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NETWORK COMMUNICATIONS

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TASK 3 | SURVIVOR

Lecturer:

MUHAMMAD ZAFRAN BIN MUHAMMAD ZALY SHAH

Group 02 Members:

No.	Name	Matric No
1	ABDURRAFIQ BIN ZAKARIA	A24CS0031
2	AHMAD MUNIF BIN BAHARUM	A24CS0038
3	NAJMUDDIN BIN KAMARUDIN	A24CS0145
4	DANIEL IMAN HAQIMIE BIN YUSOFF	A24CS0063

BRIEF EXPLANATION OF THE TASK

In Task 3, our objective is to select suitable LAN devices that can support the networking requirements of the new Faculty of Computing building. Based on the user requirements gathered through interviews, preliminary analysis, and research conducted in Task 2, this task focuses on identifying the appropriate networking devices including switches, routers, wireless access points, patch panels, and cabling that will ensure reliable connectivity, scalability, and high performance for an academic environment.

We conducted detailed research by comparing multiple brands such as Cisco, Huawei, Ubiquiti, and TP-Link Omada, analysing their specifications, supported features, reliability, and pricing. Our selection process considered factors such as high-density user environments, hybrid classroom needs, Wi-Fi capacity, network scalability, and long-term maintenance.

The final output of this task includes a complete list of required devices with quantities, technical specifications, and justification for choosing each device. A reflection section discussing pricing, brand differences, and cost considerations is also included as part of this deliverable.

DEVICES COMPARISON

1. Core Switch

		
Huawei CloudEngine S6730-H24X6C	FS-S5850-48B8C-PE 48×25Gb + 8×100Gb L3	HPE JL624A – Aruba 8325 – 48x25GbE + 8x100GbE
RM12,484.47	RM22,874.00	RM35,702.25
<ul style="list-style-type: none"> Ports: 24 x 10G SFP+, 6 x 100G QSFP28 Capacity: 2.4 Tbit/s Switching, 490 Mbps Forwarding WLAN: Native AC Built-in (Manage up to 1K APs) Feature: Supports VXLAN, Telemetry & BGP-EVPN Power: Dual Modular Power Supply (1+1 Redundancy) 	<ul style="list-style-type: none"> Ports: 48×10/25G SFP28, 8×40/100G QSFP28 (breakout support) Performance: 4 Tbps, 2976 Mpps, 0.7 µs latency Power & Cooling: 2 PSUs (1+1), 4 fans (2+2), hot-swappable Memory & Buffer: 2 GB DRAM, 8 GB flash, 36 MB buffer Other Specs: Jumbo frame 9600, 120K MAC, 60K IPv4 / 4K IPv6 routes, 4K VLANs, 160 W max 	<ul style="list-style-type: none"> Ports: 48×25 GbE + 8×100 GbE Layer: Fully Layer 3, ArubaOS-CX Performance: 6.4 Tbps, ~2000 Mpps Redundancy: 2 PSUs, 6 fans Protocols: BGP, OSPF, VRF, VXLAN
<p>Summary</p> <p>The FS-S5850-48B8C-PE is the optimal core switch, balancing high performance with cost-efficiency. It surpasses the Huawei S6730-H24X6C (lower forwarding) and the expensive HPE Aruba 8325. The FS-S5850 offers 48×25GbE and 8×100GbE uplinks, 4 Tbps switching, 2976 Mpps forwarding, full Layer 3 support, MLAG, and robust redundancy (dual hot-swappable PSUs/fans). This makes it a practical, reliable, and scalable solution for core/aggregation roles in enterprise/data center environments.</p>		

2. Access Switch (PoE)

		
Cisco Catalyst 9200L-24P-4X-E	USW-Enterprise-24-PoE	FS S3270-24TM-P
RM5,234.87	RM3,118.84	RM2,311.00
<ul style="list-style-type: none"> Ports: 24× 1 Gbps PoE+ RJ-45 downlinks, 4× 10 Gbps SFP+ uplinks Performance: 128 Gbps switching, ~190.4 Mpps forwarding Power & PoE: 600 W AC PSU, fixed redundant fans, up to ~370 W PoE budget (expandable with second PSU) Software & Stack: Cisco IOS XE with Network Essentials, StackWise-80 stacking support Scale & Routing: 16 000 MAC, ~11 000 IPv4 routes, 512 SVIs, Layer 2 + basic Layer 3 features 	<ul style="list-style-type: none"> Ports: 12× 2.5 GbE PoE+ + 12× 1 GbE PoE+ + 2× 10 Gbps SFP+ uplinks PoE Power: Up to 400 W total PoE budget, all PoE+ ports Performance: 124 Gbps switching, ~92 Mpps forwarding Layer: Managed Layer 3 switch with routing & VLAN support Extras: Integrated 1.3" touchscreen, rack-mountable, UniFi controller management 	<ul style="list-style-type: none"> Ports: 24× Gigabit PoE+ RJ45 + 4× 1/2.5 Gb SFP uplinks Switching: 68 Gbps capacity, ~50.6 Mpps forwarding PoE: 370 W total PoE budget (IEEE 802.3af/at) Power & Cooling: Built-in PSU, 2 internal fans Other: PicOS® OS (managed L2+), jumbo frames, QoS, OSPF, MLAG support
<p>Summary</p> <p>The Ubiquiti USW-Enterprise-24-PoE was selected over the Cisco Catalyst 9200L-24P-4X-E and FS S3270-24TM-P because it provides a better balance of modern port speeds, PoE budget, and cost. Compared to the FS S3270, it offers higher-speed 2.5 GbE ports and 10 Gbps uplinks, which better support high-performance APs and heavier traffic. Against the Cisco 9200L, it delivers similar PoE capability and Layer 3 features but at a significantly lower price, making it more practical and cost-effective for a faculty network.</p>		

