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Modules

# AT Command Reference Guide

## RC76xx Series

December 2025

41113566 Rev. 18

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# Sierra Wireless

Semtech Corporation acquired Sierra Wireless in January 2023. The Sierra Wireless brand is gradually being phased out. During the phase-out period, references to both "Semtech" and "Sierra Wireless" may appear in product documentation.

# Contact Information

| | |
|---|---|
| Sales information and technical support, including warranty and returns | Web: sierrawireless.com/company/contact-us/<br>Global toll-free number: 1-877-687-7795<br>6:00 am to 5:00 pm PST |
| Corporate and product information | Web: sierrawireless.com |

# Revision History

| Revision number | Release date | Changes |
|---|---|---|
| 1 | Dec 2019 | ▪ Created, internal |
| 2 | Jan 2019 | ▪ General release |

| Revision number | Release date | Changes |
|---|---|---|
| 3 | Feb 2019 | Updated Modem Status Commands<br>▪ Updated +CMUX, +KSIMDET, !MAPUART, !POWERWAKE, !SCACT, !USBCOMP<br>▪ Updated !CUSTOM customizations:<br>· Added OSAENABLE<br>· Removed HSICENABLE<br>Updated Diagnostic Commands<br>▪ Added !BCRESETTYPE<br>Updated Test Commands<br>▪ Updated !DAWSCONFIGRX<br>Updated GPS Commands<br>▪ Added !GPSMOMETHOD, !GPSNMEACONFIG<br>Updated SIM Commands<br>▪ Updated +KSIMSEL<br>Updated OMA-DM Commands<br>▪ Updated !IDSDEBUGPRINT<br>Updated SAR Backoff and Thermal Control Commands<br>▪ Added !SARGPIO<br>Updated Audio Commands<br>▪ Updated !AVCFG, !AVRXG, !AVTXG<br>▪ Removed !AVCODECMICTXG<br>Updated I/O Commands<br>▪ Added +WEXTCLK<br>▪ Updated +WIOCFG<br>Updated Protocol Commands<br>▪ Added Usage Notes<br>▪ Updated +KCNXCFG, +KCNXUP, +KHTTPCFG, +KHTTPGET, +KIPOPT, +KPATTERN, +KTCP_DATA (notification), +KTCP_SRVREQ (notification), +KTCPCFG, +KTCPCLOSE, +KTCPCNX, +KTCPRCV, +KTCPSND, +KUPD_DATA (notification), +KUDPCFG, +KUDPRCV, +KUDPSND, +KURCCFG<br>▪ Removed +KTCP_ACK (notification), +KTCPACKINFO |
| 4 | Mar 2020 | Updated Protocol Commands:<br>▪ Added +KSSLCRYPTO<br>▪ Added +KSSLCFG<br>Updated Modem Status Commands<br>▪ Updated !BAND, +CMUX, !POWERWAKE, I<br>Updated Supported GSM / WCDMA AT Commands<br>▪ +CALA |

| Revision number | Release date | Changes |
|---|---|---|
| 5 | June 2020 | Updated Protocol Commands:<br>▪ Added +KHTTPCNX<br>▪ Updated +KHTTPCFG<br>Updated Modem Status Commands:<br>▪ I<br>▪ +KCELL<br>▪ !IMAGE<br>▪ !USBCOMP<br>▪ !GNSSCONFIG<br>▪ !ENTERCND<br>▪ !PCINFO<br>▪ !PCTEMPLIMITS<br>Updated Diagnostic Commands:<br>▪ Removed !BCRESETTYPE<br>Removed OMA-DM Commands section and the following commands:<br>▪ !IDSDEBUGPRINT<br>▪ !IMSTESTMODE |
| 6 | August 2020 | Updated I/O Commands:<br>▪ Added !RIOWNER<br>Updated Protocol Commands:<br>▪ Added +KHTTPHEAD<br>Added LGU+ RASS Commands<br>Updated Modem Status Commands:<br>▪ !ANTSEL<br>▪ +KCELL<br>▪ +CMUX<br>▪ !MAPUART<br>▪ !MUXMODE<br>▪ *PSRDBS<br>▪ !SELACQ<br>▪ !USBCOMP<br>▪ !CUSTOM<br>▪ Removed !BSGPIO<br>Updated SIM Command Details:<br>▪ !UIMS<br>Updated Audio Command:<br>▪ !AVCFG<br>Updated AirVantage Device Services Command:<br>▪ +WDSI<br>Updated Test Command:<br>▪ !DALSWAVEFORM |

| Revision number | Release date | Changes |
|---|---|---|
| 7 | November 2020 | Updated Protocol Commands:<br>▪ AT+KCNXCFG<br>▪ AT+KHTTPCLOSE<br>▪ AT+KPATTERN<br>▪ AT+KHTTPCFG<br>Updated Test Commands<br>▪ AT!DALSWAVEFORM<br>Updated LGU+RASS Commands:<br>▪ AT$LGTDBGSCR<br>▪ AT@DBG<br>▪ AT$LGTRSVRDNS<br>Updated Modern Status Commands:<br>▪ AT!MUXMODE<br>▪ AT!CUSTOM<br>▪ AT!MAPUART<br>Updated Diagnostic Command:<br>▪ AT!ERR<br>Removed Modern Status Commands:<br>▪ AT!SELCIOT<br>▪ AT!SELSNR<br>▪ +WFWUPD<br>▪ +WFWUPD (notification) |
| 8 | January 2021 | Added Audio Commands:<br>▪ AT!AVAUDIOLPBK<br>▪ AT!AVEC<br>▪ AT!IIC<br>Added GNSS Commands:<br>▪ AT!GPSLBSAPN<br>Added I/O Commands:<br>▪ AT!MADC<br>▪ AT+WIOW<br>▪ AT+WIOR<br>Updated Protocol Commands:<br>▪ AT+KHTTPCFG<br>Updated GPS Commands:<br>▪ AT!GPSAUTOSTART<br>▪ AT!GPSSUPLURL<br>Updated Modem Commands:<br>▪ AT!ADC<br>Updated Audio Commands:<br>▪ AT!AVCFG |

| Revision number | Release date | Changes |
|---|---|---|
| 9 | August 2021 | Added Audio Command:<br>▪ AT!IIC<br>Added Modem Status Commands:<br>▪ AT+WFWUPD<br>▪ AT+WFWUPD (notification)<br>Added Protocol Commands:<br>▪ AT+KFTPCFG<br>▪ AT+KFTPCNX<br>▪ AT+KFTPRCV<br>▪ AT+KFTPSND<br>▪ AT+KFTPDEL<br>▪ AT+KFTP_IND Notification<br>▪ AT+KFTPCLOSE<br>▪ AT+KFTPCFGDEL<br>▪ AT+KFTPLS<br>▪ AT+KCERTDELETE<br>▪ AT+KCERTSTORE<br>▪ AT+KPRIVKDELETE<br>▪ AT+KPRIVKSTORE<br>▪ AT+KHTTPHEADER<br>▪ AT+KHTTPPOST<br>▪ AT+KURCCFG<br>▪ AT+KHTTP_IND Notification<br>Added Unsolicited Message Commands:<br>▪ AT!MUSLEN<br>Updated Protocol Commands:<br>▪ AT+KCELL<br>▪ AT+KHTTPCFG<br>▪ AT+KHTTPCNX<br>▪ AT+KHTTPGET<br>▪ AT+KHTTPHEAD<br>▪ AT+KSSLCRYPTO<br>▪ AT+KTCPSTART<br>▪ AT+KTCPRCV<br>▪ AT+KTCPSND<br>▪ AT+KUDPSND<br>▪ AT+KUDPRCV<br><br>(Continued on next page) |

| Revision number | Release date | Changes |
|---|---|---|
| **9 (cont.)** | August 2021 | Updated Test Commands:<br>▪ AT!DASCALSTATE<br>▪ AT!DALSNSVAL<br>Updated LGU+ RASS Commands:<br>▪ AT$LGTRRCV<br>▪ AT@DBG<br>▪ AT$LGTDBGSCR<br>▪ AT$LGTRQOS<br>Updated Diagnostic Command:<br>▪ AT!ERR<br>Updated SIM Commands:<br>▪ AT+KSIMSEL<br>▪ AT!UIMS<br>Updated Modem Status Commands:<br>▪ AT!MUXMODE<br>▪ AT!CUSTOM<br>▪ AT!MAPUART<br>Updated Audio Commands:<br>▪ AT!AVAUDIOLPBK<br>▪ AT!AVCFG<br>▪ AT!AVEC<br>Updated I/O Commands:<br>▪ AT+WIOR<br>▪ AT!MADC<br>▪ AT+WIOW<br>▪ AT+WWAKESET<br>Updated GPS Commands:<br>▪ AT!GPSSUPLURL<br>▪ AT!GPSLBSAPN<br>▪ AT!GPSAUTOSTART<br>▪ AT!GPSFIX<br>Updated AirVantage Command:<br>▪ AT+WDSS<br>Updated AT Password Command:<br>▪ !SETCND |

| Revision number | Release date | Changes |
|---|---|---|
| 10 | November 2022 | Added Modem Status, Customization, and Reset Commands:<br>▪ +CEDRXRDP<br>▪ +CEDRXS<br>▪ +CMEC<br>▪ !USERAGENT<br>Updated Modem Status, Customization, and Reset Commands:<br>▪ !CUSTOM: WAKEHOSTEN, SMSWAKE, SMSWAKEWIDTH, GPSSEL, ICMPINTSRVDIS, removed IPV6ENABLE<br>▪ !ADC<br>▪ +CGACT<br>Updated GNSS Commands:<br>▪ !GPSAUTOSTART<br>▪ !GPSNMEASENTENCE<br>▪ !GPSTRACK<br>Added SIM Commands:<br>▪ +CCHC<br>▪ +CCHO<br>▪ +CGLA<br>▪ +CPINR<br>Added Audio Commands:<br>▪ +VTD<br>Updated SIM Commands:<br>▪ +KSIMSEL<br>Updated Supported GSM/WCDMA AT Commands:<br>▪ +CBC<br>▪ +CFUN<br>Updated Protocol Commands:<br>▪ +KCERTDELETE<br>▪ +KCERTSTORE<br>▪ +KHTTP_IND<br>Updated Protocol Commands:<br>▪ !MADC<br>Added ASCII Tables:<br>▪ Table A-2<br>▪ Table A-3 |
| 11 | April 2023 | Updated LGU+ RASS Commands:<br>▪ @DBG—Execution response, <Status (Service/EMM)> (EMM Status), <EMM Sub State>, <RRC State><br>▪ $LGTDBGSCR—Execution response, <EMM>, <EMMState> |

