**PA #2 – Part I**

**Implementing Selective-Repeat with cumulative ACKs**

**Ziqi Tan U 88387934 ziqi1756@bu.edu**

**Xueyan Xia U 82450191 xueyanx@bu.edu**

# **0 How to run this protocol?**

1. Open folder “src” and find “Project.java”.
2. Turn to the bottom of “Project.java” and uncomment

simulator = **new** SelectiveRepeatSimulator(numOfMessages, loss, corrupt, delay, trace, seed, windowsize, timeout);

1. Run “Project.java”.

# **1 Stop & Wait (window = 1)**

## **Case 1: works for no loss and no corruption**

**Input values**

* Number of messages to simulate: 100
* Packet loss probability: 0.0
* Packet corruption probability: 0.0
* Average time between messages from sender’s layer 5: 300
* **Window size: 1**
* Retransmission timeout: 30
* Trace level: 3
* Random seed: 1234

**Part of output in the terminal**

-- \* Network Simulator v1.0 \* --

Enter number of messages to simulate (> 0): [10] 100

Enter packet loss probability (0.0 for no loss): [0.0] 0

Enter packet corruption probability (0.0 for no corruption): [0.0] 0

Enter average time between messages from sender's layer 5 (> 0.0): [1000] 300

Enter window size (> 0): [8] 1

Enter retransmission timeout (>0.0) [15.0] 30

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

Enter random seed: [0] 1234

generateNextArrival(): called

generateNextArrival(): time is 0.0

generateNextArrival(): future time for event 1 at entity 0 will be 65.1509140293588

EVENT time: 65.1509140293588 type: 1 entity: 0

generateNextArrival(): called

generateNextArrival(): time is 65.1509140293588

generateNextArrival(): future time for event 1 at entity 0 will be 101.0406811731315

Calling aOutput()...

toLayer3: seqnum: 0 acknum: 0 checksum: 3029525244 payload: aaaaaaaaaaaaaaaaaaaa

toLayer3: scheduling arrival on other side

startTimer: starting timer at 65.1509140293588

EVENT time: 67.37757499923703 type: 2 entity: 1

Calling bInput()...

toLayer3: seqnum: 0 acknum: 0 checksum: 4108050209 payload:

toLayer3: scheduling arrival on other side

EVENT time: 69.2864467299417 type: 2 entity: 0

Calling aInput()...

stopTimer: stopping timer at 69.2864467299417

EVENT time: 101.0406811731315 type: 1 entity: 0

generateNextArrival(): called

generateNextArrival(): time is 101.0406811731315

generateNextArrival(): future time for event 1 at entity 0 will be 124.9732963042085

Calling aOutput()...

toLayer3: seqnum: 1 acknum: 0 checksum: 2281148032 payload: bbbbbbbbbbbbbbbbbbbb

toLayer3: scheduling arrival on other side

startTimer: starting timer at 101.0406811731315

EVENT time: 102.46888637958922 type: 2 entity: 1

Calling bInput()...

toLayer3: seqnum: 0 acknum: 1 checksum: 2212294583 payload:

toLayer3: scheduling arrival on other side

toLayer3: seqnum: 0 acknum: 1 checksum: 2212294583 payload:

toLayer3: scheduling arrival on other side

…

…

Simulator terminated at time 30186.773277993096

**Statistics**

===============STATISTICS=======================

Number of original packets transmitted by A: 100

Number of retransmissions by A: 0

Number of data packets delivered to layer 5 at B: 100

Number of ACK packets sent by B: 150

Number of corrupted packets: 0

Ratio of lost packets: 0.00%

Ratio of corrupted packets: 0.00%

Average RTT: 10.340

Average communication time: 10.340

==================================================

## **Case 2: works for loss and no corruption**

**Input values**

- Number of messages to simulate: 100

- Packet loss probability: 0.1

- Packet corruption probability: 0.0

- Average time between messages from sender’s layer 5: 300

- Window size: 1

- Retransmission timeout: 30

- Trace level: 3

- Random seed: 1234

**Recovery from DATA loss and error detection by bimeout**

EVENT time: 101.0406811731315 type: 1 entity: 0

generateNextArrival(): called

generateNextArrival(): time is 101.0406811731315

generateNextArrival(): future time for event 1 at entity 0 will be 124.9732963042085

Calling aOutput()...

**toLayer3: seqnum: 1 acknum: 0 checksum: 2281148032 payload: bbbbbbbbbbbbbbbbbbbb**

**toLayer3: packet being lost**

startTimer: starting timer at 101.0406811731315

EVENT time: 124.9732963042085 type: 1 entity: 0

generateNextArrival(): called

generateNextArrival(): time is 124.9732963042085

generateNextArrival(): future time for event 1 at entity 0 will be 357.98211615344707

Calling aOutput()...

EVENT time: 131.0406811731315 type: 0 entity: 0

Calling aTimerInterrupt()...

toLayer3: seqnum: 1 acknum: 0 checksum: 2281148032 payload: bbbbbbbbbbbbbbbbbbbb

toLayer3: scheduling arrival on other side

startTimer: starting timer at 131.0406811731315

EVENT time: 132.4688863795892 type: 2 entity: 1

Calling bInput()...

toLayer3: seqnum: 0 acknum: 1 checksum: 2212294583 payload:

toLayer3: scheduling arrival on other side

EVENT time: 134.43626209295937 type: 2 entity: 0

Calling aInput()... Receive ACK=0

**Recovery from ACK loss and error detection by timeout**

EVENT time: 2803.921231727042 type: 2 entity: 1

Calling bInput()...

**toLayer3: seqnum: 0 acknum: 0** checksum: 4108050209 payload:

**toLayer3: packet being lost**

EVENT time: 2830.372325815607 type: 0 entity: 0

**Calling aTimerInterrupt()...**

**toLayer3: seqnum: 0 acknum: 0** checksum: 3924856370 payload: kkkkkkkkkkkkkkkkkkkk

toLayer3: scheduling arrival on other side

startTimer: starting timer at 2830.372325815607

EVENT time: 2839.928464613788 type: 2 entity: 1

Calling bInput()...

**toLayer3: seqnum: 0 acknum: 0** checksum: 4108050209 payload:

toLayer3: scheduling arrival on other side

EVENT time: 2842.5797601245154 type: 2 entity: 0

**Calling aInput()...**

stopTimer: stopping timer at 2842.5797601245154

**Statistics**

===============STATISTICS=======================

Number of original packets transmitted by A: 100

Number of retransmissions by A: 28

Number of data packets delivered to layer 5 at B: 100

Number of ACK packets sent by B: 157

Number of corrupted packets: 0

Ratio of lost packets: 9.82%

Ratio of corrupted packets: 0.00%

Average RTT: 12.630

Average communication time: 274.947

==================================================

## **Case 3: works for corruption and no loss**

Input values

- Number of messages to simulate: 100

- Packet loss probability: 0.0

- Packet corruption probability: 0.1

- Average time between messages from sender’s layer 5: 300

- Window size: 1

- Retransmission timeout: 30

- Trace level: 3

- Random seed: 1234

**Recovery from DATA corruption and error detection by timeout**

**Recovery from ACK corruption and error detection by time out**

## **Case 4: works for both loss and corruption**

# **2 Selective Repeat (window > 1)**

- number of messages = 26

- loss probability = 0.1

- corruption probability = 0.1

- average time between messages from sender's layer 5

- trace level = 3