3. Access Switch (non-PoE)

S3700-24T4F 24x RJ45, 4x SFP	NETGEAR GS524v3 24-Port Gigabit Ethernet Unmanaged Switch	REYEE 24-Port Gigabit Smart Non-PoE Switch Cloud Managed
RM11,573.00	RM889.00	RM833.31
<ul style="list-style-type: none"> Ports: 24× 1 Gbps RJ45 + 4× 1 Gbps SFP optical uplinks Switching Capacity: 56 Gbps switching, ~42 Mbps forwarding Layer: Managed Layer 2+ features (VLAN, STP/RSTP/MSTP, LACP) MAC & Routes: ~8K MAC addresses, basic IPv4/IPv6 routing support Design: Fan-less for silent operation, supports QoS, ACL, SNMP, web/CLI management 	<ul style="list-style-type: none"> Ports: 24× 10/100/1000 Mbps Gigabit RJ-45 ports (unmanaged) Switching Capacity: 48 Gbps non-blocking bandwidth Forwarding: Up to ~1,488,000 fps at 1 Gbps per port Features: Auto-MDI/MDI-X, 802.1p QoS, jumbo frames up to 9 KB Design: Fanless (silent), Energy Efficient Ethernet (IEEE 802.3az), desktop/wall/rack mount 	<ul style="list-style-type: none"> Ports: 24 x Gigabit Ethernet ports (10/100/1000 Mbps) Switching Capacity: 48 Gbps MAC Address Table: 8K entries VLAN Support: Up to 4,094 VLANs QoS: Traffic prioritization based on port, 802.1p, and DSCP Security: Includes features like port security, ACLs, and storm control Management: Cloud-based management with SNMP support
<p>Summary</p> <p>For the Access Switch (Non-PoE) category, we chose the REYEE 24-Port Gigabit Smart Non-PoE Switch because it offers the best balance of features, manageability, and cost for a faculty or office network. Unlike the FS S3700-24T4F, which is more expensive and overpowered for a simple access layer, and the NETGEAR GS524v3, which is unmanaged and lacks advanced features, the REYEE switch provides 24× Gigabit ports, VLAN support up to 4,094, QoS, ACLs, and cloud-based management at a very affordable price (RM833.31). This makes it practical, cost-effective, and easy to manage for connecting PCs, printers, and non-PoE devices without unnecessary complexity.</p>		

4. WIRELESS ACCESS POINT (STUDENT LOUNGE, LABS)

		
Ubiquiti UniFi 6 Lite (U6-Lite)	TP-Link Omada EAP245 AC1750 Wireless AP	Ubiquiti UniFi AC Mesh UAP-AC-M
RM780.00	RM670.00	RM570.00
<ul style="list-style-type: none"> • Wi-Fi Standard: Wi-Fi 6 (802.11ax) • Ports: 1× Gigabit RJ45 (PoE) • Performance: Up to ~1.5 Gbps combined speed • Features: Newer Wi-Fi standard, good for many modern devices • Use Case: Classrooms/offices needing faster throughput 	<ul style="list-style-type: none"> • Wi-Fi Standard: AC1750 (802.11ac) • Ports: 2× Gigabit RJ45 (PoE support) • Performance: Up to ~1.75 Gbps combined speed • Features: <ul style="list-style-type: none"> ○ Cloud/Omada controller management ○ Seamless roaming, band steering, guest portal ○ Designed for stable business Wi-Fi • Use Case: Labs, offices, and areas with many users 	<ul style="list-style-type: none"> • Wi-Fi Standard: Wi-Fi 5 (802.11ac) • Ports: 1× Gigabit RJ45 (PoE) • Performance: Good coverage and stable throughput • Features: Mesh support for wide coverage • Use Case: Large halls, outdoor/mesh areas
<p>Summary</p> <p>For low-traffic zones such as individual faculty offices, we deployed the TP-Link Omada EAP245 as a cost-saving measure. We recognize that this model provides merely adequate connectivity rather than high-performance throughput, but it is perfectly sufficient for areas where only one or two users connect at a time. This strategic compromise allowed us to avoid overspending on 'overkill' hardware for quiet rooms, preserving our budget for the high-density equipment required in the student labs.</p>		

