**G. H. RAISONI COLLEGE OF ENGG., NAGPUR**

**(An Autonomous Institute)**

**Department of Computer Science & Engg.**



**Date: 07-09-2021**

**Practical Subject: Data Communication and Networking.**

**Session: 2021-22**

**Student Details:**

| **Roll Number** | 01 |
| --- | --- |
| **Name** | Anand Suralkar |
| **Semester** | 9th |
| **Section** | A |
| **Batch** | CSE |

**Practical Details: Practical Number-3;**

| Practical Aim | Implement Carrier-sense  multiple access with collision  detection (CSMA/CD) |
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| Theory & Syntax | CSMA-CD  is a network protocol for carrier transmission  that operates in the Medium Access Control  (MAC) layer.  What is network protocol?  What is Medium Access Control?  CSMA-CD  Network protocols  are a set of rules, conventions, and data  structures that dictate how devices exchange data  across networks.  CSMA-CD  Network protocols..  are a set of rules, conventions, and data  structures that dictate how devices exchange data  across networks.  Examples of standard network protocols are  TCP (Transmission Control Protocol), UDP (User  Datagram Protocol), IP (Internet Protocol), ARP (Address  Resolution Protocol), HTTP (Hypertext Transfer Protocol), FTP  (File Transfer Protocol).  CSMA-CD  Network protocols.. How it work?  CSMA-CD  Network protocols..  What is Medium Access Control?  A media access control is a network data transfer  policy  that determines how data is transmitted between two  computer terminals through a network cable.  involves sub-layers of the data link layer 2 in the OSI  reference model.  CSMA-CD  Network protocols..  What is Medium Access Control?..  The MAC protocol ensure non-collision and eases  the transfer of data packets between two  computer terminals.  A collision takes place when two or more terminals  transmit data/information simultaneously.  This leads to a breakdown of communication.  CSMA-CD  Network protocols..  What is Medium Access Control?..  The MAC protocol ensure non-collision and eases  the transfer of data packets between two  computer terminals.  A collision takes place when two or more terminals  transmit data/information simultaneously.  This leads to a breakdown of communication.  CSMA-CD-Algorithm  First, the station that wants to transmit the data  senses the carrier as to whether it is busy or idle. If a  carrier is found idle, then the transmission is carried  out.  The transmission station detects a collision, if any,  using the condition: Tt >= 2 \* Tp where Tt is the  transmission delay and Tp is the propagation delay.  The station releases the jam signal as soon as it  detects a collision.  After collision has occurred, the transmitting station  stops transmitting and waits for some random amount  of time called the ‘back-off time’. After this time, the  station retransmits again.  CSMA-CD-Works  Suppose there are two stations A and B. If station A wants  to send some data to station B, then it has to sense the  carrier first. The data is being sent only if the carrier is free.  But by standing at one point, it cannot sense the entire  carrier, it can only sense the point of contact. According to  the protocol, any station can send data at any time, but the  only condition is to first sense the carrier as if its idle or  busy.  In case A and B together start transmitting their data, then  it’s fairly possible that the data of both the stations will  collide. So, both the stations will receive inaccurate collided  data.  CSMA-CD-Works..  Now, the question that arises here is: how will the stations  know that their data got collided?  The answer to this question is, if the colloidal signal comes  back during the process of transmission, then it indicates  that the collision has occurred.  For this, the stations need to keep on transmitting. Only  then they can be sure that it’s their own data that got  collided/corrupted.  If in case, the packet is large enough, which means by the  time the collision signal comes back to the transmitting  station, the station is still transmitting the left part of data.  Then it can recognize that its own data got lost in the  collision.  Understanding Collision Detection  In order to detect a collision, it is important that  the station keeps on transmitting the data until  the transmitting station gets back the collision  signal if any.  Let’s take an example where the first bits  transmitted by the station is involved in the  collision. Consider we have four stations A, B, C  and D. Let the propagation delay from station A to  station D be 1 hour i.e. if the data packet bit starts  to move at 10 a.m., then it will reach D at 11 a.m.  Understanding Collision Detection  At 10 a.m. both the stations, A and D sense the carrier as free  and start their transmission.  