Comp 445 Theory Assignment 3

1. Pure ALOHA: station: has data, send

collision: wait freedom time to send

Slotted ALOHA: Separate timeslot (2T)

Send data timeslot reduce collision

If traffic is increase, they will bad and same. If normal traffic, Slotted ALOHA better Pure ALOHA.

2.

3.

4. 00101 10101 01000 01111 11010 01101

Encryption key: 10110

Encrypted: 10011 00011 11110 11001 01100 11011

Decrypted: 00101 10101 01000 01111 11010 01101

5. 2^64 / 30 = 614891469123651700 keys

6.

7. Advantages: (1). Data can be transmitted from different devices at the same time, good for high traffic; (2). Failed components does not affect data transfer, use different way; (3). Can modify and expand network easily.

Disadvantages: (1). Redundancy in connections; (2). Which lead to high cost in set-up and maintenance; (3). Tough administrating acts

Data centers:

Limited host-to-host capacity: if each TOR are connected to switch A as 1GPS, each switch connect to each other at 10GPS. Assume that 40 hosts in switch A want to send data to switch B, which only have capacity of 10GPS. That would reduce them to only 250mbs. But if we do fully-connected topology for A and B and others, that would raise the capacity a lot, say minimum 40GPS which made the connection between every host is 1GPS, which is good and real.

8. (a). 4 as 2^4 > 15.

p1:1 3 5 7 9 11 13

p2:2 3 6 7 10 11 14 15

p3:4 5 6 7 12 13 14 15

p4:8 9 10 11 12 13 14 15

(b). 5 as 2^4 > 23

p1:1 3 5 7 9 11 13 17 19

p2:2 3 6 7 10 11 14 15 18 19

p3:4 5 6 7 12 13 14 15

p4:8 9 10 11 12 13 14 15

p5:16 17 18 19