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Computer Networks Lab Assignment 1

Assignment 1: ip Address

**Question # 1 Part 1**

IP Address:

The IP address is a 32-bit number. It directly identifies the host (computer or another device, such as a printer or router or any end device suitable for communication) on the TCP / IP network. IP addresses are usually expressed in decimal, with four digits separated by periods, such as 192.168.1.1.

**For example,** the dotted internet address 192.168.1.1 is a 32-bit decimal number. This number can be difficult to make sense of, so divide it into four-digit binary digits.

These 8-bit segments are known as an octet. A typical Internet address, then, becomes 11000000.10101000.01111011.10000100. This number makes additional sense, so in most systems, convert a binary address to a dotted-decimal format (192.168.1.1). Decimal numbers are divided by the time octet is converted from binary to decimal text.

For the local TCP / IP (LAN) network to function effectively as a network, routers that transmit data packets between networks do not know the exact host location on which the data packet is sent. Routers only know which host and use the information stored in the router table to determine how they transfer the package to the local network. After the package is delivered to the local network, the package is delivered to the appropriate host.

For this process to work, the IP address has two parts. The first part of the IP address is used as the network address, the last part as the host address. If you take the example 192.168.1.1 and divide it into two categories, you get 192.168.1. Network .1 Host or 192.168.1.0 - network address. 0.0.0.1 - institutional address.

In short, 192.168.1.0 is reserved for the network’s IP, and 192.168.1.255 is reserved for the broadcasting IP. Range of a period like 192 starts from 0 to 255 from which usable are from 1 to 254 because of the network’s IP and broadcasting’s IP

Diagram, text

Description automatically generated with medium confidence

Classes of IP Address:

Internet addresses are provided by **InterNIC**, an internet hosting company. These IP addresses are classified as A, B, C, D, and E. Classes D and E exist but are not commonly used by users. Each address category has a different default subnet mask. You can identify the class of IP address by looking at its first octet.

The following is the range of online addresses in Classes A, B, and C, each with a sample address:

1. Class A networks use the default subnet mask 255.0.0.0 and have 0-127 as their first octet. Address 10.52.36.11 class address A. Its first octet is 10, which is between 1 and 126, combined. Class A is for networks with more than 65,536 hosts.
2. Class B networks use the default subnet mask 255.255.0.0 and have 128-191 as their first octet. Address 172.16.52.63 address of class B. Its first octet is 172, between 128 and 191, combined. Class B is for networks with 256 to 65,534 hosts.
3. Class C networks use the default subnet mask 255.255.255.0 and have 192-223 as their first octet. Address 192.168.123.132 address of class C. Its first octet is 192, between 192 and 223, combined. Class C is for smaller networks with fewer than 254 hosts.
4. Class D networks are reserved for multicasting.
5. Class E networks are not used on the internet because they are reserved for research by the Internet Engineering Task Force IETF.

Table

Description automatically generated

Source: <https://webeasyinfo.com/classes-in-ip-address-ipv4-classes/>

Subnet Masks of IP Address:

TCP / IP requires a subnet mask to work. It is used by the TCP / IP protocol to determine whether the host is on a local subnet or remote-control network (used for telnet).

In TCP / IP, the components of an IP address used as network and hosted addresses are not configured. Unless you have additional information, the network and host addresses above cannot be specified. This information is provided in another 32-bit number called subnet mask. The subnet mask is 255.255.255.0 in this example. It is not clear what this number means unless you know 255 in binary notation equals 11111111. Therefore, the subnet mask says 11111111.11111111.11111111.00000000. This 32-bit number is then masked on the IP address to make it functional.

By combining the IP address and subnet mask, network, and address parts can be separated:

11000000.10101000.01111011.10000100 - IP address (192.168.1.1)

11111111.11111111.11111111.00000000 - Subnet mask (255.255.255.0)

The first 24 bits are considered a network address. The last 8 bits are identified as the host address. It gives you the following addresses:

11000000.10101000.01111011.00000000 - Network address (192.168.123.0)

00000000.00000000.00000000.10000100 - Hosting address (000000.000.132)

Now you know, in this example you are using the subnet mask 255.255.255.0, that the network ID is 192.168.123.0, and the host address is 0.0.0.132. If the package reaches a subnet of 192.168.123.0 (from a local subnet or remote network) and has a destination address of 192.168.123.132, your computer will find it on the network and process it.

