Problem #1

1. Switch via memory: The switching is done between input and output ports under the direct control of the CPU (routing processor).
2. Switching via a bus: An input port transfers a packet directly to the output port over a shared bus, without intervention of the routing processor.
3. Switching via an interconnection network: A crossbar switch is an interconnection network consisting of 2N buses that connect N input ports to N output ports. Each vertical bus intersects each horizontal bus at a crosspoint, which can be opened or closed at any time by the switch fabric controller (whose logic is part of the switching fabric itself). Crossbar networks are capable of forwarding multiple packets in parallel.

Problem #2

Packets can get lost at output ports if there are arriving too fast at the input port and the queue size grows resulting in running out of buffer space. Packets loss at input ports can be eliminated without using infinite buffers if the switching fabric speed is larger than the speed of the input ports time.

Problem #3

In this case, the percentage of overhead will be 50% (40 bytes). The other 50% will be the application data (40 bytes).

Problem #4

Route aggregation is a methodology that helps minimize the number of routing tables in an IP network by combining multiple routes into a single route. It helps the router to have less multiple routes. It also stops assigning IP addresses to small organizations and it assigns IP addresses to large network service providers.

Problem #5

Subnet 1: 223.1.17.0/25

Subnet 2: 223.1.17.128/26

Subnet 3: 222.1.17.192/26

Problem #6

The maximum size of data field in each fragment is 680 bytes. Now, subtracting 2400-20, will give us 2380 bytes. 20 bytes are subtracted because that is the size of the IP header. Now, 2380/680 = 3.5, which is rounded up to 4 fragments.

Values in the various fields in the IP datagram:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Length | Identification Number | Flags | Offset |
| First | 700 bytes | 422 | 1 | 0 |
| Second | 700 bytes | 422 | 1 | 85 |
| Third | 700 bytes | 422 | 1 | 170 |
| Forth | 360 bytes | 422 | 0 | 255 |

Each fragment will have the same identification number: 422. The first three fragments will have the value 1 as a flag. The last fragment will have a value equal to 0 (zero) as a flag. The first three fragments will be 700 bytes long and the last one will be 360 bytes long. For the offset, the values will be 0, 85, 170, and 255, respectively.