



Project Task 3
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Section 01
Group : Mozilla

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LIST OF DEVICES AND SPECIFICATIONS

1. SERVER

Model		
Dell EMC PowerEdge T640 Tower Server		Huawei RH2288H V3 Server
Performance	<ul style="list-style-type: none"> 2 x Intel Xeon Platinum 8168 (24 cores each, 48 threads) Up to 2.7GHz 	<ul style="list-style-type: none"> 1 x Intel Xeon E5-2620 V4 (8 cores, 16 threads) 2.1GHz
Scalability	Highly scalable for future growth	Moderate scalability
Memory	768GB DDR4 (expandable up to 3TB)	16GB DDR4 (expandable)
Storage	6 x 1.92TB SSD (total: 11.52TB)	2 x 600GB 10K SAS (total: 1.2TB)
Integration	Compatible with modern IT tools, software-defined technologies	Basic enterprise compatibility
Expandability	Multiple PCIe slots, additional drive bays for storage upgrades	Multiple PCIe slots, limited expandability
Price	RM 28,821.00	RM 14,092.98
References	https://www.server2u.com/shop/t640-xp8168-refurbished-dell-emc-powerededge-t640-tower-server-2xp8160m-768gb-6x1-92tb-57402?gad_source=1&gcid=CjwKCAiA9bq6BhAKEiwAH6bqoFoGrI8Io-32YG1FfgFlaAesb2XIk0phgROAWT2ZYLx1fNeingMRoCZEAQAvD_BwE#attr=	

We have chosen the Dell EMC PowerEdge T640 for its exceptional performance, scalability, and ability to meet both current and future business needs. The Dell EMC PowerEdge T640 is a high-performance tower server designed for scalability and versatility, making it an ideal choice for small to medium-sized businesses with demanding workloads. Powered by dual Intel Xeon Platinum 8168 processors with 24 cores, 48 threads, and speeds of up to 2.7 GHz, the T640 significantly outperforms servers equipped with a single Intel Xeon E5-2620 V4 processor, which offers only 8 cores, 16 threads, and a maximum speed of 2.1 GHz. This enhanced processing capability makes the T640 well-suited for resource-intensive tasks.

In addition to superior processing power, the T640 features exceptional memory capacity, offering 768 GB of RAM that can be expanded up to 3 TB. This far surpasses the 16 GB RAM found in other servers, enabling the T640 to handle larger workloads and accommodate future growth in memory requirements. Furthermore, its advanced storage configuration includes six 1.92 TB SSDs, providing significantly more space and faster data access compared to other servers. With multiple PCIe slots and additional drive bays, the T640 offers extensive scalability for future upgrades.

Given its superior performance, robust scalability, and enhanced storage capabilities, the Dell EMC PowerEdge T640 stands out as a reliable and future-proof investment. It delivers the power and flexibility necessary to meet current demands while being ready for future growth, making it an excellent long-term solution for businesses.

2. ROUTER

Model		
	C8500-12X	S5860-24XB-U is FS
Performance	12 x 10G SFP+ ports, typically used in enterprise routing.	High-speed with 24 x 10GBASE-T/Multi-Gigabit ports + 4 x 25Gb SFP28 uplinks.
Expendability	No direct stacking support, relies on additional modules for expansion.	Supports stacking for easy expandability.
Processor	Advanced Cisco processors, focused on routing and higher network intelligence.	Broadcom chip, designed for high throughput and Layer 3 routing.
Ports	12 x 10G SFP+ ports.	24 x 10GBASE-T, 4 x 10Gb SFP+, 4 x 25Gb SFP28 uplinks.
Scalability	Scalability via modular add-ons but lacks stacking support.	Good scalability through stacking and high-capacity uplinks.
Price	RM 309,163.23	RM17,594.00
References	https://www.cdw.com/product/cisco-catalyst-8500-12x-edge-platform-switch-12-ports-rack-mountable/6318206?msocid=1aacc11c3625648a13d5d5c73752655c	https://www.fs.com/sg/products/108716.html?country=my&currency=MYR&languages=English&paid=google_shopping&gad_source=1&gclid=Cj0KCQiAsaS7BhDPARIsAAAX5cSBqMBuIWOBvivPXsf6YwmUTkHPV_GcUH_8kHuVIIfVmvsseJCj0tcaAiLPEALw_wcB

The most suitable router for our needs is the FS S5860-24XB-U, selected for its exceptional performance, advanced processing capabilities, scalability, and versatile port options. It delivers high-speed networking with 24 x 10GBASE-T/Multi-Gigabit ports and 4 x 25 Gb SFP28 uplinks, making it optimized for data-intensive tasks that require a combination of switching and routing. Powered by a Broadcom chip designed for high throughput and Layer 3 routing, this router ensures efficient handling of network traffic.

In terms of scalability, the FS S5860-24XB-U supports stacking, allowing seamless and straightforward expandability, an ideal feature for growing network environments with increasing uplink demands. Furthermore, its greater port density, offering 24 x 10GBASE-T ports and high-speed uplink options, provides flexibility for various networking requirements in high-throughput environments. These features make the FS S5860-24XB-U a reliable and future-ready choice for our network infrastructure.

