**Part 2: Cabling, Subnetting and Initial Router Configuration**

|  |  |  |  |
| --- | --- | --- | --- |
| **Selected IP Address Range** *(include the selected range here)* | | | |
| **Range** | **Network Address** | **Subnet Mask (Decimal)** | **CIDR Notation** |
| 2 | 192.168.230.0 | 255.255.255.192 | /26 |

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| --- | --- | --- | --- | --- | --- | --- |
| **VLSM Calculations** (*show your calculations here. Add space if required*) | | | | | | |
| * Original subnet mask: 255.255.255.192 = 1111 1111.1111 1111.1111 1111.1100 0000, which has a total of 26 network bits (/26) * To get two sized subnets, we need to add the first subnet additional network bits: 1111 1111.1111 1111.1111 1111.1110 0000, which gives us sized subnets 32 (24) addresses for 1 host bits. This makes for total of 27 network bit (/27). A /27 subnet mask in decimal notation is 255.255.255.224. * To get the second subnet additional network bits: 1111 1111.1111 1111.1111 1111.1111 0000, which gives us sized subnets 16 (23) addresses for 1 host bits. This makes for total of 28 network bit (/28). A /28 subnet mask in decimal notation is 255.255.255.240. * For the purposes of this configuration, we only need the two subnets. * Subnet 1   Subnet address 192.168.230 .0 netmask 255.255.255.224 range of address 192.168.230 .0 – 192.168.230.31. Therefore, useable IPs 192.168.230 .1-192.168.230 .30   * Subnet 2   Subnet address 192.168.230.32 netmask 255.255.255.240 range of address 192.168.230.32 – 192.168.230.47. Therefore, useable IPs 192.168.230.33-192.168.230 .46 | | | | | | |
| **IP Address Allocation for Networks** *(include the calculated IP Address information here)* | | | | | |
| **Network** | | **Number of Hosts** | **IP Address** | **Subnet Mask**  **(Decimal & CIDR)** | |
| Network 1 | Switch 1 – PC 1 – Server 1 | 25 hosts | 192.168.230.0 | 255.255.255.224 | /27 |
| Network 2 | Switch 2 – PC 2 – Server 2 | 10 hosts | 192.168.230.32 | 255.255.255.240 | /28 |

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| **IP Address Allocation** *(include the assigned IP Address information here)* | | | |
| **Device** | **Interface** | **IP Address / Subnet Mask (CIDR)** | **Default Gateway**  (if applicable) |
| AccessRouter | Network 1 interface | 192.168.230.30/27 |  |
| Network 2 interface | 192.168.230.46/28 |  |
|  | | | |
| Switch 1 | VLAN 1 interface | 192.168.230.29/27 |  |
| PC1 | Network interface | 192.168.230.2/27 | 192.168.230.30 |
| Server 1 | Network interface | 192.168.230.1/27 | 192.168.230.30 |
|  | | | |
| Switch 2 | VLAN 1 interface | 192.168.230.45/28 |  |
| PC2 | Network interface | 192.168.230.34/28 | 192.168.230.46 |
| Server 2 | Network interface | 192.168.230.33/28 | 192.168.230.46 |

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| **Firmware Upgrade** (*include screen captures of the OS upgrade for a Router*).  Outputs from the ***show flash*** command before and after IOS upgrade |
| A screenshot of a computer program  Description automatically generated  Before Upgrade the Firmware After Upgrade the Firmware |

**Part 3: Static and Default Routing**

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| --- | --- | --- | --- |
| **Selected IP Address Range** *(include the selected range here)* | | | |
| **Range** | **Network Address** | **Subnet Mask (Decimal)** | **CIDR Notation** |
| 4 | 172.17.170.0 | 255.255.255.0 | /24 |

