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About the Document

History

Revision	Date	Author	Description
1.0	2014-08-01	Chris PENG	Initial
1.1	2015-03-02	Yolanda YAO	<ol style="list-style-type: none">1. Changed the document name from “UG95” to “UGxx”.2. Added AT commands: AT+QISDE, AT+QISENDEX, AT+QICFG
1.2	2015-04-01	Yolanda YAO	Updated applicable modules.

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1 Introduction

UGxx embeds a TCP/IP stack. Host is able to access the Internet directly over AT commands. It can reduce the dependence on the PPP and TCP/IP protocol stack and thus minimize the cost. UGxx provides the following socket services: TCP client, UDP client, TCP server and UDP service.

This document is applicable to UGxx modules.

1.1. The Process of Using TCPIP AT Commands

Through UGxx TCPIP AT commands, host can configure PDP context, activate/deactivate PDP context, start/close socket service and send/receive data via socket service. The general process is shown as follows:

- Step 1:** Configure the <apn>, <username>, <password> and other parameters of a context by AT+QICSGP. If QoS settings need to be updated, configure them by the commands AT+CGQMIN, AT+CGEQMIN, AT+CGQREQ and AT+CGEQREQ.
- Step 2:** Activate PDP context by AT+QIACT, then the assigned IP address can be queried by AT+QIACT?.
- Step 3:** Start a socket service by AT+QIOPEN. The service type can be specified by the parameter <service_type>. The URC "+QIOPEN" indicates whether or not the socket service is started successfully.
- Step 4:** Send and receive data via the socket. UGxx has three kinds of data access mode. The AT command flow may be different according to the data access mode. Please refer to Chapter 1.2 for details. For example, in buffer access mode, you can send data by AT+QISEND. After data has been received, the module will report a URC as +QIURC: "recv", <connectID> to notify host. Then host can retrieve data by AT+QIRD.
- Step 5:** Close the socket service by AT+QICLOSE. Step 3 to Step 5 can be repeated.
- Step 6:** Deactivate PDP context by AT+QIDEACT.

1.2. Description of Data Access Mode

The TCPIP AT commands of UGxx includes three kinds of data access modes:

1. Buffer access mode
2. Direct push access mode
3. Transparent access mode

When opening a socket service via AT+QIOPEN, you can specify the data access mode by the parameter <access_mode>. After a socket service is opened, AT+QISWTMD could be used to change the data access mode.

1. In buffer access mode, send data by AT+QISEND. When the data has been received, the module will buffer the data and report a URC as +QIURC: "recv",<connectID>. Then host can read data by AT+QIRD. Note: If the buffer is not empty, the module will not report a new URC until all the received data has been read by AT+QIRD from buffer.
2. In direct push mode, send data by AT+QISEND. The received data will be output to COM port directly by +QIURC: "recv",<connectID>,<currentrecvlength><CR><LF><data>.
3. In transparent access mode, the corresponding port (such as UART, USB modem port, etc.) enters into the exclusive mode. The data received from COM port will be sent to Internet directly, and the received data from Internet will be output to COM port directly as well. "+++" is used to exit from transparent access mode. When "+++" returns OK, the module will be switched to buffer access mode. AT+QISWTMD can be used to return back to transparent access mode. Note: In transparent access mode, host cannot execute AT command. If the socket connection is closed because of network error or else, the module will report NO CARRIER and exit from the transparent access mode. In this case, AT+QICLOSE should be executed to close socket service.
4. Use "+++" or DTR (AT&D1 should be set) to exit from the transparent access mode. To prevent the "+++" from being misinterpreted as data, it should comply to the following sequence:
 - 1) Do not input any character within T1 time (1 second) before inputting "+++".
 - 2) Input "+++" during 1s, and no other characters can be inputted during this time.
 - 3) Do not input any character within T1 time (1 second) after "+++" has been inputted.
 - 4) Exit from transparent access mode, return OK.
5. There are two methods to return back to the transparent access mode:
 - 1) By AT+QISWTMD. Specify the <access_mode> as 2. If it enters into transparent access mode successfully, CONNECT will be returned.
 - 2) By ATO. ATO will change the access mode of connection that exits from transparent access mode lately. If it enters into transparent access mode successfully, CONNECT will be returned. If there is no connection enters transparent access mode before, ATO will return NO CARRIER.

2 Description of AT Command

2.1. AT+QICSGP Configure Context

Configure the <apn>, <username>, <password> and other context by AT+QICSGP. The QoS of the context can be configured by AT+CGQMIN, AT+CGEQMIN, AT+CGQREQ and AT+CGEQREQ.

AT+QICSGP Configure Context

Test Command AT+QICSGP=?	Response +QICSGP: (1-20),1-IPV4,<apn>,<username>,<password>,(0-3) OK
Query the configuration of context AT+QICSGP=<contextID>	Response +QICSGP: <context_type>,<apn>,<username>,<password>,<authentication> OK
Write Command, configure the context AT+QICSGP=<contextID>,<context_type>,<apn>,<username>,<password>,<authentication>]]	Response OK ERROR

Parameter

<contextID>	Integer type, context ID, range is 1-20
<context_type>	Integer type, protocol type 1 IPV4
<apn>	String type, access point name
<username>	String type, user name
<password>	String type, password
<authentication>	Integer type, the authentication methods 0 NONE 1 PAP

-
- 2 CHAP
 - 3 PAP_OR_CHAP
-

Example

```

AT+QICSGP=1 //Query the configurations of context 1.
+QICSGP: 1,"","","",0

OK
AT+QICSGP=1,1,"UNINET","","",1 //Configure context 1, APN is "UNINET" for China Unicom.

OK

```

2.2. AT+QIACT Activate PDP Context

Before activating context by AT+QIACT, host should configure the context by AT+QICSGP. After activation, the IP address can be queried by AT+QIACT?. The range of <contextID> is 1-20, but the maximum number of context which can be activated at the same time is 3. Depending on the network, it may take at most 150 seconds to return OK or ERROR after executing AT+QIACT. Before the response is returned, other AT commands cannot be executed.

