
CDMA-C1 AT Commands

AT Commands Reference Guide



CDMA C1 AT Commands

Reference Guide

This Command Set Applies to the Following Products:

SocketModem® Cell (MTSMC-C1, MTSMC-C1-V)
 MultiModem® iCell (MTSMC-C1-IP)
 MultiModem® iCell (MTCMR-C1)
 MultiModem® rCell (MTCBA-C1-EN2)
 MultiModem® CDMA C1X (MTCBA-C1X-xx)

Product Number S000478C

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Revisions

Revision Level	Date	Description
A	02/25/10	Initial release. Based on Sierra Wireless Commands, Rev. 005, dated 7/14/09.
B	05/18/10	Update based on Sierra Wireless Commands, Rev. 006, dated 3/20/10. Added new Chapter "Host Application Scenarios." Added new parameter <P_REV_IN_USE> to Serving System +CSS command. Removed GPS commands – users should see the GPS commands in the Multi-Tech Universal IP AT Commands Reference Guide. Added WIPCLOSE command to TCP App Commands Chapter.
C	10/01/10	Added the MultiModem® CDMA C1X (MTCBA-C1X-xx) as a product that uses this command set.
	12/16/10	Added a note to +CFUN regarding resetting and powering down the modem.
	01/07/11	Removed "Power Down Using the ON/OFF Signal" from the +CFUN command.

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World Headquarters

Multi-Tech Systems, Inc.
 2205 Woodale Drive
 Mounds View, Minnesota 55112
 Phone: 763-785-3500 or 800-328-9717
 Fax: 763-785-9874
 Internet Address: <http://www.multitech.com>

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Chapter 1 – Introduction

The AT command set is one of the main interfaces for the modem to interact with an external application layer. CDMA AT commands are defined in TIA/EIA/IS707.3. However, as the wireless applications increase, TIA/EIA/IS707.3 is not sufficient. In addition, a lot of GSM applications already exist and GSM customers would like to maintain the same interface in order to make no or minimum changes to the applications to be used with CDMA modem. To meet the all these needs, this CDMA AT command set is designed to cover the following:

1. IS707.3 AT commands;
2. GSM 07.07 when applicable;
3. GSM 07.05 when applicable,
4. ITU-T v25 when applicable;
5. Proprietary AT set;
6. Customer specific AT commands;
7. Qualcomm defined AT commands.

Please note that in several instances, the GSM 7.07 and 7.05 specifications could not be followed because of fundamental differences between CDMA and GSM call processing behaviors. In these cases, minimal changes were made to the GSM-related commands.

Scope of This Document

This document describes CDMA AT commands, their syntax, responses, and result codes. It serves as the reference for wireless application development based on the CDMA modem and for its integration and testing. The intended audience is expected to be familiar with CDMA data services protocol and AT modem commands.

Related References

This interface specification is based on the following recommendations or standards:

- ETSI GSM 07.05: Digital cellular telecommunications system (Phase 2): Use of DTE-DCE interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)
- ETSI GSM 07.07: Digital cellular telecommunications system (Phase 2): AT command set for GSM Mobile Equipment (ME)
- ITU-T Recommendation V.25 ter: Serial asynchronous automatic dialing and control
- ETSI GSM 03.40: Digital cellular telecommunications system (Phase 2): Technical implementation of the Short Message Service (SMS) Point-to-Point (PP)
- ETSI GSM 03.38: Digital cellular telecommunications system (Phase 2): Alphabets and language-specific information
- ETSI GSM 04.80: Digital cellular telecommunications system (Phase 2): Mobile radio interface layer 3, Supplementary service specification, Formats and coding
- WAVECOM AT Commands Interface Guide version 001/9.1
- TIA/EIA/IS-707.3: Data Service Options for Wideband Spread Spectrum Systems: AT Command Processing and the Rm Interface
- Qualcomm Application Note (CL93-V0327-1 X10): AT COMMANDS FOR DMSS
- IS-131: Data Transmissions Systems and Equipment – Extensions to Asynchronous Dialing and Control.
- WISMO-CDMA Q24x8 Product Technical Specification; WI_HWD_Q24X8_PTS_001.
- TIA/EIA-592: Asynchronous Facsimile DCE Control Standard - Service Class 2
- WM_CCD_Q24x8_CTI_009: TCP App Application note

Chapter 2 – AT Commands Overview

Serial Interface Settings

A modem serial interface is set with the following default values (factory settings):

- 115,200bps
- 8 bits data
- 1 stop bit
- no parity
- RTS/CTS flow control.

Note: Some models may have a different value for the default baud rate.

The **+IPR**, **+IFC** and **+ICF** commands can be used to change these settings, if required. Changes made using these commands become effective immediately following the transmission of the successful command result (OK).

Overview

AT commands are commonly used to communicate with modem equipment. The modem provides an AT command interface over the serial link between the modem and a host application. The format of an AT command is an ASCII string that always starts with "AT" and ends with a defined set of characters. The format is defined in detail later in this chapter.

AT command communication between the host application and the modem is blocking: the host application must wait for the completion of one command before issuing the next command. The behavior of the modem is undefined if a new command is issued before the previous command's result code is returned.

While AT command communication is generally host-driven, unsolicited responses may also be sent to the host application when a certain events occur. Host applications should be prepared to receive unsolicited responses from the modem at any time except during AT command entry.

AT+CREG=0<CR>	Unsolicited response cannot occur between the 'A' and <CR>
<CR><LF>	Unsolicited response will not occur here unless otherwise documented
OK<CR><LF>	Unsolicited response can occur here

Wavecom supports only the AT commands listed in this document. Other AT commands may be functional as a result of the baseline code, but they will not be supported by Wavecom. The status of undocumented commands should not be assumed. It is recommended that only the listed AT commands be used in a host application.

Note: The test command option associated with AT commands may also be present for a large percentage of the AT commands.

Command Types

Terminology Used to Describe AT Command Communication

Term	Definition
AT Command	This is referred to as a command from the host application to modem with a request to perform a service.
Result Code	This is an immediate response to a command, informing the host application whether the execution of the command succeeded or failed. The strings “OK” or “ERROR” are the only two Result Codes available. A result code is always returned after an AT command has been sent to the modem.
Extended Reason Code	If enabled, (see AT+CMEER), modem responds with a detailed reason code string in addition to “OK” or “ERROR”. The reason code is returned before the result code. Extended reason codes are only provided when the result code is ERROR.
Response	A response contains data that has been requested via an AT command. A response is returned before the result code of the command. A response is provided only when the result code is OK.
Unsolicited Response	An unsolicited response is sent by modem when a specific event occurs. Some unsolicited responses can be turned on and off via AT commands. Some unsolicited responses are always enabled or turned on.

Three Types of AT Commands

Command Type	Definition
Action Command	Action commands are used to perform a function. Typically, action commands are used to change the value of a setting in modem, send data, or perform advanced queries that require input data.
Read Command	Read commands typically end with a “?”. Most read commands do not have any input parameters; however, in some cases an input parameter provides options for the response format. The read commands are used for reading values of certain settings in the modem.
Test Command	Test commands are not supported in the C1 modem.

Command Format and Syntax

Alphabet

The T.50 International Alphabet 5 (IA5) is used in this manual. Only the low-order seven bits of each character are significant to modem. Any eighth or higher-order bit(s) are ignored for the purpose of identifying commands and parameters. Lower-case characters (IA5 values from 0x61 to 0x7A) are considered identical to their upper-case equivalents (IA5 values from 0x41 to 0x5A) when received by modem from the host application. Result codes from the modem shall be in upper case.

All commands must begin with the characters A and T. If the A and T are not received by the software, the remaining characters will not be processed. This is important; should the A or T be lost in communication or not supplied, none of the characters sent to the modem will be echoed back until an AT sequence is observed.

Command-Line Editing

The character defined by the command ATS5 in chapter 9.14, (default: backspace [IA5 0x08]) is intended to be interpreted as a request from the host application to the modem to delete the previous character.

Any control characters (IA5 0x00 through 0x1F, inclusive) that remain in the command line after receipt of the termination character are ignored by the modem.

Before checking for other characters, the modem checks characters from the host application to see if they match the termination character (S3), then it checks to see if they match the editing character (S5). This ensures that these characters will be properly recognized even if they are set to values that the modem uses for other purposes. If S3 and S5 are set to the same value, a matching character will be treated as matching S3 (S3 is checked before S5).

Input Command Syntax

A command line is made up of the following three elements: the prefix, the body, and the termination character.

```
AT+WSCI=1<CR>
```

In the example above, AT is the prefix. The modem expects all commands to begin with the letters “AT” or “at”. If the host application inadvertently begins a command with characters other than “AT” or “at”, the modem will ignore the characters and will not echo them. The modem will continue to ignore input until the characters “AT” or “at” are received.

In some power save modes, the modem serial port UART is powered down. See section 19 for sleep related functionality.

In the example above, the body, +WSCI=1, includes commands and parameters. The termination character cannot appear in the body.

The termination character may be selected using the ATS3 command. For more information, see chapter 9.12. The default value is CR (IA5 0x0D).

In addition, the modem supports multiple AT commands embedded in a single AT command string request. However it is recommended that this feature be used with care. Response from the modem to multiple AT commands embedded in a single AT command string can be confusing. The modem will only return the status of the last instructional command of the string.

Other Syntax

Syntax	Definition
< >	Name enclosed in angle brackets is a syntactical element. Do not use the angle brackets when entering a command line.
[]	Square brackets are used to indicate an optional parameter of a command or an optional part of a response. Do not use the brackets when entering a command.

Note: In many cases the commas separating parameters are NOT optional when delimiting a list of “optional” parameters. The commas are necessary to provide parameter matching with the modem parser.

Output Response Syntax

The two characters defined in ATS3 (the terminating character) and ATS4 (Response formatting character) are used in all responses, reason codes, and result codes. The default values are <CR> (IA5 0x0D) and <LF> (IA5 0x0A) respectively. The following example illustrates how S3 and S4 are used with their default values.

Response with data

```
AT+CGMI<CR>
<CR><LF>WAVECOM<CR><LF>
<CR><LF>OK<CR><LF>
```

Result code only:

```
AT<CR>
<CR><LF>OK<CR><LF>
```

Parameter Defaults

When applicable, this document identifies default parameter values. Note that within the modem, parameter values can be either persistent or not persistent. Parameter settings that are NOT persistent are not saved over a power cycle; therefore, for every power cycle this type of parameter will be reset back to a predefined value. This predefined value is the listed default.

Values that are persistent are in fact saved over a power cycle. Therefore, the value when the modem is powered on will be set to the value during the previous power cycle. The default value that is listed for persistent parameters is the value the modem defaults to when the modem is created at the factory. It should be noted that Wavecom provides a process to customers where the persistent parameters can be modified at the factory. As a result, the parameter values might not correspond with this documentation. The factory customization is available on a per variant basis, and for all variants EXCEPT the generic variant. For more information regarding how to customize the persistent values at the factory refer to the PRI document.

Unsolicited Message Syntax

The modem can notify the application of events as they occur. There are two types of unsolicited messages: those that the modem will always report and those that are optional.

The format for unsolicited messages is:

```
<CR><LF>+WIND: 4<CR><LF>
```

As a general rule, unsolicited messages are not embedded in an AT command response. The unsolicited message may be returned after an AT command is issued and before the AT command response, but not in the middle.

Therefore, the following is NOT possible:

```
AT+CGMI<CR>
<CR><LF>WAVEC<CR><LF>RING<CR><LF>OM<CR><LF>
<CR><LF>OK<CR><LF>
```

However, the following example is possible:

```
AT+CGMI<CR>
<CR><LF>RING<CR><LF>
<CR><LF>WAVECOM<CR><LF>
<CR><LF>OK<CR><LF>
```

It is strongly recommended to design the host application parser to ignore unrecognized unsolicited messages. Such a design allows for modifications to the returned unsolicited messages for testing purposes and possible future enhancements to the modem. Unsolicited messages are discarded while the modem is in 32khz sleep.

Unsolicited messages can be buffered under certain conditions. The buffer is 15 entries deep and when full will drop the oldest messages for a new message. To control the unsolicited message continue, use AT+WUSLMSK. AT commands are buffered in PPP and TCP online data. It is recommended that during buffering that the level of unsolicited messages be dropped back as far as possible; the Ring Indicator can be used as a replacement for many unsolicited messages.

Chapter 3 - General Commands

Provides detailed descriptions of the AT commands supported by CDMA C1 modems. The functionality and syntax as well as expected result codes and responses are documented for each command.

Attention AT

Description: This two-character command prefix is used to alert the modem software that a command has been entered for processing. This prefix must be included in all commands unless otherwise noted. When entered alone, the modem responds with OK to signify it is ready to process commands.

Syntax: Command syntax: AT

Command	Possible Responses
AT	Note: No response returned.

Repeat Last Command A/

Description: This command repeats the previous command. Only the A/ command itself cannot be repeated.

Syntax: Command syntax: A/

Command	Possible Responses
A/	Response of the previous AT Command

Echo E

Description: This command is used to determine whether or not the modem echoes characters received by an external application (DTE). This is a standard Hayes® modem AT command.

Syntax: Command syntax: ATE

Command	Possible Responses
ATE0 Note: Characters are not echoed	OK Note: Done
ATE1 Note: Characters are echoed	OK Note: Done

Enable/Disable Individual Unsolicited Message Mask Bits +WUSLMSK

Description: The intent of this AT command is to enable/disable individual unsolicited message mask bits to be sent out to the serial port. This is a 64-bit mask that determines which messages are enabled or disabled. The setting is persistent over power cycle. The default setting is to allow all unsolicited messages.

Syntax: **Command Syntax:** AT+WUSLMSK=<mask-bit>, <mask>

Command	Possible Responses
AT+WUSLMSK?<cr> Note: Ask for current setting	+WUSLMSK: FFFFFFFFEFFFFFFDE OK
AT+WUSLMSK=?<cr> Note: Ask for possible values	+WUSLMSK: (00000000-FFFFFFF),(0-1) OK
AT+WUSLMSK=FFFFFFF,0<cr> Note: Enable All Unsolicited Messages Associated with the lower 32 bit mask	OK
AT+WUSLMSK=00020000,0<cr> Note: Enable ONLY +WIND Unsolicited Messages in the lower 32bit mask	OK
AT+WUSLMSK<cr> Note: Enable All Unsolicited Messages	OK

Values: The parameters values are:

<mask-bit> Currently only 32 bits are used for masking of unsolicited responses.
 00000000 All mask bits off.
 {various combinations in between (e.g., 0F817DFE).}
 FFFFFFFF All mask bits on.

<mask>
 0 Write bit mask values to the lower 32 bit mask.
 1 Write bit mask values to the upper 32 bit mask.
 The <mask-bit> bits correspond to the unsolicited response table below.

Lower 32-Bit Mask **Note:** Upper 32-bit Mask is not used at this time.

Bit	Mask Value	Unsolicited Response	Response for:
0	0x00000001	"+WSRV:"	Service State change
1	0x00000002	"+CCWA:"	Call waiting notification
2	0x00000004	"+CSQ:"	RSSI change across threshold
3	0x00000008	"+CLIP:"	CPN or CNAP notification
4	0x00000010	"+WORG:"	Call State origination
5	0x00000020	"+CRING:"	Call State incoming
6	0x00000040	"+WANS:"	Call State answered
7	0x00000080	"+WCNT:"	Call State conversation
8	0x00000100	"+WEND:"	Call End status
9	0x00000200	"+COPS:"	System mode, band, roam settings
11	0x00000800	"+WPRV:"	Privacy change
12	0x00001000	"+WROM:"	Roaming change
13	0x00002000	"+CREG:"	Registration information
15	0x00008000	"+WSPS:"	Enter/Exit Power Save Mode (no service found)
16	0x00010000	"+WNAM:"	Current NAM change
17	0x00020000	"+WIND:"	generic unsolicited message WIND
18	0x00040000	"+WOTA:"	OTASP or OTAPA programming info
19	0x00080000	"+WUZ:"	User zone notification
20	0x00100000	"+WTS:"	Diagnostic Timestamp
21	0x00200000	"DTMF:"	Uplink DTMF sent
22	0x00400000	"PINGRING"	Ping Ring

Bit	Mask Value	Unsolicited Response	Response for:
23	0x00800000	"BUSY TONE"	Busy Tone
24	0x01000000	"+WMGF"	SMS +WMGF memory full notification
25	0x02000000	"+WDSI: "	OMA/DM Event notifications
26	0x04000000	"+DPRL:"	+DPRL PRL validated ok
27	0x08000000	"+WVMI:"	Voice Mail Indication
28	0x10000000	"+WAKETA"	Alert Timer Indicator
29	0x20000000	"RING"	Incoming call notification
30	0x40000000	"+WANTS"	Antenna Diagnostics Status Change
31	0x80000000	"+WBCI"	Battery Charging Status Change

Request PRI Version information +WPRI

Description: This command requests Product Release Instructions (PRI) edition for the modem.

Syntax: Command Syntax: AT+WPRI?

Command	Possible Responses
AT+WPRI? Note: Request current PRI version	+WPRI: Version 1 OK
AT+WPRI? Note: Request current PRI edition	NO PRI Note: PRI request invalid because there's no PRI loaded.

Note: The range for PRI label is 20 characters (not including the null termination).

Chapter 4 – Identification Commands

Request Revision Identification +CGMR

Description: This command is used to display the operating software version.

Syntax: **Command syntax:** AT+CGMR

Command	Possible Responses
AT+CGMR	+CGMR: S/W VER: Q26EL001 P1A066 Jan 1 2009 23:02:14
Note: Get software version	OK

Hardware Version +WHWV

Description: This command displays the hardware version number.
The hardware version number is a factory defined three-digit character string of in the format of X.Y where S is the major version number and Y is the minor version number.

Syntax: **Command syntax:** AT+WHWV

Command	Possible Responses
AT+WHWV	+WHWV: 5.1 OK
AT+WHWV	+WHWV: 6.0 OK

Electronic Serial Number +CGSN

Description: This command allows the user application to get the ESN of the product. The ESN value is displayed in hexadecimal format. If the MEID is present, then it is also displayed along with the pseudo ESN.

Syntax: **Command syntax:** AT+CGSN

Command	Possible Responses
AT+CGSN	+CGSN: FE7A7704 OK
Note: Get the ESN	Note: ESN is displayed
	+CGSN: <MEID>,<pseudo ESN> OK
	Note: MEID and pseudo ESN

Manufacturer Identification +CGMI

Description: This command gives the manufacturer identification.

Syntax: **Command syntax:** AT+CGMI

Command	Possible Responses
AT+CGMI Note: Get manufacturer identification	+CGMI: (BRAND OF) MODEM OK Note: Command valid, modem

Request Model Identification (Frequency Bands) +CGMM

Description: This command is used to get the supported frequency bands. With multi-band products the response may be a combination of different bands.

Syntax: **Command syntax:** AT+CGMM

Command	Possible Responses
AT+CGMM Note: Get supported bands	+CGMM: 800 1900 OK Note: CDMA 800 MHz band and 1900 (PCS)

Request Product Serial Number +WMSN

Description: The command allows the user application to get the serial number of the wireless modem.

Syntax: **Command syntax:** AT+WMSN

Command	Possible Responses
AT+WMSN? Note: Get the wireless modem serial number.	+WMSN: 123456789012345 OK Note: Serial Number read from NV memory

Values:

The serial number is fifteen digits in length and the breakdown of the string is as follows:

Digits	Meaning
AA	Wireless modem type
B	Year built
CC	Week built
DDDDD	Unit number
EE	Bench number
FFF	Part Number

Chapter 5 – Query Commands

Capabilities List +GCAP

Description: This command gets the complete list of capabilities.

Syntax: Command syntax: AT+GCAP

Command	Possible Responses
AT+GCAP Note: Get capabilities list	+GCAP: +CGSM, +CIS707-A, +DS OK

Subscriber Number +CNUM

Description: This command is used to return the subscriber MSISDN for the current NAM.

Syntax: **Command syntax:** AT+CNUM

Response syntax: +CNUM: "Phone", <number1>, <type1>, <CR><LF>

Command	Possible Responses
AT+CNUM Note: Get MSISDN	+CNUM:"Phone","8585551212",129 Note: MSISDN displayed
AT+CNUM=?	+CNUM: OK

Values:
 <numberx> string type phone number with format as specified by <typex>
 <typex> type of address byte in integer format – supports only 129

Chapter 6 – Global Configuration Commands

Set Phone Functionality +CFUN

Description: This command selects the mobile station's level of functionality. The AT+CFUN=1 command restarts the entire CDMA stack and CDMA functionality: **a complete software reset is performed**. The OK response will be sent at the last baud rate defined by the +IPR command. Issuing the AT+CFUN with no arguments will act the same as AT+CFUN=1.

Syntax: **Command syntax:** AT+CFUN=<functionality level>

Command	Possible Responses
AT+CFUN? Note: Ask for current functionality level	+CFUN: 1 OK Note: Full functionality
AT+CFUN=0 Note: Powers off the modem	OK Note: Command valid
AT+CFUN=1 Note: Sets modem to ONLINE mode. Performs software reset	OK Note: Command valid

Values: <functionality level>

- 0 Powers off the modem.
- 1 Sets modem to ONLINE mode. Performs software reset

Notes:

Powering Down and Hardware Reset

It is recommended to follow this shutdown sequence, when possible, prior to a hardware reset or a powering down of the modem.

The shutdown sequence informs the network that the mobile station is going offline, and then saves critical data to the modem's non-volatile memory (flash).

```
AT+CFUN=0 (issues the command)
+WIND:10 (wait for this response from the modem)
```

The modem is now ready to be powered off or reset.

If you do not see the +WIND:10 response, you may want to enable this unsolicited message using the command AT+WUSLMSK=00020000,0<cr>.

Display Configuration &V

Description: This command is used to display the modem configuration. It lists all the commands supported by the modem and their possible parameters. This is a standard Hayes® modem AT command.

Syntax: **Command syntax:** AT&V

Command	Possible Responses
AT&V Note: Display the active parameter settings	&C: 2; &D: 2; OK

Restore Factory Settings &F

Description: This command is used to restore the factory settings from NV memory. This is a standard Hayes® modem AT command. See Appendix "Effects of AT&W, ATZ and AT&F"

Note: There is a remote chance of NV memory corruption if a reset or power loss occurs during the processing of this command. This command should be used only during the initial setup of the operating characteristics.

Syntax: **Command syntax:** AT&F

Command	Possible Responses
AT&F	OK Note: Command valid, modem resets

Save Configuration &W

Description: This command writes the current configuration to NV. See table in Chapter 19 for a list of items. This is a standard Hayes® modem AT command.

Syntax: **Command syntax:** AT&W

Command	Possible Responses
AT&W	OK Note: Command valid

Reset to Default Configuration Z0

Description: This command is used to restore the configuration last saved by AT&W.

Syntax: **Command syntax:** ATZ0

Command	Possible Responses
ATZ0 Note: reset to default configuration.	OK Note: Command is valid

Chapter 7 – Status Commands

General Indicator +WIND

Description: This is a general mechanism to send unsolicited non-standardized indications to the application. The identified unsolicited non-standardized indications are:

- Indication during mobile originated call setup that the calling party is ringing.
- Indication of the availability of the product to receive AT commands after boot.

The +WIND is overloaded with two functionalities:

1. posts non-standardized indications and
2. allows the user to specify indication level.

For each of these indications, a “bit flow” has to be indicated.

Syntax: **Command syntax:** AT+WIND=<IndLevel>

Command	Possible Responses
AT+WIND? Note: Show current setting.	WIND: 8 OK Note: Default 204
AT+WIND=? Note: Show <IndLevel> range.	+WIND: (0-32767) OK
AT+WIND=128 Note: Turn on Network lost indication only.	OK Note: Command accepted.
AT+WIND Note: Set the default of 204.	OK Note: Command accepted.

Values:

<IndLevel>

- 1** (bit-0): Reserved
- 2** (bit-1): A calling party is alerting
- 4** (bit-2): Product is ready to process read-only AT commands
- 8** (bit-3): Indication that the product is ready to process all AT commands
- 16** (bit-4): A call <idx> has been created (after ATD, +CCWA, etc.)
- 32** (bit-5): A call <idx> has been released (NO_CARRIER, ATH, etc.)
- 64** (bit-6): Network service available indication
- 128** (bit-7): Network lost indication
- 256** (bit-8): Reserved
- 512** (bit-9): Shut down complete
- 1024** (bit-10): Corrupted RF calibration values (checksum mismatch)
- 2048** (bit-11): Reserved
- 4096** (bit-12): Reserved
- 8192** (bit-13): Reserved
- 16384** (bit-15): SMS service ready indication

Note 1: If <IndLevel> is equal to 0, no unsolicited “+WIND: <IndNb>” will occur.

Note 2: The power off indication, +WIND=10, will occur even if +WIND is equal to 0.

A combination (addition of the values) is used to allow more than one indication flow.
 $0 \leq \text{Ind Level} \leq 32767$.

For example: 128 (network lost indication) + 64 (network service available indication) = 192.

The response is OK if the values are in the previous range.

+WIND General Indicator Unsolicited Message

The unsolicited response indicates a variety of events.

Result Examples

+WIND: 4

Note: General indication that AT commands are ready to be accepted

The supported events are:

<event>

- 0:** Reserved
- 1:** Reserved
- 2:** Reserved
- 3:** Reserved
- 4:** Product is ready to process all AT commands
- 5:** A call <idx> has been created (after ATD, +CCWA, etc.)
- 6:** A call <idx> has been released (NO_CARRIER, ATH, etc.)
- 7:** Network service is available
- 8:** The network is lost.
- 9:** Reserved
- 10:** Shut down is complete
- 11:** Corrupted RF calibration values (checksum mismatch)
- 12:** Reserved
- 13:** Reserved
- 14:** Reserved
- 15:** Reserved
- 16:** SMS service ready indication

The following table indicates the correspondences between <InLevel> values and “+WIND: <event> [...]” indications that are activated.

<InLevel> Value	Corresponding <event>
1	0 and 1
2	2
4	3
8	4
16	5
32	6
64	7
128	8
256	9
512	10
1024	11
2048	12
4096	13 and 14
8192	15
16384	16

Report Mobile Equipment Errors +CMEE

Description: This command disables or enables the use of the "Extended" error codes. The extended errors are output instead of "ERROR" when +CMEE is enabled. Extended error codes are output as "+CME ERROR: <xxx>" for most errors, or as "+CMS ERROR: <xxx>" for SMS-related commands. See error codes descriptions below.

Syntax: **Command syntax:** AT+CMEE=<error reporting flag>

Command	Possible Responses
AT+CMEE=0 Note: Disable MS error reports; use only « ERROR »	OK
AT+CMEE=1 Note: Enable «+CME ERROR: <xxx>»	OK

CME Error Codes:

<err>	Meaning
1-2	Reserved
3	Operation not allowed
4	Operation not supported
5-9	Reserved
10	UIM not inserted
11	UIM PIN1 required
12	UIM PUK1 required
13	UIM failure
14-15	Reserved
16	UIM wrong password
17	UIM PIN2 required
18	UIM PUK2 required
19	Reserved
20	Memory Full
21	Invalid Index
22	Entry Not Found
23	Reserved
24	Text string too long
25	Reserved
26	Dial string too long
27	Invalid Character in Dial String
28-29	Reserved
30	No network service
31	Reserved
32	Network not allowed – Emergency Calls only
33-40	Reserved
41	Software resource not available
42	Invalid parameter
43	Non-Volatile Memory failure
45	Invalid WSPC provisioning code
46	OTKSL provisioning code access restricted
47-49	Reserved
50	Session already in progress
51	Invalid PD parameter
52	PD parameter not supported
53	Tracking mode requires +WPDFR setup
54	No active session
55-147	Reserved

CME Error Codes Continued:

<err>	Meaning
148	Unsupported serial port baud rate
149	Socket transmit timeout
150-239	Reserved
240	FDN is active and number is not in FDN
241-299	Reserved
300-399	See CMS Errors
400-499	Reserved
500	unknown error.
502-512	Reserved
513	Lower layer failure (for SMS)
514	Reserved
515	Please wait. Initialization or command processing in progress.
516-518	Reserved
519	Reset the product to activate or change a new echo cancellation.
520-530	Reserved
531	Only FDN phonebook entries can be sent when the FD facility is enabled.
532-599	Reserved
601	PRL request invalid (no PRL)
800	WIP: Invalid option
801	WIP: Invalid option value
803	WIP: Operation not allowed in current stack state
804	WIP: Device already open
805	WIP: Network interface not established
806	WIP: Operation not allowed on bearer
808	WIP: Bearer connection failed
830	WIP: Bad index
832	WIP: Bad port number
834	WIP: Not implemented
835	WIP: Option not supported
837	WIP: Bad protocol
838	WIP: No sockets available
840	WIP: Socket in use
842	WIP: Destination Unreachable
844	WIP: Stack Already Started
850	WIP: Unknown error
860	WIP: Undefined protocol, Internal error
863	WIP: Protocol delete error
864	WIP: Protocol list error

CMS Error Codes:

<err>	Meaning
300-301	Reserved
302	Operation not allowed
303	Operation not supported
304	Invalid mode parameter
305	Invalid text mode parameter
306-320	Reserved
321	Invalid memory index
322-339	Reserved
341	Non Volatile Memory failure
342-399	Reserved

Cellular Result Codes +CRC

Description: This command gives more detailed ring information for an **incoming call**. Instead of the string “RING”, an extended string is used to indicate which type of call is ringing (e.g., +CRING:0).