5. WIRELESS ACCESS POINT (HYBRID, SMART CLASS ROOM)

		
Ubiquiti UniFi 6 Lite (U6-Lite)	TP-Link Omada EAP245 AC1750 Wireless AP	Ubiquiti UniFi AC Mesh UAP-AC-M
RM780.00	RM670.00	RM570.00
<ul style="list-style-type: none"> • Wi-Fi Standard: Wi-Fi 6 (802.11ax) • Ports: 1× Gigabit RJ45 (PoE) • Performance: Up to ~1.5 Gbps combined speed • Features: Newer Wi-Fi standard, good for many modern devices • Use Case: Classrooms/offices needing faster throughput 	<ul style="list-style-type: none"> • Wi-Fi Standard: AC1750 (802.11ac) • Ports: 2× Gigabit RJ45 (PoE support) • Performance: Up to ~1.75 Gbps combined speed • Features: <ul style="list-style-type: none"> ○ Cloud/Omada controller management ○ Seamless roaming, band steering, guest portal ○ Designed for stable business Wi-Fi • Use Case: Labs, offices, and areas with many users 	<ul style="list-style-type: none"> • Wi-Fi Standard: Wi-Fi 5 (802.11ac) • Ports: 1× Gigabit RJ45 (PoE) • Performance: Good coverage and stable throughput • Features: Mesh support for wide coverage • Use Case: Large halls, outdoor/mesh areas
<p>Summary</p> <p>We ultimately selected the Ubiquiti UniFi 6 Lite (U6-Lite) over the TP-Link and AC Mesh options specifically for its superior High-Density Performance. Unlike the older Wi-Fi 5 standards used by the competitors, the U6-Lite utilizes Wi-Fi 6 (802.11ax) technology with OFDMA, which allows it to communicate with multiple devices simultaneously rather than sequentially. This capability is critical for our crowded faculty environment, ensuring that the network maintains high throughput and low latency even when dozens of students in a single lab connect their laptops and smartphones at the same time.</p>		

6. Router/Firewall

		
Cisco Firepower 1010 (FPR1010-NGFW-K9)	Ubiquiti UniFi Dream Machine Special Edition (UDM-SE)	Fortinet FortiGate 80F
RM3,841.00	RM2,733.00	RM6,763.00
<ul style="list-style-type: none"> • Performance: 10 Gbps firewall, 1.4 Gbps threat protection (IPS, anti-malware, web filtering) • Ports: 2 WAN (Gigabit SFP/RJ45), 8 LAN (Gigabit RJ45) • Security: Next-gen firewall with IPS, anti-malware, web filtering, and network segmentation • Networking: Secure SD-WAN for reliable Internet and cloud/LMS access • Design: Fanless, compact, energy-efficient, suitable for lab or office rack deployment 	<ul style="list-style-type: none"> • 1x 2.5 GbE RJ45 WAN, 1x 10 Gbps SFP+ WAN • 8x 1 GbE LAN with PoE/PoE+ (6x 802.3af, 2x 802.3at) • 1x 10 Gbps SFP+ LAN uplink • Performance: ~3.5 Gbps routing + IDS/IPS throughput • Features: All-in-one gateway/router/firewall with UniFi OS, IDS/IPS, DPI, PoE/PoE+ switch, 128 GB SSD + HDD bay, 1.3" touchscreen • Design: 1U rack-mountable, aluminum/steel chassis, supports Bluetooth setup via UniFi app 	<ul style="list-style-type: none"> • Performance: Firewall 10 Gbps, Threat Protection 1.4 Gbps • Ports: 2 WAN (Gigabit SFP/RJ45), 8 LAN (Gigabit RJ45) • Features: Next-gen firewall with IPS, anti-malware, web filtering; Secure SD-WAN • Design: Fanless, silent, suitable for lab or office rack deployment
<p>Summary</p> <p>The Fortinet FortiGate 80F was chosen because it provides much higher security performance compared to both the Cisco Firepower 1010 and the Ubiquiti UniFi Dream Machine Special Edition. The FortiGate 80F supports up to 10 Gbps firewall throughput and 1.4 Gbps threat protection, making it more suitable for a faculty network with high Internet usage. In comparison, the Cisco Firepower 1010 has lower throughput and limited scalability, which may become a bottleneck as network traffic grows. While the UDM-SE is a good all-in-one device with routing and basic security features. Therefore, the FortiGate 80F offers the best balance of performance, security, and future scalability for the faculty network.</p>		

