Computer Networks I

Assignment #2

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Description

The 1 bit sliding window protocol allows full duplex communication between two modules. Acknowledgements are piggy-backed on data frames and are numbered.

The **Algorithm** for the 1 bit sliding window is as follows :

```
void 1_bit_sliding_window(void) {
   seq_nr next_frame_to_send, next_frame_expected;
   frame r, s;
   packet buffer;
   event_type event;
                                     // Send 1st frame
   next_frame_to_send = 0;
   frame_expected = 0;
   from_network_layer(buffer);
   s.info = buffer;
   s.seq = next_frame_to_send;
   s.ack = 1 - frame_expected;
   to_physical_layer(s);
   start_timer(s.seq);
```

```
  while (true) {
    wait_for_event(event);
    if( event == frame_arrival) {
      from_physical_layer(r);
      if(r.seq == frame_expected) {      // If correct frame pass to
network
        to_network_layer(r.info);
        frame_expected =
          (frame_expected+1)%2;
      }
      if(r.ack == next_frame_to_send) {  // If correct ACK received get

new
        from_network_layer(buffer);      // frame to send
        next_frame_send =
          (next_frame_to_send+1)%2;
      }
    }
    s.info = buffer;                     // Send new frame or resend old
    s.seq = next_frame_to_send;          // frame if no ACK
    s.ack = 1 - frame_expected;
    to_physical_layer(s);
    start_timer(s.seq);
  }
}
```

Implementation

The simulation was modeled in JAVA using a multithreaded approach.

4 different threads were started for the 2 modules and the 2 channels.
The threads communicate through Pipe Communications sending packets to each other.

Analysis

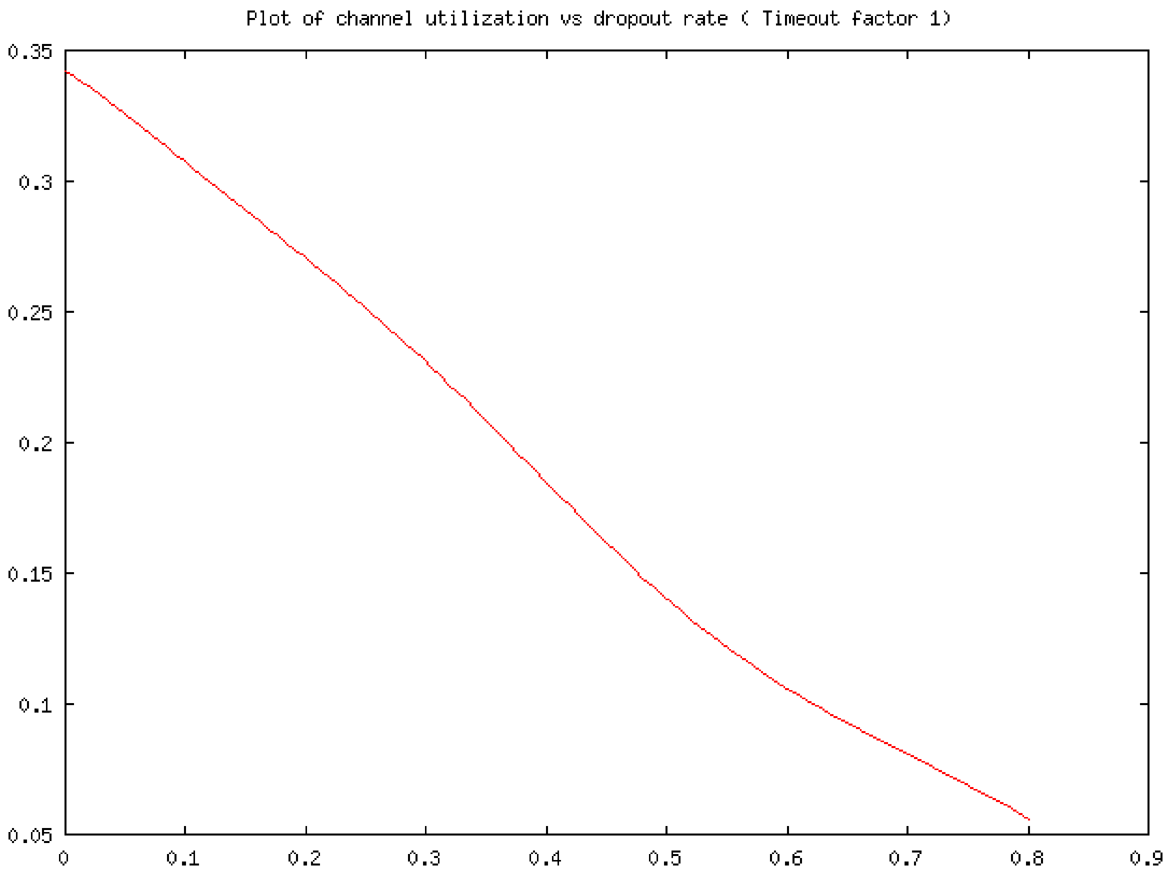
For the following analysis following parameters were assumed :

