a SUNSEA AIOT company

A7600 Series_ SSL_Application Note

LTE Module

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About Document

Version History

Version	Date	Chapter	What is new
V1.00	2020.06.19		New version

Scope

This document presents the AT Command Set for SIMCom A7600 Series, including A7600XX-XXXX, A5360E, and A7670X.

Contents

1 Introduction

1.1 Purpose of the document

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

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

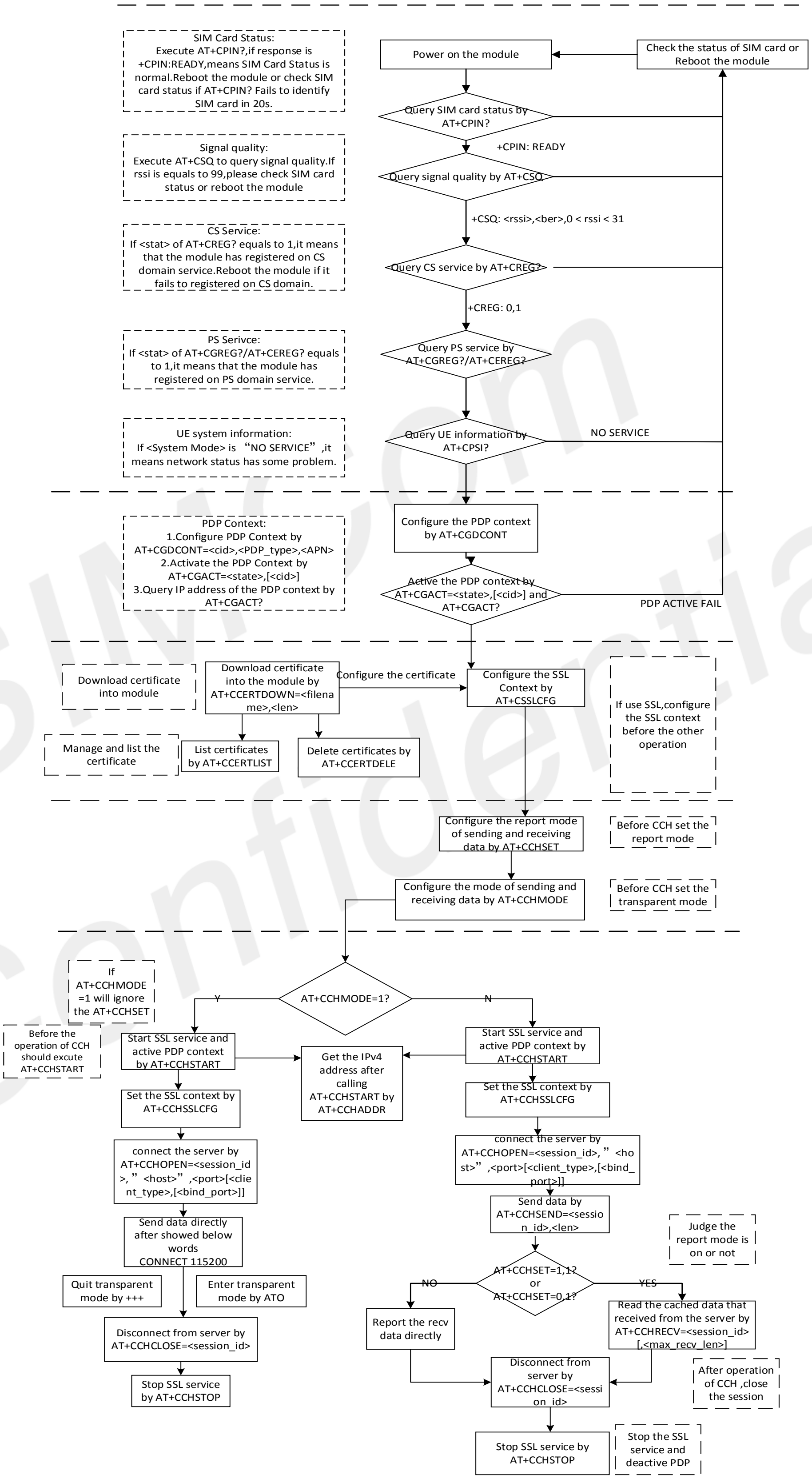
1.2 Related documents

[1] A7600 Series_AT Command Manual

1.3 Conventions and abbreviations

PDP	Packet Data Protocol;
SSL	Security Socket Layer;
URC	Unsolicited result codes;
DNS	Domain Name Server;