3. FIREWALL

Model	 FPR2140-NGFW-K9 - Cisco Firepower 2100 Series Appliances	 Fortinet FortiGate 500E
Storage	1x 200 GB with an additional spare slot for a managed service provider (MSP) storage expansion	1x 128 GB SSD
Security Capabilities	Advanced firewall, application visibility, malware protection, IPS	AI-based malware prevention, IPS, DLP, URL filtering, botnet protection
Performance	Optimized for enterprise-level threat defense and deep packet inspection	High threat protection performance with purpose-built SPU technology
Integration	Integrates with Cisco SecureX ecosystem	Fortinet Security Fabric and Fabric-Ready partner solutions
Price	RM 116,195.92	RM 25,364.53
References	https://www.router-switch.com/fpr2140-ngfw-k9.html	https://www.avfirewalls.com/FortiGate-500E.asp#pricing

We have chosen the FPR2140-NGFW-K9 - Cisco Firepower 2100 Series Appliances for its advanced security features, high performance, scalability, and seamless integration with other Cisco products, making it a reliable and future-proof solution for protecting our network. The FPR2140-NGFW-K9 - Cisco Firepower 2100 Series Appliances is an excellent choice for organizations seeking advanced security, high performance, and scalability for their enterprise networks. This next-generation firewall delivers top-notch protection against cyber threats, leveraging AI-based malware prevention, intrusion prevention (IPS), data loss prevention (DLP), URL filtering, and botnet protection, ensuring comprehensive and reliable threat defense.

Designed for scalability, it features a spare slot for adding additional storage, making it a future-proof solution for businesses with growing security requirements. Its robust security capabilities include application visibility and control, intrusion prevention, and malware protection, offering multiple layers of protection to safeguard the network. Optimized for enterprise use, the Cisco Firepower 2100 series efficiently manages high network traffic and performs thorough packet analysis without compromising performance, making it ideal for large-scale networks.

With its advanced security features, scalability, and seamless integration with other Cisco products, the Cisco Firepower 2100 series is a dependable and forward-looking solution for organizations aiming to protect their networks while preparing for future growth.

4. WIRELESS ACCESS POINT

Model	 NETGEAR WEB 758-111 NAS WiFi 7	 Aruba AP-505 US
Transmission speed	Up to 46 Gbps	Up to 9.6 Gbps.
Frequency Bands	2.4 GHz, 5 GHz, 6 GHz	2.4 GHz, 5 GHz.
Security	WPA3 encryption, enhanced efficiency with OFDMA and MU-MIMO.	WPA3, advanced security features like AirMatch and ClientMatch.
Advantages/ Disadvantages	Faster speeds, supports 6 GHz band.	Reliable for medium-density, advanced management features.
	Higher cost, limited device compatibility	Lower speeds, no support for 6 GHz band.
Price	RM 7,422.00	RM 2,691.97
References	https://www.networkhardwares.com/en-my/products/netgear-wbe758-111nas-netgear-1pt-insight-managed-wifi-7-wbe758-111nas?variant=47635341410509&gad_source=1&gclid=CjwKCAiAmMC6BhA6EiwAdN5iLd0jMgXUM2FjAv6FK2HfXXUXO_RrSxnYk4YtL4jRpn5D7A2y-jilhxoC4ecQAvD_BwE	https://www.securewirelessworks.com/Aruba-AP-505.asp?srltid=AfmBOopYwrG8Jrf0U1szYHMCyxjQfx6hVWVqCW4DvKAyGXcx1dG18Oee

The most suitable choice for our needs is the NETGEAR WEB 758-111 NAS WiFi 7, selected for its exceptional transmission speed, advanced frequency band support, and robust security features. It delivers speeds of up to 46 Gbps, which is five times faster than the Aruba AP-505 US, making it ideal for high-performance applications requiring ultra-fast connectivity.

The router operates on 2.4 GHz, 5 GHz, and 6 GHz frequency bands, with the 6 GHz band providing higher performance, reduced network congestion, and compatibility with emerging devices. Additionally, it offers WPA3 encryption and enhanced efficiency through features like OFDMA and MU-MIMO, ensuring superior security and optimized traffic management. These capabilities make the NETGEAR WEB 758-111 NAS WiFi 7 a reliable and future-ready solution for demanding networking environments.

5. SWITCH

Model	 <p>WS-C3850-48XS-S Catalyst 3850 Switch SFP+</p>	 <p>R0X27A - Aruba 6410 Switch</p>
Port	48 x 10G SFP+ fiber ports.	Up to 48 x 10G SFP+ fiber ports
Switching Capacity	176 Gbps switching capacity	2.4 Tbps.
Advantages	<ul style="list-style-type: none"> High switching capacity (176 Gbps) for large networks. 48 x 10G SFP+ ports for high-speed fiber connections. Cisco's IP Base features for enhanced management and security. Excellent for data centers or high-demand environments. 	<ul style="list-style-type: none"> High switching capacity (2.4 Tbps) for large and scalable networks. Modular design allows future expansion and flexibility. AOS-CX operating system with advanced automation and analytics. Energy-efficient design.
Disadvantages	<ul style="list-style-type: none"> Higher cost compared to more basic models. Not suitable for environments with extreme conditions (not hardened). More complex management due to advanced features. 	<ul style="list-style-type: none"> Higher initial cost due to modular architecture. Requires skilled personnel for managing advanced features. Larger physical footprint compared to fixed-configuration switches.
Price	RM 75,615.59	RM 57,314.29

References	https://www.router-switch.com/ws-c3850-48xs-s.html	https://www.router-switch.com/r0x27a.html
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The most suitable switch for our needs is the Cisco Catalyst 3850 (WS-C3850-48XS-S), chosen for its high-speed connectivity, robust switching capacity, and seamless integration within the Cisco ecosystem. It features 48 x 10G SFP+ fiber ports, providing reliable high-speed fiber connections in a fixed configuration that is well-suited for medium-sized networks. With a switching capacity of 176 Gbps, it is optimized for high-demand environments, making it ideal for medium to large networks with typical throughput requirements.

