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TIRUCHIRAPPALLI CAMPUS

COMPUTER NETWORKS ASSIGNMENT

QUESTION BANK 3 & 4

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CSE - B

III rd yr.

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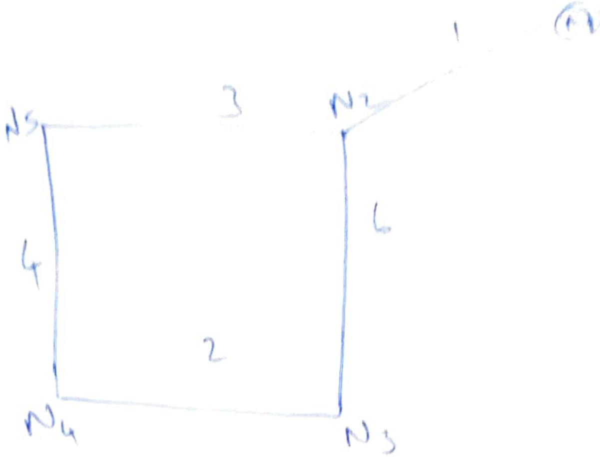
1)



As soon as N_2-N_3 reduces to 2 but N_2 & N_3 instantly updates their distance to N_3 and N_2 to 2 respectively.

So, N_2: (1, 0, 2, 7, 3), N_3 (7, 2, 0, 2, 6) become this. After this first round of update in which each node shares it's table with their respective neighbour only.

N_1: (0, 1, 7, 8, 4)

N_2: (1, 0, 2, 7, 3)

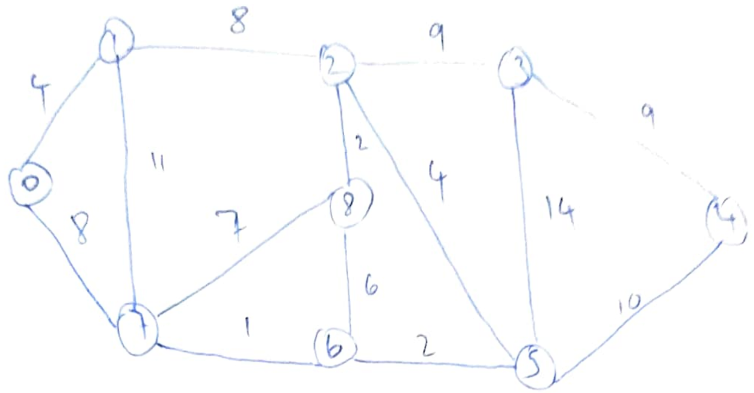
N_3: (7, 2, 0, 2, 6)

N_4: (8, 7, 2, 0, 4)

N_5: (4, 3, 6, 4, 0)

SEE at this time all the entries are odd except in N_2 & N_3 where value changes to 2 instead of 6. N_3 recives tables from N_2: (1, 0, 2, 7, 3) and N_4 (8, 7, 2, 0, 4) using. This only original N_3 (7, 2, 0, 2, 6) updates to N_3 (3, 2, 0, 2, 5)

2



The given graph does not contain negative edge

Ex:-

Input = src = 0, The graph is shown below

Output: 0 4 12 19 21 11 9 8 14

Explanation: The distance from 0 to 1 = 4

The minimum distance from 0 to 2 = 12. 0 -> 1 -> 2

The minimum distance from 0 to 3 = 19. 0 -> 1 -> 2 -> 3

The minimum distance from 0 to 4 = 21. 0 -> 7 -> 6 -> 5 -> 4

The minimum distance from 0 to 5 = 11.0 -> 7 -> 6 -> 5 -> 4

The minimum distance from 0 to 6 = 9.0 -> 7 -> 6

The minimum distance from 0 to 7 = 8.0 -> 7

The minimum distance from 0 to 8 = 14. 0 -> 1 -> 2 -> 8.

(2)
4

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3. (S) —L_1— (R_1) —L_2— (R_2) —L_3— (D)
100km 100km 100km

TP from S to R_1 = $\frac{\text{Distance}}{\text{Link speed}}$ = $\frac{10^5}{10^8}$ = 1ms

Total propogation delay to travel from s to D

= 3 * 1 ms = 3ms

Total transmission delay for a packet

= 3 * No. of Bits / Bandwidth.

=> 3 * (1000/10^6)

= 3 ms

The first Packet will take 6ms to reach D. while first packet reaches D the rest will been Processing in parallel to D, so D will recive remaining packets will recive remaining packets per 1ms from R_2. So, remaining 999 packets will take 999 ms so, 999+6 = 1005 ms.

Propagation time $= \frac{100 km}{10^8 m/s} = 1$ milli second.

1 ms (T_s at sender) + 1 m (T_p from sender to R_1) + 1 ms (T_2 and R_1) + 1 m (T_p from R_1 to R_2) + 1 ms (T_1 at R_2) + 1 ms (T_p from R_2 to destinations) = 6 ms.

$\Rightarrow 1000 = 6 ms + 999 ms \Rightarrow 1005 ms$

4) Consider a CSMA/CD network that transmits data at the rate of 100 mbps cable with no repeaters. If the minimum frame size required for this network is 1250 bytes, what is the signal speed (Km/sec) in the cable

$B = 10^8$ bits/sec

$d = 1 km$

Round trip distance = 2km

$\therefore \frac{1250 \times 8}{10^8} = \frac{2}{speed}$

$\therefore$ Speed = $\frac{2 \times 10^8}{10^4} = 2 \times 10^4$

5. Frame Size S >= 2BL / P

where,

Cable Length L = 1km = 1000m
Propagation speed = P = 2x10^8 m/sec
Bandwidth = 1GBPS = 10^9 bps
See this for details of bove formula

S >= (2 * 10^9 * 1000) / (2x10^8)

= 10000 bits

1046.45/8 = 1250 bytes.

