SIM7000 Series_FTP _Application Note

LPWA Module

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SIMCom Wireless Solutions Limited

Building B, SIM Technology Building, No.633 Jinzhong Road, Changning District, Shanghai P.R. China
Tel: +86 21 31575100
Email: simcom@simcom.com

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About Document

Version History

Version	Date	Owner	What is new
V1.00	2019.09.18	Wenjie.Lai	First Release
V1.01	2020.07.28	Wenjie.Lai	All

Scope

This document applies to the following products

Name	Type	Size(mm)	Comments
SIM7000E/C/A/G	Cat-M1(/NB1/EGPRS)	24*24	
SIM7000E-N SIM7000C-N	NB1	24*24	

Content

1 Introduction

1.1 Purpose of the document

Based on module AT command manual, this document will introduce FTP application process.

Developers could understand and develop application quickly and efficiently based on this document.

1.2 Related documents

[1] SIM7000 Series_AT Command Manual

1.3 Conventions and abbreviations

In this document, the GSM engines are referred to as following term:
● ME (Mobile Equipment);
● MS (Mobile Station);
● TA (Terminal Adapter);
● DCE (Data Communication Equipment) or facsimile DCE (FAX modem, FAX board);

In application, controlling device controls the GSM engine by sending AT Command via its serial interface.
The controlling device at the other end of the serial line is referred to as following term:
● TE (Terminal Equipment);
● DTE (Data Terminal Equipment) or plainly "the application" which is running on an embedded system;

2 FTP Introduction

File Transfer Protocol (FTP) is a TCP-based protocol that uses a client/server model. Through the FTP protocol, users can upload or download files in the FTP server. Although there are many sites downloaded through the HTTP protocol, the FTP protocol can control the number of users and the distribution of broadband, and upload and download files quickly and easily. Therefore, FTP has become the preferred server for file uploading and downloading on the network. At the same time, it is also an application that allows users to connect their computers to all servers running FTP protocols around the world, accessing a large number of programs and information on the server. The function of the FTP service is to realize the off-site transmission of complete files.

2.1. Features

➢ FTP uses two parallel connections: control connections and data connections. The control connection transfers control commands between the two hosts, such as user identity, password, directory change command, and so on. Data connections are only used to transfer data.

➢ During a session, the FTP server must maintain the user state, that is, the control connection with a certain user cannot be disconnected. In addition, when the user is active in the directory tree, the server must track the user's current directory, so that FTP limits the number of concurrent users.

➢ FTP support files are transmitted in any direction. When a user establishes a connection with a remote computer, the user can obtain a remote file or transfer a local file to a remote machine.

2.2. Working Mode

FTP is a TCP-only service and does not support UDP. The difference is that FTP uses 2 ports, a data port and a command port (also called a control port). Usually these two ports are 21 (command port) and 20 (data port). But the way FTP works, the data port is not always 20. This is the biggest difference between active and passive FTP. There are two main modes of operation:

2.2.1. Active FTP Mode

Active FTP is the port mode. The client connects to the command port of the FTP server from an arbitrary non-privileged port N (N>1024), which is also the 21 port. The client then listens on port N+1 and sends the FTP command "port N+1" to the FTP server. The server then connects to its own data port (N+1) from its own data port (20).

For the firewall in front of the FTP server, the following communication must be allowed to support active mode FTP:

✧ Any port larger than 1024 to port 21 of the FTP server. (client-initiated connection)

✧ Port 21 of the FTP server to a port larger than 1024. (The server responds to the client's control port)

✧ The port of the FTP server is 20 ports to more than 1024 ports. (The server side initializes the data connection to the client's data port)

✧ More than 1024 ports to port 20 of the FTP server (the client sends an ACK response to the server's data port)

2.2.2. **Passive FTP Mode**

In order to solve the problem of the server initiating the connection to the client, a different FTP connection method was developed. This is called passive mode, or PASV, which is enabled when the client notifies the server that it is in passive mode.

In passive mode FTP, both the command connection and the data connection are initiated by the client, so that the problem that the incoming connection from the server to the client's data port is filtered by the firewall can be solved.

