

# **Application Note**

## **FTP\_Client Example**

**Version 1.0.0**



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## 1 Introduction

This Application Note covers the implementation of FTP client on WIZnet's TOE Chip.

## 2 Github Link

<https://github.com/WIZnet-ioNIC/WIZnet-PICO-C/tree/main/examples/ftp/client>

## 3 Applicable products

[Raspberry Pi Pico & WIZnet Ethernet HAT](#)

[W5100S-EVB-Pico](#)

[W5500-EVB-Pico](#)

[W55RP20-EVB-Pico](#)

[W5100S-EVB-Pico2](#)

[W5500-EVB-Pico2](#)

## 4 How to Test FTP Client Example

### 4.1 Step 1: Prepare software

The following serial terminal program and FTP server are required for FTP Client example test, download and install from below links.

- [Tera Term](#)
- [FileZilla Server Interface](#)

### 4.2 Step 2: Prepare hardware

If you are using W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2 or W5500-EVB-Pico2, you can skip '1. Combine...'

1. Combine WIZnet Ethernet HAT with Raspberry Pi Pico.
2. Connect ethernet cable to WIZnet Ethernet HAT, W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2 or W5500-EVB-Pico2 ethernet port.
3. Connect Raspberry Pi Pico, W5100S-EVB-Pico or W5500-EVB-Pico to desktop or laptop using 5 pin micro USB cable. W55RP20-EVB-Pico, W5100S-EVB-Pico2 or W5500-EVB-Pico2 require a USB Type-C cable.

### 4.3 Step 3: Setup FTP Client Example

To test the FTP client example, minor settings shall be done in code.

1. Setup SPI port and pin in 'w5x00\_spi.h' in 'WIZnet-PICO-C/port/ioLibrary\_Driver/' directory.

Setup the SPI interface you use.

- If you use the W5100S-EVB-Pico, W5500-EVB-Pico, W5100S-EVB-Pico2 or W5500-EVB-Pico2,

```
/* SPI */
#define SPI_PORT spi0

#define PIN_SCK 18
#define PIN_MOSI 19
#define PIN_MISO 16
#define PIN_CS 17
#define PIN_RST 20
```

- If you want to test with the FTP client example using SPI DMA, uncomment USE\_SPI\_DMA.

```
/* Use SPI DMA */
//#define USE_SPI_DMA // if you want to use SPI DMA, uncomment.
```

- If you use the W55RP20-EVB-Pico,

```
/* SPI */
#define USE_SPI_PIO

#define PIN_SCK 21
#define PIN_MOSI 23
#define PIN_MISO 22
#define PIN_CS 20
#define PIN_RST 25
```

2. Setup network configuration such as IP in 'w5x00\_ftp\_client.c', which is the FTP client example in 'WIZnet-PICO-C/examples/ftp/client' directory.

- Setup IP, other network settings to suit your network environment.

```
/* Network */
static wiz_NetInfo g_net_info =
{
    .mac = {0x00, 0x08, 0xDC, 0x12, 0x34, 0x56}, // MAC address
    .ip = {192, 168, 11, 2}, // IP address
    .sn = {255, 255, 255, 0}, // Subnet Mask
    .gw = {192, 168, 11, 1}, // Gateway
    .dns = {8, 8, 8, 8}, // DNS server
```

```
.dhcp = NETINFO_STATIC // DHCP enable/disable
};
```

### 3. Setup FTP client configuration

- If you use the Setup FTP client configuration in 'ftpc.c' in 'WIZnet-PICO-C/libraries/ioLibrary\_Driver/Internet/FTPCClient' directory.

```
uint8_t FTP_destip[4] = {192, 168, 11, 230};
// For FTP client examples; destination network info
uint16_t FTP_destport = 21;
// For FTP client examples; destination network info
```