These extended indications are:

+CRING: 0	Normal voice calls
+CRING: 1	Circuit switched data calls
+CRING: 2	Packet switched data calls
+CRING: 3	SMS calls
+CRING: 5	For markov, loopback, and test calls
+CRING: 6	For OTAPA calls
+CRING: 7	For standard OTASP calls
+CRING: 8	For non-standard OTASP calls

Syntax: **Command syntax:** AT+CRC

Command	Possible Responses
AT+CRC=0 Note: Extended reports disabled	OK Note: Command valid
AT+CRC=1 Note: Extended reports enabled	OK Note: Command valid
AT+CRC=? Note: Show range	+CRC: (0-1) OK
AT+CRC? Note: Show current value	+CRC: 1 OK

Phone Activity Status +CPAS

Description: This command returns the activity status of the mobile equipment.

Syntax: **Command syntax:** AT+CPAS

Command	Possible Responses
AT+CPAS Note: Current activity status	+CPAS: <pas> OK

Values: <pas>

- 0 ready (allow commands from TA/TE)
- 1 unavailable (does not allow commands)
- 2 unknown
- 3 ringing (ringer is active)
- 4 call in progress
- 5 Not supported, asleep (low functionality)
- 6 corrupted RF calibration values (checksum mismatch)

Non Volatile Memory Unsolicited Message +WNVM

Description: This unsolicited response is used to indicate various Non-Volatile Memory (NVM) events. The messages will only be presented during the startup sequence; before receiving +WIND:4. Synchronization at startup may occur if the modem was improperly shut down before an NVM synchronization between primary NVM storage and secondary NVM storage was completed. If during startup it is determined the primary NVM storage is not usable, the modem will boot from the secondary copy. This insures reasonable notification that the modem has started and is taking the necessary actions to correct the primary NVM storage.

Results Example:

+WNVM: 1
+WNVM: 0

Supported Events:

- 0** Synchronization stopped, Primary NVM storage to Secondary NVM storage
- 1** Synchronization started, Primary NVM storage to Secondary NVM storage
- 2** Primary NVM resulted in an error, booting using the secondary NVM image

Chapter 8 – Communication Commands

Fixed DTE Rate +IPR

Description: This command is used to specify the baud rate for the modem DATA port. The factory default value is 115200.

Note: Auto-baud (automatic detection of DTE rate) is not supported.

At power-up, the interface rate is set to the value that was active when the last AT&W command was used.

Note: The use of baud rates below 9600 may affect the operability of some software features; e.g., TCP App.

Syntax: **Command syntax:** AT+IPR

Command	Possible Responses
AT+IPR? Note: Read syntax.	+IPR: 9600 OK Note: Current rate is 9600 bps
AT+IPR=115200 Note: Set interface rate to 115200 bps	OK
AT+IPR=? Note: List of supported <rate> values, [(list of fixed-only <rate> values)]	(),(300,600,1200,2400,4800,9600,19200,38400,57600,115200,230400) OK Note: List of values showing possible baud rates
AT+IPR Note: Set interface rate to factory default of 115200 bps	OK

DTE-DCE Local Flow Control +IFC

Description: This command is used to specify the UART flow control method. The factory default value is 2,2. AT&F and AT&W are in effect. Software flow control is not supported.

Syntax: **Command syntax:** AT+IFC=<Tx>,<Rx>

Command	Possible Responses
AT+IFC=2,2 Note: Set values	OK Note: New values set.
AT+IFC Note: Set factory default values	OK
AT+IFC? Note: Display current settings.	+IFC: 2,2 OK
AT+IFC=? Note: Display valid parameter ranges.	+IFC: (0-3),(0-2) OK

Values:

<Tx>

- | | | |
|---|----------|---|
| 0 | None | Transmit data flow control disabled. |
| 1 | XON/XOFF | Not Supported. Remove Xon (0x19) and Xoff (0x17) characters from data stream. |
| 2 | Hardware | Use RTS (Request To Send) signal (default) |
| 3 | XON/XOFF | Not Supported. Leave Xon (0x19) and Xoff (0x17) characters in data stream. |

<Rx>

- 0** None Receive data flow control disabled.
- 1** XON/XOFF Not Supported. Remove Xon (0x19) and Xoff (0x17) characters from data stream.
- 2** Hardware Use CTS (Clear To Send) signal (default)

Set Diagnostic Port **+WDMX**

Description: Set the diagnostic port to either UART2 or USB. The diagnostic port is used with tools like QPST, QXDM, and WPST. These tools can run in conjunction with normal execution of the modem.

Syntax: **Command Syntax:** AT+WDMX= <port>

Command	Possible Responses
AT+WDMX=2 Note: Set diagnostics to UART2	OK Note: New values set.
AT+WDMX? Note: Display current settings	+WDMX: 2 OK
AT+WDMX=? Note: Display valid parameter ranges	WDMX: (1,2,6) OK

Values: **<port>**

- 1:** Map port to AT\$QCDMG setting
- 2:** Map port to UART2
- 6:** Map port to USB

Set DCD Signal **&C**

Description: This command is used to specify the behavior of the Data Carrier Detect (DCD) signal on the modem DATA port. The factory default value is 2. The AT&F command restores the value to the factory setting.

Syntax: **Command syntax:** AT&C<n>

Command	Possible Responses
AT&C0 Note: DCD always on	OK Note: Command valid
AT&C1 Note: DCD matches the true state of the call.	OK Note: Command valid
AT&C2 Note: Wink DCD signal on call disconnect	OK Note: Command valid

Values: **<n>**

- 0** The DCD signal is always asserted.
- 1** The DCD signal is asserted in a call and de-asserted when not in a call.
- 2** The DCD signal is always asserted except at the end of a call. At the end of a call, the DCD signal is de-asserted for 1 second. **Default is 2**

Set DTR Signal &D

Description: This command controls the interpretation of the Data Terminal Ready (DTR) signal on the modem DATA port. The factory default value is 2. The AT&F command restores the value to the factory default.

Syntax: **Command syntax:** AT&D<n>

Command	Possible Responses
AT&D0 Note: The DTR signal is ignored	OK Note: Command valid
AT&D1 Note: Enter online command state following ON-to-OFF transition of circuit 108/2	OK Note: Command valid
AT&D2 Note: Enter command state following ON-to-OFF transition of circuit 108/2	OK Note: Command valid

Values:

<n>

- 0 The DTR signal is ignored.
- 1 Enter online command state following ON-to-OFF transition of circuit 108/2. Data call remains active.
- 2 Enter AT command state following ON-to-OFF transition of circuit 108/2. Data call is terminated. Note: All open sockets are automatically closed prior to terminating the data call.

Set DSR Signal &S

Description: This commands controls the Data Set Ready (DSR) signal on the modem DATA port. The default value is 0. The AT&F command restores the value to the factory default setting.

Syntax: **Command syntax:** AT&S<n>

Command	Possible Responses
AT&S0 Note: The DSR signal always on.	OK Note: Command valid
AT&S1 Note: The DSR signal is always off.	OK Note: Command valid

Values:

<n>

- 0 The DSR signal is always on. (Default)
- 1 The DSR signal is always off.

V.42bis Data Compression +DS

Description: This command enables or disables V.42bis data compression if this feature is provided on the PSTN in the IWF.

Syntax: **Command syntax:** AT+DS=<dir>,<neg>,<P1>,<P2>

Command	Possible Responses
AT+DS=3,0,4096,250 Note: Set new parameters	OK Note: Command valid
AT+DS? Note: Current values	+DS: 3,0,4096,250 OK Note: Command valid

Values: Four numeric sub-parameters are accepted:

<dir> Specifies the desired direction(s) of operation of the data compression function; from the DTE point of view.

Default is 3.

- 0** Negotiated ... no compression
- 1** Transmit only
- 2** Receive only
- 3** Both directions, accept any direction

<neg> Specifies whether or not the DCE should continue to operate if the desired result is not obtained.

Default is 0

- 0** Do not disconnect if V.42 bis is not negotiated by the remote DCE as specified in <dir>
- 1** Disconnect if V.42 bis is not negotiated by the remote DCE as specified in <dir>

<P1>

512-4096 Specifies the maximum number of dictionary entries that should be negotiated.

Default is 4096.

<P2>

6-250 Specifies the maximum string length to be negotiated.

Default is 250.

V.42bis Data Compression Report +DR

Description: This command returns the results of data compression capability. If data reporting is enabled, this command returns the data compression type of an incoming or outgoing data call. Otherwise, the command returns NONE.

The intermediate result code represents current DCE-DCE data compression type. The syntax for +DR reporting is: +DR<result>, and the result code is defined as follows:

+DR: NONE	Data compression is not in use
+DR: V42B	Rec. V.42bis is in use in both directions
+DR: V42B RD	Rec. V.42bis is in use in receive direction only
+DR: V42B TD	Rec. V.42bis is in use in transmit direction only

The +DR intermediate result code, if enabled, is issued before the final result code and after the service report control +CR.

Syntax: **Command syntax:** AT+DR=<val>

Command	Possible Responses
AT+DR=1 Note: Reporting enabled	OK Note: Command valid
AT+DR? Note: Display the current value	+DR: 1 OK Note: Command valid
AT+DR=? Note: Display the supported values	+DR: (0,1) OK Note: Command valid

Values: This syntax is for setting the +DR reporting method.

<val>

- 0 Disable reporting
- 1 Enable reporting

Hang-Up 1x Data Command +WCHD

Description: The AT+WCHD command is used by the application to disconnect all 1x data calls. The alternative is to use the DTR pin.

Syntax: **Command Syntax:** AT+WCHD

Command	Possible Responses
AT+WCHD Note: Ask for disconnection	OK NO CARRIER

Automatic Answer S0

Description: This S0 (zero) S-register parameter determines and controls the product automatic answering mode. The setting is not persistent.

Syntax: **Command syntax:** ATS0=<value>

Command	Possible Responses
ATS0=2 Note: Automatic answer after 2 rings	OK
ATS0? Note: Current value	002 OK Note: always 3 characters padded with zeros
ATS0=0 Note: No automatic answer	OK

Values:

- <value> (0-255)
- 0 No automatic answer.
- 1-255 Answers after the specified number of rings

Line Termination Character S3

Description: This command is used to terminate an incoming command line. The value is not persistent.

Syntax: **Command syntax:** ATS3=<value>

Command	Possible Responses
ATS3=13 Note: Set detection character to carriage return	OK

Values: <char> Character decimal representation
1 – 127 Escape character (default is 13 or the carriage return character)

Response Formatting Character S4

Description: This command sets the value of the AT defined character when formatting the result codes and information text. It is used together with the ATS3 command. The value is not persistent.

Syntax: **Command syntax:** ATS4=<value>

Command	Possible Responses
ATS4=10 Note: Set detection character to line feed	OK

Values: <char> Character decimal representation
1 – 127 Escape character (default is 10 or the carriage return character)

Command Edit Character S5

Description: This command sets the value of the defined character for deleting the immediately preceding character from the command line. The value is not persistent.

Syntax: **Command syntax:** ATS5=<value>

Command	Possible Responses
ATS5=8 Note: Set detection character to backspace	OK

Values: <char> Character decimal representation
1 – 127 Escape character (default is 8 or the carriage return character)

Connection Completion Timeout S7

Description: This command defines the maximum time allowed between completion of dialing and the connection being established. If this time is exceeded, then the connection is aborted. The value is not persistent.

Syntax: **Command syntax:** ATS7=<value>

Command	Possible Responses
ATS7=100	OK

Values: <value> Timeout in seconds
1 – 255 Default value is 50

Carrier Detect Threshold S9

Description: This command defines the amount of time the carrier detect signal stays high. The value is not persistent.

Syntax: **Command syntax:** ATS9=<value>

Command	Possible Responses
ATS9=10	OK

Values: <value> Value in tenths of a second
 1 – 255 Default value is 60 (or 6 seconds)

Automatic Disconnect Delay S10

Description: This command defines the duration of received-line-signal loss that the DCE tolerates. If the duration is exceeded, the DCE disconnects. The value is not persistent.

Syntax: **Command syntax:** ATS10=<value>

Command	Possible Responses
ATS10=10	OK

Values: <value> Value in tenths of a second
 1 – 254 Default value is 14 (or 1.4 seconds)
 255 Ignore received-line-signal loss; do not disconnect

DTMF Duration and Spacing S11

Description: This command defines the DTMF pulse width for both burst and continuous DTMF. The value is not persistent.

Syntax: **Command syntax:** ATS11=<value>

Command	Possible Responses
ATS11=150	OK

Values: <value> Value range
 50 – 149 Burst DTMF time of 95ms digit time with 60ms inter-digit time
 150 – 199 Burst DTMF time of 150ms digit time with 100ms inter-digit time
 200 – 249 Burst DTMF time of 200ms digit time with 150ms inter-digit time
 250 Burst DTMF time of 250ms digit time with 200ms inter-digit time
 251 – 255 Continue DTMF in ms – Equation: (value-250) x 1000

Chapter 9 – Call Control Commands

Dial Command D

Description: The ATD command is used to originate a **voice** or **data** call.

For a **data call**, the application sends the following ASCII string to the product:

ATD<nb> where <nb> is the destination phone number.

Note: ATD<nb> is followed by PPP session startup and negotiation. Standard PPP packets are HDLC formatted. A packet data call is terminated by de-assertion of the DTR signal to the modem. See the AT&D command.

For a **voice call**, the application sends the following ASCII string to the product:

ATD<nb>; where <nb> is the dialing string or destination phone number, followed by a semicolon “;”. The dialing string may contain characters “0-9”, “#”, “*” only. Note that some countries may have specific numbering rules for their CDMA handset numbering.

If a call, voice or data, is already in progress, initiating a dial will return an ERROR.

The dial sequence is responsible for handling emergency calls. It is the host application's responsibility to tear down a data call if an outgoing emergency call has been initiated.

The response to the ATD command is one of the following:

Verbose Result Code	Numeric Code (with ATV0 set)	Description
OK	0	Command executed (voice)
ERROR		Call already in progress
CONNECT <speed>	10,11,12,13,14,15	If the call succeeds, for data calls only, <speed> takes the value negotiated by the product
BUSY	7	If the called party is already in communication
NO ANSWER	8	If no hang up is detected after a fixed network time-out
NO CARRIER	3	Call setup failed or remote user release
NO DIALTONE	6	Voice call with missing “;”

Direct Dial Syntax: Command syntax: ATD<nb>[:]

Command	Possible Responses
ATD18005551212; Note: Attempt a voice call.	OK Note: Command executed +WORG:18005551212 Note: Voice call origination sent to Base Station with dial string “18005551212”. +WCNT: 9 Note: Call Connected, CDMA traffic channel established with service option 9. You can now hear audio of the calling party's phone ringing. However, this event does not mean the other calling party has answered.
ATD5551212; Note: Example of a failed voice call attempt.	OK Note: Command executed +WORG:5551212 Note: Voice call origination sent to Base Station with dialing string “5551212”. +WEND: 3 Note: Call Attempt failed/ended. Reason 22, signal faded.

Hang-Up Command H

Description: The ATH (or ATH0) command is used by the application to disconnect the remote user. In the case of multiple calls, all calls are released (active, on-hold and waiting calls).

Syntax: **Command syntax:** ATH

Command	Possible Responses
ATH Note: Ask for disconnection	OK +WEND: 29 Note: Every call, if any, is released

Answer a Call A

Description: When the product receives a call, it sets the **RingInd** signal and sends the ASCII “RING” or “+CRING: <type>” string to the application (+CRING if the cellular result code +CRC is enabled). Then it waits for the application to accept the call with the ATA command.

Syntax: **Command syntax:** ATA

Command	Possible Responses
	RING Note: Incoming call
ATA Note: Answer to this incoming call	+WANS:0 +WCNT: 10 Note: Call accepted
ATH Note: Disconnect call	OK +WEND: 29 Note: Call disconnected

Calling Line Identification Presentation +CLIP

Description: This command allows control of the incoming Calling Line Identification Presentation (CLIP) supplementary service. When CLIP is enabled, the +CLIP response is returned after the RING unsolicited result code. By default, +CLIP is enabled.

CLIP = Calling Line Identification Presentation is a supplementary service that allows the called party to receive the line identity of the calling party.

CNAP = Calling Name Presentation provides the name identification of the calling party to the called party based on the calling party's number. In this product, the CNAP will always be 129.

Syntax: **Response syntax:** AT+CLIP=<mode>

Command	Possible Responses
AT+CLIP=1 Note: Enable CLIP	OK Note: CLIP is enabled
AT+CLIP? Note: Ask for current functionality	+CLIP:<mode> OK Note: <mode> defined as below
	RING +CLIP: “8585551212”,129 Note: Incoming call with CLIP and CNAP
AT+CLIP=0 Note: Disable CLIP presentation	OK Note: Command valid

Values: **<mode>** This parameter enables or disables the caller +CLIP unsolicited response
0 Disable
1 Enable

Caller ID Presentation Unsolicited Response +CLIP:

This response indicates that CLIP (Calling Line Identification Presentation) is enabled for the current incoming call. See +CLIP for enable and disabling this result.

Syntax: Response Syntax: +CLIP: <clip>, <cnap>

Result Example 1:

+CLIP: "8585551212",129

Note: Incoming call with CLIP and CNAP available

Result Example 2:

+CLIP: "", ""

Note: Incoming call with CLIP and CNAP not available. This result is due to either:
UNKOWN information
BLOCKED information by carrier

Call Waiting Indication +CCWA

Description: This response indicates that another incoming call is occurring during an existing call. See +WFSH for information about handling call-waiting situations.

Syntax: Response syntax: +CCWA: <caller_id>, <type>

Result Example

+CCWA: 18005551212,129

Note: Incoming call from 1-800-555-1212, type always equals 129.

Values:

<caller_id>	Calling Line Identification Presentation
<type>	Always 129 for this response

Incoming Call +RING

Description: This response indicates an incoming call. Consecutive RING indications are spaced at 3 seconds.

Syntax: Response syntax: +RING

Result Example

+RING

+RING

Note: Incoming Call

Set Voice Privacy Level +WPRV

Description: This command requests the CDMA voice privacy level. CDMA voice privacy is an optional feature of CDMA networks. Therefore, voice privacy will only become enabled during a voice call if the base station supports voice privacy; otherwise this feature is unavailable on your CDMA carrier. This command enables a request from the modem to the base station for voice privacy. If voice privacy is activated by the base station, the unsolicited response +WPRV: 1 will appear indicating the long code PN mask for the traffic channel has been scrambled by the base station. This command may be issued before or during a voice call.

Note: When voice privacy is enabled, an audible alert will be generated if the state of voice privacy changes (loss or establishment).

Syntax: **Command Syntax:** AT+WPRV=<voice privacy level>

Command	Possible Responses
AT+WPRV=0 Note: Set to normal voice call	OK
AT+WPRV=1 Note: Request a secure voice call ATD18005551212;	OK OK +WORG: 18005551212 +WPRV: 1 +WCNT: 3 Note: Voice Privacy is now ON
AT+WPRV? Note: Request current privacy setting	+WPRV: <voice privacy level> OK Note: <voice privacy level> defined below

Values: <voice privacy level>

0	normal privacy (default setting)
1	enhanced privacy

Call Privacy Indication Unsolicited Response +WPRV

This response confirms that the call privacy level has changed during a call.

Response Syntax: +WPRV: <voice privacy level>

Result Example 1: +WPRV: 0
Voice privacy level change to “normal privacy”

Result Example 2 +WPRV: 1
Note: Voice privacy level change to “enhanced privacy”

Emergency Mode +WSOS

Description: In the event of a user-originated emergency call, the modem will automatically put itself into Emergency callback state. The modem will remain on the same system to be able to receive callbacks from emergency personnel. The modem behavior during Emergency callback state depends on the factory-provisioned mode--Timer Reset Mode or Basic Mode. The mode is carrier-specific.

Timer Reset Mode:

AT+WSOS can only query the Emergency callback state. The user cannot exit Emergency callback state using the AT+WSOS=0 command. Emergency callback state is exited when:

- The modem is reset,
- The user originates a normal voice call, or
- The emergency callback timer expires. This timer is carrier-specific and is set in the factory.

Basic Mode/No Timer

AT+WSOS=0 must be used to exit Emergency callback state. While in Emergency callback state, only calls to emergency numbers can be established. Emergency callback state is exited when:

- The modem is reset, or
- The user enters AT+WSOS=0 to exit emergency callback state.

If neither Timer Reset Mode nor Basic Mode has been set in the factory, then AT+WSOS will return ERROR.

In addition to 911, other emergency numbers are supported by the modem software. See the AT\$WEMER command.

Syntax: **Command Syntax:** AT+WSOS=<Action>

Command	Possible Responses
AT+WSOS=0 Note: Exit Emergency callback state (Basic Mode only)	+WSOS: 0 OK Note: Successful exit of Emergency callback state
AT+WSOS=1	ERROR Note: Cannot enter Emergency callback state manually
AT+WSOS Note: Ask for current Emergency Mode state	+WSOS: 1 OK Note: Emergency mode is active

Values: The parameters values are the following ones:

<Action>

0 Exit Emergency Mode

<State>

0 Not in Emergency Mode

1 Is in Emergency Mode

Call Answered +WANS

Description: This response indicates that a voice call has been answered.

Syntax: **Response syntax:** +WANS:<ct>

Command	Possible Responses
ATA	+RING OK +WANS:0 Note: Incoming call answered +WCNT:3

Values:

<ct>	Call Type
0	Voice
1	Circuit switch data
2	Packet switch data
3	SMS
4	Position determination
6	OTAPA
7	Standard OTASP
8	Non-standard OTASP
9	Emergency

Call Connected +WCNT

Description: This unsolicited response indicates that an incoming or outgoing voice call has been connected into a traffic channel state. If the service option is not available, +WCNT: will output "NULL".

Syntax: **Response syntax:** +WCNT: <so>

Command	Possible Responses
ATD18005551212;	OK +WORG:18005551212 +WCNT:3 Note: Call Connected with service option 3

Values:

<so>	Service option of call.
	Speech: 3, 17, 32768
	Loopback: 2, 9, 55
	OTAPA: 18, 19
	Position Determination: 35, 36
	SMS: 6, 14
	1xdata: 33
	Circuit Switch Data: 12

Call Ended +WEND

Description: This response indicates that a voice call or attempt to establish a voice call has ended.

Syntax: **Response syntax: +WEND: <reason>**

Command	Possible Responses
ATD18005551212; ATH	OK +WORG:18005551212 +WCNT:3 OK +WEND:29 Note: Call Ended with a normal release
ATD18005551212;	OK +WORG:18005551212 +WEND:22 Note: Call failed because the signal faded.

Values:

<reason>

0	Phone is offline
20	Phone is CDMA locked
21	Phone has no service
22	Call Faded/Dropped
23	Received Intercept from Base Station
24	Received Reorder from Base Station
25	Received a Release from Base Station (This is a normal call termination).
26	Service Option rejected by Base Station
27	Received Incoming Call
28	Received an alert stop from Base Station
29	Software ended the call (Normal release).
30	Received End Activation – OTASP calls only.
31	Internal Software aborted the origination/call.
32	Maximum Access probes exhausted (The modem failed to contact the Base Station)
33	Persistence test failure
34	RUIM not present
35	Origination already in progress
36	General Access Failure
37	Received retry order (IS-2000 only).
38	Concurrent service is not supported by base station.
39	No response received from base station.
40	Call rejected by the base station.
41	Concurrent services requested were not compatible.
42	Access is blocked by base station. (Release A only).
43	Traffic channel already available.
44	Call is ended due to Emergency call is flashed over this call.
45	CM is ending a GPS call in favor of a user call. (GPS_ONE only).
46	CM is ending a SMS call in favor of a user call.
47	CM is ending a DATA call in favor of an emergency call.
48	Call rejected because of redirection or handoff.
49	Access is blocked by base station for all mobiles. (KDDI specific).
50	OTASP SPC Error indication.
202	Call origination on IP Failed.
401	Origination throttled.
402	Unknown Error.

Call Originated +WORG

Description: This response indicates that an attempt to establish a voice call has occurred.

Syntax: **Response Syntax:** +WORG: <number>

Command	Possible Responses
ATD18005551212;	OK +WORG:18005551212 +WCNT:3 OK

Notes:

<number> is the dialing string sent to the base station. You may see extra numbers before the intended dialing string; this is a result of pre-pended numbers or other call options.

<number> could also be the NULL string if there is no user supplied origination address as in the case of SMS.

Call Privacy Information +WPRV

Description: This response confirms that the call privacy level has changed during a call.

Syntax: **Response syntax:** AT+WPRV=<prv>

Command	Possible Responses
AT+WPRV=0	OK +WPRV: 1

Values: <prv>

- 0 Indicates normal privacy (default)
- 1 Indicates enhanced privacy

CPHS Command +CPHS

Description: This command is used to activate, deactivate or interrogate a CPHS feature (e.g., Voice Mail Indicator). When performing an interrogation (mode = 2), the selected <FctId> CPHS feature is automatically enabled (status = 1).

Note: This command will return +CME ERROR: 3 if the CPHS feature is disabled.

Syntax: **Command syntax:** AT+CPHS=<Mode>,<FctId>

Command	Possible Responses
AT+CPHS=<Mode>,<FctId>	OK
AT+CPHS?	+CPHS: <Status>,<FctId1><CR<LF> OK
AT+CPHS=? Note: display the range of values	+CPHS: (0-2),(1-1) OK

Values: <Mode>

- 0 Deactivate a CPHS feature
- 1 Activate a CPHS feature
- 2 Interrogate a CPHS status

<FctId>

- 1 Voice Mail Indicator

<Status>

- 0 CPHS feature disabled
- 1 CPHS feature enabled

Voice Mail Indicator +WVMI

Description: This response indicates the status of the Voicemail Inbox.

Syntax: **Response syntax:** +WVMI: <Lineld>,<Num>

Possible Responses
+WVMI: 1,2 OK Note: 2 messages are in your voicemail box.

Values: <Lineld>

1 Line 1

<Num> The number of messages waiting in the inbox. Maximum value is 99.

0 No message waiting.

1 One message is waiting

3 Three messages are waiting

Examples:	Command/Response	Explanation
	AT+CPHS? +CPHS: 1,0 OK	Interrogate the status of CPHS functionality The voice mail indicator functionality is deactivated
	AT+CPHS=3,1 +CME ERROR: 3	Syntax error
	AT+CPHS=1,1 OK	Activate the voice mail indicator functionality
	AT+CPHS? +CPHS: 1,1 OK	Interrogate the status of CPHS functionality The voice mail indicator functionality is activated
	**** the message box contains 1 message ***** +WVMI: 1,1	A message is waiting on Line 1
	AT+CPHS=2,1 +WVMI: 1,1 OK	Interrogate the status of voice mail indicator functionality A message is waiting on LINE 1
	AT+CPHS? +CPHS: 1,1 OK	Interrogate the status of CPHS functionality The voice mail indicator functionality is activated

List Current Call State +CLCC

Description: This command is used to return the current call state of the modem. Note that when dormant mode is active, a “no call” status will be returned even though a data call may still be in progress.

Syntax: **Command syntax:** AT+CLCC
+CLCC: <state>, <mode>, <termination>

Command	Possible Responses
AT+CLCC Note: Seek current phone state	+CLCC: 0,9,0 OK Note: Command valid

Values:

<state> (state of the call):

- 0 no call
- 1 traffic
- 2 dialing (MO call)
- 3 incoming (MT call)

<mode> (teleservice) :

- 0 voice
- 1 data
- 3 sms
- 4 otasp
- 5 markov or loopback
- 9 unknown or not applicable

<termination>

- 0 unknown or not applicable
- 1 mobile terminated (MT) call
- 2 mobile originated (MO) call

Call Forwarding +CCFC

Description: This command allows control of the call forwarding supplementary service, if supported by the carrier. All calls will be forwarded unconditionally to the phone number specified. The modem will make a brief call to the CDMA network using a prefix number in NV memory. An audio tone will be produced in the audio path to confirm the change of the call forwarding state.

