AirPrime EM74xx/MC74xx

AT Command Reference

SIERRA WIRELESS®

4117727
Rev. 3

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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	July 2015	Created document based on 4114486 AirPrime AT Command Reference • Updated !BAND, !PRIID, !RXDEN (description) • Added !CUSTOM customizations: ”IPV6ENABLE”. Removed “GOBIIMEN” • Added !GMEAS, !HWID, !LTECA, !DACGPSCTON, !DACGPSMASKON, !DACGPSSTANDALONE, !DACGPSTESTMODE, !SARBACKOFF, !SARSTATE, !SARSTATEDFLT

Revision number	Release date	Changes
2	September 2015	• Removed +CPINR, !DAGGAVGRSSI, !DAGGRSSI, !DAGGRSSIRAW, !DAGINFO, !DAGSLOCK, !DAGSRXBURST, !DAGSRXCONT, !DAGSTXBURST, !DAGSTXFRAME, !DALSPARANGE, !DALSTXINDEX, !DALSWAVEFORM, !DARPEN, !DTMEN, !EDAEN, !GCFUIMTYPE, !GETRAT, !GMEAS, !GPSCLRASSIST, !GPSKEEPWARM, !GPSMTLRSETTINGS, !GPSONLY, !GPSXTRAAPN, !GPSXTRADATAENABLE, !GPSXTRADATAURL, !GPSXTRAINITDNLD, !GPSXTRASTATUS, !GPSXTRATIME, !GPSXTRATIMEENABLE, !GPSXTRATIMEURL, !GRESET, !ICCID, !IDSAUTOFOTA, !IDSAUTOSDM, !IDSDFLTACC, !IDSPID, !IDSROAM, !LTECA, !LTENAS, ^MODE, !NASREL, !NVNSCODE, !NVSPCODE, !PACKAGE, !POWERDOWN, !REL, !RMARESET, !SELACQ, !SIMRSTC • Updated !ANTSEL (usage), !BAND (length of bandwidth parameters), !NVPLMN (description), !GSTATUS (added CA-specific info to example, replaced 'Bootup Time' with 'Reset Counter' in LTE example) • Added !DATALOOPBACK, !SCACT, +WANT • Replaced !UDINFO w/ !USBINFO, !UDPID w/ !USBPID, !UDUSBCOMP w/ !USBCOMP

3	November 2016	• Updated Modem Status chapter:
		  • Added !IMPREF
		  • Deprecated !GOBIIMPREF
		  • Updated !ANTSEL (Descr., <gpio> descr.); !RXDEN (SISO sensitivity note)
		  • Updated !CUSTOM customizations: IPV6ENABLE (noted default), USBSERIALENABLE (updated supported values)
		  • Added !CUSTOM customizations: UIM2ENABLE
		  • Removed !CUSTOM customizations: REL8FASTDORMDIS, UBISTENABLE
		• Updated Test Commands chapter:
		  • Replaced !DAWSTXPWR
		  • Updated !DASCHAN (updated LTE usage requirement), !DASTXOFF (added LTE usage), !DASTXON (added LTE usage)
		  • Added !DALSNSVAL, DALSTXMOD, !DALSWAVEFORM
		• Added Memory Management Commands chapter:
		  • Added !NVBACKUP, !RMARESET
		• Updated GNSS Commands chapter:
		  • Updated !GPSAUTOSTART (revised query response), !GPSCOLDSTART (description, added usage requirement), !GPSEND (added <sessionID> parameter), !GPSNMEASENTENCE (additional NMEA sentences), !GPSSATINFO (SV numbers)
		  • Added !GPSCLRASSIST
		  • Removed !GPSONLY
		• Added SIM Commands chapter:
		  • Added !UIMS
		• Updated OMA-DM chapter:
		  • Updated !IDSCREATEACC (updated <AccountIndex>), !IDSCONFIGACC (updated <AccountIndex>), !IDSSUPPORT (format, parameter names)
		• Updated SAR Backoff and Thermal Control Commands chapter:
		  • Updated !SARBACKOFF (added TD-SCDMA)
		• Added AirVantage Commands chapter

Contents

1: About This Guide

Introduction

This document describes supported standard and proprietary AT commands available for Sierra Wireless AirPrime® 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)*.

Note: When designing applications that use these AT commands, use Skylight™ or other Sierra Wireless applications as functionality templates to ensure proper use of command groups. For questions or concerns relating to command implementation, please contact your Sierra Wireless account representative.

Command access

Most commands in this reference are password-protected. To use these commands, you must enter the correct password using AT!ENTERCND on page 20. 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 **AT!ENTERCND** is unique to each carrier and is configured onto the modem during manufacture. If you do not know your password, contact your Sierra Wireless Account Manager.

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.

You may also want to consult the other documents available on our website at www.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
!ENTERCND	Enable access to password-protected commands	20
!SETCND	Set AT command password	21

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
!ANTSEL	Set/query external antenna select configuration	25
!BAND	Select/return frequency band set	26
!BOOTHOLD	Reset modem and wait in bootloader for firmware download	28
!CUSTOM	Set/return customization settings	29
!DATALOOPBACK	Enable/disable and configure loopback mode	34
!GCFEN	Enable/disable GCF test mode	35
!GETBAND	Return the current active band	35
!GOBIIMPREF	Query Gobi Image Management preferences	35
!GSTATUS	Return operational status	36
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!IMPREF	Query/set Image Management preferences	37
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Table 1-2: Modem status commands (Continued)

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!USBINFO	Return information from active USB descriptor	52
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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 19 lists the commands described in this chapter.

Table 2-1: AT password commands

Command	Description	Page
!ENTERCND	Enable access to password-protected commands	20
!SETCND	Set AT command password	21

Command reference

Table 2-2: AT command password 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. **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, upper or lower case) • Characters may be entered in ASCII format, or in Hex format. (For example: "myPass3" or "ABCDEF01234".)

Table 2-2: AT command password 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 **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, upper or lower case) • 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
!ANTSEL	Set/query external antenna select configuration	25
!BAND	Select/return frequency band set	26
!BOOTHOLD	Reset modem and wait in bootloader for firmware download	28
!CUSTOM	Set/return customization settings	29
!DATALOOPBACK	Enable/disable and configure loopback mode	34
!GCFEN	Enable/disable GCF test mode	35
!GETBAND	Return the current active band	35
!GOBIIMPREF	Query Gobi Image Management preferences	35
!GSTATUS	Return operational status	36
!HWID	Display hardware version	36
!IMPREF	Query/set Image Management preferences	37
!LTEINFO	Display LTE network information	39
!NVENCRYPTIMEI	Write unencrypted IMEI to modem	41
!NVPLMN	Provision/display PLMN list for Network Personalization locking	42
!PCINFO	Return power control status information	43
!PCOFFEN	Set/return Power Off Enable state	44
!PCTEMP	Return current temperature information	44
!PCTEMPLIMITS	Set/report temperature state limit values	45
!PCVOLT	Return current power supply voltage information	46
!PCVOLTLIMITS	Set/report power supply voltage state limit values	47
!PRIID	Set/report module PRI part number and revision	48

Table 3-1: Modem status commands (Continued)

Command	Description	Page
!RESET	Reset modem	48
!SCACT	Activate/deactivate data connection	49
!SELMODE	Set/return current service domain	50
!USBCOMP	Set/report USB interface configuration	51
!USBINFO	Return information from active USB descriptor	52
!USBPID	Set/report product ID in USB descriptor	53
&V	Return operating mode AT configuration parameters	54

Command reference

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

Command	Description
!ANTSEL	**Set/query external antenna select configuration** Configure the modem to use available GPIOs to select which antenna to use for each specified frequency band. (Any of the available GPIOs that are not needed for a specific band should be configured as not required.) When the modem switches to a frequency band that has been configured using this command, the GPIOs are driven as specified and the host uses them to tune the external antenna appropriately. (This applies whether this is a primary band, or as the secondary component carrier as part of LTE CA (Carrier Aggregation)). If the modem switches to a band that has not been configured, the host uses the default antenna. *Note: Frequency bands are RAT-independent. For example, Band 5 corresponds to any 850-band technology (CDMA, WCDMA, LTE, GSM).* When designing the system, and configuring the device: • Perform system level testing 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). • Make sure there are no conflicts between primary (PCell) and secondary (SCell) cells for all supported LTE CA combinations, since a conflict can detune the PCell during LTE CA, resulting in reduced performance. (A conflict occurs when the primary band is configured to drive a GPIO one way (high or low), and the secondary is configured to drive the same GPIO the other way (low or high). **Password required:** Yes **Reset required to apply changes:** Yes **Persistent across power cycles:** 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>] ... Conflict: *(Note: Heading appears only if there are conflicts.)* <band *q*>+<band *r*>: <gpio1>, <gpio2>, <gpio3>[, <gpio4>] *(Note: GPIOs in conflict appear as 'C')* ... OK (Continued on next page)

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

Command	Description
!ANTSEL (continued)	**Set/query external antenna select configuration (continued)** Examples: BAND 2: 1, 0, 1, 1 BAND 5: 1, 1, 2, 2 Conflict: B2 + B5: 1, C, 1, 1*(<gpio2> has a conflict ('C'))* B5 + B2: 1, C, 1, 1 OK Purpose: Display the current external antenna select configuration. • Query List: **AT!ANTSEL=?** Purpose: Display valid parameter values and command format. **Parameters:** <band> (RF band) • low- or high-frequency 3GPP band number, as appropriate. (See Table 13-2 on page 154 for a full list of low-, mid-, and high-frequency bands.) • 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.) • 0=Logic low • 1=Logic high • 2=Not used for antenna selection (Default value for <gpio4> if not specified.) • Note: <gpio4> availability is device-specific—see the appropriate Product Technical Specification for details.) • gpio1–4 correspond to ANT_CTRL0–3 (EM devices) or ANT_CTRL1–3 (MC devices)
!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. **Password required:** Yes—Execution (Extended) format **Usage:** • Execution (Basic): **AT!BAND=<Index>** Response: OK Purpose: Select an existing set of bands. • Execution (Extended): **AT!BAND=<Index>,"<Name>",<GWmask>[,<Lmask>,<Lmask2>][,<Tdsmask>]** Response: OK Purpose: Create a new set of bands. (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: **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: **AT!BAND=?** Response: Index, Name, GW Band Mask L Band Mask TDS Band Mask <Index1>, <Name1>, <GWmask1> <Lmask1> <Tdsmask1> ... <IndexN>, <NameN>, <GWmaskN> <LmaskN> <TdsmaskN> <Tdsmask> .... <Lmask> ... <GWmask> ... 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.) <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—W900 1000000000000000—B19 (850) (Continued on next page)

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

Command	Description
!BAND (continued)	**Select/return frequency band set (continued)** <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 <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
!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
!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 **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. • "CFUNPERSISTEN"—Enable/disable persistence (across power cycles) of AT+CFUN setting. <value>: • 0 = Disable (+CFUN setting does not persist across power cycle) • 1 = Enable (+CFUN setting persists across power cycle) • "CMCLIENT"—Assign a default communication manager (CM) client. <value>: • 0 = No CM client specified (default) • 1 = Verizon Access Manager • 2 = Cisco CM (Continued on next page)