| Revision number | Release date | Changes |
|---|---|---|
| 12 | November 2023 | Updated LGU+ RASS Commands:<br>▪ @DBG—Execution response, <Status (Service/EMM)><br>Updated Modem Status, Customization, and Reset Commands:<br>▪ !PCINFO—Added AVMS<br>▪ !MAPUART—Updated <services><br>▪ !CUSTOM—Updated USBSERIALENABLE, removed note under WAKEHOSTEN<br>▪ +KSREP—Updated bitmask for WDDI<br>▪ +KSREP—Updated WDDI notification<br>Updated GNSS Commands:<br>▪ !GPSNMEACONFIG—Added note for <output_rate> parameter<br>Updated Supported GSM / WCDMA AT Commands<br>▪ Added support for Automatic Time Zone Update<br>▪ Added valid values for +CFUN<br>Updated ASCII Table:<br>▪ Added timeout for !GNSSCONFIG<br>Updated AirVantage Commands<br>▪ +WDSI—Updated (<Event>=11) download failure reason<br>Updated Memory Management Commands:<br>▪ !RMARESET—Updated <level><br>Updated Protocol Commands:<br>▪ Added How to Wake the WAKE_ON_WWAN pin by Detecting TCP/UDP URC<br>Updated SIM Commands:<br>▪ +KSIMSEL—Added <sim_mode>, updated purpose of AT+KSIMSEL=<sim_mode><br>Updated Test Commands:<br>▪ !DALSTXPWR—Updated note<br>Added Audio Commands:<br>▪ +WDDM<br>▪ +WDDI (notification)<br>Added AirVantage Command<br>▪ +WDSTPF |
| 13 | December 2023 | Added Modem Status, Customization, and Reset Command<br>▪ +CVMOD |

| Revision number | Release date | Changes |
|---|---|---|
| **14** | July 2024 | Updated to Semtech template<br>Added Appendix section<br>Updated Modem Status Commands:<br>▪ !POWERWAKE<br>Updated Protocol Commands:<br>▪ AT+KFTPCFG<br>▪ AT+KPRIVKSTORE<br>▪ AT+KTCPRCV<br>▪ AT+KURCCFG<br>Updated SAR Backoff Commands:<br>▪ AT!MAXPWR<br>Updated Modem Status Commands:<br>▪ AT!CUSTOM<br>▪ AT+CEDRXS |
| **15** | December 2024 | Updated Supported 27.007 AT Commands<br>▪ +CTZR<br>Updated Protocol AT Commands<br>▪ +KUDPCFG<br>Updated AirVantage Commands<br>▪ +WDSTPF<br>Added MQTT AT Commands |
| **16** | February 2025 | Updated Modem Status, Customization, and Reset Commands<br>▪ +KCELL<br>▪ I<br>Added Modem Status, Customization, and Reset Command<br>▪ +WESHDOWN |
| **17** | July 2025 | Updated Protocol Commands<br>▪ +KCNXCFG<br>Updated Modem Status, Customization, and Reset Commands<br>▪ !NVBACKUP<br>Added Modem Status, Customization, and Reset Commands<br>▪ !ECMENABLE |
| **18** | December 2025 | Added Modem Status, Customization, and Reset Commands<br>▪ AT!IIDIPV6 |

# 1: About This Guide

## 1.1 Introduction

This document describes supported standard and proprietary AT commands available for Semtech RC76xx products, and provides details where commands vary from the standards.

These commands are intended for use by OEMs, and are supplemental to the standard AT commands for GSM devices defined by the 3GPP (3rd Generation Partnership Project) in *TS 27.007 AT command set for User Equipment (UE)* and *TS 27.005 Use of Data Terminal Equipment — Data Circuit terminating Equipment (DTE-DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (BSE)*.

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

## 1.2 Command Access

Some commands in this reference are password-protected. To use these commands, enter the correct password using AT!ENTERCND on page 20. Once the password is entered, all commands are available and remain available until the modem is reset or powered off and on.

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

## 1.3 Command Timing

### 1.3.1 Interval Timing

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

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

### 1.3.2 Escape Sequence Guard Time

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

## 1.4 Result Codes

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

## 1.5 Response Formats

Response formats shown in this document are intended to accurately describe the non-whitespace content of responses. For display purposes within this document, extraneous whitespace content (blank lines between lines of text) may not be displayed, and whitespace (blank spaces) between text segments within lines may be shorter or longer than what is received in actual responses.

For example:

```
AT!THISEXAMPLE?

THISEXAMPLE:

TestVal1=7          TestVal2=Hello

OK
```

could be shown in this document without extra blank lines and with less space between TestVal1 and TestVal2

```
AT!THISEXAMPLE?

THISEXAMPLE:
TestVal1=7   TestVa2=Hello
OK
```

If automated scripts are used to parse command responses, make sure to parse whitespace appropriately.

## 1.6 References

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

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

## 1.7 Terminology and Acronyms

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

## 1.8 Current Firmware Versions

### 1.8.1 Version

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

### 1.8.2 Upgrading

To check for newer modem firmware, go to the device page at source.sierrawireless.com and select the Firmware option.

## 1.9 Document Structure

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

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

SIM Toolkit Commands — Commands and notifications used to enable the AT Interface's SIM toolkit support, and receive and respond to unsolicited SIM command notifications.

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

Diagnostic Commands — Commands used to select frequency bands and diagnose problems.

Test Commands — Commands required to place the modem in particular modes of operation, test host connectivity, and to configure the transmitters and receivers for test measurements.

Memory Management Commands — Commands that control the data stored in non-volatile memory of the modem.

GNSS Commands — Supported on GPS-enabled modems only.

SIM Commands — Commands used to communicate with an installed SIM.

SD Commands — Commands used to communicate with an installed SD card.

SAR Backoff Commands — Commands used to configure SAR options.

Audio Commands — Commands used to configure and manage audio-capable devices.

I/O Commands — Commands used to configure and manage GPIOs, ADCs and other IOs.

AirVantage Commands — Commands used to work with AirVantage.

Protocol Commands — Internet Protocol-related Commands.

LGU+ RASS Commands —Commands that are applicable to LGU+ RASS services only.

Unsolicited Message Commands—Commands that are related to USL.

MQTT Commands—Commands that are related to MQTT.

Supported GSM/WCDMA AT Commands—Commands that are supported by most Sierra Wireless devices.

Band Definitions—Commands include input and/or output 'band' parameters, where the value is an enumerated value representing a network technology and band or a 3GPP band number.

Appendix

## 1.10 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.

The leading "**AT**" characters are not shown but must be included before all commands except as noted in the reference tables.

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

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

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

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

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

# 2: AT Password Commands

## 2.1 Introduction

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

## 2.2 Command Summary

Table 2-1 on page 20 lists the commands described in this chapter.

**Table 2-1: AT Password Commands**

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

## 2.3 Command Reference

**Table 2-2: AT Password Command Details**

| Command | Description |
|---|---|
| **!ENTERCND** | **Enable access to password-protected commands**<br>Before any password-protected AT commands can be used, !ENTERCND must be used to enter the password to gain access. The initial password is configured onto the modem during manufacture. You can change the password using !SETCND. If you do not know the password, contact your Semtech account manager.<br>Once the password has been entered correctly, the password-protected AT commands are available until the modem is reset or powered off and on.<br>**Password required:** Yes — Query format only.<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** No<br>**Usage:**<br>▪ Execution: **AT!ENTERCND=<"key">**<br>Response: OK<br>Purpose: Unlock password-protected commands.<br>**Parameters:**<br><"key"> (Password stored in NV memory)<br>· Password must be entered with quotation marks. (For example, AT!ENTERCND="ExamplePW".)<br>· Length: 4–15 characters<br>· Supported characters: '0'–'9', 'A'–'Z', 'a'–'z', special characters (e.g. "!#$%&'()*+,-./:<>=?@"<br>Note: Double quotes (") are not allowed.<br>· Characters may be entered in ASCII format, or in Hex format. (For example: "myPass3" or "ABCDEF01234".) |

**Table 2-2: AT Password Command Details (Continued)**

| Command | Description |
|---|---|
| **!SETCND** | **Set AT command password**<br>Change the password used for the !ENTERCND command. (Before you can change the password using **!SETCND**, you must enable access to this command using **!ENTERCND**.)<br>**Password required:** Yes (see !ENTERCND for details)<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br>**Usage:**<br>▪ Execution: **AT!SETCND=<"key">**<br>Response: OK<br>Purpose: Sets <"Key"> as the new password for accessing protected commands.<br>**Parameters:**<br><"key"> (New password)<br>• Password must be entered with quotation marks (for example, AT!SETCND="NewPW").<br>• Length: 8–64 characters<br>• Supported characters: '0'–'9', 'A'–'Z', 'a'–'z', special characters (e.g. "!#$%&'()*+,-./ :<>=?@"<br>Note: Double quotes (") are not allowed.<br>• Characters may be entered in ASCII format, or in Hex format. (For example: "myPass3" or "ABCDEF01234".)<br>**Warning:** *Do NOT enter a null password (that is, the <"Key"> cannot be "") — you will NOT be able to use password-protected commands, and will have to contact Semtech for help to reset the password.* |

# 3: SIM Toolkit Commands

## 3.1 Introduction

This chapter describes commands and notifications used to enable the AT Interface's SIM toolkit support, and receive and respond to unsolicited SIM command notifications.

