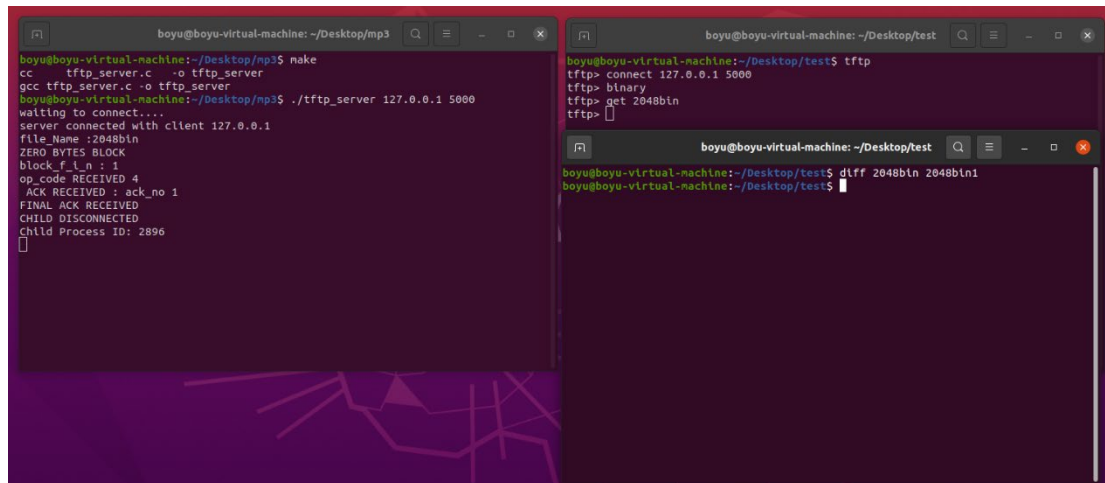


1. Testcase 1: transferring a 2048byte binary file



The image shows two terminal windows. The left window, titled 'boyu@boyu-virtual-machine: ~/Desktop/mp3', shows the compilation of 'tftp_server.c' and the execution of the server. It receives a connection from 127.0.0.1 and successfully transfers the file '2048bin'. The right window, titled 'boyu@boyu-virtual-machine: ~/Desktop/test', shows the client-side commands: 'tftp', 'connect 127.0.0.1 5000', 'binary', and 'get 2048bin'. A third window below shows the command 'diff 2048bin 2048bin1' being executed, which returns an empty result, indicating the files are identical.

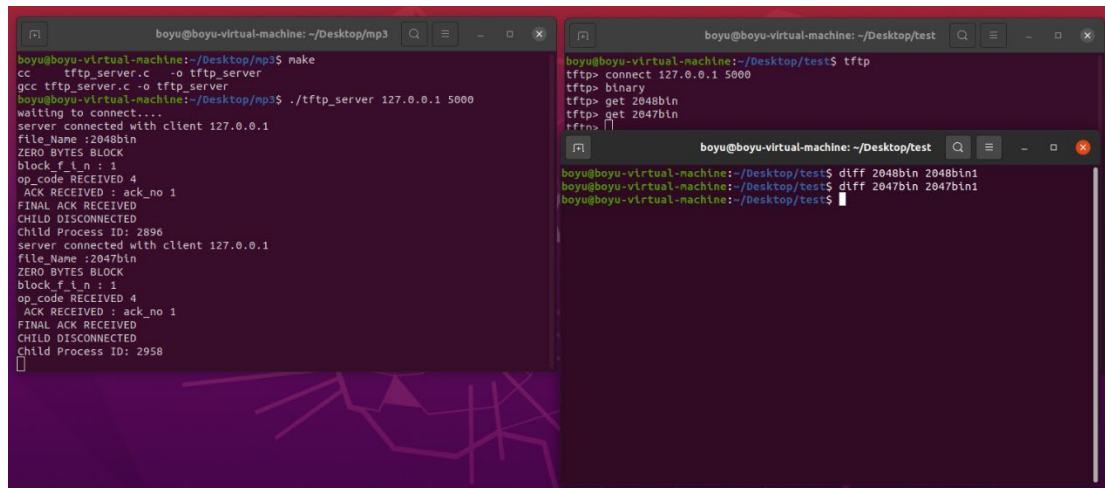
```
boyu@boyu-virtual-machine: ~/Desktop/mp3$ make
cc -o tftp_server tftp_server.c
gcc tftp_server.c -o tftp_server
boyu@boyu-virtual-machine: ~/Desktop/mp3$ ./tftp_server 127.0.0.1 5000
waiting to connect....
server connected with client 127.0.0.1
file_Name :2048bin
ZERO BYTES BLOCK
block_f_i_n : 1
op_code RECEIVED 4
ACK RECEIVED : ack_no 1
FINAL ACK RECEIVED
CHILD DISCONNECTED
Child Process ID: 2896
[]

boyu@boyu-virtual-machine: ~/Desktop/test$ tftp
tftp> connect 127.0.0.1 5000
tftp> binary
tftp> get 2048bin
tftp> []

boyu@boyu-virtual-machine: ~/Desktop/test$ diff 2048bin 2048bin1
boyu@boyu-virtual-machine: ~/Desktop/test$
```

