Application Note FTP_Server Example

Version 1.0.0



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1 Introduction

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

2 Github Link

https://github.com/WIZnet-ioNIC/WIZnet-PICO-C/tree/main/examples/ftp/server

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 Server Example

4.1 Step 1: Prepare software

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

- <u>Tera Term</u>
- <u>WinSCP</u>

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.
- 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.
- 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 Server Example

To test the FTP Server 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 Server 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_server.c', which is the FTP Server example in 'WIZnet-PICO-C/examples/ftp/server' 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

3. Setup FTP Server configuration in 'ftpd.h' in 'WIZnet-PICO-

C/libraries/ioLibrary_Driver/Internet/FTPServer' directory.

```
#define IPPORT_FTP 21 /* FTP Control port */
```

4.4 Step 4: Build

- 1. After completing the FTP Server 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_server.uf2' is generated in 'WIZnet-PICO-C/build/examples/ftp/server' directory.

4.5 Step 5: Upload and Run

 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.

💻 🛃 📗 🖛 This PC	5			_	×
File Computer	View				^ ?
Properties Open Rename	Access Map network Add a network media - drive - location	rk Open Settings			
Location	Network	System			
$\leftrightarrow \rightarrow \neg \uparrow \blacksquare $	This PC		~ č	。 P Search This PC	
3D Objects	Desi	top Do	cuments		^
Downloads	Mus	ic Pict	tures		
Videos					
~ Devices and drives	(4)				
Local Disk (C:)	Data	(D:)	느템 예약 (E:)		
105 GB free of	231 GB 811	GB free of 931 GB 84.9	MB free of 99.9 MB		
RPI-RP2 (F:)					
127 MB free o	F 127 MB				~
11 items					800 📼

Figure 1. USB mass storage

2. Drag and drop 'w5x00_ftp_server.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, W5500-EVB-Pico2 or W5500-EVB-Pico2 with Tera Term

_	_											_	
<u></u>	Tera 1	erm - [d	isconnect	ed] VT							_		×
File	Edit	Setup	Control	Window	Help								
						Tera Term: Serial por	t setup and c	onnecti	on	×			^
						Dett	COMO			_			
						Port:	COMA	~	New open				
						Speed:	115200	\sim					
						Data:	8 bit	\sim	Cancel				
						Parity:	none	~					
						Stop bits:	1 bit	~	Help				
						Flow control:	none	~					
						Transr	nit dalau						
						Transr	nit delay	_					
						0	msec/char	r 🛛	msec/line				
						Device Friendly I	Name: USB 직	렬 장치	(COM9)	^			
						Device Instance Device Manufact	D: USB#VID_	_218A8(ft	PID_000A&MI_00#8&28				
						Provider Name:	Microsoft						
						Driver Date: 6-2	1-2006	02					
						Driver version. I	0.0.19041.12	02		~			
						<				>			

Figure 2. Tera Term

- 4. Reset your board.
- If the FTP Server 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 FTP server is open.

COM9 - Tera Term VT	-	×
File Edit Setup Control Window Help		
W5100S network configuration : static		^
MAC : 00:08:DC:12:34:56 IP : 192.168.11.253 Subnet Mask : 255.255.05 Gateway : 192.168.11.1 DNS : 8.8.8.8		
2:Opened 2:Listen ok		
		~

Figure 3. Network Information



6. Run WinSCP to be used as the FTP client.

🚡 Login	- 🗆 X
New Site	Session File protocol: SFTP V Host name: Port number: User name: Password: User name: Password:
Tools 🔻	Manage
Show Login dialog on startup and when the last session is dosed	

Figure 4. Run WinSCP

 Connect to the open FTP server using WinSCP. When connecting to the FTP server, you need to select FTP from the 'File protocol' session and enter IP that was configured in Step 3, the port is 21 by default. After completing the setup, click the 'Login' button.