7. Cable

		
RS PRO Cat6a Ethernet Cable (100m)	RS PRO Cat6 Ethernet Cable (100m)	RS PRO Cat8 Ethernet Cable (100m)
RM635.91	RM372.00	RM1,034.60
<ul style="list-style-type: none"> Type & Category: RS PRO Cat6a Ethernet cable, shielded (F/FTP) for high-speed networks. Length & Color: 100 m reel, white LSZH outer jacket. Construction: 4 twisted pairs, solid bare copper cores, foam PE insulation. Performance: Supports 10 Gbps Ethernet up to 100 m with reduced crosstalk. Durability: Voltage rated 300 V, operating temperature -20°C to $+75^{\circ}\text{C}$. 	<ul style="list-style-type: none"> Type & Category: Unshielded Cat6 Ethernet cable (U/UTP) on a bulk reel. Length & Color: 100 m, white jacket Construction: 4 twisted pairs of solid copper conductors. Sheath: Low Smoke Zero Halogen (LSZH) outer jacket. Performance: Cat6 standard supports up to ~ 250 MHz data bandwidth. 	<ul style="list-style-type: none"> Category & Type: Cat 8 Ethernet cable with S/FTP shielding for high-speed network performance. Length & Jacket: 100 m reel with white Low Smoke Zero Halogen (LSZH) outer jacket. Construction: 4 shielded twisted pairs (S/FTP) with stranded 26 AWG copper conductors. Performance: Designed for next-gen Ethernet (high frequency, up to 2000 MHz typical Cat8 spec). Termination: Unterminated (no connectors fitted) — cut and fit to need.
<p>Summary</p> <p>We'd choose the RS PRO Cat6a Ethernet Cable (100 m) at RM635.91 because it strikes the best balance between price and performance. Unlike the standard Cat6, it supports 10 Gbps over 100 m with shielding to reduce crosstalk, making it future-proof for high-speed networks, yet it's significantly cheaper than the Cat8, which is over RM1,000 and mostly overkill for typical office or faculty use. The Cat6a gives strong durability, high performance, and ease of installation without paying for the extreme specs of Cat8 that you likely won't fully utilize.</p>		

8. Patch Panel

		
Pro Signal 24-Port Cat6 Patch Panel	CommScope SL Series 24-Port Panel	24-Port Shielded Keystone Patch Panel
RM172.00	RM300.00	RM75.00
<ul style="list-style-type: none"> Ports: 24 RJ45 (Cat6 unshielded) Design: 1U, 19" rack-mount steel panel, supports T568A/B wiring standards Modularity: Uses CommScope SL modular jack system; modules can be replaced or reconfigured if needed Use Case: Best for clean, organized structured cabling in office/lab racks; meets Cat6 performance standards (Gigabit Ethernet) 	<ul style="list-style-type: none"> Ports: 24 RJ45 Cat6 Design: 1U, 19" rack mount with IDC punch-down terminations Performance: Cat6 support for up to Gigabit Ethernet (1 Gbps) Use Case: Simple, reliable panel ideal for most campus/office cabling where shielded cables aren't required 	<ul style="list-style-type: none"> Ports: 24 shielded keystone openings for adapter jacks Design: 1U rack-mount panel with shielded metal housing Flexibility: You add your own Cat6/6A keystone jacks (great for mixed environment or shielded cables) Use Case: Good if you plan to terminate various cable types or want shielded termination for EMI-noisy areas
Summary		
<p>The CommScope SL Series 24-Port Patch Panel is the preferred choice because it combines high-quality Cat6 performance, modular flexibility, and professional-grade durability. Unlike fixed punch-down panels, its replaceable modules allow easy upgrades to Cat6a or special connectors, supporting future network growth. CommScope's reputation ensures robust build quality and easier long-term maintenance. While the Pro Signal panel is cheaper with fixed terminations and the shielded keystone panel requires extra parts, the SL Series offers the best balance of reliability, flexibility, and ease of installation for a faculty network rack.</p>		

9. Desktop Computer

		
DELL OptiPlex Tower	HP Pro Tower 400 G9 PCI Desktop PC	Precision 3680 Tower
RM3,255.00	RM3,137.00	RM9,909.00
<ul style="list-style-type: none"> CPU: Intel® Core™ i5-13500 (13th Gen, up to 4.8 GHz, 14 cores/20 threads) Memory: 8 GB DDR4 RAM Storage: 256 GB M.2 NVMe SSD Graphics: Integrated Intel® UHD Graphics OS & Extras: Windows 11 Pro; multiple USB, HDMI & DisplayPort, Gigabit Ethernet, DVD±RW drive 	<ul style="list-style-type: none"> CPU: Intel® Core™ i5-14500 (14th Gen, up to 5.0 GHz) Memory: 8 GB DDR5-4800 MHz RAM Storage: 512 GB PCIe® NVMe SSD Graphics: Intel® UHD Graphics 770 OS & Extras: Windows 11 Pro, includes wired keyboard & mouse 	<ul style="list-style-type: none"> CPU: Up to Intel Core i9 (14th Gen) RAM: Up to 128GB DDR5 (4 Slots) GPU: Up to NVIDIA RTX 6000 Ada Storage: Up to 28TB (3x M.2 + 3x SATA) Size: 27.1L Tower (14.7" H x 6.8" W)
<p>Summary</p> <p>Based on the specific configurations and prices provided, our recommendation is to strictly choose the HP Pro Tower 400 G9 (RM3,137) for all standard business needs. It is the clear winner in value and performance, offering a newer 14th Gen processor, faster DDR5 memory, and double the storage (512GB) compared to the Dell OptiPlex, all while being RM118 cheaper. The Dell OptiPlex Tower (RM3,255) is not recommended here as it provides older 13th Gen technology and only 256GB of storage for a higher price. We would only recommend the Precision 3680 Tower (RM9,909) if you have specialized, heavy-duty workloads like 3D rendering or engineering that require its massive scalability, as it costs nearly three times as much as the HP; for general office use, the HP Pro Tower 400 G9 is undeniably the smartest investment.</p>		

