



Extended AT Command Reference

Proprietary and Confidential

Products supported:

MiniCard	MC5725 MC5725V MC5727 MC5727V MC5728V
ExpressCard	AirCard 597E
ExpressCard/PC Card	AirCard 402
PC Card	AirCard 595
USB modem	AirCard 250U AirCard 595U Compass 597 USB 598



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Rev 3

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For up-to-date product descriptions, documentation, application notes, firmware upgrades, troubleshooting tips, and press releases, consult our website:

www.sierrawireless.com

Revision history

Version	Summary of changes	Internal doc
1.0 Oct05	Initial release	
1.1 Sep06	<p>Added support for AirCard 595 PC Card, MC5725/MC5725V Mini Card.</p> <p>New commands:</p> <p>!ACHK (page 33)</p> <p>!AKEY (page 33)</p> <p>!DIVERSITY (page 20)</p> <p>!FILE (removed in rev 1.2)</p> <p>!GPSBSINFO (page 75)</p> <p>!GPSIPADDR (page 77)</p> <p>!GPSNETACC (page 77)</p> <p>!GPSPORTID (page 78)</p> <p>!GPSPRIV (page 78)</p> <p>!GPSPTLM (page 78)</p> <p>!MSL (removed in rev. 1.2)</p> <p>!OTSL (removed in rev. 1.2)</p>	

Version	Summary of changes	Internal doc
1.2 Apr07	<p>New commands:</p> <ul style="list-style-type: none"> !EFS (page 81) !FML (page 81) !FMGENL (page 81) !FMGENDIRL (page 81) <p>Removed commands: !FILE, !MSL, !OTSL.</p> <p>Edits to these commands:</p> <ul style="list-style-type: none"> !AUDLP (page 26) ~AUDMOD !LED (page 21) +PRIREV (page 36) !RXAGC (page 30) ~SCRPAD (page 22) <p>Added support for the AirCard 595U USB modem.</p> <p>Added an Index (page 85).</p>	
1.3 Apr08	<p>Added support for:</p> <ul style="list-style-type: none"> • MC5757 module • Compass 597 USB modem • AirCard 597E ExpressCard 	
1.4 Feb 09	<p>Moved MC5725V audio commands into a new chapter "Voice Commands (MC5725V)" (page 69).</p> <p>Added support for:</p> <ul style="list-style-type: none"> • USB 598 modem • AirCard 402 ExpressCard/PC Card • MC5728V Mini Card. <p>Removed support for EM5625 and MC5720 modems.</p> <p>Bugzilla item 10828 (!DIVERSITY, page 20): swapped the descriptions for values of the EVDO parameter.</p> <p>Added "Appendix B: Glossary" (page 83).</p> <p>Added column "Internal doc" to the current table.</p> <p>Added chapter "Voice Commands (MC5727V/MC5728V)" (page 42).</p> <p>Added chapter "Device Management Commands" (page 37).</p> <p>Added command !GPSCLRASSIST (page 76).</p> <p>Added command !ACTSTAT (page 33).</p>	<p>Rev. 0.2-0.7</p> <p>Rev. 0.2-0.7</p> <p>Rev. 0.2-0.7</p> <p>Rev. 0.4-0.7</p>

Version	Summary of changes	Internal doc
<p>2 (Jul 10)</p>	<p>Added support for the AirCard 250U modem.</p> <p>Removed IDMHFA.</p> <p>Added !GPSNMEAENABLE (page 77), \$NMEA (page 79), !SERIALPORTMAP (page 23).</p> <p>Split out (into product-specific) tables for default settings for each audio profile:</p> <ul style="list-style-type: none"> • MC5727V: Table 20 on page 43 • MC5728V, firmware versions 01.09 and newer: Table 21 on page 44 • MC5728V, firmware versions 01.08 and earlier: Table 22 on page 45 <p>New formatting.</p>	<p>1.3</p>
<p>3 (Apr 11)</p>	<p>Changed !NMEA to \$NMEA.</p> <p>Edits to !GPSNMEAENABLE (page 77).</p> <p>Added clarifications (re carrier applicability) to !GPSNMEAENABLE (page 77) and \$NMEA (page 79).</p> <p>Changes to the “Patents” section (page 3).</p>	

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1: About This Guide

Introduction

This reference describes extensions to the operational set of Attention (AT) commands supported by the CDMA 1X/1xEV-DO AirCard™ 595 PC Card, AirCard 597E ExpressCard, AirCard 402 ExpressCard/PC Card, AirCard 250U, 595U, USB 598, and Compass™ 597 USB modems, and MC5725/MC5725V/MC5727/MC5727V/MC5728V modems. Unless specified otherwise, the word “modem” applies to all of these Sierra Wireless products.

Note: This document covers commands that are not to be provided to the end-user, but are needed to make hardware configuration at the factory and conduct required product testing.

This document is supplemental to the AT Command Reference (document #2130620) from Sierra Wireless.

Access to the commands

Many commands in this reference are not generally accessible to end users. Access to the commands is unlocked by a setting of the **!OEM** command (page 27).

Commands related to testing the hardware may require the normal modem operations be halted to prevent unintended changes in state. To do this, use the **!DIAG** command (page 27) to place the modem in diagnostic mode. While in diagnostic mode, the normal automatic operations are suspended.

Commands requiring **!OEM** access or **!DIAG** mode operation are noted with the symbols shown below.



Commands requiring the **!OEM** setting to unlock access are marked with the cog symbol.



Commands requiring the **!DIAG** setting for diagnostic mode are marked with the magnifying glass symbol.

References

This guide covers only the command set used by designers and testers of the Sierra Wireless modems. It does not deal with operational use commands. For normal operations of the modem, consult the AT Command Reference (document #2130620).

You may also want to consult the other documents available in the Development Kit or on our Internet site 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. Our Internet site provides a Glossary (document #2110032) that may be helpful in understanding some acronyms and terminology used in this guide.

Currency

Versions

Document

Note: *Revisions using letters are to be considered drafts and are subject to change before final release.*

This document is under ongoing revision to expand explanations and enhance detail. This edition is:

Rev 3, 21 April 2011

This document is current with the modem firmware revisions shown in the following table:

Product	Firmware version
AirCard 250U USB modem	SWI6085_FP_01.16 or newer
AirCard 402 ExpressCard/PC Card	SWI6085_FP_01.00 or newer
AirCard 595 PC Card	SWI6800_FP.00.57 or newer
AirCard 595U USB modem	SWI6800_FP.00.57 or newer
AirCard 597E ExpressCard	SWI6800_FP.00.29 or newer
Compass 597 USB modem	SWI6800_FP.00.62 or newer
MC5725/MC5725V MiniCard	SWI6800_FP.00.57 or newer
MC5727/MC5727V MiniCard	SWI6800V2_FP.01.65 or newer
MC5728V MiniCard	SWI6800V2_FP.01.04 or newer
USB 598 modem	SWI6085_FP_01.00 or newer

To determine your firmware revision:

- Enter the AT command **AT+GMR**

The modem will respond with version information for software, firmware, and hardware.

The details following the revision number include Sierra Wireless information on the specific build followed by the date and time of the build.

Upgrading

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

Document structure

This document assumes you have the AT Command Reference to use for basic information about the serial connection to the modem.

This reference covers the following classes of extended AT commands.

Hardware Configuration Commands These commands are usually used in a script to configure the modem in the integrated product, at the factory.

Table 1: Hardware configuration commands

Command	Page	Description
~AUDMOD	71	Audio Mode (MC5725V)
!AVCODECRXG	47	Set / query CODEC RX gain (MC5727V/MC5728V)
!AVCODECTXG	49	Set / query the CODEC TX gain (MC5727V/MC5728V)
!AVSETPROFILE	59	Activate a profile (MC5727V/MC5728V)
!DIVERSITY	20	Antenna diversity control
~IPR2	21	Port Rate - Secondary Port
!LED	21	Temporarily change LED behavior.
~MICLVL	71	Microphone Level (calibration) (MC5725V)
!NDIS	22	Enable/disable NDIS driver
~SCRPAD	22	Scratchpad
!SERIALPORTMAP	23	Modem port mappings in non-MUX mode.
~SPKLVL	72	Speaker Level - Codec Gain (calibration) (MC5725V)
!WHQL	24	Enable/disable NDIS -based Autoconnect for WHQL testing

Diagnostic Commands Commands used to perform diagnostics not normally performed by end users are covered, starting on page 25.

Table 2: Diagnostic commands

Command	Page	Description
!AUD	26	Activates the audio circuitry for testing
!AUDLP	26	Controls audio loopback
!DIAG	27	Change from normal to diagnostic operation
!OEM	27	Enable access to protected commands
!SCI	27	Reads the Slot Cycle Index

Test Commands This chapter covers commands required to place the modem in particular modes of operation, test host connectivity, and to exercise the transmitter and receiver for test measurements.

Table 3: Test commands

Command	Page	Description
!ALLUP	29	Turn on transmitter in all up's condition.
!CHAN	29	Tune the synthesizer channel and band
!KEYOFF	30	Turn off the transmitter power amplifier
!KEYON	30	Key the transmitter
!RX2	30	Turn the second receiver on and off
!RXAGC	30	Reads RX AGC of first receiver
!RX2AGC	31	Reads RX AGC of second receiver
!TX	31	Turn the transmitter circuitry on and off
!TXAGC	31	Set TX AGC

Device Interrogation and Provisioning Commands This chapter covers commands for querying the modem for device and provisioning information, and for configuring authentication and security items.

Table 4: Device interrogation and provisioning commands

Command	Page	Description
!ACHK	33	Store the A-Key checksum in the modem
!ACTSTAT	33	Activation status.
!AKEY	33	Calculate the A-Key checksum; write the A-Key
+CARRIERID	34	Carrier ID
!IOTABOOTURL	35	IOTA Boot URL
!IOTALOG	35	Display the IOTA EFS Log
!IOTAMSG	35	Control IOTA Message Level
!IOTASTART	36	Start a client initiated IOTA session
!IOTATDOMAIN	36	IOTA Trusted Domain
+PRIREV	36	PRI revision
!SKU	36	Query the Sierra Wireless SKU

Device Management Commands This chapter covers commands related to OMA Device Management.

Table 5: Device management commands

Command	Page	Description
!DMBOOT	38	Populate the bootstrap information in the DM tree file.
!DMCANCEL	39	Cancel an OMA-DM session.
!DMDC	39	Set or query the Device Configuration Session setting; initiate a CIDC session.
!DMDLRSP	40	Confirm or reject the installation of the FUMO update package.
!DMFUMO	40	Set or query the FUMO session setting; initiate a CIFUMO session.
!DMLOG	40	Display the contents of an OMA-DM EFS session log

Command	Page	Description
!DMMSG	41	Set or query the message logging level.
!DMPRL	41	Set or query the PRL Update session setting; initiate a CIPRL session.

Voice Commands (MC5727V/MC5728V) This chapter covers commands required to query or configure voice-related settings of the MC5727V/MC5728V modems.

Table 6: Voice commands (MC5727V/MC5728V only)

Command	Page	Description
!AVALDIOLPBK	47	Enable / disable an audio loopback
!AVCODECRXG	47	Set / query CODEC RX gain
!AVCODECSTG	48	Set / query CODEC sidetone gain
!AVCODECTXG	49	Set / query the CODEC TX gain
!AVDEF	50	Set audio settings to default values
!AVDTMFTXG	50	Set / query the DTMF TX gain
!AVDTMFVOLDDB	51	Set the audio volume and DTMF volume for each audio type.
!AVEC	52	Set / query the echo cancellation setting
!AVEXTPCMCFG	53	Configure the external PCM interface
!AVEXTPCMSEL	53	Query / set external PCM interface for profile
!AVEXTPCMSTOPCLKOFF	54	Enable / disable the ability to turn off the external PCM interface clock
!AVMICGAIN	55	Set / query the microphone gain
!AVNS	55	Enable / disable noise suppression
!AVRXAGC	56	Set / query RX AVC / AGC configuration
!AVRXPCMFLTR	57	Set / query the RX PCM filter tap
!AVSETPROFILE	59	Activate a profile

Command	Page	Description
!AVSN	60	Set / query audio revision number
!AVTONEPLAY	60	Play a tone
!AVTXAGC	61	Set the TX AGC
!AVTXPCMFLTR	61	Set / query the TX PCM filter tap
!AVTXVOL	62	Set the TX volume

Voice Commands (MC5725V) This chapter covers commands required to query or configure voice-related settings of the MC5725V.

Table 7: Voice commands (MC5725V only)

Command	Page	Description
~AUDMOD	71	Audio Mode
~MICLVL	71	Microphone Level (calibration)
~SPKLVL	72	Speaker Level - Codec Gain (calibration)
!AVTXVOL	72	Set the TX volume

GPS Commands These commands are used for Position Determination Session Management (PDSM)—a GPS feature supported by some carriers/networks. The CDMA network is used to assist the modem to acquire a GPS location fix.

Note: For information on GPS support, please see the product specification for your Sierra Wireless product.

Table 8: GPS commands

Command	Page	Description
!GPSBSINFO	75	Returns the base station (BS) information used for Location Processing
!GPSCLRASSIST	76	Force a cold start for GPS acquisition.
!GPSIPADDR	77	Queries or sets the IP address used when TCP/IP is the transport mechanism for Location Processing.
!GPSNETACC	77	Queries or sets the network access level for location processing

Command	Page	Description
!GPSNMEAENABLE	77	Starts or stops the NMEA stream
!GPSPORTID	78	Queries or sets the port ID to be used when TCP/IP is the transport mechanism for Location Processing
!GPSPRIV	78	Queries or sets the privacy level for location processing
!GPSPTLM	78	Queries or sets the transportation mechanism to be used for Location Processing.
\$NMEA	79	Starts or stops the NMEA stream

EFS Commands This chapter covers commands for file/directory operations.

Table 9: EFS commands

Command	Page	Description
!EFS	81	Check EFS space
!FML	81	Lists file contents of the modem's /SWIR directory.
!FMGENL	81	Lists file contents of a specified directory.
!FMGENDIRL	81	Lists the directories in the modem's top directory.

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 "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 (<c>), while

optional parameters are enclosed within square brackets (**[b]**). 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 strict ASCII alphabetical 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.



Commands requiring the **!OEM** setting to unlock access are marked with the cog symbol.



Commands requiring the **!DIAG** setting for diagnostic mode are marked with the magnifying glass symbol.

Result Code—This is a numeric or text code that is returned after all commands (except resets). 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

Note: You can view this guide online or print it to keep on hand. If you're viewing it online, simply click a topic in the [Table of Contents](#), or any page reference, table reference, section reference, or AT command. (Most text that is blue is a clickable link.) The PDF automatically displays the appropriate page.

2: Hardware Configuration Commands

Introduction

The modems provide the following elements for hardware configuration to suit your particular integration project:

- Modem port mappings in non-MUX mode.
- Audio level—headset or line level
- Microphone level calibration
- Speaker level calibration
- Antenna diversity control
- Shutdown mode—defines the conditions that trigger modem shutdown
- Status line behaviour—human (LEDs) or machine interface
- Secondary port data rate

Hardware configuration summary

The reference tables are presented in alphabetical order. This format allows quick look-up of each command to verify syntax, parameters, and behaviors.