🌆 Login	- 🗆 X
Tools	Session File protocol: FIP No encryption Host name: Port number: 192.168.11.253 21 User name: Anonymous login Save Advanced
Show Login dialog on startup and when the last session is closed	

Figure 5. Enter FTP server IP or HOST name and Port



8. Click 'OK' button without entering the user name and password.

Username - 192.16	8.11.253		×
Prompting	for credentials		
<u>⊔</u> sername: 			
	ОК	Cancel	Help

Figure 7. Enter User name

Passwo	rd - 192.168.11.253			
.	Prompting for credentials Connecting to 192.168.11.253			
Passwo 	rd: OK Cancel Help			

Figure 6. Enter Password



9. After all actions are completed, you should be able to connect to FTP server.

🌆 Test Data Set - 192.168.11.253 - WinSCP						- 0	×
Local Mark Files Commands Session Optic	ons Remote Help						
🖶 🚉 📚 Synchronize 🔳 🦑 💽 🏟	🗿 Queue 🔹 🛛 Trans	sfer Settings D	efault -	100 -			
■ 192.168.11.253 × 💣 New Session							
- D: Data • 🚰 • 🔽 • 🗠 - 🚽	- 🖻 🖻 🏠 🛃 🦻	2	/ <root> • 🚝 •</root>	▼ • V	→ 1 m m ∩	2 🔯 Find Files	2
I file Upload • 🔐 Edit • 🗙 📣 🖓 Propert	ies 😝 New - 📭		I Download -	dit v M ada	Properties	Vew • [+] 🗐 🗑	1
D #Austin#Test Data Set#			/	C (121			-
Name	Size	Type	Name	Size	Changed	Rights	Ow
	10.000	Parent direct	t.				
1K.txt	1 KB	TXT 파일	SRecycle.Bin		2014-12-31	rwxr-xr-x	ftp
1M.bd	1,024 KB	TXT 파일	est.txt	1 KB	2014-12-31	rwxr-xr-x	ftp
2K.txt	2 KB	TXT 파일					
4K.Dtt	4 KB	1入1 파일					
CAN be	O ND						
128K txt	128 KB	TXT파잌					
	120 100						
<		>	<				>
0 B of 1.20 MB in 0 of 7			0 B of 512 B in 0 of 2				
					FTP	0:00	:07

Figure 8. Connect to FTP Server 1

💻 COM9 - Tera Term VT
File Edit Setup Control Window Help
W51005 network configuration : static
MAC : 00:08:DC:12:34:56 IP : 192.168.11.253 Subnet Mask : 255.255.0 Gateway : 192.168.11.1 DNS : 8.8.8.8
2:Opened 2:Listen ok 2:FTP Connected size: 7 Rcvd Command: USER
USER_CMD : size: 7
Rcvd Command: PASS PAS5_CMD : logged in size: 6
Rcvd Command: SYST size: 6 Rcvd Command: FFAT
size: 28 Rcvd Command: CLNT WinSCP-release-5.19.2
size: 14 Rcvd Command: OPTS UTF8 ON size: 5
Rcvd Command: PWD size: 8 Rcvd Command: TYPE A
size: 6 Revd Command: PASV RASV port: 35000
size: 6
Rcvd Command: MLSD MLSD_CMD 3:Opened
3:Listen ok 3:FTP Data socket Connected previous size: 0
meturned size: 0 mlsd

