WIP AT COMMANDS USER GUIDE (WIPSOFT V2.01)

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Overview

The aim of this document is to provide Wavecom customers with a full description of the Wavecom AT commands associated with the Wavecom IP feature.

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1 Introduction

1.1 Related Documents

None

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1.2 Abbreviations and Definitions

1.2.1 Abbreviations

APN	Access Point Name
ASCII	American Standard Code for Information Interchange
AT	ATtention
CHAP	Challenge Handshake Authentication Protocol
CHV	Card Holder Verification
CID	Context IDentifier
CMUX	Converter Multiplexer
CPU	Central Processing Unit
DNS	Domain Name System
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GSM	Global System for Mobile communicatio006E
IP	Internet Protocol
IPCP	Internet Protocol Control Protocol
M	Mandatory
MS	Mobile Station
N/A	Not Applicable
MSCHAP	MicroSoft Challenge Handshake Authentication
MSS	Maximum Segment Size
NU	Not Used
O	Optional
OS	Operating System
PAP	Password Authentication Protocol
PDP	Packet Data Protocol
PIN	Personal Identity Number
PPP	Point-to-Point Protocol
SIM	Subscriber Information Module
TCP	Transmission Control Protocol
TOS	Type Of Service
TTL	Time To Live
UART	Universal Asynchronous Receiver Transmitter
UDP	User Data Protocol
URL	Uniform Resource Locator
WIP	Wavecom Internet Protocol

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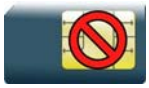
1.3 Logos

This picture indicates the +WIND indication from which the AT command is allowed. X values can be: 1, 3, 4, 16.

This picture indicates that a SIM card must be inserted to support the AT command.

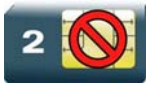


This picture indicates that an AT command is supported even if the SIM card is absent.

This picture indicates that the PIN 1 /CHV 1 code must be entered to support the AT command.

This picture indicates that an AT command is supported even if the PIN 1 /CHV 1 code is not entered.

This picture indicates that the PIN 2 /CHV 2 code must be entered to support the AT command.



This picture indicates that an AT command is supported even if the PIN 2/CHV 2 code is not entered.

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1.4 AT Commands Presentation Rules

The AT commands to be presented in the document are as follows:

- A "Description" section as Heading 3 provides general information on the AT command (or response) behavior.
- A "Syntax" section as Heading 3 describes the command and response syntaxes and all parameters description.
- A "Parameters and Defined Values" section as Heading 3 describes all parameters and values.
- A "Parameter Storage" as Heading 3 presents the command used to store the parameter value and/or the command used to restore the parameter default value.
- An "Examples" section as Heading 3 presents the real use of the described command.
- A "Note" section as Heading 3 can also be included indicating some remarks about the command use.

Figures are provided where necessary.

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2 AT Command Syntax

This section describes the AT command format and the default value for their parameters.

2.1 Command Line

Commands always start by the standard prefix “AT+WIP” and end with the <CR> character. Optional parameters are shown in brackets [ ].

Example:
AT+WIPcmd=<Param1>[,<Param2>]
<Param2> is optional. When the AT+WIPcmd is executed without <Param2> the default value of <param2> is used.

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2.2 Information Responses and Result Codes

Responses start and end with <CR><LF>, except for the ATV0 DCE response format and the ATQ1 (result code suppression) commands.

- If command syntax is incorrect, the "ERROR" string is returned.
- If command syntax is correct but transmitted with wrong parameters, the "+CME ERROR: <Err>" or "+CMS ERROR: <SmsErr>" strings is returned with adequate error codes if CMEE was previously set to 1. By default, CMEE is set to 0, and the error message is only "ERROR".
- If the command line has been executed successfully, an "OK" string is returned.

In some cases, such as "AT+CPIN?" or (unsolicited) incoming events, the product does not return the "OK" string as a response.
In the following examples <CR> and <CR><LF> are intentionally omitted.

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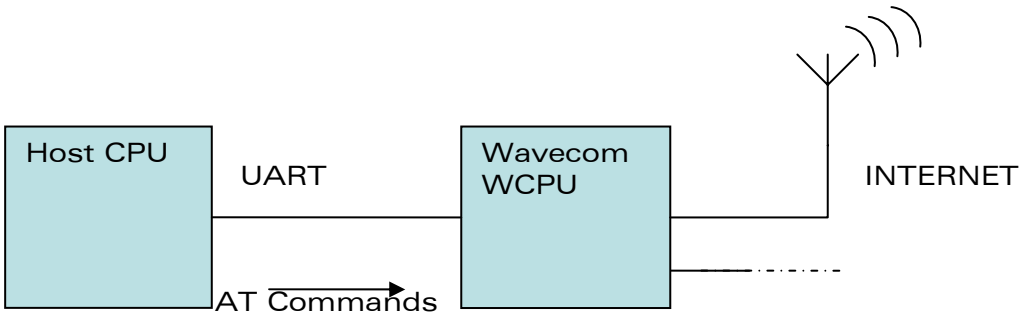
3 Principles

The wipSoft is an Open AT® application that implements the TCP/IP protocols using custom AT commands. This Open AT® application operates in co-operative mode and must be downloaded to the Wavecom Wireless CPU®. The commands are sent from an external application and the corresponding responses are sent back from the Wavecom Wireless CPU® to the external application. The wipSoft uses the APIs provided by wipLib and provides custom AT command interface to the external application.
AT+WIP commands involve:

- a host computer, which issues AT+WIP commands
- wavecom's wireless CPU®
- the rest of the Internet / Intranet



Multiplexing: Several sockets can be operating at once. The +WIPDATA command allows to temporarily identify the UART in data mode with a given socket. The data written on UART is transferred through the socket. The data which arrives on the socket can be read from the UART.
In AT mode, the host receives an unsolicited event when the data arrives on the socket.
Multiple UARTs: There can be several UARTs simultaneously active at once, and different UARTs can map a different socket simultaneously. However, it is a forbidden to map a single socket on several UARTs simultaneously.

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3.1 Sockets Identification

Sockets are identified by a pair of numbers: the first one identifies the protocol; the second one identifies a given socket of this protocol.

3.1.1 Possible Protocols

The possible protocols are,

- 1 = UDP
- 2 = TCP in connect mode (Client)
- 3 = TCP in listen mode (Server)
- 4 = FTP

Two pairs with a different protocol number but the same index identify two distinct sockets.
Example: Both 1,7 and 2,7 are valid identifiers simultaneously; the former identifies a UDP socket and the later, a TCP connected socket.

3.1.2 Number of Sockets

The number of sockets per protocol is limited.

- UDP : 8 sockets
- TCP Clients : 8 sockets
- TCP Servers : 4 sockets

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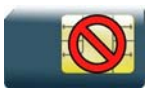
4 General Configuration

4.1 IP Stack Handling +WIPCFG



4.1.1 Description

The +WIPCFG command is used for performing the following operations:

- start TCP/IP stack
- stop TCP/IP stack
- configuring TCP/IP stack
- displaying version information

4.1.2 Syntax

- if<mode>=0,1

Action Command
AT+WIPCFG=<mode>
OK

- if <mode>=2

Action Command
AT+WIPCFG=<mode>,<opt num>,<value>
OK

- if <mode>=3

Action Command
AT+WIPCFG=<mode>
WIP soft vXX.YY.ZZ on Open AT OS vA.B
OK

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- if <mode>=4

Action Command

AT+WIPCFG=<mode>,<action>

OK

Read Command

AT+WIPCFG?