The Catalyst 3850 supports stacking of up to nine switches, allowing for straightforward expansion as network demands grow. Its integration with the Cisco ecosystem ensures reliable and consistent performance, while the IP Base features offer enhanced management and security controls. However, it is important to note its limitations: the switching capacity may not suffice for very large-scale networks, its non-modular design limits expansion options, and its advanced features require skilled personnel for effective management. Despite these drawbacks, the Cisco Catalyst 3850 is a dependable and efficient choice for medium-scale network environments.

6. PATCH PANEL 48

Model	 NKPP48FMY	 PR175SC48-SM
Port	48	48
Features	<ul style="list-style-type: none"> Type: Cat5e/Cat6 patch panel.. Mounting: 2U rackmount design for standard 19-inch racks. Use: Suitable for Ethernet networking. 	<ul style="list-style-type: none"> Type: SC fiber patch panel for multi-mode fiber. Mounting: 1U rackmount design for 19-inch racks. Use: Designed for fiber optic networking with SC connections
Durability	<ul style="list-style-type: none"> Built for standard Ethernet connections. Constructed with metal housing for strength and longevity. Less susceptible to environmental factors, as it's designed for typical office or data center environments. 	<ul style="list-style-type: none"> Designed for fiber optic applications, so it's built to withstand more delicate fiber optic cables. Metal housing ensures stability, but it's more sensitive to handling than Ethernet panels due to the nature of fiber. Suitable for indoor use in controlled environments, typically used in data centers or telecommunications.
Price	RM 525.67	RM683.950
References	https://my.element14.com/panduit/nkpp48fmy/patch-panel-cat5e-cat6-48port/dp/2706537	https://my.element14.com/l-com/pr175sc48-sm/patch-panel-sc-sm-48port-1u/dp/2947276

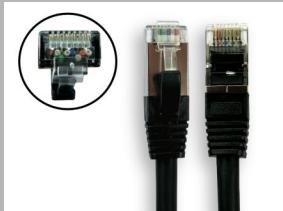
The most suitable patch panel for our networking needs is the NKPP48FMY, chosen for its extensive port capacity, durable construction, and versatile features. This patch panel offers 48 ports, making it ideal for managing Ethernet networking connections using Cat5e or Cat6 cables. It provides a high-density solution for medium to large network environments, where efficient organization and reliable connections are essential.

The NKPP48FMY is designed with a 2U rackmount configuration, making it compatible with standard 19-inch racks, which are commonly used in server rooms, data centers, and network closets. This design ensures that the patch panel fits seamlessly into the existing infrastructure, facilitating a neat and organized setup for Ethernet cabling.

In terms of durability, the NKPP48FMY is built specifically for Ethernet connections, making it suitable for both office and data center environments. Its metal housing provides enhanced strength and longevity, offering protection against wear and tear, and ensuring reliability even in high-traffic areas. The robust construction also makes it less sensitive to handling, reducing the risk of damage during installation and maintenance.

Overall, the NKPP48FMY patch panel offers a reliable, space-efficient solution for organizing Ethernet networks, ensuring long-term performance and ease of use in both small and large-scale network environments.

7. ETHERNET CABLE

Model			
RS PRO, 10m Cat8, Black RJ45 to Male RJ45 Male, S/FTP, Terminated LSZH Sheath	RS PRO, 7m Cat6, White RJ45 to Male RJ45 Male, UTP, Terminated PVC Sheath	RS PRO, 1.5m Cat6a, Blue RJ45 to Male RJ45 Male, S/FTPShielded	
Bandwidth	2000Mhz	600Mhz	500 Mhz
Transmission Speed	25/40Gbps	10Gbps	10Gbps
Transmission Distance	30m	100m	100m
Shielding Type	Shield	Shield	Shield/Unshield
Price	RM 162.13(10m)	RM57.08(7m)	RM28.73(1.5m)
References	https://my.rs-online.com/web/p/ethernet-cable/2761131?gb=s	https://my.rs-online.com/web/p/ethernet-cable/2646549	https://my.rs-online.com/web/p/ethernet-cable/2515168

8. ETHERNET CONNECTOR

Model	 Cat8 Ethernet Cable Connector RJ45	 J00-0045NL PulseJack Right Angle 1x1 Modular Connectors - 100Base RJ45 Magnetics
Bandwidth	Supports up to 2 GHz	Typically supports up to 100 MHz
Shielding	shielded	unshielded
Material	high-quality metal (gold-plated pins)	Plastic housing with magnetic components (for signal processing) and metal contacts for the connection
Durability	Built for high-performance networking, these connectors are designed for long-lasting use in environments where high-speed transmission is required.	These connectors are designed for lower-speed networks and are less robust compared to Cat8 connectors.
Price	RM 8.58	RM 11.23
References	https://www.globalsources.com/Modular-jack/Cable-Connector-1200681989p.htm	https://www.rj45-modularjack.com/sale-7295873-j00-0045nl-pulsejack-right-angle-1x1-modular-connectors-100base-rj45-magnetics.html

The most suitable Ethernet connector for our needs is the Cat8 Ethernet Cable Connector RJ45, chosen for its excellent bandwidth, superior shielding, durable materials, and overall reliability. With the best bandwidth for high-speed networking, it supports the highest data rates and frequencies, ensuring maximum performance for demanding applications.

The connector provides effective shielding, offering enhanced protection against electromagnetic interference (EMI), which is crucial in maintaining stable performance in high-noise environments. Its durable and reliable materials help preserve signal integrity, reduce loss, and ensure a strong, uninterrupted connection. Additionally, the connector is designed for long-lasting use, making it ideal for environments that require high-speed transmission and consistent performance over time. These features make the Cat8 Ethernet Cable Connector RJ45 the ideal choice for high-performance networking setups.