## 4.4 Step 4: Setup FileZilla Server program

### 1. Execute FileZilla server program and open FTP server.

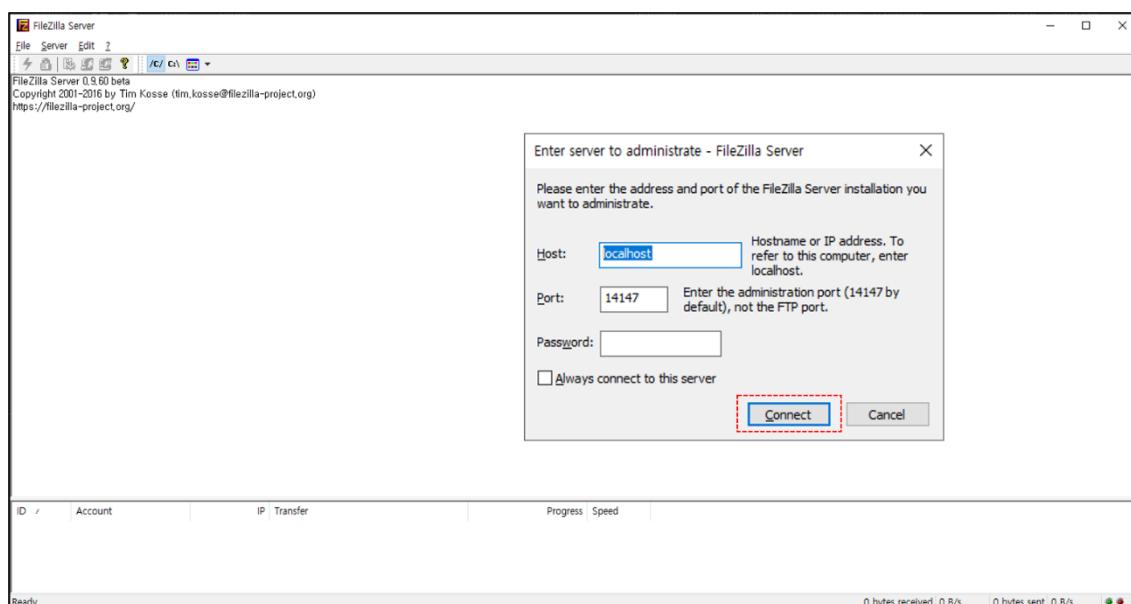


Figure 1. FileZilla server open

## 2. Add user and set password

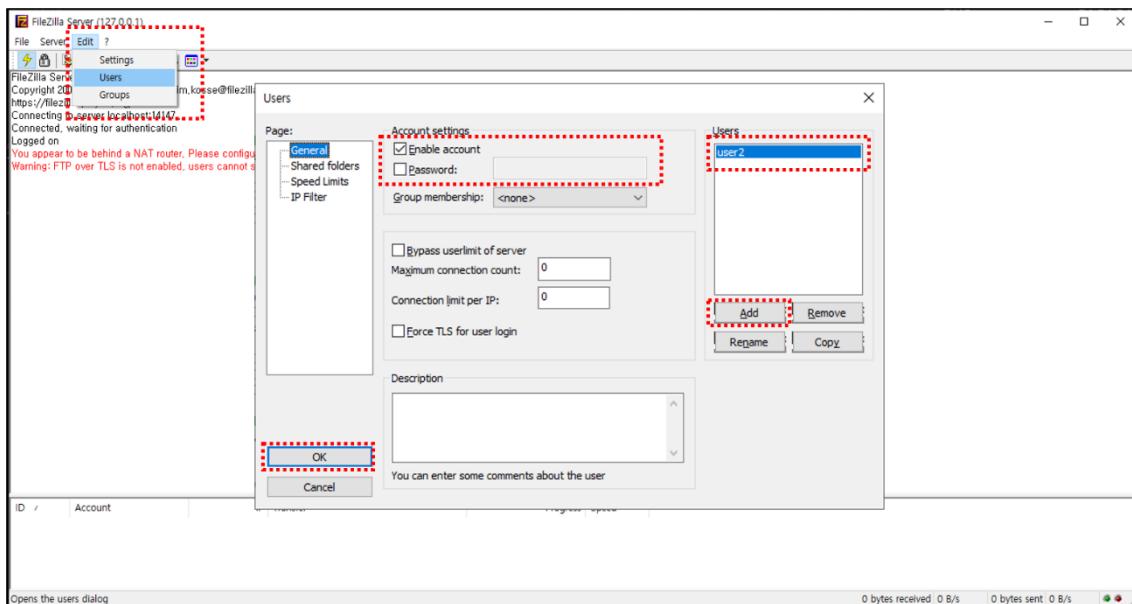


Figure 2. Add user

## 3. Set folder path to share

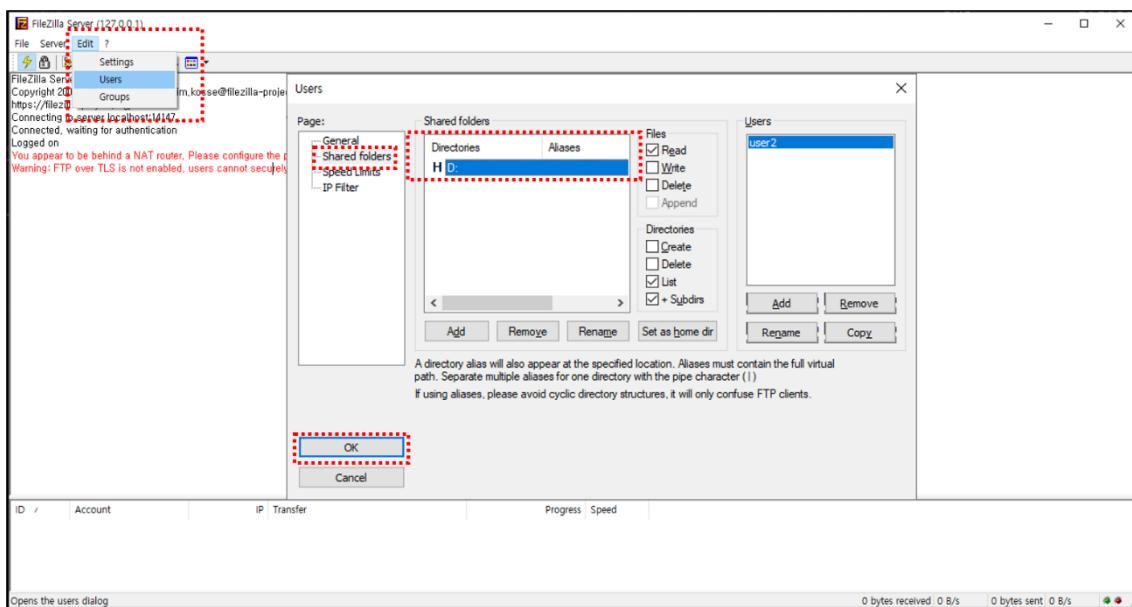


Figure 3. Set path

#### 4. General strings

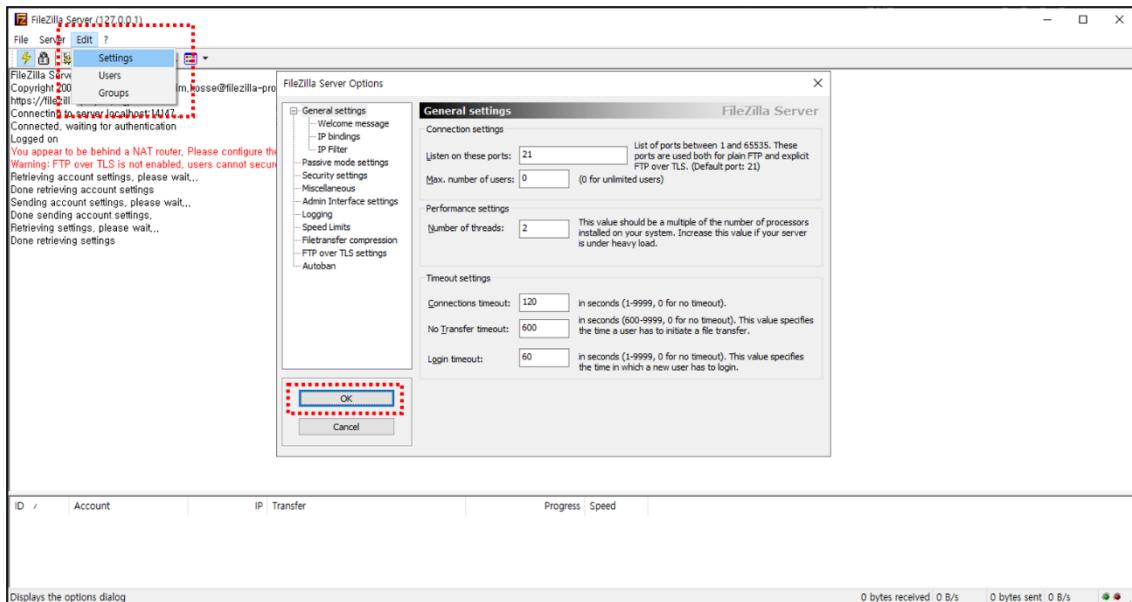


Figure 4. Set general strings

## 4.5 Step 5: Build

1. After completing the FTP client example configuration, click 'build' in the status bar at the bottom of Visual Studio Code or press the 'F7' button on the keyboard to build.
2. When the build is completed, 'w5x00\_ftp\_client.uf2' is generated in 'WIZnet-PICO-C/build/examples/ftp/client' directory.

## 4.6 Step 6: Upload and Run

1. While pressing the BOOTSEL button of Raspberry Pi Pico, W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2 or W5500-EVB-Pico2 power on the board, the USB mass storage 'RPI-RP2' is automatically mounted.

