Packet Tracer documentation:

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13 Offices:

Thirteen offices are constructed, with twelve allocated for 2 - 4 staff members each and one designated for storage. Four wired access points will be available in each office, as well as Wi-Fi for staff members through the use of wireless access points.

Two 24-Port switches, located in the machine room, will be used to provide 4 wired access points to each office. Four wireless access points will be used to provide a Wi-Fi connection to staff, with two located in the machine room and two placed closer to the applicable offices which are further away from the machine room.

Devices and Costs

For the wired access points, 2 TP-LINK TL-SF1024 switches will be used that are located in the machine room. These switches have 24 ports each, meaning that only two units are required to provide for all twelve offices.

For the Wi-Fi connection, 4 D-Link DAP-1360 Indoor Access Points will be installed which would allow staff to connect to the internet. Each unit costs R 370 and is easy to set up and install, which will also lower labour costs.

Labour Costs

- Installation of 4 D-Link DAP-1360 Indoor Access Points:
    - Labour costs including contingency of 20%: **R 3 500**

Budget

- Devices:
    - 4 D-Link DAP-1360: **R 1 480**
    - **Total:** **R 1 480**

- Labour Costs:
    - 4 D-Link DAP-1360: **R 3 500**
    - **Total:** **R 3 500**

- Total Cost: **R 4 980**

Therefore, a budget of **R 5 000** will be sufficient for the 13 offices.

Technicians' Office:

The technicians' Office does not form part of the 13 offices in terms of requirements, skill of user and job descriptions of employees. Two technicians would be situated in the office where they would make use of desktops or laptops that would ideally have ethernet ports. Two wired access points would be provided and dedicated to office work. Additionally, four wired access points should be available for potential office equipment maintenance. Direct wired access to the Machine Room will also be provided. Wi-fi for 16 devices should be made available (8 devices per technician).

The technicians' office consists of two technicians using a desktop each. There is a wired switch (that has seven ports) that connects directly to the machine room. The switch also connects to the technicians' desktops and four desktops representing the potential office equipment when in maintenance. There is also a wired access point for the technicians where 16 devices can connect to the Wi-Fi.

Labour Costs

- Installation of 1 D-Link DAP-1360 Indoor Access Points:
    - Labour costs including contingency of 20%: **R 700**
- Installation of 1 TP-LINK TL-SF1008D:
    - Labour costs including contingency of 20%: **R 1 500**

Budget

- Devices:
    - 1 D-Link DAP-1360: **R 370**
    - 1 TP-Link TL-SF1008D: **R 230**
    - **Total:** **R 600**

- Labour Costs:

    - 1 D-Link DAP-1360: **R 700**
    - 1 TP-Link TL-SF1008D: **R 1 500**
    - **Total:** **R 2 200**

- Total Cost: **R 2 800**

Therefore, a budget of **R 3 000** will be sufficient for the Technicians Office.

Reception/ Waiting area:

The reception/waiting area accommodates two staff members and multiple guests. For the staff, two wired access points are available, as well as full Wi-Fi access for up to 4 devices per staff member. Limited Wi-Fi is provided for guests and the room has one networked printer.

The room will have 1 5-Port switch to connect the devices to the rest of the network, as well as provide a wired access point to each staff member respectively. For the Wi-Fi, two access points will be installed to provide staff members and guests with a reliable Wi-Fi signal.

Devices and Costs

A TP-LINK TL-SF1008D switch will be installed to connect this room and its components to the rest of the network, as well as provide two wired access points to staff members. Only one unit needs to be purchased, costing R 230.

For the Wi-Fi connection, two D-Link DAP-1360 Indoor Access Points will be installed.One access point will provide for the staff Wi-Fi connection and the other for the guest Wi-Fi connection. Costing only R 370 per unit, this is a much better option financially compared to many other access points.