Datasize = 1024 bits
Headersize = 80 bits
Channel Bandwidth = 18 bits/unittime
Propagation delay = 3
Interrupt delay = 3
Additional Random delay = 0 to Roundtriptime/5

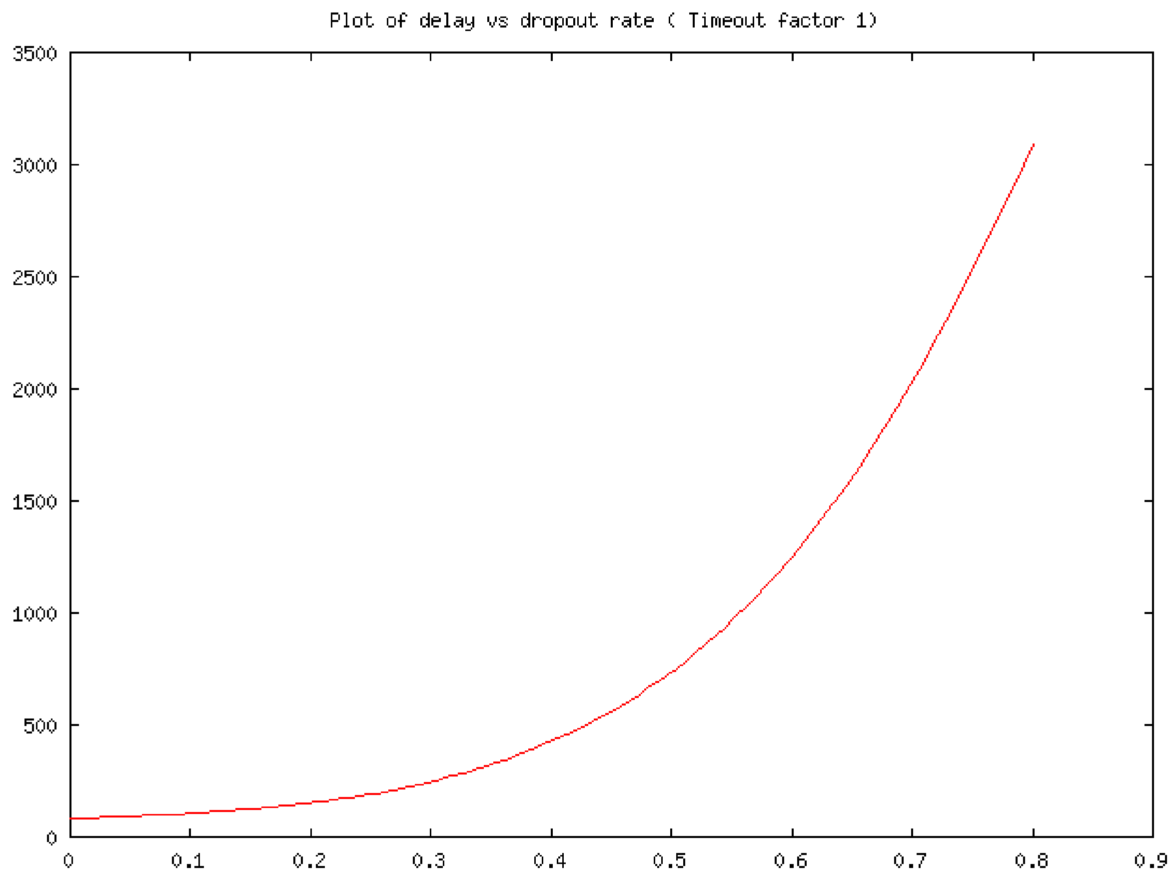
Please Note :
Timeout factor 1 corresponds to one roundtrip time.
Timeout factor 2 corresponds to twice the roundtrip time and so on.