The diff function tells the transferring succeeds.

2. Testcase 2: transferring a 2047byte binary file(not a multiple of 512)



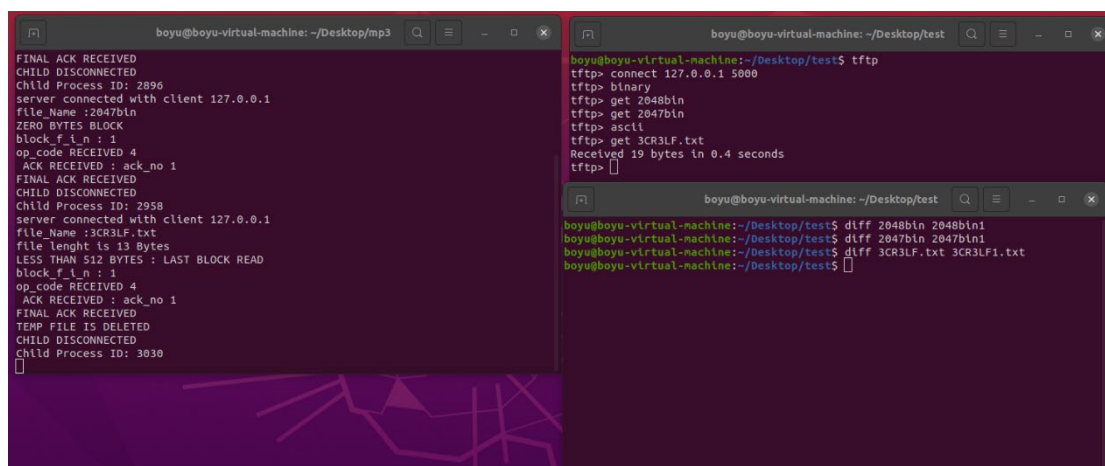
The image shows two terminal windows. The left window shows the server successfully transferring the file '2047bin'. The right window shows the client-side commands: 'tftp', 'connect 127.0.0.1 5000', 'binary', and 'get 2047bin'. A third window below shows the command 'diff 2047bin 2047bin1' being executed, which returns an empty result, indicating the files are identical.

```
boyu@boyu-virtual-machine: ~/Desktop/mp3$ make
cc -o tftp_server tftp_server.c
gcc tftp_server.c -o tftp_server
boyu@boyu-virtual-machine: ~/Desktop/mp3$ ./tftp_server 127.0.0.1 5000
waiting to connect....
server connected with client 127.0.0.1
file_Name :2047bin
ZERO BYTES BLOCK
block_f_i_n : 1
op_code RECEIVED 4
ACK RECEIVED : ack_no 1
FINAL ACK RECEIVED
CHILD DISCONNECTED
Child Process ID: 2896
server connected with client 127.0.0.1
file_Name :2047bin
ZERO BYTES BLOCK
block_f_i_n : 1
op_code RECEIVED 4
ACK RECEIVED : ack_no 1
FINAL ACK RECEIVED
CHILD DISCONNECTED
Child Process ID: 2958
[]

boyu@boyu-virtual-machine: ~/Desktop/test$ tftp
tftp> connect 127.0.0.1 5000
tftp> binary
tftp> get 2048bin
tftp> get 2047bin
tftp> []

boyu@boyu-virtual-machine: ~/Desktop/test$ diff 2048bin 2048bin1
boyu@boyu-virtual-machine: ~/Desktop/test$ diff 2047bin 2047bin1
boyu@boyu-virtual-machine: ~/Desktop/test$
```