Labour Costs

- Wi-Fi for Staff and Guests:
    - Labour costs including contingency of 20%: **R 3 500**
- Switch Installation and Setup:
    - Labour costs including contingency of 20%: **R 1 500**

Budget

- Devices:
    - 2 D-Link DAP-1360: **R 740**
    - 1 TP-LINK TL-SF1008D: **R 230**
    - **Total:** **R 970**
- Labour Costs
    - Wi-Fi for Staff and Guests: **R 3 500**

- Switch Installation and Setup: **R 1 500**
- **Total:** **R 5 000**

· Total cost: **R 5 970**

Therefore, a budget of **R 6 000** will be sufficient for the Reception/Waiting Area.

Kitchen:

The kitchen, located next to the reception, has 4 wired access points for ‘Internet of Things’ devices, such as a smart fridge, lights, coffee machine and a smoke detector. Wi-Fi will also be available.

A 5-port Switch will be used as a wired access point for the IoT. The kitchen will also have an wireless access point to supply a strong Wi-Fi signal.

Devices and Costs

One Linksys 5-port switch will be installed, which will cost R540. A TP-Link wireless access point will be used for Wi-Fi, costing R1560.

The total cost of the devices amounts to **R 2 100**.

Labour Costs

Wi-Fi for staff:

- Labour costs including contingency of 20%: **R 2 400**

Switch installation and setup:

- Labour costs including contingency of 20%: **R 1 500**

Budget

· Devices:

- 1 5-Port Gigabit Ethernet Unmanaged Linksys switch, 1000Mbps: **R 540**
- 1 TP-Link EAP610 Ultra-Slim Wireless Access Point: **R 1 560**
- **Total:** **R 2 100**

Labour Costs

- Switch installation and setup: **R 1 500**
- Wi-Fi for Staff: **R 2 400**
- **Total:** **R 3 900**

- Total cost: **R 6 000**

Therefore, a budget of **R 6 500** will be sufficient for the Kitchen.

Meeting Room:

The meeting room/board room can accommodate 20 to 30 people. There are 2 wired devices, Voice over Internet Protocol (VoIP), used for teleconferencing. There is also Wi-Fi available for 250 devices to connect to.

2 VoIP teleconferencing devices will be connected to a 5-port switch, which will be connected to the rest of the network. 2 Wireless access points allows all the people to connect up to 4 devices to the Wi-Fi.

Devices and Costs

Two Ooma Telo VoIP devices will cost R2600, but it is an optional add-on. A Linksys 5-port switch to be installed is priced at R540. Lastly, 2 TP-Link wireless access points will cost R 3 120.

The total cost of the devices amounts to **R 6 260** including the 2 VoIP devices. Excluding the VoIP devices, the total cost will be **R 3 660.**

Labour Costs

Wi-Fi for staff:

- Labour costs including contingency of 20%: **R 2 400**

Switch installation and setup:

- Labour costs including contingency of 20%: **R 1 500**

Setup and installation for teleconferencing hardware (Optional):

- Labour costs including contingency of 20%: **R 700**

Budget

Devices:

- 2 Ooma Telo VoIP:

R 2 600

- 1 5-Port Gigabit Ethernet Unmanaged Linksys switch, 1000Mbps: **R 540**
- 2 TP-Link EAP610 Ultra-Slim Wireless Access Points: **R 3 120**
- **Total including VoIP devices: R 6 260**
    - **Total excluding VoIP devices: R 3 660**

Labour Costs

- Switch installation and setup: **R 1 500**
- Wi-Fi for Staff: **R 2 400**
- Setup and installation for teleconferencing hardware: **R 700**
- **Total including VoIP devices: R 4 600**
    - **Total excluding VoIP devices: R 3 900**

Total cost including VoIP devices: **R 10 860**

Total cost excluding VoIP devices: **R 7 560**

Therefore, a budget of **R 11 000** will be sufficient for the Meeting room/Boardroom when the optional add-on (VoIP devices) is included. If it is not included, a budget of **R 8 000** will suffice.

Machine Room/ Server Room:

The machine room houses most of the switches which connect components from different rooms to one another. Only technicians are allowed within the room. Servers within the machine room are accessed primarily from the technicians office. All of the Internet traffic moves through the machine room to the rest of the network, but not all the traffic moves through the servers. No Wi-Fi connection is necessary within the machine room itself.

