



SIM7070_SIM7080_SIM7090 Series_HTTP(S) _Application Note

LPWA Module

SIMCom Wireless Solutions Limited

Building B, SIM Technology Building, No.633, Jinzhong Road

Changning District, Shanghai P.R. China

Tel: 86-21-31575100

support@simcom.com

www.simcom.com

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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

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Version	Date	Owner	What is new
V1.00	2019.9.16	Jiangting.Ding	First Release
V1.01	2019.11.7	Jiangting.Ding	Change AT+SHBOD
V1.02	2020.7.8	Wenjie.Lai	All

Scope

This document applies to the following products

Name	Type	Size(mm)	Comments
SIM7080G	CAT-M/NB	17.6*15.7*2.3	N/A
SIM7070G/SIM7070E	CAT-M/NB/GPRS	24*24*2.4	N/A
SIM7070G-NG	NB/GPRS	24*24*2.4	N/A
SIM7090G	CAT-M/NB	14.8*12.8*2.0	N/A

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1 Introduction

1.1 Purpose of the document

Based on module AT command manual, this document will introduce HTTP(S) application process.

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

1.2 Related documents

[1] SIM7070_SIM7080_SIM7090 Series_AT Command Manual

[2] SIM7070_SIM7080_SIM7090 Series_SSL_Application Note

[3] RFC2616

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 HTTP Introduction

HTTP (HyperText Transfer Protocol) is an application layer protocol. When you browse a web page, the browser and the web server will send and receive data on the Internet through the HTTP protocol. HTTP is a stateless protocol based on request and response patterns. That is what we usually call Request/Response.

2.1 Characteristic

➤ **Support client/server mode;**

✧ **Simple and fast**

When a client requests a service from a server, it only needs to pass the request method and path. Because the HTTP protocol is simple, the program size of the HTTP server is small, and the communication speed is fast.

✧ **Flexible**

HTTP allows the transfer of any type of data object. The type being transferred is marked by Content-Type.

✧ **No connection**

No connection means limiting the processing of only one request per link. After the server processes the client's request and receives the customer's response, the server disconnects the link. This way, the transmission time can be saved.

✧ **Stateless**

The HTTP protocol is a stateless protocol. Stateless means that the protocol has no memory for transaction processing. A lack of state means that if subsequent processing requires the previous information, it must be retransmitted, which may result in an increase in the amount of data transferred per connection. On the other hand, it responds faster when the server does not need previous information.

2.2 Request Method

According to the HTTP standard, HTTP requests can use a variety of request methods.

HTTP 1.0 defines three request methods: the GET, POST, and HEAD methods.

HTTP1.1 adds six new request methods: OPTIONS, PUT, PATCH, DELETE, TRACE, and CONNECT methods.

No	Method	Description
1	GET	Make a request to a specific resource.
2	HEAD	Ask the server for a response that is consistent with the GET request, except that the response body will not be returned. This method can obtain the meta information contained in the response message header without having to transmit the entire response content.
3	POST	Submit data to a specified resource for processing requests (such as submitting a form or uploading a file). The data is included in the request body. POST requests may result in the creation of new resources and/or modifications to existing resources.
4	PUT	Uploads its latest content to a specified resource location.
5	DELETE	Requests the server to delete the resource identified by the Request-URI.
6	CONNECT	The HTTP/1.1 protocol is reserved for proxy servers that can connect connections to pipes.
7	OPTIONS	Returns the HTTP request method supported by the server for a particular resource. You can also test the functionality of the server by sending a '*' request to the web server.
8	TRACE	Echoes requests received by the server, primarily for testing or diagnostics.
9	PATCH	It is a supplement to the PUT method for local updating of known resources.

The SIM7070_SIM7080_SIM7090 Series supports several methods: GET, POST, PUT, PATCH and HEAD.

3 AT Commands for HTTP(S)

Command	Description
AT+CSSLCFG	Configure SSL parameters of a context identifier
AT+SHCONF	Set HTTP(S) Parameter
AT+SHSSL	Select SSL Configure
AT+SHCONN	HTTP(S) Connection
AT+SHBOD	Set Body
AT+SHAHEAD	Add Head
AT+SHPARA	Set HTTP(S) Para
AT+SHCPARA	Clear HTTP(S) Para
AT+SHCHEAD	Clear Head
AT+SHSTATE	Query HTTP(S) Connection Status
AT+SHREQ	Set Request Type
AT+SHREAD	Read Response Value
AT+SHDISC	Disconnect HTTP(S)
AT+HTTPTOFS	Download file to ap file system
AT+HTTPTOFSRL	State of download file to ap file system

For detail information, please refer to "SIM7070_SIM7080_SIM7090 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+CSQ //Check RF signal
+CSQ: 20,0

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

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

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

OK
AT+CNCFG=0,1,"ctnb" //Before activation please use AT+CNCFG to set
// APN\user name\password if needed.