Syntax: **Command syntax:** AT+CCFC= <number>

Command	Possible Responses
AT+CCFC=8585551212 Note: Register to an unconditional call forwarding.	OK +WORG:*728585551212 +WCNT:3 Note: Call forwarding active for all incoming calls to phone number 858-555-1212
AT+CCFC=0 Note: Cancel unconditional call forwarding	OK +WORG:*720 +WCNT:3 Note: Call forwarding cancelled.

Values: **<number>** The phone number to which all calls are forwarded.

Send Flash to Base Station +WFSH

Description: This command sends a flash or flash with information to the base station. The flash command is used to manage call waiting and 3-way calls. For call waiting situations when the 3rd party call is received, send a flash (AT+WFSH) to toggle between the two different call parties. The +WFSH unsolicited AT command will be returned if a flash was sent to the base station over the air. Note that on CDMA networks, this does not guarantee that an actual switch between calls took place, because there is no acknowledgement to the modem.

For 3-way calls, initiate the first call to party # 1 (see ATD). Then send a flash with information (AT+WFSH=18005551212) to initiate a call to party # 2; party # 1 will automatically be placed on hold. The “information” is the phone number of party # 2. Once a conversation with party # 2 is established, send a regular flash (AT+WFSH) to connect all 3 parties. Send another flash (AT+WFSH) to disconnect party # 2, or End call (see ATH) to end the call with all parties.

Syntax:

Command syntax: AT+WFSH

AT+WFSH= < phone_number > (for a flash with information)

Unsolicited result syntax: +WFSH (confirms a flash was sent to the base station)

Command	Possible Responses
ATD8585551212; Note: Make a voice call	OK +WORG:8585551212 +WCNT:3 Note: Conversation...
AT+WFSH Note: Send a flash to the Base Station (toggle to the second call). Note: Conversation with second call.	+CCWA:"8582701234",129 Note: Indication of another incoming call OK +WFSH Note: Flash sent to the Base Station. Call to the second call. However, this is not 100% guaranteed because there is no confirmation from the Base Station.
AT+WFSH Note: Send a flash to the Base Station (toggle to the first call).	OK +WFSH Note: Flash sent to the Base Station. Call switches to the first call. However, this is not 100% guaranteed because there is no confirmation from the Base Station.
ATH Note: Release all calls	OK +WEND:10 Note: All Calls End

ATD858551212 Note: Make a voice call	OK +WORG:858551212 +WCNT:3 Note: Conversation...
AT+WFSH=6195552121 Note: Place first call on hold, connect to second party.	OK +WFSH Note Modem now places first call on hold and attempts connection to second call.
AT+WFSH Note: Connect all 3 parties.	OK +WFSH Note: All 3 parties now connected.
AT+WFSH	OK +WFSH Note: Disconnect second party, connected to first party only.
ATH	OK +WEND:10

Flash Indication for +WFSH:

This response confirms that a flash has been sent to the base station.

Response Syntax: +WFSH

Command	Possible Responses
AT+WFSH	OK +WFSH

Send DTMF Tones +VTS

Description: The product supports the ability of the user application to send burst DTMF tones over the CDMA network. This command enables the transmission of burst DTMF tones.

To transmit DTMF tones (only when there is an active call), the application use ATS11 to configure the DTMF durations.

Syntax: **Command syntax:** AT+VTS=<Tone>

Command	Possible Responses
ATD858551212 Note: Make a voice call	OK +WORG:858551212 +WCNT: 3 Note: Conversation... +CCWA:"8582701234",129 Note: Indication of another incoming call
AT+VTS=1 Note: Send DTMF tone associated with the value of 1	OK
ATH Note: Release all calls	OK +WEND: 29 Note: All calls end

Values: <tone> 0-9, *, #

Chapter 10 – Network Service Commands

Serving System +CSS

Description: The numeric parameter is used to query the serving system.

Syntax: **Command syntax:** AT+CSS Returns: <Class>,<Band>,<SID>,<BS_P_REV>,<CHANNEL>

Command	Possible Responses
AT+CSS?	+CSS: 2, PA, 4, 6, 384
Note: Display the current setting	OK Note: Command is valid
AT+CSS=?	+CSS:
Note: Display the parameter range	OK Note: Command is valid; however, range display is not supported for this command due to carrier-specific requirements

Values:

<Class>

- 0 No service
- 1 800 Mhz
- 2 1900 Mhz PCS

<Band>

- CA – CB Cellular 800
- PA – PF PCS 1900
- Z The mobile station is not registered

<SID>

- 0 – 32767 The mobile station is registered with the system indicated.
- 99999 The mobile station is not registered.

<BS_P_REV> (Base Station Protocol Revision in Use – Band Class 0/Cellular)

- 1 IS-95
- 2 IS-95A
- 3 TSB74
- 4 N/A
- 5 IS-95B
- 6 IS-2000
- 7 IS-2000A

<BS_P_REV> (Base Station Protocol Revision In Use – Band Class 1/PCS)

- 1 J-STD-008C
- 2 N/A
- 3 N/A
- 4 N/A
- 5 IS-95B
- 6 IS-2000
- 7 IS-2000A

<P_REV_IN_USE> (Protocol Revision In Use)

- 0 Unrecognized or non-CDMA system
- 1 J-STD-008
- 2 IS-95-A
- 3 IS-95-A + TSB74
- 4 TIA/EIA-95-B
- 5 TIA/EIA-95-B
- 6 IS-2000
- 7 IS-2000A
- 8 IS-2000B
- 9 IS-2000C
- 10 IS-2000C

<CHANNEL>

- 0 – Max RF Channel Number

Set Rm Interface Protocol +CRM

Description: The numeric parameter is used to set the Rm interface protocol. The Rm interface protocol value is affected by the current \$QCMIP setting. The Rm interface protocol can be set by the +CRM command only if \$QCMIP is set to zero (Mobile IP disabled; Single IP only).

Syntax: **Command syntax:** AT+CRM=<val>

Command	Possible Responses
AT+CRM? Note: Display the current setting.	+CRM: 0 OK Note: Command is valid
AT+CRM=? Note: Display the range of setting.	+CRM: (0-2) OK Note: Command is valid
AT+CRM=1 Note: Set to 1.	OK Note: Command is valid

Values:

- <val> The default value for the +CRM parameter will be 0 if supported by the DCE.
- 0 Asynchronous Data
- 1 Packet data service, Relay Layer Rm interface
- 2 Packet data service, Network Layer Rm interface, PPP

Note: The values 3 and 4 are currently not supported.

Signal Quality +CSQ

Description: This command is used to ascertain the *received signal strength indication* (<rss>) and the *channel frame error rate* (<fer>). The algorithm used to calculate the RSSI is defined in ETSI TS 127.007.

The channel frame error rate is a function of the percentage of bad received frames in the total number of received frames since the device was reset. The channel frame error rate is only valid when the device is on a call.

Syntax: **Command syntax:** AT+CSQ

Command	Possible Responses
AT+CSQ	+CSQ: <rss>, <fer> OK Note: <rss> and <fer> as defined above
AT+CSQ?	+CSQ: <rss>, <fer> OK

Values:

<rss>

- 0-31 Valid value ranges. Signal strength can be computed using: $\text{dBm} = 2(\text{RSSI}) - 113$
 - 0 = -113 dBm or less
 - 1 = -111 dbm
 - 2 - 30 = -109 to -53 dBm where one rssi step = 2 dBm.
 - 31 = -51 dBm or greater.
- 99 Represents an unknown signal quality.

<fer>

- 0-7 Valid value ranges.
 - 0 - <0.01%
 - 1 - 0.01 to < 0.1%
 - 2 - 0.1 to < 0.5%
 - 3 - 0.5 to < 1.0%
 - 4 - 1.0 to < 2.0%
 - 5 - 2.0 to < 4.0%
 - 6 - 4.0 to < 8.0%
 - 7 - >= 8.0%
- 99 <FER> is not known or is not detectable.

Signal Quality Unsolicited Response for +CSQ:

The Signal Quality (CSQ) unsolicited response is reported whenever the signal quality changes by a predetermined threshold. See +CCED for enabling and disabling this result. This unsolicited response may also be suppressed by using the +WUSLMSK command.

Response Syntax: +CSQ: <rssi>, <fer>

Result Example

+CSQ: 31,99

Note: Signal quality is now -51 dBm or greater.
Frame error rate is unknown.

Values:

<rssi> Received signal strength indication.
<fer> Frame error rate.

Network Registration & Roaming +CREG

Description: This command is used by the application to ascertain the registration and roaming status of the product.

Syntax: **Command syntax:** AT+CREG= <mode>
Response syntax: +CREG: <mode>, <stat>

Command	Possible Responses
AT+CREG=0 Note: Disable network registration unsolicited result code.	+CREG: 0,1 OK Note: Command valid
AT+CREG=1 Note: Enable network registration unsolicited result code	+CREG: 1,1 OK Note: Command valid
AT+CREG?	+CREG: 1,5 OK Note: Unsolicited enabled, MS currently roaming.
AT+CREG=?	+CREG: (0-1) OK Note: 0,1 <mode> values are supported
Note: Example of the unsolicited result code. MS is searching for a base station.	+CREG: 2

Values:**<mode>**

- 0 Disable network registration unsolicited result code (**default**)
- 1 Enable network registration unsolicited code result code +CREG: <stat>

<stat>

- 0 not registered; MS is not currently searching for a new operator
- 1 registered; home network
- 2 not registered; MS currently searching for a base station
- 4 unknown
- 5 registered; roaming

Persistence: The unsolicited response mode setting is not persistent unless written using the AT&W command. AT&F resets the CREG mode to the default value.

Network Registration & Roaming Unsolicited Response +CREG

This response indicates the current state of roaming.

Response Syntax: +CREG: <stat>

Result Example

+CREG: 1

Note: Modem has found the home network and is registered.

Values:

<stat>

- 0** not registered; MS is not currently searching for a new operator
- 1** registered; home network
- 2** not registered; MS currently searching for a base station
- 4** unknown
- 5** registered; roaming

Set More Preferred Rescans +WTBMPRS

Description: This command is used to update the time between more preferred rescans. The setting is saved in non-volatile memory and takes effect immediately.

The rescan value is defined in minutes. The range of values for rescan is between 1 and 255 minutes with the default being 3 minutes.

Syntax:

Command Syntax: AT+WTBMPRS=[<scanval>]

Command	Possible Responses
AT+WTBMPRS=1	OK Note: Command valid
AT+WTBMPRS? Note: Current values	+WTBMPRS: 1 OK Note: Command valid
AT+WTBMPRS=?	+WTBMPRS: (1-255) OK Note: Test Command

Read Result: +WTBMPRS: <scanval>

Values:

< scanval >

- 1-255: More preferred rescan value. (Default = 3 minutes)

Set Uniform Out-Of-Service Values +WTUOOS

Description: This command is used to update the scan and sleep durations for the Uniform Out-of-Service scanning algorithm. The settings are saved in non-volatile memory. The scan duration and sleep duration are specified in seconds with values between 1 second and 32767 seconds.

Syntax: **Command Syntax:** AT+WTUOOS=[< scanval >], [<sleepval >]

Command	Possible Responses
AT+WTUOOS=1,2	OK Note: Command valid
AT+WTUOOS? Note: Current values	+WTUOOS: 1,2 OK Note: Command valid
AT+WTUOOS=?	+WTUOOS: (1-32767),(1-32767) OK Note: Test Command

Read Result: +WTUOOS: <scanval>,<sleepval>

Values:

< scanval >

1 – 32767 Uniform out of service scan value in seconds. (Default = 4 seconds)

< sleepval >

1 – 32767 Uniform out of service sleep value in seconds. (Default = 36 seconds)

Band Preference +WBND

Description: The Band Preference of a CDMA modem governs the basic system acquisition behavior of the PRL (Preferring Roaming List). It's important to note that the PRL takes precedence over band preference when guiding the phone to a band. The PRL must allow a particular band first, before the band preference can take effect. In other words, a band preference change is simply a request; the PRL decides whether or not to allow it. If the setting is accepted by the MS, the value will be written to non-volatile RAM and persist after a power-cycle.

The behavior of Cellular A and cellular B has changed slightly from previous Wavecom definitions. Cellular A now means cellular A is preferred, and cellular B means cellular B is preferred. As an example: If the device is set to cellular A, the modem will look for service on the A side first. If service cannot be found, the modem will then check the B side for service before reporting no service.

Note: The command may not be available in all software variations due to carrier requirements.

Syntax: **Command syntax:** AT+WBND=<band>,<persist>

Command	Possible Responses
AT+WBND? Note: Ask for current Band Preference	+WBND: 0 OK Note: Any
AT+WBND=?	+WBND: (0-4),(0-1) OK Note: Any, PCS, Cell, Cell A, Cell B
AT+WBND=0 Note: Allow Any Band	OK

Values:

<band>

- 0 Any
- 1 PCS
- 2 Cellular A or B
- 3 Cellular A
- 4 Cellular B

<persist>

- 0 Do not save to NV
- 1 Save to NV (default)

Service Indication +WSRV

Description: This response indicates the SID and NID of the service provider selected for the modem as dictated by the PRL, AT+WBND, and AT+WRMP commands.

Syntax: **Response Syntax:** +WSRV: <sid>, <nid>

Possible Responses
+WSRV: 69, 101

Values: <sid> <nid>
0-65536 Values of the SID and NID.

Roam Preference +WRMP

Description: The Roam Preference of a CDMA modem informs the MS whether it is allowed to roam on foreign CDMA networks or only allow operation on home networks. The determination of what is a foreign or home network is programmed into the PRL (Preferring Roaming List). This command simply enables or disables the capability of the MS (mobile station) to roam, based on the PRL configuration. If the setting is accepted by the MS, the value will be written to non-volatile memory and persist after a power-cycle. After execution of the +WRMP command, the MS may change roaming states. The unsolicited result +WROM: <mode> will indicate the new state.

This command may be used in conjunction with the Auto-A, Auto-B feature (Auto A/B feature is a Verizon specific feature). If the roaming preference is set to 2 and the Auto-A, Auto-B feature flag is enabled the modem will perform Auto-A, Auto-B system selection.

Note: Command may not be available in all software variations due to carrier requirements; consult with your Wavcom technical representative for details.

Note: For Sprint ONLY, set mode to Home Networks Only.

Syntax: **Command syntax:** AT+WRMP=<mode>,<persist>

Command	Possible Responses
AT+WRMP? Note: Ask for current Mode Preference	+WRMP: 0 OK Note: Home only
AT+WRMP=?	+WRMP: (0-2),)0-1) OK Note: Home, Affiliated, Any
AT+WRMP=0 Note: Allow Home only networks	OK +WROM: 0 Note: Unsolicited +WROM may or may not appear based on current circumstances
AT+WRMP=1 Note: Allow Roaming Affiliated Networks	OK +WROM: 1 Note: Unsolicited +WROM may or may not appear based on current circumstances
AT+WRMP=2 Note: Allow Roaming on Any Network	OK +WRMP: 2 Note: Unsolicited +WROM may or may not appear based on current circumstances

Values: The parameter values are the following ones:

<mode>

- 0 Home Networks only, as defined in the PRL (default value)
- 1 Roaming on Affiliated networks, as defined in the PRL
- 2 Roaming on Any Network, as defined in the PRL.

<persist>

- 0 Do not save to NV
- 1 Save to NV (default)

Default Cell Band +WDCB

Description: This command allows the user to display or override the Auto-A or Auto-B selection made by a prior AT+WRMP command or an OTASP session. The Auto-A/Auto-B selection determines which cell bands, if any, are scanned when the channels listed in the PRL are not found. If the Auto-A/Auto-B feature is enabled, the default cell band is set based on the value of the home SID. The +WDCB command can be used to select the cell band, or none, as the default, or fallback.

This setting is persistent across power-downs.

Note: Command may not be available in all software variations due to carrier requirements.

Syntax: **Command syntax:** AT+WDCB=<value>

Command	Possible Responses
AT+WDCB=? Note: Display valid parameter range.	+WDCB: (0-2) OK
AT+WDCB? Note: Display current setting.	+WDCB: 2 OK
AT+WDCB=1 Note: Select A-band Cellular as fallback.	OK

Values: <value>

- 0** No fallback. Only entries in the PRL are scanned.
- 1** A-band Cellular is selected as fallback.
- 2** B-band Cellular is selected as fallback.

Roaming Indication +WROM

Description: This response indicates that the roaming status has changed. This command can also be used in a read only capacity in order to read the roaming status at any time.

Syntax: **Response Syntax:** +WROM: <roam>

Command	Possible Responses
AT+WROM	+WROM: 0 OK
AT+WROM?	+WROM:1 OK
	+WROM:1

Values: <roam>

- 1** Service Unavailable (For Read Only)
 - 0** Home.
 - 1** Roam Icon ON (affiliated network)
 - 2** Roam Icon Blink (foreign network)
 - X** Enhanced Roaming Indicator value if ERI is enabled
- The following values apply to enhanced roaming:
- 3** Out of Neighborhood
 - 4** Out of Building
 - 5** Roaming - Preferred System
 - 6** Roaming - Available System
 - 7** Roaming - Alliance Partner
 - 8** Roaming - Premium Partner
 - 9** Roaming - Full Service Functionality
 - 10** Roaming - Partial Service Functionality
 - 11** Roaming Banner On
 - 12** Roaming Banner Off
 - 13 - 63** Reserved for Standard Enhanced Roaming Indicator Numbers
 - 64 - 127** Reserved for Non-Standard Enhanced Roaming Indicator Numbers
 - 128 - 255** Reserved

Cell Environment and RxLev Indication +CCED

Description: This command can be used by the application to retrieve information about the main cell and up to six neighboring cells. This is an extended command that may be used in two different settings:

1. Interrogation of the cell environment information
2. Interrogation of the *received signal strength indication* (RSSI)

The +CCED command supports two modes of operation: on request by the application or automatically by the product every 5 seconds. Signal strength can also be reported when the change exceeds a threshold.

Syntax: **Command syntax:** AT+CCED=<mode>[, <requested dump>[,<sqStep>]]

Command	Possible Responses
AT+CCED=?	+CCED: (0-2),(1,8,9),(1-5) OK
AT+CCED? Note: <requested dump> is the most recently requested one. If none requested, <requested dump>=1 will be displayed.	+CCED: 0,1,0 OK
AT+CCED=0 Note: One time dump of the <requested dump> that was last requested. If none requested, <requested dump>=1 will be displayed	+CSQ: 15, 99 or +CCED: 0,160,69,101,6,144,2690,2,18,-85,-51,-63 OK
AT+CCED=0,1 Note: one time, dump main cell	+CCED: 0,160,69,101,6,144,2690,2,18,-85,-51,-63 OK
AT+CCED Note: one time, previous <requested dump> value is used	+CCED: 0,160,69,101,6,144,2690,2,18,-85,-51,-63 OK
AT+CCED =0,9	+CSQ: 15, 99 +CCED: 0,160,69,101,6,144,2690,2,18,-85,-51,-63 OK
AT+CCED=1,8 Note: Start automatic snapshots and dump <rsi>.	OK +CSQ: 18, 99 Note: +CSQ response output every 5 seconds.
AT+CCED=2	OK Note: Stop automatic snapshots.
AT+CCED=,,1	OK +CSQ: 18, 99 Note: New +CSQ response output when change in RSSI equals or exceeds <CsqStep>
AT+CCED=1,9 Note: Start automatic snapshots and dump cell environment and <rsi>	OK +CSQ: 15, 99 +CCED: 0,160,69,101,6,144,2690,2,18,-85,-51,-63

Values:

<mode>

- 0** Requests a single snapshot of cell data
- 1** Start automatic snapshot mode. The unsolicited responses +CCED and/or +CSQ will be used to return the requested information.
- 2** Stop automatic snapshot mode

<requested dump> This parameter is specified as the summation of one or more of the following values:

- 1** Main Cell Indication
- 2** Main Cell RSSI Indication (RxLev) from 0 to 31 and frame error rate. Set the AT+CSQ command description for more information.

<CsqStep>

- 0** Unsolicited +CSQ reports due to changing RSSI levels are disabled.
- 1-5:** Whenever the RSSI changes by this amount or more, an unsolicited +CSQ report is generated.

Notes:

The CCED response format is <band class>, <Channel #>, SID, NID, <Base Station P Rev>, <Pilot PN offset>, <Base Station ID>, <Slot cycle index>, <Ec/Io>, <Rx power>, <Tx power>, <Tx Adj>.

<band_class> values are 0 for cellular band (800 MHz) or 1 for PCS band (1900 MHz).

The value displayed for <Ec/Io> is the index of the Active set in 0.5dB steps from 0 (0dB) to 63 (-31.5dB). For example: 0 = 0dB, 1 = 0.5dB, 2 = 1dB, ... 62 = 31dB, 63 = 31.5dB. The value displayed for <Rx power>, <Tx power>, and <Tx Adj> is in units of dBm.

If the <requested dump> parameter is not specified, the <requested dump> value from the most recent invocation of the +CCED command with an explicit <requested dump> value will be used. If no previous +CCED <requested dump> value is available, a value of 9 (8 and 1) will be used.

For <requested dump> 8, the information is output using the unsolicited +CSQ response. The 07.07 format of the +CSQ response is respected. Automatic snapshots are supported in idle mode and during communication.

Either or both the +CCED and +CSQ responses are used for automatic snapshot output depending upon the <requested dump> value at the time the snapshot activation was requested.

Chapter 11 – Provisioning Control Commands

Change NAM Selection +WNAM

Description: This command is used to request a change in the NAM (Number Assignment Modem) selection. The modem supports up to 2 NAMs. However, if a NAM is not fully programmed, the modem will not switch to the requested NAM. The default NAM for the modem is 1. The response to this command is only OK, and there is no guarantee that the NAM will change. If the NAM selection request is accepted, the unsolicited response +WNAM: <nam> will be returned.

Syntax: **Command syntax:** AT+WNAM=<nam>

Command	Possible Responses
AT+WNAM=2 Note: Use NAM 2, if programmed	OK +WNAM: 2
AT+WNAM?	+WNAM: 1
AT+WNAM=?	+WNAM: (1-2) or +WNAM: (1)

Values:

<nam>	
1	NAM 1
2	NAM 2

Notes: Verizon based modems propagate the new NAM MDN to SIP NAI, MIP NAI, tethered NAI, and PPP user ID when the NAM is changed.

In addition, some modems are configured to support only a single NAM. This is carrier-dependent and settable at the factory. When only a single NAM is allowed, NAM1 is the only supported value.

Current NAM Change Unsolicited Response +WNAM

This response indicates that the current NAM has changed.

Syntax: Response Syntax: +WNAM: <nam>

Possible Responses
+WNAM: 2

Values:

<nam>	
1	NAM 1
2	NAM 2

Service Programming Code +WSPC

Description: This command allows for entry of the service programming code (either MSL or OTKSL). Upon successful entry of this code, all other service provisioning AT commands may be used. If this code is not properly entered prior to attempting other provisioning AT commands, all provisioning commands will return ERROR. If the OTKSL is used to enter provisioning mode, only the +WIMI, +WMDN, and +WCMT commands will be allowed. All other commands will return ERROR.

Once the correct SPC code is entered, the modem transitions to the Service Programming state. This state is not exited until a commit is done (+WCMT). While in the Service Programming state, subsequent validations of the SPC code are ignored until the Service Programming state is reset.

Verizon requires the following additional action:

- If the SPC fails verification 15 consecutive times, the modem will provide an unsolicited message indicating excessive SPC verification failures (see Excess SPC Failures +WLCK) and then shutdown. This is in accordance to Verizon's OTA specification. The host application must prevent the modem from restarting for 1 minute when this condition occurs.

Syntax: **Command syntax:** AT+WSPC=[<lock type>[,<code>]]

Command	Possible Responses
AT+WSPC? Note: Service programming code request	ERROR Note: Invalid request
AT+WSPC=?	ERROR Note: Invalid request
AT+WSPC=1,111111 Note: Enter service programming code 111111	ERROR Note: Code invalid
AT+WSPC=1,000000 Note: Enter service programming code 000000	OK Note: Code valid

Values:

<lock type>

0 OTKSL – One Time Key Subsidy Lock

1 MSL – Master Subsidy Lock

<code> Six character programming code.

Excess SPC Failures +WLCK

Description: This response indicates that 15 failed attempts have been made to enter the service programming code. If the modem is not in emergency mode, any active call will be terminated and the modem will go into offline mode.

Note: A successfully entered service programming code grants access to modem configuration data.

Syntax: **Response Syntax:** +WLCK: "Excess SPC failures!"

Command	Possible Responses
AT+WSPC=0,123456 Note: 15th attempt to enter the SPC.	+WLCK: "Excess SPC failures!" Note: Modem now in offline mode.

Download PRL +DPRL

Description: This command is used to download a Preferred Roamer List (PRL) to the modem. The PRL must be formatted in accordance with TIA/EIA-683-A.

The +DPRL command is part of the Wavecom suite of service programming commands. The modem service programming code must be successfully entered (see +WSPC) prior to using this command.

The +DPRL command is a multiline command, which means that the modem will expect the host to continue to input data after the first line of command is entered.

The first line of the +DPRL command consists of four parameters and a carriage return. The parameters consist of the target NAM number (1 or 2), current sequence number, last sequence number, and length (in bytes) of the PRL data in the current sequence. The PRL data can be large in size (up to 16k Bytes). The host may divide the whole PRL into multiple sequences if it doesn't have a large enough buffer to hold it. The sequence number needs to start from 0 to tell the modem to start counting the sequence number. To send the next sequence, you need to use the same command (+DPRL) and only increment the sequence number by 1. You may split the PRL into no more than 255 sequences. When the last sequence equals the current sequence, the modem will put the PRL data altogether and start processing it.

The second line of the command consists of <PrIData>, which is a stream of bytes usually encoded in hexadecimal. The number of bytes must equal the length specified in the first line. It is not recommended to manually type the <PrIData> since some of the ASCII characters are invisible. If you are using HyperTerminal, you may use the send text file feature to download a PRL.

Once the PRL has been successfully downloaded to the modem, the +WCMT=1 command must be used to save the PRL to NV memory and activate it. The PRL is validated as part of the commit operation and the validation result is returned using the +DPRL unsolicited response. A downloaded PRL that fails validation is not activated and the old PRL, if any, remains in effect.

To abort PRL download prior to final commit, use the AT+WCMT=0 command. To re-start the download sequence, set the current sequence number (<cur_seq>) to zero.

Syntax: **Command syntax:** AT+DPRL=<nam>,<cur_seq>,< last_seq>,<length><cr><PrIData>

Command	Possible Responses
AT+WSPC=1,0000 Note: Enter service programming code. The SPC code for your modem may be different.	OK Note: Code successfully entered.
AT+DPRL=1,0,0,18<cr> Note: Target NAM is 1, current sequence is 0 (start), last sequence is 0 (total 1 sequence), total bytes in current sequence is 18. Use HyperTerminal's "Send Text File" feature to send the PRL file , or use your application to send 18 hexadecimal data bytes	OK Note: PRL stored in modem. +DPRL:0 Note: PRL validated.
AT+WCMT=1 Note: Save the PRL in NV and activate new Nam1 PRL.	OK Note: Modem software reset begins. +WIND: 8 Note: Modem software reset complete.

AT+DPRL=? Note: Display parameter ranges.	+DPRL: (1-2),(0-255),(0-255),(1-16384) OK Note: Valid parameter ranges.
AT+DPRL? Note: Display last used parameter values.	+DPRL: 1,0,0,57 OK Note: Parameter values displayed.

Values:

<nam>	NAM to receive the <PrIData>. Note: Some modems are configured to support only a single NAM. This is carrier dependent and settable at the factory. When only a single NAM is allowed, NAM1 is the only supported value.
<cur_seq>	Sequence number of this PRL data packet. An error is returned if this value is greater than <last_seq> or is non-sequential with the previous <cur_seq> value. When set to zero, the current internal buffer contents is discarded prior to appending the <PrIData> bytes.
<last seq>	Sequence number of the last PRL data packet. The PRL is considered complete when <cur_seq> is equal to <last_seq>. If the +WCMT=1 command is issued prior to <cur_seq> equal to <last_seq>, the downloaded PRL data will be discarded.
<length>	Length of <PrIData> expressed as a decimal number.
<cr>	Carriage return character. Value 13 decimal or 0x0d hexadecimal.
<PrIData>	PRL binary data. Once <length> bytes have been received by the modem, the OK response is returned.