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

Command	Description
!CUSTOM (continued)	**Set—query customization settings (continued)** • "CSVOICEREJECT"—Enable/disable ability to ignore incoming voice call pages from the network. <value>: • 0 = Process pages as per device capabilities (default) • 1 = Ignore paging (type 1 and 2) messages • 2 = Reject call setup (voice and circuit-switched VT), returning cause code 88 (Incompatible destination) • 3 = Process voice pages as per device capabilities, and reject call setup (circuit-switched VT), returning cause code 88 (Incompatible destination) • 4 = Reject voice pages, returning cause code 65 (Bearer service not implemented), and reject call setup (circuit-switched VT), returning cause code 88 (Incompatible destination) • "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 • "GMMCAUSE7REMAP"—Enable/disable remapping of GMM Cause 7 instances to GMM Cause 14. <value>: • 0 = Do nothing • 1 = Remap all GMM Cause 7 instances to GMM Cause 14. • "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.) • "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 (Continued on next page)

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

Command	Description
!CUSTOM (continued)	**Set/query customization settings (continued)** • "GPSREFLOC"—Enable/disable reference GPS location reporting. <value>: • 0 = Enable (Default) • 1 = Disable • "GPSSEL"—Select GPS antenna (useful only for devices with both a GPS and a shared GPS/Rx diversity antenna). <value>: • 0 = Use dedicated GPS antenna (Default) • 1 = Use shared GPS/Rx diversity antenna • "IMSIREFRESH"—Allow/prohibit IMSI Refresh during active PDP context. <value>: • 0 = Do not allow (Default) • 1 = Allow • "IPV6ENABLE"—Enable/disable IPV6 support. <value>: • 0 = Disable IPV6 • 1 = Enable IPV6 (Default) • "ISVOICEN"—Enable/disable voice functionality. <value>: • 0 = Disable voice • 1 = Enable voice • "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. • "NETWORKNAMEFMT"—Set MBIM provider name format for vanui (roaming). <value>: • 0 = Display one of: SPN, LongName, or ShortName, by order of priority (Default QCT behavior) • 1 = Display one of: LongName or ShortName • 2 = Display [SPN] - [LongName/ShortName] (Note: May be truncated.) • 3 = Display [LongName/ShortName] - [SPN] (Note: May be truncated.) • "NOROAM"—Enable/disable roaming indicator display. <value>: • 0 = Enable—Display indicator if roaming • 1 = Disable—Never display indicator • 2 = Disable—Never display when on Home MCC (Continued on next page)

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

Command	Description
!CUSTOM (continued)	**Set/query customization settings (continued)** • "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) • "QMIDETACHEN"—Enable/disable QMI NAS detach. <value>: • 0 = Disable—QMI detach request returns NO_EFFECT response, and no action is taken. • 1 = Enable—QMI detach request is acted on, and appropriate response is returned based on the detach result. • "RRCREL7CAPDIS"—Configure RRC Release 7 capability <value>: • 0 = Enable CPC, enable EF-DPCH (default) • 1 = Disable CPC, enable EF-DPCH • 2 = Disable CPC, disable EF-DPCH • "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 (Continued on next page)

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

Command	Description
!CUSTOM (continued)	**Set/query customization settings (continued)** • "STKUIEN"—Enable/disable SIM toolkit UI. <value>: • 0 = Enable for QMI interface • 1 = Reserved • 2 = Enable for AT interface • "UIM2ENABLE"—Enable/disable UIM2 slot support. <value>: • 0 = Disable • 1 = Enable (Default) • "USBSERIALENABLE"—Use IMEI as serial number in USB descriptor (USBD). <value>: • 0 = Same as 1 (Default) • 1 = Use IMEI as USB serial number • 2 = Set serial number as NULL in the USBD • 3 = Use hard-coded default (0123456789ABCDEF) in the USBD • "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. • "WIN7MBOPTIONS"—Configure Windows7 MB options. <mask> (Bitmap): • Bit 0: Hide profile 0=Default behavior 1=Force OSP to hide all profiles from host • Bit 1: Connect Auth Type Re-map 0='NONE' from host maps to CHAP or PAP if UN and/or PWD present 1='NONE' from host maps only to PAP if UN and/or PWD present

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

Command	Description
!DATALOOPBACK	**Enable/disable and configure loopback mode** Enable or disable loopback mode and the loopback multiplier, or display the current settings. **Password required:** No **Persistent across power cycles:** Yes **Usage:** • Query: **AT!DATALOOPBACK?** Response: !DATALOOPBACK: Data Loopback mode; <loopback_mode> Replication count: <loopback_multiplier> OK Purpose: Display the loopback mode state, and loopback multiplier. • Execution: **AT!DATALOOPBACK=<loopback_mode>, <loopback_multiplier>** Response: OK Purpose: Enable/disable loopback mode, and set the loopback multiplier. • Query list: **AT!DATALOOPBACK=?** Purpose: Returns a list of valid parameter values. **Parameters:** <loopback_mode> (Loopback mode state) • 0=Disable data loopback mode • 1=Enable data loopback mode <loopback_multiplier> (Number of downlink bytes sent for each uplink byte (replication count)) • Decimal value • Maximum=6

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

Command	Description
!GCFEN	**Enable/disable GCF test mode** Place the modem in GCF testing mode or normal operating mode. **Password required:** Yes—Execution format only **Usage:** • Execution: **AT!GCFEN=<enableFlag>** Response: OK Purpose: Place the modem in GCF testing mode or normal operating mode. • Query: **AT!GCFEN?** Response: !GCFEN: <enableFlag> OK Purpose: Display the modem's current mode. • Query List: **AT!GCFEN=?** Purpose: Return a list of supported <enableFlag> values. **Parameters:** <enableFlag> (Enable/disable GCF testing) • 0 = Disable GCF test mode (Default) — This value is used for normal operations. • 1 = Enable GCF test mode.
!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* Unknown OK *or* No Service OK Purpose: Return a description of the current active band, or return an error message. *Note: Due to stack implementation requirements, **!GETBAND** reports W800 for both W800 and W850.*
!GOBIIMPREF	**Query Gobi Image Management preferences** List the configuration pairs that are currently downloaded and preferred. *Note: This command is deprecated. Use !IMPREF on page 38, which provides the same functionality.*

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. The response details vary depending on the current RAT. Contact Sierra Wireless for further details if required. **Password required:** No **Usage:** • Query: **AT!GSTATUS?** Response (Example shown is for LTE, actual fields may vary) !GSTATUS: Current Time: <ctime> Temperature: <temp> Reset Counter: <rcounter> Mode: <mode> System mode: <smode> PS state: <PSstate> LTE band: <lband> LTE bw: <lbw> LTE Rx chan: <lrchan> LTE Tx chan: <ltchan> LTE CA state: <CAstate> LTE Scell band: <SCband> LTE Scell bw: <SCbw> LTE Scell chan: <SCchan> EMM state: <emmstate> <emmdesc> RRC state: <rrcstate> IMS reg state: <imsstate> PCC RxM RSSI: <PRxMrssi> RSRP (dBm): <PRxMrsrp> PCC RxD RSSI: <PRxDrssi> RSRP (dBm): <PRxDrsrp> SCC RxM RSSI: <SRxMrssi> RSRP (dBm): <SRxMrsrp> SCC RxD RSSI: <SRxDrssi> RSRP (dBm): <SRxDrsrp> Tx Power: <TXpower> TAC: <tac> RSRQ (dB): <rsrq> Cell ID: <cellid> SINR (dB): <sinr>
!HWID	**Display hardware version** Display the devices's hardware version number. **Password required:** Yes **Usage:** • Query: **AT!HWID?** Response: Revision: <MajorVer>.<MinorVer> OK Purpose: Display hardware version number. • Query List: **AT!HWID=?** Purpose: Return the query command format. **Parameters:** <MajorVer> (Major versioning number) • 0–9 <MinorVer> (Minor versioning number) • 0–9

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

Command	Description
!IMPREF	**Query/set Image Management preferences** Indicate which firmware image (firmware plus carrier configuration) should be selected from those available on the device, or enable SIM-based image switching. Use the query format to list the configuration pairs that are currently downloaded and preferred. **Password required:** No **Usage:** • Execution: **AT!IMPREF=<preference>** Response: OK Purpose: Indicate which image should be used (the preferred image), or enable SIM-based image switching. • 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 *or* !IMPREF: <invalid image> OK Purpose: Query (show) the preferred and current images (firmware plus carrier configuration pairs), or if an image setting does not exist, a message will be displayed, as shown. **Parameters:** <preference> (The preferred carrier, or a flag to enable SIM-based image switching) • Valid values: • <carrier-name>—Module will search for a matching carrier PRI and the firmware required for that PRI. If found, the new image preference is set. • "AUTO-SIM"—Enable SIM-based switching. (To disable SIM-based switching, select a <carrier-name> instead.) <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 (Continued on next page)

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

Command	Description

!IMPREF	**Query/set Image Management preferences (continued)**
	<mismatch information> (Message indicating a field mismatch between the current and preferred image settings)
	• ASCII string (quotation marks do not appear):
	  • "fw version mismatch"
	  • "carrier name mismatch"
	  • "config name mismatch"
	<invalid image> (Message indicating an image does not exist)
	• ASCII string (quotation marks do not appear):
	  • "preferred image setting does not exist"
	  • "current image setting does not exist"
	Example(s):
	• AT!IMPREF="ABC" *(where "ABC" is a carrier name)*
	• AT!IMPREF="AUTO-SIM" *(to enable SIM-based switching)*

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
!NVENCRYPTIMEI	**Write unencrypted IMEI to modem** Write an unencrypted IMEI to a modem *if* the modem does not already have an IMEI—the command can only be used once per modem. The IMEI is a fifteen digit string formed by concatenating the following elements: TAC code (8 digits) SN (Serial number) (6 digits) CheckDigit (1 digit calculated from TAC code and SN) The CheckDigit is calculated as follows: **1.** Label the fourteen digits in the TAC and SN as: TAC: D14..D7 SN: D6..D1 For example: TAC = 12345678 (‘1’ is D14, ‘8’ is D7) SN = 901234 (‘9’ is D6, ‘4’ is D1) **2.** Double the value of each odd-labeled digit (D13, D11, ..., D1). **3.** Add the values of each individual digit from the result of Step 2. **4.** Add the even-labeled digits (D14, D12, ..., D2) to the result of Step 3. **5.** Check the last digit of the result of Step 4. If it is ‘0’, the CheckDigit is 0; if it is not ‘0’, subtract it from 10 to get the CheckDigit. For example: TAC (12345678) SN (901234) Step 1: Label the digits of the TAC and SN. D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 1 2 3 4 5 6 7 8 9 0 1 2 3 4 Step 2: Double the odd-labeled values: D14 **D13** D12 **D11** D10 **D9** D8 **D7** D6 **D5** D4 **D3** D2 **D1** 1 **4** 3 **8** 5 **12** 7 **16** 9 **0** 1 **4** 3 **8** Step 3: Add *each* digit of the odd-labeled values: 4 + 8 + (1 + 2) + (1 + 6) + 0 + 4 + 8 = 34 Step 4: Add each digit of the even-labeled values to the Step 3 total: 1 + 3 + 5 + 7 + 9 + 1 + 3 +34 = 63 Step 5: Check last digit of Step 4 total. CheckDigit = 10 - 3 = 7 Result: IMEI = TAC:SN:CheckDigit = 123456789012347 **Password required:** Yes **Usage:** • Execution: **AT!NVENCRYPTIMEI=<P1>, <P2>, <P3>, <P4>, <P5>, <P6>, <P7>, <P8>** Response: OK Purpose: Write the unencrypted IMEI to the modem. (Continued on next page)