The summary in this section offers a quick description of commands to allow you to more quickly locate a desired command when the operation is known but the command is not.

Table 10: Hardware configuration commands

Command	Page	Description
~AUDMOD	71	Audio Mode (MC5725V only)
!AVCODECRXG	47	Set / query CODEC RX gain (MC5727V/MC5728V)
!AVCODECTXG	49	Set / query the CODEC TX gain (MC5727V/MC5728V)
!AVSETPROFILE	59	Activate a profile (MC5727V/MC5728V)
!DIVERSITY	20	Antenna diversity control
~IPR2	21	Port Rate - Secondary Port
!LED	21	Temporarily change LED behavior

Command	Page	Description
~MICLVL	71	Microphone Level (calibration) (MC5725V only)
!NDIS	22	Enable/disable NDIS driver
~SCRPAD	22	Scratchpad
!SERIALPORTMAP	23	Modem port mappings in non-MUX mode.
~SPKLVL	72	Speaker Level - Codec Gain (calibration) (MC5725V)
!WHQL	24	Enable/disable NDIS -based Autoconnect for WHQL testing


Hardware configuration reference


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.

Table 11: Hardware configuration command details

Command	Description													
!DIVERSITY= <1x,EVDO> !DIVERSITY?	<p>Antenna diversity control</p> <p>Set or query the antenna diversity control for both 1X and 1xEV-DO.</p> <p>The setting is stored in non-volatile memory. The modem does not need to be reset for the change to take effect.</p> <table> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1x</td> <td>0</td> <td>Diversity control for 1X is off</td> </tr> <tr> <td>1</td> <td>Diversity control for 1X is on</td> </tr> <tr> <td rowspan="2">EVDO</td> <td>0</td> <td>Diversity control for 1xEV-DO is off</td> </tr> <tr> <td>1</td> <td>Diversity control for 1xEV-DO is on</td> </tr> </tbody> </table> <p>Example</p> <pre>AT!DIVERSITY? CDMA Diversity: 1 HDR Diversity: 1</pre>	Parameter	Value	Meaning	1x	0	Diversity control for 1X is off	1	Diversity control for 1X is on	EVDO	0	Diversity control for 1xEV-DO is off	1	Diversity control for 1xEV-DO is on
Parameter	Value	Meaning												
1x	0	Diversity control for 1X is off												
	1	Diversity control for 1X is on												
EVDO	0	Diversity control for 1xEV-DO is off												
	1	Diversity control for 1xEV-DO is on												

Command	Description								
~IPR2=<n> ~IPR2?	<p>Port Rate - Secondary Port</p> <p>Sets or queries the data rate used on the secondary serial port. The setting is persistent until explicitly changed by a new command.</p> <p>This command affects only the serial port. USB usage is not affected.</p> <p>Valid parameters for the data rate are: 2400, 4800, 9600, 19200, 38400, 57600, and 115200.</p> <p>The factory default is 115200 bps.</p> <p>For information on controlling the primary port, see +IPR (Fixed Port (R_m) Rate) in the AT Reference (document #2130620).</p>								
!LED=<led>, <rate>, <on_time>	<p>Temporarily change the LED behavior.</p> <p>This command takes direct control of the LED in order to test different rates and on_time's. This change is not persistent, and is lost once power is cycled.</p> <p>Use this command to determine the LED timing desired, and then insert those settings into the PRI tables.</p> <table border="0" data-bbox="812 997 1453 1369"> <thead> <tr> <th data-bbox="812 997 909 1029">Parm</th> <th data-bbox="941 997 1023 1029">Values</th> </tr> </thead> <tbody> <tr> <td data-bbox="812 1039 860 1071">led</td> <td data-bbox="941 1039 1453 1165"> <ul style="list-style-type: none"> • 0,1,2,3 – Service LED (AirCard 595 PC Card) • 3 – Service LED (for the rest of the products) </td> </tr> <tr> <td data-bbox="812 1176 860 1207">rate</td> <td data-bbox="941 1176 1250 1207">Period or rate in milliseconds.</td> </tr> <tr> <td data-bbox="812 1218 909 1249">on_time</td> <td data-bbox="941 1218 1453 1369"> Defines the duty cycle in which the LED is on within "rate" Range 0-65535 (time in milliseconds) </td> </tr> </tbody> </table>	Parm	Values	led	<ul style="list-style-type: none"> • 0,1,2,3 – Service LED (AirCard 595 PC Card) • 3 – Service LED (for the rest of the products) 	rate	Period or rate in milliseconds.	on_time	Defines the duty cycle in which the LED is on within "rate" Range 0-65535 (time in milliseconds)
Parm	Values								
led	<ul style="list-style-type: none"> • 0,1,2,3 – Service LED (AirCard 595 PC Card) • 3 – Service LED (for the rest of the products) 								
rate	Period or rate in milliseconds.								
on_time	Defines the duty cycle in which the LED is on within "rate" Range 0-65535 (time in milliseconds)								

Command	Description													
<p>!NDIS= <supported>, <enabled></p> <p>!NDIS?</p> 	<p>Enable/disable the NDIS driver</p> <p>Sets or queries the NDIS driver support. This change is persistent, and is maintained across power cycles.</p> <p>The “supported” parameter instructs the USB bus driver whether to load the NDIS driver; “enabled” is then used to instruct the NDIS driver to run or not.</p> <table border="1" data-bbox="813 520 1299 720"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td rowspan="2">supported</td> <td>0</td> <td>NDIS not supported</td> </tr> <tr> <td>1</td> <td>NDIS supported</td> </tr> <tr> <td rowspan="2">enabled</td> <td>0</td> <td>NDIS not enabled</td> </tr> <tr> <td>1</td> <td>NDIS enabled</td> </tr> </tbody> </table> <p>at!ndis? NDIS Support: 1 NDIS Pref: 0 OK</p>	Parameter	Value	Meaning	supported	0	NDIS not supported	1	NDIS supported	enabled	0	NDIS not enabled	1	NDIS enabled
Parameter	Value	Meaning												
supported	0	NDIS not supported												
	1	NDIS supported												
enabled	0	NDIS not enabled												
	1	NDIS enabled												
<p>~SCRPAD=<str> ~SCRPAD?</p>	<p>Scratchpad</p> <p>Sets and reads a text string of up to 20 characters. The string is stored in non-volatile memory. Due to the nature of this command, no other AT command can follow on the same command line.</p> <p>The string is taken from immediately after the “=” sign; no delimiters are used. If quotes are entered, they will be treated as part of the string—not delimiters of it.</p> <p>A modem response of "unset" means that the memory location has not been written.</p> <p>at~SCRPAD? Unset OK</p>													

Command	Description																																																											
!SERIALPORTMAP =<mode> !SERIALPORTMAP? 	<p>Modem port mappings in non-MUX mode..</p> <hr/> <p>Note: <i>This command has no effect on operations when using 27.010 MUX mode drivers from Sierra Wireless.</i></p> <p>Aircard 250U, 402, and USB 598:</p> <table border="1"> <thead> <tr> <th>mode</th> <th>AT/PPP</th> <th>CnS</th> <th>DM</th> <th>NMEA</th> </tr> </thead> <tbody> <tr> <td>75</td> <td rowspan="2">USB EP 2</td> <td>USB (HIP) EP 4</td> <td>USB EP 8</td> <td rowspan="2">USB EP 5</td> </tr> <tr> <td>77</td> <td colspan="2">USB (HIP) EP 4</td> </tr> </tbody> </table> <p>AirCard 597E, 595, 595U and Compass 597 (note: DM is not supported on its own USB endpoint [EP]):</p> <table border="1"> <thead> <tr> <th>mode</th> <th>AT/PPP</th> <th>CnS</th> <th>DM</th> <th>NMEA</th> </tr> </thead> <tbody> <tr> <td>74</td> <td>USB EP 2</td> <td>USB (HIP) EP 4</td> <td></td> <td>USB EP 5</td> </tr> </tbody> </table> <p>MC5725/MC5725V/MC5727/MC5727V/MC5728V (note: DM is not supported on its own USB endpoint [EP]):</p> <table border="1"> <thead> <tr> <th>mode</th> <th>AT/PPP</th> <th>CnS</th> <th>DM</th> <th>NMEA</th> </tr> </thead> <tbody> <tr> <td>45</td> <td>UART1</td> <td colspan="2">USB (HIP) EP 4</td> <td rowspan="3">USB EP 5</td> </tr> <tr> <td>57</td> <td rowspan="2">USB EP 2</td> <td>USB (HIP) EP 4</td> <td>UART1</td> </tr> <tr> <td>74</td> <td colspan="2">USB (HIP) EP 4</td> </tr> </tbody> </table> <p>MC5728V:</p> <table border="1"> <thead> <tr> <th>mode</th> <th>AT/PPP</th> <th>CnS</th> <th>DM</th> <th>NMEA</th> </tr> </thead> <tbody> <tr> <td>75</td> <td rowspan="3">USB EP 2</td> <td>USB (HIP) EP 4</td> <td>USB EP 8</td> <td rowspan="4">USB EP 5</td> </tr> <tr> <td>76</td> <td>USB (HIP) EP 4</td> <td>UART1</td> </tr> <tr> <td>77</td> <td colspan="2">USB (HIP) EP 4</td> </tr> <tr> <td>79</td> <td>UART1</td> <td>USB (HIP) EP 4</td> </tr> </tbody> </table>	mode	AT/PPP	CnS	DM	NMEA	75	USB EP 2	USB (HIP) EP 4	USB EP 8	USB EP 5	77	USB (HIP) EP 4		mode	AT/PPP	CnS	DM	NMEA	74	USB EP 2	USB (HIP) EP 4		USB EP 5	mode	AT/PPP	CnS	DM	NMEA	45	UART1	USB (HIP) EP 4		USB EP 5	57	USB EP 2	USB (HIP) EP 4	UART1	74	USB (HIP) EP 4		mode	AT/PPP	CnS	DM	NMEA	75	USB EP 2	USB (HIP) EP 4	USB EP 8	USB EP 5	76	USB (HIP) EP 4	UART1	77	USB (HIP) EP 4		79	UART1	USB (HIP) EP 4
mode	AT/PPP	CnS	DM	NMEA																																																								
75	USB EP 2	USB (HIP) EP 4	USB EP 8	USB EP 5																																																								
77		USB (HIP) EP 4																																																										
mode	AT/PPP	CnS	DM	NMEA																																																								
74	USB EP 2	USB (HIP) EP 4		USB EP 5																																																								
mode	AT/PPP	CnS	DM	NMEA																																																								
45	UART1	USB (HIP) EP 4		USB EP 5																																																								
57	USB EP 2	USB (HIP) EP 4	UART1																																																									
74		USB (HIP) EP 4																																																										
mode	AT/PPP	CnS	DM	NMEA																																																								
75	USB EP 2	USB (HIP) EP 4	USB EP 8	USB EP 5																																																								
76		USB (HIP) EP 4	UART1																																																									
77		USB (HIP) EP 4																																																										
79	UART1	USB (HIP) EP 4																																																										

Command	Description									
<p>!WHQL= <enabled></p> <p>!WHQL?</p>	<p>Enable/disable NDIS-based Autoconnect for WHQL testing</p> <p>Sets or queries the WHQL autoconnect feature. This change is persistent, and is maintained across power cycles.</p> <p>When enabled, the modem will autoconnect when the NDIS driver is detected.</p> <table border="1" data-bbox="803 556 1339 669"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>enabled</td> <td>0</td> <td>Autoconnect is disabled</td> </tr> <tr> <td></td> <td>1</td> <td>Autoconnect is enabled</td> </tr> </tbody> </table>	Parameter	Value	Meaning	enabled	0	Autoconnect is disabled		1	Autoconnect is enabled
Parameter	Value	Meaning								
enabled	0	Autoconnect is disabled								
	1	Autoconnect is enabled								

3: Diagnostic Commands

Introduction

The modems support some low-level diagnostic commands that are not normally used by end-users. This chapter details these commands.

The set of diagnostic commands supports the following items:

- Unlock access to diagnostic and test services
- Reading device status
- Audio circuit testing

These commands are not available on the modem until access is unlocked using the **!OEM** command (page 27). These commands can be executed with the modem in its normal operating mode, although this can cause unintended changes in behavior when using the audio features. For audio tests, diagnostic mode (via **!DIAG**; page 27) is recommended.

Diagnostic summary

The reference tables are presented in alphabetical order. This format allows quick look-up of each command to verify syntax, parameters, and behaviors.

The summary in this section offers a quick description of commands to allow you to more quickly locate a desired command when the operation is known but the command is not.





Table 12: Diagnostic commands


Command	Page	Description
!AUD	26	Activates the audio circuitry for testing
!AUDLP	26	Controls audio loopback
!DIAG	27	Change from normal to diagnostic operation
!OEM	27	Enable access to protected commands
!SCI	27	Reads the Slot Cycle Index

Diagnostic reference

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.

Table 13: Diagnostic command details

Command	Description										
<p>!AUD=<n></p>   <p>(Recommended)</p>	<p>Audio enable</p> <hr/> <p>Note: <i>Supported only by the MC5725V/MC5727V/MC5728V modems.</i></p> <hr/> <p>Enables or disables the audio path circuitry. Normally, the audio path is off unless a voice call is active.</p> <p>Diagnostic mode (!DIAG; page 27) is strongly recommended when using this feature. The normal operation of the modem may turn the audio circuit on or off, disrupting tests. Diagnostic mode will prevent unintended changes in circuit state.</p> <table> <thead> <tr> <th>Parm</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Audio circuit disabled (Default)</td> </tr> <tr> <td>1</td> <td>Audio circuit enabled</td> </tr> </tbody> </table>	Parm	Meaning	0	Audio circuit disabled (Default)	1	Audio circuit enabled				
Parm	Meaning										
0	Audio circuit disabled (Default)										
1	Audio circuit enabled										
<p>!AUDLP=<n></p>   <p>(Recommended)</p>	<p>Audio enable</p> <hr/> <p>Note: <i>Supported only by the MC5725V/MC5727V/MC5728V modems.</i></p> <hr/> <p>Enables or disables a loopback of the audio path. The audio circuitry must first be enabled using !AUD=1.</p> <p>Diagnostic mode (!DIAG; page 27) is strongly recommended when using this feature. The normal operation of the modem may turn the audio circuit on or off, disrupting tests. Diagnostic mode will prevent unintended changes in circuit state.</p> <table> <thead> <tr> <th>Parm</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>PCM loopback off (Default)</td> </tr> <tr> <td>1</td> <td>PCM loopback on</td> </tr> <tr> <td>2</td> <td>Audio loopback off</td> </tr> <tr> <td>3</td> <td>Audio loopback on</td> </tr> </tbody> </table>	Parm	Meaning	0	PCM loopback off (Default)	1	PCM loopback on	2	Audio loopback off	3	Audio loopback on
Parm	Meaning										
0	PCM loopback off (Default)										
1	PCM loopback on										
2	Audio loopback off										
3	Audio loopback on										

Command	Description				
!DIAG 	<p>Diagnostic Mode</p> <p>Places the modem into diagnostic mode. Normal operations are suspended. This is required for several test functions and is recommended for audio diagnostics.</p> <p>To leave diagnostics mode, the modem must be reset or power cycled.</p>				
!OEM=176	<p>OEM Access Lock</p> <p>Sets the status of the lock for access to OEM restricted commands. Once the restricted command access has been unlocked, it remains unlocked until the modem is reset.</p>				
!SCI=<n> !SCI?	<p>Slot Cycle Index</p> <p>Sets or reads the slot cycle index used for slotted mode sleep. This setting is made in non-volatile memory. For the value to take effect, the modem must be reset.</p> <p>Upon reset and registration with a network, the modem will use the lower of:</p> <ul style="list-style-type: none"> • This setting • Maximum that the network will allow <p>This command overrides the default setting from the PRI, but cannot override the network. The network will ultimately determine the maximum permitted setting.</p> <hr/> <p>Note: <i>Once !SCI is used, the original PRI setting for the slot cycle index can only be restored by manually entering it using this command.</i></p> <hr/> <table> <thead> <tr> <th>Parm</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>n</td> <td>0–7</td> </tr> </tbody> </table>	Parm	Meaning	n	0–7
Parm	Meaning				
n	0–7				

4: Test Commands

Introduction

The modems can test host connectivity by setting and reading the I/O pins, and can also permit direct control of the transmitter and receiver for test purposes.

