

# **TOE1G-IP FTP Server Demo Instruction**

Rev1.1 2-Sep-16

#### 1 Environment Setup

As shown in Figure 1 - Figure 2, to run TOE1G-IP FTP demo, please prepare

- 1) FPGA Development board (KC705/ZC706)
- 2) ISE ver 14.4 or later, or Vivado tool
- 3) For ZC706 board, use SFP-RJ45 adapter

Note: The demo uses FCLF-8520-3/FCLF-8521-3 to be SFP-RJ45 adapter <u>https://www.finisar.com/sites/default/files/downloads/finisar\_fclf-8520-3\_fclf-8521-3\_100</u> <u>Obase-t\_copper\_sfp\_optical\_transceiver\_productspecreve1.pdf</u>

- 4) Ethernet cable (Cat5e or Cat6) for network connection between FPGA Development board and PC
- 5) PC with Gigabit Ethernet support
- 6) micro USB cable for programming FPGA between FPGA Development board and PC
- 7) Test Application "FileZilla" (test on ver 3.9.0.6) or "Default FTP Client on Windows OS" running on PC
- 8) (Optional) USB mini cable can be connected FPGA Development board and PC for monitoring FTP server operation through Serial console.



Figure 1 TOE1G-IP FTP Server Demo Environment Setup on KC705





## 2 Demo description

The demo designs to use 1 GB DDR3 memory on FPGA board to be the storage of FTP server. The document shows FTP server operation when running by two FTP client applications, i.e. FileZilla and default FTP client on Windows OS.

During data transferring between FPGA board and Test PC, LED on the board will be ON/OFF. The description of LED is shown in Table 1.

#### Table 1 LED Definition

GPIO LED	ON	OFF
0	Data transferring	No data connection
1/R	TOE1G-IP receives data from PC	No received data from PC
2/C	Data transferring from TOE1G-IP to PC	No data transferring
3/L	Data transferring from PC to TOE1G-IP	No data transferring

### 3 PC Setup

Please follow the same setting as described in "dg\_toe1gip\_instruction\_xilinx\_en" document (standard demo).



#### 4 How to run demo

#### 4.1 FPGA Programming

To run the demo, please follow these steps.

 For ZC706 board only, set SW11="00000" to configure PS from JTAG and set SW4="01" to connect JTAG with USB-to-JTAG interface, as shown in Figure 3 - Figure 4.

SW11



Figure 3 SW11 setting to configure PS from JTAG on ZC706 board



Figure 4 SW4 setting to use USB-to-JTAG on ZC706 board

- Connect micro USB cable from FPGA development board to PC and connect power supply to FPGA board.
- (Optional) Connect USB mini cable from FPGA development board to PC and open serial monitoring software on PC such as HyperTerminal. Terminal setting is BuadRate=115200, Data=8 bit, Non-Parity, Stop=1.
- Connect Ethernet cable between FPGA development board and PC.
- Set up network setting on PC, following Topic 3.
- Power on FPGA development board.
- For KC705, open iMPACT and download "download\_ftpserv.bit" to FPGA development board. After download completely, check 1000 link status LED at DS11 (near RJ45). LED must be ON to show that the Ethernet link is ready, as shown in Figure 5.



SE IMPACT (P.68d) - [Boundary Scan]	10	
🕒 ờ 🖬 🚺 🏭 😂 💥 🤃 🧮	E Pebug Window Help	KC705
MPACT Flows     ↔ □ ♂ ×       ⊕     ⊕       SystemACE       ○	Right click device to select operations	10 100 1000 DUP TX RX
	Boundary Scan	
Console		++ □ & ×
LCK cycle: NoWait () INFO: iMPACT - '1': Checking of '1': Programmed successfully	done pindone.	
<		. P.
Console S Errors Warnings	No Cable Connection No File Ope	en [ [ [ ]
	Figure 5 Programmer Env	vironment

- For ZC706, open ISE command prompt or Vivado TCL Shell, change current directory to ready\_for\_download, and run batch file as shown in Figure 6 and Figure 7. There is no Ethernet LED status on ZC706, user can check from message on Serial console instead.

