Computer Communications and Networks

Project-2

GBN and SR Implementation

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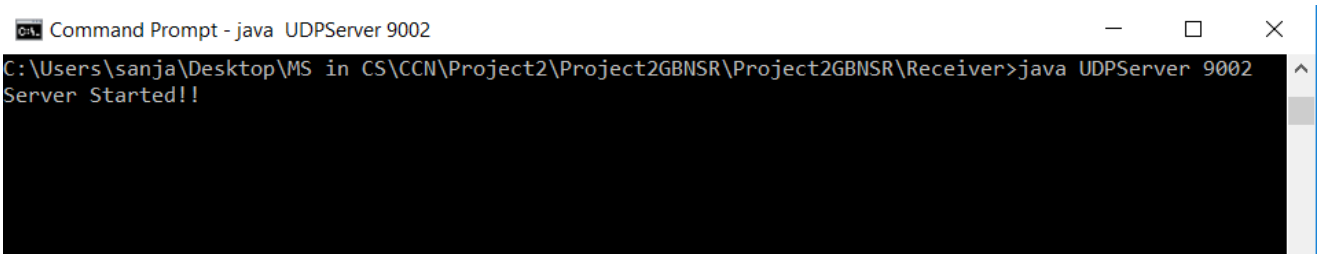
Implementation –

We implemented sliding window protocols - GBN and SR using Java programming language and UDP sockets for communication between sender and receiver.

Go Back N –

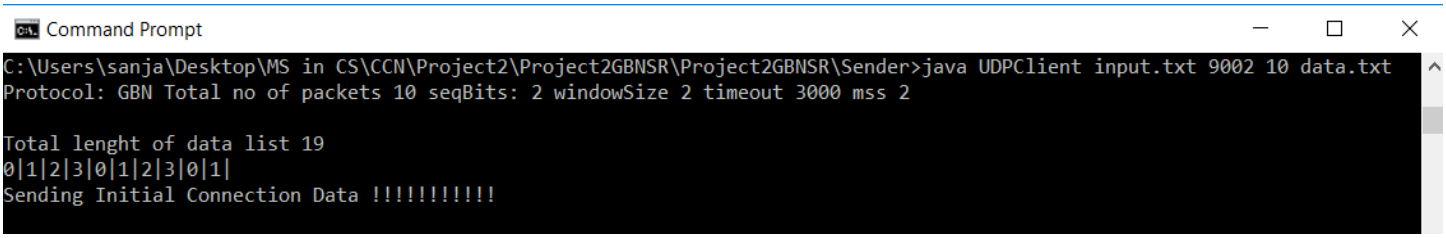
Receiver Side – Receiver will take the following arguments –

java UDPServer 9002



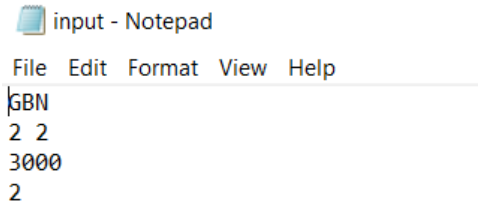
Sender Side – Sender will take the following arguments –

java UDPClient input.txt 9002 10 data.txt



where,

input.txt is the initial file sent to receiver. It contains –



data.txt is the data file sent to receiver

10 is the number of packets

GBN Working – Here the ack number 'n' means that packet 'n' has been received correctly.

a) Firstly, sender sends an initial connection data (input.txt) containing the information about Protocol name (GBN), Total number of packets (10), sequence number bits (2), window size (2), and MSS.
b) Sender will send packet 0 and packet 1 to receiver and wait for acknowledgement. Here, the timer will be started for packet 0. See Figure 1.1.
c) On Receiver side, it will receive packet 0 and sends ack number '0' to sender. It also sends ack number '1' after receiving packet 1 correctly and deliver the data to the application layer. See Figure 1.2.
d) Figure 1.3 shows the scenario of **bit error**. Sender sends packet 4 which has checksum error. Receiver receives the packet 4 and discards it after knowing that it is corrupted. Also, the incoming packet 5 is also discarded because Receiver is expecting packet 4. Sends ack number 3 to sender.
e) Figure 1.4 shows the scenario of **timeout**. Timeout occurs for packet 2. Therefore, sender sends the packet 2 and 3 (currently in window) again.
f) Figure 1.5 shows the scenario of **ack lost.** Ack for packet 8 got lost but on receiving ack for packet 9, sender determines that packet 8 and 9 both got received.
g) Figure 1.6 shows the scenario of **lost packet** while going to Server. Packet 2 got lost. So, Server discards the incoming packet 3 and sends the ack number for packet 1 which was previously correctly received.

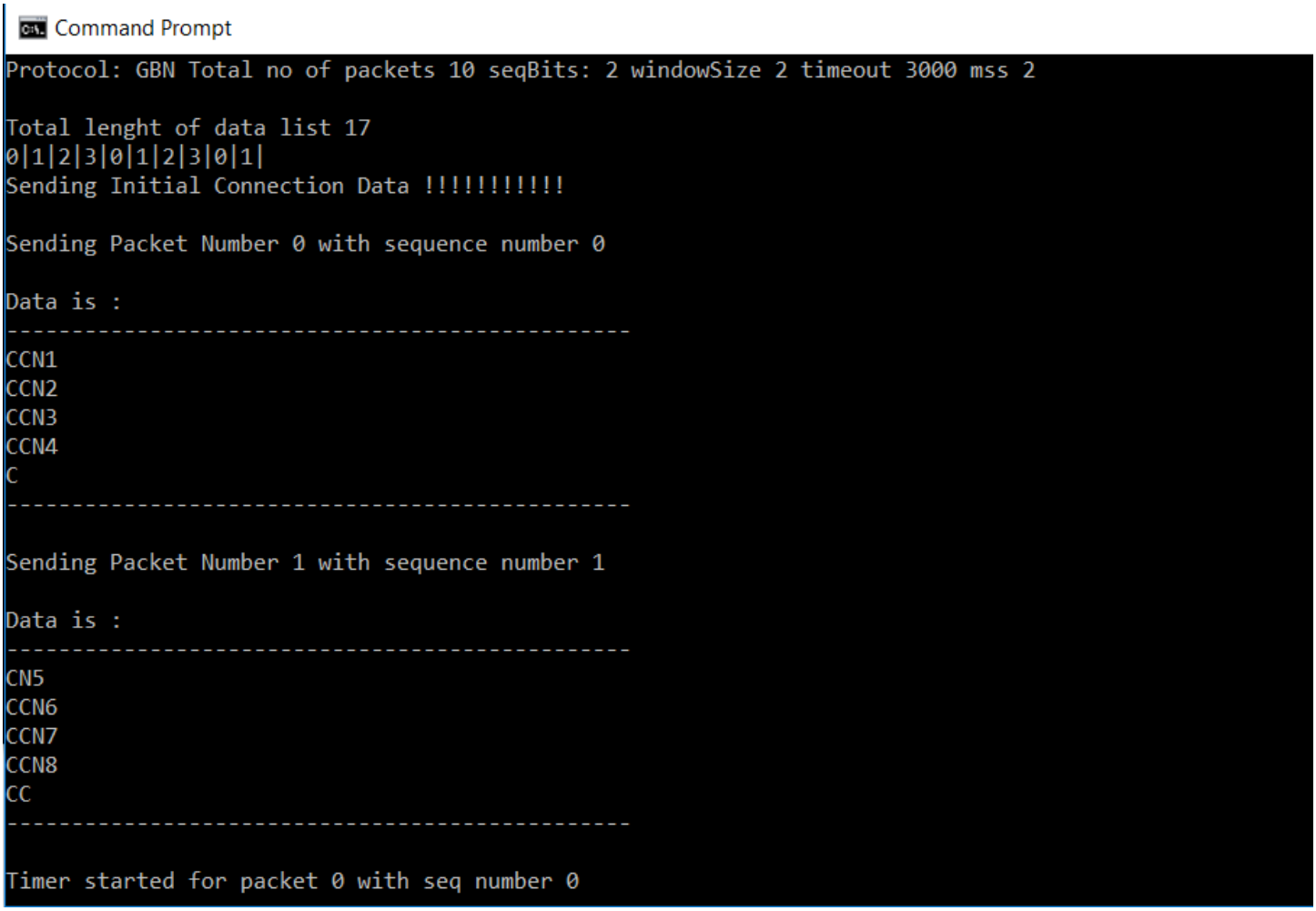

Command Prompt
Protocol: GBN Total no of packets 10 seqBits: 2 windowSize 2 timeout 3000 mss 2
Total lenght of data list 17
0|1|2|3|0|1|2|3|0|1|
Sending Initial Connection Data !!!!!!!!!!
Sending Packet Number 0 with sequence number 0
Data is :
CCN1
CCN2
CCN3
CCN4
C
Sending Packet Number 1 with sequence number 1
Data is :
CN5
CCN6
CCN7
CCN8
CC
Timer started for packet 0 with seq number 0

