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# Part 2: Cabling, Subnetting and Initial Router Configuration

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| **Selected IP Address Range** *(include the selected range here)* | | | |
| **Range** | **Network Address** | **Subnet Mask (Decimal)** | **CIDR Notation** |
|  | 192.168.0.0 | 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 for each VLANs, we need to add the first subnet for VLAN 10 (Sales) 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 a total of 27 network bits (/27). A /27 subnet mask in decimal notation is 255.255.255.224. * To get the second subnet VLAN 20 (HR) additional network bits: 1111 1111.1111 1111.1111 1111.1110 0000, which gives us sized subnets 16 (24) addresses for 1 host bit. This makes for a total of 28 network bits (/28). A /28 subnet mask in decimal notation is 255.255.255.240. * To get the third subnet VLAN 30 (Marketing) additional network bits: 1111 1111.1111 1111.1111 1111.1110 0000, which gives us sized subnets 32 (25) addresses for 1 host bit. This makes for a total of 27 network bits (/27). A /27 subnet mask in decimal notation is 255.255.255.224. * To get the fourth subnet VLAN (Management Network) additional network bits: 1111 1111.1111 1111.1111 1111.1111 1000, which gives us sized subnets 8 (23) addresses for 1 host bit. This makes for a total of 29 network bits (/29). A /29 subnet mask in decimal notation is 255.255.255.248. * For this configuration, we only need the four subnets for each VLANs. * VLAN 10 Subnet   Subnet address 192.168.0.0 netmask 255.255.255.224, range of address 192.168.0.0– 192.168.0.31. Therefore, useable IPs 192.168.0.1– 192.168.0.30   * VLAN 20 Subnet   Subnet address 192.168.0.64 netmask 255.255.255.124, range of address 192.168.0.64– 192.168.0.79. Therefore, useable IPs 192.168.0.64– 192.168.0.78   * VLAN 30 Subnet   Subnet address 192.168.0.32 netmask 255.255.255.224, range of address 192.168.0.32– 192.168.0.63. Therefore, useable IPs 192.168.0.33– 192.168.0.62   * VLAN 99 Subnet   Subnet address 192.168.0.80 netmask 255.255.255.248, range of address 192.168.0.80– 192.168.0.87. Therefore, useable IPs 192.168.0.81– 192.168.0.86 |

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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) | |
| Network 1 (VLAN 10 - Sales) | Sales PC  Sales Server | 25 hosts | 192.168.0.0 | 255.255.255.224 | /27 |
| Network 2  (VLAN 20 - HR) | HR PC  HR Server | 10 hosts | 192.168.0.64 | 255.255.255.240 | /28 |
| Network 3  (VLAN 30 - Marketing) | Marketing PC  Marketing Server | 20 hosts | 192.168.0.32 | 255.255.255.224 | /27 |
| Management network (VLAN 99) | Switch 1 | 5 hosts | 192.168.0.80 | 255.255.255.248 | /29 |

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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) |
| Access Router  (AccessRouter) | Sub-interface 1 (VLAN 10) | 192.168.0.30/27 |  |
| Sub-interface 2 (VLAN 20) | 192.168.0.78/28 |  |
| Sub-interface 3 (VLAN 30) | 192.168.0.62/27 |  |
| Sub-interface 4 (VLAN 99) | 192.168.0.86/29 |  |
| **Network 1 (VLAN 10)** | | | |
| Sales PC | Network interface | 192.168.0.2/27 | 192.168.0.30 |
| Sales Server | Network interface | 192.168.0.1/27 | 192.168.0.30 |
| **Network 2 (VLAN 20)** | | | |
| HR PC | Network interface | 192.168.0.66/28 | 192.168.0.78 |
| HR Server | Network interface | 192.168.0.65/28 | 192.168.0.78 |
| **Network 3 (VLAN 30)** | | | |
| Marketing PC | Network interface | 192.168.0.34/27 | 192.168.0.62 |
| Marketing Server | Network interface | 192.168.0.33/27 | 192.168.0.62 |
| **Management network (VLAN 99)** | | | |
| Switch 1 | VLAN 99 interface | 192.168.0.85/29 | 192.168.0.86 |

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| **Configurations** |
| **VLANs**    Figure 1 VLANs Configuration - Assigning to Ports |
| **Passwords**    Figure 2 Enable Password and Secret to the Switch |