🔤 Administrator: ISE Design Suite 64 Bit Command Prompt	- • •
C:\Xilinx\14.6\ISE_DS> <mark>cd C:\Pat\ready_for_download</mark> C:\Pat\ready_for_download> <mark>zc706_toe2ip_ftpserv.bat_</mark>	• •
Figure 6 Example command script for download to ZC706 by ISE to	ol

Vivado 2014.1 Tcl Shell - C:\Xilinx\Vivado\2014.1\bin\vivado.bat -mode tcl

 \*\*\*\*\*\*\*
 Uivado v2014.1 (64-bit)

 \*\*\*\*\*
 SW Build 881834 on Fri Apr 4 14:15:54 MDT 2014

 \*\*\*\*\*
 IP Build 877625 on Fri Mar 28 16:29:15 MDT 2014

 \*\*\* Copyright 1986-2014 Xilinx, Inc. All Rights Reserved.

 Vivado:
 cd C:/Pat/ready\_for\_download

 Vivado:
 cc706\_toe2ip\_ftpserv.bat\_

Figure 7 Example command script for download to ZC706 by Vivado tool



- On serial console, "Detect Client PC" message will be displayed when FTP server can detect FTP client in the network. If message is not displayed, please check LAN cable and Ethernet connection setting on PC.



Figure 8 Bootup message on Serial console



#### 4.2 FileZilla

This topic shows the step to use FileZilla software for connecting with FTP server. The demo can support only upload and download the file. Delete operation is not supported.

- 4.2.1 Setting and Connect
  - Before connect to FTP server, open FileZilla setting firstly to set Maximum data connection to be 1 by selecting Edit->Settings.
  - In the new window, select Transfers -> Maximum simultaneous transfers = 1 (Default value is 2), and click "OK" button as shown in Figure 9.

🔁 FileZilla	Settings	
File Edit View Transfer Server Bookmarks  For Clear private data  Settings	Select page: Connection FTP Active mode Passive mode FTP Proxy SFTP Generic proxy File Types File exists action Date/time format File lists Language OK	Concurrent transfers Maximum simultaneous transfers: Maximum simultaneous transfers: Maximum simultaneous transfers: Maximum simultaneous transfers: Maximum simultaneous transfers: (1-10) Limit for concurrent glownloads: (0 for no limit) Speed limits Proveso (0 for no l

Figure 9 Set Maximum simultaneous transfers = 1

- Enter Host = "192.168.11.42", and then click "Quickconnect" button, as shown in Figure 10.

E FileZilla			
<u>Eile E</u> dit <u>V</u> iew <u>T</u> ransfer <u>S</u> erver <u>B</u> ookmarks <u>H</u> e	elp <u>N</u> ew version available!		
x - V	R F N		
Host: 192.168.11.42	Pass <u>w</u> ord:	Port: Quick	connect 💌
			A
			Ŧ
Figure	10 Enter Host na	me for FileZilla	

 After connection successful, Empty directory is listed on the windows with "Directory listing successful" message, as shown in Figure 11.



<b>192.168.11.42</b> <u>File E</u> dit <u>V</u> iew	- FileZilla v <u>T</u> ransfer <u>S</u> erv	er <u>B</u> ookmarks j	<u>H</u> elp <u>N</u> ew versio	on available!			• .
Host: 192.168.1	1.42 <u>U</u> serna	ime: anonymous	Pass <u>w</u> or	d:	<u>P</u> ort:	Quickconnect	•
Command: Response: Command: Response: Response: Status: Directory	PASV 227 Entering Pass MLSD 150 Connection A 226 Transfer Ok listing successful	ve Mode (192,168, .ccepted	11,42,195,80)				* 
Local site: \			•	Remote site:	1		Ŧ
Filename	Filesiz	e Filetype	Last modifiec	Filename	Filesize Filetyp	e Last modified	Permi
2:		Local Disk			Empty direct	ory listing	
•	m			4	m		•
1 directory				Empty directo	ry.	- 17	
Server/Local file		Direction Remote	file		Size Priority St	atus	
Queued files	Failed transfers	Successful transf	ers				
						Queue: empty	
		Figu	ure 11 Conn	ect succe	ssful		



#### 4.2.2 Upload File

Server uses 1 GB DDR3 memory to store file from the client. There are some limitations about file size, file name length, and total number of file as follows.

- 1) Maximum capacity of storage on FTP server is 1,072,624,640 Byte
- 2) Maximum file name length is 30 characters
- 3) Maximum total number of file is 16 file
- 4) Only file transfer without file directory is supported
- To upload file by FileZilla, user can select the file on PC, and then "double-click" or right-click->upload. Then, file will be uploaded to the server. Finally, the file will be displayed in the server list, as shown in Figure 12.