Note: Due to the danger of interference with public networks, these commands are not to be made available to general users.

To access the features, the modem must be set to the unlock value (**!OEM=176**; page 27). Additionally, the modem must be placed in diagnostic mode using **!DIAG** (page 27). On completion of testing, the modem must be reset to clear the diagnostic mode and lock the restricted command set.

The set of test commands supports the following actions:

- Transmitter or receiver on and off
- Channel selection
- Transmitter power level
- I/O line configuration, setting, and reading

Test summary

The reference tables are presented in alphabetical order. This format allows quick look-up of each command to verify syntax, parameters, and behaviors.

The summary in this section offers a quick description of commands, allowing you to more quickly locate a desired command when the operation is known but the command is not.

Table 14: Test commands



Command	Page	Description
!ALLUP	29	Turn on transmitter in all up's condition.
!CHAN	29	Tune the synthesizer channel and band
!KEYOFF	30	Turn off the transmitter power amplifier
!KEYON	30	Key the transmitter
!RX2	30	Turn the second receiver on and off
!RXAGC	30	Read RX AGC of first receiver
!RX2AGC	31	Read RX AGC of second receiver









Command	Page	Description
!TX	31	Turn the transmitter circuitry on and off
!TXAGC	31	Set TX AGC







Test reference

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. Remember to unlock the command access and set diagnostic mode.

Table 15: Test command details

Command	Description									
!ALLUP=<value> 	<p>Turn on transmitter in all up's condition. Turns on/off the Transmitter and simulates an "All Up's" TX condition.</p> <table> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>All Up's Off</td> </tr> <tr> <td>1</td> <td>All Up's On</td> </tr> </tbody> </table>	Value	Meaning	0	All Up's Off	1	All Up's On			
Value	Meaning									
0	All Up's Off									
1	All Up's On									
!CHAN=<c>[,b] !CHAN? 	<p>Channel</p> <p>Tunes the synthesizer to the specified channel and band, or reports the current tuning (including changes made via !KEYON; page 30). If the band is omitted, the modem uses the current band setting, changing only the channel.</p> <p>The channel setting on entry to diagnostic mode is determined by the prior activity of the modem.</p> <table> <thead> <tr> <th>Parm</th> <th>Meaning</th> <th>Range</th> </tr> </thead> <tbody> <tr> <td>c</td> <td>channel</td> <td>0–799, 991–1023 (Cellular) 0–1200 (PCS)</td> </tr> <tr> <td>b</td> <td>band</td> <td>0 = cellular 1 = PCS</td> </tr> </tbody> </table> <p>The query command will return the last channel that the synthesizer attempted to tune to.</p>	Parm	Meaning	Range	c	channel	0–799, 991–1023 (Cellular) 0–1200 (PCS)	b	band	0 = cellular 1 = PCS
Parm	Meaning	Range								
c	channel	0–799, 991–1023 (Cellular) 0–1200 (PCS)								
b	band	0 = cellular 1 = PCS								

Command	Description												
<p>!KEYOFF</p>  	<p>Key Off</p> <p>Turns off the transmitter's power amplifier. The transmitter circuitry remains powered until !TX=0 (page 31) is used.</p>												
<p>!KEYON=<c,b,w></p>  	<p>Key On</p> <p>Tunes the radio and keys the transmitter at maximum. The command can select either pseudo-random noise (PN) or a sine wave signal (SINE).</p> <p>!TX is not needed prior to use; this command will enable the transmitter circuitry.</p> <p>The power amplifier is set to maximum gain and the output power limit is disabled.</p> <p>!KEYOFF (page 30) is used to turn off the power amplifier, or !TX=0 (page 31) will turn off the transmitter circuit.</p> <table border="1"> <thead> <tr> <th>Parm</th> <th>Meaning</th> <th>Range</th> </tr> </thead> <tbody> <tr> <td>c</td> <td>channel</td> <td>0–799, 991–1023 (Cellular) 0–1200 (PCS)</td> </tr> <tr> <td>b</td> <td>band</td> <td>0 = cellular 1 = PCS</td> </tr> <tr> <td>w</td> <td>wave</td> <td>0 = PN 1 = SINE</td> </tr> </tbody> </table>	Parm	Meaning	Range	c	channel	0–799, 991–1023 (Cellular) 0–1200 (PCS)	b	band	0 = cellular 1 = PCS	w	wave	0 = PN 1 = SINE
Parm	Meaning	Range											
c	channel	0–799, 991–1023 (Cellular) 0–1200 (PCS)											
b	band	0 = cellular 1 = PCS											
w	wave	0 = PN 1 = SINE											
<p>!RX2=<n></p>  	<p>Second receiver</p> <p>Turns the circuitry of the second receiver on or off. The channel tuned is set by the !CHAN (page 29) or !KEYON (page 30) commands.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Turn the circuitry of the second receiver off</td> </tr> <tr> <td>1</td> <td>Turn the circuitry of the second receiver on</td> </tr> </tbody> </table>	Value	Meaning	0	Turn the circuitry of the second receiver off	1	Turn the circuitry of the second receiver on						
Value	Meaning												
0	Turn the circuitry of the second receiver off												
1	Turn the circuitry of the second receiver on												
<p>!RXAGC?</p>  	<p>Reads RX AGC of first receiver.</p> <p>0 represents the most positive RX_AGC value.</p> <p>0x3FF represents the lowest RX_AGC value.</p> <p>0x200 represents a 50% duty cycle.</p>												

Command	Description						
!RX2AGC?  	Reads RX AGC of second receiver. 0 represents the most positive RX_AGC value. 0x3FF represents the lowest RX_AGC value. 0x200 represents a 50% duty cycle.						
!TX=<n>  	Transmitter Currently not supported. Turns the transmitter circuitry on and off. When turned on, the transmitter is not keyed until the !KEYON command (page 30) is used. <table> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Transmitter circuit off</td> </tr> <tr> <td>1</td> <td>Transmitter circuit on</td> </tr> </tbody> </table>	Value	Meaning	0	Transmitter circuit off	1	Transmitter circuit on
Value	Meaning						
0	Transmitter circuit off						
1	Transmitter circuit on						
!TXAGC=<value>  	Set TX AGC <table> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0x000 to 0x1FF</td> <td>The desired TX_AGC_ADJ, entered in hexadecimal.</td> </tr> </tbody> </table> 0 represents the lowest TX_AGC_ADJ value. 0x100 represents a 50% duty cycle. 1FF represents the most positive TX_AGC_ADJ value.	Value	Meaning	0x000 to 0x1FF	The desired TX_AGC_ADJ, entered in hexadecimal.		
Value	Meaning						
0x000 to 0x1FF	The desired TX_AGC_ADJ, entered in hexadecimal.						

5: Device Interrogation and Provisioning Commands

Introduction

The modems support some device interrogation and provisioning commands that are not normally used by end-users. This chapter describes these commands.

The set of commands supports access to the following items:

- [PRI](#) revision
- Carrier ID
- [IOTA](#)-related items (not all carriers support IOTA)
- A-Key

These commands are not available on the modem until access is unlocked using the [!OEM](#) command (page 27).

Device interrogation and provisioning summary

The reference tables are presented in alphabetical order. This format allows quick look-up of each command to verify syntax, parameters, and behaviors.

The summary in this section offers a quick description of commands to allow you to more quickly locate a desired command when the operation is known but the command is not.

Table 16: Device interrogation and provisioning commands

Command	Page	Description
!ACHK	33	Store the A-Key checksum in the modem
!ACTSTAT	33	Activation status.
!AKEY	33	Calculate the A-Key checksum; write the A-Key
+CARRIERID	34	Carrier ID
!IOTABOOTURL	35	IOTA Boot URL
!IOTALOG	35	Display the IOTA EFS Log
!IOTAMSG	35	Control IOTA Message Level


Command	Page	Description
!IOTASTART	36	Start a client initiated IOTA session
!IOTATDOMAIN	36	IOTA Trusted Domain
+PRIREV	36	PRI revision
!SKU	36	Query Sierra Wireless SKU




Device interrogation and provisioning reference





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.

Table 17: Device interrogation and provisioning command details

Command	Description						
!ACHK=<value>	Store the A-Key checksum in the modem. See also !AKEY (below).						
!ACTSTAT?	Query the activation status. This command checks for a valid MIN . <table> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>The modem has not been activated.</td> </tr> <tr> <td>1</td> <td>The modem has been activated.</td> </tr> </tbody> </table>	Value	Meaning	0	The modem has not been activated.	1	The modem has been activated.
Value	Meaning						
0	The modem has not been activated.						
1	The modem has been activated.						
!AKEY=<value>	Calculate the A-Key checksum; write the A-Key If the value entered is a 20-digit number, the 6 digit checksum is returned. If the value entered is a 26-digit number, the modem validates the last six digits (the checksum), before writing the validated A-Key to the modem. If the checksum is invalid, or the A-Key has already been written, ERROR is returned.						

Command	Description																																												
	<p>Note: <i>Run this command only AFTER the modem has been calibrated, default NV items have been loaded, and the modem has been reset. Otherwise, the produced checksum will be incorrect.</i></p> <p>Example</p> <p>To write the A-Key for NAM 0:</p> <pre>AT!AKEY=00,DF,D9,37,E5,9F,E0,86,2F 204516 OK</pre> <p>See also !ACHK (above).</p>																																												
<p>+CARRIERID?</p> 	<p>Carrier ID that the modem is configured for.</p> <p>Queries the Carrier ID.</p> <table border="1" data-bbox="779 829 1201 1848"> <thead> <tr> <th>Value</th> <th>Carrier</th> </tr> </thead> <tbody> <tr><td>1</td><td>Generic</td></tr> <tr><td>2</td><td>Sprint</td></tr> <tr><td>3</td><td>Bell Mobility</td></tr> <tr><td>4</td><td>Telus</td></tr> <tr><td>5</td><td>Verizon</td></tr> <tr><td>6</td><td>Western Wireless</td></tr> <tr><td>7</td><td>Smartcom</td></tr> <tr><td>8</td><td>Alltel</td></tr> <tr><td>9</td><td>US Cellular</td></tr> <tr><td>10–13</td><td>Obsolete</td></tr> <tr><td>14</td><td>China Unicom</td></tr> <tr><td>15</td><td>Hutchison Thailand</td></tr> <tr><td>16</td><td>Movinet</td></tr> <tr><td>17</td><td>Tarjetas-Lusacell Mexico</td></tr> <tr><td>18</td><td>Telecom New Zealand</td></tr> <tr><td>19</td><td>Reliance</td></tr> <tr><td>20</td><td>Telstra</td></tr> <tr><td>21</td><td>Mobility Canada</td></tr> <tr><td>22</td><td>VZW Puerto Rico</td></tr> <tr><td>23</td><td>Pelephone</td></tr> <tr><td>24</td><td>Bell Canada</td></tr> </tbody> </table>	Value	Carrier	1	Generic	2	Sprint	3	Bell Mobility	4	Telus	5	Verizon	6	Western Wireless	7	Smartcom	8	Alltel	9	US Cellular	10–13	Obsolete	14	China Unicom	15	Hutchison Thailand	16	Movinet	17	Tarjetas-Lusacell Mexico	18	Telecom New Zealand	19	Reliance	20	Telstra	21	Mobility Canada	22	VZW Puerto Rico	23	Pelephone	24	Bell Canada
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Command	Description																		
	<table border="0"> <tr><td>25</td><td>Indosol Indonesia</td></tr> <tr><td>26</td><td>Midwest Wireless</td></tr> <tr><td>27</td><td>Bell South Chile</td></tr> <tr><td>28</td><td>Bell South Panama</td></tr> <tr><td>29</td><td>Tata India</td></tr> <tr><td>30</td><td>Alaska Communication Systems</td></tr> <tr><td>31</td><td>Sprint Private Label Services</td></tr> <tr><td>32</td><td>Starcomm Nigeria</td></tr> <tr><td>33</td><td>Telecsa Ecuador</td></tr> </table>	25	Indosol Indonesia	26	Midwest Wireless	27	Bell South Chile	28	Bell South Panama	29	Tata India	30	Alaska Communication Systems	31	Sprint Private Label Services	32	Starcomm Nigeria	33	Telecsa Ecuador
25	Indosol Indonesia																		
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30	Alaska Communication Systems																		
31	Sprint Private Label Services																		
32	Starcomm Nigeria																		
33	Telecsa Ecuador																		
<p>!IOTABOOTURL= <string> !IOTABOOTURL?</p> 	<p>IOTA Boot URL</p> <p>This parameter represents IOTA parameter block phone:boot.url, which is the URL used for the client initiated IOTA session. This parameter is stored in one of the IOTA EFS files. Changes made to this parameter are persistent through power cycles.</p>																		
<p>!IOTALOG</p> 	<p>Display the IOTA EFS Log</p> <p>This command displays the IOTA EFS log created from the most recent IOTA session, either client initiated or network initiated.</p>																		
<p>!IOTAMSG= <0 1 2> !IOTAMSG? !IOTAMSG=?</p> 	<p>Control IOTA Message Level</p> <p>This parameter determines the IOTA message level for EFS logs, DIAG messages and AT command unsolicited messages. Setting this parameter will remain in effect until the next time the modem is power-cycled. The power-up default setting is 0.</p> <table border="0"> <thead> <tr> <th data-bbox="824 1335 889 1356">Value</th> <th data-bbox="919 1335 1013 1356">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="824 1377 837 1398">0</td> <td data-bbox="919 1377 1393 1598"> Normal messages for EFS logs, DIAG messages and unsolicited messages (AT command initiated IOTA session only). No unsolicited messages are sent if an IOTA session was initiated from a CnS message or from an IOTA WAP trigger received from the network. </td> </tr> <tr> <td data-bbox="824 1619 837 1640">1</td> <td data-bbox="919 1619 1377 1736"> Normal messages for EFS logs, DIAG messages and unsolicited messages for all IOTA sessions (both client initiated and network initiated IOTA sessions). </td> </tr> </tbody> </table>	Value	Meaning	0	Normal messages for EFS logs, DIAG messages and unsolicited messages (AT command initiated IOTA session only). No unsolicited messages are sent if an IOTA session was initiated from a CnS message or from an IOTA WAP trigger received from the network.	1	Normal messages for EFS logs, DIAG messages and unsolicited messages for all IOTA sessions (both client initiated and network initiated IOTA sessions).												
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1	Normal messages for EFS logs, DIAG messages and unsolicited messages for all IOTA sessions (both client initiated and network initiated IOTA sessions).																		