*Note: SIM toolkit commands are available only if the feature is enabled via AT!CUSTOM='STKUIEN',2).*

## 3.2 Command Summary

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

**Table 3-1: SIM Toolkit Commands**

| Command | Description | Page |
|---|---|---|
| ***PSSTKI** | Configure AT interface's SIM toolkit support | 23 |
| **!STKC** | Report last unsolicited proactive SIM command notification | 24 |
| **!STKC (notification)** | Unsolicited proactive SIM command notification | 25 |
| **!STKCR** | Respond to proactive SIM command | 26 |
| **!STKGC** | Get (retrieve) data for last unsolicited proactive SIM command notification | 31 |
| **!STKMS** | Inform SIM of menu item selection or provide help information | 43 |
| **!STKN (notification)** | Response to mobile-originated Call or SMS control request (notification) | 44 |
| **!STKPD** | Select host-supported STK features | 46 |

# 3.3 Command Reference

**Table 3-2: SIM Toolkit Command Details**

| Command | Description |
|---|---|
| ***PSSTKI** | **Configure AT interface's SIM toolkit support**<br>Configure the AT interface's support (interaction method with terminal equipment (TE)) for SIM Toolkit.<br>**Password required:** No<br>Reset required to apply changes: No<br>Persistent across power cycles: Yes<br><br>**Usage:**<br>▪ Execution: **AT*PSSTKI=<mode>**<br>Response: OK<br>Purpose: Configure the AT interface's STK support to the specified <mode>.<br>▪ Query: **AT*PSSTKI?**<br>Response: *PSSTKI: <mode><br>OK<br>Purpose: Display the AT interface's current <mode> for STK support.<br>▪ Query List: **AT*PSSTKI=?**<br>Purpose: Return the execution command format. See the parameter descriptions below for details.<br>**Parameters:**<br><mode> (AT interface's STK support mode)<br>· 0 — STK not supported. Module does not send unsolicited result codes to TE, and TE does not send STK AT command to module.<br>· 1 — Manual mode. Module sends URCs to TE, and TE must acknowledge proactive command notification to continue<br>· 2 — Auto-acknowledge mode. Module responds to STK without TE. Any URCs are sent to TE.<br>· 3 (Default) — Auto-acknowledge mode. Module responds without sending URC to the TE.<br>· NOTE: Modes 2 and 3 are used only for the following STK proactive commands that require user interaction:<br>· Commands that require Yes/No responses:<br>▪ SEND SMS<br>▪ SEND SS<br>▪ SEND USSD<br>▪ SEND DTMF<br>▪ SET UP CALL<br>▪ SET UP MENU<br>· Commands that require MMI (man-machine interaction) and Yes/No responses when complete:<br>▪ SET UP IDLE MODE TEXT<br>▪ DISPLAY TEXT<br>· For BIP (Bearer Independent Protocol) feature:<br>▪ OPEN CHANNEL |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKC** | **Report last unsolicited proactive SIM command notification**<br>Display the most recent unsolicited proactive SIM command notification (!STKC on page 25).<br>All notifications (except where <cmdId> is "01" or "81") require a response to be sent using AT!STKCR on page 26.<br>**Password required:** No<br><br>**Usage:**<br>▪ Query: **AT!STKC?**<br>Response: [Outstanding Proactive Command: <cmdId>]<br>OK<br>Purpose: Display the most recent unsolicited !STKC notification. If none, return only "OK".<br>**Parameters:**<br><cmdId> (Unique ID of proactive SIM command)<br>• Note: This is the full set of supported <cmdID> types.<br>• Hexadecimal ID as ASCII string (without quotation marks):<br>• "01" — Refresh<br>• "05" — Set Up Event List<br>• "10" — Set Up Call<br>• "11" — Send SS<br>• "12" — Send USSD<br>• "13" — Send SMS<br>• "14" — Send DTMF<br>• "15" — Launch Browser<br>• "20" — Play Tone<br>• "21" — Display Text<br>• "22" — Get Inkey<br>• "23" — Get Input<br>• "24" — Select Item<br>• "25" — Set Up Menu<br>• "28" — Set Up Idle Mode Text<br>• "35" — Language Notification<br>• "40" — Open Channel<br>• "81" — End of proactive session |

Table 3-2: SIM Toolkit Command Details (Continued)

| Command | Description |
|---|---|
| **!STKC** | **Unsolicited proactive SIM command notification**<br>Unsolicited notification indicating a proactive SIM command has been received.<br>All notifications (except where <cmdId> is "01" or "81") require a response to be sent using AT!STKCR on page 26.<br><br>**Notification format:**<br>**+STKC: <cmdId>**<br>**Parameters:**<br><cmdId> (Unique ID of proactive SIM command)<br>• Note: This is the full set of supported <cmdID> types.<br>• Hexadecimal ID as ASCII string (without quotation marks):<br>• "01" — Refresh<br>• "05" — Set Up Event List<br>• "10" — Set Up Call<br>• "11" — Send SS<br>• "12" — Send USSD<br>• "13" — Send SMS<br>• "14" — Send DTMF<br>• "15" — Launch Browser<br>• "20" — Play Tone<br>• "21" — Display Text<br>• "22" — Get Inkey<br>• "23" — Get Input<br>• "24" — Select Item<br>• "25" — Set Up Menu<br>• "28" — Set Up Idle Mode Text<br>• "35" — Language Notification<br>• "40" — Open Channel<br>• "81" — End of proactive session |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKCR** | **Respond to proactive SIM command**<br>Respond to the last unsolicited proactive SIM command. This command must be issued before the next unsolicited command is received, otherwise an error will be returned.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!STKCR=<cmdId>,<result>[,<data>]**<br>Response: OK<br>*or*<br>ERROR<br>Purpose: Respond to the last received unsolicited proactive SIM command. If the <cmdId> is different than the last received command, ERROR is returned.<br>▪ Query List: **AT!STKCR=?**<br>Purpose: Return the execution command format. See the parameter descriptions below for details.<br>**Parameters:**<br><cmdId> (Unique ID of proactive SIM command being responded to)<br>▪ Note: !STKCR is not used to respond to the following <cmdID> values: '81'.<br>▪ Hexadecimal ID as ASCII string (without quotation marks):<br>▪ "05" — Set Up Event List (Note: This triggers the event identified in the response and sends the corresponding ENVELOPE command to the UICC. Once the envelope is sent successfully, the event is removed from the event list, per 3GPP TS 31.111.)<br>▪ "10" — Set Up Call<br>▪ "11" — Send SS<br>▪ "12" — Send USSD<br>▪ "13" — Send SMS<br>▪ "14" — Send DTMF<br>▪ "15" — Launch Browser<br>▪ "20" — Play Tone<br>▪ "21" — Display Text<br>▪ "22" — Get Inkey<br>▪ "23" — Get Input<br>▪ "24" — Select Item<br>▪ "25" — Set Up Menu<br>▪ "28" — Set Up Idle Mode Text<br>▪ "35" — Language Notification<br>▪ "40" — Open Channel |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKCR** | **Respond to proactive SIM command**<br><result>[,<data>] (Response being sent for the specified <cmdId>)<br>• Note: The <data> portion of the response format is unique for each <cmdID>. For example, <cmdId = "05"> returns <event> as the <data> portion, and <cmdID = "22"> returns <DCS>,<text> as the <data> portion.<br>• The response format depends on the <cmdId> type:<br>• If <cmdId>="05" (Set Up Event List), then response format is:<br><result>,<event><br>▪ <result> (Command result being returned)<br>▪ 0 — No meaning, 0 always returned as <result> value<br>▪ <event> (Supported Events list)<br>▪ 4 — User activity<br>▪ 5 — Idle Screen available<br>▪ Note: This is to trigger the <event> and send the corresponding ENVELOPE command to the UICC. Once the envelope is sent successfully, the event will be removed from the event list (per 3GPP TS 31.111).<br>• If <cmdId>="10" (Set Up Call), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Command performed successfully<br>▪ 1 — Command beyond ME's capabilities<br>▪ 2 — Currently busy on call<br>▪ 3 — Currently busy with SS transaction<br>▪ 4 — Terminated by user<br>▪ 5 — SS returned Result Error Code<br>▪ 6 — Network currently unable to process command<br>▪ 7 — Call setup not accepted<br>▪ 8 — User cleared down call before connection or network release<br>▪ 9 — Command performed successfully, but requested icon could not be displayed<br>• If <cmdId>="11" (Send SS), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Command performed successfully<br>▪ 1 — Command beyond ME's capabilities<br>▪ 2 — Currently busy with USSD transaction<br>▪ 3 — Currently busy with SS transaction<br>▪ 4 — Terminated by user<br>▪ 5 — SS returned Result Error Code<br>▪ 6 — Network currently unable to process command<br>▪ 7 — Command performed successfully, but requested icon could not be displayed |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKCR** | **Respond to proactive SIM command**<br>• If <cmdId>="12" (Send USSD), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Command performed successfully<br>▪ 1 — Command beyond ME's capabilities<br>▪ 2 — Currently busy with USSD transaction<br>▪ 3 — Currently busy with SS transaction<br>▪ 4 — Terminated by user<br>▪ 5 — USSD returned Result Error Code<br>▪ 6 — Network currently unable to process command<br>▪ 7 — Command performed successfully, but requested icon could not be displayed<br>• If <cmdId>="13" (Send Short Message), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Command performed successfully<br>▪ 1 — Command beyond ME's capabilities<br>▪ 2 — SMS RP error<br>• If <cmdId>="14" (Send DTMF), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Command performed successfully<br>▪ 1 — Command beyond ME's capabilities<br>▪ 2 — Not in speech call<br>▪ 3 — Terminate proactive session<br>▪ 4 — Command performed successfully, but requested icon could not be displayed<br>• If <cmdId>="15" (Launch Browser), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Command performed successfully<br>▪ 1 — Command performed – partial completion<br>▪ 2 — Command performed – missing information<br>▪ 3 — Error – no specific cause given<br>▪ 4 — Bearer unavailable<br>▪ 5 — Browser unavailable<br>▪ 6 — ME cannot process command<br>▪ 7 — Network cannot process command<br>▪ 8 — Command beyond ME's capabilities<br>• If <cmdId>="20" (Play Tone), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Command performed successfully<br>▪ 1 — Terminate proactive session<br>▪ 2 — Specified tone not supported |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKCR** | **Respond to proactive SIM command**<br>• If <cmdId>="21" (Display Text), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Message displayed OK<br>▪ 1 — Terminate proactive session<br>▪ 2 — Screen is busy<br>▪ 3 — Backward move requested<br>▪ 4 — No response from user<br>• If <cmdId>="22" (Get Inkey), then response format is:<br><result>[,<DCS>,<text>]<br>▪ <result> (Command result being returned)<br>▪ 0 — Data entered OK<br>▪ 1 — Terminate proactive session<br>▪ 2 — Help information requested<br>▪ 3 — Backward move requested<br>▪ 4 — No response from user<br>▪ Note: <DCS> and <text> are sent only for <result>=0 (The SIM expects input to be in a Text String Data Object in the Terminal Response SIM command when data has been input.)<br>▪ <DCS> (Data coding scheme for <text>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <text> (Text string, in <DCS> format)<br>▪ Hex string<br>▪ For Yes/No responses, use the following hex strings:<br>00 — Negative response entered<br>01 — Positive response entered<br>• If <cmdId>="23" (Get Input), then response format is:<br><result>[,<DCS>,<text>]<br>▪ <result> (Command result being returned)<br>▪ 0 — Data entered OK<br>▪ 1 — Terminate proactive session<br>▪ 2 — Help information requested<br>▪ 3 — Backward move requested<br>▪ 4 — No response from user<br>▪ Note: <DCS> and <text> are sent only for <result>=0 (The SIM expects input to be in a Text String Data Object in the Terminal Response SIM command when data has been input.)<br>▪ <DCS> (Data coding scheme for <text>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <text> (Text string, in <DCS> format)<br>▪ Hex string<br>▪ If the string is empty (e.g. the user makes an 'empty' input), either leave the parameter blank or send a null test string (""). |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKCR** | **Respond to proactive SIM command**<br>• If <cmdId>="24" (Select Item), then response format is:<br><result>[,<itemId>]<br>▪ <result> (Command result being returned)<br>▪ 0 — Item selected OK<br>▪ 1 — Terminate proactive session<br>▪ 2 — Help information requested<br>▪ 3 — Backward move requested<br>▪ 4 — No response from user<br>▪ <itemId> (Identifier of menu item selected)<br>▪ Integer value<br>▪ Applies to <result> types 0 and 2<br>• If <cmdId>="25" (Set Up Menu), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Menu successfully added/removed<br>▪ 1 — Problem with menu operation<br>• If <cmdId>="28" (Set Up Idle Mode Text), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Text successfully added/removed<br>▪ 1 — Problem performing command<br>• If <cmdId>="35" (Language Notification), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Command performed successfully<br>• If <cmdId>="40" (Open Channel), then response format is:<br><result><br>▪ <result> (Command result being returned)<br>▪ 0 — Command performed successfully<br>▪ 1 — User did not accept the proactive command |

