CENTRE ESPECÍFIC
D´EDUCACIÓ A DISTÀNCIA DE
LA COMUNITAT VALENCIANA

UNIT 11.COMPUTER NETWORKS

Activities. Solutions

Computer Systems
CFGS DAW

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Licencia

Nomenclatura

A lo largo de este tema se utilizarán distintos símbolos para distinguir elementos importantes dentro del contenido. Estos símbolos son:

Actividad opcional. Normalmente hace referencia a un contenido que se ha comentado en la documentación por encima o que no se ha hecho, pero es interesante que le alumno investigue y practique. Son tipos de actividades que no entran para examen

Atención. Hace referencia a un tipo de actividad donde los alumnos suelen cometer equivocaciones.

UD11. COMPUTER NETWORKS
Activities. Solutions

1.1 Activity 1

Indicate if these IP are right or not

a) 1.1.1.1 → *Correct*

b) 2.2.2.200 → *Correct*

c) 200.260.0.3 → *Incorrect*. Second byte value greater than 255.

d) 4.4.4.4.4 → *Incorrect*. 5 bytes. There must be 4 bytes.

e) 5.0.0.300 → *Incorrect*. Fourth byte value greater than 255.

f) 256.244.244.4 → *Incorrect*. First byte value greater than 255.

g) 700.1000.100 → *Incorrect*. 3 bytes. There must be 4 bytes.

1.2 Activity 2

Indicate if these IP are masks or not. For IP that are mask, calculate the number of computers that we can connect to them.

a) 255.0.0.0 → *Mask*. 11111111.00000000.00000000.00000000

b) 255.255.0.1 → *Not* a mask. Bits must be changed to 1 from MSB to LSB. 11111111.11111111.00000000.0000000**1**

c) 255.255.128.0 → *Mask*. 11111111.11111111.10000000.00000000

d) 255.255.127.0→ *Not* a mask. Bits must be changed to 1 from MSB to LSB. 11111111.11111111.0**1111111**.00000000

e) 255.255.128.15 → *Not* a mask. Bits must be changed to 1 from MSB to LSB. 11111111.11111111.**1**0000000.0000**1111**

1.3 Activity 3

Given an IP and a mask, calculate network ID and broadcast address. If mask is not provided use default mask for IP class:

a) 18.120.16.250: Mask not provided

Class A. Default mask 255.0.0.0.

Network ID (and operation bit per bit with Mask and IP) → 18.0.0.0

Broadcast address → 18.255.255.255

b) 18.120.16.255 / 255.255.0.0:

Class A. Mask 255.255.0.0.

Network ID (and operation bit per bit with Mask and IP) → 18.120.0.0

Broadcast address → 18.120.127.255

8 bits borrowed from host default ID –> 256 subnets.

Subnet → 18.01111000.00000000.0000000 → 18.120.0.0

Next Subnet → 18.01111001.00000000.0000000 → 18.121.0.0

Therefore, the broadcast address of the network given is → 18.120.255.255

c) 155.4.220.39: Mask not provided

Class B. Default mask 255.255.0.0.

Network ID (and operation bit per bit with Mask and IP) → 155.4.0.0

Broadcast address→ 155.4.255.255

d) 194.209.14.33: Mask not provided

Class C. Default mask 255.255.255.0.

Network ID (and operation bit per bit with Mask and IP) → 194.209.14.0

Broadcast address → 194.209.14.255

e) 190.33.109.133 / 255.255.255.0:

Class B. Mask 255.255.255.0

Network ID (and operation bit per bit with Mask and IP) → 190.33.109.0

Broadcast address → 190.33.109.255

8 bits borrowed from host default ID –> 256 subnets.

Subnet → 190.33.01101101.0000000 → 190.33.109.0

Next Subnet → 190.33.01101110.0000000 → 190.33.110.0

Therefore, the broadcast address of the network given is → 190.33.109.255

1.4 Activity 4

We have a 255.255.0.0 mask and we want to create as much subnets as we can. Each subnet needs at leas 47 hosts.

How many subnets can we create?

For 47 host we need 6 bits → 2^6=64

255.255.00000000.00**000000**

There are 10 bits left that can be borrowed to create subnets → 2^{10}=1024 subnets.

1.5 Activity 5 (**solved**)

Our computer has IP 194.100.129.120. If there are 8 subnets, indicate:

a) IP class and default mask

IP class: C

Default mask: 255.255.255.0

b) Mask when net is divided in 8 subnets

To obtain 8 subnets, we have to add 3 bits (2^3=8) to the default mask.

