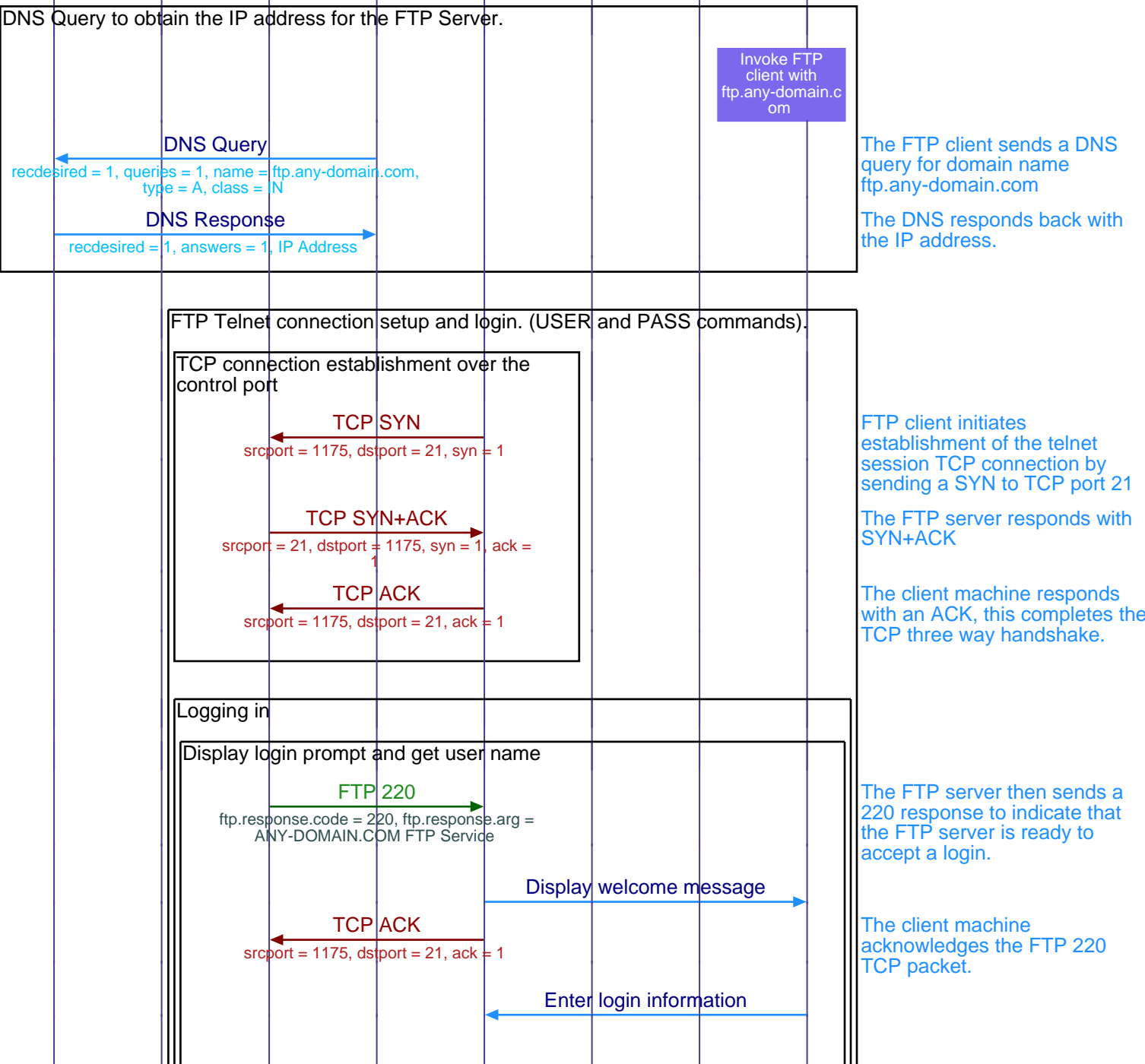


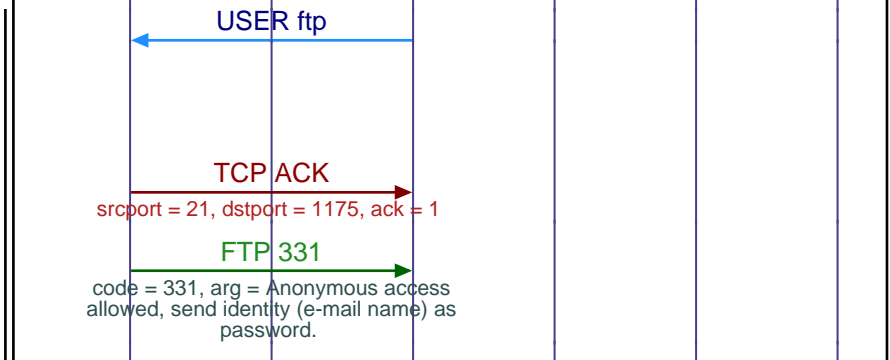
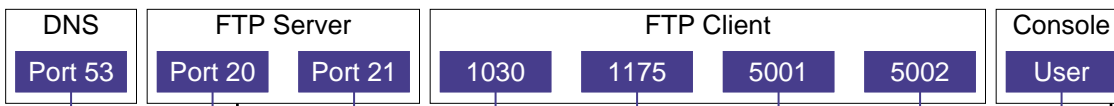
This sequence diagram was generated with EventStudio System Designer (<http://www.EventHelix.com/EventStudio>).

Here we explore the sequence of interactions in a typical FTP (File Transfer Protocol) session. The example here illustrates the use of multiple TCP connections by FTP. We will cover how FTP establishes a telnet TCP connection (TCP Port 21) to control the overall flow of the FTP transfer. Then we examine the use of TCP Port 20 for establishing TCP connections for directory transfer and file retrieval.

