COMP9331 – Computer Networks & Applications
Assignment 1

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Lab class: Tuesday 6pm – 8pm

Protocol summary

The protocol has been designed and implemented as a reliable transfer protocol over User Datagram Protocol (UDP), otherwise known as STP. The header is designed to include the following packet information:

- Receiver port
- Sequence number
- Acknowledgement number
- SYN bit
- ACK bit
- FIN bit

The following features are included in the STP:

- Three-way handshake
- Single-timer for timeout operations
- Cumulative Acknowledgment
- Sequence and Acknowledgment numbers based on payload size
- Maximum Segment Size
- Maximum Window Size
- Four-segment connection termination
- Sender and Receiver side logs including packet receipt and transmission summary

Key features not included in the STP include:

- Fast retransmit
- Receiver side packet buffering and re-organisation

Data transmission methodology

Three-way handshake

Connection between the sender and receiver is initiated by the sender through a three-way handshake. This involves a SYN byte in the packet header being set to 1, packed to binary format and transmitted to the receiver using the receiver IP address and available port number. No payload data is transmitted during the three-way handshake.

If the receiver IP address and port are available the receiver will read the SYN byte, set the header ACK byte to 1 and update the sequence number as the next expected sequence number the receiver expects to see. The header is again packed to binary format and transmitted back to the sender to acknowledge the SYN byte from sender. This is known as a SYNACK segment.

Once the sender receives the SYNACK segment, the sender transmits another segment, acknowledging that connection has been granted. The SYN byte is set to 0 and the sender is now ready to begin transmitting payload data to the receiver.

Data transmission

1. When initiated, the protocol will first transfer data from the source text files based on the user-defined Maximum Window Size (MWS) which is the maximum window size used by the STP protocol in bytes, and Maximum Segment Size (MSS) which is the maximum number of data in bytes carried in each STP segment. Each packet is iteratively transferred from the text file, converted to bytes and packed into a binary structure before being included in the window.

2. Once the window has reached maximum capacity, that is it can no longer fit anymore STP segments, the protocol will begin continuously transmitting data to the sender based on the user-defined receiver IP address and Port. The window byte capacity is iteratively increased and tracked:
   Window_capacity += len(payload)bytes

3. When a packet acknowledgement (ACK) is received by the sender, STP will check whether the received acknowledgement number > the largest sequence number in the window. If acknowledgement number > largest sequence number. The sender will iteratively acknowledge all packets in the window where the received acknowledge number > sequence number. The is called **cumulative acknowledgement.** Each time a packet is acknowledged, the window byte capacity is iteratively decreased:
   Window_capacity -= len(payload)bytes

4. *The window which only counts payload data, not header data. It will continuously slide as data is being acknowledged, with the maximum number of un-acknowledged that the Sender can have at any time being the defined MWS.*

5. In the event there is a **timeout**, that is
   time since last acknowledged packet > timeout (user-defined input)
   the protocol will re-transmit all packets currently in the window

6. The STP has been implemented to allow reliable unidirectional data transfer, meaning the sender may transmit and acknowledge STP segments on a continual basis.
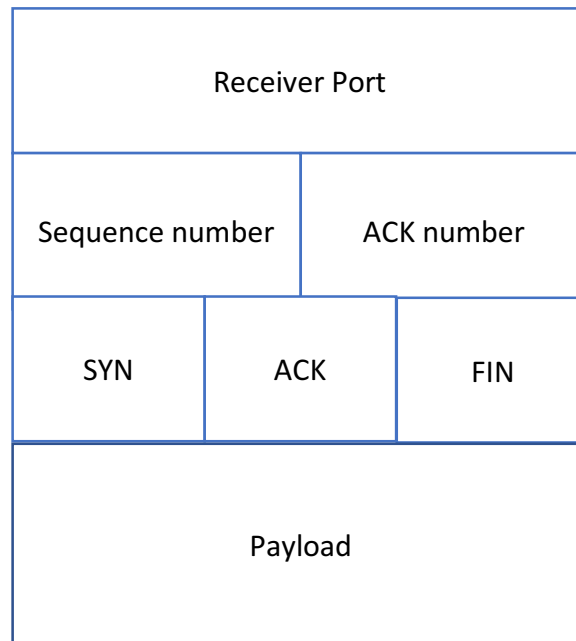
Four-segment connection termination

Once the total acknowledged STP segments from the Sender is >= length of the text file being transmitted, STP will begin the four-segment connection termination. Logic is as follows:

- Sender transmit header with FIN a byte to initiate the termination with the Receiver
- Receiver will ACK the termination by transmitting ACK byte = 1 to the Sender
- Receiver will send a FIN byte to the Sender
- Sender ACK the FIN byte by sending a ACK byte to the Receiver which in turns acknowledges the terminates the final transfer.

PLD Module

A PLD module has been designed and implemented between the Sender and Receiver. A random number is generated based on a seed defined by the user. If this random seed number is greater than pdrop then packed is successfully transmitted to the Receiver, else the packet is dropped.

Detailed STP Header design

Receiver Port		
Sequence number		ACK number
SYN	ACK	FIN
Payload		

The header includes the following key data:

Data	Description
Receiver port	Receiver port number allowing users to keep track of which Ports are and are not available on the Receiver side
Sequence number	Identifies how much data has been transmitted to the Receiver. Provides an indication as to where in the stream the packet is
Acknowledgement number (ACK)	Signifies the number of bytes that has been received and acknowledged by the Receiver
SYN	Initiates three-way handshake between the Sender and Receiver through a SYN byte
ACK	Acknowledges the SYN in initialising three-way handshake or FIN in four-segment connection termination through an ACK byte
FIN	Initiates the four-segment connection termination through a FIN byte
Payload	Payload data at <= Maximum Segment Size

Questions

3. a

Timeout value selected is 1000ms. Initial value of 1 second is recommended through RFC6298. As the probability of dropped or lost packets through the local is minimal, it is beneficial to have a lower timeout internal to minimise data transfer delays.

Pdrop	Retransmission
0.1	28
0.3	30

As can be seen in the table above as the number drop probability increases, the chances of retransmission also increase. This is due to the number of out of order packets arriving at the receiver due to increase in the number of dropped packets, thus STP must retransmit the most recent acknowledged packet from the Seceiver side.

b.

Timeout	Transmitted + Re-transmitted	Overall Transfer Time
1000	70	7133ms
4*1000 = 4000	70	28140ms
1000/4	70	1876ms

As can be seen with a decrease in timeout there is a decrease in overall transfer time. There however was no change in transmitted and re-transmitted segments. This may be due to the experiment being run across a local machine, thus there being minimum to low change of there being any packet delay. In real world application, with low timeout values one would typically see pre-mature retransmissions leading to high number of re-transmissions.