Figure 1.1

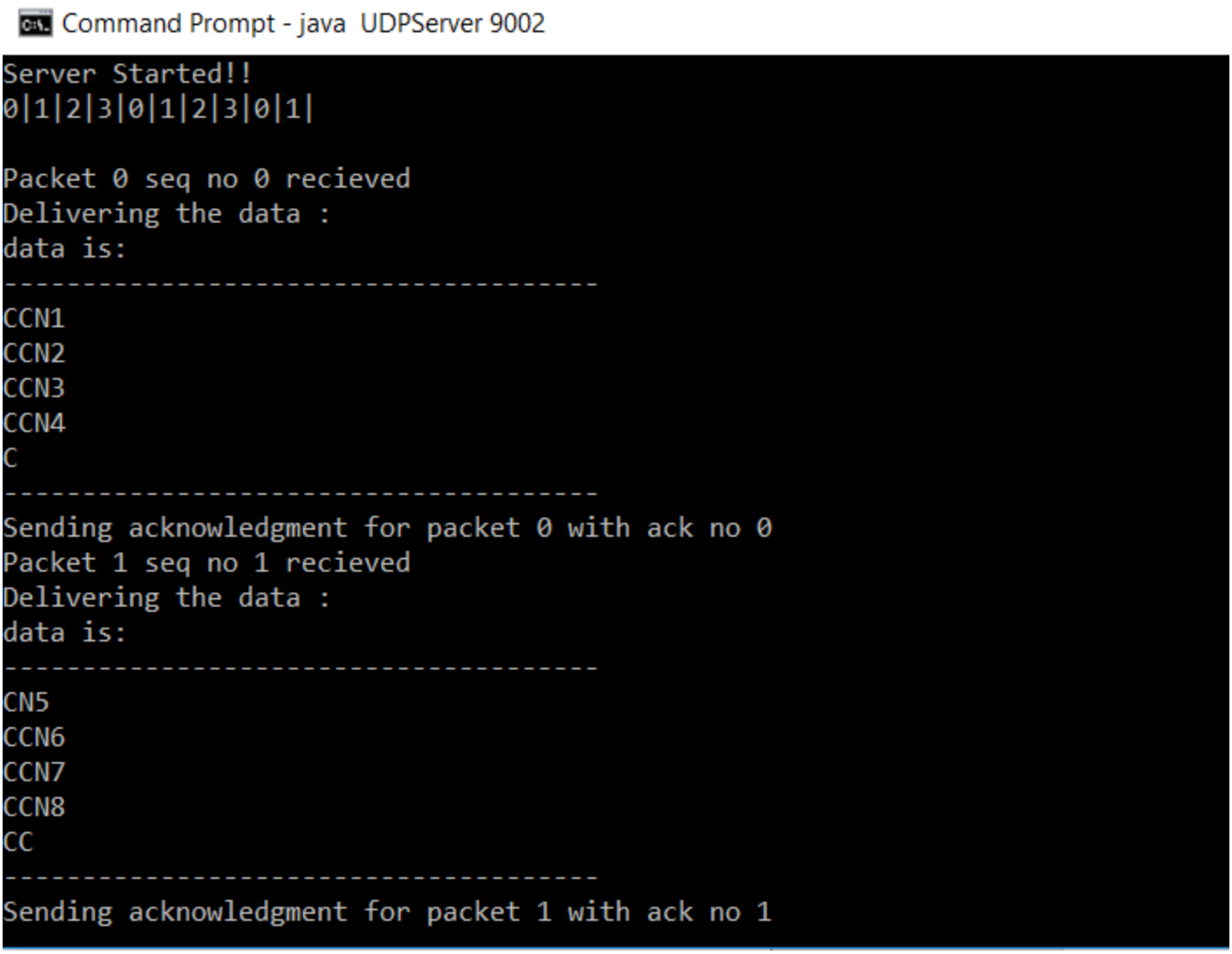

Command Prompt - java UDPServer 9002
Server Started!!
0|1|2|3|0|1|2|3|0|1|
Packet 0 seq no 0 recieved
Delivering the data :
data is:
CCN1
CCN2
CCN3
CCN4
C
Sending acknowledgment for packet 0 with ack no 0
Packet 1 seq no 1 recieved
Delivering the data :
data is:
CN5
CCN6
CCN7
CCN8
CC
Sending acknowledgment for packet 1 with ack no 1

Figure 1.2

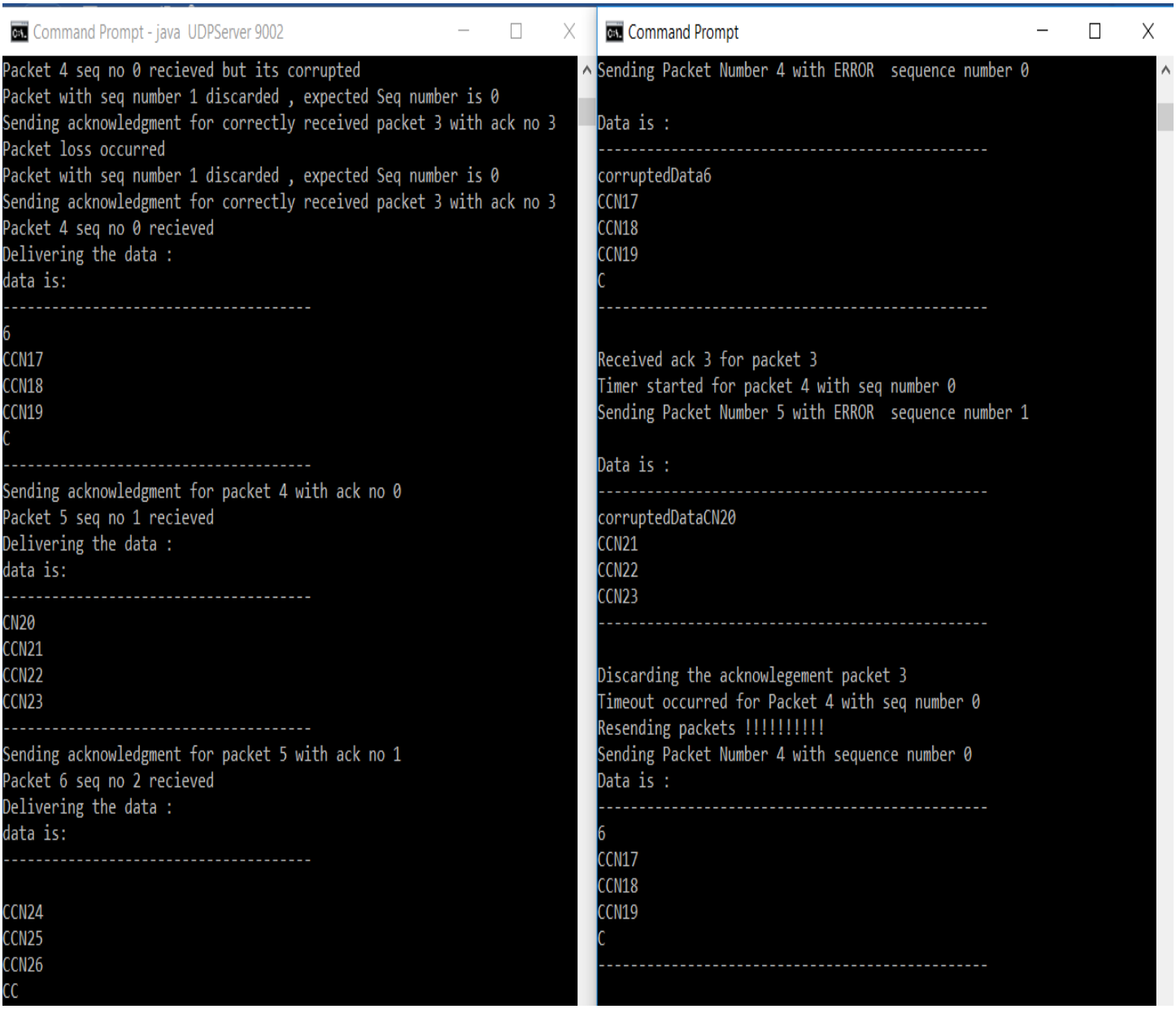

Command Prompt - java UDPServer 9002
Packet 4 seq no 0 recieved but its corrupted
Packet with seq number 1 discarded , expected Seq number is 0
Sending acknowledgment for correctly received packet 3 with ack no 3
Packet loss occurred
Packet with seq number 1 discarded , expected Seq number is 0
Sending acknowledgment for correctly received packet 3 with ack no 3
Packet 4 seq no 0 recieved
Delivering the data :
data is:
6
CCN17
CCN18
CCN19
C
Sending acknowledgment for packet 4 with ack no 0
Packet 5 seq no 1 recieved
Delivering the data :
data is:
CN20
CCN21
CCN22
CCN23
Sending acknowledgment for packet 5 with ack no 1
Packet 6 seq no 2 recieved
Delivering the data :
data is:
CCN24
CCN25
CCN26
CC
Command Prompt
Sending Packet Number 4 with ERROR sequence number 0
Data is :
corruptedData6
CCN17
CCN18
CCN19
C
Received ack 3 for packet 3
Timer started for packet 4 with seq number 0
Sending Packet Number 5 with ERROR sequence number 1
Data is :
corruptedDataCN20
CCN21
CCN22
CCN23
Discarding the acknowlegement packet 3
Timeout occurred for Packet 4 with seq number 0
Resending packets !!!!!!!!!!
Sending Packet Number 4 with sequence number 0
Data is :
6
CCN17
CCN18
CCN19
C

