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## Socket Programming

1. What kinds of messages will be exchanged across the control channel?

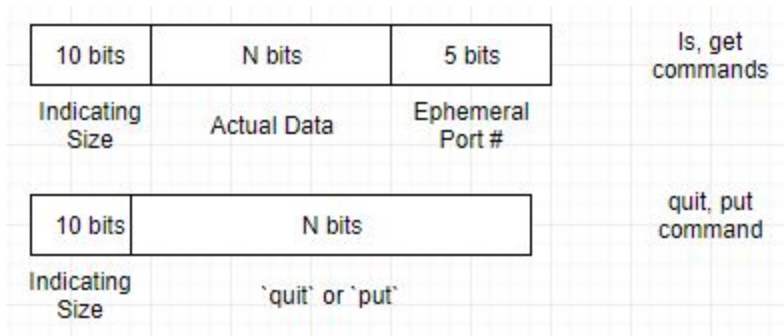
For the client we will send the command messages to the server (ls, get, put quit). For the server we will send back the status of the command. If it is successful, it sends back the success message, if it fails it will send back the error of the failure.

2. How should the other side respond to the messages?

The other side will respond with a status. Either with a success message or it will give back the error if it were to fail.

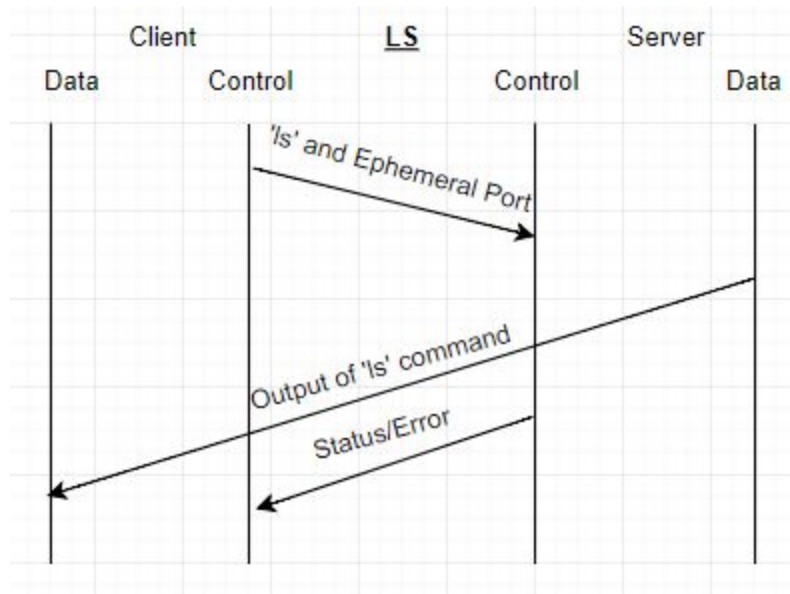
3. What sizes/formats will the messages have?