AT+QIACT Activate PDP Context

Test Command AT+QIACT=?	Response +QIACT: (1-20) OK
Read Command AT+QIACT?	Response Return the list of the current activated context and its IP address: [+QIACT: 1,<context_state>,<context_type>,<IP_address> [.....] +QIACT: 20,<context_state>,<context_type>,<IP_address>] OK
Write Command AT+QIACT=<contextID>	Response Activate the context of specified <contextID>: OK ERROR

Maximum Response Time	150 seconds, determined by network.
-----------------------	-------------------------------------

Parameter

<contextID>	Integer type, context ID, range is 1-20
<context_state>	Integer type, context state 0 Deactivated 1 Activated
<context_type>	Integer type, protocol type <u>1</u> IPV4
<IP_address>	The local IP address after context is activated

2.3. AT+QIDEACT Deactivate PDP Context

AT+QIDEACT will deactivate the specific context <contextID> and close all TCPIP connections set up in this context. Depending on the network, it may take at most 40 seconds to return OK or ERROR after executing AT+QIDEACT. Before the response is returned, other AT commands cannot be executed.

AT+QIDEACT Deactivate PDP Context

Test Command AT+QIDEACT=?	Response +QIDEACT: (1-20) OK
Write Command AT+QIDEACT=<contextID>	Response OK ERROR
Maximum Response Time	40 seconds, determined by network.

Parameter

<contextID>	Integer type, context ID, range is 1-20
-------------	---

2.4. AT+QIOPEN Start Socket Service

Start a socket service by AT+QIOPEN. The service type can be specified by the parameter <service_type>. The data access mode (buffer access mode, direct push access mode and transparent access mode) can be specified by parameter <access_mode>. The URC "+QIOPEN" indicates whether or not the socket service is started successfully.

1. If <service_type> is "TCP LISTENER", module works as TCP SERVER. After accepting a new TCP connection, module will auto specify a <connectID> and report URC as +QIURC: "incoming",<connectID>,<serverID>,<remotelP>,<remote_port>. The range of <connectID> is 0-11. The <service_type> for this new incoming connection is "TCP INCOMING" and the <access_mode> is buffer access mode.
2. If <service_type> is "UDP SERVICE", UDP data can be sent to and received from the remote IP via <local_port>.
 - Send data: AT+QISEND=<connectID>,<send_length>,<remotelP>,<remote_port>.
 - Receive data in direct push access mode: report URC as +QIURC: "recv",<connectID>,<currentrecvlenght>,<remotelP>,<remote_port><CR><IF><data>.
 - Receive data in buffer access mode: report a URC as +QIURC: "recv",<connectID>, then retrieve data by AT+QIRD=<connectID>.
3. The maximum timeout of TCP connect is 75 seconds.

AT+QIOPEN Startup Socket Service

Test Command AT+QIOPEN=?	Response +QIOPEN: (1-20),(0-11),"TCP/UDP/TCP LISTENER/UDP SERVICE", "<IP_address>/<domain_name>",<remote_port >,<local_port>,(0-2) OK
Read Command AT+QIOPEN?	Response OK
Write Command AT+QIOPEN=<contextID>,<connectID >,<service_type>,<IP_address>/<dom ain_name>,<remote_port>[,<local_po rt>,<access_mode>]	Response If the <access_mode> is transparent access mode and it is successful to start the service, response: CONNECT Else, response: ERROR Error description can be got via AT+QIGETERROR.

	<p>If the <access_mode> is buffer access mode or direct push mode, response:</p> <p>OK</p> <p>+QIOPEN: <connectID>,<err></p> <p><err> is 0 when service is set up successfully, else <err> is not 0.</p>
Maximum Response Time	150 seconds, determined by network.

Parameter

<contextID>	Integer type, context ID, range is 1-20
<connectID>	Integer type, socket service index, range is 0-11
<service_type>	String type, socket service type "TCP" Start up a TCP connection as a client "UDP" Start up a UDP connection as a client "TCP LISTENER" Start up a TCP server to listen TCP connection "UDP SERVICE" Start up a UDP service
<IP_address>	String type If <service_type> is TCP or UDP, it indicates the IP address of remote server, such as "124.74.41.170" If <service_type> is TCP LISTENER or UDP SERVICE, please enter "127.0.0.1"
<domain_name>	String type, the domain name address of the remote server
<remote_port>	The port of the remote server, only valid when <service_type> is "TCP" or "UDP"
<local_port>	The local port If <service_type> is "TCP LISTENER" or "UDP SERVICE", this parameter must be specified If <service_type> is "TCP" or "UDP", <local_port> is 0, then the local port will be assigned automatically, else the local port is assigned as specified
<access_mode>	Integer type, the data access mode of the socket services 0 Buffer access mode 1 Direct push mode 2 Transparent access mode
<err>	Integer type, error code. Please refer to Chapter 3.

2.5. AT+QICLOSE Close Socket Service

Close the specified socket service by AT+QICLOSE. Depending on the Network, it may take some time to return OK or ERROR after executing AT+QICLOSE. Before the response is returned, other AT

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