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| **VLSM Calculations** (*show your calculations here. Add space if required*) |
| * Original subnet mask: 255.255.255.0 = 1111 1111.1111 1111.1111 1111.0000 0000, which has a total of 24 network bits (/24) * To get four sized subnets, we need to add the first subnet additional network bits: 1111 1111.1111 1111.1111 1111.1000 0000, which gives us sized subnets 128 (27) addresses for 1 host bits. This makes for total of 25 network bit (/25). A /25 subnet mask in decimal notation is 255.255.255.128. * To get the second subnet additional network bits: 1111 1111.1111 1111.1111 1111.1100 0000, which gives us sized subnets 64 (26) addresses for 1 host bits. This makes for total of 26 network bit (/26). A /26 subnet mask in decimal notation is 255.255.255.192. * To get the third subnet additional network bits: 1111 1111.1111 1111.1111 1111.1111 1100, which gives us sized subnets 4 (22) addresses for 1 host bits. This makes for total of 30 network bit (/30). A /30 subnet mask in decimal notation is 255.255.255.252. * To get the fourth subnet additional network bits: 1111 1111.1111 1111.1111 1111.1111 1100, which gives us sized subnets 4 (22) addresses for 1 host bits. This makes for total of 30 network bit (/30). A /30 subnet mask in decimal notation is 255.255.255.252. * For the purposes of this configuration, we only need the four subnets. * Subnet 1   Subnet address 172.17.170.0 netmask 255.255.255.128, range of address 172.17.170.0– 172.17.170.128. Therefore, useable IPs 172.17.170.1-172.17.170.126   * Subnet 2   Subnet address 172.17.170.128 netmask 255.255.255.192, range of address 172.17.170.128 - 172.17.170.191. Therefore, useable IPs 172.17.170.129 - 172.17.170.190   * Subnet 3   Subnet address 172.17.170.192 netmask 255.255.255.252, range of address 172.17.170.192 - 172.17.170.195. Therefore, useable IPs 172.17.170.193 - 172.17.170.194   * Subnet 4   Subnet address 172.17.170.196 netmask 255.255.255.252, range of address 172.17.170.196 - 172.17.170.199. Therefore, useable IPs 172.17.170.197 - 172.17.170.198 |

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| **IP Address Allocation for Networks** *(include the calculated IP Address information here)* | | | | |
| **Network** | **Number of Hosts** | **IP Address** | **Subnet Mask**  **(Decimal & CIDR)** | |
| Router 1 / PC-A | 100 hosts | 172.17.170.0 | 255.255.255.128 | /25 |
| Router 2 / PC-B | 50 hosts | 172.17.170.128 | 255.255.255.192 | /26 |
| AccessRouter – Router 1 link | 2 addresses | 172.17.170.192 | 255.255.255.252 | /30 |
| Router 1 – Router 2 link | 2 addresses | 172.17.170.196 | 255.255.255.252 | /30 |

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| --- | --- | --- | --- |
| **IP Address Allocation** *(include the assigned IP Address information here)* | | | |
| **Device** | **Interface** | **IP Address / Subnet Mask (CIDR)** | **Default Gateway**  (if applicable) |
| Router 1 | Interface to PC-A | 172.17.170.1/25 |  |
| PC-A | Network Interface | 172.17.170.2/25 | 172.17.170.1 |
|  | | | |
| Router 2 | Interface to PC-B | 172.17.170.129/26 |  |
| PC-B | Network Interface | 172.17.170.130/26 | 172.17.170.129 |
|  | | | |
| AccessRouter | Interface to Router 1 | 172.17.170.193/30 |  |
| Router 1 | Interface to AccessRouter | 172.17.170.194/30 |  |
|  | | | |
| Router 1 | Interface to Router 2 | 172.17.170.197/30 |  |
| Router 2 | Interface to Router 1 | 172.17.170.198/30 |  |

**Part 4: RIPv2 Dynamic Routing**

|  |  |  |  |
| --- | --- | --- | --- |
| **Selected IP Address Range** *(include the selected range here)* | | | |
| **Range** | **Network Address** | **Subnet Mask (Decimal)** | **CIDR Notation** |
| 9 | 172.31.100.0 | 255.255.255.0 | /24 |