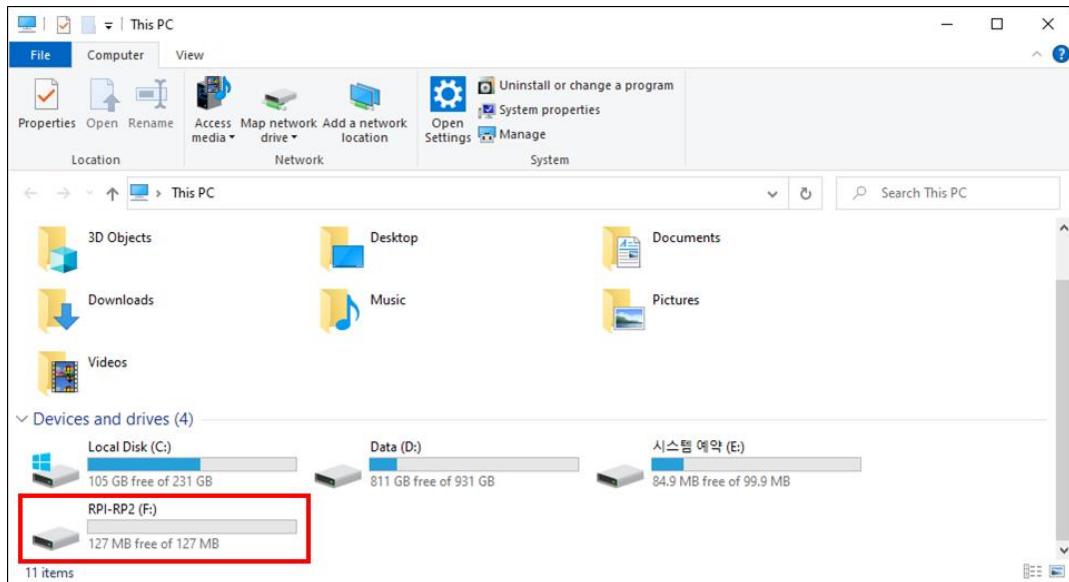


Figure 5. USB mass storage

2. Drag and drop 'w5x00\_ftp\_client.uf2' onto the USB mass storage device 'RPI-RP2'.
3. Connect to the serial COM port of Raspberry Pi Pico, W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2 or W5500-EVB-Pico2 with Tera Term.

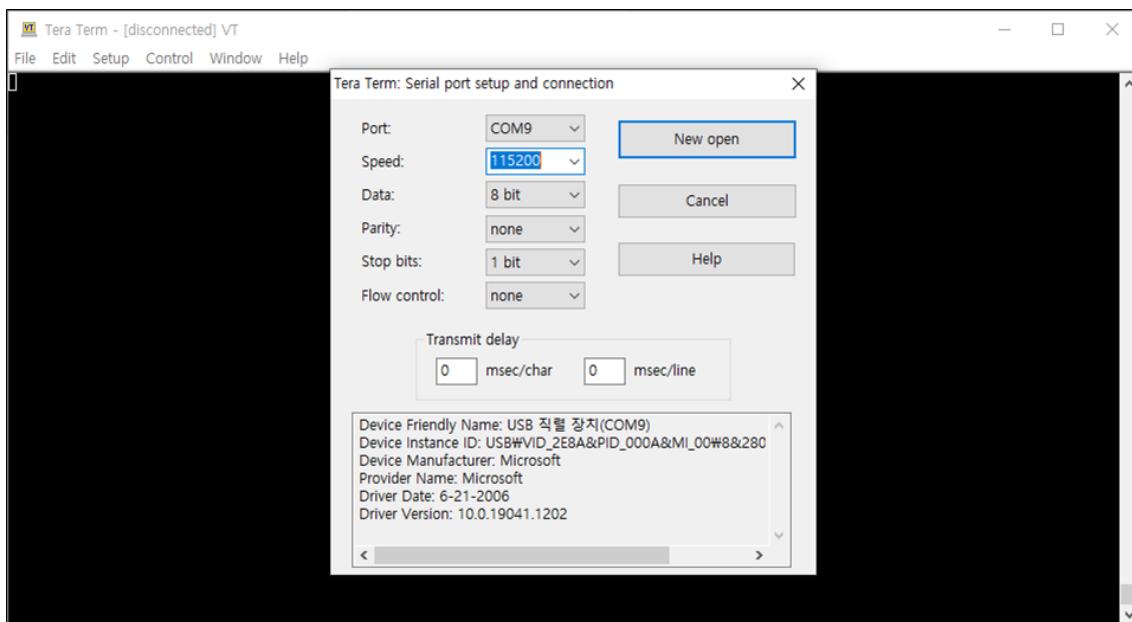
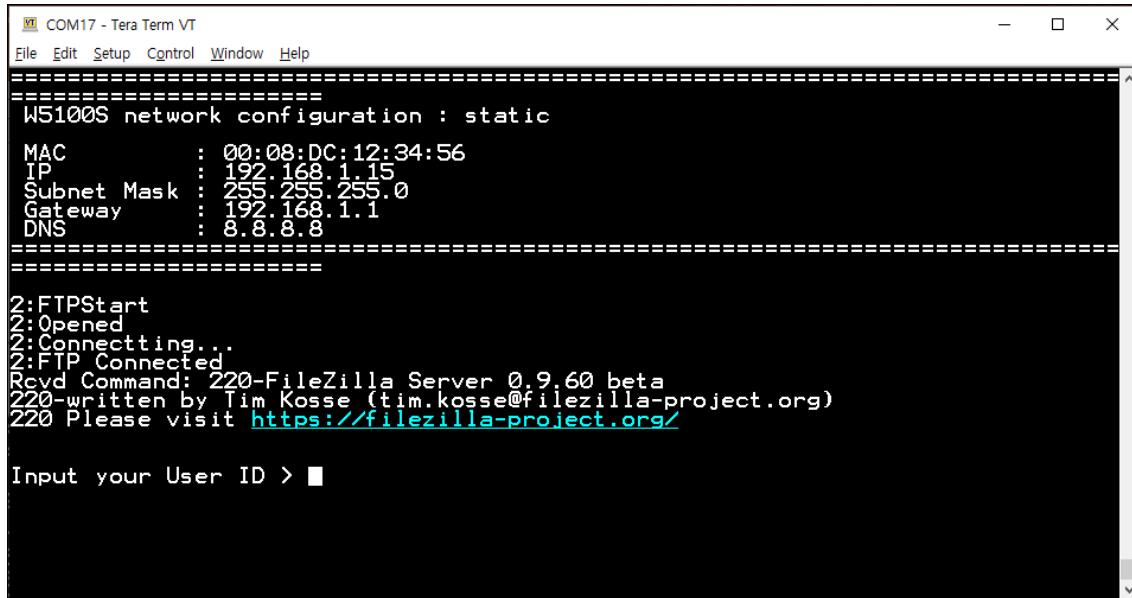


