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NETWORK PLANNING

Industry standard design for 3 department of Folds, Fins & Welders Company (Administration, Amenities and Warehouse 1 department)

STEPS

A. VLAN Configuration:

- I Configure VLANs for each department in the administration building (Payroll Section, Administration/ Reception, Account, Sales, Finance and Management) as per the provided specifications on the plan and also creating room for expansion.
- I segregated network traffic into VLANs based on departments to enhance the network security and management, which is a common practice in network design.
- I also gave room for Administration Guest IP which will be used with Wireless Access point giving room for guest to be able to use the internet with their own devices when they are in the department. This will enhance the network security and management.

B. Layer 2 Switches (Switch A and Switch B):

- I introduced Layer 2 switches to create distinct broadcast domains for the VLANs.
- Configure VLANs on each switch and assign ports accordingly to separate departmental traffic.

Reasons: Employing separate Layer 2 switches for distinct broadcast domains (VLANs) is standard practice to control broadcast traffic and manage network traffic efficiently.

C. Trunk Link:

- Establish a trunk link between Switch A and Switch B to transport VLAN traffic between the switches.

Reason: Establishing a trunk link between switches for transporting VLAN traffic adheres to standard practices for inter-switch connectivity in VLAN-based networks.

D. Layer 3 Switch Administration IDF (Intermediate Distribution Frames):

- Install a Layer 3 switch in the Administration IDF to handle inter-VLAN routing.

- Configure VLAN interfaces on the Layer 3 switch, assigning IP addresses as per the provided subnet information.
- Configure routing between VLAN interfaces to allow communication between departments.

Reason: Utilizing a Layer 3 switch for inter-VLAN routing enhances network performance and security, providing communication between departments and this is commonly recommended for medium to large-scale networks.

E. Structured Cabling:

- Use Category 6 (Cat6) Ethernet cabling for high-speed data transmission between devices and switches.

Reason: Using Category 6 Ethernet cabling ensures high-speed data transmission and supports Gigabit Ethernet speeds, which is a standard for modern network installations.

F. Network Switch:

- Install a 48-port Gigabit Ethernet switch with stacking capabilities for scalability and future expansion.
- Stack additional switches as needed to accommodate growth.

Reason: Installing a 48-port Gigabit Ethernet switch with stacking capabilities provides scalability and facilitates future expansion, aligning with industry recommendations for scalable network infrastructure.

G. Wireless Access Points (WAPs):

- Deploy at least two dual-band wireless access points for comprehensive coverage.
- Use Guest IP address for the WAPs to ensure security for sensitive departmental data.

Reason: Deploying dual-band wireless access points with a separate VLAN addresses ensures secure wireless connectivity and also give room for multiple guest user to be able to access the internet with their own devices, which is in line with best practices for securing wireless networks.

H. IP Cameras:

- Install IP cameras for surveillance purposes and connect them to the network.
- Centralize monitoring of the IP cameras for enhanced security and surveillance capabilities.

Reason: Integrating IP cameras into the network and centralizing their monitoring enhances security and surveillance capabilities, which is a standard approach in modern surveillance systems.

Note: Same principle will be deployed to the Amenities and Warehouse 1 building.

Overall, the plan demonstrates adherence to industry standards for structured cabling and network design, ensuring efficiency, security, and scalability.

B: IP scheme for 3 department (Administration, Amenities, warehouse) building LANs

Note: Full ipv4 Scheme for the whole site is provide in Answer to Que 2 below. This can help for better view base on network subnetting for each department.

Building	Network	No of useable Host	No of host + expansion	No of Host for Expansion	Sub Bit	Host Bits	Subnet ID/ Mask	First Host	Last Host	Broadcast
Administration Building	192.168.15.128/25	32	126	94	1	000000	.128/25	.129	.254	.255
Amenities Building	192.168.16.0/26	10	62	52	00	000000	.0/26	.1	.62	.63
Warehouse 1 Building	192.168.16.112/28	1	14	13	01	0000	.112/28	.113	.126	.127

Administration Building VLANs

Network: 192.168.15.128/25

Administration Building VLANs	No of host + expansion	VLAN Subnet ID/ Mask	First Host	Last Host	Broadcast
Administration Guest (Wireless Access Point) VLAN	30	.128/27	.129	.158	.159
Payroll Section VLAN	14	.160/28	.161	.174	.175
Administration/ Reception VLAN	14	.176/28	.177	.190	.191
Management Section VLAN	14	.192/28	.193	.206	.207
Account VLAN	14	.208/28	.209	.222	.223

Finance VLAN	6	.224/29	.225	.230	.231
Sales VLAN	6	.232/29	.233	.238	.239
Amin IP Camera VLAN	6	.240/29	.241	.246	.247