11111111.11111111.11111111.11100000 = 255.255.255.224 = \27

c) Network ID and broadcast IP of each subnet

Network ID of each subnet:

11000010.01100100.10000001.00000000 = 194.100.129.0

11000010.01100100.10000001.00100000 = 194.100.129.32

11000010.01100100.10000001.01000000 = 194.100.129.64

11000010.01100100.10000001.01100000 = 194.100.129.96

11000010.01100100.10000001.10000000 = 194.100.129.128

11000010.01100100.10000001.10100000 = 194.100.129.160

11000010.01100100.10000001.11000000 = 194.100.129.192

11000010.01100100.10000001.11100000 = 194.100.129.224

Broadcast IP of each subnet:

11000010.01100100.10000001.00011111 = 194.100.129.31

11000010.01100100.10000001.00111111 = 194.100.129.63

11000010.01100100.10000001.01011111 = 194.100.129.95

11000010.01100100.10000001.01111111 = 194.100.129.127

11000010.01100100.10000001.10011111 = 194.100.129.159

11000010.01100100.10000001.10111111 = 194.100.129.191

11000010.01100100.10000001.11011111 = 194.100.129.223

11000010.01100100.10000001.11111111 = 194.100.129.255

d) Subnet that our IP belongs to

Our IP 11000010.01100100.10000001.01111000 = 194.100.129.120

Is in subnet11000010.01100100.10000001.01100000 = 194.100.129.96

e) Number of host available to each subnet

There are 5 bits for host. We cannot use Network ID IP and Broadcast IP.

The number of host available is 2^5 – 2 = 30

1.6 Activity 6

Our computer has IP 172.10.130.4. If there are 4 subnets, indicate:

a) IP class and default mask.

Class B

Default mask 255.255.0.0

b) Mask when net is divided in 4 subnets.

4 subnets → 2 bits borrowed.

*255.255.**11**00000.0000000 → 255.255.192.0*

c) Network ID and broadcast IP of each subnet.

Subnet 1 → 172.10.**00**000000.00000000 → 172.10.0.0 (Network ID) 172.10.63.255 (broadcast)

Subnet 2 → 172.10.**01**000000.00000000 → 172.10.64.0 (Network ID) 172.10.127.255 (broadcast)

Subnet 3 → 172.10.**10**000000.00000000 → 172.10.128.0 (Network ID) 172.10.191.255 (broadcast)

Subnet 4 → 172.10.**11**000000.00000000 → 172.10.192.0 (Network ID) 172.10.255.255 (broadcast)

d) Subnet that our IP belongs to.

172.10.130.4 AND 255.255.192.0

10101010.00001010.10000010.00000100

11111111.11111111.11000000.00000000

10101010.00001010.10000000.00000000 → **172.10.128.0**

e) Number of hostsavailable to each subnet.

2 bits borrowed from host ID → 14 bits left → 2^{14}=**16384** hosts (minus 2, Network and broadcast address) → **16382** usable hosts.

1.7 Activity 7

Our computer has IP 170.10.133.2. If there are 5 subnets, indicate:

a) IP class and default mask

Class B

Default mask 255.255.0.0

b) Mask when net is divided in 5 subnets

5 subnets → 3 bits borrowed.

*255.255.**111**0000.0000000 → 255.255.224.0*

c) Network ID and broadcast IP of each subnet

Subnet 1 → 172.10.**000**00000.00000000 → 172.10.0.0 (Network ID) 172.10.31.255 (broadcast)

Subnet 2 → 172.10.**001**00000.00000000 → 172.10.32.0 (Network ID) 172.10.63.255 (broadcast)

Subnet 3 → 172.10.**010**00000.00000000 → 172.10.64.0 (Network ID) 172.10.95.255 (broadcast)

Subnet 4 → 172.10.**011**00000.00000000 → 172.10.96.0 (Network ID) 172.10.127.255 (broadcast)

Subnet 5 → 172.10.**100**00000.00000000 → 172.10.128.0 (Network ID) 172.10.159.255 (broadcast)

Subnet 6 → 172.10.**101**00000.00000000 → 172.10.160.0 (Network ID)

d) Subnet that our IP belongs to

172.10.133.2 AND 255.255.224.0

10101010.00001010.10000101.00000100

11111111.11111111.11100000.00000000

10101010.00001010.10000000.00000000 → **172.10.128.0**

e) Number of host available to each subnet

3 bits borrowed from host ID → 13 bits left → 2^{13}=**8192** hosts (minus 2, Network and broadcast address) → **8190** usable hosts.