# Part 3: WAN links

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| **Selected IP Address Range** *(include the selected range here)* | | | |
| **Range** | **Network Address** | **Subnet Mask (Decimal)** | **CIDR Notation** |
| Public | 11.11.11.0 | 255.0.0.0 | /8 |
| Private | 192.168.1.0 | 255.255.255.192 | /26 |

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| **VLSM Calculations** (*show your calculations here. Add space if required*) |
| * Original **Public** subnet mask: 255.0.0.0 = 1111 1111.0000 0000.0000 0000.0000 0000, which has a total of 8 network bits (/8) * Original **Private** 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 for the **public**, we need to add the first subnet for the AccessRouter and the ISP router 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 a total of 30 network bits (/30). A /30 subnet mask in decimal notation is 255.255.255.252. * To get the second subnet for **ISP** Router and **Customer** Router additional network bits: 1111 1111.1111 1111.1111 1111.1111 1100, which gives us sized subnets 4 (22) addresses for 1 host bit. This makes for a total of 30 network bits (/30). A /30 subnet mask in decimal notation is 255.255.255.252. * For **Private** subnets, required host only 50 addresses. Therefore, we need to add network bits: 1111 1111.1111 1111.1111 1111.1100 0000 to the customer remote network, which gives us sized subnets 64 (26) addresses for 1 host bit. This makes for a total of 26 network bits (/26). A /26 subnet mask in decimal notation is 255.255.255.192. * For this configuration, we only need one subnet for private and two subnets for public. * Public Subnet 1   Subnet address 11.11.11.0 netmask 255.255.128.0, range of address 11.11.11.0– 11.11.11.3. Therefore, useable IPs 11.11.11.1-11.11.11.2   * Public Subnet 2   Subnet address 11.11.11.4 netmask 255.255.128.0, range of address 11.11.11.4– 11.11.11.7. Therefore, useable IPs 11.11.11.5-11.11.11.6   * Private Subnet   Subnet address 192.168.1.0 netmask 255.255.255.192, range of address 192.168.0.0– 192.168.0.63. Therefore, useable IPs 192.168.0.1– 192.168.0.62 |

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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)** | |
| Access router - ISP router link | 2 hosts | 11.11.11.0 | 255.255.255.252 | /30 |
| ISP router – Customer router link | 2 hosts | 11.11.11.4 | 255.255.255.252 | /30 |
| Customer’s remote network | 50 addresses | 192.168.1.0 | 255.255.255.192 | /26 |

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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) |
| **Access Router - ISP router link** | | | |
| Access router  (AccessRouter) | Interface to ISP router | 11.11.11.1/30 |  |
| ISP router | Interface to Access router | 11.11.11.2/30 |  |
| **ISP router – Customer router link** | | | |
| ISP router | Interface to Customer router | 11.11.11.5/30 |  |
| Customer router (CustRouter) | Interface to ISP router | 11.11.11.6/30 |  |
| **Customer’s remote network** | | | |
| Customer server (CustServer) | Network interface | 192.168.1.1/26 | 192.168.1.62 |
| Customer PC  (CustPC) | Network interface | 192.168.1.2/26 | 192.168.1.62 |

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| **Classless routing protocol configuration** |
| Figure 3 EIGRP Configuration for AccessRouter    Figure 4 EIGRP Configuration for ISP Router    Figure 5 EIGRP Configuration for CustRouter |

# Part 4: Access Control Lists

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| **ACLs applied** |
| Figure 6 ACLs Configuration and Apply to each serials interface. |

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| **Screenshot demonstrating policy has been implemented correctly** |
| Figure 7 ACLs List |

# Part 5: DHCP Configuration

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| **Selected IP Address Range** *(include the selected range here)* | | | |
| **Range** | **Network Address** | **Subnet Mask (Decimal)** | **CIDR Notation** |
|  | 192.168.0.0 | 255.255.255.0 | /24 |

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| **DHCP scope allocation for networks** | | | | | |
| **Network** | | **Number of Hosts** | **IP Address Range** | **Subnet Mask**  **(Decimal & CIDR)** | |
| Network 1 (VLAN 10 - Sales) | Sales PC  Sales Server | 25 hosts | 192.168.0.1-192.168.0.30 | 255.255.255.224 | /27 |
| Network 2  (VLAN 20 - HR) | HR PC  HR Server | 10 hosts | 192.168.0.65-192.168.0.78 | 255.255.255.240 | /28 |
| Network 3  (VLAN 30 - Marketing) | Marketing PC  Marketing Server | 20 hosts | 192.168.0.33-192.168.0.62 | 255.255.255.224 | /27 |

