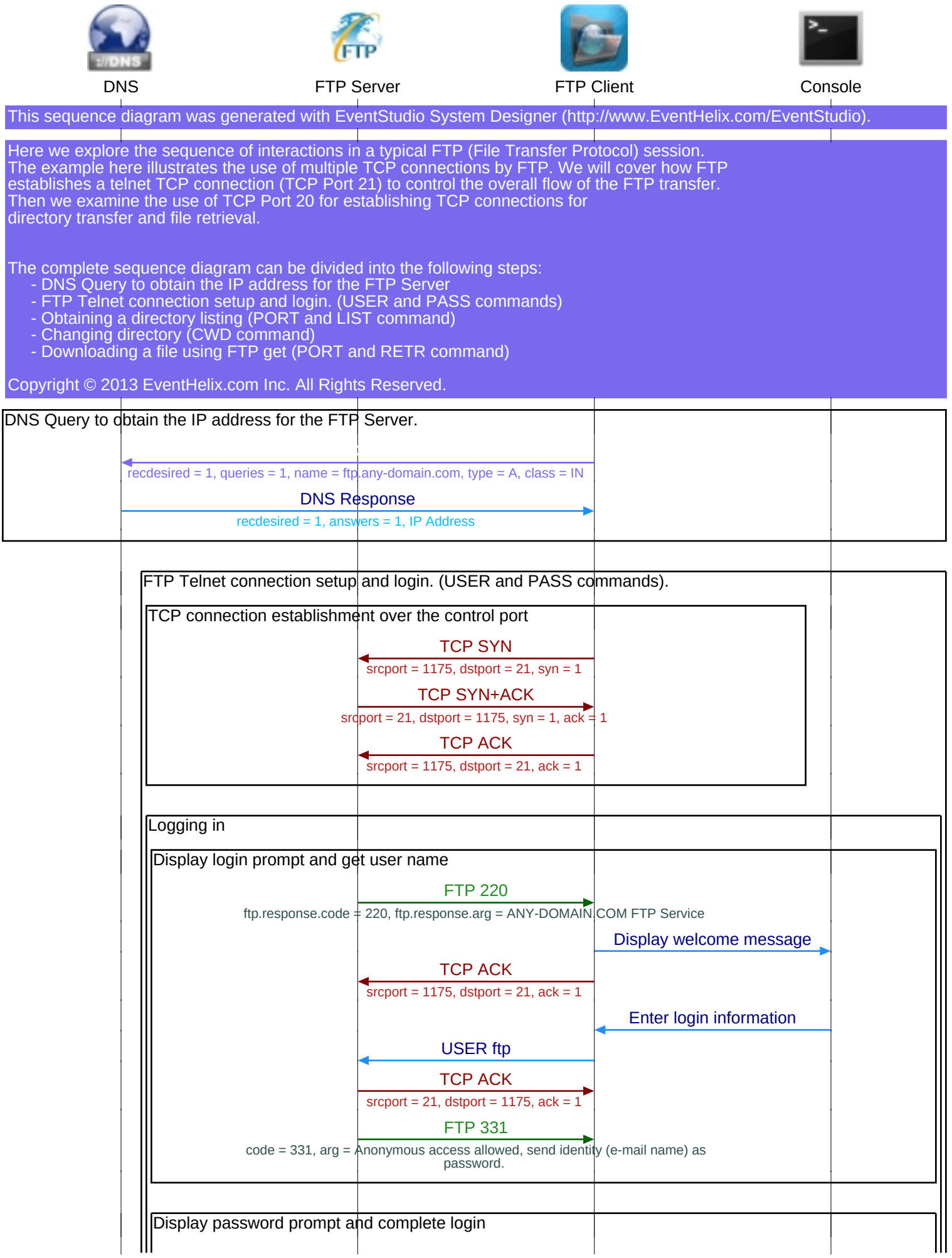
DNS
FTP Server
FTP Client
Console
This sequence diagram was generated with EventStudio System Designer (http://www.EventHelix.com/EventStudio).
Here we explore the sequence of interactions in a typical FTP (File Transfer Protocol) session.
The example here illustrates the use of multiple TCP connections 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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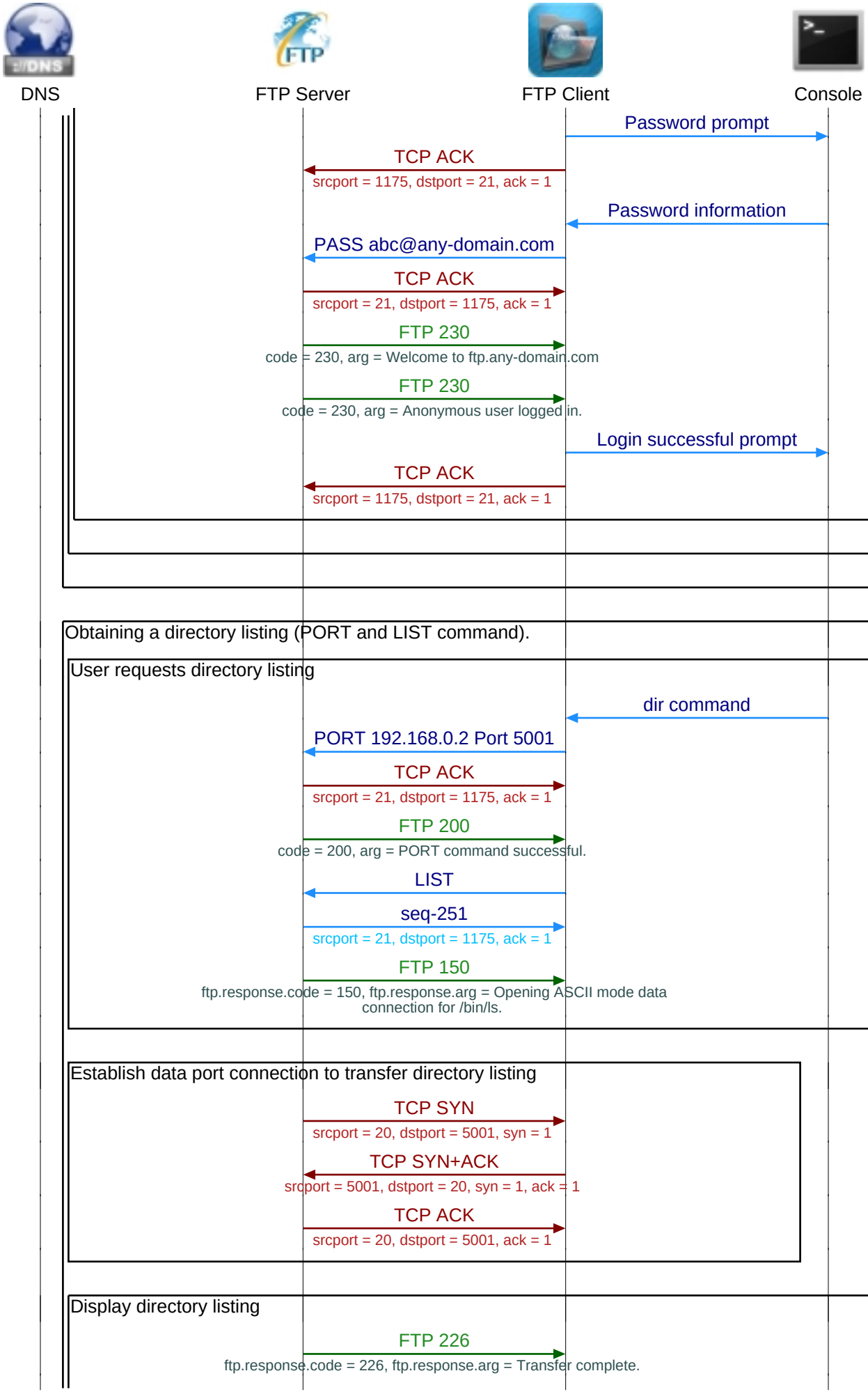
DNS Query to obtain the IP address for the FTP Server.
recdesired = 1, queries = 1, name = ftp.any-domain.com, type = A, class = IN
DNS Response
recdesired = 1, answers = 1, IP Address
FTP Telnet connection setup and login. (USER and PASS commands).
TCP connection establishment over the control port
TCP SYN
srcport = 1175, dstport = 21, syn = 1
TCP SYN+ACK
srcport = 21, dstport = 1175, syn = 1, ack = 1
TCP ACK
srcport = 1175, dstport = 21, ack = 1
Logging in
Display login prompt and get user name
FTP 220
ftp.response.code = 220, ftp.response.arg = ANY-DOMAIN.COM FTP Service
Display welcome message
TCP ACK
srcport = 1175, dstport = 21, ack = 1
Enter login information
USER ftp
TCP ACK
srcport = 21, dstport = 1175, ack = 1
FTP 331
code = 331, arg = Anonymous access allowed, send identity (e-mail name) as password.
Display password prompt and complete login