- The complete sequence diagram can be divided into the following steps:
- DNS Query to obtain the IP address for the FTP Server
 - FTP Telnet connection setup and login. (USER and PASS commands)
 - Obtaining a directory listing (PORT and LIST command)
 - Changing directory (CWD command)
 - Downloading a file using FTP get (PORT and RETR command)

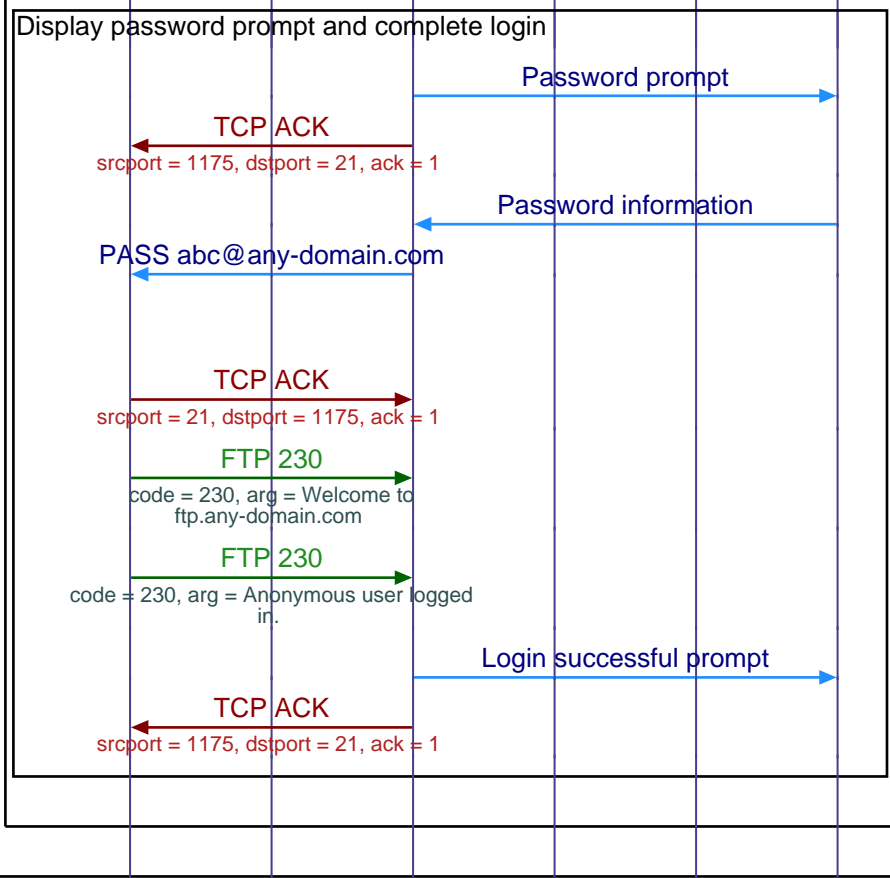
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User's login name is transported in a TCP segment. In this example an anonymous FTP is being initiated with the user name "ftp"

FTP server indicates that anonymous FTP is allowed.

