Assignment 1 Report

COMP 9331 – Tianwei Zhu, z5140081

1. Most of works for my STP protocol function are completed by Sender.py, it handles retransmit and timeout features. The Receiver.py contains handshake and close function, then keeps the state of receiving segments until there is a FIN header, which is set to close the connection.

    First of all, sender and receiver build connection by finishing **handshake**, then hold this state and wait for data transmitting. There is a **recorded sequence** in receiver, it will write file and change to next step only if there is an expected package arrived. This feature makes sure that receiver always records correct data in order.

    The **default_window** is the amount of data packages to be sent according to WMS and MSS (WMS/MSS). The data to be sent are push in a list and wait for sending. The sender sends N packages at one time and wait for ACKs. If the ACK sequence corresponds the sent package, this pack will be pop from list and push next pack into list (create new window). If one pack was lost, then every next ACKs will be the same, which tells sender a lost happened. Once there are three duplicated ACKs, the sender will resend the corresponding packs list (top is the missing pack, following next some packs) to receiver. This is the fast transmit feature.

    If timeout happened, sender will resend that package in a new window, following other packs together. Since timeout **only happens** to the last three packages in a window or there are less than three packs lost during the transmission, it appears sometimes in the entire process, which won't slow down program too much.

2. Here is the default set for segment: **SYN=0, ACK=0, FIN=0, seq=0, acknowledgment=0, data=""**. I use a class to hold these information, they will keep zero each time if there is no need for change. SYN, ACK and FIN is flag for recognition, they are the same idea with textbook. The seq represent sequence number for each package. All these texts will be switched into bit type and decode once received.

sequence number					
acknowledgement number					
head len	not used	SYN	ACK	FIN	not used
application data (variable length)					

3.
(a) pdrop = 0.1, MWS = 500 bytes, MSS = 50 bytes, seed = 300, timeout = 0.2
Since this is a local transmit, delay will be small enough, so I set timeout = 0.2 to avoid limiting program's efficiency.

state	time	seq	data	ack
rcv	9.126 D	101	50	201
rcv	9.126 D	151	50	201
rcv	9.126 D	201	50	201
rcv	9.126 D	251	50	201
rcv	9.126 D	301	50	201
rcv	9.126 D	351	50	201
rcv	9.127 D	401	50	201
rcv	9.127 D	451	50	201
rcv	9.127 D	501	50	201
rcv	9.127 D	551	50	201
rcv	9.127 D	601	50	201
rcv	9.127 D	651	50	201
rcv	9.127 D	701	50	201
rcv	9.127 D	751	50	201
rcv	9.127 D	801	50	201
rcv	9.128 D	851	50	201
rcv	9.128 D	901	50	201
rcv	9.128 D	951	50	201
rcv	9.128 D	1001	50	201
rcv	9.128 D	1051	50	201
rcv	9.128 D	1101	50	201
rcv	9.128 D	1201	50	201
rcv	9.129 D	1251	50	201

state	time	seq	data	ack
rcv	9.129 D	1301	50	201
rcv	9.129 D	1351	50	201
rcv	9.129 D	1401	50	201
rcv	9.129 D	1451	50	201
rcv	9.129 D	1501	50	201
rcv	9.330 D	1151	50	201
rcv	9.330 D	1201	50	201
rcv	9.330 D	1251	50	201
rcv	9.330 D	1301	50	201
rcv	9.330 D	1401	50	201
rcv	9.330 D	1451	50	201
rcv	9.330 D	1501	50	201
rcv	9.330 D	1551	50	201
rcv	9.330 D	1601	50	201
rcv	9.531 D	1351	50	201
rcv	9.531 D	1401	50	201
rcv	9.531 D	1451	50	201
rcv	9.531 D	1501	50	201
rcv	9.531 D	1551	50	201
rcv	9.531 D	1601	50	201
rcv	9.532 D	1651	43	201

For the first experiment **pdrop=0.1**, there are drops at sequence number = 1151, 1551. After fast retransmitted, seq=1351 drop, and then fast retransmitted. (see appendix)

For the first experiment **pdrop=0.3**, seq = 301, 451 dropped but fast retransmitted. The seq = 501 is a little tricky, it consecutively lost 4 times, but finally been retransmitted.
After that, seq = 701and 1001 lost and fast retransmitted.
Although there are some packages lost and wait for timeout, but system do fast transmit for previous packages and not wait for timeout.

(b)
pdrop = 0.1, MWS = 500 bytes, MSS = 50 bytes, seed = 300, timeout = 0.2

	Tcurrent	4 x Tcurrent	Tcurrent/4
STP packets transmitted	73	73	73
Time took	0.408	2.409	0.157

The number of STP packets transmitted keeps constant whatever timeout setting is. The time taking for each experiment seems to be linear change as the timeout setting.

Appendix

Experimental for question 1 (a):

pdrop = 0.1, MWS = 500 bytes, MSS = 50 bytes, seed = 300, timeout = 0.2, test1.txt