DNS
FTP Server
FTP Client
Console
Password prompt
TCP ACK
srcport = 1175, dstport = 21, ack = 1
Password information
PASS abc@any-domain.com
TCP ACK
srcport = 21, dstport = 1175, ack = 1
FTP 230
code = 230, arg = Welcome to ftp.any-domain.com
FTP 230
code = 230, arg = Anonymous user logged in.
Login successful prompt
TCP ACK
srcport = 1175, dstport = 21, ack = 1
Obtaining a directory listing (PORT and LIST command).
User requests directory listing
dir command
PORT 192.168.0.2 Port 5001
TCP ACK
srcport = 21, dstport = 1175, ack = 1
FTP 200
code = 200, arg = PORT command successful.
LIST
seq-251
srcport = 21, dstport = 1175, ack = 1
FTP 150
ftp.response.code = 150, ftp.response.arg = Opening ASCII mode data connection for /bin/ls.
Establish data port connection to transfer directory listing
TCP SYN
srcport = 20, dstport = 5001, syn = 1
TCP SYN+ACK
srcport = 5001, dstport = 20, syn = 1, ack = 1
TCP ACK
srcport = 20, dstport = 5001, ack = 1
Display directory listing
FTP 226
ftp.response.code = 226, ftp.response.arg = Transfer complete.

