Canterbury Institute of Management (CIM)

ASSESSMENT COVER SHEET

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Campus	Darwin Campus		
Course Title and Code	MBIS404 Networks and Communications		
Assessment Title	Assesment Task - *Week 7*		
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Course Lecturer/Tutor Name: Sharad Neupane		Assessment Word Count (if applicable): 445	

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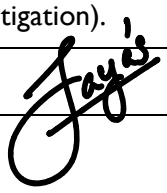
Signature:		Date:	17/11/24

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MBIS404 Networks and Communications

Assesment Task - *Week 7*

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What is a subnet?

Having a big chunky network is not a good architectural decision. More hosts means more traffic and bandwidth requirements, leading to network congestion and collision.

In addition to physical challenges mentioned above, certain cluttering all hosts in to one network has security penalty as well. Particularly man-in-middle attacks can easily be orchestrated if the compromised host has direct access to the whole network from single point.

Now, if the network is logically seperated to multiple sub-networks with hosts with similar interests grouped together it solves half of the challenges listed above. Hosts grouped based on their features such as all computers in a department of a company in to a single subnet increase network performance due to fewer hops to reach destination. And security can easily be increased by installing a software or hardware firewall between subnets.

> **Subnetting provides an elegantly simple way to reduce the total number of network numbers that are assigned. The idea is to take a single IP network number and allocate the IP addresses with that network number to several physical networks, which are now referred to as subnets.**
>
> (Peterson & Davie, 2003)

Subnetting Example

Create 25 Subnets for 192.168.1.5/24

- It must be first noted that number of subnets we can create are always a some power of 2. In this case we have to divide the network to 32 subnets, out of which 25 shall be assigned to 25 departments or groups of devices.

- /24 indicates that there are already 24 bits assigned to the network ID resulting, **192.168.1** to be the primary network ID and that leaves 8 bits remaining to create subnets and assign host IDs in each of these subnets.

- Now we have already identified that 32 subnets to be created in order to cater 25 actual requirement of subnets. That is $2^5 = 32$. Therefore, out of the remaining 8 bits we have to play around, 5 bits needs be

allocated to the network ID portion to create unique bit combinations to identify the 32 sub-networks.

- Each of these subnets will have remaining 3 bits available for creating and assigning unique host IDs. Technically using 3 binary bits 8 combinations can be created. That is $2^3 = 8$.
- But in all networks there are two host IDs reserved for gateway and broadcast namely the address with all host address bits as 0 and 1 respectively. That leaves us with only 6 usable host IP address in each of these subnets.
- In summary there will be 32 subnets, each of them can accommodate 6 hosts that gives $32 \times 6 = 192$ potential hosts.

Refer to the table below for host distribution across the subnets.

Subnet ID	Subnet Address	Broadcast Address	Host Address Range
1	192.168.1.0	192.168.1.7	192.168.1.1 - 192.168.1.6
2	192.168.1.8	192.168.1.15	192.168.1.9 - 192.168.1.14
3	192.168.1.16	192.168.1.23	192.168.1.17 - 192.168.1.22
4	192.168.1.24	192.168.1.31	192.168.1.25 - 192.168.1.30
5	192.168.1.32	192.168.1.39	192.168.1.33 - 192.168.1.38
6	192.168.1.40	192.168.1.47	192.168.1.41 - 192.168.1.46
7	192.168.1.48	192.168.1.55	192.168.1.49 - 192.168.1.54
8	192.168.1.56	192.168.1.63	192.168.1.57 - 192.168.1.62
9	192.168.1.64	192.168.1.71	192.168.1.65 - 192.168.1.70
10	192.168.1.72	192.168.1.79	192.168.1.73 - 192.168.1.78
11	192.168.1.80	192.168.1.87	192.168.1.81 - 192.168.1.86
12	192.168.1.88	192.168.1.95	192.168.1.89 - 192.168.1.94
13	192.168.1.96	192.168.1.103	192.168.1.97 - 192.168.1.102
14	192.168.1.104	192.168.1.111	192.168.1.105 - 192.168.1.110
15	192.168.1.112	192.168.1.119	192.168.1.113 - 192.168.1.118
16	192.168.1.120	192.168.1.127	192.168.1.121 - 192.168.1.126
17	192.168.1.128	192.168.1.135	192.168.1.129 - 192.168.1.134
18	192.168.1.136	192.168.1.143	192.168.1.137 - 192.168.1.142
19	192.168.1.144	192.168.1.151	192.168.1.145 - 192.168.1.150
20	192.168.1.152	192.168.1.159	192.168.1.153 - 192.168.1.158
21	192.168.1.160	192.168.1.167	192.168.1.161 - 192.168.1.166
22	192.168.1.168	192.168.1.175	192.168.1.169 - 192.168.1.174
23	192.168.1.176	192.168.1.183	192.168.1.177 - 192.168.1.182
24	192.168.1.184	192.168.1.191	192.168.1.185 - 192.168.1.190
25	192.168.1.192	192.168.1.199	192.168.1.193 - 192.168.1.198
26	192.168.1.200	192.168.1.207	192.168.1.201 - 192.168.1.206
27	192.168.1.208	192.168.1.215	192.168.1.209 - 192.168.1.214
28	192.168.1.216	192.168.1.223	192.168.1.217 - 192.168.1.222
29	192.168.1.224	192.168.1.231	192.168.1.225 - 192.168.1.230
30	192.168.1.232	192.168.1.239	192.168.1.233 - 192.168.1.238
31	192.168.1.240	192.168.1.247	192.168.1.241 - 192.168.1.246
32	192.168.1.248	192.168.1.255	192.168.1.249 - 192.168.1.254

Bibliography

Peterson, L., & Davie, B. (2003). *Computer Networks [Third Edition]]* [https://www.perlego.com/book/1875413(visited 2024-11-17)]. Morgan Kaufmann.