Command	Description
	<p>2 Extended messages for EFS logs, DIAG messages and unsolicited messages for all IOTA sessions. Extended messages include normal messages plus additional debug messages.</p>
<p>!IOTASTART</p> 	<p>Start a client-initiated IOTA session</p> <p>This command starts a client initiated IOTA session using the parameters stored in the IOTA EFS files. A mobile IP session is established using MIP profile 0, and an HTTPS connection is made to the URL stored in parameter block <code>phone:boot.url</code>.</p> <p>MIP profile 1 data is provisioned during a client initiated IOTA session and, if the session is completed successfully, the active mobile IP profile is switched to 1. If an IOTA session fails, the previous active mobile IP profile is restored.</p> <p>During a client initiated IOTA session, unsolicited messages show the progress of the IOTA session; when the session is concluded, OK or ERROR final result code is displayed.</p>
<p>!IOTATDOMAIN= <string> !IOTATDOMAIN?</p> 	<p>IOTA Trusted Domain</p> <p>This parameter represents IOTA parameter block browser:domain.trusted, which is the trusted domain for IOTA sessions. This parameter is stored in one of the IOTA EFS files. Changes made to this parameter are persistent through power cycles.</p>
<p>+PRIREV?</p> 	<p>PRI revision.</p> <p>Reports the PRI revision (major and minor revision number).</p>
<p>!SKU?</p> 	<p>Query the Sierra Wireless SKU</p>

6: Device Management Commands

Introduction

OMA Device Management is a device management (DM) protocol specified by the Open Mobile Alliance (OMA) Device Management Working Group and the Data Synchronization (DS) Working Group.

*Note: OMA-DM is supported only by the
USB598/AirCard250U/402/MC5727/MC5727V/MC5728V/Compass597 modems.*

Device management summary

The reference tables are presented in alphabetical order. This format allows quick look-up of each command to verify syntax, parameters, and behaviors.

The summary in this section offers a quick description of commands to allow you to more quickly locate a desired command when the operation is known but the command is not.

Table 18: Device management commands

Command	Page	Description
!DMBOOT	38	Populate the bootstrap information in the DM tree file.
!DMCANCEL	39	Cancel an OMA-DM session.
!DMDC	39	Set or query the Device Configuration Session setting; initiate a CIDC session.
!DMDLRSP	40	Confirm or reject the installation of the FUMO update package.
!DMFUMO	40	Set or query the FUMO session setting; initiate a CIFUMO session.
!DMLOG	40	Display the contents of an OMA-DM EFS session log
!DMMSG	41	Set or query the message logging level.
!DMPRL	41	Set or query the PRL Update session setting; initiate a CIPRL session.

Device management reference

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.

Table 19: Device management command details

Command	Description																
!DMBOOT	<p>Populate the bootstrap information in the DM tree file. To use the updated information, the modem must power-cycle after executing the command.</p> <p>The bootstrap information contains the following four parameters :</p> <ul style="list-style-type: none"> Client Password ./DMAcc/AppAuth/clientAuth/AAuthSecret Server Password ./DMAcc/AppAuth/clientAuth/AAuthSecret Client Name ./DMAcc/AppAuth/clientAuth/AAuthName Device Id ./DevInfo/DevId <p>The response includes the OMA-DM library provider and the session mask. The session mask value indicates the OMA-DM session types that the device supports.</p> <table> <thead> <tr> <th>Session mask</th> <th>Session type</th> </tr> </thead> <tbody> <tr> <td>0x00000001</td> <td>CIDC</td> </tr> <tr> <td>0x00000002</td> <td>NIDC</td> </tr> <tr> <td>0x00000004</td> <td>CIPRL</td> </tr> <tr> <td>0x00000008</td> <td>NIPRL</td> </tr> <tr> <td>0x00000010</td> <td>CIFUMO</td> </tr> <tr> <td>0x00000020</td> <td>NIFUMO</td> </tr> <tr> <td>0x00000040</td> <td>HFA</td> </tr> </tbody> </table> <p>Example: AT!DMBOOT OK, OMA_DM_RED_BEND, 4f OK</p>	Session mask	Session type	0x00000001	CIDC	0x00000002	NIDC	0x00000004	CIPRL	0x00000008	NIPRL	0x00000010	CIFUMO	0x00000020	NIFUMO	0x00000040	HFA
Session mask	Session type																
0x00000001	CIDC																
0x00000002	NIDC																
0x00000004	CIPRL																
0x00000008	NIPRL																
0x00000010	CIFUMO																
0x00000020	NIFUMO																
0x00000040	HFA																

Command	Description												
	<p>Interpretation: “OMA_DM_RED_BEND” is the OMA-DM library provider; the device supports these session types: HFA, CIDC, NIDC, CIPRL, and NIPRL.</p>												
<p>!DMCANCEL</p>	<p>Cancel an OMA-DM session.</p> <p>Cancel any active or retry-pending (for example, an HFA retry pending) OMA-DM session.</p> <p>If the session is Network Initiated (NI), then the modem may or may not queue a session reattempt; this is determined by the SKU configuration of the modem. If the NI session is not queued for a reattempt, then any NIA associated with this NI DM session is deleted from the modem; to reattempt the same NI session, the network must resend the NIA.</p> <p>The modem never queues a cancelled Client Initiated (CI) session for a session reattempt; to reattempt the CI session, use !DMDC (page 39).</p>												
<p>!DMDC= <command></p> <p>!DMDC?</p>	<p>Set or query the Device Configuration Session setting; initiate a CIDC session.</p> <table border="1" data-bbox="841 1003 1360 1222"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>command</td> <td>0</td> <td>Disable the NIDC/CIDC Session setting</td> </tr> <tr> <td></td> <td>1</td> <td>Enable the NIDC/CIDC Session setting</td> </tr> <tr> <td></td> <td>2</td> <td>Initiate a CIDC session</td> </tr> </tbody> </table>	Parameter	Value	Meaning	command	0	Disable the NIDC/CIDC Session setting		1	Enable the NIDC/CIDC Session setting		2	Initiate a CIDC session
Parameter	Value	Meaning											
command	0	Disable the NIDC/CIDC Session setting											
	1	Enable the NIDC/CIDC Session setting											
	2	Initiate a CIDC session											

Command	Description												
!DMDLRSP= <user_response>	<p>Confirm or reject the installation of the FUMO update package.</p> <hr/> <p>Note: <i>Not supported by the Compass 597 modem.</i></p> <p>Once the update package is successfully downloaded from the OMA server, the user is prompted for the confirmation. If the user confirms the package (by entering AT!DMDLRSP=1), the modem proceeds with the firmware update. If user rejects the package (by entering AT!DMDLRSP=0), the modem discards the package.</p> <p>This command has no effect if no update package is pending for user response.</p> <table border="1"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>user_response</td> <td>0</td> <td>Reject the package</td> </tr> <tr> <td></td> <td>1</td> <td>Confirm installation of the package. The modem will then proceed with the firmware update.</td> </tr> </tbody> </table>	Parameter	Value	Meaning	user_response	0	Reject the package		1	Confirm installation of the package. The modem will then proceed with the firmware update.			
Parameter	Value	Meaning											
user_response	0	Reject the package											
	1	Confirm installation of the package. The modem will then proceed with the firmware update.											
!DMFUMO= <command> !DMFUMO?	<p>Set or query the FUMO session setting; initiate a CIFUMO session.</p> <table border="1"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>command</td> <td>0</td> <td>Disable the NIFUMO/CIFUMO Session setting</td> </tr> <tr> <td></td> <td>1</td> <td>Enable the NIFUMO/CIFUMO Session setting</td> </tr> <tr> <td></td> <td>2</td> <td>Initiate a CIFUMO session</td> </tr> </tbody> </table>	Parameter	Value	Meaning	command	0	Disable the NIFUMO/CIFUMO Session setting		1	Enable the NIFUMO/CIFUMO Session setting		2	Initiate a CIFUMO session
Parameter	Value	Meaning											
command	0	Disable the NIFUMO/CIFUMO Session setting											
	1	Enable the NIFUMO/CIFUMO Session setting											
	2	Initiate a CIFUMO session											
!DMLOG [=<log_number>]	<p>Display the contents of an OMA-DM EFS session log on the AT command port.</p> <table border="1"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>log_number</td> <td>0</td> <td>Display the most recent session log (default).</td> </tr> <tr> <td></td> <td>1</td> <td>Display the second most recent session log.</td> </tr> </tbody> </table>	Parameter	Value	Meaning	log_number	0	Display the most recent session log (default).		1	Display the second most recent session log.			
Parameter	Value	Meaning											
log_number	0	Display the most recent session log (default).											
	1	Display the second most recent session log.											

Command	Description															
<p>!DMMSG= <level> !DMMSG?</p>	<p>Set or query the message logging level.</p> <p>The message logging level determines the type of messages generated for OMA-DM EFS logs, DIAG messages and AT command unsolicited messages.</p> <p>A change to this parameter remains in effect until the modem is power cycled.</p> <table border="1" data-bbox="841 514 1365 877"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>level</td> <td>0</td> <td>No messages are logged.</td> </tr> <tr> <td></td> <td>1</td> <td>Normal messages are logged (default).</td> </tr> <tr> <td></td> <td>2</td> <td>Normal and debug messages are logged.</td> </tr> <tr> <td></td> <td>3</td> <td>Normal, debug and extended debug messages are logged.</td> </tr> </tbody> </table>	Parameter	Value	Meaning	level	0	No messages are logged.		1	Normal messages are logged (default).		2	Normal and debug messages are logged.		3	Normal, debug and extended debug messages are logged.
Parameter	Value	Meaning														
level	0	No messages are logged.														
	1	Normal messages are logged (default).														
	2	Normal and debug messages are logged.														
	3	Normal, debug and extended debug messages are logged.														
<p>!DMPRL= <command> !DMPRL?</p>	<p>Set or query the PRL Update session setting; initiate a CIPRL session.</p> <table border="1" data-bbox="841 976 1390 1287"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>command</td> <td>0</td> <td>Disable the NIPRL/CIPRL Session setting</td> </tr> <tr> <td></td> <td>1</td> <td>Enable the NIPRL/CIPRL Session setting</td> </tr> <tr> <td></td> <td>2</td> <td>Initiate a CIPRL session</td> </tr> </tbody> </table>	Parameter	Value	Meaning	command	0	Disable the NIPRL/CIPRL Session setting		1	Enable the NIPRL/CIPRL Session setting		2	Initiate a CIPRL session			
Parameter	Value	Meaning														
command	0	Disable the NIPRL/CIPRL Session setting														
	1	Enable the NIPRL/CIPRL Session setting														
	2	Initiate a CIPRL session														

7: Voice Commands

(MC5727V/MC5728V)

Introduction

The MC5727V/MC5728V modems have built-in audio support that allows the modems to be used as mobile phones.

The modems all support a single analog audio interface that can be used for handset-style applications or headset applications, and a PCM digital audio interface. The modems have a wide range of software-controlled, audio filtering and amplification stages that minimize the amount of external circuitry required on the host system.

At its most basic configuration, the host audio system could contain:

- A microphone / speaker combination (handset)

—or—

- A headset jack

The audio pass band for the primary and secondary audio paths extends from 300 Hz to 3.4 kHz in both the receive and transmit directions.

These transmit audio features are supported:

- Adjustable gain up to +40 dB
- Several adjustable filtering stages (high-pass and slope filters)
- Noise cancellation
- Configurable echo cancellation for various acoustic environments like headset, handset, and speakerphone
- Adjustable sidetone from mute to unity gain

These receive audio features are supported:

- Adjustable gain up to +24 dB
- High-pass filter stage
- Output driver stages, which can drive speakers directly

The module also provides 13-tap FIR (Finite Impulse Response) filtering for both the receive and transmit paths to equalize the acoustic response of the speaker and microphone.

The embedded module can serve as an integral component of a more complex audio system, such as a PDA with a separate codec interfacing with the main processor. In this case, the interface between the modem and PDA codec can be as simple as line-level audio with no transducer considerations. Phone-oriented functions such as echo cancellation and FIR filtering are typically left to the module, while path-switching and transducer interfaces are the responsibility of the PDA codec. Functions such as adjustable gain and volume settings, DTMF

and ringer tone generation, and mixing can be accomplished in either codec, depending on the architecture of the particular product. The interface between the module and host audio systems is usually the primary audio interface set to line-level amplitudes, routed as differential pairs for noise immunity.

Audio profiles

The AT command set allows you to have different audio configurations for different purposes. As an example, assume you are embedding the module in a device that has a handset mode and a speakerphone mode. Assume also that you want to use different transmit gain, noise suppression, and echo cancellation settings in each mode. You can store the settings for each mode in separate audio profiles, then activate the appropriate profile as your application switches to handset or speakerphone mode.

The MC5727V/MC5728V modems support various audio profiles:

- 0—Handset
- 1—Headset
- 2— Speaker phone
- 3— Car kit
- 4— HAC (Hearing Aid Compatibility)
- 5— TTY (TeleTYpe—a device that allows speech and hearing-impaired people to use a phone)

AT commands that are used to change the audio configuration have a profile parameter; any changes you make are applied to the specified profile. The default audio configuration for each profile is shown in one of the three following tables (depending on the product, and its firmware version).