Figure 1.3

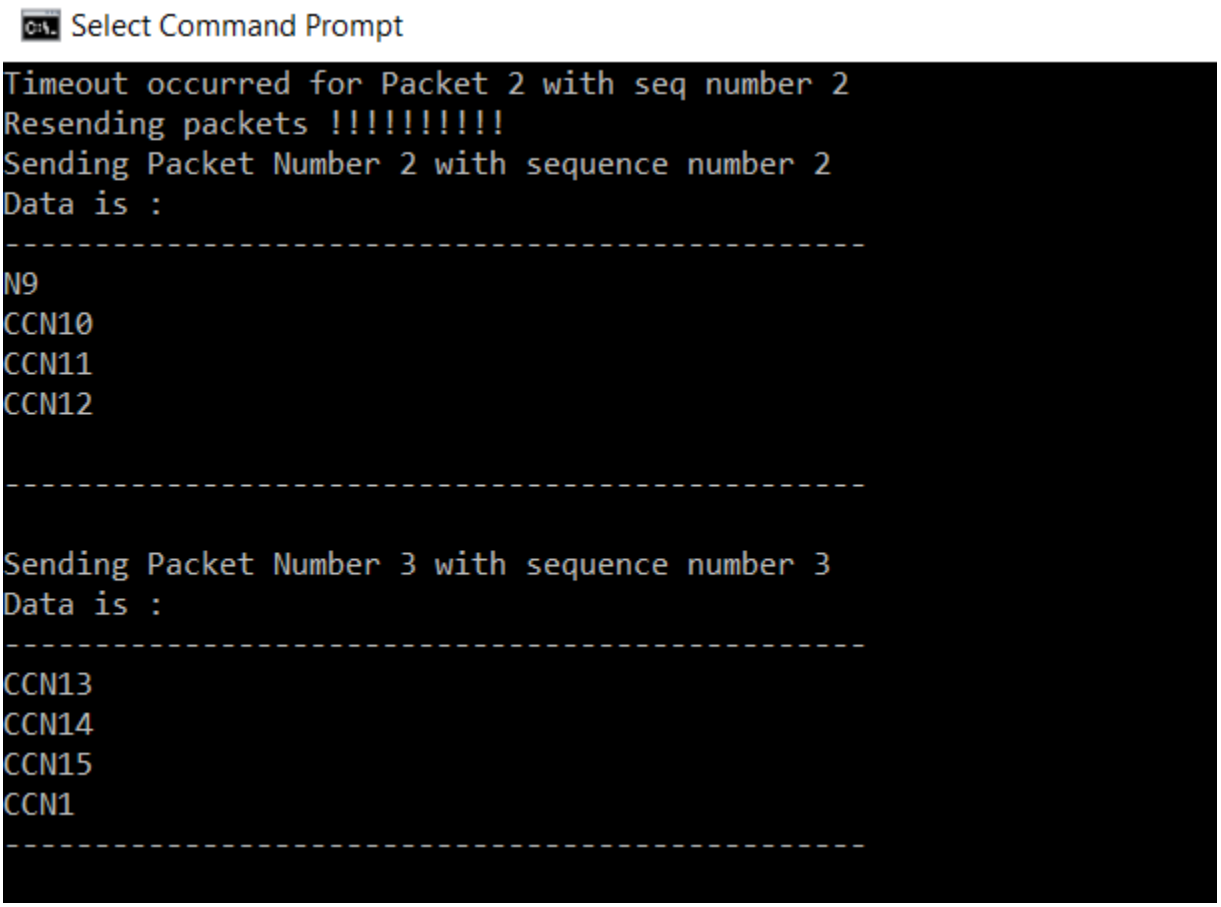


Figure 1.4

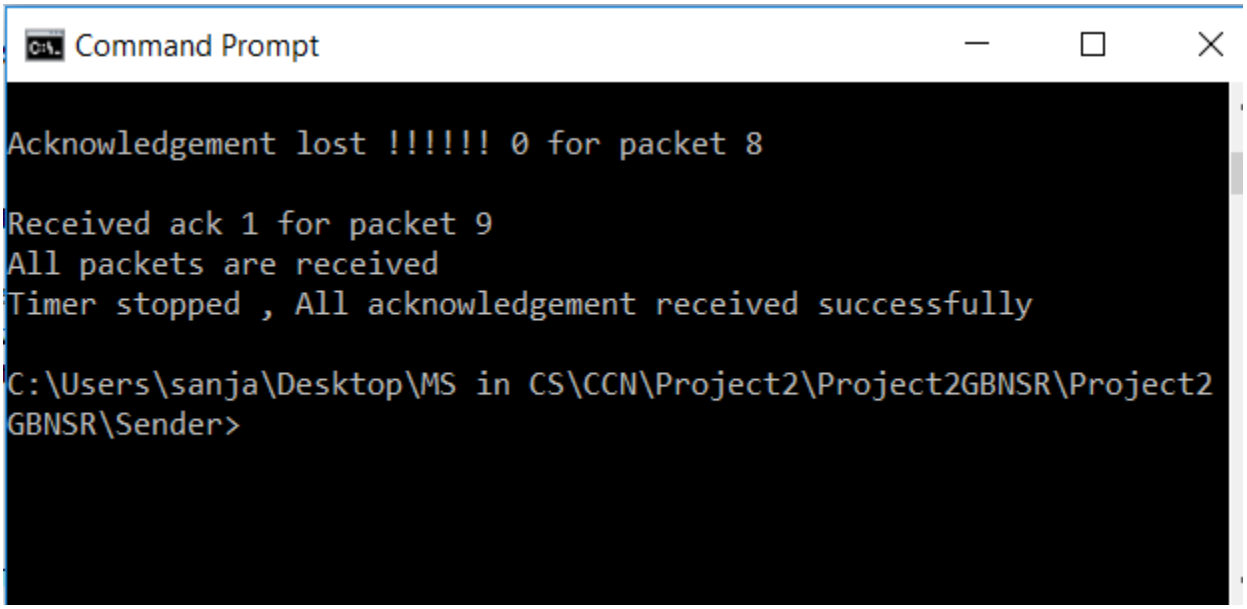
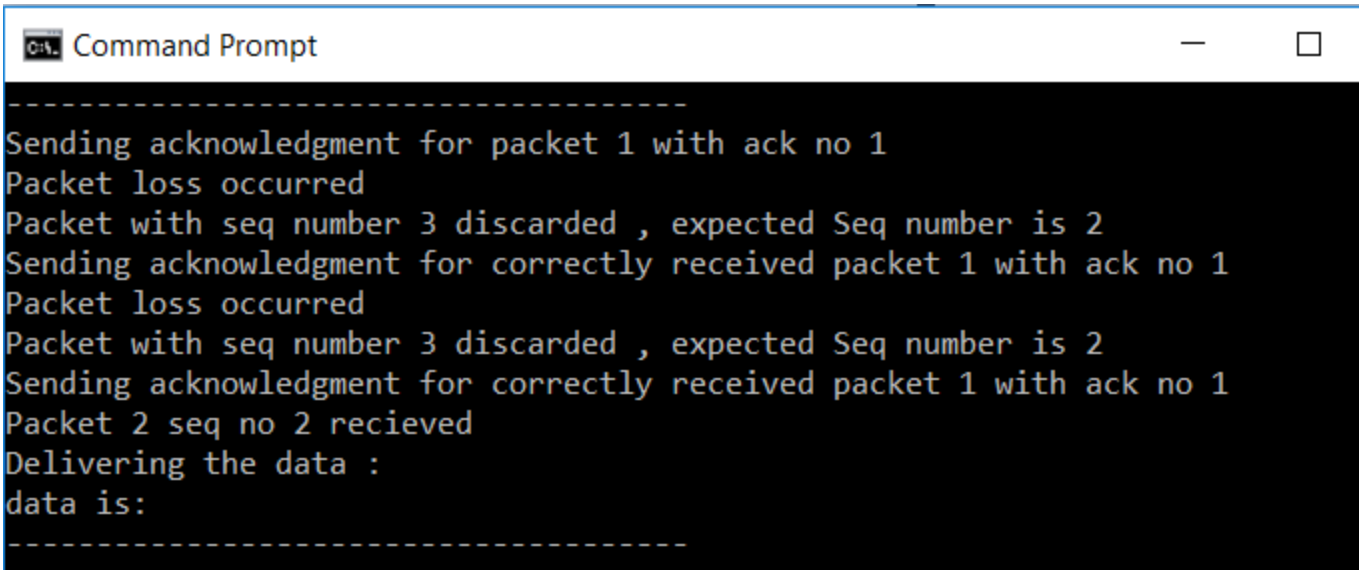


