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| **Networking Infrastructure**  Diploma in CSF / IT  Apr 2020 Semester 3 | Week 6 |
| Session 1 |
| IP Subnetting | |

**OBJECTIVES**

After completing this session, you should have a better understanding of special IP addresses and the various aspects of IP subnetting.

**Activity 1: Special IP Addresses**

There are several IP addresses that are used for different purposes.

Explain whether the following IP addresses are valid or invalid host assignment [invalid meaning that the IP address cannot be assigned to a PC host]. Also identify whether the address is a private IP address or not. Assume that each address is using its default subnet mask. Explain your answers.

1. 225.1.1.1

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| It is not a valid address. 225.1.1.1 is a class D address which range from 224.0.0.0 – 239.255.255.255. Class D address is a private address reserved for multi-casting, cannot be assign to a PC. |

1. 241.1.1.1

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| It is not a valid address. 241.1.1.1 is a class E address which range from 240.0.0.0 – 255.255.255.254. Class E address is a private address reserved for experimental and research purpose, cannot be assign to a PC. |

(c) 255.255.255.255

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| It is not a valid address; it is a private address reserved for limited broadcast |

1. 161.1.255.255

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| It is not a valid address; this is a public broadcast address for class B subnet |

1. 165.1.1.1

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| This is a valid IP address; this is a public host address for class B subnet |

1. 127.0.0.1

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| Tis is not a valid IP address. This is a private address use for local loopback |

1. 192.168.1.1

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| This is a valid IP address; this is a private host address for class C subnet |

1. 0.0.0.0

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| It is not a valid address; it is a private address reserved, it is a non-routable meta-address used to designate an invalid, unknown or non-applicable target |

1. 201.1.1.0

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| It is not a valid address; this is a public network address for class C subnet |

**Activity 2: IP Subnetting**

1. Explain the purpose of subnet mask
2. Explain the reasons for subnetting

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| 1. **The purpose of subnet mask to is allow users and the network to identify which part of an IP address is reserved form the network and which part is available for user(host) to use.** 2. **The reason for subnetting is to help relieve network congestion. Without subnetting, when a broadcast packet is sent, every PC in the network will see the packet, if in a big network, this will slow down the whole network, and data sending will be affected.** |

**Activity 3: IP Subnetting Technique**

A class C address with network-id **198.20.30.0** is assigned to your organization. You are required to set up subnets for **4 departments (SALES, ENGINEERING, MARKETING and ADMIN departments)** with spares for a maximum of **3 more** new departments in the future. The number of staff in each department **will not exceed 10**.

1. Determine the number of lending bits (numbers of bits to borrow from host portion to be subnet bits);

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| Bit to lead: 3 |

1. State the new subnet mask; what is the purpose of subnet mask?

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| 255.255.255.224  **The purpose of subnet mask to is allow users and the network to identify which part of an IP address is reserved form the network and which part is available for user(host) to use.** |

1. Determine the first 4 usable subnets and their IP address ranges;

[Sales dept is assigned first useable subnet; Marketing is assigned second; Engineering dept is assigned third and Admin dept is assigned fourth useable subnet)

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| Subnet Range  198.20.30.0 198.20.30.1-198.20.30.30  198.20.30.32 198.20.30.33-198.20.30.62  198.20.30.64 198.20.30.65-198.20.30.94  198.20.30.96 198.20.30.97-198.20.30.126 |

1. What are the number of usable subnets and number of hosts per subnet if the subnet mask is 255.255.255.248 is used?

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| There will be 32 subnet and 6 host per subnet |

1. A PC in the network has an IP address of 198.20.30.70 with subnet mask of 255.255.255.240.

(i) How do you represent the IP address in prefix form?

(ii) Determine the subnet address that this address is in.

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| i) 198.20.30.70/28  ii) 198.20.30.64 |

(f) Sketch a network diagram to show the subnet implementation.

Provide an IP addressing scheme for the network. It should include the following:

* + Useable IP address range for PCs in each department;
  + IP addresses of the router’s interfaces;
  + Default gateway addresses for PCs.

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