+WIPCFG: <optnum>,<value>

[+WIPCFG: <optnum>,<value>[..]]

OK

Test Command

AT+WIPCFG=?

OK

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4.1.3 Parameters and Defined Values

<mode>:		requested operation
	0	stop TCP/IP stack
	1	start TCP/IP stack
	2	configure TCP/IP stack
	3	display TCP/IP application version.
	4	TCP/IP stack configuration management
<opt num>:		configuration option identifier
	0	WIP_NET_OPT_IP_TTL – Default TTL of outgoing data grams range: 0-255 (default value: 64)
	1	WIP_NET_OPT_IP_TOS – Default TOS of outgoing parameters range: 0-255 (default value: 0)
	2	WIP_NET_OPT_IP_FRAG_TIMEO - Time to live in seconds of incomplete fragments range: 1-65535 (default value: 60)
	3	WIP_NET_OPT_TCP_MAXINITWIN – Number of segments of initial TCP window range: 0-65535 (default value: 0)
	4	WIP_NET_OPT_TCP_MIN_MSS - Default MSS of off-link connections range: 536-1460 (default value: 536)
	5	WIP_NET_OPT_DEBUG_PORT range: 0-3 (default value: 0)
	6	WIP_NET_OPT_SOCK_MAX – Total number of sockets (TCP and UDP) range: 1-172 (default value: 8)
	7	WIP_NET_OPT_BUF_MAX – Total number of network buffers range: 4-42 (default value: 32)
	8	WIP_NET_OPT_IP_MULTI_MAX – Total number of multicast group
	9	WIP_NET_OPT_IP_ROUTE_MAX – Size of IP routing table range: 0-2730 (default value: 0)

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	10	WIP_NET_OPT_RSLV_QUERY_MAX – Maximum number of DNS resolver queries range: 1-511 (default value: 4)
	11	WIP_NET_OPT_RSLV_CACHE_MAX – Size of DNS resolver cache range: 1-292 (default value: 4)
<action>:		requested operation on TCP/IP stack parameter management
	0	configuration storage (when existing) is freed
	1	stores the configuration parameters
<value>:		value range for different configuration options
<XX.YY.ZZ >:		WIP soft release version
<A.B>:		Open AT® OS release version

4.1.4 Parameter Storage

Only one IP stack configuration set can be saved into the FLASH memory.

- "AT+WIPCFG=4,1" is used to store the TCP/IP stack configuration parameters into the FLASH memory
- "AT+WIPCFG=4,0" is used to free the TCP/IP stack configuration storage

Executing "AT+WIPCFG=1" will apply default parameters when existing. Still it is possible to change option values at run time using "AT+WIPCFG=2,<optnum>,<optvalue>".

4.1.5 Possible Errors

The possible error message is displayed only if "AT+CMEE=1" is activated else "ERROR" is displayed.

"+CMEE" AT error code	Description
800	invalid option
801	invalid option value
802	not enough memory left
820	error writing configuration in FLASH memory
821	error freeing configuration in FLASH memory
850	initialization failed

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4.1.6 Examples

Command	Responses
AT+WIPCFG=1 *Note: Start IP Stack*	OK
AT+WIPCFG?	+WIPCFG: 0,64 +WIPCFG: 1,0 +WIPCFG: 2,60 +WIPCFG: 3,0 +WIPCFG: 4,536 +WIPCFG: 5,0 +WIPCFG: 6,8 +WIPCFG: 7,32 +WIPCFG: 8,0 +WIPCFG: 9,0 +WIPCFG: 10,4 +WIPCFG: 11,4 OK
AT+WIPCFG=2,0,10 *Note: Configure TTL of IP Stack*	OK

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Command	Responses
AT+WIPCFG?	+WIPCFG: 0,10 +WIPCFG: 1,0 +WIPCFG: 2,60 +WIPCFG: 3,0 +WIPCFG: 4,536 +WIPCFG: 5,0 +WIPCFG: 6,8 +WIPCFG: 7,32 +WIPCFG: 8,0 +WIPCFG: 9,0 +WIPCFG: 10,4 +WIPCFG: 11,4 OK
AT+WIPCFG=3 *Note: Display software version*	WIP soft v201 on Open AT OS v312 OK
AT+WIPCFG=0 *Note: Stop the TCP/IP Stack*	OK
AT+WIPCFG=4,1 *Note: Store IP configuration parameters into FLASH*	OK
AT+WIPCFG=4,0 *Note: Free IP configuration parameters stored in FLASH*	OK

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4.2 Bearers Handling +WIPBR

4.2.1 Description

The +WIPBR command can be used to

- select the bearer
- start/close the bearer
- configure different bearer options such as access point name

4.2.2 Syntax

- if <cmdtype>=0,1 or 5

Action Command
AT+WIPBR=<cmdtype>,<bid>
OK

- if <cmdtype>=2

Action Command
AT+WIPBR=<cmdtype>,<bid>,<opt num>,<value>
OK

- if <cmdtype>=3

Action Command
AT+WIPBR=<cmdtype>,<bid>,<opt num>
+WIPBR: <bid>,<opt num>,<value>
OK

- if <cmdtype>=4

Action Command
AT+WIPBR=<cmdtype>,<bid>,<mode>[,<login>,<password>,[<caller identity>]]
OK

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- if <cmdtype>=6

Action Command

AT+WIPBR=<cmdtype>,<bid>,<mode>

OK

Read Command

AT+WIPBR?

<bid>,<state>

[<bid>,<state>[..]]

OK

Test Command

AT+WIPBR=?

OK

- if <mode>=1

Unsolicited response

+WIPBR: <bid>,<status>,<local IP @>,<remote IP @>,<DNS1 @>, <DNS2 @>

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4.2.3 Parameters and Defined Values

<cmd type>:		type of command
	0	close bearer
	1	open bearer
	2	set value of different bearer options
	3	get value of different bearer options
	4	start bearer
	5	stop bearer
	6	bearer configuration management
<bid>:		bearer Identifier
	1	UART1
	2	UART2
	3	N/A
	4	N/A
	5	GSM
	6	GPRS
	11..14	CMUX port over UART1
	21..24	CMUX port over UART2
<opt num>:		bearer option identifier
	0	WIP_BOPT_LOGIN – username (string) max: 64 characters
	1	WIP_BOPT_PASSWORD – password (string) max: 64 characters
	2	WIP_BOPT_DIAL_PHONENB – phone number (string) max: 32 characters
	5	WIP_BOPT_DIAL_RINGCOUNT - Number of rings to wait before sending the WIP_BEV_DIAL_CALL event range: 0-65535

