

# Summary Table

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#	Description	Test	Expected Result	Pass/Fail
1	Send with no drop rate.	Send packets with 0% drop rate set on the emulator.	Successful transfer with few resends.	Pass
2	Send with some drop rate.	Send packets with 10% drop rate set on the emulator.	Successful transfer with some resends.	Pass
3	Send with 100% drop rate.	Send packets with 100% drop rate set on the emulator.	Sending client times out and aborts.	Pass
4	Sending gives up if the other client disconnects mid-transfer.	Send packets with 10% drop rate set on the emulator, but disconnect before the transfer is complete.	Sending client times out and aborts.	Pass
5	Send with no drop rate and delay.	Send packets with 0% drop rate and 20000 $\mu$ s delay set on the emulator.	Successful transfer with some resends.	Pass
6	Send with some drop rate and delay.	Send packets with 10% drop rate and 20000 $\mu$ s delay set on the emulator.	Successful transfer with more resends.	Pass
7	Transfer history graph works properly.	Check the history graph on the emulator after a successful transfer.	Transfer history graph visually displays the previous transfer.	Pass
8	RTT during the transfer is displayed in the log file.	Check log file after a successful transfer with the log option checked.	RTT is displayed in the log file.	Pass
9	Window size during the transfer is displayed in the log file.	Check log file after a successful transfer with the log option checked.	Window size is displayed in the log file.	Pass
10	Full-duplex transfer with drop rate and delay.	Set 10% drop rate and 10000 $\mu$ s delay on the emulator, begin the transfer on one client, and then the other before the transfer is complete.	Successful transfer on both ends with significantly more resends.	Pass

# Test Details

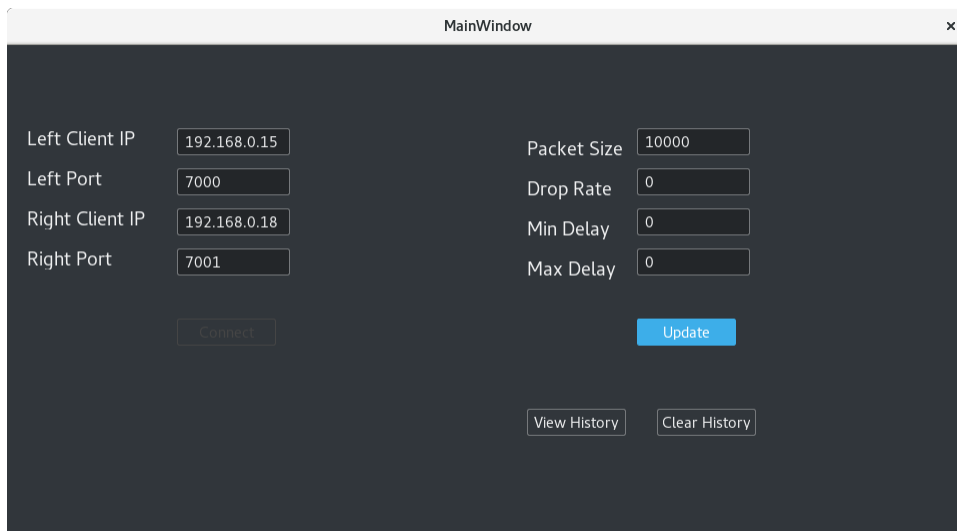
## Test 1: Normal Half-Duplex Operation

Description: Send with no drop rate.

Test: Send packets with 0% drop rate set on the emulator.