1.4 The process of SSL AT Commands



SIM Card Status:
Execute AT+CPIN?,if response is +CPIN:READY,means SIM Card Status is normal.Reboot the module or check SIM card status if AT+CPIN? Fails to identify SIM card in 20s.
Power on the module
Check the status of SIM card or Reboot the module
Query SIM card status by AT+CPIN?
+CPIN: READY
Signal quality:
Execute AT+CSQ to query signal quality.If rssi is equals to 99,please check SIM card status or reboot the module
Query signal quality by AT+CSQ
+CSQ: <rssi>,<ber>,0 < rssi < 31
CS Service:
If <stat> of AT+CREG? equals to 1,it means that the module has registered on CS domain service.Reboot the module if it fails to registered on CS domain.
Query CS service by AT+CREG?
+CREG: 0,1
PS Serivce:
If <stat> of AT+CGREG?/AT+CEREG? equals to 1,it means that the module has registered on PS domain service.
Query PS service by AT+CGREG?/AT+CEREG?
UE system information:
If <System Mode> is “NO SERVICE”,it means network status has some problem.
Query UE information by AT+CPSI?
NO SERVICE
PDP Context:
1.Configure PDP Context by AT+CGDCONT=<cid>,<PDP_type>,<APN>
2.Activate the PDP Context by AT+CGACT=<state>,[<cid>]
3.Query IP address of the PDP context by AT+CGACT?
Configure the PDP context by AT+CGDCONT
Active the PDP context by AT+CGACT=<state>,[<cid>] and AT+CGACT?
PDP ACTIVE FAIL
Download certificate into module
Download certificate into the module by AT+CCERTDOWN=<filename>,<len>
Configure the certificate
Configure the SSL Context by AT+CSSLCFG
If use SSL,configure the SSL context before the other operation
Manage and list the certificate
List certificates by AT+CCERTLIST
Delete certificates by AT+CCERTDELE
Configure the report mode of sending and receiving data by AT+CCHSET
Before CCH set the report mode
Configure the mode of sending and receiving data by AT+CCHMODE
Before CCH set the transparent mode
If AT+CCHMODE =1 will ignore the AT+CCHSET
AT+CCHMODE=1?
Y
N
Before the operation of CCH should excute AT+CCHSTART
Start SSL service and active PDP context by AT+CCHSTART
Get the IPv4 address after calling AT+CCHSTART by AT+CCHADDR
Start SSL service and active PDP context by AT+CCHSTART
Set the SSL context by AT+CCHSSLCFG
Set the SSL context by AT+CCHSSLCFG
connect the server by AT+CCHOPEN=<session_id>,”<host>”,<port>[<client_type>,[<bind_port>]]
connect the server by AT+CCHOPEN=<session_id>,”<host>”,<port>[<client_type>,[<bind_port>]]
Send data directly after showed below words CONNECT 115200
Send data by AT+CCHSEND=<session_id>,<len>
Judge the report mode is on or not
Quit transparent mode by +++
Enter transparent mode by ATO
AT+CCHSET=1,1? or AT+CCHSET=0,1?
NO
YES
Report the recv data directly
Read the cached data that received from the server by AT+CCHRECV=<session_id>[,<max_recv_len>]
Disconnect from server by AT+CCHCLOSE=<session_id>
Disconnect from server by AT+CCHCLOSE=<session_id>
After operation of CCH ,close the session
Stop SSL service by AT+CCHSTOP
Stop SSL service by AT+CCHSTOP
Stop the SSL service and deactive PDP

1.5 Error Handling

1.5.1 Failed to Open SSL Connection

If it is failed to open SSL connection, please check the following aspects:
1. Query the status of the specified PDP context by **AT+CGACT?** command to check whether the specified PDP context has been activated.
2. Please check the SSL configuration by **AT+CSSLCFG?** command, especially the SSL version and cipher suite
3.When the **CCHXXX: <errorcode>** is not 0, it indicates an error code replied from CCH server.
For more details, please refer to A7600 Series_AT Command Manual _V1.01.09.