Figure 6. Tera Term

- 
4. Reset your board.
  5. If the FTP Client example works normally on Raspberry Pi Pico, W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2 or W5500-EVB-Pico2, you can see the network information of Raspberry Pi Pico, W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2 or W5500-EVB-Pico2 and the FileZilla web site URL.

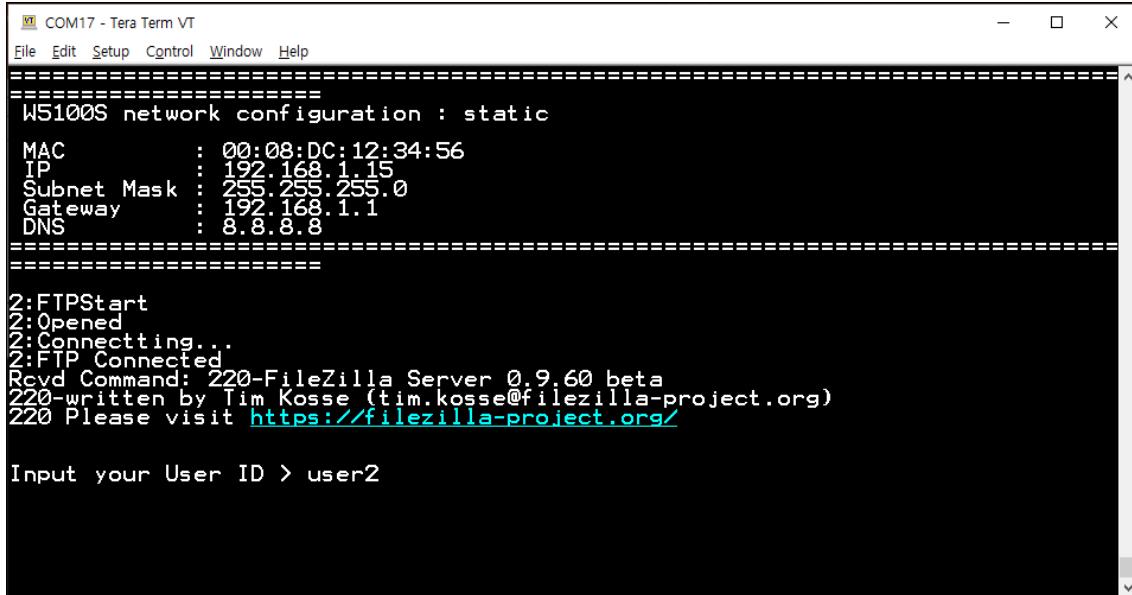


```
COM17 - Tera Term VT
File Edit Setup Control Window Help
=====
W5100S network configuration : static
MAC      : 00:08:DC:12:34:56
IP       : 192.168.1.15
Subnet Mask : 255.255.255.0
Gateway   : 192.168.1.1
DNS      : 8.8.8.8
=====
2:FTPStart
2:Opened
2:Connectting...
2:FTP Connected
Rcvd Command: 220-FileZilla Server 0.9.60 beta
220-written by Tim Kosse (tim.kosse@filezilla-project.org)
220 Please visit https://filezilla-project.org/

Input your User ID > ■
```

