Networking Refresher

Here are a few important commands and information that will be helpful in this guide:

To find out the IP address and interface information of a Linux machine, use the `ifconfig` command as shown below:

`inet` -> IPv4 address

`inet6` -> IPv6 address

`netmask` -> subnet mask

`ether` -> MAC address (can be verified using MAC address lookup on the internet)

TCP is a connection-oriented protocol
UDP is a connectionless protocol

Three-Way Handshake

i. SYN
ii. SYN ACK
iii. ACK

Tip: To open "Wireshark" with shell access, use "`wireshark&`".

Common Ports and Protocols

TCP

1. FTP - 21
2. SSH - 22
3. Telnet - 23
4. SMTP - 25
5. DNS - 53
6. HTTP - 80
7. HTTPS - 443
8. POP3 - 110

9. SMB - 139 + 445
10. IMAP - 143

UDP

1. DNS - 53
2. DHCP - 67, 68
3. TFTP - 69
4. SNMP - 161

The OSI Model

1. Physical - data cables
2. Data Link - Switching, MAC addresses
3. Network - IP addresses, Routing
4. Transport - TCP/UDP
5. Session - session management
6. Presentation - WMV, JPEG, MOV
7. Application - HTTP, SMTP

NOTE: When troubleshooting a network, start from the Physical Layer down to the Application Layer.

Subnetting

The Cyber Mentor's Subnetting Sheet								
	Subnet x.0.0.0							
CIDR	/1	/2	/3	/4	/5	/6	/7	/8
Hosts	2,147,483,648	1,073,741,824	536,870,912	268,435,456	134,217,728	67,108,864	33,554,432	16,777,216
Class A	Subnet 255.x.0.0							
CIDR	/9	/10	/11	/12	/13	/14	/15	/16
Hosts	8,388,608	4,194,304	2,097,152	1,048,576	524,288	262,144	131,072	65,536
Class B	Subnet 255.255.x.0							
CIDR	/17	/18	/19	/20	/21	/22	/23	/24
Hosts	32,768	16,384	8,192	4,096	2,048	1,024	512	256
Class C	Subnet 255.255.255.x							
CIDR	/25	/26	/27	/28	/29	/30	/31	/32
Hosts	128	64	32	16	8	4	2	1
Subnet Mask (Replace x)	128	192	224	240	248	252	254	255

Notes:	*Hosts double each increment of a CIDR *Always subtract 2 from host total: Network ID - First Address Broadcast - Last Address

Use ipaddressguide.com/cidr as a guide when calculating subnets.

Subnet Calculation Example

```
1. 192.168.0.0/22 -> Subnet: 255.255.252.0 -> Hosts: 1022 -> Network ID: 192.168.0.0 -
> Broadcast IP: 192.168.3.255
2. 192.168.1.0/26 -> Subnet: 255.255.255.192 -> Hosts: 62 -> Network ID: 192.168.1.0 -
> Broadcast IP: 192.168.1.63
3. 192.168.1.0/27 -> Subnet: 255.255.255.224 -> Hosts: 30 -> Network ID: 192.168.1.0 -
> Broadcast IP: 192.168.1.31
```