When an FTP connection is opened, the client opens two arbitrary non-privileged local ports (N > 1024 and N+1). The first port connects to port 21 of the server, but unlike active mode FTP, the client does not submit a PORT command and allows the server to connect back and forth to its data port, instead submitting a PASV command. The result of this is that the server will open an arbitrary non-privileged port (P > 1024) and send a PORT P command to the client. The client then initiates a connection from the local port N+1 to the port P of the server for transmitting data.

For server-side firewalls, the following communication must be allowed to support passive FTP:
✧ From any port larger than 1024 to port 21 of the server (client-initiated connection)
✧ The server's 21 port to any port greater than 1024 (the server responds to the client's control port connection)
✧ From any port greater than 1024 to the server greater than 1024 ports (client initialization data connection to any port specified by the server)
✧ The server is larger than 1024 ports to remote ports greater than 1024 (the server sends ACK response and data to the client's data port)

SIM7000 series modules support the active mode and passive mode of the FTP protocol. Support download, upload, create directory, delete directory, get directory or file size, get directory details, delete files and other functions.

3 AT Commands for FTP

AT Command	Description
AT+FTPPORT	Set FTP control port
AT+FTPMODE	Set active or passive FTP mode
AT+FTPTYPE	Set the type of data to be transferred
AT+FTPPUTOPT	Set FTP put type
AT+FTPCID	Set FTP bearer profile identifier
AT+FTPREST	Set resume broken download
AT+FTPSERV	Set FTP server address
AT+FTPUN	Set FTP user name
AT+FTPPW	Set FTP password
AT+FTPGETNAME	Set download file name
AT+FTPGETPATH	Set download file path
AT+FTPPUTNAME	Set upload file name
AT+FTPPUTPATH	Set upload file path
AT+FTPGET	Download file
AT+FTPPUT	Set upload file
AT+FTPDELE	Delete specified file in FTP server
AT+FTPSIZE	Get the size of specified file in FTP server
AT+FTPSTATE	Get the FTP state
AT+FTPEXTPUT	Extend upload file
AT+FTPMKD	Make directory on the remote machine
AT+FTPRMD	Remove directory on the remote machine
AT+FTPLIST	List contents of directory on the remote machine
AT+FTPEXTGET	Extend download file
AT+FTPETPUT	Upload File
AT+FTPETGET	Download File
AT+FTPQUIT	Quit current FTP session
AT+FTPRENAME	Rename the Specified File on the Remote Machine
AT+FTPMDTM	Get the Last Modification Timestamp of Specified File on the Remote Machine

For detail information, please refer to "SIM7000 Series_AT Command Manual".

4 Bearer Configuration

Usually module will register PS service automatically.

4.1 PDN Auto-activation

```
//Example of PDN Auto-activation.

AT+CPIN?                              //Check SIM card status
+CPIN: READY

OK
AT+CGDCONT=1,"IP",""                  //Configure APN for registration when needed
OK
AT+CSQ                                //Check RF signal
+CSQ: 27,99

OK
AT+CGATT?                             //Check PS service.
+CGATT: 1                             //1 indicates PS has attached.

OK
AT+COPS?                              //Query Network information, operator and network
+COPS: 0,0,"CHN-CT",9                 mode 9, NB-IOT network

OK
AT+CGNAPN                             //Query the APN delivered by the network after the
                                      CAT-M   or   NB-IOT   network   is   successfully
                                      registered.
+CGNAPN: 1,"ctnb"                     //"ctnb" is APN delivered by the CAT-M or NB-IOT
                                      network. APN is empty under the GSM network.

OK
AT+CNCFG=1,"ctnb","cdma","1234"       //Before activation please use AT+CNCFG to set
                                      APN\user name\password if needed.
OK
AT+CNACT=1                            //Activate network
OK
```

+APP PDP: ACTIVE
AT+CNACT?   //Get local IP
+CNACT: 0,1,"10.94.36.44"

OK

4.2 APN Manual configuration

If not attached automatically, could configure correct APN setting.

//Example of APN Manual configuration.