state	time		seq	data	ack
snd	9.126	D	101	50	201
snd	9.126	D	151	50	201
snd	9.126	D	201	50	201
snd	9.126	D	251	50	201
snd	9.126	D	301	50	201
snd	9.126	D	351	50	201
snd	9.126	D	401	50	201
snd	9.126	D	451	50	201
snd	9.126	D	501	50	201
snd	9.126	D	551	50	201
snd	9.127	D	601	50	201
snd	9.127	D	651	50	201
snd	9.127	D	701	50	201
snd	9.127	D	751	50	201
snd	9.127	D	801	50	201
snd	9.127	D	851	50	201
snd	9.127	D	901	50	201
snd	9.127	D	951	50	201
snd	9.127	D	1001	50	201
snd	9.127	D	1051	50	201
snd	9.128	D	1101	50	201
drop	9.128	D	1151	50	201 # fast retransmitted
snd	9.128	D	1201	50	201
snd	9.128	D	1251	50	201
snd	9.128	D	1301	50	201
snd	9.129	D	1351	50	201
snd	9.129	D	1401	50	201
snd	9.129	D	1451	50	201
snd	9.129	D	1501	50	201
drop	9.129	D	1551	50	201
snd	9.330	D	1151	50	201
snd	9.330	D	1201	50	201
snd	9.330	D	1251	50	201
snd	9.330	D	1301	50	201
drop	9.330	D	1351	50	201 # fast retransmitted
snd	9.330	D	1401	50	201

```
snd   9.330 D   1451   50   201
snd   9.330 D   1501   50   201
snd   9.330 D   1551   50   201
snd   9.330 D   1601   50   201


snd   9.531 D   1351   50   201
snd   9.531 D   1401   50   201
snd   9.531 D   1451   50   201
snd   9.531 D   1501   50   201
snd   9.531 D   1551   50   201
snd   9.531 D   1601   50   201
snd   9.531 D   1651   43   201 # last package
```

pdrop = 0.3, MWS = 500 bytes, MSS = 50 bytes, seed = 300, timeout = 0.2, test1.txt

```
state   time       seq  data   ack
snd   40.953 D    101   50   201
snd   40.953 D    151   50   201
snd   40.953 D    201   50   201
snd   40.953 D    251   50   201
drop 40.953 D    301   50    201 # fast retransmitted
snd   40.953 D    351   50   201
snd   40.953 D    401   50   201
snd   40.953 D    451   50   201
snd   40.953 D    501   50   201
snd   40.954 D    551   50   201


snd   41.154 D    301   50   201
snd   41.154 D    351   50   201
snd   41.154 D    401   50   201
drop 41.154 D    451   50    201 # fast retransmitted
snd   41.154 D    501   50   201
snd   41.154 D    551   50   201
drop 41.154 D    601   50   201
snd   41.154 D    651   50   201
snd   41.154 D    701   50   201
drop 41.154 D    751   50   201


snd   41.355 D    451   50   201
drop 41.355 D    501   50    201 # fast retransmitted
snd   41.355 D    551   50   201
snd   41.355 D    601   50   201
snd   41.355 D    651   50   201
drop 41.355 D    701   50   201
snd   41.355 D    751   50   201
```

```
drop 41.355 D    801   50    201
snd   41.355 D    851   50    201
drop 41.355 D    901   50    201

drop 41.557 D    501   50    201 # fast retransmitted
drop 41.557 D    551   50    201
snd   41.557 D    601   50    201
drop 41.557 D    651   50    201
drop 41.557 D    701   50    201
drop 41.557 D    751   50    201
snd   41.557 D    801   50    201
snd   41.557 D    851   50    201
snd   41.557 D    901   50    201
snd   41.557 D    951   50    201

drop 41.758 D    501   50    201 # fast retransmitted
snd   41.758 D    551   50    201
drop 41.758 D    601   50    201
snd   41.758 D    651   50    201
snd   41.758 D    701   50    201
drop 41.758 D    751   50    201
snd   41.758 D    801   50    201
snd   41.758 D    851   50    201
snd   41.758 D    901   50    201
snd   41.758 D    951   50    201

drop 41.958 D    501   50    201 # fast retransmitted
snd   41.958 D    551   50    201
snd   41.958 D    601   50    201
drop 41.958 D    651   50    201
drop 41.958 D    701   50    201
snd   41.958 D    751   50    201
drop 41.958 D    801   50    201
snd   41.958 D    851   50    201
snd   41.958 D    901   50    201
snd   41.958 D    951   50    201

snd   42.159 D    501   50    201
snd   42.159 D    551   50    201
snd   42.159 D    601   50    201
snd   42.159 D    651   50    201
drop 42.159 D    701   50    201 # fast retransmitted
drop 42.159 D    751   50    201
snd   42.159 D    801   50    201
```

```
snd    42.159 D    851    50      201
drop 42.159 D      901    50      201
snd    42.159 D    951    50      201

drop 42.359 D      701    50      201 # fast retransmitted
snd    42.359 D    751    50      201
snd    42.359 D    801    50      201
snd    42.359 D    851    50      201
snd    42.359 D    901    50      201
snd    42.359 D    951    50      201
snd    42.359 D   1001    50      201
snd    42.359 D   1051    50      201
drop 42.359 D    1101    50      201
drop 42.359 D    1151    50      201

snd    42.559 D    701    50      201
snd    42.559 D    751    50      201
snd    42.559 D    801    50      201
snd    42.559 D    851    50      201
snd    42.559 D    901    50      201
snd    42.559 D    951    50      201
drop 42.559 D    1001    50      201 # fast retransmitted
snd    42.559 D   1051    50      201
snd    42.559 D   1101    50      201
snd    42.559 D   1151    50      201

snd    42.759 D   1001    50      201
snd    42.759 D   1051    50      201
snd    42.759 D   1101    50      201
snd    42.759 D   1151    50      201
snd    42.759 D   1201    50      201
snd    42.759 D   1251    50      201
snd    42.759 D   1301    50      201
snd    42.759 D   1351    50      201
snd    42.759 D   1401    50      201
snd    42.759 D   1451    50      201

snd    42.760 D   1501    50      201
snd    42.760 D   1551    50      201
snd    42.760 D   1601    50      201
snd    42.760 D   1651    43      201 # last package
```