Request PRL Version Information +WPRL

Description: This command requests PRL Version information for the currently selected NAM.

Syntax: **Command syntax:** AT+WPRL?

Command	Possible Responses
AT+WPRL? Note: Request current NAM's PRL version	+WPRL: 1024 OK
AT+WPRL? Note: Request current NAM's PRL version	+CME ERROR: 41 Note: PRL request invalid because there's no PRL loaded.

Note: The range for PRL is a 16-bit type.

Update Authentication Key +WAKY

Description: This command sets the 20 character decimal A-Key in the modem. Do not include the 6 digit A-Key checksum (digits 21 through 26) as these digits are ignored. When this command is issued, the SDD data areas will be zeroed out. The A-Key value cannot be read back with the AT+WAKY? Command.

Syntax: **Command Syntax:** AT+WAKY=<nbr>

Command	Possible Responses
AT+WAKY=12345678901234567890 Note: Set the A-Key	OK Note: A-Key successfully set.

Values: **<nbr>** A-Key number

Access Overload Class +WAOC

Description: This command is used to set the Access Overload Class. If the +WAOC command is used specifically to modify the AOC value, it will retain this value and will not be automatically updated via the WIMI or WMDN commands. Otherwise, if the AOC has not been modified via the WAOC command, it will be automatically updated to be the last digit of the MDN (WMDN) or IMSI (WIMI) when the commit (WCMT=1) command is issued.

Syntax: **Command syntax:** AT+WAOC=<number>

Command	Possible Responses
AT+WAOC? Note: Get current Access Overload Class	+WAOC: 5 OK
AT+WAOC=7 Note: Set Access Overload Class to 7	OK

Values: **<number>** Access overload value range:
0 to 15

Commit Changes +WCMT

Description: This command is used to commit or to undo/revert any changes done during the service programming session. Changes performed during this session will not take place until a commit command has been sent (AT+WCMT=1). Commission of these changes will force a software reset of the modem. Sending this command indicates this service provisioning session is complete. In order to perform any subsequent provisioning, the service programming code must be entered using the +WSPC command.

Syntax: **Command syntax:** AT+WCMT=<val>

Command	Possible Responses
AT+WCMT=0 Note: Undo any changes performed during this provisioning AT session	OK
AT+WCMT=1 Note: Commit all changes performed during this provisioning AT session to non-volatile memory.	OK Note: software reset is performed

Values: **<val>**
0 undo changes
1 commit changes

Set IMSI +WIMI

Description: This command is used to set the IMSI. S valid IMSI is 15 digits in length: MCC (3), MNC (2), MIN2 (3), MIN1 (7). For support of Wireless Number Portability, changes to the IMSI will **NOT** update the MDN. If the MDN is modified via the WMDN command, the IMSI_M portion of the IMSI will be automatically updated to the least significant 10 digits of the MDN, but the update will not be visible or applied until the commit command is issued via the WCMT command. Changes to the IMSI will automatically update Access Overload Class values unless specifically modified using +WAOC.

Syntax: **Command syntax:** AT+WIMI=<number>

Command	Possible Responses
AT+WIMI? Note: Get current IMSI	+WIMI: 310008581111111 OK
AT+WIMI=310008585551212 Note: Set IMSI to 310008585551212	OK

Mobile Directory Number +WMDN

Description: This command is used to enter a new mobile directory number. Valid numbers are between 10 and 15 digits in length. For support of Wireless Number Portability in all non-RUIM software versions, changes to the MDN will update the IMSI_M portion (least significant 10 digits) of the IMSI. Changes to the MDN will also automatically update the Access Overload Class values unless specifically modified using the +WAOC command. The new IMSI_M and Access Overload Class values will not be visible in the WIMI and WAOC commands until after the changes are committed with the WCMT command.

Syntax: **Command syntax:** AT+WMDN=<number>

Command	Possible Responses
AT+WMDN? Note: Get current mobile directory number	+WMDN: 8581111111 OK
AT+WMDN=8585551212 Note: Set mobile directory number to 8585551212	OK

Note: Verizon based wireless modems propagate the MDN to SIP NAI, MIP NAI, tethered NAI, and PPP user ID when the MDN is committed using the AT+WCMT=1 command.

Value: <number> Can be up to 15 digits

Primary CDMA Channels +WPCC

Description: This command is used to set the primary CDMA channels for 800Mhz CDMA operation only. Values entered must be valid CDMA 800Mhz Channel numbers. If an invalid channel number is entered, the number will be automatically set to the appropriate default value at restart.

Syntax: **Command syntax:** AT+WPCC=<channel a number>,<channel b number>

Command	Possible Responses
AT+WPCC? Note: Get current primary CDMA channels	+WPCC: 283,384 OK
AT+WPCC=211,432 Note: Set the primary CDMA channels	OK
AT+WPCC=?	+WPCC: (0-2047),(0-2047)

Values:
 <channel a number> Value range: 0 – 2047
 <channel b number> Value range: 0 – 2047

Secondary CDMA Channels +WSCC

Description: This command is used to set the secondary CDMA channels for 800Mhz CDMA operation only. Values entered must be valid CDMA 800Mhz Channel numbers. If an invalid channel number is entered, the number will be automatically set to the appropriate default value at restart.

Syntax: **Command syntax:** AT+WSCC=<channel a number>,<channel b number>

Command	Possible responses
AT+WSCC? Note: Get current secondary CDMA channels	+WSCC: 691,777 OK
AT+WSCC=511,632 Note: Set the secondary CDMA channels	OK
AT+WSCC=?	+WSCC: (0-2047),(0-2047)

Values:
 <channel a number> Value range: 0 – 2047
 <channel b number> Value range: 0 – 2047

Slot Cycle Index +WSCI

Description: This command is used to set the slot cycle index. Changes made to this data will not be committed to NV memory until the +WCMT command is issued. .

Syntax: **Command syntax:** AT+WSCI=<number>

Command	Possible Responses
AT+WSCI? Note: Read the current slot cycle index	+WSCI: 2 OK
AT+WSCI=1 Note: Set the slot cycle index	OK

Values: <number> Slot cycle index; ranges from 0 to 7.

SID and NID +WSID

Description: This command is used to set the home SID and NID for 800Mhz CDMA operation only. The new SID/NID values are committed to NV with the +WCMT command.

Syntax: **Command syntax:** AT+ WSID=<index>,<SID number>,<NID number>

Command	Possible Responses
AT+WSID? Note: Get all modified SID/NID pairs. If no pairs have been modified, the first entry in location 0 will be retrieved.	+WSID: 0, 45, 84 +WSID: 1, 56, 9 OK
AT+WSID=3, 4145, 2102 AT+WSID? Note: Set SID to 4145 and NID to 2102. Store in location 3 of the SID/NID list.	OK +WSID: 3, 4145, 2102 OK Note: The SID/NID pair 4145,2102 in location 3 is selected.
AT+WSID=2 AT+WSID? Note: Set SID to 0 and NID to 0. Store in location 2 of the SID/NID list.	OK +WSID: 2, 0, 0 OK Note: The SID/NID pair 0,0 in location 2 is selected.
AT+WSID=4, 64 AT+WSID? Note: Set SID to 64 and NID to 0. Store in location 4 of the SID/NID list.	OK +WSID: 4, 64, 0 OK Note: The SID/NID pair 64,0 in location 4 is selected.
AT+WSID=, 64, 1024 AT+WSID? Note: Set SID to 64 and NID to 1024. Store in the currently selected location of the SID/NID list.	OK +WSID: 4, 64, 1024 OK Note: The SID/NID pair 64,1024 in location 4 is selected.
AT+WSID=, , AT+WSID? Note: Set SID and NID to default value 0. Store in the default selected location of the SID/NID list.	OK +WSID: 0, 0, 0 OK Note: The SID/NID pair 0,0 in location 0 is selected.

Values: <index> The location in the SID/NID list to store the values. A maximum of 20 entries (0-19) are supported. Error is returned if the specified index value is not in the valid range.

<SID number> SID value range – 0 to 32767.

<NID number> NID value range – 0 to 65535. Defaults to 65535 if not specified.

Updating the first entry in the SID/NID list will update the A/B side setting with odd SID for A side and even SID for B side.

Chapter 12 – OTASP / OTAPA Commands

OTASP OTASP stands for Over the Air Service Programming. This gives a wireless carrier the ability to provision new services over the network, rather than requiring the customers to bring the terminal device into a store for programming. For example, an automatic update in internal software parameters PRL can be performed.

OTAPA OTAPA stands for Over the Air Parameter Administration. The gives a wireless carrier the ability to automatically update internal software parameters by means of a specially defined CDMA data call that is mobile terminated (MT).

Initial Programming Required +WOT0

Description: This Over-The-Air Service Provisioning (OTASP) response indicates that initial device programming is required.

Syntax: **Response Syntax:** +WOT0: "Initial programming required!"

Possible Responses
+WOT0: "Initial programming required!"

Programming In Progress +WOT1

Description: This Over-The-Air Service Provisioning (OTASP) response indicates that device programming is in progress.

Syntax: **Response Syntax:** +WOT1: "Programming in progress"

Possible Responses
+WOT1: "Programming in progress"

Programming Successful +WOT2

Description: This Over-The-Air Service Provisioning (OTASP) response indicates that device programming has been completed successfully. This response will be accompanied by three quick audio tones from the speaker.

Syntax: **Response Syntax:** +WOT2: "Programming Successful"

Possible Responses
+WOT2: "Programming Successful"

Programming Unsuccessful +WOT3

Description: This Over-The-Air Service Provisioning (OTASP) response indicates that device programming has been completed unsuccessfully. This response will be accompanied by three quick audio tones from the speaker.

Syntax: **Response Syntax:** +WOT3: "Programming Unsuccessful"

Possible Responses
+WOT3: "Programming Unsuccessful"

Commit Successful +WOTC

Description: This Over-The-Air Service Provisioning (OTASP) response indicates that the programmed parameters have been successfully committed to NV memory.

Syntax: **Response Syntax:** +WOTC: "Commit Successful"

Possible Responses
+WOTC: "Commit Successful"

SPL Unlocked +WOTS

Description: This Over-The-Air Service Provisioning (OTASP) response indicates that the Software Provisioning Lock is in the unlocked state.

Syntax: **Response Syntax:** +WOTS: "SPL unlocked"

Possible Responses
+WOTS: "SPL unlocked"

NAM Download OK +WOTN

Description: This Over-The-Air Service Provisioning (OTASP) response indicates that the NAM download has been completed successfully.

Syntax: **Response Syntax:** +WOTN: "NAM Download OK"

Possible Responses
+WOTN: "NAM Download OK"

MDM Download OK +WOTM

Description: This Over-The-Air Service Provisioning (OTASP) response indicates that the MDM download has been completed successfully.

Syntax: **Response Syntax:** +WOTM: "MDM Download OK"

Possible Responses
+WOTM: "MDM Download OK"

IMSI Download OK +WOTI

Description: This Over-The-Air Service Provisioning (OTASP) response indicates that the IMSI download has been completed successfully.

Syntax: **Response Syntax:** +WOTI: "IMSI Download OK"

Possible Responses
+WOTI: "IMSI Download OK"

PRL Download OK +WOTP

Description: This Over-The-Air Service Provisioning (OTASP) response indicates that the PRL download has been completed successfully.

Syntax: **Response Syntax:** +WOTP: "PRL Download OK"

Possible Responses
+WOTP: "PRL Download OK"

Chapter 13 – OMA / DM Control Commands

This chapter is subject to change.

Wavecom Device Services Session +WDSS

Description: This Wavecom proprietary command allows a user to configure a dedicated Network Access Point (NAP) and to initiate a connection to the OMA/DM server.

Syntax: **Command Syntax:** +WDSS: =<Mode>,<Apn>[,<User>[,<Pwd>]]

Command	Possible Responses
AT+WDSS=?	+WDSS: 0,<Apn> +WDSS: 1,<Action> OK
AT+WDSS=?	+WDSS: 0,(Max length for <Apn>),(Max length for <User>),(Max length for <Pwd>), +WDSS: 1,(0-1) OK
AT+WDSS=1,<Action>	OK
AT+WDSS=0,<Apn>[,<User>[,<Pwd>]] Note: Define the APN for Device Services	OK

Values:

<Mode>

- 0 PDP context configuration for Device Services
- 1 User Initiated connection to the Device Services server

<Apn> Access point name for Device Services. String type, up to 50 chars.

<User> Login for the APN. String type, up to 30 chars.

<Pwd> Password for the APN. String type, up to 30 chars.

<Action> Only for <Mode>=1

- 0 Abort the current session with the Device Services server. (default value)
- 1 Establish a Device Configuration session with the Device Services server.
- 2 Establish a Firmware Update session with the Device Services server.
- 3 Establish a PRL Update session with the Device Services server.

Parameter Storage:

<APN>,<User> and <Pwd> parameters are stored in flash without using the AT&W command. AT&F has no effect on these parameters.

Wavecom Device Services Error +WDSE

Description: This Wavecom proprietary command allows a user to display the last HTTP response received by the device during an OMA session.

Syntax: **Command Syntax:** AT+WDSE

Command	Possible Responses
AT+WDSE	+WDSE: <HTTP Status> OK

Values:

<HTTP Status>	Last HTTP response received by the device.
100	Continue
101	Switching Protocols
200	OK
201	Created
202	Accepted
203	Non-Authoritative Information
204	No Content
205	Reset Content
206	Partial Content
300	Multiple Choices
301	Moved Permanently
302	Found
303	See Other
304	Not Modified
305	Use Proxy
307	Temporary Redirect
400	Bad Request
401	Unauthorized
402	Payment Required
403	Forbidden
404	Not Found
405	Method Not Allowed
406	Not Acceptable
407	Proxy Authentication Required
408	Request Time-out
409	Conflict
410	Gone
411	Length Required
412	Precondition Failed
413	Request Entity Too Large
414	Request-URI Too Large
415	Unsupported Media Type
416	Requested range not correct
417	Expectation Failed
500	Internal Server Error
501	Not Implemented
502	Bad Gateway
503	Service Unavailable
504	Gateway Time-out
505	HTTP Version not supported

Note: If no session was made with the server, AT+WDSE only returns OK response, without any +WDSE: <HTTP Status> response.

Wavecom Device Services Reply +WDSR

Description: This Wavecom proprietary command allows a user to respond to the Device Services server request when user agreement is requested for connection, download and/or package install (see +WDSI command).

Syntax: **Command Syntax:** AT+WDSR=<Reply>[,<Timer>]

Command	Possible Responses
AT+WDSR=?	+WDSR: (0-5),(0-1440) OK
AT+WDSR=5,10 Note: A delay (10 minutes) is requested to a firmware installation request.	OK Note: the WDSI request for package installation will be re-issued 10 minutes later.
AT+WDSR=2,0 Note: Refuse the package download.	OK

Values:

<Reply> Reply to a user agreement request (see +WDSI command description) from the modem.

- 0** Delay or refuse the connection to the server
- 1** Accept the connection to the server
- 2** Delay or refuse the download
- 3** Accept the download (download now)
- 4** Accept the install (Install now)
- 5** Delay the install (Install later)

<Timer> Timer until a new User agreement request is returned by the modem. This parameter is only available for <Reply>=0, 2 and 5.
Units: minutes (0-1440). When this value is not filled, a default value is set to 30 minutes later. Value 0 indicates that the application refuses the user agreement (impossible for <Reply>=5).

Parameter Storage: No parameter storage.

Note: It is not possible to refuse an install request. AT+WDSR=5,0 will return a +CME ERROR: 3 response.

After an install delay, if the modem is powered down until after the delay, it's not powered on and the new user agreement request should be returned at the next start up.

Command Availability:

This command is not available when the modem is provisioned for Sprint.

Results:

This command returns OK when the command is proceed correctly.

This command returns +CME ERROR: 3 when the parameter is out of range.

Wavecom Device Services Wavecom +WDSW

Description: This Wavecom proprietary command allows carrier- or customer-specific configuration of Device Services.

Syntax: **Command Syntax:** AT+WDSW=<Operation>,<Action>

Command	Possible Responses
AT+WDSW=?	ERROR
AT+WDSW=12,0 Note: Clear auto-registration complete	OK
AT+WDSW=12,1 Note: Mark auto-registration complete	OK
AT+WDSW? Note: Display auto-registration state	+WDSW: 12,1 Note: Auto-registration is complete
AT+WDSW? Note: Display auto-registration state	+WDSW: 12,0 Note: Auto-registration is incomplete.

Values: **<Operation>**

12 Auto-registration. This operation allows auto-registration status to be set or cleared. The Service Provisioning Code must be entered using the +WSPC command prior to attempting to set or clear auto-registration.

<Action>

0 Clear auto-registration. Auto-registration will be attempted after the next power cycle.

1 Mark auto-registration complete. No further auto-registration attempts will be made.

Parameter Storage: Parameters are stored in flash without using the AT&W command. AT&F has no effect on these parameters.

Note: The auto-registration operation is available for only for modem configured for the Sprint network.

Wavecom Device Services Indications +WDSI

Description: This Wavecom proprietary command allows a user to select which Device Services events are reported. Device Services events are reported through the +WDSI unsolicited response.

Syntax: **Command Syntax:** AT+WDSI=<Level>

Command	Possible Responses
AT+WDSI?	+WDSI: <Level> OK
AT+WDSI=?	+WDSI: (0-8388607) OK
AT+WDSI=8388607 Note: Enable all Device Services event notifications	OK
AT+WDSI Note: Enable all Device Services event notifications (default)	OK
+WDSI: <Event>[,<Data>] Note: Unsolicited response	OK

Values: **<Level>** Indications level, bit field (default value = 0)
bit set to 0: indication deactivated
bit set to 1: indication activated

0 No indication

1 (bit 0) Reserved

2 (bit 1) Reserved

4 (bit 2) Activate the authentication indications (<Event> = 4 & 5)

8 (bit 3) Activate the session start indication (<Event> = 6, 7 & 8)

16 (bit 4) Activate the package download indications (<Event> = 9, 10 & 11)

32 (bit 5) Reserved

64 (bit 6) Activate the update indications (<Event> = 14, 15 & 16)

128 (bit 7)	Reserved
256 (bit 8)	Activate download progress indication (<Event>=18)
512 (bit 9)	Reserved
1024 (bit 10)	Reserved
2048 (bit 11)	Reserved
4096 (bit 12)	Activate automatic registration indication (<Event>=22)
<Event>	
0	Reserved
1	Reserved
2	Reserved
3	Reserved
4	The modem starts sending data to the server.
5	Authentication with the server failed.
6	The authentication has succeeded, a session with the server started.
7	The session with the server failed.
8	The session with the server is finished.
9	Reserved
10	A package was successfully downloaded and stored in flash.
11	An error occurred while downloading a package.
12	Reserved
13	Reserved
14	The firmware update process will be launched.
15	The firmware update has failed.
16	The firmware update has succeeded.
17	Reserved
18	Download progress. This event is returned without <Data> parameter to indicate that a download starts. During the download, progress in total number of bytes downloaded and download size is indicated in <Data> parameter.
19	Reserved
20	Reserved
21	A provisioning was made by the server
22	Automatic registration status
<Data> Specific data for some <event>	
	For <Event>=15, <Data> indicates the failure reason.
	For <Event>=18, <Data> indicates the progress as “,<percentage downloaded>”,<download size>.
	For <Event>=21, <Data> indicates the parameters which was provisioned 10: Preferred Roaming List (PRL)
	For <Event>=22, <Data> indicates the status of the automatic registration 0: registration in progress 1: Registration failed (after retries) 2: Registration succeeded

Parameter Storage:

The <Level> parameter is stored in EEPROM without using AT&W command. The default value can be restored using AT&F.

Command Availability:

This command is available when the modem has finished its initialization and the +WIND: 3 unsolicited event is received by the application.

Results:

This command returns OK when the command is processed correctly.
This command returns +CME ERROR: 3 when the parameter is out of range.

ERROR Responses: +CME ERROR: 3 (means parameter is out of range).

Examples:

- Example 1:** Client-initiated device configuration request, no errors
 AT+WDSS=1,1
 OK
 +WDSI: 4
 +WDSI: 6
 +WDSI: 8
- Example 2:** Client-initiated device configuration request, authentication error
 AT+WDSS=1,1
 OK
 +WDSI: 4
 +WDSI: 5

Wavecom Device Services Configuration +WDSC

- Description:** This Wavecom proprietary command allows a user to configure:
- The user agreement for connection, package download and package install
 - The mode of automatic registration to the IDS server

Syntax: **Command syntax:** AT+WDSS=<Mode>,[<State> || <Config>]

Command	Possible Responses
<Mode>= 0, 1, 2, 3 AT+WDSC=<Mode>,<State>	OK
<Mode>= 5 AT+WDSC=<Mode>,<Config>	Note: No connection to the server and the used PDP context for the next connection is the one defined by the provisioning.
AT+WDSC?	+WDSC: 0,<State> +WDSC: 1,<State> +WDSC: 2,<State> +WDSC: 5,<Config> OK
AT+WDSC=?	+WDSC: (list of supported<Mode>s), (list of supported [<State>s]<Config>] OK

Values:

- <Mode>**
- 0** User agreement for connection
 When this mode is activated and when a notification SMS is received by the modem, an indication (see +WDSI indication) is returned by the modem to request an agreement before connecting to the IDS server.
- 1** User agreement for package download
 When this mode is activated, an indication (see +WDSI indication) is returned by the modem to request an agreement before downloading any package.
- 2** User agreement for package install
 When this mode is activated, an indication (see +WDSI indication) is returned by the modem to request an agreement before installing any package.
- 3** Not Supported
- 4** Not Supported
- 5** Registration configuration
 The registration is performed using +WDSS command.
- <State>** Status of the mode (Only for <Mode>= 0, 1, 2)
- 0** Disabled (default value)
- 1** Enabled
- <Config>** Status of the Registration configuration (Only for <Mode>= 5)
- 0** Not configured (default value)
- 1** Configured

Parameter Storage: <State> and <Config> parameters are stored in flash without using &W command. &F has no effect on these parameters.

Chapter 14 – Short Message Service Control Commands

Send Message +CMGS

Description: This command is used to send an SMS message.

The <da> field is the address of the terminal to which the message is sent. To send the text message, type <ctrl-Z> (0x1A) as the final character of the message. This command can be aborted using the <ESC> (0x1B) character while entering the message text.

The <length> parameter is optional, it is used to set the length of the text string. When <length> is specified, the CMGS command will only process the number of bytes specified by <length> regardless of whether it contains <ctrl-Z>, <ESC>, or <backspace> characters.

The <priority>, <privacy>, <reply option>, and <cbn> parameters are optional. Defaults are used when not specified.

The +CMGS: <mr> unsolicited message and OK response indicate that the +CMGS command has been accepted without errors and an attempt to deliver the SMS to the network is being made.

It is recommended that +CDS: unsolicited messages are enabled using the AT+CNMI command. +CDS: indicates that the message has been received by the network and the network is delivering the SMS or there is an error in attempting to send the SMS. Attempting to send a second SMS prior to the +CDS: unsolicited message will result in an error.

Syntax: **Command syntax:** AT+CMGS=<da> [,<length>] [,<priority>] [,<privacy>] [,<reply>] [,<cbn>] <cr><message text>ctrl-Z /ESC>

Command	Possible responses
AT+CMGS="8585551212"<cr> Please call me soon, Fred. <ctrl-Z> Note: Send a message	+CMGS:<mr> OK +CDS: <fo>, <mr>, [<ra>] , [<tora>], <scts>, <dt>, <st>
AT+CMGS="8585551212",12<cr> Please call. Note: Send 12 byte message	+CMGS:<mr> OK
AT+CMGS="8585551212",,2,1,1,"5550000"<cr> Please call ASAP<ctrl-Z> Note: Send a message with the specified priority, privacy, reply option and call back number. Note omitted length field.	+CMGS:<mr> OK

Values:

- <da> Destination address value in string format.
- <length> Length of the text message (in bytes).
- <priority> The priority level of the message.
 - 0 Normal (default)
 - 1 Interactive) *Not currently supported*
 - 2 Urgent
 - 3 Emergency *Not currently supported*
- <privacy> The privacy level of the message.
 - 0 Normal (default)
 - 1 Restricted
 - 2 Confidential
 - 3 Secret

- <reply>** The reply options for the message.
- 0** No acknowledgement requested (default)
 - 1** Positive user acknowledgement request
 - 2** Delivery acknowledgement request
 - 3** Request both user acknowledgement and delivery acknowledgement
- <cbn>** The call back number (not included by default).

Read Message +CMGR

Description: This command allows the application to read stored messages. The messages are read from the memory selected by the **+CPMS** command. A message read with status "REC UNREAD" will be updated in memory with the status "REC READ".

Currently "Sent/Unsent" and "Status Report" messages are not being stored and therefore can not be read using the +CMGR command.

Syntax: **Command syntax:** AT+CMGR=<index>

Response syntax: +CMGR: <stat> [,<oa>], <scts>, <lang>, <encod>, <priority>[,<cbn>], <length> <CR><LF> <data> (for **SMS-DELIVER** only)

Command	Possible Responses
AT+CMGR=1 Note: Read a message (index 1)	+CMGR: "REC UNREAD",8585551212", "98/10/01,18:22 :11+00",1,2,0,"8585550000",9<CR><LF> ABCdefGHI OK
AT+CMGR=1 Note: Read the message again	+CMGR: "REC READ",8585551212", "98/10/01,18:22:11",1,2,0,"8585550000",9<CR><LF> ABCdefGHI OK Note: Message is now indicating "read"
AT+CMGR=2 Note: Read at a wrong index	ERROR Note: Error : invalid index

Values:

<index> 0-99

<stat> Status of message in memory. Possible values are as follows:

Text Mode Possible Values	Status of Messages in Memory
"REC UNREAD"	received unread messages
"REC READ"	received read messages

<oa/da> Origination/destination address value in string format.

<scts>: Service Center Time Stamp in string format : "yy/MM/dd,hh:mm:ss"
(Year/Month/Day,Hour:Min:Seconds)

<lang> Language (network specific)

- 0** Unspecified
- 1** English
- 2** French
- 3** Spanish
- 4** Japanese
- 5** Korean
- 6** Chinese
- 7** Hebrew

<encod> Encoding (network specific)

- 0** Octet (or Unspecified)
- 1** IS91EP
- 2** ASCII
- 3** IA5
- 4** UCS-2 Unicode

<priority>	Message priority:
0	Normal
1	Interactive
2	Urgent
3	Emergency
<cbn>	Call Back Number
<length>	Length of the text message (in bytes). The maximum message text length for all other software editions is 160 characters.
<data>	Message text

List Message +CMGL

Description: This command allows the application to list stored messages as indicated by the type of the message to read. The messages are listed from the memory selected by the **+CPMS** command. Note that these messages are NOT marked as "Read" if previously "Unread".

Syntax: **Command syntax:** AT+CMGL=<type>

Response syntax: +CMGL: <index>,<stat>,<da/oa>,<lang>, <encod>,<length><CR><LF><data> (for **SMS-DELIVER** and **SMS-SUBMIT**, may be followed by other <CR><LF>+CMGL:<index>...)

Command	Possible Responses
AT+CMGL="UREAD" Note: List unread messages in text mode	+CMGL: 1,"REC UNREAD","8585551212",1,2,15 <CR><LF>Unread message! +CMGL: 3,"REC UNREAD", "8585551212", 1,2,5<CR><LF>Hello OK
AT+CMGL="READ" Note: List read messages in text mode	+CMGL: 2,"REC READ", "8585551212", 1,2,9<CR><LF>Keep cool OK
AT+CMGL="ALL"	+CMGL: 1,"REC UNREAD", "8585551212", 1,2,15<CR><LF>Unread message! +CMGL: 2,"REC READ", "8585551212", 1,2,9<CR><LF>Keep cool +CMGL: 3,"REC UNREAD", "8585551212", 1,2,5<CR><LF>Hello OK

Values: **<index>** Place of storage in memory.

<type> Possible values, the status of messages in memory, are as follows:

Text Mode Possible Values	Status of Messages in Memory
"REC UNREAD"	received unread messages
"REC READ"	received read messages

<oa/da> Origination/destination address value in string format.

<lang>

0	Unspecified
1	English
2	French
3	Spanish
4	Japanese
5	Korean
6	Chinese
7	Hebrew

<encod>	Encoding (network specific)
0	Octet (or Unspecified)
1	IS91EP
2	ASCII
3	IA5
4	UCS-2 Unicode
<length>	Length of the text message (in bytes).
<data>	Message text

Delete Message +CMGD

Description: This command is used to delete one or several messages from preferred message storage.

