CP1402 Assessment Networking Case Study

By: Braydan Newman

Finished 31/10/2021

Part 1: Network Diagram

The following network diagram is a reprasentaion of how my*Data* Services Inc’s is laying out their infrastructure and network:

Diagram

Description automatically generated

Part 2: Subnetting

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Subnets | | | | | | | |
| Subnet Name | Subnet Address | Subnet Mask | First Useable Address | Last Useable Address | Broadcast Address | Static Address Range | DHCP Address Range |
| Melbourne LAN | 172.16.0.0/21 | 255.255.248.0/21 | 172.16.0.1 | 172.16.7.254 | 172.16.7.255 | 172.16.0.1 | 172.16.0.2 - 172.16.7.254 |
| Vancouver LAN | 172.16.8.0/22 | 255.255.252.0/22 | 172.16.8.1 | 172.16.11.254 | 172.16.11.255 | 172.16.8.1 | 172.16.8.2 - 172.16.11.254 |
| Ontario LAN | 172.16.12.0/24 | 255.255.255.0/24 | 172.16.12.1 | 172.16.12.254 | 172.16.12.255 | 172.16.12.1 | 172.16.12.2 - 172.16.12.254 |
| Adelaide LAN | 172.16.13.0/24 | 255.255.255.0/24 | 172.16.13.1 | 172.16.13.254 | 172.16.13.255 | 172.16.13.1 | 172.16.13.2 - 172.16.13.254 |
| Darwin LAN | 172.16.14.0/24 | 255.255.255.0/24 | 172.16.14.1 | 172.16.14.254 | 172.16.14.255 | 172.16.14.1 | 172.16.14.2 - 172.16.14.254 |
| Vancouver WLAN | 172.16.15.0/25 | 255.255.255.128/25 | 172.16.15.1 | 172.16.15.126 | 172.16.15.127 | 172.16.15.1 | 172.16.15.2 - 172.16.15.126 |
| Melbourne WLAN | 172.16.15.128/26 | 255.255.255.192/26 | 172.16.15.129 | 172.16.15.190 | 172.16.15.191 | 172.16.15.129 | 172.16.15.130 - 172.16.15.190 |
| Ontario WLAN | 172.16.15.192/28 | 255.255.255.240/28 | 172.16.15.193 | 172.16.15.206 | 172.16.15.207 | 172.16.15.193 | 172.16.15.194 - 172.16.15.206 |
| Vancouver Server LAN | 172.16.15.208/29 | 255.255.255.248/29 | 172.16.15.209 | 172.16.15.214 | 172.16.15.215 | 172.16.15.209 - 172.16.15.213 | 172.16.15.214 |
| Melbourne Server LAN | 172.16.15.216/29 | 255.255.255.248/29 | 172.16.15.217 | 172.16.15.222 | 172.16.15.223 | 172.16.15.217 - 172.16.15.220 | 172.16.15.221 - 172.16.15.222 |
| Adelaide Server LAN | 172.16.15.224/29 | 255.255.255.248/29 | 172.16.15.225 | 172.16.15.232 | 172.16.15.231 | 172.16.15.225 - 172.16.15.227 | 172.16.15.228 - 172.16.15.232 |
| Melbourne - Adelaide WAN | 172.16.15.232/30 | 255.255.255.252/30 | 172.16.15.233 | 172.16.15.234 | 172.16.15.235 | 172.16.15.233 - 172.16.15.234 | N/A |
| Melbourne - Ontario WAN | 172.16.15.236/30 | 255.255.255.252/30 | 172.16.15.237 | 172.16.15.238 | 172.16.15.239 | 172.16.15.237 - 172.16.15.238 | N/A |
| Ontario - Vancouver WAN | 172.16.15.240/30 | 255.255.255.252/30 | 172.16.15.241 | 172.16.15.242 | 172.16.15.243 | 172.16.15.241 - 172.16.15.242 | N/A |
| Melbourne - Vancouver WAN | 172.16.15.244/30 | 255.255.255.252/30 | 172.16.15.245 | 172.16.15.246 | 172.16.15.247 | 172.16.15.245 - 172.16.15.246 | N/A |
| Darwin - Melbourne WAN | 172.16.15.248/30 | 255.255.255.252/30 | 172.16.15.249 | 172.16.15.250 | 172.16.15.251 | 172.16.15.249 - 172.16.15.250 | N/A |
| Adelaide - Darwin WAN | 172.16.15.252/30 | 255.255.255.252/30 | 172.16.15.253 | 172.16.15.254 | 172.16.15.255 | 172.16.15.253 - 172.16.15.254 | N/A |

