

COMPUTER NETWORKS LAB
ASSIGNMENT 2

MU IN NASIF

BCSE-III, semester 5

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Topic: Implementing Data Link Layer protocols

Overview

We implement the three data link layer protocols for flow control,

- Stop and Wait
- Go Back N Sliding window
- Selective Repeat Sliding Window

Constraints

Sender, Receiver and Channel all are independent process. There may be multiple Transmitter and Receiver process. The channel process introduces a random delay and/ bit error while transferring frames.

Specifications

- *Language used: JAVA* (compiler: javac 17, runtime env: 17+35-LTS-2724)
- *Frame format used: IEEE802.3*

```
|SFD: Start frame delimiter flag ( 10101011 ) |

|-----|
| Preamble | SFD | Destination address | Source address | Length, type | Data + Padding | CRC
| 7bytes   | 1byte|        6 bytes        |        6 bytes        |    2 bytes    |              | 4 bytes

|maximum and minimum lengths|
|-----|
| Destination address | Source address | length PDU |    Data and Padding    |    CRC    |
|        6 bytes      |        6 bytes |    2 bytes  |              | 4 bytes  |

                                |--minimum.len: 46 bytes--|
                                |--maximum.len: 1500 bytes-|

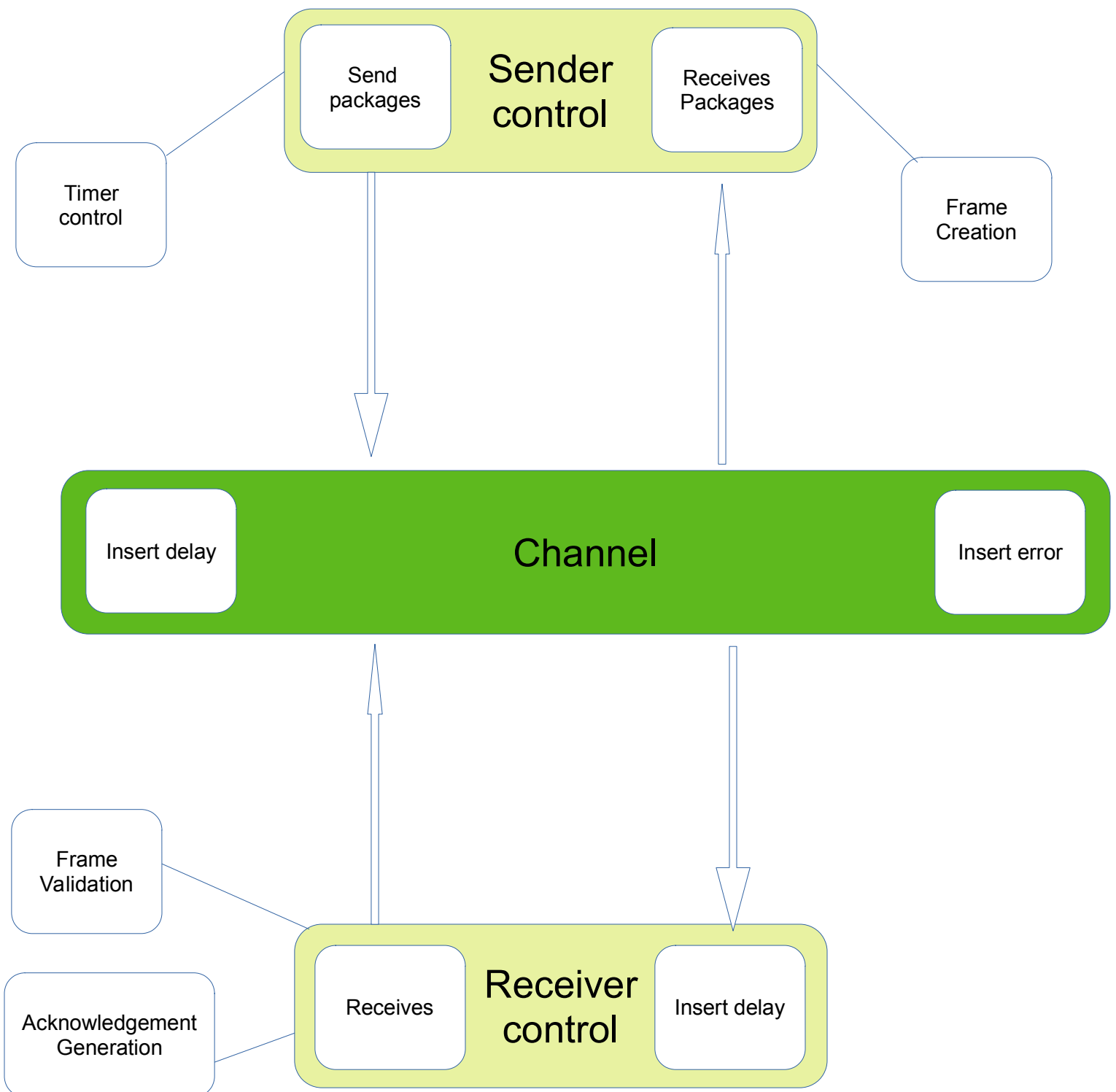
|----- Minimum frame length: 64 bytes -----|
|----- Maximum frame length: 1518 bytes -----|
```