3. Testcase 3: transferring a netascii file



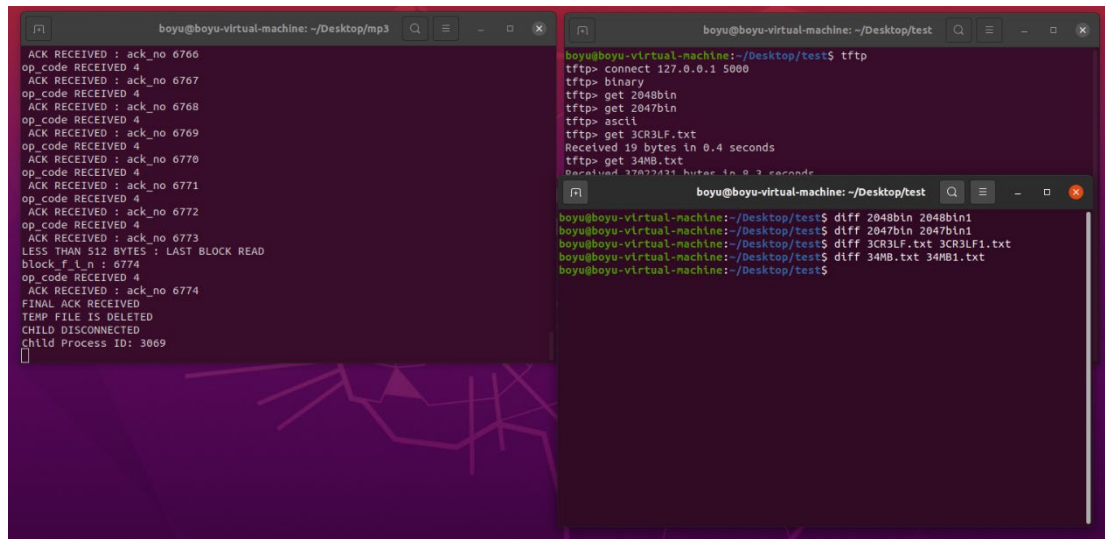
The image shows two terminal windows. The left window shows the server successfully transferring the file '3CR3LF.txt'. The right window shows the client-side commands: 'tftp', 'connect 127.0.0.1 5000', 'binary', and 'get 3CR3LF.txt'. A third window below shows the command 'diff 3CR3LF.txt 3CR3LF1.txt' being executed, which returns an empty result, indicating the files are identical.

```
boyu@boyu-virtual-machine: ~/Desktop/mp3$ make
cc -o tftp_server tftp_server.c
gcc tftp_server.c -o tftp_server
boyu@boyu-virtual-machine: ~/Desktop/mp3$ ./tftp_server 127.0.0.1 5000
waiting to connect....
server connected with client 127.0.0.1
file_Name :2047bin
ZERO BYTES BLOCK
block_f_i_n : 1
op_code RECEIVED 4
ACK RECEIVED : ack_no 1
FINAL ACK RECEIVED
CHILD DISCONNECTED
Child Process ID: 2958
server connected with client 127.0.0.1
file_Name :3CR3LF.txt
file length is 13 Bytes
LESS THAN 512 BYTES : LAST BLOCK READ
block_f_i_n : 1
op_code RECEIVED 4
ACK RECEIVED : ack_no 1
FINAL ACK RECEIVED
TEMP FILE IS DELETED
CHILD DISCONNECTED
Child Process ID: 3030
[]

boyu@boyu-virtual-machine: ~/Desktop/test$ tftp
tftp> connect 127.0.0.1 5000
tftp> binary
tftp> get 2048bin
tftp> get 2047bin
tftp> ascii
tftp> get 3CR3LF.txt
Received 19 bytes in 0.4 seconds
tftp> []

boyu@boyu-virtual-machine: ~/Desktop/test$ diff 2048bin 2048bin1
boyu@boyu-virtual-machine: ~/Desktop/test$ diff 2047bin 2047bin1
boyu@boyu-virtual-machine: ~/Desktop/test$ diff 3CR3LF.txt 3CR3LF1.txt
boyu@boyu-virtual-machine: ~/Desktop/test$
```