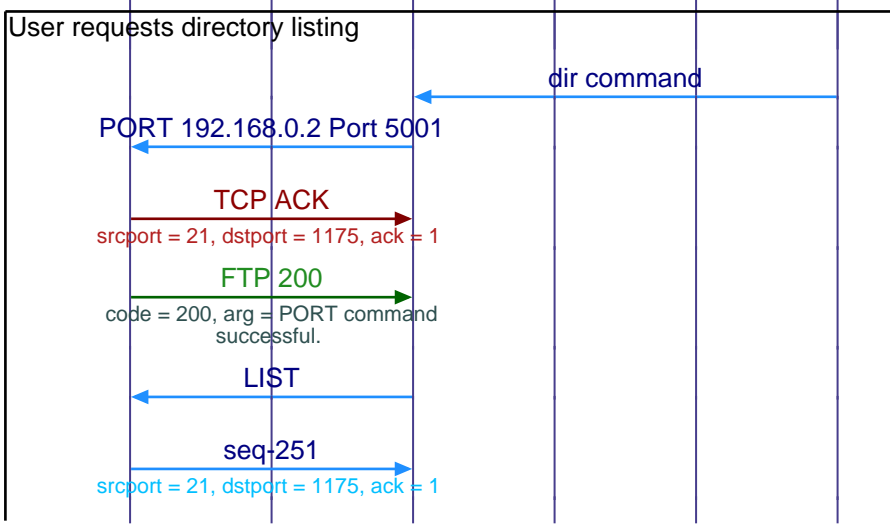


User enters his or her e-mail address as the password. This password is being transported by this TCP segment.

Welcome message after login.

User login notification.

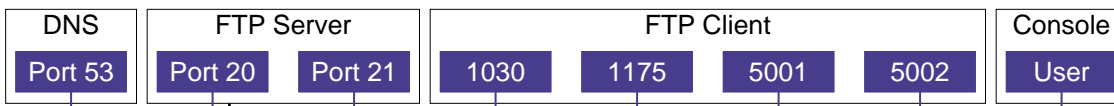
Obtaining a directory listing (PORT and LIST command).



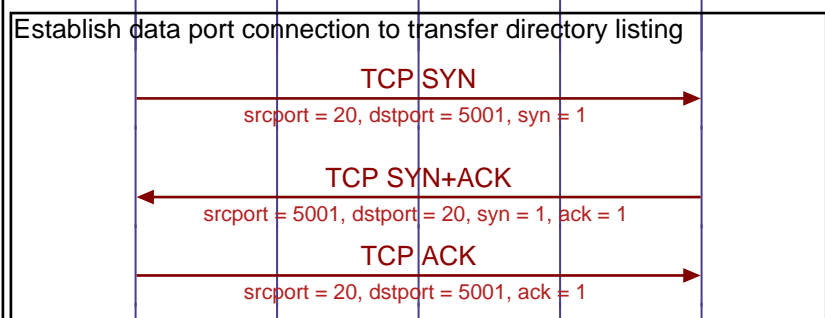
FTP client provides port number information.

FTP server positively acknowledges the PORT command.

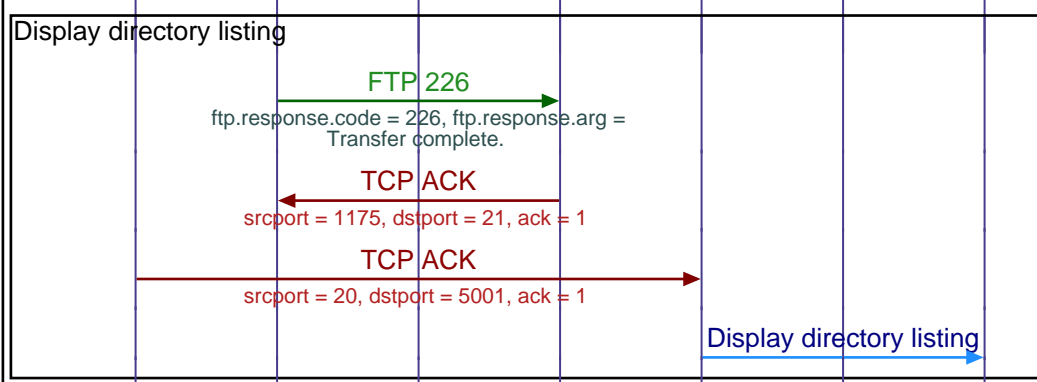
User requests a directory listing.