Syntax: **Command syntax:** AT+CMGD=<Index> [,<DelFlag>]

Command	Possible Responses
AT+CMGD=1	OK Note: The message from the preferred message storage at the location 1 is deleted
	ERROR Note: There is no message stored at preferred message storage location 1
AT+CMGD=1,0 Note: Delete message stored in location (index) 1 (with optional <CelFlag>)	
	ERROR Note: There is no message stored at preferred message storage location 1
AT+CMGD=1,1	OK Note: All READ messages from the preferred message storage are deleted
AT+CMGD=1,4	OK Note: All messages are deleted

Values: **<index>**
0-99

<DelFlag>

- 0** Delete message at location <index>
- 1** Delete all READ messages
- 2** Reserved (unsupported)
- 3** Reserved (unsupported)
- 4** Delete all messages.

Preferred Message Storage +CPMS

Description: This command allows the message storage area to be selected (for reading, writing, etc). The total storage area size is: 100 for "MT". In the future when the RUIIM is supported, the size will vary dependent on the configuration of the SIM card.

Syntax: **Command syntax:** AT+CPMS=<mem1>,<used>,<total>

Command	Possible Responses
AT+CPMS=? Note: Display available message storage areas.	+CPMS: ("MT") OK
AT+CPMS? Note: Display currently selected area information.	+CPMS: "MT",3,99 OK
AT+CPMS="BC" Note: Select invalid message storage area.	+CMS ERROR: 302
AT+CPMS="MT" Note: Select NV message storage	+CPMS: 0,99 OK

Values:

- <mem1>** Memory area to be used to list, read and delete messages. It can be:
 - "MT" SMS Mobile Terminated message storage in NV (default)
 - Each reported memory area includes information about current used & total storage locations.
 - When <mem1> is selected, all following +CMGL, +CMGR and +CMGD commands are related to the type of SMS stored in this memory.
- <used>** The number of used storage locations in the reported area.
- <total>** The total number of available storage locations.

Set SMS Compose Language and Encoding +WSCL

Description: The +WSCL command sets the SMS composition language and encoding types. When composing a message (+CMGS), the SMS language and encoding fields will be set using the current +WSCL value.

Syntax: **Command syntax:** AT+WSCL = <lang>, <encod>

Command	Possible Responses
AT+WSCL=1,2	OK Note: Set language to English, encoding to ASCII
AT+WSCL=6,4	OK Note: Set language to Chinese, encoding to USC-2 UNICODE
AT+CMGS="8585551212"<CR> ÃÖ<ctrl-Z> Note: Send a message in Chinese	+CMGS: <mr> OK Note: Message sent

Values:

- <lang>**
 - 0 Unspecified
 - 1 English
 - 2 French
 - 3 Spanish
 - 4 Japanese
 - 5 Korean
 - 6 Chinese
 - 7 Hebrew
- <enc>**
 - 0 Octet (or Unspecified)
 - 1 IS91EP
 - 2 ASCII
 - 3 IA5
 - 4 USC-2 UNICODE

New Message Indication +CNMI

Description: This command selects the procedure for message reception from the network. **Note:** Cell Broadcast messages and Status Report messages are not stored.

Syntax: **Command syntax:** AT+CNMI=<mode>,<mt>,<bm>,<ds>,<bfr>

Command	Possible Responses
AT+CNMI=2,1,0,0,0 Note: <mt>=1	OK
	AT+CMTI : "MT",1 Note: message received
AT+CNMI=2,2,0,0,0 Note: <mt>=2	OK
	+CMT : "8585551212","98/10/01,12 :30 00", 129,1,2,0,5<CR><LF> Hello Note: message received
AT+CNMI=2,0,0,1,0 Note: <ds>=1	OK
AT+CMGS="8585551212"<CR> Message to send <ctrl-Z> Note: Send a message in text mode	+CMGS : 7 OK Note: Successful transmission
	+CDS : 2, 116, "8585551212", 129, "98/10/01,12 :30 :07", "98/10/01 12 :30 :08", 32768 Note: message was correctly delivered

Values

- <mode>** The <mode> value controls the processing of unsolicited result codes. Only mode 2 is supported at this time.
- 2** Buffer unsolicited result codes in the TA when TA-TE link is reserved and flush them to the TE after reservation. Otherwise forward the messages directly to the TE without storing.
- <mt>** Sets the result code indication routing for SMS-DELIVERs. Default is 1.
- 0** No SMS-DELIVER indications are routed.
- 1** SMS-DELIVERs are routed using unsolicited code: +CMTI: "MT", <index>
- 2 or 3** SMS-DELIVERs (except class 2 messages) are routed using unsolicited code: +CMT: <oa>, <scts>, <toa>, <lang>, <encod>, <priority>[,<cbn>],<length><CR><LF><data> (text mode)
- <bm>** Sets the result code indication routing for received Cell Broadcast Messages. Default is 0.
- 0** No CBM indications are routed to the TE. The CBMs are **not** stored.
- 2 or 3** New CBMs are routed directly to the TE using unsolicited result code (format matches that of +CBM: <oa>, [<alpha>,<,>] <scts> [<,>,<toa>, <length>] <CR><LF><data> (text mode)
- <ds>** Sets the routing for SMS-STATUS-REPORTs. Default is 0.
- 0** No SMS-STATUS-REPORTs are routed.
- 1** SMS-STATUS-REPORTs are routed using unsolicited code: +CDS: <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st> (Text mode)
- <bfr>** Since <mode> cannot be changed, this parameter is no longer used, but these values are still accepted for legacy purposes. Default is 0.
- 0** TA buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1...3 is entered (OK response shall be given before flushing the codes)
- 1** TA buffer of unsolicited result codes defined within this command is cleared when <mode> 1...3 is entered.

Incoming Message Directly Displayed +CMT

Description: This response indicates that an incoming message has been received and according to the message storage preferences (+CNMI), is to be directly displayed.

Syntax: **Response syntax:** +CMT: <oa>, <scts>, <toa>, <lang>, <encod>, <priority> [,<cbn>], <length> <CR><LF> <data> (text mode)

Example Result

```
+CMT: "123456",98/10/01,12 :30 00",129,1,2,0,5<CR><LF>
Hello
Note: message received
```

Values:

- <oa>** Originator Address.
- <scts>** Service Center Time Stamp in string format : "yy/MM/dd,hh :mm :ss±zz"
(Year/Month/Day,Hour:Min:Seconds±TimeZone)
- <toa>** Type-of-Address of <oa>
- <lang>** Language
- <encod>** Encoding method
- <priority>** Message priority:
 - 0 – Normal
 - 1 – Interactive
 - 2 – Urgent
 - 3 – Emergency
- <cbn>** Call Back Number
- <length>** The number of characters in the following <data> field
- <data>** Message contents

Incoming Message Stored in Memory +CMTI

Description: This response indicates that an incoming message has been received and according to the message storage preferences (+CNMI), is to be stored in memory.

Syntax: **Response syntax:** +CMTI: <mem>,<index>,<priority>

Example Result

```
+CMTI: "MT",1,0
Note: Message received
```

Value:

- <mem>** NVRAM storage area (always "MT" for this response)
- <index>** Location of message within storage area
- <priority>** Message priority
 - 0 – Normal
 - 1 – Interactive
 - 2 – Urgent
 - 3 – Emergency

SMS Status Report Indication Directly Displayed +CDS

Description: This response indicates an SMS status report has been received and according to the message storage preferences (+CNMI), is to be directly displayed.
Status report messages are not saved to NV; the host application must be communicating with the modem by either the UART or USB channel. In addition, there is not RI pulse.

Syntax: **Response Syntax:** +CDS: <n>, <mr>, [<ra>], [<tora>], <scts>,<dt>,<st> (Text mode)

Example Result

```
+CDS : 2, 1, "3146290800", 129, "98/10/01,12 :30 :07+04", "98/10/01 12 :30 :08+04", 32768
Note: SMS status report received
```

Values:

- <n> Always 2
- <mr> Message Reference
- <ra> Recipient Address
- <tora> Type-of-Address of <ra>
- <scts> Service Center Time Stamp in string format : "yy/MM/dd,hh :mm :ss±zz"
(Year/Month/Day,Hour:Min:Seconds±TimeZone)
- <dt> Discharge Time in string format: "yy/MM/dd,hh :mm :ss±zz"
(Year [00-99], Month [01-12], Day [01-31], Hour, Minute, Second and Time Zone [quarters of an hour])
- <st> Status of a SMS-STATUS-REPORT (See table below)

Codes for SMS Status Report

Code	Description
Network Problems	
0	Address vacant
1	Address translation failure
2	Network resource shortage
3	Network failure
4	Invalid teleservice ID
5	Other network problem
Terminal Problems	
32	No page response
33	Destination busy
34	No acknowledgment from transport layer
35	Destination resource shortage
36	SMS delivery postponed
37	Destination out of service
38	Destination no longer at this address
39	Other terminal problem
Radio Interface Problems	
64	Radio interface resource shortage
65	Radio interface incompatible
66	Other radio interface problem
General problems (IS-41D)	
96	Unexpected parameter size
97	SMS Origination denied
98	SMS Termination denied
99	Supplementary service not supported
100	SMS not supported
101	Reserved
102	Missing expected parameters
103	Missing mandatory parameters
104	Unrecognized parameter value
105	Unexpected parameter value
106	User data size error
107-255	No acknowledgement / Unknown error

General Codes	
32768	SMS OK. Message successfully delivered to base station
32770	Out of resources
32771	Message too large for access channel
32772	Message too large for dedicated channel
32773	Network not ready
32774	Phone not ready
32775	Not allowed in AMPS
32776	Cannot send broadcast

SMS Message Storage Full +WMGF

Description: This response indicates that the SMS Service Center has attempted to send an SMS message but it was rejected because SMS Message Storage is Full. No new SMS messages will be received until some room is created by deleting old messages from SMS storage. Message deletion can be done using AT+CMGD.

Syntax: **Response Syntax:** +WMGF

Example Result

+WMGF

Note: Incoming message rejected. Message center notified with “out of resources” message. Message center will attempt to re-send the message at a later time.

SMS Read Acknowledge Enable +WSRA

Description: This command enables or disables sending an SMS to acknowledge the reading of an MT SMS. If enabled, a point-to-point SMS will be sent back to the origination address of the MT SMS when the SMS is read using AT+CMGR command. The message type contained in the Message ID Bearer for the SMS is Read Acknowledge.

This setting is saved in non-volatile memory. It is also restored to the default value by the restore to factory defaults command, AT&F.

Syntax: **Command Syntax:** AT+WSRA=[<val>]

Command	Possible Responses
AT+WSRA	OK Note: Set default value of 0
AT+WSRA=1	OK
AT+WSRA? Note: Current value	+WSRA: 1 OK
AT+WSRA=?	+WSRA: (0-1) OK Note: Test Command

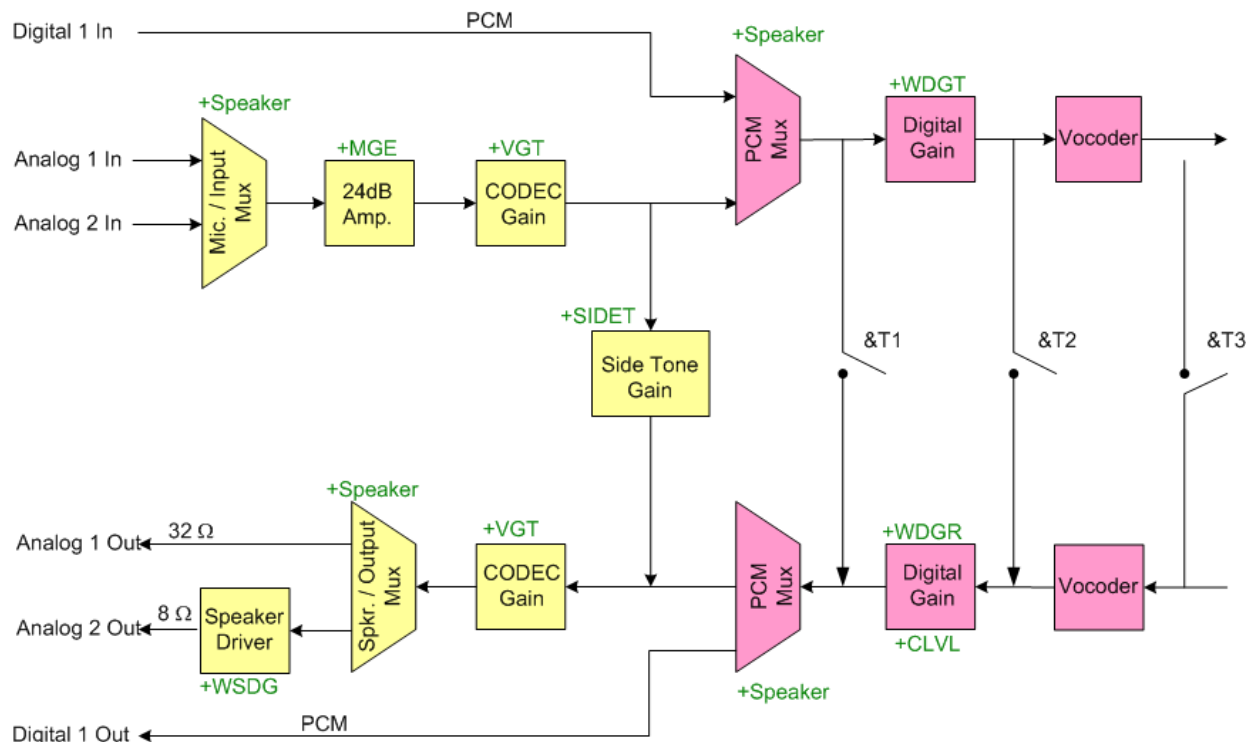
Values: <val>

- 0 SMS Read Acknowledge capability is disabled (Default)
- 1 SMS Read Acknowledge capability is enabled

Chapter 15 – Audio Commands

Audio Subsystem Overview

The audio sub-system block diagram below indicates where the various gains and AT commands take effect. Since the AT command values are saved separately for each audio path, the audio gains should be tuned independently for each audio path. Note that the +CLVL is intended to operate like a volume control, so it should be set to 0dB gain during the tuning process (this is the default value).



Tuning Audio

Note: PCM digital voice is not supported in the Multi-Tech models.

Audio parameters need to be set for each device connected to the audio sub-system. The audio parameters are saved independently for the three audio paths: Analog 1 and Analog 2. Tune the audio parameters using the procedures detailed below.

Analog

1. Select the relevant audio path, and issue the AT+VIP command to set the audio parameters to their default values.
2. Set +MGE so that the microphone output plus MGE gain is 23dB to 25dB below 2.828Vpp.
3. Make a voice call.
4. Adjust +VGT to appropriate levels.
5. Adjust +VGR to appropriate levels.
6. Adjust +WSDG, if applicable.

Speaker & Microphone Selection +SPEAKER

Description: This command is used to select the voice path, and activates a speaker/microphone audio path. The modem provides three audio paths: analog1, analog2, and digital1. An audio path is functional only with appropriate external hardware.

Voice paths may be changed while a call is in progress as well as in the idle state.

Syntax: **Command Syntax:** AT+SPEAKER=<n>

Command	Possible Responses
AT+SPEAKER=0 Note: Select analog1 audio path.	OK Note: Command valid.
AT+SPEAKER Note: Select analog1 audio path.	OK Note: Command valid (default path)
AT+SPEAKER=1 Note: Select analog2 audio path.	OK Note: Command valid.
AT+SPEAKER=2 Note: Select digital1 audio path.	OK Note: Command valid.
AT+SPEAKER?	+SPEAKER: 1 OK Note: analog2 audio path active.
AT+SPEAKER=? Note: Get the range of values.	+SPEAKER: (0-2)

Defined Values:

< n >

- 0 Analog1 – LINE_IN and HPH_OUT. (default)
- 1 Analog2 – MIC2 and SPKR_OUT.
- 2 Digital1 – PCM.

If no argument is supplied to the command, the default value is assumed. The configuration is saved immediately. The Analog 1 output is designed to drive a 32Ω speaker, while the Analog 2 output is designed to drive an 8Ω speaker. See the Audio Overview section for more information.

Microphone Gain Enable +MGE

Description: This command enables or disables the 24dB microphone gain amplifier.

Syntax: **Command Syntax:** AT+MGE=<val1>

Command	Possible Responses
AT+MGE	OK Note: Sets default value of 0
AT+MGE=0	OK Note: Disable amplifier
AT+MGE? Note: Interrogate value	+MGE: 1 OK Note: Current value
AT+MGE=? Note: Test command	+MGE : (0-1) OK Note: Possible values

Values: <Gain>

- 0 Amplifier Disabled (0dB gain) (default)
- 1 Amplifier Enabled (24dB gain)

If no argument is supplied to the command, the default value is assumed. The configuration is saved immediately. See the Audio Overview section for more information.

Microphone Gain +VGT

Description: This command sets the voice gain in the transmit direction (microphone gain) of the current audio path.

Syntax: **Command syntax:** AT+VGT=<MicGain>

Command	Possible Responses
AT+VGT	OK Note: Sets default value of 20
AT+VGT=2	OK Note: Command valid
AT+VGT? Note: Interrogate value	+VGT: 2 OK Note: Current value
AT+VGT=? Note: Test command	+VGT : (0-24) OK Note: Possible values

Values: <Gain>

0	-84dB
1	-80dB
2	-76dB
3	-72dB
4	-68dB
5	-64dB
6	-60dB
7	-56dB
8	-52dB
9	-48dB
10	-44dB
11	-40dB
12	-36dB
13	-32dB
14	-28dB
15	-24dB
16	-20dB
17	-16dB
18	-12dB
19	-8dB
20	-4dB (default)
21	0dB
22	+4dB
23	+8dB
24	+12dB

If no argument is supplied to the command, the default value is assumed. The configuration is saved immediately. See the Audio Overview section for more information.

Speaker Gain Control +VGR

Description: This command sets the voice gain in the receiver direction (speaker gain) of the current audio path.

Syntax: **Command syntax:** AT+VGR=<Rgain>

Command	Possible Responses
AT+VGR	OK Note: Sets default value of 22
AT+VGR=2	OK Note: Command valid
AT+VGR? Note: Interrogate value	+VGR: 2 OK Note: Current value
AT+VGR=? Note: Test command	+VGR : (0-24) OK Note: Possible values

Values:

<Gain>	
0	-84dB
1	-80dB
2	-76dB
3	-72dB
4	-68dB
5	-64dB
6	-60dB
7	-56dB
8	-52dB
9	-48dB
10	-44dB
11	-40dB
12	-36dB
13	-32dB
14	-28dB
15	-24dB
16	-20dB
17	-16dB
18	-12dB
19	-8dB
20	-4dB
21	0dB
22	+4dB default
23	+8dB
24	+12dB

If no argument is supplied to the command, the default value is assumed. The configuration is saved immediately. See the Audio Overview section for more information.

Digital Gain Transmit +WDGT

Description: This command sets the digital gain in the transmit direction (microphone gain) of the current audio path.

Syntax: **Command Syntax:** AT+WDGT=<Gain>

Command	Possible Responses
AT+WDGT	OK Note: Sets default value of 22
AT+WDGT=2	OK Note: Command valid
AT+WDGT? Note: Interrogate value	+WDGT: 2 OK Note: Current value
AT+WDGT=? Note: Test command	+WDGT: (0-24) OK Note: Possible values

Values:

<Gain>	
0	-84db
1	-80dB
2	-76dB
3	-72dB
4	-68dB
5	-64dB
6	-60dB
7	-56dB
8	-52dB
9	-48dB
10	-44dB
11	-40dB
12	-36dB
13	-32dB
14	-28dB
15	-24dB
16	-20dB
17	-16dB
18	-12dB
19	-8dB
20	-4dB
21	0dB
22	+4dB default
23	+8dB
24	+12dB

If no argument is supplied to the command, the default value is assumed. The configuration is saved immediately. See the Audio Overview section for more information.

Digital Gain Receive +WDGR

Description: This command sets the digital gain in the receive direction (speaker gain) of the current audio path.

Syntax: **Command Syntax:** AT+WDGR=<Gain>

Command	Possible Responses
AT+WDGR	OK Note: Sets default value of 21
AT+WDGR=2	OK Note: Command valid
AT+WDGR? Note: Interrogate value	+WDGR: 2 OK Note: Current value
AT+WDGR=? Note: Test command	+WDGR: (0-24) OK Note: Possible values

Values: <Gain>

0	-84db
1	-80dB
2	-76db
3	-72dB
4	-68dB
5	-64dB
6	-60dB
7	-56dB
8	-52dB
9	-48dB
10	-44dB
11	-40dB
12	-36dB
13	-32dB
14	-28dB
15	-24dB
16	-20dB
17	-16dB
18	-12dB
19	-8dB
20	-4dB
21	0dB default
22	+4dB
23	+8dB
24	+12dB

If no argument is supplied to the command, the default value is assumed. The configuration is saved immediately. See the Audio Overview section for more information.

Side Tone Modification +SIDET

Description: This command is used to set the level of **audio feedback** in the speaker (microphone feedback in the speaker).

Syntax: **Command syntax:** AT+SIDET=<val1>,<val2>

Command	Possible Responses
AT+SIDET	OK Note: Set default values of 0, 0
AT+SIDET=1,0	OK Note: Command valid
AT+SIDET? Note: Current value	+SIDET: 1,0 OK Note: Command valid
AT+SIDET=?	+SIDET: (1-0),(0-24) OK Note: Test command

Values: <val1>

- 0 Sidetone is disabled (Default)
- 1 Sidetone is enabled

Note that if val1 is set to zero (0), then val2 (level) is forced to zero (0).

<val2>

0	-96dB (default)
1	-92dB
2	-88dB
3	-84dB
4	-80dB
5	-76dB
6	-72dB
7	-68dB
8	-64dB
9	-60dB
10	-56dB
11	-52dB
12	-48dB
13	-44dB
14	-40dB
15	-36dB (typical handset level)
16	-32dB
17	-28dB
18	-24dB (typical headset level)
19	-20dB
20	-16dB
21	-12dB
22	-8dB
23	-4dB
24	0dB

If no argument is supplied to the command, the default value is assumed. The configuration is saved immediately. See the Audio Overview section for more information.

Echo Cancellation +ECHO

Description: This command is used to enable, disable or configure the Echo Cancellation functions for voice calls (in rooms, in cars, etc.). The +SPEAKER function automatically sets echo cancellation based upon audio path choice and this command allows non-standard operation.

Syntax: **Command syntax:** AT+ECHO= <mode>

Command	Possible Responses
AT+ECHO? Note: Read current settings	+ECHO: 0 OK
AT+ECHO=0 Note: Set Echo Cancellation Off	OK
AT+ECHO=1 Note: Set Echo Cancellation to Ear Seal	OK
AT+ECHO=2 Note: Set Echo Cancellation to Headset	OK
AT+ECHO=4 Note: Set Echo Cancellation to Handset	OK
AT+ECHO=5 Note: Set Echo Cancellation to Default Path	OK
AT+ECHO	OK Note Set to 5 (default)
AT+ECHO=? Note: Test command	+ECHO: (0-5) OK Note: Possible values

Values: <mode>

- 0 Vocoder Echo Cancellation Off (default for Digital 1 path)
- 1 Ear Seal Echo Cancellation (default for Analog 1 path)
- 2 Head Set Echo Cancellation
- 3 Acoustic Echo Cancellation (AEC)
- 4 Speaker Echo Cancellation for car kit operation (default for Analog 2 path)
- 5 Default Echo Cancellation for current path settings (default)

If no argument is supplied to the command, the default value is assumed. The configuration is saved immediately. See the Audio Overview section for more information.

Loudspeaker Volume Level +CLVL

Description: This command sets the loudspeaker volume level of the current audio path.

Syntax: **Command Syntax:** AT+CLVL=<Level>

Command	Possible Responses
AT+CLVL	OK Note: Sets default value of 9
AT+CLVL=2	OK Note: Command valid
AT+CLVL? Note: Interrogate value	+CLVL: 2 OK Note: Current value
AT+CLVL=? Note: Test command	+CLVL: (0-12) OK Note: Possible values

Values: <Level>

0	-84dB (no output)
1	-32dB
2	-28dB
3	-24dB
4	-20dB

5	-16dB
6	-12dB
7	-8dB
8	-4dB
9	0dB (default)
10	4dB
11	8dB
12	12dB

If no argument is supplied to the command, the default value is assumed. The configuration is saved immediately. See the Audio Overview section for more information.

Special Considerations: The +CLVL gain value is added onto the +WDGR gain. Depending on the gain setting of +WDGR, the full range of the +CLVL command may not be realized.

Example: If +WDGR is set to +12dB gain, the +CLVL command cannot add any more positive gain. Setting the +CLVL command to +12dB gain would not yield a total of +24dB gain, since the gain stage can only supply a maximum of +12dB gain.

The following formulas govern the total digital receive gain:

Total Gain = (WDGR Gain + CLVL Gain)

-84dB <= Total Gain <= +12dB

Speaker Driver Gain +WSDG

Description: This command sets the 8 Ohm speaker driver gain of the current audio path. Note from the diagram at the top of this section that only the Analog 2 audio path has a speaker driver. Setting the speaker driver gain on other audio paths has no effect.

Syntax: **Command Syntax:** AT+WSDG=<Level>

Command	Possible Responses
AT+WSDG	OK Note: Sets default value of 4
AT+WSDG=7	OK Note: Command valid
AT+WSDG? Note: Interrogate value	+CLVL: 7 OK Note: Current value
AT+WSDG=? Note: Test command	+CLVL: (0-7) OK Note: Possible values

Values: <Level>

0	-16dB
1	-12dB
2	-8dB
3	-4dB
4	0dB (default)
5	4dB
6	8dB
7	12dB

If no argument is supplied to the command, the default value is assumed. The configuration is saved immediately. See the Audio Overview section for more information.

Initialize Voice Parameters +VIP

Description: This resets audio parameters back to factory default values for the currently selected audio path (See +SPEAKER).

The following parameters are restored:

- Gain control (+VGR, +VGT)
- Speaker & microphone selection (+SPEAKER)
- Echo cancellation (+ECHO)
- Side tone selection (+SIDET)
- Digital gain (+WDGT, +WDGR)
- Microphone gain enable (+MGE)
- Loudspeaker volume level (+CLVL)

Syntax: **Command syntax:** AT+VIP

Command	Possible Responses
AT+VIP	OK Note: Command valid

Audio Loopback &T

Description: This command is used to perform audio loop back of the current audio path. This command can be used to validate the audio loop. This is a standard Hayes® modem AT command.

Syntax: **Command syntax:** AT&T<num>

Command	Possible Responses
AT&T0	OK Note: Audio loopback is off.
AT&T1	OK Note: Audio loopback is on.

Values: <num>

- 0** Audio loopback of off.
- 1** Audio loopback for PCM interface is enabled.
- 2** Audio loopback for DSP interface is enabled.
- 3** Audio loopback for Remote End is enabled.

Chapter 16 – Data Commands

Quick Net Connect \$QCQNC

Description: This command is used to enable or disable the Quick Net Connect (QNC) feature.

Syntax: **Command syntax:** AT\$QCQNC=<Val>

Command	Possible Responses
AT\$QCQNC? Note: Display the current setting	\$QCQNC: 0 OK Note: Command is valid
AT\$QCQNC=? Note: Display the range of values	\$QCQNC: (0-1) OK Note: Command is valid
AT\$QCQNC=1 Note: Enable QNC compatibility	OK Note: Command is valid
AT\$QCQNC Note: Default – Enable QNC compatibility	OK Note: Command is valid

Values: <Val>

- 0 Disable QNC capability. This means that packet Originations will use the Packet Data Service Option number.
- 1 Enable QNC capability. This means that Packet Originations will use the Asynchronous Data Service Option number. Default.

Set Data Service Option \$QCSO

Description: This command is used to Set Data Service Option number set; saves to non-volatile memory.

Values: <Val>

- 0 pre-707 SO numbers (RS 1: Async 4, packet 7; RS 2: Async 12, packet 15)
- 1 proprietary SO numbers (RS 1: Async 4, packet 7; RS 2: Async 0x8021, packet 0x8020)
- 2 IS-707 SO numbers (RS 1: Async 0x1004, packet 0x1007; RS 2: Async 12, packet 15)

Syntax: **Command syntax:** AT\$QCSO =<Val>

Command	Possible Responses
AT\$QCSO? Note: Display the current setting	\$QCSO: 2 OK Note: Command is valid
AT\$QCSO =? Note: Display the range of values	\$QCSO: (0-2) OK Note: Command is valid
AT\$QCSO =1 Note: Set proprietary SO numbers.	OK Note: Command is valid

Mobile Station IP Address +CMIP

Description: This read-only command is used to display the mobile station's temporary IP address. The value displayed is in standard IP address format.