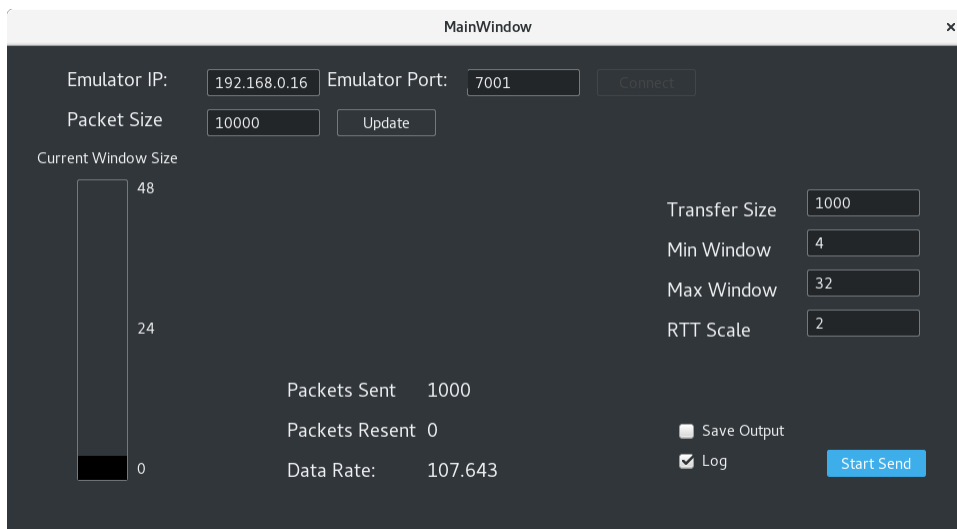
Expected result: Successful transfer with few resends.

Emulator side:



The screenshot shows a window titled 'MainWindow' with a dark background. It contains two columns of input fields. The left column has 'Left Client IP' (192.168.0.15), 'Left Port' (7000), 'Right Client IP' (192.168.0.18), and 'Right Port' (7001). The right column has 'Packet Size' (10000), 'Drop Rate' (0), 'Min Delay' (0), and 'Max Delay' (0). Below these are three buttons: 'Connect' (disabled), 'Update' (active), and 'View History' (disabled). There is also a 'Clear History' button.

Client side:



The screenshot shows a window titled 'MainWindow' with a dark background. It contains several input fields and buttons. At the top, 'Emulator IP' (192.168.0.16) and 'Emulator Port' (7001) are followed by a 'Connect' button. Below them is 'Packet Size' (10000) with an 'Update' button. On the left, there is a vertical bar labeled 'Current Window Size' with a scale from 0 to 48. On the right, there are 'Transfer Size' (1000), 'Min Window' (4), 'Max Window' (32), and 'RTT Scale' (2). At the bottom, there are 'Packets Sent' (1000), 'Packets Resent' (0), and 'Data Rate' (107.643). There are also checkboxes for 'Save Output' (unchecked) and 'Log' (checked), and a 'Start Send' button.

Pass

## Test 2: Normal Half-Duplex Operation with Dropping

Description: Send with some drop rate.

Test: Send packets with 10% drop rate set on the emulator.

Expected result: Successful transfer with some resends.

Emulator side:

The screenshot shows the 'MainWindow' interface for the emulator side. It features a dark grey background with white text and input fields. On the left, there are four input fields for 'Left Client IP' (192.168.0.15), 'Left Port' (7000), 'Right Client IP' (192.168.0.18), and 'Right Port' (7001). On the right, there are four input fields for 'Packet Size' (10000), 'Drop Rate' (10), 'Min Delay' (0), and 'Max Delay' (0). Below these fields are two buttons: 'Connect' and 'Update'. At the bottom, there are two buttons: 'View History' and 'Clear History'.

Client side:

The screenshot shows the 'MainWindow' interface for the client side. It features a dark grey background with white text and input fields. At the top, there are two input fields for 'Emulator IP' (192.168.0.16) and 'Emulator Port' (7001), followed by a 'Connect' button. Below these are two input fields for 'Packet Size' (10000) and an 'Update' button. On the left, there is a vertical bar chart labeled 'Current Window Size' with a scale from 0 to 48. The bar is currently at 0. On the right, there are four input fields for 'Transfer Size' (1000), 'Min Window' (4), 'Max Window' (32), and 'RTT Scale' (2). Below these are two checkboxes: 'Save Output' (unchecked) and 'Log' (checked). At the bottom, there are two buttons: 'Start Send' and 'Data Rate: 13.6507'. In the center, there are two lines of text: 'Packets Sent 1000' and 'Packets Resent 448'.