Results :

Results for variation of droprate with timeout fixed

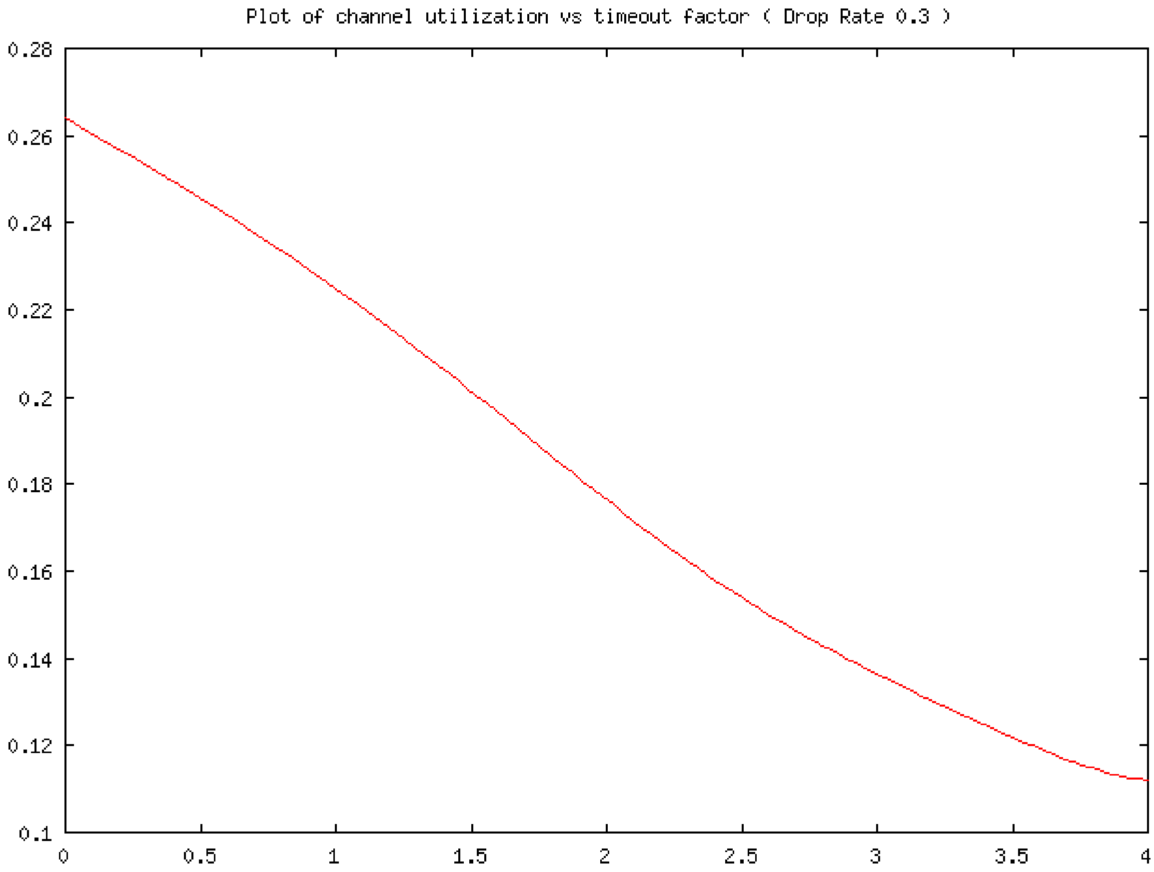


It is observed that channel util. falls rapidly as droprate is increased.

