AT Commands Examples

Examples for
u-blox GSM/GPRS modules

Application Note

Abstract

This document provides detailed examples of how to use AT commands with u-blox GSM/GPRS modules.

u-blox

Document Information

Title	AT Commands Examples
Subtitle	Examples for u-blox GSM/GPRS modules
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Contents

1 Introduction

This document provides examples of using AT commands. .

2 Parameter saving

Save parameters in the Non Volatile Memory (NVM). Retrieve parameters from NVM. For further details refer to the command description of AT+CPWROFF, AT&V, AT&W, ATY in the u-blox AT Commands Manual [1].

Command	Response	Description
AT+CMEE=2	OK	Set verbose error messages
AT&K0	OK	Disable flow control for the current profile
AT&Y1	OK	Select the default profile that will be automatically loaded after the next hardware reset (in this example profile #1)
AT&W1	OK	Store the current settings into profile 1
AT&V	ACTIVE PROFILE: &C1, &D1, &K3, E1, Q0, V1, X4, S00:000, S02:043, S03:013, S04:010, S05:008, S07:060, +CBST:007, 000, 001, +CRLP:061, 061, 048, 006, +CR:000, +CRC:000, +BR:115200, +COPS:0, FFFFF, +ICF:3,1, +UPSV: 1,1 STORED PROFILE 0: &C1, &D1, &K3, E1, Q0, V1, X4, S00:000, S02:043, S03:013, S04:010, S05:008, S07:060, +CBST:007, 000, 001, +CRLP:061, 061, 048, 006, +CR:000, +CRC:000, +BR:115200, +COPS:0, FFFFF, +ICF:3,1, +UPSV: 1,1 STORED PROFILE 1: &C1, &D1, &K0, E1, Q0, V1, X4, S00:000, S02:043, S03:013, S04:010, S05:008, S07:060, +CBST:007, 000, 001, +CRLP:061, 061, 048, 006, +CR:000, +CRC:000, +BR:115200, +COPS:0, FFFFF, +ICF:3,1, +UPSV: 1,1 OK	Display both the current profile and the user profiles stored in memory
AT+CPWROFF	OK	To reload the stored configuration it is needed to switch off the module

3 Network Registration and Configuration

The following steps are necessary to establish a data connection (FTP, HTTP, SMTP, TCP/IP examples):

3.1 Steps performed to establish a data connection:

1. Set verbose error messages

2. Check the PIN

3. Check network registration status

4. Configure GPRS

5. Activate the GPRS connection (PDP context)

Command	Response	Description
AT+CMEE=2	OK	Set verbose error messages
AT+CPIN?	+CPIN: SIM PIN OK	Check the PIN
AT+CPIN="1234"	OK	Define PIN
AT+CPIN?	+CPIN: READY OK	Check PIN Note: Ok, the PIN is ready

Check network registration (first scenario)

Command	Response	Description
AT+COPS?	+COPS: 0,0,"vodafone IT" OK	Check network registration status Note: OK, the module is registered to GSM service
AT+CGATT?	+CGATT: 1 OK	Check GPRS attach status Note: OK, the module is GPRS attached

Check network registration (second scenario)

Command	Response	Description
AT+COPS?	+COPS: 2 OK	Check network registration status Note: the module is NOT registered to GSM service
AT+COPS=0	OK	Force network registration
AT+COPS?	+COPS: 0,0,"vodafone IT" OK	Check network registration status Note: OK, the module is registered to GSM service
AT+CGATT?	+CGATT: 1 OK	Check GPRS attach status Note: OK, the module is GPRS attached
		Create a GPRS connection profile for TCP/IP with the +UPSD command. This will be made in 2 steps: 1. Setup APN 2. Specify to use the dynamic IP address assignment Note: AT+UPSD command does not affect the GPRS profiles created with +CGDCONT command

Command	Response	Description
`AT+UPSD=0,1,"web.omnitel.it"`	OK	Setup APN Note: APN "web.omnitel.it" is an example only. Use your APN operator
`AT+UPSD=0,7,"0.0.0.0"`	OK	Setup the dynamic IP address assignment
`AT+UPSDA=0,1`	OK	Save GPRS profile in the NVM Note: this step is not mandatory Note: in this example the GPRS profile is stored in profile number 0
`AT+UPSDA=0,3`	OK	Activate the GPRS connection
`AT+UPSND=0,0`	+UPSND: 0,0,"93.68.225.175" OK	Check the assigned IP address Note: in this example is requested the assigned dynamic IP address

4 TCP/IP AT Commands

Before doing this example, verify that the module is registered on the network, and a GPRS connection is active. Follow the steps in "Network Registration and Configuration" (chapter 3).