65,536 bytes for both client and server

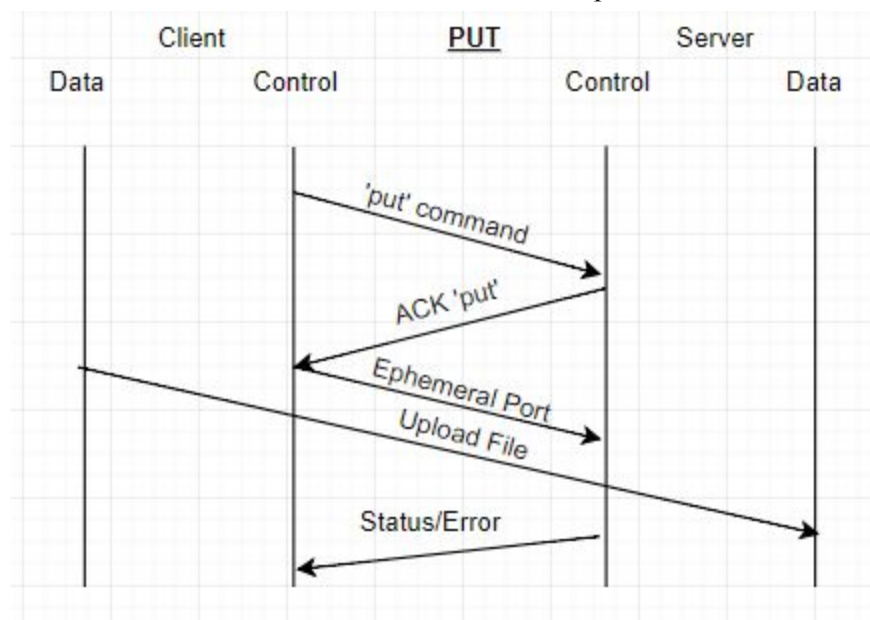


4. What message exchanges have to take place in order to setup a file transfer channel?

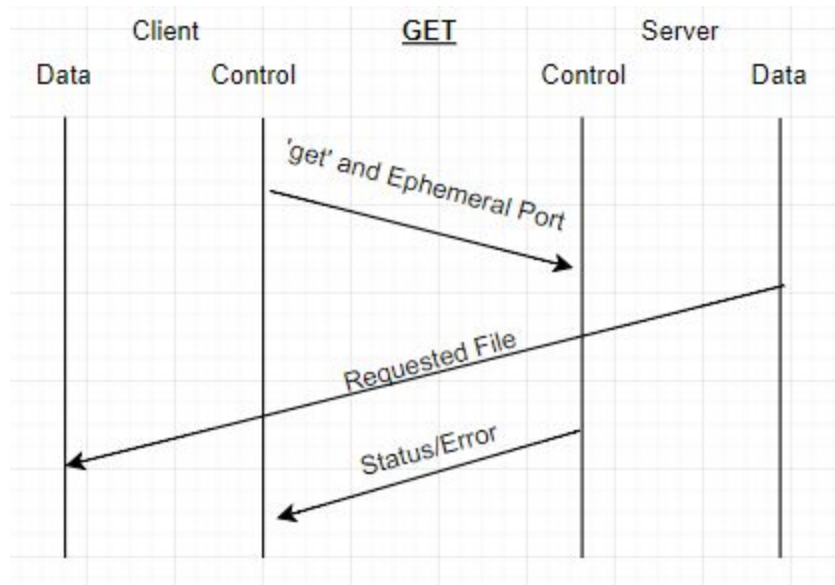
For the ls command, in order to setup the FTP channel, the client needs to send the the packet containing both 'ls' command and 'ephemeral port' (which is used for data connection)



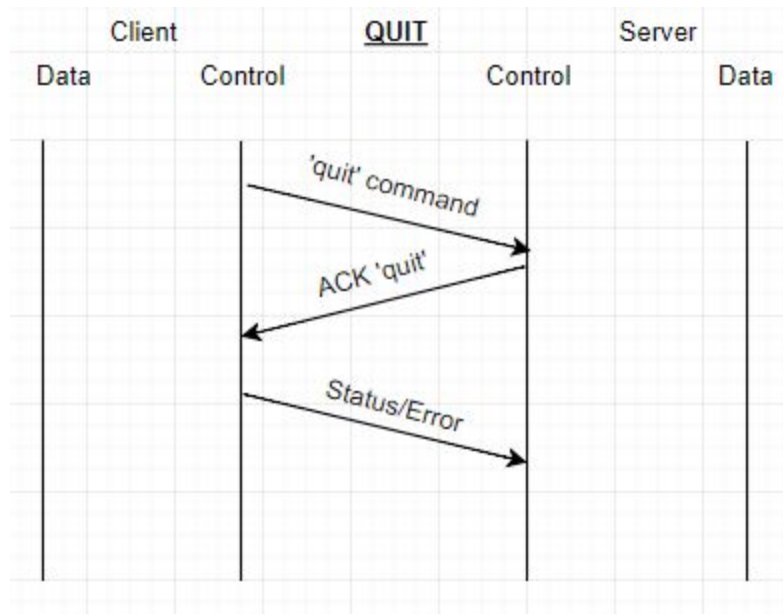
For the PUT command, first you need to send the PUT command from the client to the server. The server will receive the command and send back the ACK packet to the client.



For the get command, in order to setup the FTP channel, the client needs to send the the packet containing both 'get' command and 'ephemeral port' (which is used for data connections).



For the quit command, we do not use the transfer channel, so no message will be exchanged.



5. How will the receiving side know when to start/stop receiving the file?

The receiving side will know when to stop or start based on the size of the file that given to the client or the server. The first 10 bytes of the packet (header) indicates the file size. The client or the server will know the size of the file being uploaded or downloaded before it has occurred.

6. How to avoid overflowing TCP buffers?

You need to make sure that you have a check in place to not send over the TCP buffer size. Check the file that is being uploaded or downloaded to make sure it is less than the buffer size. (65,536 bytes) If it is over the buffer size, the program will not allow the transfer to occur and will give an error.