# UNIT 3

Ques1: What are the functions of a multiservice network?

Following are the functions of a multiservice network:

• Implementation of several services in the unified transportation network, for example, transmission of real time voice over a multiservice network allows a company to reduce expenses on long-distance calls.

• Network reliability growth and reduction of network downtime due to building a multiservice network based on the fault-tolerant architecture solutions which have proven their worth in actual practice.

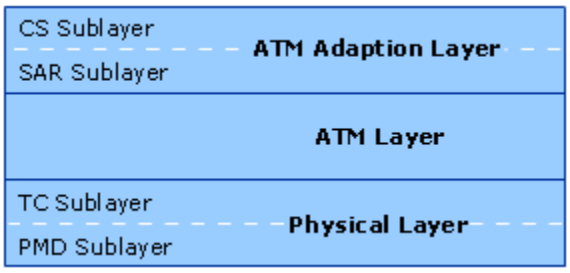
• Increase in labour productivity owing to implementation of new management tools of work organization based on the advanced network applications.

• Increase in competitiveness due to the availability of new high-demand services.

• Reduction in costs of information infrastructure support by means of implementation of a single infrastructure control system, SLA, outsourcing of network support, etc.

Ques 2: What do you understand by ATM ?
Asynchronous transfer mode (ATM) is a switching technique used by telecommunication networks that uses asynchronous time-division multiplexing to encode data into small, fixed-sized cells. This is different from Ethernet or Internet, which use variable packet sizes for data or frames. ATM is the core protocol used over the synchronous optical network (SONET) backbone of the integrated digital services network (ISDN).

Ques 3: Explain in detail different layers of ATM.




PHYSICAL LAYER

The physical layer provides for the transmission and reception of ATM cells across a physical medium between two ATM devices. This can be a transmission between an ATM endpoint and

an ATM switch, or it can be between two ATM switches. The physical layer is subdivided into a Physical Medium Dependent sublayer and Transmission Convergence sublayer.

PMD Sublayer

The Physical Medium Dependent (PMD) sublayer is responsible for the transmission and reception of individual bits on a physical medium. These responsibilities encompass bit timing, signal encoding, interacting with the physical medium, and the cable or wire itself.

ATM does not rely on any specific bit rate, encoding scheme or medium and various specifications for ATM exist for coaxial cable, shielded and unshielded twisted pair wire, and optical fiber at speeds ranging from 64 kilobits per second to 9.6 gigabits per second. In addition, the ATM physical medium can extend up to 60 kilometers or more by using single-mode fiber and long-reach lasers. Thus it can readily support wide-range connectivity, including a private metropolitan area network. The independence of ATM from a particular set of hardware constraints has allowed it to be implemented over radio and satellite links.

TRANSMISSION CONVERGENCE Sublayer

The Transmission Convergence (TC) sublayer functions as a converter between the bit stream of ATM cells and the PMD sublayer. When transmitting, the TC sublayer maps ATM cells onto the format of the PDM sublayer, such as the DS-3 interface or Synchronous Optical Network (SONET) frames. Because a continuous stream of bytes is required, unused portions of the ATM cell stream are filled by idle cells. These idle cells are identified in the ATM header and are silently discarded by the receiver. They are never passed to the ATM layer for processing.

The TC sublayer also generates and verifies the Header Error Control (HEC) field for each cell. On the transmitting side, it calculates the HEC and places it in the header. On the receiving side, the TC sublayer checks the HEC for verification. If a single bit error can be corrected, the bit is corrected, and the results are passed to the ATM layer. If the error cannot be corrected (as in the case of a multibit error) the cell is silently discarded.

ATM Layer

The ATM layer provides cell multiplexing, demultiplexing, and VPI/VCI routing functions. The ATM layer also supervises the cell flow to ensure that all connections remain within their negotiated cell throughput limits. If connections operate outside their negotiated parameters, the ATM layer can take corrective action so the misbehaving connections do not affect connections that are obeying their negotiated connection contract. The ATM layer also maintains the cell sequence from any source.

The ATM layer multiplexes and demultiplexes and routes ATM cells, and ensures their sequence from end to end. However, if a cell is dropped by a switch due to congestion or corruption, it is not the responsibility of the ATM layer to correct the dropped cell by means of retransmission or to notify other layers of the dropped cell. Layers above the ATM layer must detect the lost cell and decide whether to correct it or disregard it.

ATM Layer Multiplexing and Demultiplexing

ATM layer multiplexing blends all the different input types so that the connection parameters of each input are preserved. This process is known as traffic shaping.

ATM layer demultiplexing takes each cell from the ATM cell stream and, based on the VPI/VCI, either routes it (for an ATM switch) or passes the cell to the ATM Adaptation Layer (AAL) process that corresponds to the cell (for an ATM endpoint).

ATM Adaptation Layer

The ATM Adaptation Layer (AAL) creates and receives 48-byte payloads through the lower layers of ATM on behalf of different types of applications. Although there are five different types of AALs, each providing a distinct class of service, Windows Server 2003 supports only AAL5. ATM Adaptation is necessary to link the cell-based technology at the ATM Layer to the bit-stream technology of digital devices (such as telephones and video cameras) and the packet-stream technology of modern data networks (such as frame relay, X.25 or LAN protocols such as TCP/IP or Ethernet).

Ques 4: What are the advantages of ATM over DSL service?

ATM over the DSL service preserves the high-speed characteristics and QoS guarantees, which are available in the core. These guarantees create the potential for an end-to-end ATM network to the residence or small office. This network model provides several advantages, including:

- Protocol transparency
- Support for multiple classes of QoS with service guarantees
- Bandwidth scalability
- An evolution path to newer DSL technologies

Ques 5: What are the drawbacks of traditional IP routing?