AT+CFUN=0   //Disable RF
+CPIN: NOT READY

OK
AT+CGDCONT=1,"IP","ctnb"   //Set the APN manually
OK
AT+CFUN=1   //Enable RF
OK

+CPIN: READY
AT+CGATT?   //Check PS service.
+CGATT: 1   //1 indicates PS has attached.

OK
AT+CGNAPN   //Query the APN delivered by the network after the CAT-M or NB-IOT network is successfully registered.

+CGNAPN: 1,"ctnb"   //"ctnb" is APN delivered by the CAT-M or NB-IOT

OK   network. APN is empty under the GSM network.
AT+CNCFG=1,"ctnb","cdma","1234"   //Before activation please use AT+CNCFG to set APN\user name\password if needed.

OK
AT+CNACT=1   //Activate network
OK

+APP PDP: ACTIVE
AT+CNACT?   //Get local IP

+CNACT: 0,1,"10.94.36.44"

OK

+CNACT: 0,1,"10.94.36.44"

5 FTP Examples

5.1 FTP GET Method

Download data from FTP server.

AT+FTPCID=1	//Set parameters for FTP session.
OK	
AT+FTPSERV="116.228.221.52"	
OK	
AT+FTPUN="sim.cs1"	
OK	
AT+FTPPW="*****"	
OK	
AT+FTPGETNAME="1K.txt"	
OK	
AT+FTPGETPATH="/"	
OK	
AT+FTPGET=1	//Open the FTP get session. Data are available.
OK	
+FTPGET: 1,1	
AT+FTPGET=2,1024	//Request to read 1024 bytes,
+FTPGET: 2,50	
01234567890123456789012345678901234567890123456789	//but Only 50 bytes are now available.
OK	
AT+FTPGET=2,1024	//Request to read 1024 bytes again.
+FTPGET: 2,0	//No byte is now available, but it is not the end of session
OK	
	//If the module receives data but user do not input "AT+FTPGET:2, <reqlength>" to read data, "+FTPGE T:1,1" will be shown again in a certain time.
+FTPGET: 1,1	
AT+FTPGET=2,1024	//Request to read 1024 bytes.
+FTPGET: 2,1024	//1024 bytes are now available.
01234567890123456789012345678	

901234567890…..1234

OK

+FTPGET:1,0   //Data transfer finished. The connection to the FTP server is closed.

5.2 FTP PUT Method

Upload data to FTP server.

AT+FTPCID=1	//Set parameters for FTP session.
OK	
AT+FTPSERV="116.228.221.52"	
OK	
AT+FTPUN="sim.cs1"	
OK	
AT+FTPPW="****"**	
OK	
AT+FTPGETNAME="1K.txt"	
OK	
AT+FTPGETPATH="/"	
OK	
AT+FTPPUT=1	//Open the FTP put session.
OK	
+FTPPUT: 1,1,1360	//FTP session is ready for uploading. 1360 is the max length of data which can be sent at a time. It depends on the network status.
AT+FTPPUT=2,100	//Client requests to send 100 bytes.
+FTPPUT: 2,100	//Response indicates that user must input 100 bytes for transferring now.
	It is ready to receive data from UART, and DCD has been set to low.
……	
OK	*All data has been received over, and DCD is set to high.*
+FTPPUT: 1,1,1360	//URC indicates that the FTP session is ready to transfer more data.
AT+FTPPUT=2,0	//No more data will be uploaded, the FTP session will be closed.
OK	
+FTPPUT: 1,0	//Data transfer is finished. The connection to the FTP server is closed.

During FTP session, different failure may occur because of bad network environment or other reasons. Some common failure includes timeout failure and wrong password failure.

5.3 FTP Time out

Time out occurs during FTP session because of different reasons.

AT+FTPGET=1 **OK**	//Open the FTP Get session.
	//If the status of the network is poor, it may be time out.
+FTPGET: 1,64	//The connection to the FTP server is closed.
AT+FTPGET=1 **OK**	//Open the FTP Get session.
+FTPGET: 1,1	//Data are available.
+FTPGET: 1,1 …….. **+FTPGET: 1,1**	//If customer does not use "AT+FTPGET:2, <reqlength>" to read data, "+FTPGE T:1,1" will be shown again in a certain time.
+FTPGET: 1,64	//If the user does not read data for a long time, the session will time out. The connection to the FTP server is closed.