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

Command	Description
!NVENCRYPTIMEI (continued)	**Write unencrypted IMEI to modem (continued)** **Parameters:** <P1> to <P8> (IMEI segments) • <P1> = IMEI[0..1]; <P2> = IMEI[2..3]; ...; <P8> = IMEI[14..15] • <P1> to <P4> represent the TAC • <P5> to <P7> represent the SNR • <P8> represents the CheckDigit plus a padding digit ('0') **Example(s):** Using the example IMEI shown above: AT!NVENCRYPTIMEI=12,34,56,78,90,12,34,70
!NVPLMN	**Provision/display PLMN list for Network Personalization locking** Provision or display the list of PLMN (MCC/MNC pairs) used for Network Personalization locking. Use the execution format to provision the list ONE TIME ONLY. After the list is provisioned, it can only be displayed, not updated. **Password required:** Yes **Usage:** • Query: **AT!NVPLMN?** Response: <MCC> <MNC> ... OK Purpose: Return a list of up to fifty NV items that can be read or written. • Execution: **AT!NVPLMN=<MCC1>, <MNC1>, ..., <MCCn>, <MNCn>** Response: OK Purpose: Add up to six MCC/MNC pairs to the PLMN list Note: Execution can be performed one time only (all MCC/MNC pairs must be set at the same time). **Parameters:** <MCC> (Mobile Country Code) • 3 digits <MNC> (Mobile Network Code) • 2 digits

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> BIOS: <description> GOBIIM: <description> OK Purpose: Return power control information. **Parameters:** <state> (The modem's power mode) • Low Power Mode (LPM) • Online • Offline • Power off (internal) • Initialization (internal) <ForceFlag> (Conditions that caused modem to enter LPM. 0=did not cause, 1 = caused) • W_DISABLE: W_DISABLE is asserted • USER: CnS/AT command was issued • TEMP: Temperature is outside operational limits • VOLT: Voltage is outside operational limits <description> (Explanation of associated information) • ASCII string

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 **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.
!PCTEMP	**Return current temperature information** Return the module's temperature state and actual temperature. **Password required:** No **Usage:** • Query: **AT!PCTEMP?** Response: Temp state: <state> Temperature: <temperature> degC OK Purpose: Return the module's temperature information. **Parameters:** <state> (Temperature state): • Valid values: • "Normal" • "High Warning" • "High Critical" • "Low Critical" <temperature> (Current temperature): • Current temperature in degrees Celsius. This is the temperature reported by a thermistor positioned near the power amplifiers. • Decimal ASCII

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 44. *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:** <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:
	  • "Normal"
	  • "High Critical"
	  • "Low Warning"
	  • "Low Critical"
	<voltage>:
	• Current voltage reading in mV.
	• Decimal ASCII
	<raw>:
	• ADC (Analog/digital convertor) reading
	• Decimal ASCII

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:** Yes **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

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

Command	Description
!PRIID	**Set/report module PRI part number and revision** Report or set the module's customer and carrier PRI part numbers and revisions. **Password required:** Yes—Execution format only **Usage:** • Execution: **AT!PRIID="<priPN>","<priRev>","<pri_cust>"** Response: OK Purpose: Set the module's PRI part number (<priPn>), revision (<priRev>), and customer name (<pri_cust>). • Query: **AT!PRIID?** Response: PRI Part Number: <priPn> Revision: <priRevDisplay> Customer: <pri_cust> Carrier PRI: <bcVersion> OK Purpose: Return the module's PRI information. **Parameters:** <priPn> (PRI part number) • 7-digit ASCII number • Example: 9991234 <priRev> (PRI revision number being written to the module) • 4-digit ASCII: XXYY (implied '.' between XX and YY) • Example: 0100 <priRevDisplay> (PRI revision number being read from the module) • 4-digit ASCII: XX.YY • Example: 01.00 <pri_cust> (PRI customer name) • ASCII string • Example: "Generic Operator" <bcVersion> (BC version) • ASCII string
!RESET	**Reset modem** Perform a modem reset. **Password required:** No **Usage:** • Execution: **AT!RESET** Response: OK Purpose: Reset the modem.

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

Command	Description
!SCACT	**Activate/deactivate data connection** Activate or deactivate a specific data connection between the host and network. *Note: This command does not work on Windows 8 or Windows 7 systems operating in MBIM mode. For those systems, use Microsoft APIs to initiate/end a data connection.* **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 a specific data connection. **Parameters:** <pid> (PDN connection ID) • Valid values: • UMTS: • 1–16 • Default: 1 (all networks except Verizon), 3 (Verizon) • CDMA: • 101–107 • Default: 101 (all networks except Verizon), 3 (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
!USBCOMP	**Set/report USB interface configuration** Set or display the device's USB interface configuration. By default, devices are typically configured to use a USB composition that presents a minimal set of interfaces from a list of available interfaces. This command is used to add or remove interfaces from the configuration. **Password required:** Yes **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> <Config Type Desc> Interface bitmask: <Interface bitmask> <Bitmask Desc> OK Purpose: Report the current interface composition. • Query List: **AT!USBCOMP=?** Purpose: Display valid execution format and parameter values, and examples. **Parameters:** <Config Index> (USB composition) • Valid value: 1 • Use **AT!USBCOMP=?** to view the configurations available for the device. Available configurations are identified as "SUPPORTED". <Config Type> (USB composition) • Valid value: 1 • Reserved values: 2, 3 <Config Type Desc> (Configuration description) • "(Generic)"—Description of <Config Type> = 1. <Interface bitmask> (USB composition) • Bitmask representing all enabled interfaces • Format: 32-bit bitmask • Valid values (available interfaces are device-dependent): • 0x00000001—DIAG • 0x00000004—NMEA • 0x00000008—MODEM • 0x00000100—RMNET0 • 0x00000400—RMNET1 • 0x00001000—MBIM • 0x00010000—AUDIO <Bitmask Desc> (Interface bitmask description) • List of interface descriptions corresponding to <Interface bitmask> components • Example: "(diag, nmea, modem, mbim)"

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

Command	Description
!USBINFO	**Return information from active USB descriptor** Return information from the active USB descriptor. **Password required:** No **Usage:** • Query: **AT!USBINFO?** Response: VID: <vendor_id> APP PID: <app_product_id> BOOT PID: <boot_product_id> Manufacturer: <product_manufacturer> Product: <product_name> 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 <product_manufacturer> (Manufacturer string): • ASCII string (32 characters maximum) • Example: “Sierra Wireless, Incorporated” <product_name> (Product string): • ASCII string (64 characters maximum) • Example: “Mini Card”

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

Command	Description
!USBPID	**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 **Usage:** • Execution: **AT!USBPID=<app product_id> [,<boot product_id>]** Response: OK Purpose: Set the application and boot product IDs in the USB descriptor. • Query: **AT!USBPID?** Response: !USBPID: <app product_id>, <boot product_id> OK Purpose: Report the product ID that is stored in the USB descriptor. • Query List: **AT!USBPID=?** 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!USBPID=? to see a list of all available non-custom PIDs.)

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

Command	Description
&V	**Return operating mode AT configuration parameters** Return the status of all AT command parameters that apply to the current operating mode. **Password required:** No **Usage:** • Execution: **AT&V** Response: &C: 2; &D: 2; &F: 0; E: 1; L: 0; M: 0; Q: 0; V: 1; X: 0; Z: 0; S0: 0; S2: 43; S3: 13; S4: 10; S5: 8; S6: 2; S7: 50; S8: 2; S9: 6; S10: 14; S11: 95; +FCLASS: 0; +ICF: 3,3; +IFC: 2,2; +IPR: 115200; +DR: 0; +DS: 0,0,2048,6;+WS46: 12; +CBST: 0,0,1;+CRLP: (61,61,48,6,0),(61,61,48,6,1),(240,240,52,6,2);+CV120: 1,1,1,0,0,0; +CHSN: 0,0,0,0; +CSSN: 0,0; +CREG: 0; +CGREG: 0;+CFUN:; +CSCS: "IRA"; +CSTA: 129; +CR: 0; +CRC: 0; +CMEE: 2; +CGDCONT: (1,"IP","","",0,0); +CGDSCONT: ; +CGTFT: ; +CGEQREQ: ; +CGEQMIN: ; +CGQREQ: ; +CGQMIN: ;+CGEREP: 0,0; +CGDATA: "PPP"; +CGCLASS: "A"; +CGSMS: 3; +CSMS: 0;+CMGF: 0; +CSCA: "",; +CSMP: ,,0,0; +CSDH: 0; +CSCB: 0,"","; +FDD: 0;+FAR: 0; +FCL: 0; +FIT: 0,0; +ES: ,,; +ESA: 0,,,,0,0,255,; +CMOD: 0;+CVHU: 0; +CPIN: ,; +CMEC: 0,0,0; +CKPD: 1,1; +CGATT: 0; +CGACT: 0;+CPBS: "SM"; +CPMS: "SM","SM","SM"; +CNMI: 0,0,0,0,0; +CMMS: 0; +FTS: 0;+FRS: 0; +FTH: 3; +FRH: 3; +FTM: 96; +FRM: 96; +CCUG: 0,0,0;+COPS: 0,0,""; +CUSD: 0; +CAOC: 1; +CCWA: 0; +CPOL: 0,2,""; +CTZR: 0;+CLIP: 0; +COLP: 0; +CMUX: 0,0,5,31,10,3,30,10,2;!CMUX: 0,0,5,31,10,3,30,10,2 OK *Note: this is an example only. The supported commands may vary by device/SKU.* Purpose: Display command parameters.

4: Diagnostic Commands

4

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	56
!ERR	Display diagnostic information	57
!GCCLR	Clear crash dump data	57
!GCDUMP	Display crash dump data	58
!RXDEN	Enable/disable WCDMA/LTE/TD-SCDMA receive diversity	58

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 • Applies only to the CUSTOM_IMG case

Table 4-2: Diagnostic command details (Continued)

Command	Description
!ERR	**Display diagnostic information** This command is used to display 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

Table 4-2: Diagnostic command details (Continued)

Command	Description
!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.
!RXDEN	**Enable/disable WCDMA/LTE/TD-SCDMA receive diversity** Enable or disable WCDMA/LTE/TD-SCDMA receive diversity, or establish receive diversity as the primary path. The new state takes effect the next time the modem is reset. *Note: To change from <state=0> to <state=2> (or from <state=2> to <state=0>, you must issue AT!RXDEN=1, reset the modem, and then make the final state change.* *Note: Due to firmware design, LTE open-loop Tx power should be set to 20 dBm when measuring SISO sensitivity with Rx diversity as the primary path.* **Password required:** Yes—Execution format only **Usage:** • Execution: **AT!RXDEN=<state>** Response: OK Purpose: Set the current receive diversity state. • Query: **AT!RXDEN?** Response: !RXDEN: <state> OK Purpose: Return the current receive diversity <state>. • Query List: **AT!RXDEN=?** Purpose: Return a list of available <state> values to use in this command. **Parameters:** <state> (Current/ requested receive diversity state) • 0 = Rx diversity disabled • 1 = Rx diversity enabled • 2 = Rx diversity is primary path (See note above for measuring SISO sensitivity.)