9. FACEPLATE

Model			
Port Capacity	single	dual	single or multiple
Type	standard RJ45 faceplate or socket	dual RJ45 faceplate or socket	Premium RJ45 socket
Material	plastic	plastic	High-quality plastic, with metal contacts
Application	home or office environments for basic networking setups.	dual-port Ethernet connections in networking setups requiring multiple outlets in one plate.	high-performance environments such as data centers or commercial installations
Price	RM 18.26	RM 18.33	RM39.38
References	https://my.element14.com/panduit/nk1fwhy/vertical-faceplate-1-module-white/dp/1316470	https://my.element14.com/panduit/nk2fniw/vertical-faceplate-2-module-white/dp/2707041	https://www.ebay.com.my/itm/224584723572

The most suitable faceplate for our needs is the RJ45 Face Plate Premium Socket, selected for its dual-port capacity, high-quality materials, and versatile application. It provides dual Ethernet connections in a single plate, making it ideal for more advanced setups that require multiple connections in a single location, allowing for enhanced network flexibility.

The dual-port design not only adds extra functionality but also maintains a premium quality, ensuring that multiple devices can be connected without compromising performance. This configuration is perfect for spaces where more than one Ethernet connection is needed but a sleek, high-end design is still desired.

Made from premium plastic, the faceplate offers enhanced durability and a polished finish, while the metal contacts ensure stable, high-quality connections. The RJ45 Face Plate Premium Socket is well-suited for businesses and larger networking environments, where a high-end, efficient, and aesthetically pleasing solution is required to manage multiple connections from a single faceplate.

10. KEYSTONE JACK PANEL

Model	 <p>RJ45 Cat 8.1 Tool-less Keystone Jack</p>	 <p>SKMCKPM</p>
Bandwidth	up to 25/40 Gbps	up to 1 Gbps
Installation	Tool-less, making it easy for fast installation	Requires a 110 or Krone termination tool for installation
Shielding	shielded	Unshielded
Material	premium plastic materials	UL94V-0 rated ABS plastic housing
Price	RM 37.14	RM29.05
References	https://www.hb-digital.de/100-Pcs-Keystone-module-RJ45-CAT-81-GHMT-certified-LSA-tool-less-rj45-keystone-jack	https://my.element14.com/tuk/skmckpm/keystone-rcpt-ri45-cat6-8p8c-black/dp/2534594?&CMP=KNC-GMY-GEN-SHOPPING-PERF-MAX-V1&mckv=dclperid pkw pmt slid product[2534594]pgrid ptaid &gad_source=1&gclid=CjwKCAiAjp-7BhBZEiwAmh9rBZkSLZGX-p8ez0uuMFeQXccLV2i1ColS1Jbm9nOsiO4Y8eOdYSe8RoCch8QAvDBwE

The most suitable keystone jack panel for our needs is the RJ45 Cat 8.1 Tool-less Keystone Jack, chosen for its superior bandwidth, easy installation, and enhanced shielding. The Cat 8.1 keystone jack offers high bandwidth capabilities, supporting speeds up to 25 Gbps, making it perfect for high-speed, high-demand networking environments, unlike lower bandwidth options that only support 1 Gbps for basic applications.

Its tool-less installation design simplifies setup, eliminating the need for specialized termination tools, which can be time-consuming and complicated, as required by other jacks. The keystone jack is built with effective shielding, ensuring superior protection against electromagnetic interference (EMI), which helps maintain signal integrity and performance in noisy environments.

Additionally, the RJ45 Cat 8.1 Tool-less Keystone Jack is made from durable, high-quality materials, offering better durability, fire resistance, and overall longevity compared to basic plastic options. This combination of features makes it a reliable and future-proof solution for advanced networking setups.

11. NETWORK MANAGEMENT DEVICES

Model		
APC SRT8KXLI 230V Input Rack Mount UPS - 8000VA (8kW)		SMART1500LCDT
Power Capacity	8000VA (8kW)	1500VA
Input Voltage	230V	120V
Processor	Advanced, enterprise-level	Basic, suited for home/office use
Memory	Larger memory for monitoring	Smaller memory for basic use
Application	Large systems, data centers	Home/small office networking
Features	Smart monitoring, rack-mountable	LCD display, AVR, compact
Shielding	High-performance, shielded	Basic power protection
Price	RM50,253.54	RM1,436.68
References	https://my.rs-online.com/web/p/uninterruptible-power-supplies/2877928?cm_mmc=MY-PLA-DS3A---google---PLA-MY_EN_PMAX_High-Impression_20240118---&matchtype=&&ads_rl=8558441598&&&gad_source=1&gclid=CjwKCAiA9bq6BhAKEiwAH6bqoKH7CgswDOLmeP27P_5ijFnExzFHktzR9Ba6J2nTYvtGEpTwZcRTThoC6EYQAvD_BwE&gclsrc=aw.ds	https://www.digikey.my/en/products/detail/tripp-lite/SMART1500LCDT/4439114?srsltid=AfmBOopbnp4wkqfErGsZC2KEig83f2dhZbB3KDWS5jppfb8_nMuXTRD5

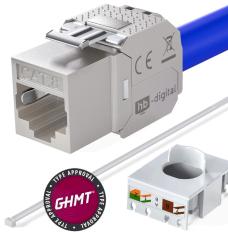
The most suitable network management device for our needs is the APC SRT8KXLI 230V Input Rack Mount UPS - 8000VA (8kW), selected for its high power capacity, advanced monitoring features, and space-efficient design. With a high power capacity of 8000VA, it is ideal for large systems, data centers, and enterprise-level applications, providing reliable support for high-power demanding equipment such as servers and network hardware.