Amenities Building VLANs

Network: 192.168.16.0/26

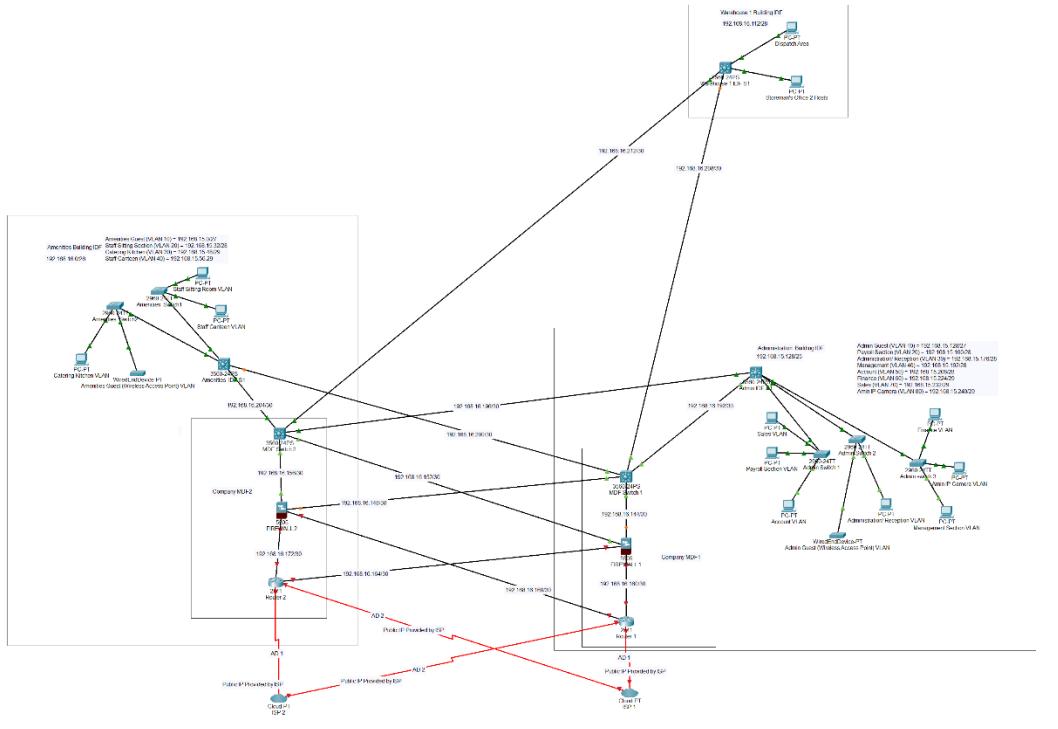
Amenities Building VLANs (192.168.16.0/26)	No of useable Host	No of host + expansion	VLAN Subnet ID/ Mask	First Host	Last Host	Broadcast
Amenities Guest (Wireless Access Point) VLAN		30	.0/27	.1	.30	.31
Staff Sitting Room VLAN	6	14	.32/28	.33	.46	.47
Catering Kitchen VLAN	2	6	.48/29	.49	.54	.55
Staff Canteen VLAN	2	6	.56.29	.57	.62	.63

Warehouse Building

Network: 192.168.16.112/28

Warehouse Building (192.168.16.112/28)	No of useable Host	No of host + expansion	VLAN Subnet ID/ Mask	First Host	Last Host	Broadcast
Warehouse 1 Building	1	14	192.168.16.112/28	.113	.126	.127

Design and network allocation for the 3 selected department in Parket Tracer



The above pic is the networking designing of 3 Department with redundancy and Ip scheme.

Note: Due to any outbreak such as accident, security treat or Emergency, each Network system in the MDF point will be Placed in Different department.

I suggest the Main MDF network 1 should be placed in Administration department and the Redundance MDF network 2 should be installed in the Amenity Department

C: Reasoning for choosing IPv4 over IPv6

- The vast address space offered by IPv6 is not necessary in this design because the company have limited number of devices.
 - Presently, IPv4 is the most extensively used version of the Internet Protocol and is compatible with the great majority of networking hardware, operating systems, and software.
 - Upgrades to the current network infrastructure, such as firewalls, switches, routers, and other networking equipment, may be necessary in order to support IPv6.

- Due to its decades-long use, IPv4 is typically better familiar to IT experts. Due to the extensive information and experience available, IPv4 addressing and subnetting systems are well understood, therefore troubleshooting IPv4 networks is frequently simpler.

Que 2: Industry Standard Design of The All-Site Network with Redundancy Capability and Considering the Necessary Media Types Also with Issues with Site Features.

