SIM82XX_SIM83XX Series TCPIP_Application Note

5G Module
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Scope

This document applies to the SIMCom SIM820X series, SIM821X series, SIM826X series and SIM83XX series.
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1 Introduction

1.1 Purpose of the document

Based on module AT command manual, this document will introduce TCPIP application process. Developers could understand and develop application quickly and efficiently based on this document.

1.2 Related documents


1.3 Conventions and abbreviations
2 TCPIP Introduction

TCPIP is used to setup connections between clients and servers, which are used for TCP/UDP clients communicating with servers.

2.1 Characteristic

- Support connecting TCP/UDP servers;
  - TCP connections
    Module works as TCP clients. It communicates with TCP servers by TCP connections.
  - UDP connections
    Module works as UDP clients. It communicates with UDP servers.

- Support accepting TCP clients;
  - TCP servers
    Module works as TCP servers. It listens TCP clients accept request and communicates with TCP clients.

- Support multiple data transmission mode;
  - Direct Push Mode
    Host data will be sent to internal protocol stack and forwarded to air interface. Data received from air interface will be transmitted to internal protocol stack and forwarded to COM ports.
  - Buffer Access Mode
    Host data will be sent to internal protocol stack and forwarded to air interface. Data received from air interface will be saved into local buffers. Host could retrieve buffer data by AT commands.
  - Transparent Access Mode
    Host data will be directly sent to air interface. Data received from air interface will be directly sent to COM ports.
2.2 TCPIP Commands Process

Figure 1: Flow Chart of Using TCP/IP Commands
# 3 AT Commands for TCPIP

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<th>Description</th>
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</tr>
<tr>
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<tr>
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<td>Analysis Domain Name from IP Address</td>
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<tr>
<td>AT+CIPDNSSET</td>
<td>Configure DNS Context</td>
</tr>
</tbody>
</table>

For detail information, please refer to “SIM82XX_SIM83XX Series_AT Command Manual”.
4 Bearer Configuration

Make sure that module has been attached to network successfully and APN information is configured.

```
AT+CPIN?
+CPIN: READY       // Check Status of SIM Card
OK
AT+CSQ
+CSQ: 27,99        // Check RF Signal
OK
AT+CGREG?
+CGREG: 0,1        // Check Status of PS Service
OK
AT+CEREG?
+CEREG: 0,1        // Check EPS network registration state
OK
AT+COPS?
+COPS: 0,0,"CHN-UNICOM",13     // Check Information of Operator
OK
AT+CPSI?
+CPSI:
LTE,Online,460-00,0x1816,27593490,295,EUTRAN-BAND3,1300,5,
5,-98,-738,-440,8
+CPSI: NR5G_NSA,210,NR5G_BAND41,504990,-1000,-140,55     // Check Information of Network
OK
AT+CGDCONT=1,"IP","CMNET"    // Set PDP context Parameters
OK
AT+CGDCONT?
+CGDCONT:
1,"IPV4","CMNET","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0","0.0,0,0,0
OK
```
5 TCPIP Examples

5.1 TCP Client

5.1.1 TCP Client Works in Direct Push Mode

5.1.1.1 Set up TCP Client Connection

```
AT+NETOPEN
OK

+NETOPEN: 0
AT+CIPOPEN=1,"TCP","117.131.85.139",5253  // Set up a TCP connection, <link_num> is 1.
OK

+CIPOPEN: 1,0  // Before using AT+CIPOPEN, host should
              // activate PDP context with AT+NETOPEN first.
```

5.1.1.2 Send data to Server

```
AT+CIPSEND=1,5  // send data with fixed length
>HELLO
OK

+CIPSEND: 1,5,5
AT+CIPSEND=1,   // send data with changeable length, <CTRL+Z> to end
>HELLO_WORLD<CTRL+Z>
OK

+CIPSEND: 1,10,10
```
5.1.1.3 Receive Data From Server

RECV FROM:117.131.85.139:5253  // data from server directly output to COM
+IPD16
data from server

5.1.1.4 Close TCP Connection

AT+CIPCLOSE=1
OK
+CIPCLOSE: 1,0

5.1.2 TCP Client Works in Buffer Access Mode

5.1.2.1 Set up TCP Client connection

AT+NETOPEN
OK
+NETOPEN: 0
AT+CIPRXGET=1  // buffer access mode, get data by AT+CIPRXGET
OK
AT+CIPOPEN=1,"TCP","117.131.85.139",5253  // set up a TCP connection, <link_num> is 1
OK
+CIPOPEN: 1,0

5.1.2.2 Send Data to Server

AT+CIPSEND=1,5  // send data with fixed length
>hello
OK
+CIPSEND: 1,5,5

5.1.2.3 Receive Data from Server

+CIPRXGET: 1,1  // URC to notify host of data from server
AT+CIPRXGET=4,1  // query the length of data in the buffer of socket with <link_num>=1
+CIPRXGET: 4,1,16