Appendix

Appendix A – pdrop = 0.1, MWS = 500bytes, MSS = 50bytes, timeout = 1000ms

Receiver

```
rcv  0.038      S     0    0    0
snd  0.828      SA    0    0    1
rcv  3.099      A     0    0    1
rcv  4.209      D     1    50   1
snd  7.024      D     1    0    51
rcv  7.741      D     51   50   1
snd  10.661     D     51   0    101
rcv  3015.183   D     151  50   101
rcv  3015.881   D     201  50   151
rcv  3017.343   D     251  50   201
rcv  3017.895   D     301  50   251
rcv  3021.210   D     351  50   301
rcv  3021.859   D     401  50   351
rcv  3025.803   D     451  50   401
rcv  3029.712   D     501  50   451
rcv  3031.191   D     551  50   501
rcv  6035.953   D     101  50   51
snd  6036.791   D     101  0    151
rcv  6038.512   D     151  50   101
snd  6039.264   D     151  0    201
rcv  6040.104   D     201  50   151
snd  6040.922   D     201  0    251
rcv  6041.431   D     251  50   201
snd  6042.342   D     251  0    301
rcv  6043.151   D     301  50   251
snd  6046.623   D     301  0    351
rcv  6047.235   D     351  50   301
snd  6047.937   D     351  0    401
rcv  6048.343   D     401  50   351
snd  6049.007   D     401  0    451
rcv  6049.386   D     451  50   401
snd  6049.998   D     451  0    501
rcv  6050.355   D     501  50   451
snd  6051.020   D     501  0    551
rcv  6051.417   D     551  50   501
snd  6052.023   D     551  0    601
rcv  9048.708   D     651  50   601
rcv  9051.257   D     701  50   651
rcv  9054.991   D     751  50   701
rcv  9059.411   D     801  50   751
rcv  9063.241   D     851  50   801
rcv  9067.272   D     901  50   851
rcv  9071.461   D     951  50   901
rcv  9075.115   D     1001 50   951
rcv  12083.941  D     1001 50   951
rcv  12084.613  D     601  50   551
snd  12086.794  D     601  0    651
rcv  12087.323  D     651  50   601
snd  12088.089  D     651  0    701
rcv  12088.582  D     701  50   651
snd  12089.454  D     701  0    751
rcv  12090.016  D     751  50   701
snd  12091.014  D     751  0    801
rcv  12091.669  D     801  50   751
snd  12092.378  D     801  0    851
rcv  12092.851  D     851  50   801
snd  12093.481  D     851  0    901
rcv  12094.033  D     901  50   851
```

```
snd   12094.750   D    901    0   951
rcv   12095.220   D    951   50   901
snd   12095.746   D    951    0  1001
rcv   12096.061   D   1001   50   951
snd   12096.610   D   1001    0  1051
rcv   12097.457   D   1051   50  1001
snd   12097.963   D   1051    0  1101
rcv   12100.959   D   1101   50  1051
snd   12101.523   D   1101    0  1151
rcv   12101.873   D   1151   50  1101
snd   12102.563   D   1151    0  1201
rcv   15103.965   D   1251   50  1201
rcv   15104.696   D   1301   50  1251
rcv   15106.918   D   1351   50  1301
rcv   15107.249   D   1401   50  1351
rcv   15110.170   D   1451   50  1401
rcv   15110.661   D   1501   50  1451
rcv   15111.376   D   1551   50  1501
rcv   18116.767   D   1201   50  1151
snd   18118.793   D   1201    0  1251
rcv   18119.389   D   1251   50  1201
snd   18120.202   D   1251    0  1301
rcv   18122.939   D   1301   50  1251
snd   18123.886   D   1301    0  1351
rcv   18126.039   D   1351   50  1301
snd   18126.943   D   1351    0  1401
rcv   18127.628   D   1401   50  1351
snd   18128.665   D   1401    0  1451
rcv   18131.387   D   1451   50  1401
snd   18132.260   D   1451    0  1501
rcv   18135.284   D   1501   50  1451
snd   18136.036   D   1501    0  1551
rcv   18136.469   D   1551   50  1501
snd   18137.070   D   1551    0  1601
rcv   18138.769   F   1551    0  1501
snd   18139.078   FA   1551    0  1552
rcv   18142.095   A   1551    0  1501
```

Amount of (original) Data Received: 1592
Number of Data Segments Received: 32
Number of duplicate segments received: 25

Sender
```
snd   1.205      S    0    0    0
rcv   2.227      SA   0    0    1
snd   4.274      A    1    0    1
snd   5.314      D    1   50    1
snd   8.051      D   51   50    1
drop  8.711      D  101   50   51
snd   3015.050   D  151   50  101
snd   3015.871   D  201   50  151
snd   3018.439   D  251   50  201
snd   3019.017   D  301   50  251
snd   3022.340   D  351   50  301
snd   3023.002   D  401   50  351
snd   3026.791   D  451   50  401
rcv   3027.404   D    1    0   51
snd   3030.815   D  501   50  451
rcv   3031.320   D   51    0  101
snd   3032.266   D  551   50  501
snd   6037.104   D  101   50   51
snd   6037.757   D  151   50  101
```

```
snd   6039.744   D    201   50   151
snd   6040.262   D    251   50   201
snd   6041.492   D    301   50   251
snd   6042.005   D    351   50   301
snd   6042.515   D    401   50   351
snd   6042.990   D    451   50   401
snd   6043.655   D    501   50   451
snd   6044.486   D    551   50   501
rcv   6047.584   D    101   0    151
drop  6048.288   D    601   50   551
rcv   9048.890   D    151   0    201
snd   9049.787   D    651   50   601
rcv   9051.604   D    201   0    251
snd   9052.348   D    701   50   651
rcv   9055.326   D    251   0    301
snd   9056.097   D    751   50   701
rcv   9056.528   D    301   0    351
snd   9060.374   D    801   50   751
rcv   9060.904   D    351   0    401
snd   9064.329   D    851   50   801
rcv   9064.911   D    401   0    451
snd   9068.360   D    901   50   851
rcv   9068.831   D    451   0    501
snd   9072.260   D    951   50   901
rcv   9072.879   D    501   0    551
snd   9076.187   D    1001  50   951
rcv   9076.744   D    551   0    601
snd   12085.025  D    1001  50   951
snd   12085.725  D    601   50   551
snd   12087.663  D    651   50   601
snd   12088.129  D    701   50   651
snd   12088.697  D    751   50   701
snd   12089.210  D    801   50   751
snd   12089.618  D    851   50   801
snd   12090.046  D    901   50   851
snd   12090.436  D    951   50   901
snd   12091.011  D    1001  50   951
rcv   12091.550  D    601   0    651
rcv   12092.118  D    651   0    701
rcv   12092.742  D    701   0    751
rcv   12093.446  D    751   0    801
rcv   12094.075  D    801   0    851
rcv   12094.835  D    851   0    901
rcv   12096.148  D    901   0    951
rcv   12097.126  D    951   0    1001
rcv   12097.933  D    1001  0    1051
snd   12098.602  D    1051  50   1001
snd   12098.979  D    1101  50   1051
snd   12102.327  D    1151  50   1101
drop  12103.060  D    1201  50   1151
snd   15105.117  D    1251  50   1201
snd   15105.606  D    1301  50   1251
snd   15107.468  D    1351  50   1301
snd   15107.940  D    1401  50   1351
snd   15111.359  D    1451  50   1401
snd   15111.814  D    1501  50   1451
rcv   15112.125  D    1051  0    1101
snd   15112.548  D    1551  50   1501
rcv   15112.847  D    1101  0    1151
rcv   15113.269  D    1151  0    1201
snd   18117.864  D    1201  50   1151
snd   18119.697  D    1251  50   1201
snd   18120.590  D    1301  50   1251
```

```
snd  18121.402  D   1351   50  1301
snd  18124.156  D   1401   50  1351
snd  18124.596  D   1451   50  1401
snd  18127.318  D   1501   50  1451
snd  18127.772  D   1551   50  1501
rcv  18128.292  D   1201    0  1251
rcv  18128.968  D   1251    0  1301
rcv  18129.460  D   1301    0  1351
rcv  18132.748  D   1351    0  1401
rcv  18133.310  D   1401    0  1451
rcv  18136.667  D   1451    0  1501
rcv  18137.401  D   1501    0  1551
rcv  18138.441  D   1551    0  1601
snd  18138.952  F   1551    0  1501
rcv  18140.461  FA  1551    0  1501
snd  18140.760  A   1501    0  1501
```