OK
AT+CNACT=0,1 //Activate network, Activate 0th PDP.
OK
+APP PDP: 0,ACTIVE

```

```

AT+CNACT? //Get local IP
+CNACT: 0,1,"10.94.36.44"
+CNACT: 1,0,"0.0.0.0"
+CNACT: 2,0,"0.0.0.0"
+CNACT: 3,0,"0.0.0.0"

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. Some operators need to
                             //set APN first when registering the network.

OK
AT+CFUN=1 //Enable RF

OK

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

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=0,1,"ctnb" //Before activation please use AT+CNCFG to set
                       //APN\user name\password if needed.

OK
AT+CNACT=0,1 //Activate network, Activate 0th PDP.

OK

```

+APP PDP: 0,ACTIVE

AT+CNACT?

//Get local IP

+CNACT: 0,1,"10.94.36.44"

+CNACT: 1,0,"0.0.0.0"

+CNACT: 2,0,"0.0.0.0"

+CNACT: 3,0,"0.0.0.0"

OK

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5 HTTP(S) Examples

5.1 HTTP Function

5.1.1 HTTP GET

//Example of HTTP GET.

```

AT+SHCONF="URL","http://httpbin.org"           //Set up server URL
OK
AT+SHCONF="BODYLEN",1024                       //Set HTTP body length, for range of max body
OK                                              length
AT+SHCONF="HEADERLEN",350                    //Set HTTP head length, for range of max head
OK                                              length
AT+SHCONN                                      //HTTP build
OK
AT+SHSTATE?                                   //Get HTTP status
+SHSTATE: 1                                   //"+SHSTATE: 1": connected
                                              //"+SHSTATE: 0": disconnected

OK
AT+SHCHEAD                                     //Clear HTTP header, because of http header is
OK                                              appended
AT+SHAHEAD="User-Agent","curl/7.47.0"        //Add header content
OK                                              //For detail, please refer to document "rfc2616"
AT+SHAHEAD="Cache-control","no-cache"        //Add header content
OK                                              //For detail, please refer to document "rfc2616"
AT+SHAHEAD="Connection","keep-alive"        //Add header content
OK                                              //For detail, please refer to document "rfc2616"
AT+SHAHEAD="Accept","*/*"                    //Add header content
OK                                              //For detail, please refer to document "rfc2616"
AT+SHREQ="/get?user=jack&password=123",
1
OK                                              //Set request type is GET.
                                              //Get data size is 387.

+SHREQ: "GET",200,387
AT+SHREAD=0,387                               //Read data length is 387

```

```

OK //The data content is follow "+SHREAD: 387"

+SHREAD: 387
{
  "args": {
    "password": "123",
    "user": "jack"
  },
  "headers": {
    "Accept": "*/*",
    "Cache-Control": "no-cache",
    "Content-Length": "0",
    "Host": "httpbin.org",
    "User-Agent": "curl/7.47.0",
    "X-Amzn-Trace-Id":
"Root=1-5ed706c8-99b97372ae6f043f805cf243
"
  },
  "origin": "117.132.195.245",
  "url":
"http://httpbin.org/get?user=jack&password=1
23"
}

AT+SHDISC //Disconnect HTTP connect
OK

```

5.1.2 HTTP POST

//Example 1 of HTTP POST.

```

AT+SHCONF="URL","http://httpbin.org" //Set up server URL
OK
AT+SHCONF="BODYLEN",1024 //Set HTTP body length
OK
AT+SHCONF="HEADERLEN",350 //Set HTTP head length
OK
AT+SHCONN //HTTP build
OK
AT+SHSTATE? //Get HTTP status
+SHSTATE: 1
OK

```

```

AT+SHCHEAD                                     //Clear HTTP header
OK
AT+SHAHEAD="Content-Type","application/x-
www-form-urlencoded"                          //Add header content
OK
AT+SHAHEAD="Cache-control","no-cache"        //Add header content
OK
AT+SHAHEAD="Connection","keep-alive"        //Add header content
OK
AT+SHAHEAD="Accept","*/*"                    //Add header content
OK
AT+SHCPARA                                     //Clear body content parameter
OK
AT+SHPARA="product","apple"                  //Add body content parameter
OK
AT+SHPARA="price","1"                        //Add body content parameter
OK
AT+SHREQ="/post",3                            //Set request type is POST
OK                                             //Get data size is 452.

