Fibocom
PERFECT WIRELESS EXPERIENCE

MTC
Application Guide_FTP

V1.0

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Contents

Applicable Model

No.	Applicability Model	Description
1	All MTC products	NA

Change History

V1.0 (2023-12-01)	Initial version

1 About This Document

Fibocom IOT module internally integrates the standard FTP protocol. The host computer implements FTP transmission by sending AT commands to the module. This standard FTP protocol provides functions such as file upload and download, and can implement encrypted FTPS services based on SSL/TLS.

2 Reference Documents

Refer to TCP&UDP, SSL, FTP and universal AT command manuals of the corresponding platform.

3 FTP Function Description

3.1 Preparation Before Service

Before using the FTP function, you must power on the module and check the module network, and ensure that the module can access the network normally.

The FTP function requires the module to initiate built-in dial-up using the MIPCALL command before performing related services.

For relevant commands, refer to the following documents:

Module power-up and residence on the network: AT command manual of each module

Built-in protocol stack: *Fibocom_MTC_AT Commands User Manual_TCP&UDP*

3.2 AT Command for FTP Services

The following describes AT commands for FTP service, including:

1. AT+FTPMODE, used to set the FTP mode

The FTP provides two data channel connection modes, namely, PASV and PORT. The default is PASV mode (+FTPMODE: 0).

Determine the connection mode before enabling the FTP. Generally, the passive mode PASV has better compatibility. It is recommended to use passive mode PASV.

2. AT+FTPINFO, used to obtain FTP details

When FTPINFO is enabled, you can obtain detailed information about the FTP control channel. This information may cause additional overhead to the host computer. Therefore, it is recommended to use this command only during debugging.

3. AT+FTPOPEN, used to set the FTP connection

This command can be used to set the relevant parameters and enable the FTP control channel. The main parameters that can be set include IP/URL, user name and password, specified port number, and encryption status, where IP/URL, user name and password are mandatory. For users without passwords and anonymous users, the password can be empty, but double quotation marks are required.