|  |  |  |  |
| --- | --- | --- | --- |
| Router Interface | | | |
| Location | Interface | IP Address | Subnet Mask |
| Melbourne | WAN | 172.16.15.233 | 255.255.255.252/30 |
| Melbourne | WAN | 172.16.15.237 | 255.255.255.252/30 |
| Melbourne | WAN | 172.16.15.245 | 255.255.255.252/30 |
| Melbourne | WAN | 172.16.15.250 | 255.255.255.252/30 |
| Melbourne | ISP WAN | 28.251.48.105/30 | 255.255.255.252/30 |
| Melbourne | WLAN | 172.16.15.129 | 255.255.255.192/26 |
| Melbourne | LAN | 172.16.0.1 | 255.255.248.0/21 |
| Melbourne | LAN | 172.16.15.217 | 255.255.255.248/29 |
| Vancouver | WAN | 172.16.15.242 | 255.255.255.252/30 |
| Vancouver | WAN | 172.16.15.246 | 255.255.255.252/30 |
| Vancouver | WLAN | 172.16.15.1 | 255.255.255.128/25 |
| Vancouver | LAN | 172.16.8.1 | 255.255.252.0/22 |
| Vancouver | LAN | 172.16.15.209 | 255.255.255.248/29 |
| Ontario | WAN | 172.16.15.238 | 255.255.255.252/30 |
| Ontario | WAN | 172.16.15.241 | 255.255.255.252/30 |
| Ontario | WLAN | 172.16.15.193 | 255.255.255.240/28 |
| Ontario | LAN | 172.16.12.1 | 255.255.255.0/24 |
| Adelaide | WAN | 172.16.15.234 | 255.255.255.252/30 |
| Adelaide | WAN | 172.16.15.253 | 255.255.255.252/30 |
| Adelaide | LAN | 172.16.13.1 | 255.255.255.0/24 |
| Adelaide | LAN | 172.16.15.225 | 255.255.255.248/29 |
| Darwin | WAN | 172.16.15.249 | 255.255.255.252/30 |
| Darwin | WAN | 172.16.15.254 | 255.255.255.252/30 |
| Darwin | LAN | 172.16.14.1 | 255.255.255.0/24 |

|  |  |  |  |
| --- | --- | --- | --- |
| Servers | | | |
| Location | Server Name | IP Address | Subnet Mask |
| Melbourne | Database Server | 172.16.15.218 | 255.255.255.248 |
| Melbourne | Web Server | 172.16.15.219 | 255.255.255.248 |
| Melbourne | Mail Server | 172.16.15.220 | 255.255.255.248 |
| Vancouver | Backup Server 1 | 172.16.15.210 | 255.255.255.248 |
| Vancouver | Backup Server 2 | 172.16.15.211 | 255.255.255.248 |
| Vancouver | Backup Server 3 | 172.16.15.212 | 255.255.255.248 |
| Vancouver | Backup Server 4 | 172.16.15.213 | 255.255.255.248 |
| Adelaide | Backup Server 1 | 172.16.15.226 | 255.255.255.248 |
| Adelaide | Backup Server 2 | 172.16.15.227 | 255.255.255.248 |

Part 3: Research and source appropriate devices

Budget $4000

Devices Needed:

* Router
* Switch/s
* Wireless Access point

|  |  |
| --- | --- |
| 0 | The requirement does not apply to this scenario |
| 1 | The requirement is not very important |
| 3 | The requirement should be met |
| 5 | The requirement is critical |
|  |  |
| 0 | The Requirement isn’t met at all |
| 2 | The Requirement is partially met, but not completely |
| 4 | The Requirement has been met |
| 6 | The item exceeds the requirement |

**Router**

Requirements table:

|  |  |  |
| --- | --- | --- |
| Router | |  |
| Requirements | Description |  |
| Cost | Under 1000 | 5 |
| Speed | Has the capability to handle the throughput | 5 |
| Expandability | Having extra capability then what we need it to do now | 1 |
| Size | Size of the unit (Smaller Better) | 1 |
| Ports | Has the required number of ports | 5 |
| Extra Features | e.g., Having a built-in switch | 3 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Routers | | | | | | | |
| Requirement | Cost | Speed | Expandability | Size | Ports | Extra Features | Total Weighted Score |
| Weight | 5 | 5 | 1 | 1 | 5 | 3 |
| Cisco RV340 | 6 | 2 | 0 | 6 | 4 | 0 | 76 |
| HPE FlexNetwork MSR1003 8 AC Router | 2 | 6 | 6 | 6 | 6 | 6 | 130 |
| Juniper CTP150 | 0 | 6 | 6 | 6 | 6 | 6 | 120 |
| Cisco ISR4331/KD | 0 | 6 | 6 | 6 | 6 | 6 | 120 |

Weighted Decision Matrix:

The most obvious part was to try and stay udder budget, so I assigned a $1000 budget which is fair for the size of this branch, that is why this was placed at priority 5. Along with this speed and ports were placed at 5 as well. This is because if the speed was not at a decent stranded it would lead to many frustrations and ultimately a fall of efficiency for anyone working at this office. Ports were placed at priority 5 as without the required ports to connect to the WAN, LAN and WLAN they would not have access to the my*Data* Services Inc’s network nor internet, that’s why it was critical reequipment.