5: Test Commands

5

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.

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.

  You must execute **AT!DASBAND** to select an LTE band to run these commands that test the LTE transceiver:
  - !DALGAVGAGC
  - !DALGRXAGC
  - !DALGTXAGC

  You must execute **AT!DASBAND** to select a WCDMA band to run these commands that test the WCDMA transceiver:
  - !DAWGRXAGC
  - !DAWGAVGAGC
  - !DAWSTXCW
  - !DAWSPARANGE
  - !DASTXOFF
  - !DASTXON
  - !DAWSCONFIGRX
- !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 GPS CtoN and frequency measurement	62
!DACGPSMASKON	Set CGPS IQ log mask	62
!DACGPSSTANDALONE	Enter/exit StandAlone (SA) RF mode	63
!DACGPSTESTMODE	Start/stop CGPS diagnostic task	63
!DAFTMACT	Put modem into Factory Test Mode	64
!DAFTMDEACT	Put modem into online mode from Factory Test Mode	64
!DALGAVGAGC	Return averaged Rx AGC value (LTE only)	65
!DALGRXAGC	Return Rx AGC value (LTE only)	66
!DALGTXAGC	Return Tx AGC value and transmitter parameters (LTE only)	67
!DALSNSVAL	Set LTE NS value (LTE only)	68
!DALSRXBW	Set LTE Rx bandwidth (LTE only)	69
!DALSTXBW	Set LTE Tx bandwidth (LTE only)	69
!DALSTXMOD	Set LTE Tx modulation type (LTE only)	70
!DALSWAVEFORM	Set LTE TX waveform (LTE only)	71
!DAOFFLINE	Place modem offline	71
!DASBAND	Set frequency band	72
!DASCHAN	Set modem channel (frequency)	73
!DASLNAGAIN	Set LNA gain state	74
!DASPDM	Set PDM value	75
!DASTXOFF	Turn Tx PA off (WCDMA or LTE mode)	76
!DASTXON	Turn Tx PA on (WCDMA or LTE mode)	76
!DAWGAVGAGC	Return averaged Rx AGC value (WCDMA only)	77
!DAWGRXAGC	Return Rx AGC value (WCDMA only)	78
!DAWINFO	Return WCDMA mode RF information (WCDMA only)	79
!DAWSCONFIGRX	Set WCDMA receiver to factory calibration settings (WCDMA only)	80
!DAWSPARANGE	Set PA range state machine (WCDMA only)	81
!DAWSSCHAIN	Enable secondary receive chain (WCDMA only)	81
!DAWSCHAINTCM	Place receive chain in test call mode (WCDMA only)	82

Table 5-1: Test commands (Continued)

Command	Description	Page
!DAWSTXCW	Set waveform used by the transmitter (WCDMA only)	82
!DAWSTXPWR	Set desired Tx power level (WCDMA mode only)	83

Command reference

Table 5-2: Test command details

Command	Description
!DACGPSCTON	**Return GPS CtoN and frequency measurement** Return the GPS CtoN and frequency measurement. **Requirements:** **a.** AT!DACGPSTESTMODE=1 *(to start CGPS diagnostic task)* **b.** AT!DACGPSSTANDALONE=1 *(to enter SA RF mode)* **c.** AT!DACGPSMASKON *(to enable log mask)* **Password required:** Yes **Usage:** • Execution: **AT!DACGPSCTON** Response: CtoN=<CtoN>, Freq=<freq> OK Purpose: Return CtoN and frequency measurements. **Parameters:** <CtoN> (Signal strength calculated in dBHz as part of WBIQ test) • Uint32 <freq> (Frequency in Hz calculated as part of WBIQ test) • Int32
!DACGPSMASKON	**Set CGPS IQ log mask** Set CGPS IQ (0x138a) log mask. **Password required:** Yes **Usage:** • Execution: **AT!DACGPSMASKON** Response: 730000000300000000000000001000000DC03 00000000000000000000000000000000000000 00000000000000000000000000000000000000 00000000000000000000000000000000000000 00000000000000000000000000000000000000 00000000000000000000000000000000000000 00000000000000000000000000000000000000 00000000000000040000000000000000000000 OK Purpose: Set log mask.

Table 5-2: Test command details (Continued)

Command	Description
!DACGPSSTANDALONE	**Enter/exit StandAlone (SA) RF mode** Enter/exit SA RF mode. **Requirements:** **a.** AT!DACGPSTESTMODE=1 *(to start CGPS diagnostic task)* **Password required:** Yes **Usage:** • Query: **AT!DACGPSSTANDALONE=<state>** Response: 4B0D65001400 OK or Error Purpose: Enter/exit SA RF mode **Parameters:** <state> (SA RF mode state) • 0= Enter SA RF mode • 1=Exit SA RF mode
!DACGPSTESTMODE	**Start/stop CGPS diagnostic task** Start/stop the CGPS diagnostic task. **Password required:** Yes **Usage:** • Execution: **AT!DACGPSTESTMODE=<mode>** Response: *(for start):* 4B0D0800 OK *(for stop):* 4B0D0C00 OK or Error Purpose: Start or stop the CGPS diagnostic test. **Parameters:** <mode> (CGPS diagnostic task mode) • 0= Stop • 1=Start

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. AT commands that start with "!DA" are only available when the modem is in FTM mode. *Note: When this command executes successfully, the modem responds with the value 290300. Any other response indicates an error.* **Password required:** Yes **Usage:** • Query: **AT!DAFTMACT** Response: 290300 *(Success. Any other response indicates an error.)* OK Purpose: Place modem in FTM mode.
!DAFTMDEACT	**Put modem into online mode from Factory Test Mode** This command takes the modem out of FTM and puts the modem back into online mode. (The command !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 **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
!DALGAVGAGC	**Return averaged Rx AGC value (LTE only)** Return the averaged AGC (Automatic Gain Control) readings for a specific uplink channel on the main and diversity paths. **Requirements:** • The modem must be in LTE mode. • **!DASBAND** and **!DALSRXBW** must be issued before you can use this command. **Password required:** Yes **Usage:** • Execution: **AT!DALGAVGAGC=<channel>, <LNA Index>** Response: Paths: <paths> Rx<n>: AGC: <agc> dBm LNA: <lna> Chain: <chain> Rx<n>: AGC: <agc> dBm LNA: <lna> Chain: <chain> OK Purpose: Return the averaged AGC for <channel> on the main and diversity paths. **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) <paths> (Number of receive paths) • 2 <agc> (AGC value in dBm) • Valid values: Dynamic Rx range <chain> (Receive paths) • 0=Rx Main • 1=Rx Diversity

Table 5-2: Test command details (Continued)

Command	Description

!DALGRXAGC	**Return Rx AGC value (LTE only)**
	
	Return the Rx AGC (Automatic Gain Control) value and LNA gain states for each RF path.
	The AGC value can be converted to RSSI (Received Signal Strength Indicator) in dBm:
	if (<AGC_value> < 511)
	<RX_dBm> = -106 + ((<AGC_value> + 512) / 12)
	else
	<RX_dBm> = -106 + (((<AGC_value>-1024) + 512) / 12)
	
	Requirements:
	• The modem must be in LTE mode.
	• **!DASBAND** and **!DASCHAN** must be issued before you can use this command.
	
	Password required: Yes
	
	Usage:
	• Execution: **AT!DALGRXAGC** or **AT!DALGRXAGC?**
	Response: <AGC value>
	OK
	Purpose: Return the <AGC value> for either the main or diversity path. If no <path> is specified, the main path is assumed.
	
	Parameters:
	<path> (For modules supporting diversity)
	• 0=Main path
	• 1=Diversity path
	
	<AGC value> (Rx AGC value for specified path)
	• Valid range: -512 to +511

Table 5-2: Test command details (Continued)

Command	Description
!DALGTXAGC	**Return Tx AGC value and transmitter parameters (LTE only)** Return the Tx AGC (Automatic Gain Control) value and other transmitter parameters. **Requirements:** • The modem must be in LTE mode. • **!DASBAND** and **!DASCHAN** must be issued before you can use this command. • Must be in an active call (for example, when connected to a call box or live network) **Password required:** Yes **Usage:** • Execution: **AT!DALGTXAGC** or **AT!DALGTXAGC?** Response: Paths: <paths> Tx<n>:AGC: <agc> dBm RBi: <rbi> RB: <rbn> PA: <pa> TxGainIdx: <txgi> MTPL: <mtpl> dBm IQgain: <iq> MPR: <mpr> AMPR: <ampr> NS: <ns> SARmpr: <sarmpr> PDet Mode: <mode> PDetAGC: <pagc> PDet: <pdbm> Traw: <traw> Tscaled: <tscaled> Tidx: <tidx> Trem: <trem> OK Purpose: Return transmitter parameters and the transmit <AGC value>. **Parameters:** <paths> (Number of transmit paths) • 1 (Tx) <agc> (Tx AGC value in dBm) • Valid range: -70 to +23 <rbi> • Start resource block index <rbn> (Number of resource blocks) • Valid range: 0–50 <pa> (PA gain state) • Valid range: 0–3 <txgi> • Tx gain index <mtpl> (Max Tx power limit) • Max value: +23 <iq> • Digital IQ gain scaling <mpr> (Maximum power reduction) • See 3GPP 36.101 for details <ampr> (Additional Max power reduction) • See 3GPP 36.101 for details <ns> (Network Signaled (NS) value) • See 3GPP 36.101 for details (Continued on next page)

Table 5-2: Test command details (Continued)

Command	Description

!DALGTXAGC (continued)	**Return Tx AGC value and transmitter parameters (LTE only) (continued)**
	
	<mode> (HDET (power detector) mode)
	• Valid values:
	  • L (Lower power)
	  • H (Higher power)
	
	<padc>
	• HDET ADC
	
	<pdbm>
	• HDET dBm
	
	<traw> (Raw thermistor ADC value)
	• Valid range: 0–4095
	
	<tscaled> (Scaled thermistor value)
	• Valid range: 0–255
	• Value is scaled from <traw> based on calibrated min/max <traw> values for the supported temperature range.
	