Figure 1.5


Command Prompt

Sending acknowledgment for packet 1 with ack no 1
Packet loss occurred
Packet with seq number 3 discarded , expected Seq number is 2
Sending acknowledgment for correctly received packet 1 with ack no 1
Packet loss occurred
Packet with seq number 3 discarded , expected Seq number is 2
Sending acknowledgment for correctly received packet 1 with ack no 1
Packet 2 seq no 2 recieved
Delivering the data :
data is:

Figure 1.6

Selective Repeat –

Receiver Side – Receiver will take the following arguments –

java UDPServer 9002

Sender Side – Sender will take the following arguments –

java UDPClient input.txt 9002 10 data.txt

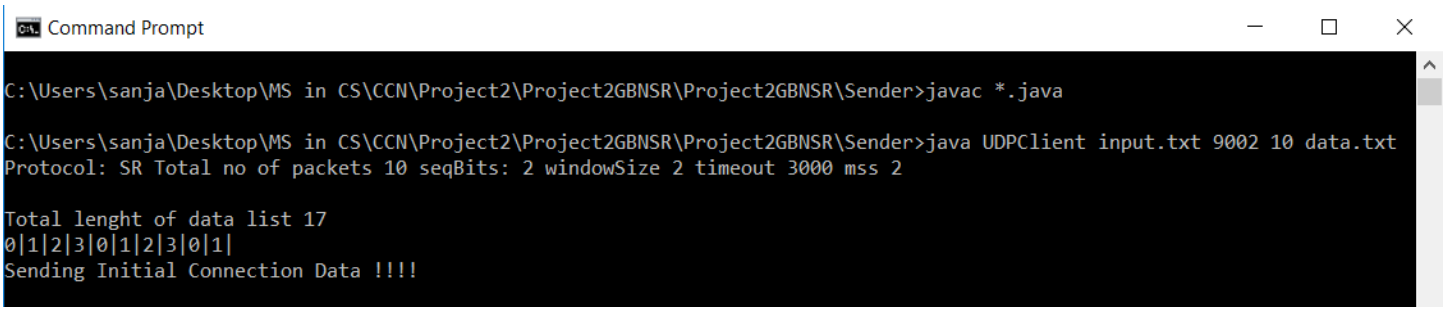
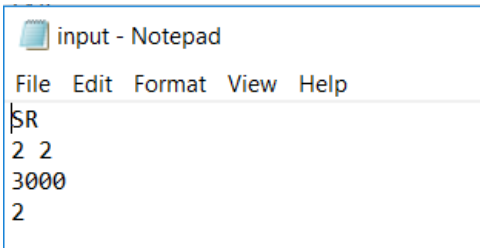


Figure 2.1

The input.txt contains –



SR Working –

a) Firstly, sender sends an initial connection data (input.txt) containing the information about Protocol name (SR), Total number of packets (10), sequence number bits (2), window size (2), and MSS.
b) Sender will send packet 0 and packet 1 to receiver and wait for acknowledgement. Here, the timer will be started for packet 0. See Figure 2.2.
c) On receiving ack 0, window slides and packet 2 is sent. But **packet** 2 got **lost**. Figure 2.3 shows the scenario of packet lost.
d) Figure 2.4 shows the scenario for **bit error**. Sender sends packet 2 but it got checksum error. So, at receiver, packet 2 will be discarded.
e) Figure 2.5 shows the scenario of buffering of out-of-order packets. Sender sends packet 4 but receiver is expecting packet 3. So, packet 4 will be buffered at receiver side.
f) Figure 2.6 shows the scenario of **lost ack** number. Sender sends packet 8. It got received successfully by the receiver but its ack got lost. So, when a timeout occurs for packet 8, it will be resent to the receiver.

