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of a transmitter keeping a large than permitted congestion window or possibly retransmitting on shorter timeouts.
Detecting non conformant applications is nontrivial. One would have to construct a TCP implementation which modelled the implementation being monitored, passing the times and TCP headers of all packets going to and from the monitored implementation. Moreover, some knowledge about the path between the monitor and monitored would have to be acquired. The potential for route oscillation (or asymmetric routes) would have to eliminated. For all of these reasons the ISP would want to monitor the implementation at the point of attachment to the ISP and this would only be sensible for directly attached customers.
An ISP wanting to monitor traffic originating from another domain would only be able to monitor the frequency and rate of retransmissions (but were getting well beyond the course here...)

Digital Communication I

Question 1

a) In circuit switching, higher layer channels (circuits) appear strictly periodically on a lower layer channel. Typically a repeating frame structure is transmitted on the underlying channel and each circuit is assigned the same timeslot in each frame. In packet switching the higher layer channels appear sporadically; access to the underlying channel is demand driven. Because of this, there is no need to identify a circuit with symbols in the channel whereas with packets there is. Thus packets must contain addressing information. Circuits are identified by their temporal location within a multiplex of several circuits. Note that the address to which a circuit is connected is a different concept to the allocation (eg time slots) which the circuit receives on various links between the two end points of the circuit.
A circuit switch must demultiplex links each containing a number of circuits and transfer timeslots of a incoming circuit to the timeslots of the correct outgoing circuit. It must perform this with constant delay for each timeslot within a circuit connection. There will be no contention for resource on outgoing links since each circuit connection will have a periodic set of time slots allocated to them.
A packet switch has the same task of demultiplexing incoming links, but instead of using temporal information, addresses within packets must be examined. A determination of which out going link that the packet should be sent on is made. Now however there can be contention for the outgoing link and some sort of packet scheduling will be necessary.
Circuit switching is advantageous when the user of the channel wants to see constant capacity and constant delay. Packet switching is useful when the each user of the channel is making bursty demands on the channel.

b) Packet switching provides rate decoupling between source and destination. Individual workstations tend to send bursty traffic to any particular destination, so packet switching will always have a place here. As traffic is aggregated up however it will be less bursty and circuit switching in the middle of a network will be more appropriate. [This is a fairly open ended question.]

Question 2

a) A hierarchical address space is one in which the address is composed of a number of components arranged in a hierarchy. Lower components only need to be examined within the domain of the higher level components. Such addresses conform to our intuitive concept of address and aid the routing process. An example is the IP address space in which addresses are divided into network and host numbers. The Ethernet address space is nonhierarchical.
b) The Address Resolution Protocol (ARP) is protocol which can be used to map network level addresses onto link level addresses. It generally takes advantage of the broadcast nature of shared media LANs. In the case of IP to Ethernet ARP, a sender A with IP address Aip, and Ethernet address Aet wishing to send to B with IP address Bip but not knowing B's Ethernet address, broadcasts an ARP Request :

ARP Request
Aip
Aet
Bip