4. Testcase 4: transferring a 34Megabyte netascii file

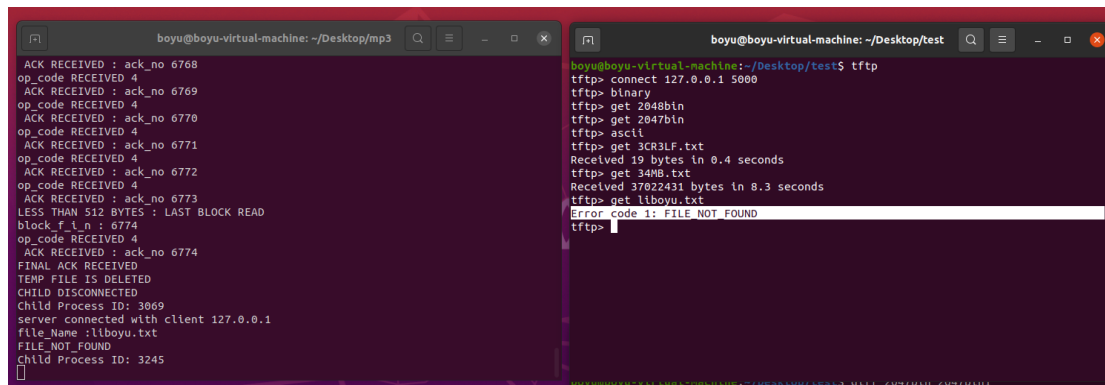


The screenshot shows two terminal windows. The left window, titled 'boyu@boyu-virtual-machine: ~/Desktop/mp3', displays the server-side logs for the tftp transfer. It shows a series of 'ACK RECEIVED' messages for sequence numbers 6766 through 6774, followed by 'FINAL ACK RECEIVED', 'TEMP FILE IS DELETED', 'CHILD DISCONNECTED', and 'Child Process ID: 3069'. The right window, titled 'boyu@boyu-virtual-machine: ~/Desktop/test', shows the client-side commands and responses. It starts with 'tftp connect 127.0.0.1 5000', followed by 'tftp> binary', 'tftp> get 2048bin', 'tftp> get 2047bin', 'tftp> ascii', 'tftp> get 3CR3LF.txt', and 'tftp> get 34MB.txt'. The client receives the 34MB file in 8.3 seconds. Below this, it shows the 'diff' command being used to compare the original files with the received ones, all showing no differences.

```
boyu@boyu-virtual-machine: ~/Desktop/mp3
ACK RECEIVED : ack_no 6766
op_code RECEIVED 4
ACK RECEIVED : ack_no 6767
op_code RECEIVED 4
ACK RECEIVED : ack_no 6768
op_code RECEIVED 4
ACK RECEIVED : ack_no 6769
op_code RECEIVED 4
ACK RECEIVED : ack_no 6770
op_code RECEIVED 4
ACK RECEIVED : ack_no 6771
op_code RECEIVED 4
ACK RECEIVED : ack_no 6772
op_code RECEIVED 4
ACK RECEIVED : ack_no 6773
op_code RECEIVED 4
ACK RECEIVED : ack_no 6774
op_code RECEIVED 4
FINAL ACK RECEIVED
TEMP FILE IS DELETED
CHILD DISCONNECTED
Child Process ID: 3069
[]

boyu@boyu-virtual-machine: ~/Desktop/test
tftp connect 127.0.0.1 5000
tftp> binary
tftp> get 2048bin
tftp> get 2047bin
tftp> ascii
tftp> get 3CR3LF.txt
Received 19 bytes in 0.4 seconds
tftp> get 34MB.txt
Received 37022431 bytes in 8.3 seconds
tftp>
boyu@boyu-virtual-machine: ~/Desktop/test$ diff 2048bin 2048bin1
boyu@boyu-virtual-machine: ~/Desktop/test$ diff 2047bin 2047bin1
boyu@boyu-virtual-machine: ~/Desktop/test$ diff 3CR3LF.txt 3CR3LF1.txt
boyu@boyu-virtual-machine: ~/Desktop/test$ diff 34MB.txt 34MB1.txt
boyu@boyu-virtual-machine: ~/Desktop/test$
```