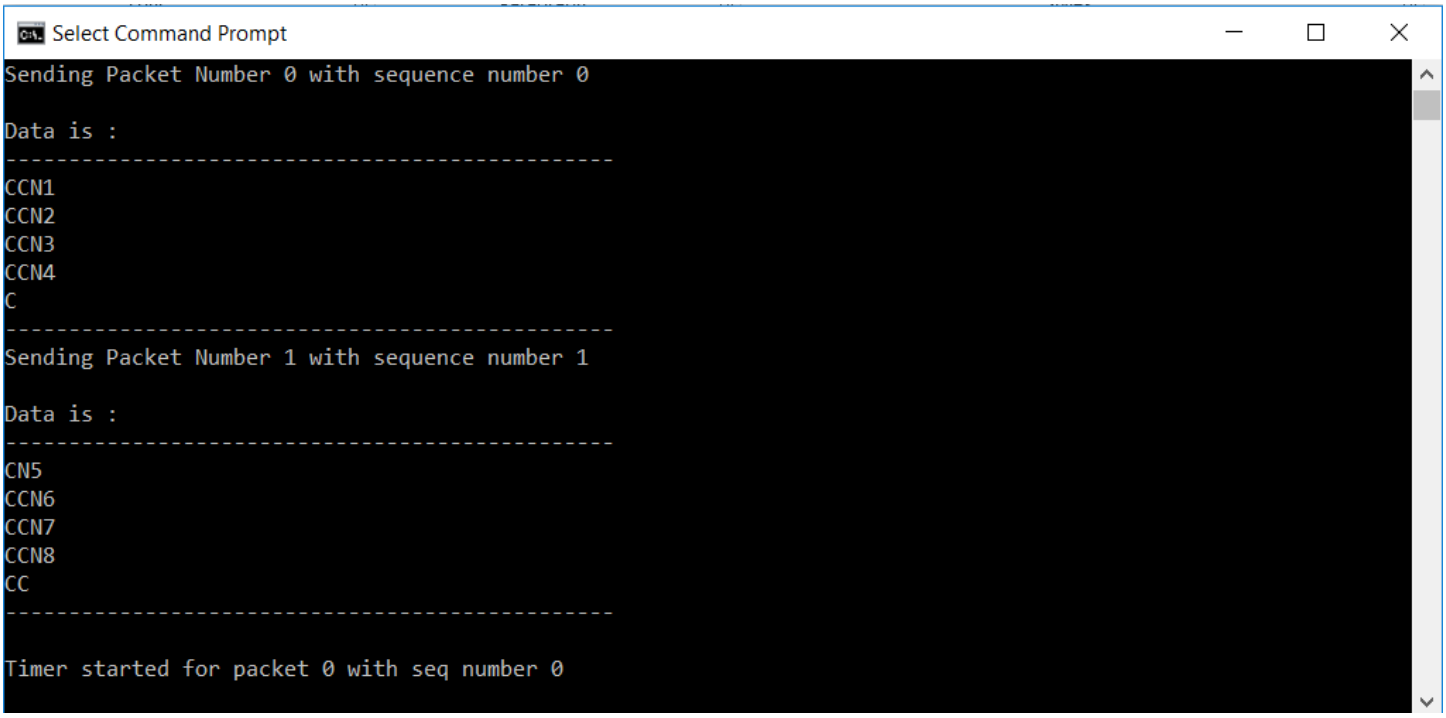


Figure 2.2

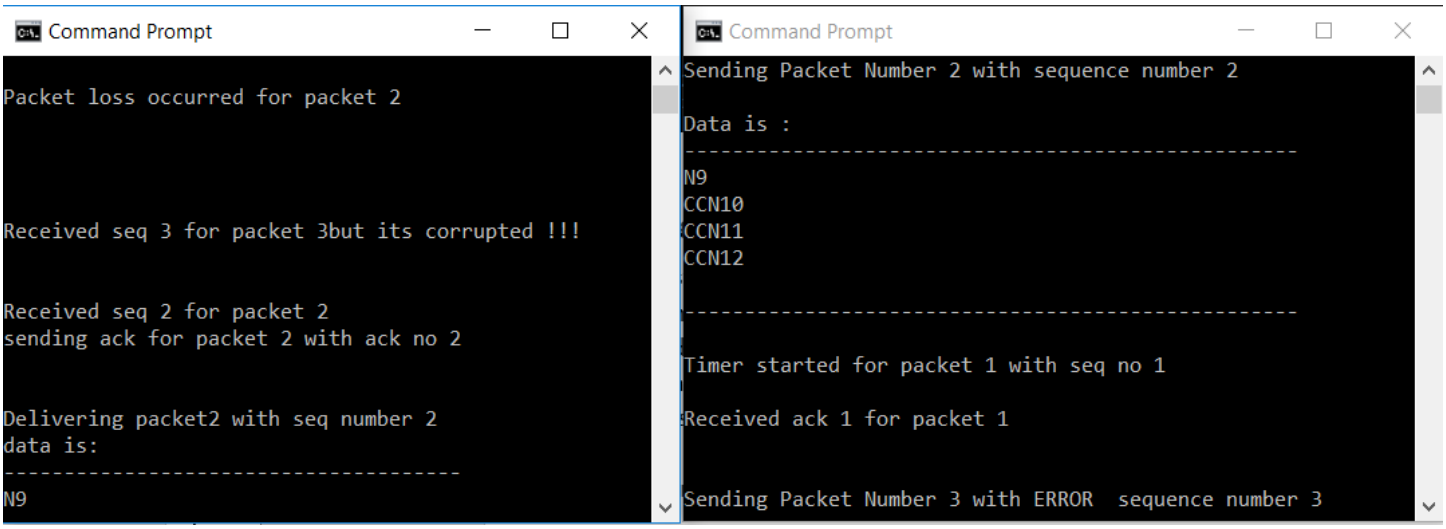


Figure 2.3

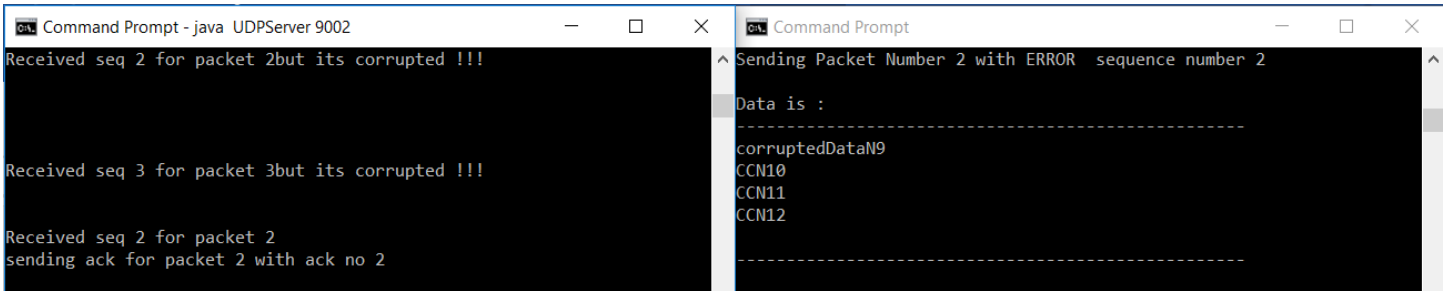


Figure 2.4

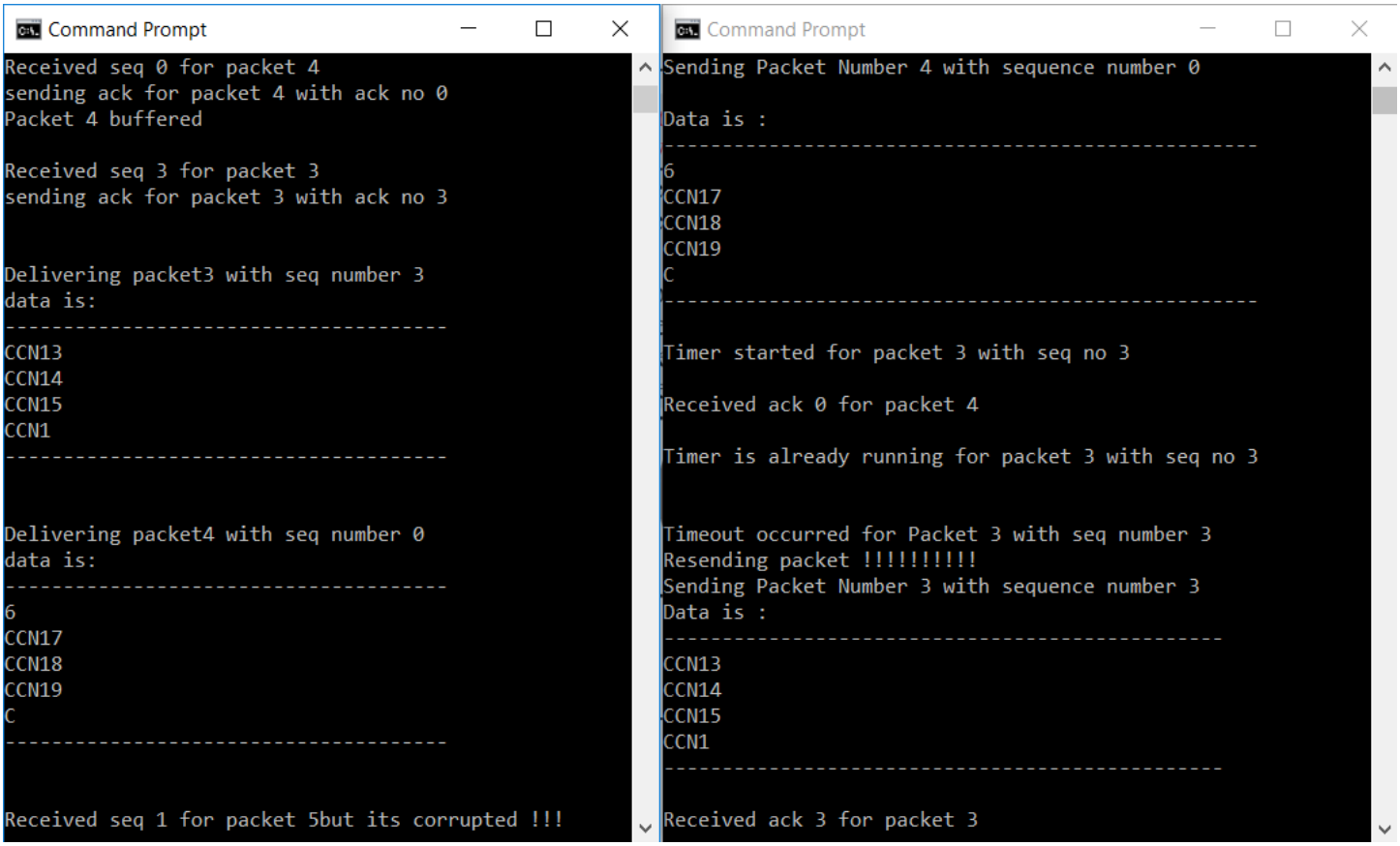


