AirPrime WPx5xx/WP76xx

AT Command Reference

4118047
Rev. 3

Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Sierra Wireless modem are used in a normal manner with a well-constructed network, the Sierra Wireless modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Sierra Wireless accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Sierra Wireless modem, or for failure of the Sierra Wireless modem to transmit or receive such data.

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Revision History

Revision number	Release date	Changes
1	Nov 2015	• Document created

Revision number	Release date	Changes
2	September 2016	• Updated chapter: Modem Status, Customization, and Reset Commands • Removed +CGXCONT, $DIAG, !GCFEN, !GOBIIMPREF, !HWID, !LTENAS, !UDUSBCOMP, !SELACQ, !SIMRSTC • Added !IMPREF, !MAPUART, !PRLVER, !SELRAT, !USBCOMP, +WDDM, +WUSLMSK • Updated !BAND (added <Tdsmask> parameter>), +GMR (<tag> example>), !GSTATUS (show all response formats and parameters), ^MODE (<mode> parameter>), !PCINFO (response format, <ForceFlag> options), !PCTEMP (response format, added <mode>), !POWERDOWN (description/behavior), !PRIID (removed Execute format), !SCACT (<profile> parameter usage, default pid activation), !UDINFO (removed DIP interface type) • Moved commands from Audio chapter to Modem chapter: !PRLVER • Added !CUSTOM customization “BOOTQUIETDISABLE”, “DHCPRELAY-ENABLE”, “FASTBOOTEN”, “HARDCODEDIPEN”, “HSICENABLE”, “IMCONFIG”, “JAMENABLE”, “RMNETREDIALEN” • Removed !CUSTOM customization(s): “CMCLIENT”, “CSVOICEREJECT”, “FLOWNOTDISABLE”, “GMMCAUSE7REMAP”, “GOBIIMEN”, “GPSSEL”, “IMSIREFRESH”, “ISVOICEN”, “NETWORKNAMEFMT”, “NOROAM”, “QMIDETACHEN”, “REL8FASTDORMDIS”, “RRCREL7CAPDIS”, “UBISTENABLE”, “USBSERIALENABLE”, “WIN7MBOPTIONS” • Added unsolicted notifications: !AVVOCODER, !AMR_NB, !AMR_WB, +CSQ, !EONS, !EVRC, !EVRC_B, !EVRC_NW, !EVRC_WB, !GSM_EFT, !GSM_FR, !GSM_HR, ^MODE, !MODE, !NI, !PATEMP, !PCDEFR, !PCTEMP, !PCVOLT, !PSCS, !QCELP13K, !RI, RING, !RSSI, !SRV, !UIMREGSTATE, !UIMSTATUS, +WANS, +WCC, +WCNT, +WDDI, +WEND, +WJAM, +WMGF, +WORG, +WRMICN, +WVMI • Updated chapter: Diagnostic Commands • Removed !RXDEN • Removed chapter: Test Commands • Updated chapter: GPS Commands • Removed !GPSKEEPWARM, !GPSLBSAPN, !GPSMOMETHOD, !GPSMTLR-SETTINGS, !GPSNIQOSTIME, !GPSNMEA, !GPSNMEACONFIG, !GPSNMEASENTENCE, !GPSONLY, !GPSPORTID, !GPSPOSMODE • Updated !GPSSATINFO (# of satellites), !GPSSUPLURL (added <portID>), !GPSTRANSSEC (<security> options) • Removed chapter: OMA-DM Commands • Removed chapter: SAR Backoff and Thermal Control Commands • Updated chapter: Audio Commands • Removed !AVFLTREN, !AVRXAGC, !AVRXAVC, !RVRXG, !AVTXAGC, !AVTXG, +CMEP, +CNTI, !MLDTMFEN, +VTSBST, +WANTGNSSPWR, +WANTS, +WFSH, +WSOS • Updated !AVAUDIOLPBK (added <enable> values), !AVCFG (<interface> values), !AVSETPROFILE (<volume> parameter), !AVSETVOL (<volume> parameter) • Added !AVAUDVOL, !AVCODECMICTXG, +CLVL • Added Chapter: I/O Commands. • Added !GPIOINT, !RIOWNER, !WEXTCLK, +WIOCFG, +WRID, +WWAKE, +WWAKESET • Moved commands from Audio chapter to I/O chapter: !MADC, +WIOR, +WIOW (Continued on next page)

Revision number	Release date	Changes
		• Added AirVantage Commands chapter • Added +WDSC, +WDSE, +WDSG, +WDSI, +WDSR, +WDSS • Added Chapter: Supported GSM/WCDMA AT Commands. • Added Result Codes section to Table 14-1 • Added 27.007 commands to Table 14-3: +CGCONTRDP, +CGEQOS, +CGSCONTRDP, +CGTFTRDP, +CSIM • Updated 27.007 commands to Table 14-3: +CGCMOD (supported), +CPBR (supported)
3	June 2017	• Updated AT Password Commands chapter • Updated !ENTERCND and !SETCND parameter <key> format—special characters allowed • Updated Modem Status, Customization, and Reset Commands chapter • Added +KSLEEP, !POWERMODE, !POWERWAKE • Added !CUSTOM customizations: EXTUIMSWITCHEN, FLOWNOTI-DISABLE, IPCHANNELRATEEN, UIMDETPULL • Removed +GMR, &V • Updated !GSTATUS? response format (WCDMA); added <smode>, <n> • Updated !PCDEFR <state> description • Updated !PCINFO <state> strings • Corrected !PRIID description • Corrected !UDPID? response format • Updated !GETBAND response format (removed ‘Unknown’) • Added Test Commands chapter • Updated GPS Commands chapter • Updated !GPSAUTOSTART command format (<function> replaces <enable>) • Updated !GPSSATINFO <SV n> description • Removed !GPSXTRAAAPN • Updated SIM Commands chapter • Added +CCID, +CCID (notification), +KSIMSEL • Added OMA-DM Commands chapter • Added SAR Backoff and Thermal Control Commands chapter • Added !SARBACKOFF, !SARINTGPIOMODE, !SARSTATE, !SARSTATEDFLT • Updated Audio Commands chapter • Corrected !AVAUDIO examples (removed quotations from filenames) • Updated !AVNS formats—changed <value> to <ns>, added <fns> • Updated I/O Commands chapter • Added !MCCELL, !MVCOIN • Added usage restriction for +WIOR • Corrected +WDSI <Level> description • Corrected +WIOCFG <trigger> description

Contents

1: About This Guide

Introduction

This document describes supported standard and proprietary AT commands available for Sierra Wireless AirPrime® WP products, and provides details where commands vary from the standards. These commands are intended for use by OEMs, and are supplemental to the standard AT commands for GSM devices defined by the 3GPP (3rd Generation Partnership Project) in *TS 27.007 AT command set for User Equipment (UE)* and *TS 27.005 Use of Data Terminal Equipment—Data Circuit terminating Equipment (DTE-DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (BSE)*.

Important: *WP76xx support for the commands described in this document is in progress. As of the publication date of this document, some commands may not yet be implemented.*

Note: For questions or concerns relating to command implementation, please contact your Sierra Wireless account representative.

Command access

Some commands in this reference are password-protected. To use these commands, you must enter the correct password using AT!ENTERCND on page 22. Once the password is entered, all commands are available and remain available until the modem is reset or powered off and on.

The password assigned to !ENTERCND is unique to each customer and is configured onto the modem during manufacture. If you do not know your password, contact your Sierra Wireless Account Manager or Sierra Wireless distributor.

Command timing

Interval timing

Some commands require time to process before additional commands are entered. For example, the modem returns OK when it receives **AT**!DAFTMACT. If **AT**!DASBAND is received too soon after this, the modem returns an error.

When building automated test scripts, ensure that sufficient delays are embedded, where necessary, to avoid these errors.

Escape sequence guard time

The AT escape sequence "**+++**" requires a guard time of 1.0 seconds before and after it is used.

Result codes

Result codes are not shown in the command tables unless special conditions apply. Generally the result code OK is returned when the command has been executed. ERROR may be returned if parameters are out of range, and is returned if the command is not recognized or is not permitted in the current state or condition of the modem.

References

This guide covers the command sets used by OEMs, designers and testers of Sierra Wireless AirPrime products, plus general operational use commands.

For additional product-specific documentation, refer to source.sierrawireless.com.

Terminology and acronyms

This document makes wide use of acronyms that are in common use in data communications and cellular technology.

Current firmware versions

Version

To determine your firmware revision, enter the identification command **AT+GMR**.

Upgrading

If your modem firmware is an earlier version, you can acquire updated firmware by contacting your account manager.

Document structure

This document describes the proprietary commands listed in the tables below—each table corresponds to a specific chapter.

AT Password Commands—Commands used to enable access to password-protected AT commands and to set the AT command password.

Table 1-1: AT password commands

Command	Description	Page
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Modem Status, Customization, and Reset Commands—Commands used to determine modem status, adjust customization settings, and reset the modem.

Table 1-2: Modem status commands

Command	Description	Page
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!AVDEF	Reset configurable audio parameters to default settings	161
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Conventions

The following format conventions are used in this reference:

Character codes or keystrokes that are described with words or standard abbreviations are shown within angle brackets using a different font, such as <CR> for Carriage Return and <space> for a blank space character.

Numeric values are decimal unless prefixed as noted below.

Hexadecimal values are shown with a prefix of 0x, i.e. in the form 0x3D.

Binary values are shown with a prefix of 0b, i.e. in the form 0b00111101.

Command and register syntax is noted using an alternate font: **!CHAN=<c>[,b]**. The leading "**AT**" characters are not shown but must be included before all commands except as noted in the reference tables.

Characters that are required are shown in uppercase; parameters are noted in lowercase. Required parameters are enclosed in angle brackets (**<n>**) while optional parameters are enclosed within square brackets (**[x]**). The brackets are not to be included in the command string.

Commands are presented in table format. Each chapter covers the commands related to that subject and presents a summary table to help you locate a needed command. Commands are in ASCII alphabetical order in the body of each chapter.

Any default settings are noted in the command tables. Note that these are the factory default settings and *not* the default parameter value assumed if no parameter is specified.

Result Code This is a numeric or text code that is returned after all commands (except resets)—text codes are returned if verbose responses are enabled. Only one result code is returned for a command line regardless of the number of individual commands contained on the line.

Response This term indicates a response from the modem that is issued prior to a result code. Reading registers or issuing commands that report information will provide a response followed by a result code unless the command generates an error.

Responses and result codes from the modem, or host system software prompts, are shown in this font:

```
CONNECT 14400
```

2: AT Password Commands

Introduction

AT commands described in this document are password-protected. This chapter describes how to enter and change the password.

Command summary

Table 2-1 on page 21 lists the commands described in this chapter.

Table 2-1: AT password commands

Command	Description	Page
!ENTERCND	Enable access to password-protected commands	22
!SETCND	Set AT command password	23

Command reference

Table 2-2: AT password command details

Command	Description
!ENTERCND	**Enable access to password-protected commands** Before you can use any password-protected AT commands, you must enter the password correctly using this command. The initial password is configured onto the modem during manufacture. You can change the password using !SETCND. If you do not know the password, contact your Sierra Wireless account manager. Once the password has been entered correctly, the password-protected AT commands are available until the modem is reset or powered off and on. **Password required:** Yes—Query format only. **Reset required to apply changes:** No **Persistent across power cycles:** No **Usage:** • Execution: **AT!ENTERCND=<"key">** Response: OK Purpose: Unlock password-protected commands. • Query: **AT!ENTERCND?** Response: <key> *(if unlocked)* Purpose: This command is password-protected. After entering the password correctly using the execution operation ("="), you can use this command to display the password as a reminder. **Parameters:** <"key"> (Password stored in NV memory) • Password must be entered with quotation marks. (For example, AT!ENTERCND="ExamplePW".) • Password length: 4–10 characters (0–9, A–Z, a–z, special characters (e.g. "!#$%&'()*+,-./:<>=?@". Note: double quotes (") are not allowed.) • Characters may be entered in ASCII format, or in Hex format. (For example: "myPass3" or "ABCDEF01234".)

Table 2-2: AT password command details (Continued)

Command	Description
!SETCND	**Set AT command password** Change the password used for the !ENTERCND command. (Before you can change the password using **!SETCND**, you must enable access to this command using **!ENTERCND**.) **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!SETCND=<"key">** Response: OK Purpose: Sets <"Key"> as the new password for accessing protected commands. **Parameters:** <"key"> (New password) • Password must be entered with quotation marks (for example, AT!SETCND="NewPW"). • Password length: 4–10 characters (0–9, A–Z, a–z, special characters (e.g. "!#$%&'()*+,-./:<>=?@". Note: double quotes (") are not allowed.) • Characters may be entered in ASCII format, or in Hex format. (For example: "myPass3" or "ABCDEF01234".) **Warning:** *Do NOT enter a null password (that is, the <"Key"> cannot be "") — you will NOT be able to use password-protected commands, and will have to contact Sierra Wireless for help to reset the password.*

3: Modem Status, Customization, and Reset Commands

Introduction

This chapter describes commands used to reset the modem, adjust customization settings, retrieve the hardware version, and monitor the temperature, voltage, and modem status.

Command summary

Table 3-1 lists the commands described in this chapter.

Table 3-1: Modem status commands

Command	Description	Page
!AMR_NB (notification)	Vocoder in use—Unsolicited notification	28
!AMR_WB (notification)	Vocoder in use—Unsolicited notification	28
!ANTSEL	Set/query external antenna select configuration	28
!AVVOCODER (Notification group)	Vocoder in use—Unsolicited notifications	29
!BAND	Select/return frequency band set	30
!BOOTHOLD	Reset modem and wait in bootloader for firmware download	32
+CSQ (notification)	RSSI change across threshold—Unsolicited notification	33
!CUSTOM	Set/return customization settings	34
!EONS (notification)	Enhanced Operator Name String (EONS)—Unsolicited notification	38
!EVRC (notification)	Vocoder in use—Unsolicited notification	38
!EVRC_B (notification)	Vocoder in use—Unsolicited notification	38
!EVRC_NW (notification)	Vocoder in use—Unsolicited notification	38
!EVRC_WB (notification)	Vocoder in use—Unsolicited notification	38
!GETBAND	Return the current active band	39
!GETRAT	Return the current active radio access technology (RAT)	39
!GSM_EFR (notification)	Vocoder in use—Unsolicited notification	39
!GSM_FR (notification)	Vocoder in use—Unsolicited notification	39
!GSM_HR (notification)	Vocoder in use—Unsolicited notification	39
!GSTATUS	Return operational status	40
!IMPREF	Query/set Image Management preferences	51
+KSLEEP	Configure UART1 power management (sleep mode entry conditions)	52

Table 3-1: Modem status commands (Continued)

Command	Description	Page
!LTEINFO	Display LTE network information	53
!MAPUART	Map services to UART	55
^MODE	Set/report system mode indication state	56
^MODE (notification)	Mode events—Unsolicited notification	56
!MODE (notification)	Current system mode—Unsolicited notification	57
!NI (notification)	Network identity—Unsolicited notification	57
!PACKAGE	Return package version string	58
!PATEMP	Return PA temperature information	58
!PATEMP (notification)	PA temperature state change—Unsolicited notification	59
!PCDEFR (notification)	Deferred shutdown timer expired—Unsolicited notification	59
!PCINFO	Return power control status information	60
!PCOFFEN	Set/return Power Off Enable state	61
!PCTEMP	Return Power control temperature information	62
!PCTEMP (notification)	PMIC temperature state change—Unsolicited notification	62
!PCTEMPLIMITS	Set/report temperature state limit values	63
!PCVOLT	Return current power supply voltage information	64
!PCVOLT (notification)	PMIC voltage state change—Unsolicited notification	64
!PCVOLTLIMITS	Set/report power supply voltage state limit values	65
!POWERDOWN	Power down system	65
!POWERMODE	Set the module power mode	66
!POWERWAKE	Configure ULPM wakeup sources	67
!PRIID	Report module PRI part number and revision	69
!PRLVER	Display current PRL version	69
!PSCS (notification)	Packet switched data call status—Unsolicited notification	69
!QCELP13K (notification)	Vocoder in use—Unsolicited notification	70
!RESET	Reset modem	70
!RI (notification)	Roaming indicator state—Unsolicited notification	70
RING (notification)	Incoming call notification—Unsolicited notification	70
!RSSI (notification)	Signal strength—Unsolicited notification	71
!SCACT	Activate/deactivate data connection	71

Table 3-1: Modem status commands (Continued)

Command	Description	Page
!SELMODE	Set/return current service domain	72
!SELRAT	Set preferred RAT	73
!SRV (notification)	WWAN network status change—Unsolicited notification	75
!UDINFO	Return information from active USB descriptor	75
!UDPID	Set/report product ID in USB descriptor	76
!UIMREGSTATE (notification)	UIM registration state—Unsolicited notification	76
!UIMSTATUS (notification)	UIM status change—Unsolicited notification	77
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+WANS (notification)	Call answered—Unsolicited notification	79
+WCC (notification)	Call control status change—Unsolicited notification	80
+WCNT (notification)	Call connected—Unsolicited notification	81
+WDDI (notification)	DTMF tone detection—Unsolicited notification	82
+WDDM	Enable/disable DTMF detection	82
+WEND (notification)	Call end status—Unsolicited notification	83
+WJAM (notification)	Jamming events—Unsolicited notification	86
+WMGF (notification)	SMS memory full—Unsolicited notification	86
+WORG (notification)	Call origination attempt—Unsolicited notification	87
+WRMICN (notification)	Roaming icon—Unsolicited notification (CDMA only)	87
+WUSLMSK	Enable/disable unsolicited notifications	88
+WVMI (notification)	Voicemail received—Unsolicited notification	91

Command reference

Table 3-2: Modem status, customization, and reset commands

Command	Description
!AMR_NB (notification)	**Vocoder in use—Unsolicited notification** See !AVVOCODER on page 29 for details.
!AMR_WB (notification)	**Vocoder in use—Unsolicited notification** See !AVVOCODER on page 29 for details.
!ANTSEL	**Set/query external antenna select configuration** Configure the device to drive (high or low) up to four GPIOs for specific bands. (If a GPIO is not needed for a specific band, it is identified as not required.) When the device switches to a configured band, the GPIOs are driven as specified, and the host uses those GPIOs to tune the external antenna appropriately. Note that this feature is independent of the radio technology being used. For example, Band 5 corresponds to any 850-band technology (CDMA, WCDMA, LTE, GSM). *Note: System level testing should be performed to ensure that the antenna switching feature does not introduce any handover issues. The tunable antenna should be designed to ensure that it can retune in < 5 µs (recommended) and < 10 µs (maximum).* **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** Yes **Usage:** • Execution: **AT!ANTSEL=<band>, <gpio1>, <gpio2>, <gpio3>[, <gpio4>]** Response: OK Purpose: Configure the GPIOs for the specified <band>. • Query: **AT!ANTSEL?** Response: BAND <band *a*>: <gpio1>, <gpio2>, <gpio3>[, <gpio4>] BAND <band *b*>: <gpio1>, <gpio2>, <gpio3>[, <gpio4>] ... OK Purpose: Display the current external antenna select configuration. • Query List: **AT!ANTSEL=?** Purpose: Display valid execution format and parameter values. **Parameters:** <band> (RF band) • 3GPP band number. For a full listing of 3GPP band numbers, see Table 15-2 on page 206. • Valid range: 0–60. Band support is product specific—see the device's Product Specification or Product Technical Specification document for details. <gpio1>, <gpio2>, <gpio3>, <gpio4> (GPIO configurations. Note: <gpio4> availability is device-specific—see the appropriate Product Technical Specification for details.) • 0=Logic low • 1=Logic high • 2=Not used for antenna selection (Default value for <gpio4>.)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!AVVOCODER (Notification group)	**Vocoder in use—Unsolicited notifications** *Note: The unsolicited notification string for "Vocoder in use" varies as described in the Notification format and example below. "!AVVOCODER" is a configuration option for +WUSLMSK, which enables these notifications.* Unsolicited notification indicating the codec and speech encoder sampling rate being used for a voice call. To enable !AVVOCODER (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification formats:** Speech Codec — Notification string QCELP-13K — !QCELP13K,freq: <sampling_rate> EVRC — !EVRC,freq: <sampling_rate> EVRC-B — !EVRC_B,freq: <sampling_rate> EVRC wideband — !EVRC_WB,freq: <sampling_rate> EVRC narrowband-wideband — !EVRC_NW,freq: <sampling_rate> AMR narrowband — !AMR_NB,freq: <sampling_rate> AMR wideband — !AMR_WB,freq: <sampling_rate> GSM enhanced full rate — !GSM_EFR,freq: <sampling_rate> GSM full rate — !GSM_FR,freq: <sampling_rate> GSM half rate — !GSM_HR,freq: <sampling_rate> **Examples:** • Notifications received: !AMR_NB,freq: 8000 (Codec used is AMR narrowband, with sampling rate=8000.) !GSM_FR,freq: 8000 (Codec used is GSM full rate, with sampling rate=8000.) **Parameters:** <sampling_rate> (Speech encoder sampling rate instructed by the network, in Hz) • 0—Unknown/ignore • 8000—Narrow-band • 16000—Wide-band

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!BAND *Note: The 'Basic' command and response versions are used if you haven't entered the required password. (See Command access on page 11.)*	**Select/return frequency band set** Configure the modem to operate on a set of frequency bands, look up available sets, create new sets, or return the current selection. *Note: Either !SELRAT must be set to 'Automatic' or !BAND must be set to 'All Bands' to avoid issues with incompatible RAT/Band combinations.* **Password required:** Yes—Execution (Extended) format (see !ENTERCND for details) **Usage:** • Execution (Basic): **AT!BAND=<Index>** Response: OK Purpose: Select an existing set of bands. • Execution (Extended): **AT!BAND=<Index>,"<Name>",<GWmask>[,<Lmask>,<Lmask>][,<Tdsmask>]** Response: OK Purpose: Create a new set of bands. • Query (Basic): **AT!BAND?** Response: Index, Name <Index>, <Name> OK *or* *(If the current band mask doesn't match a band set)* Unknown band mask. Use AT!BAND to set band. <Index> OK Purpose: Report the current band selection. • Query (Extended): **AT!BAND?** Response: Index, Name, GW Band Mask L Band Mask TDS Band Mask <Index>, <Name>, <GWmask> <Lmask> <Tdsmask> OK *or* *(If the current band mask doesn't match a band set)* Unknown band mask. Use AT!BAND to set band. <Index> OK Purpose: Report the current band selection. (<GWmask>, <Lmask>, and <Tdsmask> will appear only in Extended responses, and only if applicable.) • Query List (Basic): **AT!BAND=?** Response: Index, Name <Index1>, <Name1> ... <IndexN>, <NameN> OK Purpose: Display allowed <Index> values and descriptions of the associated band sets. (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!BAND (continued)	**Select/return frequency band set (continued)** • Query List (Extended): AT!BAND=? Response: Index, Name, GW Band Mask L Band Mask TDS Band Mask <Index1>, <Name1>, <GWmask1> <Lmask1> <Tdsmask1> ... <IndexN>, <NameN>, <GWmaskN> <LmaskN> <TdsmaskN> <TdsBand> ... <LBand> ... <GWBand> ... OK Purpose: Display allowed <Index> values and descriptions of the associated band sets. (<GWmask1..N>, <Lmask1..N>, and <Tdsmask1..N> will appear only in Extended responses, and only if applicable.) After the masks, lists of each bands comprising the masks are also shown. Parameters: <Index> (Index of a band set. Use the Query List command to display all supported sets) • Valid range: 0–13 (Hexadecimal—there are 20 possible values. By default, '0' indicates 'All bands'.) <Name> (Name of the band set) • ASCII string—Up to 30 characters <GWmask> (GSM/WCDMA bands included in the set) • Format: 64-bit bitmask • Example values (Available bands are device-dependent. Use the extended query command to display the list of bands available for your device): 0000000000000001—BC0-A 0000000000000002—BC0-B ... 0000000080000000—BC15 0002000000000000—W900100000000000000—B19 (850) <Lmask> (LTE bands included in the set) • Format: 64-bit bitmask • Example values (Available bands are device-dependent. Use the extended query command to display the list of bands available for your device.): 0000000000000001—Band 1 0000000000000002—Band 2 ... 0000008000000000—Band 40 0000010000000000—Band 41 (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!BAND (continued)	**Select/return frequency band set (continued)** <Tdsmask> (TD-SCDMA bands included in the set) • Format: 64-bit bitmask • Example values (Available bands are device-dependent. Use the extended query command to display the list of bands available for your device.): 0000000000000001—TDS B34 0000000000000010—TDS B39 0000000000000020—TDS B40 <TdsBand> (List of individual TD-SCDMA bands forming the <Tdsmask>) • Format: <mask> - <description>. See <GWBand> for a GSM/WCDMA example. <LBand> (List of individual LTE bands forming the <Lmask>) • Format: <mask> - <description>. See <GWBand> for a GSM/WCDMA example. <GWBand> (List of individual GSM/WCDMA bands forming the <GWmask>) • Format: <mask> - <description>. • Example: 1000000000000000 - B19 (800) 0002000000000000 - B8 (900) 0000000008000000 - B6 (800) 0000000004000000 - B5 (850) 0000000000800000 - B2 (1900) 0000000000400000 - B1 (2100) 0000000000200000 - G1900 0000000000080000 - G850 0000000000000200 - G900P 0000000000000100 - G900E 0000000000000080 - G1800
!BOOTHOLD	**Reset modem and wait in bootloader for firmware download** Prepare for a firmware download by resetting the modem and waiting in 'boot and hold' mode. **Password required:** No **Usage:** • Execution: **AT!BOOTHOLD** Response: OK Purpose: Force the modem to backup user NV options, reset, and then wait in boot and hold mode for a firmware download.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+CSQ (notification)	**RSSI change across threshold—Unsolicited notification** Unsolicited notification indicating the signal strength (<rssi>) has changed. Typically, a !RSSI unsolicited notification will also be received (see !RSSI on page 71). To enable +CSQ (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **+CSQ: <rssi>,<ber>** **Examples:** • Notifications received: +CSQ: 20,99 Signal strength (RSSI) -33 dBm, with bit error ration (BER) not known/not detectable **Parameters:** <rssi> (Received Signal Strength Indication offset value) • Integer value. Each step represents 2 dBm increase from base value • 0: -113 dBm or less • 1–30: -111 to -53 dBm • 31: -51 dBm or greater • 99: Not known, or not detectable <ber> (Channel Bit Error Rate, in percent) • Integer value. • 0–7: As RXQAL values in the table in 3GPP TS 45.008 subclause 8.2.4 • 99: Not known, or not detectable