TCP ACK
srcport = 1175, dstport = 21, ack = 1

TCP ACK
srcport = 20, dstport = 5001, ack = 1

Display directory listing

Release the data port TCP connection on completion of the directory listing

TCP FIN+ACK
tcp.srcport = 20, tcp.dstport = 5001, tcp.flags.ack = 1, tcp.flags.fin = 1

TCP ACK
tcp.srcport = 5001, tcp.dstport = 20, tcp.flags.ack = 1

TCP FIN+ACK
tcp.srcport = 5001, tcp.dstport = 20, tcp.flags.ack = 1, tcp.flags.fin = 1

TCP ACK
tcp.srcport = 20, tcp.dstport = 5001, tcp.flags.ack = 1

Changing directory (CWD command).

Change working directory (cwd)

CWD <directory-name>

TCP ACK
tcp.srcport = 21, tcp.dstport = 1175, tcp.flags.ack = 1

250 CWD Successful
code = 250, arg = CWD command successful.

TCP ACK
tcp.srcport = 1175, tcp.dstport = 21, ack = 1

Downloading a file using FTP get (PORT and RETR command).

Requesting file over the TCP control port

FTP get for readme.txt

PORT 192.168.0.2 Port 5002

TCP ACK
tcp.srcport = 21, tcp.dstport = 1175, ack = 1

PORT 192.168.0.2 Port 5002

RETR readme.txt

TCP ACK
tcp.srcport = 21, tcp.dstport = 1175, ack = 1

FTP 150
code = 150, arg = Opening ASCII mode data connection for readme.txt(1715 bytes).

Setting up the data TCP connection (3 way handshake)