Note: This command returns an IP value only during a data call when a temporary IP address has been assigned.

Syntax: **Command syntax:** AT+CMIP

Command	Possible Responses
AT+CMIP? Note: Display the current setting	+CMIP: 198.229.142.90 OK Note: Command is valid
AT+CMIP? Note: Display the current setting	+CMIP: 0.0.0.0 OK Note: When no IP address is assigned.
AT+CMIP	ERROR Note: Command is not valid

R-SCH Selection \$QCMIP

Description: This command is used to enable or disable mobile IP. The default value is carrier-specific. This command is for test purposes only and should not be issued by the mobile phone user.

Syntax: **Command syntax:** AT\$QCMIP=<Val>

Command	Possible Responses
AT\$QCMIP? Note: Display the current setting	\$QCMIP: 1 OK Note: Command is valid
AT\$QCMIP=? Note: Display the range of values	\$QCMIP: (0-2) OK Note: Command is valid
AT\$QCMIP=0 Note: Set value to 0	OK Note: Command is valid

Values: <Val>

- 0** Mobile IP disabled, Simple IP only.
- 1** Mobile IP preferred. In the initial MIP registration, if the network does not support Mobile IP, then the mobile automatically reverts to Simple IP (force a PPP renegotiation by sending a LCP C-Req). However, if a Mobile IP session is registered, and then enters a network that does not support Mobile IP, the mobile will drop the session and inform the upper layers of the failure (for example, by dropping DCD to a laptop).
- 2** Mobile IP only. The mobile will make data calls only when Mobile IP is supported in the network. During a MIP session, if the mobile hands off to a network that does not support MIP, then the mobile will drop the session and inform the upper layers of the failure (for example, by dropping DCD to a laptop).

Note: When the AT\$QCMIP value is changed to 1 or 2, this modifies the value of AT+CRM to 2. AT+CRM with a value of 2 enables network model operation. Changing the value to 0 will reset the AT+CRM to its original value.

MIP Selection \$QCMIPP

Description: This command is used to select and activate an MIP user profile.

Syntax: **Command syntax:** AT\$QCMIPP

Command	Possible Responses
AT\$QCMIPP? Note: Display the current setting	\$QCMIPP: 0 Note: User profile 1 is currently used
AT\$QCMIPP=2 Note: Set to user profile 2	OK Note: Command is valid
AT\$QCMIPP=? Note: Display the range of values	\$QCMIPP: (0-5) OK Note: Command is valid

Note: Takes a profile number between 0 and 5. This value is stored in NV. This AT command is used to configure Dial-Up Networking. Although 5 is the absolute maximum profile number, the actual number may be limited by the carrier.

Current Active Profile \$QCMIEP

Description: This command is used to enable or disable the currently active profile.

Syntax: **Command syntax:** AT\$QCMIEP=<Val>

Command	Possible Responses
AT\$QCMIEP? Note: Display the current setting	\$QCMIEP: 1 OK Note: Command is valid
AT\$QCMIEP=? Note: Display the range of values	\$QCMIEP: (0-1) OK Note: Command is valid
AT\$QCMIEP=0 Note: Set value to 0	OK Note: Command is valid

Values: <Val>

- 0 Disable the currently active profile (profile is unavailable until it is re-enabled).
- 1 Enable the currently active profile.

Return Profile Information \$QCMIPGETP

Description: This command is used to return all information corresponding to the specified profile number.

Note: The number of MIP user profiles supported is determined by the carrier.

Syntax: **Command syntax:** AT\$QCMIPGETP=<Val>

Command	Possible Responses
AT\$QCMIPGETP? Note: Display the current setting	ERROR Note: Command is not valid
AT\$QCMIPGETP=? Note: Display the range of values	\$QCMIPGETP: (0-5) OK Note: Command is valid
AT\$QCMIPGETP=0 Note: Set value to 0	Profile:0 Enabled OK Note: Command is valid

Values: <Val>

- (0-5) Profile #

Note: If no profile number is entered, all information corresponding to the currently active profile is returned. If there is no profile associated with the specified number, an error is returned. Although 5 is the absolute maximum profile number the actual number may be limited by the carrier.

Set NAI for Active Profile `$QCMIPNAI`

Description: This command is used to set the network access identifier (NAI) for the currently active profile.
Note: Writing the NAI is not allowed for a Verizon configuration. Command will return ERROR if the modem is configured for Verizon.

Syntax: **Command syntax:** AT\$QCMIPNAI=<String>,<Val>

Command	Possible Responses
AT\$QCMIPNAI? Note: Display the current setting	Wavecom 1 @myprovider.com,1 OK Note: Command is valid
AT\$QCMIPNAI=? Note: Display the range of accepted character values.	\$QCMIPNAI: (20,21,23-7E),(0-1) OK Note: ASCII hexadecimal character range supported by this command. (All non-control codes.)
AT\$QCMIPNAI="myName@myDomain.com",0 Note: Non-committed value set	OK Note: NAI is now: myName@MyDomain.com

Values: <String> The network access identifier text to be stored.

<Val>
 0 Do not commit to NV
 1 Commit to NV

Set Reverse Tunneling `$QCMIPRT`

Description: This command is used to set the reverse tunneling for the currently active profile.

Syntax: **Command syntax:** AT\$QCMIPRT=<Val1>, <Val2>

Command	Possible Responses
AT\$QCMIPRT? Note: Display the current setting	\$QCMIPRT: 1,1 OK Note: Command is valid
AT\$QCMIPRT=? Note: Display the range of values	\$QCMIPRT: (0-1), (0-1) OK Note: Command is valid
AT\$QCMIPRT=1,1 Note: Set value to 1 and commit	OK Note: Command is valid

Values: <Val1>
 0 Do not request reverse tunneling
 1 Request reverse tunneling

<Val2>
 0 Do not commit to NV
 1 Commit to NV

Note: If the value provisioned is not committed to NV, the temporary value will be deleted.

Set MN-AAA Shared Secrets \$QCMIPMASS

Description: This command is used to set MN-AAA shared secrets for the currently active profile. It should be noted that the length of the shared secret is 16 bytes (128 bits).

Syntax: **Command syntax:** AT\$QCMIPMASS =<String>,<Val>

Command	Possible Responses
AT\$QCMIPMASS? Note: Display the current setting	\$QCMIPMASS: Set OK Note: Command is valid
AT\$QCMIPMASS=? Note: Display the range of values.	\$QCMIPMASS: (20,21,23-7E),(0-1) OK Note: ASCII hexadecimal character range supported by this command. (All non-control codes.) the length of the shared secret is 16 bytes (128 bits).
AT\$QCMIPMASS= my5ecretC0de,0 Note: Non-committed value set	OK Note: MN-AAA is now: my5ecretC0de.

Values: <String> The shared secret text to be stored

<Val>

0 Do not commit to NV
1 Commit to NV

Note: Double quotes are only required if the string contains a command.

Note: If the value provisioned is not committed to NV, the temporary value will be deleted.

Set MN-HA Shared Secrets \$QCMIPMHSS

Description: This command is used to set MN-HA shared secrets for the currently active profile. It should be noted that the length of the shared secret is 16 bytes (128 bits).

Syntax: **Command syntax:** AT\$QCMIPMHSS =<String>,<Val>

Command	Possible Responses
AT\$QCMIPMHSS? Note: Display the current setting	\$QCMIPMHSS: Set OK Note: Command is valid
AT\$QCMIPMHSS=? Note: Display the range of values	\$QCMIPMHSS: (20,21,23-7E),(0-1) OK Note: Command is valid. The length of the shared secret is 16 bytes (128 bits).
AT\$QCMIPMHSS=20,0 Note: Set value to 20, 0	OK Note: Command is valid

Values: <String> The shared secret text to be stored.

<Val>

0 Do not commit to NV
1 Commit to NV

Note 1: Double quotes are only required if the string contains a command.

Note 2: If the value provisioned is not committed to NV, the temporary value will be deleted.

Set MN-AAA Shared Secrets in HEX \$QCMIPMASSX

Description: This command is used to set MN-AAA shared secrets for the currently active profile in HEX. It should be noted that the length of the shared secret is 16 bytes (128 bits).

Syntax: **Command syntax:** AT\$QCMIPMASSX =<HEX>,<Val>

Command	Possible Responses
AT\$QCMIPMASSX? Note: Display the current setting	\$QCMIPMASSX: Set OK Note: Command is valid
AT\$QCMIPMASSX=? Note: Display the range of values.	\$QCMIPMASSX: [0x00-0xff] (max 16 bytes, (0,1)) OK Note: Command is valid. The length of the shared secret is 16 bytes (128 bits).
AT\$QCMIPMASSX=FFFFFF,0 Note: Set value to 0xFFFFFFFF, but not commit	OK Note: Command is valid.

Values: <HEX> Hex value from 0 to FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF (32 characters)

<Val>

0 Do not commit to NV
1 Commit to NV

Note: If the value provisioned is not committed to NV, the temporary value will be deleted.

Set MN-HA Shared Secrets in HEX \$QCMIPMHSSX

Description: This command is used to set MN-HA shared secret for the currently active profile in HEX. It should be noted that the length of the shared secret is 16 bytes (128 bits).

Syntax: **Command syntax:** AT\$QCMIPMHSSX =<HEX>,<Val>

Command	Possible Responses
AT\$QCMIPMHSSX? Note: Display the current setting	\$QCMIPMHSSX: Set OK Note: Command is valid
AT\$QCMIPMHSSX=? Note: Display the range of values	\$QCMIPMHSSX: [0x00-0xFF] (max 16 bytes, (0-1)) OK Note: Command is valid. The length of the shared secret is 16 bytes (128 bits).
AT\$QCMIPMHSSX=FFFFFF,0 Note: Set value to 0xFFFFFFFF, but not commit	OK Note: Command is valid

Values: <HEX> Hex value from 0 to FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF (32 characters)

<Val>

0 Do not commit to NV
1 Commit to NV

Note: If the value provisioned is not committed to NV, the temporary value will be deleted.

Set MN-AAA Shared Secrets SPI Values \$QCMIPMASPI

Description: This command is used to set MN-AAA SPI values for the currently active profile.

Syntax: **Command syntax:** AT\$QCMIPMASPI =<SPI>,<Val>

Command	Possible Responses
AT\$QCMIPMASPI? Note: Display the current setting	\$QCMIPMASPI: 1234,1 OK Note: Command is valid
AT\$QCMIPMASPI=? Note: Display the range of values	\$QCMIPMASPI: (0-4294967295),(0-1) OK Note: Command is valid
AT\$QCMIPMASPI=2300,0 Note: Set value to 2300, but not commit	OK Note: Command is valid

Values: <SPI> SPI value from 0 to 4294967295

<Val>

0 Do not commit to NV

1 Commit to NV

Note: If the value provisioned is not committed to NV, the temporary value will be deleted.

Set MN-HA Shared Secrets SPI Values \$QCMIPMHSPi

Description: This command is used to set MN-HA SPIs for the currently active profile. Two arguments – SPI value and one of the values: 0 and 1.

Syntax: **Command syntax:** AT\$QCMIPMHSPi =<SPI>,<Val>

Command	Possible Responses
AT\$QCMIPMHSPi? Note: Display the current setting	\$QCMIPMHSPi: 1234,1 OK Note: Command is valid
AT\$QCMIPMHSPi=? Note: Display the range of values	\$QCMIPMHSPi: (0-4294967295),(0-1) OK Note: Command is valid
AT\$QCMIPMHSPi=5500,0 Note: Set value to 5500, but not commit	OK Note: Command is valid

Values: <SPI> SPI value from 0 to 4294967295

<Val>

0 Do not commit to NV

1 Commit to NV

Note: If the value provisioned is not committed to NV, the temporary value will be deleted.

Set Primary HA IP Address \$QCMIPPHA

Description: This command is used to set the primary HA address of the mobile for the currently active profile. The command takes two arguments, a string corresponding to the IP address of the HA to be stored and a number (either 0 or 1) indicating whether or not to commit this value to NV. The IP address should be formatted in standard dotted-decimal notation; e.g., “10.1.1.20”.

Syntax: **Command syntax:** AT\$QCMIPPHA =<IP>,<Val>

Command	Possible Responses
AT\$QCMIPPHA? Note: Display the current setting.	\$QCMIPPHA: 10.1.1.20, 0 OK
AT\$QCMIPPHA =? Note: Display the range of values.	\$QCMIPPHA: ((0-255).(0-255).(0-255).(0-255)),(0-1) OK
AT\$QCMIPPHA =10.1.2.15,1 Note: Set to 10.1.2.15, and commit to NV.	OK

Values: <IP> IP address in standard dotted-decimal notation; e.g., “10.1.1.20”.

<Val>

0 Do not commit to NV

1 Commit to NV

Note: If the value provisioned is not committed to NV, the temporary value will be deleted.

Set Secondary HA IP Address \$QCMIPSHA

Description: This command is used to set the secondary HA address of the mobile for the currently active profile. The command takes two arguments, a string corresponding to the IP address of the HA to be stored and a number (either 0 or 1) indicating whether or not to commit this value to NV. The IP address should be formatted in standard dotted-decimal notation; e.g., “10.1.1.20”.

Syntax: **Command syntax:** AT\$QCMIPSHA =<IP>,<Val>

Command	Possible Responses
AT\$QCMIPSHA? Note: Display the current setting.	\$QCMIPSHA: 10.1.1.20, 0 OK
AT\$QCMIPSHA =? Note: Display the range of values.	\$QCMIPSHA: ((0-255).(0-255).(0-255).(0-255)),(0-1) OK
AT\$QCMIPSHA =10.1.2.15,1 Note: Set to 10.1.2.15, and commit to NV.	OK

Values: <IP> IP address in standard dotted-decimal notation; e.g., “10.1.1.20”.

<Val>

0 Do not commit to NV

1 Commit to NV

Note: If the value provisioned is not committed to NV, the temporary value will be deleted.

Set Home HA IP Address \$QCMIPHA

Description: This command is used to set the home HA address of the mobile for the currently active profile. The command takes two arguments, a string corresponding to the IP address of the HA to be stored and a number (either 0 or 1) indicating whether or not to commit this value to NV. The IP address should be formatted in standard dotted-decimal notation; e.g., “10.1.1.20”.

Syntax: **Command syntax:** AT\$QCMIPHA =<IP>,<Val>

Command	Possible Responses
AT\$QCMIPHA? Note: Display the current setting.	\$QCMIPHA: 10.1.1.20, 0 OK
AT\$QCMIPHA =? Note: Display the range of values.	\$QCMIPHA: ((0-255).(0-255).(0-255).(0-255)),(0-1) OK
AT\$QCMIPHA =10.1.2.15,1 Note: Set to 10.1.2.15, and commit to NV.	OK

Values: <IP> IP address in standard dotted-decimal notation; e.g., “10.1.1.20”.

<Val>

0 Do not commit to NV

1 Commit to NV

Note: If the value provisioned is not committed to NV, the temporary value will be deleted.

Max Number of MIP NAI User Profiles Indicator \$SPNAI

Description: AT\$SPNAI Network Access Identifier AT\$SPNAI? 0,1:
0 -> The device does not support the ability to enter up to six different NAI profiles through the user interface.
1 -> The device supports the ability to enter up to six different NAI profiles through the user interface.

Syntax: **Command syntax:** AT\$SPNAI?

Command	Possible Responses
AT\$SPNAI? Note: Get max number of MIP profiles indicator	1 OK Note: Device supports the ability to enter up to 6 different NAI profiles 0 OK Note: Device does not support the ability to enter up to 6 different NAI profiles

Chapter 17 – TCP APP AT Commands (For Non-UPI and Non- GPS Builds)

This section details the AT commands that are available with the TCP App feature. This feature provides functionality for establishing multiple TCP and UDP compliant non-blocking socket connections over an IP network while retaining AT command level control of the modem. The TCP App feature includes a set of AT commands and unsolicited responses for host application initialization and control of its functionality.

Configure TCP/IP +WIPCFG

Description: This command is used to start and stop the TCP/IP stack, set TCP/IP configuration parameters and save/restore configuration to/from NV memory.

Syntax: **Command syntax:** AT+WIPCFG=<mode>[[,<optnum>][,<value>]]

Command	Possible Responses
AT+WIPCFG? Note: Display current TCP/IP configuration settings.	+WIPCFG: 0,64 +WIPCFG: 3,16384 +WIPCFG: 4,536 +WIPCFG: 6,8 +WIPCFG: 12,60 +WIPCFG: 54,1460 +WIPCFG: 55,0 OK
AT+WIPCFG=0 Note: Stop TCP/IP stack	OK Note: Command valid
AT+WIPCFG=1 Note: Start TCP/IP stack	OK Note: Command valid
AT+WIPCFG=2,0 Note: Set Time-to-Live to default value of 64	OK Note: Command valid
AT+WIPCFG=2,0,255 Note: Set Time-to-Live to maximum value	OK Note: Command valid
AT+WIPCFG=2,3 Note: Set Number of bytes of initial TCP window to default value of 16384	OK Note: Command valid
AT+WIPCFG=2,3,1000 Note: Set Number of bytes of initial TCP window to 1000	OK Note: Command valid
AT+WIPCFG=2,4 Note: Set MSS to default value of 536	OK Note: Command valid
AT+WIPCFG=2,6,5 Note: Set Total number of TCP and UDP sockets to 5	OK Note: Command valid
AT+WIPCFG=2,12,10 Note: Set TCP Timeout to 1 second (10 * 100msec)	OK Note: Command valid
AT+WIPCFG=4,0 Note: Restore configuration from NV memory	OK Note: Command valid
AT+WIPCFG=4,1 Note: Save configuration to NV memory	OK Note: Command valid

- Values:**
- <mode>**
 - 0** Stop TCP/IP stack
 - 1** Start TCP/IP stack
 - 2** Configure TCP/IP stack
 - 4** Save/Restore Configuration to/from NV memory
 - <optnum> when <mode> = 2**
 - 0** Default TTL of outgoing data grams. This option is a limit on the period of time or number of iterations or transmissions that a unit of data can experience before it should be discarded. The time to live (TTL) is an 8-bit field in the Internet Protocol (IP) header. It is the 9th octet of 20. Its value can be considered as an upper bound on the time that an IP datagram can exist in an internet system. The TTL field is set by the sender of the datagram, and reduced by every host on the route to its destination. If the TTL field reaches zero before the datagram arrives at its destination, then the datagram is discarded. This is used to avoid a situation in which an undelivered datagram keeps circulating in the network. Valid range is 0-255. The default value is 64.
 - 3** Number of bytes of initial TCP window. This option is used to specify the number of bytes in the initial TCP window. A TCP window specifies the amount of outstanding (unacknowledged by the recipient) data a sender can send on a particular connection before it gets an acknowledgement back from the receiver. The primary reason for the window is congestion control. Valid range is 536 to 65535. The default value is 16384.
 - 4** Default MSS of off-link connections. This parameter specifies the initial size of TCP segment which would be sent. Note that the TCP protocol layer will negotiate this parameter when the socket is opened. Valid range is 536 to 1460. The default value is 536.
 - 6** Total number of sockets (TCP and UDP) that are allowed. This option specifies the maximum number of TCP and UDP sockets that can be created at one particular time. Valid range is 1 to 8. The default value is 8.
 - 12** This option is used to specify the time from the first character received on the UART/serial port until TCP data is sent to the network. It allows the application to buffer TCP data before writing to the TCP socket. Note: If 536 bytes of data are received on the UART/serial port before the timeout, the TCP data will also be removed from the UART and written to the TCP socket.
This option value represents the number of 100 millisecond time periods to wait. For example, setting this option to 10 will make the application wait at least 1 second (10 * 100msec) before sending data on the IP network. Valid range is 1 to 100. The default value is 3.
 - 54** The UDP packet size. When the socket is opened as a UDP socket, this option determines the UDP packet size. The valid range is 536 to 1460. The default value is 1460.
 - 55** ICMP Ping Reply. This is a flag which indicates if the modem should reply to the ICMP echo request which is used by ping. The valid values are 0 and 1. The default value is 0 which means that no reply will be sent.
 - <optnum> when <mode> = 4**
 - 0** Restore configuration data from NV memory. The current working TCP/IP configuration will be overwritten with the configuration stored in NV memory.
 - 1** Save configuration data to NV memory. The current working TCP/IP configuration will be written to NV memory.

Bearer Configuration +WIPBR

Description: This command is used to open or close a PPP session with the carrier and to read the PPP session options. A CDMA 1xRTT data call will be originated when a PPP session is started and will be terminated when a PPP session is closed. The modem must be in the idle state (no call in progress) when a new PPP session is requested; otherwise, an error will be returned.

Syntax: **Command syntax:** AT+WIPBR=<cmdtype>,<bld>[,<opt num>,<mode>]

Command	Possible Responses
AT+WIPBR? Note: Ask for current functionality level	+WIPBR: 6,1 OK Note: PPP session active
AT+WIPBR=4,6 Note: Start PPP session	OK Note: Command valid
AT+WIPBR=5,6 Note: Stop PPP session	OK Note: Command valid
AT+WIPBR=3,6,15 Note: Get IP address of PPP session	+WIPBR: 6,15,"66.193.79.243" OK Note: PPP session active

Values:

<cmdtype>

- 3: Get value of PPP session options
- 4: Originate a 1xRTT data call and open a PPP session
- 5: Close a PPP session and terminate the 1xRTT data call

<bld>

- 6: 1xRTT/PPP Bearer Id

<opt num> only valid when <cmdtype>=3 and PPP session is active

- 15: local IP address
- 17: primary DNS server IP address
- 18: secondary DNS server IP address

<mode> only valid when <cmdtype>=4

- 0: client operation

Bearer Status +WIPBR Unsolicited Response Indicates the Status of the Bearer

Response Syntax: +WIPBR: <bld>,<status>

Possible Responses
+WIPBR: 6,1 Note: PPP is active

Response Values:

<bld>

- 6 1xRTT/PPP Bearer Id

<status>

- 1 session active
- 0 session not active.

Service Creation +WIPCREATE

Description: The +WIPCREATE command is used to create UDP, TCP client, and TCP server sockets associated with the specified index and service.

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. If peer IP and peer port are 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 to as “spawning”. When a server socket is created, the socket passively listens on a specified port for incoming connections. 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
- Server socket remains in the listening mode and is ready to accept the request from other clients

A UDP socket can be created which acts as a “listening” socket waiting for first incoming datagram to the specified local port. This is accomplished by creating a socket with protocol set to 1 (UDP) and specifying only a Local Port, without providing a Peer IP Address or Peer Port. The +WIPDATA unsolicited response is output when a datagram is received on the port.

Note: The UDP “Listen” socket can receive incoming datagrams; however, it does not bind to the peer IP Address/port, and thus cannot be used to transmit data. To reply to the received datagram, a new UDP socket must be created using the datagrams source IP Address and port.

Syntax: **Command syntax:** If <protocol> = 1: AT+WIPCREATE=<protocol>,<index>,[<local port>] [,<peer IP>,<peer port>]
 If <protocol> = 2: AT+WIPCREATE=<protocol>,<index>,<peer IP>,<peer port>
 If <protocol> = 3: AT+WIPCREATE=<protocol>,<server index>,<local port>,<from idx>,<to idx>

Command	Possible Responses
AT+WIPCREATE=1,<index>,[<local port>] [,<peer IP>,<peer port>]	OK +WIPREADY: 1,<index>
AT+WIPCREATE=2,<index>,<peer IP>,<peer port>	OK +WIPREADY: 2,<index>
AT+WIPCREATE=3,<server index>,<local port>,<from idx>,<to idx>	OK
AT+WIPCREATE?	Lists all open sockets. +WIPCREATE: <protocol>,<index>,<local port>,<peer IP>,<peer port> OK

Values:

<protocol>
 1 UDP
 2 TCP client
 3 TCP server

<index>
 1-8 Socket or session identifier

<local port>
 0 – 65535 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>
 0 – 65535 Peer TCP/UDP port

<server index>
 1-4 TCP server socket index

<from idx>
 1-8 Minimum index for spawned TCP client sockets

<to idx>
 1-8: Maximum index for spawned TCP client sockets

Notes:

- Starting a TCP server requires specifying the maximum number of client sockets that can be spawned. This can be done using the <from idx> and <to idx> parameters. Note that the value set for <to idx> should be equal or more than <from idx>.
- It is not possible to create a client socket with AT+WIPCREATE=2, x, y, z when x is already reserved by a server with AT+WIPCREATE=3,<server idx>,<local port>,a,b if one of the TCP client sockets indexes between a and b is already reserved, be it by a client or a sever range.
- The <from idx> and <to idx> are reserved for the server socket till the server socket and the spawned sockets are closed explicitly. So when trying to create a new TCP server socket, the <from idx> and <to idx> should be different from what was used earlier. A parameter used as <from idx> can't be used as <to idx> anymore for other TCP server socket creation until spawned sockets with specified <from idx> and <to idx> are closed along with the TCP server socket explicitly and vice versa.

When no more client indexes are available in the TCP server's range (or no more resources to accept new incoming connections), any peer trying to connect to the server will receive an "accept" immediately followed by a shutdown ("peer close").

Service Status Unsolicited Response 1 +WIPREADY

Description: This unsolicited response indicates the status of the created service.

Response Syntax: +WIPREADY: <protocol>,<index>

Possible Responses
+WIPREADY: 2,3 Note: TCP connected socket index 3

Response Values:

<protocol>

- 1 UDP
- 2 TCP client

<index>

- 1-8 Socket or session identifier

Service Status Unsolicited Response 2 +WIPACCEPT

Description: This unsolicited response indicates an incoming connection is accepted on a TCP server socket and the TCP client socket has been spawned.

Response Syntax: +WIPACCEPT: <server index>,<client index>

Possible Responses
+WIPACCEPT: 1,5 Note: Server index 1 accepted a connection; resulting TCP client assigned to index 5

Response Values

<server index>

- 1-4 TCP server socket or session identifier

<client index>

- 1-8 TCP client socket or session identifier

Service Status Unsolicited Response 3 +WIPERROR

Description: This unsolicited response indicates an error occurred while attempting to connect a socket to its peer, or that an error occurred on the socket after the socket was created. The AT+WIPCREATE command immediately returns OK after the command syntax is verified, therefore the unsolicited response +WIPERROR is needed to indicate any error conditions when the socket can not connect to the peer, or when the socket loses connection to the peer.

Response Syntax: +WIPERROR: <protocol>,<index>,<error>

Sample Responses

+WIPACCEPT: 1,5

Note: Server index 1 accepted a connection; resulting TCP client assigned to index 5

Response Values: <protocol>

- 1 UDP
- 2 TCP client

<index>

- 1-8 Socket or session identifier

<error>

+WIPERROR error codes and their descriptions are shown below.

<error>	Meaning
100	Invalid socket descriptor
103	Address family not supported
107	No more sockets available for opening
108	Operation not supported
109	Address already in use
110	Destination address required
113	IP address changed, causing TCP reset
114	Socket not connected
115	Connection attempt refused
116	Connection attempt timed out
117	Connection reset
118	Connection aborted
119	Broken pipe
120	Network subsystem unavailable
124	Invalid operation
125	Domain Name Error or Host not found
126	Domain Name not found
127	Network is not opened
129	The DNS resolve system is already in use or Temporary error
133	No address for the domain name
201	Network subsystem establishment in progress
202	Network subsystem unavailable
203	PPP is closing

Last Socket Error Query +WIPERR

Description: The +WIPERR command is used query the last error that occurred within the socket subsystem.

Syntax: **Command Syntax:** AT+WIPERR?

Command	Possible Responses
AT+WIPERR?	+WIPERR: <error>

Values: <error> (See Service Status Unsolicited Response 3 for list of possible error indications)

- 0 No error found

Socket Data Exchange +WIPDATA

Description: The +WIPDATA command is used to read from or write to a socket. On successful execution of the command, the UART switches to online data mode. The UART can be switched back to online command mode (AT mode with PPP data call established) by sending an escape sequence (“+++”) within a 1 second guard time before and after the sequence. De-asserting DTR can also switch the mode from Data mode to Online Command mode (depending on the &D setting). If data is not read using +WIPDATA command, further data will be delayed.

Syntax: **Command syntax:** AT+WIPDATA=<protocol>,<index>,<mode>

Command	Possible Responses
AT+WIPDATA=<protocol>,<index>,<mode>	CONNECT
AT+WIPDATA=?	OK
AT+WIPDATA?	OK or displays pending data in socket as follows: Note: if <protocol> equals 1: +WIPDATA: <protocol>,<index>,<datagram size>,<peer IP>,<peer port> Note: if <protocol> equals 2: +WIPDATA: <protocol>,<index>,<number of readable bytes>

Values:

<protocol>

- 1 UDP
- 2 TCP client

<index>

- 1-8 Socket or session identifier

<mode> Mode of operation.

