

**Institute of Business Administration
MIS & CS Department
CSE-556 Internetworking
Fall Semester 2002
First Hourly Test
September 4, 2002**

Time Allowed: One Hour

Total Marks: 100

Instructions

1. Attempt all questions. Maximum/Total Marks are 100. All questions carry 10 points except Question 8 which carries 30 points.
 2. Time allowed is 1 hour.
 3. Do NOT write on the Question Paper. Provide your answers on the answer sheet provided for this purpose.
-

Question 1: Differentiate between the responsibilities of the network layer and the transport layer of the OSI Reference Model. Name one standards-based protocol at each layer.

Network Layer - The network layer is responsible for: providing independence to the upper layers from switching and transmission technologies, addressing hosts on the network, setting up paths through the network, routing messages among networks, translating logical addresses or names to physical addresses, controlling congestion, using accounting functions to count packets or bits sent by users to produce billing information. Examples of standards-based network layer protocols include IP, ATM and X.25.

Transport Layer - The Transport Layer forms the interface between the higher application-oriented layers and underlying network-dependent protocol layers. It provides the session layer with reliable message transfer facilities. Transport Layer Provides reliable, transparent transfer of data between end points; provides end-to-end (host-to-host) error recovery and flow control. Examples of standards-based transport layer protocols include TCP, UDP and AAL.

Question 2: What is the difference between switched networks and broadcast networks? Why is the broadcast model of transmission suitable for a local area network?

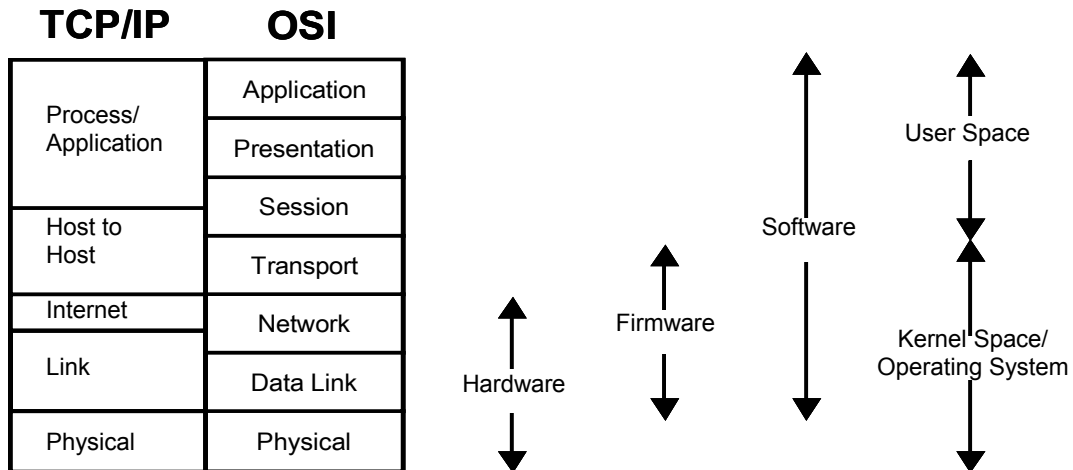
In switched networks the messages are transferred from the source station to the to the destination station by the action of intermediate nodes called the switching nodes whereas in broadcast networks the source station transmits the information and all other stations on the network listen to it. The intended destination is one of the other stations and so a station pays attention to the message if its address is in the destination address field.

The broadcast model suits local area networks well because in a local area network a relatively small number of stations are attached to a high speed shared medium. The broadcast model results in a simple medium access control mechanism.