- *External Library used: socket.io*

Code

The program is set in independent packages. The connection is created in the channel using the **external library: socket.io** the channel introduces a random delay and random error in the sender side at random intervals. A sender control and a receiver control module controls the data flow in the system a Helper package contains all the utility methods essential for the frame manipulation

Flow diagram of the code

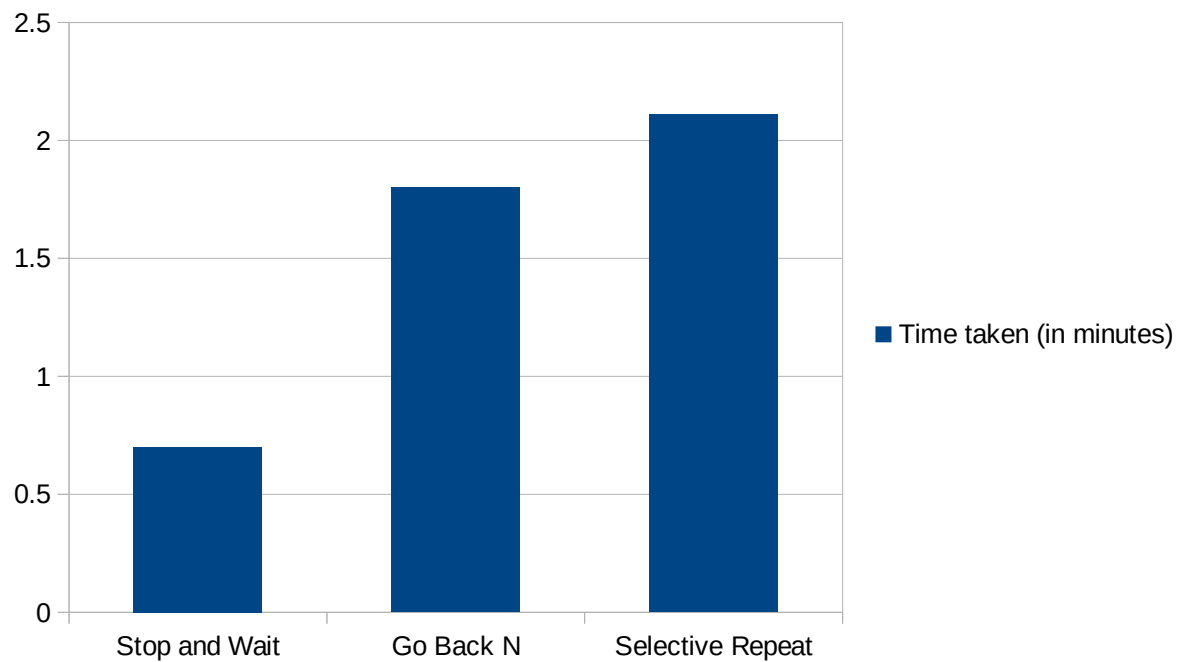


Sender side Statistics

Time taken to send 50 frames

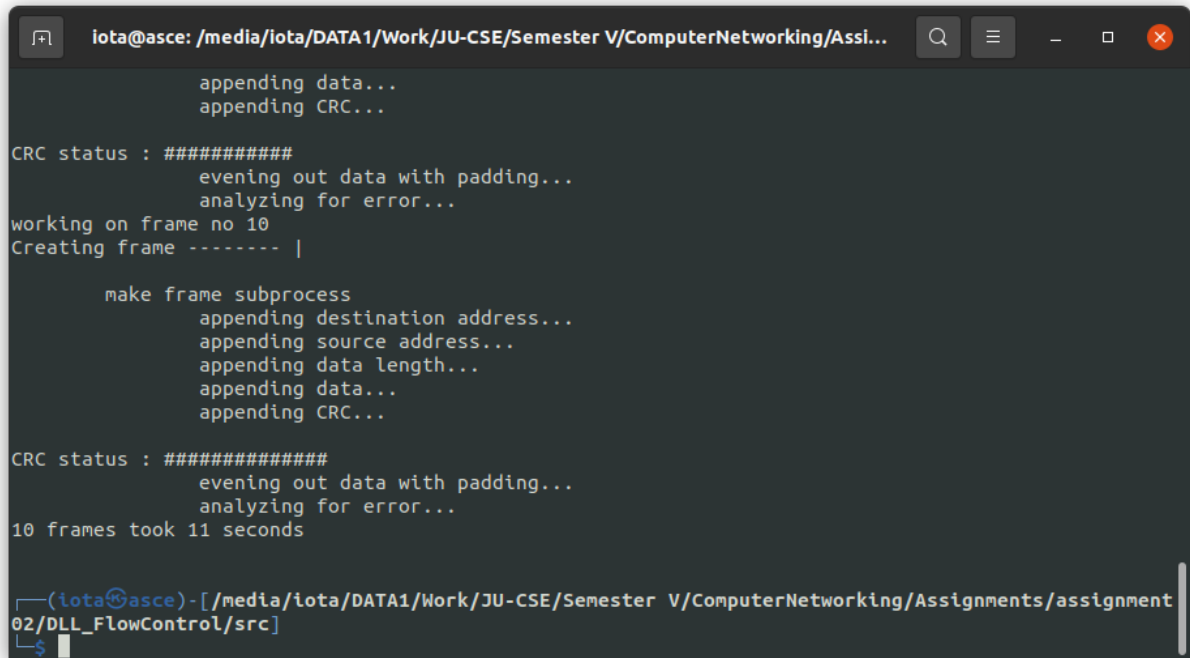
Process	Time taken (in minutes)
Stop and Wait	0.7
Go Back N	1.8
Selective Repeat	2.11

Average roundtrip



Program output overview

Stop and Wait



```
iota@asce: /media/iota/DATA1/Work/JU-CSE/Semester V/ComputerNetworking/Assi...
    appending data...
    appending CRC...

CRC status : #####
    evening out data with padding...
    analyzing for error...
working on frame no 10
Creating frame ----- |

    make frame subprocess
        appending destination address...
        appending source address...
        appending data length...
        appending data...
        appending CRC...

CRC status : #####
    evening out data with padding...
    analyzing for error...
10 frames took 11 seconds

(iota@asce) - [~/media/iota/DATA1/Work/JU-CSE/Semester V/ComputerNetworking/Assignments/assignment02/DLL_FlowControl/src]
$
```

Go Back N

$$N = 4$$

```
iota@asce: /media/iota/DATA1/Work/JU-CSE/Semester V/ComputerNetworking/Assi...
    appending data length...
    appending data...
    appending CRC...

CRC status : ###
    evening out data with padding...
    analyzing for error...
Creating frame ----- |

    make frame subprocess