Table 3-2: SIM Toolkit Command Details (Continued)

| Command | Description |
|---|---|
| **!STKGC** | **Get (retrieve) data for last unsolicited proactive SIM command notification**<br>Get the data associated with the most recent unsolicited proactive SIM command. This command must be issued before the next unsolicited command is received, otherwise the data will not be accessible.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!STKGC=<cmdId>**<br>Response: !STKGC: <cmdId>[,<data>]<br>OK<br>*or*<br>ERROR<br>Purpose: Get the data associated with the last received unsolicited proactive SIM command. If the <cmdId> is different than the last received command, ERROR is returned.<br>▪ Query List: **AT!STKGC=?**<br>Purpose: Return the execution command format. See the parameter descriptions below for details.<br>**Parameters:**<br><cmdId> (Unique ID of proactive SIM command for which data is to be retrieved)<br>▪ Note: !STKGC is not used to respond to the following <cmdID> values: '01', '81'.<br>▪ Hexadecimal ID as ASCII string (without quotation marks):<br>▪ "05" — Set Up List<br>▪ "10" — Set Up Call<br>▪ "11" — Send SS<br>▪ "12" — Send USSD<br>▪ "13" — Send SMS<br>▪ "14" — Send DTMF<br>▪ "15" — Launch Browser<br>▪ "20" — Play Tone<br>▪ "21" — Display Text<br>▪ "22" — Get Inkey<br>▪ "23" — Get Input<br>▪ "24" — Select Item<br>▪ "25" — Set Up Menu<br>▪ "28" — Set Up Idle Mode Text<br>▪ "35" — Language Notification<br>▪ "40" — Open Channel |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKGC** | **Get (retrieve) data for last unsolicited proactive SIM command notification**<br><data> (Data retrieved for the specified <cmdId>)<br>• The format of the received <data> depends on the <cmdId> type:<br>• If <cmdId>="05" (Set Up Event List), then <data> format is a string containing all supported event types:<br><event><event><br>▪ <event> (Event types, to be monitored by the host)<br>▪ 04 — User activity<br>▪ 05 — Idle screen available<br>• If <cmdId>="10" (Set Up Call), then <data> format is:<br><method>, <TON>, <NPI>, <address>, <subaddress>, <ccp>, <DCS1>, <alphaId1>, <iconId1>, <dispMode1>, <DCS2>, <alphaId2>, <iconId2>, <dispMode2>, <redial>, <timeout><br>▪ <method> (Call setup method)<br>▪ 0 — Only if there are no other calls<br>▪ 1 — Put all other calls on hold<br>▪ 2 — Disconnect all other calls<br>▪ <TON> (Type of number)<br>▪ 0 — Unknown<br>▪ 1 — International<br>▪ 2 — National<br>▪ 3 — Network-specific<br>▪ <NPI> (Numbering Plan Identifier)<br>▪ 0 — Unknown<br>▪ 1 — ISDN Telephony<br>▪ 3 — Data<br>▪ 4 — Telex<br>▪ 9 — Private<br>▪ <address> (Dialing address)<br>▪ Hex string<br>▪ <subaddress> (Dialing sub-address)<br>▪ Hex string<br>▪ <ccp> (Capability configuration parameters)<br>▪ Hex string<br>▪ <DCS1> (Data coding scheme for <alphaID1>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <alphaId1> (Alpha identifier for user confirmation><br>▪ Hex string<br>▪ <iconId1> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKGC** | **Get (retrieve) data for last unsolicited proactive SIM command notification**<br>▪ <dispMode1> (Icon image usage)<br>▪ 0 — Display icon only (replaces <alphaId1>)<br>▪ 1 — Display with <alphaId1><br>▪ <DCS2> (Data coding scheme for <alphaId2>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <alphaId2> (Alpha identifier for call setup display><br>▪ Hex string<br>▪ <iconId2> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode2> (Icon image usage)<br>▪ 0 — Display icon only (replaces <alphaId2>)<br>▪ 1 — Display with <alphaId2><br>▪ <redial> (Redial flag)<br>▪ 0 — Redial not required<br>▪ 1 — Redial required<br>▪ <timeout> (Timeout period, in ms)<br>▪ Integer<br>▪ 0 — No timeout<br>▪ 100–15300000 — Timeout ranging from 0.1 second to 255 minutes<br>• If <cmdId>="11" (Send SS), then <data> format is:<br><TON>, <NPI>, <address>, <DCS>, <alphaId>, <iconId>, <dispMode><br>▪ <TON> (Type of number)<br>▪ 0 — Unknown<br>▪ 1 — International<br>▪ 2 — National<br>▪ 3 — Network-specific<br>▪ <NPI> (Numbering Plan Identifier)<br>▪ 0 — Unknown<br>▪ 1 — ISDN Telephony<br>▪ 3 — Data<br>▪ 4 — Telex<br>▪ 9 — Private<br>▪ <address> (Dialing address)<br>▪ Hex string<br>▪ <DCS> (Data coding scheme for <alphaId>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <alphaId> (Alpha identifier for user confirmation><br>▪ Hex string<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKGC** | **Get (retrieve) data for last unsolicited proactive SIM command notification**<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces <alphaId>)<br>▪ 1 — Display with <alphaId><br>· If <cmdId>="12" (Send USSD), then <data> format is:<br><DCS1>, <ussd>, <DCS2>, <alphaId>, <iconId>, <dispMode><br>▪ <DCS1> (Data coding scheme for <ussd>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <ussd> (USSD string>)<br>▪ Hex string<br>▪ <DCS2> (Data coding scheme for <alphaId>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <alphaId> (Alpha identifier for user confirmation>)<br>▪ Hex string<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces <alphaId>)<br>▪ 1 — Display with <alphaId><br>· If <cmdId>="13" (Send Short Message), then <data> format is:<br><pack>, <tpdu>, <TON>, <NPI>, <address>, <DCS>, <alphaId>, <iconId>, <dispMode><br>▪ <pack> (Packing flag)<br>▪ 0 — Packing not required<br>▪ 1 — Packing required<br>▪ <tpdu> (TPDU string>)<br>▪ Hex string<br>▪ <TON> (Type of number)<br>▪ 0 — Unknown<br>▪ 1 — International<br>▪ 2 — National<br>▪ 3 — Network-specific<br>▪ <NPI> (Numbering Plan Identifier)<br>▪ 0 — Unknown<br>▪ 1 — ISDN Telephony<br>▪ 3 — Data<br>▪ 4 — Telex<br>▪ 9 — Private<br>▪ <address> (Destination address)<br>▪ Hex string |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKGC** | **Get (retrieve) data for last unsolicited proactive SIM command notification**<br>▪ <DCS> (Data coding scheme for <alphaId>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <alphaId> (Alpha identifier for user confirmation>)<br>▪ Hex string<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces <alphaId>)<br>▪ 1 — Display with <alphaId><br>· If <cmdId>="14" (Send DTMF), then <data> format is:<br><dtmf>, <DCS>, <alphaId>, <iconId>, <dispMode><br>▪ <dtmf> (DTMF string)<br>▪ Hex string<br>▪ <DCS> (Data coding scheme for <alphaId>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <alphaId> (Alpha identifier for user confirmation>)<br>▪ Hex string<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces <alphaId>)<br>▪ 1 — Display with <alphaId><br>· If <cmdId>="15" (Launch Browser), then <data> format is:<br><comQual>, <url>, <browserId>, <bearer>, <DCS1>, <gateway>, <DCS2>, <alphaId>, <iconId>, <dispMode>, <numFiles>[, <provFiles>, [...]]<br>▪ <comQual> (Command qualifier)<br>▪ 0 — Launch browser if not already launched<br>▪ 2 — Use existing browser<br>▪ 3 — Close existing browser and launch new browser<br>▪ <url> (URL to connect to in browser>)<br>▪ Format: 8-bit data using GSM default 7-bit alphabet<br>▪ Special case: If <url>="" (Null string), use the default URL.<br>▪ <browserId> (Browser ID to use>)<br>▪ "00" — Use default browser |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKGC** | **Get (retrieve) data for last unsolicited proactive SIM command notification**<br>▪ <bearer> (Allowed bearers><br>▪ List of allowed bearers in priority order<br>▪ "00" — SMS<br>▪ "01" — CSD<br>▪ "02" — USSD<br>▪ "03" — GPRS<br>▪ Example: 01030200 (CSD, GPRS, USSD, SMS)<br>▪ <DCS1> (Data coding scheme for <gateway>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <gateway> (Gateway address><br>▪ Hex string<br>▪ <DCS2> (Data coding scheme for <alphaId>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <alphaId> (Alpha identifier for user confirmation><br>▪ Hex string<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces <alphaId>)<br>▪ 1 — Display with <alphaId><br>▪ <numFiles> (Number of <provFiles> following this parameter)<br>▪ Integer<br>▪ <provFile> (Provisioning File reference><br>▪ 0 or more provisioning file pathnames, separated by commas<br>▪ Full pathnames are provided<br>▪ If <cmdId>="20" (Play Tone), then <data> format is:<br><DCS>, <alphaId>, <tone>, <duration><br>▪ <DCS> (Data coding scheme for <alphaId>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <alphaId> (Alpha identifier for user confirmation><br>▪ Hex string |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKGC** | **Get (retrieve) data for last unsolicited proactive SIM command notification**<br>▪ <tone> (Requested SST (Standard Supervisory Tone) or MPT (ME Proprietary Tone) type)<br>▪ Hex value<br>▪ 01 — Dial (SST)<br>▪ 02 — Called subscriber busy (SST)<br>▪ 03 — Congestion (SST)<br>▪ 04 — Radio path acknowledge (SST)<br>▪ 05 — Radio path not available / Call dropped (SST)<br>▪ 06 — Error / Special information (SST)<br>▪ 07 — Call waiting (SST)<br>▪ 08 — Ringing tone (SST)<br>▪ 10 — General beep (MPT)<br>▪ 11 — Positive ack (MPT)<br>▪ 12 — Negative ack or Error (MPT)<br>▪ If no tone is specified, default to General beep.<br>▪ <duration> (Tone duration, in ms><br>▪ Integer<br>▪ 0 — Use the ME default value<br>▪ 100–15300000 — Duration ranging from 0.1 second to 255 minutes<br>▪ If <cmdId>="21" (Display Text), then <data> format is:<br><DCS>, <text>, <priority>, <clear>, <iconId>, <dispMode>, <response><br>▪ <DCS> (Data coding scheme for <text>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <text> (Text string in <DCS> format)<br>▪ Hex string<br>▪ <priority> (Display priority information)<br>▪ 0 — Do not display information<br>▪ 1 — Display information<br>▪ <clear> (Allow message to be cleared)<br>▪ 0 — Clear message automatically after a delay<br>▪ 1 — Allow user to clear message<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces <text>)<br>▪ 1 — Display with <text><br>▪ <response> (Response requirement)<br>▪ 0 — Normal response expected<br>▪ 1 — Immediate response expected |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKGC** | **Get (retrieve) data for last unsolicited proactive SIM command notification**<br>• If <cmdId>="22" (Get Inkey), then <data> format is:<br><DCS>, <text>, <response>, <helpInfo>, <iconId>, <dispMode><br>▪ <DCS> (Data coding scheme for <text>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <text> (Text string in <DCS> format)<br>▪ Hex string<br>▪ <response> (Expected response character format><br>▪ 0 — SMS default alphabet<br>▪ 1 — Yes/No response only<br>▪ 2 — Digits (0–9, *, #, +) only<br>▪ 3 — UCS2 alphabet<br>▪ <helpInfo> (Help information availability><br>▪ 0 — Not available<br>▪ 1 — Available<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces <text>)<br>▪ 1 — Display with <text><br>• If <cmdId>="23" (Get Input), then <data> format is:<br><DCS1>, <text>, <response>, <echo>, <helpInfo>, <minLgth>, <maxLgth>, <DCS2>, <default>, <iconId>, <dispMode><br>▪ <DCS1> (Data coding scheme for <text>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <text> (Text string in <DCS1> format)<br>▪ Hex string<br>▪ <response> (Expected response character format)<br>▪ 0 — SMS default alphabet<br>▪ 1 — Yes/No response only<br>▪ 2 — Digits (0–9, *, #, +) only<br>▪ 3 — UCS2 alphabet<br>▪ <echo> (Echo input availability)<br>▪ 0 — Echo not allowed. Actual string entered by user cannot be displayed, but can be 'masked' to indicate key entry using characters from the set (0–9, *, #, +).<br>▪ 1 — Echo input to display<br>▪ <helpInfo> (Help information availability><br>▪ 0 — Not available<br>▪ 1 — Available<br>▪ <minLgth> (Minimum length of expected response)<br>▪ 0–255 |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKGC** | **Get (retrieve) data for last unsolicited proactive SIM command notification**<br>▪ <maxLgth> (Maximum length of expected response)<br>▪ 0–254<br>▪ 255 — No maximum length (can be ≥ 255 bytes)<br>▪ <DCS2> (Data coding scheme for <default>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <default> (Text string in <DCS2> format)<br>▪ Hex string<br>▪ If string is provided, ME will display this text for the user to accept, reject, or edit as appropriate.<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces any text string or <alphaId>)<br>▪ 1 — Display with <alphaId> or text string<br>· If <cmdId>="24" (Select Item), then <data> format is:<br><numItems>, <selection>, <default>, <helpInfo>, <DCS>, <alphaId>, <iconId>, <dispMode> <CR><LF><br>[<itemId>, <itemText>, <iconId>, <dispMode>, <nai>] <CR><LF><br>[...]<br>▪ <numItems> (Number of items that are accessible in the menu structure))<br>▪ 0 — Remove existing menu from the ME's menu structure<br>▪ 1–255 — Number of items in menu structure<br>▪ <selection> (Preferred user selection method)<br>▪ 0 — No selection preference<br>▪ 1 — Soft key selection preferred<br>▪ <default> (Default selection item)<br>▪ Integer value corresponding to one of the <itemId>s in the menu<br>▪ <helpInfo> (Help information availability>)<br>▪ 0 — Not available<br>▪ 1 — Available<br>▪ <DCS> (Data coding scheme for <alphaId>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <alphaId> (Alpha identifier for user confirmation, in <DCS> format)<br>▪ Hex string<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces any text string or <alphaId>)<br>▪ 1 — Display with <alphaId> or text string |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKGC** | **Get (retrieve) data for last unsolicited proactive SIM command notification**<br>▪ <itemId> (Menu item identifier)<br>▪ Integer value<br>▪ <itemText> (Menu item text)<br>▪ Hex string<br>▪ <nai> (Next Action Indicator)<br>▪ Action that SIM can initiate if selected by the user. For a list of available values, refer to TS 31.111 Section 9.4 and TS 102 223 Section 9.4.<br>▪ Hex value<br>▪ Example: 13 (Send Short Message)<br>· If <cmdId>="25" (Set Up Menu), then <data> format is:<br><numItems>, <selection>, <helpInfo>, <DCS>, <alphaId>, <iconId>, <dispMode>[, <itemId>, <itemText>, <iconId>, <dispMode>, <nai>]<br>[<itemId>, <itemText>, <iconId>, <dispMode>, <nai>]<br>[...]<br>▪ <numItems> (Number of items that are accessible in the menu structure))<br>▪ 0 — Remove existing menu from the ME's menu structure<br>▪ 1–255 — Number of items in menu structure<br>▪ <selection> (Preferred user selection method)<br>▪ 0 — No selection preference<br>▪ 1 — Soft key selection preferred<br>▪ <helpInfo> (Help information availability>)<br>▪ 0 — Not available<br>▪ 1 — Available<br>▪ <DCS> (Data coding scheme for <alphaId>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <alphaId> (Alpha identifier for user confirmation, in <DCS> format)<br>▪ Hex string<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces any text string or <alphaId>)<br>▪ 1 — Display with <alphaId> or text string<br>▪ <itemId> (Menu item identifier)<br>▪ Integer value<br>▪ <itemText> (Menu item text)<br>▪ Hex string<br>▪ <nai> (Next Action Indicator)<br>▪ Action that SIM can initiate if selected by the user. For a list of available values, refer to TS 31.111 Section 9.4 and TS 102 223 Section 9.4.<br>▪ Hex value<br>▪ Example: 13 (Send Short Message) |