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!CUSTOM *Note: Some customizations may not be available for certain chipsets, firmware revisions, or devices.*	**Set/return customization settings** Set or return several customization values. **Password required:** Yes (Execution only) (see !ENTERCND for details) **Usage:** • Execution: **AT!CUSTOM=<customization>, <value>** Response: OK Purpose: Assign <value> to a specific <customization> setting. • Query: **AT!CUSTOM?** Response: (list of enabled <customization>s) OK Purpose: Display customizations that are currently enabled. • Query list: **AT!CUSTOM=?** Purpose: Return a list of valid <customization> values. **Parameters:** <value> (Value being assigned to a specific <customization> setting) • Descriptions are included in each of the customizations described below. • Numeric value. Valid range depends on the <customization> type. <customization> (String identifying customization setting. The default value for all customizations is 0.) *Note: Use quotation marks around the customization string. For example, AT!CUSTOM="CSDOFF",0.* • "AUTONETWORKMODE"—Indicate if UE should revert to Automatic Network mode after 60 seconds of Manual Network mode. <value>: • 0 = Remain in Manual. (Default) • 1 = Revert to Automatic. • 2 = Remain in Manual if UE is attached to the network, otherwise switch to Automatic. • "BOOTQUIETDISABLE"—Enable/disable Linux kernel console messages. Disabling non-critical Linux kernel console logging improves the boot time. <value>: • 0 = Disable Linux kernel console messages during boot (Default) • 1 = Enable all Linux kernel console messages during boot • "CFUNPERSISTEN"—Enable/disable persistence (across power cycles) of AT+CFUN setting. <value>: • 0 = Disable (+CFUN setting does not persist across power cycle) Note: If the modem is in P-LPM (persistent low power mode—AT+CFUN mode 0) when this option is used, persistence remains enabled until the modem is put into online mode using an AT or QMI command. • 1 = Enable (+CFUN setting persists across power cycle) • Note: This customization does not affect operating mode persistence set using other interfaces. For example, the QMI interface can still be used to set the operating mode to LPM or P-LPM, even if this customization is disabled. (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!CUSTOM (continued)	**Set—query customization settings (continued)** • "DHCPRELAYENABLE"—Enable/disable DHCP relay feature. <value>: • 0 = Disable (Default). Modem filters DHCP requests into internal DHCP server. • 1 = Enable. DHCP requests (packets for port 67 with target IP address of DHCP server) go out over the network. • "EXTUIMSWITCHEN"—Enable/disable control of fast SIM switching feature (see +KSIMSEL on page 143 for details) <value>: • 0 = Disable (Default) • 1 = Enable • "FASTBOOTEN"—Enable/disable fast enumeration. <value>: • 0 = Disable (Default) • 1 = Enable • "FASTENUMEN"—Enable/disable fast enumeration for warm/cold boot. <value>: • 0 = Disable fast enumeration (Default) • 1 = Enable fast enumeration for cold boot and disable for warm boot • 2 = Enable fast enumeration for warm boot and disable for cold boot • 3 = Enable fast enumeration for warm and cold boot • "FLOWNOTIDISABLE"—Enable/disable QoS QMI notification events. <value>: • 0–255 (Default value = 0—all events enabled) • Bit 0: Flow activated event (0=Enable, 1=Disable) • Bit 1: Flow modified event (0=Enable, 1=Disable) • Bit 2: n/a • Bit 3: Flow deleted event (0=Enable, 1=Disable) • Bit 4: Flow suspended event (0=Enable, 1=Disable) • Bit 5: Flow enabled event (0=Enable, 1=Disable) • Bit 6: Flow disabled event (0=Enable, 1=Disable) • Bit 7: n/a • "GPIOSARENABLE"—Indicate whether SAR backoff is controlled by GPIOs or by AT commands. <value>: • 0 = Controlled by AT commands (default) • 1 = Controlled by GPIOs • "GPSENABLE"—Enable/disable the GPS feature. <value>: • 0 = GPS disabled • 1 = MO & MT enabled regardless of GPS_DISABLE setting • 2 = MO enabled regardless of GPS_DISABLE setting • 3 = MT enabled regardless of GPS_DISABLE setting • 4 = MO & MT enabled but are gated by GPS_DISABLE setting • 5 = MO enabled but is gated by GPS_DISABLE setting • 6 = MT enabled but is gated by GPS_DISABLE setting • <value> + 80 = Disable GLONASS (For example, 84 = MO & MT narrow-band GPS enabled, but gated by GPS_DISABLE setting.) (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!CUSTOM (continued)	**Set/query customization settings (continued)** • "GPSLPM"—Enable/disable GPS in Low Power Mode. <value>: • 0 = Enable—GPS engine remains enabled when modem enters LPM (Default) • 1 = Disable—GPS engine is disabled when modem enters LPM • "GPSREFLOC"—Enable/disable reference GPS location reporting. <value>: • 0 = Enable (Default) • 1 = Disable • "HARDCODEDIPEN"—Enable/disable hard-coded IP. <value>: • 0 = Disable hard-coded IP (Default) • 1 = Enable hard-coded IP • "HSICENABLE"—Enable/disable HSIC interface <value>: • 0 = Disable HSIC host (Default) • 1 = Enable HSIC host • "IMCONFIG"—Image switching configuration <value>: • 0 = On device (Default) • 1 = On host • "IPCHANNELRATEEN"—Enable/disable calculation of IP channel rates (Rx and Tx) <value>: • 0 = Disable (Default) • 1 = Enable • "JAMENABLE"—Enable/disable JAM detection. <value>: • 0 = Disable (Default) • 1 = Enable • "LTEREJDELAY"—Set delay before LTE attach requests are sent after TAU or service request rejection. <value>: • 0–255 = Delay in 10 msec units. (e.g. 10=100 msec) • Actual range is 0–2.55 sec • Delay is cancelled if RRC connection is released early. • Suggested value (if delay is being enabled) is 50 (500 msec). Adjust the value as necessary based on testing. • "PCSCDISABLE"—Determine functionality of PCSC, GSM Algorithm and Authenticate commands, and +CIMI command. <value>: • 0–7 (Default value = 0—all functions enabled) • Bit 0: PCSC (0=Enable, 1=Disable) • Bit 1: GSM Algorithm and Authenticate commands (0=Enable, 1=Disable) • Bit 2: AT+CIMI outputs IMSI (0=Enable, 1=Disable) • "RMNETREDIALEN"—Enable/disable RmNet redial. <value>: • 0 = Disable RmNet redial (Default) • 1 = Enable RmNet redial (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>!CUSTOM (continued)</td><td>
Set/query customization settings (continued)

“SIMHOTSWAPDIS”—Configure SIM hotswap feature.
<value>:

0 = Enable UIM1 and UIM2 (default)
1 = Disable UIM1, enable UIM2
2 = Enable UIM1, disable UIM2
3 = Disable UIM1 and UIM2

“SIMLPM”—Indicate default SIM power state during Low Power Mode.
<value>:

0 = QCT default behavior (same as <value>=2) (Default)
Note—The default behavior could change in future revisions. Use <value>=2 if you need to guarantee the described behavior.
1 = SIM remains powered in LPM
2 = Power down SIM with AT+CFUN=0; Power up SIM with AT+CFUN=1

“SINGLEAPNSWITCH”—Indicate device behavior when changing APN name, username, or password.
<value>:

0 = Do nothing
1 = Device detaches and re-attaches after changing APN information
2 = Power-cycle the UE

“STKUIEN”—Enable/disable SIM toolkit UI.
<value>:

0 = Enable for QMI interface
1 = Reserved
2 = Enable for AT interface

“UIMDETPULL”—Configure UIM detect lines pull settings. (Note: Hotswap must be enabled for a UIM slot for the corresponding pull setting to take effect.)
<value>:

0–15 (4 bits)

Bits 1/0: UIM1_DET pull setting
Bits 3/2: UIM2_DET pull setting

<table>
<tr><th>Bit 3</th><th>Bit 2</th><th>Bit 1</th><th>Bit 0</th><th>Description</th></tr>
<tr><td>1</td><td>1</td><td>X</td><td>X</td><td>UIM2 Pull Up</td></tr>
<tr><td>1</td><td>0</td><td>X</td><td>X</td><td>UIM2 Pull down</td></tr>
<tr><td>0</td><td>1</td><td>X</td><td>X</td><td>UIM2 No pull</td></tr>
<tr><td>0</td><td>0</td><td>X</td><td>X</td><td>UIM2 Default (Note: CF3 modules default is Pull up.)</td></tr>
<tr><td>X</td><td>X</td><td>1</td><td>1</td><td>UIM1 Pull Up</td></tr>
<tr><td>X</td><td>X</td><td>1</td><td>0</td><td>UIM1 Pull down</td></tr>
<tr><td>X</td><td>X</td><td>0</td><td>1</td><td>UIM1 No pull</td></tr>
<tr><td>X</td><td>X</td><td>0</td><td>0</td><td>UIM1 Default (Note: CF3 modules default is Pull up.)</td></tr>
</table>

Example:

AT!CUSTOM=”UIMDETPULL”,9
(Sets UIM1 to ‘no pull’ and UIM2 to ‘pull down’)

(Continued on next page)
</td></tr>
</table>

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!CUSTOM (continued)	**Set/query customization settings (continued)** • "WAKEHOSTEN"—Enable/disable host wake-up via SMS or incoming data packet. <value>: • 0 = Disable—Host will not wake when SMS or incoming data packet is received. (Default) • 1 = Wake host when simple SMS is received. • 2 = Wake host when incoming data packet is received. • 3 = Wake host when simple SMS or incoming data packet is received.
!EONS (notification)	**Enhanced Operator Name String (EONS)—Unsolicited notification** Unsolicited notification indicating the current network's name. This would typically be received when entering an area with a new serving network, or when swapping SIMs for a different mobile network provider. To enable !EONS (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!EONS: <name_string>** **Examples:** • Notifications received: !EONS: "CHN-UNICOM" The current carrier is China Unicom. **Parameters:** <state> (Network name) • ASCII string within quotes
!EVRC (notification)	**Vocoder in use—Unsolicited notification** See !AVVOCODER on page 29 for details.
!EVRC_B (notification)	**Vocoder in use—Unsolicited notification** See !AVVOCODER on page 29 for details.
!EVRC_NW (notification)	**Vocoder in use—Unsolicited notification** See !AVVOCODER on page 29 for details.
!EVRC_WB (notification)	**Vocoder in use—Unsolicited notification** See !AVVOCODER on page 29 for details.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GETBAND	**Return the current active band** Return the active band currently being used by the modem. **Password required:** No **Usage:** • Query: **AT!GETBAND?** Response: !GETBAND: <active band description> OK *or* No Service OK Purpose: Return a description of the current active band, or return an error message. *Note: **!GETBAND** reports W800 for both W800 and W850.*
!GETRAT	**Return the current active radio access technology (RAT)** Return the RAT currently being used by the modem. **Password required:** No **Usage:** • Query: **AT!GETRAT?** Response: !GETRAT: <active RAT description> OK *or* Unknown OK *or* No Service OK Purpose: Return a description of the current RAT, or return an error message.
!GSM_EFR (notification)	**Vocoder in use—Unsolicited notification** See !AVVOCODER on page 29 for details.
!GSM_FR (notification)	**Vocoder in use—Unsolicited notification** See !AVVOCODER on page 29 for details.
!GSM_HR (notification)	**Vocoder in use—Unsolicited notification** See !AVVOCODER on page 29 for details.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GSTATUS	**Return operational status** Return specific details about the current operational status of the modem. **Important:** *Response details vary depending on the current RAT, and may evolve from release to release. Parameter descriptions show all possible values—actual supported values vary depending on module type and current RAT. Contact Sierra Wireless for further details if required.* **Password required:** No **Usage:** • Query: **AT!GSTATUS?** Response (GSM): !GSTATUS: Current Time: <ctime> Temperature: <temp> Bootup Time: <btime> Mode: <mode> System mode: <smode> PS state: <PSstate> GSM band: <gband> GSM channel: <gchan> GMM (PS) state: <gmmstate> <gmmsubstate> MM (CS) state: <mmstate> <mmsubstate> Serving Cell: <gchan> (<gband>) RX level (dBm): <rxlev> LAC: <LAC> GPRS State: <gstate> Cell ID: <Cell ID> IMS Reg State: <imsstate> IMS mode: <ims mode> IMS Service: <imssrvstatus> OK Response (WCDMA): !GSTATUS: Current Time: <ctime> Temperature: <temp> Bootup Time: <btime> Mode: <mode> System mode: <smode> PS state: <PSstate> WCDMA band: <wband> WCDMA channel: <wchan> GMM (PS) state: <gmmstate> <gmmsubstate> MM (CS) state: <mmstate> <mmsubstate> WCDMA L1 State: <wrstate> LAC: <LAC> RRC State: <wrstate> Cell ID: <Cell ID> RxMRSSI C0: <wrxlev> RxDRSSI C0: <wrxlev> RxMRSSI C1: <wrxlev> RxDRSSI C1: <wrxlev> IMS Reg State: <imsstate> IMS mode: <ims mode> IMS Service: <imssrvstatus> OK (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GSTATUS	**Return operational status (continued)** Response (LTE): !GSTATUS: Current Time: <ctime> Temperature: <temp> Bootup Time: <btime> Mode: <mode> System mode: <smode> PS state: <PSstate> LTE band: <lband> LTE bw: <lbw> LTE Rx chan: <lrchan> LTE Tx chan: <ltchan> EMM state: <emmstate> <emmsubstate> EMM connection: <emmconn> RSSI (dBm): <rssi> Tx Power: <txpwr> RSRP (dBm): <rsrp> TAC: <tac> RSRQ (dB): <rsrq> Cell ID: <Cell ID> SINR (dB): <sinr> IMS Reg State: <imsstate> IMS mode: <ims mode> IMS Service: <imssrvstatus> OK Response (CDMA): !GSTATUS: Current Time: <ctime> Temperature: <temp> Bootup Time: <btime> Mode: <mode> System mode: <smode> PS state: <PSstate> CDMA band: <cband> CDMA Channel: <cchan> Roaming indicator: <ri> SID: <csid> NID: <cnid> RSSI (dBm): <rssi> ECIO (dB): <ecio> RX1 (dBm): <rxdivpower> IMS Reg State: <imsstate> IMS mode: <ims mode> IMS Service: <imssrvstatus> OK Response (HDR): !GSTATUS: Current Time: <ctime> Temperature: <temp> Bootup Time: <btime> Mode: <mode> System mode: <smode> PS state: <PSstate> CDMA band: <cband> CDMA channel: <cchan> Roaming indicator: <ri> Subnet mask: <hsmsk> Color code: <hccode> PN offset: <hpoff> Sector ID: <hscid> RSSI (dBm): <rssi> ECIO (dB): <ecio> IO (dBm): <io> SINR (dB): <sinr> RX1 (dBm): <rxdivpower> IMS Reg State: <imsstate> IMS mode: <ims mode> IMS Service: <imssrvstatus> OK (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GSTATUS	**Return operational status (continued)** Response (eHRPD): !GSTATUS: Current Time: <ctime> Temperature: <temp> Bootup Time: <btime> Mode: <mode> System mode: <smode> PS state: <PSstate> CDMA band: <cband> CDMA channel: <cchan> Roaming indicator: <ri> Subnet mask: <hsmsk> Color code: <hccode> PN offset: <hpoff> Sector ID: <hscid> RSSI (dBm): <rssi> ECIO (dB): <ecio> IO (dBm): <io> SINR (dB): <sinr> RX1 (dBm): <rxdivpower> IMS Reg State: <imsstate> IMS mode: <ims mode> IMS Service: <imssrvstatus> OK Response (TD-SCDMA): !GSTATUS: Current Time: <ctime> Temperature: <temp> Bootup Time: <btime> Mode: <mode> System mode: <smode> PS state: <PSstate> TDS band: <tdsband> TDS channel: <tdschan> GMM (PS) state: <gmmstate> <gmmsubstate> MM (CS) state: <mmstate> <mmsubstate> TDS L1 State: <tdsstate> TDS LAC: <LAC> TDS RRC State: <tdsrstate> TDS Cell ID: <Cell ID> RxM RSSI C0: <tdsrxlev> RxD RSSI C0: <tdsrxlev> IMS Reg State: <imsstate> IMS mode: <ims mode> IMS Service: <imssrvstatus> OK **Parameters:** <ctime> (Number of seconds since boot time (<btime>)) • 32-bit decimal <temp> (Temperature (approximate) in °C, accurate within ~5 °C) • 32-bit decimal <btime> (Time (24-hour format) that system booted) • 32-bit decimal (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GSTATUS	**Return operational status (continued)** <mode> (Current module mode) • ASCII string (quotation marks do not appear): • “POWERING OFF” • “FACTORY TEST” • “OFFLINE” • “ONLINE” • “LOW POWER MODE” • “RESETTING” • “NETWORK TEST” • “OFFLINE REQUEST” • “PSEUDO ONLINE” • “RESETTING MODEM” • “Unknown” <smode> (Current system mode) • ASCII string (quotation marks do not appear): • “None” • “No service” • “AMPS” • “CDMA” • “GSM” • “HDR” • “WCDMA” • “GPS” • “WCDMA+GSM” • “WLAN” • “LTE” • “GWL” • “TD-SCDMA” • “eHRPD” • “Unknown” <PSstate> (Current PS state of module) • ASCII string (quotation marks do not appear): • “Attached” • “Not attached” (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GSTATUS	**Return operational status (continued)** <wband> (Current WCDMA band being accessed) • ASCII string (quotation marks do not appear): • “WCDMA 2100” • “WCDMA 1900” • “WCDMA BC3” • “WCDMA 1700” • “WCDMA 800” • “WCDMA 900” • “WCDMA BC9” • “WCDMA BC11” • “WCDMA BC19” <gband> (Current GSM band being accessed (TCH or BCCH)) • ASCII string (quotation marks do not appear): • “GSM850” • “GSM900” • “DCS1800” • “PCS1900” • “Unknown” <tdsband> (Current TD-SCDMA band being accessed) • ASCII string (quotation marks do not appear): • “TDS B34” • “TDS B39” • “TDS B40” <wchan> (WCDMA channel number) • 32-bit decimal ASCII <gchan> (GSM channel number) • 32-bit decimal ASCII <tdschan> (TD-SCDMA channel number) • 32-bit decimal ASCII <emmstate> (Current EMM state) • ASCII string (quotation marks do not appear): • “Deregistered” • “Reg Initiated” • “Registered” • “TAU Initiated” • “SR initiated” • “Dereg Initiated” • “Invalid” • “NULL” (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GSTATUS	**Return operational status (continued)** <emmsubstate> (Current EMM sub-state) • ASCII string (quotation marks do not appear): • For <emmstate> = “Deregistered”: • “No IMSI” • “PLMN Search” • “Attach Needed” • “No Cell” • “Attaching” • “Normal Service” • “Limited Service” • “Waiting for PDN” • For <emmstate> = “Reg Initiated”: • “Waiting for NW” • “Waiting for ESM” • For <emmstate> = “Registered”: • “Normal Service” • “Update Needed” • “Attempt Update” • “No Cell” • “PLMN Search” • “Limited Service” • “MM Update” • “IMSI Detach” • “Waiting for ESM” • For all other <emmstate>s: • “---” <emmcon> (Current EMM connection state) • ASCII string (quotation marks do not appear): • “RRC Idle” • “Waiting RRC Cfm” • “RRC Connecting” • “RRC Releasing” <gmmstate> (Current GMM state) • ASCII string (quotation marks do not appear): • “DEREGISTERED” • “Registering” • “REGISTERED” • “Deregistering” • “RA updating” • “Requesting srvc” • “NULL” (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GSTATUS	**Return operational status (continued)** <gmmsubstate> (Current GMM sub-state) • ASCII string (quotation marks do not appear): • “NORMAL SERVICE” • “LIMITED SERVICE” • “ATT NEEDED” • “ATTEMPTING ATT” • “NO IMSI” • “NO SERVICE” • “PLMN SEARCH” • “SUSPENDED” • “UPDATE NEEDED” • “UPDATING” • “DEATACHING” • “---” —No sub-state, or a sub-state not defined in this command <mmstate> (Current MM state) • ASCII string (quotation marks do not appear): • “NULL” • “IDLE” • “LA Rejected” • “LA Start” • “CONNECTED” • “Network Command” • “IMSI Detach” • “Wait RR Active” • “Wait RR LU” • “Wait RR Detach” • “Wait RR MM” • “Wait MM” • “Wait add’l MM” • “Wait Re-est Dec” • “Wait RR Re-est” • “Re-est” • “LU Pending” • “Rel not allowed” • “Prompt” <mmsubstate> (Current MM sub-state) • ASCII string (quotation marks do not appear): • “NORMAL SERVICE” • “LIMITED SERVICE” • “NO IMSI” • “NO SERVICE” • “PLMN SEARCH” • “UPDATE NEEDED” • “UPDATING” • “ECALL INACTIVE” • “---” —No sub-state, or a sub-state not defined in this command (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GSTATUS	**Return operational status (continued)** <gstate> (State of GMM ↔ LLC interface) • ASCII string (quotation marks do not appear): • “GPRS IDLE” • “GPRS READY” • “GPRS STANDBY” <wstate> (WCDMA L1 state) • ASCII string (quotation marks do not appear): • “L1M_IDLE” • “L1M_FS” • “L1M_ACQ” • “L1M_BCH” • “L1M_PCH” • “L1M_FACH” • “L1M_DCH” • “L1M_DEACTIVE” • “L1M_PCH_SLEEP” • “L1M_DEEP_SLEEP” • “L1M_STOPPED” • “L1M_SUSPENDED” • “L1M_PCH_BPLMN” • “L1M_WAIT_TRM_STOP” • “---” <tdsstate> (TD-SCDMA L1 state) • ASCII string (quotation marks do not appear): • “L1M_IDLE” • “L1M_FS” • “L1M_ACQ” • “L1M_SYNC” • “L1M_BCH” • “L1M_PCH” • “L1M_FACH” • “L1M_DCH” • “L1M_PCH_SLEEP” • “L1M_STOPPED” • “L1M_SUSPENDED” • “L1M_PCH_BPLMN” • “L1M_WAIT_TRM_STOP” • “L1M_IRAT” • “---” (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GSTATUS	**Return operational status (continued)** <wrstate> (WCDMA RRC state) • ASCII string (quotation marks do not appear): • “DISCONNECTED” • “CONNECTING” • “CELL_FACH” • “CELL_DCH” • “CELL_PCH” • “URA_PCH” • “State N/A” • “---” <tdsrstate> (TD-SCDMA RRC state) • ASCII string (quotation marks do not appear): • “DISCONNECTED” • “CONNECTING” • “CELL_FACH” • “CELL_DCH” • “CELL_PCH” • “URA_PCH” • “State N/A” • “---” <wrxlev> (Receive power in dBm) • decimal <tdsrxlev> (Receive power in dBm) • decimal <lband> (LTE band) • ASCII string (quotation marks do not appear): • “B1” .. “B41” • “No band” <lbw> (LTE bandwidth) • ASCII string (quotation marks do not appear): • “1.4 MHz” • “3 MHz” • “5 MHz” • “10 MHz” • “15 MHz” • “20 MHz” • “Unknown” <lrchan> (LTE Rx channel) • decimal <ltchan> (LTE Tx channel) • decimal (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GSTATUS	**Return operational status (continued)** <cband> (CDMA band) • ASCII string (quotation marks do not appear): • “US Cellular” • “US PCS” • “JTACS” • “JCDMA” • “Korean PCS” • “NMT” • “IMT” • “No band” <rssi> (Total received power) • -120 to 0 <rsrp> (Reference Signal Receive Power) • -140 to -44 <rsrq> (Reference Signal Receive Quality) • -20 to -3 <sinr> (Signal to Interference plus Noise) • -20 to +30 <txpwr> (Transmit Power) • -100 to +100 • Note: Tx power is not yet implemented for the LTE query. <lac> (Location Area Code) • Hex (decimal) <tac> (Tracking Area Code) • Hex (decimal) <Cell ID> (Cell ID) • Hex (decimal) <ri> (Roaming Indicator) • decimal <cchan> (CDMA Rx channel) • decimal <csid> (CDMA System ID) • decimal <cnid> (CDMA Network ID) • decimal <hsmsk> (HDR subnet mask) • decimal <hccode> (HDR color code) • decimal <hpoff> (HDR PN offset) • decimal (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!GSTATUS	**Return operational status (continued)** <hscid> (HDR sector ID) • 32 hexadecimal digits in eight groups of four digits, separated by ":" • Example: ABCD:EF12:3456:7890:ABCD:EF23:ED45:B2C3 <IMS state> (IMS registration state) • ASCII string (quotation marks do not appear): • "NOT REGISTERED" • "REGISTERED" • "UNKNOWN" <imssrvstatus> (IMS Registered Server status) • ASCII string (quotation marks do not appear): • "NO SMS,NO VoIP" • "NO SMS,FULL VOIP" • "LIMITED SMS,NO VOIP" • "LIMITED SMS,FULL VOIP" • "FULL SMS,NO VoIP" • "FULL SMS,FULL VoIP" • "LIMITED SMS,UNKNOWN VoIP" • "UNKNOWN SMS,UNKNOWN VoIP" <ims mode> (IMS mode) • ASCII string (quotation marks do not appear): • "Normal" • "Test" • "Not Support"— Device is not configured with IMS <ecio> (Ratio of received pilot energy (Ec) to total received energy) • -31.5 to 0 <io> (Total received energy (Io)) • -106 to -21 <rxdivpwr> (Diversity received power) • -106 to -21

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!IMPREF	**Query/set Image Management preferences** Indicate (set) which firmware image (firmware plus carrier configuration pair) should be downloaded to the module or enable SIM-based image switching, or list (query) the configuration pairs that are currently downloaded and preferred. **Password required:** No **Usage:** • Execution: **AT!IMPREF=<carrier-name>** or **AT!IMPREF="AUTO-SIM"** Response: OK Purpose: Indicate which carrier should be used (if a matching carrier PRI and required firmware are found), or specify "AUTO-SIM" to enable SIM-based image switching. Note: If AUTO-SIM is currently enabled, selecting a carrier will disable it. • Query: **AT!IMPREF?** Response:! IMPREF: preferred fw version: <firmware-ver> preferred carrier name: <carrier-name> preferred config name: <carrier-config> current fw version: <firmware-ver> current carrier name: <carrier-name> current config name: <carrier-config> [<mismatch information>] OK Purpose: Query (show) the preferred and current firmware plus carrier carrier configuration pairs. **Parameters:** <carrier-name> (Unique code identifying the carrier that the firmware was designed for) • ASCII string <firmware-ver> (Unique firmware version number assigned by Sierra Wireless) • ASCII string <carrier-config> (Unique code identifying the carrier and configuration details) • ASCII string **Example(s):** • AT!IMPREF="ABC" *(where "ABC" is a carrier name)*

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+KSLEEP	**Configure UART1 power management (sleep mode entry conditions)** Configure UART1 power management, indicating under which conditions the module will enter sleep mode. **Password required:** No **Persistent across power cycles:** Yes **Requirements:** • To have DTR control sleep mode (<mngt>=0), AT!RIOWNER=0 must be used before using +KSLEEP. **Notes:** • Controls only UART1 power management; does not affect USB AT command port. • When KSLEEP=1 and the module is in sleep mode, the user must input a character to wake the module. When the module is awake, AT commands can be input as normal. **Usage:** • Execution: **AT+KSLEEP=<mngt>** Response: OK Purpose: Set the power management configuration. • Query: **AT+KSLEEP?** Response:! +KSLEEP: <mngt> OK Purpose: Indicate current power management configuration. • Query list: **AT+KSLEEP=?** Purpose: Return a list of supported <mngt> values. **Parameters:** <mngt> (UART1 Power management configuration) • 0—Module will not enter sleep mode when DTR is active (low level). If DTR is inactive, module enters sleep mode after 5 seconds. Note: DTR must be active to send AT commands. • 1—Module enters sleep mode automatically based on an internal timer (default 2 seconds; if a different default is required, it must be configured in the PRI) • 2—Module never enters sleep mode (regardless of DTR state)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!LTEINFO	**Display LTE network information** Display LTE network information. **Password required:** No **Usage:** • Query: **AT!LTEINFO?** Response: !LTEINFO: Serving: ...<list of applicable parameters> IntraFreq: ...<list of applicable parameters> InterFreq: ...<list of applicable parameters> GSM: ...<list of applicable parameters> WCDMA: ...<list of applicable parameters> CDMA 1x: ...<list of applicable parameters> CDMA HRPD: ...<list of applicable parameters> Purpose: Return LTE network measurements. **Parameters:** <earfcn> (E-UTRA absolute radio frequency channel number of the serving cell) • 16-bit decimal <mcc> (MCC code) • 16-bit decimal <mnc> (MNC code) • 16-bit decimal <tac> (Tracking area code) • 16-bit decimal <cid> (LTE Serving cell id) • 16-bit hexadecimal <bd> (Serving cell operating band) • 8-bit decimal <d> (Transmission bandwidth configuration of serving cell on the downlink) • 8-bit decimal <u> (Transmission bandwidth configuration of serving cell on the uplink) • 8-bit decimal <snr> (Average RSSNR of the serving cell over last measurement period in decibels) • 8-bit decimal <pci> (Physical cell ID) • 16-bit decimal <rsrq> (Current Reference Signal Receive Quality as measured by L1) • 16-bit decimal <rsrp> (Current Reference Signal Receive Power in dBm x10 as measured by L1) • 16-bit decimal <rssi> (Current Received Signal Strength Indication as measured by L1) • 16-bit decimal (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!LTEINFO (continued)	**Display LTE network information (continued)** <rxlv> (Cell selection Rx level (Srxlev) value) • 16-bit decimal <thresholdlow> (Cell Srxlev low threshold) • 8-bit decimal <thresholdhi> (Cell Srxlev high threshold) • 8-bit decimal <priority> (Cell reselection priority) • 8-bit decimal <threshl> (Reselection threshold for low priority layers) • 8-bit decimal <threshh> (Reselection threshold for high priority layers) • 8-bit decimal <prio> (Priority of this frequency group) • 8-bit decimal <ncc> (Bitmask identifying whether neighbor with a particular Network Color Code is to be reported) • 8-bit decimal <arfcn> (GSM frequency being reported) • 16-bit decimal <1900> (Band indicator for the GSM ARFCN, only valid if arfcn is in the overlapping region) • boolean <valid> (Flag indicating whether the BSIC ID is valid) • boolean <bsic> (BSIC ID) • 8-bit decimal <uarfcn> (WCDMA layer frequency) • 16-bit decimal <psc> (Scrambling code) • 16-bit decimal <rscp> (Absolute power level of the CPICH as received by the UE in dBm x10) • 16-bit decimal <ecn0> (Ratio of received energy per PN chip for the CPICH to the total received power spectral density at the UE antenna connector) • 16-bit decimal <chan> (Channel number) • 16-bit decimal <bc> (Band class) • 16-bit decimal <offsey> (The neighbor cell Pilot PN offset) • 16-bit decimal <phase> (The neighbor cell Pilot PN phase) • 16-bit decimal <str> (The neighbor cell Pilot EC/IO) • 16-bit decimal

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!MAPUART	**Map services to UART** Map services to the module's physical UARTs. Note that a reset is required for the change to take effect. **Password required:** No **Reset required to apply changes:** Yes **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!MAPUART=<service>[,<uart>]** Response: OK Purpose: Map the specfiied <service> to the specified <uart> (if no <uart> is specified, UART1 is used). • Query: **AT!MAPUART?** Response: !MAPUART: <service (UART1)>, <service (UART2)> OK Purpose: Report the current mappings for both UARTs • Query List: **AT!MAPUART=?** Purpose: Return the command format and the supported parameter values. **Parameters:** <service> (Service to map to a UART) • 0—UART disabled • 1—AT command service (Note: Not available for UART2) • 2—Diagnostic Message (DM) service • 3—Reserved • 4—NMEA service • 5–15—Reserved • 16—Linux Console • 17—Customer Linux application <uart> (Physical UART) • 1—UART1 (Default) • 2—UART

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
^MODE	**Set/report system mode indication state** Enable or disable system mode indications (unsolicited ^MODE notifications— see ^MODE on page 56). *Note: ^MODE and ^MODE notifications are equivalent to +WUSLMSK (setting !MODE) and !MODE notifications.* **Password required:** No **Usage:** • Execution: **AT^MODE=<mode>** Response: OK Purpose: Enable or disable system mode indication support. • Query: **AT^MODE?** Response: ^MODE: <mode> OK Purpose: Report current system mode indication support state (enabled/disabled). • Query List: **AT^MODE=?** Purpose: Return the execution command format and the supported parameter values. **Parameters:** <mode> (System mode indication support state) • 0 = Disabled • 1 = Enabled (Default)
^MODE notification)	**Mode events—Unsolicited notification** Unsolicited notification received when the device searches for service. *Note: ^MODE and ^MODE notifications are equivalent to +WUSLMSK (setting !MODE) and !MODE notifications.* **Notification format:** **^MODE: <mode>]** **Examples:** • ^MODE: 0 • ^MODE: 9 **Parameters:** <mode> (Service mode) • 0—No service • 2—CDMA • 3—GSM • 4—HDR • 5—WCDMA • 9—LTE • 11—TDS

