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Analysis of FTP and TFTP Protocols

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Abstract- This paper presents our approach to study the storage and retrieval of information between a router and a server in a simulated network on CISCO Packet Tracer. Current approach uses File Transfer Protocol (FTP) and Trivial File Transfer Protocol (TFTP) as supporting file transfer protocols for backing-up and restoring information. We study the procedure and analyze the key features of both the transferring protocols and observe the time taken to transfer the running configuration and the internetwork operating system files of the router using both the protocols for backing up as well as restoring.

I. INTRODUCTION

Data loss and it's recovery has been a matter of high concern during this era of digitization. Loss of crucial data or unintended deletion may happen due to human error, malicious intent, system failure or natural disaster. A 2008 survey found that 66% of respondents had lost files on their home PC [1]. This inspired us to study the process of backing up crucial information and retrieving it later on if required to ensure the integrity and reliability of networking. After studying the processes and possibilities to do so, this paper shall demonstrate the transferring of vital data such as the ios-files and the running configuration of a router between itself and a provided server. The simulation of the router, server and the rest of the network components was successfully carried out using Cisco Packet Tracer [5].

II. SYSTEM OVERVIEW

As shown in fig. 1, our network has several components configured to the network. The network consists of switches, routers, a dedicated server, fast access cable, serial cable and cross-over cable.



Figure 1: Simulated Network on CISCO Packet Tracer=]

III. WORK DONE

The work done can be shown in the form of an algorithm given below:

1.) Steps for TFTP server to backup and restore a configuration:

a) At the Router > prompt, issue the enable command, and provide the required password when prompted. The prompt changes to *Router*#, which indicates that the router is now in privileged mode.

b) Copy the running configuration file to the TFTP server:

CE_2#copy running-config tftp: Address or name of remote host []? 64.104.207.171 Destination filename[ce_2-confg]? backup_cfg_for_my_route !! 1030 bytes copied in 2.489 secs (395 bytes/sec) CE_2#

- c) Open the configuration file with a text editor. Search for and remove any line that starts with "AAA". Note: This step is to remove any security commands that can lock you out of the router.
- d) Copy the configuration file from the TFTP server to a new router in privileged (enable) mode which has a basic configuration.

These steps can be shown in the following figures.

nysical	Config	CLI	Attributes					
	1.11		105 Cm	mand Line In	terface			
								1
Router	tcopy fl	4						
Router	tcopy fi	ash: t	ftp					
Router	tcopy fi	ash: :	ftp:					
Source	filenat	e []?	c1841-adv	pservices	k9-mz.12	4-15.T	.bin	
Addres	s or nat	e of :	remote hos	1]? 10.0	.0.1			
Destin	ation fi	lename	e [c1841-a	vipservic	esk9-nz.	124-15	Tl.bin	17
Seitin	a c1841-	advine	erulceski					
nz.124	-15.71.8	in			mm	mm	naa	mir
11111	1111111	11111	mmm	111111111	111111	111111	1111111	11111
11111		111111		11111111	111111	IIIIII	HUIH	11111
mm	1111111	(1111)	mmm	11111111	mmm		111111	11111
111111		11111	mmm	11111111	mmm	111111	111111	11111
mm	1111111	11111	IIIIIIII	11111111	HIIII	111111	HIII	11111
111111	1111111	11111		THEFT	1111111	111111	HIIII	HHH
шш	101010	11111	HIIIII	11111111	mmm	IIIIII	HIII	11111
шш	man	HHH	HILLING	HHHH	DHIII	HILLI I	HIIH	HHH
IIIIII	HILLI	1111	mmm	11111111	HHHH	11111	HIIII	HHI
IIIIII	mm	111111	HHHH					
10K -	33591768	bytes	I					- 1
335917	68 bytes	copie	d in 2.32	secs (15	15033 bj	rtes/sec	2)	- 1
Router	:		0.000100	04 7012 DOX	2022/2022	serves of	2011	
						Сору		Paste
							-1/0	

Figure 2: Copying IOS files from router to server.

RouterO						
Physical	Config	aı	Attributes			
			IOS Cor	nmand Line Interface		
%LINK-	5-CHANGE	D: Int	erface Se	rial0/0/0, changed state to up		
%LINEP change	ROTO-5-U d state	IPDOWN: to up	Line pro	cocol on Interface Serial0/0/0		
Router	≻en					
Router	‡copy ru	inni				
Router	\$copy ru	inning-	config st	art		
Router	\$copy ru	inning-	config st	artup-config		
Destin	ation fi	lename	s [startup	-config]?		
Buildi [OK]	ng confi	gurati	.on			
Router	‡copy ru	inni				
Router	‡copy ru	inning-	config tf	εp		
Router	#copy ru	inning-	config tf	sp:		
Addres	s or nam	ne of 1	emote hos	: []? 10.0.0.1		
Destin	ation fi	lename	Router-	confg]?		
Writin	a runnir	ia-conf	fia			