10. Monitor

		
ThinkVision S22i-30 21.5" Monitor	Dell E2222HS	HP V22v G5
RM534.00	RM339.00	RM440.00
<ul style="list-style-type: none"> Ports: 1x HDMI 1.4, 1x VGA, 1x Audio-out (3.5 mm) Design: 21.5" IPS panel; 3-side NearEdgeless bezel; includes tilt stand with integrated phone holder and VESA mount support (100x100mm) Modularity: Fixed stand, standard VESA mounting Use Case: Best for university labs requiring high color accuracy (99% sRGB) and eye protection (Natural Low Blue Light) for long coding sessions 	<ul style="list-style-type: none"> Ports: 1x HDMI 1.4, 1x VGA, 1x DisplayPort 1.2 Design: 21.5" VA panel; traditional thick bezels; height-adjustable stand with built-in speakers Modularity: Height-adjustable stand included; VESA compatible (100x100mm) Use Case: Ideal for office environments requiring legacy connectivity (DisplayPort) and built-in audio 	<ul style="list-style-type: none"> Ports: 1x HDMI 1.4, 1x VGA Design: 21.45" VA panel, 3-side micro-edge design, compact tilt-adjustable stand Modularity: Basic tilt stand, VESA mountable (100x100mm). Use Case: A budget-friendly option for general administrative tasks and basic student use
Summary		
<p>We chose the ThinkVision S22i-30 because it is the only monitor in this budget that offers 99% sRGB color coverage. For a computing faculty, this accuracy is vital for students working on UI/UX design or web development. Additionally, its 75Hz refresh rate provides a much smoother experience than the 60Hz alternatives, all while being the most affordable option.</p>		

11. Projector

		
Epson EB-FH52	BenQ MH733	Optoma EH412
RM4,189.00	RM4,750.00	RM5,335.00
<ul style="list-style-type: none"> Projection Technology: 3LCD (3-chip technology) Native Resolution: Full HD 1080p (1920 x 1080) Brightness: 4,000 Lumens Contrast Ratio: 16,000:1 Wireless Connectivity: Built-in Wi-Fi and Screen Mirroring Wired Inputs: 2 x HDMI, 1 x VGA (D-Sub 15-pin), 1 x Composite (RCA), 1 x Audio In (2 x RCA Red/White) 	<ul style="list-style-type: none"> Projection Technology: DLP (Single chip) Native Resolution: Full HD 1080p (1920 x 1080) Brightness: 4,000 Lumens Contrast Ratio: 16,000:1 Wireless: Requires optional QCast dongle Wired Inputs: 2 x HDMI (one supports MHL), USB Type-A (Reader), VGA, RS232 	<ul style="list-style-type: none"> Projection Technology: DLP Native Resolution: Full HD 1080p (1920 x 1080) Brightness: 4,500 Lumens Contrast Ratio: 50,000:1 (Dynamic) Wireless Connectivity: Strictly cabled or requires 3rd party dongle) Wired Inputs: 1 x HDMI 2.0 (4K Input Compatible), 1 x HDMI 1.4, VGA, Audio In/Out
<p>Summary</p> <p>We have selected the Epson EB-FH52 because it offers the best overall value at RM4,189.00, saving significantly compared to the BenQ (RM4,750) and Optoma (RM5,335) alternatives. Unlike its competitors, the Epson features built-in Wi-Fi and screen mirroring, which eliminates the need to purchase and manage separate, easily lost wireless dongles. Additionally, its 3LCD technology ensures superior colour accuracy and image stability compared to the single-chip DLP systems found in the rival models. Ultimately, the Epson provides a complete, "ready-to-use" solution for our 25-person conference room without requiring any additional hardware investments.</p>		

