

Article from page 2 and 3.

Table 3

Subnet 0	
Network address	131.108.0.0
First host	131.108.0.1
Last host	131.108.0.254
Broadcast address	131.108.0.255
Subnet 1	
Network address	131.108.1.0
First host	131.108.1.1
Last host	131.108.1.254
Broadcast address	131.108.1.255
Subnet 3	
Network address	131.108.2.0
First host	131.108.2.1
Last host	131.108.2.254
Broadcast address	131.108.2.255
Subnet 254	
Network address	131.108.254.0
First host	131.108.254.1
Last host	131.108.254.254
Broadcast address	131.108.254.255
Subnet 255	
Network address	131.108.255.0
First host	131.108.255.1
Last host	131.108.255.254
Broadcast address	131.108.255.255

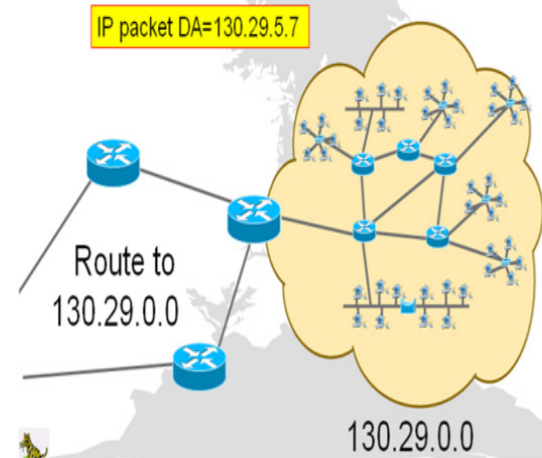


Figure 4

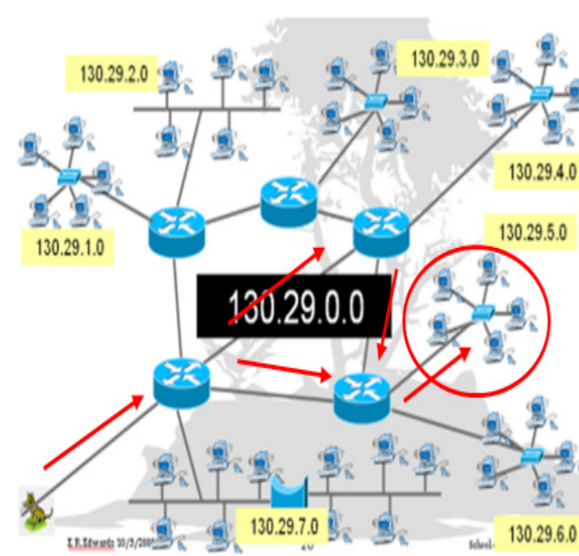


Figure 5

Written by :
Siti Sara Binti Rais

Do you know?

APNIC - Short for the Asia Pacific Network Information Centre, one of four non-profit organizations that register and administer IP addresses. APNIC serves the Asia Pacific region, which consists of 62 economies.

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GEMPAK SUPER FIZIK 2015

Pada 18 September 2015, Program Gempak Super Fizik 2015 telah diadakan bertujuan meningkatkan kualiti pencapaian bagi mata pelajaran PHY143 Fizik Kejuruteraan I. Seramai 120 pelajar telah terpilih dan terlibat dalam menjayakan dalam program ini. Program ini dikendalikan oleh pelajar-pelajar terpilih yang mengambil subjek PHY143 yang bertindak sebagai mentor dan dipantau oleh pensyarah yang mengajar PHY143. Seramai 15 mentor daripada kalangan pelajar cemerlang telah hadir bagi berkongsi kepakaran dengan rakan-rakan pelajar yang lain.



Program ini berlangsung selama 3 jam, iaitu daripada pukul 9.00 pagi hingga 12.00 tengahari di mana mentor berperanan dalam memberi tunjuk ajar kepada peserta dalam menyelesaikan masalah pembelajaran Fizik. Pembahagian kepada 15 kumpulan kecil dibuat bagi memudahkan proses pembelajaran dan perundingan berjalan dengan lancar.



Seramai 6 orang pensyarah bertugas memantau perjalanan program iaitu Pn. Nurul Huda Kamarulzaman, Pn. Rafiza Abdul Rahman, Pn. Nurul Nazuha Arrifin, En. Baktiar Musa, En. Fadhli Dzul Hikmi Mohd Fauzi dan En. Saiful Baktiar Hashim. Pengisian program tersebut adalah mengkhusus kepada menjawab soalan-soalan peperiksaan akhir semester terdahulu.

Perundingan dan pemantauan yang berterusan kepada pelajar terpilih ini mendapat respon positif daripada semua pelajar terlibat, dengan rata-rata mengatakan bahawa program sebegini membantu mereka untuk mengulangkaji pelajaran dengan lebih konsisten. Diharap dengan adanya program akademik ini dapat memberi lebih pendedahan kepada para pelajar tentang cara belajar yang betul.



Disediakan oleh: Pn. Nurul Huda Kamarulzaman, Pn. Rafiza Abdul Rahman, Pn. Nurul Nazuha Arrifin, En. Baktiar Musa, En. Fadhli Dzul Hikmi Mohd Fauzi dan En. Saiful Baktiar Hashim.

IPv4 Subnetting

IPv4 address consists of 32-bit binary numbers and it is represented in decimal number such as 192.168.15.100. Each octet contains 8-bit, hence maximum numbers for each octet is 255. It is important as a network engineer to identify classes of IP address. Table 1 and Table 2 show IP address classes and the details of IP classes correspondingly. As mentioned earlier in the article 'Introduction to IP Addressing', we already know that the address 192.168.15.100 is a private address. 'NAT' or Network Address Translation in a router will convert private addressing to the real addressing.