Figure 7. Network Information

6. Input the user ID created in step 4.

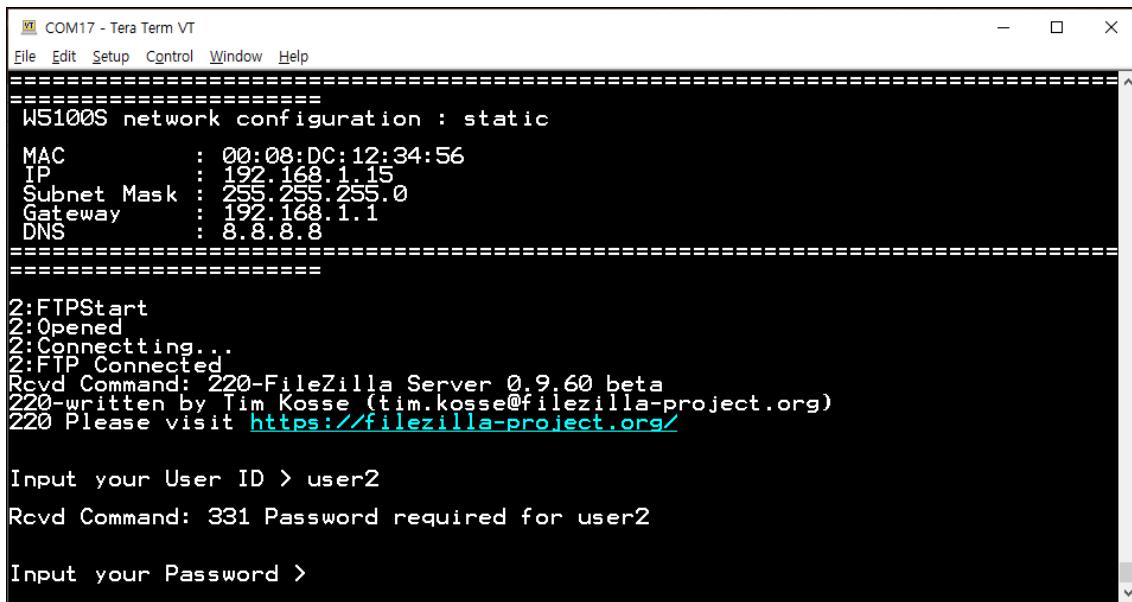


```
COM17 - Tera Term VT
File Edit Setup Control Window Help
=====
W5100S network configuration : static
MAC      : 00:08:DC:12:34:56
IP       : 192.168.1.15
Subnet Mask : 255.255.255.0
Gateway   : 192.168.1.1
DNS      : 8.8.8.8
=====
2:FTPStart
2:Opened
2:Connectting...
2:FTP Connected
Rcvd Command: 220-FileZilla Server 0.9.60 beta
220-written by Tim Kosse (tim.kosse@filezilla-project.org)
220 Please visit https://filezilla-project.org/

Input your User ID > user2
```

Figure 8. Input user ID

## 7. Input the password.



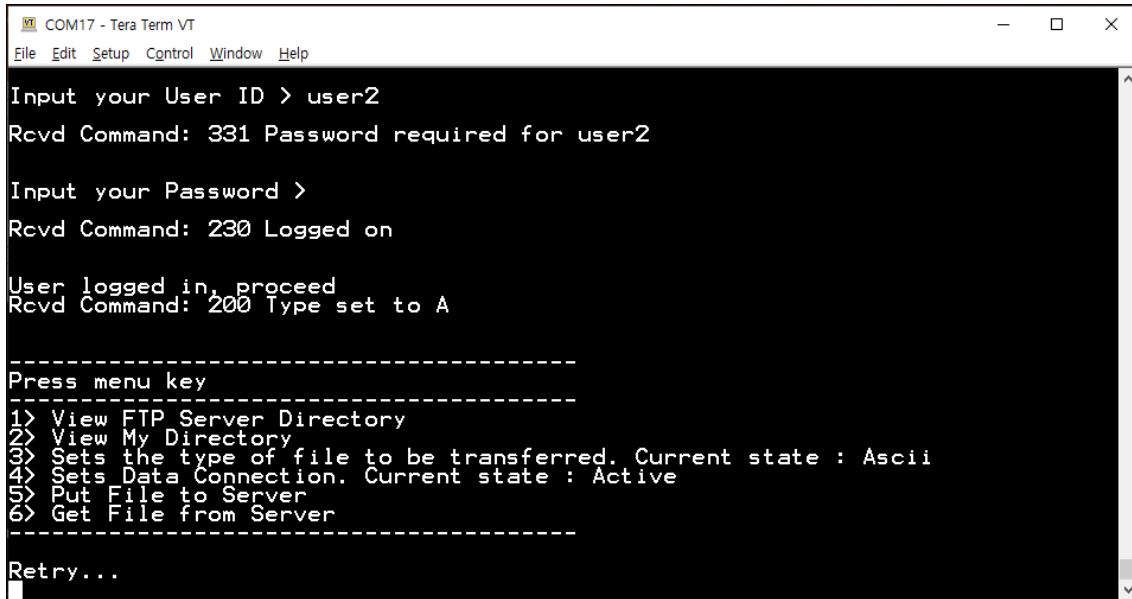
```
COM17 - Tera Term VT
File Edit Setup Control Window Help
=====
W5100S network configuration : static
MAC      : 00:08:DC:12:34:56
IP       : 192.168.1.15
Subnet Mask : 255.255.255.0
Gateway   : 192.168.1.1
DNS       : 8.8.8.8
=====
2:FTPStart
2:Opened
2:Connectting...
2:FTP Connected
Rcvd Command: 220-FileZilla Server 0.9.60 beta
220-written by Tim Kosse (tim.kosse@filezilla-project.org)
220 Please visit https://filezilla-project.org/

Input your User ID > user2
Rcvd Command: 331 Password required for user2

Input your Password >
```