192.168.11.42 - I	fileZilla						
Eile Edit View	Transfer Server	Bookmarks Hu	elp <u>N</u> ew version	n available!			
		r• • • • • •	AX 17 88			0200	
Host: 192.168.11.4	12 <u>U</u> sernam	ne: anonymous	Pass <u>w</u> ord	:	Port:	Quickcon	nect 💌
Response: 2	26 Transfer Ok	repres.					
Status: File transfe	r successful, transf	erred 943,718,400 b	oytes in 8 second	5 Tran	sfer Speed is	more than	
status: Retrieving Command: T	directory listing			100	MByte/sec		
Response: 2	00 Ok						
Command: P	ASV						
Response: 2	27 Entering Passive	e Mode (192,168,11	L,42,195,80)				
Command: N	ALSD						
Response: 1	50 Connection Act	cepted					
Kesponse: 2 Statum Dimetanti	26 Transfer Ok						
status: Directory ii	sung succession						
Local site: C:\Ten	np\		•	Remote site:	1		2
Filename	Filesize	Filetype	Last modified	Filename	Filesize	Filetype	Last modified
<u></u>				- <b>-</b>	0.0000000000000000000000000000000000000		
DDR_size	1,073,675,7	File	19/11/2557 15:	noname.b	d 943,718,400	Text Document	
IntelUSB3.log	37,562	Text Document	7/12/2555 13:2				43
noname.txt	943,718,400	Text Document	12/1/2558 17:				
	m				m		
	1 . 042 740 4004			3 () 4 ()) - T - 1 - 1	0.43 740 400 1 4		
Selected 1 file, 1 ota	1 size: 943,718,400 i	bytes		Tile. Total siz	e: 943,718,400 bytes		
Server/Local file	Dir	rection Remote fi	ile		Size Priority S	tatus	
Queued files	Failed transfers	Successful trans	sfers (1)				
					<u>A</u> ] =	📾 Queue: empt	/
				ا ما میں میں	file to comment		



- As shown in Figure 13, if file name length of uploaded file is more than 30 characters, only the first 30 characters will be used to be file name.
- As shown in Figure 14 and Figure 15, transfer error will be found when uploaded file size is too big or total number of file is more than 16.

<u>File E</u> dit <u>V</u> iew	Transfer Server	<u>B</u> ookmarks <u>H</u> elp • 🗽 🛷   💷 <i>Ş</i>	New version av	vaila	ble!			
<u>H</u> ost: 192.168.11.	42 <u>U</u> sername	anonymous	Pass <u>w</u> ord:		Port: Quic	(connect 💌		
Response: Response: Status: Directory	150 Connection Acce 226 Transfer Ok listing successful	pted						1
Local site: C:\Te	mp\			•	Remote site: /			3
Filename	~	F	lesize Filetype		Filename	Filesize	Filetype	
🔟 📄 Test012345678	9012345678901234567	89 536,87	0,912 File			536,870,912	File	
•	ш			F.	• [			3
Selected 1 file. Tot	al size: 536,870,912 by	tes			1 file. Total size: 536,870,912 bytes			
Server/Local file	Direc	tion Remote file			Size Priority Status			
Queued files	Failed transfers	Successful transfe	rs (1)					
		2	1	_	F	🚥 Queue: emp	ty	

Figure 13 Example when File name length is more than 30 characters

🔁 192.168.11.42 - FileZilla	
<u>File Edit View Transfer Server Bookmarks H</u> elp <u>New version available!</u>	
M • M = C + K = K K * A	
Host: 192.168.11.42 Username: anonymous Password:	Port: Quickconnect 💌
Error: File transfer failed after transferring 1.074.003.968 bytes in 9 seconds	
Status: Starting upload of C:\Temp\File1_1GB	
Status: Retrieving directory listing	
Command: TYPE1	
Command: DASV	
Besnonse: 227 Entering Passive Mode (192 168 11 42 195 80)	
Command: MLSD	
Response: 150 Connection Accepted	
Response: 226 Transfer Ok	
Command: TYPE A	
Response: 200 Ok	
Command: PASV	
Response: 227 Entering Passive Mode (192,108,11,42,195,80)	
Response: 550 Permission denied	
Error: Critical file transfer error	
Local site: C:\Temp\	Remote site: /
Filename Filesize Filetype Last modified	Filename Filesize Filetype Last modified Permissions
File1_1GB 1,153,433,6 File 13/1/2558 9:23:44	File1_1GB 1,073,673, File
Selected 1 file. Total size: 1,153,433,600 bytes	1 file. Total size: 1,073,673,216 bytes
Server/Local file Direction Remote file	Size Priority Status
Queued files Failed transfers (1) Successful transfers	
	And the second s