The 230V input is well-suited for international applications, particularly in regions where 230V power systems are standard, ensuring compatibility across different locations. The UPS is powered by a high-end processor designed for smart monitoring and efficient power distribution management, essential for large-scale environments. It also features advanced memory and monitoring capabilities, enabling real-time tracking of power usage, battery health, and UPS status, which is critical for enterprise environments.

The rack-mountable design enhances space efficiency in server racks, making it ideal for data centers and server rooms. It offers smart monitoring tools that track UPS health, power metrics, and provide detailed insights into performance. Additionally, the high-performance shielding ensures better protection for sensitive equipment, safeguarding it from electrical surges, interference, and power disruptions. These features make the APC SRT8KXLI UPS a reliable and efficient solution for managing power in enterprise-level network environments.

TOTAL COST

Component	Model	Price per unit(RM)	Quantity	Total Price(RM)
Server	Dell EMC PowerEdge T640 Tower Server 	28,821.00	50	1,441,050.00
Router	S5860-24XB-U is FS 	17,594.00	2	35,188.00
Firewall	FPR2140-NGFW-K9 - Cisco Firepower 2100 Series Appliances 	116,195.92	1	116,195.92
Wireless Access Point (WAP)	NETGEAR WEB 758-111 NAS WiFi 7 	7,422.00	2	14,844.00

	WS-C3850-48XS-S Catalyst 3850 Switch SFP+	75,615.59	15	1,134,233.85
	NKPP48FMY	525.67	15	7,885.05
	RS PRO, 10m Cat8, Black RJ45 to Male RJ45 Male, S/FTP, Terminated LSZH Sheath	162.13	52	8,430.76
	Cat8 Ethernet Cable Connector RJ45	8.58	500	4,290.00
	RJ45 Face Plate Premium Socket	39.38	70	2,756.60
	RJ45 Cat 8.1 Tool-less Keystone Jack	37.14	96	3,565.44

	APC SRT8KXLI 230V Input Rack Mount UPS - 8000VA (8kW)	50,253.54	2	100,507.08
Network Management Devices				
	MTP-88-C8-SR-A 3	0.45	500	225
Total				2,869,171.70

1.1. Research and References

Based on research conducted, we decided to include firewalls, routers, switches, and a server in our list of devices. These components are crucial for establishing a secure and efficient network system. Cisco Packet Tracer, a widely used network simulator, emphasizes the importance of these devices in designing realistic network topologies. It provides a diverse range of tools, including support for routers, switches, ASA firewalls, and Meraki appliances, making it invaluable for learning and testing networking concepts (CBT Nuggets, 2020). This aligns with the practical requirements for deploying and testing networking technologies in both educational and professional environments.

1.2. References includes and are appropriate

A reference list on the research we had done is also attached at the end of the report.

1.3 & 1.4 Characteristics of LAN devices and its specifications to accomplish the needs and requirements.

The selected devices for our project which are routers, firewalls, servers, switches, and wireless access points are tailored to create a secure and efficient LAN setup. These devices have been chosen based on their specifications to fulfill the project requirements. The Cisco C8500-12X router, with an aggregate throughput of up to 195 Gbps, provides enterprise-grade routing with advanced security features such as integrated IPSec VPN and firewall capabilities. Its 12 x 10GbE SFP+ ports and 4 x 1GbE RJ45 uplinks ensure scalability and high-speed connectivity, making it ideal for an academic institution's growing network demands.

The Cisco Firepower 2140 firewall offers comprehensive multi-layered security with features like advanced threat protection, intrusion prevention systems (IPS), and deep packet inspection. Its robust design ensures uninterrupted network operations by safeguarding against external threats and vulnerabilities.

For data storage and processing, the Dell EMC PowerEdge T640 server was chosen for its powerful capabilities, including 768GB RAM, dual Intel Xeon Platinum 8168 processors, and 6 x 1.92TB SSDs. It supports up to 8 GPU accelerators and scalable configurations, making it highly efficient for managing large volumes of data and supporting critical network applications.

The Cisco Catalyst WS-C3850-48XS-S switch is integral to the network's wired connectivity. With 48 x 10GbE SFP+ ports, Layer 3 switching capabilities, and support for up to 2000 wireless clients, it ensures high-speed, reliable communication within the network. Its advanced VLAN management and high throughput make it a key component of the LAN infrastructure.

For wireless connectivity, the Netgear WBE758-111NAS access points were selected. These access points feature cutting-edge Wi-Fi 7 technology, offering speeds up to 18.4 Gbps and tri-band operation (2.4 GHz, 5 GHz, and 6 GHz). Their advanced MIMO technology supports efficient multi-user communication, ensuring seamless wireless coverage throughout the campus.

Additionally, Cat8 Ethernet cables with a data transmission rate of up to 40 Gbps and a bandwidth of 2000 MHz were chosen for high-speed, stable wired connections. To organize and manage the cabling infrastructure, Panduit NKPP48FMY patch panels with 48 ports were selected for their durability and compatibility with Cat5e and Cat6 cables.

2. REPORT

2.1 Are you surprised by the prices? How were you surprised?

Yes, we were quite surprised by the prices of network devices such as servers, routers, switches, and firewalls. The costs were significantly higher than what we initially anticipated, particularly for devices equipped with advanced features like extended range options, enhanced security measures, and robust integration capabilities. The steep price tags reflect the sophistication and reliability of these devices, but they were beyond our initial budget expectations.