SOCKET CONNECT

Command	Response	Description
`AT+USOCR=6`	+USOCR: 0 OK	Create TCP socket. In this example Socket #0 is created. +USOCR: 0 response returns the created socket identifier (in this example #0). If a new socket is created (without closing the already existent), a new socket identifier will be returned
`AT+USOCR=6`	+USOCR: 1 OK	Create a second socket. This socket has the ID #1
`AT+USOCL=1`	OK	Close the socket identifier 1. Socket #1 is free.
`AT+UDNSRN=0,"ftp.test.neonseven.com"`	+UDNSRN: "151.9.34.66" OK	DNS resolution of the url "ftp.test.neonseven.com"
`AT+USOCO=0,"151.9.34.66",444`	OK	Connect to server with IP address 151.9.34.66, port 444. The connection is now uniquely associated to the socket. Socket is now ready for read / write of data
`AT+USOCO=0,"151.9.34.66",444`	ERROR +UUSOCL: 0	If the connection is not successful, an ERROR response is returned and the socket used for the connection attempt <u>is closed</u>. The notification is provided by the URC +UUSOCL.

SOCKET LISTENING

Command	Response	Description
`AT+USOCR=6`	+USOCR: 0 OK	Create a TCP socket with ID #0

SOCKET LISTENING

Command	Response	Description
AT+USOLI=0,1099	OK	Set socket in listening mode on port 1099
		WARNING: The ability to reach the opened port on the server depends also on the network operator. Some network operators will not allow incoming connection on opened TCP port
	+UUSOLI: 1,"151.9.34.66",39912,0, "151.9.34.74",1099	When a connections request arrives from a remote server, a new socket is created with the first integer identifier available, after the one of the listening socket. In this example socket ID is #1
		+UUSOLI indicates:
		1: the new socket created.. Incoming data from the established connection will be received on this socket. Data to be sent over the connection must be written into this socket
		151.9.34.66: IP of the remote server
		39912: port of service
		0: listening socket. It is the socket identifier specified with the AT+USOLI command
		151.9.34.74: IP address of the module
		1099: listening port assigned to the connection. Returned with AT+USOLI command
		Socket #1 is now ready for reading/writing data
	+UUSORD: 1,18	18 bytes of incoming data over the previously established connection.
		Note that data arrives on socket identified by integer number 1 not on socket identified by integer number 0. The incoming data will be sent always on the related socket.

SOCKET WRITE (binary mode)

AT+USOWR=0,2	@	Request to write 2 bytes of data into socket #0. Wait "@" symbol indicating the data prompt is now open (AT commands are not allowed after the data prompt)
12	+USOWR: 0,2 OK	Write data. After the last byte the data prompt is closed.
		It is not allowed to write fewer bytes than previously specified with AT+USOWR command.
		If more bytes are written with respect to the threshold, the remaining bytes will be truncated
		The interface is blocked until all bytes are written.
		URC +USOWR: 0,2 and OK are returned. This indicates that data sent to lower level of protocol stack. This is not an acknowledgment that data is received by the remote server..

SOCKET WRITE (Base syntax)

Command	Response	Description
AT+USOWR=0,2"12"	+USOWR: 0,2 OK	Write 2 bytes of data on socket #0. URC +USOWR: 0,2 and OK are returned. This indicates that data is sent to lower level of protocol stack. This is not an acknowledgment that data are received by the remote server. Note: Some characters are not allowed in Base syntax mode. Check the AT manual for the allowed characters.

SOCKET WRITE, GSM network coverage lost

scenario 1：Network coverage lost after AT+USOWR command

Command	Response	Description
AT+CREG=1	OK	Enable network registration URC
AT+USOCO=0,"151.9.34.66",444	OK	Connect socket #0 to the server with IP address 151.9.34.66 on port 444. The socket is now ready for read / write data
AT+USOWR=0,3	@	Request to write 3 bytes of data into socket #0. Wait for "@" symbol indicating the data prompt is now open (AT commands are not allowed after the data prompt)
123	+USOWR: 0,3 OK	Write data. After the last byte the data prompt is closed **It is not allowed to write fewer bytes than previously specified with AT+USOWR command.** The interface is blocked until all bytes are written. URC +USOWR: 0,2 and OK are returned. Data sent to lower level of protocol stack. This is not an acknowledgment that data are received by the remote server the socket is connected to.
	+UUSORD: 0,3	Remote TCP test server sent back data
		Coverage lost may be simulated by disconnecting the antenna from the modem. In this case it is not possible to have GSSM&GPRS signal coverage
	+CREG: 2	Module is not registered on a mobile network. Currently in "search"-mode
AT+USOWR=0,2	@	Request to write 2 bytes of data into socket #0. Wait for "@" symbol indicating the data prompt is now open (AT commands are not allowed after the data prompt)