12. Server

		
Dell PowerEdge T150 Tower Server	HPE ProLiant ML30 Gen10 Plus Server	DELL PowerEdge T350 Tower Server (Basic Variant)
RM4,507.00	RM8,440.00	RM8,200.00
<ul style="list-style-type: none"> • CPU: Intel Xeon E-2314 • RAM: 16 GB ECC • Storage: 2 TB HDD • Network: Dual 1 Gb Ethernet • Use Case: File server, small applications, basic virtualization server listing above 	<ul style="list-style-type: none"> • CPU: Intel Xeon E-2124 • RAM: 16 GB ECC • Storage: Expandable (multiple drive bays) • Network: 1 Gb Ethernet • Use Case: Business applications, database, light to medium virtualization 	<ul style="list-style-type: none"> • CPU: Intel Xeon E-2324G • RAM: 8 GB ECC (upgradeable) • Storage: Highly expandable • Network: Dual 1 Gb Ethernet • Use Case: Larger workloads, future expansion, multiple service hardware
Summary		
<p>The three servers offer different levels of performance and scalability: the Dell PowerEdge T150 is a low-cost entry-level server suitable for basic file sharing and simple applications, the HPE ProLiant ML30 Gen10 Plus provides a balanced combination of performance, reliability, and expandability for small to medium business workloads, and the Dell PowerEdge T350 targets heavier workloads with higher upgrade potential but at a higher cost. The second server (HPE ProLiant ML30 Gen10 Plus) is the best choice because it delivers strong business-grade performance with ECC memory, RAID and remote management support, while remaining cost-effective and flexible for future upgrades, making it ideal for long-term business use without over-spending.</p>		

LIST OF SELECTED DEVICES

DEVICE	MODEL	PRICE PER UNIT(RM)	QUANTITY	SUBTOTAL
CORE SWITCH	FS-S5850-48B8C-PE	22,874.00	2	45,748.00
ACCESS SWITCH (PoE)	USW-Enterprise-24-PoE	3,118.84	2	6,237.68
ACCESS SWITCH (non-PoE)	REYEE 24-Port Gigabit Smart Non-PoE Switch	833.31	8	6,666.48
WIRELESS ACCESS POINT (STUDENT LOUNGE, LABS)	Ubiquiti UniFi 6 Lite (U6-Lite)	780.00	6	4,680.00
WIRELESS ACCESS POINT (HYBRID, SMART CLASS ROOM)	TP-Link Omada EAP245	670.00	2	1,340.00
FIREWALL /ROUTER	Fortinet FortiGate 80F	6,763.00	1	6,763.00
CABLE	RS PRO Cat6a Ethernet Cable	635.91 (per 100m)	32	20,349.12
PATCH PANEL	CommScope SL Series 24-Port Panel	329.00	2	658.00
DESKTOP COMPUTER	HP Pro Tower 400 G9	3,137.00	150	470,550.00
SERVER	Dell PowerEdge T150	4,507.00	1	4,507.00
MONITOR	ThinkVision S22i-30	534.00	150	80,100.00
PROJECTOR	Epson EB-FH52	4,189.00	6	25,134.00
TOTAL				672,733.28

Reflections

1. Are you surprised by the prices? How were you surprised?

Yes, we were very surprised by the prices. The costs were manipulated directly by network reliability and capacity. With our limited budget of RM900K, every upgrade we considered for our equipment shocked and threw us off with the cost of an “upgrade”. We underestimated how much we’d expend for the high-capacity equipment that we needed to meet the demanding requirements.

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

Yes, we considered the cost first before we decide everything. We noted from the previous task, as well as the university environment. The 10GB backbone was the prime suspect in most of our equipment and device choices, causing us to invest a whole lot more than we expected. Not only that, the “hidden” costs, such as the Cisco subscription license also shocked us profoundly. We had to pull back certain high-performance items such as Cat6A cabling due to the extremely high costs.

**3. What are the major differences between the same devices from different brands?
For example, Cisco and Huawei Routers.**

	Cisco C9300L-24UXG-4X	Huawei CloudEngine S6730-H24X6C	Key difference
Primary focus	Networking Legacy: Dominates the global enterprise market (especially North America/EU). Known for deep reliability and stability	Performance & value: Aggressively competes on performance (high throughput) & friendly in budget, encouraging integration	Cisco offers operational confidence and strong support, while Huawei offers superior hardware performance and value for our budget
Port Density & Design	Modular/Fixed Hybrids: Cisco offers flexible modular uplinks on higher-end lines (C9300) but uses fixed ports on the budget friendly C9200L/C9300L switches, which limits downlink speed to 1G	High Density/Fixed Fiber: Huawei focuses on maximizing port density on fixed switches, directly offering 24-48 10GE SFP+ ports on their aggregation switches, making them ideal for this project	Huawei offers a larger number of high-speed 10G aggregation ports needed for the core switch that the Cisco C9300L did not provide
Cost	Higher initial price, and substantial recurring costs through mandatory subscription licenses (like Cisco DNA) for advanced features and updates	Lower initial hardware cost (20-30% less), with features & management software often bundled into the hardware purchase price	Cisco's cost structure is the reason we chose the Huawei S6730-H as the core switch. It provides better 10G/40G hardware at a manageable long-term cost

The major difference between equivalent devices from the leading brands is not their ability to connect (which they all do using standard protocols), but where they focus their engineering and business strategy, impacting cost and operations.

