

Part 2

Case1: protocol works for no loss + no corruption

-- * Network Simulator v1.0 * --

Enter number of messages to simulate (> 0): [10] 20

Enter packet loss probability (0.0 for no loss): [0.0]

Enter packet corruption probability (0.0 for no corruption): [0.0]

Enter average time between messages from sender's layer 5 (> 0.0): [1000]

Enter window size (> 0): [8]

Enter retransmission timeout (>0.0) [15.0]

Enter trace level (>= 0): [0] 3

Enter random seed: [0] 1334

generateNextArrival(): called

generateNextArrival(): time is 0.0

generateNextArrival(): future time for event 1 at entity 0 will be 990.0204474013489

EVENT time: 990.0204474013489 type: 1 entity: 0

generateNextArrival(): called

generateNextArrival(): time is 990.0204474013489

generateNextArrival(): future time for event 1 at entity 0 will be 1227.088229010895

A output START

Upper layer MSG at A:aaaaaaaaaaaaaaaaaaaa

toLayer3: seqnum: 0 acknum: -1 checksum: 1939 payload: aaaaaaaaaaaaaaaaaaaaaa

toLayer3: scheduling arrival on other side

toLayer3: seqnum:0 acknum:-1 checksum:1939 payload:aaaaaaaaaaaaaaaaaaaaa

stopTimer: stopping timer at 990.0204474013489

stopTimer: Warning: Unable to cancel your timer

stopTimer: stopping timer at 990.0204474013489

startTimer: starting timer at 990.0204474013489

startTimer: starting timer at 990.0204474013489

A output END

EVENT time: 995.725211340678 type: 2 entity: 1

B input START

B getting:aaaaaaaaaaaaaaaaaaaaa

Correct seq num. Expecting pkt:0, got pkt:0

toLayer3: seqnum:0 acknum:0 checksum:1940 payload:aaaaaaaaaaaaaaaaaaaaa

toLayer3: seqnum: 0 acknum: 0 checksum: 1940 payload: aaaaaaaaaaaaaaaaaaaaaa

toLayer3: scheduling arrival on other side

B input END

EVENT time: 998.1625415814691 type: 2 entity: 0
A input START
A got ACK from B, packet is: seqnum:0 acknum:0 checksum:1940
payload:aaaaaaaaaaaaaaaaaaaaa
stopTimer: stopping timer at 998.1625415814691
stopTimer: stopping timer at 998.1625415814691
Received ACK:0
A input END

EVENT time: 1227.088229010895 type: 1 entity: 0
generateNextArrival(): called
generateNextArrival(): time is 1227.088229010895
generateNextArrival(): future time for event 1 at entity 0 will be 2074.343089083529
A output START
Upper layer MSG at A:bbbbbbbbbbbbbbbbbbbb
toLayer3: seqnum: 1 acknum: -1 checksum: 1960 payload: bbbbbbbbbbbbbbbbbbbb
toLayer3: scheduling arrival on other side
toLayer3: seqnum:1 acknum:-1 checksum:1960 payload:bbbbbbbbbbbbbbbbbbbb
stopTimer: stopping timer at 1227.088229010895
stopTimer: Warning: Unable to cancel your timer
stopTimer: stopping timer at 1227.088229010895
startTimer: starting timer at 1227.088229010895
startTimer: starting timer at 1227.088229010895
A output END

EVENT time: 1231.9698171941282 type: 2 entity: 1
B input START
B getting:bbbbbbbbbbbbbbbbbbbb
Correct seq num. Expecting pkt:1, got pkt:1
toLayer3: seqnum:1 acknum:1 checksum:1962 payload:bbbbbbbbbbbbbbbbbbbb
toLayer3: seqnum: 1 acknum: 1 checksum: 1962 payload: bbbbbbbbbbbbbbbbbbbb
toLayer3: scheduling arrival on other side
B input END