2 AT Commands for SSL

Command	Description
AT+CSSLCFG	Configure the SSL Context
AT+CCERTDOWN	Download certificate into the module
AT+CCERTLIST	List certificates
AT+CCERTDELE	Delete certificates
AT+CCHSET	Configure the report mode of sending and receiving data
AT+CCHMODE	Configure the mode of sending and receiving data
AT+CCHSTART	Start SSL service
AT+CCHSTOP	Stop SSL service
AT+CCHADDR	Get the IPv4 address
AT+CCHSSLCFG	Set the SSL context
AT+CCHCFG	Configure the Client Context
AT+CCHOPEN	Connect to server
AT+CCHCLOSE	Disconnect from server
AT+CCHSEND	Send data to server
AT+CCHRECV	Read the cached data that received from the server

For more detailed information, please refer to *A7600 Series_AT Command Manual*.

3 SSL Examples

Before all SSL related operations, we should ensure the following:
Ensure GPRS network is available:

```
AT+CSQ
+CSQ: 23,0

OK
AT+CREG?
+CREG: 0,1

OK
AT+CGREG?
+CGREG: 0,1

OK
```

3.1 Access to TCP server

Following commands shows how to communicate with a TCP server.

AT+CCHSET=1	//Enable reporting +CCHSEND result
 OK	
AT+CCHSTART	
OK +CCHSTART: 0	
AT+CCHOPEN=0,”www.baidu.com”,80,1	//connect to TCP server
OK +CCHOPEN: 0,0	
AT+CCHSEND=0,121	//send data to server
>GET / HTTP/1.1	
Host: www.baidu.com User-Agent: Mozilla/5.0 (Windows NT 5.1;	

```
rv:2.0) Gecko/20100101 Firefox/4.0
Accept:
text/html,application/xhtml+xml,application/x
ml;q=0.9,*/*;q=0.8
Accept-Language: zh-cn,zh;q=0.5
Accept-Encoding: gzip, deflate
Accept-Charset: GB2312,utf-8;q=0.7,*;q=0.7
Keep-Alive: 115
Connection: keep-alive
Cookie:
BAIDUID=D6F6D0D297CCAE39BD45C683996
696C7:FG=1;
Hm_lvt_9f14aaa038bbba8b12ec2a4a3e51d254
=1321597443439;
USERID=e194072f4759c0f7c2b6e5d3b092989
84fd1

OK

+CCHSEND: 0,0

+CCHRECV: DATA,0,757
HTTP/1.1 302 Found
Connection: Keep-Alive
Content-Length: 225
Content-Type: text/html
Date: Wed, 05 Sep 2018 08:59:38 GMT
Location: https://www.baidu.com/
Server: BWS/1.1
Set-Cookie:
BIDUPSID=D6F6D0D297CCAE39BD45C68399
6696C7; expires=Thu, 31-Dec-37 23:55:55
GMT; max-age=2147483647; path=/;
domain=.baidu.com
Set-Cookie: PSTM=1536137978; expires=Thu,
31-Dec-37 23:55:55 GMT;
max-age=2147483647; path=/;
domain=.baidu.com
Set-Cookie:
BD_LAST_QID=11878059346481009304;
path=/; Max-Age=1
X-Ua-Compatible: IE=Edge,chrome=1

<html>
<head><title>302 Found</title></head>
<body bgcolor="white">
```

//report the received data from server

<center><h1>302 Found</h1></center> <hr><center>7a367f7b87705e16b985e34ca59 b8ae8b1d28d47 Time : Tue Aug 21 10:55:16 CST 2018</center> </body> </html>	
AT+CCHCLOSE=0	//Disconnect from the Service
OK +CCHCLOSE: 0,0	
AT+CCHSTOP	//stop SSL Service
OK +CCHSTOP: 0	

3.2 Access to SSL/TLS server (not verify server and client)

Following commands shows how to access to a SSL/TLS server without verifying the server. It needs to configure the authentication mode to 0, and then it will connect to the server successfully.