SOCKET WRITE, GSM network coverage lost

scenario 1：Network coverage lost after AT+USOWR command

Command	Response	Description
12	+USOWR: 0,2 OK	Write data. After the last byte the data prompt is closed **It is not allowed to write fewer bytes than previously specified with AT+USOWR command .** URC +USOWR: 0,2 and OK are returned. Data sent to lower level of protocol stack. This is not an acknowledgment that data are received by the remote server the socket is connected to. It is not possible to give further AT-commands until all bytes are written. Coverage lost may be simulated by disconnecting the antenna from the modem.
	+CREG: 1	Module found network and is registered
	+UUSORD: 0,2	Remote TCP test server sent back data This means data has been sent immediately after out of service condition ended

SOCKET WRITE, network GSM network coverage lost

scenario 2：Network coverage lost during a AT+USOWR command

Command	Response	Description
AT+CREG=1	OK	Enable network registration URC
AT+USOCO=0,"151.9.34.66",444	OK	Connect socket #0 to the server with IP address 151.9.34.66 on port 444 The socket is now ready for read / write data
AT+USOWR=0,100	@	Request to write 100 bytes of data into socket #0. Wait for "@" symbol indicating the data prompt is now open (AT commands are not allowed after the data prompt)
ggggggggggggggggggggggggg	+CREG: 2	Module loses the network while writing data in data prompt mode. If URC is enabled an URC is returned in the byte stream.
ggggggggggggggggggggggggggggg ggggggggggggggggggggggggggggg ggggggggggggggggg	+USOWR: 0,100 OK	Continue writing data. After the last byte the data prompt is closed. The command is blocking until the data writing is not finished URC +USOWR: 0,2 and OK are returned. Data sent to lower level of protocol stack. This is not an acknowledgment that data are received by the remote server the socket is connected to
	+CREG: 1	Module found network and is registered

SOCKET WRITE, GSM network coverage lost

scenario 1 : Network coverage lost after AT+USOWR command

Command	Response	Description
	+UUSORD: 0,100	Remote TCP test server sent back data.
		Data has been sent immediately when the module has registered on the network

Socket operations with "KEEP ALIVE" OPTION

Note:

- In "keep Alive" mode, module periodically sends dummy TCP packets. This is to prevent the network from closing inactive context

- network operator may close inactive TCP connections without notifying it to the mobile

Command	Response	Description
AT+USOCR=6	+USOCR: 0 OK	Create a TCP socket #0
AT+USOSO=0,6,2,3000	OK	Enable "keep alive" option. Module periodically sends dummy TCP packets over TCP connection. This prevents network operator from closing inactive connections. **0**: socket number you want to set to enable keep alive option **30000**: module will send dummy TCP packets every 30000 milliseconds

SOCKET READ (first scenario)

Command	Response	Description
		Remote server sends 2 bytes of data on socket #0.
	+UUSORD: 0,2	A URC is returned indicating the socket on which the data is received and the total amount of data received.
AT+USORD=0,2	+USORD: 0,2,"ar" OK	Read data. Data is returned between quotation marks.

SOCKET READ (second scenario)

Command	Response	Description
		Remote server sends 30 bytes of data on socket #0.
	+UUSORD: 0,30	A URC is returned indicating the socket on which the data is received and the total amount of data.
AT+USORD=0,10	+USORD: 0,10,"hfgyrhgfty" OK	Read only part of the data (in this example 10 bytes of data are read)
		Data is returned between quotation marks.
	+UUSORD: 0,20	A URC with the remaining data to be read in the buffer (in this example 20 bytes of data remain in the socket)

SOCKET READ (third scenario)

Command	Response	Description
		Remote server sends 30 bytes of data on socket #0.
	+UUSORD: 0,30	A URC is returned indicating the socket on which the data is received and the total amount of data.
AT+USORD=0,10	+USORD: 0,10,"hfgyrhgfty" OK	Only part of the data (in this example 10 bytes of data are read)
	+UUSORD: 0,25	
		Data is returned between quotation marks.
		Remote server sends more data after the first part is received. URC +UUSORD indicates the total amount of data present in the buffer after last AT+USORD execution. In this example 25 bytes are in the buffer, 10 bytes were already read.
AT+USORD=0,10	+USORD: 0,10,"hfgbchs7[o" OK	Only part of the data (in this example 10 bytes of data are read)
		Data is returned between quotation marks.
	+UUSORD: 0,34	Remote server sends more data after the first part is received.URC +UUSORD indicates the total amount of data present in the buffer after last AT+USORD execution. In this example 34 bytes are in the buffer, 10 bytes were already read.
AT+USORD=0,34	+USORD: 0,34,"jghfbv74ksHDFUEçpjè0'@è pyujfnvhfyù" OK	All data bytes are read
AT+USORD=0,0	+USORD: 0,24 OK	Verifies how much unread data is in the buffer. In this example 24 bytes are in socket #0

SOCKET CLOSE (by remote server)

Command	Response	Description
	+UUSOCL: 1	Indication of connection closed by remote server
		WARNING: URC is returned only when all data is read. This means that this URC will not be returned as long as there are bytes of data in the socket.