Figure 2.5

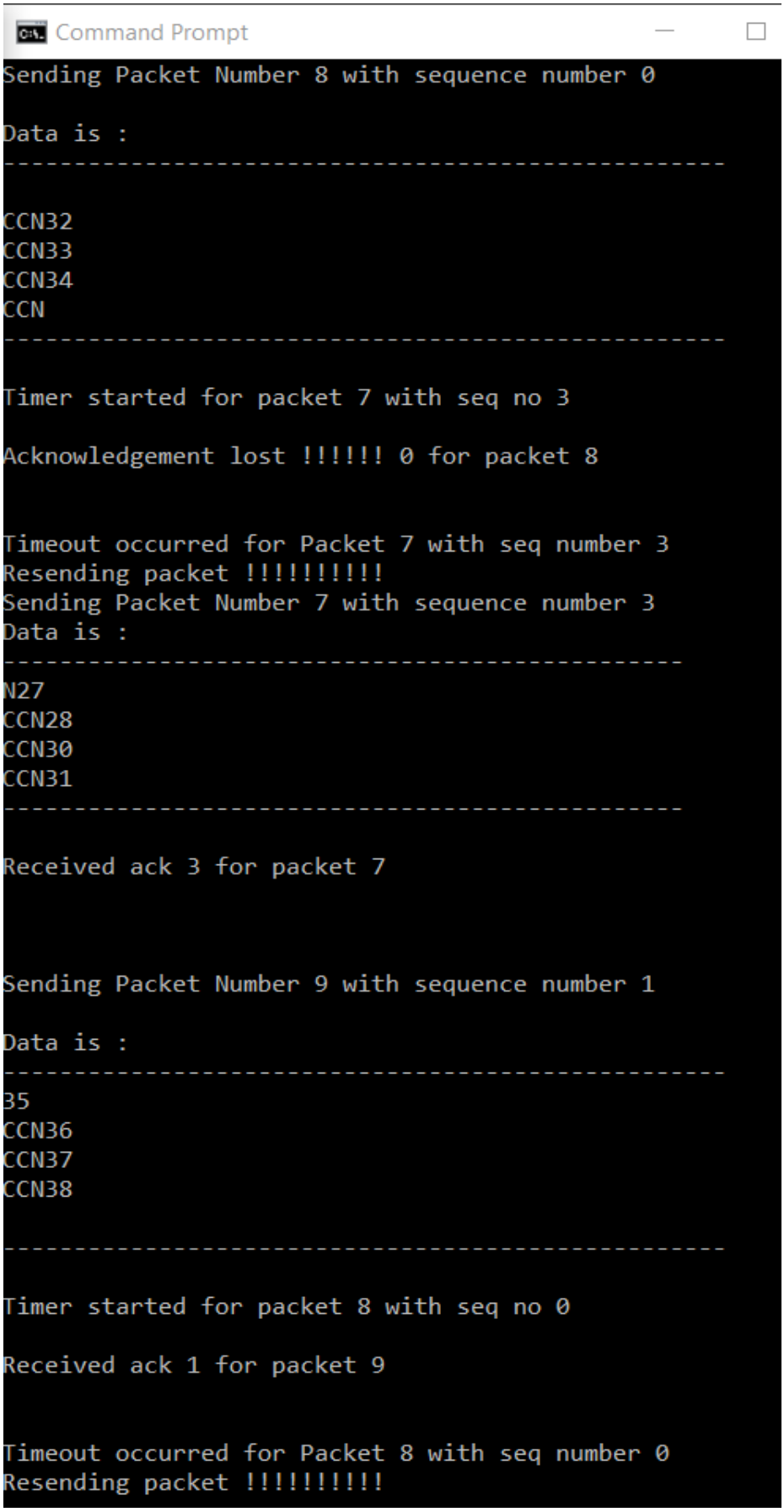
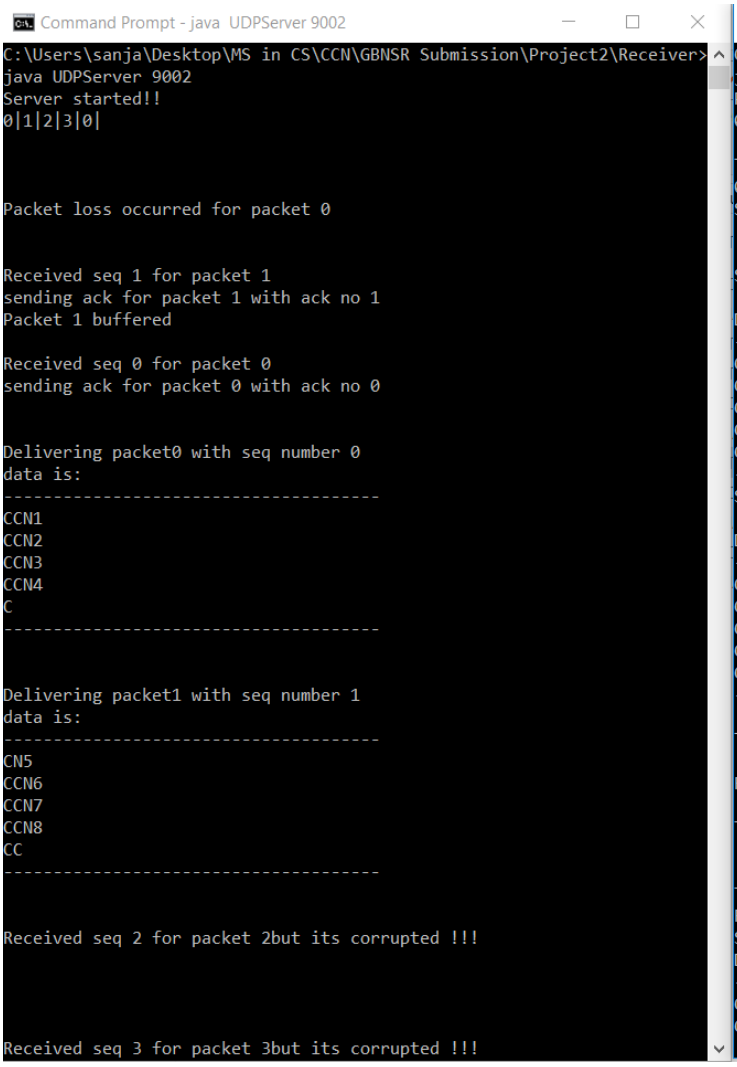
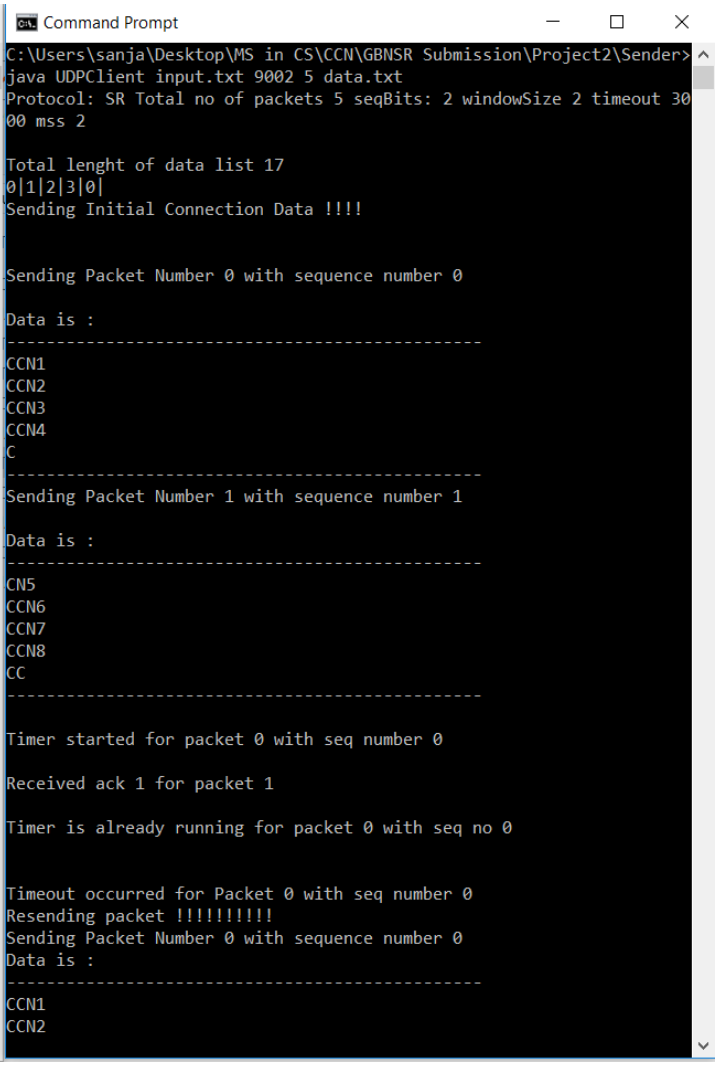
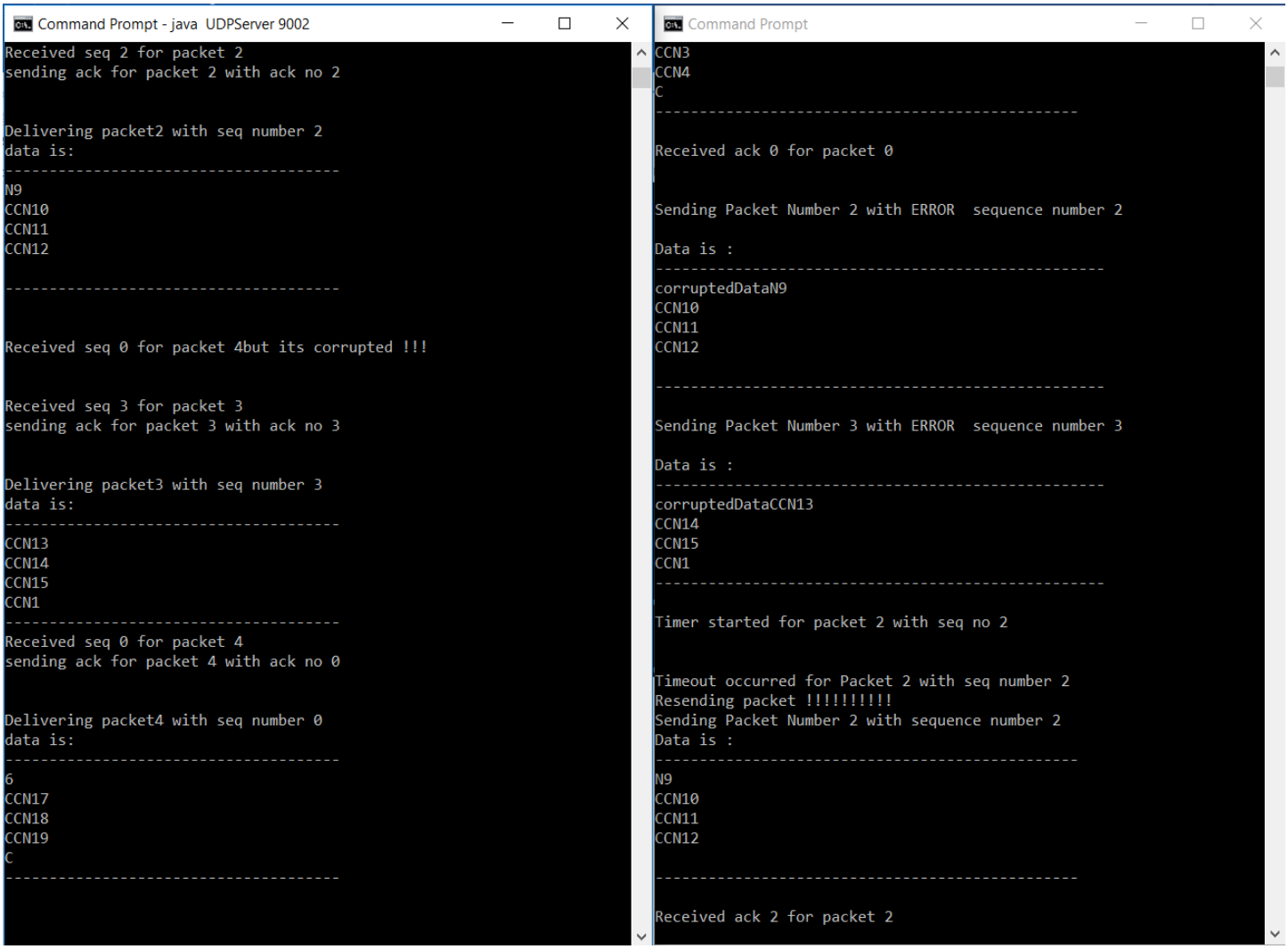