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!MODE (notification)	**Current system mode—Unsolicited notification** Unsolicited notification indicating the network's current system mode. To enable !MODE (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. *Note: +WUSLMSK (setting !MODE) and !MODE notifications are equivalent to ^MODE and ^MODE notifications.* **Notification format:** **!MODE: <mode>** **Examples:** • Notifications received: !MODE: 3 (Indicates current system mode is GSM.) **Parameters:** <mode> (System mode) • 0—No service • 2—CDMA • 3—GSM • 4—HDR • 5—WCDMA • 9—LTE • 11—TDS
!NI (notification)	**Network identity—Unsolicited notification** Unsolicited notification indicating the network identity (MCC and MNC codes), received when the identity changes. To enable !NI (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!NI: <MCC>,<MNC>** **Parameters:** <MCC> (Mobile Country Code) • 3-digit number <MNC> (Mobile Country Code) • 2-digit or 3-digit number, depending on <MCC> value

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!PACKAGE	**Return package version string** This command returns the configuration package name loaded in the modem. **Password required:** No **Usage:** • Query: AT!PACKAGE? Response: !PACKAGE:<PackageName> OK Purpose: Return the package name string. **Parameters:** <PackageName> • Character string, maximum 126 characters • Example: MC7750_01.00.02.03_00_VZW_011.006_000
!PATEMP	**Return PA temperature information** Return the module's PA temperature state and current temperature. **Password required:** No **Usage:** • Query: AT!PATEMP? Response: Temp state: <state> Temperature: <temperature> degC OK Purpose: Return the module's Power control temperature information. **Parameters:** <state> (Temperature state): • Valid values: • "Initializing" • "Normal" • "High Warning" • "High Critical" <temperature> (Current temperature): • Decimal ASCII string • Current PA temperature in degrees Celsius. This is the temperature reported by a thermistor positioned near the power amplifiers. • Example: "32.3"

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!PATEMP (notification)	**PA temperature state change—Unsolicited notification** Unsolicited notification received when the PA temperature state changes. To enable !PATEMP (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!PATEMP: <state>** **Parameters:** <state> (PMIC temperature state) • Valid range: 1–3 • 1—Normal • 2—High Warning • 3—High Critical
!PCDEFR (notification)	**Deferred shutdown timer expired—Unsolicited notification** Unsolicited notification received when the Deferred Shutdown timer has expired. The timer is pre-set for 1 minute and starts automatically at power ON. This 'guard time' allows emergency calls to be made or received regardless of the temperature monitoring state. However, if the PMIC thermistor exceeds its hard limit, the device can power off regardless of this timer. To enable !PCDEFR (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!PCDEFR: <state>** **Examples:** • Notifications received: !PCDEFR: 0 Deferred shutdown timer expired. **Parameters:** <state> (Deferred Shutdown timer state) • 0—Timer has expired

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!PCINFO	**Return power control status information** Return the modem's power control status information. **Password required:** No **Usage:** • Query: AT!PCINFO? Response: State: <state> LPM force flags - W_DISABLE:<ForceFlag>, User:<ForceFlag>, Temp:<ForceFlag>, Volt:<ForceFlag>, BIOS:<ForceFlag>, GOBIIM:<ForceFlag> W_DISABLE: <ForceFlag> Poweroff mode: <ForceFlag> LPM Persistent: <ForceFlag> OK Purpose: Return power control information. **Parameters:** <state> (The modem's power mode) • ASCII string (quotation marks do not appear): • "LowPowerMode" • "Online" • "Offline" • "PowerOff" • "EnteringLowPowerMode" • "Initialization" <ForceFlag> (List of conditions indicating which ones caused modem to enter LPM) • Valid values: • 0=Did not cause 1=Caused • Condition types: • W_DISABLE—W_DISABLE is asserted • USER—AT/SDK/Legato command was issued • TEMP—Temperature is outside operational limits • VOLT—Voltage is outside operational limits • BIOS—Host BIOS locking is enabled • GOBIIM—Image preference mismatch

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!PCOFFEN	**Set/return Power Off Enable state** The modem can be configured to enter low power mode or power off when W_DISABLE is asserted. (This is called the Power Off Enable feature.) Use this command to indicate or set the Power Off Enable feature state. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!PCOFFEN=<state>** Response: OK Purpose: Set the current state. • Query: **AT!PCOFFEN?** Response: <state> OK Purpose: Report the current <state>. **Parameters:** <state> (Current state of Power Off Enable) • 0 = Modem will enter LPM (low power mode) when W_DISABLE is asserted. • 2 = Ignore changes on W_DISABLE.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!PCTEMP	**Return Power control temperature information** Return the module's power control temperature state and current temperature. **Password required:** No **Usage:** • Query: **AT!PCTEMP?** Response: Temp state: <state> Temperature: <temperature> degC Call mode: <mode> OK Purpose: Return the module's power control temperature information. **Parameters:** <state> (Temperature state): • Valid values: ◦ "Initializing" ◦ "Normal" ◦ "High Warning" ◦ "High Critical" ◦ "Low Critical" <temperature> (Current temperature): • Decimal ASCII string • Current temperature in degrees Celsius. • Example: "32.3" <mode> (Call mode): • Valid values: ◦ "Initializing" ◦ "No CallsAllowed" ◦ "All CallsAllowed" ◦ "EcallOnly"
!PCTEMP (notification)	**PMIC temperature state change—Unsolicited notification** Unsolicited notification received when the PMIC temperature state changes. To enable !PCTEMP (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!PCTEMP: <state>** **Parameters:** <state> (PMIC temperature state) • Valid range: 1–5 • 1—Normal • 2—High Warning • 3—High Critical • 4—Low Warning • 5—Low Critical

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!PCTEMPLIMITS	**Set/report temperature state limit values** Certain modem functionality is affected by the modem's temperature state. The possible temperature states are high critical, high warning, high normal, low normal, and low critical. Use this command to report or set the limits that correspond to these temperature states. To display the current temperature and temperature state, see !PCTEMP on page 62. *Note: All temperatures are in Celsius.* **Password required:** Yes **Usage:** • Execution: **AT!PCTEMPLIMITS=<hc>,<hw>,<hn>,<ln>,<lc>** Response: OK Purpose: Set the temperature limits for each state (all five values must be specified). • Query: **AT!PCTEMPLIMITS?** Response: HI CRIT: <hc> HI WARN: <hw> HI NORM: <hn> LO NORM: <ln> LO CRIT: <lc> Purpose: Return the temperature limits for each state. **Parameters:** *Note: Minimum separation between threshold values is 4°C. (e.g. If <hc> = 120, <hw> must be ≤116.)* <hc> (High Critical) • Temperature limit varies by device (see device Product Specification Document or Product Technical Specification). • Default = 108°C. <hw> (High Warning) • Temperature limit varies by device (see device Product Specification Document or Product Technical Specification). • Default = 95°C. <hn>(High Normal) • Temperature limit varies by device (see device Product Specification Document or Product Technical Specification). • Default = 85°C. <ln> (Low Normal) • Temperature limit varies by device (see device Product Specification Document or Product Technical Specification). • Default = -15°C. <lc> (Low Critical) • Temperature limit varies by device (see device Product Specification Document or Product Technical Specification). • Default = -25°C.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!PCVOLT	**Return current power supply voltage information** Return the module's power control supply state and actual voltage. **Password required:** No **Usage:** • Query: **AT!PCVOLT?** Response: Volt state: Normal Power supply voltage: <voltage> mV (<raw> cnt) OK Purpose: Return the module's voltage information. **Parameters:** <state> (Power supply state): • Valid values: ◦ "Initializing" ◦ "Normal" ◦ "High Critical" ◦ "Low Warning" ◦ "Low Critical" <voltage>: • Current voltage reading in mV. • Decimal ASCII <raw>: • ADC (Analog/digital convertor) reading • Decimal ASCII
!PCVOLT (notification)	**PMIC voltage state change—Unsolicited notification** Unsolicited notification received when the PMIC voltage state changes. To enable !PCVOLT (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!PCVOLT: <state>** **Parameters:** <state> (Power supply state) ◦ Valid range: 1–4 ◦ 1—Normal ◦ 2—Low Warning ◦ 3—Low Critical ◦ 4—High Critical

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!PCVOLTLIMITS	**Set/report power supply voltage state limit values** Certain modem functionality is affected by the modem's power supply voltage state. The possible voltage states are high critical, high normal, low normal, low warning, and low critical. Use this command to report or set the limits that correspond to these voltage states. **Password required:** No **Usage:** • Execution: **AT!PCVOLTLIMITS=<hc>,<hn>,<ln>,<lw>,<lc>** Response: OK Purpose: Set the voltage limits for each state (all five values must be specified). • Query: **AT!PCVOLTLIMITS?** Response: HI CRIT: <hc> HI NORM: <hn> LO NORM: <ln> LO WARN: <lw> LO CRIT: <lc> Purpose: Return the voltage limits for each state. **Parameters:** <hc> (High Critical) • Voltage limit varies by device (see device Product Specification Document or Product Technical Specification) • Default = 4400 mV <hw> (High Normal) • Voltage limit varies by device (see device Product Specification Document or Product Technical Specification) • Default = 4300 mV <ln> (Low Normal) • Voltage limit varies by device (see device Product Specification Document or Product Technical Specification) • Default = 3300 mV <lw> (Low Warning) • Voltage limit varies by device (see device Product Specification Document or Product Technical Specification) • Default = 3200 mV <lc> (Low Critical) • Voltage limit varies by device (see device Product Specification Document or Product Technical Specification) • Default = 3100 mV
!POWERDOWN	**Power down system** Power down the system. **Password required:** No **Usage:** • Execution: **AT!POWERDOWN** Response: OK Purpose: Power the system down.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!POWERMODE	**Set the module power mode** Set the module's power mode. **Password required:** No **Requirements:** • AT!POWERWAKE must be used to configure wakeup sources before using this command. **Usage:** • Execution: **AT!POWERMODE=<mode>** Response: OK Purpose: Set the module's power <mode>. • Query: **AT!POWERMODE?** Response: ^MODE: <mode> OK Purpose: Report current system mode indication support state (enabled/disabled). • Query List: **AT!POWERMODE=?** Purpose: Return the execution command format and the supported parameter values. **Parameters:** <mode> (Power mode) • 1 = Enable Ultra-low Power Mode (ULPM). When selected, the module powers down immediately, then begins monitoring for wakeup sources that were previously configured using !POWERWAKE.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!POWERWAKE	**Configure ULPM wakeup sources** Configure the wakeup sources (triggers) for Ultra-low Power Mode (ULPM). When a module is in ULPM, only the on-board MCU is powered on. The MCU monitors configured triggers and boots the module when a trigger is detected. After configuring wakeup triggers, the command AT!POWERMODE can be used to enter LPM. **Password required:** No **Notes:** • At least one wakeup sources must be configured before !POWERMODE can be used to enter ULPM. **Usage:** • Execution (clear): **AT!POWERWAKE=<clear>** Response: OK Purpose: Clear all wakeup sources. • Execution (timer): **AT!POWERWAKE=<type=1>,<timeout>** Response: OK Purpose: Set the timeout period for a wakeup timer. • Execution (GPIO): **AT!POWERWAKE=<type=2>,<gpio>,<edge>** Response: OK Purpose: Configure a GPIO as a wakeup source. • Execution (ADC): **AT!POWERWAKE=<type=3>,<adc>,{<clear> | <above>,<below>,<interval>}** Response: OK Purpose: Configure an ADC as a wakeup source (or clear it). • Query: **AT!POWERWAKE?** Response: !POWERWAKE: TIMER: <timeout> GPIO36: <edge> GPIO38: <edge> GPIO39: <edge> ADC2: <above>, <below>, <interval> ADC3: <above>, <below>, <interval> Last Wakeup event: <type>[,[<gpio>] [<adc>]] OK Purpose: Show currently configured wakeup sources. If a source is not configured, it will not appear. • Query List: **AT!POWERWAKE=?** Purpose: Return the execution command format and the supported parameter values. (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!POWERWAKE continued	**Configure ULPM wakeup sources (continued)** Parameters: <clear> (Clear wakeup source(s)) • 1—Clear all sources (if used in “Execution (clear)” format, or clear a specific ADC (if used in “Execution (ADC)” format <type> (Wakeup source type) • 1—Timer • 2—GPIO • 3—ADC <timeout> (Timeout period for Timer wakeup source) • 0—Disable Timer wakeup source • 1–4294967—Timeout period in seconds <gpio> (GPIO to configure as wakeup source) • 36—GPIO36 • 38—GPIO38 • 39—GPIO39 <edge> (GPIO trigger type) • 0—Off • 1—High • 2—Low • 3—Rising • 4—Falling • 5—Both (rising or falling) <adc> (ADC to configure as wakeup source) • 2—ADC2 • 3—ADC3 • Note: Only one ADC at a time can be configured as a wakeup source. For example, if ADC3 is currently configured and you want to use ADC as a wakeup source, you must first clear ADC3 using AT!POWERWAKE=3,3,0 <above> (ADC trigger lower bound) • 0–1800 <below> (ADC trigger upper bound) • 0–1800 <interval> (ADC sampling interval) • 1–65535—Sampling interval, in milliseconds

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!PRIID	**Report module PRI part number and revision** Report the module's customer and carrier PRI part numbers and revisions. **Password required:** No **Usage:** • Query: **AT!PRIID?** Response: PRI Part Number: <priPn> Revision: <priRevDisplay> Carrier PRI: None OK Purpose: Return the module's PRI part number (<priPn>) and revision (<priRev-Display>). (In the example shown above, no Carrier PRI is present. If it were, then the Part Number and Revision would display.) **Parameters:** <priPn> (PRI part number) • 7-digit ASCII number • Example: 9991234 <priRevDisplay> (PRI revision number being read from the module) • 4-digit ASCII: XX.YY • Example: 01.00
!PRLVER	**Display current PRL version** Display the device's current PRL (Preferred Roaming List) version. **Password required:** No **Usage:** • Query: **AT!PRLVER?** Response: PRL VER: <n> Purpose: Display the PRL version. **Parameters:** <n> (PRL version number) • Integer
!PSCS (notification)	**Packet switched data call status—Unsolicited notification** Unsolicited notification indicating the current state of packet switched (PS) data calls (multiple PDP is supported, allowing data calls on multiple APNs), received when the state changes (e.g. <status>=1 is received when the first data call is brought up, and <status>=0 is received when the last data call is torn down). To enable !PSCS (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!PSCS: <status>** **Parameters:** <status> (PS data call status) • 0—No active PS calls • 1—Active PS calls

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!QCELP13K (notification)	**Vocoder in use—Unsolicited notification** See !AVVOCODER on page 29 for details.
!RESET	**Reset modem** Perform a modem reset. **Password required:** No **Usage:** • Execution: **AT!RESET** Response: OK Purpose: Reset the modem.
!RI (notification)	**Roaming indicator state—Unsolicited notification** Unsolicited notification indicating the current state of the roaming indicator, received when the roaming state changes. To enable !RI (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!RI: <state>** **Parameters:** <state> (Roaming indicator state) • 0—Roaming indicator off • 1—Roaming indicator on
RING (notification)	**Incoming call notification—Unsolicited notification** Unsolicited notification indicating an incoming call from the network. To enable RING (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **RING** **Parameters:** None

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!RSSI (notification)	**Signal strength—Unsolicited notification** Unsolicited notification indicating the current signal strength, received when the strength changes. Typically, a +CSQ unsolicited notification will also be received (see +CSQ on page 33). The signal strength ranges vary depending on the RAT. To enable !RSSI (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!RSSI: <strength>** **Parameters:** <strength> (Signal strength in dBm) • Note: Values have implied '-'. For example, <strength> = 75 indicates -75 dBm. • AMPS range: 89–110 • 800 CDMA range: 90–105 • 1900 CDMA range: 93–108 • GSM/WCDMA/LTE range: 60–105 • TD-SCDMA range: 25–125
!SCACT	**Activate/deactivate data connection** Activate or deactivate a specific data connection between the host and network. **Password required:** No **Usage:** • Query: **AT!SCACT?[<pid>]** Response: !SCACT: <pid>,<state> ... *(additional <pid>/<state> combinations)* OK Purpose: Display a list of all defined connections and their current state, or display a specified connection and its state. • Execution: **AT!SCACT=<state>[,<pid>]** Response: OK Purpose: Activate or deactivate the connection for the specified <pid>. If <pid> is not included, use the default <pid> (see <pid> for values). **Parameters:** <pid> (PDN connection ID) • Valid values: • GSM/UMTS/LTE: • 1–16 • Default: 1 (all networks except Sprint and Verizon) • 3 (Sprint, Verizon) • CDMA: • 101–107 • Default: 101 (all networks except Sprint and Verizon) • 103 (Sprint, Verizon) <state> (Current state of specified <pid>) • 0= Deactivated • 1=Activated • Any other value causes command execution to return ERROR.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!SELMODE	**Set/return current service domain** Configure the modem to use a specific service domain. **Password required:** No **Usage:** • Execution: **AT!SELMODE=<sdInd>** Response: OK Purpose: Set the desired service domain. • Query: **AT!SELMODE?** Response: <sdInd>, Service Domain description OK *or* Unknown service domain mask. Use AT!SELMODE to set service domain. <sdInd> OK Purpose: Return the current service domain index (<sdInd>) and description. If the <sdInd> is undefined, an error message is returned. • Query List: **AT!SELMODE=?** Purpose: Return a list of supported service domain indexes. **Parameters:** <sdInd> (Service domain index): • 00=CS only • 01=PS only • 02=CS and PS

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!SELRAT	**Set preferred RAT** Set the preferred RAT mode(s) for acquisition. If the module's current band setting is not compatible with the selected RAT, an appropriate band will be selected automatically and set on the modem. TD-SCDMA-related RATs are available only on products supporting TD-SCDMA. *Note: Either !SELRAT must be set to 'Automatic' or !BAND must be set to 'All Bands' to avoid issues with incompatible RAT/Band combinations.* **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!SELRAT=<ratInd>** Response: OK Purpose: Set the desired RAT. • Query: **AT!SETRAT?** Response: <ratInd>, RAT configuration description OK *or* Unknown RAT mode. Use AT!SELRAT to set mode. <ratInd> OK Purpose: Return the current RAT (<ratInd>) and description. If the <ratInd> is undefined, an error message is returned. • Query List: **AT!SELRAT=?** Purpose: Return a list of supported RAT index values and their descriptions. (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!SELRAT	**Set preferred RAT (continued)** Parameters: <ratInd> (RAT index): • 00—Automatic • 01—UMTS 3G only • 02—GSM 2G only • 03—UMTS 3G preferred • 04—GSM 2G preferred • 05—GSM and UMTS only • 06—LTE only • 07—GSM, UMTS, LTE • 08—CDMA, HRPD, GSM, UMTS, LTE • 09—CDMA only • 0A—HRPD only • 0B—hybrid CDMA/HRPD • 0C—CDMA, LTE • 0D—HRPD, LTE • 0E—CDMA, HRPD, LTE • 0F—CDMA, GSM, UMTS • 10—CDMA, HRPD, GSM, UMTS • 11—UMTS and LTE only • 12—GSM and LTE only • 13—TDS and LTE only • 14—TDS, GSM, LTE • 15—TDS, WCDMA, LTE • 16—TDS, GSM, WCDMA, LTE • 17—TDS only • 18—TDS and GSM only • 19—TDS and WCDMA only • 1A—TDS, GSM, WCDMA

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!SRV (notification)	**WWAN network status change—Unsolicited notification** Unsolicited notification received when the WWAN network status changes. To enable !SRV (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!SRV: <state>** **Parameters:** <state> (Network status notifications) • 0—No service • 1—Limited service • 2—Service available • 3—Regional service • 4—Power save
!UDINFO	**Return information from active USB descriptor** Return information from the active USB descriptor. **Password required:** No **Usage:** • Query: **AT!UDINFO?** Response: VID: <vendor_id> APP PID: <app_product_id> BOOT PID: <boot_product_id> Interface: <interfaceType> Manufacturer: <manuString> Product: <prodString> Purpose: Display USB descriptor information. **Parameters:** <vendor_id> (Vendor ID): • Valid range: 0000–FFFF <app_product_id> (Product ID used when modem is in application mode): • Valid range: 0000–FFFF <boot_product_id> (Product ID used when modem is in boot loader mode): • Valid range: 0000–FFFF <interfaceType> (USB interface type): • ASCII string: • “QBI”—QBI interface • “QMI”—QMI interface <manuString> (Manufacturer string): • ASCII string (32 characters maximum) • Example: “Sierra Wireless, Incorporated” <prodString> (Product string): • ASCII string (64 characters maximum) • Example: “WP8548”

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!UDPID	**Set/report product ID in USB descriptor** Use this command to set the device's product ID in the USB descriptor. (Some devices may support more than one product ID.) *Note: If a custom PID is used for <app product_id>, then the <boot product_id> must be set at the same time.* **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!UDPID=<app product_id> [,<boot product_id>]** Response: OK Purpose: Set the application and boot product IDs in the USB descriptor. • Query: **AT!UDPID?** Response: !UDPID: <app_product_id>[, <boot product_id>] OK Purpose: Report the product ID that is stored in the USB descriptor. • Query List: **AT!UDPID=?** Purpose: Display a list of default (non-custom) product IDs for the device. **Parameters:** <app product_id> • Hexadecimal ASCII value. • Valid range: 0000–FFFF < boot product_id> • Hexadecimal ASCII value. • Valid range: 0000–FFFF • In the Execution command format, if the <app product_id> is a custom PID>, then the <boot product_id> must be set at the same time. (To check if the <app product_id> is a custom PID, use AT!UDPID=? to see a list of all available non-custom PIDs.)
!UIMREGSTATE (notification)	**UIM registration state—Unsolicited notification** Unsolicited notification indicating the UIM registration state of the active UIM interface, received when the state changes. The active UIM interface is selected using AT!UIMS—see !UIMS on page 144 for details. To enable !UIMREGSTATUS (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!UIMREGSTATE: <state>** **Parameters:** <state> (UIM card registration state) • 0—UIM not available • 1—UIM available • 2—UIM marked by network as invalid for CS services • 3—UIM marked by network as invalid for PS services • 4—UIM marked by network as invalid for CS and PS services • 5—UIM is PIN1 locked

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!UIMSTATUS (notification)	**UIM status change—Unsolicited notification** Unsolicited notification received when the UIM status changes. To enable !UIMSTATUS (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **!UIMSTATUS: <uim_interface>,<uim_event>** **Examples:** • Notifications received: !UIMSTATUS: 1,1 Embedded UIM is detected. **Parameters:** <uim_interface> (UIM interface that has a status change) • 0—UIM1 (External UIM interface 1) • 1—UIM2 (External UIM interface 2 or eSIM (embedded SIM). Depending on the module, the interface may be exposed to an external SIM connector or may be connected internally to an eSIM installed directly on the module.) <uim_event> (Event causing status change) • 0—SIM card deactivated (switched/removed) • 1—SIM card activated (switched/inserted/detected)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
!USBCOMP	**Set/report USB interface configuration** Use this command with modems that have been configured with multiple USB compositions. By default, devices are typically configured to use a USB composition that presents a minimal set of interfaces. If the device also supports other compositions, this command is used to choose from any of the supported compositions. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!USBCOMP=<Config Index>,<Config Type>,<Interface bitmask>** Response: OK Purpose: Set the current composition. For the change to take effect, you must reset the modem. • Query: **AT!USBCOMP?** Response: Config Index: <Config Index> Config Type: <Config Type> Interface bitmask: <Interface bitmask> OK Purpose: Report the current interface composition. • Query List: **AT!USBCOMP=?** Purpose: Display valid execution format and parameter values. **Parameters:** <Config Index> (Configuration index to which composition applies) • Valid value(s): 1 <Config Type> (Configuration type) • Valid value(s): 1—Generic <Interface bitmask> (Interfaces enabled for selected configuration) • Format: 32-bit bitmask • Valid values: • 00000001—DIAG • 00000002—ADB • 00000004—NMEA • 00000008—MODEM • 00000010—AT • 00000020—OSA • 00000040—RAWDATA • 00000100—RMNET0 • 00000400—RMNET1 • 00000800—RMNET2 • 00001000—MBIM • 00004000—RNDIS • 00010000—AUDIO • 00080000—ECM *Note: Availability of specific interfaces is product-dependent.*

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WANS (notification)	**Call answered—Unsolicited notification** Unsolicited notification received when a voice or data call has been answered. To enable +WANS (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **+WANS: <call_type>],<RAT>** **Examples:** • When an incoming call is answered: Notifications received: +WANS: 0,0 +WCNT: 0,0 **Parameters:** <call_type> (Call type) • Valid range: 0–9 • 0—Voice • 1—Circuit-switched data • 2—Packet-switched data • 3—SMS • 4—Position determination • 5—Reserved • 6—OTAPA • 7—Standard OTASP • 8—Non-standard OTASP • 9—Emergency <RAT> (Network type) • Valid range: 0–3 • 0—GSM/WCDMA • 1—LTE • 2—CDMA • 3—TDS

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WCC (notification)	**Call control status change—Unsolicited notification** Unsolicited notification received when the call control status changes. To enable +WCC (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **+WCC: <status>[,<cause>]** **Examples:** • Notification received: +WCC:2 Call control status—alerting • Notification received: +WCC:4,1 Call disconnected, unassigned (unallocated) number **Parameters:** <status> (Call status) • 0—Call proceeding (for MO call) • 1—Call confirmed (for MT call) • 2—Alerting • 3—Connected • 4—Disconnect <cause> (Reason for status change) • Refer to 3GPP TS 24.008 Annex H (3GPP specific cause values for call control) for defined values.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WCNT (notification)	**Call connected—Unsolicited notification** Unsolicited notification received when an incoming or outgoing call has been connected into a traffic channel state. To enable +WCNT (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **+WCNT: <service_option>,<RAT>** **Examples:** • Call originated using ATD18005551212 on a GSM/WCDMA/LTE connection: Notifications received: +WORG: 18005551212 +WCNT: 0,0 **Parameters:** <service_option> (Service option indicating type of call) • 0—GSM/WCDMA/LTE call • All other options are for 1x/EVDO calls: • 2—Loopback (Note: 9 and 55 also indicate loopback) • 3—Speech (Note: 17, 68, 32768 also indicate speech) • 6—SMS (Note: 14 also indicates SMS) • 9—Loopback (Note: 2 and 55 also indicate loopback) • 12—Circuit-switched data • 14—SMS (Note: 6 also indicates SMS) • 17—Speech (Note: 3, 68, 32768 also indicate speech) • 18—OTAPA (Note: 19 also indicates OTAPA) • 19—OTAPA (Note: 18 also indicates OTAPA) • 33—1x data • 35—Position determination (Note: 36 also indicate position determination) • 36—Position determination (Note: 35 also indicate position determination) • 55—Loopback (Note: 2 and 9 also indicate loopback) • 68—Speech (Note: 3, 17, 32768 also indicate speech) • 32768—Speech (Note: 3, 17, 68 also indicate speech) • 33023—1xEVDO <RAT> (Network type) • Valid range: 0–3 • 0—GSM/WCDMA • 1—LTE • 2—CDMA • 3—TDS

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WDDI (notification)	**DTMF tone detection—Unsolicited notification** Unsolicited notification indicating a DTMF value was detected on the downlink audio. To enable +WDDI (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **+WDDI: <dtmf>** **Requirements:** • DTMF detection must be enabled via AT+WDDM for these notifications to occur—see +WDDM on page 82. **Parameters:** <dtmf> (DTMF value) • 0–9, *, #, A–D
+WDDM	**Enable/disable DTMF detection** Enable or disable DTMF detection on the downlink audio. When enabled, unsolicited notifications are received when DTMF values are detected—see +WDDI on page 82 for details. **Password required:** No **Usage:** • Execution: **AT+WDDM=<status>** Response: OK Purpose: Enable or disable DTMF detection. • Query: **AT+WDDM?** Response: +WDDM: <status> OK Purpose: Report the current jamming thresholds for all four <modes>. • Query List: **AT+WDDM=?** Purpose: Display valid execution format and parameter values. **Parameters:** <status> (DTMF detection status) • 0—Disabled • 1—Enabled