AT+CSSLCFG=”sslversion”,0,4	//Set the SSL version of the first SSL context
OK	
AT+CSSLCFG=”authmode”,0,0	//Set the authentication mode(not verify server) of the first SSL context
OK	
AT+CCHSET=1	//Enable reporting +CCHSEND result
OK	
AT+CCHSTART	// start SSL service, activate PDP context
OK +CCHSTART: 0	
AT+CCHSSLCFG=0,0	// Set the first SSL context to be used in the SSL connection
OK	
AT+CCHOPEN=0, “www.baidu.com” , 443,2	//connect to SSL/TLS server
OK +CCHOPEN: 0,0	
AT+CCHSEND=0,121	//send data to server
>GET / HTTP/1.1	

Host: www.baidu.com User-Agent: MAUI htp User Agent Proxy-Connection: keep-alive Content-Length: 0 OK +CCHSEND: 0,0 +CCHRECV: DATA,0,917 HTTP/1.1 200 OK Accept-Ranges: bytes Cache-Control: no-cache Connection: Keep-Alive Content-Length: 227 Content-Type: text/html Date: Tue, 04 Sep 2018 06:21:35 GMT Etag: "5b7b7f40-e3" Last-Modified: Tue, 21 Aug 2018 02:56:00 GMT P3p: CP=" OTI DSP COR IVA OUR IND COM " Pragma: no-cache Server: BWS/1.1 Set-Cookie: BD_NOT_HTTPS=1; path=/; Max-Age=300 Set-Cookie: BIDUPSID=D95046B2B3D5455BF01A622DB8DED9EA; expires=Thu, 31-Dec-37 23:55:55 GMT; max-age=2147483647; path=/; domain=.baidu.com Set-Cookie: PSTM=1536042095; expires=Thu, 31-Dec-37 23:55:55 GMT; max-age=2147483647; path=/; domain=.baidu.com Strict-Transport-Security: max-age=0 X-Ua-Compatible: IE=Edge,chrome=1 <html> <head> <script> location.replace(location.href.replace("https://","http://")); </script> </head> <body>	//report the received data from server

<noscript><meta http-equiv="refresh" content="0;url=http://www.baidu.com/"></noscript> </body> </html>	
AT+CCHCLOSE=0	//Disconnect from the Service
OK +CCHCLOSE: 0,0	
AT+CCHSTOP	//stop SSL Service
OK +CCHSTOP: 0	

3.3 Access to SSL/TLS server (only verify the server)

Following commands shows how to access to a SSL/TLS server with verifying the server. It needs to configure the authentication mode to 1 and the right server root CA, and then it will connect to the server successfully.

AT+CSSLCFG=”sslversion”,0,4	//Set the SSL version of the first SSL context
OK	
AT+CSSLCFG=”authmode”,0,1	//Set the authentication mode(verify server) of the first SSL context
OK	
AT+CSSLCFG=”cacert”,0,”ca_cert.pem”	//Set the server root CA of the first SSL context
OK	
AT+CCHSET=1	//Enable reporting +CCHSEND result
OK	// start SSL service, activate PDP context
AT+CCHSTART	
OK +CCHSTART: 0	
AT+CCHSSLCFG=0,0	// Set the first SSL context to be used in the SSL connection
OK	
AT+CCHOPEN=0,”www.baidu.com”,443,2	//connect to SSL/TLS server
OK +CCHOPEN: 0,0	
AT+CCHSEND=0,121	//send data to server