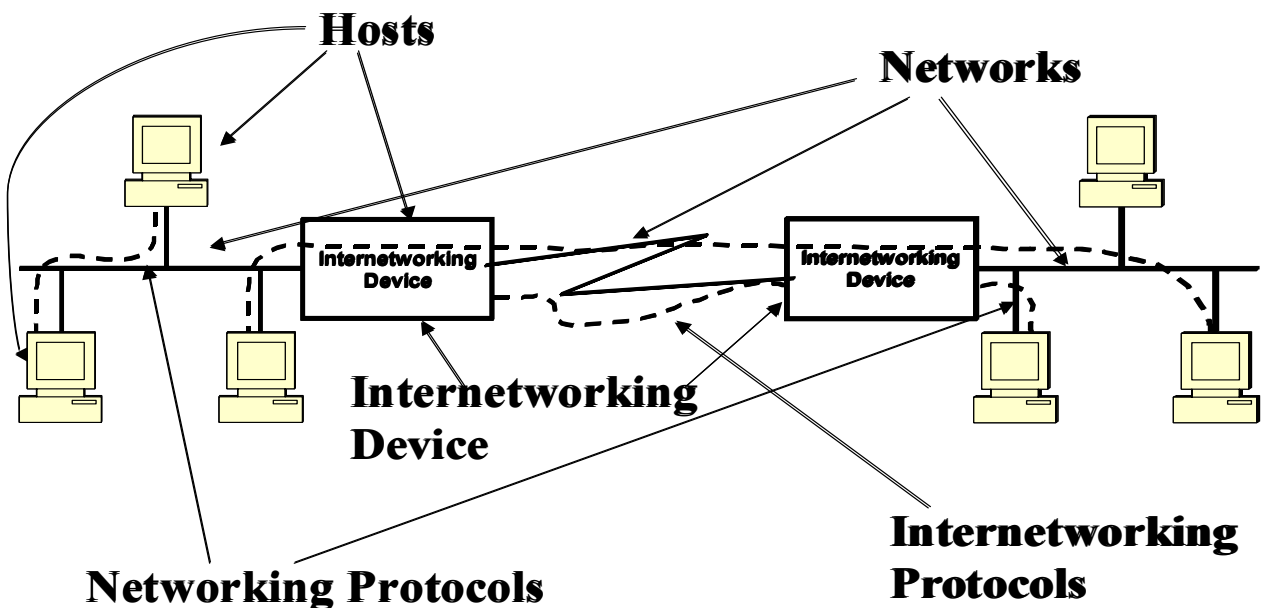
Question 3: Name the types of intermediate systems which work on the layer 1, 2 and 3 of the OSI Reference Model respectively. What are the names of the PDU's that each one of these intermediate systems handle or work with?

Layer	Intermediate System Name	PDU Name
Physical	Repeater	Bit
Data Link	Bridge/Switch	Frame
Network	Router	Packet, Datagram

Question 4: Label the ten unlabeled parts of the following figure:



Question 5: Label each item in the following figure and define each term you label:



Hosts – devices that attach to networks. Generally computers but may be embedded computers e.g. printers, printer servers, routers, etc.

Networks – entities that provide communication capabilities to hosts

Internetworking Device – a special entity allowing information to travel from one network to another

Networking Protocols – rules of communication between hosts

Internetworking Protocols – special protocols allowing internetworking capabilities

Question 6: Give three advantages and disadvantages of a layered approach to the design of computer networking systems. You must support your answer with arguments and examples.

Advantages of Layered Approach:

Ease of understanding - makes computer networking understandable. Because the computer communication process is too complex to understand as one piece the layered approach breaks it into small parts. Each smaller part is simpler and more understandable. For example, the OSI model makes it possible to understand computer communication.

Ease of implementation - makes computer networking easy to implement. It is easier to implement and verify operation of each module or layer. For example in a network implementation, the physical layer or cabling can be done regardless of the application availability.

Ease of troubleshooting and upgrade – if there is a problem, a layered or modular approach makes it easier to diagnose where the problem is and replace or upgrade the faulty component/module. For example if there is a problem with the transport layer implementation (e.g. TCP) one can install a better transport layer without having to replace all the applications (e.g. Browser, FTP Client, Telnet Client, Email Client)

Disadvantages of Layered Approach:

Inefficiency - each layer introduces overhead. A simple application like voice transmission uses small packets. However each subsequent layer adds headers so as a result the eventual physical layer transmission contains more bits for layer headers than the original voice content.

Restrictive - layer N may need access to lower layers than N – 1. For specialized applications such as network management or diagnosis a layer may need to access a particular lower layer directly such as in the “ping” application which does not use TCP or UDP but uses IP directly. Similarly some routing protocols too need to use IP directly without using a transport layer protocol. OSPF uses IP.

Redundancy - of functions such as flow control error handling, addressing, packetizing, and encapsulation between layers. Error control is done at the transport layer and also at the datalink layer when using TCP across a link using HDLC encapsulation.

