```
#include<sys/socket.h>
#include<stdio.h>
#include<unistd.h>
#include<string.h>
#include<stdlib.h>
#include <arpa/inet.h>
struct packet
{       int data;
        int seq;
};
struct ackn
{
        int seq;
        int ack;
};
void main()
{       int receiver,sender,len,c,t,wind,j,l,k,r,ran,f,i,n;
        int opt=1;
        struct ackn a[20];
        char buffer[1024];
        struct packet p[25];
        struct sockaddr_in senderadd,recvadr;
        receiver=socket(AF_INET,SOCK_STREAM,0);
        recvadr.sin_family=AF_INET;
         recvadr.sin_port=htons(2069);
         recvadr.sin_addr.s_addr=inet_addr("192.168.1.19");
        setsockopt(receiver, SOL_SOCKET,
              SO_REUSEADDR | SO_REUSEPORT, &opt,
              sizeof(opt));
        if (bind(receiver,(struct sockaddr*)&recvadr,sizeof(recvadr))<0)
           printf("Not Connected\n");
        listen(receiver,3);
       sender=accept(receiver,(struct sockaddr*)&senderadd,&len);
        i=read(sender,buffer,1024);
        buffer[i]='\0';
        printf("Received %s\n",buffer);
        send(sender,"hello",strlen("hello"),0);
        j=1;
        k=1;
      c=0;
        while(j<=4)
        {       r=read(sender,(char *)&p[j],sizeof(p[j]));
                j++;
        }
      t=4;
        j=1;
        n=8;
        while(c<8)
        {
                ran=rand()%3;
                if(ran==0)
        {       a[j].ack=-1;
```

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                    a[j].seq=p[j].seq;
                }
                else{ a[j].ack=1;
                    a[j].seq=p[j].seq;
                }

            if(a[j].ack==1)
            {  printf("Received Packet with data %d and seq %d\n",p[j].data,p[j].seq);
                    send(sender,(char*)&a[j],sizeof(a[j]),0);c++;j++;


             }
                else
                {   send(sender,(char*)&a[j],sizeof(a[j]),0);
                 printf("\n\n");
                    j++;    n++;

            }
                    if(t< n)
          { t++;read(sender,(char*)&p[t],sizeof(p[t])); }


        }


close(receiver);
}
```

```
#include<sys/socket.h>
#include<stdio.h>
#include<unistd.h>
#include<string.h>
#include <arpa/inet.h>
struct packet
{       int data;
        int seq;
};
struct ackn
{
        int seq;
        int ack;
};
void main()
{
  int sender,len,wind,j,l,k,c,i,r;
  struct ackn a;
   char buffer[1024];
   struct packet p[25];
  struct sockaddr_in receiver;
  sender=socket(AF_INET,SOCK_STREAM,0);
  receiver.sin_family=AF_INET;
  receiver.sin_port=htons(2069);
  receiver.sin_addr.s_addr=inet_addr("192.168.1.19");
   connect(sender,(struct sockaddr*)&receiver,sizeof(receiver));
  send(sender,"hai",strlen("hai"),0);

  i=read(sender,buffer,1024);
  buffer[i]='\0';
  printf("Received %s\n",buffer);

j=1;
l=1;
k=1;

printf("Sending frame \nNo: of frames=8\nWindow size=4\n");
while(j<=8)
{  printf("Enter frame data");
   scanf("%d",&p[j].data);
     p[j].seq=j;
        j++;

}
while(l<=4)
{       send(sender,(char*)&p[l],sizeof(p[l]),0);
        printf("sending packet with data %d and seq no %d\n",p[l].data,p[l].seq);
        l++;
}
c=0;
n=8;
while(c<8)
```

```
{
        r=read(sender,(char *)&a,sizeof(a));
        if (a.ack==1)
        {       c=c+1;
                printf("received ack for packet %d\n",a.seq);

         if(l<=8)
                {printf("sending packet with data %d and seq no %d\n",p[l].data,p[l].seq);
                send(sender,(char*)&p[l],sizeof(p[l]),0);
                l++;}
        }
        else if (a.ack==-1)
                {       printf("\n\ntime expired for packet %d\n",a.seq);
                        printf("resending packet with data %d and seq no %d\n",p
      [a.seq].data,a.seq);
                                send(sender,(char*)&p[a.seq],sizeof(p[a.seq]),0);

                        }


}

close(sender);
}
```