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| --- |
| **VLSM Calculations** (*show your calculations here. Add space if required*) |
| * Original subnet mask: 255.255.255.0 = 1111 1111.1111 1111.1111 1111.0000 0000, which has a total of 24 network bits (/24) * To get six sized subnets, we need to add the first subnet additional network bits: 1111 1111.1111 1111.1111 1111.1000 0000, which gives us sized subnets 128 (27) addresses for 1 host bits. This makes for total of 25 network bit (/25). A /25 subnet mask in decimal notation is 255.255.255.128. * To get the second subnet additional network bits: 1111 1111.1111 1111.1111 1111.1100 0000, which gives us sized subnets 64 (26) addresses for 1 host bits. This makes for total of 26 network bit (/26). A /26 subnet mask in decimal notation is 255.255.255.192. * To get the third subnet additional network bits: 1111 1111.1111 1111.1111 1111.1110 0000, which gives us sized subnets 32 (25) addresses for 1 host bits. This makes for total of 27 network bit (/27). A /27 subnet mask in decimal notation is 255.255.255.224. * To get the fourth to sixth subnet additional network bits: 1111 1111.1111 1111.1111 1111.1111 1100, which gives us sized subnets 4 (22) addresses for 1 host bits. This makes for total of 30 network bit (/30). A /30 subnet mask in decimal notation is 255.255.255.252. * For the purposes of this configuration, we only need the six subnets. * Subnet 1   Subnet address 172.31.100.0 netmask 255.255.255.128, range of address 172.31.100.0– 172.31.100.128. Therefore, useable IPs 172.31.100.1-72.31.100.127   * Subnet 2   Subnet address 172.31.100.128 netmask 255.255.255.192, range of address 172.31.100.128 - 172.31.100.191. Therefore, useable IPs 172.31.100.129 - 172.17.170.190   * Subnet 3   Subnet address 172.31.100.192 netmask 255.255.255.224, range of address 172.31.100.192 - 172.31.100.223. Therefore, useable IPs 172.31.100.193 - 172.31.100.222   * Subnet 4   Subnet address 172.31.100.224 netmask 255.255.255.252, range of address 172.31.100.224 - 172.31.100.227. Therefore, useable IPs 172.31.100.225 - 172.31.100.226   * Subnet 5   Subnet address 172.31.100.228 netmask 255.255.255.252, range of address 172.31.100.228 - 172.31.100.231. Therefore, useable IPs 172.31.100.229 - 172.31.100.230   * Subnet 6   Subnet address 172.31.100.232 netmask 255.255.255.252, range of address 172.31.100.232 - 172.31.100.235. Therefore, useable IPs 172.31.100.233 - 172.31.100.234  Spare |

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| --- | --- | --- | --- | --- |
| **IP Address Allocation for Networks** *(include the calculated IP Address information here)* | | | | |
| **Network** | **Number of Hosts** | **IP Address** | **Subnet Mask**  **(Decimal & CIDR)** | |
| Router 3 / PC-C | 100 hosts | 172.31.100.0 | 255.255.255.128 | /25 |
| Router 4 / PC-D | 50 hosts | 172.31.100.128 | 255.255.255.192 | /26 |
| Router 5 / PC-E | 20 hosts | 172.31.100.192 | 255.255.255.224 | /27 |
| AccessRouter – Router 3 link | 2 addresses | 172.31.100.224 | 255.255.255.252 | /30 |
| Router 3 – Router 4 link | 2 addresses | 172.31.100.228 | 255.255.255.252 | /30 |
| Router 3 – Router 5 link | 2 addresses | 172.31.100.232 | 255.255.255.252 | /30 |

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| --- | --- | --- | --- |
| **IP Address Allocation** *(include the assigned IP Address information here)* | | | |
| **Device** | **Interface** | **IP Address / Subnet Mask (CIDR)** | **Default Gateway**  (if applicable) |
| Router 3 | Interface to PC-C | 172.31.100.126/25 |  |
| PC-C | Network Interface | 172.31.100.1/25 | 172.31.100.126 |
|  | | | |
| Router 4 | Interface to PC-D | 172.31.100.190/26 |  |
| PC-D | Network Interface | 172.31.100.129/26 | 172.31.100.190 |
|  | | | |
| Router 5 | Interface to PC-E | 172.31.100.222/27 |  |
| PC-E | Network Interface | 172.31.100.193/27 | 172.31.100.222 |
|  | | | |
| AccessRouter | Interface to Router 3 | 172.31.100.225/30 |  |
| Router 3 | Interface to AccessRouter | 172.31.100.226/30 |  |
|  | | | |
| Router 3 | Interface to Router 4 | 172.31.100.229/30 |  |
| Router 4 | Interface to Router 3 | 172.31.100.230/30 |  |
|  | | | |
| Router 3 | Interface to Router 5 | 172.31.100.233/30 |  |
| Router 5 | Interface to Router 3 | 172.31.100.234/30 |  |

**Task 5: OSPF Dynamic Routing**

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| --- | --- | --- | --- |
| **Selected IP Address Range** *(include the selected range here)* | | | |
| **Range** | **Network Address** | **Subnet Mask (Decimal)** | **CIDR Notation** |
| 12 | 192.168.130.0 | 255.255.255.0 | /24 |