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WEND (notification)	**Call end status—Unsolicited notification** Unsolicited notification received when a call or call attempt has ended. To enable +WEND (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **+WEND: <reason>,<service_option>,<RAT>** **Examples:** • Call originated using ATD1800555; on a GSM/WCDMA/LTE connection: Notifications received: +WORG: 1800555 +WCNT: 0,0 Call disconnected with ATH: Notifications received: +WEND: 29,0,0 This call ended with a normal release (<reason>=29) • Call originated using ATD18005551212; on a GSM/WCDMA/LTE connection: Notifications received: +WORG: 18005551212 +WEND: 22,0,0 This call failed because the signal faded (<reason>=22) **Parameters:** <reason> (Reason for end of call.) • For LTE: • ESM cause from the network, if available. For a list of ESM causes, refer to section 9.9.4.4 of 3GPP TS 24.301. • For non-LTE RATs: • 0—Phone is offline • 20—Phone is CDMA locked • 21—Phone has no service • 22—Call faded/dropped (CDMA only) • 23—Received intercept from base station (CDMA only) • 24—Received reorder from base station (CDMA only) • 25—Received release from base station (normal call termination) • 26—Service option rejected by base station (CDMA only) • 27—Received incoming call • 28—Received an alert stop from base station (CDMA only) • 29—Software ended the call (normal release) • 30—Received end activation (OTASP calls only) • 31—Internal software aborted the origination/call (CDMA only) • 32—Maximum access probes exhausted; the module failed to connect to the base station (CDMA only) • 33—Persistence test failure (CDMA only) • 34—RUIM not present • 35—Origination already in progress • 36—General access failure • 37—Received retry order (IS-2000 only) • 38—Concurrent service not supported by base station (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WEND (notification)	**Call end status—Unsolicited notification (Continued)** • 39—No response received from base station • 40—Call rejected by base station (CDMA only) • 41—Concurrent services requested were not compatible • 42—Access blocked by base station (Release A only) • 43—Traffic channel already available • 44—Call ended because an Emergency call is flashed over this call (CDMA only) • 45—CM is ending a GPS call in favor of a user call (gpsOne 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 blocked by base station for all mobiles (KDDI specific) • 50—OTASP SPC Error indication • 51—Max access (CDMA only) • 100—Lower layer error (GSM/WCDMA only) • 101—Call origination request failed (GSM/WCDMA only) • 102—Client rejected the incoming call (GSM/WCDMA only) • 103—Client rejected the call setup (GSM/WCDMA only) • 104—Network ended the call (GSM/WCDMA only) • 105—No funds (GSM/WCDMA only) • 106—Phone has no service (GSM/WCDMA only) • 108—Full services unavailable • 109—Call general or network busy • 150—Abort connection setup - connection denied • 151—Abort connection setup - billing or authentication failure • 152—Change HDR system due to redirection or PRL not preferred • 153—Exit HDR due to redirection or PRL not preferred • 154—No HDR session • 155—Fail to acquire collocated HDR for origination • 156—HDR call origination ended in favor of GPS fix • 157—HDR connection setup timeout • 158—HDR call ended so 1x call can continue • 159—CM will hold the HDR origination to allow 1x SMS to end • 160—Call ended due to OTASP commit in progress • 161—Phone has no hybrid HDR service • 162—Call ended because HDR did not get the RF lock • 163—Call held to allow other call to end • 164—Call ended due to fade • 165—Call ended due to access failure attempts (HDR only) • 202—Call origination on IP failed • 203—Call needs to be retried on IP • 204—IP call ended due to Emergency origination • 401—Origination throttled • 402—Unknown error (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WEND (notification)	**Call end status—Unsolicited notification (Continued)** <service_option> (Service option indicating type of call) • 0—GSM/WCDMA/LTE call • All other options are for 1x/EVDO calls: • 2—Loopback (Note: 9 and 55 also indicate loopback) • 3—Speech (Note: 17, 68, 32768 also indicate speech) • 6—SMS (Note: 14 also indicates SMS) • 9—Loopback (Note: 2 and 55 also indicate loopback) • 12—Circuit-switched data • 14—SMS (Note: 6 also indicates SMS) • 17—Speech (Note: 3, 68, 32768 also indicate speech) • 18—OTAPA (Note: 19 also indicates OTAPA) • 19—OTAPA (Note: 18 also indicates OTAPA) • 33—1x data • 35—Position determination (Note: 36 also indicate position determination) • 36—Position determination (Note: 35 also indicate position determination) • 55—Loopback (Note: 2 and 9 also indicate loopback) • 68—Speech (Note: 3, 17, 32768 also indicate speech) • 32768—Speech (Note: 3, 17, 68 also indicate speech) • 33023—1xEVDO <RAT> (Network type) • Valid range: 0–3 • 0—GSM/WCDMA • 1—LTE • 2—CDMA • 3—TDS

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WJAM (notification)	**Jamming events—Unsolicited notification** Unsolicited notification received for various jamming events. To enable +WJAM (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **+WJAM: <response type>,<jam status>]** **Examples:** • +WJAM: 0,2 *Intermediate report, possible jammer detected* • +WJAM: 1,1 *Final result, no jamming detected* **Parameters:** <response type> (Response type) • 0—Final • 1—Intermediate *Note: If <response_type> = 0 (Final), the <jam status> value can only be 1 (Null) or 5 (Jammed).* <jam status> (Jamming status) • 0—Unknown. Status is unknown. • 1—Null. No jamming suspicion; radio environment is considered normal. • 2—Low. Low probability that the device is jammed, but some radio environment parameters are considered abnormal. • 3—Medium. Medium probability that the device is jammed; a lot of interference in the radio spectrum. • 4—High. High probability that the device is jammed; radio environment is considered jammed, but there is still a possibility that the module succeeds in synchronizing a cell. • 5—Jammed. Module is jammed; cell synchronization impossible while sufficient power level is detected on a large number of frequencies.
+WMGF (notification)	**SMS memory full—Unsolicited notification** Unsolicited notification received when the SMS Service Center has tried to send an SMS message to the module, but the message was rejected because the SMS memory storage on the module is full. (The Service Center will attempt to resend the message to the module at a later time.) No new SMS messages will be received until old messages are deleted from storage using AT+CMGD. To enable +WMGF (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **+WMGF** **Parameters:** None

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WORG (notification)	**Call origination attempt—Unsolicited notification** Unsolicited notification received when an attempt is made to establish a voice or data call. To enable +WORG (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **+WORG: <dialing_string>** **Examples:** • Call originated using ATD18005551212: Notifications received: +WORG: 18005551212 +WCNT: 0,0 **Parameters:** <dialing_string> (Dialing string sent to the base station) • Format: ASCII string • Valid characters: '0'..'9', + * #
+WRMICN (notification)	**Roaming icon—Unsolicited notification (CDMA only)** Unsolicited notification received for call control status notifications (CDMA devices only). **Notification format:** **+WRMICN: <mode>,<icon>]** **Examples:** • +WRMICN: 0,0 *1xRTT network, home icon (not roaming)* • +WRMICN: 1,2 *EVDO network, roam icon on, blinking (affiliated network)* **Parameters:** <mode> (Current RAT) • 0—1xRTT • 1—EVDO <icon> (Roaming icon type) • 0—Home • 1—Roam icon ON (affiliated network) • 2—Roam icon Blink (foreign network)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WUSLMSK	**Enable/disable unsolicited notifications** Enable or disable unsolicited notifications. When enabled, unsolicited notifications are output to the AT port when specific events occur. By default, unsolicited notifications are disabled. **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT+WUSLMSK=<bitmask>,<mask_position>** Response: OK Purpose: Enable or disable the selected notifications (in <bitmask>) defined in the specified 32-bit <mask_position>. • Query: **AT+WUSLMSK?** Response: +WUSLMSK: <bitmask><mask_position> OK Purpose: Report current state of system mode indications (enabled/disabled), showing the upper 32-bit mask followed by the lower 32-bit mask. Example: +WUSLMSK: 00002B0E710241D0 OK (The upper mask is 00002B0E, and lower mask is 710241D0.) • Query List: **AT+WUSLMSK=?** Purpose: Return the execution command format. See the parameter descriptions below for details. **Parameters:** <bitmask> (Unsolicited notifications bit mask, applied to the specified 32-bit <mask_position>) • Bit mask indicating which notifications to enable/disable. • Range: 00000000–FFFFFFFF. For example: • 00000000=All bits off (Default value) • FFFFFFFF=All bits on • Any other combination=Combination of bits off and on • See LOWER unsolicited notifications mask on page 89 and UPPER unsolicited notifications mask on page 90 for supported messages <mask_position> (The 32-bit mask of notifications that the <bitmask> is to be applied to.) • 0=Lower 32-bit mask • 1=Upper 32-bit mask (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WUSLMSK	**Enable/disable unsolicited notifications (continued)** *Note: Notification support is firmware-dependent. Some of these notifications may not be supported or applicable.* **LOWER unsolicited notifications mask** Bit — Mask value — Unsolic. Notif. — Responsible for: 0 — 0x00000001 — --- — Reserved 1 — 0x00000002 — --- — Reserved 2 — 0x00000004 — +CSQ — RSSI change across threshold 3 — 0x00000008 — --- — Reserved 4 — 0x00000010 — +WORG — Call State origination 5 — 0x00000020 — --- — Reserved 6 — 0x00000040 — +WANS — Call State answered 7 — 0x00000080 — +WCNT — Call State conversation 8 — 0x00000100 — +WEND — Call End status 9 — 0x00000200 — --- — Reserved 10 — 0x00000400 — --- — Reserved 11 — 0x00000800 — --- — Reserved 12 — 0x00001000 — +WRMICN — Roaming change 13 — 0x00002000 — --- — Reserved 14 — 0x00004000 — --- — Reserved 15 — 0x00008000 — --- — Reserved 16 — 0x00010000 — --- — Reserved 17 — 0x00020000 — --- — Reserved 18 — 0x00040000 — --- — Reserved 19 — 0x00080000 — --- — Reserved 20 — 0x00100000 — --- — Reserved 21 — 0x00200000 — --- — Reserved 22 — 0x00400000 — --- — Reserved 23 — 0x00800000 — --- — Reserved 24 — 0x01000000 — +WMGF — SMS +WMGF memory full notification 25 — 0x02000000 — --- — Reserved 26 — 0x04000000 — --- — Reserved 27 — 0x08000000 — +WVMI — Voice Mail indication 28 — 0x10000000 — --- — Reserved 29 — 0x20000000 — RING — Incoming call notification 30 — 0x40000000 — --- — Reserved 31 — 0x80000000 — --- — Reserved (Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WUSLMSK	**Enable/disable unsolicited notifications (continued)** **UPPER unsolicited notifications mask** *Note: Notification support is firmware-dependent. Some of these notifications may not be supported or applicable.* Bit / Mask value / Unsolic. Notif. / Responsible for: 0 / 0x00000001 / --- / Reserved 1 / 0x00000002 / !PCVOLT / PMIC voltage state change 2 / 0x00000004 / !PCTEMP / PMIC temperature state change 3 / 0x00000008 / !PATEMP / PA Temperature state change 4 / 0x00000010 / +WJAM / Jamming event 5 / 0x00000020 / --- / Reserved 6 / 0x00000040 / --- / Reserved 7 / 0x00000080 / --- / Reserved 8 / 0x00000100 / +WCC / Call Progress 9 / 0x00000200 / !UIMSTATUS / UIM status change 10 / 0x00000400 / --- / Reserved 11 / 0x00000800 / !PCDEFR / Deferred shutdown timer expiration 12 / 0x00001000 / !GPIOINT / GPIO Interrupt detected 13 / 0x00002000 / !SRV / WWAN Service State change 14 / 0x00004000 / +WDDI / DTMF tone Detection notification 15 / 0x00008000 / !AVVOCODER / Vocoder In Use notifications 16 / 0x00010000 / !RSSI / Signal strength in dBm 17 / 0x00020000 / !RI / Roaming indicator 18 / 0x00040000 / !EONS / Enhanced Operator Name String indicator. String appears within quotes (e.g. ‘ “Response String” ‘) 19 / 0x00080000 / --- / Reserved 20 / 0x00100000 / !NI / Network Identity indication 21 / 0x00200000 / --- / Reserved 22 / 0x00400000 / !PSCS / Indication status of the packet switched data calls 23 / 0x00800000 / --- / Reserved 24 / 0x01000000 / !MODE / Indication of Network modes 25 / 0x02000000 / --- / Reserved 26 / 0x04000000 / !UIMREGSTATE / UIM registration state 27 / 0x08000000 / --- / Reserved 28 / 0x10000000 / --- / Reserved 29 / 0x20000000 / --- / Reserved 30 / 0x40000000 / --- / Reserved 31 / 0x80000000 / --- / Reserved

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	Description
+WVMI (notification)	**Voicemail received—Unsolicited notification** Unsolicited notification that indicates a voicemail has been received. To enable +WVMI (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 89 for details. **Notification format:** **+WVMI: <count>]** **Parameters:** <count> (Number of messages stored in voicemail system) • Valid range: 0–*n*

4: Diagnostic Commands

Introduction

This chapter describes commands used to diagnose modem problems.

Command summary

The table below lists the commands described in this chapter.

Table 4-1: Diagnostic commands

Command	Description	Page
!BCFWUPDATESTATUS	Report status of most recent firmware update attempt	94
!ERR	Display/clear diagnostic information	95
!GCCLR	Clear crash dump data	95
!GCDUMP	Display crash dump data	95

Command reference

Table 4-2: Diagnostic command details

Command	Description
!BCFWUPDATESTATUS	**Report status of most recent firmware update attempt** Return the status of the most recent firmware update attempt made since the last cold restart. **Password required:** No **Usage:** • Execution: **AT!BCFWUPDATESTATUS** Response: !BCFWUPDATESTATUS: <result> *or* !BCFWUPDATESTATUS: <result> Failed IMG TYPE <type>, DATA <data>, PART <part> OK Purpose: Return the status of the most recent firmware update attempt. The second response format appears only if <result> = “FAILED”. **Parameters:** <result> (Status of last firmware update attempt) • ASCII string: • “UNKNOWN”—Status of last attempt is unknown. • “SUCCESS” —Last update was successful. • “FAILED”—Last update failed. <type> (Firmware image type that failed to update) • ASCII string <data> (Reference data for failed image) • Location of the reference data as an offset in the CWE image • Valid range: 0–(2^{32}-1) <part> (Partition associated with the failed image) • ASCII string

Table 4-2: Diagnostic command details (Continued)

Command	Description
!ERR	**Display/clear diagnostic information** This command is used to display or clear diagnostic information (logged error conditions) that Sierra Wireless uses to assist in resolving technical issues. **Password required:** No **Usage:** • Execution: **AT!ERR=0** Response: OK Purpose: Clear the logged error conditions. Use this command before running tests to make sure that details displayed using AT!ERR are relevant to the tests being performed. • Query: **AT!ERR** Response: 00 [F] <count> <file> <line> ... nn [F] <count> <file> <line> OK Purpose: Return all logged error conditions that are stored in NVRAM. **Parameters:** <count> (Number of occurrences) • Valid range: 0x00–0xFF <file> (Log file name) • Name of log file using ASCII characters <line> (Line number in log file) • Valid range: 1–99999
!GCCLR	**Clear crash dump data** Clear crash dump data. **Password required:** No **Usage:** • Execution: **AT!GCCLR** Response: Crash data cleared OK Purpose: Clear crash dump data. **Parameters:** None
!GCDUMP	**Display crash dump data** Display crash dump data. **Password required:** No **Usage:** • Execution: **AT!GCDUMP** Response: (crash dump data) OK or No crash data available OK Purpose: Display crash dump data.

5: Test Commands

Introduction

To obtain regulatory approval and carrier approvals for your product, you may be required to perform tests on the radio component of the embedded modem. This chapter describes AT commands used to perform those tests.

Warning: *These commands are intended for use by developers, not end-users. The commands should be used only in a controlled network environment.*

In most cases the modem must be in a particular mode before you can issue the AT commands to perform particular tests. Therefore, the order in which you issue certain commands is important. Three AT commands are important in setting the mode:

- !DAFTMACT—puts the modem in factory test mode (a non-signaling mode). You must issue **AT!DAFTMACT** before issuing any other command that starts with "!DA".
- !DASBAND—selects the frequency band.
- !DASCHAN—selects the channel. This command must be run after you have selected the band with **!DASBAND**. (If you don't select a channel, the modem uses a default.)

Command summary

The table below lists the commands described in this chapter.

Table 5-1: Test commands

Command	Description	Page
!DACGPSCTON	Return CGPS C/N and frequency	99
!DACGPSMASKON	Set CGPS log mask	99
!DACGPSSTANDALONE	Enter/exit Stand Alone RF mode	100
!DACGPSTESTMODE	Start/stop CGPS diagnostic task	100
!DAFTMACT	Put modem into Factory Test Mode	101
!DAFTMDEACT	Put modem into Online Mode from Factory Test Mode	101
!DALSNSVAL	Configure LTE Net Sig value (LTE only)	102
!DALSPARANGE	Set LTE PA range (LTE only)	102
!DALSRXBW	Set LTE Rx bandwidth (LTE only)	103
!DALSTXBW	Set LTE Tx bandwidth (LTE only)	103
!DALSTXMOD	Set LTE Tx modulation type (LTE only)	104
!DALSTXPWR	Set LTE Tx power level (LTE only)	105
!DALSWAVEFORM	Set LTE TX waveform (LTE only)	106
!DASBAND	Set frequency band	107
!DASCHAN	Set modem channel (frequency)	108
!DASLNAGAIN	Set LNA gain state	109
!DASPDM	Set PDM value (WCDMA and GSM only)	110
!DASTXOFF	Turn Tx PA off	110
!DASTXON	Turn Tx PA on	111
!DAWGAVGAGC	Return averaged Rx AGC value (WCDMA only)	111
!DAWSPARANGE	Set PA range state machine (WCDMA only)	112
!DAWSSCHAIN	Enable secondary receive chain (WCDMA only)	112
!DAWSTXCW	Set waveform used by the transmitter (WCDMA only)	113
!LDTEST	Test LED	113
!LDTESTOFF	Reset LED to normal mode from test mode	114

Command reference

Table 5-2: Test command details

Command	Description
!DACGPSCTON	**Return CGPS C/N and frequency** Return the CGPS C/N (signal strength) and frequency measurement. **Requirements:** Before this command can be used: • Use !DACGPSTESTMODE=1 to start the CGPS diagnostic task • Use !DACGPSSTANDALONE=1 to enter standalone RF mode • Use !DACGPSMASKON to enable the CGPS log mask **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DACGPSCTON** Response: CtoN=<CtoN>,Freq=<freq> OK Purpose: Return the current CGPS signal strength and frequency. **Parameters:** <CtoN> (Signal strength) • 0.0–99.0—Signal strength calculated in 0.1 dBHz. <freq> (Frequency offset) • 0–4294967295—Frequency offset in Hz.
!DACGPSMASKON	**Set CGPS log mask** Set the CGPS IQ log mask. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DACGPSMASKON** Response: <logmask> OK Purpose: Enter or exit Stand Alone RF mode. **Parameters:** <logmask> (CGPS IQ log mask) • 288-character hexadecimal string • 730000000300000000000000001000000DC03 00000000000000000000000000000000000000 00000000000000000000000000000000000000 00000000000000000000000000000000000000 00000000000000000000000000000000000000 00000000000000000000000000000000000000 00000000000000000000000000000000000000 00000000000000040000000000000000000000

Table 5-2: Test command details (Continued)

Command	Description
!DACGPSSTANDALONE	**Enter/exit Stand Alone RF mode** Enter or exit stand alone (SA) RF mode. **Requirements:** Before this command can be used: • Use !DACGPSTESTMODE=1 to start the CGPS diagnostic task. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DACGPSSTANDALONE=<state>** Response: <status> OK *or* ERROR Purpose: Enter or exit Stand Alone RF mode. **Parameters:** <state> (Requested SA RF mode) • 0—Exit • 1—Enter <status> (Return value indicating requested <state> change) • Appears only if <state> change is successful. • 4B0D65001400—Successfully changed state.
!DACGPSTESTMODE	**Start/stop CGPS diagnostic task** Start or stop the CGPS diagnostic task. This command allows the GNSS engine to be tested without obtaining a GNSS position fix. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DACGPSTESTMODE=<mode>** Response: <status> OK *or* ERROR Purpose: Start or stop the CGPS diagnostic task. **Parameters:** <mode> (Start/stop CGPS diagnostic task) • 0—Stop • 1—Start <status> (Return value indicating requested <mode> change) • Appears only if <mode> change is successful. • 4B0D0800—Successfully started the CGPS diagnostic task • 4B0D0C00—Successfully stopped the CGPS diagnostic task

Table 5-2: Test command details (Continued)

Command	Description
!DAFTMACT	**Put modem into Factory Test Mode** Place the modem in FTM (Factory Test Mode). FTM is a non-signaling mode that allows the radio component to be manually configured to conduct certain types of tests. The modem must be in FTM mode to use the test commands described in this chapter (except for commands that start with "!DACGPS" *Note: When this command executes successfully, the modem responds with the value 290300. Any other response indicates an error.* **Password required:** Yes (see !ENTERCND for details) **Usage:** • Query: **AT!DAFTMACT** Response: 290300 *(Success. Any other response indicates an error.)* OK Purpose: Place modem in FTM mode (from online mode)
!DAFTMDEACT	**Put modem into Online Mode from Factory Test Mode** Take the modem out of FTM and put it back into online mode. (!DAFTMACT puts the modem into FTM.) *Note: When this command executes successfully, the modem responds with the value 290400. Any other response indicates an error.* **Password required:** Yes (see !ENTERCND for details) **Usage:** • Query: **AT!DAFTMDEACT** Response: 290400 *(Success. Any other response indicates an error.)* OK Purpose: Place modem in online mode (from FTM mode).

Table 5-2: Test command details (Continued)

Command	Description
!DALSNSVAL	**Configure LTE Net Sig value (LTE only)** Configure the LTE Net Sig (NS) value, which will be used to configure Tx power. The NS value is used to determine the additional max power backoff to reduce spectrum emissions. **Command Availability:** Valid in WPx5 Release 16 and later **Requirements:** Before this command can be used: • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to an LTE band. • Use !DALSRXBW to set the LTE Rx bandwidth. • Use !DALSTXBW to set the LTE Tx bandwidth. • Use !DASCHAN to set the uplink channel for the selected band. • Use !DALSTXMOD to set the LTE Tx modulation type. • Use !DALSWAVEFORM to set the LTE Tx waveform characteristics. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DALSNSVAL=<ns_val>** Response: OK Purpose: Set the LTE Net Sig value. **Parameters:** <ns_val> (Net Sig value) • 1–32
!DALSPARANGE	**Set LTE PA range (LTE only)** Set the LTE PA (Power Amplifier) range. **Requirements:** Before this command can be used: • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to an LTE band. • Use !DALSTXBW to set the LTE Tx bandwidth. • Use !DASCHAN to set the uplink channel for the selected band. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DALSPARANGE=<pa_range>** Response: OK Purpose: Set the LTE PA range. **Parameters:** <pa_range> (PA range) • 0–3

Table 5-2: Test command details (Continued)

Command	Description
!DALSRXBW	**Set LTE Rx bandwidth (LTE only)** Set the LTE Rx bandwidth. **Requirements:** Before this command can be used: • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to an LTE band. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DALSRXBW=<bw>** Response: OK Purpose: Set the LTE Rx bandwidth. **Parameters:** <bw> (LTE bandwidth) • 0=1.4 MHz • 1=3 MHz • 2=5 MHz • 3=10 MHz • 4=15 MHz • 5=20 MHz
!DALSTXBW	**Set LTE Tx bandwidth (LTE only)** Set the LTE Tx bandwidth. **Requirements:** Before this command can be used: • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to an LTE band. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DALSTXBW=<bw>** Response: OK Purpose: Set the LTE Tx bandwidth. **Parameters:** <bw> (LTE bandwidth) • 0=1.4 MHz • 1=3 MHz • 2=5 MHz • 3=10 MHz • 4=15 MHz • 5=20 MHz

Table 5-2: Test command details (Continued)

Command	Description
!DALSTXMOD	**Set LTE Tx modulation type (LTE only)** Set the LTE Tx modulation type. **Command Availability:** Valid in WPx5 Release 16 and later **Requirements:** Before this command can be used: • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to an LTE band. • Use !DALSRXBW to set the LTE Rx bandwidth. • Use !DALSTXBW to set the LTE Tx bandwidth. • Use !DASCHAN to set the uplink channel for the selected band. After this command is used: • For the modulation change to have an effect, use !DALSWAVEFORM to set the LTE Tx waveform. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DALSTXMOD=<mod_type>** Response: OK Purpose: Set the LTE Tx modulation type. **Parameters:** <mod_type> (LTE modulation type) • 0—QPSK • 1—16 QAM • 2—64 QAM

Table 5-2: Test command details (Continued)

Command	Description
!DALSTXPWR	**Set LTE Tx power level (LTE only)** Set the desired LTE Tx power level. *Note: This command cannot support a PUCCH waveform. (Waveform type is set using !!DALSPARANGE.)* **Command Availability:** Valid in WPx5 Release 16 and later **Password required:** Yes (see !ENTERCND for details) **Requirements:** Before this command can be used: • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to an LTE band. • Use !DASCHAN to set the uplink channel for the selected band. • Use !DALSRXBW to set the LTE Rx bandwidth. • Use !DALSTXBW to set the LTE Tx bandwidth. • Use !DALSTXMOD to set the LTE Tx modulation type. • Use !DALSWAVEFORM to set the LTE Tx waveform characteristics. • Use !DALSNSVAL to set the LTE Net Sig value. • Use !DASTXON to turn the LTE transceiver PA on. **Usage:** • Execution: **AT!DALSTXPWR=<enable>,<power_dBm>** Response: OK Purpose: Set the LTE Tx modulation type. **Parameters:** <enable> (Enable/disable Tx power output) • 0—Disable • 1—Enable <power_dBm> (Desired Tx power) • -57 to 23—Tx power in dBm • Field is ignored if <enable>=0

Table 5-2: Test command details (Continued)

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>!DALSWAVEFORM</td><td>
Set LTE TX waveform (LTE only)
Set the LTE Tx waveform characteristics.

Requirements:
Before this command can be used:
• Use !DAFTMACT to enter FTM mode.
• Use !DASBAND to set the device to an LTE band.
• Use !DALSTXBW to set the LTE Tx bandwidth.
• Use !DASCHAN to set the uplink channel for the selected band.
Password required: Yes (see !ENTERCND for details)

Usage:
• Execution: AT!DALSWAVEFORM=<waveform>[,<PUSCH_RBs>,<PUCCH_RBs>,<PUSCH_start_RB_index>]
Response: OK
Purpose: Set the LTE Tx waveform characteristics.
Parameters:
<waveform> (Tx waveform)
• 0=1 MHz offset CW (Carrier Wave)
• 1=LTE PUSCH (Physical Uplink Shared Channel)
• 2=LTE PUCCH (Physical Uplink Control Channel)
• 3=LTE PRACH (Physical Random Access Channel)
• 4=LTE SRS (Signaling Reference Signal)
• 5=UpPTS (Uplink Pilot Time Slot (LTE TDD))

<PUSCH_RBs> (Number of PUSCH resource blocks
• Valid rnage: 0–100
• Recommended number of PUSCH RBs:
<table>
<tr><th>Bandwidth (MHz)</th><th>PUSCH RBs</th></tr>
<tr><td>1.4</td><td>6</td></tr>
<tr><td>3</td><td>15</td></tr>
<tr><td>5</td><td>25</td></tr>
<tr><td>10</td><td>50</td></tr>
<tr><td>15</td><td>75</td></tr>
<tr><td>20</td><td>100</td></tr>
</table>
<PUCCH_RBs> (Number of PUCCH resource blocks)
• Valid range: 0–12

<PUSCH_start_RB_index> (PUSCH starting resource block index
• Valid range: 0–255
</td></tr>
</table>

Table 5-2: Test command details (Continued)

Command	Description
!DASBAND	**Set frequency band** Set the modem to use a particular frequency band. You must use this command to select an appropriate band before running LTE, WCDMA, or GSM commands. See page 97. **Requirements:** Before this command can be used: • Use !DAFTMACT to enter FTM mode. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DASBAND=<rfband>** Response (GSM/WCDMA): <rfband> OK Response (LTE): 0 OK *(Note: For LTE frequency bands, even though the response shows 0 instead of <rfband>, the band has been set correctly if the response shows 'OK'.)* Purpose: Set frequency band. **Parameters:** <rfband> (Unique value corresponding to an RF band and technology.) • Unique value that maps to an RF band and technology. It is not an actual 3GPP band number. For example, '18' is GSM 850, which corresponds to 3GPP band 5 (on a GSM network). • Band support is product-dependent—see the device's Product Specification or Product Technical Specification document for details. • Examples (for a full listing, see Table 15-1 on page 205): • GSM • 10=GSM 900 • 11=GSM 1800 • 12=GSM 1900 • 18=GSM 850 • WCDMA • 9=WCDMA 2100 • 16=WCDMA 1900B • 22=WCDMA 850 • 29=WCDMA 900 (BC8) • LTE • 34=LTE B1 • 35=LTE B7 • 36=LTE B13 • 37=LTE B17 • 42=LTE B4 • 44=LTE B3 • 47=LTE B8 • 56=LTE B20

Table 5-2: Test command details (Continued)

Command	Description
!DASCHAN	**Set modem channel (frequency)** Set the modem to operate on a particular frequency channel. Before using this command, use the command !DASBAND (described on page 107) to set the band. Once a channel is set, the modem continues to use that channel until the modem is reset or powered off and on. **Requirements:** • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to an LTE, WCDMA, or GSM band. • If In LTE mode (an LTE band was selected): • Use !DALSRXBW to set the LTE Rx bandwidth. • Use !DALSTXBW to set the LTE Tx bandwidth. • Use !DASCHAN to set the uplink channel for the selected band. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** No **Persistent across power cycles:** No **Usage:** • Execution: **AT!DASCHAN=<rfchannel>** Response: <rfchannel> OK Purpose: Set modem channel (frequency). **Parameters:** <rfchannel> (Uplink channel number (ARFCN)—depends on frequency band being used) • 128–251: GSM 850 MHz • 1–24: GSM 900 MHz • 975–1023: GSM 900 MHz • 512–885: GSM 1800 MHz • 512–810: GSM 1900 MHz • 9612–9888: WCDMA 2100 • 9262–9538: WCDMA 1900 • 4132–4233: WCDMA 850 • 2712–2863: WCDMA 900 • 18000–18599: LTE B1 • 19200–19949: LTE B3 • 19950–20399 LTE B4 • 20750–21449: LTE B7 • 21450–21799: LTE B8 • 23180–23279: LTE B13 • 23730–23849: LTE B17 • 24150–24449: LTE B20

Table 5-2: Test command details (Continued)