STEPS

1. ISP Connection to Router:

- Connect the ISP's internet line fiber optic cable to the WAN port of your router. This connection typically uses fiber optic cable for high-speed internet services.
- Use appropriate media converters such as LC Multi-Mode Transceiver Module to connect the ISP's fiber optic cable to the router's WAN interface.

2. Router with Wireless Capability:

- Use a Cisco ISR 4000 series router with integrated wireless capability.
- Configure the router's wireless settings to provide Wi-Fi access to the network. This ensures redundancy as wireless connectivity is integrated with the router.

3. Firewall Integration:

- Connect the router to the Cisco ASA 5506-X Firewall to enforce security policies and protect the network.
- Use Cat6 Ethernet cables to connect the LAN interface of the router to the WAN interface of the firewall.

4. MDF (Main Distribution Frame) Switch Connectivity:

- Connect the firewall to the switch using Cat6 Ethernet cables. This connection allows multiple devices to connect to the network and provides connectivity to the departments.
- Configure VLANs on the switch to segregate traffic between different departments for security and management purposes.

Note all 1-4 are done in the MDF (Main Distribution Frame) demarc point.

5. Connecting Departments:

- Connect each department's devices (computers, printers, etc.) to their IDF switch using Cat6 Ethernet cables. Each department can have its own VLAN for network segmentation and security.

- For the Lathe machines in the manufacturing Department and other industrial devices this may require high-performance connectivity to withstand harsh environments and ensure reliable operation the fiber optic cable will be used for this connection as the Cat6 Ethernet cables may not withstand the device performance.
- Also, wireless Access point will be installed in several point in each department to increase scalability and security, allowing guest to be able to access the internet when in the site.
- IP camera will be installed in several point in each department to increase security.
- Each department Switch in the IDF (Intermediate Distribution Frames) will be connected to the MDF Switch with a fiber optic cables, this help transmit data using light signals and it's best due to the longer distance and the electromagnetic interference in the site.

All-Site IPv4 Network scheme for Folds, Fins & Welders Company

Building	Network	No of Host	No of host + expansion	No of Host for Expansion	Sub Bit	Host Bits	Subnet ID/ Mask	First Host	Last Host	Broadcast
	192.168.15.0 /24									
Testing Floor	192.168.15.0 /25	55	126	71	0	0000 000	.0/25	.1	.126	.127
Administration Building	192.168.15.1 28/25	32	126	94	1	0000 000	.128/ 25	.129	.254	.255
	192.168.16.0 /24									
Amenities Building	192.168.16.0 /26	10	62	52	00	0000 00	.0/26	.1	.62	.63
Manufacturing Building	192.168.16.6 4/27	18	30	12	010	0000 0	.64/27	.65	.94	.95
Security Building	192.168.16.9 6/28	3	14	11	0110	0000	.96/28	.97	.110	.111
Warehouse 1 Building	192.168.16.1 12/28	1	14	13	0111	0000	.112/28	.113	.126	.127
Warehouse 2 Building	192.168.16.1 28/28	2	14	12	1000	0000	.128/28	.129	.142	.143