Amount of (original) Data Transferred: 1592
Number of Data Segments Sent: 32
Number of (all) Packets Dropped: 3
Number of Retransmitted Segments: 28
Number of Duplicate Acknowledgements received: 1

Appendix B – pdrop = 0.3, MWS = 500bytes, MSS = 50bytes

Sender

```
snd  1.481     S    0    0    0
rcv  2.412     SA   0    0    1
snd  4.095     A    1    0    1
snd  4.984     D    1    50   1
snd  5.629     D    51   50   1
drop 8.722     D    101  50   51
snd  3011.601  D    151  50   101
snd  3012.396  D    201  50   151
snd  3014.550  D    251  50   201
snd  3015.218  D    301  50   251
drop 3015.921  D    351  50   301
snd  6018.063  D    401  50   351
snd  6018.810  D    451  50   401
rcv  6020.649  D    1    0    51
drop 6021.340  D    501  50   451
rcv  9027.917  D    51   0    101
drop 9028.671  D    551  50   501
snd  15036.800 D    101  50   51
snd  15037.397 D    151  50   101
snd  15039.515 D    201  50   151
snd  15040.011 D    251  50   201
snd  15040.587 D    301  50   251
snd  15041.047 D    351  50   301
snd  15041.585 D    401  50   351
snd  15042.507 D    451  50   401
snd  15042.941 D    501  50   451
snd  15043.621 D    551  50   501
rcv  15044.133 D    101  0    151
drop 15044.997 D    601  50   551
rcv  18049.362 D    151  0    201
snd  18050.146 D    651  50   601
rcv  18052.030 D    201  0    251
snd  18052.878 D    701  50   651
rcv  18055.916 D    251  0    301
snd  18056.827 D    751  50   701
rcv  18057.495 D    301  0    351
snd  18060.945 D    801  50   751
rcv  18061.489 D    351  0    401
snd  18063.121 D    851  50   801
rcv  18063.617 D    401  0    451
drop 18065.509 D    901  50   851
rcv  21067.269 D    451  0    501
snd  21068.073 D    951  50   901
rcv  21070.011 D    501  0    551
snd  21070.831 D    1001 50   951
rcv  21071.353 D    551  0    601
snd  24077.370 D    1001 50   951
snd  24078.135 D    601  50   551
snd  24080.237 D    651  50   601
snd  24080.698 D    701  50   651
snd  24081.224 D    751  50   701
snd  24081.683 D    801  50   751
snd  24082.226 D    851  50   801
snd  24082.660 D    901  50   851
snd  24083.134 D    951  50   901
snd  24083.594 D    1001 50   951
rcv  24084.239 D    601  0    651
rcv  24085.024 D    651  0    701
rcv  24085.625 D    701  0    751
rcv  24086.589 D    751  0    801
```

```
rcv   24087.113   D    801    0   851
rcv   24088.176   D    851    0   901
rcv   24089.315   D    901    0   951
rcv   24090.303   D    951    0  1001
rcv   24091.250   D   1001    0  1051
snd   24091.966   D   1051   50  1001
drop  24092.282   D   1101   50  1051
snd   27097.271   D   1151   50  1101
drop  27098.058   D   1201   50  1151
snd   30103.294   D   1251   50  1201
snd   30103.990   D   1301   50  1251
snd   30106.003   D   1351   50  1301
snd   30106.613   D   1401   50  1351
snd   30110.052   D   1451   50  1401
snd   30110.652   D   1501   50  1451
rcv   30113.994   D   1051    0  1101
snd   30114.821   D   1551   50  1501
snd   33120.301   D   1101   50  1051
snd   33120.902   D   1151   50  1101
snd   33122.931   D   1201   50  1151
snd   33123.393   D   1251   50  1201
snd   33123.834   D   1301   50  1251
snd   33124.387   D   1351   50  1301
snd   33124.889   D   1401   50  1351
snd   33125.356   D   1451   50  1401
snd   33126.560   D   1501   50  1451
snd   33127.159   D   1551   50  1501
rcv   33127.911   D   1101    0  1151
rcv   33128.597   D   1151    0  1201
rcv   33129.295   D   1201    0  1251
rcv   33129.880   D   1251    0  1301
rcv   33130.396   D   1301    0  1351
rcv   33130.977   D   1351    0  1401
rcv   33131.406   D   1401    0  1451
rcv   33132.178   D   1451    0  1501
rcv   33133.304   D   1501    0  1551
rcv   33134.258   D   1551    0  1601
snd   33134.643   F   1551    0  1501
rcv   33135.495   FA  1551    0  1501
snd   33135.766   A   1501    0  1501
```

Amount of (original) Data Transferred: 1592
Number of Data Segments Sent: 32
Number of (all) Packets Dropped: 8
Number of Retransmitted Segments: 30
Number of Duplicate Acknowledgements received: 1