Command	Description
!DASLNAGAIN	**Set LNA gain state** Set the LNA (Low Noise Amplifier) range for the main or diversity path (if applicable), in either WCDMA or GSM mode. **Requirements:** • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to a WCDMA or GSM band • Use !DASCHAN to set the uplink channel for the selected band. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DASLNAGAIN=<gain index>[, <path>]** Response: <gain index> OK Purpose: Set the LNA gain state for either the main or diversity paths. **Parameters:** <gain index> • 0=R0 (highest gain) Approximate switch from low to high gain: WCDMA (< -72 dBm); GSM (< -73 dBm) • 1=R1 Approximate switch from low to high gain: WCDMA (< -72 up to -46 dBm); GSM (< -73 up to -58 dBm) • 2=R2 Approximate switch from low to high gain: WCDMA (< -46 up to -36 dBm); GSM (< -58 up to -41 dBm) • 3=R3 (lowest gain) Approximate switch from low to high gain: WCDMA (> -36 dBm); GSM (< -41 dBm) *Note: The LNA gain state is set based on the expected receive power level. The gain state values listed above are provided as a guideline. Values are approximations and subject to change over time.* <path> (For modules supporting diversity) • 0=Main path (Default) • 1=Secondary (diversity) path

Table 5-2: Test command details (Continued)

Command	Description
!DASPDM	**Set PDM value (WCDMA and GSM only)** Adjust the PDM (Pulse Duration Modulation), allowing you to apply frequency offset to the LO (Local Oscillator) or Tx AGC. When you adjust the Tx AGC (<PDM ID> = 2), the modem does not use a calibrated result but uses the raw AGC value. The resulting change in Tx power will vary from modem to modem, so it is usually necessary to tune this value by executing the command repeatedly with different settings for the <PDMvalue> until you obtain the desired Tx power. When adjusting the tracking LO, you also need to execute the command repeatedly with different settings for the <PDMvalue> until you obtain the desired frequency offset. **Requirements:** • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to a WCDMA or GSM band. • Use !DASCHAN to set the uplink channel for the selected band. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DASPDM=<PDM ID>, <PDMvalue>** Response: <PDM ID> <PDMvalue> OK Purpose: Set the tracking LO and Tx AGC PDM. **Parameters:** <PDM ID> (LO (Local Oscillator) or Tx AGC (Automatic Gain Control) to adjust) • 0—Tracking LO adjust (GSM only) • 2—Tx AGC adjust (WCDMA only) • 4—Tracking LO adjust (WCDMA only) <PDMvalue> (Frequency offset value) • If <PDM ID>=0: 0–511 • If <PDM ID>=2: 0–511 • If <PDM ID>=5: 0–65536
!DASTXOFF	**Turn Tx PA off** Turn the transceiver PA off, after it has been turned on with !DASTXON. **Requirements:** • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the band. • Use !DASCHAN to set the uplink channel for the selected band. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** No **Persistent across power cycles:** No **Usage:** • Execution: **AT!DASTXOFF** Response: OK Purpose: Turn the Tx PA off. **Parameters:** None

Table 5-2: Test command details (Continued)

Command	Description
!DASTXON	**Turn Tx PA on** Turn the transceiver PA on. The PA remains on until you turn it off using !DASTXOFF, or until you reset or power the modem down and up. **Requirements:** • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the band. • Use !DASCHAN to set the uplink channel for the selected band. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** No **Persistent across power cycles:** No **Usage:** • Execution: **AT!DASTXON** Response: OK Purpose: Turn the Tx PA on. **Parameters:** None
!DAWGAVGAGC	**Return averaged Rx AGC value (WCDMA only)** Return the averaged AGC (Automatic Gain Control) reading for a specific band for either the main path or diversity path (if applicable). **Requirements:** • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to a WCDMA band. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DAWGAVGAGC=<channel>, <LNA Index>[, <path>]** Response: <agc> OK Purpose: Return the averaged AGC for <channel> on the main path or diversity path. **Parameters:** <channel> (Uplink channel number (UARFCN) for the band specified using !DASBAND) • Valid values depend on the selected band <LNA Index> (LNA offset index) • 0=R0 (Highest gain) • 1=R1 • 2=R2 • 3=R3 (Lowest gain) <path> (For modules supporting diversity) • 0=Main path • 1=Diversity path <agc> (Averaged Rx AGC in dBm) • Example: -78.9

Table 5-2: Test command details (Continued)

Command	Description
!DAWSPARANGE	**Set PA range state machine (WCDMA only)** Set the PA range state machine in WCDMA operation. **Requirements:** • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to a WCDMA band. • Use !DASCHAN to set the uplink channel for the selected band. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DAWSPARANGE=<PA range>** Response: <PA range> OK Purpose: Set the PA range state machine. **Parameters:** <PA range> • 0—Low gain state of the PA — Limited to about 16 dBm output power (R0=0, R1=0) • 1— (R0=1, R1=0) • 2— (R0=0, R1=1) • 3—High gain state of the PA — Up to the maximum output power of the modem (R0=1, R1=1)
!DAWSSCHAIN	**Enable secondary receive chain (WCDMA only)** Enable or disable the secondary receive chain. **Requirements:** • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to a WCDMA band. • Use !DASCHAN to set the uplink channel for the selected band. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DAWSSCHAIN=<state>** Response: OK Purpose: Enable or disable the secondary receive chain. **Parameters:** <state> (Requested state for secondary receive chain) • 0=Off (Disable) • 1=On (Enable)

Table 5-2: Test command details (Continued)

Command	Description
!DAWSTXCW	**Set waveform used by the transmitter (WCDMA only)** Set the waveform used by the transmitter—the modem can transmit either in carrier wave or WCDMA modulated. **Requirements:** • Use !DAFTMACT to enter FTM mode. • Use !DASBAND to set the device to a WCDMA band. • Use !DASCHAN to set the uplink channel for the selected band. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!DAWSTXCW=<waveform>** Response: OK Purpose: Set the transmitter waveform. **Parameters:** <waveform> (Waveform used by the transmitter) • 0=WCDMA • 1=Carrier wave (no modulating signal applied)
!LDTEST	**Test LED** Test an LED by turning it on (light) or off (dark). When finished testing the LED, either use !LDTESTOFF or reboot the device to return to normal LED operation. *Note: Only one LED can be tested at a time.* **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!LDTEST=<led_no>,<state>** Response: OK Purpose: Turn the specified LED on (light) or off (dark). • Query: **AT!LDTEST?** Response: (last test record of tested leds) OK Purpose: Report the reusult of the last test. • Query List: **AT!LDTEST=?** Purpose: Display the assignment command format and valid parameter options. **Parameters:** <led no> (LED to test) • 0–8—LED index number <state> (LED state) • 0—Dark • 1—Light

Table 5-2: Test command details (Continued)

Command	Description
!LDTESTOFF	**Reset LED to normal mode from test mode** Show current LED mode (testing/normal) or return LED to normal mode from test mode. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!ILDTESTOFF** Response: OK Purpose: Return an LED that is currently in test mode to normal mode. • Query: **AT!LDTESTOFF?** Response: !LDTESTOFF: <mode> OK Purpose: Report the current mode of the LED. • Query List: **AT!LDTESTOFF=?** Purpose: Display the assignment command format. **Parameters:** <mode> (LED mode) • 0—Normal operating mode • 1—Test mode

6: Memory Management Commands

Introduction

The modem uses non-volatile memory to store:

- Factory calibration data
- Settings made in a host application such as Skylight.

The commands in this chapter allow you to back up and restore the data in non-volatile memory.

Command summary

The table below lists the commands described in this chapter:

Table 6-1: Memory management commands

Command	Description	Page
!RMARESET	Restore device to original settings	115

Command reference

Table 6-2: Memory management command details

Command	Description
!RMARESET	**Restore device to original settings** Restore the device to the original provisioned (OEM default) state. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: AT!RMARESET=<category> Response: !RMARESET: <category> RESET OK Purpose: Restore device to original provisioned (OEM default) state. **Parameters:** <category> (Type of restoration) • OEM=Default OEM provisioned state • RTN=OEM provisioned state plus activation and Sprint-related settings

7: GPS Commands

Introduction

This chapter describes commands used to access GPS functionality in supporting modules.

When using these commands, the following considerations apply:

- GPS is typically enabled by default; however, it may be disabled by default for some SKUs. If so, enable GPS using AT!CUSTOM="GPSENABLE"
- If supported by the modem, gpsOneXTRA is enabled (over the NDIS interface) by default when GPS is enabled, and it generates data traffic.

Command summary

The table below lists the commands described in this chapter.

Table 7-1: GPS commands

Command	Description	Page
!GPSAUTOSTART	Configure GPS auto-start features	119
!GPSCLRASSIST	Clear specific GPS assistance data	120
!GPSCOLDSTART	Clear all GNSS assistance data	121
!GPSEND	End an active session	121
!GPSFIX	Initiate GPS position fix	122
!GPSLOC	Return last known location of the modem	123
!GPSSATINFO	Request satellite information	124
!GPSSTATUS	Request current status of a position fix session	125
!GPSSUPLURL	Set/report SUPL server URL	126
!GPSSUPLVER	Set/report SUPL server version	127
!GPSTRACK	Initiate local tracking (multiple fix) session	128
!GPSTRANSSEC	Control GPS transport security	129
!GPSXTRADATAENABLE	Set/report GPS XTRA settings	130
!GPSXTRADATAURL	Set/report GPS XTRA data server URLs	131
!GPSXTRAINITDNLD	Initiate gpsOneXTRA data download and inject operation	131
!GPSXTRASTATUS	Return current status of gpsOneXTRA	132

Table 7-1: GPS commands (Continued)

Command	Description	Page
!GPSXTRATIME	Inject GPS or UTC time into gpsOneXTRA system	133
!GPSXTRATIMEENABLE	Set/report GPS XTRA time settings	134
!GPSXTRATIMEURL	Set/report GPS XTRA SNTP server URLs	135

Command reference

Table 7-2: GPS command details

Command	Description
!GPSAUTOSTART	**Configure GPS auto-start features** Configure the GPS auto-start features. Any changes take effect the next time the modem is reset. *Note: If auto-start is enabled, another GPS session cannot be started.* **Password required:** No **Reset required to apply changes:** Yes **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!GPSAUTOSTART=<function>[, <fixtype>, <maxtime>, <maxdist>, <fixrate>]** Response: OK *or* ERROR Purpose: Assign start values for various GPS settings • Query: **AT!GPSAUTOSTART?** Response: !GPSAUTOSTART function: <function> fixtype: <fixtype> maxtime: <maxtime> seconds maxdist: <maxdist> meters fixrate: <fixrate> seconds OK Purpose: Display the current values for auto-start features • Query List: **AT!GPSAUTOSTART=?** Purpose: Return the expected command format. **Parameters:** <function> (When GPS auto-start will occur) • 0=Disabled • 1=At bootup • 2=When NMEA port opened <fixtype> (Type of fix to establish) • 1=Standalone (not supported by a mobile station) • 2=MS-based only • 3=MS-assisted only <maxtime> (Maximum time to wait for a position fix) • Valid range: 0–255—Number of seconds to wait <maxdist> (Requested accuracy of fix) • Entered in decimal format • Valid range: • 0–4294967279 meters • 4294967280=No preference <fixrate> (Time to wait between fixes) • Valid range: 1–65535 seconds

Table 7-2: GPS command details (Continued)

Command	Description
!GPSCLRASSIST	**Clear specific GPS assistance data** Clear one or more types of assistance data from the modem. This forces a cold start for GPS acquisition the next time a session starts. This command is equivalent to **!GPSCOLDSTART** when all four parameters are set to '1'. **Requirements:** • Device must not have an active GPS session (the GPS receiver is off and no position fix is being calculated). **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!GPSCLRASSIST=<eph>, <alm>, <pos>, <time>, <iono>** Response: OK *or* Command ignored OK Purpose: Clear each assistance data type that is flagged as '1'. • Query List: **AT!GPSCLRASSIST=?** Purpose: Return the expected command format and supported values. **Parameters:** <eph> (Ephemeris assistance data) • 0=Ignore (Do not clear the ephemeris assistance data) • 1=Clear this assistance data type—Clears GPS, GLONASS, and SBAS ephemeris assistance data. <alm> (Almanac assistance data) • 0=Ignore (Do not clear the almanac assistance data) • 1=Clear this assistance data type—Clears GPS, GLONASS, and SBAS almanac assistance data. <pos> (Position assistance data) • 0=Ignore (Do not clear the position assistance data) • 1=Clear this assistance data type <time> (Time reference) • 0=Ignore (Do not clear the time reference) • 1=Clear the time reference <iono> (Ionosphere assistance data) • 0=Ignore (Do not clear the ionosphere assistance data) • 1=Clear this assistance data type

Table 7-2: GPS command details (Continued)

Command	Description
!GPSCOLDSTART	**Clear all GNSS assistance data** Clear all GNSS assistance details from the modem and put the modem into a coldstart state. Data cleared includes Almanac, Ephemeris, Previous Position, Ionosphere, and GPS time. This forces a cold start for GPS acquisition the next time a session starts. **Requirements:** • Device must not have an active GPS session (the GPS receiver is off and no position fix is being calculated). **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!GPSCOLDSTART** Response: OK Purpose: Clear the modem's GPS details **Parameters:** None
!GPSEND	**End an active session** End an active position fix session. **Password required:** No **Usage:** • Execution: **AT!GPSEND=<sessType>** Response: ERRCODE = <value> OK *or* OK Purpose: End the current session. **Parameters:** <sessType> (Type of session to end) • 0=Position fix session <value> (Error code returned when command fails for any reason) • See Table 7-3 on page 135 for a list of possible error codes.

Table 7-2: GPS command details (Continued)

Command	Description
!GPSFIX	**Initiate GPS position fix** Initiate a GPS position fix. **Password required:** No **Usage:** • Execution: **AT!GPSFIX=<fixType>, <maxTime>, <maxDist>** Response: OK *or* ERROR CODE = <value> OK Purpose: Initiate a time-limited position fix with a specified accuracy. • Query List: **AT!GPSFIX=?** Purpose: Return supported <fixType>, <maxTime>, and <maxDist> values. **Parameters:** <fixType> (Type of fix to establish) • 1=Standalone (not supported by a mobile station) • 2=MS-based only • 3=MS-assisted only <maxTime> (Maximum time to wait for a position fix) • Valid range: 0–255 seconds <maxDist> (Requested accuracy of fix) • Entered in decimal format • Valid range: • 0–4294967279 meters • 4294967280=No preference <value> (Error code returned when command fails for any reason) • See Table 7-3 on page 135 for a list of possible error codes. **Example(s):** AT!GPSFIX=1, 15, 10 requests a standalone position fix to 10 meters accuracy. The request will fail (timeout) if the modem cannot determine a position fix within 15 seconds. **Related commands:** • **!GPSSTATUS** (page 125)—Use this command while the tracking session is in progress. • **!GPSLOC** (page 123)—Use this command after the session completes to obtain the result.

Table 7-2: GPS command details (Continued)

Command	Description
!GPSLOC	**Return last known location of the modem** Return the details obtained during the most recent position location session, if available. **Password required:** No **Usage:** • Query: AT!GPSLOC? Response: Unknown *(No information is available)* OK *or* Not Available *(No information is available)* OK *or* Lat: <latitude> Lon: <longitude> Time: <time> LocUncAngle: <luAngle> LocUncA: <luA> LocUncP: <luP> HEPE: <hepe> <fixType> Altitude: <altitude> LocUncVe: <luV> Heading: <heading> VelHoriz: <vH> VelVert: <vV> OK *(Altitude and heading only appear if data was collected as part of the most recent fix.)* Purpose: Return last position location details. **Parameters:** <latitude> (Latitude at last position fix) • Example: “49 Deg 10 Min 21.49 Sec N (0x008BDE6C)” <longitude> (Longitude at last position fix) • Example: “123 Deg 4 Min 14.76 Sec W (0xFEA1EE9A)” <time> (Time at which last position fix was taken) • Example: “2009 01 30 4 20:27:18 (GPS)” <luAngle> (Location uncertainty angle of returned position) • Example: “11.2 deg” <luA> (Standard deviation of axis along <luAngle>) • Example: “6.0 m” <luP> (Standard deviation of axis perpendicular to <luAngle>) • Example: “6.0 m” <hepe> (Horizontal Estimated Positional Error) • Example: “8.485 m” <fixType> (2D or 3D fix) • Example: “2D Fix” or “3D Fix” <altitude> (Altitude in meters at which last position fix was taken) • Only present if <fixType> is 3D • Example: “-1 m” <luV> (Vertical uncertainty in meters) • Only present if <fixType> is 3D • Example: “3.0 m” (Continued on next page)

Table 7-2: GPS command details (Continued)

Command	Description
!GPSLOC (continued)	**Return last known location of the modem (continued)** <heading> (Direction of MS) • Example: “0.0 deg” <vH> (Horizontal velocity) • Example: “0.0 m/s” <vV> (Vertical velocity) • Example: “0.0 m/s”
!GPSSATINFO	**Request satellite information** Return the following information for all satellites in view (including those used in the latest position fix): satellite vehicle number (SV), elevation (ELEV), azimuth (AZI), and signal to noise ratio (SNR). The information returned is valid regardless of the current fix mode or whether the PDE or the modem performs the fix calculations. **Password required:** No **Usage:** • Query: **AT!GPSSATINFO?** Response: NO SAT INFO OK *or* Satellites in view: <numSats> * SV: <SV 1> ELEV:<ELEV 1> AZI:<AZI 1> SNR:<SNR 1> ... * SV: <SV n> ELEV:<ELEV n> AZI:<AZI n> SNR:<SNR n> OK Purpose: Return the number of satellites in view (including those used in the latest position fix) and details for each satellite (or return an error message). *Note: An asterisk (*) at the beginning of a line indicates the satellite was used in the fix location calculation.* **Parameters:** <numSats> (Number of satellites in view) • 1 or more <SV n> (Satellite vehicle number for the nth satellite in the list) • 1 or more • 1-32—GPS • 65-96—GLONASS • 201–237—Beidou (Note: Not supported by WPx5xx.) • 301-336—Galileo <ELEV n> (Satellite elevation relative to modem location, in degrees) • Valid range: 0–90 <AZI n> (Satellite azimuth relative to modem location, in degrees) • Valid range: 0–360 <SNR n> (Signal to noise ratio, in dB) • Valid range: 0–99

Table 7-2: GPS command details (Continued)

Command	Description
!GPSSTATUS	**Request current status of a position fix session** Return the current status of a position fix session. **Password required:** No **Usage:** • Query: **AT!GPSSTATUS?** Response: <year> <month> <day> <day of week> <time of day> Last Fix Status = <status> <year> <month> <day> <day of week> <time of day> Fix Session Status = <status> Purpose: Return timestamps and status of a position fix session. **Parameters (Timestamp):** <year> • Example: “2007” <month> • 01–12 (Jan–Dec) <day> • 01–31 <day of week> • 0–6 (0=Monday) <time of day> • 24-hour clock format • Example: “13:25:48” **Parameters (Status):** <status> (Session status) • “NONE”: No session of this type has occurred since the modem powered up. • The timestamp is the current time. • “ACTIVE”: A session of this type is currently active. • The timestamp is the time when the session entered this state. • “SUCCESS”: The most recent session of this type succeeded. • The timestamp is the time when the previous session completed successfully. • “FAIL”: The most recent session of this type failed. • The timestamp is the time when the previous session failed. • An error code is displayed with the “FAIL” string. See Table 7-3 on page 135 for a list of error codes. **Example(s):** AT!GPSSTATUS? returns: 2007 01 06 6 00:25:01 Last Fix Status = SUCCESS 2007 01 06 6 00:25:02 Fix Session Status = ACTIVE

Table 7-2: GPS command details (Continued)

Command	Description
!GPSSUPLURL	**Set/report SUPL server URL** Set or return the URL and port of the SUPL server to be used when TCP/IP is used as the transport mechanism for location processing. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** Yes **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!GPSSUPLURL="<suplURL>"[:<port ID>]** Response: OK or ERROR Purpose: Identify the SUPL server URL. • Query: **AT!GPSSUPLURL?** Response: <suplURL> OK Purpose: Return the SUPL server's URL.. • Query List: **AT!GPSSUPLURL=?** Purpose: Return the execution command format. **Parameters:** <suplURL> (SUPL server URL) • Must be a fully qualified domain name (FQDN) or address • Examples: "supl.url.net", "123.123.123.123" • The <suplURL> is not checked for correctness—if the string is invalid, the modem will not be able to perform MS-assisted GPS fixes. <port ID> (Port ID to use over TCP/IP) • Valid range: 0–65535 **Example(s):** AT!GPSSUPLURL="supl.url.net" AT!GPSSUPLURL="123.123.123.123" AT!GPSSUPLURL="123.123.123.123":17432

Table 7-2: GPS command details (Continued)

Command	Description
!GPSSUPLVER	**Set/report SUPL server version** Set or return the version of the SUPL server. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** Yes **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!GPSSUPLURL=<supl ver>"** Response: OK or ERROR Purpose: Identify the SUPL server version. • Query: **AT!GPSSUPLVER?** Response: <supl ver> OK Purpose: Return the SUPL server's version. • Query List: **AT!GPSSUPLVER=?** Purpose: Return the execution command format. **Parameters:** <supl ver> (SUPL server version) • 1—SUPL version 1 • 2—SUPL version 2

Table 7-2: GPS command details (Continued)

Command	Description
!GPSTRACK	**Initiate local tracking (multiple fix) session** Initiate a local tracking session comprising a specific number of position fixes taken at regular time intervals. **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** No **Usage:** • Execution: **AT!GPSTRACK = <fixType>, <maxTime>, <maxDist>, <fixCount>, <fixRate>** Response: OK *or* ERROR CODE = <value> OK Purpose: Initiate a series of time-limited position fixes. • Query List: **AT!GPSTRACK=?** Purpose: Return supported <fixType>, <maxTime>, <maxDist>, <fixCount>, and <fixRate> values. **Parameters:** <fixType> (Type of fix to establish) • 1=Standalone (not supported by a mobile station) • 2=MS-based only • 3=MS-assisted only <maxTime> (Maximum time to wait for satellite information) • Valid range: 0–255 seconds <maxDist> (Requested accuracy of fix) • Entered in decimal format • Valid range: • 0–4294967279 meters • 4294967280=No preference <fixCount> (Number of position fixes requested) • Valid range: 1–1000 (1000—Take a continuous series of position fixes) <fixrate> (Amount of time to wait between fix attempts) • Valid range: 0–1799999 seconds **Failure conditions:** The request fails if the tracking session fails to initiate. If the request fails, the message ERROR CODE = <value> is returned. See Table 7-3 on page 135 for a list of error codes. *Note: The 'time to first fix' may require more time than subsequent fixes, if almanac, ephemeris, or location data needs to be updated. (Almanac data is valid for 3–4 days, ephemeris for 30–120 minutes, and location data for 4 minutes). To avoid a timeout error (time spent > <maxtime>), your application could precede the **!GPSTRACK** call with a single position fix (**AGPSFIX**) with a greater <maxTime> value.* (Continued on next page)

Table 7-2: GPS command details (Continued)

Command	Description
!GPSTRACK (continued)	**Initiate local tracking (multiple fix) session (continued)** **Example(s):** AT!GPSTRACK=1, 15, 10, 20, 60 requests a series of 20 standalone position fixes to 10 meters accuracy—fixes are taken every 60 seconds. One of the following responses will be received: • "OK" if the request is successful, or • "ERROR CODE = <value>" if the request fails for any reason. See Table 7-3 on page 135 for a list of error codes. **Related commands:** • **!GPSSTATUS**—Use this command while the tracking session is in progress. • **!GPSLOC**—Use this command after the session completes to obtain the result.
!GPSTRANSSEC	**Control GPS transport security** Enable or disable GPS transport security for SUPL GPS fixes. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** Yes **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!GPSTRANSSEC=<security>** Response: OK *or* ERROR Purpose: Indicate if transport security is used. • Query: **AT!GPSTRANSSEC?** Response: Transport security: <security> OK Purpose: Return the current <security> setting. • Query List: **AT!GPSTRANSSEC=?** Purpose: Display the command format and valid parameter options. **Parameters:** <security> (Transport security state) • Bit mask: • Bit 0: 0=Disabled (No security); 1=Enabled (Security) • Bit 1: 0=SSL Version TLS 1.1; 1=SSL Version TLS 1.0 • Bit 2: 0=SHA256; 1=SHA1

Table 7-2: GPS command details (Continued)

Command	Description
!GPSXTRADATAENABLE	**Set/report GPS XTRA settings** Enable or disable gpsOneXTRA data and set or report gpsOneXTRA data configuration settings. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** Yes **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!GPSXTRADATAENABLE=<enable>[,<retries>,<retryInt>[,<dload>,<dloadInt>[,<validityTime>]]]** Response: OK *or* ERROR Purpose: Enable or disable gpsOneXTRA data. You can set the retry parameters only if <enable> = 2, and you can set the download parameters only if the retry parameters are set. • Query: **AT!GPSXTRADATAENABLE?** Response: XTRA Data Enabled: <enable> XTRA Data Retry Number: <retries> XTRA Data Retry Interval: <retryInt> XTRA Data Autodownload Enabled: <dload> XTRA Data Autodownload Interval: <dloadInt> XTRA Data Validity Time: <validityTime> Purpose: Return the current GPS XTRA data settings. • Query List: **AT!GPSXTRADATAENABLE=?** Purpose: Display the command format and valid parameter options. **Parameters:** <enable> (Enable or disable gpsOneXTRA data information) • 0=Disable. To fully disable gpsOneXTRA, you must also call **!GPSXTRATIMEENABLE=0** to disable gpsOneXTRA time functionality. • 1=Reserved • 2=Enable <retries> (Number of download retries) • Valid range: 0–10 <retryInt> (Interval between download retries, in minutes) • Valid range: 1–120 <dload> (Enable or disable automatic downloads) • 0=Disable • 1=Enable <dloadInt> (Interval between automatic downloads, in hours) • Valid range: 24–168 • Note: If <dload> is 0 (disable), a value must still be entered for the interval (although it will not be used) <validityTime> (Length of time that XTRA data is considered to be valid, in hours) • Valid range: 1–168

Table 7-2: GPS command details (Continued)

Command	Description
!GPSXTRADATAURL	**Set/report GPS XTRA data server URLs** Set or report the URLs of up to three GPS XTRA data servers. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** Yes **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!GPSXTRADATAURL=<urlIndex>,<url>** Response: OK *or* ERROR Purpose: Set the URL used for the primary, secondary, or tertiary data server. • Query: **AT!GPSXTRADATAURL?** Response: XTRA Primary Server: <url1> XTRA Secondary Server: <url2> XTRA Tertiary Server: <url3> OK Purpose: Return the URLs of the primary, secondary, and tertiary data servers. **Parameters:** <urlIndex> (Server index) • 1=Primary server • 2=Secondary server • 3=Tertiary server <url> (Server URL) • URL string includes quotes • Example: “http://xtra1.gpsoneextra.net/xtra.bin” • URL must be complete, including the “http://” • Maximum string length: 128 characters
!GPSXTRAINITDNLD	**Initiate gpsOneXTRA data download and inject operation** Initiate a gpsOneXTRA data download and inject operation using the data server specified in the **!GPSXTRADATAURL** command. **Password required:** No **Usage:** • Execution: **AT!GPSXTRAINITDNLD** Response: Xtra command sent successfully OK *or* Error code = <err> OK Purpose: Initiate the download and inject operation. If the command fails, it returns “Error code = <err>”. **Parameters:** <err> (Error code returned if command fails) • 3=Bad CRC for XTRA data file • 4=Old XTRA data file • 7=GPS subsystem busy • 8=GPS time reference entered is invalid • 9=Unknown error

Table 7-2: GPS command details (Continued)

Command	Description
!GPSXTRASTATUS	**Return current status of gpsOneXTRA** Return the status of the most recent time and data injection operations. **Password required:** No **Usage:** • Query: **AT!GPSXTRASTATUS?** Response: Xtra Time status = <timeStatus> Xtra Data status = <dataStatus> Validity Start = <timeStamp> Validity End = <timeStamp> OK Purpose: Return the status of the most recent time and data injection operations. **Parameters:** <timeStatus> • Returned string does not include quotes (they are used in this description for clarity). • "Unknown": Default value if time injection operation has not been performed yet, or if operation was incomplete • "Valid": GPS time injection succeeded • "Invalid": GPS time injection failed <dataStatus> • Returned string does not include quotes (they are used in this description for clarity). • "Unknown": Default value if data injection operation has not been performed yet, or if operation was incomplete • "Valid": GPS data injection succeeded • "Invalid": GPS data injection failed • "xtra.bin file has bad crc" • "GPS Busy, end current session first" • "error reading xtra.bin file" • "bad TOA in xtra.bin file": The XTRA data retrieved from the XTRA server is too old (exceeds the Time Of Applicability). <timeStamp> (GPS time stamp) • Format: <year> <month> <day> <dayOfWeek> <time> • <year>: 4 digits (Example: 2008) • <month>: 2 digits (01–12) • <day>: 2 digits (01–31) • <dayOfWeek>: 1 digit (0–6) where 0=Monday • <time>: time of day (Example: 13:15:45) • Example: 2008 02 28 5 13:15:45 represents Thursday 28 Feb 2008 at 1:15:45 PM

Table 7-2: GPS command details (Continued)

Command	Description
!GPSXTRATIME	**Inject GPS or UTC time into gpsOneXTRA system** Inject the GPS or UTC time into the gpsOneXTRA system. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!GPSXTRATIME=<YYYY>, <MM>, <DD>, <hh>, <mm>, <ss>, <utc>, <force>, <uncrtn>** Response: Xtra command sent successfully OK *or* Error code = <err> OK Purpose: Inject the specfied date and time into the gpsOneXTRA system. If the command fails, it returns “Error code = <err>”. • Query List: **AT!GPSXTRATIME=?** Purpose: Return supported parameter values. **Parameters:** <YYYY> (Year) • 4 digits required <MM> (Month) • Valid range: 1–12 <DD> (Day) • Valid range: 1–31 <hh> (Hour) • Valid range: 0-23 <mm> (Minute) • Valid range: 0–59 <ss> (Second) • Valid range: 0–59 <utc> (Flag indicating time type) • 0=GPS time • 1=UTC time <force> (Force or allow GPS subsystem to decide to accept the time entered) • 0=Do not force acceptance • 1=Force acceptance <err> (Error code returned if command fails) • 3=Bad CRC for XTRA data file • 4=Old XTRA data file • 7=GPS subsystem busy • 8=GPS time reference entered is invalid • 9=Unknown error

Table 7-2: GPS command details (Continued)

Command	Description
!GPSXTRATIMEENABLE	**Set/report GPS XTRA time settings** Enable or disable gpsOneXTRA time information, and set or report specific gpsOneXTRA time settings. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** Yes **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!GPSXTRATIMEENABLE=<enable> [,<thresh>, <delay>]** Response: OK *or* ERROR Purpose: Enable or disable time information. If enabled, sets the uncertainty threshold and delay time to retry with a backup server. • Query: **AT!GPSXTRATIMEENABLE?** Response: XTRA Time Info Enabled: <enable> XTRA Time Uncertainty Threshold: <thresh> XTRA Time Delay Threshold: <delay> Purpose: Return the current values of GPS XTRA time parameters. • Query List: **AT!GPSXTRATIMEENABLE=?** Purpose: Return supported execution parameter values. **Parameters:** <enable> (Enable or disable gpsOneXTRA time information) • 0=Disable. To fully disable gpsOneXTRA, you must also call **!GPSXTRADATAENABLE=0** to disable gpsOneXTRA data information. • 1=Reserved • 2=Enable <thresh> (XTRA time uncertainty threshold, in ms) • Valid range: 100–30000 <delay> (Time to delay before retrying with backup server, in ms) • Valid range: 100–10000

Table 7-2: GPS command details (Continued)

Command	Description
!GPSXTRATIMEURL	**Set/report GPS XTRA SNTP server URLs** Set or report the URLs of up to three GPS XTRA SNTP (Simple Network Time Protocol) servers. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** Yes **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!GPSXTRATIMEURL=<urlIndex>,<url>** Response: OK *or* ERROR Purpose: Set the URL used for the primary, secondary, or tertiary data server. • Query: **AT!GPSXTRATIMEURL?** Response: XTRA SNTP Primary Server: <url 1> XTRA SNTP Secondary Server: <url 2> XTRA SNTP Tertiary Server: <url 3> Purpose: Return the URLs of the primary, secondary, and tertiary SNTP servers. **Parameters:** <urlIndex> (Server index) • 1=Primary server • 2=Secondary server • 3=Tertiary server <url> (Server URL) • URL string includes quotes • Example: “xtra1.gpsoneextra.net” • Maximum string length=128 characters

Error codes

Table 7-3 describes error codes that can be returned by **!GPSEND** (page 121), **!GPSSTATUS** (page 125), and **!GPSTRACK** (page 128).