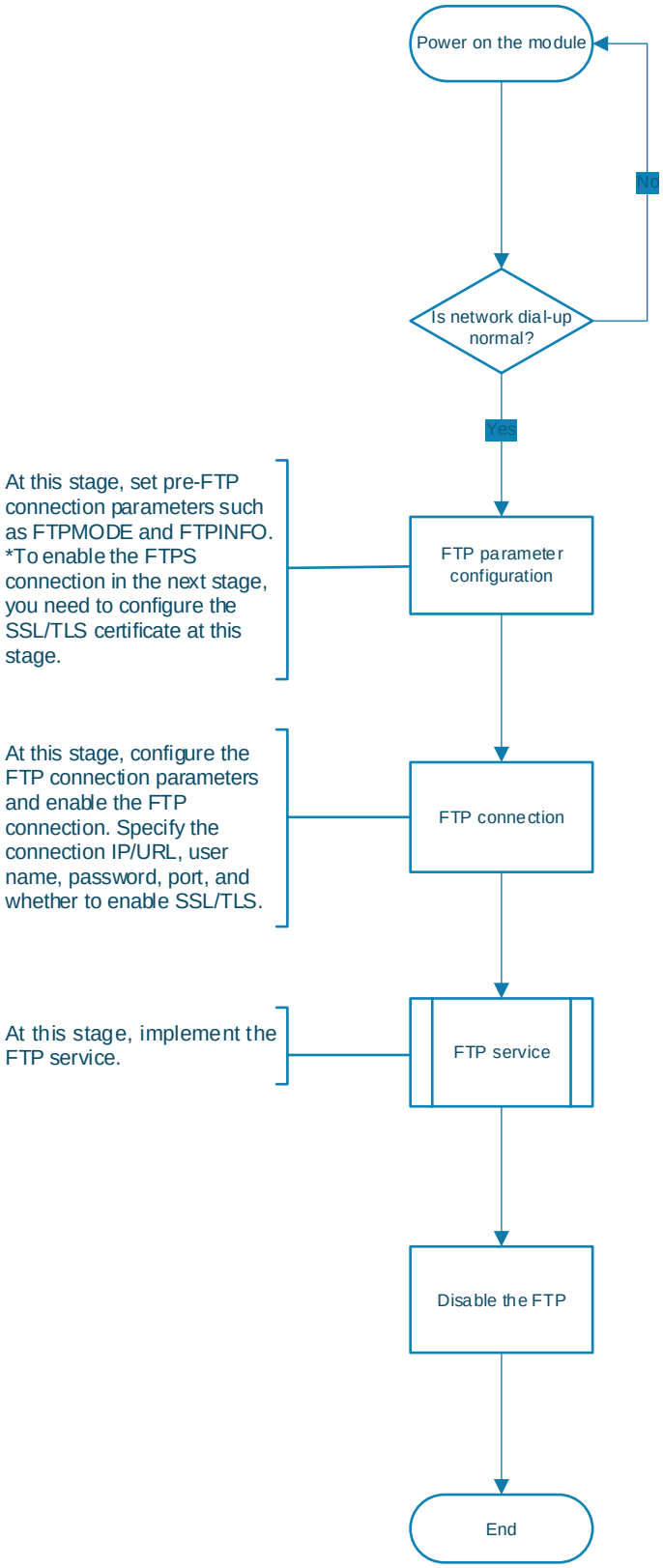
4. FTP control commands

FTP control commands which will not enable data channels, including SYST/CWD/PWD/MKD/RMD/DEL/NOOP etc.

5. FTP transmission commands

FTP transmission commands which will enable data channels, including LIST/RETR/GET/STOR/PUT etc.

3.3 FTP Service Flow



3.4 Description of FTP Application

This section explains the matters that require special attention in the FTP application.

3.4.1 Control Channel and Data Channel

A standard FTP connection requires two socket connections, namely, the control channel and the data channel. The module's control channel and data channel ports, as well as the server's control channel connection port can be configured through optional parameters.

When connecting to the server, if the control channel connection port is not specified, the control channel defaults to 21 for FTP connections and 990 for FTPS connections.

The control channel is a persistent connection, which is established when FTP is enabled, and disconnected when FTP is disabled. The data channel is a non-persistent connection, which is established during each data transmission, and disconnected after the current data transmission is completed.

3.4.2 Passive Mode and Active Mode

There are two modes for FTP connections, namely, passive mode (PASV) and active mode (PORT). Select the appropriate mode.

Passive mode: The data channel will be connected to the FTP server by the module. The passive mode is the default mode. Use this mode if the server has no special rules for data channel ports.

Active mode: Before the data channel is established, the module sends a port number to the FTP server, and then the data channel will be connected to the module by the FTP server. Use this mode if the server has custom rules for its own data channel port.

Due to port forwarding, if the module is succeeded to a NAT gateway (for example, in an intranet environment), it may not be able to establish a connection in active mode. In this situation, use the passive mode.

3.4.3 FTP and FTPS

When using FTP, you can choose FTPS transmission based on SSL/TLS. For details, refer to *Fibocom_AT_Commands_User_Manual_SSL*.

3.4.4 FTP Download Method

Fibocom provides two standard FTP download methods, namely, RETR direct download and GET cached download.

In direct download mode, the received data will be directly returned to the AT serial port through the AT engine, and an URC "+FTPRETR: 2" is reported as a mark. When the download is completed, an URC "+FTPRETR: 1" is reported, indicating that the download is completed.

Direct download has certain requirements on the data receiving and processing capabilities of the host computer. If the host computer cannot process the data in a timely manner, cached download can be used. In cached download mode, "+FTPGET: 2" is used as the start mark. At this time, you can read data through AT+FTPRECV=<len>. The size of data read for a single time shall not exceed 3000 bytes. There is a certain cache area left in cache mode. The size of the cache area for each project is subject to the description in the AT manual. The "+FTPGET: 1" is used as an end mark.