- 1 Continuous Mode
Data mode used by UDP sockets. Data is collected from UART until the [ETX] character is encountered in the data stream, or until the maximum size of the buffer is reached, then sent as a single datagram. If the [ETX] character needs to be transmitted then it must be preceded by the [DLE] character. This mode is only supported by UDP protocol.
- 2 Continuous Transparent Mode
Data mode used by TCP sockets. All data received on UART is treated as data. In this mode, [DLE]/[ETX] characters are considered as normal data and not special characters. This mode is only supported for TCP protocol.

+WIPDATA Unsolicited Response:

The +WIPDATA unsolicited response is output when data is received on a given socket while in Online Command mode. If data is not read using +WIPDATA command, further data will be delayed and +WIPDATA will not be shown.

TCP/IP Service Option Handling +WIPOPT

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

Syntax: **Command syntax:** AT+WIPOPT=<protocol>,<idx>,<action>,<optnum>[,<optval>]

Command	Possible Responses
AT+WIPOPT=2,1,1,0 Note: Display local port number for connection on TCP socket 1	+WIPOPT: 2,0,56228 OK Note: Display is +WIPOPT: <protocol>,<optnum>,<result>
AT+WIPOPT=2,1,1,2 Note: Display peer IP address of the connection on TCP socket 1	+WIPOPT: 2,2,"192.168.13.34" OK
AT+WIPOPT=1,2,1,6 Note: Display bytes available to be read on UDP socket 2	+WIPOPT: 1,6,23 OK
AT+WIPOPT=2,2,2,8,32 Note: Set Time to Live for TCP socket 2 to value of 32	OK
AT+WIPOPT?	ERROR

Values:

<protocol>

- 1: UDP
- 2: TCP client
- 3: TCP server

<idx>

- 1-8 Socket or session identifier

<action>

- 1 Read (<optval> not allowed)
- 2 Write (<optval> required)

<optnum> Option to read or write (see Options and Values listed next)

<optval> Value of option to write (see Options and Values listed next)

Options and Values:

Optnum	Value Format	Description	UDP	TCP Client	TCP Server
0	0-65535	Local port number of the socket	R	R	R
1	0-65535	Port of the peer socket	R	R	-
2	String	Address of the peer socket	R	R	-
3	0-1	Specifies whether the socket is bound to a peer socket or not (see 18.11.5) default: 1	R	R	-
4	536-36864	Size in bytes of the local transmit buffer. default: 10240	-	RW	RW
5	536-65535	Size in bytes of the local receive buffer. default: 16384	-	RW	RW
6	0-65535	Number of bytes that can currently be read on the socket	R	R	-
7	0-1	When set to TRUE, TCP packets are sent immediately, even if the buffer is not full enough. When set to FALSE, the packets will be sent either, a) by combining several small packets into a bigger packet b) when the data is ready to send and the stack is idle. default: 0	-	RW	RW

Optnum	Value Format	Description	UDP	TCP Client	TCP Server
8	0-255	Time-to-live for IP packets default: 64	RW	RW	RW
9	0-255	Type of Service default: 0	RW	RW	RW

Notes:

- The +WIPOPT command will return ERROR if the socket is not active.
- Option 3 is used to check whether an UDP socket is bound to any other UDP socket or not. When the UDP socket is created without specifying the IP address of the peer, then option 3 will be read as 0 (FALSE). This is because there is no destination IP address to communicate with. If the UDP socket is created by specifying the peer IP address, the option will be read as 1 (TRUE). This is because the peer IP address will be resolved by the DNS and the socket is said to be bounded to the peer socket. Hence this option will be read as TRUE.

Closing a Service +WIPCLOSE

Description: The +WIPCLOSE command is used to close a socket session. AT+WIPCLOSE closes the local socket at which point the index can be re-used. When AT+WIPCLOSE is used to close a TCP socket, a TCP FIN is sent to the peer socket notifying the peer the local socket has closed. When a TCP socket session is closed by its peer, an unsolicited event is generated (+WIPPEERCLOSE). However, the local socket must still be closed using AT+WIPCLOSE.

Syntax: **Command syntax:** AT+WIPCLOSE=<protocol>,<index> **Command Possible responses**

Command	Possible Responses
AT+WIPCLOSE=<protocol>,<index>	OK
AT+WIPCLOSE=?	OK
AT+WIPCLOSE?	AT+WIPDATA=<protocol>,<index>

Values:

<protocol>

- 1 UDP
- 2 TCP client
- 3 TCP server

<index>

- 1-8 Socket or session identifier

Close Service Status +WIPPEERCLOSE

Description: This unsolicited response indicates the local socket was closed by the peer. This response will only be output for connected TCP sockets.

Syntax: **Response syntax:** AT+WIPPEERCLOSE=<protocol>,<index>

Possible Responses
+WIPPEERCLOSE: 2,3 Note: TCP socket index 3 is closed

Response Values:

<protocol>

- 2 TCP Client

<index>

- 1-8 Socket or session identifier

Chapter 18 – Sleep Commands (Not for IP and GPS Builds)

Wavecom 32kHz Sleep Mode +W32K

Description: This specific command allows the 32kHz sleep mode to be enabled or disabled. When sleep mode is entered, the product uses a 32kHz internal clock during inactivity stages.

Syntax: **Command syntax:** AT+W32K=<mode>

Command	Possible Responses
AT+W32K=<mode>[,<DTR Used>]	OK
AT+W32K?	+W32K: 1,0 OK
Note: Disable 32kHz sleep mode	OK
AT+W32K=?	+W32K: (0-1),(0-1) OK

Values:

<mode>

- 0 Disable 32kHz sleep mode
- 1 Enable 32kHz sleep mode

<DTR Used>

- 0 DTR cannot be used to wake up the modem
- 1 DTR can be used to wake up the modem. DTR high wakes up the modem. DTR low puts the modem to sleep.

Notes:

The modem will not go to sleep if any of the following conditions are true:

- The modem is not registered to the network. If it has stopped searching for a network due to a UOOS timeout, the modem will go to sleep.
- The modem is in the middle of an NV Backup.
- DTR is asserted, and it has been enabled as a sleep control (AT+W32K=1,1).
- QXDM is running and is connected to the modem.
- The modem is in a call state other than idle.
- Deep Sleep mode is disabled; i.e., AT+W32K=1 has not been issued.
- USB is connected.
- Note that if QXDM was running before USB is disconnected, the modem will not go to sleep. QXDM must be closed before disconnecting USB.
- The modem can take up to a minute to enter sleep after the +W32K command is issued. This can occur when it is in the middle of GPS processing such as GPS demodulation.

The modem will wake up from sleep when any of the following conditions are true.

- Plugging in a USB cable will cause the modem to exit deep sleep.
- An incoming call can wakeup the modem from deep sleep. All peripherals (i.e., UARTs, USB, GPS, etc.) are available while the call is up. Once the call hangs up, the modem will go back to deep sleep and all peripherals will shutdown.
- The UART is connected and the DTR pin is asserted (if AT+W32K=1,1 was issued).
- In deep sleep, unsolicited messages are not buffered and will be discarded. If real-time notifications of events are needed, the Ring Indicator can be used. After the modem wakes up, new unsolicited messages will be received.

Query Scan Sleep State +WSPS

Description: This specific command queries the state of the service scan. It returns the same data as the +WSPS unsolicited message.

Syntax: **Command syntax:** AT+WSPS: <state>

Command	Possible Responses
AT+WSPS	+WSPS: 0 OK

Values: <state>

- 0 Not in power-saving state
- 1 In power-saving state

Close Service Status Unsolicited Response +WSPS

Description: This unsolicited response indicates the a change in the power save status as it pertaining to scanning for service

Syntax: **Response Syntax:** +WSPS: <state>

Possible Responses
+WSPS: 0

Response Values:

<state>

- 0 Leaving power-saving state
- 1 Entering power-saving state

Sudden Momentary Power Loss Timer \$WPLTIME

Description: This command sets the length of the sudden momentary power loss (SMPL) timer. The Sudden Momentary Power Loss feature requires that a timer be set to indicate how long after main battery loss SMPL should stay active. If power from the main battery returns to its valid range before the timer expires then the power management circuits initiate a power on sequence without software intervention.

The timer is set after the command to enable SMPL (AT\$WSMPL=1) has been issued, it is not set after issuing the \$WPLTIME command. Once SMPL has been enabled the timer cannot be changed until SMPL is disabled.

The setting is persistent. As a result, it is saved after a power cycle. The default is 3 (2.0 seconds).

Syntax: **Command Syntax:** AT\$WPLTIME=<State>

Command	Possible Responses
AT\$WPLTIME=0 Note: Timer set to .5 secs	OK
AT\$WPLTIME=? Note: Display parameter ranges.	\$WPLTIME: (0-3) OK Note: Valid parameter ranges.
AT\$WPLTIME Note: Reset to Default (2 secs)	OK
AT\$WPLTIME =5 Note: Range Check Failed	ERROR
AT\$WSMPL? AT\$WPLTIME= 1 Note: Cannot change timer value while SMPL is enabled	\$WSMPL: 1 OK ERROR
AT\$WPLTIME=0 AT\$WPLTIME? Note: Display last used parameter values.	OK \$WWPLTIME: 0 OK

Values:

<State>	Timer Length
0	0.5 Second
1	1.0 Second
2	1.5 Seconds
3 (Default)	2.0 Seconds

Sudden Momentary Power Loss (SMPL) \$WSMPL

Description: This command enables or disables the Sudden Momentary Power Loss feature. When AT+CFUN is issued SMPL is disabled to allow for a normal power down and is enabled again on power up. Please note that if the command receives the input value that is the currently set parameter value it will return an error. If Sudden Momentary Power Loss is already enabled and an application tries to enable it again the command will return an error and the same is true for disable. The setting is persistent. As a result, it is saved after a power cycle. The default is 0 (Disabled). An SMPL event can cause a ring indication to a host application during sleep.

Syntax: **Command Syntax:** AT\$WSMPL=<State>

Command	Possible Responses
AT\$WSMPL=0 Note: SMPL Disabled	OK
AT\$WSMPL=? Note: Display parameter ranges.	\$WSMPL: (0-1) OK Note: Valid parameter ranges.
AT\$WSMPL Note: Reset to Default (Disabled)	OK
AT\$WSMPL =2 Note: Range Check Failed	ERROR
AT\$WSMPL=0 AT\$WSMPL? Note: Display last used parameter values.	OK \$WSMPL: 0 OK
AT\$WSMPL=0 AT\$WSMPL=0	OK ERROR
AT\$WSMPL? Note: After SMPL	\$WSMPL: 1

Values:

<State>	
0 (Default)	Sudden Momentary Power Loss is Disabled
1	Sudden Momentary Power Loss is Enabled

Set CDMA Network Time Format +WNETTIMEFMT

Description: This command sets the CDMA time response output format for the WNETTIMEGET command. This setting is not persistent.

Syntax: **Command Syntax:** AT+WNETTIMEFMT=[<val1>]

Command	Possible Responses
AT+WNETTIMEFMT	OK Note: Set default value of 0
AT+WNETTIMEFMT=1	OK
AT+WNETTIMEFMT?	+WNETTIMEFMT: 0 OK
AT+WNETTIMEFMT=?	+WNETTIME: (0-2) OK

Values

<val1>

- 0 Terse mode, only GMTtime is returned (Default)
- 1 Verbose mode, GMTtime, LeapSeconds, TimeZone, and Daylight Savings are returned
- 2 Julian time format, for example: <hhmmss>,<yymmdd>,<dw>

Read CDMA Network Time +WNETTIMEGET

Description: This command returns the time as defined in the CDMA network. For time to be returned, the modem must have CDMA service. Time will be returned in seconds from 1/6/80.

If CDMA service is not present, GMTtime format returns 16 zeros and Julian time returns ERROR.

The use of CDMA time when handling E911 location data is strongly discouraged since the CDMA time does not reflect the time the GPS data was retrieved. Furthermore, GPS time and CDMA time are not exactly the same time constants.

According to IS95A, section 7.7.1.3, local time is calculated by GMTtime – LeapSec + TimeZone.

Note: Daylight savings time is available, but it is already factored into TimeZone and, therefore, should not be used in the calculation.

The format of the command response output is defined by the AT+WNETTIMEFMT command setting.

Syntax: **Command Syntax:** AT+WNETTIMEGET?

Command	Possible Responses
AT+WNETTIMEGET? NOTE: response when WNETTIMEFMT = 0	+WNETTIME: <GMTTime> OK
AT+WNETTIMEGET? NOTE: response when WNETTIMEFMT = 1	+WNETTIME: <GMTTime>,<LeapSecs>, <TimeZone>,<Daylight Savings> OK
AT+WNETTIMEGET? NOTE: response when WNETTIMEFMT = 2	+WNETTIME: <hhmmss>,<yymmdd>,<dw> OK

Response Field Description:

Parameter	Description
<GMTtime>	Time at GMT. Hex value in seconds from 1/6/80. The format is a 16 digit hex number, preceded with zeros, for example: 0000000035f27ec5.
<TimeZone>	Time zone offset from GMT. Signed decimal value in seconds.
<LeapSecs>	Leap seconds since 1/1/80 in decimal.
<Daylight Savings>	Daylight saving indicator, 0 = no, 1 = yes
<hhmmss>	Time in hours(0-23), minutes(0-59), seconds(0-59).
<yymmdd>	Date in years(0-99), month(1-12), day(1-31).
<dw>	Monday(0) through Sunday(6).

Chapter 19 – Antenna Commands (Not for IP and GPS Builds)

Configure Antenna Diagnostics +WANTLIM

Description: This command is used to configure the low limit and high limit diagnostic values of the primary and secondary (diversity or GPS) antenna. The values are compared to the ADC reading from the antenna diagnostic voltage divider network. The current antenna status (NORMAL, OPEN, or SHORTED) is derived from comparison to these limits.

The ADC used to read the antenna diagnostic voltage divider network for the primary antenna may be selected using the AT+WANTADC command.

The secondary antenna has two sets of low/high limits—one for the non-powered state and one for the powered state. The secondary antenna is powered when the setting of AT+WANT=1. For hardware revisions 2.1 and later, the non-powered low/high limits of the secondary antenna are not applicable. Use the +WHWV command to determine the hardware version of your device.

The limit settings are persistent across power cycles.

Syntax

Command Syntax:

AT+WANTLIM=<action>,<ant>[,<lowlim>,<highlim>[,<poweredLowlim>,<poweredHighlim>]]

Command	Possible Responses
AT+WANTLIM=? Note: show parameter ranges	+WANTLIM: (1-2),(1-2),(0-255),(0-255),(0-255),(0-255) OK
AT+WANTLIM=1,1,30,74 Note: Set primary antenna low and high limits	OK
AT+WANTLIM=2,1 Note: Display primary antenna diagnostic limits	+WANTLIM: 1,30,74 OK
AT+WANTLIM=1,2,30,74,185,222 Note: Set secondary antenna non-powered and powered low and high limits	OK
AT+WANTLIM=2,2 Note: Display secondary antenna diagnostic limits	+WANTLIM: 2,30,74,185,222 OK
AT+WANTLIM=2,1,53,33	ERROR Note: Low limit must be less than or equal to high limit

Values:

<action>

- 1 Set values
- 2 Display values

<ant>

- 1 Primary antenna
- 2 Secondary antenna

<lowlim> The ADC value below which the non-powered antenna is considered to be in a shorted condition. Possible values are 0-255. Default is 0. This value is ignored for the secondary antenna of hardware versions 2.1 and later.

<highlim> The ADC value above which the non-powered antenna is considered to be in an open condition. Possible values are 0-255. Default is 255. This value is ignored for the secondary antenna of hardware versions 2.1 and later.

<poweredLowlim>

The ADC value below which the powered antenna is considered to be in a shorted condition. Possible values are 0-255. Default is 0. Not applicable to the primary antenna.

<poweredHighlim>

The ADC value above which the powered antenna is considered to be in an open condition. Possible values are 0-255. Default is 255. Not applicable to the primary antenna.

Antenna Diagnostic Status +WANTS

Description: This command is used to perform an antenna diagnostic check and display the results. The current values of the primary and secondary antenna ADC readings are compared against the limits specified by the AT+WANTLIM command to determine the status (NORMAL, SHORT, OPEN) of each antenna.

Syntax: **Command Syntax:** AT+WANTS

Command	Possible Responses
AT+WANTS	+WANTS: 1,2 OK Note: primary NORMAL, secondary OPEN
AT+WANTS	+WANTS: 1,1 OK Note: primary NORMAL, secondary NORMAL
AT+WANTS	+WANTS: 0,1 OK Note: primary shorted, secondary NORMAL
AT+WANTS?	+WANTS: 0,1 OK Note: primary shorted, secondary NORMAL

Values: The +WANTS response displays the diagnostic status of the primary and secondary antennas as:
+WANTS: <primaryAntStatus>,<secondaryAntStatus>

<primaryAntStatus>

- 0 SHORTED (ADC value < low limit)
- 1 NORMAL (low limit <= ADC value <= high limit)
- 2 OPEN (ADC value > high limit)

<secondaryAntStatus>

- 0 SHORTED (ADC value < low limit)
- 1 NORMAL (low limit <= ADC value <= high limit)
- 2 OPEN (ADC value > high limit)

- Notes:**
- For hardware versions 2.1 and later, the diagnostic status of the secondary antenna cannot be determined in the un-powered state (AT+WANT=0) and will report NORMAL.
 - If the hardware version is 2.1 or later and a shorted condition occurs on the secondary antenna in the powered state, the hardware will automatically disable power to the secondary antenna to prevent damage to the modem. In this case, you must re-issue AT+WANT=1 to re-enable power to the secondary antenna.

Antenna Diagnostic Status Change Unsolicited Response +WANTS

Description: The +WANTS unsolicited message is reported to the application for a change in the diagnostic status of one or both of the antennas. The AT+WANTPOLL command is used to specify which antenna is checked and the interval between checks. The AT+WANTLIM command is used to set the limits for the comparison.

Syntax **Response Syntax:** +WANTS: <primaryAntStatus>,<secondaryAntStatus>

Values:**<primaryAntStatus>**

- 0 SHORTED (ADC value < low limit)
- 1 NORMAL (low limit <= ADC value <= high limit)
- 2 OPEN (ADC value > high limit)

<secondaryAntStatus>

- 0 SHORTED (ADC value < low limit)
- 1 NORMAL (low limit <= ADC value <= high limit)
- 2 OPEN (ADC value > high limit)

Configure Antenna Diagnostics Polling Interval +WANTPOLL

Description: This command is used to configure the interval between primary and/or secondary antenna diagnostic checks. When the antenna status changes, the modem outputs a +WANTS message. A change of status is defined as an antenna ADC reading which crosses into a different range (OPEN/NORMAL/SHORT) as defined by the short and open limit settings using AT+WANTLIM for the antenna. The modem may also be configured to generate a ring indication when the antenna diagnostic status changes.

If periodic diagnostic checking of the antennas is not desired, the application can query the antenna status by using the AT+WANTS command.

The antenna status check occurs every <interval> seconds. One unsolicited message is issued on any status change for the requested antennas.

Syntax: **Command Syntax:** AT+WANTPOLL=<action>[,<sel>,<interval>]

Command	Possible Responses
AT+WANTPOLL=1,1,30 Note: Check primary antenna diagnostic status every 30 seconds	OK
AT+WANTPOLL=1,3,120 Note: Check primary and secondary antenna diagnostic status every 2 minutes	OK
AT+WANTPOLL=0 Note: Disable periodic antenna diagnostic checking	OK
AT+WANTPOLL? Note: Display periodic antenna diagnostic checking parameters	+WANTPOLL: 1,1,30 OK Note: Primary antenna diagnostic status is checked every 30 seconds
AT+WANTPOLL? Note: Display periodic antenna diagnostic checking parameters	+WANTPOLL: 0 OK Note: Periodic antenna diagnostic checking is disabled

Values:**<action>**

- 0 Disable periodic checking
- 1 Enable periodic checking

<sel>

- 1 Check periodically and report change only for primary antenna
- 2 Check periodically and report change only for secondary antenna
- 3 Check periodically and report change for primary and secondary antennas

<interval>

1-86400 Interval in seconds between antenna diagnostic checks

Notes:

1. If periodic antenna diagnostic checking is enabled and the modem enters sleep mode, it will awaken at the intervals specified to perform the antenna checks. Disable periodic checking if you do not want to wake from sleep for periodic checking.
2. If a failure (open or short) of the secondary antenna is detected and the antenna is powered, we recommend that you disable power to the antenna and suspend GPS operation while the fault condition persists. This will reduce power consumption of the modem while the antenna is not usable.
3. For hardware versions 2.1 and later, the diagnostic status of the secondary antenna cannot be determined in the un-powered state (AT+WANT=0) and will report NORMAL.
4. If the hardware version is 2.1 or later and a shorted condition occurs on the secondary antenna in the powered state, the hardware will automatically disable power to the secondary antenna to prevent damage to the modem. In this case, you must re-issue AT+WANT=1 to re-enable power to the secondary antenna.

Configure Antenna Diagnostics ADC +WANTADC

Description: By default, the antenna diagnostics feature uses an internal ADC for reading the primary and secondary antenna voltage divider. A primary CDMA antenna design that does not use the modem's primary antenna connection can still take advantage of antenna diagnostics. Using the AT+WANTADC command, the modem can be instructed to monitor one of the external ADC's to read the voltage divider network of the external antenna rather than the internal ADC.

The AT+WANTADC setting is persistent across power downs.

Syntax:

Command Syntax: AT+WANTADC=<sel>

Command	Possible Responses
AT+WANTADC=1 Note: Selects ADC_0 to read the primary antenna voltage divider	OK
AT+WANTADC Note: Sets the internal ADC to read the primary antenna voltage divider	OK
AT+WANTADC=0 Note: Sets the internal ADC to read the primary antenna voltage divider	OK
AT+WANTADC? Note: Display the ADC used to read the primary antenna voltage divider	+WANTADC: 0 OK

Values:

<sel>

- 0 Use the internal ADC to read the primary antenna voltage divider
- 1 Use ADC_0 to read the primary antenna voltage divider. ADC_0 is available on the system connector.
- 2 Use ADC_1 to read the primary antenna voltage divider. ADC_1 is available on the system connector.

Auxiliary GPS Power +WANT

Description: This command enables or disables power to the secondary antenna. A secondary active GPS antenna requires a power source. For these types of antennas, power to the GPS antenna should be enabled with this command.

The AT+WANT command is also used when determining the non-powered limits of the diagnostic check. See the AT+WANTLIM command for more information.

The state of AT+WANT is persistent across power-downs.

Syntax: **Command Syntax:** AT+WANT=<value>

Command	Possible Responses
AT+WANT=? Note: Display valid parameter range	+WANT: (0-2) OK
AT+WANT? Note: Display current setting	+WANT: 0 OK
AT+WANT Default: Disable power to the secondary antenna	OK
AT+WANT=1 Note: Enable power to the secondary antenna	OK

Values: <value>

- 0** Power to the secondary antenna is disabled.
- 1** Power to the secondary antenna is enabled.
- 2** Diagnostic testing of the un-powered GPS antenna is enabled. (Note: non-persistent setting for diagnostic setup only). This setting has no effect for hardware versions 2.1 and later. Un-powered diagnostics for the secondary antenna are not available for hardware versions 2.1 and later.

Setting Antenna Diagnostic Limits – Examples

For Hardware versions 2.1 and later:

This example shows how to calculate and specify antenna diagnostic low and high limit values for hardware versions 2.1 and later. The AT+ADC command is used to read the value of the antenna voltage divider so that the limits can be determined. Please note that this is an example only. Your antenna characteristics may be different.

Set Primary Antenna Diagnostic Limits

Command	Response
AT+WANTADC=0<cr> Note: Enable primary antenna internal ADC as the source of the primary antenna diagnostic reading. Attach primary antenna.	OK
AT+ADC=6<cr> Request the primary antenna ADC voltage. Assume a +/- 5% variance in antenna ADC reading. Low limit = $130 - (.05 * 130) = 123$ Open limit = $130 + (.05 * 130) = 137$	+ADC: 130 OK
AT+WANTLIM=1,1,123,137<cr> Set primary antenna diagnostic limits.	OK
AT+WANTS<cr> Check antenna diagnostic status.	+WANTS: 1,1 OK

Set Secondary Antenna Diagnostic Limits

Command	Response
Attach active GPS antenna. Enable power to the antenna. AT+WANT=1<cr>	OK
AT+ADC=7<cr> Request the secondary antenna ADC voltage.	+ADC: 200 OK
Assume a +/- 5% variance in antenna ADC reading. Powered low limit = $200 - (.05 * 200) = 190$ Powered high limit = $200 + (.05 * 200) = 210$	
AT+WANTLIM=1,2,0,255,190,210<cr> Set secondary antenna diagnostic limits.	OK
AT+WANTS<cr> Check antenna diagnostic status.	+WANTS: 1,1 OK

For Hardware Versions Earlier than 2.1

This example shows how to calculate and specify antenna diagnostic low and high limit values for hardware versions earlier than 2.1. The AT+ADC command is used to read the value of the antenna voltage divider so that the limits can be determined. Please note that this is an example only. Your antenna characteristics may be different.

Set Primary Antenna Diagnostic Limits

Command	Response
AT+WANTADC=0 Note: Enable primary antenna internal ADC as the source of the primary antenna diagnostic reading.	OK
Attach primary antenna.	
AT+ADC=6<cr> Request the primary antenna ADC voltage.	+ADC: 130 OK
Assume a +/- 5% variance in antenna ADC reading. Low limit = $130 - (.05 * 130) = 123$ Open limit = $130 + (.05 * 130) = 137$	
AT+WANTLIM=1,1,123,137<cr> Set primary antenna diagnostic limits.	OK
AT+WANTS<cr> Check antenna diagnostic status.	+WANTS: 1,1 OK

Set Secondary Antenna Diagnostic Limits

Attach active GPS antenna. Enable power to the antenna. AT+WANT=1<cr>	OK
AT+ADC=7<cr> Request the secondary antenna ADC voltage.	+ADC: 200 OK
Assume a +/- 5% variance in antenna ADC reading. Powered low limit = $200 - (.05 * 200) = 190$ Powered high limit = $200 + (.05 * 200) = 210$	
AT+WANT=2<cr> Enable non-powered testing of the antenna.	OK

<p>AT+ADC=7<cr> Request the secondary antenna ADC voltage.</p> <p>Assume a +/- 5% variance in antenna ADC reading. Powered short limit = $50 - (.05 * 50) = 47$ Powered open limit = $50 + (.05 * 50) = 53$.</p>	<p>+ADC: 50 OK</p>
<p>AT+WANTLIM=1,2,47,53,190,210<cr> Set secondary antenna diagnostic limits.</p>	<p>OK</p>
<p>AT+WANT=1<cr> Re-enable power to the antenna.</p>	<p>OK</p>
<p>AT+WANTS<cr> Check antenna diagnostic status</p>	<p>+WANTS: 1,1 OK</p>

Chapter 20 – Host Application Scenarios

Introduction

This chapter contains descriptions and examples of how to use many of the features that are supported by the CDMA C1 devices. While the AT commands sections describe each AT command and its syntax and function, the focus of this chapter is on the usage of the commands and how they are related to each other.

Each scenario lists the AT commands that are used in the examples. It is important to become familiar with the description of the commands before studying the examples. The user scenarios section is provided as a supplement to the AT command reference section and does not include all necessary information.

Set Up for Serial Communication

The device's UART1 is configured as an EIA232 DCE device. Refer to the Specifications sections in the Developer Guide or the User Guides for more information about the UART1 configuration and pin-out.

At a minimum, the serial connection between the host processor and the CDMA-C1 device must include the RxD, TxD and GND signals. However, it is recommended that hardware flow control be used whenever possible since it provides the best protection against serial port data overruns that could disrupt host-to-device communications. Hardware flow control requires at a minimum that the signal lines RTS (RFR) and CTS are connected as well.

The additional modem control lines RI, DTR, DSR and DCD are used by the device for advanced features like data signaling, device ready indication, wakeup and online data mode. Even if you do not currently plan to use these features, it is recommended that you connect these signal lines between the host processor and the CDMA-C1 device to provide for future enhancements.

If you are using the Development Kit and your host processor or PC is configured as DTE, be sure that your serial cable is a straight-through modem cable or DTE-DCE cable.