Pass

### Test 3: Half-Duplex Operation with 100% Drop Rate

Description: Send with 100% drop rate.

Test: Send packets with 100% drop rate set on the emulator.

Expected result: Sending client times out and aborts.

Emulator side:

The screenshot shows the 'MainWindow' interface for the emulator side. It features a dark grey background with white text and input fields. On the left, there are four input fields for 'Left Client IP' (192.168.0.15), 'Left Port' (7000), 'Right Client IP' (192.168.0.18), and 'Right Port' (7001). On the right, there are four input fields for 'Packet Size' (10000), 'Drop Rate' (100), 'Min Delay' (0), and 'Max Delay' (0). Below these fields are three buttons: 'Connect' (disabled), 'Update' (active), and 'View History' (disabled). At the bottom right, there is a 'Clear History' button (disabled).

Client side:

The screenshot shows the 'MainWindow' interface for the client side. It features a dark grey background with white text and input fields. At the top, there are two input fields for 'Emulator IP' (192.168.0.16) and 'Emulator Port' (7001), followed by a 'Connect' button (disabled). Below these are two input fields for 'Packet Size' (10000) and an 'Update' button (disabled). On the left, there is a vertical bar representing 'Current Window Size' with a scale from 0 to 48. On the right, there are four input fields for 'Transfer Size' (1000), 'Min Window' (4), 'Max Window' (32), and 'RTT Scale' (2). At the bottom, there are three labels: 'Packets Sent', 'Packets Resent', and 'Data Rate:'. To the right of these labels are two checkboxes: 'Save Output' (unchecked) and 'Log' (checked). At the bottom right, there is a 'Start Send' button (active).

Pass

## Test 4: Half-Duplex Operation with Disconnection Mid-Transfer

Description: Sending gives up if the other client disconnects mid-transfer.

Test: Send packets with 10% drop rate set on the emulator, but disconnect before the transfer is complete.

Expected result: Sending client times out and aborts.

Emulator side:

The screenshot shows the 'MainWindow' interface for the emulator side. It features a dark background with white text and input fields. On the left, there are four input fields for 'Left Client IP' (192.168.0.15), 'Left Port' (7000), 'Right Client IP' (192.168.0.18), and 'Right Port' (7001). On the right, there are four input fields for 'Packet Size' (10000), 'Drop Rate' (100), 'Min Delay' (0), and 'Max Delay' (0). Below these fields are three buttons: 'Connect' (disabled), 'Update' (active), and 'View History' (disabled). At the bottom right, there is a 'Clear History' button (disabled).

Client side:

The screenshot shows the 'MainWindow' interface for the client side. It features a dark background with white text and input fields. At the top, there are two input fields for 'Emulator IP' (192.168.0.16) and 'Emulator Port' (7001), followed by a 'Connect' button (disabled). Below these are two input fields for 'Packet Size' (10000) and an 'Update' button (disabled). On the left, there is a vertical bar labeled 'Current Window Size' with a scale from 0 to 48. On the right, there are four input fields for 'Transfer Size' (1000), 'Min Window' (4), 'Max Window' (32), and 'RTT Scale' (2). At the bottom, there are three labels: 'Packets Sent', 'Packets Resent', and 'Data Rate:'. To the right of these labels are two checkboxes: 'Save Output' (unchecked) and 'Log' (checked). At the bottom right, there is a 'Start Send' button (active).

Pass

## Test 5: Normal Half-Duplex Operation with Delay

Description: Send with no drop rate and delay.

Test: Send packets with 0% drop rate and 20000 $\mu$ s delay set on the emulator.

Expected result: Successful transfer with some resends.

Emulator side:

The screenshot shows the 'MainWindow' interface for the emulator side. It features a dark background with white text and input fields. On the left, there are four input fields for 'Left Client IP' (192.168.0.15), 'Left Port' (7000), 'Right Client IP' (192.168.0.18), and 'Right Port' (7001). On the right, there are four input fields for 'Packet Size' (10000), 'Drop Rate' (0), 'Min Delay' (18000), and 'Max Delay' (22000). Below these fields are three buttons: 'Connect' (disabled), 'Update' (active), and 'View History' (disabled). At the bottom right, there is a 'Clear History' button (disabled).

