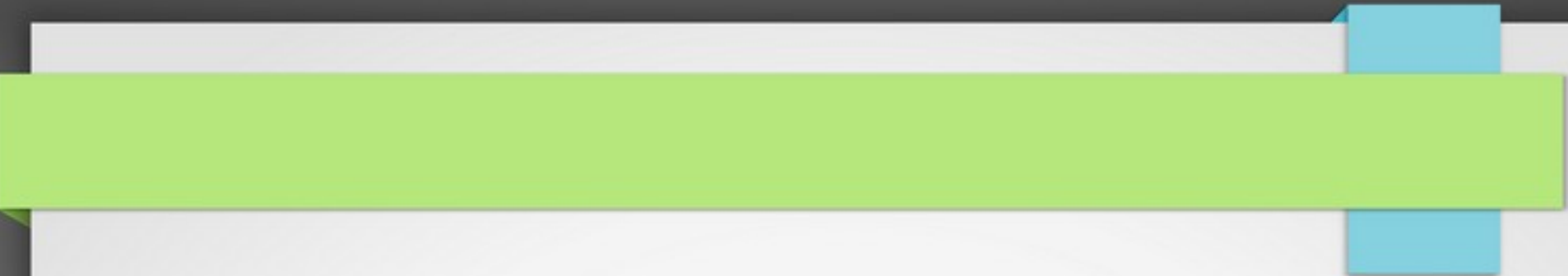


IP address

What is an IP Address?

- An IP (Internet Protocol) address is a numerical label assigned to the devices connected to a computer network that uses the IP for communication.
- IP address act as an identifier for a specific machine on a particular network. It also helps you to develop a virtual connection between a destination and a source.
- IP address is an address having information about how to reach a specific host, especially outside the LAN.
- An IP address is a 32 bit unique address.

- 
- IP addresses were divided into five different categories called classes.
 - These divided IP classes are class A, class B, class C, class D, and class E.
 - classes A, B, and C are most important. Each address class defines a different number of bits for its network prefix (network address) and host number (host address).

Offsets	0	8	16	24
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Class A	0 Network	Host
---------	-----------	------

Address 0.0.0.0 to 127.255.255.255

Class B	10 Network	Host
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Address 128.0.0.0 to 191.255.255.255

Class C	110 Network	Host
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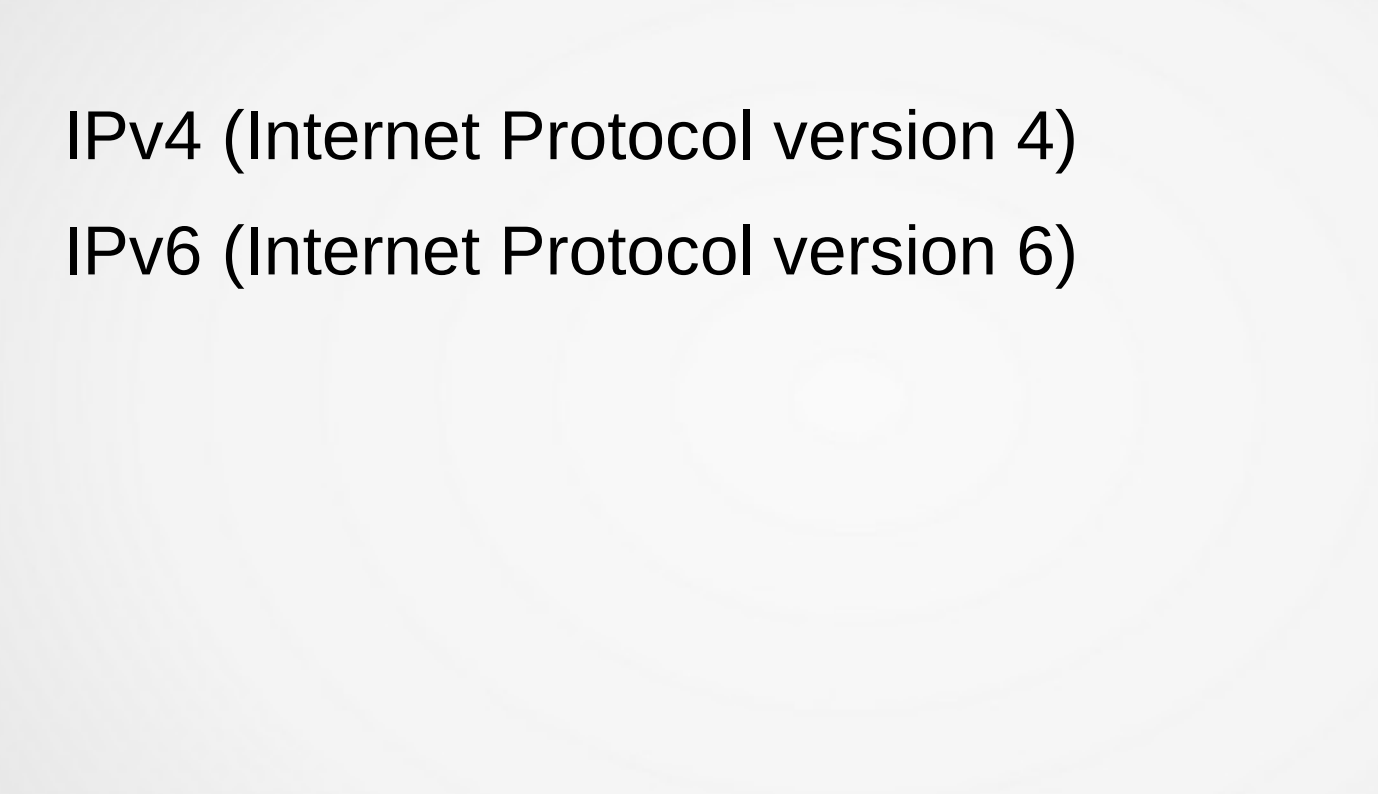