The following three drawbacks of traditional IP routing are:

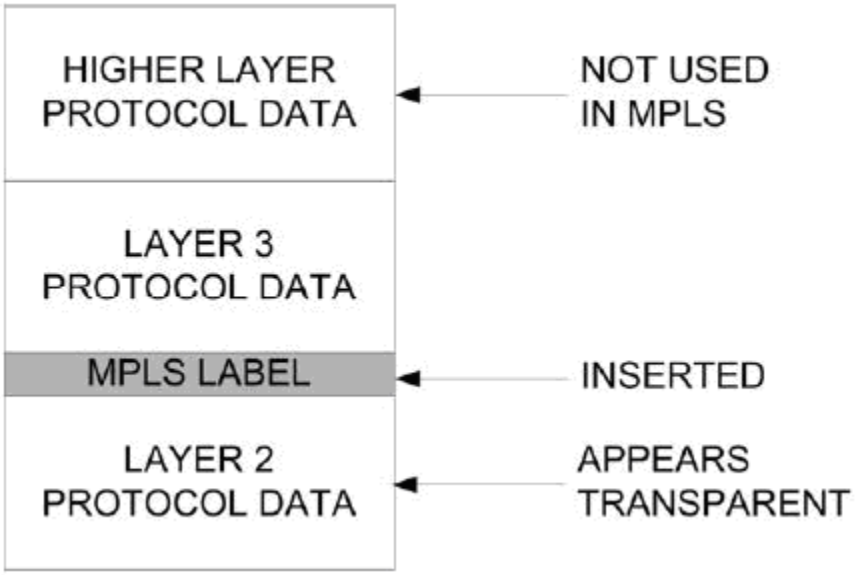
- Routing protocols are used on all devices to distribute routing information.
- Regardless of the routing protocol, routers always forward packets based on the destination address only. The only exception is policy-based routing (PBR), which bypasses the destination-based routing lookup.
- Routing lookups process is performed on each router which means that how a router will find the exit interface for an IP network. Each router in the network makes an independent decision when forwarding packets. MPLS helps reduce the number of routing lookups and can change the forwarding criteria. This capability eliminates the need to run a particular routing protocol on all the devices.

Ques 6: What is MPLS?

MPLS is Multiprotocol Label Switching. It is a networking technology that uses labels which are attached to packets to forward them through the network. MPLS is standard from IETF for including routing information in the packets of an IP networks. MPLS is used to ensure that all packets in particular flow take the same route over a backbone. MPLS can deliver the quality of service (QOS) required to support real time voice and video as well as service level agreements (SLAs) that guarantees bandwidth. In computer networking and telecommunications is data carrying mechanism related to packet switched networks. MPLS operates between that OSI layer 2 and the layer 3, so it can be considered as layer 2.5 protocol. It can be used to carry many different types of traffics including IP packets, ATM, SONET and ETHERNET frames.

Ques 7: How MPLS increases the efficiency of the system?

Multiprotocol Label Switching (MPLS) is a protocol framework used to prioritize Internet traffic and improve bandwidth utilization. Those functions are accomplished by inserting a label between OSI layer 2 and OSI layer 3 in a packet and forwarding the packet based on the label contents alone as in ATM networks. Performance and efficiency are increased by this approach because less time is required to process a label than to process routing information like source and destination IP addresses. Errors are also detected more quickly they can only occur with a single label than with potentially several data types in different protocols. Figure describes a packet that has been modified for MPLS. Protocol data which is above layer 3 is unused in MPLS while layer 2 data appears transparent. Since the Internet is a collection of numerous networks using various communications technologies MPLS can be used without any changes to those existing mechanisms.



Ques 8: What are the benefits of MPLS?

Benefits of MPLS*:*

Multiprotocol Label Switching (MPLS) is a versatile solution to address the problems faced by present day networks. Some of the benefits are given below.

- Speed
- Scalability
- QOS (Quality of Service) management
- Traffic Engineering

MPLS has emerged as an elegant solution to meet the bandwidth-management and service requirements for next generation Internet Protocol (IP) based backbone networks. MPLS addresses issues related to scalability and routing (based on QoS and service quality metrics and can exist over existing Asynchronous Transfer mode (ATM) and Frame Relay networks.

Ques 9: What do you mean by Multi Service Switching Platform(MSSP)?

Multi-Services switching Platform is a flexible, high-density media resource platform with integrated signaling capabilities, and is suitable for deployment in TDM, IP, and converged networks as a service node, intelligent peripheral, and application server. Applications that can be deployed with the MSSP include prepaid voice and data services, PBX switching, and voice applications such as call center, IVR, Multi-Ring Back Tone (MRBT), voice mail, and conferencing solutions. Also supported are a wide range of services based on SS7 monitoring, including welcome roamer and missed call alert, and signaling services such as SMS-C, SMS Router, IN applications, and signaling converters.

QUES 10: What are the applications of MSSP?

Newer "multi-service SONET/SDH" (also known as a multi-service provisioning platform or MSPP) equipment has all the capabilities of legacy ADMs, but can also include cross-connect functionality to manage multiple fiber rings in a single chassis. These devices can replace multiple legacy ADMs and also allow connections directly from Ethernet LANs to a service provider's optical backbone. In the end of 2003, sales of multiservice ADMs exceeded those of legacy ADMs for the first time, as the change to next-generation SONET/SDH networks accelerated.