Propagation time = $\frac{100km}{10^8 m/s}$ = 1 milli second.

1 ms (T_s at sender) + 1 m (TP from sender to R) + 1 ms

(T_2 and R_1) + 1 m (TP from R_1 to R_2) + 1 ms (T_2 at R_2) + 1 ms

(TP from R_2 to destinations) = 6 ms.

⇒ 1000 = 6 ms + 999 ms ⇒ 1005 ms

4) Consider a CSMA/CD network that transmits data at the rate of 100 mbps cable with no repeaters. If the minimum frame size required for this network is 1250 bytes, what is the signal speed (Km/sec) in the cable

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Round trip distance = 2 km

$\therefore \dfrac{1280 \times 8}{10^{8}} = \dfrac{2}{\text{speed}}$

$\therefore \text{Speed} = \dfrac{2 \times 10^{8}}{10^{9}} \cdot 2 \times 10^{4}$

Frame size $S >= 2BL/P$

where,

Cable Length $L = 1\,km = 1000\,m$

Propagation speed $= P = 2 \times 10^{\wedge}8$ m/sec

Bandwidth $= 1\,GBPS = 10^{9}$ bps

See this for details of above formula

$S >= (2 * 10^{\wedge}9 * 1000) / (2 \times 10^{\wedge}8)$

$= 10000$ bits

$1046.45 / 8 = 1250$ bytes.

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14. Border Gateway protocal (BGP)

The BGP is a standardized exterior gateway protocol used to exchange routing information b/w autonomous system (ASes) on the Internet. It is defined in several RFCs, with RFC 4271 being the most widely referenced. BGP is crucial for the functioning of the global Internet, enabling different networks to communicate and exchange routing information to work more efficiently in the network topology without any miss routing and error correction

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16) IPV6:

An IPV6 address is a 128-bit identifier for a network interface expressed as eight groups of four hexadecimal digits, separated by colons. Each group represents 16 bits of the address.

ex: 2001:0db8:0000:0042:0000:8a2e:0370:7334

-> It has 128 bits (16 bytes)

-> hexadecimal with colons

ex: 2001:0db8:0000:0042

-> Approx 340 undecillion addresses

-> more complex header, designed for efficiency

-> No broadcast: uses multicast instead.

-> Stateless Address Auto configuration (SLAAC) and DHCPV6.

-> IPSec is mandatory.

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12. Hamming code:

It is an error detection and error correction code that can detect up to two bits error (or) correct one bit error in data transmission. It is widely used in computer memory and communication systems.

The position of the parity bits are power of 2 and are used to check the bits in specific position

$$2^n \geq k + r + 1$$

r → the no. of parity bit

k → no of bits

calculation parity bits:-

→ each parity bit covers a specific set of bits. The parity is calculated such that the total no. of 1s in the bits covered by the parity bit is even

11. Cyclic Redundancy check (CRC)

It is error detecting code code used to detect accidental changes to raw data in digital networks and storage devices. It is based on polynomial division and is widely used in network communication, file storage and other applications where data integrity is critical.

* Polynomial Representation:
  - Data is treated as polynomial
* generator polynomial:
  - A predefined polynomial is used for divisions.
  - Augmented data is divided by the generator polynomial using binary division.

10. check sum method:

It is error detection technique used in Data transmission where a value is calculated from the Data being sent. this value is then transmitted along with the data. The reciver performs the same calculation to verify the integrity.

· Data segmentation: Data is divided into equal segment

· Transmission: the original data along with the computed checksum is sent to the receiver.

· Verification:

open receiving the data, the reciver recalculates the checksum from the recevide data segment.

Distance Vector Routing:

DVR is a dynamic routing protocol that determines the best path to a destination based on the distance in terms of hops from the source. It uses the Bellman-Ford algorithm to calculate the shortest path between nodes in a network. These key features

* Distance vectortable
* Periodic updates
* Routing by Rumors
* Loop preventions

-Information about the spread through the network gradually. Router exchange their information with their neighbour periodically.

4) RIP version 1 and version 2

It is a DVR protocol used in a small network.

RIP v_1: uses classfull routing meaning it does not send subnet mask information with its updates

Sends routing updates using broadcast (255.255.255.255).

· Does not support VLSM or CIDR

RIP v_2: Supports classless routing by including the subnet mask in routing updates, allowing for variable length subnet masking (VSLM)

· Supports VLSM and CIDR

5) ALOHA Protocol:

It is simple communication protocol used for medium access control (MAC) in a shared network. It was developed to allow multiple devices to transmit data over a shared communication channel without a central controller.

Pure ALOHA:- Device can transmit Data at any time without checking if the channel is free.

When collision occurs, the affected devices wait for a random backoff period before trying to retransmit.

Spotted ALOHA:- Device can only transmit only at the start of the time slot.

maximum efficiency is 36.84.

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7 Stop and wait ARQ protocol:

It is a fundamental data communication to ensure reliable data transmission. It operates by sending one frame at a time and waiting for an acknowledgement (ACK) from the reciver ~~for~~ before sending the next frame.

Handling lost or corrupted:

If the ACK is not recived within the timeout period, the sender assumes that the data either lost or corrupted.

Error Detection:

To detect transmission error, mechanisms like checksums or CRC are used.