What stood out the most was the investment required for features that ensure long-term network efficiency, such as high-speed performance, scalability, and robust security mechanisms. While the initial costs may appear overwhelming, these devices often justify their price through long-term savings. For instance, their durability, dependable performance, and ability to minimize network downtime contribute to operational efficiency and reduce maintenance expenses over time.

In conclusion, although the prices were surprising, understanding the added value and potential cost savings these devices offer helps us appreciate why they are priced at a premium. Their features and benefits ultimately make them worthwhile investments for creating a high-quality and reliable network infrastructure.

2.2 Have you ever considered cost as a factor for choosing networking devices?

Yes, of course. Cost is always a critical factor especially when the budgets are limited and tight. However, the decision will include maintenance, scalability, energy efficiency and expected lifespan. A device with higher initial costs but lower maintenance requirements may be more cost effective in the long run term.

2.3 What are the major differences between the same devices from different brands?

When comparing switches from Cisco and Huawei, several distinctions arise in terms of performance, scalability, and cost. Cisco switches are known for their robust features, including advanced VLAN management, superior Quality of Service (QoS), and enhanced network security. These features cater to large enterprises that demand high reliability and scalability. Cisco's switches also utilize the Cisco IOS operating system, which is praised for its consistency and extensive support. In contrast, Huawei switches offer a more cost-effective alternative while still delivering competitive features such as high port density and energy efficiency. Huawei's VRP (Versatile Routing Platform) is user-friendly but might lack the advanced options available in Cisco IOS. Moreover, Huawei switches are popular in budget-conscious markets due to their lower price point and comparable performance for medium-scale implementations (Networkise, n.d.; Lia, 2020).

Servers (Dell PowerEdge Rack Servers and Huawei FusionServer RH Series Rack Servers)

When comparing **Dell PowerEdge Rack Servers** and **Huawei FusionServer RH Series Rack Servers**, the first major factor to consider is performance and scalability. Both brands offer Intel Xeon Scalable processors, ensuring strong performance for a variety of workloads. Dell PowerEdge is well-known for its robust performance and enterprise reliability, making it an excellent choice for businesses with established IT infrastructures. Dell's OpenManage management tools further enhance its ability to integrate with other Dell products, making it easier for IT teams to manage complex systems. On the other hand, Huawei FusionServer RH Series excels in providing flexible scalability, making it a great choice for businesses requiring scalable solutions in cloud computing, big data, and AI applications.

In terms of cost-effectiveness, **Huawei FusionServer RH Series** offers a budget-friendly solution, particularly appealing to companies with limited resources or those looking to scale their infrastructure at a lower cost. Huawei's focus on cost-effective performance allows businesses to grow without overspending on enterprise-level hardware. This makes the FusionServer RH Series especially suitable for small and medium-sized enterprises (SMEs) or those operating in data-intensive environments such as cloud computing and AI workloads. Conversely, Dell PowerEdge, while higher in price, justifies the cost with superior reliability, enterprise-class integration, and extensive support services. For companies heavily invested in the Dell ecosystem, the added cost is often seen as an investment in long-term performance and support.

Finally, expandability and integration are essential for businesses looking to grow their IT infrastructure. Huawei FusionServer RH Series provides highly scalable solutions, designed to handle dense data center computing and software-defined storage, ensuring that businesses can expand without replacing their hardware as their needs grow. Huawei's servers also provide a good balance of performance and flexibility at a competitive cost, making them ideal for businesses focused on maximizing value. Dell PowerEdge, however, is known for its seamless integration with other Dell products, which is particularly beneficial for larger enterprises or those already using Dell's networking and storage systems. Dell's comprehensive support, along with

its high reliability in mission-critical environments, makes it the go-to choice for businesses that require consistent uptime and enterprise-level security.

Routers (Cisco C8500-12X and the S5860-24XB-U is FS)

From our perspective, Cisco C8500-12X and FS S5860-24XB-U are ideal networking devices which are designed for specific purposes. Cisco C8500-12X is excellent for large business applicability with the complex network. It provides 12x1G Ethernet ports with advanced routing and strong security that makes it perfect for companies that need reliable WAN connections and secure VPNs package with smooth application performance. Cisco's reputation for reliability and network security further strengthens its appeal. However, its solutions often come with a higher price tag and additional licensing requirements, which can increase overall costs over time.

On the other hand, the FS S5860-24XB-U is a versatile Layer 3 managed switch that offers exceptional performance and flexibility, especially for data centers and modern enterprise networks. With 24x10G SFP+ ports and 4x100G uplinks, it delivers superior switching power, making it ideal for high-speed data transmission and scalable networking. FS devices are known for their open compatibility with third-party hardware, which allows for greater interoperability compared to Cisco's proprietary ecosystem. Additionally, FS solutions are more cost-effective, with many advanced features included without extra licensing fees, making them a budget-friendly choice for organizations.

Choosing the FS S5860-24XB-U is a smart decision for organizations seeking an affordable yet powerful networking solution. Its combination of high-speed ports, scalability, and cost-effectiveness makes it well-suited for data centers and modern enterprise LAN setups. While the Cisco C8500-12X remains a reliable router for specific high-security applications, the FS S5860-24XB-U stands out as the more practical choice for those focused on performance and value in switching infrastructure.

Firewalls (Cisco Firepower 2140 and the Fortinet FortiGate 500E)

The Cisco Firepower 2140 and the Fortinet FortiGate 500E are both advanced next-generation firewalls (NGFWs) designed to offer robust security for enterprise environments, but they cater to different needs. The Cisco Firepower 2140 is equipped with Cisco's Firepower Threat Defense (FTD) software, providing integrated firewalling, intrusion prevention systems (IPS), URL filtering, and application control in a unified platform. It offers deep visibility into network traffic, advanced threat protection, and secure network segmentation, making it ideal for businesses already within the Cisco ecosystem. Its advanced security capabilities, such as deep packet inspection, automated response mechanisms, and VPN support, make it suitable for critical infrastructure protection (Cisco Systems, n.d., retrieved December 4, 2024).