Figure 3: Copying running config from router to server

			Router0 -
Physical	Config	CLI Attributes	
		IOS Com	mand Line Interface
Router Router Addres	tcopy tf tcopy tf s or nam filenam	tp: runni tp: running-conf e of remote host e []? c1841-advi lename (running-	ig : []? 10.0.0.1 .pservicesk9-mms.124-15.T1.bin .confin]?
Destin	ation fi		eonrig):
Access mz.124	ing tftp -15.T1.b	://10.0.0.1/c184 in	(1-advipservicesk9-
Access mz.124 Loadir	ing tftp -15.T1.b g c1841-	://10.0.0.1/c184 in advipservicesk9-	(l-advipservicesk9- mz.124-15.71.bin from 10.0.0.1:
Access mz.124 Loadir !!!!!!	ation fi ing tftp -15.T1.b g c1841- 11111111	://10.0.0.1/c184 in advipservicesk9- []]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]	(l-advipservicesk9- mz.124-15.71.bin from 10.0.0.1:
Access mz.124 Loadir 111111	ation fi -15.T1.b g c1841- 11111111 11111111	://10.0.0.1/c184 in advipservicesk9- !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!	(l-advipservicesk9- mz.124-15.71.bin from 10.0.0.1:
Access mz.124 Loadir 111111 111111	ation fi ing tftp -15.T1.b g c1841- !!!!!!!! !!!!!!!!!	://10.0.0.1/c184 in advipservicesk9- 111111111111111111111111111111111111	Config: 1-advipservicesk9- mz.124-15.71.bin from 10.0.0.1:
Destin Access mz.124 Loadin 111111 111111 111111 111111	ation fi ing tftp -15.T1.b g c1841- 11111111 11111111 11111111 11111111 1111	://10.0.0.1/c184 in advipservicesk9- 111111111111111111111111111111111111	<pre>cunig; 1-advipservicesk9- mz.124-15.71.bin from 10.0.0.1: 111111111111111111111111111111</pre>
Access mz.124 Loadir !!!!!! !!!!!! !!!!!!	ation fi ing tftp -15.T1.b g c1841- 11111111 11111111 11111111 11111111 1111	://10.0.0.1/c184 in advipservicesk9- 111111111111111111111111111111111111	<pre>curry; 1-advipservicesk9- mz.124-15.71.bin from 10.0.0.1: 111111111111111111111111111111</pre>
Access mz.124 Loadir 111111 111111 111111 111111 111111 1111	ation fi ing tftp -15.T1.b g c1841- !!!!!!!! !!!!!!!! !!!!!!!!! !!!!!!!	://10.0.0.1/c184 in advipservicesk9- 111111111111111111111111111111111111	<pre>cully; 1-advipservicesk9- mz.124-15.71.bin from 10.0.0.1: 111111111111111111111111111111</pre>
Access mz.124 Loadir 111111 111111 111111 111111 111111 1111	ation fi -15.71.b g c1841- 11111111 11111111 11111111 11111111 1111	://10.0.0.1/c184 in advipservicesk9- !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!	<pre>curry;: 1-advipservicesk9- mz.124-15.71.bin from 10.0.0.1: 111111111111111111111111111111</pre>
Access mz.124 Loadir 111111 111111 111111 111111 111111 1111	ation fi -15.T1.b g c1841- 1111111 1111111 11111111 11111111 11111	://10.0.0.1/c184 in advipservicesk9- 111111111111111111111111111111111111	<pre>currig: * i1-advipservicesk9- mz.124-15.71.bin from 10.0.0.1: ************************************</pre>
Access mz.124 Loadir 111111 111111 111111 111111 111111 1111	ation fi ing tftp -15.T1.b g c1841- 1111111 1111111 1111111 1111111 111111	://10.0.0.1/c184 in advipservicesk9- 111111111111111111111111111111111111	<pre>control : 1-advipservicesk9- mz.124-15.71.bin from 10.0.0.1: 11.11.11.11.11.11.11.11.11.11.11.11.11.</pre>
Destin Access mz.124 Loadin 111111 111111 111111 111111 111111 1111	ation fi ing tftp -15.T1.b g c1841- 1111111 1111111 1111111 1111111 111111	://10.0.0.1/c184 in advipservicesk9- 111111111111111111111111111111111111	<pre>contig: * i1-advipservicesk9- mz.124-15.71.bin from 10.0.0.1: ************************************</pre>

Figure 4: Downloading/retrieving running config from the server

²⁾ Steps for FTP Server to Backup and Restore a Configuration:

In this procedure, an FTP server can be used in place of a TFTP server.

(a) At the Router> prompt, issue the enable command, and provide the required password when prompted.

The prompt changes to Router#, which indicates that the router is now in privileged mode.

- (b) Configure the FTP username and password:
- CE_2#config terminal CE_2(config)#ip ftp username cisco CE_2(config)#ip ftp password cisco CE_2(config)#end CE_2# (c) Copy the configuration to the FTP server: Router#copy running-config ftp: Address or name of remote host []? 10.0.0.1 Destination filename [Router-confg]? Writing running-config---
 - 33591768 bytes copied in 5.379 secs (655697 bytes/sec) Router#
- (d) Open the configuration file with a text editor. Search for and remove any line that starts with "AAA".