Cisco excels in providing a highly stable and trusted solution with deep security features and a mature management system, but this comes with a significantly higher total cost due to extra licensing fees.

While Huawei focuses on delivering maximum raw performance (such as more high speed 10G ports) at a much lower initial price. They typically bundle features, which is essential for our project because it allows us to get the powerful hardware we need for the core backbone.

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Access Switch (PoE)

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Access Switch (non-PoE)

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APPENDIX

Meeting Minutes Bil.01

DATE / TIME	20 November 2025, 8:30 P.M
LOCATION	WA2, KDSE
AGENDAS	<ol style="list-style-type: none">1. Overview of Task 3 requirements2. Listing potential LAN devices3. Identifying research sources4. Task distribution
Meeting MC	ABDURRAFIQ BIN ZAKARIA

ATTENDANCE		
NAME	TIME	REASON FOR ABSENCE
ABDURRAFIQ BIN ZAKARIA	20:30	
AHMAD MUNIF BIN BAHARUM	20:30	
NAJMUDDIN BIN KAMARUDIN	20:30	
DANIEL IMAN HAQIMIE BIN YUSOFF	20:30	

MINUTES			
NO.	ITEM DISCUSSED	OUTCOME	PERSON IN CHARGE
1	Opening	- Rafiq starts the meeting with Surah Al-Fatihah and explain the agendas	Rafiq
2	Understanding Task 3 Requirements	- All members read the Task 3 instructions and understood that the	All members

		objective is to select appropriate LAN devices based on Task 2 findings.	
3	Listing Potential Devices	- Members listed possible devices: core switch, access switch, routers, wireless APs, patch panels, cabling, and racks.	Najmuddin & Munif
4	Research Sources	- Members agreed to gather info from vendor websites (Cisco, Huawei, TP-Link, Ubiquiti), YouTube reviews, and academic references.	Daniel
5	Task Distribution	- Each member is assigned to research at least 2 devices with specs & price.	Rafiq
6	Next Meeting	- Next meeting set for 22 November 2025 to review collected device data. - Meeting ends at 10:00 P.M with tasbeeh kifarah and Surah Al-Asr.	Rafiq

Meeting Minutes Bil.02

DATE / TIME	22 November 2025, 8:30 P.M
LOCATION	Discord
AGENDA	<ol style="list-style-type: none"> 1. Review research progress 2. Compare device brands 3. Analyze cost vs performance 4. Decide preliminary device selections
Meeting MC	AHMAD MUNIF BIN BAHARUM

ATTENDANCE		
NAME	TIME	REASON FOR ABSENCE
ABDURRAFIQ BIN ZAKARIA	20:30	
AHMAD MUNIF BIN BAHARUM	20:30	
NAJMUDDIN BIN KAMARUDIN	20:30	
DANIEL IMAN HAQIMIE BIN YUSOFF	20:30	

MINUTES			
NO.	ITEM DISCUSSED	OUTCOME	PERSON IN CHARGE & DATE
1	Research Sharing	- Members shared device specs & prices from different vendors.	All members
2	Research updates	- Brand Comparison: - Cisco vs Huawei	Najmuddin & Daniel
3	Cost vs Performance	- The group agreed cost must be considered as per the Task 3 reflection questions. (0.9million)	Daniel
4	Preliminary Device Selection	- Backbone: Huawei/Cisco switches. - Access Layer: TP-Link or Ubiquiti. - Router: Huawei AR Series or Cisco ISR.	Rafiq

5	Next meeting	- Meeting on 25 November 2025 for quantity planning.	Munif
6	Meeting ended	- Rafiq ends this meeting with tasbeeh kifarah and surah al-asr. - The meeting ends at 10:30 P.M	Rafiq

Meeting Minutes Bil.03

DATE / TIME	25 November 2025, 8:30 P.M
LOCATION	WA2, KDSE
AGENDA	<ol style="list-style-type: none"> Finalize device list Determine device quantities Discuss layout considerations Assign report writing sections
Meeting MC	NAJMUDDIN BIN KAMARUDIN

ATTENDANCE		
NAME	TIME	REASON FOR ABSENCE
ABDURRAFIQ BIN ZAKARIA	20:30	
AHMAD MUNIF BIN BAHARUM	20:30	
NAJMUDDIN BIN KAMARUDIN	20:30	
DANIEL IMAN HAQIMIE BIN YUSOFF	20:30	