TCP SYN
tcp.srcport = 20, tcp.dstport = 5002, syn = 1, ack = 0, fin = 0

TCP SYN+ACK
tcp.srcport = 5002, tcp.dstport = 20, syn = 1, ack = 1

TCP ACK
tcp.srcport = 20, tcp.dstport = 5002, ack = 1

Transfering the file over the data TCP connection

FTP DATA
tcp.srcport = 20, tcp.dstport = 5002, ack = 1

FTP DATA
tcp.srcport = 20, tcp.dstport = 5002, ack = 1

TCP ACK
tcp.srcport = 5002, tcp.dstport = 20, ack = 1

FTP DATA
tcp.srcport = 20, tcp.dstport = 5002, ack = 1

FTP DATA
tcp.srcport = 20, tcp.dstport = 5002, ack = 1

TCP ACK
tcp.srcport = 5002, tcp.dstport = 20, ack = 1

Releasing the data TCP connection

FTP DATA+FIN
tcp.srcport = 20, tcp.dstport = 5002, ack = 1, fin = 1

TCP ACK
tcp.srcport = 5002, tcp.dstport = 20, ack = 1

TCP FIN+ACK
tcp.srcport = 5002, tcp.dstport = 20, ack = 1, fin = 1

TCP ACK
tcp.srcport = 20, tcp.dstport = 5002, ack = 1

Signal completion of the FTP over the control port

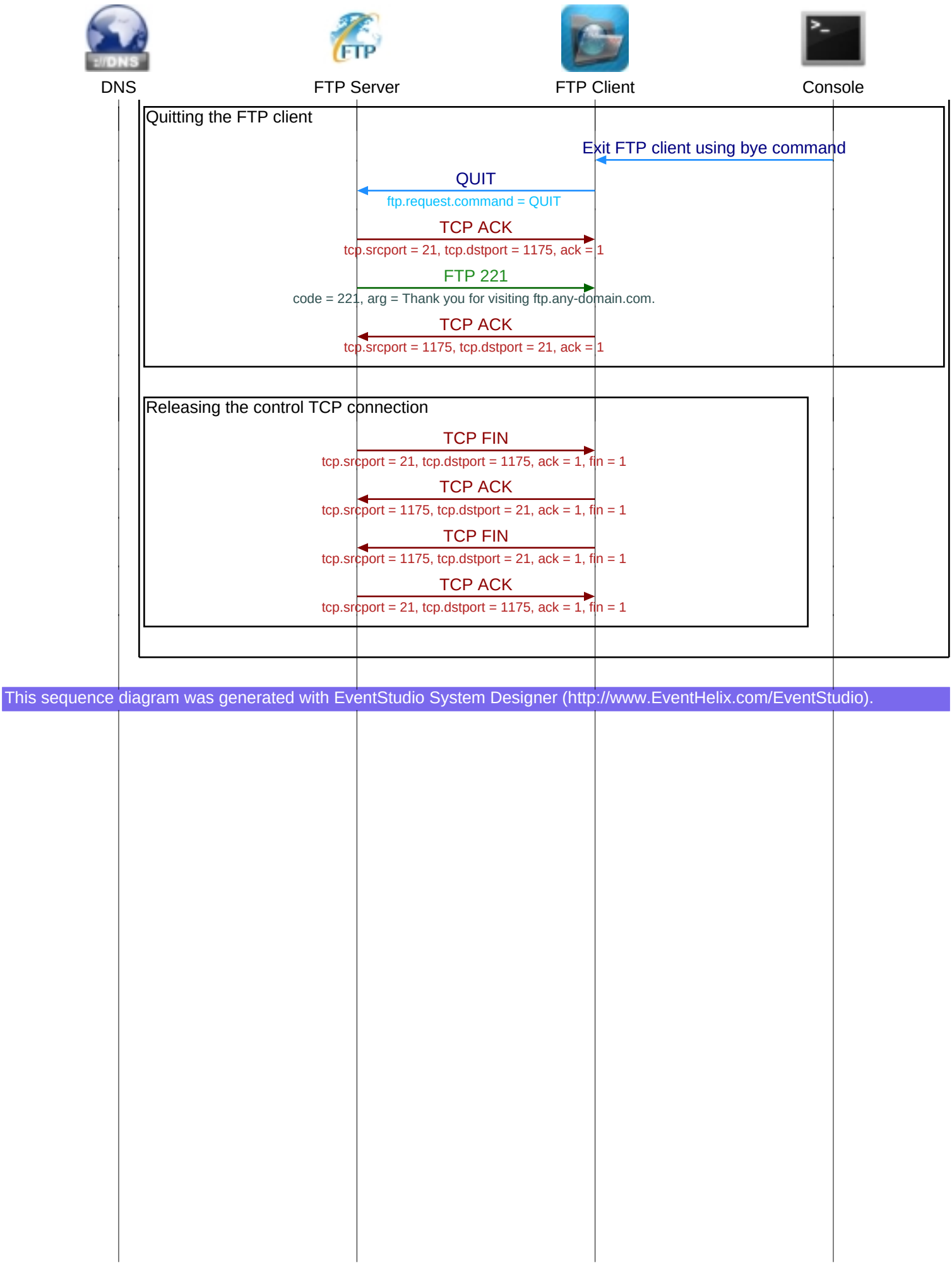
TCP ACK
tcp.srcport = 1175, tcp.dstport = 21, ack = 1

FTP 226
code = 226, arg = Transfer complete.

Display transfer complete indication

TCP ACK
tcp.srcport = 1175, tcp.dstport = 21, ack = 1

Logging out


DNS
FTP Server
FTP Client
Console
Quitting the FTP client
Exit FTP client using bye command
QUIT
ftp.request.command = QUIT
TCP ACK
tcp.srcport = 21, tcp.dstport = 1175, ack = 1
FTP 221
code = 221, arg = Thank you for visiting ftp.any-domain.com.
TCP ACK
tcp.srcport = 1175, tcp.dstport = 21, ack = 1
Releasing the control TCP connection
TCP FIN
tcp.srcport = 21, tcp.dstport = 1175, ack = 1, fin = 1
TCP ACK
tcp.srcport = 1175, tcp.dstport = 21, ack = 1, fin = 1
TCP FIN
tcp.srcport = 1175, tcp.dstport = 21, ack = 1, fin = 1
TCP ACK
tcp.srcport = 21, tcp.dstport = 1175, ack = 1, fin = 1
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