If the total propagation delay is 1 hour, then after half an  hour both the station’s first bits will reach halfway and will  soon experience a collision.  So, exactly at 10:30 a.m., there will be a collision which will  produce collision signals.  At 11 a.m. the collision signals will reach stations A and D i.e.  exactly after one hour the stations receive the collision signal.  Understanding Collision Detection  Therefore, for the respective stations to  detect that it’s their own data that got  collided the transmission time for both the  stations should be greater than their  propagation time. i.e. Tt>Tp  Where Tt is the transmission time and Tp is the  propagation time.  Understanding Collision Detection  Let’s see the worst-case situation now.  Station A started the transmission at 10 a.m. and is about to reach  station D at 10:59:59 a.m.  At this time, station D started its transmission after sensing the carrier  as free.  So here the first bit of data packet sent from station D will face  collision with the data packet of station A.  After collision occurred, the carrier starts sending a colloidal signal.  Station A will receive the collision signal after 1 hour.  Understanding Collision Detection  Let’s see the worst-case situation now.  This is the condition for detecting collision in the  worst case where if a station wants to detect  collision then it should keep on transmitting the  data till 2Tp, i.e. Tt>2\*Tp.  Understanding Collision Detection  Now the next question is if the station has to transmit the  data for at least 2\*Tp time then how much data should the  station have so that it could transmit for this amount of  time?  So in order to detect a collision, the minimum size of the  packet should be 2\*Tp\*B.  Collision of first bits in CSMA/CD:  Station A,B,C, D are connected through Ethernet wire. Any station  can send its data packet for transmission after sensing the signal as  idle. Here the data packets are sent in bits which take time to  travel. Due to this, there are chances of a collision.  Collision of first bits in CSMA/CD:  In the above diagram, at time t1 station A starts transmitting the  first bit of data after sensing the carrier as free. At time t2, station  C also senses the carrier as free and starts transmitting the data. At  t3, the collision occurs between bits sent by stations A and C.  Collision of first bits in CSMA/CD:  Thus, the transmission time for station C becomes t3-t2. After  the collision, the carrier will send back the colloidal signal to  station A which will reach at time t4. This means, while  sending the data, the collision can also be detected. |
| Program | First, the station that wants to transmit the data  senses the carrier as to whether it is busy or idle. If a  carrier is found idle, then the transmission is carried  out.  The transmission station detects a collision, if any,  using the condition: Tt >= 2 \* Tp where Tt is the  transmission delay and Tp is the propagation delay.  The station releases the jam signal as soon as it  detects a collision.  After collision has occurred, the transmitting station  stops transmitting and waits for some random amount  of time called the ‘back-off time’. After this time, the  station retransmits again.  CSMA-CD-Works  Suppose there are two stations A and B. If station A wants  to send some data to station B, then it has to sense the  carrier first. The data is being sent only if the carrier is free.  But by standing at one point, it cannot sense the entire  carrier, it can only sense the point of contact. According to  the protocol, any station can send data at any time, but the  only condition is to first sense the carrier as if its idle or  busy.  In case A and B together start transmitting their data, then  it’s fairly possible that the data of both the stations will  collide. So, both the stations will receive inaccurate collided  data.  CSMA-CD-Works..  Now, the question that arises here is: how will the stations  know that their data got collided?  The answer to this question is, if the colloidal signal comes  back during the process of transmission, then it indicates  that the collision has occurred.  For this, the stations need to keep on transmitting. Only  then they can be sure that it’s their own data that got  collided/corrupted.  If in case, the packet is large enough, which means by the  time the collision signal comes back to the transmitting  station, the station is still transmitting the left part of data.  Then it can recognize that its own data got lost in the  collision. |
| Output |  |
| Conclusion | Implemented and learned concept Carrier-sense  multiple access with collision  detection (CSMA/CD) |