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6	WIP_BOPT_DIAL_MSNULLMODEM - Enable MS-Windows null-modem protocol ("CLIENT"/"SERVER" handshake) range: 0-1
7	WIP_BOPT_PPP_PAP - Allow PAP authentication range: 0-1
8	WIP_BOPT_PPP_CHAP - Allow CHAP authentication range: 0-1
9	WIP_BOPT_PPP_MSCHAP1 - Allow MSCHAPv1 authentication range: 0-1
10	WIP_BOPT_PPP_MSCHAP2 - Allow MSCHAPv2 authentication range: 0-1
11	WIP_BOPT_GPRS_APN - Address of GGSN (string) max: 96 characters
12	WIP_BOPT_GPRS_CID - Cid of the PDP context range: 1-4
13	WIP_BOPT_GPRS_HEADERCOMP - Enable PDP header compression range: 0-1
14	WIP_BOPT_GPRS_DATACOMP - Enable PDP data compression range: 0-1
15	WIP_BOPT_IP_ADDR - Local IP address (IP/string)
16	WIP_BOPT_IP_DST_ADDR - Destination IP address (IP/string)
17	WIP_BOPT_IP_DNS1 - Address of primary DNS server (IP/string)
18	WIP_BOPT_IP_DNS2 - Address of secondary DNS server (IP/string)
19	WIP_BOPT_IP_SETDNS - Configure DNS resolver when connection is established range: 0-1

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	20	WIP_BOPT_IP_SETGW - Set interface as default gateway when connection is established range: 0-1
<value>:		range of value for different bearer options
<mode>:		mode of operation
	0	client
	1	server
<state>:		current state of the bearer
	0	stopped
	1	started
<status>:		result of the connection process
	0	successful
	any other value	to be matched to error code value (e.g. "814" means PPP authentication failure)
<local IP @*>:		local IP address
<remote IP @*>:		remote IP address. (first node in internet)
<DNS1 IP @*>:		Domain Name Server address
<DNS2 IP @*>:		Domain Name Server address
<login>:		PPP login
<passwd>:		PPP password
<caller identity>:		optional ASCII string (type ascii*). If not specified, then target will accept all DATA calls (independently of caller identification). If specified, then target will only accept calls from <caller identity>(which is the GSM data call number of the GSM client).

* IP @ are displayed in alpha numeric dot format. e.g. 192.168.0.1...When no IP address is known, "0.0.0.0" is displayed.

Caution: **The options WIP_BOPT_IP_DST_ADDR, WIP_BOPT_IP_DNS1 and WIP_BOPT_IP_DNS2 are "read only" for GPRS/GSM client**

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4.2.4 Parameter Storage

Several bearer configuration set can be saved.
Calling twice AT+WIPBR=6,<bid>,1 with the same <bid> will store the last configuration set.

- "AT+WIPBR=6,<bid>,1" is used to store the bearer configuration parameters set associated with the bearer <bid> into the FLASH memory.
- "AT+WIPBR=6,<bid>,0" is used to free the bearer configuration parameters set associated with the bearer <bid>.

Executing "AT+WIPBR=1,<bid>" will open bearer <bid> with default parameters of the bearer when existing.

4.2.5 Possible Errors

The possible error message is displayed only if "AT+CMEE=1" is activated else "ERROR" is displayed.

"+CMEE" AT error code	Description
800	invalid option
801	invalid option value
802	not enough memory left
803	already open
804	not available on this platform
807	bearer connection failure : line busy
808	bearer connection failure : no answer
815	bearer connection failure : PPP authentication failed
816	bearer connection failure : PPP IPCP negotiation failed
820	error writing configuration in FLASH memory
821	error freeing configuration in FLASH memory

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4.2.6 Examples

Command	Responses
AT+WIPBR?	1,0 6,1 OK *Note: Bearer UART1 is open but not started bearer GPRS is open and started*
AT+WIPBR?	OK *Note: No bearer has been opened yet*
AT+WIPBR=1,6 *Note: Open GPRS bearer*	OK
AT+WIPBR=2,6,11,"APN name" *Note: Set APN of GPRS bearer*	OK
AT+WIPBR=3,6,11 *Note: Get APN of GPRS bearer*	+WIPBR: 6,11,"APN name" OK
AT+WIPBR=4,6 *Note: Start GPRS bearer*	OK
AT+WIPBR=5,6 *Note: Stop GPRS bearer*	OK
AT+WIPBR=0,6 *Note: Close GPRS bearer*	OK

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4.2.7 Notes

4.2.7.1 For Starting a Bearer

Depending on the mode and the bearer type, additional parameters are required or forbidden:

Bid	Mode	Other Params
1,3,11,14,21,24	0	none
1,3,11,14,21,24	1	<PPP login>, <PPP password>
5	0	none
5	1	<login>,<password>[,<caller identity>]
6	0	None

Starting bearer as a server requires additional parameters as mentioned in the above table.

- For PPP server, only parameters <login> and <password> are required. They will be compared with remote PPP client login and password.
- For GSM server, <login> and <password> will be used for PPP over GSM establishment (same behaviour as described for PPP server).

The <caller identity> is an optional ASCII string (type ASCII*). If not specified, then target will accept all DATA calls (independently of caller identification). If specified, then target will only accept calls from <caller identity> (which is the GSM data call number of the GSM client.

Opening bearer only consists in associating the IP protocol stack with the specified bearer. The corresponding bearer setup has to be done through the adequate already existing AT commands (please refer to +WMFM commands for UART1 and UART2, +CMUX command for CMUX virtual ports and GSM/GPRS AT commands).

Several bearer can be opened at the same time but only one bearer can be started at a time.
If both DNS1 and DNS2 are displayed as "0.0.0.0" in the unsolicited message when bearer is opened in server mode, it means that connecting to a remote IP host through an URL will fail.

The options WIP_BOPT_DIAL_REDIALCOUNT and WIP_BOPT_DIAL_REDIALDELAY will not be implemented through AT commands. Nevertheless, for future compatibility reason, Opt num 3 and 4 are kept as reserved.

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5 IP Protocol Services

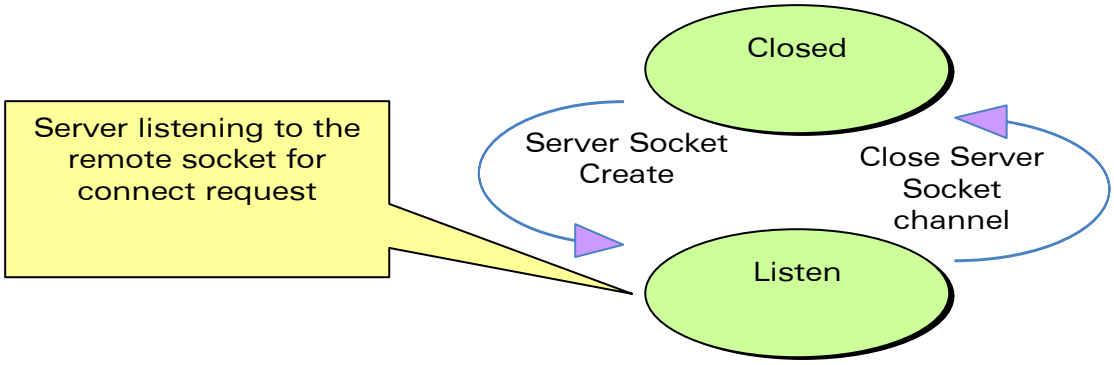
5.1 Service Creation +WIPCREATE

5.1.1 Description

The +WIPCREATE command is used to create UDP, TCP client and TCP server sockets associated with the specified index and FTP service. Only one FTP session at a time is available.