SOCKET CLOSE (by the module)

Command	Response	Description
AT+USOCL=0	OK	Socket closed by the module (socket #0).
		WARNING: No +UUSOCL URC is returned

CONTEXT DEACTIVATION (by the network)

Command	Response	Description
	+UUPSDD: 0	URC indicating that PDP context #0 is closed by the network

Note:

- Open sockets are now invalid. Close them and reinitialize TCP connections

CONTEXT DEACTIVATION (by the module)

Command	Response	Description
AT+UPSDA=0,4	OK	Detach the GPRS connection identified by integer number 0 with the +UPSDA command Note: the specified profile will be deactivated

Note:

- Open sockets are now invalid. Close them and reinitialize TCP connections.

5 UDP/IP AT Commands

UDP SOCKET WRITE

Command	Response	Description
AT+USOCR=17	+USOCR: 0 OK	Create a UDP socket. In this example Socket #0 is created. +USOCR: 0 response returns the created socket identifier (in this example #0). If a new socket is created (without closing the already existent), a new socket identifier will be returned
AT+USOCR=6	+USOCR: 1 OK	Create a TCP socket (socket #1 is created, socket #0 is already open)
AT+USOCL=1	OK	Close the socket #1
AT+USOCO=0,"151.9.34.66",443	OK	Specify IP address of the remote server and TCP port where UDP packets have to be sent. Reception of UDP packets is not guarantied. **+USOCO does not establish a connection** Socket is now ready to read / write data to the remote server or for receiving data from the remote server
AT+USOWR=0,2	@	Request to write 2 bytes of data into socket #0. Wait for "@" symbol, indicating the data prompt is now open (AT commands are not allowed after the data prompt)

UDP SOCKET WRITE

Command	Response	Description
12	+USOWR: 0,2 OK	Write data. After the last byte the data is written, the prompt is closed. **It is not possible to write a number of bytes smaller then the one previously specified with AT+USOWR command.** URC +USOWR: 0,2 and OK are returned. This means the data is sent to lower level of protocol stack. This is not an acknowledgment that data are received by the remote server the socket is connected to.

UDP SOCKET READ (reading data)

Command	Response	Description
		UDP packet with 2 bytes of data received from remote server
	+UUSORD: 0,2	A2 bytes of data has been received
AT+USORD=0,2	+USORD: 0,2,"23" OK	Read the data
		UDP packet with 20 byte of data received from remote server
	+UUSORD: 0,20	20 bytes of data has been received
AT+USORD=0,10	+USORD: 0,10,"1234567890" OK +UUSORD: 0,10	Read 10 bytes of data. URC indicates that 10 bytes are still unread.
		UDP packet with 20 byte of data received from remote server
AT+USORD=0,10	+USORD: 0,10,"1234567890" OK +UUSORD: 0,20	Read the remaining 10 bytes of data of the previous packet. URC indicates that another packet with 20 bytes of data has been received.
		Note: after the first URC has been returned, a second URC is returned (only after a reading operation) indicating: - If a reading of a packet is not finished it will be provided the remaining data of the specific packet - Otherwise it will provide the number of packets to be read present in the buffer

Note:

- With UDP it is not possible to receive data if a data transmission has not already been performed
- It is not possible to do SOCKET LISTEN with UDP socket
- UDP packets can be received only after the first packet had been received from server

6 FTP AT Commands

Make sure to follow the steps in "Network Registration and Configuration" (chapter 3) before using the AT commands in this chapter.