	<tidx> (Temperature compensation bin)
	• Valid range: 0–7
	
	<trem>
	• Temperature compensation remainder bin

!DALSNSVAL	**Set LTE NS value (LTE only)** Set the LTE NS value used to configure Tx power. This value is used to determine the Additional Max Power Backoff to reduce spectrum emissions. **Requirements:** • Device must be in FTM mode • Device must be in LTE mode • **!DASBAND**, **!DASCHAN**, **!DALSTXBW**, **!DALSRXBW**, **!DALSTXMOD**, and **!DALSWAVEFORM** must be issued before you can use this command. **Password required:** Yes **Usage:** • Execution: **AT!DALSNSVAL=<ns_val>** Response: OK Purpose: Set the LTE NS value. **Parameters:** <ns_val> (LTE NS (Net Sig) value) • Valid range: 1–32

Table 5-2: Test command details (Continued)

Command	Description
!DALSRXBW	**Set LTE Rx bandwidth (LTE only)** Set the LTE Rx bandwidth. **Requirements:** • The modem must be in LTE mode. • **!DASBAND** must be issued before you can use this command. • This command must be issued before you can use **!DALGAVGAGC**. **Password required:** Yes **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:** • **!DASBAND** must be issued before you can use this command. **Password required:** Yes **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. **Requirements:** • Device must be in FTM mode • Device must be in LTE mode • **!DASBAND**, **!DASCHAN**, **!DALSTXBW**, and **!DALSRXBW** must be issued before you can use this command. • **!DALSWAVEFORM** must be issued after you use this command for the modulation change to have an effect. **Password required:** Yes **Usage:** • Execution: **AT!DALSTXMOD=<mod_type>** Response: OK Purpose: Set the LTE Tx modulation type. **Parameters:** <mod_type> (LTE Tx modulation type) • Valid range: 0–2 • 0—QPSK • 1—16 QAM • 2—64 QAM

Table 5-2: Test command details (Continued)

Command	Description
!DALSWAVEFORM	**Set LTE TX waveform (LTE only)** Set the LTE Tx waveform characteristics. **Requirements:** • Device must be in FTM mode • Device must be in LTE mode • **!DASBAND**, **!DASCHAN**, **!DALSTXBW**, and **!DALSRXBW** must be issued before you can use this command. **Password required:** Yes **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 • 1=LTE PUSCH (Physical Uplink Shared Channel) • 2=LTE PUCCH (Physical Uplink Control Channel) • 3=LTE PRACH (Physical Random Access Channel) • 4=LTE SRS • 5=UpPTS (Uplink Pilot Time Slot <PUSCH_RBs> (Number of PUSCH resource blocks • Valid rnage: 0–100 <PUCCH_RBs> (Number of PUCCH resource blocks) • Valid range: 0–12 <PUSCH_start_RB_index> (PUSCH starting resource block index • Valid range: 0–255
!DAOFFLINE	**Place modem offline** Put the modem offline. **Password required:** Yes **Usage:** • Execution: **AT!DAOFFLINE** Response: OK Purpose: Put the modem offline. **Parameters:** None

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 59.
	
	Requirements:
	• The modem must be in FTM mode—use **!DAFTMACT** to enter FTM mode.
	
	Password required: Yes
	
	Usage:
	• Execution: **AT!DASBAND=<rfband>**
	Response: <rfband>
	OK
	Purpose: Set frequency band.
	
	Parameters:
	<rfband> (Unique value corresponding to an RF band and technology.)
	• This is a 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 specific—see the device's Product Specification or Product Technical Specification document for details.
	• Examples (for a full listing, see Table 13-1 on page 153):
	  • 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 72) 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:** • The modem must be in FTM mode—use **!DAFTMACT** to enter FTM mode. • If modem is in WCDMA mode, **!DASBAND** must be issued before you can use this command. • If modem is in LTE mode, **!DASBAND**, **!DALSRXBW** and **!DALSTXBW** must be issued before you can use this command. **Password required:** Yes **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:** • **!DASBAND** and **!DASCHAN** must be issued before you can use this command. **Password required:** Yes **Usage:** • Execution: **AT!LNAGAIN=<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. The values are approximations and subject to change over time. The values are different than those from high to low gain.* <path> (For modules supporting diversity) • 0=Main path • 1=Secondary (diversity) path

Table 5-2: Test command details (Continued)

Command	Description
!DASPDM	**Set PDM value** 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:** • The modem must be in FTM mode—use **!DAFTMACT** to enter FTM mode. • **!DASBAND** and **!DASCHAN** must be issued before you can use this command. **Password required:** Yes **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

Table 5-2: Test command details (Continued)

Command	Description
!DASTXOFF	**Turn Tx PA off (WCDMA or LTE mode)** Turn the transceiver PA off, after it has been turned on with !DASTXON. **Requirements:** • The modem must be in FTM mode—use **!DAFTMACT** to enter FTM mode. • In WCDMA mode, **!DASBAND** and **!DASCHAN** must be issued before you can use this command. • In LTE mode, **!DASBAND**, **!DASCHAN**, **!DALSTXBW**, and **!DALSRXBW** must be issued before you can use this command. **Password required:** Yes **Usage:** • Execution: **AT!DASTXOFF** Response: OK Purpose: Turn the Tx PA off. **Parameters:** None
!DASTXON	**Turn Tx PA on (WCDMA or LTE mode)** Turn on the transceiver PA (either the WCDMA PA or the LTE PA, depending on the mode set with !DASBAND). The PA then remains on until you turn it off using the !DASTXOFF command, or until you reset or power the modem down and up. **Requirements:** • The modem must be in FTM mode—use **!DAFTMACT** to enter FTM mode. • In WCDMA mode, **!DASBAND** and **!DASCHAN** must be issued before you can use this command. • In LTE mode, **!DASBAND**, **!DASCHAN**, **!DALSTXBW**, **!DALSRXBW**, **!DALSTXMOD**, **!DALSWAVEFORM**, and **!DALSNSVAL** must be issued before you can use this command. **Password required:** Yes **Usage:** • Execution: **AT!DASTXON** Response: OK Purpose: Turn the Tx PA on. **Parameters:** None

Table 5-2: Test command details (Continued)

Command	Description
!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:** • The modem must be in WCDMA mode. • **!DASBAND** must be issued before you can use this command. **Password required:** Yes **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

!DAWGRXAGC	**Return Rx AGC value (WCDMA only)**
	
	Return the Rx AGC (Automatic Gain Control) value of the main path or diversity path (if applicable).
	This value can be converted to RSSI (Received Signal Strength Indicator) in dBm:
	if (<AGC_value> < 511)
	<RX_dBm> = -106 + ((<AGC_value> + 512) / 12)
	else
	<RX_dBm> = -106 + (((<AGC_value>-1024) + 512) / 12)
	
	Requirements:
	• The modem must be in WCDMA mode.
	• **!DASBAND** and **!DASCHAN** must be issued before you can use this command.
	
	Password required: Yes
	
	Usage:
	• Execution: **AT!DAWGRXAGC?[<path>]**
	Response: <AGC value>
	OK
	Purpose: Return the <AGC value> for either the main or diversity paths. If no <path> is specified, the main path is assumed.
	
	Parameters:
	<path> (For modules supporting diversity)
	• 0=Main path
	• 1=Diversity path
	
	<AGC value> (Rx AGC value for specified path)
	• Valid range: -512 to +511

Table 5-2: Test command details (Continued)

Command	Description
!DAWINFO	**Return WCDMA mode RF information (WCDMA only)** Return RF information for WCDMA mode when the modem is in CELL_DCH (Designated Channel) state. **Requirements:** • The modem must be in WCDMA mode. • The modem must be in online mode (not FTM mode). **Password required:** Yes **Usage:** • Execution: **AT!DAWINFO** Response: RXAGC:<rxAGC> TXAGC:<txAGC> TXADJ:<txAdj> TXLIM:<txLim> LNA:<lnaRange> PA ON:<paOn> TX ON:<txOn> PA Range:<paRange> RxD RXAGC:<RXDrxAGC> RxD LNA:<RXDlnaRange> HDET:<hdet> OK Purpose: Return the RF information. **Parameters:** <rxAGC> (Rx AGC value) • Valid range: 0–65535 <txAGC> (Tx AGC value) • Valid range: 0–65535 <txAdj> (Tx AGC value after linearization (adjustment)) • Valid range: 0–65535 <txLim> (Tx AGC limit) • Valid range: 0–65535 <lnaRange> (State of the LNA) • Valid range: 0–65535 <paOn> (State of PA_ON0) • Valid range: 0–65535 <txOn> (State of TX_ON) • Valid range: 0–65535 <paRange> (State of PA_R1: PA_R0) • Valid range: 0–65535 <RXDrxAGC> (RxD Rx AGC value) • Valid range: 0–65535 <RXDlnaRange> (State of the RxD LNA) • Valid range: 0–65535 <hdet> (Raw HDET (High Power Detector) data) • Valid range: 0–255

Table 5-2: Test command details (Continued)

Command	Description
!DAWSCONFIGRX	**Set WCDMA receiver to factory calibration settings (WCDMA only)** Configure the WCDMA receiver according to factory calibration settings stored in the modem's NV (Non-Volatile memory). This allows for accurate measurement of Rx AGC levels. The command performs these steps: **1.** Sets the channel. **2.** Selects and sets LNA range (or LNA gain). **3.** Sets the VGA gain offset based on the channel. **4.** Sets the LNA range offset. **Requirements:** • The modem must be in WCDMA mode. • The modem must be in FTM mode—use **!DAFTMACT** to enter FTM mode. • **!DASBAND** and **!DASCHAN** must be issued before you can use this command. **Password required:** Yes **Usage:** • Execution: **AT!DAWSCONFIGRX=<channel>,<Rx_Level_dBm>** Response: <LNA Index>, <LNA Value> OK Purpose: Configure the receiver. **Parameters (Input):** <channel> (Uplink channel number (ARFCN)) • Value based on the selected band <Rx_Level_dBm> (Approximate signal level (in dBm) being applied to the modem receiver) • Valid range: -113 to 20 **Parameters (Output):** <LNA Index> (LNA offset index) • 0=R0 (highest gain) • 1=R1 • 2=R2 • 3=R3 (lowest gain) <LNA Value> • Internal use only

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:** • The modem must be in WCDMA mode. • The modem must be in FTM mode—use **!DAFTMACT** to enter FTM mode. • **!DASBAND** and **!DASCHAN** must be issued before you can use this command. **Password required:** Yes **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) • 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:** • The modem must be in WCDMA mode. • **!DASBAND** and **!DASCHAN** must be issued before you can use this command. **Password required:** Yes **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
!DAWSCHAINTCM	**Place receive chain in test call mode (WCDMA only)** Place one or both of the primary and secondary receive chains in test call mode. **Requirements:** • The modem must be in WCDMA mode. • **!DASBAND** and **!DASCHAN** must be issued before you can use this command. **Password required:** Yes **Usage:** • Execution: **AT!DAWSCHAINTCM=<chain>** Response: OK Purpose: Place requested receive chain(s) in test call mode. **Parameters:** <chain> (Receive chain to place in test call mode) • 0=Main • 1=Secondary • 2=Both
!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:** • The modem must be in WCDMA mode. • The modem must be in FTM mode—use **!DAFTMACT** to enter FTM mode. • **!DASBAND** and **!DASCHAN** must be issued before you can use this command. **Password required:** Yes **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)

Table 5-2: Test command details (Continued)