Two multilayer switches will be installed in the machine room. One of the switches is connected to a router (connected to the Internet), and connects the multiple 24-port switches going to each room respectively. The other multilayer switch provides an internet connection of all the access points used in the building, and is connected to the wireless LAN controller.

Eight 24-Port Switches will be used to provide for the 100 wired access points in the open floor space, and the wired access points in the 12 offices.

Devices and Costs

Two TP-Link T1700G-28TQ multiplayer switches will be installed. These switches contain 24 ports each and provide Gigabit ethernet. Each unit costs R 7 100.

For the Internet connection, the TP-Link Archer AX6000 will be used. This router costs R 5 500 and uses Gigabit ethernet to provide an Internet connection to the connected devices.

A TP-Link Omada wireless LAN controller will be installed costing R 2 000.

Eight TP-Link TL-SF1024 switches will be purchased with each unit costing R 999, amounting to a sum of R 7 992. These switches each contain 24 ports, making it the most power efficient and budget-friendly option.

Labour Costs

- 2 TP-Link T1700G-28TQ Setup and Install:
    - Labour costs including contingency of 20%: **R 21 000**
- TP-Link Archer AX6000 Setup and Install:

    - Labour costs including contingency of 20%: **R 5 400**
- TP-Link Omada Setup and Install:
    - Labour costs including contingency of 20%: **R 1 000**
- 8 TP-Link TL-SF1024 Setup and Install:
    - Labour costs including contingency of 20%: **R 35 000**

Budget

· Devices:

- 2 TP-Link T1700G-28TQ: **R 14 200**
- 1 TP-Link Archer AX6000: **R 5 500**
- 1 TP-Link Omada: **R 2 000**
- 8 TP-Link TL-SF1024: **R 7 992**
- **Total:** **R 29 692**

· Labour Costs

- 2 TP-Link T1700G-28TQ Setup and Install **R 21 000**
- TP-Link Archer AX6000 Setup and Install **R 5 400**
- TP-Link Omada Setup and Install **R 1 000**
- 8 TP-Link TL-SF1024 Setup and Install: **R 35 000**
- **Total:** **R 62 400**

· Total cost: **R 92 092**

Therefore, a budget of **R 100 000** will be sufficient for the Machine Room.

Open Floor Space:

The open floor space is described as a multi-functional office space that needs to be adaptable to accommodate various tasks and projects. The room is big enough to accommodate 75 – 120 people and the floor is raised to allow cables to effortlessly run under the desks to the machine room. One hundred wired access points are available to allow for devices to connect to the network via Ethernet. Staff have a reliable Wi-Fi connection and five networked printers are available.

The room's devices will be connected to 5 24-Port switches, located in the machine room, which is connected to one main multilayer switch. Five printers will be connected to one 8-Port switch, making them accessible to the rest of the network. Three access points will be connected to a multilayer switch in the machine room to provide a Wi-Fi connection to staff members.

Devices and Costs

A TP-LINK TL-SF1008D switch will be used to connect the 5 printers to the rest of the network. Costing only R 230, this switch has 8 ports and provides a data transfer speed of 100Mbps to all its connected components.

Three D-Link DAP-1360 Indoor Access Points will be used to provide a stable Wi-Fi connection to staff. With a cost of only R 370 per unit, these access points are both affordable and high quality, making it the perfect choice.

Labour Costs

- Wi-Fi for Staff:
    - Labour cost including contingency of 20%: **R 3 500**

Budget

- Devices:
    - 1 TP-LINK TL-SF1008D: **R 230**
    - 3 D-Link DAP-1360 Indoor Access Points: **R 1 110**
    - **Total:** **R 1 340**

- Labour costs:
    - Wi-Fi for Staff: **R 3 500**
    - **Total:** **R 3 500**

- Total cost: **R 4 840**

Therefore, a budget of **R 5 000** will be sufficient for the Open Floor Space.