Table 3-2: SIM Toolkit Command Details (Continued)

| Command | Description |
|---|---|
| **!STKGC (continued)** | **Get (retrieve) data for last unsolicited proactive SIM command notification (continued)**<br>• If <cmdId>="26" (Set Up Idle Mode Text), then <data> format is:<br><DCS>, <text>, <iconId>, <dispMode><br>▪ <DCS> (Data coding scheme for <text>)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpacked)<br>▪ 8 — UCS2 alphabet<br>▪ <text> (Idle Mode text string, in <DCS> format)<br>▪ Hex string<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces any text string or <alphaId>)<br>▪ 1 — Display with <alphaId> or text string<br>• If <cmdId>="35" (Language Notification), then <data> format is:<br><spec>, <lang><br>▪ <spec> (Language notification type)<br>▪ 0 — Non-specific language notification<br>▪ 1 — Specific language notification<br>▪ <lang> (List of language codes)<br>▪ Hex string<br>▪ Example: 656E ("en" — English. Refer to ISO 639 for complete list of language codes.)<br>• If <cmdId>="40" (Open Channel), then <data> format is:<br><onDemand>, <alphaId>, <iconId>, <dispMode>, <bearerType>, <bearer>, <bufSize>, <apn>, <localAddrType>, <localAddr>, <login>, <pwd>, <transProtocol>, <portNum>, <destAddrType>, <destAddr><br>▪ <onDemand> (Link establishment method)<br>▪ 0 — On-demand link establishment<br>▪ 1 — Immediate link establishment<br>▪ <alphaId> (Alpha identifier for user confirmation)<br>▪ Hex string, 7-bit GSM format or UCS2<br>▪ <iconId> (Numeric tag (index) of icon image file on SIM to be displayed)<br>▪ 0 — No icon<br>▪ 1–255 — Icon tag<br>▪ <dispMode> (Icon image usage)<br>▪ 0 — Display icon only (replaces any text string or <alphaId>)<br>▪ 1 — Display with <alphaId> or text string<br>▪ <bearerType> (Bearer type)<br>▪ Integer value<br>▪ 1 — CSD<br>▪ 3 — GPRS<br>▪ 4 — Default bearer<br>▪ All other values are reserved |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKGC** | **Get (retrieve) data for last unsolicited proactive SIM command notification**<br>▪ <bearer> (Encoded bearer description (QoS and packet data protocol type))<br>▪ Hex string (byte order: B1B2B3B4B5B6)<br>▪ B1 — Precedence class<br>▪ B2 — Delay class<br>▪ B3 — Reliability class<br>▪ B4 — Peak throughput<br>▪ B5 — Mean throughput<br>▪ B6 — Packet data protocol type<br>▪ Example: 020405051602 (e.g. "04" is the Delay class (B2))<br>▪ <bufSize> (Buffer size requested)<br>▪ Integer value<br>▪ <apn> (Access point name)<br>▪ Hex string<br>▪ <localAddrType> (Local address type)<br>▪ Integer value<br>▪ 0 — No address given<br>▪ 1 — Dynamic address<br>▪ 2 — IPv4 address<br>▪ 3 — IPv6 address<br>▪ <localAddr> (Local address)<br>▪ Hex string<br>▪ <login> (User login name)<br>▪ Hex string<br>▪ <pwd> (User password)<br>▪ Hex string<br>▪ <transProtocol> (Transport protocol)<br>▪ Integer value<br>▪ 0 — Not present<br>▪ 1 — UDP<br>▪ 2 — TCP<br>▪ 3 — TCP server<br>▪ <portNum> (Port number)<br>▪ Integer value<br>▪ 0–65535<br>▪ <destAddrType> (Data destination address type)<br>▪ Integer value<br>▪ 0 — No address given<br>▪ 1 — Dynamic address<br>▪ 2 — IPv4 address<br>▪ 3 — IPv6 address<br>▪ <destAddr> (Data destination address)<br>▪ Hex string |