5. Testcase 5: transferring an invalid file

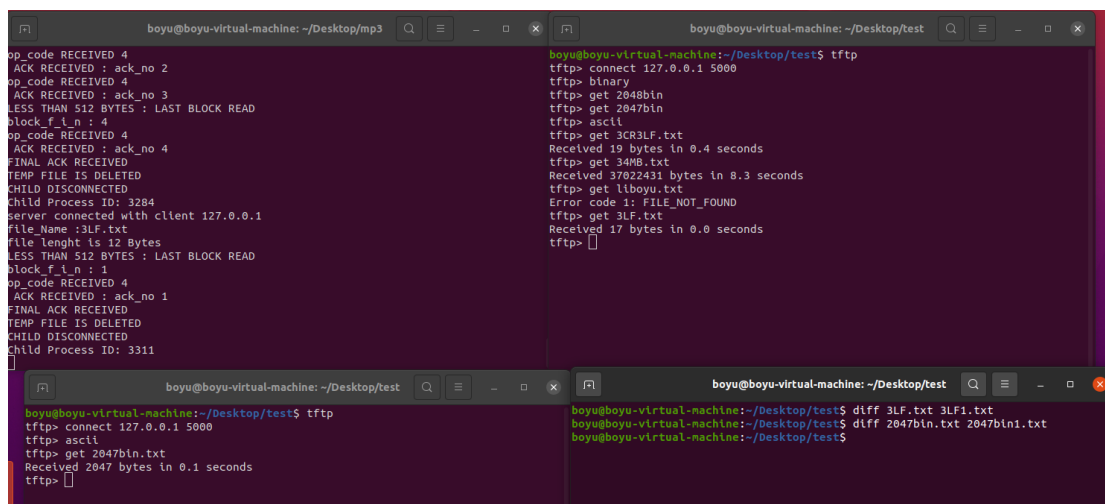


The screenshot shows two terminal windows. The left window, titled 'boyu@boyu-virtual-machine: ~/Desktop/mp3', displays the server-side logs. It shows 'ACK RECEIVED' messages for sequence numbers 6768 through 6774, followed by 'FINAL ACK RECEIVED', 'TEMP FILE IS DELETED', 'CHILD DISCONNECTED', and 'Child Process ID: 3069'. It then shows 'server connected with client 127.0.0.1', 'file Name :liboyu.txt', and 'FILE_NOT_FOUND'. The right window, titled 'boyu@boyu-virtual-machine: ~/Desktop/test', shows the client-side commands. It starts with 'tftp connect 127.0.0.1 5000', followed by 'tftp> binary', 'tftp> get 2048bin', 'tftp> get 2047bin', 'tftp> ascii', 'tftp> get 3CR3LF.txt', 'tftp> get 34MB.txt', and 'tftp> get liboyu.txt'. The client receives the 34MB file in 8.3 seconds, but then receives an error message: 'Error code 1: FILE NOT FOUND'.

```
boyu@boyu-virtual-machine: ~/Desktop/mp3
ACK RECEIVED : ack_no 6768
op_code RECEIVED 4
ACK RECEIVED : ack_no 6769
op_code RECEIVED 4
ACK RECEIVED : ack_no 6770
op_code RECEIVED 4
ACK RECEIVED : ack_no 6771
op_code RECEIVED 4
ACK RECEIVED : ack_no 6772
op_code RECEIVED 4
ACK RECEIVED : ack_no 6773
op_code RECEIVED 4
ACK RECEIVED : ack_no 6774
op_code RECEIVED 4
FINAL ACK RECEIVED
TEMP FILE IS DELETED
CHILD DISCONNECTED
Child Process ID: 3069
server connected with client 127.0.0.1
file Name :liboyu.txt
FILE_NOT_FOUND
Child Process ID: 3245
[]

boyu@boyu-virtual-machine: ~/Desktop/test
tftp connect 127.0.0.1 5000
tftp> binary
tftp> get 2048bin
tftp> get 2047bin
tftp> ascii
tftp> get 3CR3LF.txt
Received 19 bytes in 0.4 seconds
tftp> get 34MB.txt
Received 37022431 bytes in 8.3 seconds
tftp> get liboyu.txt
Error code 1: FILE NOT FOUND
tftp>
```