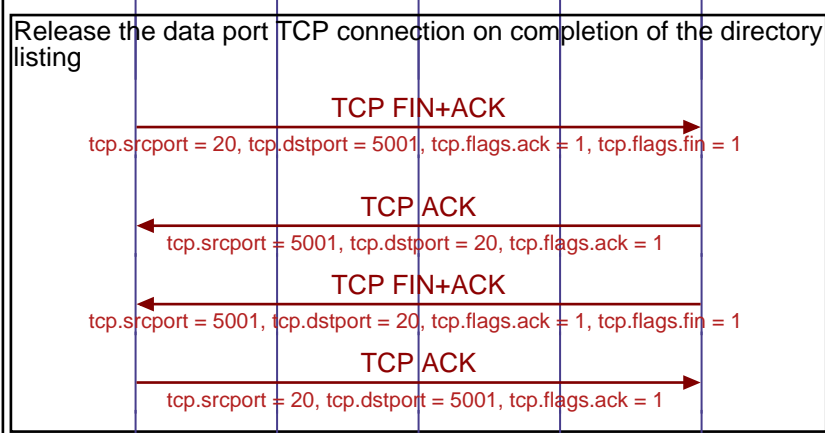
FTP server notifies the client that it is about to transfer the requested listing.



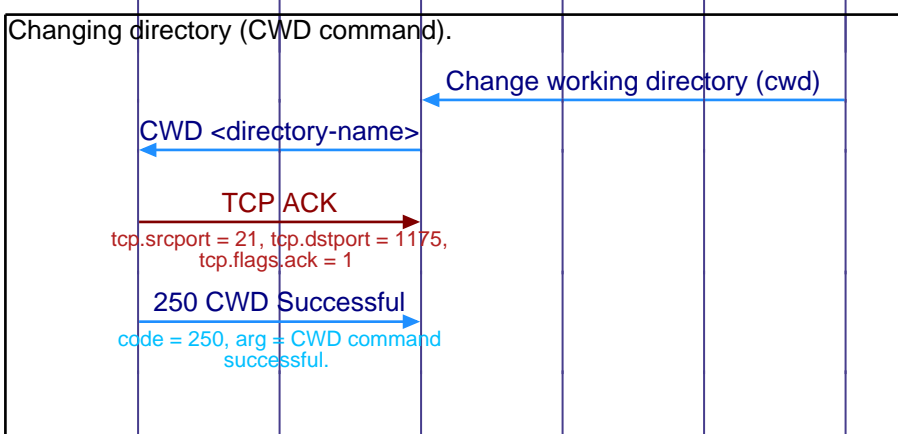
TCP three way handshake for connection establishment on port 5001.



The directory listing completion is signaled by this TCP segment.