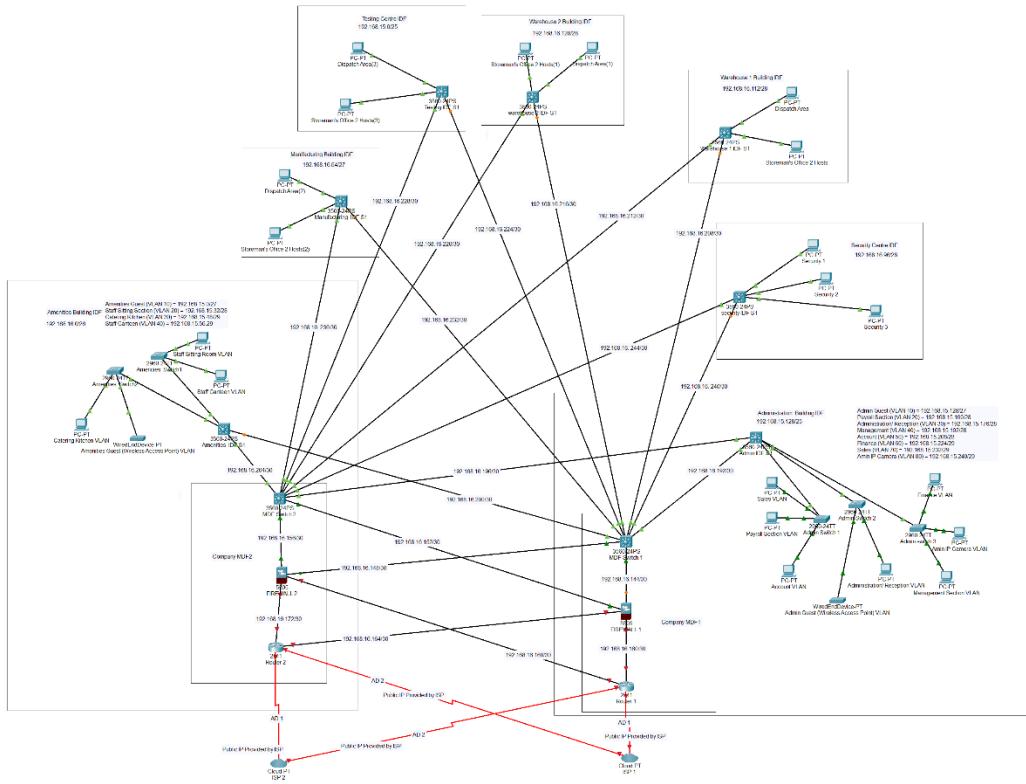
MDF Switch 1 to Firewall 1	192.168.16.1 44/30	2	2	0	1001 00	00	.144/ 30	.14 5	.14 6	.147
MDF Switch 1 to Firewall 2	192.168.16.1 48/30	2	2	0	1001 01	00	.148/ 30	.14 9	.15 0	.151
MDF Switch 2 to Firewall 1	192.168.16.1 52/30	2	2	0	1001 10	00	.152/ 30	.15 3	.15 4	.155
MDF Switch 2 to Firewall 2	192.168.16.1 56/30	2	2	0	1001 11	00	.156/ 30	.15 7	.15 8	.159
Firewall 1 to Router 1	192.168.16.1 60/30	2	2	0	1010 00	00	.160/ 30	.16 1	.16 2	.163
Firewall 1 to Router 2	192.168.16.1 64/30	2	2	0	1010 01	00	.164/ 30	.16 5	.16 6	.167
Firewall 2 to Router 1	192.168.16.1 68/30	2	2	0	1010 10	00	.168/ 30	.16 9	.17 0	.171
Firewall 2 to Router 2	192.168.16.1 72/30	2	2	0	1010 11	00	.172/ 30	.17 3	.17 4	.175
Administration IDF S1 to MDF Switch 1	192.168.16.1 92/30	2	2	0	1100 00	00	.192/ 30	.19 3	.19 4	.195
Administration IDF S1 to MDF Switch 2	192.168.16.1 96/30	2	2	0	1100 01	00	.196/ 30	.19 7	.19 8	.199
Amenities IDFS1 to MDF Switch 1	192.168.16.2 00/30	2	2	0	1100 10	00	.200/ 30	.20 1	.20 2	.203
Amenities IDF S1 to MDF Switch 2	192.168.16.2 04/30	2	2	0	1100 11	00	.204/ 30	.20 5	.20 6	.207

Warehouse 1 IDF S1 to MDF Switch 1	192.168.16.2 08/30	2	2	0	1101 00	00	.208/ 30	.20 9	.21 0	.211
Warehouse 1 IDF S1 to MDF Switch 2	192.168.16.2 12/30	2	2	0	1101 01	00	.212/ 30	.21 3	.21 4	.215
Warehouse 2 IDF S1 to MDF Switch 1	192.168.16.2 16/30	2	2	0	1101 10	00	.216/ 30	.21 7	.21 8	.219
Warehouse 2 IDF S1 to MDF Switch 2	192.168.16.2 20/30	2	2	0	1101 11	00	.220/ 30	.22 1	.22 2	.223
Testing IDF S1 to MDF Switch 1	192.168.16.2 24/30	2	2	0	1110 00	00	.224/ 30	.22 5	.22 6	.227
Testing IDF S1 to MDF Switch 2	192.168.16.2 28/30	2	2	0	1110 01	00	.228/ 30	.22 9	.23 0	.231
Manufacturing IDF S1 to MDF Switch 1	192.168.16.2 32/30	2	2	0	1110 10	00	.232/ 30	.23 3	.23 4	.235
Manufacturing IDF S1 to MDF Switch 2	192.168.16.2 236/30	2	2	0	1110 11	00	.236/ 30	.23 7	.23 8	.239
Security IDF S1 to MDF Switch 1	192.168.16.2 240/30	2	2	0	1111 00	00	.240/ 30	.24 1	.24 2	.243
Security IDF S1 to MDF Switch 2	192.168.16.2 244/30	2	2	0	1111 01	00	.244	.24 5	.24 6	.247