Command Prompt
Sending Packet Number 8 with sequence number 0
Data is :
CCN32
CCN33
CCN34
CCN
Timer started for packet 7 with seq no 3
Acknowledgement lost !!!!!! 0 for packet 8
Timeout occurred for Packet 7 with seq number 3
Resending packet !!!!!!!!!!
Sending Packet Number 7 with sequence number 3
Data is :
N27
CCN28
CCN30
CCN31
Received ack 3 for packet 7
Sending Packet Number 9 with sequence number 1
Data is :
35
CCN36
CCN37
CCN38
Timer started for packet 8 with seq no 0
Received ack 1 for packet 9
Timeout occurred for Packet 8 with seq number 0
Resending packet !!!!!!!!!!

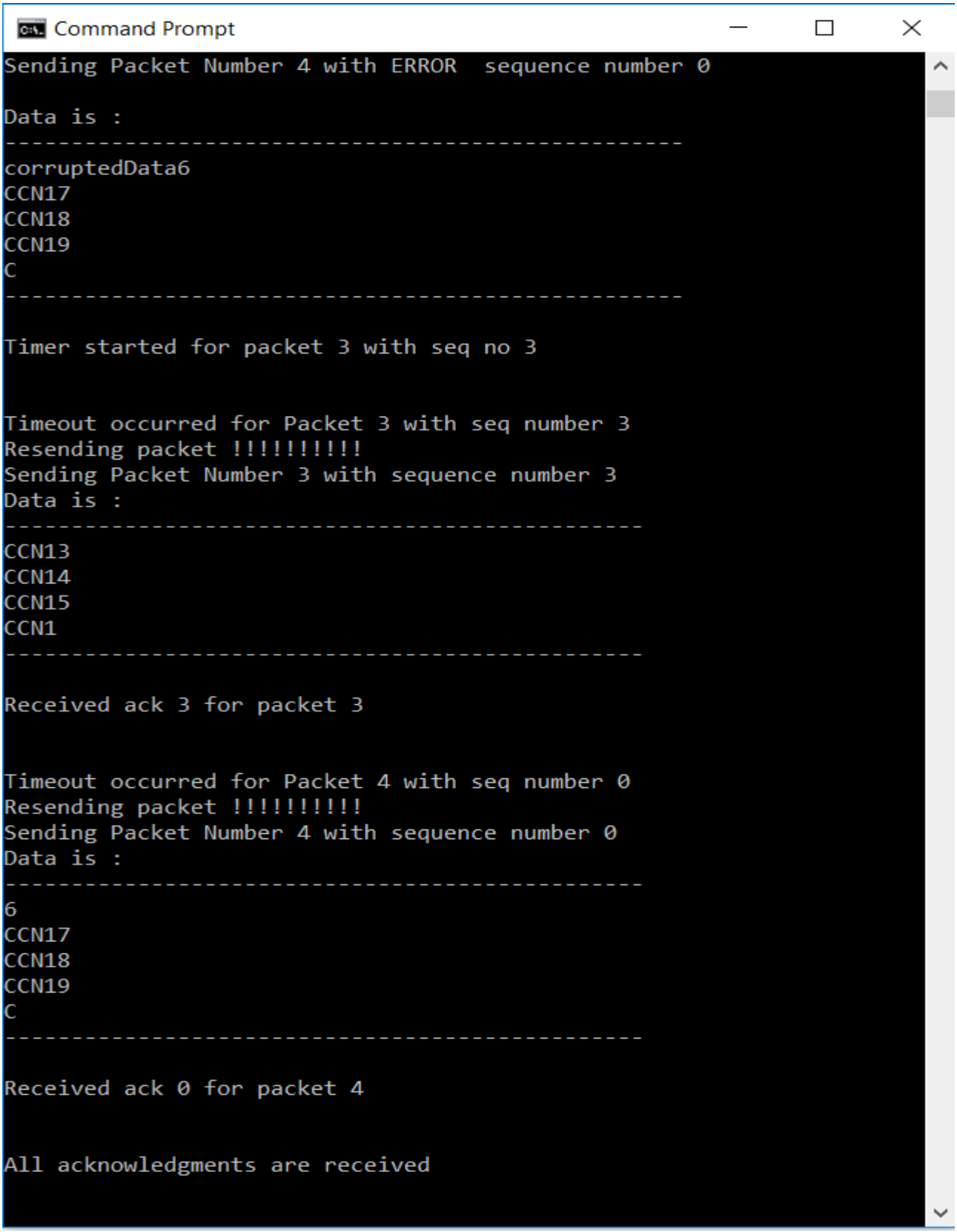
Figure 2.6

Demo of SR with 5 packets to send –

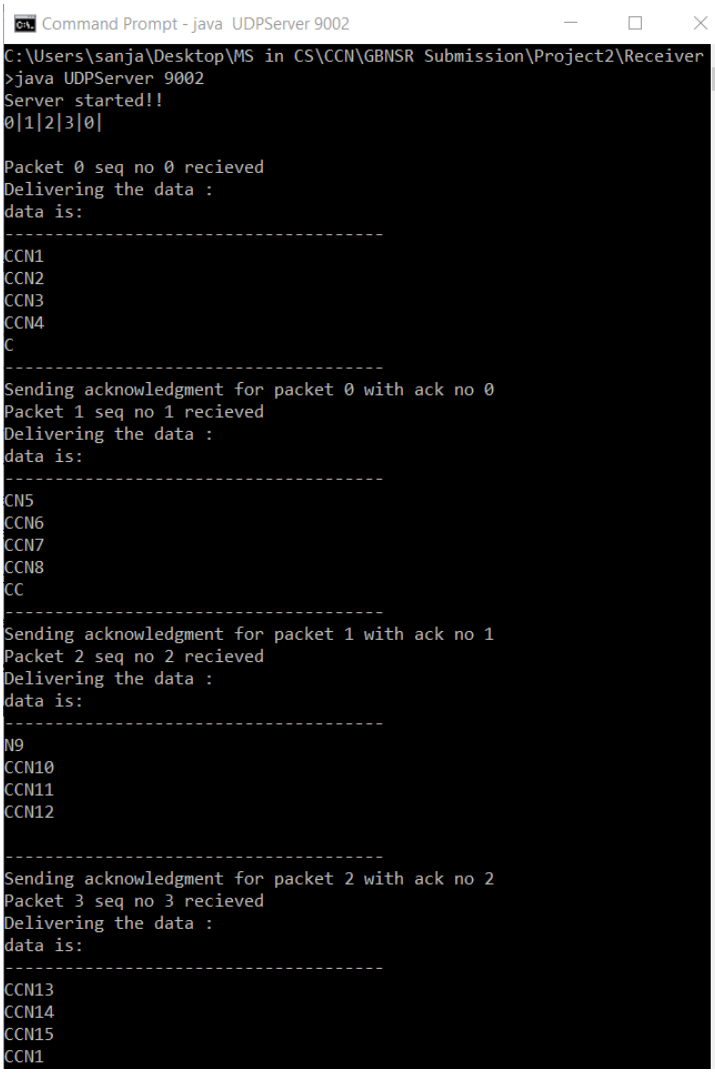


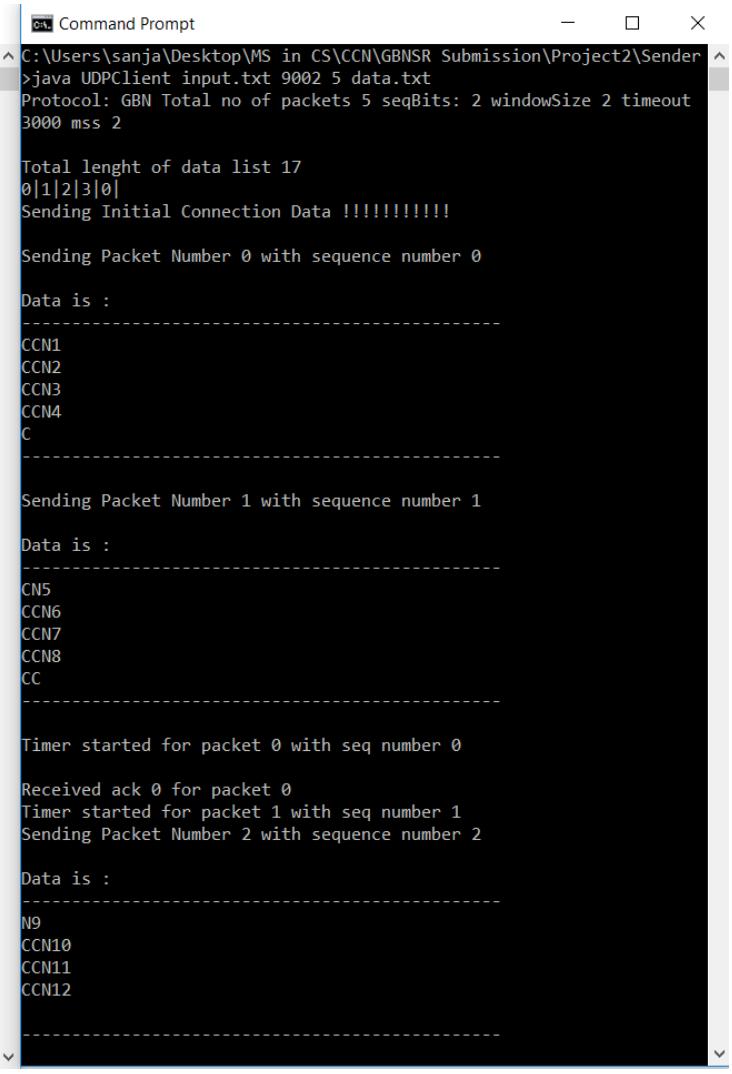


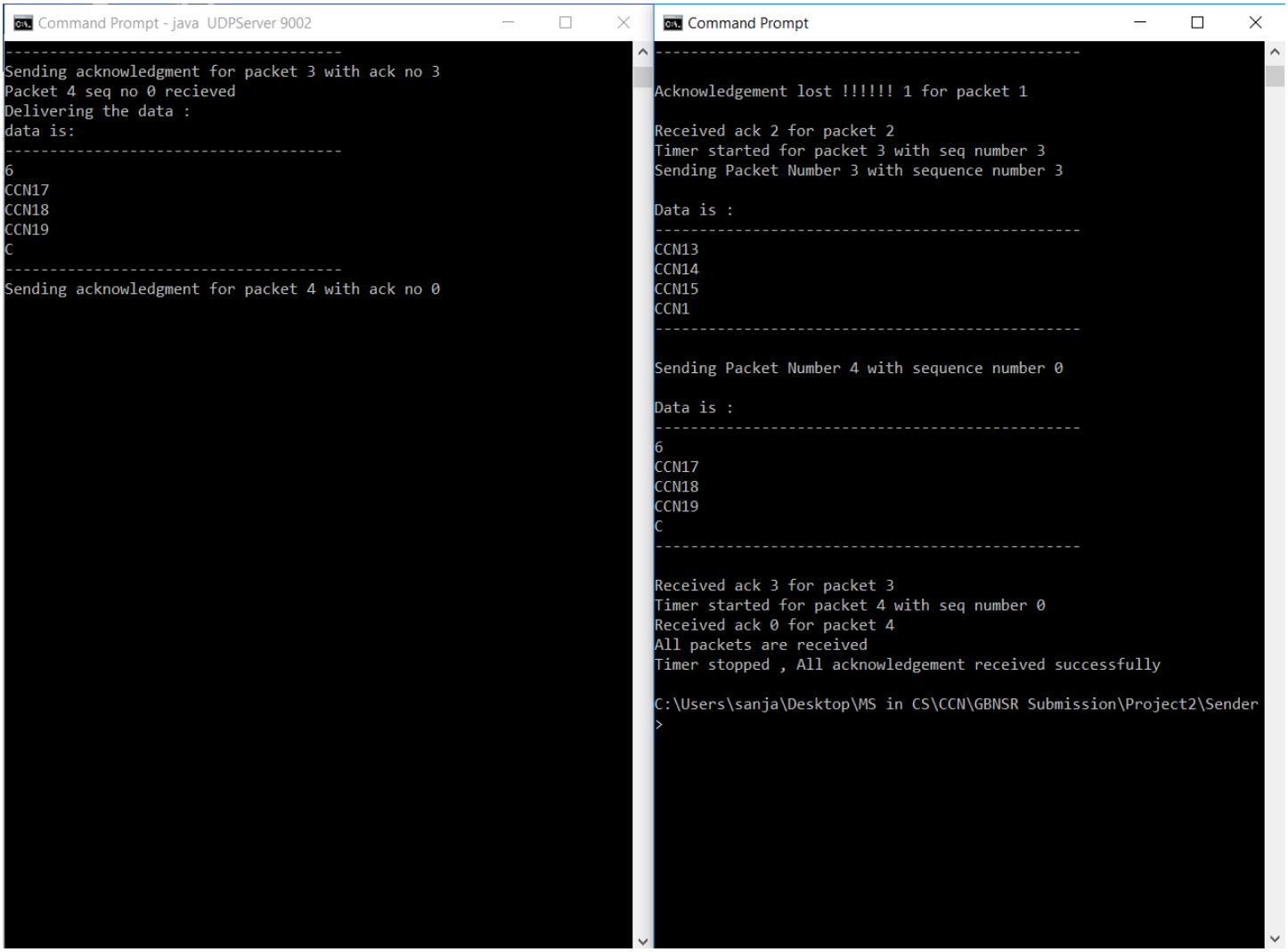

Command Prompt - java UDPServer 9002
Received seq 2 for packet 2
sending ack for packet 2 with ack no 2
Delivering packet2 with seq number 2
data is:
N9
CCN10
CCN11
CCN12
Received seq 0 for packet 4but its corrupted !!!
Received seq 3 for packet 3
sending ack for packet 3 with ack no 3
Delivering packet3 with seq number 3
data is:
CCN13
CCN14
CCN15
CCN1
Received seq 0 for packet 4
sending ack for packet 4 with ack no 0
Delivering packet4 with seq number 0
data is:
6
CCN17
CCN18
CCN19
C
Command Prompt
CCN3
CCN4
C
Received ack 0 for packet 0
Sending Packet Number 2 with ERROR sequence number 2
Data is :
corruptedDataN9
CCN10
CCN11
CCN12
Sending Packet Number 3 with ERROR sequence number 3
Data is :
corruptedDataCCN13
CCN14
CCN15
CCN1
Timer started for packet 2 with seq no 2