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| **Screenshots demonstrating PCs have received correct addresses via DHCP** |
| **Sales PC**    Figure 8 Sales PC received IP address from DHCP. |
| **HR PC**    Figure 9 HRPC received the IP address from DHCP |
| **Marketing PC**    Figure 10 MarketingPC received the IP address from DHCP. |

# Part 6: Network Address Translation

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| **Screenshot demonstrating NAT implementation** |
| Figure 11 Show IP NAT in AccessRouter    Figure 12 Access Webpage on Customer PC |

# Part 7: Virtual Private Network

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| **Selected IP Address Range** *(include the selected range here)* | | | |
| **Range** | **Network Address** | **Subnet Mask (Decimal)** | **CIDR Notation** |
| Public | 22.22.22.0 | 255.0.0.0 | /8 |
| Private | 192.168.2.0 | 255.255.255.128 | /25 |
| GRE Tunnel | 10.10.10.0 | 255.255.255.252 | /30 |

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| **VLSM Calculations** (*show your calculations here. Add space if required*) |
| * Original **Public** subnet mask: 255.0.0.0 = 1111 1111.0000 0000.0000 0000.0000 0000, which has a total of 8 network bits (/8) * Original subnet mask: 255.255.255.0 = 1111 1111.1111 1111.1111 1111.0000 0000, which has a total of 24 network bits (/24) * Original **GRE Tunnel** subnet mask: 255.255.255.252 = 1111 1111.1111 1111.1111 1111.1111 1100, which gives us sized subnets 4 (22) addresses for 1 host bit. This makes for a total of 30 network bits (/30). A /30 subnet mask in decimal notation is 255.255.255.252. * For the **Public** subnet, required only two hosts. Therefore, we need to add the subnet for the Customer Router to the Teleworker network, the network bits: 1111 1111.1111 1111.1111 1111.1111 1100, which gives us sized subnets 4 (22) addresses for 1 host bit. This makes for a total of 30 network bits (/30). A /30 subnet mask in decimal notation is 255.255.255.252. * For **Private** subnets, required host only 100 addresses. Therefore, we need to add network bits: 1111 1111.1111 1111.1111 1111.1000 0000 to the Teleworker network, which gives us sized subnets 128 (27) addresses for 1 host bit. This makes for a total of 25 network bits (/25). A /25 subnet mask in decimal notation is 255.255.255.128. * For this configuration, we only need one subnet for Private and one for Public. * Private Subnet   Subnet address 192.168.2.0 netmask 255.255.255.128, range of address 192.168.2.0– 192.168.2.127. Therefore, useable IPs 192.168.3.1– 192.168.3.126   * Public Subnet   Subnet address 22.22.22.0 netmask 255.255.255.252, range of address 22.22.22.0– 22.22.22.3. Therefore, useable IPs 22.22.22.1-22.22.22.2   * GRE Tunnel Subnet   Subnet address 10.10.10.0 netmask 255.255.255.252, range of address 10.10.10.0– 10.10.10.3. Therefore, useable IPs 10.10.10.1-10.10.10.2. |

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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)** | |
| Customer Router – Remote router link | 2 hosts | 22.22.22.0 | 255.255.255.252 | /30 |
| Teleworker network | 100 hosts | 192.168.2.0 | 255.255.255.128 | /25 |
| GRE Network | 2 hosts | 10.10.10.0 | 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) |
| **Customer Router - Remote router link** | | | |
| Customer router (CustRouter) | Interface to Remote router | 22.22.22.1/30 |  |
| Remote router (RemRouter) | Interface to Customer router | 22.22.22.2/30 |  |
| **Teleworker network** | | | |
| Remote router (RemRouter) | Interface to Teleworker network | 192.168.2.126/25 |  |
| Teleworker PC (TelePC) | Network interface | 192.168.2.1/25 | 192.168.2.126 |
| **GRE network** | | | |
| Remote router (RemRouter) | Tunnel GRE to AccesRouter | 10.10.10.1/30 |  |
| AccessRouter | Tunnel GRE to RemoteRouter | 10.10.10.2/30 |  |

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| **GRE tunnel configuration between Access Router and Remote Router** |
| Figure 13 Show Interface Tunnel7 of AccessRouter    Figure 14 Show Interface Tunnel7 of RemotRouter |

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| **Screenshot demonstrating that teleworker can access all of the servers throughout the network** |
| Figure 15 Tracert and Ping Test to SalesServer |