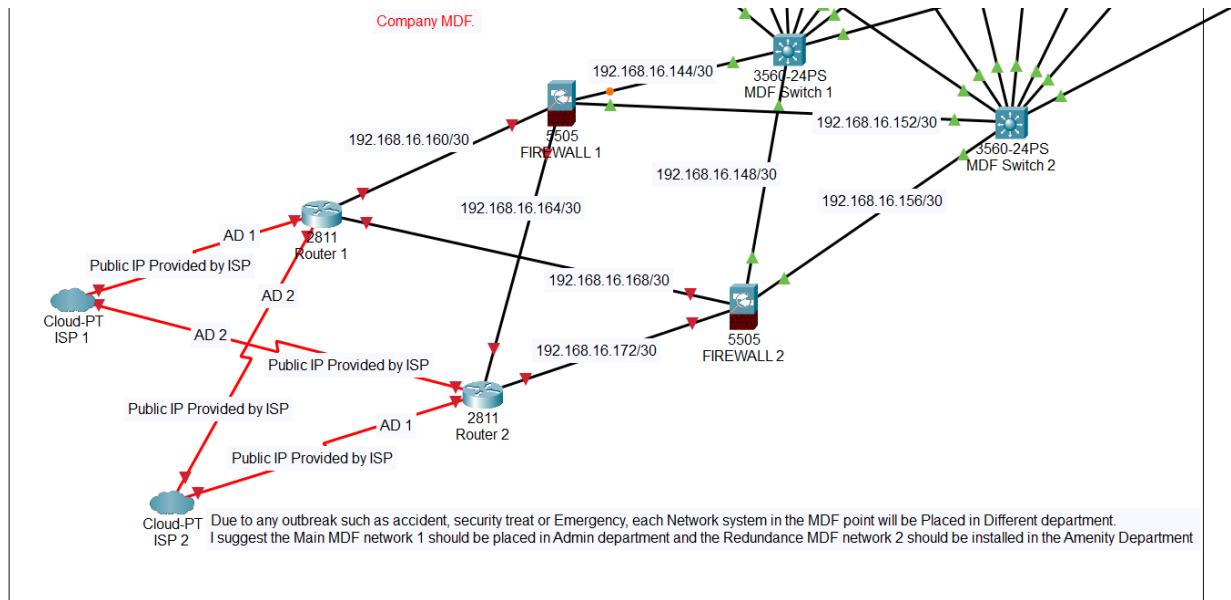
Note: Network Address from ISP 1 to Switch 1, ISP 1 to Switch 2, ISP 2 to Switch 1 and ISP 2 to Switch 2 will be provided by the ISP.

IDF = Intermediate Distribution Frame, **MDF** = Main Distribution Frame, **S1** = Switch 1

Design and network allocation in Packet Tracer



The above pic is a detail networking designing of all site with redundancy and IP scheme.



Structural Topography Image of the MDF

Note: Due to any outbreak such as accident, security treat or Emergency, each Network system in the MDF point will be Placed in Different department.

I suggest the Main MDF network 1 should be placed in Administration department and the Redundance MDF network 2 should be installed in the Amenity Department

Reason of choosing the Administration Department to place my Main MDF Network and the Amenities Department for the Redundant MDF Network

Placing the Main MDF Network in the Administration Department creates easy access for IT personnel and close proximity to decision-makers. This setup streamlines maintenance, troubleshooting, and upgrades, while also facilitating quick decision-making during network issues. Proximity to decision-makers enhances communication between IT and administrative staff, aiding coordination of IT projects with organizational goals. Decision-makers can allocate resources efficiently for network expansion, upgrades, and security enhancements. Additionally, having decision-makers nearby enables informed strategic decisions regarding IT infrastructure and facilitates rapid response to security breaches or network outages, minimizing operational impact.

Also, selecting the Amenities department as the location for the Redundant MDF Network serves as a strategic measure, providing a diversion for housing the backup main network in the event of emergencies affecting the Administration department. This setup ensures continuous network operation, with the redundant MDF network in the Amenities seamlessly taking over when the primary network is inactive due to emergencies. Although the Amenities department may lack decision-makers found in the Administration department, it still offers reasonable accessibility for IT personnel to perform maintenance, troubleshooting, and upgrades. Additionally, it guarantees accessibility to critical network infrastructure while minimizing disruptions to daily operations.

