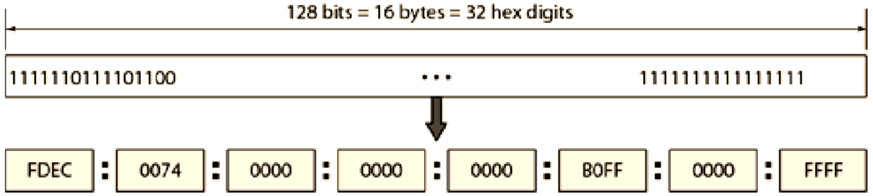
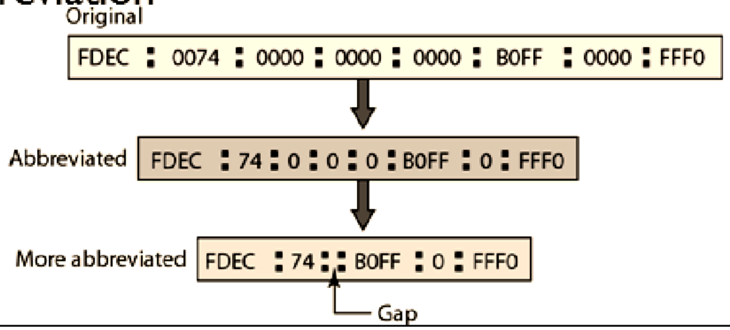
IP6

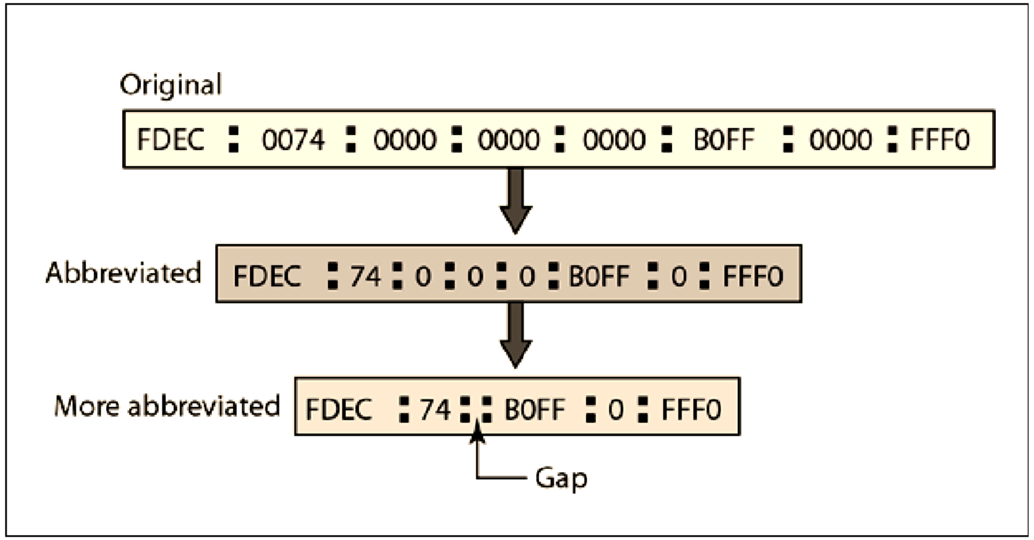
IPv6 Address

- An IPv6 address is 128 bits long (16-byte).
- Hexadecimal Colon Notation



- Abbreviation




Original
FDEC : 0074 : 0000 : 0000 : 0000 : B0FF : 0000 : FFF0
Abbreviated
FDEC : 74 : 0 : 0 : 0 : B0FF : 0 : FFF0
More abbreviated
FDEC : 74 :: B0FF : 0 : FFF0
Gap

Example:

Expand the address 0:15::1:12:1213 to its original.