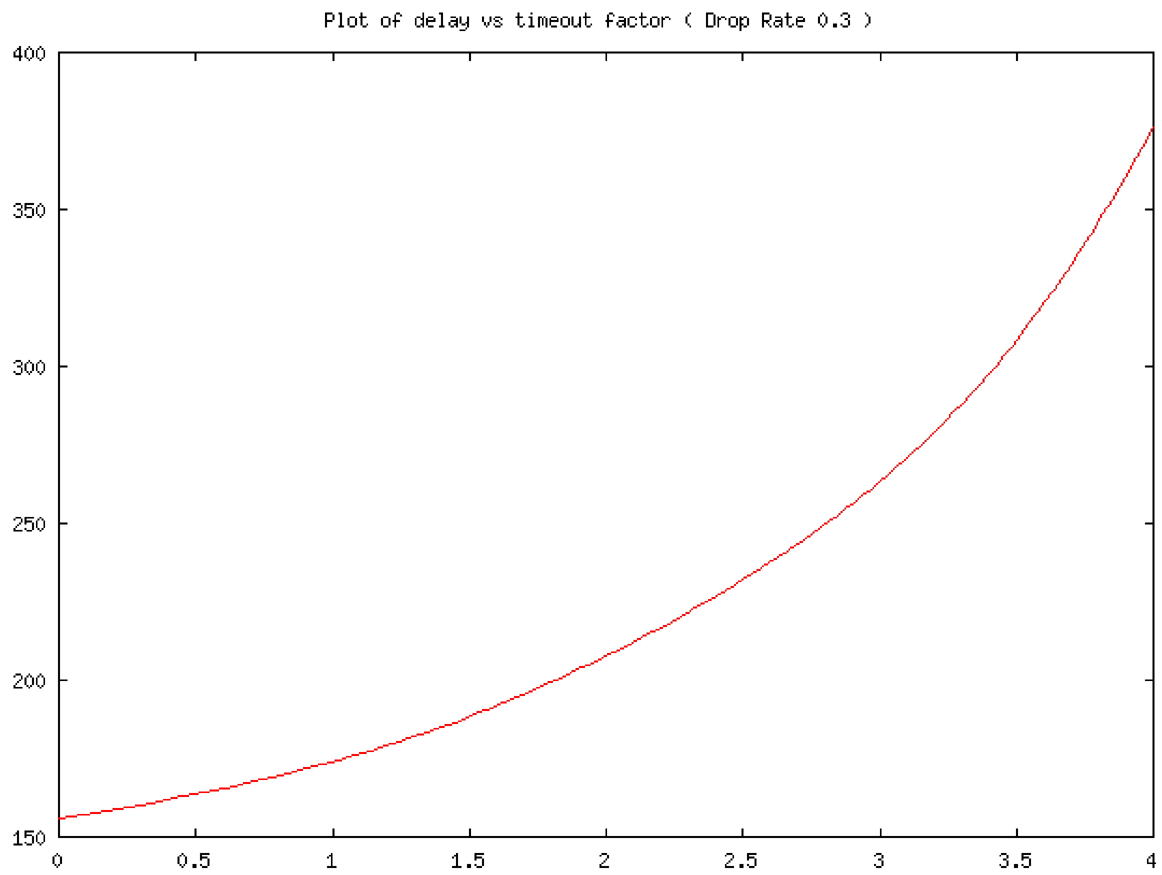


The delay rises very fast as the droprate is increased.

Results for variation of timeout value with droprate fixed



With increasing timeout values , the channel utilization falls.



With increasing timeout value , the delay rises rapidly.

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