Figure 9.Connect FTP Server 2



10. Let's try to download file from FTP server to FTP client, you should be able to get results



Figure 10. Download selected remote file to local directory 1



```
M COM9 - Tera Term VT
 File Edit Setup Control Window Help
                                                                                  W5100S network configuration : static
 MAC : 00:08:DC:12:34:56

IP : 192.168.11.253

Subnet Mask : 255.255.255.0

Gateway : 192.168.11.1

DNS : 8.8.8.8
2:Opened
2:Listen ok
2:Listen ok
2:FTP Connected
size: 7
Rcvd Command: USER
USER_CMD :
USER_CMD :
size: 7
Revd Command: PASS
PASS_CMD :
logged in
size: 6
Revd Command: SYST
size: 6
 Rcvd Command: FEAT
size: 28
Rcvd Command: CLNT WinSCP-release-5.19.2
size: 14
Rcvd Command: OPTS UTF8 ON
size: 5
Rcvd Command: PWD
size: 8
Rcvd Command: TYPE A
size: 6
Rcvd Command: PASV
PASV port: 35000
3:FTPDataStart, port : 35000
size: 6
Rcvd Command: MLSD
MLSD_CMD
3:Opened
3:Listen ok
3:FTP Data socket Connected
previous size: 0
returned size: 0
mlsd
size: 8
Rcvd Command: TYPE I
size: 6
Rcvd Command: PASV
PASV port: 35001
3:FTPDataStart, port : 35001
3:Opened
3:Listen ok
size: 15
Rcvd Command: RETR test.txt
RETR_CMD
filename to retrieve : /test.txt 9
```

Figure 11. Download selected remote file to local directory 2



11. Now, let's try to upload file from FTP client to FTP server, you should be able to see the contents of the uploaded file printed in terminal.



Figure 12. Upload selected local file to remote directory 1



🗵 COM9 - Tera Term VT – 🗆 🗙
File Edit Setup Control Window Help
Rcvd Command: MLSD
nLSD_UPD 3:Opened
3:Listen ok
3:FTP Data socket Connected
returned size: 0
mlsd
size: 8
Rcvd Command: TYPE I
size: 6 Prud Command: PASV
ASV port 35001
3:FTPDataStart, port : 35001
3:Upten ok
size: 15
Rcvd Command: REIR test.txt BFTR (M)
3:FTP Data socket Connected
filename to retrieve : /test.txt 9
size: 8
Rcvd Command: TYPE I
Size: 6 Devel Command: DASV
ASV port 35002
3:FTPDataStart, port : 35002
3:Upten ok
size: 13
Rcvd Command: STOR 1K.txt
Siconect error
3-ETD Data socket Connected
<pre>intername cu store : /intername cu store : /i /intername cu store : /intername cu s</pre>
bcdefghijklmnopqrstuvwxyz0123456789abcdefghijklmnopqrstuvwxyz0123456789abcdefghijklmnopqrstuvwxyz0123456789abcdefghijklmnopqrstuvwxyz
12/345b/89abcdefgn1jKimnopqr5tuvixxy2012/345b/89abcdefgh1jKimnopqr5tuvixxy2012/345b/89abcdefgn1jKimnopqr5tuvixxy2012/345b/89abcdefgh1jKimnop rstuvixxy2012345b789abcdefgh1jKinnoparstuvixxy2012/345b789abcdefgh1jKinnopqrstuvixxy2012/345b789abcdefgh1jKinnop
######################################
jklamopqrstuvxxyz0123455789abcdefghijklamopqrstuvxxyz0123456789abcdefghijklamopqrstuvxxyz0123456789abcdefghijklamopqrstuvxxyz01234567 Dabcdefghišklamoparstuvxxyz0123455789abcdefghijklamoparstuvxxyz0123456789abcdefghišklamoparstuvxxyz012345678abc
rsouverignijkumopqistuvnayvoiisaorosaotuetignijkumotopqistuvnayvoiisaotoetignijkumoopqistuvnayvoiisaotuetignijkumoopqistuvna
size: 28
54267 x0 Rcvd Command: MFNT 20210330012406 1K.txt
size: 8
Rcvd Command: TYPE A
Rcvd Command: PASV
PASV port: 35003
size: 6
Revd Command: MLSD
PLSD CMD 3:00ened
Bilisten ok
3:FTP Data socket Connected
returned size: 0
nlsd

Figure 13. Upload selected local file to remote directory 2



Revision history

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

Table 1. Revision history

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