Table 7-4 on page 137 describes error codes that can be returned by **!GPSFIX** (page 122).

Table 7-3: AT command error codes (!GPSEND, !GPSSTATUS, !GPSTRACK)

Error code	Description
0	Phone is offline
1	No service
2	No connection with PDE (Position Determining Entity)
3	No data available
4	Session Manager is busy
5	Reserved

Table 7-3: AT command error codes (!GPSEND, !GPSSTATUS, !GPSTRACK) (Continued)

Error code	Description
6	Phone is GPS-locked
7	Connection failure with PDE
8	Session ended because of error condition
9	User ended the session
10	End key pressed from UI
11	Network session was ended
12	Timeout (for GPS search)
13	Conflicting request for session and level of privacy
14	Could not connect to the network
15	Error in fix
16	Reject from PDE
17	GPS is disabled
18	Ending session due to E911 call
19	Server error
20	Reserved
21	Reserved
22	Unknown system error
23	Unsupported service
24	Subscription violation
25	Desired fix method failed
26	Reserved
27	No fix reported because no Tx confirmation was received
28	Network indicated normal end of session
29	No error specified by the network
30	No resources left on the network
31	Position server not available
32	Network reported an unsupported version of protocol

Table 7-4: AT command error codes (!GPSFIX)

Error code	Description
0	No error
1	Invalid client ID
2	Bad service parameter
3	Bad session type parameter
4	Incorrect privacy parameter
5	Incorrect download parameter
6	Incorrect network access parameter
7	Incorrect operation parameter
8	Incorrect number of fixes parameter
9	Incorrect server information parameter
10	Error in timeout parameter
11	Error in QOS accuracy threshold parameter
12	No active session to terminate
13	Session is active
14	Session is busy
15	Phone is offline
16	Phone is CDMA locked
17	GPS is locked
18	Command is invalid in current state
19	Connection failure with PDE
20	PDSM command buffer unavailable to queue command
21	Search communication problem
22	Temporary problem reporting position determination results
23	Error mode not supported
24	Periodic NI in progress
25	Unknown error
26	Unknown error

8: SIM Commands

Introduction

This chapter describes commands used to communicate with an installed SIM.

Command summary

Table 8-1 lists the commands described in this chapter:

Table 8-1: SIM command passwords

Command	Description	Page
+CCID	Return SIM/eUICC ICCID and EID	140
+CCID (notification)	eUICC profile switch—Unsolicited notification	140
+CPINR	Display remaining number of SIM unlock retries	141
!ICCID	Return SIM card's ICCID	142
+KSIMSEL	Select External SIM interface	143
!UIMS	Select active UIM interface	144

Command reference

Table 8-2: SIM command details

Command	Description
+CCID	**Return SIM/eUICC ICCID and EID** Return the active SIM's ICCID and (if it is an eUICC) its EID, and enable/disable unsolicited notifications of eUICC profile switches. **Password required:** No **Usage:** • Execution: **AT+CCID=<notifications>** Response: +CCID: <iccid>[,<eid>] OK Purpose: Enable/disable unsolicited notifications for eUICC profile switches. • Query: **AT+CCID?** or **AT+CCID** Response: +CCID: <iccid>[,<eid>] OK or +CME ERROR: <error> Purpose: Display the ICCID of the active SIM and, if the SIM is an eUICC, display its EID (eUICC-ID). **Parameters:** <notifications> (Unsolicited notifications): • 0—Disable eUICC profile switch unsolicited notifications • 1—Enable eUICC profile switch unsolicited notifications (default) • See +CCID (notification) on page 140 for details. <iccid> (ICCID of the SIM/eUICC currently being tested): • 20 digit decimal number—This number is often printed on the SIM card. <eid> (eUICC ID): • Appears in response only if SIM is an eUICC • 32 digit decimal number
+CCID (notification)	**eUICC profile switch—Unsolicited notification** Unsolicited notification indicating the eUICC profile has been switched. To enable/disable this notification, use AT+CCID. See +CCID on page 140 for details. **Notification format:** **+CCID: <new_iccid>** **Examples:** • Notifications received: +CCID: 89019990001234567026 ICCID of the new profile **Parameters:** <new_iccid> (ICCID of the new profile) • 20 digit decimal number—This number is often printed on the SIM card.

Table 8-2: SIM command details (Continued)

Command	Description
+CPINR	**Display remaining number of SIM unlock retries** Display the number of remaining SIM unlock retries. **Password required:** No **Usage:** • Execution: **AT+CPINR=<CPIN TYPE>** Response: +CPINR: <CPIN TYPE>,<remaining> OK Purpose: Display the number of remaining retries for the specified PIN/PUK type. • Execution: **AT+CPINR** Response: +CPINR: SIM PIN,<remaining> +CPINR: SIM PUK,<remaining> +CPINR: SIM PIN2,<remaining> +CPINR: SIM PUK2,<remaining> +CPINR: PH-FSIM PIN,<remaining> +CPINR: PH-NET PIN,<remaining> +CPINR: PH-NETSUB PIN,<remaining> +CPINR: PH-SP PIN,<remaining> +CPINR: PH-CORP PIN,<remaining> +CPINR: PH-FSIM PUK,<remaining> +CPINR: PH-NET PUK,<remaining> +CPINR: PH-NETSUB PUK,<remaining> +CPINR: PH-SP PUK,<remaining> +CPINR: PH-CORP PUK,<remaining> OK Purpose: Display the number of remaining retries for all PIN/PUK types. **Parameters:** <CPIN TYPE> (PIN/PUK type): • ASCII string enclosed within quotes. (Continued on next page)

Table 8-2: SIM command details (Continued)

Command	Description
+CPINR (continued)	**Display remaining number of SIM unlock retries (continued)** • Valid values: (Note: If there are any errors in this list, use AT+CPINR to display the full list of available types.) • "SIM PIN" • "SIM PUK" • "SIM PIN2" • "SIM PUK2" • "PH-FSIM PIN" • "PH-NET PIN" • "PH-NETSUB PIN" • "PH-SP PIN" • "PH-CORP PIN" • "PH-FSIM PUK" • "PH-NET PUK" • "PH-NETSUB PUK" • "PH-SP PUK" • "PH-CORP PUK" <remaining> (Number of retries remaining for specified PIN/PUK type) • 0–255 (maximum value is type-dependent)
!ICCID	**Return SIM card's ICCID** Return a SIM's ICCID (Integrated Circuit Card ID). **Password required:** No **Usage:** • Query: **AT!ICCID?** Response: !ICCID: <iccid> OK Purpose: Display the ICCID. **Parameters:** <iccid> (ICCID of the SIM currently being tested): • 20 digit decimal number—This number is often printed on the SIM card.

Table 8-2: SIM command details (Continued)

Command	Description
+KSIMSEL	**Select External SIM interface** This command is used for hardware designs with an external SIM multiplexer connected to the UIM1 WP interface. The active SIM is controlled by GPIO6 to the multiplexer according to AT+KSIMSEL. **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Requirements:** • The fast SIM switch feature must be enabled using the !CUSTOM EXTUIMSWITCHEN customization before +KSIMSEL can be used. See !CUSTOM on page 34. **Notes:** • The !CUSTOM UIMDETPULL customization can be used to control the UIM detect lines for UIM1 and UIM2. To use this customization, you must have enabled hot swap for the desired slot(s) using the HOTSWAPDIS customization. (By default, hot swap is not enabled, so default pull settings are used.) See !CUSTOM on page 34 for details on both customizations. **Usage:** • Execution: **AT+KSIMSEL=<sim_slot>** Response: OK Purpose: Set the active external SIM interface. • Query: **AT+KSIMSEL?** Response:! +KSIMSEL: <sim_slot> OK Purpose: Indicate the active external SIM interface. • Query list: **AT+KSIMSEL=?** Purpose: Return a list of supported <sim_slot> values. **Parameters:** <sim_slot> (External SIM being used) • 0—(Query only) External SIM select feature disabled. This value is returned when the !CUSTOM EXTUIMSWITCHEN customization is 0. • 1—External SIM slot 1 (GPIO6 low) • 2—External SIM slot 2 (GPIO6 high)

Table 8-2: SIM command details (Continued)

Command	Description
!UIMS	**Select active UIM interface** On a module that supports multiple UIM interfaces, select the active UIM interface. **Password required:** No **Usage:** • Execution: **AT!UIMS=<uim>** Response: OK Purpose: Configure the module to use the selected UIM interface. • Query: **AT!UIMS?** Response: !UIMS: <uim> OK Purpose: Display the currently selected interface. • Query List: **AT!UIMS=?** Purpose: Return the command format and the supported parameter values. **Parameters:** <uim> (SIM interface): • 0=UIM1—External UIM interface #1 • 1=UIM2— External UIM interface #2 or eSIM (embedded SIM). Depending on the module, the interface may be exposed to an external SIM connector or may be connected internally to an eSIM installed directly on the module.

9: OMA-DM Commands

Introduction

Note: The commands in this chapter are provided to satisfy AT&T carrier requirements.

This chapter describes commands used to configure DM (Device Management) accounts, sessions, and host–device–server interactions.

Command summary

The table below lists the commands described in this chapter.

Table 9-1: OMA-DM Host Device Configuration Commands

Command	Description	Page
!HOSTDEVINFO	Configure host device details	146
!OSINFO	Configure host device operating system information	147

Command reference

Table 9-3: OMA-DM command details

Command	Description
!HOSTDEVINFO	**Configure host device details** Configure the host device details that will be reported by OMA DM for AT&T devices, to comply with AT&T <CDR-DVM-4532> requirement. To configure host device operating system information, see !OSINFO on page 147. *Note: In the Execution format, if a parameter is not entered then the value on the device does not change.* **Password required:** Yes (Execution format only) (see !ENTERCND for details) **Usage:** • Execution: **AT!HOSTDEVINFO="<hostman>"[, "<hostmod>"[, "<hostswv>"[, "<hostplasmaid>"]]]** Response: OK *or* ERROR Purpose: Set some or all host device detail parameters. • Query: **AT!HOSTDEVINFO?** Response: HostMan: <hostman> HostMod: <hostmod> HostSwV: <hostswv> HostPlasmaID: <hostplasmaid> OK Purpose: Display current host device details. • Query List: **AT!HOSTDEVINFO=?** Purpose: Display the execution command format and parameter values. **Parameters:** <hostman> (Host device manufacturer's name) • 256 characters maximum <hostmod> (Host device model name) • 256 characters maximum <hostswv> (Host software version) • 256 characters maximum <hostplasmaid> (Host Plasma ID) • 256 characters maximum **Example(s):** • AT!HOSTDEVINFO="Manufacturer",,"1.0", This sets the <hostman> and <hostswv> values. The values for <hostmod> and <hostplasmaid> do not change. • AT!HOSTDEVINFO="Manufacturer" This sets the <hostman> value. The values for all other parameters do not change.

Table 9-3: OMA-DM command details (Continued)

Command	Description
!OSINFO	**Configure host device operating system information** Configure the host device operating system name and version that will be reported by OMA DM for AT&T devices, to comply with AT&T <CDR-DVM-4533> requirement. To configure host device details, see !HOSTDEVINFO on page 146. *Note: In the Execution format, if a parameter is not entered then the value on the device does not change.* **Password required:** Yes (Execution format only) (see !ENTERCND for details) **Usage:** • Execution: **AT!OSINFO="<osname>"[, "<osversion>"]** Response: OK *or* ERROR Purpose: Set host device operating system information parameters. • Query: **AT!OSINFO?** Response: OSName: <osname> OSVersion: <osversion> OK Purpose: Display current host device operating system information. • Query List: **AT!OSINFO=?** Purpose: Display the execution command format and parameter values. **Parameters:** <osname> (Host device operating system name) • 256 characters maximum <osversion> (Host device operating system version) • 256 characters maximum **Example(s):** • AT!OSINFO="An OS Name","1.0" This sets both parameters. • AT!OSINFO=,"1.0" This sets the <osversion> value. The value for the <osname> does not change.

10: SAR Backoff Commands

10

Introduction

This chapter describes:

- SAR-related commands (Specific Absorption Rate)—SAR commands are used to meet regulatory requirements for the OEM host device by managing the modem's SAR backoff state. OEMs should carefully evaluate their use of these commands and their impact on device operation.

Note: Operators may require OEMs to disclose SAR settings and theory of operation for applicable certifications.

Command summary

The table below lists the commands described in this chapter.

Table 10-1: SAR backoff and thermal control commands

Command	Description	Page
!SARBACKOFF	Set/report offset from maximum Tx power	150
!SARINTGPIOMODE	Set/report default pull mode for SAR interrupt GPIOs	151
!SARSTATE	Set/report SAR backoff state	152
!SARSTATEDFLT	Set/report default SAR backoff state	153

Command reference

Table 10-2: Thermal mitigation command details

Command	Description
!SARBACKOFF	**Set/report offset from maximum Tx power** Set or report the offset from maximum Tx power limit for a specific band/technology/backoff state combination. Changes take place after the next modem reset. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution (WCDMA, CDMA, LTE):**AT!SARBACKOFF=<tech>,<band>,<state>,<offset>** Response: OK Purpose: Set the maximum Tx power for the tech/band/state combination. • Execution (GSM): **AT!SARBACKOFF=<tech>,<band>,<slot>,<state>,<modulation>,<offset>** Response: OK Purpose: Set the maximum Tx power for the tech/band/state combination. • Query (WCDMA, CDMA, LTE): **AT!SARBACKOFF?<tech>,<band>,<state>** Response: <offset> dBm *or* NV Not Set OK Purpose: Display the offset from maximum Tx power for the tech/band/state combination. • Query (GSM): **AT!SARBACKOFF?<tech>,<band>,<slot>,<state>,<modulation>** Response: <offset> dBm *or* NV Not Set OK Purpose: Display the offset from maximum Tx power for the tech/band/state combination. • Query list: **AT!SARBACKOFF=?<tech>** Purpose: Display valid execution format and parameter values for LTE/WCDMA/CDMA and GSM queries. **Parameters:** <tech> (Network technology) • 0=WCDMA • 1=CDMA • 2=LTE • 3=GSM (Continued on next page)

Table 10-2: Thermal mitigation command details (Continued)

Command	Description
!SARBACKOFF (continued)	**Set/report offset from maximum Tx power (continued)** <band> (RF band) • 0–40 • Band support is device-dependent. See the device's Product Technical Specification for details. <slot> (Tx slot. GSM only) • 1–5 <state> (SAR backoff state) • 0=No backoff • 1–8=Backoff state 1 to 8 <modulation> (Modulation method. GSM only.) • 0=GMSK (GPRS) • 1=8PSK (EDGE) <offset> (Offset from max Tx power, in dBm) • Valid values: use the Query List command to display valid values. • Value may be integer or decimal. (For example, 4 or 6.8)
!SARINTGPIOMODE	**Set/report default pull mode for SAR interrupt GPIOs** Set or report the default pull mode (high/low) for SAR interrupt GPIOs. This setting applies to all SAR interrupt GPIOs. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!SARINTGPIOMODE=<mode>** Response: OK Purpose: Set the default pull mode for all SAR interrupt GPIOs. • Query: **AT!SARINTGPIOMODE?** Response: <mode> OK Purpose: Indicate the default pull mode. • Query list: **AT!SARINTGPIOMODE=?** Purpose: Display valid execution format and parameter values. **Parameters:** <mode> (SAR GPIO interrupt pull mode default setting) • 0=Standard mode—Default pull is HIGH/DAL_GPIO_PULL_UP • 1=Inverse mode—Default pull is LOW/DAL_GPIO_PULL_DOWN

Table 10-2: Thermal mitigation command details (Continued)

Command	Description
!SARSTATE	**Set/report SAR backoff state** Set or report the current SAR (Specific Absorption Rate) backoff state. *Note: This setting is not persistent. To change the default backoff state (persistent), use !SARSTATEDFLT.* **Password required:** No **Persistent across power cycles:** No **Usage:** • Execution: **AT!SARSTATE=<state>** Response: OK Purpose: Temporarily set the SAR backoff state. • Query: **AT!SARSTATE?** Response: !SARSTATE: <state> OK Purpose: Indicate the current SAR backoff state. • Query list: **AT!SARSTATE=?** Purpose: Display valid execution format and parameter values. **Parameters:** <state> (SAR backoff state) • 0=No backoff • 1–8=Backoff state 1 to 8

Table 10-2: Thermal mitigation command details (Continued)

Command	Description
!SARSTATEDFLT	**Set/report default SAR backoff state** Set or report the default (persistent) SAR (Specific Absorption Rate) backoff state. *Note: This setting is persistent. To temporarily change the backoff state, use !SARSTATE.* **Password required:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!SARSTATEDFLT=<state>** Response: OK Purpose: Set the default SAR backoff state. • Query: **AT!SARSTATEDFLT?** Response: <state> OK Purpose: Indicate the default SAR backoff state. • Query list: **AT!SARSTATEDFLT=?** Purpose: Display valid execution format and parameter values. **Parameters:** <state> (SAR backoff state) • 0=No backoff • 1–8=Backoff state 1 to 8

11: Audio Commands

Introduction

This chapter describes commands used to configure and manage audio-capable devices.

Note: To enable audio on an audio-capable device, use the "ISVOICEN" customization for AT!CUSTOM (see page 34 for details).

Command summary

Table 11-1 lists the commands described in this chapter.

Table 11-1: Audio commands

Command	Description	Page
!AVAUDIO	Play/record audio file (.wav format)	156
!AVAUDIOLPBK	Start/stop audio loopback	157
!AVAUDVOL	Set/return audio playback volume	157
!AVCFG	Bind audio profile to device/physical interface	158
!AVCODECMICTXG	Set/return codec Tx path gain	160
!AVDEF	Reset configurable audio parameters to default settings	161
!AVEC	Enable/disable Echo Cancellation mode for audio profile	161
!AVMUTE	Mute/unmute earpiece/microphone/call waiting tone	162
!AVNS	Enable/disable Noise Suppression and Far-end Noise Suppression modes for audio profile	163
!AVSETPROFILE	Select/configure audio profile for CS call	164
!AVSETVOL	Query/set audio profile's Rx volume level	165
!AVTONEPLAY	Play a tone	166
!AVTXVOL	Query/set audio profile's Tx volume gain	167
+CLVL	Set active audio profile's Rx volume	168
+VTD	Set DTMF tone duration	168
+VTS	Send DTMF tone	169

Command reference

Table 11-2: Audio command details

Command	Description
!AVAUDIO Min f/w rev: • 06.xx.xx.xx or higher	**Play/record audio file (.wav format)** Play an audio file (locally or for both sides of a voice call), or record to an audio file (from the microphone only, or both sides of a voice call). Each <operation> type is started and stopped independently. For example, to simultaneously play a file for both ends of a voice call and record that call to another file: 1. Start recording to a file and start playing an existing audio file for both ends of the call: **AT!AVAUDIO=4,1,/usr/recording1.wav** **AT!AVAUDIO=3,1,/data/outgoing1.wav** 2. When ready to stop playing the outgoing file and recording the call: **AT!AVAUDIO=3,0** **AT!AVAUDIO=4,0** *Note: Only .wav format audio files are supported.* **Password required:** No **Usage:** • Execution: **AT!AVAUDIO=<operation>, <switch>[, <file_path>]** Response: OK Purpose: Start or stop the playback or recording of an audio file. Note: <file_path> is required when <switch> = 1, and optional when <switch> = 0. • Query List: **AT!AVAUDIO=?** Purpose: Display valid execution format and parameter values. **Parameters:** <operation> (Play or record) • 1=Audio play. Play the specified .wav file (<filepath>) locally. If a voice call is in progress, the file is not played for the far end of the call. • 2=Audio record. Record the local microphone input to the specified .wav file (<filepath>). If a voice call is in progress, the far end of the call is not recorded. • 3=WWAN play. Play the specified .wav file (<filepath>) for both ends of a voice call. • 4=WWAN record. Record both ends of a voice call to the specified .wav file (<filepath>). <switch> (Stop or start playing/recording) • 0=Stop • 1=Start <filepath> (Absolute pathname of file to play/record) • ASCII string. Note that the string must not use quotation marks. • Example: /usr/avfile.wav Note: Relative pathnames are not supported. • Required when <switch> = 1 (starting to play or record a file), and optional when <switch> = 0.

Table 11-2: Audio command details (Continued)

Command	Description
!AVAUDIOLPBK Min f/w rev: • 06.xx.xx.xx or higher	**Start/stop audio loopback** Set up (start/stop) an audio loopback at some point in the audio chain. **Password required:** Yes (see !ENTERCND for details) **Usage:** • Execution: **AT!AVAUDIOLPBK=<enable>** Response: OK Purpose: Start or stop an audio loopback. • Query List: **AT!AVAUDIOLPBK=?** Purpose: Display valid execution format and parameter values. **Parameters:** <enable> (Start/stop an audio loopback) • 0=Stop the loopback • 3=PCM loopback • 4=codec loopback
!AVAUDVOL	**Set/return audio playback volume** Set (or return) the audio playback volume. The volume setting can be set before or during file playback and takes effect immediately. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!AVAUDVOL=<volume>** Response: OK Purpose: Set the audio playback volume. • Query: **AT!AVAUDVOL?** Response: !AVAUDVOL: <volume> Purpose: Return the current volume. • Query List: **AT!AVAUDVOL=?** Purpose: Display valid execution format and parameter values. **Parameters:** <volume> (Audio playback volume) • Format: Hexadecimal • Valid range: 0–FFFF **Example(s):** • AT!AVAUDVOL=172A

Table 11-2: Audio command details (Continued)

Command	Description
!AVCFG Min f/w rev: • 06.xx.xx.xx or higher	**Bind audio profile to device/physical interface** Bind an audio profile to a specific ACDB (Audio Calibration Database) device/physical interface combination and, depending on the interface that is chosen, configure the physical interface. **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!AVCFG=<profile>,<device>, <interface>[,<param1>[,...<paramN>]]** Response: OK Purpose: Bind the specified <profile> to a <device>/<interface> combination. If applicable, specify required parameters. • Query: **AT!AVCFG?** Response: !AVCFG: <profile0>,<device>,<interface> [<param1> [,...<paramN>]] ... <profile5>,<device>,<interface>[<param1>[,...<paramN>]] Purpose: Show current bindings for all audio profiles. • Query List: **AT!AVCFG=?** Purpose: Display valid execution format and parameter values. **Parameters:** <profile> (Audio profile) • 0–5=Audio profile number (6 profiles are supported) <device> (ACDB device type) • 0=Vehicle hands-free device • 1=Handset • 2=TTY device • 3=USB device <interface> (Physical interface type) • 0=PCM (Use <param> options to configure the interface.) • 1=I2S (No <param> required.) • 2=Internal codec (No <param> required.) • 3=USB (No <param> required.) (Continued on next page)

Table 11-2: Audio command details (Continued)

Command	Description
!AVCFG (continued)	**Bind audio profile to device/physical interface (continued)** <param> (Interface configuration parameters) • For <interface>=0 (PCM): • <param1> (Mode) • 0=Slave • 1=Master • 2=Auxiliary PCM • <param2> (Rate) • 0=8K • 1=16K • <param3> (Format) • 0=Linear • 1=μ-law • 2=A-law • <param4> (Padding) • 0=Disable • 1=Enable • <param5> (Bits per frame (bpf)) • 0=8 bpf • 1=16 bpf • 2=32 bpf • 3=64 bpf • 4=128 bpf • 5=256 bpf **Example(s):** • AT!AVCFG=1,1,0,1 (Bind profile 1 to the handset device via PCM, and set PCM as master mode.)

Table 11-2: Audio command details (Continued)

Command	Description
!AVCODECMICTXG	**Set/return codec Tx path gain** Set (or return) the codec Tx path gain for s specific profile. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!AVCODECMICTXG=<profile>,<gain>** Response: OK Purpose: Set the overall gain. • Query: **AT!AVCODECMICTXG?<profile>** Response: !AVCODECMICTXG: <gain> Purpose: Return the overall gain for the specified <profile>. • Query List: **AT!AVCODECMICTXG=?** Purpose: Display valid execution format and parameter values. **Parameters:** <profile> (Audio profile) • 0–5=Audio profile number (6 profiles are supported) <gain> (Codec Tx path overal gain value) • Valid <gain> values: 0000–FFFF Note: 4 hexadecimal digits must be entered. (e.g. 0x7F is not valid) • 0000—Disable • 0001–FFFF—Gain in range -48 dB to +48 dB • 0001: -48 dB 0002: -42 dB ... 010F: 0 dB 217F: 30 dB ... FFFF: 48 dB • Gain is calculated using the following formula: 20 * LOG(<value> / 0x0100) • Supported gain range: -48 dB to +48 dB **Example(s):** • AT!AVCODECMICTXG=1,1AF4 • AT!AVCODECMICTXG=5,217F

Table 11-2: Audio command details (Continued)

Command	Description
!AVDEF Min f/w rev: • 06.xx.xx.xx or higher	**Reset configurable audio parameters to default settings** Reset all of the configurable audio parameters that are stored in non-volatile (NV) memory to default values. *Note: Some values that affect ACDB (Audio Calibration Database) devices are stored in NV, and some are stored on the device. Values that are stored on the device are not affected by this command.* **Password required:** No **Usage:** • Execution: **AT!AVDEF** Response: OK Purpose: Reset parameters to default values. **Parameters:** None
!AVEC Min f/w rev: • 06.xx.xx.xx or higher	**Enable/disable Echo Cancellation mode for audio profile** Enable or disable Echo Cancellation (EC) mode for a specific audio profile. **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!AVEC=<profile>,<value>** Response: OK Purpose: Enable or disable EC mode for the selected profile. • Query: **AT!AVEC?<profile>** Response: !AVEC: <value> Purpose: Show the current EC mode state (enabled/disabled) for the selected profile. • Query List: **AT!AVEC=?** Purpose: Display valid execution format and parameter values. **Parameters:** <profile> (Audio profile) • 0–5=Audio profile number (6 profiles are supported) <value> (EC mode state) • 0=Disable • 1=Enable

Table 11-2: Audio command details (Continued)

Command	Description
!AVMUTE Min f/w rev: • 06.xx.xx.xx or higher	**Mute/unmute earpiece/microphone/call waiting tone** Mute or unmute the earpiece, microphone, and call waiting tone. **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!AVMUTE=<profile>,<earmute>,<micmute>[,<cwtmute>]** Response: OK Purpose: Set the mute states for the selected profile. • Query: **AT!AVMUTE?<profile>** Response: !AVMUTE: <earmute>,<micmute>,<cwtmute> Purpose: Show the current mute settings (enabled/disabled) for the selected profile. • Query List: **AT!AVMUTE=?** Purpose: Display valid execution format and parameter values. **Parameters:** <profile> (Audio profile) • 0–5=Audio profile number (6 profiles are supported) <earmute> (Earpiece mute state) • 0=Unmuted • 1=Muted <micmute> (Microphone mute state) • 0=Unmuted • 1=Muted <cwtmute> (Call waiting tone mute state) • 0=Unmuted • 1=Muted • This parameter is optional.