Question 7: How has the Internet been changing its behavior over the years? Give at least four examples. For each example mention who has been affected positively by the change in the Internet and who has been affected negatively.

S. No.	Changing Internet Behavior	Positive Effect On	Negative Effect On
1.	From a research network to a global network	Consumers	Other multi-service networks such as ISDN, Online services such as Compuserve, Prodigy
2.	From best effort, free for all, first come first served network to a Quality of Service and class of service based network	Internet user willing to pay a premium for quality of service	Ordinary Internet user
3.	From an insecure network to a secure network	Enterprise networks and systems	Proprietary network solutions such as Novell IPX/SPX, IBM SNA, Digital DECNET
4.	From a data network to a multimedia network	Consumer	Telephone Network

Question 8: Given below are two figures showing the Electromagnetic Spectrum and the Acoustic Spectrum respectively. Based on these two figures answer the following questions:

(a) Which of the two operates at higher frequencies AM or FM?
 FM operates at higher frequencies.

(b) Can coaxial cable be used to carry visible light?
 No, coaxial cable cannot be used to carry light.

(c) Can coaxial cable be used to carry Television signals?
 Yes, coaxial cable can carry television signals.

(d) Which has higher frequency content in it, music or speech?
 Music has higher frequencies in it.

(e) Out of AM, FM and the Telephone channel, which one transmits the smallest band of voice frequencies?
 The telephone channel transmits the smallest band of voice frequencies amongst AM, FM and the telephone channel.

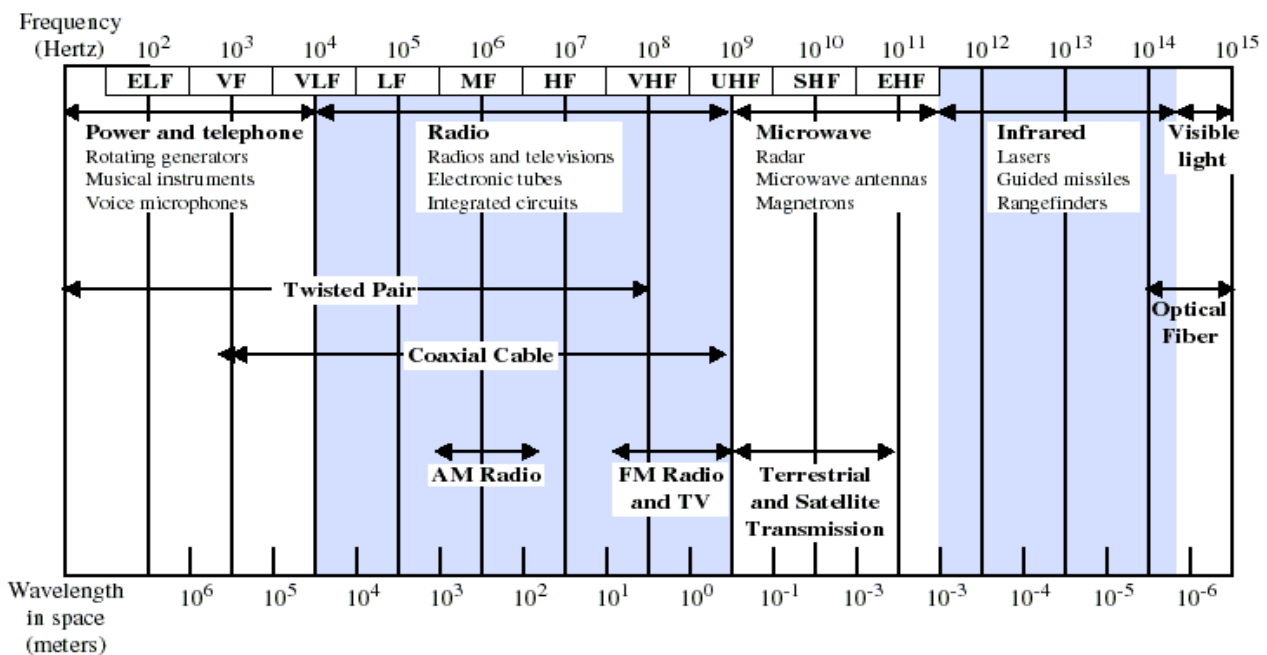


Figure 4.14 Electromagnetic Spectrum for Telecommunications

SOLUTION

