mbps
Internal Bandwidth	1 Gbps
LAN - DS location	72 (L2 SW – 750 + AP 100+)
Branches – VPLS	8 Mbps per location
Protocols	TCP/UDP, SSH,RDP,DNS,SNMP,DHCP

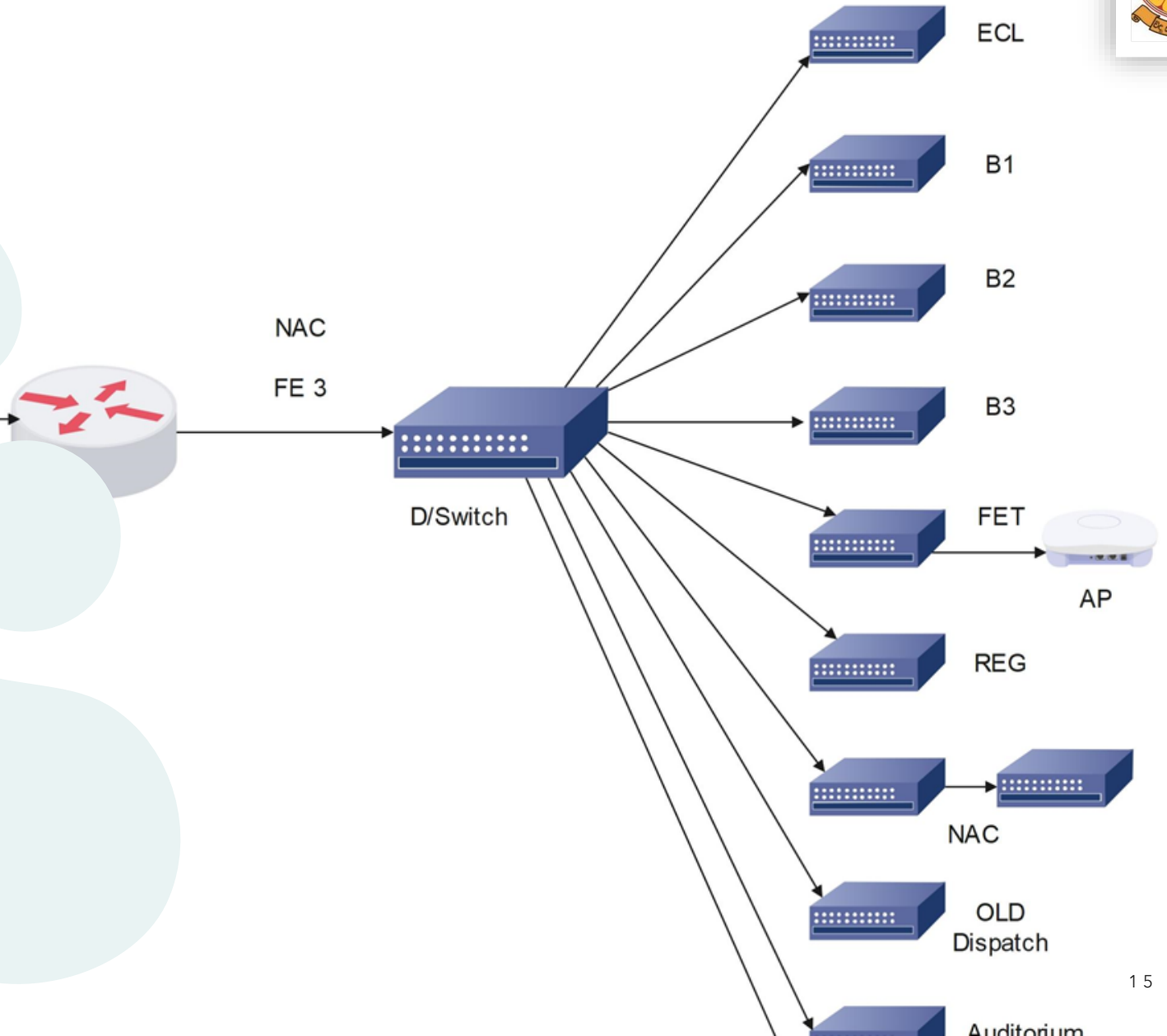
PHYSICAL NETWORK INFRASTRUCTURE LAYOUT