Table 20: Default settings for each audio profile (MC5727V, firmware versions 01.65 and newer)

Setting	Profile ID					
	0 Handset	1 Headset	2 Speaker phone	3 Car kit	4 HAC	5 TTY
Automatic Gain Control (TX) !AVTXAGC (page 61)	Off					
Noise Suppression (TX) !AVNS (page 55)	On	On	On	On	On	Off
AGC, AVC (RX) !AVRXAGC (page 56)	Off					

Setting	Profile ID					
	0 Handset	1 Headset	2 Speaker phone	3 Car kit	4 HAC	5 TTY
Echo Cancellation !AVEC (page 52)	Ear Seal	Headset	Speaker-phone	Acoustic	Ear Seal	Off
Sidetone gain !AVCODECSTG (page 48)	-24 dB	-6 dB	-91 dB	-91 dB	-24 dB	-90 dB
Codec TX gain !AVCODECTXG (page 49)	10 dB					
Codec RX gain !AVCODECRXG (page 47)	2 dB	-1 dB	-1 dB	-1 dB	2 dB	-1 dB

Table 21: Default settings for each audio profile (MC5728V, firmware versions 01.09 and newer)

Setting	Profile ID					
	0 Handset	1 Headset	2 Speaker phone	3 Car kit	4 HA C	5 TTY
Automatic Gain Control (TX) !AVTXAGC (page 61)	On					
Noise Suppression (TX) !AVNS (page 55)	On	On	On	On	On	Off
AGC, AVC (RX) !AVRXAGC (page 56)	On					
Echo Cancellation !AVEC (page 52)	Ear Seal	Headset	Speaker-phone	Acoustic	Ear Seal	Off

Setting	Profile ID					
	0 Handset	1 Headset	2 Speaker phone	3 Car kit	4 HAC	5 TTY
Sidetone gain !AVCODECSTG (page 48)	-36 dB	-18 dB	-96 dB	-96 dB	-36 dB	-96 dB
Codec TX gain !AVCODECTXG (page 49)	-6.5 dB					Firmware versions 01.12 and newer: -14 dB Firmware versions 01.09 through 01.11: -6.5 dB
Codec RX gain !AVCODECRXG (page 47)	-16.5 dB	-19.5 dB	-19.5 dB	-19.5 dB	-16.5 dB	Firmware versions 01.12 and newer: -1 dB Firmware versions 01.09 through 01.11: -19.5 dB

Table 22: Default settings for each audio profile (MC5728V, firmware versions 01.08 and earlier)

Setting	Profile ID					
	0 Handset	1 Headset	2 Speaker phone	3 Car kit	4 HAC	5 TTY
Automatic Gain Control (TX) !AVTXAGC (page 61)	Off					
Noise Suppression (TX) !AVNS (page 55)	On	On	Off	On	Off	On
AGC, AVC (RX) !AVRXAGC (page 56)	Off					
Echo Cancellation !AVEC (page 52)	Ear Seal	Headset	Acoustic	Speaker-phone	Ear Seal	Off
Sidetone gain !AVCODECSTG (page 48)	-24 dB	-6 dB	Infinity	Infinity	-24 dB	Infinity

Setting	Profile ID					
	0 Handset	1 Headset	2 Speaker phone	3 Car kit	4 HAC	5 TTY
Codec TX gain !AVCODECTXG (page 49)	10 dB					
Codec RX gain !AVCODECRXG (page 47)	2 dB	-1 dB	-1 dB	-1 dB	2 dB	-1 dB

Profile activation

Profile 0 (Handset) is the default profile. Unless you activate a different profile prior to establishing a circuit-switched call, the default profile is used in establishing the call. To use a profile other than Profile 0, use the command [!AVSETPROFILE](#) (page 59) to activate the profile prior to establishing the call.

Voice command summary (MC5727V/MC5728V)


Table 23: Voice commands (MC5727V/MC5728V)

Command	Page	Description
!VAUDIOLPBK	47	Enable / disable an audio loopback
!AVCODECRXG	47	Set / query CODEC RX gain
!AVCODECSTG	48	Set / query CODEC sidetone gain
!AVCODECTXG	49	Set / query the CODEC TX gain
!AVDEF	50	Set audio settings to default values
!AVDTMFTXG	50	Set / query the DTMF TX gain
!AVDTMFVOLDB	51	Set the audio volume and DTMF volume for each audio type.
!AVEC	52	Set / query the echo cancellation setting
!AVEXTPCMCFG	53	Configure the external PCM interface

Command	Page	Description
IAVEXTPCMSEL	53	Query / set external PCM interface for profile
IAVEXTPCMSTOPCLKOFF	54	Enable / disable the ability to turn off the external PCM interface clock
IAVMICGAIN	55	Set / query the microphone gain
IAVNS	55	Enable / disable noise suppression
IAVRXAGC	56	Set / query RX AVC / AGC configuration
IAVRXPCMFLTR	57	Set / query the RX PCM filter tap
IAVSETPROFILE	59	Activate a profile
IAVSN	60	Set / query audio revision number
IAVTONEPLAY	60	Play a tone
IAVTXAGC	61	Set the TX AGC
IAVTXPCMFLTR	61	Set / query the TX PCM filter tap
IAVTXVOL	62	Set the TX volume

Voice reference (MC5727V/MC5728V)

Table 24: Voice reference (MC5727V/MC5728V)

Command	Description									
IAVAUDIOLPBK= <enable>  Supported modems: <ul style="list-style-type: none"> MC5727V MC5728V 	Enable / disable an audio loopback The loopback occurs at the vocoder interface and tests the audio front end with the EFR (Enhanced Full Rate) vocoder. <table border="1"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>enable</td> <td>0</td> <td>Loopback off</td> </tr> <tr> <td></td> <td>1</td> <td>Loopback on</td> </tr> </tbody> </table>	Parameter	Value	Meaning	enable	0	Loopback off		1	Loopback on
Parameter	Value	Meaning								
enable	0	Loopback off								
	1	Loopback on								
IAVCODECRXG= <profile>, <value>	Set / query CODEC RX gain The CODEC RX gain is applied to the digital signal prior to its conversion to the analog									

Command	Description																																	
<p>!AVCODECRXG? <profile></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>domain to provide additional gain range from -84dB to +12dB in the receive direction.</p> <p>This setting is stored in non-volatile memory and persists across power cycles.</p> <p>The change to the audio system takes place immediately if the specified audio profile is active.</p> <p>This command has no effect if the specified profile's external PCM interface is enabled. Use !AVEXTPCMSEL (page 53) to disable the interface.</p> <table border="1" data-bbox="792 705 1273 1226"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> <tr> <td></td> <td>1</td> <td>Headset</td> </tr> <tr> <td></td> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td></td> <td>3</td> <td>Car kit</td> </tr> <tr> <td></td> <td>4</td> <td>HAC (Hearing Aid Compatibility)</td> </tr> <tr> <td></td> <td>5</td> <td>TTY</td> </tr> <tr> <td><value></td> <td>0x0000</td> <td>Mute (minimum value)</td> </tr> <tr> <td></td> <td>0x4000</td> <td>Unity gain</td> </tr> <tr> <td></td> <td>0xFFFF</td> <td>Maximum value</td> </tr> </tbody> </table> <p>You can calculate the gain in dB using this formula:</p> $\text{Gain} = 20 \log_{10} (\text{<value>} / 16384)$ <p>In the command, <value> is in hexadecimal format. In the formula, convert <value> to decimal format.</p>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone		3	Car kit		4	HAC (Hearing Aid Compatibility)		5	TTY	<value>	0x0000	Mute (minimum value)		0x4000	Unity gain		0xFFFF	Maximum value
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<value>	0x0000	Mute (minimum value)																																
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<p>!AVCODECSTG= <profile>, <value></p> <p>!AVCODECSTG? <profile></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set / query CODEC sidetone gain</p> <p>The side tone is the sound of the mobile user's own voice as heard on the mobile's speaker, and the gain ranges from -84dB to +12dB.</p> <p>This setting is stored in non-volatile memory and persists across power cycles.</p> <p>The change to the audio system takes place immediately if the specified audio profile is active.</p>																																	

Command	Description																																	
	<p>This command has no effect if the specified profile's external PCM interface is enabled. Use !AVEXTPCMSEL (page 53) to disable the interface.</p> <table border="1" data-bbox="797 443 1271 961"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> <tr> <td></td> <td>1</td> <td>Headset</td> </tr> <tr> <td></td> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td></td> <td>3</td> <td>Car kit</td> </tr> <tr> <td></td> <td>4</td> <td>HAC (Hearing Aid Compatibility)</td> </tr> <tr> <td></td> <td>5</td> <td>TTY</td> </tr> <tr> <td><value></td> <td>0x0000</td> <td>Mute (minimum value)</td> </tr> <tr> <td></td> <td>0x4000</td> <td>Unity gain</td> </tr> <tr> <td></td> <td>0xFFFF</td> <td>Maximum value</td> </tr> </tbody> </table> <p>You can calculate the gain in dB using this formula:</p> $\text{Gain} = 20 \log_{10} (\text{<value>} / 16384)$ <p>In the command, <value> is in hexadecimal format. In the formula, convert <value> to decimal format.</p>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone		3	Car kit		4	HAC (Hearing Aid Compatibility)		5	TTY	<value>	0x0000	Mute (minimum value)		0x4000	Unity gain		0xFFFF	Maximum value
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	0xFFFF	Maximum value																																
<p>!AVCODECTXG= <profile>, <value> !AVCODECTXG? Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set / query the CODEC TX gain</p> <p>The CODEC TX gain is applied to the digital signal after its conversion from the analog domain to provide additional gain range from -84dB to +12dB in the transmit direction.</p> <p>This setting is stored in non-volatile memory and persists across power cycles.</p> <p>The change to the audio system takes place immediately if the specified audio profile is active.</p> <p>This command has no effect if the specified profile's external PCM interface is enabled. Use !AVEXTPCMSEL (page 53) to disable the interface.</p> <table border="1" data-bbox="797 1770 1214 1839"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<profile>		Audio profile																											
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0	Handset																					
1	Headset																					
2	Speaker phone																					
3	Car kit																					
4	HAC (Hearing Aid Compatibility)																					
5	TTY																					
<p>!AVDEF</p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set audio settings to default values</p> <p>This command sets all the configurable audio parameters to default values. The default values are also loaded into non-volatile memory.</p>																					
<p>!AVDTMFTXG= <profile>, <value></p> <p>!AVDTMFTXG? <profile></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set / query the DTMF TX gain</p> <p>The DTMF TX gain determines the gain, from -84dB to +12dB, for the DTMF tone that is transmitted over the air.</p> <p>This setting is stored in non-volatile memory and persists across power cycles. The change to the audio system takes effect when a phone call is made or received.</p> <table border="0"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr><td></td><td>0</td><td>Handset</td></tr> <tr><td></td><td>1</td><td>Headset</td></tr> <tr><td></td><td>2</td><td>Speaker phone</td></tr> <tr><td></td><td>3</td><td>Car kit</td></tr> <tr><td></td><td>4</td><td>HAC (Hearing Aid Compatibility)</td></tr> </tbody> </table>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone		3	Car kit		4	HAC (Hearing Aid Compatibility)
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<p>!AVDTMFBVOLDB= <profile>, <method>, <level>, <value></p> <p>!AVDTMFBVOLDB? <profile>, <method>, <level></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<table border="0" style="width: 100%;"> <tr> <td style="width: 15%;"></td> <td style="width: 15%; text-align: center;">5</td> <td style="width: 15%;"></td> <td style="width: 55%;">TTY</td> </tr> <tr> <td style="vertical-align: top;"><value></td> <td style="text-align: center;">0x0000</td> <td></td> <td>Mute (minimum value)</td> </tr> <tr> <td></td> <td style="text-align: center;">0x4000</td> <td></td> <td>Unity gain</td> </tr> <tr> <td></td> <td style="text-align: center;">0xFFFF</td> <td></td> <td>Maximum value</td> </tr> </table> <p>You can calculate the gain in dB using this formula:</p> $\text{Gain} = 20 \log_{10} (\text{<value>} / 16384)$ <p>In the command, <value> is in hexadecimal format. In the formula, convert <value> to decimal format.</p> <p>Set the audio volume and DTMF volume for each audio type.</p> <p>This command sets the audio volume and the DTMF volume level for voice and key beep tones. The setting is stored in non-volatile memory and persists across power cycles. The change to the audio system takes effect immediately if the specified path is active and all the volumes have been initialized. (You must run the AVSETPROFILE (page 59) command to assign specific volume ranges to each of the predefined volume levels, 0 through 7. See "Profile activation" on page 46.</p> <table border="0" style="width: 100%;"> <thead> <tr> <th style="width: 15%;">Parameter</th> <th style="width: 15%;">Value</th> <th style="width: 15%;"></th> <th style="width: 55%;">Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td style="text-align: center;">0</td> <td></td> <td>Handset</td> </tr> <tr> <td></td> <td style="text-align: center;">1</td> <td></td> <td>Headset</td> </tr> <tr> <td></td> <td style="text-align: center;">2</td> <td></td> <td>Speaker phone</td> </tr> <tr> <td></td> <td style="text-align: center;">3</td> <td></td> <td>Car kit</td> </tr> <tr> <td></td> <td style="text-align: center;">4</td> <td></td> <td>HAC (Hearing Aid Compatibility)</td> </tr> <tr> <td></td> <td style="text-align: center;">5</td> <td></td> <td>TTY</td> </tr> <tr> <td style="vertical-align: top;"><method></td> <td style="text-align: center;">0</td> <td></td> <td>Voice</td> </tr> <tr> <td></td> <td style="text-align: center;">1</td> <td></td> <td>Key beep</td> </tr> <tr> <td style="vertical-align: top;"><level></td> <td></td> <td></td> <td>Volume level</td> </tr> <tr> <td></td> <td style="text-align: center;">0</td> <td></td> <td>Level 0</td> </tr> <tr> <td></td> <td style="text-align: center;">1</td> <td></td> <td>Level 1</td> </tr> <tr> <td></td> <td style="text-align: center;">2</td> <td></td> <td>Level 2</td> </tr> </tbody> </table>		5		TTY	<value>	0x0000		Mute (minimum value)		0x4000		Unity gain		0xFFFF		Maximum value	Parameter	Value		Meaning	<profile>			Audio profile		0		Handset		1		Headset		2		Speaker phone		3		Car kit		4		HAC (Hearing Aid Compatibility)		5		TTY	<method>	0		Voice		1		Key beep	<level>			Volume level		0		Level 0		1		Level 1		2		Level 2
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	0xFFFF to 0xEC78	Negative gains																										
<p>IAVEC=<profile>, <value></p> <p>IAVEC?<profile></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set / query the echo cancellation setting</p> <p>The echo canceller monitors the conversation and eliminates the echo that may return to its point of origin (far end). Several settings are available:</p> <ul style="list-style-type: none"> • Handset mode for mild echo with short delay • Headset mode for moderate echo with short delay • Car kit for loud echo with long delay • Speakerphone mode for loud echo with extreme acoustic distortion <p>This setting is stored in non-volatile memory and persists across power cycles.</p> <p>The change to the audio system takes place immediately if the specified audio profile is active.</p> <table border="0"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> <tr> <td></td> <td>1</td> <td>Headset</td> </tr> <tr> <td></td> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td></td> <td>3</td> <td>Car kit</td> </tr> <tr> <td></td> <td>4</td> <td>HAC (Hearing Aid Compatibility)</td> </tr> <tr> <td></td> <td>5</td> <td>TTY</td> </tr> <tr> <td><value></td> <td></td> <td>Echo cancellation mode</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone		3	Car kit		4	HAC (Hearing Aid Compatibility)		5	TTY	<value>		Echo cancellation mode
Parameter	Value	Meaning																										
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<p>!AVEXTPCMCFG= <clock>,<format>,<padding></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Configure the external PCM interface</p> <p>The change takes place immediately if the current audio profile uses the external PCM interface.</p> <p>These settings are stored in NV memory and persist across power cycles.</p> <p>Padding is typically disabled (padding bits are used to control the volume level for some external codecs).</p> <table border="0"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td rowspan="2"><clock></td> <td style="text-align: center;">0</td> <td>2.048 MHz (short sync)</td> </tr> <tr> <td style="text-align: center;">1</td> <td>128 kHz (long sync)</td> </tr> <tr> <td rowspan="4"><format></td> <td style="text-align: center;">0</td> <td>8-bit μ-law</td> </tr> <tr> <td style="text-align: center;">1</td> <td>8-bit a-law</td> </tr> <tr> <td style="text-align: center;">2</td> <td>16-bit linear</td> </tr> <tr> <td style="text-align: center;">3</td> <td>16-bit linear</td> </tr> <tr> <td rowspan="2"><padding></td> <td style="text-align: center;">0</td> <td>Disable padding</td> </tr> <tr> <td style="text-align: center;">1</td> <td>Enable padding</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<clock>	0	2.048 MHz (short sync)	1	128 kHz (long sync)	<format>	0	8-bit μ -law	1	8-bit a-law	2	16-bit linear	3	16-bit linear	<padding>	0	Disable padding	1	Enable padding
Parameter	Value	Meaning																					
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<p>!AVEXTPCMSEL? <profile></p>	<p>Query / set external PCM interface for profile</p> <p>The change takes effect after the modem is reset.</p>																						