Having extra features like a strong management tool and inbuilt switch would be nice to have but not a critical reequipment that’s why it’s a priority 3.

Expandability and size where barely considered a factor as this facility would have a dedicated room which would be plenty of size for the level of hardware we needed for this branch and its unlikely that this site would need to expand like this in the close future.

**Switch/s**

Requirements table:

|  |  |  |
| --- | --- | --- |
| Switch LAN | |  |
| Requirements | Description |  |
| Cost | Under 2500 | 5 |
| Speed | Has the capability to handle the throughput | 5 |
| Expandability | Having extra capability then what we need it to do now | 3 |
| Size | Size of the unit (Smaller Better) | 1 |
| Ports | Has the required number of ports | 5 |
| Extra Features | e.g., Having a POE | 3 |

Weighted Decision Matrix:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Switches | | | | | | | |
| Requirement | Cost | Speed | Expandability | Size | Ports | Extra Features | Total Weighted Score |
| Weight | 5 | 5 | 3 | 1 | 5 | 3 |
| NETGEAR SOHO Unmanaged Switch - 48-Port (GS348) + Netgear GS105 Prosafe 5-Port Gigabit Switch | 2 | 4 | 4 | 4 | 4 | 4 | 90 |
| D-link 24-Port Gigabit Unmanaged Switch (Metal Housing) | 0 | 6 | 4 | 2 | 6 | 2 | 102 |
| Cisco CBS110-24T | 0 | 6 | 4 | 2 | 6 | 2 | 102 |
| S2800S-48T4F, 48-Port Gigabit Ethernet L2+ Smart Managed Switch, 48 x Gigabit RJ45, with 4 x 1Gb SFP Uplinks + Netgear GS105 Prosafe 5-Port Gigabit Switch | 6 | 4 | 4 | 4 | 4 | 4 | 110 |

Switches were given a $2500 budget, and this was because the required number of plugged-in workstations is 250, this this section has a combination of multiple and many of the same type of switch. The switches chosen was 5 48 port switches coupled with 2 5 port switches to reach the required 250 workstation requirements. Therefore, it was set at priority 5 along with cost. The speed needs to be high enough to no experience substantial delay.

Expandability and extra features were set to 3 as it is very possible that more workstations could be added and that having extra features such at Power over Ethernet would make powering extra devises such at security systems a lot easier.

Size again barely matters as the space required for the level of gear is not enough to this about.

**Wireless Access Point**

Requirements table:

|  |  |  |
| --- | --- | --- |
| Wireless Access Point | |  |
| Requirements | Description |  |
| Cost | Under 1000 | 5 |
| Speed | Has the capability to handle the throughput | 5 |
| Expandability | Having extra capability then what we need it to do now | 3 |
| Size | Size of the unit (Smaller Better) | 1 |
| Ports | Can Handel the number of users | 5 |
| Extra Features | e.g., Wi-Fi 6 | 1 |

Weighted Decision Matrix:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Wireless Access Point | | | | | | | |
| Requirement | Cost | Speed | Expandability | Size | Ports | Extra Features | Total Weighted Score |
| Weight | 5 | 5 | 3 | 1 | 5 | 1 |
| D-Link Wireless AC1750 Wave 2 Concurrent Dual-Band PoE Access Point | 6 | 4 | 4 | 6 | 4 | 4 | 112 |
| Cisco Aironet 1852 | 6 | 6 | 6 | 6 | 6 | 6 | 150 |
| NETGEAR Insight Managed WiFi 6 AX3600 Dual-Band Access Point (WAX620) | 6 | 6 | 6 | 6 | 4 | 4 | 134 |
| NETGEAR WiFi 6 AX1800 Dual-Band PoE Wireless Access Point (WAX214) | 6 | 6 | 2 | 6 | 4 | 2 | 124 |

The wireless access point was the cheapest item on the list as the number of uses it needed to handle at a given time is comparatively low and thus all stayed well under the $1000 budget. The cost, speed and ports (number of uses at a time) were still most important at priority 5 like the other items.

The Number of uses at one time is very likely to go up over time and thus expandability was necessary but not essential, that is why it is at priority 3.

The size and extra features was put at priority 1, is because of the lack of need for them. Wireless Access Point don’t take up much room and can be placed almost anywhere like on the ceiling thus size was barely conceded. While extra features would be nice is was far from a necessity, Wi-Fi 6 or longer range was not necessary for this application with the limited users.