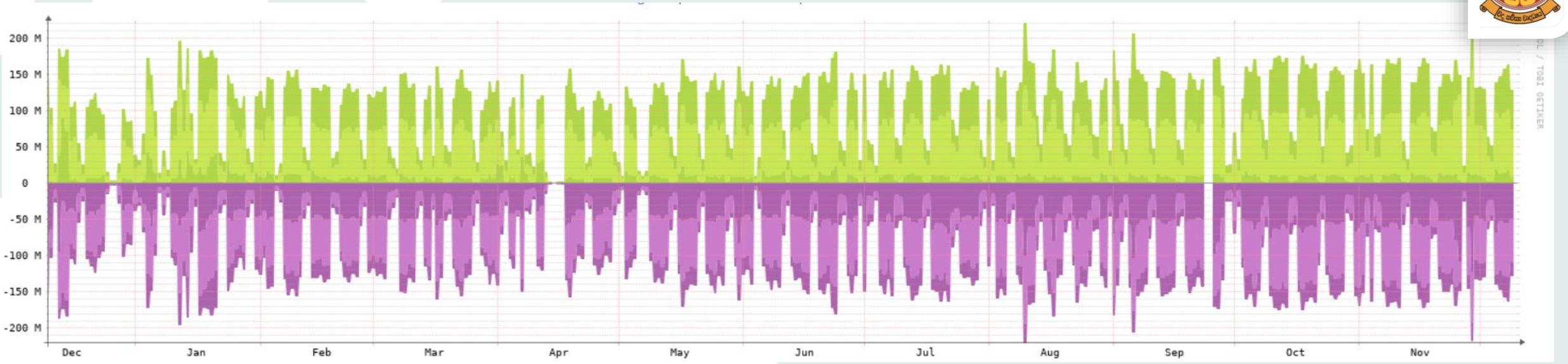
LOGICAL LAN NETWORK INFRASTRUCTURE - MAIN CAMPUS



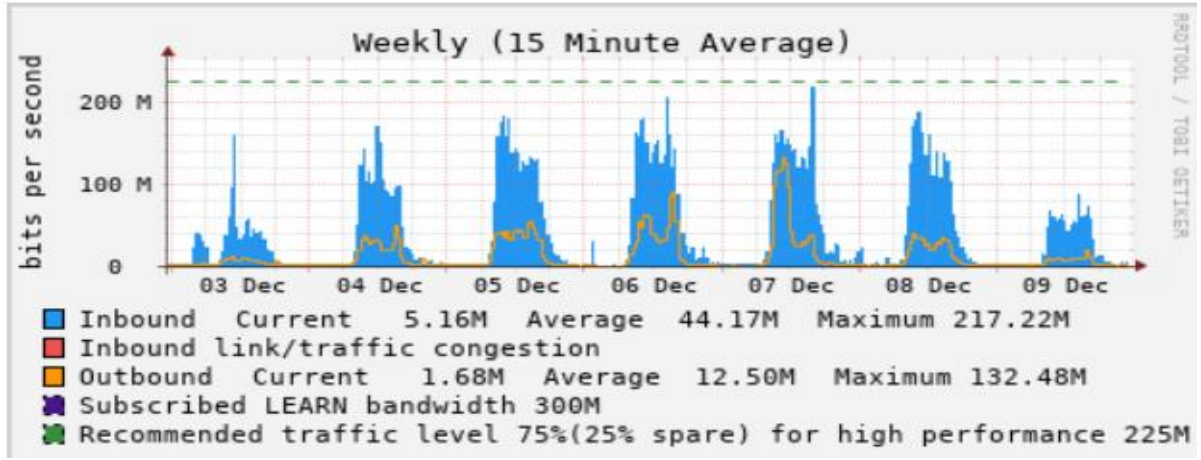
LOGICAL LAN NETWORK INFRASTRUCTURE - BRANCH



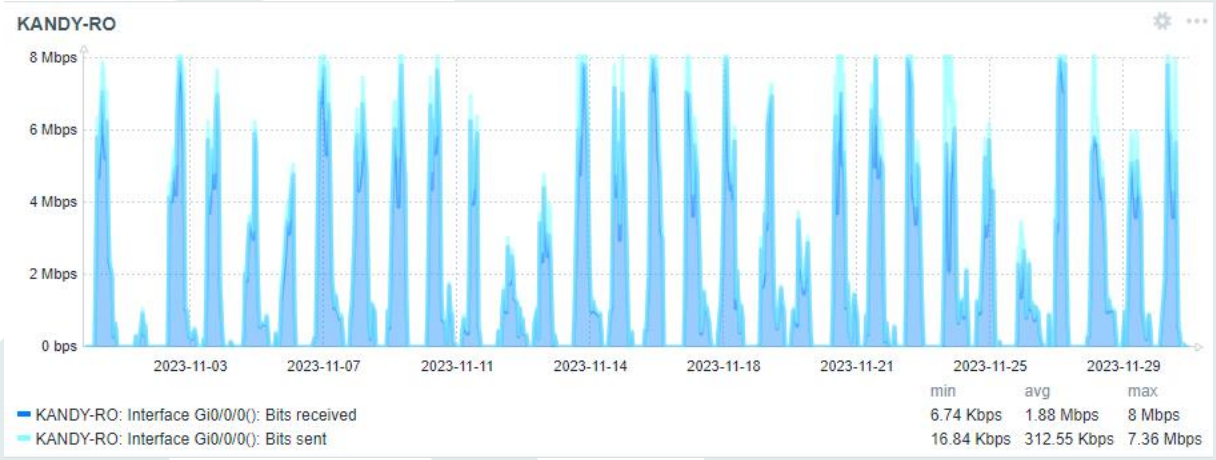
NETWORK BANDWIDTH



[Core Switch Bandwidth - LAN]



