Best Effort Delivery - User Datagram Protocol Part 1

Exercise 1: Understanding the Use of Ports

* 1. Start one copy of the UDP Workbench (found under the UDP tab on the Networking Workbench) on computer A and one copy on computer B.
  2. Prepare the following settings:
     1. Set the correct **destination IP addresses** for each workbench so that the address shown in the “Address 1” field is the address of the other computer. To check the address of a computer, click on the Start button, look for cmd.exe to launch the command line then type in “ipconfig”
     2. Select the “unicast” mode for this exercise.
     3. The **send port** corresponds to the port that the packet will be sent to; that is, it is the value that is written into the destination port number in the UDP packet header.
     4. The **receive port** number is the port number that the receiving UDP software module listens on.
  3. Click the “Enable Receiver” button to enable receiving.
  4. To change a receive port number, you must click the “Stop Receiving” button, then change the port number, and then re-enable receiving.
  5. Try each of the port number configurations shown below. In each case, try holding a two-way conversation between the two workbench instances

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| Trial | Computer | Send Port | Receive Port | Trial | Computer | Send Port | Receive Port |
| 1 | A | 8000 | 8002 | 4 | A | 8001 | 8001 |
| B | 8001 | 8003 | B | 8001 | 8001 |
| 2 | A | 8001 | 8002 | 5 | A | 8001 | 8002 |
| B | 8001 | 8002 | B | 8002 | 8001 |
| 3 | A | 8001 | 8001 |
| B | 8002 | 8002 |

Which of these send and receive port configurations work (i.e., allow 2-way communication)?

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What then is the underlying requirement for port-based communication?

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Which of the above configurations work if both copies of the UDP Workbench are running on the same computer?

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What is the reason for the difference in outcome?

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Exercise 2: Broadcasting with UDP

* 1. Choose 1 computer to serve as the sender and set its UDP Workbench to broadcast communication.
  2. Choose another 1 computer to serve as target. (You may work with PCs of other groups).
  3. Set up the UDP Workbench on target computer and enable the receiver. Make sure to set the receive port on the target computers to match the send port of the sender then enable the receiver.
  4. Try sending a broadcast message using the sender PC. Does the target computer receive the broadcast message? If no, why?

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When a message is broadcast to a network of 5 computers, how many messages are sent?  
How many messages are received (hint: look at the statistics windows)? Explain how this can be

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Exercise 3: Achieving a Multicasting Effect with UDP

UDP directly supports only unicast and broadcast modes of addressing, and therefore must use workarounds to achieve multicasting.

* 1. Set the UDP Workbench to multicast communication on a source computer.
  2. Set two addresses (“Address 1,” “Address 2,”) to point at two different existing computers that will serve as targets. (You may use IP addresses of PCs of other groups)
  3. Set up the UDP Workbench on each target computer and enable the receivers. Make sure the port configurations are correct (refer to exercise 1 and 2 above if you have any doubt).

What happens when you send a message, in terms of the number of messages actually sent by the sending process and the numbers of messages received by each of the receiving process?

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* 1. Now, set the two addresses to all point at the same computer.

What happens when you send a message (hint: look at the statistics windows)?

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Can you determine what method was used (in the UDP Workbench) to achieve the multicast effect?

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Suggest another method by which a multicast effect can also be achieved using UDP without sending multiple copies of the same unicast?

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