If a local port is specified while creating a socket, the created socket will be assigned to this port; if not, a port will be assigned dynamically by WIP application. If peer IP and peer port is specified, the created socket will be connected to the specified IP and port.

TCP server cannot be used to transfer data. To transfer data, it creates a local TCP client socket. This process of creating local socket is referred as "spawning". When a server socket is created using, socket passively listens on a specified port for incoming connections. The below mentioned diagram shows different states managed for TCP server.



On reception of a connection request from a remote client socket, a server socket does the following,

- spawns a new socket (client) to connect to the remote socket
- data transfer is done between the spawned socket and the remote socket

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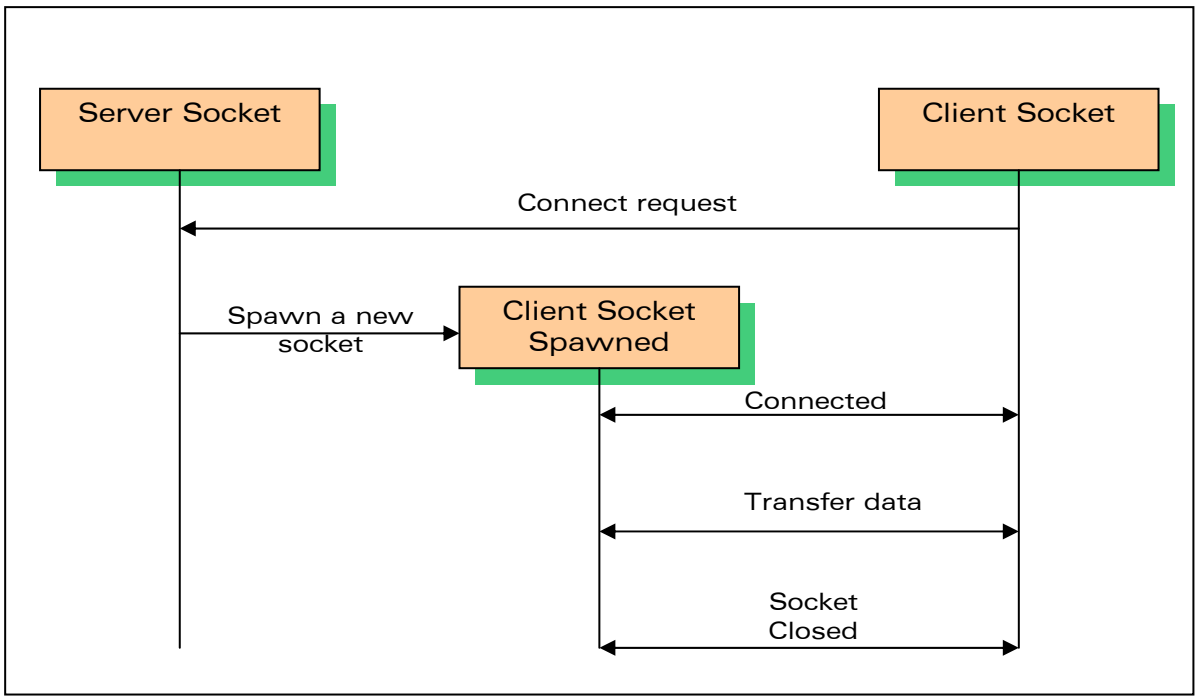
- server socket remains in the listening mode and is ready to accept the request from other clients

Below mentioned diagram shows connection establishment procedure.



5.1.2 Syntax

- if <mode>=1

Action Command
AT+WIPCREATE=<mode>,<communication index>,[<local port>] [,<peer IP>,<peer port>]
OK

- if <mode>=2

Action Command
AT+WIPCREATE=<mode>,<communication index>,<peer IP>,<peer port>
OK

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- if <mode>=3

Action Command

AT+WIPCREATE=<mode>,<server index>,<local port>,<from idx>,<to idx>

OK

- if <mode>=4

Action Command

AT+WIPCREATE=<mode>,<index>,<server>[,<peer_port>],<username>,

<password>[,<account>]

OK

Read Command

AT+WIPCREATE?

NONE

Test Command

AT+WIPCREATE=?

OK

- if <mode>=1 or 2

Unsolicited response

+WIPREADY: <mode>,<communication index>

- if <mode>=3

Unsolicited response

+WIPACCEPT: <server index>,<communication idx>

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5.1.3 Parameters and Defined Values

<mode>:		specifies type of socket
	1	UDP
	2	TCP Client
	3	TCP server
	4	FTP
<index>:		TCP/UDP/FTP Connection Identifier
<local port>:		local TCP/UDP port
<peer IP>:		peer IP address; a string between quotes indicating an address either in numeric form (e.g. "85.12.133.10") or as a DNS entry (e.g. "www.wavecom.com")
<peer port>:		peer TCP/UDP port in socket service or the server port in FTP service range: 1-65535 (default value: 21)
<from idx>:		minimum index for spawned TCP sockets
<server index>:		maximum index for spawned TCP sockets
<to idx>:		TCP server socket identifier
<communication index>:		indexes reserved for spawned sockets It cannot be used by other sockets even if the spawned sockets are not created yet.
<server>:		address of the FTP server It can either be a 32 bit number in dotted-decimal notation ("xxx.xxx.xxx.xxx") or an alpha numeric string format for hostname.
<user name>:		login of the user string
<password>:		password of the user string

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<account>:	account information of the user This is required by some FTP server during authentication phases. String

5.1.4 Parameter Storage

None

5.1.5 Possible Errors

"+CMEE" AT error code	Description
3	operation not allowed
800	invalid option
803	operation not allowed in the current WIP stack state
830	bad index
832	bad port number
834	not implemented
836	memory allocation error
837	bad protocol
839	error during channel creation
840	FTP session is already active
842	destination host unreachable (whether host unreachable, Network unreachable, response timeout)