First do preliminary configuration:
1. Set verbose error messages
2. Check the PIN
3. Attach to the network

Command	Response	Description
		Configure the parameters needed to connect to the FTP server using the +UFTP command These parameters will be set:
AT+UFTP=1,"ftp.test.neonseven.com"	OK	• FTP server hostname
AT+UFTP=2,"anonymous"	OK	• FTP username
AT+UFTP=3,"user@somedomain.com"	OK	• FTP password
AT+UFTP=6,0	OK	• FTP connection mode (ACTIVE connection)
AT+UDNSRN=0,"ftp.test.neonseven.com"	+UDNSRN: "216.239.59.147" OK	Resolve the hostname
AT+UFTPC=1	OK +UUFTPCR: 1,1	Connect to the server and manage the FTP Connection using the +UFTPC command. Let's start connecting to the server URC +UUFTPCR is returned when the connection is established
AT+UFTPC=13	OK +UUFTPCD: 13,194,"-rw-r--r-- 1 ftp ftp 1037 Aug 5 09:45 dat_000 -rw-r--r-- 1 ftp ftp 21041 Aug 5 09:12 data.zip -rw-r--r-- 1 ftp ftp 12 Aug 5 09:42 xlog.zip " +UUFTPCR: 13,1	Request the file-list on the server
AT+UFTPC=10,"uploads"	OK +UUFTPCR: 10,1	Create a new directory on the FTP server
AT+UFTPC=13	OK +UUFTPCD: 13,258,"-rw-r--r-- 1 ftp ftp 1037 Aug 5 09:45 dat_000 -rw-r--r-- 1 ftp ftp 21041 Aug 5 09:12 data.zip drwxr-xr-x 2 ftp ftp 4096 Aug 5 09:48 uploads -rw-r--r-- 1 ftp ftp 12 Aug 5 09:42 xlog.zip " +UUFTPCR: 13,1	Request again the file list
		Change directory to directory name "uploads"

Command	Response	Description
AT+UFTPC=8,"uploads"	OK +UUFTPCR: 8,1	Note: to return back in the parent directory use AT+UFTPC=8,".."
AT+UFTPC=5,"gps_positions","g ps_positions"	OK +UUFTPCR: 5,1	File from the module to FTP server from local file the module (in this example filename "gps_positions")
AT+UFTPC=13	OK +UUFTPCD: 13,70,"-rw-r--r-- 1 ftp ftp 176673 Aug 5 10:03 gps_positions" +UUFTPCR: 13,1	Request the file list
AT+UFTPC=8,".."	OK +UUFTPCR: 8,1	Return to the parent directory
AT+UFTPC=4,"data.zip","data.z ip"	OK +UUFTPCR: 4,1	Download a file from the FTP server to the local file system of the module
AT+UFTPC=0	OK +UUFTPCR: 0,1	Disconnect from FTP server
AT+UPSDA=0,4	OK	Detach the GPRS connection with the +UPSDA command Note: the specified profile will be deactivated

☞ To list and view all files stored in the wireless module file system, refer to chapter 14.

7 SMTP AT Commands

Make sure to follow the steps in "Network Registration and Configuration" (chapter 3) before using the AT commands in this chapter.

Command	Response	Description
		Set up the necessary parameters for SMTP using the +USMTP.
AT+USMTP=1,"smtp.mail.yahoo.c om"	OK	1. SMTP server hostname
AT+USMTP=4,0	OK	2. Authentication type (no authentication)
AT+USMTP=5,3600	OK	3. Inactivity timeout
AT+UDNSRN=0, "smtp.mail.yahoo .com"	+UDNSRN: "69.147.102.58" OK	Resolve the hostname
		Prepare the mail envelope and body using the +USMTPM command
AT+USMTPM	OK	4. Reset all the parameters
AT+USMTPM=0,"test.sender@yaho o.com"	OK	5. Set up mail sender address
AT+USMTPM=1,"test.sender@yaho o.com"	OK	6. Set up the reply-to mail address
		7. Set up the mail receiver address
AT+USMTPM=2,"receiver@somedom ain.com"	OK	Note: the specified mail addresses only examples. Use real email addresses

Command	Response	Description
`AT+USMTPM=3,"This is the subject of the email"`	`OK`	8. Set up the mail subject
`AT+USMTPM=4,"This is the body text of the email"`	`OK`	9. Set up the mail text
`AT+USMTPM=5,"screenshot.jpg", 2,"jpg"`	`OK`	10. Set up the attachment stored in file system Note: "screenshot.jpg" is a filename for example only. Specify filenames stored into the file system
		Send the email using the +USMTPC command. To send an email it is needed to:
`AT+USMTPC=1`	`OK` `+UUSMTPCR: 1,1`	1. Connect to the SMTP server
`AT+USMTPC=2`	`OK` `+UUSMTPCR: 2,1`	2. Send the email
`AT+USMTPC=0`	`OK` `+UUSMTPCR: 0,1`	3. Disconnect from the SMTP server Note: the notification of the success of the operation is provided by the reception of the URC +UUSMTPCR
`AT+USMTPM`	`OK`	Reset the mail parameters
`AT+UPSDA=0,4`	`OK`	Finally detach the GPRS connection with the +UPSDA command Note: the specified profile will be deactivated

8 HTTP AT Commands

Make sure to follow the steps in "Network Registration and Configuration" (chapter 3) before using the AT commands in this chapter.