>GET / HTTP/1.1 Host: www.baidu.com User-Agent: MAUI htp User Agent Proxy-Connection: keep-alive Content-Length: 0 OK +CCHSEND: 0,0 +CCHRECV: DATA,0,917 HTTP/1.1 200 OK Accept-Ranges: bytes Cache-Control: no-cache Connection: Keep-Alive Content-Length: 227 Content-Type: text/html Date: Tue, 04 Sep 2018 06:21:35 GMT Etag: "5b7b7f40-e3" Last-Modified: Tue, 21 Aug 2018 02:56:00 GMT P3p: CP=" OTI DSP COR IVA OUR IND COM " Pragma: no-cache Server: BWS/1.1 Set-Cookie: BD_NOT_HTTPS=1; path=/; Max-Age=300 Set-Cookie: BIDUPSID=D95046B2B3D5455BF01A622DB8DED9EA; expires=Thu, 31-Dec-37 23:55:55 GMT; max-age=2147483647; path=/; domain=.baidu.com Set-Cookie: PSTM=1536042095; expires=Thu, 31-Dec-37 23:55:55 GMT; max-age=2147483647; path=/; domain=.baidu.com Strict-Transport-Security: max-age=0 X-Ua-Compatible: IE=Edge,chrome=1 <html> <head> <script> location.replace(location.href.replace("https://","http://")); </script> </head>	//report the received data from server

<body> <noscript><meta http-equiv="refresh" content="0;url=http://www.baidu.com/"></noscript> </body> </html>	
AT+CCHCLOSE=0	//Disconnect from the Service
OK +CCHCLOSE: 0,0	
AT+CCHSTOP	//stop SSL Service
OK +CCHSTOP: 0	

3.4 Access to SSL/TLS server (verify server and client)

Following commands shows how to access to a SSL/TLS server with verifying the server and client. It needs to configure the authentication mode to 2, the right server root CA, the right client certificate and key, and then it will connect to the server successfully.

AT+CSSLCFG=”sslversion”,0,4	//Set the SSL version of the first SSL context
OK	
AT+CSSLCFG=”authmode”,0,2	//Set the authentication mode(verify server and client) of the first SSL context
OK	
AT+CSSLCFG=”cacert”,0,”ca_cert.pem”	//Set the server root CA of the first SSL context
OK	
AT+CSSLCFG=”clientcert”,0,”cert.pem”	//Set the client certificate of the first SSL context
OK	
AT+CSSLCFG=”clientkey”,0,”key_cert.pem”	//Set the client key of the first SSL context
OK	
AT+CCHSET=1	//Enable reporting +CCHSEND result
OK	
AT+CCHSTART	// start SSL service, activate PDP context
OK +CCHSTART: 0	
AT+CCHSSLCFG=0,0	// Set the first SSL context to be used in the SSL connection
OK	

AT+CCHOPEN=0, ”www.baidu.com”,443,2	//connect to SSL/TLS server
OK +CCHOPEN: 0,0	
AT+CCHSEND=0,121	//send data to server
>GET / HTTP/1.1 Host: www.baidu.com User-Agent: MAUI htp User Agent Proxy-Connection: keep-alive Content-Length: 0 OK +CCHSEND: 0,0	
+CCHRECV: DATA,0,917 HTTP/1.1 200 OK Accept-Ranges: bytes Cache-Control: no-cache Connection: Keep-Alive Content-Length: 227 Content-Type: text/html Date: Tue, 04 Sep 2018 06:21:35 GMT Etag: "5b7b7f40-e3" Last-Modified: Tue, 21 Aug 2018 02:56:00 GMT P3p: CP=" OTI DSP COR IVA OUR IND COM " Pragma: no-cache Server: BWS/1.1 Set-Cookie: BD_NOT_HTTPS=1; path=/; Max-Age=300 Set-Cookie: BIDUPSID=D95046B2B3D5455BF01A622DB8DED9EA; expires=Thu, 31-Dec-37 23:55:55 GMT; max-age=2147483647; path=/; domain=.baidu.com Set-Cookie: PSTM=1536042095; expires=Thu, 31-Dec-37 23:55:55 GMT; max-age=2147483647; path=/; domain=.baidu.com Strict-Transport-Security: max-age=0 X-Ua-Compatible: IE=Edge,chrome=1 <html> <head>	//report the received data from server

<script> location.replace(location.href.replace("https://","http://")); </script> </head> <body> <noscript><meta http-equiv="refresh" content="0;url=http://www.baidu.com/"></noscript> </body> </html>	
AT+CCHCLOSE=0	//Disconnect from the Service
OK +CCHCLOSE: 0,0	
AT+CCHSTOP	//stop SSL Service
OK +CCHSTOP: 0	

3.5 Access to SSL/TLS server (only verify the client)

Following commands shows how to access to a SSL/TLS server with verifying the client. It needs to configure the authentication mode to 3, the right client certificate and key, and then it will connect to the server successfully.