The UART1 default serial port settings are 115,200 bps, 8 bits, no parity, 1 stop bit and hardware flow control enabled. These settings work well for many host applications. If you need to change UART1 settings, please refer to the commands in the Communication Commands section. You can return the settings to their defaults by using the AT&F command.

The remainder of the examples in this section assume that the CDMA-C1 device has been configured for 115200,n,8,1 and hardware flow control.

Acquiring Cellular Service

See the Activation Notices included in with your product and on the product CD.

Call Processing

Call Origination

Calls are originated by using the ATD command.

Answer Incoming Call

Incoming calls are answered either by using the ATA command or setting the value of the Automatic Answer S0 register to a non-zero value.

Hang Up Call

Calls can be terminated either by using the ATH command or by negating the modem signal DTR on UART1. See the AT&D command for more information.

Subscriber Calling Features

Subscriber Calling Features provides voice call services beyond making a single call. The services are to a large extent implemented on the network side and can, therefore, vary among different operators. The examples below are for the service provider Verizon but should apply for most operators.

The services supported by the CDMA-C1 device are:

- Calling Line ID

- Call Forwarding

- Call Waiting

- Three-way calling

See *Call Commands* for more information about voice call services.

Calling Line ID

The caller's ID, if presented to the network during an incoming call, is reported as a +CLIP unsolicited message if the AT+CLIP=1 command is issued. For example:

```
at+clip=1
```

```
OK
```

```
RING
```

```
+CLIP: "9195551212",129
```

Call Forwarding

Your application can unconditionally forward or cancel forwarding of all incoming calls by using the AT+CCFC command.

Call Waiting

The device will report an incoming call while a call is active by using the +CCWA unsolicited response.

Three-Way Calling

The AT+WFSH command can be used to initiate and manage three-way calling.

SMS

Mobile Originated (MO) Messages

The AT+CMGS command is used to originate SMS messages. Up to 140 characters may be sent in a text message. Note that a ctrl-Z terminates the message text entry. The *Short Message Service Control Commands* section contains more information. For example:

```
at+cmgs="9195551212"
> hi, there.<ctrl-Z>
+CMGS: 150
OK
+WORG:
+WCNT: 6
+WEND: 29
```

It is recommended that you enable ASCII mode for text messages using the AT+WSCL command.

Sending Binary Data

Binary data can be sent as short messages using AT+CMGS command. Since the usual text entry terminator, ctrl-Z, might be legitimate data, you define the message length in bytes in the AT+CMGS command. At the text entry prompt, enter the bytes of the message. The message is sent when the number of bytes equal to the message length has been entered.

```
at+cmgs="9195551212",10
> hi, there.
+CMGS: 151
OK
+WORG:
+WCNT: 6
+WEND: 29
```

It is recommended that you enable octet mode for binary messages using the AT+WSCL command.

Sending Text to Email Address

Many carriers support SMS-to-email gateways, allowing you to send short messages to an e-mail address. To send a message to an email address, enter 6245 (this spells mail) in the Address field, enter the recipient's email address in the beginning of the message field, followed by a space and then the text of the message.

Note: 6245 – SMS gateway number for most carriers.

Up to 140 characters may be sent in a text message. The count includes recipient's email address, space and the message to be sent.

For example:

```
at+cmgs="6245"
>someone@example.com hi, there.<ctrl-Z>
+CMGS: 150
OK
+WORG:
+WCNT: 6
+WEND: 29
```

Mobile Terminated (MT) Messages

The device reports the receipt of messages using the +CMT unsolicited response. The contents of the +CMT unsolicited response and the disposition of the received short message itself are determined by the +CNMI command. The message can be transmitted to the TE or can be stored in non-volatile memory on the device. For example, to transmit a received message to the TE:

```
at+cnmi=2,2,2,1,0
OK
+WANS: 3
+WCNT: 6
+CMT: "9195551212","09/07/20,13:43:55",129,0,2,0,,10
hi there.
+WEND: 25
```


Temporarily Store SMS Messages

If short messages are stored to non-volatile memory on the module, the +CMTI unsolicited response reports the receipt and storage of the message. The +CMGL, +CMGR and +CMGD commands can be used to list, read and delete the stored messages. For example:

```
at+cnmi=2,1,2,1,0
OK
+WANS: 3
+WCNT: 6
+CMTI: "MT",0,0
+WEND: 25
at+cmgl
+CMGL: 0,"REC UNREAD","9195551212",0,2,9
hi there.
OK
at+cmgr=0
+CMGR: "REC UNREAD","9195551212","09/07/20,13:49:17",0,2,0,9
hi there.
OK
at+cmgd=0
OK
```

TCP Socket Examples

The modem provides a comprehensive set of AT commands that allow the application to use TCP/IP for data communications with a remote application. UART1 is time-multiplexed between on-line command mode and on-line data mode, allowing the single serial channel to carry both AT commands and application data. When using the CMUX interface, a dedicated virtual channel is used for data. The device allows both TCP and UDP connections.

TCP Client Socket Connection

In this example, a TCP connection is established with a remote echo server application.

```
at+wipbr=4,6 // open PPP bearer
OK
+WORG: #777
+WCNT: 33
+WIPBR: 6,1
+WEND: 25
at+wipcreate=2,1,"1.2.3.4",5009 // open TCP connection 1
OK
+WORG: #777
+WCNT: 33
+WIPREADY: 2,1 // connection 1 is open
+WIPDATA: 2,1,35 // data available on connection 1
+WEND: 25
at+wipdata=2,1,2 // enter on-line data mode on connection 1
CONNECT
Welcome to echo server, port 5009
// +++ entered to escape on-line data mode
OK
at+wipclose=2,1 // close connection 1
OK
+WORG: #777
+WCNT: 33
+WEND: 25
at+wipbr=5,6 // close PPP bearer
OK
+WORG: #777
+WCNT: 33
+WIPBR: 6,0
+WEND: 29
```

TCP Server Example

The device can also act as a server and wait for incoming connections. In this example, a listening socket is opened. When a connection is established from a client, the module receives an unsolicited response. When the client sends data, another unsolicited response is received. The application switches the module to on-line data mode to read the received data. The client closes the connection and the module receives another unsolicited response.

```

at+wipbr=4,6 // open PPP bearer
OK
+WORG: #777
+WCNT: 33
+WIPBR: 6,1
+WEND: 25
AT+wipbr=3,6,15 // find our IP address
+WIPBR: 6,15,"75.251.5.204"
OK
at+wipcreate=3,1,80,5,8 // create TCP listen socket on port 80 as connection 1
OK
+WANS: 2
+WCNT: 33
+WIPACCEPT: 1,5 // incoming connection request. Connection 5 active.
+WEND: 29
+WANS: 2
+WCNT: 33
+WIPDATA: 2,5,8 // 8 bytes available on TCP connection 5.
+WEND: 29
at+wipdata=2,5,2 // enter on-line data mode on connection 5
CONNECT
hi there // received data
NO CARRIER
+WANS: 2
+WCNT: 33
+WEND: 29
+WIPPEERCLOSE: 2,5 // peer closed connection 5
+WANS: 2
+WCNT: 33
+WEND: 29
at+wipclose=3,1 // close listening socket
OK
at+wipbr=5,6 // close PPP bearer
OK
+WORG: #777
+WCNT: 33
+WIPBR: 6,0
+WEND: 29

```

Chapter 21 – Effects of AT&W, ATZ, and AT&F

The below table shows what impact AT&W, ATZ, and AT&F has on the various commands.

AT&W – Save Configuration. This command writes the current configuration to NV.

ATZ – Reset to Default Configuration. This command restores the configuration last saved by AT&W.

AT&F – Restore Factory Settings. This command restores the factory default setting.

Command Name	Saved Directly to NV	Saved to NV with &W	Affected by Z	Affected by &F	Listed by &V
\$BREW	No	No	No	No	No
\$QCCHS	No	No	Yes (Set to 0)	Yes (Set to 0)	No
\$QCCHV	No	No	No	No	No
\$QCDMG	No	No	No	No	No
\$QCDNSP	No	No	No	No	No
\$QCDNSS	No	No	No	No	No
\$QCHDRC	No	No	Yes (Set to F)	Yes (Set to F)	No
\$QCHDRET	No	No	Yes (Set to 0)	Yes (Set to 0)	No
\$QCHDRR	No	No	Yes (Set to F)	Yes (Set to F)	No
\$QCHDRT	No	No	Yes (Set to 1)	Yes (Set to 1)	No
\$QCMGD	No	No	No	No	No
\$QCMGS	No	No	No	No	No
\$QCMIP	No	No	Yes (Set to 0)	Yes (Set to 0)	No
\$QCMIPEP	No	No	Yes (Set to 0)	Yes (Set to 0)	No
\$QCMIPGETP	No	No	Yes (Set to 0)	Yes (Set to 0)	No
\$QCMIPHA	No	No	No	No	No
\$QCMIPMASPI	No	No	Yes (Set to 2,0)	Yes (Set to 2,0)	No
\$QCMIPMASS	No	No	No	No	No
\$QCMIPMASSX	No	No	Yes (Set to 0,0)	Yes (Set to 0,0)	No
\$QCMIPMHSPI	No	No	Yes (Set to 3,0)	Yes (Set to 3,0)	No
\$QCMIPMHSS	No	No	No	No	No
\$QCMIPMHSSX	No	No	Yes (Set to 0,0)	Yes (Set to 0,0)	No
\$QCMIPNAI	No	No	No	No	No
\$QCMIPP	No	No	Yes (Set to 0)	Yes (Set to 0)	No
\$QCMIPPHA	No	No	No	No	No
\$QCMIPRT	No	No	Yes (Set to 0,0)	Yes (Set to 0,0)	No
\$QCMIPSHA	No	No	No	No	No
\$SPNAI	No	No	No	No	No
\$QCOTC	No	No	No	No	No
\$QCQNC	No	No	Yes (Set to 1)	Yes (Set to 1)	No
\$QCQOSPRI	No	No	Yes (Set to D)	Yes (Set to D)	No
\$QCSLOT	No	No	Yes (Set to 1)	Yes (Set to 1)	No
\$QCSMP	No	No	Yes (Set to "4098",0,"",0,"")	Yes (Set to "4098",0,"",0,"")	No
\$QCSO	No	No	Yes (Set to 2)	Yes (Set to 2)	No
\$QCSYSMODE	No	No	No	No	No
\$QCTER	No	No	Yes (Set to "115200")	Yes (Set to "115200")	No
\$QCTRTL	No	No	Yes (Set to 1)	Yes (Set to 1)	No

Command Name	Saved Directly to NV	Saved to NV with &W	Affected by Z	Affected by &F	Listed by &V
\$WCCELL	No	No	No	No	No
\$WEMER	No	No	No	No	No
\$WMEM	No	No	No	No	No
\$WPLTIME	No	No	No	No	No
\$WSMPL	No	No	No	No	No
\$WVCOIN	No	No	No	No	No
&C	No	Yes	Yes (Set to NV)	Yes (Set to 2)	Yes
&D	No	Yes	Yes (Set to NV)	Yes (Set to 2)	Yes
&F	No	No	No	No	Yes
&S	No	Yes	Yes (Set to NV)	Yes (Set to 0)	Yes
&V	No	No	No	No	No
&W	No	No	No	No	No
+ADC	No	No	No	No	Yes
+CAD	No	No	No	No	No
+CBC	No	No	No	No	No
+CBIP	No	No	No	No	No
+CCFC	No	No	No	No	No
+CDR	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+CDS	No	No	Yes (Set to 0,1,2048,6)	Yes (Set to 0,1,2048,6)	Yes
+CFC	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+CFUN	No	No	No	No	Yes
+CGMR	No	No	No	No	No
+CGSN	No	No	No	No	No
+CLCC	No	No	No	No	No
+CLIP	No	Yes	Yes (Set to NV)	Yes (Set to 0)	Yes
+CLVL	No	No	No	No	No
+CMEE	No	No	No	No	Yes
+CMGD	No	No	No	No	No
+CMGL	No	No	No	No	No
+CMGR	No	No	No	No	No
+CMGS	No	No	No	No	No
+CNMI	Yes	Yes	Yes (Set to NV)	Yes (Set to 2,1,2,1,0)	Yes
+CNUM	No	No	No	No	No
+CPAS	No	No	No	No	No
+CPHS	Yes	Yes	Yes (Set to NV)	Yes (Set to 1,1)	Yes
+CPMS	No	No	Yes (Set to MT)	Yes (Set to MT)	Yes
+CRC	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+CREG	No	Yes	Yes (Set to NV)	Yes (Set to 0)	Yes
+CRM	No	No	Yes (Set to 2)	Yes (Set to 2)	Yes
+CSQ	No	No	No	No	No
+CSS	No	No	No	No	No
+DPRL	Yes	No	No	No	No
+DR	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+DS	No	No	Yes (Set to 0,0,2048,6)	Yes (Set to 0,0,2048,6)	Yes
+ECHO	Yes	No	No	No	No
+FAA	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+FAP	No	No	Yes (Set to 0,0,0)	Yes (Set to 0,0,0)	Yes
+FBO	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+FBS	No	No	No	No	No
+FBU	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes

Command Name	Saved Directly to NV	Saved to NV with &W	Affected by Z	Affected by &F	Listed by &V
+FCC	No	No	Yes (Set to 0,1,0,0,0,0,0,0)	Yes (Set to 0,1,0,0,0,0,0,0)	Yes
+FCQ	No	No	Yes (Set to 1,0)	Yes (Set to 1,0)	Yes
+FCR	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+FCT	No	No	Yes (Set to 1E)	Yes (Set to 1E)	Yes
+FDR	No	No	No	No	No
+FDT	No	No	No	No	No
+FEA	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+FFC	No	No	Yes (Set to 0,0,0,0)	Yes (Set to 0,0,0,0)	Yes
+FHS	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+FIE	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+FIP	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+FIS	No	No	Yes (Set to 0,1,0,0,0,0,0,0)	Yes (Set to 0,1,0,0,0,0,0,0)	Yes
+FKS	No	No	No	No	Yes
+FLI	No	No	No	No	Yes
+FLO	No	No	Yes (Set to 1)	Yes (Set to 1)	Yes
+FLP	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+FMS	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+FNR	No	No	Yes (Set to 0,0,0,0)	Yes (Set to 0,0,0,0)	Yes
+FNS	No	No	No	No	Yes
+FPA	No	No	No	No	Yes
+FPI	No	No	No	No	Yes
+FPP	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+FPR	No	No	Yes (Set to 8)	Yes (Set to 8)	Yes
+FPS	No	No	Yes (Set to 1)	Yes (Set to 1)	Yes
+FPW	No	No	No	No	Yes
+FRQ	No	No	Yes (Set to 0,0)	Yes (Set to 0,0)	Yes
+FRY	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+FSA	No	No	No	No	Yes
+FSP	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+GCAP	No	No	No	No	No
+GMI	No	No	No	No	No
+GMM	No	No	No	No	No
+GMR	No	No	No	No	No
+IFC	No	Yes	Yes (Set to NV)	Yes (Set to 2,2)	Yes
+IPR	Yes	No	No	No	Yes
+MGE	Yes	No	No	No	No
+SIDET	Yes	No	No	No	No
+SPEAKER	Yes	No	No	No	No
+VGR	Yes	No	No	No	No
+VGT	Yes	No	No	No	No
+VIP	Yes	No	No	No	No
+VTS	No	No	No	No	Yes
+W32K	No	No	Yes (Set to 0,0)	Yes (Set to 0,0)	Yes
+WAKESET	Yes	Yes	Yes (Set to NV)	Yes (Set to 4)	Yes
+WAKET	No	No	No	No	No
+WAKY	No	No	No	No	No
+WANT	Yes	Yes	Yes (Set to NV)	Yes (Set to 0)	Yes
+WANTADC	Yes	No	Yes (Set to NV)	No	No

Command Name	Saved Directly to NV	Saved to NV with &W	Affected by Z	Affected by &F	Listed by &V
+WANTLIM	Yes	No	Yes (Set to NV)	No	No
+WANTPOLL	No	No	No	No	No
+WANTS	No	No	No	No	No
+WAOOC	No	No (+WCMT)	No	No	No
+WBCI	No	No	No	No	No
+WBND	Yes	No	No	No	Yes
+WBTM	No	No	No	No	No
+WCHD	No	No	No	No	No
+WCMT	Yes	No	No	No	No
+WDMX	Yes	No	No	No	Yes
+WDSI	Yes	Yes	Yes (Set to NV)	Yes (Set to 0)	Yes
+WDSS	Yes	No	No	No	No
+WFSH	No	No	No	No	No
+WGDR	Yes	No	No	No	No
+WGDT	Yes	No	No	No	No
+WHWV	No	No	No	No	No
+WIMI	No	No (+WCMT)	No	No	No
+WIND	Yes	Yes	Yes (Set to NV)	Yes (Set to 196)	Yes
+WIOR	No	No	No	No	No
+WIOR	No	No	No	No	No
+WIOW	No	No	No	No	No
+WIPBR	No	No	No	No	No
+WIPCFG	No	No	No	No	No
+WIPCLOSE	No	No	No	No	No
+WIPCREATE	No	No	No	No	No
+WIPDATA	No	No	No	No	No
+WIPOPT	No	No	No	No	No
+WMBDPT	Yes	Yes	Yes (Set to NV)	Yes (Set to 15)	No
+WMBENABLE	Yes	Yes	Yes (Set to NV)	Yes (Set to 0)	No
+WMBSMS	No	No	No	No	No
+WMDN	No	No	No	No	No
+WMSN	No	No	No	No	No
+WNAM	Yes	No	No	No	No
+WNETTIMEFMT	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
+WNETTIMEGET	No	No	No	No	No
+WGPSTRACK	No	No	No	No	No
+WPCC	Yes	No	No	No	No
+WPDCT	Yes	Yes	Yes (Set to NV)	Yes (Set to 0)	Yes
+WGPSPARAM	Yes	No	No	No	Yes
+WPDR	No	No (+WCMT)	No	No	No
+WPDUC	No	No	No	No	Yes
+WGPSFIX	No	No	No	No	No
+WPRL	No	No	No	No	No
+WPRV	Yes	Yes	Yes (Set to NV)	Yes (Set to 1)	Yes
+WRID	Yes	Yes	Yes (Set to NV)	Yes (Set to 50)	Yes
+WRMP	Yes	No	No	No	Yes
+WSCC	Yes	No	No	No	No
+WSCI	No	No (+WCMT)	No	No	No
+WSCL	Yes	Yes	Yes (Set to NV)	Yes (Set to 0,0)	Yes
+WSID	No	No (+WCMT)	No	No	No

Command Name	Saved Directly to NV	Saved to NV with &W	Affected by Z	Affected by &F	Listed by &V
+WSMO	No	No	Yes (Set to C,2)	Yes (Set to C,2)	Yes
+WSPS	No	No	No	No	No
+WSOS	No	No	No	No	No
+WSPC	Yes	No	No	No	No
+WSRA	Yes	Yes	Yes (Set to NV)	Yes (Set to 0)	Yes
+WTBMPRS	Yes	Yes	Yes (Set to NV)	Yes (Set to 3)	Yes
+WTUOOS	Yes	Yes	Yes (Set to NV)	Yes (Set to 4,36)	Yes
+WUSLMSK	Yes	Yes	Yes (Set to NV)	Yes (Set to FFFFDF6,0)	Yes
+WWAKE	No	No	No	No	No
A	No	No	No	No	No
D	No	No	No	No	No
E	No	No	Yes (Set to 1)	Yes (Set to 1)	Yes
H	No	No	No	No	No
I	No	No	No	No	No
L	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
M	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
S0	No	No	Yes (Set to 0)	Yes (Set to 0)	Yes
S10	No	No	Yes (Set to 14)	Yes (Set to 14)	Yes
S11	No	No	Yes (Set to 95)	Yes (Set to 95)	Yes
S3	No	No	Yes (Set to 13)	Yes (Set to 13)	Yes
S4	No	No	Yes (Set to 10)	Yes (Set to 10)	Yes
S5	No	No	Yes (Set to 8)	Yes (Set to 8)	Yes
S6	No	No	Yes (Set to 2)	Yes (Set to 2)	Yes
S7	No	No	Yes (Set to 50)	Yes (Set to 50)	Yes
S8	No	No	Yes (Set to 2)	Yes (Set to 2)	Yes
S9	No	No	Yes (Set to 6)	Yes (Set to 6)	Yes
T	No	No	No	No	No
Z	No	No	No	No	Yes

Chapter 22 – CDMA Terminology and Acronyms

This is an alphabetical list of the CDMA cellular industry's terminology and acronyms.

2G	Second Generation. This is an all digital cellular systems developed to replace the first analog cellular systems. (GSM and CDMA).
3G	Third Generation. This is the next generation digital cellular systems designed to have high-speed data access and higher voice capacity (CDMA & CDMA2000).
AFLT	Advanced Forward Link Trilateration. A type of handset-based position location technology. GPS satellites are not used to determine location. To determine location using AFLT, the phone takes measurements of signals from nearby cellular base stations (towers) and reports the time/distance readings back to the network, which are then used to triangulate an approximate location of the handset. In general, at least three surrounding base stations are required to get an optimal position fix.
CDMA	CDMA (Code Division Multiple Access). CDMA is a spread spectrum, digital cellular modulation scheme for cellular communications systems. It has approximately 3 times the voice capacity of GSM networks. See IS-95, IS-95B, IS-2000.
cdmaONE	cdmaOne is a brand name, trademarked and reserved for the exclusive use of the CDMA Development Group (see their Web site at cdg.org). cdmaOne describes a complete cellular system that incorporates the IS-95 CDMA air interface, the ANSI-41 network standard for switch interconnection and many other standards that make up a complete cellular system.
cdma2000	cdma2000 is a third generation (3G) cellular system. It contains a significant increase in voice capacity and high-speed data rates. It is backward compatible with IS-95B and IS-95A.
cdma2000 1xRTT	"1xRTT" stands for 1 times Radio Transmission Technology and is used to identify the version of CDMA2000 radio technology that operates in a pair of 1.25-MHz radio channels (one times 1.25 MHz, as opposed to three times 1.25 MHz in 3xRTT). Although theoretically capable of higher data rates, most carrier implementations have limited the peak data rate to 144 kbit/s. While 1xRTT officially qualifies as 3G technology, 1xRTT is considered by some to be a 2.5G.
DCE	Data Communications Equipment. This is the modem in the traditional serial communication paradigm of a computer connected via two modems to another computer.
DTE	Data Terminal Equipment. This is the computer in the traditional serial communication paradigm of a computer connected via two modems to another computer.
DTMF	Dual Tone Multi-Frequency: A pre-defined set of tones sent over the air when keys are pressed on the keypad.
ESN	"ESN" stands for Electronic Serial Number. It is a 32-bit binary number that identifies each cellular phone.
Handset (Path)	Handset (Path). This is the audio path (microphone & speaker) that connects to a traditional hand held telephone receiver, usually dual balanced electrical lines.
Headset (Path)	Headset (Path). This is the audio path (microphone & speaker) that connects to an earpiece with a microphone, usually single electrical lines.
IMSI	International Mobile Station IS. This is an international 15 digit phone number that uniquely identifies a mobile. IMSI=MCC + MNC + MIN.
IOTA	IOTA stands for Internet Over The Air.

IS-95	IS-95 is the first CDMA standard published by Qualcomm in 1993. It is a TIA standard for North American cellular systems based on CDMA. It is widely deployed in North America and Asia.
IS-95A	IS-95A is a CDMA standard with improved voice quality. IS-95A defines what generally is known as cdmaOne, which supports voice and 14.4 Kbps data rates. This standard is widely used throughout the world.
IS-95B	IS-95B is a CDMA standard contains Medium Data Rate capabilities and bug fixes for system access failures. It is considered a 2.5G system. It supports data rates up to 115 Kbps.
IS-2000	IS-2000 is the first 3G CDMA standard based on IS-95B. It contains a significant increase in voice capacity and high-speed data rates. It is backward compatible with IS-95B and IS-95A.
IS-707	TIA/EIA/IS-707 describes data services available on wideband spread spectrum systems. It is organized into a series of related recommendations, some of which address functions common to all CDMA data services and others that describe a specific data service.
IWF	Interworking Function. A process that acts as a gateway or interface between two or more communication components. For example, an IWF is used to interface wireless CDMA networks and wire line PSTN or packet-data networks.
LAPM	Link Access Procedure for Modems. An error control protocol defined in the ITU-T recommendations V.42. Like the MNP protocols, LAPM uses cyclic redundancy checking (CRC) and retransmission of corrupted data (ARQ) to ensure data reliability.
MCC	Mobile Country Code is a pre-defined 30-digital number that represents a country in the IMSI.
MDN	MDN stands for Mobile Data Number or the mobile phone number.
MIN	MIN stands for Mobile Identification Number or mobile user account number.
MNC	MNC stands for Mobile Network Code, a pre-defined 2-digital number that represents a sub-network in the IMSI (usually set to "00").
MO	MO stands for Mobile Originated, an action (usually a call) that is first started from the phone. An outgoing call or SMS.
MS	MS stands for Mobile Station. The term MS is commonly used to represent the phone or mobile.
MT	MT stands for Mobile Terminated. MT is an action, usually a call that is first started from a land based network. An incoming call or SMS.
MSM	MSM stands for Mobile Station Modem.
NAM	NAM stands for Number Assignment Modem. The NAM is collection of internal parameters that define a working phone for a given network (phone number, access parameters, etc.).
NID	NID stands for Network ID. The NID is an identification number that represents geographic location of a common coverage area; but is a subset of the SID, usually a neighborhood in a large city. NID is usually not used and is set to zero. Also see SID.
NV-RAM	NV-RAM stands for Non-Volatile Random Access Memory. NV-RAM is a data storage device that does not lose its data when power is turned off.
OTAPA	OTAPA stands for Over The Air Parameter Administration. It is an automatic update in internal software parameters (PRL for example) by means of a specially defined CDMA data call that is mobile terminated (MT).
OTASP	OTASP stands for Over The Air Service Programming. It is an automatic update in internal software parameters PRL; for example, PRL by means of a specially defined CDMA data call that is mobile terminated (MT).
PD	Position Determination. Process by which the mobile GPS position is obtained.
PDU	PDU stands for Protocol Data Unit. It is a GSM SMS standard whereby any type of binary data can be transported via an SMS message. In the CDMA system, the PDU mode will not be supported; instead, the Unicode format message is supported.

PN Offset	PN Offset stands for Pseudorandom Noise Offset. In a CDMA network the PN offset is a variable time delay offset of a repeating random noise generator that is used to distinguish individual sectors of a base station.
P-REV	P-REV is the CDMA revision of the mobile or base station.
PRI	PRI stands for Provisioning Information. Provisioning Information is your cellular network carrier's profile of information that must be programmed into your cellular modem in order for it to operate on the carrier's cellular network.
PRL	PRL stands for Preferred Roaming List. The Roaming List is provided by the cellular network carrier during the process of provisioning your SocketModem. The PRL is a list of cellular service provider's preferred roaming partners.
PSTN	PSTN stands for Public Switching Telephone Network. It is the traditional telephone network.
RF	RF stands for Radio Frequency.
RSSI	RSSI stands for Receive Signal Strength Indicator: This parameter represents the total RF received signal power from the base station(s) the mobile sees.
R-UIM	R-UIM stands for Removable User Identity SocketModem. The R-UIM is similar to a SIM (Subscriber Identity SocketModem), but it is designed for networks other than GSM (Global System for Mobile Telecommunications); i.e., networks such as CDMA. The R-UIM card contains user information and data features on a removable smart card about the size of a postage stamp. It is a dual-mode solution that can store both GSM provisioning and CDMA provisioning on a single card. When used with a GSM handset, the R-UIM operates like a GSM SIM.
SID	SID stands for System ID. The SID is an identification number that represents geographic locations of a common coverage area, usually a large city. Also see NID.
SIM	SIM stands for Subscriber Identity SocketModem. A SIM card is a portable memory chip. The SIM holds personal identity information, cell phone number, phone book, text messages and other data.
SMS	SMS stands for Short Messaging Service. it is a supplementary service that is capable of sending and receiving short length text messages to/from the mobile.
SREJ	Selective Reject. An optional feature of V.42 which enhances data throughput on noisy connections. As data blocks are sent out, the remote side acknowledges only after an agreed upon number of blocks are received (window size). If any block is received bad, the sender is notified of the rejected bad block so it can be retransmitted.
TA/TE	TA/TE stands for Terminal Application/Terminal Equipment. This is the end "device" (combination of hardware and software) that communicates with a modem via a serial link. In this context, it is the device (PDA/Computer) connected to the modem. Also see DTE.
TON/NPI	Type of Number/Numbering Plan Identification.
V24-V25	A data compression algorithm.
V42	A data compression algorithm.

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