Table 3-2: SIM Toolkit Command Details (Continued)

| Command | Description |
|---|---|
| **!STKMS** | **Inform SIM of menu item selection or provide help information**<br>Host uses this command to tell the SIM which menu item was selected, or to request that the SIM provide help information for a menu item.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!STKMS=<item>[, <help>]**<br>Response: OK<br>*or*<br>ERROR<br>*or*<br>Error code: <error><br>Purpose: Indicate to the SIM that menu <item> was selected, or that the SIM must provide help information for the menu <item>.<br>▪ Query List: **AT!STKMS=?**<br>Purpose: Return the execution command format. See the parameter descriptions below for details.<br>**Parameters:**<br><item> (Menu item)<br>• Integer value<br><help> (Request help text or menu selection)<br>• 0 (Default) — Request SIM to select menu item<br>• 1 — Request SIM to provide help info to the host for the specified <item> by issuing a DISPLAY TEXT proactive SIM command.<br><error> (Error reason)<br>• 1 — SIM card busy<br>• 2 — General failure |

Table 3-2: SIM Toolkit Command Details (Continued)

| Command | Description |
|---|---|
| **!STKN (notification)** | **Response to mobile-originated Call or SMS control request (notification)**<br>Unsolicited notification indicating the result of a mobile-originated call control or SMS control request.<br>No host response is required to this notification.<br><br>**Notification format:**<br>**+STKN: <cmdId>, <data>**<br>**Parameters:**<br><cmdId> (Notification type)<br>• Hexadecimal ID as ASCII string (without quotation marks):<br>  • "D4" — Response to mobile-originating Call Control request<br>  • "D5" — Response to mobile-originating SMS Control request<br><data> (Notification content)<br>• Content format depends on <cmdId> type:<br>  • If <cmdId> = "D4", then <data> format depends on call type:<br>For Voice:<br><result>, <repeatind>, <alphaId>, 0, <TON>, <NPI>, <address>, <subaddress>, <ccp1>, <ccp2><br><br>For SS:<br><result>, <repeatind>, <alphaId>, 1, <TON>, <NPI>, <address><br><br>For USSD:<br><result>, <repeatInd>, <alphaId>, 2, <dcs>, <ussd><br><br>For PDP context:<br><result>, <repeatind>, <alphaId>, 3, <pdp><br><br>None:<br><result>, <repeatind>, <alphaId>, 4<br>▪ <result> (Call control result)<br>  ▪ 0 — Allowed with no modifications<br>  ▪ 1 — Not allowed<br>  ▪ 2 — Allowed with modifications<br>▪ <repeatind> (BC repeat indicator)<br>  ▪ 1 — Alternate mode<br>  ▪ 3 — Sequential mode<br>▪ <alphaId> (Alpha identifier)<br>  ▪ Hex string<br>▪ <TON> (Type of number)<br>  ▪ 0 — Unknown<br>  ▪ 1 — International<br>  ▪ 2 — National<br>  ▪ 3 — Network specific |

Table 3-2: SIM Toolkit Command Details (Continued)

| Command | Description |
|---|---|
| **!STKN (notification)** | **Response to mobile-originated Call or SMS control request (notification)**<br>▪ <NPI> (Numbering Plan Identifier)<br>▪ 0 — Unknown<br>▪ 1 — ISDN Telephony<br>▪ 3 — Data<br>▪ 4 — Telex<br>▪ 9 — Private<br>▪ <address> (New dialing address)<br>▪ Hex string<br>▪ <subaddress> (New dialing sub-address)<br>▪ Hex string<br>▪ <ccp1> (First capability configuration parameters)<br>▪ Hex string<br>▪ <ccp2> (Second capability configuration parameters)<br>▪ Hex string<br>▪ <dcs> (Data coding scheme)<br>▪ 0 — 7-bit GSM default alphabet (packed)<br>▪ 4 — 8-bit GSM default alphabet (unpaced)<br>▪ 8 — UCS2 alphabet<br>▪ <ussd> (USSD control string)<br>▪ Hex string<br>▪ If <cmdId> = "D5", then <data> format is:<br><result>, <alphaId>, <TON>, <NPI>, <rpaddress>, <TON>, <NPI>, <tpddress><br><br><result>, <repeatind>, <alphaId>, 4<br>▪ <result> (SMS control result)<br>▪ 0 — Allowed with no modifications<br>▪ 1 — Not allowed<br>▪ 2 — Allowed with modifications<br>▪ <alphaId> (Alpha identifier)<br>▪ Hex string<br>▪ <TON> (Type of number)<br>▪ 0 — Unknown<br>▪ 1 — International<br>▪ 2 — National<br>▪ 3 — Network specific<br>▪ <NPI> (Numbering Plan Identifier)<br>▪ 0 — Unknown<br>▪ 1 — ISDN Telephony<br>▪ 3 — Data<br>▪ 4 — Telex<br>▪ 9 — Private<br>▪ <rpaddress> (RP address)<br>▪ Hex string |

Table 3-2: SIM Toolkit Command Details (Continued)

| Command | Description |
|---|---|
| **!STKPD** | **Select host-supported STK features**<br>Host uses this command to select the set of STK features the host will support and inform the SIM of the set. The module must be reset for the selected set of features to take effect.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!STKPD=<bitmask>**<br>Response: OK<br>*or*<br>ERROR<br>Purpose: Indicate to the SIM which STK features the host will support after the next reset.<br>▪ Query: **AT!STKPD?**<br>Response: Profile config=<bitmask><br>OK<br>Purpose: Report the current set of host-supported STK features by displaying the <bitmask>. Refer to the parameter description below to decode the settings.<br>▪ Query List: **AT!STKPD=?**<br>Purpose: Return the execution command format. See the parameter descriptions below for details.<br><br>**Parameters:**<br><bitmask> (Host-supported STK features)<br>· 7-byte Hex string, big-endian format.<br>Example: Byte order: 07060504030201; Bit order: 76543210<br>· Bit value 1=Supported; Bit value 0=Not supported<br>· Note: Feature descriptions below include a code in brackets (e.g. "(B16b2)". This refers to the position of the bit in the terminal profile message according to 3GPP TS 11.14, using the following encoding:<br>BX = Byte X<br>bY = Bit Y<br>· Byte 01:<br>· Bit 0 — Menu selection support (B1b4)<br>· Bit 1 — Support for alpha in call control (B2b5)<br>· Bit 2 — UCS2 entry support (B2b6)<br>· Bit 3 — UCS2 display support (B2b7)<br>· Bit 4 — Display Text command support (B3b1)<br>· Bit 5 — Get Inkey command support (B3b2)<br>· Bit 6 — Get Input command support (B3b3)<br>· Bit 7 — Play Tone command support (B3b5) |

**Table 3-2: SIM Toolkit Command Details (Continued)**

| Command | Description |
|---|---|
| **!STKPD** | **Select host-supported STK features**<br>• Byte 02:<br>  • Bit 0 — Select Item command support (B4b1)<br>  • Bit 1 — Send SMS command support (B4b2)<br>  • Bit 2 — Send SS command support (B4b3)<br>  • Bit 3 — Send USSD command support (B4b4)<br>  • Bit 4 — Set Up Call command support (B4b5)<br>  • Bit 5 — Set Up Menu command support (B4b6)<br>  • Bit 6 — Set Up Idle Mode Text command support (B8b5)<br>  • Bit 7 — Second alpha in setup call support (B8b7)<br>• Byte 03:<br>  • Bit 0 — Second capability configuration parameter support (B8b8)<br>  • Bit 1 — Sustained display text support (B9b1)<br>  • Bit 2 — Send DTMF command support (B9b2)<br>  • Bit 3 — Language notification command support (B9b6)<br>  • Bit 4 — Launch Browser command support (B9b7)<br>  • Bit 5 — Softkey support in select item command (B10b1)<br>  • Bit 6 — Softkey support in setup menu command (B10b2)<br>  • Bit 7 — Screen size support (B14b8)<br>• Byte 04:<br>  • Bit 0 — Variable font size support (B15b8)<br>  • Bit 1 — Display resized support (B16b1)<br>  • Bit 2 — Text wrapping support (B16b2)<br>  • Bit 3 — Text scrolling support (B16b3)<br>  • Bit 4 — Not used<br>  • Bit 5 — Not used<br>  • Bit 6 — Not used<br>  • Bit 7 — Not used<br>• Byte 05:<br>  • Bit 0–7 — Maximum softkey size (B11b1–B11b8)<br>• Byte 06:<br>  • Bit 0–4 — Number of character support down ME (screen height) (B14b1–B14b5)<br>  • Bit 5–7 — Reduce width of menu support (B16b6–B16b8)<br>• Byte 07:<br>  • Bit 0–6 — Number of character support across ME (screen width) (B15b1–B15b7)<br>  • Bit 7 — Not used |

# 4: Modem Status, Customization, and Reset Commands

## 4.1 Introduction

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

## 4.2 Command Summary

Table 4-1 lists the commands described in this chapter.

