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| **Type of Assessment/**  **Tipe Assessering:** | **Semester Test 2** | **Qualification/**  **Kwalifikasie:** | **BSc IT** |
| **Module code/**  **Modulekode:** | **ITRW322** | **Duration/**  **Tydsduur:** | **2 hour**  **2 uur** |
| **Module description/**  **Module beskrywing:** | **Computer Networks** | **Max/**  **Maks:** | **50** |
| **Examiner(s)/**  **Eksaminator(e):** | **Mr Motlokwe Thobejane** | **Date/**  **Datum:** | **06/08/2018** |
| **Internal/Interne**  **Moderator(s):** | **Mr Petri Jooste** | **Time/**  **Tyd:** | **8:00** |

SECTION A / *AFDELING A*

1. Compare the three types of CSMA protocols [6]

*1-psersistent – Listen. If idle, send data. If not, wait until channel becomes available (continuous sensing) and send data. If collision, wait random time and start over.*

*nonpersistent (0-persistent) – Listen. If idle, send data. If not, wait random time and repeat. If collision, wait random time and start over.*

*p-persistent – Slotted time. If channel is available in time slot, send with probability p. If frame is not send, try again with probability p in next time slot. If collision or other station transmits, wait random time and start over. (2)*

*Classical Ethernet. 1-Persistent CSMA/CD. Random interval determined using binary exponential backoff. Time after collision is slotted according to worst-case round-trip time. Maximum wait interval set. Reports error after set number of collisions. No acknowledgements. (3)*

1. The selective repeat protocol is designed for specific needs and circumstances. Explain these needs and circumstances and then describe how this protocol provides for it. [5]

If there are a lot of errors√ from the physical medium then a protocol like Go Back N will waste a lot of bandwidth. √Because all frames after a bad frame will be discarded and needs then to be resend.√ The Selective repeat protocol was designed to deal with these errors by buffering√ all usable frames and only after timed out the oldest discarded frame will be resend.√ In this way it is a lot more efficient and wastes less bandwidth. √

1. Test the following received frame with the generator x3+x+1. [5]

Frame: 1000010

* Write generator in binary
* What is CRC
* Test if the frame has error or not
* Frame: 1000010
* **Frame: 1 0 0 0 0 1 0**

|  |  |  |  |  |  |  | 1 | 0 | 0 | 0 | 0 | 1 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Data = | | | | | 1 | 0 | 0 | 0 |  |  |  |  |  |  |  |  |  | Generator = | | | | | | | 1 | 0 | 1 | 1 |  |  |  |  |  |  |  |  |  |  |
|  |  | CRC = | | | | |  |  |  |  | 0 | 1 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 0 | 1 | 1 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | Calculation of new CRC: | | | | | | | | | | | | | | |  |  | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 0 | 1 | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 | 1 | 1 | 0 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 0 | 1 | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | 1 | 0 |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 0 | 1 | 1 |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  | Calculated CRC = | | | | | | | | | | | | | |  |  | 1 | 0 | 1 |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

* Conclusion: The received **frame is corrupt**,   
  because the calculated CRC (**101**)   
  **does not match** the sent CRC (**010**)

1. Use a flow diagram to describe a simplex stop-and-wait protocol for error-free channel (9)

*Sender:*

*1. Wait for data from network layer*

*2. Create frame*

*3. Send frame to physical layer, start timer*

*4. Wait for ACK from receiver (from physical layer)*

*a. if ACK stop timer and repeat from 1*

*b. If timeout repeat from 3*

*Receiver:*

*1. Wait for data from physical layer*

*2. Recreate frame*

*3. Send payload (or data or packet) to network layer*

*4. Send ACK to receiver (through physical layer)*

*5. Repeat from 1.*

1. Discuss the "Go-back-N" protocol. Also give advantages and disadvantages. [4]

Sliding window protocol (1)

Uses sending and receiving windows as buffers (1)

It buffers received frames and if next frame (in order) is not received, request resend from that frame on. (2)

Advantage that frames are acknowledged and missing frame resent. Frames stay in order. (1)

Disadvantage- inefficient on network with frequent packet loss. Retransmit data. (1)

1. Describe the differences between Datagram and VC networks (4) and give a scenario for the ideal use of each (2). [6]

*Differences: Circuit setup, Addressing, State info, Routing, Router failures, QoS, congestion (8 marks)*

*Scenarios (2 marks)*

Addressing: Datagram – full address, VC – only VC number

State information: Datagram – No state information stored on routers, VC – Each VC stores state information in router table space.

Routing: Datagram – Routed independently, VC – Route chosen on connection setup

Router problems: Datagram – No effect, only packet lost during crash, VC – All VCs passing through router are terminated.

1. Distance vector routing was replaced by Link state routing in 1979. Explain why. Describe Link state routing works (6).

*Count-to-infinity problem (2)*

Link state (4)

* Discover neighbours and learn their network addresses
* Set distance or cost metric to neighbours
* Construct packet with information learned
* Send packet to and receive packets from other routers
* Compute shortest path to every other router

1. What does each of the following acronyms stand for in the context of computer networks? [5]
2. UTP – Unshielded Twisted Pair
3. CSMA - Carrier Sense Multiple Access
4. ADSL - Asymmetric digital subscriber line
5. CRC - Cyclic redundancy check
6. PPP – Point-to-Point Protocol

SUBTOTAL: SECTION A

TOTAL/TOTAAL: 50

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File reference: 8.1.7.2.2