6. Testcase 6: multi-clients ask transferring different file



The screenshot shows three terminal windows. The left window, titled 'boyu@boyu-virtual-machine: ~/Desktop/mp3', displays the server-side logs. It shows 'op_code RECEIVED 4', 'ACK RECEIVED : ack_no 2', 'op_code RECEIVED 4', 'ACK RECEIVED : ack_no 3', 'LESS THAN 512 BYTES : LAST BLOCK READ', 'block_f_i_n : 4', 'op_code RECEIVED 4', 'ACK RECEIVED : ack_no 4', 'FINAL ACK RECEIVED', 'TEMP FILE IS DELETED', 'CHILD DISCONNECTED', 'Child Process ID: 3284', 'server connected with client 127.0.0.1', 'file Name :3LF.txt', 'file lenght is 12 Bytes', 'LESS THAN 512 BYTES : LAST BLOCK READ', 'block_f_i_n : 1', 'op_code RECEIVED 4', 'ACK RECEIVED : ack_no 1', 'FINAL ACK RECEIVED', 'TEMP FILE IS DELETED', 'CHILD DISCONNECTED', and 'Child Process ID: 3311'. The middle window, titled 'boyu@boyu-virtual-machine: ~/Desktop/test', shows the client-side commands. It starts with 'tftp connect 127.0.0.1 5000', followed by 'tftp> binary', 'tftp> get 2048bin', 'tftp> get 2047bin', 'tftp> ascii', 'tftp> get 3CR3LF.txt', 'tftp> get 34MB.txt', 'tftp> get liboyu.txt', 'Error code 1: FILE_NOT_FOUND', 'tftp> get 3LF.txt', and 'tftp> get 3LF1.txt'. The client receives the 34MB file in 8.3 seconds, but then receives an error message: 'Error code 1: FILE_NOT_FOUND'. The right window, titled 'boyu@boyu-virtual-machine: ~/Desktop/test', shows the client-side commands. It starts with 'tftp connect 127.0.0.1 5000', followed by 'tftp> binary', 'tftp> get 2048bin', 'tftp> get 2047bin', 'tftp> ascii', 'tftp> get 3CR3LF.txt', 'tftp> get 34MB.txt', 'tftp> get liboyu.txt', 'Error code 1: FILE_NOT_FOUND', 'tftp> get 3LF.txt', and 'tftp> get 3LF1.txt'. The client receives the 34MB file in 8.3 seconds, but then receives an error message: 'Error code 1: FILE_NOT_FOUND'.

```
boyu@boyu-virtual-machine: ~/Desktop/mp3
op_code RECEIVED 4
ACK RECEIVED : ack_no 2
op_code RECEIVED 4
ACK RECEIVED : ack_no 3
LESS THAN 512 BYTES : LAST BLOCK READ
block_f_i_n : 4
op_code RECEIVED 4
ACK RECEIVED : ack_no 4
FINAL ACK RECEIVED
TEMP FILE IS DELETED
CHILD DISCONNECTED
Child Process ID: 3284
server connected with client 127.0.0.1
file Name :3LF.txt
file lenght is 12 Bytes
LESS THAN 512 BYTES : LAST BLOCK READ
block_f_i_n : 1
op_code RECEIVED 4
ACK RECEIVED : ack_no 1
FINAL ACK RECEIVED
TEMP FILE IS DELETED
CHILD DISCONNECTED
Child Process ID: 3311
[]

boyu@boyu-virtual-machine: ~/Desktop/test
tftp connect 127.0.0.1 5000
tftp> binary
tftp> get 2048bin
tftp> get 2047bin
tftp> ascii
tftp> get 3CR3LF.txt
Received 19 bytes in 0.4 seconds
tftp> get 34MB.txt
Received 37022431 bytes in 8.3 seconds
tftp> get liboyu.txt
Error code 1: FILE_NOT_FOUND
tftp> get 3LF.txt
Received 17 bytes in 0.0 seconds
tftp>

boyu@boyu-virtual-machine: ~/Desktop/test
tftp connect 127.0.0.1 5000
tftp> binary
tftp> get 2048bin
tftp> get 2047bin
tftp> ascii
tftp> get 3CR3LF.txt
Received 19 bytes in 0.4 seconds
tftp> get 34MB.txt
Received 37022431 bytes in 8.3 seconds
tftp> get liboyu.txt
Error code 1: FILE_NOT_FOUND
tftp> get 3LF.txt
Received 17 bytes in 0.0 seconds
tftp>
tftp> get 3LF1.txt
Received 17 bytes in 0.0 seconds
tftp>
```