Command	Description
!DAWSTXPWR Min f/w rev: SWI9X30C_02.10.01.00	**Set desired Tx power level (WCDMA mode only)** Enable/disable Tx power output and set the desired Tx power level in dBm. **Requirements:** • The modem must be in WCDMA mode. • The modem must be in FTM mode—use **!DAFTMACT** to enter FTM mode. • **!DASBAND**, **!DASCHAN**, and **!DASTXON** must be issued before you can use this command. **Password required:** Yes **Usage:** • Execution: **AT!DAWSTXPWR=<enable>,<power_dBm>** Response: OK Purpose: Enable/disable Tx power output and set the Tx power level to the requested <dBm> level. **Parameters:** <enable> (Enable/disable Tx power output) • 0=Disable • 1=Enable <power_dBm> (Desired Tx power in dBm) • Valid range: -57 to 23

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
!NVBACKUP	Back up device configuration	86
!RMARESET	Restore device to saved restore point	88

Command reference

Table 6-2: Memory management command details

Command	Description
!NVBACKUP	**Back up device configuration** Save the device's current configuration as a 'restore point'. The restore point can then be restored at a later time if necessary, using !IRMARESET on page 88. **Password required:** No **Usage:** • Execution: **AT!NVBACKUP=<restore point>[,<name>]** Response: !NVBACKUP: Items Saved: <saved> Items Skipped: <skipped> OK Purpose: Save the current device configuration to the indicated <restore point>. Note: The restore point replaces the existing same-numbered restore point (if present), and deletes higher-numbered restore points. • Query: **AT!NVBACKUP?** Response: !NVBACKUP: <restore point> <name> ... OK Purpose: Display all available restore points. **Usage notes:** • When saving a restore point: – The existing <restore point> is replaced (if present). – Higher-numbered restore points are deleted. • If a <name> is not specified, the file is saved as "unnamed" or "Latest", depending on the <restore point>. **Parameters:** <restore point> (Type of saved restore point) • Valid range: 0–3 • 0=Factory-calibrated configuration (Cannot be replaced) • 1=Sierra-provided SKU configuration (Cannot be replaced) • 2=Save the current configuration using a specified file <name>. If no <name> is specified, save as "unnamed". • 3=Save the current configuration as the 'Latest' restore point. Note: The category 3 restore point is also generated automatically after a successful reconfiguration (e.g. after an image switch or firmware update). (Continued on next page)

Table 6-2: Memory management command details (Continued)

Command	Description

!NVBACKUP	**Back up device configuration (continued)**
	
	<name> (Name used to store the restore point)
	• 0–32 ASCII characters
	  • <restore point> = 0—“Factory” (Factory-calibrated configuration, pre-SKU)
	  • <restore point> = 1—“Provision” (Sierra-provisioned SKU configuration)
	  • <restore point> = 2—User-defined name provided when restore point was saved, or “unnamed” if no name was provided
	  • <restore point> = 3—“Latest” (Latest saved configuration)
	
	<saved> (Number of saved items)
	• 0–(2^{32} - 1)
	
	<skipped> (Number of skipped items)
	• 0–(2^{32} - 1)
	• Note: Does not display if 0

Table 6-2: Memory management command details (Continued)

Command	Description
!RMARESET	**Restore device to saved restore point** Restore the device to a previously saved restore point. (To save a restore point, see !NVBACKUP on page 86.) **Password required:** Yes **Reset required to apply changes:** Yes **Usage:** • Execution: **AT!RMARESET=<restore point>** Response: !RMARESET: DEVICE REBOOT REQUIRED Items Restored: <restored count> Items Deleted: <deleted count> Items Skipped: <skipped count> OK Purpose: Restore device to the specified <restore point> (configuration). A reboot is required to take effect. • Query: **AT!RMARESET?** Response: !RMARESET: <restore point> <name> ... OK Purpose: Display all available restore points. **Parameters:** <restore_point> (Saved restore point) • 0=Factory-calibrated configuration (Note: For information only, cannot be restored.) • 1=Sierra-provided SKU configuration • 2=Restore to the restore point that was saved earlier using !NVBACKUP on page 86. • 3=Restore to the latest saved restore point (saved earlier using !NVBACKUP or automatically when the device was successfully reconfigured, e.g. after an image switch or firmware update) <name> (Descriptive name of <restore_point>) • ASCII string, varies by <restore point>: • <restore point> = 0—“Factory” (Factory-calibrated configuration, pre-SKU) • <restore point> = 1—“Provision” (Sierra-provisioned SKU configuration) • <restore point> = 2—User-defined name provided when using !NVBACKUP to save a configuration, or “unnamed” if no name was provided • <restore point> = 3—User-defined name provided when using !NVBACKUP to save a configuration, or “Latest” (Latest saved configuration)

7: GNSS Commands

Introduction

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

When using these commands, the following considerations apply:

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

Command summary

The table below lists the commands described in this chapter.

Table 7-1: GNSS commands

Command	Description	Page
!GPSAUTOSTART	Configure GPS auto-start features	91
!GPSCLRASSIST	Clear specific GPS assistance data	93
!GPSCOLDSTART	Clear all GNSS assistance data	94
!GPSEND	End an active session	94
!GPSFIX	Initiate GPS position fix	95
!GPSLBSAPN	Set GPS LBS APNs	96
!GPSLOC	Return last known location of the modem	98
!GPSMOMETHOD	Set/report GPS MO method	99
!GPSNIQOSTIME	Set/report GPS QoS timeout period for network-initialized fixes	99
!GPSNMEA	Enable/disable GPS session autostart when NMEA opens	100
!GPSNMEACONFIG	Enable and set NMEA data output rate	101
!GPSNMEASENTENCE	Set/report NMEA sentence type	102
!GPSPORTID	Set/report port ID to use over TCP/IP	103
!GPSPOSMODE	Configure support for GPS positioning modes	104
!GPSSATINFO	Request satellite information	105
!GPSSTATUS	Request current status of a position fix session	106

Table 7-1: GNSS commands (Continued)

Command	Description	Page
!GPSSUPLURL	Set/report SUPL server URL	107
!GPSSUPLVER	Set/report SUPL server version	108
!GPSTRACK	Initiate local tracking (multiple fix) session	109
!GPSTRANSSEC	Control GPS transport security	110
+WANT	Enable/disable GNSS antenna power	110

Command reference

Table 7-2: GNSS 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 **Usage:** • Execution: **AT!GPSAUTOSTART=<enable>[, <fixtype>, <maxtime>, <maxdist>, <fixrate>]** Response: OK *or* ERROR Purpose: Assign start values for various GPS settings • Query: **AT!GPSAUTOSTART?** Response (f/w rev SWI9X30C_02.16.01.00 and higher): !GPSAUTOSTART function: <function> fixtype: <fixtype> maxtime: <maxtime> seconds maxdist: <maxdist> meters fixrate: <fixrate> seconds OK Response (f/w rev lower than SWI9X30C_02.16.01.00): !GPSAUTOSTART enable: <enable> 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. (Continued on next page)

Table 7-2: GNSS command details (Continued)

Command	Description

!GPSAUTOSTART	**Configure GPS auto-start features (continued)**
	
	Parameters:
	<function> (Enable/disable the feature)
	• 0=Disabled
	• 1=Enabled at boot (GPS tracking session starts automatically when modem is reset)
	• 2=Enabled when NMEA port is opened
	<enable> (Enable/disable the feature)
	• 0=Disabled
	• 1=Enabled (GPS tracking session starts automatically when modem is reset)
	<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: GNSS 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. The command is only available when there is no active GPS session—the GPS receiver is off and no position fix is being calculated. This command is equivalent to **!GPSCOLDSTART** when all parameters (except <alm>) are set to '1'. **Password required:** Yes **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: GNSS command details (Continued)

Command	Description
!GPSCOLDSTART	**Clear all GNSS assistance data** Clear GNSS assistance details from the modem and put the modem into a coldstart state. Data cleared includes Ephemeris, Previous Position, Ionosphere, and GPS time—almanac data is not cleared. This forces a cold start for GPS acquisition the next time a session starts. The command is only available when there is no active GPS session—the GPS receiver is off and no position fix is being calculated. **Requirements:** • Before using this command, end all active GNSS sessions using **AT!GPSEND=0,255**. **Password required:** Yes **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>[, <sessionID>]** Response: ERRCODE = <value> OK *or* OK Purpose: End the current session. **Parameters:** <sessType> (Type of session to end) • 0=Position fix session <sessionID> (ID of the session to end) • 255=End all sessions • 0–254=Reserved <value> (Error code returned when command fails for any reason) • See Table 7-3 on page 111 for a list of possible error codes. • N/A=Not available

Table 7-2: GNSS 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: Fix initiated
	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 111 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 106)—Use this command while the tracking session is in progress.
	• **!GPSLOC** (page 98)—Use this command after the session completes to obtain the result.

Table 7-2: GNSS command details (Continued)

Command	Description
!GPSLBSAPN	**Set GPS LBS APNs** Set the GPS LBS APNs to be used for various RATs (Radio Access Technologies). **Password required:** Yes **Usage:** • Execution (Add): **AT!GPSLBSAPN=<operation>,<ratmask>,<IPtype>,<APN>** Execution (Delete one): **AT!GPSLBSAPN=<operation>,<ratmask>** Execution (Delete all): **AT!GPSLBSAPN=<operation>** Response: OK *or* ERROR Purpose: Set the APN to be used for the specified <ratmask>, or delete the APN for a single <ratmask> or all RATs. • Query: **AT!GPSLBSAPN?** Response: <ratmask>, <IPType>, <APN> <ratmask>, <IPType>, <APN> ... OK *or* OK *(if no ID has been set)* Purpose: Display the APNs currently assigned for each RAT. • Query List: **AT!GPSLBSAPN=?** Purpose: Display valid parameter options. **Parameters:** <operation> (Add or delete APNs) • 1=Add an APN for a specific <ratmask> and <IPtype>. Note: All paramters are required. *Note: To change an APN that has been set for a RAT, you must first delete the current APN, then add the new APN.* • 2=Delete the APN for a specific <ratmask> Note: Only <ratmask> is required. • 3=Delete all APNs Note: No other parameters are required. <ratmask> (Radio access technology) • Valid values (values shown are in hexadecimal format): • 01=CDMA • 02=HDR • 04=GSM • 08=WCDMA • 10=LTE (Continued on next page)

Table 7-2: GNSS command details (Continued)

Command	Description

!GPSLBSAPN (continued)	**Set GPS LBS APNs (continued)**
	
	<IPtype> (Internet Protocol version)
	• Character string, entered without quotation marks
	• Valid values:
	  • IPV4
	  • IPV6
	  • IPV4V6
	
	<APN> (Access Point Name)
	• Character string, entered with quotation marks
	• Examples: “mycompany.mnc987.mcc123.gprs”, “ourinternet”