Client side:

The screenshot shows the 'MainWindow' interface for the client side. It features a dark background with white text and input fields. At the top, there are two input fields for 'Emulator IP' (192.168.0.16) and 'Emulator Port' (7001), followed by a 'Connect' button (disabled). Below these are two input fields for 'Packet Size' (10000) and an 'Update' button (disabled). On the left, there is a vertical bar chart titled 'Current Window Size' with a scale from 0 to 48. The bar is currently at 0. On the right, there are four input fields for 'Transfer Size' (1000), 'Min Window' (4), 'Max Window' (32), and 'RTT Scale' (2). Below these are two checkboxes: 'Save Output' (unchecked) and 'Log' (checked). At the bottom right, there is a 'Start Send' button (active). In the center, there are three lines of text: 'Packets Sent 1000', 'Packets Resent 669', and 'Data Rate: 1.7493'.

Pass

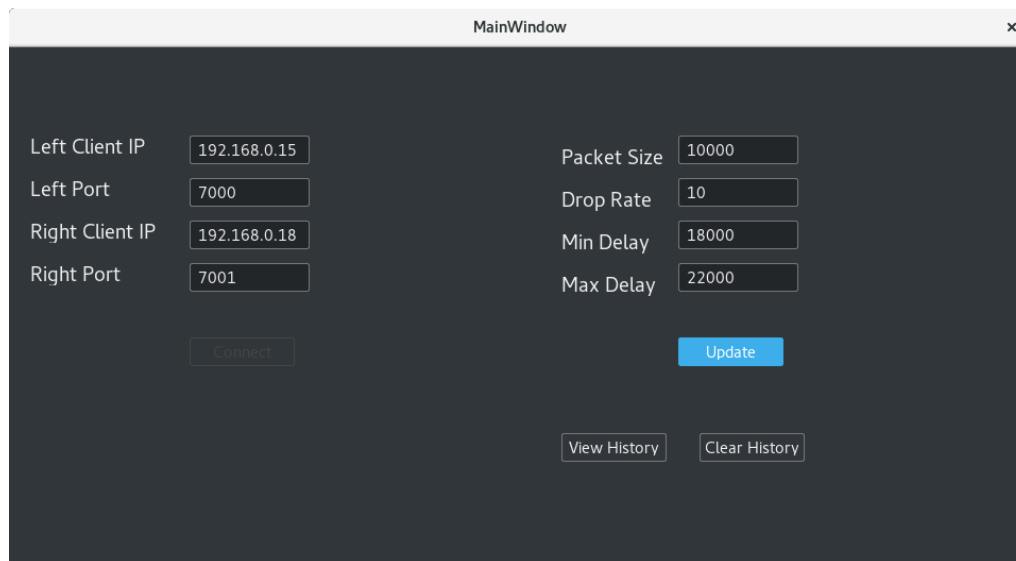
## Test 6: Normal Half-Duplex Operation with Dropping and Delay

Description: Send with some drop rate and delay.

Test: Send packets with 10% drop rate and 20000 $\mu$ s delay set on the emulator.