AT+CSSLCFG=”sslversion”,0,4	//Set the SSL version of the first SSL context
OK	
AT+CSSLCFG=”authmode”,0,3	//Set the authentication mode(only verify client) of the first SSL context
OK	
AT+CSSLCFG=”clientcert”,0,”cert.pem”	//Set the client certificate of the first SSL context
OK	
AT+CSSLCFG=”clientkey”,0,”key_cert.pem”	//Set the client key of the first SSL context
OK	
AT+CCHSET=1	//Enable reporting +CCHSEND result
OK	
AT+CCHSTART	// start SSL service, activate PDP context
OK	

+CCHSTART: 0	
AT+CCHSSLCFG=0,0	// Set the first SSL context to be used in the SSL connection
OK	
AT+CCHOPEN=0, ”www.baidu.com”, 443,2	//connect to SSL/TLS server
OK +CCHOPEN: 0,0	
AT+CCHSEND=0,121	//send data to server
>GET / HTTP/1.1 Host: www.baidu.com User-Agent: MAUI htp User Agent Proxy-Connection: keep-alive Content-Length: 0 OK +CCHSEND: 0,0 +CCHRECV: DATA,0,917 HTTP/1.1 200 OK Accept-Ranges: bytes Cache-Control: no-cache Connection: Keep-Alive Content-Length: 227 Content-Type: text/html Date: Tue, 04 Sep 2018 06:21:35 GMT Etag: "5b7b7f40-e3" Last-Modified: Tue, 21 Aug 2018 02:56:00 GMT P3p: CP=" OTI DSP COR IVA OUR IND COM " Pragma: no-cache Server: BWS/1.1 Set-Cookie: BD_NOT_HTTPS=1; path=/; Max-Age=300 Set-Cookie: BIDUPSID=D95046B2B3D5455BF01A622DB8DED9EA; expires=Thu, 31-Dec-37 23:55:55 GMT; max-age=2147483647; path=/; domain=.baidu.com Set-Cookie: PSTM=1536042095; expires=Thu, 31-Dec-37 23:55:55 GMT; max-age=2147483647; path=/; domain=.baidu.com Strict-Transport-Security: max-age=0	//report the received data from server

X-Ua-Compatible: IE=Edge,chrome=1 <html> <head> <script> location.replace(location.href.replace("https://","http://")); </script> </head> <body> <noscript><meta http-equiv="refresh" content="0;url=http://www.baidu.com/"></noscript> </body> </html>	
AT+CCHCLOSE=0	//Disconnect from the Service
OK +CCHCLOSE: 0,0	
AT+CCHSTOP	//stop SSL Service
OK +CCHSTOP: 0	

3.6 Access to SSL/TLS server in transparent mode

Following commands shows how to access to a SSL/TLS server with not verifying the server in transparent mode. It needs to configure the sending and receiving mode to 1(the transparent mode).
Only the session 0 is support the transparent mode.

