Name: Ankita Sanjay Kakade
Class: AI-B
Roll No. : 19
Subject: Computer Network

Assignment No.7

Report:

Selective Repeat Protocol:
Selective Repeat is a sliding window protocol used in computer networks for reliable data transfer between a sender and a receiver. It is an enhancement over the basic Go-Back-N protocol, providing better efficiency by allowing the receiver to acknowledge individual packets rather than just cumulative acknowledgments.

Key Features of Selective Repeat Protocol:

- Sliding Window:
  Like other sliding window protocols, Selective Repeat maintains a window of sent but unacknowledged packets at the sender's end and a window of expected packets at the receiver's end.

- Selective Retransmission:
  In Selective Repeat, the receiver individually acknowledges correctly received packets. If a packet is lost or corrupted, only that specific packet is retransmitted by the sender, unlike Go-Back-N where the sender has to retransmit all unacknowledged packets in the window.

- Buffering at Sender and Receiver:
  Both the sender and receiver maintain buffers to store packets. The sender keeps copies of sent packets until they are acknowledged, while the receiver buffers out-of-order packets until they can be delivered to the upper layer in sequence.

- Selective Acknowledgments (SACKs):
  The receiver sends selective acknowledgments indicating the highest in-order packet received and a list of out-of-order packets received.

Code:

```java
1   import java.util.*;
2
3   class Sender {
4       private int windowSize;
5       private List<Packet> packets;
6       private int base;
7       private int nextSeqNum;
8
9       public Sender(int windowSize) {
10          this.windowSize = windowSize;
11          this.packets = new ArrayList<>();
12          this.base = 0;
13          this.nextSeqNum = 0;
14      }
15
16      public void sendData() {
17          while (base < packets.size()) {
18              for (int i = base; i < Math.min(base + windowSize, packets.size()); i++) {
19                  // Simulate sending packet
20                  System.out.println("Sending packet with sequence number: " + packets.get(i).getSequenceNumber());
21              }
22
23              // Simulate waiting for ACKs
24              try {
25                  Thread.sleep(millis:2000); // Simulate network delay
26              } catch (InterruptedException e) {
27                  e.printStackTrace();
28              }
29
30              // Update base based on ACKs received
31              base = Math.max(base, nextSeqNum);
32          }
33      }

35      public void addPacket(String data) {
36          packets.add(new Packet(nextSeqNum, data));
37          nextSeqNum++;
38      }
39
40      public List<Packet> getPackets() {
41          return packets;
42      }
43  }
44
45
46  public class SelectiveRepeat {
        Run | Debug
47      public static void main(String[] args) {
48          Sender sender = new Sender(windowSize:3); // Window size of 3
49          Receiver receiver = new Receiver(3); // Window size of 3
50
51          // Simulate data transmission
52          sender.addPacket(data:"Packet 1");
53          sender.addPacket(data:"Packet 2");
54          sender.addPacket(data:"Packet 3");
55          sender.addPacket(data:"Packet 4");
56          sender.addPacket(data:"Packet 5");
57
58          // Simulate sending data from sender to receiver
59          sender.sendData();
60
61          // Simulate receiving data at receiver
62          for (Packet packet : sender.getPackets()) {
63              receiver.receiveData(packet);
64          }
65      }
```

Output:

```
PS C:\Users\ASUS Vivobook\Downloads\CN_Lab> javac SelectiveRepeat.java
PS C:\Users\ASUS Vivobook\Downloads\CN_Lab> java SelectiveRepeat
Sending packet with sequence number: 0
Sending packet with sequence number: 1
Sending packet with sequence number: 2
Received packet with sequence number: 0, Data: Packet 1
Sending ACK for packet with sequence number: 0
Received packet with sequence number: 1, Data: Packet 2
Sending ACK for packet with sequence number: 1
Received packet with sequence number: 2, Data: Packet 3
Sending ACK for packet with sequence number: 2
Received packet with sequence number: 3, Data: Packet 4
Sending ACK for packet with sequence number: 3
Received packet with sequence number: 4, Data: Packet 5
Sending ACK for packet with sequence number: 4
PS C:\Users\ASUS Vivobook\Downloads\CN_Lab> []
```