Command	Response	Description
`AT+CMEE=2`	`OK`	Set verbose error messages
`AT+UHTTP=0`	`OK`	Reset HTTP profile #0

`AT+UHTTP=0,1,"www.test.neonse ven.com"`
 	
`AT+UHTTP=0,4,80`
	`OK`
	
	`OK`
		Set the server domain name and port

`AT+UDNSRN=0, "www.test.neonse ven.com"`	`+UDNSRN: "151.9.34.66"` `OK`	DNS resolution of www.test.neonseven.com

`AT+UHTTPC=0,0,"/","head.ffs"`	`OK`
	
	`+UUHTTPCR=0,0,1`
		HEAD request of default page and store the result into the "head.ffs" file on local file system of the module. UUHTTPCR notifies success/failure of the operation (in this example: success)

`AT+UHTTPC=0,1,"/","get.ffs"`	`OK`
	
	`+UUHTTPCR=0,1,1`
		GET request of default page and store the result into the "get.ffs" file on local file system of the module. +UUHTTPCR notifies success/failure of the operation (in this example: success)

Command	Response	Description
AT+UHTTPC=0,5,"/test/plain/method_post.php","post.ffs","name_post=MyName&age_post=30",0	OK +UUHTTPCR=0,5,1	OST request sending data using content type application/x-www-form-urlencoded. The result is saved in "post.ffs" file on local file system of the module. +UUHTTPCR notifies success/failure of the operation (in this example: success)
AT+UHTTP=0,2,"test_user" AT+UHTTP=0,3,"P455w0rd" AT+UHTTP=0,4,1	OK OK OK	Set authentication for HTTP server 1. HTTP server username 2. HTTP server password 3. HTTP server authentication method (basic authentication)
at+uhttpc=0,5,"/test/auth/method_post.php","post_auth.ffs","name_post=MyName&age_post=26",0	OK +UUHTTPCR=0,5,1	The 6th character of the password is a zero POST request sending data using content type application/x-www-form-url encoded The page requires basic authentication The result is saved in "post_auth.ffs" file on local file system of the module. +UUHTTPCR notifies success/failure of the operation (in this example: success)

Note: To list and view all files stored in the wireless module file system, refer to chapter 14.

9 GPS AT Commands

Using AT-commands in this chapter can create / use several files on the local file system:

- gps_profile (contains the GPS settings, e.g. AssistNow servers parameters);
- xxxxxx.alp (almanac file for AssistNow Offline);
- GPS_YYYYMMDD_nnn (GPS log on File System: YYYYMMDD is the date, nnn is an incremental index).

Before doing these examples, make sure the module is registered on the network. Follow the steps in "Network Registration and Configuration" (chapter 3).

9.1 Using GPS without aiding support

Once GPS is on, it is not possible to restart it in another mode without first shutting it down.

Local Aiding action can be executed when the GPS is on by using +UGAOS command.

Command sent by DTE (user)	DCE Response (modem)	Description
AT+UGPS=1,0	OK	Start up the GPS
AT+UGRMC?	+UGRMC: 1,$GPRMC,,V,,,,,,,,,,N*53	Check if GPS data are sent from GPS to GSM by I2C and see if a fix has been made
AT+UGPS=0	OK	Stop the GPS

9.2 Using GPS with local aiding support

When local aiding is enabled the wireless module at shut down will download position, time, ephemeris, almanac and health, and ionospheric parameters from the GPS receiver. At the same time, the GSM network location (e.g. Cell ID) will be saved. At subsequent start up this data is uploaded to the GPS receiver: the wireless module uses the last known position and adjusts the accuracy figure assuming the dynamics of a fast moving vehicle (e.g. 150 km/h). If however, the Cell ID has not changed, the last known position is used with an accuracy figure of a maximum cell coverage radius (30 km). In case of no knowledge of the previous position, a central position of the network should be used (e.g. Rome for Italian networks) with the accuracy figure reflecting the uncertainty (e.g. a few 100 km in case of Italy).

Command sent by DTE (user)	DCE Response (modem)	Description
AT+COPS?	+COPS: 0,0,"vodafone IT"	Check if the modem is registered on a GSM network (GPS local aiding will use GSM information to reduce TTFF)
AT+UGPS=1,1	OK	Start up the GPS with local aiding (it will download orbits, time and position to GPS if available in file system, otherwise it will use country code information for a rough localization)
AT+UGRMC?	+UGRMC: 1,$GPRMC,102140.00,A,4542.852 11,N,01344.44959,E,0.356,34.9 2,261009,,,A*57	Wait at least 15' for ephemeris download
AT+UGPS=0	OK	Stop the GPS. Automatically the module will create some file hidden to the user: ubx_aid_ini.dat, ubx_aid_eph.dat, ubx_aid_hui.dat, ubx_aid_alm.dat and local_aid_info.bin (contains GPS coordinate, GPS time, fix accuracy, system time, GSM cell info)

9.3 Using GPS with AssistNow Offline support

In case of AssistNow Offline, a file with **almanacplus** data must be in the local file system. If the file is not there, the module will try to download it from a server.

