**Networking 1B – IP Addressing Skills Packet**

**Part I.** IP Addressing Questions

1. How many octets in an IP address? How many bits in an IP address?
2. What is the biggest subnet mask you can possibly have? (slash notation)
3. What are the three types of IP addresses? What is characteristic of each at the binary level?
4. What is a private IP address? What IP addresses are considered private?
5. What is the purpose of a subnet mask?

**Part II**. Power of 2

List the powers of two which result in values from between 1 to 100,000. Start with 21. You’ll end with 216.

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| **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **210** | **211** | **212** | **213** | **214** | **215** | **216** |
| 2 | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Part IV.** How many IP addresses will you give to a subnet of this size?

115 hosts - 10,000 hosts - 747 hosts -

15 hosts - 67 hosts - 4 hosts -

135 hosts - 4,000 hosts - 470 hosts -

**Part V.** Draw the Line. For these subnet masks, draw the line separating network from host.

/21 \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_

/13 \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_

255.254.0.0 \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_

255.255.255.128 \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_ . \_ \_ \_ \_ \_ \_ \_ \_

**Part VI**. Convert these dotted decimal subnet masks to slash notation

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| --- | --- | --- |
| **Subnet Mask (Dotted)** | **SM (Binary)** | **SM (Slash Notation)** |
| 255.255.0.0 |  |  |
| 255.255.224.0 |  |  |
| 255.192.0.0 |  |  |
| 255.255.255.248 |  |  |
| 255.255.128.0 |  |  |
| 255.252.0.0 |  |  |
| 255.255.255.252 |  |  |
| 255.255.254.0 |  |  |
| 255.0.0.0 |  |  |
| 255.255.255.240 |  |  |

**Part VII**. Fill out this table to solve these problems. No VLSM table or calculator!

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| --- | --- | --- | --- | --- | --- | --- |
| **# Hosts** | **Power of 2** | **# of IP Addresses** | **# Host bits** | **# Net. Bits** | **SM (Slash)** | **SM(Dotted)** |
| 50 | 6 | 64 | 6 | 26 | /26 | 255.255.255.192 |
| 85 |  |  |  |  |  |  |
| 750 |  |  |  |  |  |  |
| 300 |  |  |  |  |  |  |
| 12 |  |  |  |  |  |  |
| 18 |  |  |  |  |  |  |
| 5000 |  |  |  |  |  |  |
| 1500 |  |  |  |  |  |  |
| 185,000 |  |  |  |  |  |  |
| 99,000 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |

**Part VIII.** You request a block of 1000 public IP addresses from your ISP. They respond with the following email:

*Your request for 1,000 public IP address is approved. Your range begins at 172.23.11.0 /23. Enjoy!*

List three problems with this IP Address arrangement based on needs and your IP knowledge.

1.

2.

3.

**Part IX.**

How many possible values (decimal) are there in any octet of a subnet mask? List them in decimal.

**Part X.**  Fill in the table give the IP address and subnet mask in the problem.

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| --- | --- | --- | --- | --- | --- |
| **IP Address** | **Subnet Mask** | **Increment** | **Octet** | **Network Address** | **Broadcast Address** |
| 201.100.11.48  | 255.255.255.240 |  |  |  |  |
| 144.37.161.255 | 255.255.248.0 |  |  |  |  |
| 77.0.64.0 | 255.192.0.0 |  |  |  |  |
| 205.7.5.160 | 255.255.255.224 |  |  |  |  |
| 165.54.218.0 | 255.255.252.0 |  |  |  |  |
| 64.222.0.0 | 255.254.0.0 |  |  |  |  |

**Part XI.** Identify Characteristics of these IP addresses

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| **IP Address** | **Subnet Mask** | **Increment** | **Octet** | **Class**  | **Type**  | **Private?** | **Slash Notation** |
| 156.99.211.255 | 255.255.224.0 | 32 | 3 | B | H | No | /19 |
| 88.192.0.0 | 255.240.0.0 |  |  |  |  |  |  |
| 220.31.29.133 | 255.255.255.252 |  |  |  |  |  |  |
| 165.99.31.255 | 255.255.252.0 |  |  |  |  |  |  |
| 10.1.127.255 | 255.255.128.0 |  |  |  |  |  |  |
| 192.168.249.160 | 255.255.255.248 |  |  |  |  |  |  |

**Part XII** – Putting it all together. Develop the most efficient IP scheme for these situations.

**Scenario # 1 – Class B** – 144.96.144.0 /20

**Subnet Sizes are: 503, 421, 161, 78, 39 and two WAN links**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Subnet Size** | **Network Address** | **First Usable** | **Last Usable** | **Broadcast** | **Subnet Mask** |
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**Scenario # 2** – Class C – 223.8.151.0 /24

**Subnet Sizes are: 12, 106, 3, 27, 18 and three WAN links**

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| --- | --- | --- | --- | --- | --- |
| **Subnet Size** | **Network Address** | **First Usable** | **Last Usable** | **Broadcast** | **Subnet Mask** |
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**Scenario # 3** – Class B – 161.132.64.0 /18

**Subnet Sizes are: 3195, 128, 664, 187, 29 and two WAN links**

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| --- | --- | --- | --- | --- | --- |
| **Subnet Size** | **Network Address** | **First Usable** | **Last Usable** | **Broadcast** | **Subnet Mask** |
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