    appending destination address...
    appending source address...
    appending data length...
    appending data...
    appending CRC...

CRC status : #####
    evening out data with padding...
    analyzing for error...
10 frames took 31 seconds

(iota@asce)-[/media/iota/DATA1/Work/JU-CSE/Semester V/ComputerNetworking/Assignments/assignment
02/DLL_FlowControl/src]
$
```

Selective Repeat

```
iota@asce: /media/iota/DATA1/Work/JU-CSE/Semester V/ComputerNetworking/Assi...
    appending data length...
    appending data...
    appending CRC...

CRC status : #####
    evening out data with padding...
    analyzing for error...
Creating frame ----- |

    make frame subprocess
    appending destination address...
    appending source address...
    appending data length...
    appending data...
    appending CRC...

CRC status : #####
    evening out data with padding...
    analyzing for error...
10 frames took 22 seconds

(iota@asce)-[/media/iota/DATA1/Work/JU-CSE/Semester V/ComputerNetworking/Assignments/assignment
02/DLL_FlowControl/src]
$
```

```
iota@asce: /media/iota/DATA1/Work/JU-CSE/Semester V/ComputerNetworking/Assi...
    appending data length...
    appending data...
    appending CRC...

CRC status : #####
    evening out data with padding...
    analyzing for error...
Creating frame ----- |

    make frame subprocess
        appending destination address...
        appending source address...
        appending data length...
        appending data...
        appending CRC...

CRC status : #####
    evening out data with padding...
    analyzing for error...
10 frames took 22 seconds

(iota@asce) - [/media/iota/DATA1/Work/JU-CSE/Semester V/ComputerNetworking/Assignments/assignment
02/DLL_FlowControl/src]
$
```