#### Figure 14 Error when uploaded file size is more than space area in DDR3



192.168.11.42 - File	Zilla									×
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>T</u>	ransfer <u>S</u> erver	<u>B</u> ookmarks <u>H</u> elp	New version availab	ole!						
🔰 🕇 🚺 🖽 😷	3 🛱 🖗	P3 💺 🛷   🗐 🖗	! <del>?</del> A							
<u>H</u> ost: 192.168.11.42	<u>U</u> sernam	ne: anonymous	Pass <u>w</u> ord:		Port:	Quickcor	nnect 💌			
Response: 150	Connection Acc	epted								*
Response: 226 Status: Directory listi	Transfer Ok									
Status: Starting uploa	ad of C:\Temp\f	ile16								
Command: TYP	ΈA									
Response: 200	Ok									
Command: PAS Response: 227	W Entering Dassive	Mode (197 168 11 47	195.80)							
Command: STC	R file16	. 19100c (152,100,11,42	.,135,669							
Response: 550	Permission deni	ied								
Error: Critical file tra	insfer error									*
Local site: C:\Temp	۱			•	Remote site: )	(				•
Filename	Filesize	Filetype L	ast modified	-	Filename	Filesize	Filetype	Last modified	Permissions	*
file01	67,104,256	File 2	0/11/2557 10:05:27		file00	67,104,256	File			- 10
file02	67,104,256	File 2	0/11/2557 10:05:27		📄 file01	67,104,256	File			
file03	67,104,256	File 2	0/11/2557 10:05:27		📄 file02	67,104,256	File			
file04	67,104,256	File 2	0/11/2557 10:05:27		📄 file03	67,104,256	File			
file05	67,104,256	File 2	0/11/2557 10:05:27		📄 file04	67,104,256	File			
📄 file06	67,104,256	File 2	0/11/2557 10:05:27		📄 file05	67,104,256	File			
file07	67,104,256	File 2	0/11/2557 10:05:27		file06	67,104,256	File			
file08	67,104,256	File 2	0/11/2557 10:05:27		📄 file07	67,104,256	File			
file09	67,104,256	File 2	0/11/2557 10:05:27		📄 file08	67,104,256	File			
file10	67,104,256	File 2	0/11/2557 10:05:27	=	📄 file09	67,104,256	File			
file11	67,104,256	File 2	0/11/2557 10:05:27		📄 file10	67,104,256	File			
file12	67,104,256	File 2	0/11/2557 10:05:27		📄 file11	67,104,256	File			
file13	67,104,256	File 2	0/11/2557 10:05:27		📄 file12	67,104,256	File			
file14	67,104,256	File 2	0/11/2557 10:05:27		🗋 file13	67,104,256	File			
file15	4,096	File 3	1/10/2557 9:35:56		file14	67,104,256	File			
file16	4,096	File 3	1/10/2557 9:35:56		📄 file15	4,096	File			
IntelUSB3.log	37,562	Text Document 7	/12/2555 13:27:51		3.1					*
Colored d Clor Total -	4 006 h-+			-	16 GL + Total -	1 006 E67 036 h				4
Selected 1 file, 1 otal si	ize: 4,096 bytes	No. 1002 Albert		-	10 files. Total siz	ze: 1,000,507,930 E	oytes			
Server/Local file	Dir	ection Remote file		S	ize Priority	Status				
Queued files	Failed transfers	(1) Successful tra	ansfers (16)							
								E 🔤 Queue: empty		-

Figure 15 Error when uploading 17<sup>th</sup> file



#### 4.2.3 Download File

To download file by FileZilla, user can select the file on server side, and then "double-click" or right-click->download. Then, file will be downloaded from server to store to current directory on PC. Finally, file will be stored in the current directory on PC. "File transfer successful with the size and time usage" will be displayed.

192.168.11.42 - FileZilla					•
<u>File E</u> dit <u>View T</u> ransfer <u>Server</u> <u>B</u> ookmarks	Help New version ava	ilable!			
1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	I 🕺 🕈 🖪				
Host: 192.168.11.42 Username: anonymou	s Pass <u>w</u> ord:		Port:	Quickconnect 🛛	]
Command:       PASV         Response:       227 Entering Passive Mode (192,168         Command:       RETR Test.txt         Response:       150 Connection Accepted         Response:       226 Transfer Ok         Status:       File transfer successful, transferred 943,718,40	1,11,42,195,80) D0 bytes in 8 seconds	Transfer spo 100 MByte/	eed is more sec	t han	
Local site: C:\Temp\		Remote site: /			•
Filename Filesize Filetype	Last modified	Filename	File	size Filetype	Lasti
Test.txt 943,718,400 Text Document	: 13/1/2558 10:23:53	Jest.txt	943,718	,400 Text Docum	ent
٠ ( m	•	4	Ш		٢
1 file. Total size: 943,718,400 bytes		Selected 1 file. Tota	al size: 943,718,400	bytes	
Server/Local file Direction Remot	e file	Size Pr	iority Status		
Queued files Failed transfers Successful tr	ansfers (2)				
			<u>F</u> 860 Q.	ieue: empty	

Figure 16 Example when download file from server



File on the server cannot be deleted by user, and all files on the server will be disappeared when the board is power-down.