Receiver
```
rcv   0.038      S    0    0    0
snd   0.735      SA   0    0    1
rcv   2.626      A    0    0    1
rcv   3.574      D    1   50    1
snd   4.477      D    1    0   51
rcv   7.121      D   51   50    1
snd   7.995      D   51    0  101
rcv   3010.225   D   151   50  101
rcv   3011.006   D   201   50  151
rcv   3013.168   D   251   50  201
rcv   3013.817   D   301   50  251
rcv   6016.850   D   401   50  351
rcv   6017.534   D   451   50  401
rcv   15035.442  D   101   50   51
snd   15036.403  D   101    0  151
```

```
rcv  15037.971  D   151   50   101
snd  15038.841  D   151    0   201
rcv  15039.366  D   201   50   151
snd  15040.368  D   201    0   251
rcv  15040.996  D   251   50   201
snd  15041.930  D   251    0   301
rcv  15042.437  D   301   50   251
snd  15043.291  D   301    0   351
rcv  15043.812  D   351   50   301
snd  15044.588  D   351    0   401
rcv  15045.015  D   401   50   351
snd  15045.648  D   401    0   451
rcv  15046.053  D   451   50   401
snd  15046.730  D   451    0   501
rcv  15047.070  D   501   50   451
snd  15047.757  D   501    0   551
rcv  15048.136  D   551   50   501
snd  15048.762  D   551    0   601
rcv  18048.750  D   651   50   601
rcv  18051.454  D   701   50   651
rcv  18055.450  D   751   50   701
rcv  18059.640  D   801   50   751
rcv  18061.771  D   851   50   801
rcv  21066.740  D   951   50   901
rcv  21069.467  D  1001   50   951
rcv  24076.199  D  1001   50   951
rcv  24076.842  D   601   50   551
snd  24079.175  D   601    0   651
rcv  24079.714  D   651   50   601
snd  24080.540  D   651    0   701
rcv  24081.120  D   701   50   651
snd  24081.895  D   701    0   751
rcv  24082.425  D   751   50   701
snd  24083.420  D   751    0   801
rcv  24084.007  D   801   50   751
snd  24085.253  D   801    0   851
rcv  24085.719  D   851   50   801
snd  24086.570  D   851    0   901
rcv  24087.073  D   901   50   851
snd  24087.699  D   901    0   951
rcv  24088.071  D   951   50   901
snd  24088.681  D   951    0  1001
rcv  24089.056  D  1001   50   951
snd  24089.637  D  1001    0  1051
rcv  24090.530  D  1051   50  1001
snd  24091.113  D  1051    0  1101
rcv  27095.951  D  1151   50  1101
rcv  30101.905  D  1251   50  1201
rcv  30102.585  D  1301   50  1251
rcv  30104.589  D  1351   50  1301
rcv  30105.191  D  1401   50  1351
rcv  30108.667  D  1451   50  1401
rcv  30109.243  D  1501   50  1451
rcv  30113.445  D  1551   50  1501
rcv  33118.941  D  1101   50  1051
snd  33119.949  D  1101    0  1151
rcv  33121.410  D  1151   50  1101
snd  33122.278  D  1151    0  1201
rcv  33122.816  D  1201   50  1151
snd  33123.559  D  1201    0  1251
rcv  33124.008  D  1251   50  1201
snd  33125.684  D  1251    0  1301
rcv  33126.273  D  1301   50  1251
```

```
snd  33127.146  D   1301   0  1351
rcv  33127.568  D   1351  50  1301
snd  33128.245  D   1351   0  1401
rcv  33128.695  D   1401  50  1351
snd  33129.362  D   1401   0  1451
rcv  33129.820  D   1451  50  1401
snd  33130.583  D   1451   0  1501
rcv  33131.001  D   1501  50  1451
snd  33131.692  D   1501   0  1551
rcv  33132.057  D   1551  50  1501
snd  33132.671  D   1551   0  1601
rcv  33133.595  F   1551   0  1501
snd  33133.855  FA  1551   0  1552
rcv  33134.257  A   1551   0  1501
```

Amount of (original) Data Received: 1592
Number of Data Segments Received: 32
Number of duplicate segments received: 22

Appendix B – pdrop = 0.1, MWS = 500bytes, MSS = 50bytes, timeout = 1000ms

Sender

```
snd   1.291     S    0    0    0
rcv   2.268     SA   0    0    1
snd   4.053     A    1    0    1
snd   5.084     D    1    50   1
snd   7.510     D    51   50   1
drop  10.315    D    101  50   51
snd   1016.166  D    151  50   101
snd   1018.212  D    201  50   151
snd   1019.302  D    251  50   201
snd   1019.985  D    301  50   251
snd   1021.420  D    351  50   301
snd   1022.147  D    401  50   351
snd   1023.239  D    451  50   401
rcv   1023.738  D    1    0    51
snd   1027.438  D    501  50   451
rcv   1027.983  D    51   0    101
snd   1031.230  D    551  50   501
snd   2034.158  D    101  50   51
snd   2034.712  D    151  50   101
snd   2036.836  D    201  50   151
snd   2037.352  D    251  50   201
snd   2040.819  D    301  50   251
snd   2041.317  D    351  50   301
snd   2041.834  D    401  50   351
snd   2042.327  D    451  50   401
snd   2042.902  D    501  50   451
snd   2043.722  D    551  50   501
rcv   2046.662  D    101  0    151
drop  2047.822  D    601  50   551
rcv   3048.567  D    151  0    201
snd   3049.562  D    651  50   601
rcv   3051.258  D    201  0    251
snd   3051.975  D    701  50   651
rcv   3052.523  D    251  0    301
snd   3053.559  D    751  50   701
rcv   3054.032  D    301  0    351
snd   3055.023  D    801  50   751
rcv   3055.503  D    351  0    401
snd   3059.512  D    851  50   801
rcv   3060.081  D    401  0    451
snd   3061.786  D    901  50   851
rcv   3062.351  D    451  0    501
snd   3063.122  D    951  50   901
rcv   3063.585  D    501  0    551
snd   3066.960  D    1001 50   951
rcv   3067.387  D    551  0    601
snd   4071.256  D    1001 50   951
snd   4071.884  D    601  50   551
snd   4073.982  D    651  50   601
snd   4074.640  D    701  50   651
snd   4075.009  D    751  50   701
snd   4075.372  D    801  50   751
snd   4075.790  D    851  50   801
snd   4076.197  D    901  50   851
snd   4076.611  D    951  50   901
snd   4077.063  D    1001 50   951
rcv   4077.594  D    601  0    651
rcv   4080.748  D    651  0    701
rcv   4081.214  D    701  0    751
```

```
rcv   4081.547   D   751    0   801
rcv   4082.304   D   801    0   851
rcv   4083.062   D   851    0   901
rcv   4084.077   D   901    0   951
rcv   4085.066   D   951    0   1001
rcv   4086.058   D   1001   0   1051
snd   4086.886   D   1051   50  1001
snd   4087.285   D   1101   50  1051
snd   4090.535   D   1151   50  1101
drop  4090.956   D   1201   50  1151
snd   5094.112   D   1251   50  1201
snd   5094.755   D   1301   50  1251
snd   5096.978   D   1351   50  1301
snd   5097.895   D   1401   50  1351
snd   5098.917   D   1451   50  1401
snd   5099.549   D   1501   50  1451
rcv   5100.991   D   1051   0   1101
snd   5101.756   D   1551   50  1501
rcv   5102.356   D   1101   0   1151
drop  5103.070   D   1601   50  1551
rcv   6105.008   D   1151   0   1201
snd   6105.771   D   1651   50  1601
snd   7108.722   D   1201   50  1151
snd   7109.312   D   1251   50  1201
snd   7111.436   D   1301   50  1251
snd   7111.874   D   1351   50  1301
snd   7112.319   D   1401   50  1351
snd   7112.796   D   1451   50  1401
snd   7113.221   D   1501   50  1451
snd   7113.629   D   1551   50  1501
snd   7114.068   D   1601   50  1551
snd   7114.643   D   1651   50  1601
rcv   7115.038   D   1201   0   1251
snd   7116.446   D   1701   50  1651
rcv   7116.982   D   1251   0   1301
snd   7117.590   D   1751   50  1701
rcv   7118.032   D   1301   0   1351
snd   7118.679   D   1801   50  1751
rcv   7119.380   D   1351   0   1401
snd   7120.374   D   1851   50  1801
rcv   7120.804   D   1401   0   1451
snd   7122.196   D   1901   50  1851
rcv   7122.721   D   1451   0   1501
snd   7123.644   D   1951   50  1901
rcv   7123.979   D   1501   0   1551
rcv   7124.440   D   1551   0   1601
rcv   7125.124   D   1601   0   1651
rcv   7125.568   D   1651   0   1701
rcv   7125.950   D   1701   0   1751
rcv   7126.375   D   1751   0   1801
rcv   7126.760   D   1801   0   1851
rcv   7127.359   D   1851   0   1901
rcv   7128.230   D   1901   0   1951
rcv   7129.088   D   1951   0   2001
snd   7129.653   F   1951   0   1901
rcv   7130.393   FA  1951   0   1901
snd   7133.075   A   1901   0   1901
```