Note: This step is to remove any security commands that can lock you out of the router. (e)Copy the configuration file from the FTP server to a router in privileged (enable) mode which has a basic configuration.

Router#copy ftp: running-config Address or name of remote host [10.0.0.1]? Source filename []? Router0_running-config Destination filename [running-config]? Accessing ftp://10.0.0.1/Router0_running-config... Loading backup_cfg_for_router ! [OK – 1030 bytes]

1030 bytes copied in 9.612 (107 bytes/sec) Router#

	CLI Attributes		
	IOS Command Line Inter	face	
Press RETURN to	get started.		^
Router>en			
Router#config te	rminel		
Enter configurat	ion commands, one per lin	ne. End with CNTL	/Z.
Router (config) #3	p ftp username cisco		
The same of the sa	p rtp password cisco		
Router(config)#3 Router(config)#6			100
Router(config)# Router(config)# Router#			
Router(config)# Router(config)# Router# \$SYS-5-CONFIG_I:	Configured from console	by console	1000
Router(config)#1 Router(config)# Router# %SYS-5-CONFIG_I: 	Configured from console	by console	*
Router(config)# Router(config)# Router# \$SYS-5-CONFIG_I: 	Configured from console	by console Copy	↓ Paste

Figure 5: Configuring ftp username and password.

			Router0		
hysical	Config	αı	Attributes		
			IOS Co	mmand Line Interface	
Router	*				
Router	+				
Router	*				
Router	+				
Router	\$				
Router	+				
Router	+				
Router	\$				
Router	*				
Router	+				
Router	\$				
Router	+				
Router	#				
Router	\$				
Router	*				
Router	tcopy ru	inni			
Router	tcopy ru	inning-	-config ft	p:	
Addres	s or nas	e of :	cemote hos	t []? 10.0.0.1	
Destin	ation fi	lenam	e (Router-	confg]?	
Veitin					

Figure 6: Copying/storing running configuration to the server

IV. RESULT

After execution we obtained the following result:

TABLE 1: Results of TFTP

TFTP				
BACKING-UP				
S.NO,	FILE	SIZE(bytes)	TIME(sec)	RATE(bytes/sec)
1.	IOS	33591768	2.328	1615033
2.	Running Configuration	1030	2.607	395
RESTORING				
1.	IOS	33591768	5.379	655697
2.	Running Configuration	1030	9.612	107

TABLE 2: Results of FTP

FTP								
BACKING-UP								
S.NO.	FILE	SIZE(bytes)	TIME(sec)	RATE(bytes/sec)				
1.	Running Configuration	1030	3.341	308				
RESTORING								
1.	Running Configuration	1030	13.213	78				

V. ANALYSIS



Figure 7: Comparison of transferring rate observed in both protocols.

Time taken by TFTP [3, 4] to complete the transfer was lesser as compared to FTP. However user authentication adds to the advantages of FTP. **TFTP** uses **UDP** as a transport, as opposed to TCP which FTP uses, and works on port 69 [2, 6, 7]. The speed of copying files from the router to the server was found to be higher than that of restoring the same files. Such observations were made as the ios-files and configuration are stored in the flash memory and random access memory of the router.

VI. CONCLUSION

While studying the procedure and implementing the same we came to the conclusion that FTP should be preferred when security is desirable since TFTP does not use any kind of password protection. However, TFTP proved to be faster and easier to implement. TFTP can be referred to as a simplified version of FTP. TFTP is used mostly for backing up router configuration files like Cisco and its IOS images. FTP is widely used and preferred for transferring other files.

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REFERENCES

[1] S. P. Singh, N. Goyal, "Security Configuration and Performance Analysis of FTP Server", International Journal of Communication and Computer Technologies, Vol. 02, Issue, 07 November 2014.

[2] Todd Lammle, *CCNA Routing and Switching*, 1st edition, Wiley, 2013, **ISBN-10:** 8126544686, **ISBN-13:** 978-8126544684.

[3] R. M. M. Isa, N. N. M., H. Hashim, S. Adnan, J. Manan, R. Mahmod, "A Lightweight and Secure TFTP Protocol for Smart Environment", Published in: 2012 IEEE Symposium on Computer Applications and Industrial Electronics (ISCAIE), 3-4 Dec. 2012.

[4] R. M. M. ISA, N. N. M., H. HASHIM, S. ADNAN, J. MANAN, R. MAHMOD, "A SECURE TFTP PROTOCOL WITH SECURITY PROOFS." PROCEEDINGS OF THE WORLD CONGRESS ON ENGINEERING, VOL. I, WCE 2014, JULY 2 - 4, 2014.

[5] CISCO Packet Tracer. https://www.netacad.com/about-networking-academy/packet-tracer/

[6] CISCO, Transferring Configuration. http://www.cisco.com/c/en/us/support/docs

[7] Firewall.cx, Trivial File Transfer Protocol http://www.firewall.cx/networking-topics/protocols/126-tftp-protocol.html