CS224 (m): Computer Networks (minor)

Tutorial 13, 26/28 Oct 2016

1. Physical layer
2. Data-Link
3. To transfer frames from a 10Mbps link onto a 100Mbps link or vice-versa, one needs to buffer the frame. The hub has no provision to buffer frames.
4. 2^48, An Ethernet adaptor is uniquely identified by its MAC address. Since there are 48 bits assigned for this, 2^48 can potentially be manufactured.
5. Unicast
6. 1
7. 10
    a. Maximum can be achieved if the host is the only machine on the port, in which case it can send at full speed of 10Mbps.
    b. Minimum can be achieved if the backlogged host is on a segment with the most number of hosts, all of which are also backlogged. Then they will all contend. In this case that is 21 hosts (9 hosts on 9 other ports and 21 hosts on the port under consideration). So, the host would get 10Mbps/21 = 476Kbps.

8. send it on all ports except the one on which it was received. Its a broadcast address so it has to send it to all hosts on the extended LAN. It doesn't have to send it on the port on which it was received because hosts on that port (if any) would have already heard it on the bus.
9. B1,B3
    a. Prior to 'E to D' and 'E to B', bridge B2 knows where B is and B6 knows where D is. Given this, 'E to D' transmission takes the path E-B6-D and 'E to B' transmission takes E-B6-B5-B4-B2-B. Hence B1 and B3 will not learn where E is.
    b. B3
    B3 sees only the first two transmissions and learns about A and D. Rest don't go through it.
    B1 learns about A, D, B
    B2 learns about A, D, B, E
    B3 leans about A, D
    B4 learns about A, D, E
    B5 learns about A, D, E
    B6 learns about A, D, E

10. Drawing question.

11.

a. "B4-A", "B2-C", "B2-F", "B5-E"
For LAN segments B,C,F, the designated bridge is B1. For A it is B3, for G it is B4, for E it is B2 and for D it is B5

In terms of root ports, for B3 it is towards B, for B4 it is towards F, for B5 it is towards C. For B2 it can be either towards F or towards C. This depends on which port B2 heard the configuration message from B1 first. It will consider that port as root port and disable the other.

b. "B5-C", "B5-E"
For LAN segments F,E,C, the designated bridge is B2 (root). For D it is B5, for B it is B3, for A it is B4 and for G it it B4.
The root port for B4 it is towards F and for B3 it is towards A. For B5, it is towards E or C. So, one of them will be selected and the other disabled.

12. a

a. "B4-C", "B5-E"
For LAN segments A,G,B the designated bridge is B1. For F it is B2, for C it is B3. For D it is B5. For E it is B4 since it is same distance but smaller sending bridge id.

Given above, B4-C and B5-E are disabled. This topology was covered in detail in the video. This is more as a base for the next question.

b. B5-E
Once B3 fails, B4 will stop receiving configuration messages of B3 on LAN C and can thereby detect that B3 failed. Note even though B4-C is disabled, B4 can still receive messages on that LAN. Disabled just implies, it will not forward configuration messages on it or process (for forwarding) data packets received on that port. B4 can still passively monitor the port to determine any failures and help reconfigure the topology.

Once B4 detects B3 is down, it will become the designated bridge for C and enable the B4-C port. B5 will similarly conclude B3 is down and will now hear configuration messages from B4 on the C LAN. Though nothing much changes in terms of ports from the perspective of B5 (root port is still B5-C, B5-E port is disabled), it will have to update its distance to the root (since it will act on configuration messages from B4). This distance change will reflect in the configuration messages B5 forwards.

All the above description is theory. If one were to dig into the actual implementation details, there will be all kinds of timers, suppression of messages etc to ensure faster convergence and correctness. We will not get into that at this stage.