1. There are some special rules for the direct download mode. For details, see section 3.4.6 and section 3.4.7.
2. In cached storage mode, URC +FTPGET: 1 only indicates that the download is completed. At this time, there may be data left in the cache. Continue to use the FTPRECV command to read until no more data is output. At this time, "+FTPRECV: 0" is returned, indicating that all data has been read.

3.4.5 FTP Upload Methods

Fibocom provides two standard FTP upload methods, namely, PUT segment-based upload and STOR direct upload.

In PUT segment-based mode, files are uploaded by sending AT commands multiple times. The eof parameter indicates whether the data is sent at the last time. For data not uploaded through the last packet or at the last time, eof should be set to 0. Otherwise, it should be set to 1. When the last packet/data is uploaded, "+FTPPUT: 1" is reported, indicating that the transmission is completed.

In STOR direct upload mode, "+FTPSTOR: 2" is used as the start mark. At this time, the file content can be sent directly. When the upload is completed, the hexadecimal character 0x03 is used as the end mark, and then "+FTPSTOR: 1" is reported, indicating that the upload is completed.

1. In segment-base mode, some functions are no longer available until the segment-base transmission is completed (that is, the last command transmission with eof=1 is completed).
2. There are some special rules for the direct download mode. For details, see section 3.4.6 and section 3.4.7.

3.4.6 Direct Upload Mode Description

In direct upload mode, universal AT commands are no longer responded to, but are transmitted as data until the end of direct upload mode.

3.4.7 Direct Upload Escape Characters: 0x03 and 0x10

Fibocom's FTP upload/download uses 0x03 as the end mark of the direct upload mode. Therefore, character 0x03 (if any) in the file content needs to be specially processed. The escaping rules are as follows:

The escape character is defined as 0x10, and all 0x03s in the file content must be transmitted in the form of 0x10 0x03; similarly, 0x10 must be transmitted in the form of 0x10 0x10. A single 0x03 character will be considered as the end mark of the direct upload mode to exit this mode.

FTP cached download and segment-based upload functions specify the length of a single download/upload. Therefore, these functions are not affected by this escaping rule.

4 Example FTP Application Process

4.1 Example FTP Process

4.1.1 Enabling the FTP

```
AT+MIPCALL=1                    //Activate the PDP and obtain the IP address

OK


+MIPCALL: 10.186.178.210      //After obtaining the IP address with the received
                               //+MIPCALL command, proceed with subsequent operations


AT+FTPMODE?                    //Confirm the FTP mode, which is passive mode currently

+FTPMODE: 0


OK


AT+FTPOPEN="47.110.234.36","ftpuser4","test"

OK                             //Enable the FTP connection using the default port


+FTPOPEN: 1     //Asynchronous command execution ends and FTP connection is established
```

4.1.2 FTP Control Commands

```
AT+FTPINFO=1                                        //Show details of the FTP connection

OK


AT+FTPSYST                                          //Query the OS of the FTP server

OK


+FTPINFO: SYST
```

```
+FTPINFO: 215 UNIX emulated by FileZilla

+FTPSYST: 1

AT+FTPPWD                                          //Confirm the current path
OK

+FTPINFO: PWD



+FTPINFO: 257 "/" is current directory.

+FTPPWD: 2,"/"
+FTPPWD: 1

AT+FTPMKD="testdir"                                //Create a directory
OK

+FTPINFO: MKD testdir



+FTPINFO: 257 "/testdir" created successfully

+FTPMKD: 1

AT+FTPCWD="testdir"                                //Enter the testdir directory
OK

+FTPINFO: CWD testdir
```

```
+FTPINFO: 250 CWD successful. "/testdir" is current directory.

+FTPCWD: 1

AT+FTPNOOP                                          //No operation. Refresh the timer
OK

+FTPINFO: NOOP


+FTPINFO: 200 OK

+FTPNOOP: 1

AT+FTPCDUP                                          //Go back to the previous directory
OK

+FTPINFO: CDUP


+FTPINFO: 200 CDUP successful. "/" is current directory.

+FTPCDUP: 1

AT+FTPRMD="/testdir"                                //Delete the directory
OK

+FTPINFO: RMD /testdir
```

```
+FTPINFO: 250 Directory deleted successfully

+FTPRMD: 1

AT+FTPDEL="testfile.txt"                          //Delete the file
OK

+FTPINFO: DELE testfile.txt



+FTPINFO: 250 File deleted successfully

+FTPDEL: 1

AT+FTPINFO=0                                     //Hide details of the FTP connection
OK
```