On the other hand, the **FortiGate 500E** is powered by Fortinet's FortiOS and focuses on high-performance security with a strong emphasis on throughput and scalability. It combines

several security features such as intrusion prevention, web filtering, and advanced threat protection, making it a powerful choice for organizations with high-speed, low-latency requirements. Additionally, the FortiGate 500E supports SD-WAN, VPN, and network analytics, offering flexibility for distributed network environments (Fortinet, n.d., retrieved December 4, 2024).

While both firewalls provide comprehensive security features, the Cisco Firepower 2140 stands out in terms of quality due to its deep integration with Cisco's broader security ecosystem, making it the ideal choice for enterprises seeking a unified security approach. Its advanced threat detection capabilities, seamless integration with other Cisco security tools, and centralized management features offer unparalleled network visibility and control. In comparison, the Fortinet FortiGate 500E, while excelling in performance and scalability, lacks the same level of integration with other enterprise security solutions. Therefore, based on quality, the Cisco Firepower 2140 is the superior choice for organizations focused on comprehensive threat management and long-term network security.

Wireless Access Points (The Netgear WBE758-111NA vs Aruba AP-505 US)

The Netgear WBE758-111NAS and the Aruba AP-505 US are both high-quality Wi-Fi access points designed to provide seamless wireless connectivity for enterprise environments. The Netgear WBE758-111NAS is an Insight Managed Wi-Fi 7 access point, supporting advanced features such as high-speed wireless performance, secure guest networks, and easy integration with Netgear's Insight platform. This device is designed for environments that demand strong coverage, high throughput, and simplified management, which makes it an ideal choice for businesses seeking a reliable and scalable solution. The Netgear WBE758 supports Wi-Fi 7 technology, ensuring it delivers the latest performance standards, including enhanced data speeds, lower latency, and better efficiency compared to previous generations (NetworkHardwares, n.d., retrieved December 4, 2024).

In comparison, the Aruba AP-505 US from Aruba Networks is a Unified Access Point designed to support high-performance, secure, and reliable connectivity for a range of applications. It features Aruba's advanced wireless technologies and management tools, ensuring enterprise-grade performance in a variety of environments. The Aruba AP-505 focuses on offering high-speed Wi-Fi 6 (802.11ax) performance, along with enhanced security features like integrated WPA3 and robust encryption options. It is particularly beneficial for businesses needing high-density environments and scalability with easy cloud-based management through Aruba Central (NetworkHardwares, n.d., retrieved December 4, 2024).

While both devices offer strong wireless performance and security, the Netgear WBE758-111NAS stands out due to its support for Wi-Fi 7, which promises superior speeds, lower latency, and improved efficiency. This makes the Netgear WBE758-111NAS the better choice for businesses looking for cutting-edge technology, future-proofing their wireless network with the latest standard for maximum performance and scalability. On the other hand, the Aruba AP-505 offers a solid solution with excellent security and performance for businesses already

invested in the Aruba ecosystem but lacks the advanced capabilities of Wi-Fi 7. Therefore, based on quality, the Netgear WBE758-111NAS is the better option due to its superior technology and future-readiness.

Switch (WS-C3850-48XS-S Catalyst 3850 Switch SFP+ and R0X27A - Aruba 6410)

When evaluating networking equipment from various manufacturers, several important factors should be taken into account like performance, price, user-friendliness, and scalability. To evaluate performance, consider elements such as the kinds of ports, switching capacity, and the device's ability to accommodate future expansion. Certain brands, such as Cisco, work seamlessly with their own products, which is beneficial if you are already utilizing Cisco devices. FS, conversely, emphasizes compatibility with different brands, providing greater flexibility.

Cost is another big factor. Cisco products are usually more expensive and may require extra licenses for advanced features. FS tends to offer more features at a lower price, with fewer extra costs. In terms of ease of use, Cisco's devices have powerful features but may need skilled IT staff to manage. FS devices often have simpler interfaces that are easier for everyday users. Scalability is also important for some brands, able to expand easily, while others might have fixed setups that limit growth. Support and warranty options can differ too, with Cisco offering more comprehensive services, but at a higher price.

In conclusion, the right device depends on what you need most. If you want high performance and integration with Cisco products, Cisco might be the better choice. But if you're looking for a more affordable, flexible, and easy-to-manage solution, FS could be the better fit. It's all about balancing performance, cost, and ease of use based on your needs.

Patch Panel 48 (NKPP48FMY and PR175SC48-SM)

The decision regarding devices from various brands ultimately depends on the particular requirements of our network. We selected the NKPP48FMY patch panel due to its high port capacity, robust build, and compatibility with standard rack mounts, making it perfect for medium to large networks.

Although other brands may present comparable features, the NKPP48FMY distinguishes itself with its sturdy construction and dependability, delivering an economical option for effective Ethernet network management. This decision guarantees long-lasting performance, user-friendliness, and smooth incorporation into current infrastructure.

Ethernet Cable (RS PRO,Cat8, Black RJ45 Terminated LSZH Sheath, RS PRO, Cat6, RJ45 UTP and RS PRO Terminated PVC Sheath, Cat6a, RJ45, S/FTPShielded)

The RS PRO 10m Cat8 Ethernet cable distinguishes itself from other choices because of its exceptional blend of high bandwidth, rapid transmission speeds, and strong shielding. Although other brands might provide Ethernet cables with comparable characteristics, the RS PRO cable stands out with a bandwidth of 2000 MHz, the highest in this category.