EVENT time: 1233.5532090212714 type: 2 entity: 0
A input START
A got ACK from B, packet is: seqnum:1 acknum:1 checksum:1962
payload:bbbbbbbbbbbbbbbbbbbb
stopTimer: stopping timer at 1233.5532090212714
stopTimer: stopping timer at 1233.5532090212714
Received ACK:1
A input END

EVENT time: 2074.343089083529 type: 1 entity: 0
generateNextArrival(): called
generateNextArrival(): time is 2074.343089083529
generateNextArrival(): future time for event 1 at entity 0 will be 2765.709402752769
A output START
Upper layer MSG at A:cccccccccccccccccccc
toLayer3: seqnum: 2 acknum: -1 checksum: 1981 payload: ccccccccccccccccccc
toLayer3: scheduling arrival on other side
toLayer3: seqnum:2 acknum:-1 checksum:1981 payload:cccccccccccccccccccc
stopTimer: stopping timer at 2074.343089083529
stopTimer: Warning: Unable to cancel your timer
stopTimer: stopping timer at 2074.343089083529
startTimer: starting timer at 2074.343089083529
startTimer: starting timer at 2074.343089083529
A output END

EVENT time: 2079.7979064302494 type: 2 entity: 1
B input START
B getting:cccccccccccccccccccc
Correct seq num. Expecting pkt:2, got pkt:2
toLayer3: seqnum:2 acknum:2 checksum:1984 payload:cccccccccccccccccccc
toLayer3: seqnum: 2 acknum: 2 checksum: 1984 payload: ccccccccccccccccccc
toLayer3: scheduling arrival on other side
B input END

EVENT time: 2088.113376262703 type: 2 entity: 0
A input START
A got ACK from B, packet is: seqnum:2 acknum:2 checksum:1984 payload:cccccccccccccccccccc
stopTimer: stopping timer at 2088.113376262703
stopTimer: stopping timer at 2088.113376262703
Received ACK:2
A input END

...

Case2: ack is lost/corrupted

...

EVENT time: 3564.317758720664 type: 1 entity: 0

A output START

A sends packet seq no.1

Upper layer MSG at A:bbbbbbbbbbbbbbbbbbbb

toLayer3: seqnum:1 acknum:-1 checksum:1960 payload:bbbbbbbbbbbbbbbbbbbb

stopTimer: Warning: Unable to cancel your timer

stopTimer: stopping timer at 3564.317758720664

startTimer: starting timer at 3564.317758720664

A output END

EVENT time: 3572.2569353312783 type: 2 entity: 1

B input START

B receives packet seq no.1.
Send a corrupted ACK 1 to A

B getting:bbbbbbbbbbbbbbbbbbbb

Correct seq num. Expecting pkt:1, got pkt:1

toLayer3: seqnum:1 acknum:1 checksum:1962 payload:bbbbbbbbbbbbbbbbbbbb

toLayer3: packet being corrupted

B input END

EVENT time: 3577.2516861476483 type: 2 entity: 0

A input START

A got ACK from B, packet is: seqnum:1 acknum:999999 checksum:1962

payload:bbbbbbbbbbbbbbbbbbbb

A receives the corrupted ACK

A got Corrupted ACK/NAK from B

A input END

EVENT time: 3579.317758720664 type: 0 entity: 0

Timer interrupt A at local time:3579.317758720664

Timer: A retrans 1

toLayer3: seqnum:1 acknum:-1 checksum:1960 payload:bbbbbbbbbbbbbbbbbbbb

stopTimer: Warning: Unable to cancel your timer

Timeout for packet seq no.1
Resend packet seq no.1

stopTimer: stopping timer at 3579.317758720664

startTimer: starting timer at 3579.317758720664

EVENT time: 3586.956450086978 type: 2 entity: 1

B input START

B expects seq no.2 but
receives no.1 again.
Send duplicate ACK 1

B getting:bbbbbbbbbbbbbbbbbbbb

Expecting pkt:2, got pkt:1

B input END

EVENT time: 3592.3104647968994 type: 2 entity: 0 A get ACK 2 from B
A input START
A got ACK from B, packet is: seqnum:1 acknum:1 checksum:1962
payload:bbbbbbbbbbbbbbbbbbbb
stopTimer: stopping timer at 3592.3104647968994
Received ACK:1
A input END
...