OK
AT+CIPRXGET=2,1,5
+CIPRXGET: 2,1,5,11
  // get data in ASCII form
data

OK
AT+CIPRXGET=3,1,5
+CIPRXGET: 3,1,5,6
66726F6D20
  // get data in hex form

OK
AT+CIPRXGET=4,1
+CIPRXGET: 4,1,6
  // read the length of unread data in buffer

OK
AT+CIPRXGET=2,2
+IP ERROR: No data
  // the connection identified by link_num=2 has not been established

ERROR
AT+CIPRXGET=2,1
+CIPRXGET: 2,1,6,0
  // server

OK
AT+CIPRXGET=4,1
+CIPRXGET: 4,1,0
  // all the data in buffer has been read, the rest_len is 0.

OK

5.1.2.4 Close TCP Connection

AT+CIPCLOSE=1
OK
+CIPCLOSE: 1,0
5.1.3 TCP Client Works in Transparent Access Mode

5.1.3.1 Set up TCP Client Connection

```
AT+CIPMODE=1  // Enter into transparent mode by at+cipmode=1
OK
AT+NETOPEN
OK

+NETOPEN: 0
AT+CIPOPEN=0,"TCP","117.131.85.139",5253
CONNECT 115200  // only <link_num>=0 is allowed to operate with
// transparent mode.
```

5.1.3.2 Send Data to Server

All data got from com port will be sent to internet directly

5.1.3.3 Receive Data From Server

```
DATA FROM SERVER DATA FROM SERVER  // all the received data from server will be output to
// com port directly
// sequence of +++ to quit transparent mode
OK
AT+CIPOPEN?
+CIPOPEN: 0,"TCP","117.131.85.139",5253,-1
+CIPOPEN: 1
+CIPOPEN: 2
+CIPOPEN: 3
+CIPOPEN: 4
+CIPOPEN: 5
+CIPOPEN: 6
+CIPOPEN: 7
+CIPOPEN: 8
+CIPOPEN: 9
OK
ATO  // ATO to enter transparent mode again
CONNECT 115200
HELLO CLIENT
```
5.1.3.4 Close TCP Connection

AT+CIPCLOSE=0
OK
CLOSED
+CIPCLOSE: 0,0

5.2 UDP Client

5.2.1 UDP Client Works in Direct Push Mode

5.2.1.1 Set up UDP Client Connection

AT+NETOPEN
OK
+NETOPEN: 0
AT+CIPOPEN=1,"UDP",,,5000  // when set a UDP connection, the remote IP
+CIPOPEN: 1,0  // address and port is not necessary, but the local
                // port must be specified.
OK

5.2.1.2 Send data to Server

AT+CIPSEND=1,,"117.131.85.139",5254  // for UDP connection, when sending data, user must
>HELLOSERVER  // specify the remote IP address and port. Sending data
OK  // with changeable length
<CTRL+Z>  // <CTRL+Z> to end
+CIPSEND: 1,11,11
AT+CIPSEND=1,5,"117.131.85.139",5254  // send data with fixed length
>HELLO
OK
+CIPSEND: 1,5,5
5.2.1.3 Receive Data From Server

RECV FROM:117.131.85.139:5254 // data from server output to COM port directly
+IPD14
HELLO CLIENT

5.2.1.4 Close UDP Connection

AT+CIPCLOSE=1
+CIPCLOSE: 1,0
OK

5.2.2 UDP Client Works in Buffer Access Mode

5.2.2.1 Set up UDP Client connection

AT+NETOPEN
OK
+NETOPEN: 0
AT+CIPRXGET=1 // buffer access mode, get data by AT+CIPRXGET
OK
AT+CIPOPEN=1,"UDP",,,5000 // when set a UDP connection, the remote IP address and
+CIPOPEN: 1,0 // port is not necessary, but the local port must be specified.
OK

5.2.2.2 Send Data to Server

AT+CIPSEND=1,,"117.131.85.139",5254 // for UDP connection, when sending data, user must
>HELLOSERVER // specify the remote IP address and port. Sending data
OK // with changeable length, <CTRL+Z> to end

+CIPSEND: 1,11,11
AT+CIPSEND=1,5,"117.131.85.139",5254 // send data with fixed length
>HELLO
OK
5.2.2.3 Receive Data From Server

+CIPSEND: 1,5,5

OK

AT+CIPRXGET=1,1 // URC to notify host of data from server

OK

AT+CIPRXGET=2,1,5 // get data in ASCII form

AT+CIPRXGET=4,1 // query the length of data in the buffer of socket with <link_num>=1

AT+CIPRXGET=3,1,5 // get data in hex form

+66726F6D20

66726F6D20

OK

AT+CIPRXGET=2,1 // the connection identified by link_num=2 has not been established

+IP ERROR: No data

ERROR

AT+CIPRXGET=4,1 // read the length of unread data in buffer

+4,1,6

OK

AT+CIPRXGET=4,1 // all the data in buffer has been read, the rest_len is 0.