Table 7-2: GNSS 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: GNSS 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”
!GPSMOMETHOD	**Set/report GPS MO method** Set or report the GPS MO method. **Password required:** Yes **Reset required to apply changes:** Yes **Usage:** • Execution: **AT!GPSMOMETHOD=<MO_method>** Response: OK *or* ERROR Purpose: Indicate the MO method to use. • Query: **AT!GPSMOMETHOD?** Response: <MO_method> OK Purpose: Return the current <MO_method> setting. **Parameters:** <MO_method> (MO method) • 0=CP (Control Plane) • 1=UP (User Plane)
!GPSNIQOSTIME	**Set/report GPS QoS timeout period for network-initialized fixes** Set or report the current GPS QoS timeout period for network-initiated fixes. **Password required:** Yes **Reset required to apply changes:** Yes **Usage:** • Execution: **AT!GPSNIQOSTIME=<timeout>** Response: OK *or* ERROR Purpose: Set the new timeout period. • Query: **AT!GPSNIQOSTIME?** Response: QoS time: <timeout> OK Purpose: Return the current <timeout> period. **Parameters:** <timeout> (GPS QoS timeout period) • Timeout period (in seconds)

Table 7-2: GNSS command details (Continued)

Command	Description
!GPSNMEA	**Enable/disable GPS session autostart when NMEA opens** Enable or disable the automatic start of a GPS session when NMEA opens. **Password required:** No **Usage:** • Execution: **AT!GPSNMEA=<enable>** Response: OK Purpose: Enable or disable automatic start of GPS session when NMEA opens. • Query: **AT!GPSNMEA?** Response: Enabled: <enable> OK Purpose: Return the enable/disable state. **Parameters:** <enable> (Enable/disable GPS autostart) • 0=Disable • 1=Enable (Default)

Table 7-2: GNSS command details (Continued)

Command	Description
!GPSNMEACONFIG	**Enable and set NMEA data output rate** Enable or disable NMEA data output, and set the output rate for use with !GPSTRACK. **Requirements:** • NMEA streaming must be enabled using **!GPSNMEA** before this command will work. **Password required:** Yes **Usage:** • Execution: **AT!GPSNMEACONFIG=<enable>[,<outputRate>]** Response: OK *or* ERROR Purpose: Enable or disable NMEA output and set rate. • Query: **AT!GPSNMEACONFIG?** Response: Enabled: 0 Output Rate: <outputRate> *or* Enabled Output Rate: <outputRate> OK Purpose: Return the current <timeout> period. • Query List: **AT!GPSNMEACONFIG=?** Purpose: Return valid parameter values. **Parameters:** <enable> (Enable/disable NMEA data output) • 0=Disable. (Note: <outputRate> is ignored) • 1=Enable. (Note: <outputRate> is required) <outputRate> (NMEA data output rate—time between outputs) • Valid range: 1–255 seconds

Table 7-2: GNSS command details (Continued)

Command	Description
!GPSNMEASENTENCE	**Set/report NMEA sentence type** Set or report the current GPS NMEA sentence types. **Requirements:** • NMEA streaming must be enabled using **!GPSNMEA** before this command will work. **Password required:** Yes **Usage:** • Execution: **AT!GPSNMEASENTENCE=<nmea type>** Response: OK *or* ERROR Purpose: Enable or disable NMEA sentence types. • Query: **AT!GPSNMEASENTENCE?** Response: !GPSNMEASENTENCE: <nmea type> OK Purpose: Indicate the currently enabled GPS NMEA sentence types. • Query List: **AT!GPSNMEASENTENCE=?** Purpose: Return valid parameter values. **Parameters:** <nmea type> (NMEA sentence types) • 2-byte hex format mask (Note: In the execution format, do not include '0x' before the mask value) • Each bit: 0=Disabled; 1=Enabled • Bit 0: GPGGA (GPS fix data) • Bit 1: GPRMC (GPS recommended minimum data) • Bit 2: GPGSV (GPS satellites in view) • Bit 3: GPGSA (GPS overall satellite data) • Bit 4: GPVTG (GPS vector track and speed over the ground) • Bit 5: Reserved • Bit 6: GLGSV (GLONASS satellites in view) • Bit 7: GNGSA (GLONASS overall satellite data) • Bit 8: GNGNS (Time, position, and fixed related data for GLONASS receiver) • Bit 9: GARMC (Galileo recommended minimum data) • Bit 10: GAGSV (Galileo satellites in view) • Bit 11: GAGSA (Galileo overall satellite data) • Bit 12: GAVTG (Galileo Vector track and speed over the ground) • Bit 13: PSTIS (GPS session start indication) • Bit 14: GAGGA (Galileo fix data)

Table 7-2: GNSS command details (Continued)

Command	Description
!GPSPORTID	**Set/report port ID to use over TCP/IP** Set or report the port ID of the SUPL server to use when using TCP/IP as the transport mechanism for SUPL. The command can also be used when the FQDN is auto-generated from the IMSI. **Password required:** Yes **Usage:** • Execution: **AT!GPSPORTID=<portid>** Response: OK *or* ERROR Purpose: Queue the request to set the port ID. • Query: **AT!GPSPORTID?** Response: <portid> OK Purpose: Return the port ID currently being used **Parameters:** <port ID> (Port ID to use over TCP/IP) • Valid range: 0–65535 **Related commands** • !GPSSUPLURL (p.107)—Set/return SUPL server URL used for TCP/IP

Table 7-2: GNSS command details (Continued)

Command	Description
!GPSPOSMODE	**Configure support for GPS positioning modes** Enable or disable support for several GPS positioning modes. **Password required:** Yes **Reset required to apply changes:** Yes **Usage:** • Execution: **AT!GPSPOSMODE=<mask>** Response: OK *or* ERROR Purpose: Use a single byte hexadecimal format mask to indicate which GPS positioning modes are to be supported. • Query: **AT!GPSPOSMODE?** Response: MASK: <mask> OK Purpose: Return a <mask> value indicating which GPS positioning modes are currently supported. • Query List: **AT!GPSPOSMODE=?** Purpose: Return supported <mask> values. **Parameters:** <mask> (Bitmap value representing supported GPS positioning modes) • 1-byte hex format mask (do not include '0x' before the mask value) • 'On' bits identify modes that are supported • Bit 0: Standalone • Bit 1: UP MS-based • Bit 2: UP MS-assisted • Bit 3: CP MS-based (2G) • Bit 4: CP MS-assisted (2G) • Bit 5: CP UE-based (3G) • Bit 6: CP UE-assisted (3G) • Bit 7: Unused **Example(s):** AT!GPSPOSMODE=2a enables support for Bit 5 (CP UE-based), Bit 3 (CP MS-based), and Bit 1 (UP MS-based)

Table 7-2: GNSS command details (Continued)

Command	Description
!GPSSATINFO	**Request satellite information** Return the following information for up to twelve 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) • Valid range: 1–12 <SV n> (Satellite vehicle number for the nth satellite in the list) • Valid ranges: • 1–32 (GPS) • 65–96 (GLONASS) • 201–237 (Beidou) • 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: GNSS 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 111 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: GNSS command details (Continued)

Command	Description
!GPSSUPLURL	**Set/report SUPL server URL** Set or return the URL of the SUPL server to be used when TCP/IP is used as the transport mechanism for location processing. Use !GPSPORTID to set the port ID. **Password required:** Yes **Usage:** • Execution: **AT!GPSSUPLURL="<suplURL>"** 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. **Example(s):** AT!GPSSUPLURL="supl.url.net" AT!GPSSUPLURL="123.123.123.123"

Table 7-2: GNSS command details (Continued)

Command	Description
!GPSSUPLVER	**Set/report SUPL server version** Set or return the version of the SUPL server. **Password required:** 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: GNSS 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
	
	Usage:
	• Execution: **AT!GPSTRACK = <fixType>, <maxTime>, <maxDist>, <fixCount>, <fixRate>**
	Response: Fix initiated
	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 111 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: GNSS 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 111 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 **Reset required to apply changes:** 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.
+WANT	**Enable/disable GNSS antenna power** Enable or disable GNSS antenna power (3.3V). **Password required:** No **Persistent across power cycles:** Yes **Usage:** • Execution: **AT+WANT=<enable>** Response: OK Purpose: Enable or disable the GNSS antenna power (3.3V). • Query List: **AT+WANT=?** Purpose: Display valid execution format and parameter values. **Parameters:** <enable> (Enable/disable GNSS antenna power) • 0=Disable • 1=Enable

Error codes

Table 7-3 describes error codes that can be returned by **!GPSEND** (page 94), **!GPSSTATUS** (page 106), and **!GPSTRACK** (page 109).

Table 7-4 on page 112 describes error codes that can be returned by **!GPSFIX** (page 95)

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
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

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

Error code	Description
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

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

Error code	Description
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 (U)SIM.

Command summary

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

Table 8-1: SIM command passwords

Command	Description	Page
!UIMS	Select active SIM interface	116

Command reference

Table 8-2: SIM command details

Command	Description
!UIMS	**Select active SIM interface** On a module that supports multiple SIM interfaces, select the active SIM interface. To enable/disable UIM2 slot support, use AT!CUSTOM="UIM2ENABLE". See page 33 for option values. **Password required:** No **Usage:** • Execution: **AT!UIMS=<uim_slot>** Response: OK Purpose: Configure the module to use the selected SIM interface. • Query: **AT!UIMS?** Response: !UIMS: <uim_slot> 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=UICC1—External UIM interface #1 • 1=UICC2—External UIM interface #2 or Embedded UIM interface. Depending on the module, the interface may be exposed to an external SIM connector or ESIM, or may be connected internally to an ESIM installed directly on the module.

9: OMA-DM Commands

9

Introduction

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 commands

Command	Description	Page
!HOSTDEVINFO	Configure host device details	118
!IDSCONFIGACC	Configure DM account authentication mode and XML format	119
!IDSCREATEACC	Enter DM account credentials	120
!IDSSUPPORT	Configure DM sessions	121
!IMSTESTMODE	Enable/disable IMS test mode	122
!OSINFO	Configure host device operating system information	123

Command reference

Table 9-2: 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 123. *Note: In the Execution format, if a parameter is not entered then the value on the device does not change.* **Password required:** Yes—Execution formation only **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 9-2: OMA-DM command details (Continued)

Command	Description
!IDSCONFIGACC	**Configure DM account authentication mode and XML format** Configure the preferred authentication mode and XML format for a DM account. **Password required:** No **Usage:** • Execution: **AT!IDSCONFIGACC=<AccountIndex>, <authentication>, <xml_mode>** Response: OK *or* ERROR Purpose: Set the authentication mode and XML format for a specific DM account. • Query: **AT!IDSCONFIGACC?** Response: !IDSCONFIGACC:<AccountIndex>, <authentication>, <xml_mode> OK Purpose: Show the authentication mode and XML format for a specific DM account. • Query List: **AT!IDSCONFIGACC=?** Purpose: Display the execution command format and parameter values. **Parameters:** <AccountIndex> (DM account number) • Valid values: 1–3 • 1—IDS DM account 1 • 2—IDS DM account 2 • 3—AVMS DM account <authentication> (Account authentication mode) • Valid values • “NONE”—No authentication • “BASIC”—Basic authentication • “DIGEST”—MD5 authentication • “HMAC”—HMAC authentication <xml_mode> (XML format) • Valid values: • “XML”—XML format • “WBXML”—WBXML format

Table 9-2: OMA-DM command details (Continued)