Address 192.0.0.0 to 223.255.255

Class D	1110 Multicast address
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Address 224.0.0.0 to 239.255.255.255

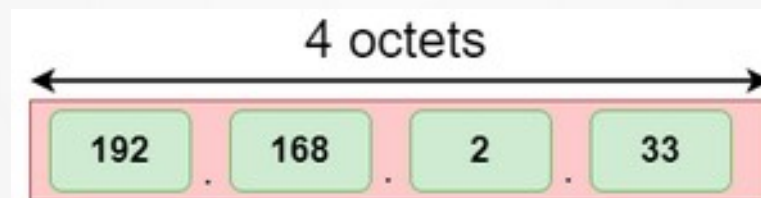
Class E	11110 Reserved for future use
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Address 240.0.0.0. to 255.255.255.255

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- 
- IPv4 (Internet Protocol version 4)
 - IPv6 (Internet Protocol version 6)

What is IPv4?

- IPv4 is version 4 of IP. It is a current version and the most commonly used IP address. It is a 32-bit address written in four numbers separated by a dot (.), i.e., periods. This address is unique for each device



What is IPv6?

- IPv4 produces 4 billion addresses, and the developers think that these addresses are enough, but they were wrong.
- IPv6 is the next generation of IP addresses.
- The main difference between IPv4 and IPv6 is the address size of IP addresses.
- The IPv4 is a 32-bit address, whereas IPv6 is a 128-bit hexadecimal address.
- IPv6 provides a large address space, and it contains a simple header as compared to IPv4.



Introduction to CIDR

- **CIDR (Classless Inter-Domain Routing or supernetting)** is a method of assigning IP addresses that improves the efficiency of address distribution and replaces the previous system based on Class A, Class B and Class C networks.
- CIDR IP addresses consist of two groups of numbers, which are also referred to as groups of bits.
- The most important of these groups is the network address, and it is used to identify a network or a sub-network (subnet).
- In contrast to classful routing, which categorizes addresses into one of three blocks, CIDR allows for blocks of IP addresses to be allocated to internet service providers.