Command	Description																																	
<p>!AVEXTPCMSEL= <profile>, <value></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<table border="0"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> <tr> <td></td> <td>1</td> <td>Headset</td> </tr> <tr> <td></td> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td></td> <td>3</td> <td>Car kit</td> </tr> <tr> <td></td> <td>4</td> <td>HAC (Hearing Aid Compatibility)</td> </tr> <tr> <td></td> <td>5</td> <td>TTY</td> </tr> <tr> <td><value></td> <td></td> <td>State of external PCM interface</td> </tr> <tr> <td></td> <td>0</td> <td>Disable</td> </tr> <tr> <td></td> <td>1</td> <td>Enable</td> </tr> </tbody> </table> <p>The following commands affect a specified profile's internal codec—they have no effect if that profile's external PCM interface is enabled: AVCODECRXG (page 47), AVCODECSTG (page 48), AVCODECTXG (page 49), and AVMICGAIN (page 55). To use these commands, you must disable the profile's external PCM interface and then reset the modem.</p>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone		3	Car kit		4	HAC (Hearing Aid Compatibility)		5	TTY	<value>		State of external PCM interface		0	Disable		1	Enable
Parameter	Value	Meaning																																
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<value>		State of external PCM interface																																
	0	Disable																																
	1	Enable																																
<p>!AVEXTPCMSTOP CLKOFF?</p> <p>!AVEXTPCMSTOP CLKOFF= <value></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Enable / disable the ability to turn off the external PCM interface clock.</p> <p>If the current audio profile uses the external PCM interface, this command enables or disables the ability to turn off the external PCM interface clock—the change takes effect after the modem is reset.</p> <p>The external PCM interface for the current audio profile must be enabled before using this command.</p> <table border="0"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Disable the ability to turn off the PCM clock</td> </tr> <tr> <td>1</td> <td>Enable the ability to turn off the PCM clock</td> </tr> </tbody> </table> <p>At startup, if audio profile 0 (default) uses the external PCM interface, the modem enables the clock.</p>	Value	Meaning	0	Disable the ability to turn off the PCM clock	1	Enable the ability to turn off the PCM clock																											
Value	Meaning																																	
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Command	Description																														
	<p>At startup, if audio profile 0 (default) does not use the external PCM interface, the user must switch to a different profile that does to enable the clock.</p> <p>If the user switches from a profile that uses the external PCM interface to one that does not, the PCM clock is lost.</p> <p>Depending on the external CODEC configuration, OEMs using this command might prevent the audio from being muted, so the device could be more prone to noise from the RF subsystem.</p>																														
<p>!AVMICGAIN= <profile>, <value></p> <p>!AVMICGAIN? <profile></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set / query the microphone gain</p> <p>This setting provides a set of twenty-six gain levels from -6 dB to +49.5 dB (steps of 1.5 dB). The gain is applied to the analog audio input prior to its conversion into the digital domain.</p> <p>This setting is stored in non-volatile memory and persists across power cycles.</p> <p>The change to the audio system takes place immediately if the specified audio profile is active.</p> <p>This command has no effect if the specified profile's external PCM interface is enabled. Use !AVEXTPCMSEL (page 53) to disable the interface.</p> <table border="1" data-bbox="797 1268 1273 1751"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> <tr> <td></td> <td>1</td> <td>Headset</td> </tr> <tr> <td></td> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td></td> <td>3</td> <td>Car kit</td> </tr> <tr> <td></td> <td>4</td> <td>HAC (Hearing Aid Compatibility)</td> </tr> <tr> <td></td> <td>5</td> <td>TTY</td> </tr> <tr> <td><value></td> <td></td> <td>Gain value</td> </tr> <tr> <td></td> <td>0–25</td> <td>0 = -6 dB, 25 = 49.5 dB</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone		3	Car kit		4	HAC (Hearing Aid Compatibility)		5	TTY	<value>		Gain value		0–25	0 = -6 dB, 25 = 49.5 dB
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<value>		Gain value																													
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<p>!AVNS=<profile>, <value></p>	<p>Enable / disable noise suppression</p> <p>The noise suppressor reduces or eliminates</p>																														

Command	Description																																	
<p>!AVNS?<profile></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>continuous background noise, providing a clearer Rx audio signal.</p> <p>The change to the audio system takes place immediately if the specified audio profile is active.</p> <p>This setting is stored in NV memory and persists across power cycles.</p> <table border="1" data-bbox="797 562 1276 1083"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> <tr> <td></td> <td>1</td> <td>Headset</td> </tr> <tr> <td></td> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td></td> <td>3</td> <td>Car kit</td> </tr> <tr> <td></td> <td>4</td> <td>HAC (Hearing Aid Compatibility)</td> </tr> <tr> <td></td> <td>5</td> <td>TTY</td> </tr> <tr> <td><value></td> <td></td> <td>Noise suppression mode</td> </tr> <tr> <td></td> <td>0</td> <td>Off</td> </tr> <tr> <td></td> <td>1</td> <td>On</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone		3	Car kit		4	HAC (Hearing Aid Compatibility)		5	TTY	<value>		Noise suppression mode		0	Off		1	On
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<p>!AVRXAGC=<profile>, <value></p> <p>!AVRXAGC?<profile></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set / query RX AVC / AGC configuration</p> <p>The RX AGC (Automatic Gain Control) compensates for variations in audio gains from the landline side, while the RX AVC (Automatic Volume Control: MC5727V/MC5728V) tracks the ambient audio noise on the mobile side and compensates accordingly. Both controls allow for a constant audio level in the RX direction. The setting is stored in non-volatile memory and persists across power cycles.</p> <p>The change to the audio system takes place immediately if the specified audio profile is active.</p> <table border="1" data-bbox="797 1591 1243 1829"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> <tr> <td></td> <td>1</td> <td>Headset</td> </tr> <tr> <td></td> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td></td> <td>3</td> <td>Car kit</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone		3	Car kit															
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Command	Description
	<p style="text-align: right;">4 HAC (Hearing Aid Compatibility)</p> <p style="text-align: right;">5 TTY</p> <p style="text-align: center;"><value></p> <p style="text-align: right;">AVC / AGC configuration</p> <p style="text-align: right;">0 AGC off, AVC off</p> <p style="text-align: right;">1 AGC on, AVC on</p> <p style="text-align: right;">2 AGC on, AVC off</p>
<p>IAVRXPCMFLTR= <profile>, <tap>, <value></p> <p>IAVRXPCMFLTR? <profile>, <tap></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set / query the RX PCM filter tap</p> <p>The MC5727V/MC5728Vmodem has a 7-tap PCM (Pulse Code Modulation) filter. This command sets the RX PCM filter tap for the specified profile.</p> <p>This command is useful only when embedding the modem in a handset.</p> <p>Mobile phones, PDAs or other handheld transmitters and receivers that incorporate a CDMA module are required to comply with certain standards or with national standards or government regulations. To conform to the relevant standard you may need to tune certain audio characteristics. This command allows you to tune the receive PCM filter to alter audio characteristics.</p> <p>Settings are stored in non-volatile memory and persist across power cycles.</p> <p>The change to the audio system takes place immediately if the specified audio profile is active.</p> <p>The process of tuning the receive audio characteristics generally involves these steps:</p> <ol style="list-style-type: none"> 1. Turn off the PCM filter (set <value> parameter to 0x0000 on Tap 6). 2. Use test equipment to obtain a frequency response curve with the passing mask. 3. Identify the frequency bands that need correction in order to bring the overall response within the bounds specified in the test case. 4. Use a filter design tool to determine the filter coefficients, convert to signed Q14 format, and enter the appropriate tap

Command	Description																																																						
	<p>settings using the IAVRXPCMFLTR command.</p> <p>5. Repeat the process until the specifications are met.</p> <p><value> is calculated using the formula: <value>= hex number of ROUND (filter coefficient x 2¹⁴)</p> <table border="1" data-bbox="792 579 1273 1518"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> <tr> <td></td> <td>1</td> <td>Headset</td> </tr> <tr> <td></td> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td></td> <td>3</td> <td>Car kit</td> </tr> <tr> <td></td> <td>4</td> <td>HAC (Hearing Aid Compatibility)</td> </tr> <tr> <td></td> <td>5</td> <td>TTY</td> </tr> <tr> <td><tap></td> <td></td> <td>Sets the taps in use</td> </tr> <tr> <td></td> <td>0</td> <td>Tap 0</td> </tr> <tr> <td></td> <td>1</td> <td>Tap 1</td> </tr> <tr> <td></td> <td>2</td> <td>Tap 2</td> </tr> <tr> <td></td> <td>3</td> <td>Tap 3</td> </tr> <tr> <td></td> <td>4</td> <td>Tap 4</td> </tr> <tr> <td></td> <td>5</td> <td>Tap 5</td> </tr> <tr> <td></td> <td>6</td> <td>Tap 6</td> </tr> <tr> <td><value></td> <td></td> <td>Sets the RX PCM filter tap</td> </tr> <tr> <td></td> <td>0x0000–0xFFFF</td> <td>0x0000 on Tap6 causes the PCM filter to be bypassed</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone		3	Car kit		4	HAC (Hearing Aid Compatibility)		5	TTY	<tap>		Sets the taps in use		0	Tap 0		1	Tap 1		2	Tap 2		3	Tap 3		4	Tap 4		5	Tap 5		6	Tap 6	<value>		Sets the RX PCM filter tap		0x0000–0xFFFF	0x0000 on Tap6 causes the PCM filter to be bypassed
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<p>!AVSETPROFILE= <profile>, <earmute>, <micmute>, <generator>, <volume>, <cwtmute></p> <p>AVSETPROFILE? <generator></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Activate a profile</p> <p>This command is used to select a profile with which to establish a circuit-switched call. (See “Profile activation” on page 46.) This command also enables/disables muting on the earpiece and microphone and sets the volume level.</p> <p>The profile you select remains active until the modem is reset or powered down and up again. Following a reset or power up, Profile 0 (the default profile) is active.</p> <p>You must run the !AVSETPROFILE (page 59) command to assign specific volume levels to each of the predefined volume levels, 1 through 7.</p> <table border="1" data-bbox="797 827 1273 1829"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td rowspan="6"><profile></td> <td>0</td> <td>Handset</td> </tr> <tr> <td>1</td> <td>Headset</td> </tr> <tr> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td>3</td> <td>Car kit</td> </tr> <tr> <td>4</td> <td>HAC (Hearing Aid Compatibility)</td> </tr> <tr> <td>5</td> <td>TTY</td> </tr> <tr> <td rowspan="2"><earmute></td> <td></td> <td>Enable / disable earpiece muting</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td rowspan="2"></td> <td>0</td> <td>Unmuted</td> </tr> <tr> <td>1</td> <td>Muted</td> </tr> <tr> <td rowspan="2"><micmute></td> <td></td> <td>Enable / disable microphone muting</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td rowspan="2"></td> <td>0</td> <td>Unmuted</td> </tr> <tr> <td>1</td> <td>Muted</td> </tr> <tr> <td rowspan="3"><generator></td> <td></td> <td>Audio type</td> </tr> <tr> <td>0</td> <td>Voice</td> </tr> <tr> <td>1</td> <td>Key beep</td> </tr> <tr> <td rowspan="3"></td> <td>2</td> <td>MIDI</td> </tr> <tr> <td></td> <td>Volume level</td> </tr> <tr> <td>0</td> <td>Level 0</td> </tr> <tr> <td rowspan="2"><volume></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>Level 1</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<profile>	0	Handset	1	Headset	2	Speaker phone	3	Car kit	4	HAC (Hearing Aid Compatibility)	5	TTY	<earmute>		Enable / disable earpiece muting				0	Unmuted	1	Muted	<micmute>		Enable / disable microphone muting				0	Unmuted	1	Muted	<generator>		Audio type	0	Voice	1	Key beep		2	MIDI		Volume level	0	Level 0	<volume>			1	Level 1
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<p>IAVSN=<value></p> <p>IAVSN?</p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set / query audio revision number</p> <p>This command allows you to store and retrieve a revision number for your audio configuration. The modem does NOT associate this number with any settings, and this command does not provide a means of restoring a particular configuration. The command only provides a means of storing and retrieving a number.</p> <table border="0"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>value</td> <td></td> <td>Revision number</td> </tr> <tr> <td></td> <td>0x00000000 –</td> <td></td> </tr> <tr> <td></td> <td>0xFFFFFFFF</td> <td></td> </tr> </tbody> </table>	Parameter	Value	Meaning	value		Revision number		0x00000000 –			0xFFFFFFFF										
Parameter	Value	Meaning																				
value		Revision number																				
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<p>IAVTONEPLAY=</p> <p><method>,</p> <p><value></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Play a tone</p> <p>This command is used to play a specified tone with the current active audio profile. This is for testing purposes—not for normal operation.</p> <table border="0"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><method></td> <td></td> <td>Audio type</td> </tr> <tr> <td></td> <td>0</td> <td>Voice</td> </tr> <tr> <td></td> <td>1</td> <td>Key beep</td> </tr> <tr> <td><value></td> <td></td> <td>Tone setting</td> </tr> <tr> <td></td> <td>0x00 –</td> <td>For details, see Table 25 on page 63.</td> </tr> <tr> <td></td> <td>0x57</td> <td></td> </tr> </tbody> </table>	Parameter	Value	Meaning	<method>		Audio type		0	Voice		1	Key beep	<value>		Tone setting		0x00 –	For details, see Table 25 on page 63.		0x57	
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	0x00 –	For details, see Table 25 on page 63.																				
	0x57																					