Timeout occurred for Packet 2 with seq number 2
Resending packet !!!!!!!!!
Sending Packet Number 2 with sequence number 2
Data is :
N9
CCN10
CCN11
CCN12
Received ack 2 for packet 2


Command Prompt
Sending Packet Number 4 with ERROR sequence number 0
Data is :
corruptedData6
CCN17
CCN18
CCN19
C
Timer started for packet 3 with seq no 3
Timeout occurred for Packet 3 with seq number 3
Resending packet !!!!!!!!!!
Sending Packet Number 3 with sequence number 3
Data is :
CCN13
CCN14
CCN15
CCN1
Received ack 3 for packet 3
Timeout occurred for Packet 4 with seq number 0
Resending packet !!!!!!!!!!
Sending Packet Number 4 with sequence number 0
Data is :
6
CCN17
CCN18
CCN19
C
Received ack 0 for packet 4
All acknowledgments are received

Demo of GBN with 5 packets to send –






Command Prompt - java UDPServer 9002

Sending acknowledgment for packet 3 with ack no 3
Packet 4 seq no 0 recieved
Delivering the data :
data is:

6
CCN17
CCN18
CCN19
C

Sending acknowledgment for packet 4 with ack no 0
Command Prompt

Acknowledgement lost !!!!!! 1 for packet 1
Received ack 2 for packet 2
Timer started for packet 3 with seq number 3
Sending Packet Number 3 with sequence number 3
Data is :

CCN13
CCN14
CCN15
CCN1

Sending Packet Number 4 with sequence number 0
Data is :

6
CCN17
CCN18
CCN19
C

Received ack 3 for packet 3
Timer started for packet 4 with seq number 0
Received ack 0 for packet 4
All packets are received
Timer stopped , All acknowledgement received successfully
C:\Users\sanja\Desktop\MS in CS\CCN\GBNSR Submission\Project2\Sender
>