Table 11-2: Audio command details (Continued)

Command	Description
!AVNS Min f/w rev: • 06.xx.xx.xx or higher	**Enable/disable Noise Suppression and Far-end Noise Suppression modes for audio profile** Enable or disable Noise Suppression (NS) mode on the Tx path and/or Far-end Noise Suppression (FNS) mode on the Rx path for a specific audio profile. **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!AVNS=<profile>,<ns>[,<fns>]** Response: OK Purpose: Enable or disable NS mode (and optionally, FNS mode) for the selected profile. • Query: **AT!AVNS?<profile>** Response: !AVNS: <ns>,<fns> Purpose: Show the current NS and FNS mode states (enabled/disabled) for the selected profile. • Query List: **AT!AVNS=?** Purpose: Display valid execution format and parameter values. **Parameters:** <profile> (Audio profile) • 0–5=Audio profile number (6 profiles are supported) <ns> (NS mode state) • 0=Disable • 1=Enable <fns> (FNS mode state) • 0=Disable • 1=Enable

Table 11-2: Audio command details (Continued)

Command	Description
!AVSETPROFILE Min f/w rev: • 06.xx.xx.xx or higher	**Select/configure audio profile for CS call** Select and configure an audio profile to be used for a circuit-switched call. (To view the current audio profile configurations, use **AT!AVCFG?**). **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!AVSETPROFILE=<profile>[,<earmute>,<micmute>,<generator>,<volume>[,<cwtmute>]]** Response: OK Purpose: Select the profile to use for a circuit switched call and, if needed, configure the mute and volume settings for the profile. • Query: **AT!AVSETPROFILE?[<generator>]** Response: !AVSETPROFILE: <profile>,<earmute>,<micmute>,[<generator>,]<volume>,<cwtmute> Purpose: Show the profile that has been selected for circuit switched calls, and its configuration parameters. (The <generator> field does not appear if <generator> is used in the query.) • Query List: **AT!AVSETPROFILE=?** Purpose: Display valid execution format and parameter values. **Parameters:** <profile> (Audio profile used for CS call) • 0–5=Audio profile number (6 profiles are supported) <earmute> (Earpiece mute state) • 0=Unmuted • 1=Muted <micmute> (Microphone mute state) • 0=Unmuted • 1=Muted <generator> • 0=Voice synthesizer (Note: This is the only option at this time.) <volume> (Rx volume level) • Valid range: 0 (quietest) – 8 (loudest) <cwtmute> (Call waiting tone mute state) • 0=Unmuted • 1=Muted

Table 11-2: Audio command details (Continued)

Command	Description
!AVSETVOL Min f/w rev: • 06.xx.xx.xx or higher	**Query/set audio profile's Rx volume level** Set the Rx volume level for a specific audio profile. **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!AVSETVOL=<profile>,<generator>,<volume>** Response: OK Purpose: Set the Rx volume for the specified audio profile/generator combination. • Query: **AT!AVSETVOL?<profile>,<generator>** Response: !AVSETVOL: <volume> Purpose: Show the current volume level for the specified audio profile/generator combination. • Query List: **AT!AVSETVOL=?** Purpose: Display valid execution format and parameter values. **Parameters:** <profile> (Audio profile used for CS call) • 0–5=Audio profile number (6 profiles are supported) <generator> • 0=Voice synthesizer (Note: This is the only option at this time.) <volume> (Rx volume level) • Valid range: 0 (quietest) – 8 (loudest)

Table 11-2: Audio command details (Continued)

Command	Description
!AVTONEPLAY Min f/w rev: • 06.xx.xx.xx or higher	**Play a tone** Play a predefined tone. **Password required:** No **Usage:** • Execution: **AT!AVTONEPLAY=<generator>,<tone>[,<duration>]** Response: OK Purpose: Play the specified tone, and if required, indicate how long to play it. • Query List: **AT!AVTONEPLAY=?** Purpose: Display valid execution format and parameter values. **Parameters:** <generator> • 0=Voice synthesizer (Note: This is the only option at this time.) <tone> (Predefined tone to play) • ASCII. Use tone number shown in table below. <duration> (Length of time to play the <tone>) • 0–65535 (milliseconds) • Default duration=1000 ms

#	Description	#	Description	#	Description	#	Description	#	Description
0	DTMF (0 key)	13	TONE_ERR	26	TONE_RING_AS5	39	TONE_RING_F6	4C	TONE_LOW_PITCH_A
1	DTMF (1 key)	14	TONE_TIME	27	TONE_RING_B5	3A	TONE_RING_FS6	4D	TONE_LOW_PITCH_B
2	DTMF (2 key)	15	TONE_RING_A	28	TONE_RING_C5	3B	TONE_RING_G6	4E	TONE_TEST_ON
3	DTMF (3 key)	16	TONE_RING_B	29	TONE_RING_CS5	3C	TONE_RING_GS6	4F	TONE_MSG_WAITING
4	DTMF (4 key)	17	TONE_RING_C	2A	TONE_RING_D5	3D	TONE_RING_A7	50	TONE_PIP_TONE_TONE
5	DTMF (5 key)	18	TONE_RING_D	2B	TONE_RING_DS5	3E	TONE_RBACK	51	TONE_SPC_DT_INDIA
6	DTMF (6 key)	19	TONE_RING_A4	2C	TONE_RING_E5	3F	TONE_BUSY	52	TONE_SIGNAL_INDIA
7	DTMF (7 key)	1A	TONE_RING_AS4	2D	TONE_RING_F5	40	TONE_INTERCEPT_A	53	TONE_DT_TONE_INDIA
8	DTMF (8 key)	1B	TONE_RING_B4	2E	TONE_RING_FS5	41	TONE_INTERCEPT_B	54	TONE_DT_TONE_BRAZIL
9	DTMF (9 key)	1C	TONE_RING_C4	2F	TONE_RING_G5	42	TONE_REORDER_TONE	55	TONE_DT_DTACO_TONE
A	DTMF (A key)	1D	TONE_RING_CS4	30	TONE_RING_GS5	43	TONE_PWRUP	56	TONE_HFK_TONE1
B	DTMF (B key)	1E	TONE_RING_D4	31	TONE_RING_A6	44	TONE_OFF_HOOK_TONE	57	TONE_HFK_TONE2
C	DTMF (C key)	1F	TONE_RING_DS4	32	TONE_RING_AS6	45	TONE_CALL_WT_TONE		
D	DTMF (D key)	20	TONE_RING_E4	33	TONE_RING_B6	46	TONE_DIAL_TONE_TONE		
E	DTMF (# key)	21	TONE_RING_F4	34	TONE_RING_C6	47	TONE_ANSWER_TONE		
F	DTMF (* key)	22	TONE_RING_FS4	35	TONE_RING_CS6	48	TONE_HIGH_PITCH_A		
10	TONE CTRL	23	TONE_RING_G4	36	TONE_RING_D6	49	TONE_HIGH_PITCH_B		
11	TONE 2ND	24	TONE_RING_GS4	37	TONE_RING_DS6	4A	TONE_MED_PITCH_A		
12	TONE WARN	25	TONE_RING_A5	38	TONE_RING_E6	4B	TONE_MED_PITCH_B		

Table 11-2: Audio command details (Continued)

Command	Description
!AVTXVOL Min f/w rev: • 06.xx.xx.xx or higher	**Query/set audio profile's Tx volume gain** Set the Tx volume gain for a specific audio profile. The value entered is mapped to a gain range of -78 dB to +18 dB. Gain is applied to PCM voice packets before they are fed into the vocoder, which encodes the PCM packets for more efficient over the air transmission. **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!AVTXVOL=<profile>,<gain>** Response: OK Purpose: Set the Tx volume gain for the specified profile. • Query: **AT!AVTXVOL?<profile>** Response: !AVTXVOL: <gain> Purpose: Show the Tx volume gain for the specified profile. • Query List: **AT!AVTXVOL=?** Purpose: Display valid execution format and parameter values. **Parameters:** <profile> (Audio profile) • 0–5=Audio profile number (6 profiles are supported) <gain> (Encoder gain value) • Format: Hexadecimal • Valid <gain> values: 0–FFFF • Execution example: Hexadecimal: AT!AVTXVOL=1,32A0 • Query response example: !AVTXVOL: 32A0 • Volume gain is calculated using the following formula: 20 * LOG(<gain> / 0x2000) • Supported volume gain range: -78 dB to +18 dB • Recommended volume gain range: 0 dB to +18 dB

Table 11-2: Audio command details (Continued)

Command	Description
+CLVL	**Set active audio profile's Rx volume** Set the Rx volume for the active audio profile. **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT+CLVL=<level>** Response: OK Purpose: Set the Rx volume gain for the active profile. • Query: **AT+CLVL?** Response: +CLVL: <level> Purpose: Show the Rx volume for the active profile. • Query List: **AT+CLVL=?** Purpose: Display valid execution format and parameter values. **Parameters:** <level> (Rx level for the active profile) • Valid range: 0–8 (Level 0–Level 8)
+VTD Min f/w rev: • 06.xx.xx.xx or higher	**Set DTMF tone duration** Set the duration for DTMF tones (for UMTS and CDMA networks) **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** No (After a power cycle, default tone duration is used.) **Usage:** • Execution: **AT+VTD=<duration>** Response: OK Purpose: Set the duration for DTMF tones. • Query: **AT+VTD?** Response: +VTD: <duration> Purpose: Display the current DTMF tone duration. • Query List: **AT+VTD=?** Purpose: Display valid execution format and parameter values. **Parameters:** <duration> (Length of DTMF tone) • Unit value: 100 msec • Valid values: • 0=20 msec (default) • 1–255=100–25500 msec (<duration> * 100)

Table 11-2: Audio command details (Continued)

Command	Description
+VTS Min f/w rev: • 06.xx.xx.xx or higher	**Send DTMF tone** Send continuous in-band DTMF tones (for UMTS and CDMA networks) while on an active call. Use **AT+VTD** to set the tone duration. **Password required:** No **Usage:** • Execution: **AT+VTS=<tone>** Response: OK Purpose: Send the specified DTMF tone. • Query List: **AT+VTS=?** Purpose: Display valid execution format and parameter values. **Parameters:** <tone> (DTMF tone) • UMTS networks: 0–9, A–D, *, # • CDMA networks: 0–9, *, # • Examples: • AT+VTS=1 (Send the DTMF tone for '1'.) • AT+VTS=# (Send the DTMF tone for '#'.)

12: I/O Commands

Introduction

This chapter describes commands used to configure and manage GPIOs, ADCs and other IOs.

Command summary

Table 12-1 lists the commands described in this chapter.

Table 12-1: I/O commands

Command	Description	Page
!GPOINT	GPIO interrupt detected—Unsolicited notification	172
!MADC	Display ADC values	173
!MCCELL	Enable/disable coin cell charging feature	173
!MVCOIN	Configure coin cell charging	174
!RIOWNER	Set/query Ring Indicator owner	175
+WEXTCLK	Enable/Disable user clock mode	176
+WIOCFG	GPIO Configuration	176
+WIOR	Read GPIO value	178
+WIOW	Write GPIO value	179
+WRID	Set/query Ring Indicator Duration	179
+WWAKE	Query Wakeup Event	180
+WWAKESET	Set/query Wake Up Event Mask	181

Command reference

Table 12-2: I/O command details

Command	Description
!GPIOINT (notification)	**GPIO interrupt detected—Unsolicited notification** Unsolicited notification received when an I/O pin sends an interrupt. *Note: The I/O pin must be configured via +WIOCFG as an Input with a <trigger> value greater than 0. See +WIOCFG on page 176 for details.* To enable !GPIOINT (and other notifications), use AT+WUSLMSK. See +WUSLMSK on page 88 for details. **Notification format:** **!GPOINT:<index>[,<level>]** **Examples:** • !GPOINT:7 *Edge-triggered interrupt detected on EXT_GPIO7.* • !GPOINT:5,0 *Level-triggered interrupt detected on EXT_GPIO5.* **Parameters:** <index> (Index of I/O port that generated the interrupt) • 1–42 Not all values are valid. Use AT+WIOCFG? (page 176) to view supported values. <level> (Logic level of the I/O port that generated the interrupt) • 0—Logic LOW • 1—Logic HIGH

Table 12-2: I/O command details (Continued)

Command	Description
!MADC	**Display ADC values** Read one of the available ADCs (Analog to Digital Converters). **Password required:** No **Usage:** • Query: **AT!MADC?<adc>** Response: !MADC: <value> Purpose: Show the value being reported by the specified ADC. • Query List: **AT!MADC=?** Purpose: Display valid execution format and parameter values. **Parameters:** <adc> (Analog to Digital Converters) • 0=VBATT (Battery voltage) • 1=VCOIN (Charging voltage of RTC coin battery. Note: This voltage can be configured using AT!MVCOIN) • 2=PA_THERM (Power Amplifier Thermistor) • 3=PMIC_THERM (Power Management Integrated Circuit Thermistor) • 4=XO_THERM (Crystal Oscillator Thermistor) • 5=ADC1 • 6=ADC2 • 10=ADC0 • 11=ADC3 <value> (Value returned from ADC) • ASCII string, contents depend on ADC being polled.
!MCCELL	**Enable/disable coin cell charging feature** Enable or disable the coin cell charging feature. (See !MVCOIN on page 174 to configure coin cell charging.) **Supporting devices:** WPx5xx **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** Yes **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!MCCELL=<enable>** Response: OK, or ERROR *(if invalid parameter entered)* Purpose: Enable or disable coin cell charging. • Query: **AT!MCCELL?** Response: !MCCELL: <enable> OK Purpose: Report the current setting for coin cell charging. • Query List: **AT!MCCELL=?** Purpose: Return the command format and the supported parameter values. **Parameters:** <enable> (Coin cell charging state) • 0—Disabled • 1—Enabled (Default)

Table 12-2: I/O command details (Continued)

Command	Description
!MVCOIN	**Configure coin cell charging** Configure the coin cell charging configuration (voltage and resistance). (Default options described in parameter list below.) (See !MCCELL on page 173 to enable/disable coin cell charging.) **Supporting devices:** WPx5xx **Password required:** Yes (see !ENTERCND for details) **Reset required to apply changes:** Yes **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!MVCOIN=<voltage>,<resistance>** Response: OK, or ERROR *(if invalid parameter entered)* Purpose: Configure coin cell chargiing parameters. • Query: **AT!MVCOIN?** Response: !MVCOIN: <voltage>,<resistance> OK Purpose: Report the current coin cell charging configuration. • Query List: **AT!MVCOIN=?** Purpose: Return the command format and the supported parameter values. **Parameters:** <voltage> (Charging voltage) • 0—3.0V • 1—3.1V • 2—3.2V • 3—2.5V (Default) <resistance> (Charging resistor) • 0—2100 Ω (Default) • 1—1700 Ω • 2—1200 Ω • 3—800 Ω

Table 12-2: I/O command details (Continued)

Command	Description
!RIOWNER	**Set/query Ring Indicator owner** Set or return the core that controls the module's Ring Indicator (RI) pin. **Password required:** No **Reset required to apply changes:** Yes (Changes take effect immediately, but a controlled reset is required to make the change persistent.) **Persistent across power cycles:** Yes **Usage:** • Execution: **AT!RIOWNER=<owner>** Response: OK Purpose: Indicate which core controls the RI pin. • Query: **AT!RIOWNER?** Response: !RIOWNER: <owner> Purpose: Display the core that controls the RI pin. • Query List: **AT!RIOWNER=?** Purpose: Display valid execution format and parameter values. **Parameters:** <owner> (Core that controls the RI pin) • 0—Modem core • 1—Application core (Legato)

Table 12-2: I/O command details (Continued)

Command	Description
+WEXTCLK	**Enable/Disable user clock mode** Enable/disable generation of 19.2 MHz on the user output clock pins. **Supporting devices:** WP **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT+WEXTCLK=<port>,<mode_select>[,<mode>]** Response: OK Purpose: Enable the user clock pin for automatic or manual mode, or disable the pin. • Query: **AT+WEXTCLK?** Response: +WEXTCLK: <port>,<mode_select> Purpose: Display the current clock mode setting. • Query List: **AT+WEXTCLK=?** Purpose: Display valid execution format and parameter values. **Parameters:** <port> (Output port) • 1 <mode_select> (Enable/disable output) • 0—Off (disable) • 1—On • 2—Switch between automatic and manual mode <mode> () • Parameter is used only if <mode_select> = 2. • 0—Automatic mode • 1—Manual mode
+WIOCFG	**GPIO Configuration** Configure a specific unallocated I/O port for one of the following uses (indicated by the <func> parameter): • GPIO, accessible via AT commands (<func> = 4) • Usage by the embedded Linux host (<func> = 16) **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes (Continued on next page)

Table 12-2: I/O command details (Continued)

Command	Description
+WIOCFG	**GPIO Configuration (continued)** **Usage:** • Execution: **AT+WIOCFG=<idx>,<func>[,<dir>,<state>,<pull>,<trigger>,<intrvl>]** *(Note 1: <func> must be 4 or 16. All other <func> values are assigned by other commands as noted in the parameter description below.* *Note 2: Optional parameters are used only when <func> = 4.)* Response: OK *(If the port configuration works as requested)* *or* ERROR *(If the port is already allocated—the current <func> value is not 0)* Purpose: Allocate the requested port (<idx>) for use as a GPIO or for control by the embedded host. • Query: **AT+WIOCFG?[<idx>]** Response: *(if <idx> is specified>)* +WIOCFG:<idx>,<func>,<dir>,<state>,<pull>,<trigger>,<intrvl> OK *or (if <idx> is not specified, shows all ports (<idx> values))* +WIOCFG:<idx>,<func>,<dir>,<state>,<pull>,<trigger>,<intrvl> ... +WIOCFG:<idx>,<func>,<dir>,<state>,<pull>,<trigger>,<intrvl> OK Purpose: Report the configuration for the specified port (<idx>), or for all ports (no <idx> specified) • Query List: **AT+WIOCFG=?** Purpose: Display valid execution format and parameter values. **Parameters:** <idx> (Index of I/O port to be configured) • 1–42 Not all values are valid. Use AT+WIOCFG? (page 176) to view supported values. <func> (I/O port usage) • 0—Unallocated • 4—General GPIO • 16—Embedded host <dir> (GPIO direction) • 0—Input • 1—Output <state> (Power-up state for external GPIO configured as an output) • 0—Output low level • 1—Output high level <pull> (Internal pull type for the I/O port) • 0—No pull • 1—Pull down • 2—Keeper • 3—Pull up (Continued on next page)

Table 12-2: I/O command details (Continued)

Command	Description
+WIOCFG	**GPIO Configuration (continued)** <trigger> (Trigger type for I/O port configured as an input) • 0—No trigger • 1—Trigger high • 2—Trigger low • 3—Trigger rising • 4—Trigger falling <intrvl> (Interval at which the I/O port is checked for the specified trigger (<trig>) level) • 0—50 ms • 1—1000 ms *Note: For edge interrupt, the module can only respond one time per 10 ms per GPIO.*
+WIOR	**Read GPIO value** Read the pin value of a GPIO (General Purpose I/O port) that has been configured as an input. *Note: This command returns an ERROR if the GPIO has been configured as an output.* **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** No (At power-on, all GPIOs are configured for input.) **Usage:** • Execution: **AT+WIOR=<gpio>** Response: <value> OK or (if <gpio> is configured as an output) ERROR Purpose: Read the specified GPIO's pin value. • Query List: **AT+WIOR=?** Purpose: Display valid execution format and parameter values. **Parameters:** <gpio> (External GPIO number) • 1–42 Not all values are valid. Use AT+WIOCFG? (page 176) to view supported values. <value> (GPIO pin value) • 0–1

Table 12-2: I/O command details (Continued)

Command	Description
+WIOW	**Write GPIO value** Write a GPIO (General Purpose I/O port) pin value. **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** No (At power-on, all GPIOs are configured for input.) **Usage:** • Execution: **AT+WIOW=<gpio>,<value>** Response: OK Purpose: Write the specified GPIO's pin value. • Query List: **AT+WIOW=?** Purpose: Display valid execution format and parameter values. **Parameters:** <gpio> (External GPIO number) • 1–42 Not all values are valid. Use AT+WIOCFG? (page 176) to view supported values. <value> (GPIO pin value) • 0–1
+WRID	**Set/query Ring Indicator Duration** Set or return the duration of the pulse that is asserted on the Ring Indicator line (pin RI1). (The pulse may be asserted under several different event conditions, but the pulse duration is the same.) Make sure to set the duration appropriately. While long durations may make sense for some events, it is possible that shorter events may expire before the pulse finishes (for example, an incoming call could expire or be re-routed to voicemail). The design is such that if an event expires before the pulse finishes, the wakeup reason and ring indicator will not be reset. **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT+WRID=<n>** Response: OK, or ERROR *(If invalid assignment)* Purpose: Set the ring indicator pulse duration. • Query: **AT+WRID?** Response: +WRID: <n> Purpose: Display the ring indicator pulse duration. • Query List: **AT+WRID=?** Purpose: Display valid execution format and parameter values. **Parameters:** <n> (Ring indicator pulse duration, in ms units) • 50–10000 (Default=50 ms). Range equates to 0.05–10.0 seconds. • Integer values only (pulse is set in 1 ms steps)

Table 12-2: I/O command details (Continued)

Command	Description
+WWAKE	**Query Wakeup Event** Return a mask indicating the event(s) that have pulsed the Ring Indicator (RI) signal since the module was powered on or since the last time this command was successfully issued, whichever is most recent. When the command is successfully issued: • the mask is cleared and, • the RI signal is de-asserted (if it is still being asserted when the command is issued) Usage recommendations: • The application should poll the module immediately upon starting up to determine the event that triggered the RI. Some events depend upon external resources (for example, the network) and may terminate if not handled immediately. For example, if an incoming voice call is not handled in a timely manner, the network will reroute the call to voicemail. • The host application should issue this command immediately before powering down if the intention is to leave the device powered on. This resets the wakeup reason, and no "old" events are indicated when in fact they did not happen during the time the host application was powered down. This is necessary because the wakeup reason can be set, and the RI pin asserted during normal execution when the host application is powered on. Notes: • Notification of losing or finding service implies that the module first had service, and then the service changed the triggering the event. • If an established call is dropped after the notification of an incoming call, the module does not reflect the dropped call in the wakeup status. The dropped call should be handled like a dropped call in the case where the application was monitoring the device all along. **Supporting devices:** WP **Password required:** No **Usage:** • Query: **AT+WWAKE?** Response: WWAKE: <bitmask> OK Purpose: Indicate the events that pulsed the RI pin. **Parameters:** <bitmask> (Events that pulsed the RI pin) • See the <bitmask> parameter in +WWAKESET on page 181 for supported values.

Table 12-2: I/O command details (Continued)

Command	Description
+WWAKESET	**Set/query Wake Up Event Mask** Set or query the WAKE mask setting, which indicates the actions that will generate a pulse on the Ring Indicator (RI1) output signal to "wake up" an application. The WAKE mask indicates all events that can generate the wake pulse. When an event occurs, the RI is asserted for the duration defined via AT+WRID and then de-asserts. If additional events occur while the RI is asserted, the RI is not re-asserted and the duration is not extended; it is assumed that the external processor is awakened by the first assertion. *Note: Each time this command is used to set the mask, the previous setting is replaced. That is, the mask value must indicate all the events that will generate a pulse.* **Supporting devices:** WP **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT+WWAKESET=[<bitmask>]** Response: OK, or ERROR (if an invalid mask value is entered) Purpose: Indicate which events pulse the RI pin. If no <bitmask> is entered, use the default mask value (4—Incoming voice call) is used. • Query: **AT+WWAKESET?** Response: +WWAKESET: <bitmask> Purpose: Display the current mask value. • Query List: **AT+WWAKESET=?** Purpose: Display valid execution format and parameter values. **Parameters:** <bitmask> (Events that will assert (pulse) the RI signal) • If more than one event will assert the signal, add the values. For example, to get notifications for both lost service and incoming voice calls, the <bitmask> value is 5. • 0—No notifications • 1—Lost service (for example, going from digital service to no service)—If the module is in deep sleep (32 kHz), the RI will assert and the module will remain asleep • 2—Service regained (going from no service to service)—If the module is in deep sleep (32 kHz), the RI will assert and the module will remain asleep. NOTE: Changing the SID and remaining on the same service type will NOT trigger the RI signal. • 4—Incoming voice call (Default setting) • 8—Incoming data call • 16—Incoming SMS message • 32—Reserved • 64—Module restart (includes the first power up) • 128—Module has undergone Sudden Momentary Power Loss • 256—Reserved • 512—Antenna status change • 1024—Reserved • 2048—Legato application event • 4095—All events as listed above

13: AirVantage Commands

Introduction

This chapter describes AirVantage (AV) related commands.

Command summary

Table 13-1 lists the commands described in this chapter.

Table 13-1: AirVantage commands

Command	Description	Page
+WDSC	Configure AirVantage Management Services	184
+WDSE	Display most recent AirVantage Management Services error	186
+WDSG	Display AirVantage Management Services status information	187
+WDSI	Activate/deactivate AirVantage Management Services unsolicited notifications	188
+WDSR	Reply to AirVantage server request	191
+WDSS	Configure/connect AirVantage Management Services session	192

Command reference

Table 13-2: AirVantage Device Services command details

Command	Description
+WDSC	**Configure AirVantage Management Services** Configure the following AirVantage Management Services parameters: • User agreement for connection, package download and package install • Polling mode to make a connection to the AirVantage server • Retry mode to attempt a new connection to the AirVantage server when the WWAN DATA service is temporarily out of order or when an http/coap error occurs **SIM card requirement:** Not required **Password required:** No **Persistent across power cycles:** Yes (<State>, <Timer_1>, <Timer_n> **Usage:** • Execution (<Mode> = 0, 1, 2, 3, 5): **AT+WDSC=<Mode>,<State>** Response: OK Purpose: Enable or disable the selected <Mode>. • Execution (<Mode> = 4): **AT+WDSC=<Mode>,<Timer_1>[[,<Timer_2>]...[,<Timer_n>]]** Response: OK Purpose: Set interval timers for successive connection attempts. • Query: **AT!WDSC?** Response: +WDSC: 0,<State> +WDSC: 1,<State> +WDSC: 2,<State> +WDSC: 3,<State> +WDSC: 4,<Timer_1>[[,<Timer_2>]...[,<Timer_n>]] +WDSC: 5,<State> OK Purpose: Show the current <Mode> configurations. • Query List: **AT!WDSC=?** Purpose: Display valid execution format and parameter values. (Continued on next page)

Table 13-2: AirVantage Device Services command details (Continued)

Command	Description
+WDSC	**Configure AirVantage Management Services (continued)** **Parameters:** <Mode> (Mode being configured) • 0=Reserved for future use • 1=User agreement for package download. When enabled, the module returns an unsolicited notification to request an agreement before downloading any package. See +WDSI on page 188 for details. • 2=User agreement for package install. When enabled, the module returns an unsolicited notification to request an agreement before installing any package. See +WDSI on page 188 for details. • 3=Polling mode. When enabled (<State> > 0), the module waits for the number of minutes specifed in <State>, then will initiate a connection to the AirVantage server based if the device is registered on the network. • 4=Retry mode. If an error occurs during a connection to the AirVantage server (e.g. WWAN DATA establishment failed, http error code received), the module will initiate a new connection according to the defined timers. (Note: This is a persistent setting.) • 5=User agreement for device reboot. When enabled, the module returns an unsolicited notification to request an agreement before rebooting the device. <State> (For <Mode> = 0, 1, 2, 5: Activation state of <Mode>) • 0=Disabled (Default value) • 1=Enabled <State> (For <Mode> = 3: Activation state/timer of <Mode>) • 0=Disabled (Default value) • 1–525600=Polling timer (in minutes) <Timer_1>..<Timer_n> (Connection attempt interval timers) • The number of minutes to wait after connection attempt (n-1) before making connection attempt (n). (Note: There is a maximum of 8 connection attempts.) • Valid range: 1–20160 • Default values: • <Timer_1>=15 (Time to wait after first failed connection attempt.) • <Timer_2>=60 (Time to wait after second failed connection attempt.) • <Timer_3>=240 (Time to wait after third failed connection attempt.) • <Timer_4>=960 (Time to wait after fourth failed connection attempt.) • <Timer_5>=2880 (Time to wait after fifth failed connection attempt.) • <Timer_6>=10080 (Time to wait after sixth failed connection attempt.) • <Timer_7>=10080 (Time to wait after seventh failed connection attempt.)