Amount of (original) Data Transferred: 1953
Number of Data Segments Sent: 40
Number of (all) Packets Dropped: 4
Number of Retransmitted Segments: 30
Number of Duplicate Acknowledgements received: 2

Receiver

```
rcv  0.038      S    0    0    0
snd  0.531      SA   0    0    1
rcv  2.273      A    0    0    1
rcv  3.177      D    1    50   1
snd  3.697      D    1    0    51
rcv  6.552      D    51   50   1
snd  7.119      D    51   0    101
rcv  1009.755   D    151  50   101
rcv  1011.676   D    201  50   151
rcv  1012.348   D    251  50   201
rcv  1012.857   D    301  50   251
rcv  1013.420   D    351  50   301
rcv  1013.945   D    401  50   351
rcv  1014.480   D    451  50   401
rcv  1015.755   D    501  50   451
rcv  1019.091   D    551  50   501
rcv  2021.408   D    101  50   51
snd  2022.221   D    101  0    151
rcv  2026.631   D    151  50   101
snd  2027.483   D    151  0    201
rcv  2028.149   D    201  50   151
snd  2028.996   D    201  0    251
rcv  2029.531   D    251  50   201
snd  2030.476   D    251  0    301
rcv  2030.987   D    301  50   251
snd  2032.044   D    301  0    351
rcv  2032.624   D    351  50   301
snd  2033.477   D    351  0    401
rcv  2033.934   D    401  50   351
snd  2035.143   D    401  0    451
rcv  2035.569   D    451  50   401
snd  2036.284   D    451  0    501
rcv  2036.671   D    501  50   451
snd  2037.307   D    501  0    551
rcv  2037.692   D    551  50   501
snd  2038.296   D    551  0    601
rcv  3038.694   D    651  50   601
rcv  3041.290   D    701  50   651
rcv  3045.031   D    751  50   701
rcv  3049.850   D    801  50   751
rcv  3053.823   D    851  50   801
rcv  3056.901   D    901  50   851
rcv  3061.740   D    951  50   901
rcv  3069.685   D    1001 50   951
rcv  4081.470   D    1001 50   951
rcv  4081.918   D    601  50   551
snd  4083.862   D    601  0    651
rcv  4084.352   D    651  50   601
snd  4084.951   D    651  0    701
rcv  4085.342   D    701  50   651
snd  4085.824   D    701  0    751
rcv  4086.143   D    751  50   701
snd  4086.697   D    751  0    801
rcv  4087.067   D    801  50   751
snd  4087.971   D    801  0    851
rcv  4088.398   D    851  50   801
snd  4089.239   D    851  0    901
rcv  4089.500   D    901  50   851
snd  4090.051   D    901  0    951
rcv  4090.893   D    951  50   901
snd  4091.384   D    951  0    1001
rcv  4091.674   D    1001 50   951
```

```
snd  4092.157   D   1001    0   1051
rcv  4093.404   D   1051   50   1001
snd  4094.239   D   1051    0   1101
rcv  4094.513   D   1101   50   1051
snd  4094.889   D   1101    0   1151
rcv  4095.197   D   1151   50   1101
snd  4095.715   D   1151    0   1201
rcv  5100.510   D   1251   50   1201
rcv  5101.158   D   1301   50   1251
rcv  5103.485   D   1351   50   1301
rcv  5104.208   D   1401   50   1351
rcv  5107.498   D   1451   50   1401
rcv  5108.124   D   1501   50   1451
rcv  5112.224   D   1551   50   1501
rcv  6118.240   D   1651   50   1601
rcv  7120.614   D   1201   50   1151
snd  7121.366   D   1201    0   1251
rcv  7123.173   D   1251   50   1201
snd  7123.964   D   1251    0   1301
rcv  7124.752   D   1301   50   1251
snd  7125.508   D   1301    0   1351
rcv  7125.951   D   1351   50   1301
snd  7126.867   D   1351    0   1401
rcv  7127.506   D   1401   50   1351
snd  7128.354   D   1401    0   1451
rcv  7128.840   D   1451   50   1401
snd  7129.751   D   1451    0   1501
rcv  7130.197   D   1501   50   1451
snd  7131.167   D   1501    0   1551
rcv  7131.698   D   1551   50   1501
snd  7132.569   D   1551    0   1601
rcv  7133.076   D   1601   50   1551
snd  7136.281   D   1601    0   1651
rcv  7136.652   D   1651   50   1601
snd  7140.416   D   1651    0   1701
rcv  7140.660   D   1701   50   1651
snd  7141.017   D   1701    0   1751
rcv  7141.767   D   1751   50   1701
snd  7142.261   D   1751    0   1801
rcv  7142.618   D   1801   50   1751
snd  7143.805   D   1801    0   1851
rcv  7144.353   D   1851   50   1801
snd  7145.126   D   1851    0   1901
rcv  7145.433   D   1901   50   1851
snd  7147.031   D   1901    0   1951
rcv  7147.396   D   1951   50   1901
snd  7150.794   D   1951    0   2001
rcv  7152.546   F   1951    0   1901
snd  7153.102   FA  1951    0   1952
rcv  7153.579   A   1951    0   1901
```