+4,1,0

OK

5.2.2.4 Close UDP Connection

AT+CIPCLOSE=1
5.2.3 UDP Client Works in Transparent Access Mode

5.2.3.1 Set up UDP Client Connection

```
AT+CIPMODE=1
OK
AT+NETOPEN
OK
+NETOPEN: 0
AT+CIPOPEN=0,"UDP","117.131.85.139",5254,5000 // only <link_num>=0 is allowed to operate
CONNECT 115200 // with transparent mode.
```

5.2.3.2 Send Data to Server

**All data got from com port will be sent to internet directly**

5.2.3.3 Receive Data From Server

```
HELLO CLIENT // data from server output to COM port directly
HELLO CLIENT // data from server output to COM port directly
OK // sequence of +++ to quit transparent mode
AT+CIPOPEN?
+CIPOPEN: 0,"UDP","117.131.85.139",5254,-1
+CIPOPEN: 1
+CIPOPEN: 2
+CIPOPEN: 3
+CIPOPEN: 4
+CIPOPEN: 5
+CIPOPEN: 6
+CIPOPEN: 7
+CIPOPEN: 8
+CIPOPEN: 9
OK
```
5.2.3.4 Close UDP Connection

```
AT+CIPCLOSE=0
CLOSED
+CIPCLOSE: 0,0
OK
```

5.3 TCP Server

5.3.1 Transparent Mode

```
AT+CIPMODE=1
OK
AT+NETOPEN
OK
+NETOPEN: 0
AT+SERVERSTART=8080, 0
OK
// only <server_index>=0 is allowed to operate with transparent mode.
+CLIENT: 0,0,192.168.108.5:57202
// only <link_num> 0 can be used for transparent mode operation.
CONNECT 115200
OK
// sequence of +++ to quit data mode
AT+CIPCLOSE=0
OK
// close client connection
CLOSED
+CIPCLOSE: 0,0
AT+SERVERSTOP=0
// close server socket
+SERVERSTOP: 0,0
OK
```

5.3.2 Non-Transparent Mode

Module supports 4 sockets to listen.
AT+NETOPEN
OK

+NETOPEN: 0,0
AT+SERVERSTART=8080,0
OK
AT+SERVERSTART=9090,1
OK
AT+SERVERSTART=7070,2
OK
AT+SERVERSTART=6060,3
OK

// If a socket is accepted, this URC will be reported

+CLIENT: 0,1,192.168.108.5:57202
// User can use AT+CIPOPEN? to check the
AT+CIPOPEN?
// accepted socket
+CIPOPEN: 0,"TCP","192.168.108.5",57202,1
// last parameter of 1 indicates this is an accepted
+CIPOPEN: 1
// socket, this server index is 1
+CIPOPEN: 2
+CIPOPEN: 3
+CIPOPEN: 4
+CIPOPEN: 5
+CIPOPEN: 6
+CIPOPEN: 7
+CIPOPEN: 8
+CIPOPEN: 9

OK
AT+CIPSEND=0,5
// only supports fixed-length to send
>HELLO
OK

+CIPSEND: 0,5,5
AT+CIPCLOSE=0
OK

+CIPCLOSE: 0,0
AT+SERVERSTOP=0
+SERVERSTOP: 0,0

OK
AT+SERVERSTOP=1
+SERVERSTOP: 1,0
OK
AT+SERVERSTOP=2
+SERVERSTOP: 2,0
OK
AT+SERVERSTOP=3
+SERVERSTOP: 3,0
OK
AT+NETCLOSE
OK
+NETCLOSE: 0

5.4 Extended Information

5.4.1 UDP Data Receiving Rules

One UDP connection could handle no more 1500 Bytes with once receiving. Please make sure that UDP server sends acceptable data packets, whose length is greater than 0 and less than 1500 Bytes.

5.4.2 Query Connection Status

AT+CIPOPEN=1,"TCP","117.131.85.139",5253
OK

+CIPOPEN: 1,0
AT+CIPOPEN?  // query the current state of all sockets
+CIPOPEN: 0
+CIPOPEN: 1,"TCP","117.131.85.139",5253,-1
+CIPOPEN: 2
+CIPOPEN: 3
+CIPOPEN: 4
+CIPOPEN: 5
+CIPOPEN: 6
+CIPOPEN: 7
+CIPOPEN: 8
+CIPOPEN: 9
OK
AT+CIPCLOSE?
+CIPCLOSE: 0,1,0,0,0,0,0,0,0,0

OK
AT+CIPCLOSE=1
OK

+CIPCLOSE: 1,0
AT+CIPCLOSE?
+CIPCLOSE: 0,0,0,0,0,0,0,0,0,0

OK