Table 13-2: AirVantage Device Services command details (Continued)

Command	Description
+WDSE	**Display most recent AirVantage Management Services error** Display the most recent HTTP(S) response received by the device for the package download. **Requirements:** • AirVantage Management Services must be activated (See +WDSG on page 187 for details). • Session must be initiated using AT+WDSS=1,1. (See +WDSS on page 192 for details). **SIM card requirement:** Not required **Password required:** No **Usage:** • Execution: **AT+WDSE** Response: [+WDSE: <HTTP_Status>] OK *or* +CME ERROR: 3 *(If AirVantage Management services are not in the Activated state.)* Purpose: Display most recent response. (If HTTP/HTTPS is not yet used, return only OK.) **Parameters:** <HTTP_Status> (Standard HTTP status code) • none—No response shown if HTTP/HTTPS has not yet been used. • Supported statuses: • 1xx Informational: 100 (Continue) 101 (Switching protocols) • 2xx Success: 200 (OK) 201 (Created) 202 (Accepted) 203 (Non-authoritative information) 204 (No content) 205 (Reset content) 206 (Partial content) • 3xx Redirection: 300 (Multiple choices) 301 (Moved permanently) 302 (Found) 303 (See other) 304 (Not modified) 305 (Use proxy) 307 (Temporary redirect) • 4xx Client Error: 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 satisfiable) 417 (Expectation failed) • 5xx Server Error: 500 (Internal server error) 501 (Not implemented) 502 (Bad gateway) 503 (Service unavailable) 504 (Gateway time-out) 505 (HTTP version not supported)

Table 13-2: AirVantage Device Services command details (Continued)

Command	Description
+WDSG	**Display AirVantage Management Services status information** Display general AirVantage Management Services status details. **SIM card requirement:** Not required **Password required:** No **Usage:** • Execution: **AT+WDSG** Response: +WDSG: <Status>, <Value> +WDSG: <Status>, <Value> OK Purpose: Returns the current <Value>s for <Status>=1 and <Status>=2. **Parameters:** <Status> (Information type to display) • 0—AirVantage Management Services activation state • • For <Value>=2 and <Value>=3, connection parameters are automatically provisioned and no actions are required by the user. • Device is activated (<Value>=3) when a dedicated APN (Access Point Name) is set manually or automatically in the first session. See +WDSS on page 192 for details. • 1—Session and package indication <Value> (Detail for the <Status>) • For <Status>=0: • 0—AirVantage Management Services prohibited. Management Services will never be activated. • 1—AirVantage Management Services deactivated. Connection parameters to an AirVantage server must be provisioned. This is the default state when a device has never been activated (first use of device services on this device). • 2—AirVantage Management Services must be provisioned. A bootstrap session is required. • 3—AirVantage Management Services are activated. • For <Status>=1: • 0—No session or package. • 1—A session is under treatment. • 2—A package is available on the server. • 3—A package was downloaded and ready to install. • Note: If a package is downloaded unsuccessfully, the <Value> is set to 0. If it downloads successfully, the <Value> is set to 3.

Table 13-2: AirVantage Device Services command details (Continued)

Command	Description
+WDSI	**Activate/deactivate AirVantage Management Services unsolicited notifications** Activate/deactivate specific AirVantage Management Services unsolicited notifications. **Requirements:** • To receive unsolicited notifications, AirVantage Management Services must be activated (see +WDSG on page 187 for details). **SIM card requirement:** Not required **Password required:** No **Reset required to apply changes:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT+WDSI=<Level>** Response: OK Purpose: Activate/deactivate identifications as specified in the <Level> bitmask parameter. • Query: **AT+WDSI?** Response: +WDSI: <Level>] OK Purpose: Indicates the current state (activated/deactivated) of indications using the <Level> bitmask parameter. • Query List: **AT+WDSI=?** Purpose: Display valid execution format and parameter values. **Parameters:** <Level> (Unsolicited AirVantage Management Services notifications bit mask) • Bit mask indicating which notifications to enable/disable entered as integer value • Default: 0= No indications activated • Bit value: • 0=Indication deactivated • 1=Indication activated • Range: 0–8191. Add the values of each bit listed below. (See +WDSI on page 189 for <Event> details.) • 1 (Bit 0)—Initialization end indication (<Event> = 0) • 2 (Bit 1)—Server request for user agreement indication (<Event> = 1, 2, 3, 24) • 4 (Bit 2)—Authentication indications (<Event> = 4, 5) • 8 (Bit 3)—Session indication (<Event> = 6, 7, 8) • 16 (Bit 4)—Package download indications (<Event> = 9, 10, 11) • 32 (Bit 5)—Certified downloaded package indication (<Event> = 12, 13) • 64 (Bit 6)—Update indications (<Event> = 14, 15, 16) • 128 (Bit 7)—Fallback indication (<Event> = 17) • 256 (Bit 8)—Download progress indication (<Event> = 18) • 512 (Bit 9)—Memory preemption indication (<Event> = 19) • 1024 (Bit 10)—User PIN request indication for bootstrap (<Event> = 20) • 2048 (Bit 11)—Reserved • 4096 (Bit 12)—Bootstrap event indication (<Event> = 23)

Table 13-2: AirVantage Device Services command details (Continued)

Command	Description
+WDSI (notification)	**AirVantage Management Services events—Unsolicited notification** Unsolicited notification received for various AirVantage Management Services events. **Requirements:** • To receive unsolicited notifications, AirVantage Management Services must be activated (see +WDSG on page 187 for details). **Notification format:** **+WDSI: <Event>[,<Data>]** *Note: <Event> parameter descriptions below indicate when a <Data> parameter is included in the response.* **Examples:** • +WDSI: 9,1000 *Package will be downloaded, size is 1000 bytes* • +WDSI: 18,1 *1% of package has been downloaded* • +WDSI: 18, 100 *Entire package (100%) has been downloaded* • +WDSI: 11,2 *Package download failue due to HTTP(S) error (see +WDSE on page 186 for error values)* **Parameters:** <Event> (AirVantage Management Services event) • 0—AirVantage Management Services are initialized and can be used. (Note: Management Services are initialized when the SIM PIN code is entered and a dedicated NAP is configured. See +WDSS on page 192 for details.) • 1—AirVantage server requests that the device make a connection. The device requests a user agreement to allow the module to make the connection. The response can be sent using +WDSR (see +WDSR on page 191) and this indication can be returned by the device if the user has activated the user agreement for connection (see +WDSC on page 185 for details). • 2—AirVantage server requests that the device make a package download. The device requests a user agreement to allow the module to make the download. The response can be sent using +WDSR (see +WDSR on page 191) and this indication can be returned by the device if the user has activated the user agreement for download (see +WDSC on page 185 for details). • 3—Device has downloaded a package. The device requests a user agreement to install the downloaded package. The response can be sent using +WDSR (see +WDSR on page 191) and this indication can be returned by the device if the user has activated the user agreement for install (see +WDSC on page 185 for details). • 4—Module starts authentication with the server. • 5—Authentication with the server failed. • 6—Authentication has succeeded and session with the server has started. • 7—Session with the server failed. • 8—Session with the server is finished. • 9—Package is available on the server and can be downloaded by the module. A <Data> parameter is returned indicating the package size in kBd. (Continued on next page)

Table 13-2: AirVantage Device Services command details (Continued)

Command	Description
+WDSI (notification)	**AirVantage Management Services events—Unsolicited notification (continued)** • 10—Package was successfully downloaded and stored in flash. • 11—One of the following issues happened during the package download: • If the download did not start (a +WDSI <Event>=9 indication has not been received), there is not enough space in the device to download the package. • If the download started (a +WDSI <Event>=9 indication has been received), a flash problem implies that the package has not been saved in the device. • 12—Downloaded package is certified to be sent by the AirVantage server. • 13—Downloaded package is not certified to be sent by the AirVantage server. • 14—Update will be launched. • 15—OTA update client has finished unsuccessfully. • 16—OTA update client has finished successfully. • 17—Reserved • 18—Download progress: • No <Data> parameter—Download start • <Data> parameter—Percentage progress • 19–22—Reserved • 23—Session type (only in LWM2M protocol) • 24—AirVantage server requests that the device make a reboot. The device requests a user agreement to allow the module to reboot. The response can be sent using +WDSR (see +WDSR on page 191) and this indication can be returned by the device if the user has activated the user agreement for connection (see +WDSC on page 185 for details). <Data> (Additional data for specific <Event>s) • (<Event>=5) To be defined • (<Event>=9) Package size: • Package size in bytes, which will be downloaded • Preempted DOTA area size needed to download an update package • If preemption is not made, this parameter is not returned for this event. • If a reverse package is not downloaded and stored, the preempted area will be released after the installation. • (<Event>=11) Download failure reason: • 0=Insufficient memory in device to save firmware update package. Package was not downloaded. • 1=HTTP/HTTPS error occurred. See +WDSE on page 186 for possible error values. • 2=Corrupted firmware update package, did not store correctly. Reasons include (or example), mismatched CRCs between actual and expected, or signature check error. • (<Event>=18) Download progress: • Integer value (% complete) • (<Event>=23) Session event type: • 0=Bootstrap session • 1=Device management session

Table 13-2: AirVantage Device Services command details (Continued)

Command	Description
+WDSR	**Reply to AirVantage server request** Reply to a user agreement request (see +WDSI on page 189 for details) from the module. **SIM card requirement:** Required, and PIN 1/CHV 1 code must be entered. **Password required:** No **Usage:** • Execution: **AT+WDSR=<Reply>[,<Timer>]** Response: OK Purpose: Send <Reply> to a user agreement request from the module. For specific <Reply> types, include a <Timer> to have the module send a new user agreement request after the specified delay. • Query List: **AT+WDSR=?** Purpose: Display valid execution format and parameter values. **Parameters:** <Reply> (Reply type) • 0—Reserved for future use • 1—Reserved for future use • 2—Delay or refuse to download. New user agreement request to be sent by module after <Timer> minutes: • Delay—<Timer> must be > 0, or blank (Default 30). New user agreement request to be sent by module after <Timer> minutes. • Refuse—<Timer>=0. Usage restrictions include: • Option available only if OMA DM protocol is used. • Not supported for install request (AT+WDSR=5,0). Returns +CME ERROR: 3 • Not supported for device reboot request (AT+WDSR=7,0). Returns +CME_ERROR: 3 • 3—Accept the download (download it now) • 4—Accept the install (install it now) • 5—Delay the install. New user agreement request to be sent by module after <Timer> minutes. • 6—Accept the device reboot (reboot now) • 7—Delay the device reboot. New user agreement request to be sent by module after <Timer> minutes. • Note: If the module is powered down before a delay (install, download, or reboot) finishes, the new user agreement request will be returned during the next start up. <Timer> (Interval before new user agreement request to be sent by module) • Applies to <Reply> types 2, 5, 7 • Valid values: • Valid range: 0–1440 (minutes) • 0—If <Reply>=2 and OMA DM protocol is used, refuse the user agreement request. • Default (if not specified): 30 (minutes)

Table 13-2: AirVantage Device Services command details (Continued)

Command	Description
+WDSS	**Configure/connect AirVantage Management Services session** Configure a dedicated access point name (APN), and initiate a connection to the AirVantage server. Also used to activate an automatic registration to the AirVantage server. Activating dedicated PDP context: • If a dedicated NAP has not been defined using this command, and a session is requested (via AT command, or via an SMS notification (SMS only in the OMA DM protocol use case), the module uses an APN that has been defined using AT+CGDCONT to activate the dedicated PDP context. This APN will be recorded to configure the AirVantage server's APN and it will be used to activate the dedicated PDP context for the next sessions. • If the PDP context cannot be activated because the AirVantage server's APN is misconfigured, the module uses an APN defined using AT+CGDCONT command to activate the dedicated PDP context. However, the initial APN configuration is not erased. **SIM card requirement:** Required, and PIN 1/CHV 1 code must be entered. **Password required:** No **Persistent across power cycles:** Yes (<Apn> only) **Usage:** • Execution (<Mode> = 0): **AT+WDSS=<Mode>,<Apn>[,<User>[,<Pwd>]]** Response: OK Purpose: Configure the AirVantage server connection. • Execution (<Mode> = 1): **AT+WDSS=<Mode>,<Action>** Response: OK Purpose: Connect to/disconnect from the AirVantage server • Query: **AT+WDSS?** Response: [+WDSS: 0,<Apn>[,<User>] +WDSS: 1,<Action>] OK Purpose: Return the current AirVantage server configuration details. If no APN has been defined, return only OK. • Query List: **AT+WDSS=?** Purpose: Display valid execution format and parameter values. **Parameters:** <Mode> (Connection method) • 0—PDP context configuration for AirVantage server • 1—User-initiated connection to the AirVantage server <Apn> (AirVantage server access point name) • ASCII string • Max length: 50 characters <User> (AirVantage server APN login) • ASCII string • Max length: 30 characters (Continued on next page)

Table 13-2: AirVantage Device Services command details (Continued)

Command	Description
+WDSS	**Configure/connect AirVantage Management Services session (continued)** <Pwd> (AirVantage server APN password) • ASCII string • Max length: 30 characters <Action> (Connect to/disconnect from AirVantage server) • 0—Release connection (Default) • 1—Establish connection

14: Supported GSM/WCDMA AT Commands

14

This chapter identifies standard AT commands that are supported by most Sierra Wireless AirPrime devices. These commands:

- Control serial communications over an asynchronous interface (*ITU-T Serial Asynchronous Dialling and Control (Recommendation V.250*), available on the International Telecommunication Union web site, www.itu.int).
  See Table 14-1 below.
- Control SMS functions for devices on GSM/WCDMA networks (*3GPP TS 27.005*, available on the 3GPP web site, www.3gpp.org)
  See Table 14-2 on page 197.
- Control devices operating on GSM/WCDMA networks (*3GPP TS 27.007,* available on the 3GPP web site, www.3gpp.org)
  See Table 14-3 on page 198.

The tables below identify whether each command is supported on Sierra Wireless UMTS devices. An “N/A” in the Supported column of the table indicates that the command is related to a feature (such as voice) that is not available on the modems.

Commands that are partially supported include descriptions identifying any limitations on command usage. Also, some commands are described in more detail in other chapters—the descriptions for these commands link to those detailed entries (for example, **&V** in Table 14-1 on page 195).

Table 14-1: Supported ITU-T Recommendation V.250 AT commands

Command	Description	Supported ✔=Yes; ✘=No
Commands		
&C	Set Data Carrier Detected (Received line signal detector) function mode	✘
&D	Set Data Terminal Ready function mode	✔
&F	Set all current parameters to manufacturer’s defaults	✔
&S	Set DSR signal	✔
&T	Auto tests	✘
&V	Return operating mode AT configuration parameters	✔
&W	Store current parameter to user-defined profile	✔
+DR	V42bis data compression report	✔
+DS	V42bis data compression	✔
+GCAP	Request complete TA capabilities list	✔

Table 14-1: Supported ITU-T Recommendation V.250 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+GMI	Request manufacturer identification	✔
+GMM	Request TA model identification	✔
+GMR	Request TA revision identification	✔
+GOI	Request global object identification	✘
+GSN	Request TA serial number identification	✔
+ICF	Set TE-TA control character framing	✔
+IFC	Set TE-TA local data flow control	✔
+ILRR	Set TE-TA local rate reporting mode	✘
+IPR	Set fixed local rate	✔
A	Answer incoming call	✔
A/	Re-issues last AT command given	✔
D	Dial	✔
D><MEM><N>	Originate call to phone number in memory <MEM>	✘
D><N>	Originate call to phone number in current memory	✔
D><STR>	Originate call to phone number in memory which corresponds to alphanumeric field <STR>	✘
DL	Redial last telephone number used	✘
E	Set command echo mode	✔
H	Disconnect existing connections	✔
I	Display product identification information	✔
L	Set monitor speaker loudness	✘
M	Set monitor speaker mode	✘
O	Switch from command mode to data mode	✔
P	Select pulse dialing	✘
Q	Set Result code presentation mode	✔
S0	Set number of rings before automatically answering the call	✔
S10	Set disconnect delay after indicating the absence of data carrier	✔
S3	Set command line termination character	✔
S4	Set response formatting character	✔
S5	Set command line editing character	✔
S6	Set pause before blind dialing	✔

Table 14-1: Supported ITU-T Recommendation V.250 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
S7	Set number of seconds to wait for connection completion	✔
S8	Set number of seconds to wait when comma dial modifier used	✔
T	Select tone dialing	✔
V	Set result code format mode	✔
X	Set connect result code format and call monitoring	✔
Z	Set all current parameters to user-defined profile	✔
Result Codes		
OK	Acknowledges execution of a command	✔
CONNECT	A connection has been established	✔
RING	Unsolicited notification of an incoming call signal from the network	✔
NO CARRIER	The connection has been terminated or the attempt to establish a connection failed	✔
ERROR	Command not recognized, command line maximum length exceeded, parameter value invalid, or other problem with processing the command line	✔
NO DIALTONE	No dial tone detected	✔
BUSY	Engaged (busy) signal detected	✔

Table 14-2: Supported 27.005 AT commands

Command	Description	Supported ✔=Yes; ✘=No
+CBM	Cell broadcast message directly displayed	✔
+CBMI	Cell broadcast message stored in memory at specified <index> location	✘
+CDS	SMS status report after sending a SMS	✔
+CDSI	Incoming SMS status report	✔
+CMGC	Send command	✔
+CMGD	Delete message	✔
+CMGF	Message format	✔
+CMGL	List messages	✔
+CMGR	Read message	✔
+CMGS	Send message	✔
+CMGW	Write message to memory	✔

Table 14-2: Supported 27.005 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+CMMS	More messages to send	✔
+CMS ERROR: <err>	SMS error (mobile or network error)	✔
+CMSS	Send message from storage	✔
+CMT	Incoming message directly displayed	✔
+CMTI	Incoming message stored in <mem> (“SM”—SIM message storage) at location <index>	✔
+CNMA	New message acknowledgment to mobile equipment	✔
+CNMI	New message indications to TE	✔
+CPMS	Preferred message storage	✔
+CRES	Restore settings	✘
+CSAS	Save settings	✘
+CSCA	Service center address	✔
+CSCB	Select cell broadcast message types	✔
+CSDH	Show text mode parameters	✔
+CSMP	Set text mode parameters	✔
+CSMS	Select message service	✔

Table 14-3: Supported 27.007 AT commands

Command	Description	Supported ✔=Yes; ✘=No
C	ITU T V.24 circuit 109 carrier detect signal behavior command Format • C<value> Limitations • Default <value> = 2 • <value> = 2 causes the AT/Data carrier detect pin to ‘wink’ (briefly switch off and on) when data calls end. • <value> = 0 or 1 performs as defined in the standard	Partial
+CACM	Accumulated call meter	✘
+CACSP	Voice Group or Voice Broadcast Call State Attribute Presentation	N/A
+CAEMLPP	eMLPP Priority Registration and Interrogation	✘
+CAHLD	Leave an ongoing Voice Group or Voice Broadcast Call	N/A
+CAJOIN	Accept an incoming Voice Group or Voice Broadcast Call	N/A
+CALA	Alarm	N/A

Table 14-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+CALCC	List current Voice Group and Voice Broadcast Calls	N/A
+CALD	Delete alarm	N/A
+CALM	Alert sound mode	✘
+CAMM	Accumulated call meter maximum	✘
+CANCHEV	NCH Support Indication	✘
+CAOC	Advice of Charge	✘
+CAPD	Postpone or dismiss an alarm	N/A
+CAPTT	Talker Access for Voice Group Call	N/A
+CAREJ	Reject an incoming Voice Group or Voice Broadcast Call	N/A
+CAULEV	Voice Group Call Uplink Status Presentation	N/A
+CBC	Battery charge	✔
+CBST	Select bearer service type	✔
+CCCM	Current call meter value	✘
+CCFC	Call forwarding number and conditions	✔
+CCLK	Clock	N/A
+CCUG	Closed user group	✔
+CCWA	Call waiting	✔
+CCWE	Call Meter maximum event	✘
+CDIP	Called line identification presentation	✘
+CDIS	Display control	✘
+CEER	Extended error report	✘
+CEREG	EPS network registration status	✔
+CFUN	Set phone functionality Format • +CFUN = [<fun> [, <rst>]] Limitations • Valid <fun> values: ◦ 0 (minimum functionality, low power draw) ◦ 1 (full functionality, high power draw)	Partial
+CGACT	PDP context activate or deactivate	✔
+CGANS	Manual response to a network request for PDP context activation	✘
+CGATT	PS attach or detach	✔

Table 14-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+CGAUTO	Automatic response to a network request for PDP context activation	✘
+CGCLASS	GPRS mobile station class	✔
+CGCLOSP	Configure local octet stream PAD parameters	✘
+CGCMOD	PDP Context Modify	✔
+CGCONTRDP	PDP Context Read Dynamic Parameters	✔
+CGDATA	Enter data state	✔
+CGDCONT	Define PDP Context	✔
+CGDSCONT	Define Secondary PDP Context	✔
+CGEQMIN	3G Quality of Service Profile (Minimum acceptable)	✔
+CGEQNEG	3G Quality of Service Profile (Negotiated)	✔
+CGEQOS	Define EPS Quality of Service	✔
+CGEQREQ	3G Quality of Service Profile (Requested)	✔
+CGEREP	Packet Domain event reporting	✔
+CGEV	GPRS network event indication	✔
+CGMI	Request manufacturer identification	✔
+CGMM	Request model identification	✔
+CGMR	Request revision identification	✔
+CGPADDR	Show PDP address	✔
+CGQMIN	Quality of Service Profile (Minimum acceptable)	✔
+CGQREQ	Quality of Service Profile (Requested)	✔
+CGREG	GPRS network registration status	✔
+CGSCONTRDP	Secondary PDP Context Read Dynamic Parameters	✔
+CGSMS	Select service for MO SMS messages	✔
+CGSN	Request product serial number identification	✔
+CGTFT	Traffic Flow Template	✔
+CGTFTRDP	Traffic Flow Template Read Dynamic Parameters	✔
+CHLD	Call related supplementary services	✔
+CHSA	HSCSD non-transparent asymmetry configuration	N/A
+CHSC	HSCSD current call parameters	N/A
+CHSD	HSCSD device parameters	N/A

Table 14-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+CHSR	HSCSD parameters report	N/A
+CHST	HSCSD transparent call configuration	N/A
+CHSU	HSCSD automatic user initiated upgrading	N/A
+CHUP	Hangup call	✔
+CIEV	Indicator event	✔
+CIMI	Request international mobile subscriber identity	✔
+CIND	Indicator control	✔
+CKEV	Key press or release event	✘
+CKPD	Keypad control	✘
+CLAC	List all available AT commands	✘
+CLAE	Language Event	✘
+CLAN	Set Language	✘
+CLCC	List current calls	✔
+CLCK	Facility lock	✔
+CLIP	Calling line identification presentation	✔
+CLIR	Calling line identification restriction	✔
+CLVL	Set/return internal loudspeaker volume	✔
+CMAR	Master Reset	✘
+CME ERROR: <err>	Mobile Termination error result code	✔
+CMEC	Mobile Termination control mode	✘
+CMEE	Report Mobile Termination error	✔
+CMER	Mobile Termination event reporting	✔
+CMOD	Call mode	✔
+CMUT	Enable/disable uplink voice muting	✔
+CMUX	Multiplexing mode	✔ (When MUX mode configured on USB interface.)
+CNUM	Subscriber number	✔
+COLP	Connected line identification presentation	✔
+COPN	Read operator names	✔

Table 14-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+COPS	Operator selection	✔
+CPAS	Phone activity status	✔
+CPBF	Find phonebook entries	✔
+CPBR	Read phonebook entries	✔
+CPBS	Select phonebook memory storage	✔
+CPBW	Write phonebook entry	✔
+CPIN	Enter PIN	✔
+CPLS	Preferred PLMN list selection	✔
+CPOL	Preferred operator list	✔
+CPROT	Enter protocol mode	✘
+CPUC	Price per unit and currency table	✔
+CPWC	Power class	✘
+CPWD	Change password	✔
+CR	Service reporting control	✔
+CRC	Cellular result codes	✔
+CREG	Network registration	✔
+CRING	Incoming call type	✔
+CRLP	Radio link protocol	✔
+CRMP	Ring Melody Playback	N/A
+CRSL	Ringer sound level	N/A
+CRSM	Restricted SIM access	✔
+CSCC	Secure control command	✘
+CSCS	Select TE character set	✔
+CSDF	Settings date format	N/A
+CSGT	Set Greeting Text	N/A
+CSIL	Silence Command	N/A
+CSIM	Generic SIM access	✔
+CSNS	Single numbering scheme	✘
+CSQ	Signal quality	✔
+CSSN	Supplementary service notifications	✔

Table 14-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+CSTA	Select type of address	✔
+CSTF	Settings time format	✔
+CSVM	Set Voice Mail Number	✘
+CTFR	Call deflection	✔
+CTZR	Time Zone Reporting	N/A
+CTZU	Automatic Time Zone Update	✘
+CUSD	Unstructured supplementary service data	✔
+CV120	V.120 rate adaptation protocol	✘
+CVHU	Voice Hangup Control	✘
+CVIB	Vibrator mode	N/A
D	ITU T V.25ter [14] dial command	✔
D*99#	Sets up a packet data call (PDP context) based on profile ID #1	✔
D*99*<n>#**	Sets up a packet data call (PDP context) based on profile ID #<n> (<n> is the <cid> in the +CGDCONT command)	✔
+VTD	Tone duration	✔
+VTS	DTMF and arbitrary tone generation	✔
+WS46	PCCA STD 101 [17] select wireless network	✘

15: Band Definitions

Some commands described in this document include input and/or output ‘band’ parameters, where the band value is one of the following:

- An enumerated value representing a network technology and band (Table 15-1)
- A 3GPP band number (Table 15-2 on page 206)

Note: Band support is product-specific—see the device’s Product Specification Document or Product Technical Specification for details.

Table 15-1: Band/technology enumerations[a]

<band>	Description	<band>	Description	<band>	Description	<band>	Description
0	CDMA	22	WCDMA 800	42	LTE B4	60	LTE B24
2	Sleep	25	WCDMA BC3	43	LTE B2	61	LTE B25
5	CDMA 800	26	CDMA BC14	44	LTE B3	62	LTE B26
6	CDMA 1900	27	CDMA BC11	45	LTE B5	63	LTE B27
7	HDR	28	WCDMA BC4	46	LTE B6	64	LTE B28
8	CDMA 1800	29	WCDMA BC8	47	LTE B8	65	LTE B29
9	WCDMA IMT	30	MF 700	48	LTE B9	66	LTE B30
10	GSM 900	31	WCDMA BC9	49	LTE B10	67	LTE B31
11	GSM 1800	32	CDMA BC15	50	LTE B12	68	LTE B32
12	GSM 1900	33	CDMA BC10	51	LTE B14	69	LTE B33
14	JCDMA	34	LTE B1	52	LTE B15	70	LTE B34
15	WCDMA 1900A	35	LTE B7	53	LTE B16	71	LTE B35
16	WCDMA 1900B	36	LTE B13	54	LTE B18	72	LTE B36
17	CDMA 450	37	LTE B17	55	LTE B19	73	LTE B37
18	GSM 850	38	LTE B38	56	LTE B20	74	LTE B39
19	IMT	39	LTE B40	57	LTE B21	75	WCDMA BC19
20	HDR 800	40	WCDMA BC11	58	LTE B22	76	LTE B41
21	HDR 1900	41	LTE B11	59	LTE B23		

a. Band values not listed (e.g. 1, 3, 4) are reserved.

Table 15-2: 3GPP bands

Band	Frequency bands (MHz)		Band	Frequency bands (MHz)	
	Rx	Tx		Rx	Tx
1	1920–1980	2110–2170	**20**	832–862	791–821
2	1850–1910	1930–1990	**21**	1447.9–1462.9	1495.9–1510.9
3	1710–1785	1805–1880	**22**	Reserved	Reserved
4	1710–1755	2110–2155	**23**	2000–2020	2180–2200
5	824–849	869–894	**24**	1626.5–1660.5	1525–1559
6	830–840	875–885	**25**	1850–1915	1930–1995
7	2500–2570	2620–2690	**26–32**	Reserved	Reserved
8	880–915	925–960	**33**	1900–1920	1900–1920
9	1749.9–1784.9	1844.9–1879.9	**34**	2010–2025	2010–2025
10	1710–1770	2110–2170	**35**	1850–1910	1850–1910
11	1427.9–1447.9	1475.9–1495.9	**36**	1930–1990	1930–1990
12	699–716	729–746	**37**	1910–1930	1910–1930
13	777–787	746–756	**38**	2570–2620	2570–2620
14	788–798	758–768	**39**	1880–1920	1880–1920
15	Reserved	Reserved	**40**	2300–2400	2300–2400
16	Reserved	Reserved	**41**	2496–2690	2496–2690
17	704–716	734–746	**42**	3400–3600	3400–3600
18	815–830	860–875	**43**	3600–3800	3600–3800
19	830–845	875–890	**44-60**	Reserved	Reserved

16: ASCII Table

Table 16-1: ASCII values

Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex
NUL	0	00	SP	32	20	@	64	40	‘	96	60
SOH	1	01	!	33	21	A	65	41	a	97	61
STX	2	02	“	34	22	B	66	42	b	98	62
ETX	3	03	#	35	23	C	67	43	c	99	63
EOT	4	04	$	36	24	D	68	44	d	100	94
ENQ	5	05	%	37	25	E	69	45	e	101	95
ACK	6	06	&	38	26	F	70	46	f	102	96
BEL	7	07	’	39	27	G	71	47	g	103	97
BS	8	08	(	40	28	H	72	48	h	104	98
HT	9	09	)	41	29	I	73	49	i	105	99
LF	10	0A	*	42	2A	J	74	4A	j	106	6A
VT	11	0B	+	43	2B	K	75	4B	k	107	6B
FF	12	0C	,	44	2C	L	76	4C	l	108	6C
CR	13	0D	-	45	2D	M	77	4D	m	109	6D
SO	14	0E	.	46	2E	N	78	4E	n	110	6E
SI	15	0F	/	47	2F	O	79	4F	o	111	6F
DLE	16	10	0	48	30	P	80	50	p	112	70
XON	17	11	1	49	31	Q	81	51	q	113	71
DC2	18	12	2	50	32	R	82	52	r	114	72
XOFF	19	13	3	51	33	S	83	53	s	115	73
DC4	20	14	4	52	34	T	84	54	t	116	74
NAK	21	15	5	53	35	U	85	55	u	117	75
SYN	22	16	6	54	36	V	86	56	v	118	76
ETB	23	17	7	55	37	W	87	57	w	119	77
CAN	24	18	8	56	38	X	88	58	x	120	78
EM	25	19	9	57	39	Y	89	59	y	121	79
SUB	26	1A	:	58	3A	Z	90	5A	z	122	7A
ESC	27	1B	;	59	3B	[	91	5B	{	123	7B
FS	28	1C	<	60	3C	\	92	5C	|	124	7C
GS	29	1D	=	61	3D	]	93	5D	}	125	7D
RS	30	1E	>	62	3E	^	94	5E	~	126	7E
US	31	1F	?	63	3F	_	95	5F	DEL	127	7F

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