If download fails, the system will automatically retry the download according to the parameter specified by +UGAOF command. In case of error, GPS will be started anyway, but no AssistNow Local is not possible.

Command sent by DTE (user)	DCE Response (modem)	Description
AT+UPSDA=0,3	OK	Activate the GPRS connection using the +UPSDA command (needed only if there is no valid almanac file in file system)
AT+UGOAF?	+UGAOF: "http://alp.u-blox.com/current_14d.alp",0,1 ,3	Check if AssistNow Offline is configured (eventually configure it) (needed only if there is no valid almanac file in file system)
AT+UGPS=1,2	OK	Start up the GPS with AssistNow Offline aiding (it will download to file system the .alp field from the specified server if there is no file on file system)
AT+UGPS=0	OK	Stop the GPS.

9.4 Using GPS with AssistNow Online support

In this mode a UDP connection is made with either the u-blox AssistNow Online Server (agps.u-blox.com) or a configurable proxy server.

In case of no response to AssistNow Online the wireless module will make 3 retry (at intervals of 10 s, 30 s and 60 s respectively).

Authentication for u-blox AssistNow Online Server (agps.u-blox.com) is done at the beginning of a server access to the u-blox AssistNow server by sending the information listed below:

- Exor of IMSI and IMEI
- Home network code (not IMSI)
- MCC, MNC, LAC, CI, TA of cell used by LEON and neighboring cells
- Latency

After a successful (=GPS Fix OK) Assistance, the module provides the information below back to the server, for quality monitoring purposes:

- Exor of IMSI and IMEI
- Calculated position after aiding
- Position accuracy
- Number of SV used
- TTFF

Command sent by DTE (user)	DCE Response (modem)	Description
AT+UPSDA=0,3	OK	Activate the GPRS connection using the +UPSDA command
AT+UGOAP?	+UGAOP: "agps.u-blox.com",46434,1000,0	Check if AssistNow Online is configured. (if not, than needs to be configured first)
AT+UGPS=1,4	OK	Start up the GPS with AssistNow Online aiding (it will send to the server GSM cell info and will receive back aiding data for the GPS)
AT+UGPS=0	OK	Stop the GPS.

9.5 Additional GPS AT commands

GPS data can be redirected from I2C to a MUX virtual channel, or be written in a file in file system, or sent over the air. These mode can be combined.

File-size of log-file is limited to 500 Kb. If there is no more space in file system, the file is closed and no more logs are recorded. Output configuration can be done only when GPS is off.

Command sent by DTE (user)	DCE Response (modem)	Description
AT+UGPRF=4	OK	Enable GPS trace on file system.
AT+UPSDA=0,3	OK	Activate the GPRS connection using the +UPSDA command
AT+UGPS=1,0	OK	Start up the GPS without aiding
AT+UGAOS=4	OK	Force AssistNow Onine and wait some minutes.
AT+UGPS=0	OK	Stop the GPS.
AT+ULSTFILE=	"gps_profile","GPS_20040101_001"	Check if trace file has been generated
AT+UGPRF=6	OK	Start the mux driver on host and then enable GPS communication on MUX and trace on file system.
AT+UGPS=1,0	OK	Start up the GPS without aiding, the GPS output will be visible on DLC1 (1st mux channel)
AT+UGAOS=0	OK	Force local aiding data download
AT+UGPS=0	OK	Stop the GPS.
AT+ULSTFILE=	"gps_profile","GPS_20040101_002","GPS_20040101_001"	Check if trace file has been generated

10 Network Congestion Detection AT Commands

Command	Response	Description
AT+CMEE=2	OK	Set verbose error messages
AT+UCD=1,12,18	OK	Enable and configure the congestion detection
	+UUCD: 1	If congestion is detected (depends on the +UCD configuration) an URC (+UCD) is raised
AT+UCD=0	OK	Disable network congestion detection

11 ADC AT Commands (LEON-G100 only)

Command	Response	Description
AT+CMEE=2	OK	Set verbose error messages
AT+UADC=?	+UADC: (0) OK	Check the current values of ADC parameters
AT+UADC=0	+UADC: 0,473 OK	Check the current value (in milliVolts) of the specified ADC