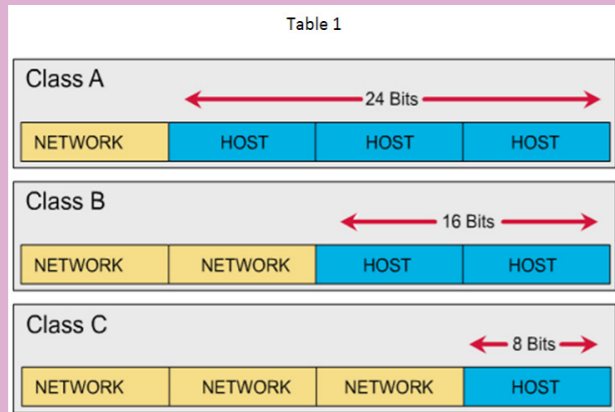


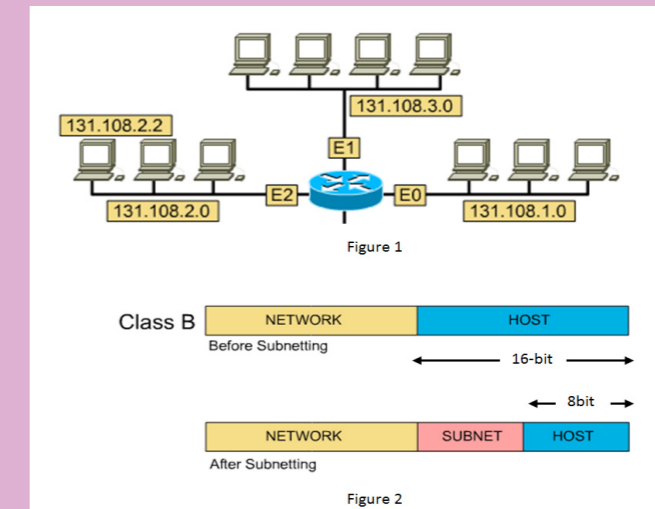
Table 2

Class	Starts with	Binary range	Decimal Value range	Maximum subnets	Maximum hosts	Routing mask
A	0	00000000-01111111	0-127*	127	16,777,214	255.0.0.0
B	10	10000000-10111111	128-191	16,384	65,534	255.255.0.0
C	110	11000000-11011111	192-223	2,097,152	254	255.255.255.0
D	1110	11100000-11101111	224-239			
E	1111	11110000-11111111	240-255			

* The 0 octet is forbidden in the RFC, and 127 is reserved for loopback testing.

From Table 1, we can identify that Class A contains the biggest amount of hosts compared to other classes. It means that Class A can support maximum 16,777,214 hosts. How do we get this number? The host portion for Class A is 24-bits. Thus, $2^{24} = 16,777,216$. However, we have to subtract two from it due to the value of broadcasting and network addresses. Then, we can get maximum hosts for Class B and C are $2^{16}-2$ and 2^8-2 correspondingly. Broadcasting address is an address which consists all ones in host portion, while network address is an address that consists all zeros in host portion. From Table 1 also, we can identify that Class C contains the biggest number of subnets compared to other classes. For Class A, we get the value of subnets with $2^{24-3}-1=127$, Class B $2^{16-2}=16,384$ and Class C $2^{24-3}=2,097,152$.

Figure 1 is an example of the network for Class B. As a network engineer, we know that 131.108 is the network portion and the rest are the hosts' portion. However, the host portion is used for subnetting to create more subnets within the network. 131.108.3.0, 131.108.2.0 and 131.108.1.0 are represented as network addresses for each LANs. We can assume that the first octet for host portion is used for subnetting. Default subnet mask for Class B is 255.255.0.0. For this network, it changes to 255.255.255.0 because of the first octet of host portion is used for subnetting. Figure 2 shows the Class B which is used for subnetting.



Subnetting is a technique where network administrator borrows bits from host portion to create subnetworks (subnets). Followings are the rules of borrowing bits from host portion:

- i) Class A address consists of 24 host bits: We can borrow between 2 to 22 bits for a subnet ID.
- ii) Class B address consists of 16 host bits: We can borrow between 2 to 14 bits for a subnet ID.
- iii) Class C address of 8 host bits: We can borrow between 2 to 6 bits for a subnet ID.

If we are given the IP address with subnet mask, we can get the Network Address by 'AND'ed both addresses. For instance, an IP address is 131.108.2.2 and the subnet mask is 255.255.255.0 (same example as before). Figure 3 is the solution to get the network address. Finally the network address is 131.108.2.0 and we can easily get the broadcast address that is 131.108.2.255. We can list the first host address until the last host as follows:

- First host : 131.108.2.1
- 2nd host: 131.108.2.2
- Last host: 131.108.2.254

For this network, we can list other subnets as shown in Table 3.

Let's take a look at this example shown in Figure 4. IP packet destination is 130.29.5.7. Because this address is of Class B, it routes to address 130.29.0.0. Within the 130.29.0.0 network, we route to 130.29.X.0 where X is the subnet. This is done by using a subnet mask which extends the range of bits representing the network. Only the router with network address of 130.29.5.0 will share the information with the adjacent routers so that the packet can be delivered to its destination as illustrated in Figure 5.

131.108.2.2	10000011	01101100	00000010	00000010
AND				
255.255.255.0	11111111	11111111	11111111	00000000
	10000011	01101100	00000010	00000000

Figure 3