Graphical user interface

Description automatically generated with low confidence

Gateways of IP Address:

If a TCP / IP computer needs to communicate with the host on another network like you want to communicate with another system user, it will usually communicate through a device called a router. In terms of TCP / IP, the router specified in the host, which connects the host subnet to other networks, is called the default gateway.

If the host attempts to communicate with another device using TCP / IP, perform a comparison process that uses the specified subnet mask with the destination IP against the sub-mask and its IP address. The result of this comparison tells the computer that the destination is the local host or remote facility.

The default gateway is used as the destination of all traffic that is not on the same subnet. The gateway is a layer 3 device such as a router or multi-layer switch that is used to route traffic. The end device needs to know whether the data is on the same subnet or not. If it's not, the source device delivers traffic to the end device through the default gateway.

The default gateway always resides in the same subnet as the end device IP. The gateway can be any unique address within the subnet itself, but most network administrators assign the first number of the subnet as the gateway. Therefore, 192.168.99.1 would be the default gateway of our source device given the fact that we have a 255.255.255.0 subnet mask.

If the result of this process determines the destination to be the localhost, the computer will send the package to the local subnet. If the comparison result determines the destination to be the remote host, the computer will transfer the package to the default gate defined in its TCP / IP features. It then becomes the responsibility of the router to transfer the package to the appropriate subnet.

A picture containing text

Description automatically generated

This picture shows the IP address along with its subnet mask and Default gateway. If the subnet changes or is on another device, then the IP address uses the default gateway for communication. As its name represents, it is only a default way to perform communication among different devices if the data is not present on the same subnet mask as provided by the system.

**Question # 1 Part 2**

**Write down 10 different examples of valid IP addresses for each class A, B, C**

**For Class A:**

|  |  |
| --- | --- |
| **IP ADDRESS** | **SUBNET MASK** |
| **1.2.3.4** | **255.0.0.0** |
| **10.10.10.10** | **255.0.0.0** |
| **25.147.191.14** | **255.0.0.0** |
| **95.86.75.4** | **255.0.0.0** |
| **126.0.0.1** | **255.0.0.0** |
| **35.137.191.14** | **255.0.0.0** |
| **20.86.25.4** | **255.0.0.0** |
| **123.0.10.1** | **255.0.0.0** |
| **111.12.13.14** | **255.0.0.0** |
| **5.6.7.8** | **255.0.0.0** |

**For Class B:**

|  |  |
| --- | --- |
| **IP ADDRESS** | **SUBNET MASK** |
| **129.12.36.42** | **255.255.0.0** |
| **168.172.1.1** | **255.255.0.0** |
| **175.66.43.12** | **255.255.0.0** |
| **145.186.175.234** | **255.255.0.0** |
| **190.60.152.25** | **255.255.0.0** |
| **130.24.112.25** | **255.255.0.0** |
| **191.136.115.224** | **255.255.0.0** |
| **158.172.1.111** | **255.255.0.0** |
| **172.123.33.11** | **255.255.0.0** |
| **189.91.90.10** | **255.255.0.0** |

**For Class C:**

|  |  |
| --- | --- |
| **IP ADDRESS** | **SUBNET MASK** |
| **192.168.1.1** | **255.255.255.0** |
| **210.20.30.40** | **255.255.255.0** |
| **216.123.145.16** | **255.255.255.0** |
| **220.86.76.43** | **255.255.255.0** |
| **220.60.80.100** | **255.255.255.0** |
| **210.35.11.10** | **255.255.255.0** |
| **222.22.22.22** | **255.255.255.0** |
| **197.67.54.34** | **255.255.255.0** |
| **194.99.87.54** | **255.255.255.0** |
| **202.10.101.10** | **255.255.255.0** |

To differentiate between different classes, following ranges help to us define the limits for 1st octet:

* **Class A: the range is between 0 to126**
* **Class B: the range is between 128 to191**
* **Class C: the range is between 192-223**