4.1.3 FTP Data Commands: List, Download and Upload

```
AT+FTPLIST                                 //List the content in the current path of FTP
OK

+FTPLIST: 2
-rw-r--r-- 1 ftp ftp              2 Dec 01 15:59 testfile1.txt
-rw-r--r-- 1 ftp ftp              1 Dec 01 16:00 testfile2.txt

+FTPLIST: 1

AT+FTPGET="testfile1.txt"                      //Download data in cached download mode
OK
```

```
+FTPGET: 2

+FTPGET: 1

AT+FTPRECV=10                                    //Read the data in the cache
+FTPRECV: 2
11
OK

AT+FTPRETR="testfile1.txt"                       //Download data in the direct mode
OK

+FTPRETR: 2
11                                          //Directly output the data, ended with 03
+FTPRETR: 1

AT+FTPSTOR="testfile3.txt"                       //Upload the data in direct load
OK

+FTPSTOR: 2
123456789                                        //File content, ended with 03

+FTPSTOR: 1

AT+FTPPUT="testfile4",5,0          //Upload in segment-based mode, with eof set to 0
+FTPPUT: 2,5
12345
OK
AT+FTPPUT="testfile4.txt",5,1      //Upload in segment-based mode, with eof set to 1
+FTPPUT: 2,5
```

```
12345

OK


+FTPPUT: 1                          //Segment-based upload is completed
```

4.1.4 Disabling the FTP

```
AT+FTPCLOSE                         //Disable the FTP

OK


+FTPCLOSE: 1
```

5 Q&A

5.1 Abnormal FTP Disconnection

The FTP connection is interrupted while using.

5.1.1 Possible Cause

Network change or automatic release of the server may cause this issue.

Specially, if there is no FTP service within 120 seconds, the FTP connection will be disconnected.

5.1.2 Troubleshooting Process

Check whether the network is disconnected. After eliminating this cause, check whether there is no FTP operation (including data transmission and command issuance) for more than 120 seconds. If the problem can be reproduced, analyze the network packets to see if the server actively interrupts the connection.

If the root cause cannot be identified through the above steps, provide the module-related logs and network packets of the server if necessary.

5.2 FTP Server Login Failure

The login to the FTP server fails, and the server returns ERROR or +FTPOPEN: 0.

5.2.1 Possible Cause

If ERROR is returned, the parameters may be erroneous or illegal, or the module does not perform dial-up.

If +FTPOPEN: 0 is returned, the account may be incorrect, the signal may be poor, or the connection port is incorrect. The FTPS connection failure may also be caused by incorrect certificate.

5.2.2 Troubleshooting Process

Check the legality of the input parameters. Check whether the module performs dial-up and whether it is disconnected from the network. Check whether the user name, password and connection server port are valid (use other Windows tools to check). Check whether the module has connected through the NAT gateway (port forwarding) and whether the PORT active mode is turned on. For FTPS mode, check the certificate.

If the root cause cannot be identified through the above steps, provide the module-related logs and network packets of the server if necessary.

Appendix A: Terms and Abbreviations

The following table lists the terms involved in this document.

Table 1. Terms and abbreviations

Acronyms	Full Spelling
IP	Internet Protocol
URL	Uniform Resource Locator
FTP	File Transfer Protocol
SSL/TLS	Secure Socket Layer/ Transport Layer Security