Solution

We first need to align the left side of the double colon to the left of the original pattern and the right side of the double colon to the right of the original pattern to find how many 0s we need to replace the double colon.

```
xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
   0:  15:              :   1:  12:1213
```

This means that the original address is.

```
0000:0015:0000:0000:0000:0001:0012:1213
```

Type prefixes for IPv6 addresses

Type Prefix	*Type*	*Fraction*
0000 0000	Reserved	1/256
0000 0001	Unassigned	1/256
0000 001	ISO network addresses	1/128
0000 010	IPX (Novell) network addresses	1/128
0000 011	Unassigned	1/128
0000 1	Unassigned	1/32
0001	Reserved	1/16
001	Reserved	1/8
010	**Provider-based unicast addresses**	**1/8**

Type prefixes for IPv6 addresses

Type Prefix	*Type*	*Fraction*
011	Unassigned	1/8
100	Geographic-based unicast addresses	1/8
101	Unassigned	1/8
110	Unassigned	1/8
1110	Unassigned	1/16
1111 0	Unassigned	1/32
1111 10	Unassigned	1/64
1111 110	Unassigned	1/128
1111 1110 0	Unassigned	1/512
1111 1110 10	Link local addresses	1/1024
1111 1110 11	Site local addresses	1/1024
1111 1111	Multicast addresses	1/256

FDDI Protocol

1. FDDI, or Fiber Distributed Data Interface, is a set of protocols used for high-speed data transmission over optical fiber networks.

2. FDDI utilizes a dual-ring topology, with a primary ring for normal data transmission and a secondary ring for backup in case of failures.

3. The MAC layer in FDDI controls network access and employs a token-passing mechanism for data transmission.

4. FDDI operates at a data rate of 100 Mbps, providing fast and reliable communication.

5. FDDI frames consist of headers, data payloads, and trailers, ensuring proper organization and error detection.

6. FDDI's fault tolerance and station management protocols enhance network reliability and ensure smooth operation.

X25

1. X.25 is a packet-switched protocol suite developed by the ITU in the 1970s and 1980s for wide area networks (WANs).

2. It provided reliable and efficient data communication over analog and digital networks, although it has been largely replaced by TCP/IP.

3. X.25 consists of physical, data link, and network layers that handle various aspects of data transmission and routing.

4. The data link layer uses LAPB (Link Access Procedure, Balanced) for error detection, flow control, and establishing logical connections.

5. The network layer utilizes the X.25 Packet Level Protocol (PLP) for encapsulating data into packets and routing them across the network.

6. X.25 employs virtual circuit switching, establishing logical connections between nodes for the duration of a session.

7. Packet format in X.25 includes fields for address, control, information, and error checking, providing necessary information for data transmission.

8. Error control mechanisms like CRC (cyclic redundancy check) are used to detect and recover from errors in X.25.

9. Flow control is managed through sliding window techniques, allowing for efficient data transmission rates.

10. While X.25 is less prevalent today, it laid the foundation for concepts like virtual circuits and error control mechanisms that are still used in modern networking protocols.

ATM

ATM (Asynchronous Transfer Mode) is a protocol used for high-speed data transmission over networks. It was developed in the late 1980s and early 1990s as a way to handle both voice and data traffic efficiently. ATM is based on the concept of asynchronous time-division multiplexing, where data is divided into fixed-size cells and transmitted asynchronously.

The key components of ATM protocols are as follows:

1. Virtual Circuits: ATM uses virtual circuits to establish logical connections between network nodes. These virtual circuits provide a dedicated path for data transmission and support both permanent and switched connections.

2. Cell Format: ATM data is organized into fixed-size cells, each consisting of a 5-byte header and a 48-byte payload. The header contains information such as the virtual circuit identifier, source, and destination addresses, and control bits.

3. Quality of Service (QoS): ATM includes provisions for managing different levels of service quality. QoS parameters such as cell loss, cell delay, and cell delay variation can be specified to meet the requirements of different applications.

4. Connection-Oriented Protocol: ATM is connection-oriented, which means that a virtual circuit is established before data transmission begins. This allows for efficient handling of data streams with predictable bandwidth requirements.

5. Cell Switching: ATM networks use cell switching, where each cell is individually switched and routed based on the virtual circuit identifier in its header. This enables fast and efficient switching of data across the network.

6. Adaptation Layer: The ATM Adaptation Layer (AAL) is responsible for adapting different types of traffic, such as voice, video, and data, to the ATM cell format. It provides the necessary protocols for segmentation, reassembly, and error control.

7. ATM Signaling: ATM signaling protocols are used for establishing, modifying, and releasing virtual circuits. These protocols provide the necessary control and management functions for efficient network operation.

ATM was widely deployed for high-speed networking in the 1990s, particularly in telecommunications networks. However, with the rise of Ethernet and IP-based technologies, ATM has become less prevalent in recent years. Nonetheless, many of its concepts, such as virtual circuits and QoS, have influenced the development of modern networking protocols.