Command	Description																																	
<p>!AVTXAGC= <profile>, <value></p> <p>!AVTXAGC? <profile></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set the TX AGC</p> <p>The TX AGC (Automatic Gain Control) compensates for variations in audio gains from the mobile side to allow for a constant audio level in the TX direction.</p> <p>The setting is stored in non-volatile memory and persists across power cycles.</p> <p>The change to the audio system takes place immediately if the specified audio profile is active.</p> <table> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> <tr> <td></td> <td>1</td> <td>Headset</td> </tr> <tr> <td></td> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td></td> <td>3</td> <td>Car kit</td> </tr> <tr> <td></td> <td>4</td> <td>HAC (Hearing Aid Compatibility)</td> </tr> <tr> <td></td> <td>5</td> <td>TTY</td> </tr> <tr> <td><value></td> <td></td> <td>Enable / disable TX AGC</td> </tr> <tr> <td></td> <td>0</td> <td>AGC off</td> </tr> <tr> <td></td> <td>1</td> <td>AGC on</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone		3	Car kit		4	HAC (Hearing Aid Compatibility)		5	TTY	<value>		Enable / disable TX AGC		0	AGC off		1	AGC on
Parameter	Value	Meaning																																
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<p>!AVTXPCMFLTR= <profile>, <tap>, <value></p> <p>!AVTXPCMFLTR? <profile>, <tap></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set / query the TX PCM filter tap</p> <p>The MC5727V/MC5728V modem has a 7-tap PCM (Pulse Code Modulation) filter. This command sets the TX PCM filter tap for the specified profile.</p> <p>See !AVRXPMLTR (page 57) for a description of using the filters.</p> <p><value> is calculated using the formula: <value>= hex number of ROUND (filter coefficient x 2¹⁴)</p> <table> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> <tr> <td></td> <td>1</td> <td>Headset</td> </tr> <tr> <td></td> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td></td> <td>3</td> <td>Car kit</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone		3	Car kit															
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<value>		Sets the TX PCM filter tap																																			
	0x0000–0xFFFF	0x0000 on Tap6 causes the PCM filter to be bypassed																																			
<p>!AVTXVOL= <profile>, <value></p> <p>!AVTXVOL? <profile></p> <p>Supported modems:</p> <ul style="list-style-type: none"> • MC5727V • MC5728V 	<p>Set the TX volume</p> <p>The TX volume gain determines the gain, from -84 dB to +12 dB, for the voice that is transmitted over the air. This gain is applied to the PCM voice packets prior to feeding them into the vocoder, which encodes the PCM packets into a more efficient format for over-the-air transmission.</p> <p>This setting is stored in non-volatile memory and persists across power cycles. The change to the audio system takes effect when a phone call is made or received.</p> <p>Calculate the gain in dB using the formula: Gain = 20 log₁₀ (<value> / 16384)</p> <p>In the command, <value> is in hexadecimal format. In the formula, convert <value> to decimal format.</p> <table border="0"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> <tr> <td></td> <td>1</td> <td>Headset</td> </tr> <tr> <td></td> <td>2</td> <td>Speaker phone</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset		1	Headset		2	Speaker phone																					
Parameter	Value	Meaning																																			
<profile>		Audio profile																																			
	0	Handset																																			
	1	Headset																																			
	2	Speaker phone																																			

Command	Description
	3 Car kit
	4 HAC (Hearing Aid Compatibility)
	5 TTY
<value>	TX volume gain
0x0000	Mute (minimum value)
0x4000	Unity gain
0xFFFF	Maximum value

Table 25: Tone settings for AT!AVTONEPLAY command

<Value>	Tone	Description
0x00	SND_0	DTMF for 0 key
0x01	SND_1	DTMF for 1 key
0x02	SND_2	DTMF for 2 key
0x03	SND_3	DTMF for 3 key
0x04	SND_4	DTMF for 4 key
0x05	SND_5	DTMF for 5 key
0x06	SND_6	DTMF for 6 key
0x07	SND_7	DTMF for 7 key
0x08	SND_8	DTMF for 8 key
0x09	SND_9	DTMF for 9 key
0x0A	SND_A	DTMF for A key
0x0B	SND_B	DTMF for B key

<Value>	Tone	Description
0x0C	SND_C	DTMF for C key
0x0D	SND_D	DTMF for D key
0x0E	SND_POUND	DTMF for # key
0x0F	SND_STAR	DTMF for * key
0x10	SND_CTRL	Tone for a control key
0x11	SND_2ND	Tone for secondary function on a key
0x12	SND_WARN	Warning tone (e.g. overwriting user phone# slot)
0x13	SND_ERR	Tone to indicate an error
0x14	SND_TIME	Time marker tone
0x15	SND_RING_A	1st Ringer tone
0x16	SND_RING_B	2nd Ringer tone
0x17	SND_RING_C	3rd Ringer tone
0x18	SND_RING_D	4th Ringer tone
0x19	SND_RING_A4	440.0 Hz (Piano Notes)
0x1A	SND_RING_AS4	466.1 Hz
0x1B	SND_RING_B4	493.8 Hz
0x1C	SND_RING_C4	523.2 Hz
0x1D	SND_RING_CS4	554.3 Hz

<Value>	Tone	Description
0x1E	SND_RING_D4	587.3 Hz
0x1F	SND_RING_DS4	622.2 Hz
0x20	SND_RING_E4	659.2 Hz
0x21	SND_RING_F4	698.5 Hz
0x22	SND_RING_FS4	739.9 Hz
0x23	SND_RING_G4	784.0 Hz
0x24	SND_RING_GS4	830.6 Hz
0x25	SND_RING_A5	880.0 Hz
0x26	SND_RING_AS5	932.2 Hz
0x27	SND_RING_B5	987.7 Hz
0x28	SND_RING_C5	1046.5 Hz
0x29	SND_RING_CS5	1108.7 Hz
0x2A	SND_RING_D5	1174.6 Hz
0x2B	SND_RING_DS5	1244.3 Hz
0x2C	SND_RING_E5	1318.5 Hz
0x2D	SND_RING_F5	1397.0 Hz
0x2E	SND_RING_FS5	1479.9 Hz
0x2F	SND_RING_G5	1568.0 Hz

<Value>	Tone	Description
0x30	SND_RING_GS5	1661.2 Hz
0x31	SND_RING_A6	1760.0 Hz
0x32	SND_RING_AS6	1864.7 Hz
0x33	SND_RING_B6	1975.5 Hz
0x34	SND_RING_C6	2093.1 Hz
0x35	SND_RING_CS6	2217.4 Hz
0x36	SND_RING_D6	2349.3 Hz
0x37	SND_RING_DS6	2489.1 Hz
0x38	SND_RING_E6	2637.0 Hz
0x39	SND_RING_F6	2793.7 Hz
0x3A	SND_RING_FS6	2959.9 Hz
0x3B	SND_RING_G6	3135.9 Hz
0x3C	SND_RING_GS6	3322.4 Hz
0x3D	SND_RING_A7	3520.0 Hz
0x3E	SND_RBACK	Ring back (audible ring)
0x3F	SND_BUSY	Busy tone
0x40	SND_INTERCEPT_A	First tone of an intercept
0x41	SND_INTERCEPT_B	Second tone of an intercept

<Value>	Tone	Description
0x42	SND_REORDER_TONE	Reorder
0x43	SND_PWRUP	Power-up tone
0x44	SND_OFF_HOOK_TONE	Off-hook tone, IS-95 (CAI 7.7.5.5)
0x45	SND_CALL_WT_TONE	Call-waiting tone
0x46	SND_DIAL_TONE_TONE	Dial tone
0x47	SND_ANSWER_TONE	Answer tone
0x48	SND_HIGH_PITCH_A	1st High pitch for IS-54B alerting
0x49	SND_HIGH_PITCH_B	2nd High pitch for IS-54B alerting
0x4A	SND_MED_PITCH_A	1st Medium pitch for IS-54B alerting
0x4B	SND_MED_PITCH_B	2nd Medium pitch for IS-54B alerting
0x4C	SND_LOW_PITCH_A	1st Low pitch for IS-54B alerting
0x4D	SND_LOW_PITCH_B	2nd Low pitch for IS-54B alerting
0x4E	SND_TEST_ON	Test tone on
0x4F	SND_MSG_WAITING	Message Waiting Tone
0x50	SND_PIP_TONE_TONE	Used for Pip-Pip-Pip-Pip (Vocoder) Tone
0x51	SND_SPC_DT_INDIA	Used for India's Special Dial Tone
0x52	SND_SIGNAL_INDIA	Used in Various India Signalling Tones

<Value>	Tone	Description
0x53	SND_DT_TONE_INDIA	Used for India's Normal Dial Tone (and others)
0x54	SND_DT_TONE_BRAZIL	Used for Brazil's Dial Tone
0x55	SND_DT_DTACO_TONE	Used for DTACO's single tone (350 Hz,350 Hz)
0x56	SND_HFK_TONE1	These two tones are used for Voice Activation and Incoming Call Answer in phone VR-HFK
0x57	SND_HFK_TONE2	

8: Voice Commands (MC5725V)

Introduction

The MC5725V modem has built-in audio support that allows the modem to be used as a mobile phone.

The modem supports a single analog audio interface that can be used for handset-style applications or headset applications, and a PCM digital audio interface. The modem has a wide range of software-controlled, audio filtering and amplification stages that minimize the amount of external circuitry required on the host system.

At its most basic configuration, the host audio system could contain:

- A microphone / speaker combination (handset)
- or—
- A headset jack

The audio pass band for the primary and secondary audio paths extends from 300 Hz to 3.4 kHz in both the receive and transmit directions.

These transmit audio features are supported:

- Adjustable gain up to +40 dB
- Several adjustable filtering stages (high-pass and slope filters)
- Noise cancellation
- Configurable echo cancellation for various acoustic environments like headset, handset, and speakerphone
- Adjustable sidetone from mute to unity gain

These receive audio features are supported:

- Adjustable gain up to +24 dB
- High-pass filter stage
- Output driver stages, which can drive speakers directly

The module also provides 13-tap FIR (Finite Impulse Response) filtering for both the receive and transmit paths to equalize the acoustic response of the speaker and microphone.

The embedded module can serve as an integral component of a more complex audio system, such as a PDA with a separate codec interfacing with the main processor. In this case, the interface between the modem and PDA codec can be as simple as line-level audio with no transducer considerations. Phone-oriented functions such as echo cancellation and FIR filtering are typically left to the module, while path-switching and transducer interfaces are the responsibility of the PDA codec. Functions such as adjustable gain and volume settings, DTMF and ringer tone generation, and mixing can be accomplished in either codec, depending on the architecture of the particular product. The interface between

the module and host audio systems is usually the primary audio interface set to line-level amplitudes, routed as differential pairs for noise immunity.

Audio profiles

The AT command set allows you to have different audio configurations for different purposes. As an example, assume you are embedding the module in a device that has a handset mode and a speakerphone mode. Assume also that you want to use different transmit gain, noise suppression, and echo cancellation settings in each mode. You can store the settings for each mode in separate audio profiles, then activate the appropriate profile as your application switches to handset or speakerphone mode.

The MC5725V modem supports various audio profiles:

- 0—Handset
- 1—Headset
- 2—Speaker phone
- 3—Car kit
- 4—TTY (TeleTYpe—a device that allows speech and hearing-impaired people to use a phone)

AT commands that are used to change the audio configuration have a profile parameter; any changes you make are applied to the specified profile. The default audio configuration for each profile is shown in the following table.

Table 26: Default settings for each audio profile (MC5725V)

Setting	Profile ID				
	0 Handset	1 Headset	2 Speaker phone	3 Car kit	4 TTY
Echo Cancellation -ECHO	Ear Seal	Headset	Speaker-phone	Acoustic	Off
Sidetone gain -STGLVL	-24 dB	-6 dB	Infinity	Infinity	-6 dB
Codec TX gain -MICLVL (page 71)	7 dB				
Codec RX gain -SPKLVL (page 72)	-3 dB				

Voice command summary (MC5725V)

Table 27: Voice commands (MC5725V)

Command	Page	Description
~AUDMOD	71	Audio Mode
~MICLVL	71	Microphone Level (calibration)
~SPKLVL	72	Speaker Level - Codec Gain (calibration)
!AVTXVOL	72	Set the TX volume

Voice reference (MC5725V)

Table 28: Voice reference (MC5725V)

Command	Description																
~AUDMOD=<n> ~AUDMOD? Supported modems: <ul style="list-style-type: none"> MC5725V 	Audio Mode Sets or queries the mode of the audio (voice) circuitry. The modem supports either headset level, or line level for connection to additional audio circuits. For additional information, consult the MC5725V documentation. The setting is persistent until explicitly changed by a new command. <table> <thead> <tr> <th>Parm</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Handset</td> </tr> <tr> <td>1</td> <td>Headset (Default)</td> </tr> <tr> <td>2</td> <td>Speaker phone</td> </tr> <tr> <td>3</td> <td>Car kit</td> </tr> <tr> <td>4</td> <td>TTY—full audio</td> </tr> <tr> <td>5</td> <td>TTY—talk audio</td> </tr> <tr> <td>6</td> <td>TTY—hear audio</td> </tr> </tbody> </table>	Parm	Meaning	0	Handset	1	Headset (Default)	2	Speaker phone	3	Car kit	4	TTY—full audio	5	TTY—talk audio	6	TTY—hear audio
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5	TTY—talk audio																
6	TTY—hear audio																
~MICLVL=<n> ~MICLVL? Supported modems: <ul style="list-style-type: none"> MC5725V 	Microphone Level Sets or queries the CODEC gain level. The setting is persistent until explicitly changed by a new command. This should be treated as a calibration command—not an end-user command. <table> <thead> <tr> <th>Parm</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Sets factory default gain (0 dB) (Default)</td> </tr> </tbody> </table>	Parm	Meaning	0	Sets factory default gain (0 dB) (Default)												
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5	+8 dB																
6	+12 dB																
<p>~SPKLVL=<n> ~SPKLVL? Supported modems: • MC5725V</p>	<p>Sets and queries the CODEC gain level of the speaker. This is not the end-user volume control (~SPKVOL) described in the AT Reference (document #2130620). This setting should be treated as a calibration setting, made once for the platform. It affects the overall range within which the ~SPKVOL command operates.</p> <p>The setting is persistent until explicitly changed by a new command.</p> <table border="0"> <thead> <tr> <th>Parm</th> <th>Meaning</th> </tr> </thead> <tbody> <tr><td>0</td><td>Sets factory default gain (0 dB) (Default)</td></tr> <tr><td>1</td><td>-12 dB</td></tr> <tr><td>2</td><td>-8 dB</td></tr> <tr><td>3</td><td>-4 dB</td></tr> <tr><td>4</td><td>+4 dB</td></tr> <tr><td>5</td><td>+8 dB</td></tr> <tr><td>6</td><td>+12 dB</td></tr> </tbody> </table>	Parm	Meaning	0	Sets factory default gain (0 dB) (Default)	1	-12 dB	2	-8 dB	3	-4 dB	4	+4 dB	5	+8 dB	6	+12 dB
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<p>!AVTXVOL= <profile>, <value> !AVTXVOL? <profile> Supported modems: • MC5725V</p>	<p>Set the TX volume</p> <p>The TX volume gain determines the gain, from -84 dB to +12 dB, for the voice that is transmitted over the air. This gain is applied to the PCM voice packets prior to feeding them into the vocoder, which encodes the PCM packets into a more efficient format for over-the-air transmission.</p> <p>This setting is stored in non-volatile memory and persists across power cycles. The change to the audio system takes effect when a phone call is made or received.</p> <p>Calculate the gain in dB using the formula: Gain = 20 log₁₀ (<value> / 16384)</p> <p>In the command, <value> is in hexadecimal format. In the formula, convert <value> to decimal format.</p> <table border="0"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td><profile></td> <td></td> <td>Audio profile</td> </tr> <tr> <td></td> <td>0</td> <td>Handset</td> </tr> </tbody> </table>	Parameter	Value	Meaning	<profile>		Audio profile		0	Handset							
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Command	Description																
	<table><tr><td data-bbox="943 306 959 327">1</td><td data-bbox="1078 306 1170 327">Headset</td></tr><tr><td data-bbox="943 348 959 369">2</td><td data-bbox="1078 348 1243 369">Speaker phone</td></tr><tr><td data-bbox="943 390 959 411">3</td><td data-bbox="1078 390 1154 411">Car kit</td></tr><tr><td data-bbox="943 432 959 453">4</td><td data-bbox="1078 432 1127 453">TTY</td></tr><tr><td data-bbox="802 474 889 495"><value></td><td data-bbox="1078 474 1243 495">TX volume gain</td></tr><tr><td data-bbox="943 516 1024 537">0x0000</td><td data-bbox="1078 516 1243 579">Mute (minimum value)</td></tr><tr><td data-bbox="943 600 1024 621">0x4000</td><td data-bbox="1078 600 1187 621">Unity gain</td></tr><tr><td data-bbox="943 642 1024 663">0xFFFF</td><td data-bbox="1078 642 1243 663">Maximum value</td></tr></table>	1	Headset	2	Speaker phone	3	Car kit	4	TTY	<value>	TX volume gain	0x0000	Mute (minimum value)	0x4000	Unity gain	0xFFFF	Maximum value
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9: GPS Commands

Introduction

Position Determination Session Management (PDSM) is a GPS feature supported by some carriers/networks. The CDMA network is used to assist the modem to acquire a GPS location fix.