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5.1.6 Examples

Command	Responses
AT+WIPCREATE=1,1,80 *Note: Create the UDP socket on local port 80 with communication index = 1 ⇔ Wireless CPU® acts as an UDP server awaiting for incoming datagram on local port 80*	OK *Note: An unsolicited event +WIPREADY: 1,1 will be received once the UDP socket is ready for usage*
AT+WIPCREATE=1,1,"www.wavecom.com",80 *Note: Create the UDP socket on arbitrary free local port with peer IP and peer port 80 with communication index = 1 ⇔ Wireless CPU® acts as a UDP client that can send datagram towards the remote entity*	OK *Note: An unsolicited event +WIPREADY: 1,1 will be received once the UDP socket is ready for usage*
AT+WIPCREATE=1,1,80,"www.wavecom.com",80 *Note: Create the UDP socket on local port 80 with peer IP and peer port 80 with communication index = 1 ⇔ Wireless CPU® acts as a UDP client and an UDP server : it can send datagram towards the remote entity and receiving datagram on the specified local port.*	OK *Note: An unsolicited event +WIPREADY: 1,1 will be received once the UDP socket is ready for usage*
AT+WIPCREATE=3,1,80,5,9 *Note: Create the TCP server on port 80 with server index=1 ⇔ Wireless CPU® acts as a TCP server : it will from now on spawn TCP client socket from communication index 5 to 9*	OK *Note: An unsolicited event +WIPACCEPT: 1,5 will be received once the TCP server is ready for usage*
AT+WIPCREATE=2,1,"IP ADDR",80 *Note: Create the TCP client on port 80 with index=1 ⇔ Wireless CPU® acts as a TCP client : it can from now on communicate with the remote specified entity through communication index 1*	OK *Note: An unsolicited event +WIPREADY: 2,1 will be received once the TCP client is ready for usage*
AT+WIPCREATE=4,1,"ftp.wavecom.com","admin","123456" *Note: Create a FTP session ⇔ towards the remote specified FTP server. Communication index to be used then is 1*	OK

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5.1.7 Notes

The +WIPCREATE command causes the connection and authentication to the FTP server. If several file uploads and retrievals are required to/from the same server, a single connection with +WIPCREATE is needed. Then, each file operation will be done (one +WIPFILE command per operation), and the FTP connection will be released with +WIPCLOSE.

SIM card is required only if FTP session is established through GSM or GPRS. An FTP session upon an UART will work without a SIM card.

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5.2 Closing a Service +WIPCLOSE

5.2.1 Description

The +WIPCLOSE command is used to close a socket or FTP session. When one serial port (UART or CMUX DLCI) is used to map a socket for read/write operations, [ETX] character can also be used to close the socket.
An unsolicited event is generated, when socket or FTP session is closed.

5.2.2 Syntax

Action command

AT+WIPCLOSE=<protocol>,<idx>

OK

Read Command

AT+WIPCLOSE?

NONE

Test Command

AT+WIPCLOSE=?

OK

Unsolicited response

+WIPPEERCLOSE: <protocol>,<idx>

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5.2.3 Parameters and Defined Values

<protocol>:		protocol type
	1	UDP
	2	TCP client
	3	TCP server
	4	FTP
<idx>:		socket identifier

5.2.4 Parameter Storage

None

5.2.5 Possible Errors

"+CMEE" AT error code	Description
802	not enough memory
803	operation not allowed in the current WIP stack state
830	bad index
831	bad state
834	not implemented
837	bad protocol

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5.2.6 Examples

Command	Responses
AT+WIPCLOSE=1,1 *Note: Close UDP socket with communication index 1*	OK *Note: An unsolicited event +WIPPEERCLOSE: 1,1 is received once the UDP socket is closed*
AT+WIPCLOSE=2,1 *Note: Close TCP client with communication index 1*	OK *Note: An unsolicited event +WIPPEERCLOSE: 2,1 is received once the TCP client is closed*
AT+WIPCLOSE=3,1 *Note: Close TCP server with communication index 1*	OK *Note: An unsolicited event +WIPPEERCLOSE: 3,1 is received once the TCP server is closed*
AT+WIPCLOSE=4,1 *Note: Close FTP session with index 1*	OK *Note: An unsolicited event +WIPPEERCLOSE: 4,1 is received once the FTP session is closed*

5.2.7 Notes

Sockets will be closed only on issuing +WIPCLOSE command and the closure of the socket is indicated by +WIPPEERCLOSE: <protocol>, <idx> unsolicited response. After issuing +WIPCLOSE command, no more data can be sent and received over the socket.

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5.3 Service Option Handling +WIPOPT

5.3.1 Description

The +WIPOPT command is used to read and/or to configure different parameters on sockets and FTP service.

5.3.2 Syntax

- if <action>=1

Action Command

AT+WIPOPT=<protocol>,<idx>,<action>,<optnum>

+WIPOPT: <proto>,<idx>,<optnum>,<optval>

OK

- if <action>=2

Action Command

AT+WIPOPT=<protocol>,<idx>,<action>,<optnum>,<optval>

OK

Read Command

AT+WIPOPT?

NONE

Test Command

AT+WIPOPT=?

OK

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5.3.3 Parameters and Defined Values

<protocol>:		protocol type
	1	UDP
	2	TCP client
	3	TCP server
	4	FTP
<idx>:		socket identifier
<action>:		requested operation
	1	read the value of an option
	2	write the value of an option
<optnum>:		option that can be read/written
<optval>:		value of an option

5.3.4 Parameter Storage

None

5.3.5 Possible Errors

"+CMEE" AT error code	Description
800	invalid option
801	invalid option value
803	operation not allowed in the current WIP stack state
830	bad index
834	not implemented
835	option not supported
837	bad protocol
850	unknown reason

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5.3.6 Examples

Command	Responses
AT+WIPOPT=2,1,2,8,20 *Note: Set TTL for TCP client*	OK
AT+WIPOPT=2,1,1,8 *Note: Get TTL for TCP client*	+WIPOPT: 2,1,8,20 OK
AT+WIPOPT=3,1,2,9,10 *Note: Set TOS for TCP server*	OK
AT+WIPOPT=3,1,1,9 *Note: Get TOS for TCP server*	+WIPOPT: 2,1,9,10 OK
AT+WIPOPT=1,1,1,1 *Note: Get peer port for UDP*	+WIPOPT: 2,1,1,80 OK
AT+WIPOPT=4,1,2,40,1 *Note: Set data representation type for FTP*	OK
AT+WIPOPT=4,1,1,40 *Note: Get data representation type for FTP*	+WIPOPT: 4,1,1,1 OK

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5.3.7 Notes

The options numbers, description, read/write permission, on UDP, TCP client and TCP server sockets, is summed up in the following table.

opt num	Value format	Meaning	UDP	TCP client	TCP server
0	0-65535	WIP_COPT_PORT	R	R	R
1	0-65535	WIP_COPT_PEER_PORT	R	R	-
2	string	WIP_COPT_PEER_STRADDR	R	R	-
3	0-1	WIP_COPT_BOUND	R	-	-
4	0-5839	WIP_COPT_SND_LOWAT	-	RW	RW
5	0-5839	WIP_COPT_RCV_LOWAT	-	RW	RW
6	0-65535	WIP_COPT_NREAD	R	R	-
7	0-1	WIP_COPT_NODELAY	-	RW	RW
8	0-255	WIP_COPT_TTL	RW	RW	RW
9	0-255	WIP_COPT_TOS	RW	RW	RW

The options that can be applied to FTP channel are:

opt num	Value format	Value type	Meaning
40	0-1	boolean	data representation type. 0: ASCII 1: binary default: 0
41	0-1	boolean	FTP mode. 0: active 1: passive default: 1

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6 Data Exchange for Protocol Services

The section deals with the data exchange for the services over TCP/IP. All the commands required for the data exchange through different services are mentioned in succeeding sections.