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| --- |
| **VLSM Calculations** (*show your calculations here. Add space if required*) |
| * Original subnet mask: 255.255.255.0 = 1111 1111.1111 1111.1111 1111.0000 0000, which has a total of 24 network bits (/24) * To get six sized subnets, we need to add the first subnet additional network bits: 1111 1111.1111 1111.1111 1111.1100 0000, which gives us sized subnets 64 (26) addresses for 1 host bits. This makes for total of 26 network bit (/26). A /26 subnet mask in decimal notation is 255.255.255.192. * To get the second and third subnet additional network bits: 1111 1111.1111 1111.1111 1111.1110 0000, which gives us sized subnets 32 (25) addresses for 1 host bits. This makes for total of 27 network bit (/27). A /27 subnet mask in decimal notation is 255.255.255.224. * To get the fourth to sixth subnet additional network bits: 1111 1111.1111 1111.1111 1111.1111 1100, which gives us sized subnets 4 (22) addresses for 1 host bits. This makes for total of 30 network bit (/30). A /30 subnet mask in decimal notation is 255.255.255.252. * For the purposes of this configuration, we only need the six subnets. * Subnet 1 * Subnet address 192.168.130.0 netmask 255.255.255.192, range of address 192.168.130.0– 192.168.130.63. Therefore, useable IPs 192.168.130.1 - 192.168.130.62 * Subnet 2   Subnet address 192.168.130.0 netmask 255.255.255.224, range of address 192.168.130.64 - 192.168.130.95. Therefore, useable IPs 192.168.130.65 - 192.168.130.94   * Subnet 3   Subnet address 192.168.130.96 netmask 255.255.255.224, range of address 192.168.130.96 - 192.168.130.127. Therefore, useable IPs 192.168.130.67 - 192.168.130.126   * Subnet 4   Subnet address 192.168.130.128 netmask 255.255.255.252, range of address 192.168.130.128 - 192.168.130.131. Therefore, useable IPs 192.168.130.129 - 192.168.130.130   * Subnet 5   Subnet address 192.168.130.132 netmask 255.255.255.252, range of address 192.168.130.132 - 192.168.130.135. Therefore, useable IPs 192.168.130.133 - 192.168.130.134   * Subnet 6   Subnet address 192.168.130.136 netmask 255.255.255.252, range of address 192.168.130.136 - 192.168.130.139. Therefore, useable IPs 192.168.130.137 - 192.168.130.138 |

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| --- | --- | --- | --- | --- |
| **IP Address Allocation for Networks** *(include the calculated IP Address information here)* | | | | |
| **Network** | **Number of Hosts** | **IP Address** | **Subnet Mask**  **(Decimal & CIDR)** | |
| Router 7 / PC-F | 50 hosts | 192.168.130.0 | 255.255.255.192 | /26 |
| Router 8 / PC-G | 20 hosts | 192.168.130.64 | 255.255.255.224 | /27 |
| Router 9 / PC-H | 20 hosts | 192.168.130.96 | 255.255.255.224 | /27 |
| AccessRouter – Router 7 link | 2 addresses | 192.168.130.128 | 255.255.255.252 | /30 |
| Router 7 – Router 8 link | 2 addresses | 192.168.130.132 | 255.255.255.252 | /30 |
| Router 7 – Router 9 link | 2 addresses | 192.168.130.136 | 255.255.255.252 | /30 |

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| --- | --- | --- | --- |
| **IP Address Allocation** *(include the assigned IP Address information here)* | | | |
| **Device** | **Interface** | **IP Address / Subnet Mask (CIDR)** | **Default Gateway**  (if applicable) |
| Router 7 | Interface to PC-F | 192.168.130.62/26 |  |
| PC-F | Network Interface | 192.168.130.1/26 | 192.168.130.62 |
|  | | | |
| Router 8 | Interface to PC-G | 192.168.130.94/27 |  |
| PC-G | Network Interface | 192.168.130.65/27 | 192.168.130.94 |
|  | | | |
| Router 9 | Interface to PC-H | 192.168.130.126/27 |  |
| PC-H | Network Interface | 192.168.130.97/27 | 192.168.130.126 |
|  | | | |
| AccessRouter | Interface to Router 7 | 192.168.130.129/30 |  |
| Router 7 | Interface to AccessRouter | 192.168.130.130 |  |
|  | | | |
| Router 7 | Interface to Router 8 | 192.168.130.133/30 |  |
| Router 8 | Interface to Router 7 | 192.168.130.134/30 |  |
|  | | | |
| Router 7 | Interface to Router 9 | 192.168.130.137/30 |  |
| Router 9 | Interface to Router 7 | 192.168.130.138/30 |  |

**Part 6: Troubleshooting Reflection** (include screen captures where applicable).