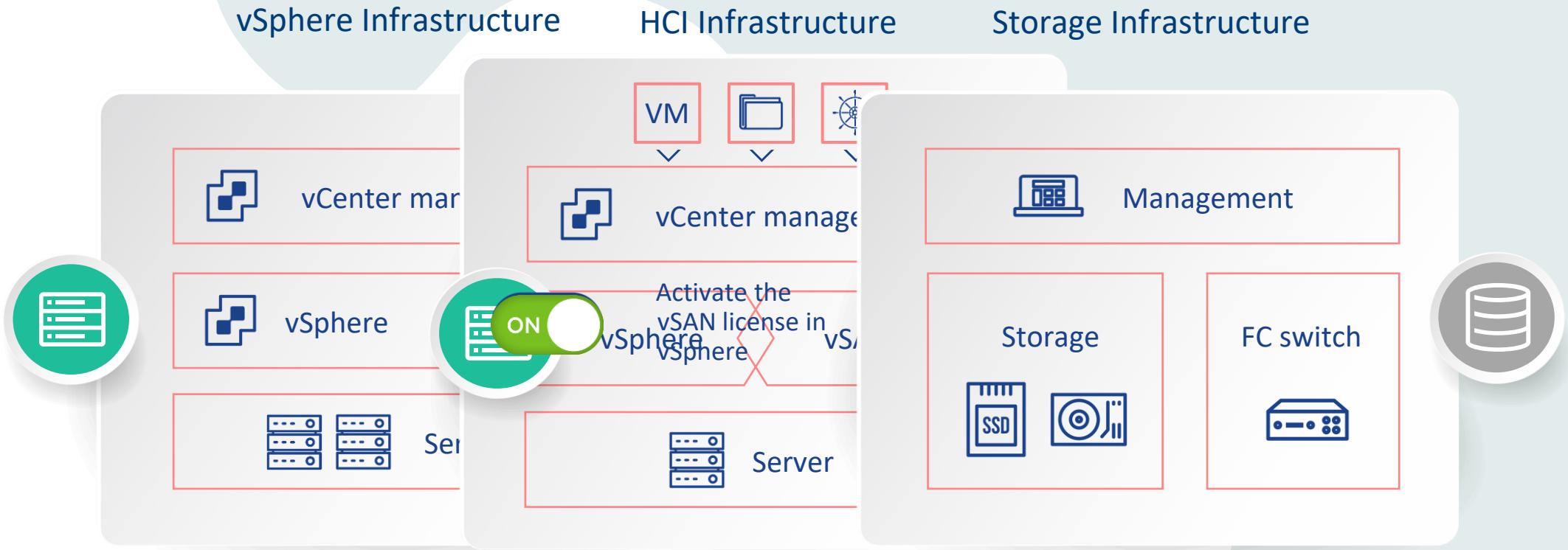
[Backbone Bandwidth]



[Branches Bandwidth]