AT+CCHMODE=1	//Set the transparent mode
OK	
AT+CCHSET=1	//Enable reporting +CCHSEND result
OK	
AT+CCHSTART	// start SSL service, activate PDP context
OK +CCHSTART: 0	
AT+CCHSSLCFG=0,0	// Set the first SSL context to be used in the SSL connection

OK	
AT+CCHOPEN=0, ”www.baidu.com”, 443,2	//connect to SSL/TLS server
CONNECT 115200	
GET / HTTP/1.1 Host: www.baidu.com User-Agent: MAUI htp User Agent Proxy-Connection: keep-alive Content-Length: 0	//send data to server
HTTP/1.1 200 OK Accept-Ranges: bytes Cache-Control: no-cache Connection: Keep-Alive Content-Length: 227 Content-Type: text/html Date: Tue, 04 Sep 2018 06:26:03 GMT Etag: "5b7b7f40-e3" Last-Modified: Tue, 21 Aug 2018 02:56:00 GMT P3p: CP=" OTI DSP COR IVA OUR IND COM " Pragma: no-cache Server: BWS/1.1 Set-Cookie: BD_NOT_HTTPS=1; path=/; Max-Age=300 Set-Cookie: BIDUPSID=F19D0F1E532ED84CE275BC1006F91F9E; expires=Thu, 31-Dec-37 23:55:55 GMT; max-age=2147483647; path=/; domain=.baidu.com Set-Cookie: PSTM=1536042363; expires=Thu, 31-Dec-37 23:55:55 GMT; max-age=2147483647; path=/; domain=.baidu.com Strict-Transport-Security: max-age=0 X-Ua-Compatible: IE=Edge,chrome=1 <html> <head> <script> location.replace(location.href.replace("https://","http://")); </script> </head>	//report the received data from server

<body> <noscript><meta http-equiv="refresh" content="0;url=http://www.baidu.com/"></noscript> </body> </html>	
+++	//switch to command mode
OK	
AT+CCHCLOSE=0	//Disconnect from the Service
OK CLOSED	
AT+CCHSTOP	//stop SSL Service
OK +CCHSTOP: 0	

3.7 Download certificate into module

Following commands shows how to download certificate into module.

AT+CCERTDOWN=”client_key.der”,1702	//download file with not ASCII coding file name
>-----BEGIN RSA PRIVATE KEY----- MIIEowIBAAKCAQEAlwuz/TNa+foGBG6rXpW E1Wnuc+GN9vS7MRenKOH+z2UfGuaV BSb8VYFCgoL4RnWLwXAcLlaqw88zlCN89E K6IydaAwNmI/U6nu3oPsVkn8r9+sOX yh9VD01DmSU349QWJvRgt1ocsFI1VTdd6RD kVtu7FdKv4XC5WHcOD7yrEIsVa7+G Qbnm5cCCz8E75HH8vHZAOFeaV3HvIHnh/1R Z+jh4ysyhEmFNOFCn3r9v2yu4kPRX 43xEsB13Ue4HgSbnT+Q7LlEK+dfsmUBoSps S2NAmQOiqGrmmYygT3/V/lSX54hit gli5bvg9DuNHYBwh2C+4nyZF95pMj2dEJf4jN wIDAQABAoIBAAJ9ze06QKDo79p4 3NjFjJhck/NTYB0XslK/+iDhgWt4VogCD6kzG GxsomU2tdOrsq9xIvXcthpeu5IQ 98mrpBhaWNC96JxlOh9O+0q1xNAh8AiH22Q ZGjUTaC8Jfx+B6w+fbkz37os1/+00 6ZajkbChFTfp7r7ANj5wUEoQKZ4vNpLJxLWD k6uH4ZMNveWcBaZQ21TUg9ZmoskK	