Amount of (original) Data Received: 1953
Number of Data Segments Received: 40
Number of duplicate segments received: 26

Appendix C – pdrop = 0.1, MWS = 500bytes, MSS = 50bytes, timeout = 4000ms

Sender

```
snd   1.110      S    0    0    0
rcv   2.219      SA   0    0    1
snd   3.755      A    1    0    1
snd   4.729      D    1    50   1
snd   5.348      D    51   50   1
drop  5.855      D    101  50   51
snd   4011.673   D    151  50   101
snd   4012.350   D    201  50   151
snd   4014.424   D    251  50   201
snd   4014.999   D    301  50   251
snd   4018.468   D    351  50   301
snd   4019.157   D    401  50   351
snd   4022.743   D    451  50   401
rcv   4023.276   D    1    0    51
snd   4027.118   D    501  50   451
rcv   4029.883   D    51   0    101
snd   4030.609   D    551  50   501
snd   8033.099   D    101  50   51
snd   8033.680   D    151  50   101
snd   8035.923   D    201  50   151
snd   8036.455   D    251  50   201
snd   8036.854   D    301  50   251
snd   8037.240   D    351  50   301
snd   8037.695   D    401  50   351
snd   8038.137   D    451  50   401
snd   8038.530   D    501  50   451
snd   8038.988   D    551  50   501
rcv   8039.591   D    101  0    151
drop  8040.390   D    601  50   551
rcv   12043.904  D    151  0    201
snd   12044.661  D    651  50   601
rcv   12046.736  D    201  0    251
snd   12047.526  D    701  50   651
rcv   12050.761  D    251  0    301
snd   12051.494  D    751  50   701
rcv   12054.791  D    301  0    351
snd   12055.565  D    801  50   751
rcv   12058.535  D    351  0    401
snd   12059.380  D    851  50   801
rcv   12062.611  D    401  0    451
snd   12063.245  D    901  50   851
rcv   12063.711  D    451  0    501
snd   12067.480  D    951  50   901
rcv   12068.109  D    501  0    551
snd   12071.166  D    1001 50   951
rcv   12071.693  D    551  0    601
snd   16080.040  D    1001 50   951
snd   16080.586  D    601  50   551
snd   16082.678  D    651  50   601
snd   16083.170  D    701  50   651
snd   16083.610  D    751  50   701
snd   16084.044  D    801  50   751
snd   16084.425  D    851  50   801
snd   16084.757  D    901  50   851
snd   16085.212  D    951  50   901
snd   16085.661  D    1001 50   951
rcv   16086.125  D    601  0    651
rcv   16087.444  D    651  0    701
rcv   16088.065  D    701  0    751
rcv   16088.649  D    751  0    801
```

```
rcv   16089.270  D    801    0   851
rcv   16090.180  D    851    0   901
rcv   16091.429  D    901    0   951
rcv   16092.525  D    951    0   1001
rcv   16093.500  D    1001   0   1051
snd   16094.371  D    1051   50  1001
snd   16095.016  D    1101   50  1051
snd   16096.006  D    1151   50  1101
drop  16096.571  D    1201   50  1151
snd   20098.714  D    1251   50  1201
snd   20099.483  D    1301   50  1251
snd   20101.758  D    1351   50  1301
snd   20102.394  D    1401   50  1351
snd   20103.802  D    1451   50  1401
snd   20104.429  D    1501   50  1451
rcv   20106.133  D    1051   0   1101
snd   20106.887  D    1551   50  1501
rcv   20107.345  D    1101   0   1151
drop  20109.386  D    1601   50  1551
rcv   24113.735  D    1151   0   1201
snd   24114.269  D    1651   50  1601
snd   28123.025  D    1201   50  1151
snd   28123.444  D    1251   50  1201
snd   28126.680  D    1301   50  1251
snd   28127.168  D    1351   50  1301
snd   28127.612  D    1401   50  1351
snd   28128.065  D    1451   50  1401
snd   28128.421  D    1501   50  1451
snd   28128.861  D    1551   50  1501
snd   28129.149  D    1601   50  1551
snd   28129.618  D    1651   50  1601
rcv   28130.058  D    1201   0   1251
snd   28130.748  D    1701   50  1651
rcv   28131.195  D    1251   0   1301
snd   28131.797  D    1751   50  1701
rcv   28132.136  D    1301   0   1351
snd   28132.803  D    1801   50  1751
rcv   28133.440  D    1351   0   1401
snd   28134.025  D    1851   50  1801
rcv   28134.370  D    1401   0   1451
snd   28134.856  D    1901   50  1851
rcv   28135.152  D    1451   0   1501
snd   28135.596  D    1951   50  1901
rcv   28135.876  D    1501   0   1551
rcv   28136.184  D    1551   0   1601
rcv   28136.700  D    1601   0   1651
rcv   28137.056  D    1651   0   1701
rcv   28137.335  D    1701   0   1751
rcv   28137.566  D    1751   0   1801
rcv   28137.873  D    1801   0   1851
rcv   28138.131  D    1851   0   1901
rcv   28138.401  D    1901   0   1951
rcv   28138.941  D    1951   0   2001
snd   28139.446  F    1951   0   1901
rcv   28140.341  FA   1951   0   1901
snd   28141.728  A    1901   0   1901
```

Amount of (original) Data Transferred: 1953
Number of Data Segments Sent: 40
Number of (all) Packets Dropped: 4
Number of Retransmitted Segments: 30
Number of Duplicate Acknowledgements received: 2