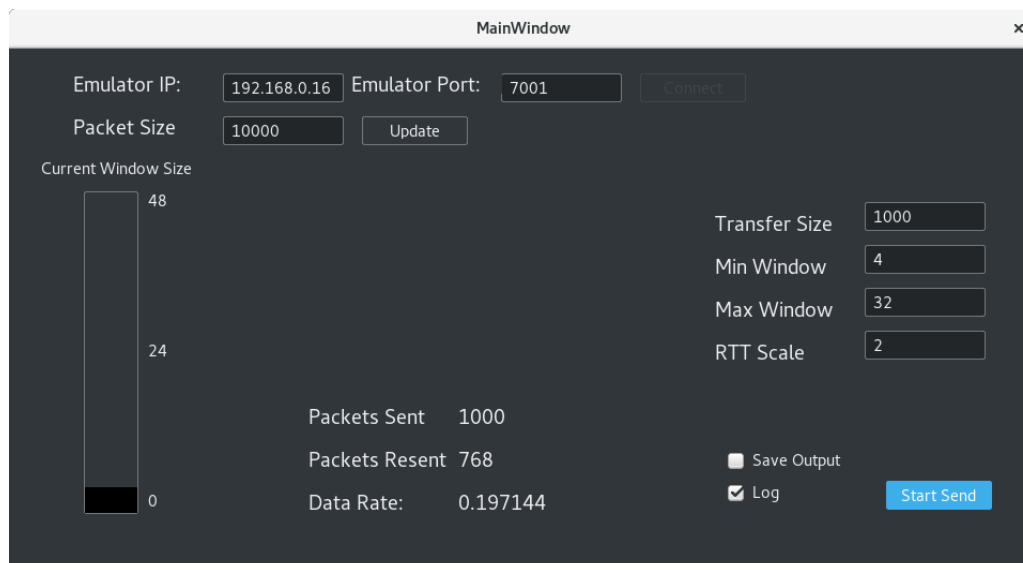
Expected result: Successful transfer with more resends.

Emulator side:



The screenshot shows the 'MainWindow' interface for the emulator side. It features a dark background with white text and input fields. On the left, there are four input fields for 'Left Client IP' (192.168.0.15), 'Left Port' (7000), 'Right Client IP' (192.168.0.18), and 'Right Port' (7001). On the right, there are four input fields for 'Packet Size' (10000), 'Drop Rate' (10), 'Min Delay' (18000), and 'Max Delay' (22000). Below these fields are three buttons: 'Connect' (disabled), 'Update' (active), and 'View History' (disabled). At the bottom right, there is a 'Clear History' button.

Client side:



The screenshot shows the 'MainWindow' interface for the client side. It features a dark background with white text and input fields. At the top, there are two input fields for 'Emulator IP' (192.168.0.16) and 'Emulator Port' (7001), followed by a 'Connect' button (disabled). Below these are two input fields for 'Packet Size' (10000) and an 'Update' button. On the left, there is a 'Current Window Size' section with a vertical bar chart showing a value of 48. On the right, there are four input fields for 'Transfer Size' (1000), 'Min Window' (4), 'Max Window' (32), and 'RTT Scale' (2). At the bottom, there are two input fields for 'Packets Sent' (1000) and 'Packets Resent' (768), followed by a 'Data Rate' field showing 0.197144. There are also two checkboxes: 'Save Output' (unchecked) and 'Log' (checked). At the bottom right, there is a 'Start Send' button.