Domain Name System

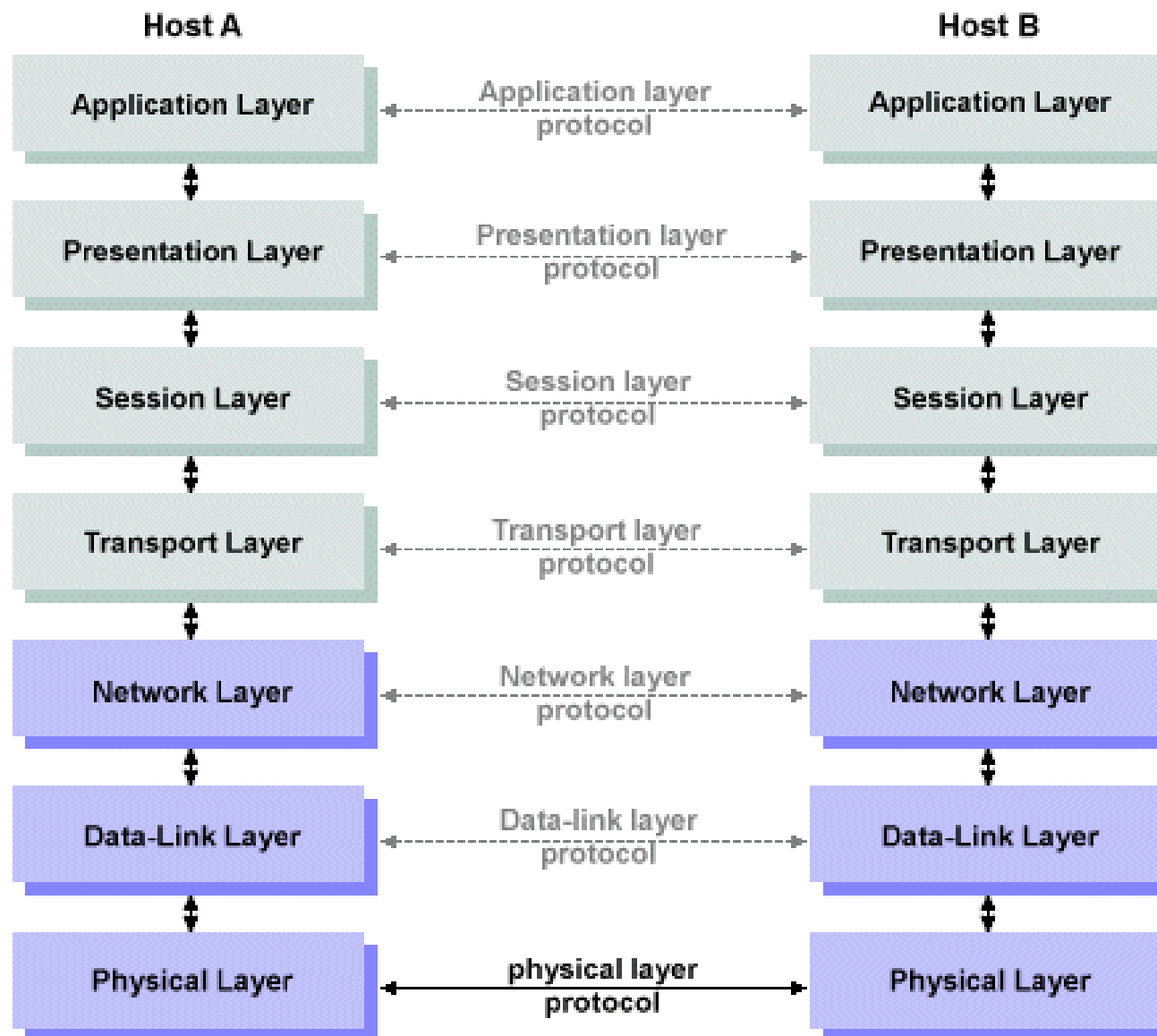
- The Domain Name System (DNS) is a hierarchical and distributed naming system for computers, services, and other resources in the Internet or other Internet Protocol (IP) networks.
- It associates various information with domain names assigned to each of the associated entities.
- DNS is a core internet technology that translates human-friendly domain names into machine-usable IP addresses.

Example : 128.66.111.102 – Exam Moodle

- The DNS operates as a distributed database, where different types of DNS servers are responsible for different parts of the DNS name space.

OSI Model

- The OSI Model (Open Systems Interconnection Model) is a conceptual framework used to describe the functions of a networking system.
- OSI model has seven layers and each layer performs a particular network function.
- The layers may be listed in a top-to-bottom or bottom to top order.
- OSI stands for Open System Interconnection is a reference model that describes how information from a software application in one computer moves through a physical medium to the software application in another computer.
- OSI model was developed by the International Organization for Standardization (ISO) in 1984, and it is now considered as an architectural model for the inter-computer communications.



1) Physical Layer :

- **Bit synchronization:** The physical layer provides the synchronization of the bits by providing a clock. This clock controls both sender and receiver thus providing synchronization at bit level.
- **Bit rate control:** The Physical layer also defines the transmission rate i.e. the number of bits sent per second.

2) Data Link Layer

- **Framing:** Framing is a function of the data link layer. It provides a way for a sender to transmit a set of bits that are meaningful to the receiver. This can be accomplished by attaching special bit patterns to the beginning and end of the frame.
- **Error control:** Data link layer provides the mechanism of error control in which it detects and retransmits damaged or lost frames.
- **Flow Control:** The data rate must be constant on both sides else the data may get corrupted thus, flow control coordinates the amount of data that can be sent before receiving acknowledgement.
- **Access control:** When a single communication channel is shared by multiple devices, the MAC sub-layer of the data link layer helps to determine which device has control over the channel at a given time.

3) Network Layer

- **Routing:** The network layer protocols determine which route is suitable from source to destination. This function of the network layer is known as routing.
- **Logical Addressing:** In order to identify each device on internetwork uniquely, the network layer defines an addressing scheme. The sender & receiver's IP addresses are placed in the header by the network layer.

4) Transport Layer

Segmentation : This layer accepts the message from the (session) layer, and breaks the message into smaller units. The transport layer at the destination station reassembles the message.

- **Service Point Addressing :** In order to deliver the message to the correct process, the transport layer header includes a type of address called service point address or port address



5) Session Layer

- Session establishment, maintenance, and termination: The layer allows the two processes to establish, use and terminate a connection.
- **Synchronization:** This layer allows a process to add checkpoints which are considered synchronization points into the data.
- These synchronization points help to identify the error so that the data is re-synchronized properly, and ends of the messages are not cut prematurely and data loss is avoided.

6) Presentation Layer

- **Encryption/ Decryption:** Data encryption translates the data into another form or code. The encrypted data is known as the
- **Compression:** Reduces the number of bits that need to be transmitted on the network.

7) Application Layer

- Application Layer is also called Desktop Layer.
- These applications produce the data, which has to be transferred over the network. This layer also serves as a window for the application services to access the network and for displaying the received information to the user.
- Example: Application – Browsers, Skype Messenger, etc.