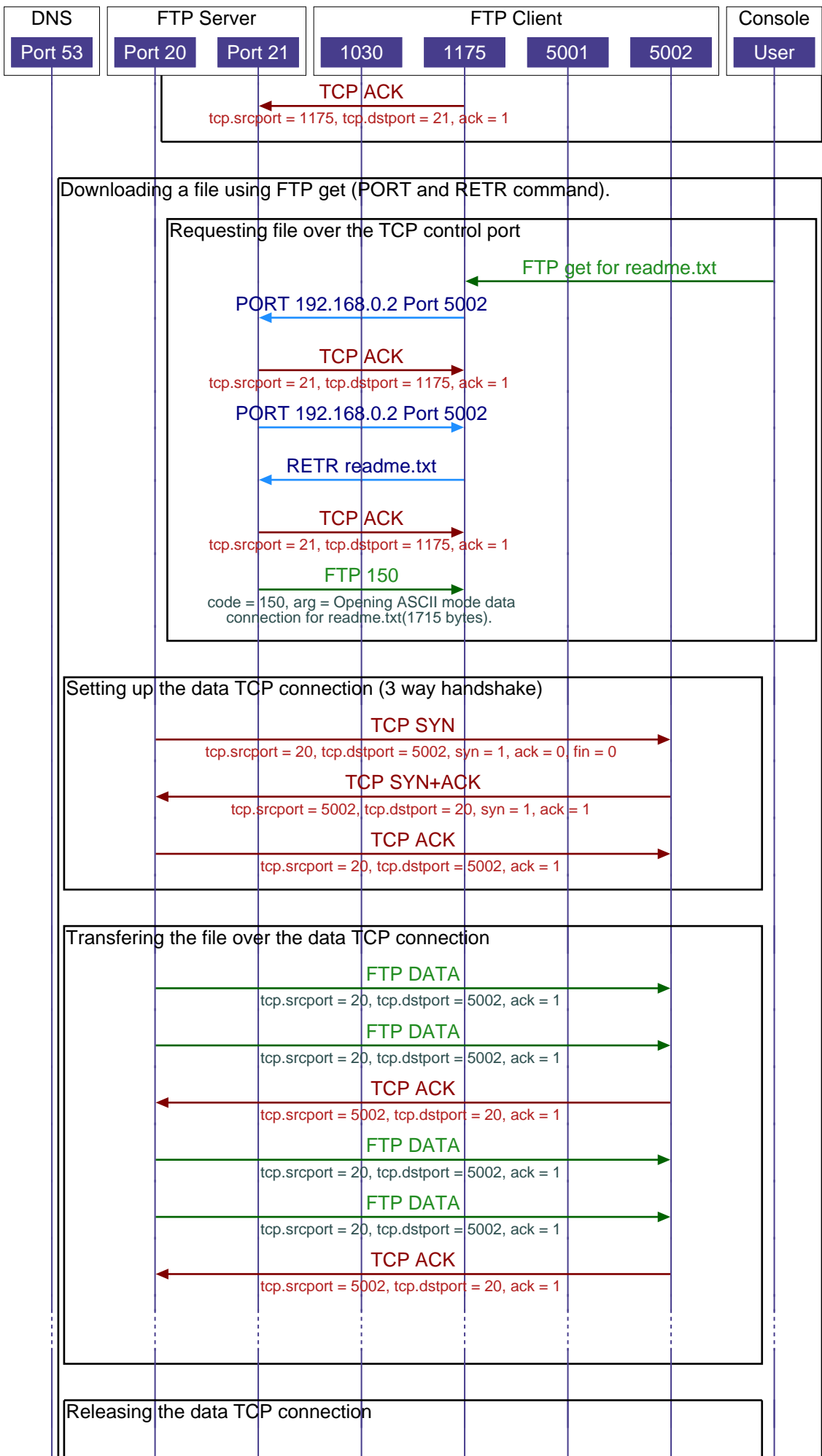


FTP server initiates the release of the TCP connection used to transport the directory listing.



User issues the change working directory command.

FTP server positively acknowledges the Change Working Directory command.



FTP client provides port number information.

FTP client provides port number information.

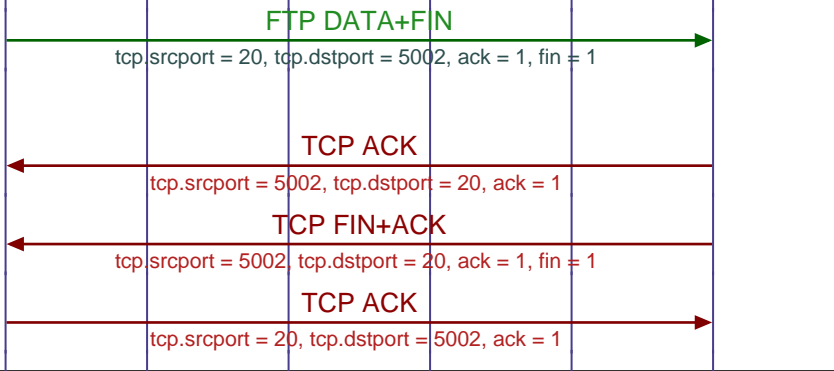
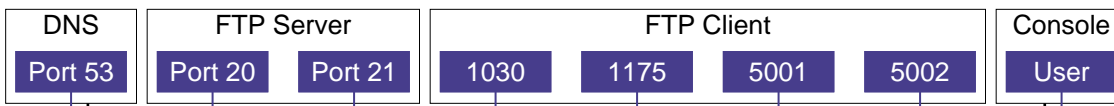
The user issues an FTP get for readme.txt.