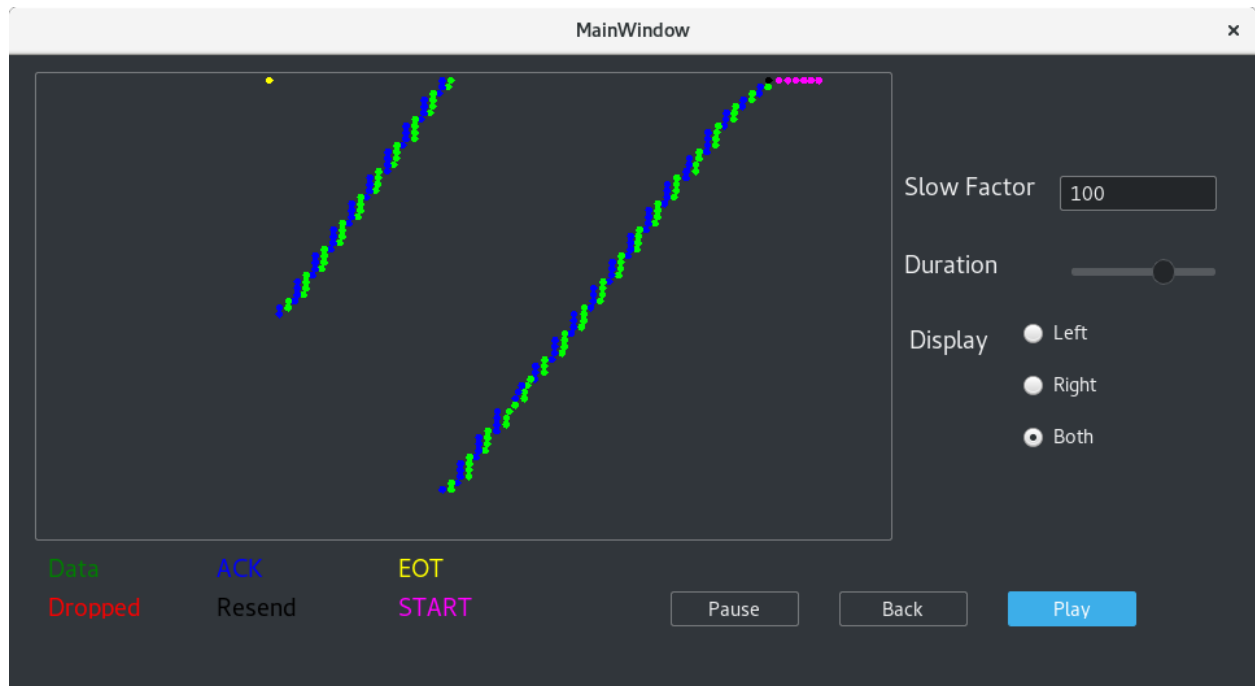
Pass

## Test 7: Transfer History Graph Display

Description: Transfer history graph works properly.

Test: Check the history graph on the emulator after a successful transfer.

Expected result: Transfer history graph visually displays the previous transfer.



Pass



### **Test 8: Round Trip Time Logging**

Description: RTT during the transfer is displayed in the log file.

Test: Check log file after a successful transfer.

Expected result: RTT is displayed in the log file.

**Pass**

### **Test 9: Window Size Logging**

Description: Window size during the transfer is displayed in the log file.

Test: Check log file after a successful transfer.

Expected result: Window size is displayed in the log file.

**Pass**

## Test 10: Full-Duplex Operation with Dropping and Delay

Description: Full-duplex transfer with drop rate and delay.

Test: Set 10% drop rate and 10000 $\mu$ s delay on the emulator, begin the transfer on one client, and then the other before the transfer is complete.

Expected result: Successful transfer on both ends with significantly more resends.

Emulator side:

The screenshot shows the 'MainWindow' interface for the emulator side. It features a dark grey background with white text and input fields. On the left, there are four input fields for 'Left Client IP' (192.168.0.15), 'Left Port' (7000), 'Right Client IP' (192.168.0.18), and 'Right Port' (7001). On the right, there are four input fields for 'Packet Size' (10000), 'Drop Rate' (10), 'Min Delay' (8000), and 'Max Delay' (12000). Below these fields are three buttons: 'Connect' (disabled), 'Update' (active, blue), and 'View History' (disabled). At the bottom right, there is a 'Clear History' button (disabled).

Client side:

The screenshot shows the 'MainWindow' interface for the client side. It features a dark grey background with white text and input fields. At the top, there are two input fields for 'Emulator IP' (192.168.0.16) and 'Emulator Port' (7001), followed by a 'Connect' button (disabled). Below these are two input fields for 'Packet Size' (1000) and an 'Update' button (disabled). On the left, there is a vertical bar representing the 'Current Window Size' with a scale from 0 to 48. The bar is mostly white, with a small black segment at the bottom. On the right, there are four input fields for 'Transfer Size' (500000), 'Min Window' (10), 'Max Window' (24), and 'RTT Scale' (2). Below these are two checkboxes: 'Save Output' (checked) and 'Log' (checked). At the bottom right, there is a 'Start Send' button (disabled). In the center, there are three lines of text: 'Packets Sent 500000', 'Packets Resent 856582', and 'Data Rate: 0.773668'.

Pass