**Table 4-1: Modem Status Commands**

| Command | Description | Page |
|---|---|---|
| +++ | Switch from Data Mode to Command Mode | 51 |
| !ADC | Read ADC value | 52 |
| !ANTSEL | Set/query external antenna select configuration | 53 |
| !BAND | Select/return frequency band set | 55 |
| !BOOTHOLD | Reset modem and wait in bootloader for firmware download | 58 |
| +CBST | Select Circuit-Switched Bearer | 59 |
| +CEDRXRDP | Read eDRX Dynamic Parameters | 60 |
| +CEDRXS | Configure eDRX | 61 |
| +CESQ | Extended Signal Quality | 63 |
| +CGACT | Activate/deactivate PDP context | 65 |
| +CGAUTH | Set/Report PDP connection authentication parameters | 66 |
| +CGDCONT | Define PDP context | 67 |
| +CMEC | Mobile equipment control mode | 69 |
| +CMEE | Report mobile termination error | 70 |
| +CMUX | Configure Multiplexing Control Channel | 71 |
| +CPSMS | Configure Power Saving Mode (PSM) | 73 |
| +CPWROFF | Power Off | 74 |
| +CSQ | Display signal quality | 75 |
| +CSQ (notification) | RSSI change across threshold — Unsolicited notification | 75 |
| !CUSTOM | Set/return customization settings | 76 |
| +CVMOD | Set/query voice call mode | 85 |

**Table 4-1: Modem Status Commands (Continued)**

| Command | Description | Page |
|---|---|---|
| !ECMENABLE | Enable/disable ECM mode | 87 |
| !GCFEN | Enable/disable GCF testing mode | 87 |
| !GSTATUS | Return operational status | 88 |
| !HWID | Read hardware ID | 96 |
| !IMAGE | Manage Firmware Images | 100 |
| I | Display product identification information | 97 |
| !IIDIPV6 | Configure Unique IPv6 IID | 99 |
| !IMPREF | Query/set Image Management preferences | 102 |
| &K | Flow Control | 102 |
| +KCCINFO | Enable/disable camped cell information notifications | 103 |
| +KCCINFO (notification) | Camped cell parameter change — Unsolicited notification | 104 |
| +KCELL | Display Detected Cell Details | 105 |
| +KGSN | Request Product Serial Number Identification and Software Version | 108 |
| +KMCLASS | Set 2G multislot class | 109 |
| +KSIMDET | Enable/Disable SIM Detection notifications | 111 |
| +KSLEEP | Configure UART1 power management (sleep mode entry conditions) | 113 |
| +KSRAT | Set the current RAT | 114 |
| +KSREP | Enable/disable startup reporting | 115 |
| +KSUP (notification) | Startup notification (unsolicited notification) | 116 |
| !MAPUART | Map services to UART | 117 |
| !MUXMODE | Enable/disable CMUX mode | 118 |
| !NETNUM | Set/report number of supported network interfaces | 118 |
| !NVBACKUP | Backup NV data | 119 |
| !PACKAGE | Return package version string | 119 |
| !PATEMP | Return PA temperature information | 120 |
| !PATEMP (notification) | PA temperature state change — Unsolicited notification | 120 |
| !PCINFO | Return power control status information | 121 |
| !PCTEMP | Return Power control temperature information | 123 |
| !PCTEMP (notification) | PMIC temperature state change — Unsolicited notification | 123 |
| !PCTEMPLIMITS | Set/report temperature state limit values | 124 |
| !PCVOLT | Return current power supply voltage information | 125 |

**Table 4-1: Modem Status Commands (Continued)**

| Command | Description | Page |
|---|---|---|
| !PCVOLT (notification) | PMIC voltage state change — Unsolicited notification | 125 |
| !PCVOLTLIMITS | Set/report power supply voltage state limit values | 126 |
| !POWERDOWN | Power down system | 127 |
| !POWERMODE | Enable/disable PSM | 127 |
| !POWERWAKE | Configure PSM wakeup sources | 128 |
| !PRIID | Report module PRI part number and revision | 129 |
| *PSRDBS | Select operating bands | 130 |
| !RESET | Reset modem | 131 |
| +RSCP | Display RSCP value(s) (WCDMA only) | 132 |
| S11 | Query/set DTMF dialing speed | 133 |
| !SCACT | Activate/deactivate data connection | 134 |
| !SCUMMTU | Set/Report MTU Size | 135 |
| !SELACQ | Select RAT acquisition order | 136 |
| !SELMODE | Set/return current service domain | 137 |
| !SELRAT | Set preferred RAT | 138 |
| +SIM (notification) | SIM inserted/removed — Unsolicited notification | 139 |
| !SKU | Read Module SKU | 140 |
| !USBCOMP | Set/report USB interface configuration | 141 |
| !USBINFO | Return information from active USB descriptor | 142 |
| !USBPID | Set/report product ID in USB descriptor | 143 |
| !USERAGENT | Write/read user-agent of IMS configuration | 144 |
| +WESHDOWN | Enable/Disable/Trigger Emergency Shutdown | 145 |
| +WFWUPD | Download and install the firmware package locally over AT port | 146 |
| +WFWUPD (notification) | Package install is launched—Unsolicited notification | 148 |
| +WJAM (notification) | Jamming events — Unsolicited notification | 148 |
| +WJAMTHRESH | Set/Report Jamming Detection Threshold Value | 149 |
| +WUSLMSK | Enable/disable unsolicited notifications | 150 |

# 4.3 Command Reference

**Table 4-2: Modem Status Command Details**

| Command | Description |
|---|---|
| **+++** | **Switch from Data Mode to Command Mode**<br><br>**Notes:**<br>• This command is only available during data mode. The +++ character sequence suspends the data flow over the AT interface and switches to command mode. This allows entering AT commands while maintaining the data connection to the remote device.<br>• To return to data mode, use ATO[n].<br>• Line needs one second silence before and one second after (do not end with terminating character).<br>• The "+" character may be changed with ATS2.<br>• The +++ characters are not transmitted in the data flow.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **+++**<br>Response: OK<br>**Parameters:**<br>None |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!ADC** | **Read ADC value**<br>Return the reading for a specified ADC channel.<br>**Password required:** No<br><br>**Usage:**<br>▪ Query: **AT!ADC?<input string>**<br>Response: !ADC: <adc_reading><br>OK<br>or<br>ADC error = 3 *(This indicates an invalid <input_string> channel was used.)*<br>*OK*<br>or<br>ERROR<br>Purpose: Display the reading from the specified input source.<br>*Note: AT!ADC just displays the raw value of ADC Sensor*<br>▪ Query List: **AT!ADC=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><input string> (Input string)<br>• ASCII string<br>• Valid options:<br>• VBATT<br>• PA_THERM<br>• PMIC_THERM<br>• XO_THERM<br>• ADC0<br>• ADC1<br><adc_reading> (Value read from input string)<br>• Unsigned integer |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!ANTSEL** | **Set/query external antenna select configuration**<br>Configure the modem to use GPIOs (GPIO28–31) to select the antenna to use for each specified frequency band. (Any of the available GPIOs that are not needed for a specific band should be configured as not required.)<br>When the modem switches to a frequency band that has been configured using this command, the GPIOs are driven as specified and the host uses them to tune the external antenna appropriately.<br>If the modem switches to a band that has not been configured, the host uses the default antenna.<br><br>**Requirements:**<br>Before this command can be used:<br>• Antenna selection is the secondary configuration for GPIO28–GPIO31. To use these GPIOs for antenna selection, use +WIOCFG to deallocate them from their current purpose(s).<br><br>**Notes:**<br>When designing the system, and configuring the device:<br>▪ Perform system level testing to ensure that the antenna switching feature does not introduce any handover issues. The tunable antenna should be designed to ensure that it can retune in < 5 µs (recommended) and < 10 µs (maximum).<br>▪ Frequency bands are RAT-independent. For example, Band 5 corresponds to any 850-band technology (CDMA, WCDMA, LTE, GSM).<br>**Password required:** Yes (see !ENTERCND for details)<br>**Reset required to apply changes:** Yes<br><br>**Usage:**<br>▪ Execution: **AT!ANTSEL=<band>, <gpio1>, <gpio2>, <gpio3>[, <gpio4>]**<br>Response: OK<br>Purpose: Configure the GPIOs for the specified <band>.<br>▪ Query: **AT!ANTSEL?**<br>Response:<br>BAND <band *a*>: <gpio1>, <gpio2>, <gpio3>[, <gpio4>]<br>BAND <band *b*>: <gpio1>, <gpio2>, <gpio3>[, <gpio4>]<br>...<br>Conflict: *(Note: Heading is for LTE-CA conflicts, but RC76xx do not support LTE-CA, so heading can be ignored.)*<br>OK<br><br>Example:<br>BAND 2: 1, 0, 1, 1<br>BAND 5: 1, 1, 2, 2<br><br>Conflict:<br><br>OK<br>Purpose: Display the current external antenna select configuration. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!ANTSEL** | **Set/query external antenna select configuration**<br><br>▪ Query List: **AT!ANTSEL=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><band> (RF band)<br>• 3GPP band number. For a full listing of 3GPP band numbers, see Table 20-2 on page 398.<br>• Valid range: 1–71. Band support is product specific — see the device's Product Specification or Product Technical Specification document for details.<br><gpio1>, <gpio2>, <gpio3>, <gpio4> (GPIO configurations)<br>• 0 = Logic low<br>• 1 = Logic high<br>• 2 = Not used for antenna selection (Default value for <gpio4>).<br>• Notes: <gpio4> availability is device-specific — see the module's Product Technical Specification for details. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!BAND**<br><br>*Note: The 'Basic' command and response versions are used if you haven't entered the required password. (See Command Access on page 16.)* | **Select / return frequency band set**<br>Configure the modem to operate on a set of frequency bands, look up available sets, create new sets, or return the current selection.<br><br>**Important:** *To avoid issues with incompatible RAT / band combinations:*<br>▪ *If !BAND is used, +KSRAT must be set to 'All RATS, automatic'.*<br>▪ *If !BAND and !SELRAT are used, either !BAND must be set to 'All Bands' or !SELRAT must be set to 'Automatic'.*<br>▪ *If +KSRAT is used, !BAND must be set to 'All Bands' and !SELRAT must not be used.*<br><br>**Notes:**<br>• The "02 User bands" set can also be changed using *PSRDBS by selecting a set of bands that does not match any of the existing band sets.<br>**Password required:** Yes — Execution (Extended) format (see !ENTERCND for details)<br><br>**Usage:**<br>▪ Execution (Basic):<br>**AT!BAND=<Index>**<br>Response: OK<br>Purpose: Select an existing set of bands.<br>▪ Execution (Extended):<br>**AT!BAND=<Index>,"<Name>",<GWmask>[,<Lmask>[,<Lmask2>]]**<br>Response: OK<br>Purpose: Create a new set of bands for the specified <index> position and assign a descriptive <Name> to the set.<br>▪ Query (Basic):<br>**AT!BAND?**<br>Response: Index, Name<br><Index>, <Name><br>OK<br>*or* *(If the current band mask doesn't match a band set)*<br>Unknown band mask. Use AT!BAND to set band.<br><bandmask><br>OK<br>Purpose: Report the current band selection. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!BAND** | **Select/return frequency band set**<br>▪ Query (Extended):<br>**AT!BAND?**<br>Response:<br>Index, Name, GW Band Mask L Band Mask 1 L Band Mask 2<br><Index>, <Name>, <GWmask> <Lmask> <Lmask2><br>OK<br>*or* *(If the current band mask doesn't match a band set)*<br>Unknown band mask. Use AT!BAND to set band.<br><Index><br>OK<br>Purpose: Report the current band selection. (<GWmask>, <Lmask>, and <Lmask2> will appear only in Extended responses, and only if applicable.)<br>▪ Query List (Basic):<br>**AT!BAND=?**<br>Response: Index, Name<br><Index1>, <Name1><br>...<br><IndexN>, <NameN><br>OK<br>Purpose: Display allowed <Index> values and descriptions of the associated band sets.<br>▪ Query List (Extended):<br>**AT!BAND=?**<br>Response: Index, Name, GW Band Mask L Band Mask 1 L Band Mask 2<br><Index1>, <Name1>, <GWmask1> <Lmask1(1)> <Lmask2(2)><br>...<br><IndexN>, <NameN>, <GWmaskN> <LmaskN(1)> <LmaskN(2)><br><LBand><br>...<br><LBandN><br><GWBand><br>...<br><GWBand><br>OK<br>Purpose: Display allowed <Index> values and descriptions of the associated band sets. (<GWmask...> and <Lmask...> will appear only in Extended responses, and only if applicable.)<br>After the masks, lists of each bands comprising the masks are also shown. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!BAND** | **Select/return frequency band set**<br>**Parameters:**<br><Index> (Index of a band set. Use the Query List command to display all supported sets)<br>• Valid range: 0–13 (Hexadecimal — there are 20 possible values. By default, '0' indicates 'All bands'.)<br>• Example values:<br>00<br>01<br>02<br><Name> (Name of the band set)<br>• ASCII string — Up to 30 characters<br>• Example values:<br>All bands<br>Europe 3G<br>GSM ALL<br>WCDMA ALL<br><GWmask> (GSM/WCDMA bands included in the set)<br>• Format: 64-bit bitmask<br>• Example values (Available bands are device-dependent. Use the extended query command to display the list of bands available for your device):<br>0000000000000001 — BC0-A<br>0000000000000002 — BC0-B<br>...<br>0000000080000000 — BC15<br>0002000000000000 — W9001000000000000000 — B19 (850)<br><Lmask>, <Lmask2> (LTE bands included in the set)<br>• Format: 64-bit bitmask<br>• Example values (Available bands are device-dependent. Use the extended query command to display the list of bands available for your device.):<br>0000000000000001 — Band 1<br>0000000000000002 — Band 2<br>...<br>0000008000000000 — Band 40<br>0000010000000000 — Band 41 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| | <LBand> (List of individual LTE bands forming the <Lmask>)<br>• Format: <mask> - <description>. See <GWBand> for a GSM/WCDMA example.<br><GWBand> (List of individual GSM/WCDMA bands forming the <GWmask>)<br>• Format: <mask> - <description>.<br>• Example:<br>1000000000000000 - B19 (800)<br>0002000000000000 - B8 (900)<br>0000000008000000 - B6 (800)<br>0000000004000000 - B5 (850)<br>0000000000800000 - B2 (1900)<br>0000000000400000 - B1 (2100)<br>0000000000200000 - G1900<br>0000000000080000 - G850<br>0000000000000200 - G900P<br>0000000000000100 - G900E<br>0000000000000080 - G1800 |
| **!BOOTHOLD** | **Reset modem and wait in bootloader for firmware download**<br>Prepare for a firmware download by resetting the modem and waiting in 'boot and hold' mode.<br>**Password required:** No<br>**Usage:**<br>▪ Execution: **AT!BOOTHOLD**<br>Response: OK<br>Purpose: Force the modem to backup user NV options, reset, and then wait in boot and hold mode for a firmware download. |