MINUTES			
NO.	ITEM DISCUSSED	OUTCOME	PERSON IN CHARGE & DATE
1	Device List Finalization	<ul style="list-style-type: none"> - Router, switches, APs, patch panels, and cabling confirmed as required. 	All members
2	Quantity Decision	<ul style="list-style-type: none"> Router: 1 unit <ul style="list-style-type: none"> (Fortinet FortiGate 80F) Core Switch: 2 units <ul style="list-style-type: none"> (Huawei CloudEngine S6730-H24X6C) Access Switches: 10 units (Total) <ul style="list-style-type: none"> 2x Cisco Catalyst 9200L (PoE) 8x Cisco Catalyst 9200L (Non-PoE) WAP: 8 units (Total) <ul style="list-style-type: none"> 6x Ubiquiti UniFi 6 	Najmuddin

		<ul style="list-style-type: none"> • <i>Enterprise</i> ○ 2x <i>Huawei AirEngine 6760-X1</i> ● Patch Panel: 2 units ○ <i>(CommScope SL Series 24-Port</i> 	
3	Layout Consideration	<ul style="list-style-type: none"> - Quantity based on floor layout, lab count & WiFi coverage. 	Daniel
4	Task Distribution	<ul style="list-style-type: none"> - Rafiq: device table & prices - Munif: reflection questions - Daniel: brand differences - Najmuddin: formatting & compilation 	All members
5	Next meeting	<ul style="list-style-type: none"> - Meeting on 29 November 2025 for quantity planning. 	Najmuddin
6	Meeting ended	<ul style="list-style-type: none"> - Rafiq ends this meeting with tasbeeh kifarah and surah al-asr. - The meeting ends at 10:30 P.M 	Rafiq

Meeting Minutes Bil.04

DATE / TIME	29 November 2025, 8:30 P.M
LOCATION	WA2, KDSE
AGENDA	<ul style="list-style-type: none"> 5. Check the completeness of the device list 6. Review reflection answers 7. Final formatting & report polishing 8. Preparation for submission
Meeting MC	DANIEL IMAN HAQIMIE BIN YUSOFF

ATTENDANCE		
NAME	TIME	REASON FOR ABSENCE
ABDURRAFIQ BIN ZAKARIA	20:30	
AHMAD MUNIF BIN BAHARUM	20:30	
NAJMUDDIN BIN KAMARUDIN	20:30	
DANIEL IMAN HAQIMIE BIN YUSOFF	20:30	

MINUTES			
NO.	ITEM DISCUSSED	OUTCOME	PERSON IN CHARGE & DATE
1	Device List Confirmation	- All devices, model names, specs, and prices verified.	All members
2	Reflection Review	- Answers checked to ensure they address pricing surprise, cost factor & brand differences.	Munif
3	Final Formatting	- Ensured consistent formatting, headings, tables & citations.	Najmuddin
4	Submission Preparation	- Agreed to submit the final PDF before the deadline	Daniel
6	Meeting ended	<ul style="list-style-type: none"> - Rafiq ends this meeting with tasbeeh kifarah and surah al-asr. - The meeting ends at 11:30 P.M 	Rafiq

Task Distributions

Member	Task/Responsibilities	Works completed
AHMAD MUNIF BIN BAHARUM	<ul style="list-style-type: none"> • Core Network & PC Selection • Meeting Coordination 	<ul style="list-style-type: none"> - Conducted research on Huawei CloudEngine switches to replace costly Cisco Core alternatives. - Selected High-Spec Workstations (Lenovo/HP) ensuring GPU requirements for Multimedia labs were met within budget. - Drafted interview questions for the technician regarding current network bottlenecks.
ABDURRAFIQ BIN ZAKARIA	<ul style="list-style-type: none"> • Strategic Justification • Brand Comparison • Reflection Writing 	<ul style="list-style-type: none"> - Developed the "Hybrid Strategy" narrative (mixing Huawei Core with Cisco Edge) for the Reflection section. - Conducted the interview with the technician and summarized maintenance pain points. - Justified the "Hidden Cost" arguments (CAPEX vs OPEX) in the report.
DANIEL IMAN HAQIMIE BIN YUSOFF	<ul style="list-style-type: none"> • Budget Optimization ("Survivor" Planning) • Visual Aids & Furniture Sourcing 	<ul style="list-style-type: none"> - Sourced "Value-for-Money" non-IT assets including IKEA Modular Tables, Motorized Screens, and the 75" Smart TV. - Calculated the Final Bill of Materials (BOM) to ensure the RM 62k surplus was maintained. - Analyzed cost-per-pixel to justify choosing Epson Full HD Projectors over cheaper XGA models.
NAJMUDDIN BIN KAMARUDIN	<ul style="list-style-type: none"> • Quantity Planning & Layout • Report Compilation 	<ul style="list-style-type: none"> - Determined the final device quantities (10x Switches, 8x APs) based on the floor plan and user density. - Integrated all new budget items (Furniture, Visual Aids) into the final Master Table. - Finalized the report formatting and ensured all citations/specs were accurate before submission.

References