EJ2ZEr/3kOSBgi2B6F50zyL8f1mbqPahHNLqt rndV5/Lr4n74TqZXRwt5Cl9GrBv tYXDHc+5Y7e1TUlXV00AMDIk+3cVR8m8Oa2 0tSdXjcw2iUk9brxb4uxreOouGfPW 5lO+q1ECgYEA4Kkok17DVx5FiapFQvJ2Jqi2/ WhzDncuBGbZtcLZnwRVfkPn3cBZ JGNwxYyfEdwItPvTYQYh6Qg81XRdSRfF43G zkQXNmkPOdZM0x3tFwzV6K5Fg7aeR g50UddaA9MraCltOgK++7C6BvA3ImXciK4V WeSZOmDW99Y6mgf92RdkCgYEArB2u /Id72LGQBmx0Z+36Hf1dxo6RQ+dB+m6XBM R8iuB/jGO/5PHdFoKoF2qa9Yj2W1+X B29Xmc1HS6GTvkDIsN5JXNO7fDmlAxd5whb wDdcmv3VEt8xJ2UeACIawjKtVcFoH LRNlvDBttWVvlCZg+9HfVpuPm14oFxN/HtSXt 48CgYACxDJ6thUDspy6mD0oGOI5 kaRHNI0OJYuMhFOz+EVDvwLqfh2RzneKiiru U8/1oVb+G4e7zx6FxxMwsbEgYEmQ hmrmo0Kn3qPhMMHanvr572Oku7KM2p5hF4 MT/GM0IHdU31D1JrTcJap1TVomAaCL FqY88arQFwFSz8HfIe0r6QKBgCbQLtTdzKzq Jdt8+6cwQFYg+9O59MJGVVefNskp chhzVfAX0n9Tl5Lq9fMJ5FX4g+3JGargjfWuG CTTFBk0TM2t4wde7AmwiiivU5LU T2Afo6pLTKrSE9k+yX2iug+O156VfsbIeAm/N g5RCJ91JCvFgULro6/axNmnWORf 9rK7AoGBAIK4edrX1MjerCsLu3y9Dy4pAx6E R6ei4xpkO25U8wUcqqc+YD2m2xlA DjqROITeaxXkmPIyRKAXVarhk8LmXT/oDFU APsTqUZ9LBrviqtMi+G2OFPbdKDwe ZBNAgwFpFlUVoi0UYnZF8rBq0tepqivrayEWd KKfMMJjq+l72SxD -----END RSA PRIVATE KEY----- OK	
AT+CCERTDOWN={non-ascii}"262378344532 443B262378353334453B2E70656D",1918	//download file with ASCII coding file name
>-----BEGIN CERTIFICATE----- MIIFRDCCAyygAwIBAgIIZmPau7FelQswDQY JKoZIhvcNAQELBQAwQDELMAkGA1UE BhMCU0kxGzAZBgNVBAoMEnN0YXRlLWluc 3RpdHV0aW9uczEUMBIGA1UEAwwLVGF4 IENBIFRlc3QwHhcNMTUwNzIzMTUyOTA1Wh cNMzUwNzIzMTUyOTA1WjBAMQswCQYD VQQGEwJTSTEbMBkGA1UECgwSc3RhdGUt aW5zdGl0dXRpb25zMRQwEgYDVQQDDAtU YXggQ0EgVGVzdDCCAiIwDQYJKoZIhvcNAQ	

```
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BPcakfMmhx1cLYdcY5ATXL/n67eo+S+1g7e/s
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Ohxy4cihEPhAg1MKUY9qnbw9
9Q6EKrCSqk3TPqiWrTtu4pxyiEiquCHk8n+HX
```

5cVhxUkaEShdx4bjgvKB7JRF2T2 ST1lrKEM2DY= -----END CERTIFICATE----- OK	
AT+CCERTLIST	//list certificate files
+CCERTLIST: "&#x4E2D;&#x534E;.pem" +CCERTLIST: "client_key.der" OK	

4 Appendix

4.1 Result codes and unsolicited codes

4.1.1 Command result <err> codes

Result codes	Meaning
0	Operation succeeded
1	Alerting state(reserved)
2	Unknown error
3	Busy
4	Peer closed
5	Operation timeout
6	Transfer failed
7	Memory error
8	Invalid parameter
9	Network error
10	Open session error
11	State error
12	Create socket error
13	Get DNS error
14	Connect socket error
15	Handshake error
16	Close socket error
17	Nonet
18	Send data timeout
19	Not set certificates

4.1.2 Unsolicited result codes

Unsolicited codes	Meaning
+CCHEVENT: <session_id>,RECV EVENT	In manual receiving mode, when new data of a

	connection arriving to the module, this unsolicited result code will be reported to MCU.
+CCH_RECV_CLOSED: <session_id>,<err>	When receive data occurred any error, this unsolicited result code will be reported to MCU.
+CCH_PEER_CLOSED: <session_id>	The connection is closed by the server.