Figure 9. Input user Password

## 8. Press number '1'.



```
COM17 - Tera Term VT
File Edit Setup Control Window Help
Input your User ID > user2
Rcvd Command: 331 Password required for user2

Input your Password >
Rcvd Command: 230 Logged on

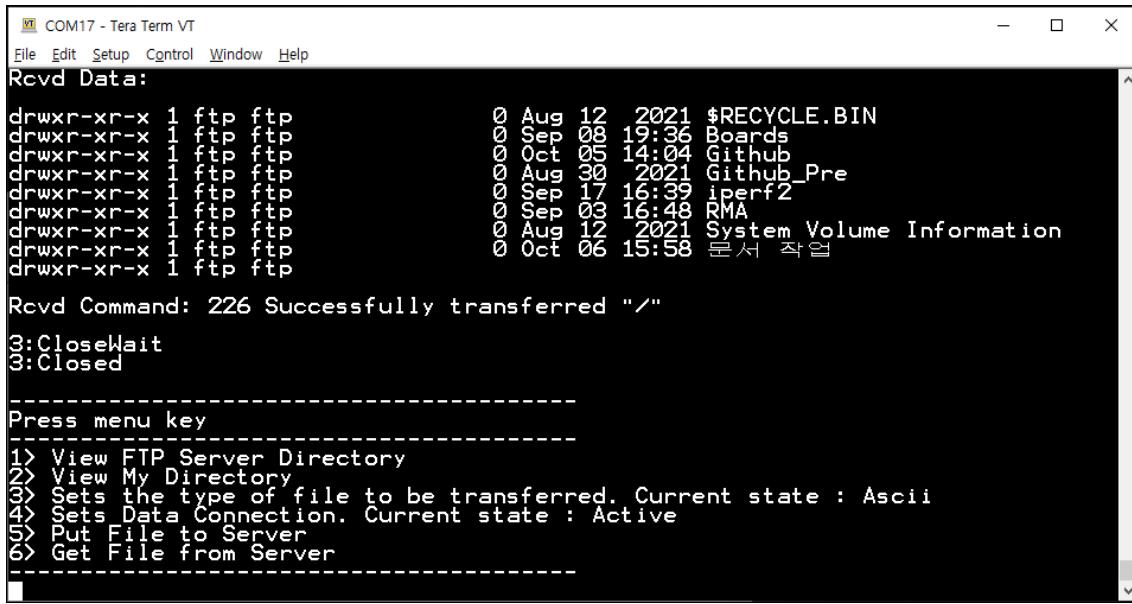
User logged in, proceed
Rcvd Command: 200 Type set to A

-----
Press menu key
-----
1> View FTP Server Directory
2> View My Directory
3> Sets the type of file to be transferred. Current state : Ascii
4> Sets Data Connection. Current state : Active
5> Put File to Server
6> Get File from Server
-----

Retry...
```

Figure 10. Press Number '1'