SERVER INFRASTRUCTURE

vSAN SERVER HYPER-CONVERGED INFRASTRUCTURE

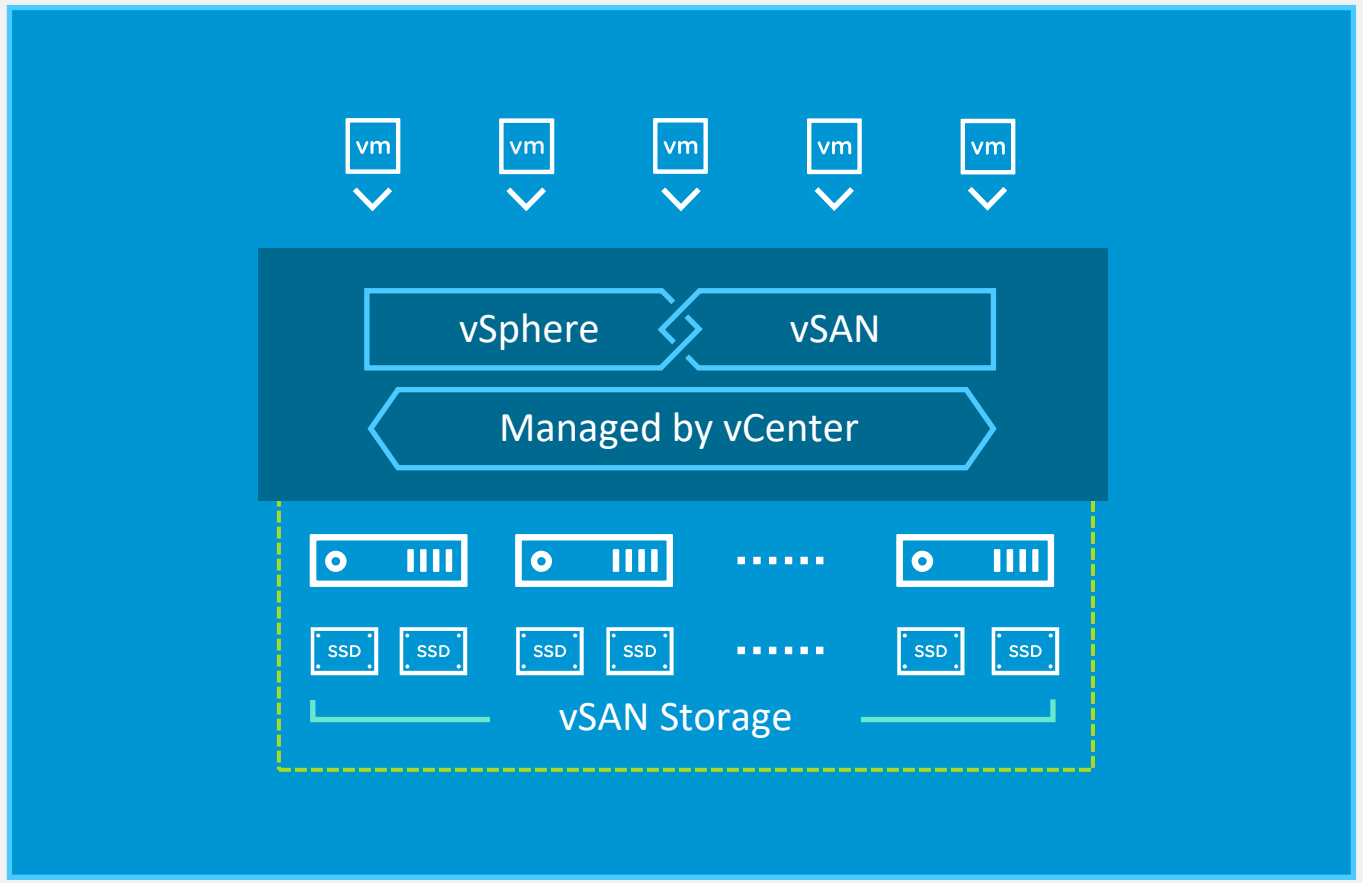


Ideal for generalist teams: common management plane for storage and compute

Minimal training: use familiar vCenter and vSphere web client

vSAN is native in the vSphere hypervisor: efficient resource utilization and consistent performance

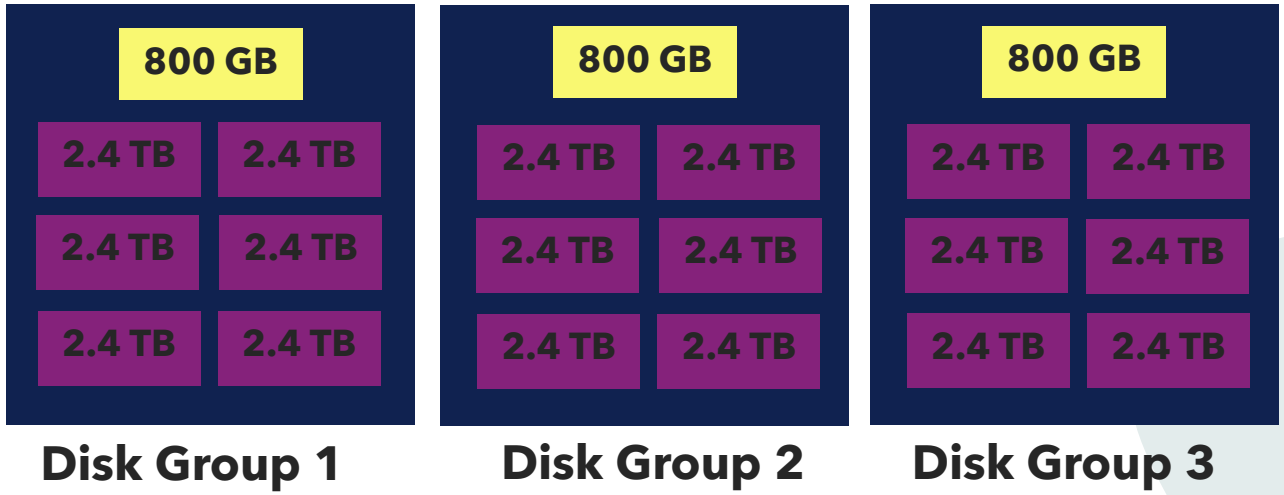
HCI vSAN ARCHITECTURE



- Runs on Any Standard x86 Server.
- Pools SSDs/HDDs into a Shared Datastore.
- Delivers Enterprise-Grade Security, Scale and Performance.
- Managed Through per-VM Storage Policies.
- Deeply Integrated with the VMware Stack.