5.4 FTP Error

Error occurs during FTP applications because of wrong parameter setting.

AT+FTPPW="3214567" **OK**	//Set wrong password
AT+FTPGET=1 **OK**	//Open the FTP Get session
+FTPGET: 1,72	//FTP session password error. The connection to the FTP server is closed.

Note: Other errors, you can refer to "AT+FTPGET" command   in 《SIM7080 Series AT Command Manual》

5.5 FTP Operation Error

Error occurs during FTP applications because of wrong operating.

AT+FTPGET=1	//Open the FTP Get session.
OK	
+FTPGET: 1,66	//The parameter of "get file name" is empty. It shows ftp operation error.
AT+FTPPUT=1	//Open the FTP PUT session.
OK	
AT+FTPPUT=1	//Open the FTP PUT session again.
OK	
	//Show ftp operation error.
+FTPPUT: 1,66	

5.6 FTP READ and WRITE Error

Error occurs before FTP applications because of operating in wrong state.

AT+FTPGET=1	//Open the FTP Get session.
OK	
AT+FTPGET=2,1000	//Read data before "+FTPGET:1,1" is shown.
ERROR	
+FTPGET: 1,1	//Data are available
AT+FTPGET=2,1000	//Read data after "+FTPGET: 1,1" is shown.
+FTPGET: 2,50	
0123456789012345678901234567890123456789012345678901234567890123456789	
OK	
+FTPGET: 1,0	//Data transfer finished. The connection to the FTP server is closed.
AT+FTPGET=2,1000	//Read data after FTP session is stopped.
ERROR	
AT+FTPPUT=1	//Open the FTP PUT session.
OK	
AT+FTPPUT=2,1000	//Write data before "+FTPPUT: 1,1,1360" is shown.
ERROR	

+FTPPUT: 1,1,1360	//FTP session is ready for uploading.
AT+FTPPUT=2,100	//Write data after "+FTPPUT: 1,1,1360" is shown.
+FTPPUT: 2,100	
……	
OK	
AT+FTPPUT=2,0	//No more data will be uploaded, the FTP session will be closed.
OK	
AT+FTPPUT=2,100	//Write data after FTP session is stopped.
ERROR	

5.7 Set FTP Download Break Point Parameter

It provides the method to use FTP broken download resuming function.

AT+FTPGET=1	//Open the FTP Get session.
OK	
+FTPGET: 1,1	//Data are available.
AT+FTPGET=2,1024	//Get data of FTP server.
+FTPGET: 2,29	
wodeceshijieguo,zhgeshigeshia	
OK	
	//Data transfer finished. The connection to the FTP server is closed.
+FTPGET: 1,0	
AT+FTPREST=20	//Set the broken point.
OK	
AT+FTPGET=1	//Open the FTP Get session.
OK	
+FTPGET: 1,1	//Data are available.
AT+FTPGET=2,1024	//Get the data begin from the broken point.
+FTPGET: 2,9	
shigeshia	
OK	
	//Data transfer is finished. The connection to the FTP server is closed.
+FTPGET: 1,0	

5.8 FTP DELE Method

Delete the specified file in FTP server.

AT+FTPCID=1	//Set parameters for FTP session.
OK	
AT+FTPSERV="116.228.221.52"	
OK	
AT+FTPUN="sim.cs1"	
OK	
AT+FTPPW="******"	
OK	
AT+FTPGETNAME="1K.txt"	
OK	
AT+FTPGETPATH="/"	
OK	
AT+FTPDELE=1	//Open the FTP DELE session.
OK	
+FTPDELE: 1,0	//Delete file finished. The connection to the FTP server is closed.

5.9 FTP SIZE Method

Get the size of specified file in FTP server.

AT+FTPCID=1	//Set parameters for FTP session.
OK	
AT+FTPSERV="116.228.221.52"	
OK	
AT+FTPUN="sim.cs1"	
OK	
AT+FTPPW="******"	
OK	
AT+FTPGETNAME="1K.txt"	
OK	
AT+FTPGETPATH="/"	
OK	
AT+FTPSIZE	//Open the FTP SIZE session.