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6.1 File Exchange +WIPFILE

6.1.1 Description

The +WIPFILE command define the "file system" services that allow sending a block of data through standard TCP/IP protocols. This command is for file transfer/reception.

6.1.2 Syntax

Action Command

AT+WIPFILE=<protocol>,<index>,<mode>,<filename>

CONNECT

OK

Read command

AT+WIPFILE?

OK

Test Command

AT+WIPFILE=?

OK

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6.1.3 Parameters and Defined Values

<protocol>:		protocol type
	4	FTP
<idx>:		channel identifier
<mode>:		file transfer mode
	1	file retrieval: Wireless CPU® switches to data mode and prints the content of the file on UART. The end of the file is marked by [ETX] character. After this has been sent, the UART switches back to AT mode.
	2	file transfer: This command switches the UART in data mode and accepts a stream of data terminated by [ETX] character.
<filename>:		specifies the name of the file to send or retrieve. The maximum file length is limited to 128 characters. The actual filename, including path name has to be used.

6.1.4 Parameter Storage

None

6.1.5 Possible Errors

"+CMEE" AT error code	Description
800	invalid option
803	operation not allowed in the current WIP stack state
830	bad index
831	bad state
834	not implemented
836	memory allocation error
837	bad protocol
839	error during channel creation

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6.1.6 Examples

Command	Responses
AT+WIPFILE=4,1,1,"data.bin" *Note: Retrieve the data for the given filename with index 1*	CONNECT <data received terminated by [ETX] character> OK
AT+WIPFILE=4,1,2,"report.log" *Note: Send data to the given filename*	CONNECT <data terminated by [ETX] character> OK

6.1.7 Notes

The [ETX] character is considered as an end of data. Hence, in case [ETX] character needs to be transmitted, it should be preceded by [DLE] character.

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6.2 Socket Data exchange +WIPDATA

6.2.1 Description

The +WIPDATA command is used to read/write from/to a socket. On successful execution of the command, the UART switches to data mode. The UART can be switched back to AT mode by sending "+++" with 1 second guard time before and after the sequence. If data is not read using +WIPDATA command, further data will be delayed.
An unsolicited event is received when there is a data to read on socket.

6.2.1.1 TCP Sockets in Continuous mode

In continuous mode, an [ETX] character is considered as an end of data. When a TCP socket is shutdown by peer, an [ETX] character will be sent on the UART. Similarly, when the host writes an [ETX] character on an UART, the local socket will be shutdown and the peer socket will be informed of this shutdown. From now on, it is not possible to send data on this shutdown socket.
In case an [ETX] character needs to be transmitted, it should be preceded by [DLE] character.
To close all sockets at once, "+++" sequence should be sent followed by +WIPCLOSE command.

6.2.1.2 UDP Sockets in Continuous mode

UDP is a connectionless protocol and hence there is no way to detect or cause a shutdown. However, an [ETX] character is used to mark the boundaries of datagrams.
All data written on an UDP socket is collected till an [ETX] character is encountered or the maximum size of the datagram[1] is reached and will be sent as a single datagram. Similarly when reading data, all data will be read till an [ETX] character is encountered which indicates the end of the datagram.
In case an [ETX] character needs to be transmitted, it should be preceded by [DLE] character similar to TCP socket.

[1] *Maximum size of an UDP datagram has been fixed to 5840 Bytes. This limit is an arbitrary one. Nevertheless, note that smaller the datagram is the surer it will reach the aimed destination. Note that UDP is not a reliable transport layer.*

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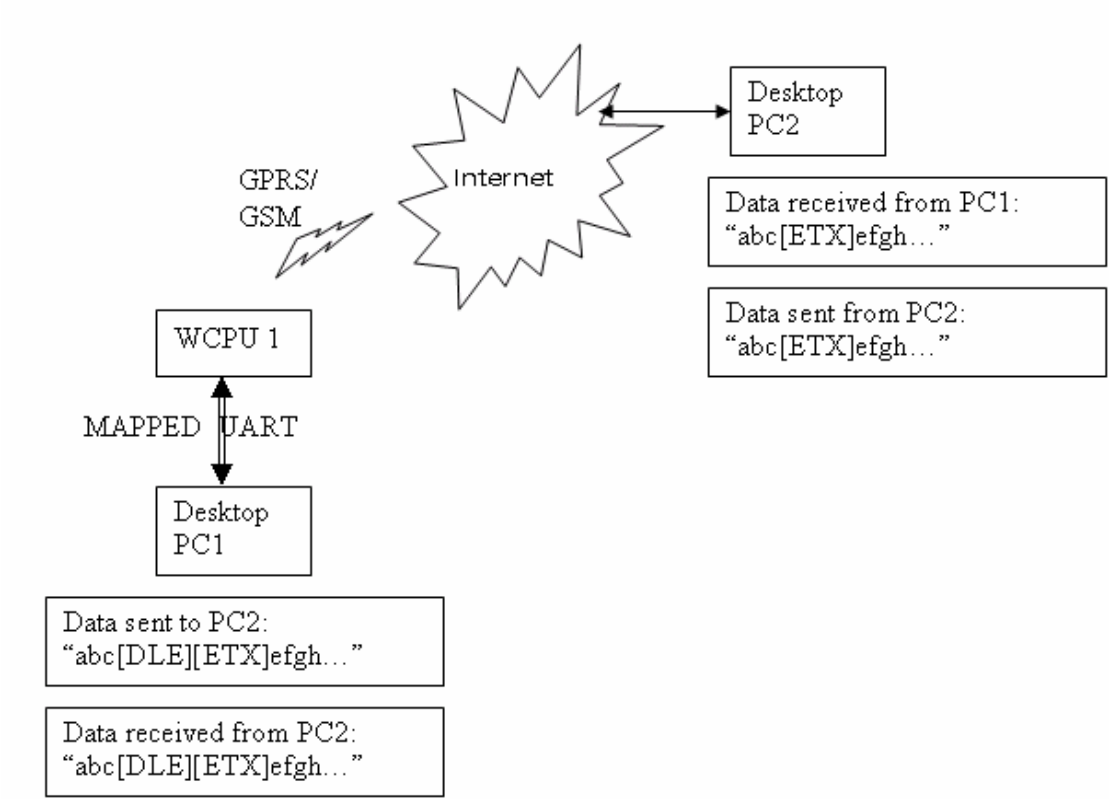
When the UART leaves DATA mode, either because of "+++" escape sequence or because of an AT+WIPDATA=1, index, 0 on another UART, the currently unsent data are sent as a single datagram.

6.2.1.3 Leaving Continuous mode

The UART can be switched back to AT mode

- by sending "+++" with 1 second guard time before and after the sequence
- by sending an AT+WIPDATA=<proto>,<index>,0 on another UART in AT mode

6.2.1.4 [ETX] Escaping Mechanism



The above schematic explains how [ETX] characters - which have a special meaning in WIP soft – are handled on Wavecom Wireless CPU®.