SERVER NODE SIZING

Specs for vSAN Certified – Per Nodes
32 Cores - 2 x Intel Xeon Gold 6338 32C 205W 2.0GHz Processor
512 GB - 8 x 64GB TruDDR4 3200 MHz (2Rx4 1.2V) RDIMM).
2.4 TB -3 x 800GB SAS SSD Cache disks.
43.2 TB -18 x 2.4TB 10K SAS HDD Capacity disks.
2 x 4 x 10/25GbE SFP28 ports.
1GbE ports for baseboard management.
Dual Power supply.



- **Availability – RAID 1 , FTT =1**
- **Slack space was made to account for failures as well as maintenance activities**
- **15% CPU overhead**

vSAN USABLE CAPACITY DISTRIBUTION

Checksum Overhead	0.23 TB
Operations Reserve	23.63 TB
Disk Formatting Overhead	1.92 TB
File System Overhead	5.71 TB
Raid Overheads	92.26 TB
Usable Capacity after FTT1/RAID-1	92.26 TB

vSAN USABLE CAPACITY ARCHITECTURE

Total Capacity
Nodes : 5
CPU: 32 Cores x 2 x 5 = 320 Cores (With **640 Logical Processors)**
Speed : 2.0GHz Processor
RAM: 8 x 64GB x 5 =**2540 GB**
Storage:
Cache (SSD): 3 x 800 GB x 5 = **11.7 TB**
Capacity (SAS) : 18 x 2.4 TB x 5 = **216 TB**

Usable Capacity
Nodes : 5
CPU: 288 Cores (With Hyperthreading 576 Cores)
Speed : 2.0GHz Processor
RAM: 2304 GB
Storage:
Cache (SSD): 3 x 800 GB x 5 = **11.7 TB**
Usable capacity: **92 TB**

RESOURCE UTILIZATION STATISTICS

IOPS Assumption:

500 IOPS per VM

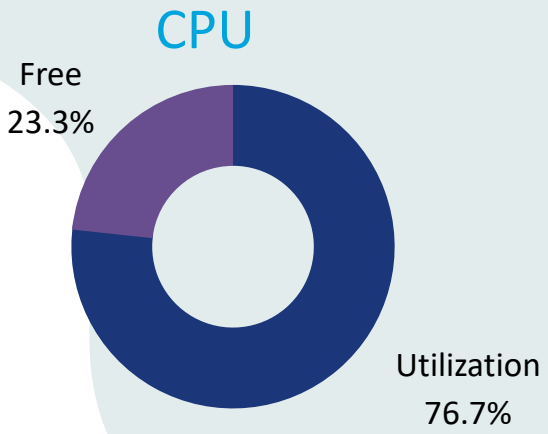
Total Cache Disks: 15 x 800GB

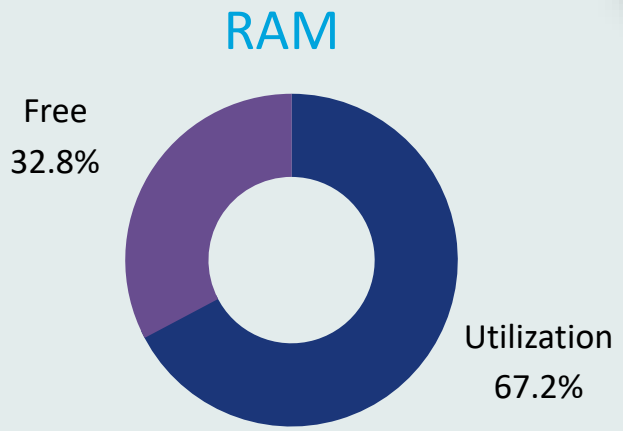
Workload Characteristics:

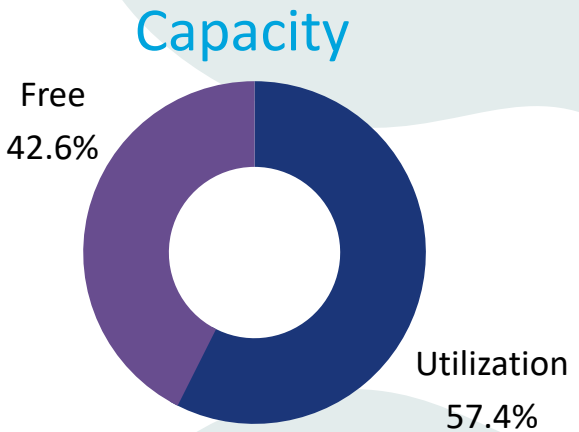
714,600 IOPS

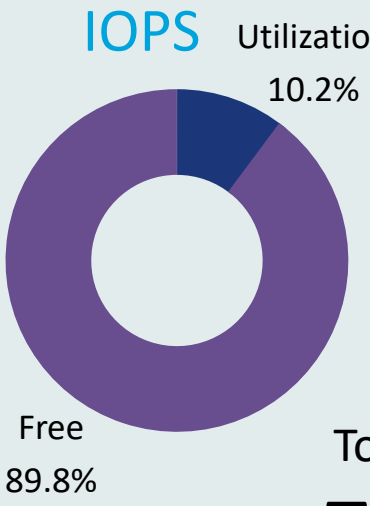
70% Read | 30% Write

4K Block Size







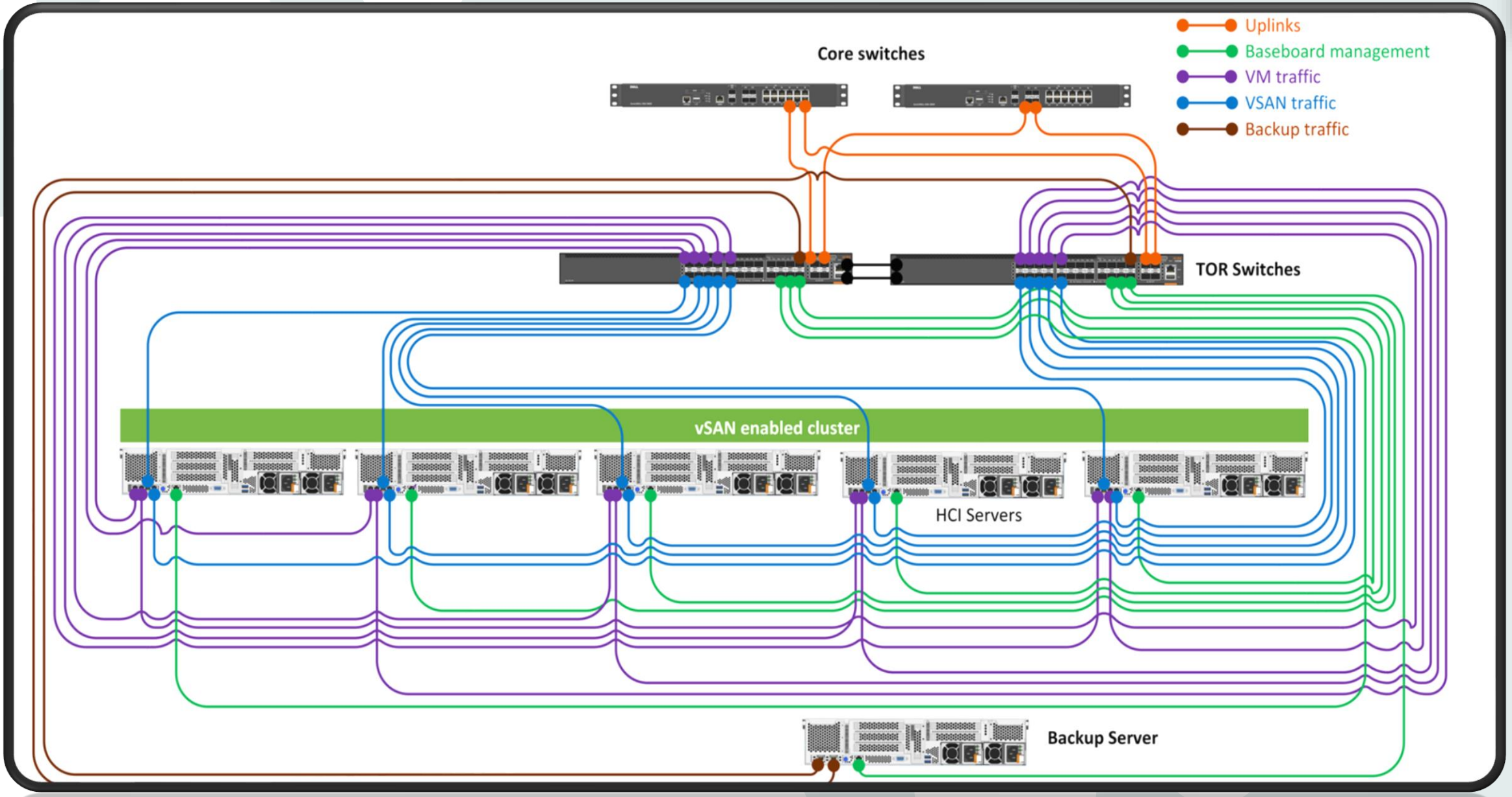


Total IOPS

714,600

Estimated

ARCHITECTURE DESIGN OF THE HCI



BACKUP SOLUTION - NAKIVO

Backup Instance	Usable Capacity
VMs -100+	72 TB

Simple Administration	Image-Based	Incremental
Application-Aware	Instant Backup Verification	Flash VM Boot
Full VM Recovery	Granular Recovery	Multiple Storage Options
Anti-Ransomware	Replication	Replication from Backup
Replica Verification	Automated VM Failover	P2V Recovery / Site Recovery