Command	Description
!IDSCREATEACC	**Enter DM account credentials** Enter the credentials for a DM account. **Password required:** No **Usage:** • Execution: **AT!IDSCREATEACC=<AccountIndex>, <ServerAddress>, <ServerID>, <ServerPassword>, <ClientUsername>, <ClientPassword>** Response: OK *or* ERROR Purpose: Set the account credentials for a specific DM account. • Query: **AT!IDSCREATEACC?** Response: !IDSCREATEACC: <AccountIndex>, <ServerAddress>, <ServerID>,<ServerPassword>, <ClientUsername>, <ClientPassword> OK Purpose: Show the account credentials for a specific DM account. • Query List: **AT!IDSCREATEACC=?** Purpose: Display the execution command format. **Parameters:** <AccountIndex> (DM account number) • Valid values: 1–3 • 1—IDS DM account 1 • 2—IDS DM account 2 • 3—AVMS DM account <ServerAddress> (URL of DM server) • Maximum length—121 characters • This parameter configures the following DM tree node: • ./DMAcc/AppAddr/1/Addr <ServerID> (DM Server ID and Username) • Maximum length—32 characters • This parameter configures the following DM tree nodes: • ./DMAcc/ServerID • ./DMAcc/AppAuth/Server/AAuthName <ServerPassword> (DM Server Password) • Maximum length—32 characters • This parameter configures the following DM tree node: • ./DMAcc/AppAuth/Server/AAuthSecret <ClientUsername> (DM Client Username) • Maximum length—32 characters • This parameter configures the following DM tree node: • ./DMAcc/AppAuth/Client/AAuthName <ClientPassword> (DM Client Password) • Maximum length—32 characters • This parameter configures the following DM tree node: • ./DMAcc/AppAuth/Client/AAuthSecret

Table 9-2: OMA-DM command details (Continued)

Command	Description
!IDSSUPPORT	**Configure DM sessions** Enable/disable client-initiated and network-initiated DM device configuration and FOTA sessions. **Password required:** Yes **Usage:** • Execution: **AT!IDSSUPPORT=<OMADM CI Config>, <OMADM NI Config>, <OMADM CI FOTA>, <OMADM NI FOTA>, <WU FOTA>, <WU STAT>** Response: OK *or* ERROR Purpose: Enable/disable device configuration sessions and FOTA sessions. • Query: **AT!IDSSUPPORT?** Response: !IDSSUPPORT:<OMADM CI Config>, <OMADM NI Config>, <OMADM CI FOTA>,<OMADM NI FOTA>,<WU FOTA>,<WU STAT> OK Purpose: Show current state of device configuration sessions and FOTA sessions. • Query List: **AT!IDSSUPPORT=?** Purpose: Display the execution command format and allowed parameter values. **Parameters:** <OMADM CI Config> (Client-initiated DM configuration session state) • 0=Disabled (Default) • 1=Enabled <OMADM NI Config> (Network-initiated DM configuration session state) • 0=Disabled (Default) • 1=Enabled <OMADM CI FOTA> (Client-initiated DM FOTA session state) • 0=Disabled (Default) • 1=Enabled <OMADM NI Config> (Network-initiated DM FOTA session state) • 0=Disabled (Default) • 1=Enabled <WU FOTA> (WebUpdater FOTA session) • NOTE: Feature not supported, but value required. Enter 0 or 1. <WU STATE> (WebUpdater Stat session) • NOTE: Feature not supported, but value required. Enter 0 or 1.

Table 9-2: OMA-DM command details (Continued)

Command	Description
!IMSTESTMODE	**Enable/disable IMS test mode** Enable/disable IMS (IP Multimedia Subsystem) test mode. If IMS test mode is enabled: • IMS registration attempts will not occur • SMS over IMS is not supported **Password required:** Yes **Usage:** • Execution: **AT!IMSTESTMODE=<mode>** Response: OK Purpose: Enable/disable IMS test mode. • Query: **AT!IMSTESTMODE?** Response: IMS Test Mode Enabled *or* IMS Test Mode Disabled Purpose: Return the current state of IMS Test Mode. **Parameters:** <mode> (IMS Test Mode state) • 0=Disable • 1=Enable

Table 9-2: 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 118. *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 **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 and Thermal Control Commands

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.

- Thermal mitigation-related commands—These commands may affect the host device's performance. OEMs should carefully evalute their use of these commands to ensure that the device meets performance expectations.

Command summary

The table below lists the commands described in this chapter.

Table 10-1: SAR backoff and thermal control commands

Command	Description	Page
!MAXPWR	Set/report maximum Tx power	126
!SARBACKOFF	Set/report offset from maximum Tx power	127
!SARINTGPIOMODE	Set/report default pull mode for SAR interrupt GPIOs	128
!SARSTATE	Set/report SAR backoff state	129
!SARSTATEDFLT	Set/report default SAR backoff state	130

Command reference

Table 10-2: Thermal mitigation command details

Command	Description
!MAXPWR	**Set/report maximum Tx power** Set or report the maximum Tx power for a specific band. **Caution:** *Any adjustments of Tx power may impact regulatory certification of the module in the host platform. The OEM is responsible for ensuring that the final module configuration in the host platform meets all regulatory requirements.* *Note: Increasing the Tx power affects the module's current consumption and thermal performance.* **Password required:** Yes **Usage:** • Execution (WCDMA/LTE): **AT!MAXPWR=<band>,<tech>,<max_tx_pwr>** Response: OK Purpose: Set the maximum Tx power for the specified band/technology combination. • Execution (CDMA): **AT!MAXPWR=<band>,<tech>,<temperature_bin>,<max_tx_pwr>** Response: OK Purpose: Set the maximum Tx power for the specified band/technology/temperature bin combination. • Query: **AT!MAXPWR?<band>,<tech>** Response: <maxpwr> dBm OK Purpose: Indicate the maximum Tx power for the specified band/technology combination. • Query list: **AT!MAXPWR=?** 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 13-2 on page 154. • Band support is product specific—see the device's Product Specification or Product Technical Specification document for details. • Valid range: 0–71 <tech> (Network technology) • 0=WCDMA • 1=CDMA • 2=LTE <maxpwr> (Maximum Tx power in dB) • Valid range: 20.0–24.5

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

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 **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=?** 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 • 4=TD-SCDMA <band> (RF band) • 0–41 • Band support is device-dependent. See the device's Product Technical Specification for details. (Continued on next page)

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

Command	Description
!SARBACKOFF (continued)	**Set/report offset from maximum Tx power (continued)** <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 **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: !SARSTATEDFLT: <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: AirVantage Commands

11

Introduction

This chapter describes AirVantage (AV) related commands.

Command summary

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

Table 11-1: AirVantage commands

Command	Description	Page
+WDSC	Configure AirVantage Management Services	132
+WDSE	Display most recent AirVantage Management Services error	134
+WDSG	Display AirVantage Management Services status information	135
+WDSI	Activate/deactivate AirVantage Management Services unsolicited notifications	136
+WDSI (notification)	AirVantage Management Services events—Unsolicited notification	137
+WDSR	Reply to AirVantage server request	139
+WDSS	Configure/connect AirVantage Management Services session	140

Command reference

Table 11-2: 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 11-2: 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 136 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 136 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.)
	
	Note: <State>, <Timer_1>, and <Timer_n> are stored in NV without sending the &W command. &F does not affect these values.

Table 11-2: 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 135 for details). • Session must be initiated using AT+WDSS=1,1. (See +WDSS on page 140 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 11-2: 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 140 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 11-2: 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 135 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 by <Level>. • Query: **AT+WDSI?** Response: +WDSI: <Level>] OK Purpose: Indicate 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 137 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) *Note: <Level> is stored in NV without sending the &W command. Default value can be restored using &F.*

Table 11-2: 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 135 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 134 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 140 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 139) and this indication can be returned by the device if the user has activated the user agreement for connection (see +WDSC on page 133 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 139) and this indication can be returned by the device if the user has activated the user agreement for download (see +WDSC on page 133 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 139) and this indication can be returned by the device if the user has activated the user agreement for install (see +WDSC on page 133 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. (Continued on next page)

Table 11-2: AirVantage Device Services command details (Continued)

Command	Description

+WDSI (notification)	**AirVantage Management Services events—Unsolicited notification (continued)**
	• 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.
	• 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 139) and this indication can be returned by the device if the user has activated the user agreement for connection (see +WDSC on page 133 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 134 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 11-2: AirVantage Device Services command details (Continued)

Command	Description
+WDSR	**Reply to AirVantage server request** Reply to a user agreement request (see +WDSI on page 137 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 11-2: 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 • Note: Stored in NV. (Continued on next page)

Table 11-2: AirVantage Device Services command details (Continued)

Command	Description
+WDSS	**Configure/connect AirVantage Management Services session (continued)** <User> (AirVantage server APN login) • ASCII string • Max length: 30 characters • Note: Stored in flash without using &W. &F does not affect this parameter. <Pwd> (AirVantage server APN password) • ASCII string • Max length: 30 characters • Note: Stored in flash without using &W. &F does not affect this parameter. <Action> (Connect to/disconnect from AirVantage server) • 0—Release connection (Default) • 1—Establish connection *Note: <User> and <Pwd> are stored in flash without sending the &W command. &F does not affect these values. <Apn> is stored in NV.*

12: Supported GSM/WCDMA AT Commands

12

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 12-1 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 12-2 on page 145.
- Control devices operating on GSM/WCDMA networks (*3GPP TS 27.007,* available on the 3GPP web site, www.3gpp.org)
  See Table 12-3 on page 146.

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 12-1 on page 143).

Table 12-1: Supported ITU-T Recommendation V.250 AT commands

Command	Description	Supported ✔=Yes; ✘=No
&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	✔
+GMI	Request manufacturer identification	✔

Table 12-1: Supported ITU-T Recommendation V.250 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+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	✔
S7	Set number of seconds to wait for connection completion	✔

Table 12-1: Supported ITU-T Recommendation V.250 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
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	✔

Table 12-2: 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	✔
+CMMS	More messages to send	✔
+CMNA	New message acknowledgement to ME/TA	✔
+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” - (U)SIM message storage) at location <index>	✔
+CNMA	New message acknowledgement to mobile equipment	✔
+CNMI	New message indications to TE	✔
+CPMS	Preferred message storage	✔
+CRES	Restore settings	✘

Table 12-2: Supported 27.005 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+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 12-3: 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
+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

Table 12-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+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	✘
+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	✔
+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	✘
+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)	✔
+CGEQREQ	3G Quality of Service Profile (Requested)	✔
+CGEREP	Packet Domain event reporting	✔

Table 12-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+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	✔
+CGSMS	Select service for MO SMS messages	✔
+CGSN	Request product serial number identification	✔
+CGTFT	Traffic Flow Template	✔
+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
+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	✔

Table 12-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+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	✔
+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	✔

Table 12-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+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	✔
+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	✔

Table 12-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported ✔=Yes; ✘=No
+VTS	DTMF and arbitrary tone generation	✔
+WS46	PCCA STD 101 [17] select wireless network	✘

13: 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 13-1)
- A 3GPP band number (Table 13-2 on page 154)

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

Table 13-1: 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 13-2: 3GPP bands

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

14: ASCII Table

Table 14-1: 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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