OK

+FTPSIZE: 1,0,1024

//Get the size of file finished. The connection to the FTP server is closed.

5.10 FTP MKD and RMD Method

Make and remove directory on the remote machine.

AT+FTPCID=1   //Set parameters for FTP session.
OK
AT+FTPSERV="116.228.221.52"
OK
AT+FTPUN="sim.cs1"
OK
AT+FTPPW="***"**
OK
AT+FTPGETNAME="1K.txt"
OK
AT+FTPGETPATH="/"
OK
AT+FTPMKD   //Open the FTP session.
OK

+FTPMKD: 1,0   //The directory "test" is made on the remote machine

AT+FTPRMD   //Open the FTP session
OK

+FTPRMD: 1,0   //The directory "test" is removed from the remote machine

5.11 FTP LIST Session

List contents of remote directory.

AT+FTPCID=1   //Set parameters for FTP session.
OK
AT+FTPSERV="116.228.221.52"

OK
AT+FTPUN="sim.cs1"
OK
AT+FTPPW="***"**
OK
AT+FTPGETNAME="1K.txt"
OK
AT+FTPGETPATH="/"
OK
AT+FTPLIST=1   //Open the FTP session.
OK
+FTPLIST: 1,1   //Data are available
AT+FTPLIST=2,1024   //Request to read 1024 bytes, but only 126 bytes are now available

+FTPLIST: 2,126
total 0
drw-rw-rw-   1 user group   0 Oct 12 14:58.
drw-rw-rw-   1 user group 0 Oct 12 14:58…

OK
+FTPLIST: 1,0   //Data transfer finished. The connection to the remote machine is closed

                                                    //Get the information of a certain file "1K.txt"
AT+FTPGETPATH="/1K.txt "

OK
                                                    //Open the FTP session.

AT+FTPLIST=1
                                                    //Data are available.

OK
+FTPLIST: 1,1

                                                    //Request to read 1024 bytes,
AT+FTPLIST=2,1024

+FTPLIST:2,78
-rw-rw----   1 zhangkun simcom   8807854 Mar   //In fact only 78 bytes are now available.
19 13:31 /1K.txt

OK
//Returns information of the file "1K.txt"   //Data transfer finished. The connection to the remote machine is closed.

+FTPLIST: 1,0

5.12 FTP Extend PUT Method

Extend Upload data to the remote machine.

AT+FTPCID=1	//Set parameters for FTP session.
OK	
AT+FTPSERV="116.228.221.52"	
OK	
AT+FTPUN="sim.cs1"	
OK	
AT+FTPPW="****"**	
OK	
AT+FTPGETNAME="1K.txt"	
OK	
AT+FTPGETPATH="/"	
OK	
AT+FTPEXTPUT=1	//Set FTP to extend put method.
OK	
AT+FTPEXTPUT=2,0,1024,10000	//Client requests to send 1024 bytes.
+FTPEXTPUT: 0,1024	//Response indicates that user must input 1024 bytes for transferring. It is saved in the module. *It is ready to receive data from UART, and DCD has been set to low.*
……	
OK	*All data has been received over, and DCD is set to high.*
AT+FTPPUT=1	//Open the FTP PUT session.
OK	//Waiting for the module to upload the data to the remote machine.
+FTPPUT: 1,0	//Data transfer finished. The connection to the remote machine is closed
AT+FTPEXTPUT=0	//Set FTP to normal put method
OK	

5.13 FTP Extend GET Method

Extend Download File

AT+FTPCID=1	//Set parameters for FTP session.
OK	
AT+FTPSERV="116.228.221.52"	
OK	
AT+FTPUN="sim.cs1"	
OK	
AT+FTPPW="***"**	
OK	
AT+FTPGETNAME="1K.txt"	
OK	
AT+FTPGETPATH="/"	
OK	
AT+FTPEXTGET=1	//Open the FTP session.
OK	
AT+FTPEXTGET?	//Query progress of FTP session
+FTPEXTGET: 1,64136	//FTP session running, 64136 bytes data has been download.
OK	
+FTPEXTGET: 1,0	//File download succeed.
AT+FTPEXTGET=3,0,174125	//Output receive data from position 0, length 174125
+FTPEXTGET: 3,174125	
……	//Output data
OK	//Finish output
AT+FTPEXTGET=0	//End FTPEXTGET.
OK	

5.14 FTP ETPUT Method

Load file in RAM from file system then upload with FTPPUT.