In GBN protocol, if the ACK is corrupted and received by A, A will retransmit the packet when timeout.

Case3: data packet is lost/corrupted, and data is retransmitted after RTO

...

EVENT time: 6573.564867091892 type: 1 entity: 0
A output START
Upper layer MSG at A:ffffffffffffffff
toLayer3: packet being lost
toLayer3: seqnum:5 acknum:-1 checksum:2044 payload:ffffffffffffffff
stopTimer: Warning: Unable to cancel your timer
stopTimer: stopping timer at 6573.564867091892 A send packet seq no.5 but is lost halfway
startTimer: starting timer at 6573.564867091892
A output END

EVENT time: 6588.564867091892 type: 0 entity: 0
Timer interrupt A at local time:6588.564867091892 Timeout for seq no.5
Timer: A retrans 5 Resend seq no.5
toLayer3: seqnum:5 acknum:-1 checksum:2044 payload:ffffffffffffffff
stopTimer: Warning: Unable to cancel your timer
stopTimer: stopping timer at 6588.564867091892
startTimer: starting timer at 6588.564867091892

EVENT time: 6594.119388409071 type: 2 entity: 1
B input START
B getting:ffffffffffffffff

B receives correct seq no.5

Correct seq num. Expecting pkt:5, got pkt:5

toLayer3: seqnum:5 acknum:5 checksum:2050 payload:ffffffffffffffff

toLayer3: packet being lost

B input END

...

Case4: data packet is lost/corrupted, and data is retransmitted after receiving duplicate ack

...

EVENT time: 163.81725516525773 type: 1 entity: 0

A output START

Upper layer MSG at A:eeeeeeeeeeeeeeeeeeee

A sends seq no.4 to B, but is lost halfway

toLayer3: packet being lost

toLayer3: seqnum:4 acknum:-1 checksum:2023 payload:eeeeeeeeeeeeeeeeeeee

stopTimer: stopping timer at 163.81725516525773

startTimer: starting timer at 163.81725516525773

A output END

EVENT time: 191.07028412732322 type: 1 entity: 0

A output START

Upper layer MSG at A:ffffffffffffffffffff

toLayer3: seqnum:5 acknum:-1 checksum:2044 payload:ffffffffffffffffffff

stopTimer: stopping timer at 191.07028412732322

startTimer: starting timer at 191.07028412732322

A sends seq no.5 to B

A output END

EVENT time: 198.31373027741324 type: 2 entity: 1

B input START

B getting:ffffffffffffffffffff

B receives seq no.5, but is expecting no.4 which is lost earlier.

Expecting pkt:4, got pkt:5

Send ACK 3

B input END

EVENT time: 205.7208777123325 type: 2 entity: 0

A input START

A got ACK from B, packet is: seqnum:3 acknum:3 checksum:2006

payload:dddddddddddddddddd

stopTimer: stopping timer at 205.7208777123325

A receives ACK 3

Received ACK:3

A input END

EVENT time: 217.92657246620075 type: 1 entity: 0

A output START
Upper layer MSG at A: eeeeeeeeeeeeeeeeeee A resend seq no.4
toLayer3: packet being lost
toLayer3: seqnum:4 acknum:-1 checksum:2023 payload:eeeeeeeeeeeeeeeeee
stopTimer: Warning: Unable to cancel your timer
stopTimer: stopping timer at 217.92657246620075
startTimer: starting timer at 217.92657246620075
A output END
...

Case5: data packet is lost/corrupted, and the retransmitted data is delivered. No cumulative ack because receiver only ACK the correctly and in-order arrived packets.

Compare

Unlike Selective Repeat, GBN's receiver only ACKs the correctly received and in-order packets. And when timeout or NAK for packet N, sender retransmits from N all over again.