3: Estimated costs for the Networking of Folds, Fins & Welders Company

Component	Description	Justification	Quantity	Unit Price (£)	Total Cost (£)
Cisco Catalyst 3850 Layer 3 Switch (48 ports)	All Building (IDF Switch)	<p>The Catalyst 3850 is equipped with robust security measures, including access control lists (ACLs), DHCP snooping, IP source guard, Dynamic ARP Inspection (DAI), TrustSec, and Secure Group Tagging Protocol (SGT). These features are integrated to safeguard a network infrastructure against unauthorized access, intrusions, and cyber threats. Their implementation helps to maintain the integrity and confidentiality of network data.</p> <p>Therefore, organizations prioritizing network security would find the Catalyst 3850 to be an excellent choice.</p> <p>Choosing a Layer 3 Switch is best in price to a router for the IDF point because it also gives room for a routing configuration.</p>	7	2300	16100
Cisco Catalyst 3650 Layer 2 Switch (48 ports)	Administration Building IDF Switch	The Cisco Catalyst 3650 switch provides various security features to safeguard network infrastructure and sensitive data. Among these are Access Control Lists	2	3292	6,584

		(ACLs), port security, DHCP snooping, IP Source Guard, and Dynamic ARP Inspection (DAI). They play a crucial role in thwarting unauthorized access, reducing network attacks, and enforcing security policies within a network.			
Cisco Catalyst 3850 Layer 3 Switch (48 ports)	Main Distribution Frame (MDF) Router (Dual ISP integration)	<p>The Catalyst 3850 is equipped with robust security measures, including access control lists (ACLs), DHCP snooping, IP source guard, Dynamic ARP Inspection (DAI), TrustSec, and Secure Group Tagging Protocol (SGT). These features are integrated to safeguard a network infrastructure against unauthorized access, intrusions, and cyber threats. Their implementation helps to maintain the integrity and confidentiality of network data. Therefore, organizations prioritizing network security would find the Catalyst 3850 to be an excellent choice.</p> <p>Choosing a Layer 3 Switch is best in price to a router for the IDF point because it also gives room for a routing configuration.</p>	2	2300	4600

Cisco ISR 4000 Series Router	Main Distribution Frame (MDF) Router (Dual ISP integration)	The router provides robust security features to safeguard network infrastructure, data, and applications against diverse threats. Its security functionalities comprise firewall, intrusion prevention, VPN (Virtual Private Network), encryption, threat defense, and content filtering. Integration of these security functions into the router platform enables the Cisco ISR 4000 Series to offer a unified and consolidated approach to network security. This integration simplifies management and ensures comprehensive protection against cyber threats.	2	3900	7,800
Cisco ASA 5506-x Firewall	Main Distribution Frame (MDF) Firewall	The Cisco ASA 5506-X Firewall offers a wide range of security functionalities, including stateful firewall capabilities, intrusion prevention system (IPS), advanced threat protection, VPN support, and application visibility and control. These features help protect your network infrastructure from various cyber threats, including malware, viruses, unauthorized access attempts, and data breaches. By leveraging the robust security capabilities of the Cisco ASA 5506-X Firewall, we can enhance the security posture of the network and	2	1330	2,660

		safeguard the critical assets and data.			
PVC Trunking Pipe (Legrand Wiremold Cord Mate III High-Capacity Cord Cover Kit)	All building	<p>The PVC Trunking Pipe is used to hide the cables, eliminate cable clutter and ensure a clean installation, eliminate cable exposure and organized arrangement.</p> <p>This trunking pipe kit comes with pre-cut channels and all necessary mounting hardware, making it quick and easy to install without the need for special tools or expertise. Its simple installation process saves time and effort, allowing for hassle-free cable management in various settings.</p>	1500m	3	4500
Underground Cable Ducting (DPE Twin Wall Underground Ducting)	Inter-building connectivity (estimated length = 1000m)	<p>Ultra-tough twin wall underground ducting has an HDPE crush resistant corrugated outer wall and a smooth inner wall for easy cable installation. The high-density polyethylene is highly chemical and water resistant and has a compression resistance. Overall, choosing HDPE Underground Cable Ducting provides peace of mind knowing that your cables are securely housed in a durable and reliable conduit.</p>	1000m	4	4000

Armored Single-mode Fiber Optic Cable (Prysmian Draka UC-PUR)	Inter-building connectivity (estimated length = 1000m per ISP)	Armored single-mode fiber optic cables are preferred because they provide physical protection, shielding against potential damage from factors like crushing or pests when installed underground. Additionally, they are suitable for the site use due to their resistance to moisture, UV radiation, and temperature changes. They excel in transmitting signals over long distances with minimal loss, making them ideal for applications requiring reliable long-distance communication. Moreover, they offer resistance to electromagnetic interference in the site, making them suitable for use in environments with high levels of electromagnetic noise.	2000	3.5	7000
Cat6 Ethernet Cables (Amazon Basics Cat6 Ethernet Patch Cable)	Intra-building connectivity (estimated length based on host to Demarc point)	This cat6 ethernet cable has higher performance and faster data transmission	5000	0.45	2250
Network Equipment Racks (NavePoint 22U Professional 4-Post IT Open Frame Server Network Rack)	All Building IDF Racks/Cabinets	The rack features built-in cable management options, including cable rings and management bars, to organize and route cables neatly. This helps prevent cable clutter and	7	284	1988