+SHREQ: "POST",200,452
AT+SHREAD=0,452
OK

+SHREAD: 452
{
  "args": {},
  "data": "",
  "files": {},
  "form": {
    "price": "1",
    "product": "apple"
  },
  "headers": {
    "Accept": "*/*",
    "Cache-Control": "no-cache",
    "Content-Length": "21",
    "Content-Type":
"application/x-www-form-urlencoded",
    "Host": "httpbin.org",
    "X-Amzn-Trace-Id":
"Root=1-5ed633df-058feb6412204392e95333b2"
  },
  "json": null,
  "origin": "218.204.252.187",
}

```

```
"url": "http://httpbin.org/post"
}
```

```
AT+SHDISC
OK
```

```
//Disconnect HTTP connect
```

```
//Example 2 of HTTP POST.
```

```
AT+SHCONF="URL","http://httpbin.org"
```

```
OK
```

```
//Set up server URL
```

```
AT+SHCONF="BODYLEN",1024
```

```
OK
```

```
//Set HTTP body length
```

```
AT+SHCONF="HEADERLEN",350
```

```
OK
```

```
//Set HTTP head length
```

```
AT+SHCONN
```

```
OK
```

```
//HTTP build
```

```
AT+SHSTATE?
```

```
+SHSTATE: 1
```

```
//Get HTTP status
```

```
OK
```

```
AT+SHCHEAD
```

```
OK
```

```
//Clear HTTP header
```

```
AT+SHAHEAD="Content-Type","application/x-
www-form-urlencoded"
```

```
OK
```

```
//Add header content
```

```
AT+SHAHEAD="Cache-control","no-cache"
```

```
OK
```

```
//Add header content
```

```
AT+SHAHEAD="Connection","keep-alive"
```

```
OK
```

```
//Add header content
```

```
AT+SHAHEAD="Accept","/*/*"
```

```
OK
```

```
//Add header content
```

```
AT+SHBOD=29,10000
```

```
> {"title":"Hello http server"}
```

```
//Set body content
```

```
OK
```

```
AT+SHREQ="/post",3
```

```
OK
```

```
//Set request type is POST
```

```
//Get data size is 457.
```

```
+SHREQ: "POST",200,457
```

```
AT+SHREAD=0,457
```

```
OK
```

```
//Read data length is 457
```

```
//The data content is follow "+SHREAD: 457"
```

```
+SHREAD: 457
```

```
{
```

```

"args": {},
"data": "{\"title\":\"Hello http server\"}",
"files": {},
"form": {},
"headers": {
  "Accept": "*//*",
  "Cache-Control": "no-cache",
  "Content-Length": "29",
  "Content-Type": "application/json",
  "Host": "httpbin.org",
  "X-Amzn-Trace-Id":
"Root=1-5ed63fa7-3dda07707b3f2ea63e092a3a
"
},
"json": {
  "title": "Hello http server"
},
"origin": "218.204.252.187",
"url": "http://httpbin.org/post"
}

```

AT+SHDISC
OK

//Disconnect HTTP connect

5.2 HTTPS Function

5.2.1 HTTPS download and convert SSL certificate

//Example of HTTPS download and convert SSL Certificate.

AT+CFSINIT

OK

//Init FS AT command

AT+CFSWFILE=3,"httpbin_root_ca.cer",0,1492
,1000

//After download, sent certificate file through the serial port.1492 is certificate size.

DOWNLOAD

//Send CA file success

OK

AT+CFSTERM

OK

//Free data buffer

AT+CSSLCFG="convert",2,"httpbin_root_ca.c

//Conversion CA certificate format.

```
er" //2 means CA type.
OK //httpbin_root_ca.cer is CA certificate name.
```

5.2.2 HTTPS GET

//Example of HTTPS GET.

```
AT+CSSLCFG="sslversion",1,3 //Configure SSL/TLS version
OK
AT+SHSSL=1,"httpbin_root_ca.cer" //Set HTTP SSL Configure
OK //if you would skip certificate verify, use
AT+SHCONF="URL","https://httpbin.org" //Set connect server parameter
OK
AT+SHCONF="BODYLEN",1024 //Set max body length
OK
AT+SHCONF="HEADERLEN",350 //Set max header length
OK
AT+SHCONN //Connect HTTPS server
OK
AT+SHSTATE?
+SHSTATE: 1 //Get HTTP status
OK
AT+SHCHEAD //Clear HTTP header content
OK
AT+SHAHEAD="User-Agent","curl/7.47.0" //Add header content
OK
AT+SHAHEAD="Cache-control","no-cache" //Add header content
OK
AT+SHAHEAD="Connection","keep-alive" //Add header content
OK
AT+SHAHEAD="Accept","*/*" //Add header content
OK
AT+SHREQ="/get?user=jack&password=123", //Set request type is GET.
1 //Get data size is 388
OK
+SHREQ: "GET",200,388
AT+SHREAD=0,388 //Read data length is 388
OK //The data content is follow "+SHREAD: 388"
```