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On transmitting side, when [ETX] are not escaped (use case: Desktop PC1 sends data towards Wireless CPU®. Data contain a non escaped [ETX] (<=> no [DLE][ETX] sequence), then [ETX] is not transmitted but an action is done on Wireless CPU® regarding the concerned socket:

- UDP socket: a non escaped [ETX] marks the boundary of the current datagram to be sent. Datagram is immediately sent and the [ETX] is not sent towards the desktop PC2.
- TCP socket: a non escaped [ETX] causes a TCP shutdown operation on the transmitting direction: peer is informed that Wireless CPU® will not send any more data on that socket. Usually, peer will shutdown the other way (downlink) and this will result in a "peer close event" on the socket.

On receiving side, when [ETX] are not escaped (use case: Wireless CPU® sends data towards Desktop PC1. Data contain a non escaped [ETX] (<=> no [DLE][ETX] sequence), then [ETX] means that a special "IP" event occurred on Wireless CPU® regarding the concerned socket:

- UDP socket: a non escaped [ETX] signals the boundary of the current received datagram.
- TCP socket: a non escaped [ETX] signals that the peer TCP connected TCP unit shutdown the downlink way. Desktop PC1 should then close the uplink socket to totally terminate the TCP "session".

Protocol	Mapped UART	IP Network (active socket)
UDP	Data containing [DLE][ETX] sequence.	Data containing [ETX].
UDP	[ETX] alone.	Mark the boundary of the UDP Datagram received/to be transmitted.
TCP	Data containing [DLE][ETX] sequence.	Data containing [ETX].
TCP	[ETX] alone.	Causes/signals a shutdown operation on TCP socket.

Note that the behaviour is symmetrical: apply both on transmitting/receiving side of mapped UART.

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6.2.2 Syntax

Action Command

AT+WIPDATA=<protocol>,<idx>,<mode>

CONNECT

Read Command

AT+WIPDATA?

NONE

Test Command

AT+WIPDATA=?

OK

- if <protocol>=1

Unsolicited response

+WIPDATA: <protocol>,<idx>,<datagram size>,<peer IP>,<peer port>

- if <protocol>=2

Unsolicited response

+WIPDATA: <protocol>,<idx>,<number of readable bytes>

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6.2.3 Parameters and Defined Values

<protocol>:		socket type
	1	UDP
	2	TCP client
<idx>:		socket identifier
<mode>:		mode of operation
	0	unmap: switch the UART (mapped to continuous mode) to AT mode.
	1	continuous: switch the UART to data mode. In this mode, size of the buffer need not be mentioned.

6.2.4 Parameter Storage

None

6.2.5 Possible Errors

"+CMEE" AT error code	Description
851	bad state

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6.2.6 Examples

Command	Responses
AT+WIPDATA=2,5,1 *Note; TCP Client with index 5 can send/read data in continuous mode*	CONNECT <read/write data> +++ OK *Note; +++ sequence causes the UART to switch to AT mode*
AT+WIPDATA=1,5,1 *Note; UDP with index 5 can send/read data in continuous mode*	CONNECT <read/write data> +++ OK *Note; +++ sequence causes the UART to switch to AT mode*
AT+WIPDATA=1,5,1 *Note: UDP with index 5 can send/read data in continuous mode*	CONNECT <read/write data> <ETX> OK *Note: <ETX> character indicates end of data*

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6.2.7 Notes

If the [ETX] character is sent from the peer, it is considered as an end of data transfer. After sending an [ETX] character, an unsolicited response +WIPPEERCLOSE: <protocol>, <idx> will be received on the other side. This indicates that no more data can be sent from the peer, but it can receive data.

In case [ETX] character needs to be transmitted as data, it should be preceded by [DLE] character.

The UART switches back to AT mode due to "+++"with 1 second guard time before and after the sequence or by sending an AT+WIPDATA=<proto>,<index>,0 on another UART in AT mode.

When +++ is issued, Wireless CPU® switches from DATA mode to AT mode. If ATO command is used to switch the Wireless CPU® back to DATA mode,

- +CME ERROR:3 will be received when GPRS bearer is used
- no response is received when GSM bearer is used

To switch the Wireless CPU® back to DATA mode, AT+WIPDATA=x,x,x should be used instead of ATO. After executing AT+WIPDATA=x,x,x command, "CONNECT" will be received to indicate that the Wireless CPU® is switched back to DATA mode.

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7 Ping Services

7.1 PING command+WIPPING

7.1.1 Description

The +WIPPING command is used to configure different PING parameters and to send PING requests. An unsolicited response is displayed each time a "PING" echo event is received or a timeout expires.

7.1.2 Syntax

Action Command

AT+WIPPING=<host>,[<repeat>,<interval>,[<timeout>,[<nwrite>,[<ttl>]]]]

OK

Read Command

AT+WIPPING?

OK

Test Command

AT+WIPPING=?

OK

Unsolicited response

+WIPPING:<timeout_expired>,<packet_idx>,<response_time>

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7.1.3 Parameters and Defined Values

<host>:	host name or IP address string
<repeat>:	number of packets to send range: 1-65535 (default value:1)
<interval>:	number of milliseconds between packets range: 1-65535 (default value:2000)
<timeout>:	number of milliseconds before a packet is considered lost range: 1-65535 (default value:2000)
<ttl>:	IP packet Time To Live. default value is set by WIP_NET_OPT_IP_TTL +WIPCFG option range : 1-255
<nwrite>:	size of packets range : 1-1500 (default value:64)
<timeout_expired>:	PING result 0: PING response received before <timeout> 1: <timeout> expired before the response was received
<packet_idx>:	packet index in the sequence
<response_time>:	PING response time in millisecond

7.1.4 Parameter Storage

None

7.1.5 Possible Errors

"+CMEE" AT error code	Description
800	invalid option
801	invalid option value
819	error on ping channel

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7.1.6 Examples

Command	Responses
AT+WIPPING="www.wavecom.com" *Note: Ping "www.wavecom.com"*	OK +WIPPING: 1,0,0 *Note: Ping "www.wavecom.com failed : timeout expired*
AT+WIPPING="192.168.0.1" *Note: Ping "192.168.0.1"*	OK +WIPPING: 0,0,224 *Note: Ping "192.168.0.1 succeeded. Ping response received in 224 ms*
AT+WIPPING="192.168.0.1",2,2000,1000 *Note: Send 2 successive ping requests to "192.168.0.1". Each Ping is every 2000 ms, timeout is set to 2000 ms (if ping responses time is more than 1000 ms then timeout expires)*	OK +WIPPING: 0,0,880 +WIPPING: 1,1,xxxx *Note: Ping "192.168.0.1 succeeded. First Ping response received in 880 ms. Second one was not received before specified timeout (1000 ms) ⇔ timeout expired*