FTP server acknowledges the RETR command from the client.

Three way handshake for TCP connection on Port 5002.

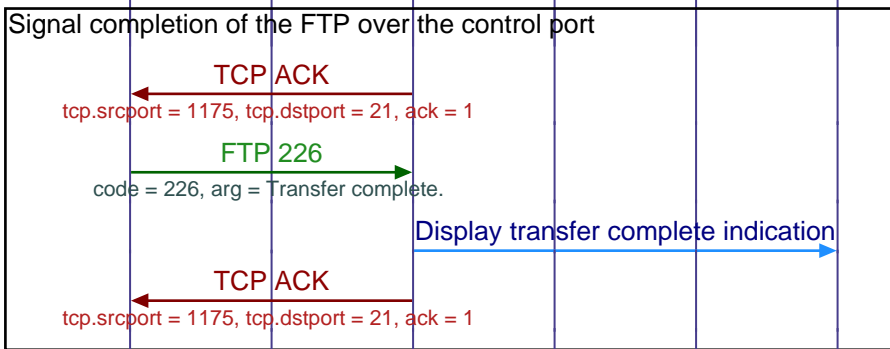
TCP segments carrying contents of readme.txt.

TCP segments carrying contents of readme.txt.



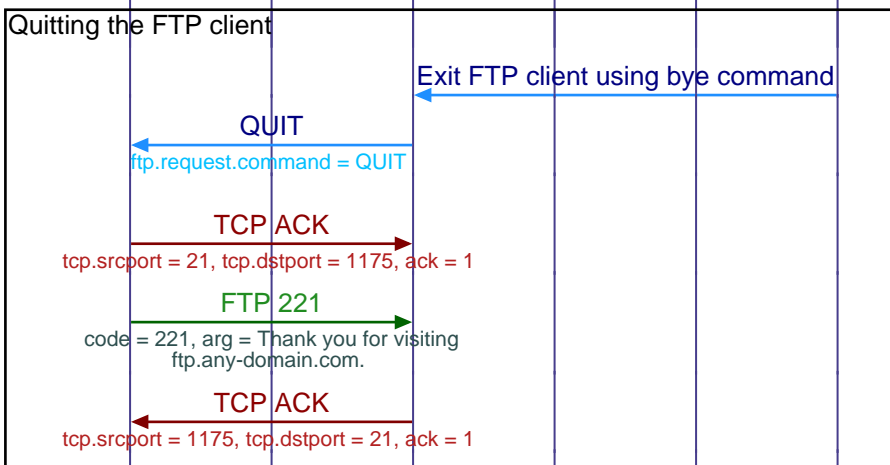
This is the last TCP segment containing data, it also includes the FIN to initiate the release of the TCP connection.

FTP client also initiates the release of the TCP connection.



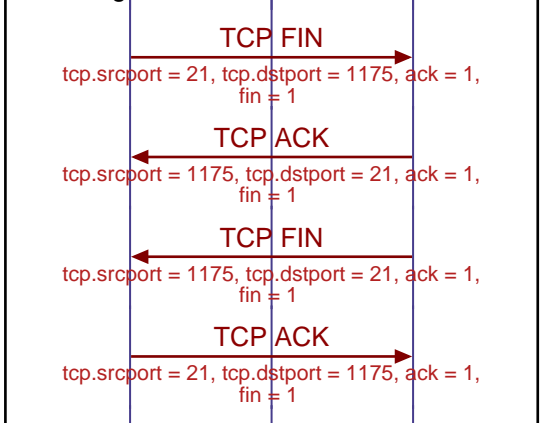
Signal to the client that the FTP transfer has been completed.

Logging out



User initiates a "bye" on the FTP client console. This is translated to the quit command.

Releasing the control TCP connection



Control TCP connection release initiated.

Control TCP connection release is completed.