		improves airflow within the rack.			
Network Equipment Rack (NavePoint 22U Professional 4-Post IT Open Frame Server Network Rack)	MDF Racks/Cabinets	The rack features built-in cable management options, including cable rings and management bars, to organize and route cables neatly. This helps prevent cable clutter and improves airflow within the rack.	2	284	568
Wall Sockets (RJ45 Ethernet Wall Plate)	All Building	These wall sockets provide a neat and tidy solution for connecting Ethernet cables to network devices, such as computers, printers, and routers. By installing RJ45 Ethernet wall sockets at strategic locations throughout all departments, dedicated network connection can be created at points where needed. This helps to eliminate cable clutter and ensure a clean and organized appearance, while also making it convenient to access and connect devices to the network.	255	12	3060
Ethernet coupler Patch Panels (TRENDnet 24-Port Cat6 Unshielded Patch Panel (TC-P24C6))	All Building	This patch panel is rack mountable and have room for labeling to help organization. Also, this simplifies cable management and troubleshooting by providing a structured and easily accessible layout of connections. Instead of having individual cables running directly from devices to switches or	13	43	559

		<p>routers, the cables are terminated onto patch panels.</p> <p>This patch panel is designed to meet industry standards for Cat6 Ethernet connectivity, ensuring high-speed and reliable data transmission. Whether you're connecting computers, servers, switches, or other network devices, the TC-P24C6 provides a stable and consistent connection, minimizing packet loss and ensuring optimal network performance.</p>			
Fiber optic Patch Panels (Panduit Opticom Fiber Optic Patch Panel)	All Building	<p>This patch panel is rack mountable and have room for labeling to help organization.</p> <p>Also, this simplifies cable management and troubleshooting by providing a structured and easily accessible layout of connections. Instead of having individual cables running directly from devices to switches or routers, the cables are terminated onto patch panels.</p> <p>The modular design allows for easy customization and expansion of the patch panel to accommodate changing network requirements. This flexibility ensures</p>	13	40	520

		scalability and future-proofing of your fiber optic infrastructure.			
Fiber optic Connector (LC)	All Building	LC connectors have a small and slim design, allowing for high-density installations in networking equipment such as patch panels, switches, and routers. Their compact size means that more connectors can be accommodated in the same space compared to larger connectors like SC or ST, making them well-suited for environments where space optimization is important.	30	7	210
10G SFP+ LC Multi-Mode Transceiver Module (2port for each)	All Building	These transceiver modules support data rates of up to 10 gigabits per second (Gbps), providing ample bandwidth for demanding applications such as video streaming, large file transfers, and data backups.	17	15	255
Cable Ties (Panduit)	All Building	These cable ties are highly durable and reliable for securing cables in various environments, this help is cable management and arrangement. Their robust design ensures that cables remain securely fastened, providing long-lasting organization and protection for your cables.	20packs for 750 per pack	10	7500
Cable Trays (Niedax Cable Tray)	All Building	Niedax Cable Trays are made from high-quality materials and are built to withstand harsh environmental conditions,	100m	250	25000

		heavy loads, and the rigors of industrial applications. Their robust construction ensures long-term reliability and minimizes the risk of damage or failure, providing a secure and stable pathway for cables while reducing maintenance and replacement costs over time.			
PoE CCTV Security Camera	All Site	This is majorly for security measure. This provides digital video surveillance by sending and receiving footage over local area network (LAN)	40	50	2000
Uninterruptible Power Supplies	Per Demarc	The APC Smart-UPS 1500VA is known for its high reliability and robust performance, providing uninterrupted power protection for critical equipment and ensuring business continuity during power outages or fluctuations.	8	1958	15664
Label Maker Machine (DYMO Label Writer 450 Turbo)		The DYMO Label Writer 450 Turbo is known for its rapid printing capabilities, allowing you to print labels quickly and efficiently. With speeds of up to 71 labels per minute, this machine is ideal for high-volume label printing tasks, saving time and increasing productivity.	5	30	150
Total					112968

Base on my cabling installation.

ISP to MDF Router = Fiber optic cable

MDF Router to Firewall = Cat6 Ethernet Cables

Firewall to MDF Layer 3 Switch = Cat6 Ethernet Cables

MDF Layer 3 Switch to IDF Layer 3 Switch = Fiber optic cable

IDF Layer 3 switch to either hosts or Layer 2 switches are established using Cat6 Ethernet cables, unless specific machines necessitate the use of fiber optic cables for connectivity.