```
+SHREAD: 388
{
  "args": {
    "password": "123",
    "user": "jack"
  },
  "headers": {
    "Accept": "*/*",
    "Cache-Control": "no-cache",
    "Content-Length": "0",
    "Host": "httpbin.org",
    "User-Agent": "curl/7.47.0",
    "X-Amzn-Trace-Id":
"Root=1-5ed706c8-99b97372ae6f043f805cf243
"
  },
  "origin": "117.132.195.245",
  "url":
"https://httpbin.org/get?user=jack&password=
123"
}
```

AT+SHDISC

OK

//Disconnect HTTP connect

5.2.3 HTTPS POST

//Example 1 of HTTPS POST.

AT+CSSLCFG="sslversion",1,3

OK

//Configure SSL/TLS version

AT+SHSSL=1,"baidu_root_ca.cer"

OK

//Set HTTP SSL Configure

//if you would skip certificate verify, use
AT+SHSSL=1,"" instead

AT+SHCONF="URL","https://httpbin.org"

OK

//Set connect server parameter

AT+SHCONF="BODYLEN",1024

OK

//Set max body length

AT+SHCONF="HEADERLEN",350

OK

//Set max header length

AT+SHCONN

OK

//Connect HTTPS server

AT+SHSTATE?

```

+SHSTATE: 1 //Get HTTP status

OK
AT+SHCHEAD //Clear HTTP header
OK
AT+SHAHEAD="Content-Type","application/x-www-form-urlencoded" //Add header content
OK
AT+SHAHEAD="Cache-control","no-cache" //Add header content
OK
AT+SHAHEAD="Connection","keep-alive" //Add header content
OK
AT+SHAHEAD="Accept","*/*" //Add header content
OK
AT+SHCPARA //Clear body content para
OK
AT+SHPARA="product","apple" //Add body content para
OK
AT+SHPARA="price","1" //Add body content para
OK
AT+SHREQ="/post",3
OK //Set request type is POST
//Get data size is 453.

+SHREQ: "POST",200,453
AT+SHREAD=0,453
OK

+SHREAD: 453
{
  "args": {},
  "data": "",
  "files": {},
  "form": {
    "price": "1",
    "product": "apple" //Read data length is 453
  }, //The data content is follow "+SHREAD: 453"
  "headers": {
    "Accept": "*/*",
    "Cache-Control": "no-cache",
    "Content-Length": "21",
    "Content-Type":
"application/x-www-form-urlencoded",
    "Host": "httpbin.org",
    "X-Amzn-Trace-Id":
"Root=1-5ed633df-058feb6412204392e95333b2

```

```
"
  },
  "json": null,
  "origin": "218.204.252.187",
  "url": "https://httpbin.org/post"
}
```

AT+SHDISC

OK

//Disconnect HTTP connect

//Example 2 of HTTPS POST.

AT+CSSLCFG="sslversion",1,3

OK

//Configure SSL/TLS version

AT+SHSSL=1,"baidu_root_ca.cer"

OK

//Set HTTP SSL Configure

//if you would skip certificate verify, use

AT+SHSSL=1,"" instead

AT+SHCONF="URL","https://httpbin.org"

OK

//Set connect server parameter

AT+SHCONF="BODYLEN",1024

OK

//Set max body length

AT+SHCONF="HEADERLEN",350

OK

//Set max header length

AT+SHCONN

OK

//Connect HTTPS server

AT+SHSTATE?

+SHSTATE: 1

//Get HTTP status

OK

AT+SHCHEAD

OK

//Clear HTTP header

**AT+SHAHEAD="Content-Type","application/js
on"**

OK

//Add header content

AT+SHAHEAD="Cache-control","no-cache"

OK

//Add header content

AT+SHAHEAD="Connection","keep-alive"

OK

//Add header content

AT+SHAHEAD="Accept","*/*"

OK

//Add header content

AT+SHBOD=29,10000

> {"title":"Hello http server"}

//Set body content

OK

AT+SHREQ="/post",3

OK

//Set request type is POST

//Get data size is 458.

+SHREQ: "POST",200,458

AT+SHREAD=0,458

OK

+SHREAD: 458

{

"args": {},

"data": {"title":"Hello http server"},

"files": {},

"form": {},

"headers": {

"Accept": "*/*",

"Cache-Control": "no-cache",

"Content-Length": "29",

//Read data length is 458

"Content-Type": "application/json",

//The data content is follow "+SHREAD: 458"

"Host": "httpbin.org",

"X-Amzn-Trace-Id":

"Root=1-5ed63fa7-3dda07707b3f2ea63e092a3a

"

},

"json": {

"title": "Hello http server"

},

"origin": "218.204.252.187",

"url": "https://httpbin.org/post"

}

AT+SHDISC

OK

//Disconnect HTTP connect