Receiver

```
rcv  0.068      S    0    0    0
snd  0.820      SA   0    0    1
rcv  2.895      A    0    0    1
rcv  3.583      D    1    50   1
snd  4.475      D    1    0    51
rcv  5.083      D    51   50   1
snd  5.732      D    51   0    101
rcv  4010.610   D    151  50   101
rcv  4011.260   D    201  50   151
rcv  4013.334   D    251  50   201
rcv  4013.904   D    301  50   251
rcv  4017.338   D    351  50   301
rcv  4018.068   D    401  50   351
rcv  4022.233   D    451  50   401
rcv  4026.396   D    501  50   451
rcv  4029.543   D    551  50   501
rcv  8032.037   D    101  50   51
snd  8032.753   D    101  0    151
rcv  8034.709   D    151  50   101
snd  8035.465   D    151  0    201
rcv  8036.071   D    201  50   151
snd  8036.808   D    201  0    251
rcv  8037.355   D    251  50   201
snd  8038.267   D    251  0    301
rcv  8038.793   D    301  50   251
snd  8040.683   D    301  0    351
rcv  8041.269   D    351  50   301
snd  8042.054   D    351  0    401
rcv  8042.599   D    401  50   351
snd  8043.429   D    401  0    451
rcv  8044.951   D    451  50   401
snd  8045.776   D    451  0    501
rcv  8048.094   D    501  50   451
snd  8048.914   D    501  0    551
rcv  8049.387   D    551  50   501
snd  8050.168   D    551  0    601
rcv  12043.603  D    651  50   601
rcv  12046.456  D    701  50   651
rcv  12050.433  D    751  50   701
rcv  12054.457  D    801  50   751
rcv  12058.328  D    851  50   801
rcv  12062.181  D    901  50   851
rcv  12066.506  D    951  50   901
rcv  12070.104  D    1001 50   951
rcv  16078.940  D    1001 50   951
rcv  16079.461  D    601  50   551
snd  16081.769  D    601  0    651
rcv  16082.202  D    651  50   601
snd  16082.931  D    651  0    701
rcv  16083.416  D    701  50   651
snd  16084.750  D    701  0    751
rcv  16085.304  D    751  50   701
snd  16086.485  D    751  0    801
rcv  16086.883  D    801  50   751
snd  16087.681  D    801  0    851
rcv  16088.153  D    851  50   801
snd  16088.864  D    851  0    901
rcv  16089.465  D    901  50   851
snd  16090.076  D    901  0    951
rcv  16090.532  D    951  50   901
snd  16091.164  D    951  0    1001
rcv  16091.547  D    1001 50   951
```

```
snd  16092.146  D   1001    0  1051
rcv  16093.319  D   1051   50  1001
snd  16093.974  D   1051    0  1101
rcv  16094.712  D   1101   50  1051
snd  16095.710  D   1101    0  1151
rcv  16096.071  D   1151   50  1101
snd  16096.675  D   1151    0  1201
rcv  20097.673  D   1251   50  1201
rcv  20098.452  D   1301   50  1251
rcv  20100.679  D   1351   50  1301
rcv  20101.280  D   1401   50  1351
rcv  20102.692  D   1451   50  1401
rcv  20103.312  D   1501   50  1451
rcv  20105.796  D   1551   50  1501
rcv  24113.169  D   1651   50  1601
rcv  28121.932  D   1201   50  1151
snd  28122.597  D   1201    0  1251
rcv  28125.489  D   1251   50  1201
snd  28126.305  D   1251    0  1301
rcv  28126.742  D   1301   50  1251
snd  28127.285  D   1301    0  1351
rcv  28127.718  D   1351   50  1301
snd  28128.581  D   1351    0  1401
rcv  28129.087  D   1401   50  1351
snd  28129.798  D   1401    0  1451
rcv  28130.168  D   1451   50  1401
snd  28130.642  D   1451    0  1501
rcv  28130.956  D   1501   50  1451
snd  28131.429  D   1501    0  1551
rcv  28131.792  D   1551   50  1501
snd  28132.607  D   1551    0  1601
rcv  28132.945  D   1601   50  1551
snd  28133.378  D   1601    0  1651
rcv  28133.597  D   1651   50  1601
snd  28134.007  D   1651    0  1701
rcv  28134.237  D   1701   50  1651
snd  28134.571  D   1701    0  1751
rcv  28134.748  D   1751   50  1701
snd  28135.055  D   1751    0  1801
rcv  28135.333  D   1801   50  1751
snd  28135.698  D   1801    0  1851
rcv  28135.993  D   1851   50  1801
snd  28136.391  D   1851    0  1901
rcv  28136.618  D   1901   50  1851
snd  28136.942  D   1901    0  1951
rcv  28137.167  D   1951   50  1901
snd  28137.636  D   1951    0  2001
rcv  28138.754  F   1951    0  1901
snd  28138.984  FA  1951    0  1952
rcv  28140.562  A   1951    0  1901
```

Amount of (original) Data Received: 1953
Number of Data Segments Received: 40
Number of duplicate segments received: 26

Sender

```
snd   1.350      S    0    0    0
rcv   2.380      SA   0    0    1
snd   4.250      A    1    0    1
snd   5.125      D    1    50   1
snd   7.984      D    51   50   1
drop  8.497      D    101  50   51
snd   259.146    D    151  50   101
snd   259.613    D    201  50   151
snd   261.489    D    251  50   201
snd   261.816    D    301  50   251
snd   262.099    D    351  50   301
snd   262.454    D    401  50   351
snd   262.895    D    451  50   401
rcv   263.138    D    1    0    51
snd   263.458    D    501  50   451
rcv   263.672    D    51   0    101
snd   264.101    D    551  50   501
snd   515.504    D    101  50   51
snd   516.645    D    151  50   101
snd   518.537    D    201  50   151
snd   519.044    D    251  50   201
snd   520.092    D    301  50   251
snd   520.663    D    351  50   301
snd   521.757    D    401  50   351
snd   522.265    D    451  50   401
snd   523.152    D    501  50   451
snd   523.594    D    551  50   501
rcv   524.563    D    101  0    151
drop  525.297    D    601  50   551
rcv   782.845    D    151  0    201
snd   783.685    D    651  50   601
rcv   785.458    D    201  0    251
snd   786.273    D    701  50   651
rcv   786.883    D    251  0    301
snd   790.308    D    751  50   701
rcv   790.818    D    301  0    351
snd   794.336    D    801  50   751
rcv   794.819    D    351  0    401
snd   798.443    D    851  50   801
rcv   799.173    D    401  0    451
snd   802.374    D    901  50   851
rcv   802.856    D    451  0    501
snd   806.312    D    951  50   901
rcv   806.796    D    501  0    551
snd   810.266    D    1001 50   951
rcv   810.782    D    551  0    601
snd   1068.385   D    1001 50   951
snd   1068.816   D    601  50   551
snd   1070.832   D    651  50   601
snd   1071.296   D    701  50   651
snd   1071.606   D    751  50   701
snd   1071.992   D    801  50   751
snd   1072.367   D    851  50   801
snd   1072.702   D    901  50   851
snd   1073.118   D    951  50   901
snd   1073.491   D    1001 50   951
rcv   1073.710   D    601  0    651
rcv   1074.118   D    651  0    701
rcv   1074.452   D    701  0    751
rcv   1074.856   D    751  0    801
```

```
rcv  1075.164   D   801    0   851
rcv  1075.605   D   851    0   901
rcv  1076.403   D   901    0   951
rcv  1077.371   D   951    0   1001
rcv  1078.518   D   1001   0   1051
snd  1079.200   D   1051   50  1001
snd  1079.586   D   1101   50  1051
snd  1080.176   D   1151   50  1101
drop 1080.474   D   1201   50  1151
snd  1333.339   D   1251   50  1201
snd  1334.012   D   1301   50  1251
snd  1335.875   D   1351   50  1301
snd  1336.347   D   1401   50  1351
snd  1337.330   D   1451   50  1401
snd  1337.764   D   1501   50  1451
rcv  1338.194   D   1051   0   1101
snd  1338.661   D   1551   50  1501
rcv  1338.987   D   1101   0   1151
drop 1339.442   D   1601   50  1551
rcv  1594.967   D   1151   0   1201
snd  1595.838   D   1651   50  1601
snd  1853.110   D   1201   50  1151
snd  1855.211   D   1251   50  1201
snd  1858.458   D   1301   50  1251
snd  1858.939   D   1351   50  1301
snd  1859.451   D   1401   50  1351
snd  1859.944   D   1451   50  1401
snd  1860.412   D   1501   50  1451
snd  1860.970   D   1551   50  1501
snd  1861.530   D   1601   50  1551
snd  1862.023   D   1651   50  1601
rcv  1863.164   D   1201   0   1251
snd  1864.101   D   1701   50  1651
rcv  1864.578   D   1251   0   1301
snd  1865.800   D   1751   50  1701
rcv  1866.446   D   1301   0   1351
snd  1867.754   D   1801   50  1751
rcv  1868.220   D   1351   0   1401
snd  1868.781   D   1851   50  1801
rcv  1869.199   D   1401   0   1451
snd  1870.011   D   1901   50  1851
rcv  1870.367   D   1451   0   1501
snd  1870.888   D   1951   50  1901
rcv  1871.215   D   1501   0   1551
rcv  1871.589   D   1551   0   1601
rcv  1872.054   D   1601   0   1651
rcv  1872.424   D   1651   0   1701
rcv  1872.901   D   1701   0   1751
rcv  1873.224   D   1751   0   1801
rcv  1873.520   D   1801   0   1851
rcv  1873.855   D   1851   0   1901
rcv  1874.104   D   1901   0   1951
rcv  1874.474   D   1951   0   2001
snd  1874.865   F   1951   0   1901
rcv  1875.743   FA  1951   0   1901
snd  1876.037   A   1901   0   1901
```