12 GPIO AT Commands

Command	Response	Description
AT+CMEE=2	OK	Set verbose error messages
AT+UGPIOR=?	+UGPIOR: (20, 21) OK	GPIO pin numbers GPIO1 is pin 20 GPIO2 is pin 21
AT+UGPIOC=20,0,0 AT+UGPIOC=21,1	OK OK	Set up the GPIO input / output mode . • GPIO1 in output mode with default value 0 • GPIO2 in input mode (no default value can be set)
AT+UGPIOR=20 AT+UGPIOR=21	+UGPIOR: 20,0 OK +UGPIOR: 21,1 OK	Read the GPIO status
AT+UGPIOW=20,1	OK	Write (set) the GPIO status Note: only GPIO configured in output mode can be written
AT+UGPIOW=21,1	+CME ERROR: Write GPIO error	Write into a GPIO in input mode. Error is returned

13 MUX AT Commands

There are 5 virtual channels for the MUX. CHANNEL 0 is used for the MUX control channel, Channels 1 to 4 can be used for AT commands or GSM/GPRS data (note there can be only 1 data channel). GPS in tunneling mode will use Channel #1.

Note:

AT+CMUX command has to be sent by the mux driver on host. When the control channel is closed the mux is disabled. To close the mux channel it is necessary to stop the mux driver; after this the   channel #0 will not be seen as a virtual port.

Command	Response	Description
`AT+CMEE=2`	OK	Set verbose error messages
`AT+CMUX=0,0,0,1400,253,3,254,0,0`	OK	Enable the MUX on the module. Once the MUX is started you need to handle the connection using the multiplexing protocol as defined in [2]

14 File System AT commands

Note

- Commands in this chapter refer to the local file system on the module. The size of the file system is limited by the available memory. Refer to [3].

Command	DCE	Description
`AT+CMEE=2`	OK	Set verbose error messages
`AT+ULSTFILE=`	`+ULSTFILE:"a_file","another_file","mydata"` OK	List all the files in the file system

`AT+UDWNFILE="new_file",12`
<press enter and wait for ">"
prompt from DCE>
`Hello World!`
	>
	
	OK
		Create a new file on file system

`AT+ULSTFILE=`	`+ULSTFILE:"a_file","another_file","mydata","new_file"` OK	List again all the files in the file system
`AT+URDFILE="new_file"`	`+URDFILE: new_file,12,"Hello World!"` OK	Read the just created file ("new_file")
`AT+UDELFILE="new_file"`	OK	Delete the file called "new_file"
`AT+ULSTFILE=`	`+ULSTFILE:"a_file","another_file","mydata"` OK	List all the file in the file system

Appendix

A List of Acronyms

Abbreviation / Term	Explanation / Definition
3GPP	3rd Generation Partnership Project
ADC	Analog to Digital Converter
APN	Access Point Name
AT	AT Command Interpreter Software Subsystem, or attention
CI	Cell Identity
DCE	Data Communication Equipment
DLC	Data Link Connection
DNS	Domain Name System
DTE	Data Terminal Equipment
FFS	Flash File System
FTP	File Transfer Protocol
GPIO	General Purpose Input Output
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communication
HTTP	HyperText Transfer Protocol
I2C	Inter-Integrated Circuit
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Station Identity
IP	Internet Protocol
IPC	Inter Processor Communication
LAC	Location Area Code
MCC	Mobile Country Code
MNC	Mobile Network Code
NVM	Non Volatile Memory
PDP	Parallel Data Processing
PIN	Personal Identification Number
SIM	Subscriber Identification Module
SMS	Short Message Service
SMTP	Simple Mail Transfer Protocol
TCP	Transmission Control Protocol
TTFF	Time To First Fix
UDP	User Datagram Protocol
URC	Unsolicited Result Code

Related documents

[1]   u-blox AT Commands Manual, Docu. No GSM.G1-SW-09002
        available on our homepage (http://www.u-blox.com).

[2]   3GPP TS 27.010 - Terminal Equipment to User Equipment (TE-UE) multiplexer protocol (Release 1999)

[3]   LEON-G100/G200 System Integration Manual, Docu. No. GSM.G1-HW-09002
        available on our homepage (http://www.u-blox.com).

☞   For regular updates to u-blox documentation and to receive product change notifications please register
      on our homepage.

Revision history

Revision	Date	Name	Status / Comments
-	29/01/2009	fves	Initial release
	13/11/2009	lpah/sgod/tgri	Changed order of chapters, update of List of Acronyms, added the chapter HTTP AT commands and file system AT commands, update of chapter 4 (TCP/IP AT Commands), added the chapter 8 (GPS AT Commands), change of document status to "Preliminary".

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