The RS PRO cable is built for high-speed, high-performance tasks. With speeds of 25/40 Gbps, it ensures quick and efficient data transfer, making it perfect for modern data centers and busy network environments. The cable's S/FTP shielding provides extra protection against electromagnetic interference (EMI), helping to keep the signal clear and strong, even in areas with a lot of electrical noise.

The LSZH sheath makes the RS PRO cable safer and more environmentally friendly. These important features make it the best choice, as it meets the high standards required for fast and reliable network setups, offering better performance and dependability than other brands.

Ethernet Connector (Cat8 Ethernet Cable Connector RJ45 and J00-0045NL PulseJack Right Angle 1x1 Modular Connectors)

We chose the Cat8 Ethernet Cable Connector RJ45 because it offers the best combination of high bandwidth, effective shielding, and durable materials, ensuring optimal performance in demanding network environments. Its ability to support high data rates and frequencies makes it ideal for high-speed networking, while its enhanced protection against electromagnetic interference (EMI) ensures stable performance even in noisy settings. The connector's reliable and long-lasting materials preserve signal integrity and reduce loss, making it a strong, uninterrupted choice for high-performance networking setups. These key features make it the best option for meeting the rigorous demands of high-speed, high-performance applications.

Faceplate (NK1FWHY, NK2FNIW and RJ45 Face Plate Premium Socket)

We chose the RJ45 Face Plate Premium Socket due to its ideal combination of functionality, quality, and aesthetics. The dual-port capability offers versatility by accommodating several Ethernet connections in a single area, making it perfect for sophisticated configurations that need effective space utilization.

The RJ45 Face Plate Premium Socket is built with durable materials like tough premium plastic and metal connectors, ensuring it lasts and delivers reliable connections. Its sleek and polished design makes it a stylish addition to any space, while its dependable performance is perfect for businesses or larger networks that need to manage multiple connections efficiently. With both form and function, it's the ideal choice to meet our networking needs.

Keystone Jack Panel (RJ45 Cat 8.1 Tool-less Keystone Jack and SKMCKP)

We chose the RJ45 Cat 8.1 Tool-less Keystone Jack because it provides the perfect combination of high performance, ease of use, and durability. With its ability to support speeds up to 25 Gbps, it meets the demands of high-speed, high-performance networks, unlike lower-bandwidth alternatives. The tool-less design makes installation quick and easy, saving time and effort compared to other jacks that need special tools. It also has excellent shielding to protect against electromagnetic interference (EMI), ensuring the signal stays strong and clear even in noisy environments. Built with durable, fire-resistant materials, it's designed to last longer and perform reliably, making it a smart, future-proof choice for high-demand networking setups.

Network Management Devices (APC SRT8KXLI 230V Input Rack Mount UPS - 8000VA and SMART1500LCDT)

We chose the APC SRT8KXLI 230V Rack Mount UPS because it offers the perfect combination of high power, smart monitoring, and space efficiency. With an 8000VA capacity, it's built to support large systems like servers and network hardware in demanding environments such as data centers. The 230V input makes the APC SRT8KXLI perfect for use anywhere, so it's always ready no matter where you are. With its smart processor and real-time monitoring, you can easily keep track of power usage, battery health, and the overall status of the UPS—helping to ensure everything runs smoothly in a business setting. The rack-mountable design is a great space-saver in server racks, and its strong shielding keeps your sensitive equipment safe from power surges and interruptions. With all these features, the APC SRT8KXLI is a trustworthy and efficient choice for managing power in large network environments.

MEETING MINUTES

Meeting minutes should follow this sample, filled with meaningful input.

MEETING MINUTES

DATE/TIME	29 November 2024 9:00pm		
LOCATION	Online (Google Meet)		
AGENDA	Completing task 3		
MEETING MC	Nazatul Nadhirah		
ATTENDANCE			
NAME	TIME	REASON FOR ABSENCE	
NAZATUL NADHIRAH	21:00	-	
NUR AINA SYAFINA	21:00	-	
NURUL ATHIRAH SYAFIQAH	21:00	-	
WAN NUR RAUDHAH	21:00	-	
MINUTES			
NO	ITEM DISCUSSED	IDEAS/SUGGESTIONS AND PERSON GIVING IT	PERSON IN CHARGE & DATE
1.	List of devices and quantities needed	Syafina proposed starting with Cisco, Huawei, and TP-Link devices for routers and switches.	Syafina
2.	Research on device capabilities and requirements	Raudhah highlighted the importance of comparing devices suited for academic institutions.	Raudhah
3.	Inclusion of appropriate references	Athirah suggested using manufacturer websites and reputable tech forums for sourcing references.	Athirah

4.	Assessment of LAN devices to meet organizational needs	Naza suggested matching devices against scalability and cost-effectiveness.	Naza
5.	Reflection on device costs and differences between brands	Athirah noted Cisco is premium-priced, while TP-Link offers budget-friendly alternatives.	Team to collaboratively reflect and include insights in the report by 5 December 2024
6.	Major differences in device features among brands	Raudhah emphasized reliability and warranty policies as critical factors for comparison.	Raudhah
7.	Next Meeting	5/12 - task 3 should have been completed and marked to make a correction	-
8.	Meeting Ended	23:00	-
9.	Consultation with subject-matter expert on network feasibility	Insights provided by Dr. Muhammad Zafran on optimizing the selection of devices and ensuring compatibility with the project goals.	Raudhah to document the insights and integrate them into the report by 2 December 2024

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