OVERVIEW OF THE DATA CENTER

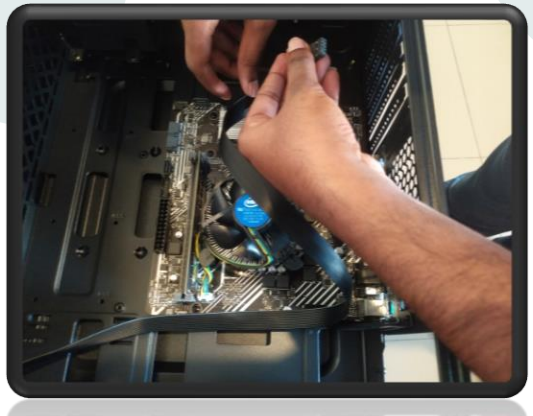
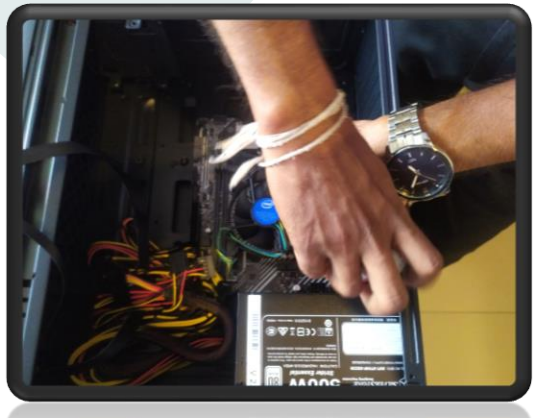
Established: **2007**

Racks: **14**

Features :

- Scalability
- Redundancy – Power (Raw & UPS)
- Highly Secured
- Connectivity
- Monitoring Tools
- Fire Suppression
- Compliance Standards
- Remote Management.
- Modular Design.
- Raised Floor