The set of commands supports access to the following items used for Location Processing:

- Base station (BS) information
- IP address
- Network access level
- NMEA output
- Port ID
- Privacy level
- Transportation mechanism

Note: For information on GPS support, please see the product specification for your Sierra Wireless product.

GPS summary

The reference tables are presented in alphabetical order. This format allows quick look-up of each command to verify syntax, parameters, and behaviors.

The summary in this section offers a quick description of commands to allow you to more quickly locate a desired command when the operation is known but the command is not.

Table 29: GPS commands

Command	Page	Description
!GPSBSINFO	75	Returns the base station (BS) information used for Location Processing
!GPSCLRASSIST	76	Force a cold start for GPS acquisition.
!GPSIPADDR	77	Queries or sets the IP address used when TCP/IP is the transport mechanism for Location Processing.
!GPSNETACC	77	Queries or sets the network access level for location processing

Command	Page	Description
!GPSNMEAENABLE	77	Starts or stops the NMEA stream
!GPSPORTID	78	Queries or sets the port ID to be used when TCP/IP is the transport mechanism for Location Processing
!GPSPRIV	78	Queries or sets the privacy level for location processing
!GPSPTLM	78	Queries or sets the transportation mechanism to be used for Location Processing.
\$NMEA	79	Starts or stops the NMEA stream

GPS reference

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.

Table 30: GPS command details

Command	Description
!GPSBSINFO?	<p>Returns the base station (BS) information used for Location Processing:</p> <ul style="list-style-type: none"> • Stale Indicator 0 = information is not stale 1 = information is stale • Timestamp (time that the system parameter message was received from the Base Station) • Base Station ID • System ID • Network ID • Base Station Latitude • Base Station Longitude <hr/> <p>Note: Depending on the version of the modem's firmware, access to the BS information may or may not be supported.</p> <hr/> <p>Example 1</p> <pre>AT!GPSBSINFO? Stale: 0 Time: 200603174135938</pre>

Command	Description																																						
	<p>BSID: 12 SID: 8 NID: 12</p> <p>Lat: 33 Deg 7 Min 21.34 Sec N</p> <p>Lon: 117 Deg 16 Min 32.10 Sec W</p> <p>OK</p> <p>Example 2</p> <p>at!gpsbsinfo</p> <p>Not supported</p> <p>OK</p>																																						
<p>!GPSCLRASSIST= <eph>,<alm>,<pos>,<learn>,<serv>,<time>,<throttle></p>	<p>Force a cold start for GPS acquisition.</p> <p>Clears various assistance data in the modem, which forces the cold start. Individual items of the assistance data can be specified.</p> <p>Example</p> <p>AT!GPSCLRASSIST=1,1,1,0,0,0,1</p> <p>OK</p> <table border="1" data-bbox="812 966 1421 1659"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td rowspan="2"><eph></td> <td>0</td> <td>Ignore</td> </tr> <tr> <td>1</td> <td>Clear epemeris assistance data</td> </tr> <tr> <td rowspan="2"><alm></td> <td>0</td> <td>Ignore</td> </tr> <tr> <td>1</td> <td>Clear almanac assistance data</td> </tr> <tr> <td rowspan="2"><pos></td> <td>0</td> <td>Ignore</td> </tr> <tr> <td>1</td> <td>Clear position assistance data</td> </tr> <tr> <td rowspan="2"><learn></td> <td>0</td> <td>Ignore</td> </tr> <tr> <td>1</td> <td>Clear self learning database</td> </tr> <tr> <td rowspan="2"><serv></td> <td>0</td> <td>Ignore</td> </tr> <tr> <td>1</td> <td>Clear serving system database</td> </tr> <tr> <td rowspan="2"><time></td> <td>0</td> <td>Ignore</td> </tr> <tr> <td>1</td> <td>Clear time reference</td> </tr> <tr> <td rowspan="2"><throttle></td> <td>0</td> <td>Ignore</td> </tr> <tr> <td>1</td> <td>Reset the MS-based throttle parameters</td> </tr> </tbody> </table> <p>Example (typical settings for a cold start)</p> <p>AT!GPSCLRASSIST=1,1,1,0,0,0,1</p> <p>OK</p>	Parameter	Value	Meaning	<eph>	0	Ignore	1	Clear epemeris assistance data	<alm>	0	Ignore	1	Clear almanac assistance data	<pos>	0	Ignore	1	Clear position assistance data	<learn>	0	Ignore	1	Clear self learning database	<serv>	0	Ignore	1	Clear serving system database	<time>	0	Ignore	1	Clear time reference	<throttle>	0	Ignore	1	Reset the MS-based throttle parameters
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	1	Clear time reference																																					
<throttle>	0	Ignore																																					
	1	Reset the MS-based throttle parameters																																					

Command	Description										
<p>!GPSIPADDR= <address></p> <p>!GPSIPADDR?</p>	<p>Queries or sets the IP address used when TCP/IP is the transport mechanism for Location Processing.</p> <p>Note: A successful SET operation does not guarantee that the value has been updated in NV. It indicates that the request to update the value is syntactically correct, and the request is being placed in the queue. The application that has requested the change in value should verify that the value has actually changed (in NV), by issuing a query operation of this command.</p> <p>Example</p> <pre>AT!GPSIPADDR=196.168.1.15 OK</pre>										
<p>!GPSNETACC= <access></p> <p>!GPSNETACC?</p>	<p>Queries or sets the network access level for location processing.</p> <table> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Network access only</td> </tr> <tr> <td>1</td> <td>No network access</td> </tr> <tr> <td>2</td> <td>Network access with demodulation</td> </tr> <tr> <td>3</td> <td>Network access without demodulation</td> </tr> </tbody> </table> <p>Note: A successful SET operation does not guarantee that the value has been updated in NV. It indicates that the request to update the value is syntactically correct, and the request is being placed in the queue. The application that has requested the change in value should verify that the value has actually changed (in NV), by issuing a query operation of this command.</p> <p>Example</p> <pre>AT!GPSNETACC=2 OK</pre>	Value	Meaning	0	Network access only	1	No network access	2	Network access with demodulation	3	Network access without demodulation
Value	Meaning										
0	Network access only										
1	No network access										
2	Network access with demodulation										
3	Network access without demodulation										
<p>!GPSNMEAENABLE= <nmea></p>	<p>Starts or ends the NMEA stream.</p> <p>Note: For non-Sprint devices, use this command. For Sprint devices, use \$NMEA (page 79).</p> <table> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Start the NMEA stream</td> </tr> <tr> <td>1</td> <td>End the NMEA stream</td> </tr> </tbody> </table> <p>Example</p> <pre>AT!GPSNMEAENABLE=0 OK</pre>	Value	Meaning	0	Start the NMEA stream	1	End the NMEA stream				
Value	Meaning										
0	Start the NMEA stream										
1	End the NMEA stream										

Command	Description								
<p>!GPSPORTID= <port ID></p> <p>!GPSPORTID?</p>	<p>Queries or sets the port ID to be used when TCP/IP is the transport mechanism for Location Processing.</p> <p>Note: A successful SET operation does not guarantee that the value has been updated in NV. It indicates that the request to update the value is syntactically correct, and the request is being placed in the queue. The application that has requested the change in value should verify that the value has actually changed (in NV), by issuing a query operation of this command.</p> <p>Example</p> <pre>AT!GPSPORTID=2301 OK</pre>								
<p>!GPSPRIV= <level></p> <p>!GPSPRIV?</p>	<p>Queries or sets the privacy level for location processing.</p> <table border="1" data-bbox="841 856 1062 1020"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Low</td> </tr> <tr> <td>1</td> <td>Medium</td> </tr> <tr> <td>2</td> <td>High</td> </tr> </tbody> </table> <p>Note: A successful SET operation does not guarantee that the value has been updated in NV. It indicates that the request to update the value is syntactically correct, and the request is being placed in the queue. The application that has requested the change in value should verify that the value has actually changed (in NV), by issuing a query operation of this command.</p> <p>Example</p> <pre>AT!GPSPRIV=2 OK</pre>	Value	Meaning	0	Low	1	Medium	2	High
Value	Meaning								
0	Low								
1	Medium								
2	High								
<p>!GPSPTLM= <transport mode></p> <p>!GPSPTLM?</p>	<p>Queries or sets the transportation mechanism to be used for Location Processing.</p> <table border="1" data-bbox="841 1535 1084 1652"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>TCP/IP</td> </tr> <tr> <td>1</td> <td>Data Burst</td> </tr> </tbody> </table>	Value	Meaning	0	TCP/IP	1	Data Burst		
Value	Meaning								
0	TCP/IP								
1	Data Burst								

Command	Description						
	<p>Note: A successful SET operation does not guarantee that the value has been updated in NV. It indicates that the request to update the value is syntactically correct, and the request is being placed in the queue. The application that has requested the change in value should verify that the value has actually changed (in NV), by issuing a query operation of this command.</p> <p>Example</p> <pre>AT!GPSPTLM=0 OK</pre>						
<p>\$NMEA=<arg></p> <p>\$NMEA=?</p>	<p>Starts or ends the NMEA stream.</p> <p>Note: Applies to Sprint devices. For non-Sprint devices, use !GPSNMEAENABLE (page 77).</p> <table border="0"> <thead> <tr> <th data-bbox="846 835 911 856">Value</th> <th data-bbox="967 835 1057 856">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="846 877 862 898">0</td> <td data-bbox="967 877 1211 898">Start the NMEA stream</td> </tr> <tr> <td data-bbox="846 919 862 940">1</td> <td data-bbox="967 919 1203 940">End the NMEA stream</td> </tr> </tbody> </table> <p>Example</p> <pre>AT\$NMEA=0 OK</pre>	Value	Meaning	0	Start the NMEA stream	1	End the NMEA stream
Value	Meaning						
0	Start the NMEA stream						
1	End the NMEA stream						

10: EFS Commands

Introduction

The command supports the following file operations:

- List the available space, used space and erased space in [EFS](#)
- List the file contents (in /SWIR directory, top directory, or a specified directory)
- List the directories in the modem's top directory

EFS command summary

Table 31: EFS commands

Command	Page	Description
!EFS	81	Check EFS space
!FML	81	Lists file contents of the modem's /SWIR directory.
!FMGENL	81	Lists file contents of a specified directory.
!FMGENDIRL	81	Lists the directories in the modem's top directory.

EFS reference

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.

Table 32: EFS command details

Command	Description				
!EFS?	Returns the available space, used space, and erased space in EFS .				
!FML	Lists the filename and size of each file in the modem's /SWIR directory. If the /SWIR directory is empty, OK is returned. If the /SWIR directory doesn't exist, an error is returned.				
!FMGENL? !FMGENL=<dir>	Lists the filename and size of each file in a specified directory. If the directory is not specified, then the modem's top directory is used. <table> <thead> <tr> <th>Parm</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>dir</td> <td>Name of directory</td> </tr> </tbody> </table> If the directory doesn't exist, an error is returned. <hr/> Note: <i>All filenames and directory names are case sensitive.</i> <hr/> If the directory is empty, OK is returned. Example 1 AT!FMGENL? / \$SYS.FACTORY 000000CE / .DIAGCFG 00000005 / .DIAGIN 0000018B /CLK_DB 00000040 OK Example 2 AT!FMGENL=mydir /myfile1 00000020 /myfile2 000000A1 OK	Parm	Meaning	dir	Name of directory
Parm	Meaning				
dir	Name of directory				
!FMGENDIRL?	Lists the directories in the modem's top directory. <hr/> Note: <i>All filenames and directory names are case sensitive.</i> <hr/>				

11: Appendix A: ASCII Table

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	64
ENQ	5	05	%	37	25	E	69	45	e	101	65
ACK	6	06	&	38	26	F	70	46	f	102	66
BEL	7	07	'	39	27	G	71	47	g	103	67
BS	8	08	(40	28	H	72	48	h	104	68
HT	9	09)	41	29	I	73	49	i	105	69
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

12: Appendix B: Glossary

Table 33: Acronyms and definitions

Acronym or term	Definition
CI	Client-Initiated
CIDC	Client-Initiated Device Configuration
CIFUMO	Client-Initiated Firmware Update Management Object
CIPRL	Client-Initiated PRL Update
CnS	Control and Status (language)—a proprietary protocol for managing the control and status of the modem.
DM	Device Management. See also OMA-DM
EFS	Encrypted File System
endpoint, USB	A uniquely addressable portion of a USB device used to transfer information between the host and module.
EP	See endpoint (above).
FUMO	Firmware Update Management Object
HFA	Hands Free Activation
IOTA	Internet Over The Air—an automated feature, supported by some service providers, to perform account setup for you by making a connection to the CDMA network and using a secure Internet connection to download account parameters to your modem.
MIN	Mobile Identification Number—a number that identifies a specific mobile unit within a wireless carrier's network.
MIP	Mobile IP
NAM	Number Assignment Module—a CDMA account definition that includes a phone number and other unique unit and network identifiers.
NDIS	Network Driver Interface Specification—a programming interface specification for connecting network interface cards in Windows.

Acronym or term	Definition
NI	Network-Initiated
NIA	Network-Initiated Alert
NID	Network Identification—a number that uniquely identifies a network.
NIDC	Network-Initiated Device Configuration
NIFUMO	Network-Initiated Firmware Update Management Object
NIPRL	Network-Initiated PRL Update
NV	Non-Volatile (memory)—Random Access Memory that retains its contents even if the power is removed.
OEM	Original Equipment Manufacturer—a company that manufactures a product and sells it to a reseller.
OMA-DM	Open Mobile Alliance - Device Management. A device management (DM) protocol specified by the Open Mobile Alliance (OMA) Device Management Working Group and the Data Synchronization (DS) Working Group.
PRI	Product Release Instructions—a file that contains the settings used to configure wireless products for a particular service provider, customer, or purpose.
PRL	Preferred Roaming List—an account configuration item set by the user's service provider. It controls the radio channels/network carrier used by the modem.
TTY	TeleTYpe—a device that allows people who are deaf, hard of hearing, or speech-impaired to use the telephone to communicate.

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