AT+FTPCID=1	//Set parameters for FTP session.
OK	
AT+FTPSERV="116.228.221.52"	
OK	
AT+FTPUN="sim.cs1"	
OK	
AT+FTPPW="***"**	
OK	
AT+FTPGETNAME="test.txt"	

OK
AT+FTPGETPATH="/"
OK
AT+FTPETPUT=1   //Start FTP etput session
OK
+FTPETPUT: 1,1   //FTP session is ready for uploading.
                                          //Client requests to send data.

AT+FTPETPUT=2   //Response indicates that user must input data for
                                          transferring now.

OK
+FTPETPUT:2,1   *It is ready to receive data from UART, and DCD*
……   *has been set to low.*
                                          To notify the module that all data has been sent,
<ETX>   *switch from data mode to command mode*
                                          All data has been received over, and DCD is set to
OK   *high.*
+FTPETPUT:1,0   //Data transfer finished. The connection to the
                                          remote machine is closed.

5.15 FTP ETGET Method

Download data from the remote machine.

AT+FTPCID=1   //Set parameters for FTP session.
OK
AT+FTPSERV="116.228.221.52"
OK
AT+FTPUN="sim.cs1"
OK
AT+FTPPW="****"**
OK
AT+FTPGETNAME="test.txt"
OK
AT+FTPGETPATH="/"
OK
AT+FTPETGET=1   //Start FTP etget session
OK
+FTPETGET: 1,1   //Enter data transfer mode.
01234567890123456789012345678901234 5678   //Data transfer finished. The connection to the
901234567890…..1234   remote machine is closed.
<ETX>   *To notify the user that all data transfer has been*

	finished, switch from data mode to command mode.
+FTPETGET:1,0	

5.16 FTPQUIT Method

Quit current FTP session

AT+FTPCID=1	//Set parameters for FTP session.
OK	
AT+FTPSERV="116.228.221.52"	
OK	
AT+FTPUN="sim.cs1"	
OK	
AT+FTPPW="****"**	
OK	
AT+FTPGETNAME="1K.txt"	
OK	
AT+FTPGETPATH="/"	
OK	
AT+FTPGET=1	//Open the FTP session.
OK	
AT+FTPQUIT	//Quit FTP session
OK	
+FTPGET: 1,80	//Manual quit FTP session

5.17 FTP Rename Method

Rename the specified file of remote machine.

AT+FTPCID=1	//Set parameters for FTP session.
OK	
AT+FTPSERV="116.228.221.52"	
OK	
AT+FTPUN="sim.cs1"	
OK	
AT+FTPPW="****"**	
OK	

AT+FTPGETPATH="/"
OK
AT+FTPGETNAME="1K.txt"   //The old file name is "1K.txt"
OK
AT+FTPPUTNAME="1.txt"   //The new file name is "1.txt"
OK

                                          //Execute rename function.
AT+FTPRENAME   //Rename the file "1K.txt" to "1.txt".
OK   //Rename action succeed.
+FTPRENAME:1,0   //The file was renamed successfully

5.18 FTP MDTM Method

Get the last modification timestamp of specified file on the remote machine.

AT+FTPCID=1   //Set parameters for FTP session.
OK
AT+FTPSERV="116.228.221.52"
OK
AT+FTPUN="sim.cs1"
OK
AT+FTPPW="*****"
OK
AT+FTPGETNAME="1K.txt"
OK
AT+FTPGETPATH="/"
OK
AT+FTPMDTM   //Get the last modification timestamp.
OK
+FTPMDTM:1,0,20140409060951   //Return the timestamp successfully.