CS224 (m): Computer Networks (minor)
Tutorial 13, 26/28 Oct 2016

Concepts tested: Ethernet

1. At what layer does a hub operate?
2. At what layer does the spanning tree protocol work?
3. A switch can connect 10Mbps and a 100Mbps link, while a hub cannot. Why?
4. How many Ethernet adaptors can potentially be manufactured?
5. If the first bit in an Ethernet MAC address is zero, the address belongs to which type? (unicast or broadcast or multicast)?
6. Draw an extended LAN with 4 different collision domains, 4 hubs, and 1 switch. What is the maximum number of hosts which can be supported in this extended LAN ?
7. A 10 port bridge supports 10Mbps on each port and interconnects Ethernet segments. The total number of hosts the bridge supports is 30 across all ports.
   (a) What is the maximum sending rate a backlogged host can achieve? Backlogged means the host has unlimited amount of data to send. Assume that there is at least one host per port.
   (b) In what situation does a backlogged host achieve the minimum sending rate? And what is this minimum?
8. What would a learning bridge do when it receives a packet with destination address as ff:ff:ff:ff:ff:ff?
9. See Fig 1. The bridges (square boxes) are learning bridges with initial empty tables. The following transmissions take place.

   A sends to C
   D sends to B
   B sends to A
   E sends to D
   E sends to B

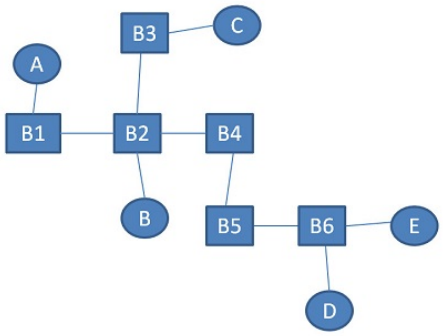

Figure 1:

   (a) After the above transmissions, which bridges still do not learn where E is?
   (b) After the above transmissions, which bridge has least amount of entries in its learning table?
10. How many paths does the spanning tree produce, between two LAN segments in an extended LAN?
11. See Fig 2
    (a) In the Extended LAN topology after running the spanning tree protocol, which all ports will 'definitely' or 'possibly' be disabled? Mark all that apply.

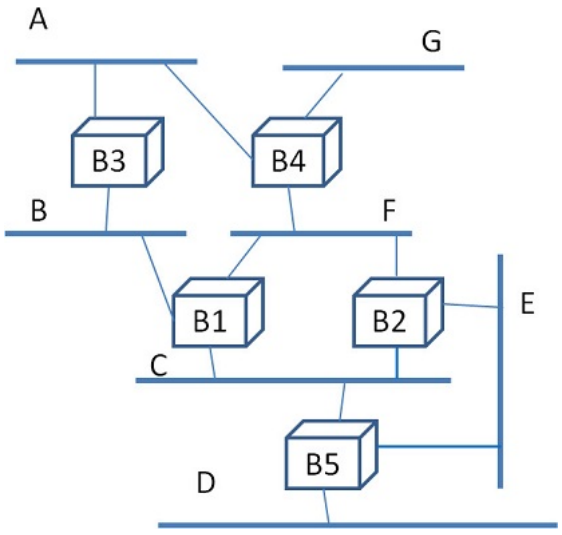

Figure 2:

(b) Suppose bridge B1 failed. Determine which ports will 'definitely' or 'possibly' be disabled after the spanning tree protocol kicks in again? Mark all that apply.

12. See Fig 3

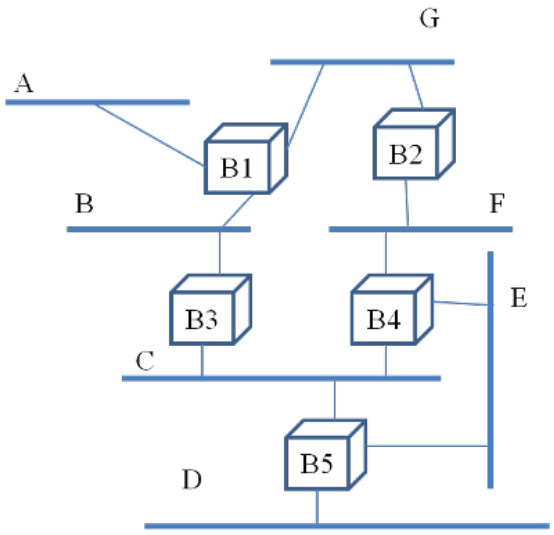

Figure 3:

(a) In the Extended LAN topology after running the spanning tree protocol, which all ports will 'definitely' or 'possibly' be disabled? Mark all that apply.

(b) Suppose bridge B3 failed, which all ports will 'definitely' or 'possibly' be disabled? Mark all that apply.