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8 Examples of Application

8.1 TCP Socket

8.1.1 TCP Server Socket

8.1.1.1 Using GPRS bearer

```
AT+WIPCFG=1                          //start IP stack
OK
AT+WIPBR=1,6                         //open GPRS bearer
OK
AT+WIPBR=2,6,11,"APN name"           //set APN name of GPRS bearer
OK
AT+WIPBR=2,6,0,"user name"           //set user name (<login>)
OK
AT+WIPBR=2,6,1,"passwd"              //set password (<password>)
OK
AT+WIPBR=4,6,0                       //start GPRS bearer
OK
AT+WIPCREATE=3,1,80,5,9              // create the server on port 80, idx=1
OK                                   //TCP Server can spawn up to 5 TCP clients.
                                     //Assigned indexes are from 5 to 9.
+WIPACCEPT: 1,5                      //unsolicited: the server accepted
                                     //connection; resulting TCP client
                                     //on index 5
AT+WIPDATA=2,5,1                     //exchange data on socket index 5
CONNECT
...                                  //read, write
+++                                  //switch to AT mode
OK
```


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AT+WIPCLOSE=2,5	*//close the TCP client socket index 5*
OK	

8.1.1.2 Using GSM bearer

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,5	*//open GSM bearer*
OK	
AT+WIPBR=2,5,2,"Phone number"	*//set phone number for GSM bearer*
OK	
AT+WIPBR=2,5,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,5,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,5,0	*//start GSM bearer*
OK	
AT+WIPCREATE=3,1,80,5,9	*//create the server on port 80, idx=1*
OK	*//TCP Server can spawn up to 5 TCP clients. //Assigned indexes are from 5 to 9*
+WIPACCEPT: 1,5	*//unsolicited: the server accepted //connection; resulting TCP client //index 5*
AT+WIPDATA=2,5,1	*//exchange data on socket idx 5*
CONNECT	
...	*//read, write*
+++	*//switch to AT mode*
OK	

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AT+WIPCLOSE=2,5	*//close the TCP client socket index 5*
OK	

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8.1.2 TCP Client Socket

8.1.2.1 Using GPRS Bearer

```
AT+WIPCFG=1                          //start IP stack
OK
AT+WIPBR=1,6                         //open GPRS bearer
OK
AT+WIPBR=2,6,11,"APN name"           //set APN name of GPRS bearer
OK
AT+WIPBR=2,6,0,"user name"           //set user name
OK
AT+WIPBR=2,6,1,"passwd"              //set password
OK
AT+WIPBR=4,6,0                       //start GPRS bearer
OK
AT+WIPCREATE=2,1,"ip addr",80        //create the TCP client on port 80, idx=1
OK
+WIPREADY: 2,1                       //unsolicited: the server accepted
                                     //connection; resulting TCP clientindex 5
AT+WIPDATA=2,1,1                     //exchange data on socket idx 1:
CONNECT
...                                  //read, write
+++                                  //switch to AT mode
OK
AT+WIPCLOSE=2,1                      //close the TCP client socket index 1
OK
```


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8.1.2.2 Using GSM Bearer

```
AT+WIPCFG=1                          //start IP stack
OK
AT+WIPBR=1,5                         //open GSM bearer
OK
AT+WIPBR=2,5,2,"Phone number"        //set phone number for GSM bearer
OK
AT+WIPBR=2,5,0,"user name"           //set user name
OK
AT+WIPBR=2,5,1,"passwd"              //set password
OK
AT+WIPBR=4,5,0                       //start GSM bearer
OK
AT+WIPCREATE=2,1,"ip addr",80        //create the TCP client on port 80, idx=1
OK
+WIPREADY: 2,1                       //unsolicited: the server accepted
                                     //connection; resulting TCP client index 5
AT+WIPDATA=2,1,1                     //exchange data on socket idx 1
CONNECT
...                                  //read, write
+++                                  //switch to AT mode
OK
AT+WIPCLOSE=2,1                      //close the TCP client socket index 1
OK
```


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8.2 UDP Socket

```
AT+WIPCFG=1                                  //start IP stack
OK
AT+WIPBR=1,6                                 //open GPRS bearer
OK
AT+WIPBR=2,6,11,"APN name"                   //set APN name of GPRS bearer
OK
AT+WIPBR=2,6,0,"user name"                   //set user name
OK
AT+WIPBR=2,6,1,"passwd"                      //set password
OK
AT+WIPBR=4,6,0                               //start GPRS bearer
OK
AT+WIPCREATE=1,1,80,"www.wavecom.com",80     //start UDP socket
OK
WIPREADY: 1,1

AT+WIPDATA=1,1,1                             //exchange data on socket idx 1:
CONNECT
...                                          //read, write
+++                                          //switch to AT mode
OK
AT+WIPCLOSE=1,1                              //close the UDP socket index 1
OK
```


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8.3 PING

```
AT+WIPCFG=1                          //start IP stack
OK
AT+WIPBR=1,6                         //open GPRS bearer
OK
AT+WIPBR=2,6,11,"APN name"           //set APN name of GPRS bearer
OK
AT+WIPBR=2,6,0,"user name"           //set user name
OK
AT+WIPBR=2,6,1,"passwd"              //set password
OK
AT+WIPBR=4,6,0                       //start GPRS bearer
OK
AT+WIPPING="192.168.0.1"             //start PING session
OK
+WIPPING:0,0,224
```


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8.4 FTP

```
AT+WIPCFG=1                                   //start IP stack
OK
AT+WIPBR=1,6                                  //open GPRS bearer
OK
AT+WIPBR=2,6,11,"APN name"                    //set APN name of GPRS bearer
OK
AT+WIPBR=2,6,0,"user name"                    //set user name
OK
AT+WIPBR=2,6,1,"passwd"                       //set password
OK
AT+WIPBR=4,6,0                                //start GPRS bearer
OK
AT+WIPCREATE=4,1,"FTP                         //create FTP session
server",21,"username","passwd"
OK
AT+WIPFILE=4,1,2,"./filename.txt"             //upload file "filename.txt"
CONNECT
<data>
[ETX]
OK
AT+WIPFILE=4,1,1,"./filename.txt"             //download file "filename.txt"
CONNECT
<data>
[ETX]
OK
```


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9 Error Codes

"+CMEE" AT error code	Description
800	invalid option
801	invalid option value
802	not enough memory
803	operation not allowed in the current WIP stack state
804	device already open
805	network interface not available
806	operation not allowed on the considered bearer
807	bearer connection failure : line busy
808	bearer connection failure : no answer
809	bearer connection failure : no carrier
810	bearer connection failure : no sim card present
811	bearer connection failure : sim not ready (no pin code entered, ...)
812	bearer connection failure : GPRS network failure
813	bearer connection failure : PPP LCP negotiation failed
814	bearer connection failure : PPP authentication failed
815	bearer connection failure : PPP IPCP negotiation failed
816	bearer connection failure : PPP peer terminates session
817	bearer connection failure : PPP peer does not answer to echo request
818	incoming call refused
819	error on Ping channel
820	error writing configuration in FLASH memory
821	error reading configuration in FLASH memory
822-829	reserved for future use
830	bad index

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831	bad state
832	bad port number
833	bad port state
834	not implemented
835	option not supported
836	memory allocation error
837	bad protocol
838	no more free socket
839	error during channel creation
840	FTP session is already active
841	peer closed
842	destination host unreachable (whether host unreachable, Network unreachable, response timeout)
843-849	reserved for future use
850	unknown reason
851	bad state

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