DESKTOP COMPUTER ASSEMBLE

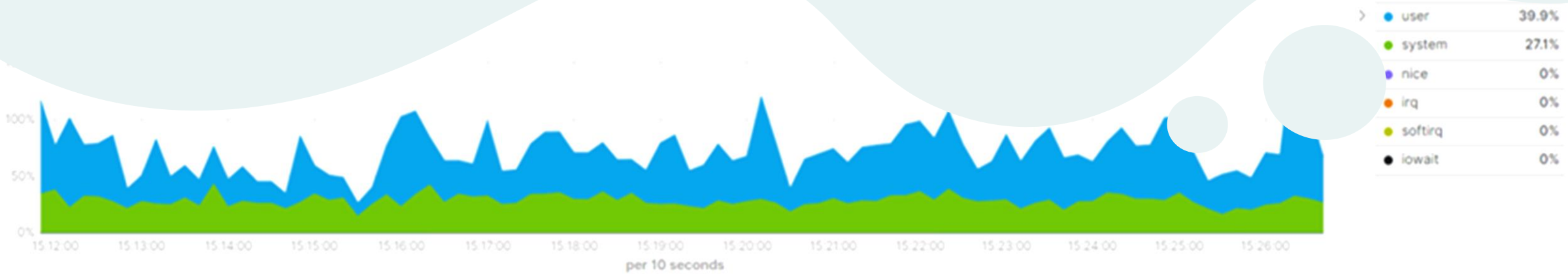




විවෘත විශ්වවිද්‍යාලයෙන් පරිගණක හා උපාංගවල උග්‍ර හිඟයට විසඳුමක්

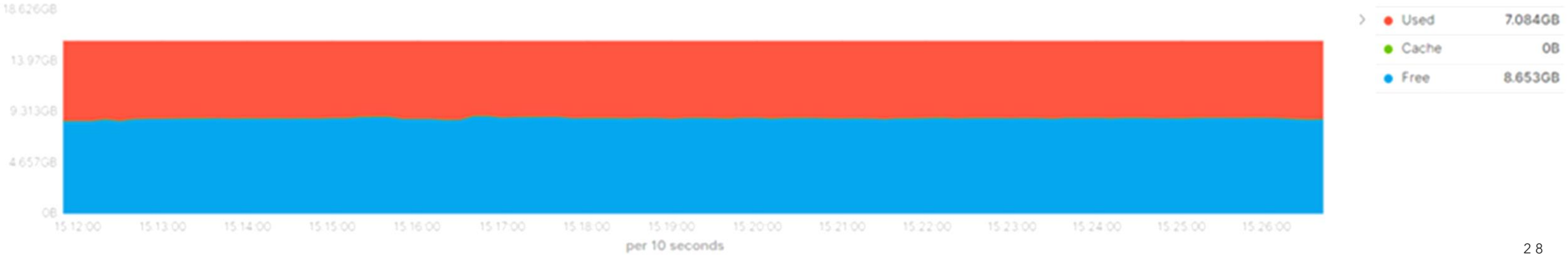
කාලීන ජාතික අවශ්‍යතාවක් වන නවතම පරිගණක සහ පරිගණක උපාංගවල උග්‍ර හිඟයට විසඳුම් සෙවීම සඳහා කඩිනම් විසඳුමක් ඉදිරිපත් කරමින් OUSL යළිත් දැවැන්ත පිම්මක් ගෙන ඇත. මෙම ව්‍යාපෘතියේ සංකල්පගත කිරීම OUSL හි උපකුලපතිවරයා වන මහාචාර්ය පී. එම්. සී. තිලකරත්න මහතා සහ ඔහුගේ නායකත්වයට OUSL හි මූල්‍ය කළමනාකරු ආචාර්ය ඩබ්ලිව්. එම්. කේ. ජී. ඒ. වික්‍රමසිංහ මහතා විසින් මනා සහයෝගයක් ලබා දෙන ලදී. ව්‍යාපෘතිය මෙහෙයවනු ලැබුවේ OUSL හි ජාල කළමනාකරු එම්. එම්. සහීර් හුසේන් මහතා විසිනි. පරිගණක එකලස් කිරීමේ ඒකකයේ තරුණ හා ජවසම්පන්න තාක්ෂණික නිලධාරීන් අට දෙනකුගෙන් යුත් ඔහුගේ කණ්ඩායම විසින් නිර්හීතව මෙම අභියෝගය භාරගත් අතර මාස දෙකක කාලයක් තුළ "OU STAR" යන OUSL සන්නාමය යටතේ පරිගණක එකලස් කරන ලදී. එකලස් කරන ලද පරිගණක 12 කින් යුත් පළමු කට්ටලය පීඨ, අංශ සහ දෙපාර්තමේන්තු වෙත බෙදා දීමෙන් මෙම මහා ව්‍යාපාරයේ සමාරම්භක උත්සවය 2022 ජූනි 8 වැනි දින OUSL සෙනෙට් මන්දිරයේ සම්මන්ත්‍රණ ශාලාවේදී පැවැත්විණි. මෙම ව්‍යාපෘතිය ආරම්භ කිරීමෙන් OUSL ආයතනයට රුපියල් මිලියන 2.2ක් ඉතිරි විය. මෙම ව්‍යාපෘතිය OUSL හි අවශ්‍යතා සපුරාලනු ඇති අතර අනාගතයේදී දිවයිනේ අනෙකුත් ආයතන වෙත සන්නාමය පිරිනැමීම සඳහා එහි සේවාවන් පුළුල් කරනු ඇත.

MAWBIMA - 12-OCT-2022

DESKTOP COMPUTER - QC



Memory Usage [Metricbeat System]



CHALLENGES

- Lack Human Resources
- Budget Allocation
- User Expectations and Support
- Integration with New Technologies
- Security Threats
- Complexity

FUTURE SCOPE

- Upgrade Network Infrastructure.
- Developing IT Policy
- Deploy Backup Server – Partially
- Increase Backbone Bandwidth.
- Develop a Password Reset and User Info System.
- Deploy IPv 6.
- Deploy Failover for Backbone Connection
- Deploy Eduroam Facility for All.
- Establish Mini SOC.
- Establish 10 Gbps Internal (LAN) Connectivity.
- Deploy SD-WAN for Branch Connectivity.
- Deploy VDI solutions.
- Deploy DR Site

NETWORK TEAM

M M Zaheer Hussain
Network Manager

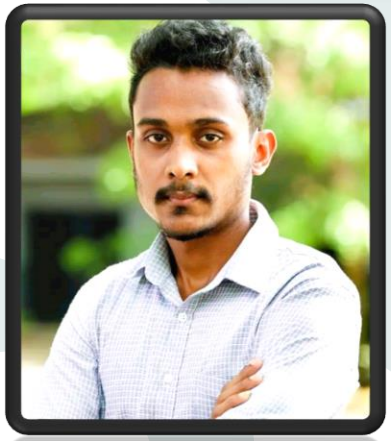
Kanishka – Datacenter Supervisor

Charith- Network Administrator

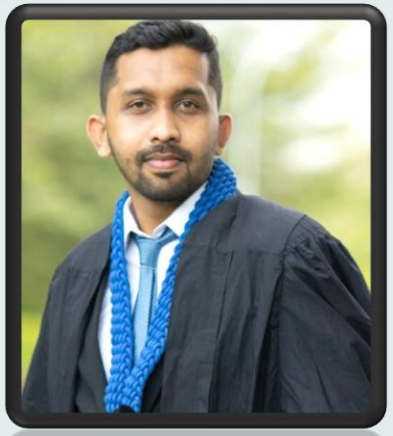
Buddika - Network Administrator

Terenga – Cloud Administrator

Eranjan - Network Administrator



Lakshan - Network Administrator



Thilina - Network Administrator

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Q & A

Thank You!

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