Amount of (original) Data Transferred: 1953
Number of Data Segments Sent: 40
Number of (all) Packets Dropped: 4
Number of Retransmitted Segments: 30
Number of Duplicate Acknowledgements received: 2

Receiver

```
rcv  0.045      S    0    0    0
snd  0.809      SA   0    0    1
rcv  3.166      A    0    0    1
rcv  6.401      D    1    50   1
snd  7.217      D    1    0    51
rcv  7.780      D    51   50   1
snd  8.364      D    51   0    101
rcv  257.816    D    151  50   101
rcv  258.223    D    201  50   151
rcv  260.110    D    251  50   201
rcv  260.572    D    301  50   251
rcv  260.878    D    351  50   301
rcv  261.118    D    401  50   351
rcv  261.492    D    451  50   401
rcv  262.072    D    501  50   451
rcv  262.810    D    551  50   501
rcv  514.940    D    101  50   51
snd  515.751    D    101  0    151
rcv  517.062    D    151  50   101
snd  517.915    D    151  0    201
rcv  518.780    D    201  50   151
snd  519.702    D    201  0    251
rcv  520.202    D    251  50   201
snd  521.065    D    251  0    301
rcv  521.774    D    301  50   251
snd  522.428    D    301  0    351
rcv  522.795    D    351  50   301
snd  523.430    D    351  0    401
rcv  526.821    D    401  50   351
snd  527.360    D    401  0    451
rcv  527.752    D    451  50   401
snd  528.199    D    451  0    501
rcv  528.584    D    501  50   451
snd  529.046    D    501  0    551
rcv  529.392    D    551  50   501
snd  529.875    D    551  0    601
rcv  782.386    D    651  50   601
rcv  784.953    D    701  50   651
rcv  789.024    D    751  50   701
rcv  793.057    D    801  50   751
rcv  797.215    D    851  50   801
rcv  801.084    D    901  50   851
rcv  805.039    D    951  50   901
rcv  808.977    D    1001 50   951
rcv  1067.029   D    1001 50   951
rcv  1067.429   D    601  50   551
snd  1069.512   D    601  0    651
rcv  1069.785   D    651  50   601
snd  1070.390   D    651  0    701
rcv  1070.776   D    701  50   651
snd  1071.275   D    701  0    751
rcv  1071.667   D    751  50   701
snd  1072.196   D    751  0    801
rcv  1072.608   D    801  50   751
snd  1073.203   D    801  0    851
rcv  1073.595   D    851  50   801
snd  1074.079   D    851  0    901
rcv  1074.414   D    901  50   851
snd  1074.863   D    901  0    951
rcv  1075.404   D    951  50   901
snd  1075.830   D    951  0    1001
rcv  1076.202   D    1001 50   951
```

```
snd  1076.741  D   1001    0  1051
rcv  1077.834  D   1051   50  1001
snd  1078.425  D   1051    0  1101
rcv  1078.730  D   1101   50  1051
snd  1079.197  D   1101    0  1151
rcv  1079.415  D   1151   50  1101
snd  1079.896  D   1151    0  1201
rcv  1332.274  D   1251   50  1201
rcv  1332.889  D   1301   50  1251
rcv  1334.563  D   1351   50  1301
rcv  1335.089  D   1401   50  1351
rcv  1335.969  D   1451   50  1401
rcv  1336.346  D   1501   50  1451
rcv  1337.378  D   1551   50  1501
rcv  1594.567  D   1651   50  1601
rcv  1851.835  D   1201   50  1151
snd  1854.081  D   1201    0  1251
rcv  1857.023  D   1251   50  1201
snd  1857.837  D   1251    0  1301
rcv  1858.391  D   1301   50  1251
snd  1859.223  D   1301    0  1351
rcv  1859.713  D   1351   50  1301
snd  1860.807  D   1351    0  1401
rcv  1861.735  D   1401   50  1351
snd  1862.457  D   1401    0  1451
rcv  1862.883  D   1451   50  1401
snd  1863.858  D   1451    0  1501
rcv  1864.358  D   1501   50  1451
snd  1865.096  D   1501    0  1551
rcv  1865.755  D   1551   50  1501
snd  1866.478  D   1551    0  1601
rcv  1866.858  D   1601   50  1551
snd  1867.498  D   1601    0  1651
rcv  1867.841  D   1651   50  1601
snd  1868.484  D   1651    0  1701
rcv  1868.843  D   1701   50  1651
snd  1869.383  D   1701    0  1751
rcv  1869.697  D   1751   50  1701
snd  1870.157  D   1751    0  1801
rcv  1870.410  D   1801   50  1751
snd  1870.832  D   1801    0  1851
rcv  1871.112  D   1851   50  1801
snd  1871.616  D   1851    0  1901
rcv  1871.850  D   1901   50  1851
snd  1872.295  D   1901    0  1951
rcv  1872.552  D   1951   50  1901
snd  1872.963  D   1951    0  2001
rcv  1873.883  F   1951    0  1901
snd  1874.156  FA  1951    0  1952
rcv  1874.616  A   1951    0  1901
```

Amount of (original) Data Received: 1953
Number of Data Segments Received: 40
Number of duplicate segments received: 26