## 9. You can see FTP server directory.



```

COM17 - Tera Term VT
File Edit Setup Control Window Help
Rcvd Data:
drwxr-xr-x 1 ftp ftp          0 Aug 12 2021 $RECYCLE.BIN
drwxr-xr-x 1 ftp ftp          0 Sep 08 19:36 Boards
drwxr-xr-x 1 ftp ftp          0 Oct 05 14:04 Github
drwxr-xr-x 1 ftp ftp          0 Aug 30 2021 Github_Pre
drwxr-xr-x 1 ftp ftp          0 Sep 17 16:39 iperf2
drwxr-xr-x 1 ftp ftp          0 Sep 03 16:48 RMA
drwxr-xr-x 1 ftp ftp          0 Aug 12 2021 System Volume Information
drwxr-xr-x 1 ftp ftp          0 Oct 06 15:58 문서 작업
drwxr-xr-x 1 ftp ftp

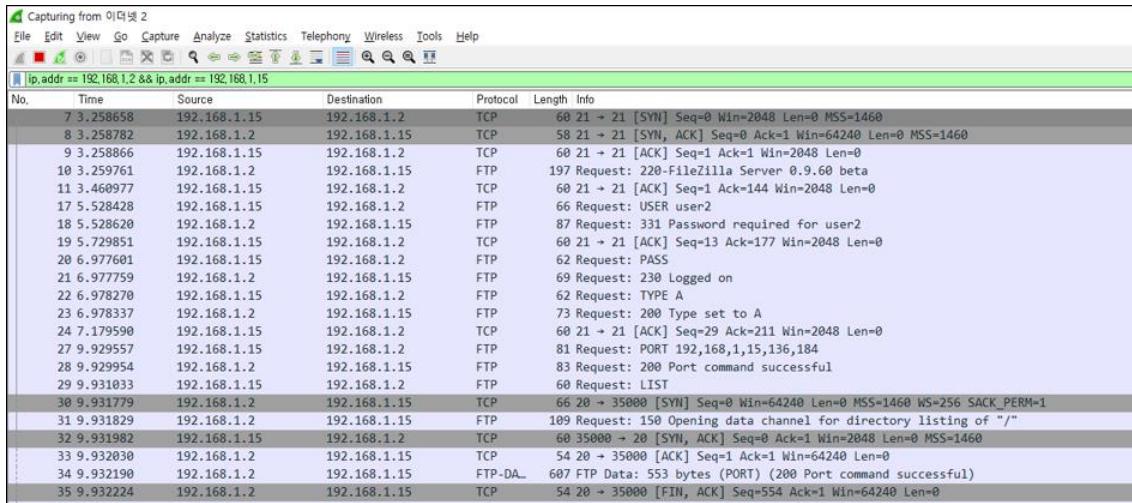
Rcvd Command: 226 Successfully transferred "/"

3:CloseWait
3:Closed

Press menu key
-----
1> View FTP Server Directory
2> View My Directory
3> Sets the type of file to be transferred. Current state : Ascii
4> Sets Data Connection. Current state : Active
5> Put File to Server
6> Get File from Server
-----
```

Figure 11. FTP server directory

## 10. Wireshark packet capture.



No.	Time	Source	Destination	Protocol	Length	Info
7	3.258658	192.168.1.15	192.168.1.2	TCP	68	21 → 21 [SYN] Seq=0 Win=2048 Len=0 MSS=1460
8	3.258782	192.168.1.2	192.168.1.15	TCP	58	21 → 21 [SYN, ACK] Seq=0 Ack=1 Win=64240 Len=0 MSS=1460
9	3.258866	192.168.1.15	192.168.1.2	TCP	68	21 → 21 [ACK] Seq=1 Ack=1 Win=2048 Len=0
10	3.259761	192.168.1.2	192.168.1.15	FTP	197	Request: 220-FileZilla Server 0.9.60 beta
11	3.460977	192.168.1.15	192.168.1.2	TCP	68	21 → 21 [ACK] Seq=1 Ack=144 Win=2048 Len=0
17	5.528428	192.168.1.15	192.168.1.2	FTP	66	Request: USER user2
18	5.528620	192.168.1.2	192.168.1.15	FTP	87	Request: 331 Password required for user2
19	5.729851	192.168.1.15	192.168.1.2	TCP	68	21 → 21 [ACK] Seq=13 Ack=177 Win=2048 Len=0
20	6.977661	192.168.1.15	192.168.1.2	FTP	62	Request: PASS
21	6.977759	192.168.1.2	192.168.1.15	FTP	69	Request: 230 Logged on
22	6.978270	192.168.1.15	192.168.1.2	FTP	62	Request: TYPE A
23	6.978337	192.168.1.2	192.168.1.15	FTP	73	Request: 200 Type set to A
24	7.179599	192.168.1.15	192.168.1.2	TCP	68	21 → 21 [ACK] Seq=29 Ack=211 Win=2048 Len=0
27	9.929557	192.168.1.15	192.168.1.2	FTP	81	Request: PORT 192,168,1,15,136,184
28	9.929954	192.168.1.2	192.168.1.15	FTP	83	Request: 200 Port command successful
29	9.931033	192.168.1.15	192.168.1.2	FTP	68	Request: LIST
30	9.931779	192.168.1.2	192.168.1.15	TCP	66	28 → 35000 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
31	9.931829	192.168.1.2	192.168.1.15	FTP	189	Request: 150 Opening data channel for directory listing of "/"
32	9.931982	192.168.1.15	192.168.1.2	TCP	68	35000 → 20 [SYN, ACK] Seq=0 Ack=1 Win=2048 Len=0 MSS=1460
33	9.932030	192.168.1.2	192.168.1.15	TCP	54	20 → 35000 [ACK] Seq=1 Ack=1 Win=64240 Len=0
34	9.932190	192.168.1.2	192.168.1.15	FTP-DA	607	FTP Data: 553 bytes (PORT) (200 Port command successful)
35	9.932224	192.168.1.2	192.168.1.15	TCP	54	20 → 35000 [FIN, ACK] Seq=554 Ack=1 Win=64240 Len=0

Figure 12. FTP wireshark result

## Revision history

Version	Date	Descriptions
Ver. 1.0.0	Nov, 2024	Initial release.

Table 1. Revision history

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