ID: A20447935 Media Access Control

Name: Alan Palayil Assignment #3

1) a) for G,

$pr[k] = G^k e^{-G} / k!$ [$pr[k]$ is the probability of k frames generated in a frame time.]

When a slot is idle,

there is 0 frame generated in that frame time $\therefore pr[0] = 0.1$

$$pr[0] = G^0 e^{-G}/0! = 1 \times e^{-G} = 0.1.$$

$$\ln(e^{-G}) = \ln(0.1)$$

$$-G = -2.30259$$

$$\therefore G = 2.30259$$

$\therefore$ The channel load is 2.30259.

When $G = 1$, the slotted ALOHA obtains the opitmal throughput

$G > 1$, we have too many generated frame in a slot.

it is an overload situation.

$$S = Ge^{-G} \leftarrow \text{formula.}$$

$$S = 2.30259e^{-2.30259}$$

$$\boxed{S = 0.230259}$$

Since, $G > S$

$\therefore$ The channel is overload.

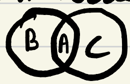
b) The throughput is 23.0259 %

2) In CSMA/CD, we are detecting the collision, to do not corrupt our data. There is a backoff time to send if collision occur. It request node for transmission before sending any frame. In comparision, pure ALOHA & slotted ALOHA, we don't check the carrier while sending frames because of this many frames collided and only some are reached destiny. CSMA senses the channel before it sends data but it

eliminate the collision. CSMA/CD is efficient in communication than pure and slotted ALOHA and CSMA.

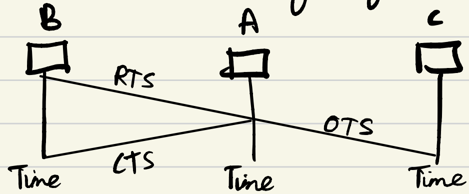
3) IEEE 802.11 → wireless LAN. CSMA/CD is for wireless networks. It won't detect the collision in the air, but it avoids the collisions. In CSMA/CA doesn't deal with the recovery after a collision. It checks whether the medium is in use or not. The transmitter waits if its busy until it is idle state, before it starts transmitting data. In wireless, there isn't a need to minimize the recovery time after collision which will occur frequently in wired network, so we use CSMA/CA which reduces the possibility of a collision.

4) Hidden Node Problem:-



Here, we have three networks A, B, C.

A is in range of B & C, but with respect to B, it doesn't. know about the network C. With respect to C, only 'A' is the network & doesn't know about 'B' network. Since 'B' isn't in range of C. B & C sends the signals to A at a time. This leads to a collision of signals. This is the hidden node problem. We can use hand shaking signals.



Whenever 'B' wants to send data to 'A' it sends RTS signal, to respond to A sends CTS to B. The signal from 'A' is recieved by 'C'. This makes 'C' realize there's another network & doesn't send data to A at that time.

5) It is impossible for a Bluetooth device to use master node in two piconets at the same time. The problem is that access code for the start of the frame will be derived from the masters' identity. The identity helps for the slaves to intimate about which message belongs to which piconet. But if two overlapping piconets use the same access code, then it is difficult to identify the frame belonging to the respective piconet. To resolve this effect, it is better to combine two piconets into one big piconet instead of using it as separate ones. Due to this, a Bluetooth device cannot use one master in two piconets at same time.

6) For Node A.

A → B : 16

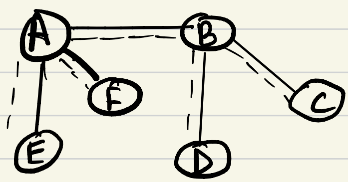
A → C : 16+6 = 22 : A → B → C

A → F : 21

A → E : 19

A → D : 16+5 = 21 : A → B → D

We choose the shortest distance to go to particular Node. The above all are shortest distances from 'A' to other nodes.



This is the minimum cost spanning tree for the given.