As shown in Figure 17, "Permission denied" is returned from server when user delete the file from the server.

192.168.11.42 -	FileZilla							×
<u>File Edit View</u>	Transfer Server	<u>B</u> ookmarks <u>H</u> el	p <u>N</u> ew version ava	iilable!				
		3 🕷 🍇 🗐 🗄	R 😤 🖪					
<u>H</u> ost: 192.168.11	.42 <u>U</u> sernam	e: anonymous	Pass <u>w</u> ord:		Port:	Quic	kconnect 💌	
Response:	150 Connection Acc	epted						*
Response: Status: Directory	226 Transfer Ok listing successful							
Command:	DELE Test.txt							
Response:	550 Permission deni	ed						*
Local site: C:\Te	mp\		Ŧ	Remote site:	1			÷
Filename	Filesize	iletype l	.ast modified	Filename		Filesize	Filetype	Last
🤳 Nest.txt	943,718,400	Fext Document :	13/1/2558 10:29:16	Test.txt	9	43,718,400	TextDocument	
	m							
Selected 1 file. Tot	al size: 943,718,400 b	ytes		Selected 1 file.	Total size: 943,7	18,400 byte	:5	
Server/Local file	Din		Size	Priority St	atus			
Queued files	Failed transfers	Successful transf	ers (1)					
					A. E	💷 Queue:	empty	
		·			<u></u>	12-12-12-12		



#### 4.3 Default FTP Client on Windows OS

This topic shows the step to use default FTP client on Windows OS for connecting with FTP server. Similar to FileZilla, only upload and download the file are supported.

#### 4.3.1 Connect

- Open windows explorer by selecting Start->Computer or using "windows key + E".
- Type "ftp://192.168.11.42" into the address bar, and press enter.
- After that, FTP connection is available and empty folder on the server is displayed, as shown in Figure 18.





#### 4.3.2 Upload/Download File

- To upload/download file, user can drag and drop file from PC to the server for uploading or from the server to PC for downloading, as shown in Figure 19.
- Progress of copying status is displayed during data transferring, as shown in Figure 20.
- File is available on server after completing file transfer, as shown in Figure 21.





- Similar to FileZilla step, FTP server has some limitations about storage capacity, file name length, total numbers of file, not supported sub-directory, and not support delete command. The example of situation from above limitation is follows.
- Figure 22 shows the test result when file name length is more than 30 characters. Only the first 30 character will be used to be file name in the server. Note: User must refresh folder at server to update file name length after complete data transfer.

🚱 🔵 🗢 📗 « Local Disk (C:) 🕨 Temp	▼ 4 Search	Temp 🔎	C         ▼         ✓	×
Organize  Open New folder	i⊞ ▼ [	I O	Organize ▼ BB ▼	0
Too long file name	13/1/2558 12:17	File	Only 30 characters are used	
<				
test012345678901234567890123 File	456789		1 item	
Fiç	gure 22 The e	example	e of too long File name	

Figure 23 - Figure 25 shows error message when transfer size of the file is bigger than space area in DDR3, when total number of file is more than 16, and when user deletes the





<b>G</b> O•[	🃙 « Local Disk (C:) 🕨 T	emp 🔹 😽 Search Temp 🔎		
Organize 🔻	Open New	folder 👫 🕶 🗍 🔞	Organize 🔻	ii • 🔞
file00 file01 file02	file08 file16 file09 file10	FTP Folder Error An error occurred copying a file	e to the FTP Server. Make sure you have	
file03 file04 file05 file06 file07	file12 file13 file14 file15	Details: 200 Ok 227 Entering Passive Mode (192 550 Permission denied	,168,11,42,195,80)	
	file16 Date modified: 29/ File Size: 100	1	ОК	

Figure 24 Error message when transfer 17<sup>th</sup> file to the server





# 5 Revision History

Revision	Date	Description
1.0	16-Jan-15	Initial version release
1.1	2-Sep-16	IP core product renamed from TOE2-IP to TOE1G-IP