4: Design of a Suitable PC To Support Administration Department workload.

Component	Description/Model	Reasoning of choice	Unit Cost (£)	Number Required	Number Required * Unit Cost (£)
Processor (CPU)	Intel Core i5-12400 Desktop Processor 18M Cache, up to 4.40 GHz	<ul style="list-style-type: none"> • Offers a significant performance boost over previous generations. • smooth operation of everyday tasks while remaining energy-efficient. • Inbuilt Graphics card. 	£117	26	£3042
Memory (RAM)	Corsair VENGEANCE LPX DDR4 RAM 16GB (2x8GB) 3200MHz CL16	<ul style="list-style-type: none"> • Offers a balance of speed, reliability, and capacity. • Meeting the demanded requirement of Sage accountancy software and offering room for multitasking and ensuring optimal system performance 	£40	26	£1040

Storage	Fanxiang NVMe M.2 2280 SSD 512GB	SSD provides ample speed and storage capacity for the Administration department's operating system, applications, and data files, ensuring efficient data access and system performance	£34	26	£884
Graphics Card (GPU)	Integrated Intel UHD Graphics (included with CPU)	<ul style="list-style-type: none"> • Integrated graphics processors integrated into the CPU offer adequate graphical performance for everyday tasks. • Eliminating the need for a dedicated GPU and reducing overall system cost. 	Included with CPU	0	—
Motherboard	ASUS PRIME B760M-A WiFi D4 Intel LGA 1700 Micro ATX motherboard	This offers a balance of performance such as support for DDR4 memory, multiple expansion slots, and built-in Wi-Fi connectivity, making it suitable for the Administration department's needs.	£117	26	£3042

Fan	(Included with Computer Case)		Included with Computer Case	0	-
Power Supply Unit (PSU)	CiT ATV Pro 500W Power Supply, Non-Modular, APFC, 80 Plus Bronze, 85% Efficiency, 14cm Cooling Fan	This power supply unit provides sufficient wattage to support the system's components while ensuring stable and efficient operation and protecting the system components from power fluctuations.	£33	26	£858
Computer Case	NZXT H5 Flow RGB Compact ATX Mid-Tower PC Gaming Case (Black)	This offers a combination of style, functionality, and airflow optimization, providing a suitable housing for the system build while enhancing the overall visual appeal.	£85	26	£2210
Operating System	Windows 11 Home 64-bit OEM license	Windows 11 Home offers a user-friendly interface, enhanced security features, and compatibility with Sage accountancy software and a wide range of software applications, making it ideal for the Administration department's daily operations.	£69	26	£1794

Monitor	Dell S2421NX 24 Inch Full HD (1920x1080) Monitor, 75Hz, IPS, 4ms, AMD FreeSync, Ultrathin Bezel, 2x HDMI		£110	26	£2860
Keyboard	Kensington- wired keyboard		£10	26	£260
Mouse	GeekerChip Rechargeable Wireless Mouse, Bluetooth Mouse, Two Modes (BT 5.1 + 2.4G Wireless), Ultra-Thin/Silent (800-1200-1600)		£6	26	£156
Antivirus Software	Windows Defender (included with Windows 11)		Included in Windows 11	0	—
Data Encryption Software	BitLocker Drive Encryption (included with Windows 11 Pro)		Included in Windows 11	0	—
Headphones	Trust Roha On-Ear USB Headset with Microphone		£16	26	£416
Webcam	Logitech C270 HD Webcam, HD 720p/30fps, Widescreen HD Video Calling, HD Light Correction, Noise-Reducing Mic		£20	26	£520

Surge Protector	Masterplug Single Socket Surge Protected Power Adaptor with Two USB Charging Points		£13	26	£338
External Hard Drive	2TB external USB hard drive for backups		£69	2	£138
Total Cost			£739		£17558

Additional Components:

External USB Hard Drives (2x 2TB): To facilitate data backups and local file transfers within the department, we will provide two 2TB external USB hard drives. These drives offer ample storage capacity and convenient plug-and-play connectivity, allowing users to backup critical data and transfer files with ease.

Uninterruptible Power Supply (UPS): For added protection against power outages and voltage fluctuations, I also recommend the APC Back-UPS Pro BR1500G UPS. This UPS is capable of supporting the system's capacity and provides battery backup to keep the systems running during power interruptions, ensuring uninterrupted productivity in the Administration department.

Reasoning: The APC Back-UPS Pro BR1500G UPS offers reliable battery backup, surge protection, and automatic voltage regulation (AVR), safeguarding the systems against power-related issues and minimizing downtime in the event of power outages or fluctuations.