Table 4-2: Modem Status Command Details (Continued)

| Command | Description |
|---|---|
| **+CBST** | **Select Circuit-Switched Bearer**<br>Select the circuit-switched bearer to use for data calls (mobile-originated or mobile-terminated).<br><br>**Notes: Only the following combinations are supported — If other combinations of valid parameter values are specified, ERROR will be returned:**<br>▪ **<speed> = valid values up to 83; <name> = 0; <ce> = 1**<br>▪ **<speed> = 83; <name> = 4; <ce> = 1**<br>▪ **<speed> = 116 or 134; <name> = 1; <ce> = 0**<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CBST=[<speed>],[<name>],[<ce>]**<br>Response: OK<br>Purpose: Configure the circuit-switched bearer.<br>▪ Query: **AT+CBST?**<br>Response: +CBST: <speed>,<name>,<ce><br>OK<br>Purpose: Report current settings.<br>▪ Query List: **AT+CBST=?**<br>Purpose: Return the execution command format and the supported parameter values.<br><br>**Parameters:**<br><speed> (Data call connection speed)<br>· 0 — (Default) Autobaud (automatic speed selection)<br>· 7 — 9600 bps (V.32)<br>· 12 — 9600 bps (V.34)<br>· 14 — 14400 bps (V.34)<br>· 16 — 28800 bps (V.34)<br>· 17 — 33600 bps (V.34)<br>· 39 — 9600 bps (V.120)<br>· 43 — 14400 bps (V.120)<br>· 48 — 28800 bps (V.120)<br>· 51 — 56000 bps (V.120)<br>· 71 — 9600 bps (V.110)<br>· 75 — 14400 bps (V.110)<br>· 80 — 28800 bps (V1.110)<br>· 81 — 38400 bps (V.110)<br>· 83 — 56000 bps (X.31 flag stuffing, UDI/RDI)<br>· 116 — 64000 bps (bit transparent)<br>· 134 — 64000 bps (multimedia)<br><name> (Bearer Service)<br>· 0 — (Default) Data circuit asynchronous (UDI or 3.1 kHz modem)<br>· 1 — UI Data circuit synchronous (UDI or 3.1 kHz modem)<br>· 4 — Data circuit asynchronous (RDI)<br><ce> (Connection element)<br>· 0 — Data transparent<br>· 1 — Data non-transparent |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CEDRXRDP** | **Read eDRX Dynamic Parameters**<br>Read the current eDRX status and related parameters.<br><br>**Notes:**<br>• This implementation of +CEDRXRDP follows 3GPP TS 27.007, with exceptions as noted in the parameter descriptions.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CEDRXRDP**<br>Response: +CEDRXRDP: <AcT-type>[, <Requested_eDRX_value>[, <NW-provided_<br>eDRX_value>[, <Paging_time_window>]]]<br>OK<br>Purpose: Report the current eDRX status and parameters.<br>▪ Query List: **AT+CEDRXRDP=?**<br>Purpose: Return the execution command format and the supported parameter values.<br><br>**Parameters:**<br><AcT> (Relationship between Access technology Type (RAT) and requested eDRX value)<br>• 0—RAT is not using eDRX<br>• 1—EC-GSM-IoT (A/Gb mode)<br>• 2—GSM (A/Gb mode)<br>• 3—UTRAN (Iu mode)<br>• 4—E-UTRAN (WB-S1 mode)<br>• 5—E-UTRAN (NB-S1 mode)<br><Requested_eDRX_value> (eDRX value requested by module) 4 bits represented as a string. Refers to bits 4–1 of octet 3 of extended DRX parameters information element. For coding and value range details, refer to the +CEDRXRDP description in 3GPP TS 27.007.<br>• 1101—Default<br><NW-provided_eDRX_value> (eDRX value provided by network) 4 bits represented as a string. Refers to bits 4–1 of octet 3 of extended DRX parameters information element. For coding and value range details, refer to the +CEDRXRDP description in 3GPP TS 27.007.<br>• e.g. 0011<br><Paging_time_window> (Paging time window length) 4 bits represented as a string. Refers to bits 8–5 of octet 3 of extended DRX parameters information element. For coding and value range details, refer to the +CEDRXRDP description in 3GPP TS 27.007.<br>• e.g. 0001 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CEDRXS** | **Configure eDRX**<br>Enable/disable eDRX and configure settings for specified RATs.<br><br>**Notes:**<br>• This implementation of +CEDRXS follows 3GPP TS 27.007, with exceptions as noted in the parameter descriptions.<br>• This command works with a SIM card.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CEDRXS=<mode>[, <AcT-type>[, <Requested_eDRX_value>]]]**<br>Response: OK<br>or<br>+CME ERROR: <err><br>Purpose: Enable/disable eDRX and configure setting for specified RAT.<br>▪ Query: **AT+CEDRXS?**<br>Response: +CEDRXS: <AcT-type>[, <Requested_eDRX_value><br>...<br>OK<br>Purpose: Report current eDRX settings for each RAT that has eDRX enabled.<br>▪ Query List: **AT+CEDRXS=?**<br>Purpose: Return the execution command format and the supported parameter values. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| | **Parameters:**<br><mode> (Enable/Disable LTE eDRX)<br>• 0—Disable eDRX<br>• 1—Enable eDRX<br>• 2—Enable eDRX and enable the unsolicited result code +CEDRXP:<br>• +CEDRXP: <AcT-type>[, <Requested_eDRX_value>[, <NW-provided_eDRX_value [, <Paging_time_window>]]]<br>• 3—Disable eDRX, discard eDRX parameters and reset to default values<br><AcT> (Access technology Type (RAT) and relationship to requested eDRX value)<br>• 0—RAT is not using eDRX<br>• 1—EC-GSM-IoT (A/Gb mode)<br>• 2—GSM (A/Gb mode)<br>• 3—UTRAN (Iu mode)<br>• 4—E-UTRAN (WB-S1 mode)<br>• 5—E-UTRAN (NB-S1 mode)<br><Requested_eDRX_value> (eDRX value requested by module) 4 bits represented as a string. Refers to bits 4–1 of octet 3 of extended DRX parameters information element. For coding and value range details, refer to the +CEDRXRDP description in 3GPP TS 27.007.<br>• 1101—Default<br><NW-provided_eDRX_value> (eDRX value provided by network) 4 bits represented as a string. Refers to bits 4–1 of octet 3 of extended DRX parameters information element. For coding and value range details, refer to the +CEDRXRDP description in 3GPP TS 27.007.<br>• e.g. 0011<br><Paging_time_window> (Paging time window length) 4 bits represented as a string. Refers to bits 8–5 of octet 3 of extended DRX parameters information element. For coding and value range details, refer to the +CEDRXRDP description in 3GPP TS 27.007.<br>e.g. 0001 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CESQ** | **Extended Signal Quality**<br><br>**Notes:**<br>• If the current serving cell is not a GERAN cell, <rxlev> and <ber> are set to value 99.<br>• If the current serving cell is not a UTRA FDD or UTRA TDD cell, <rscp> is set to 255.<br>• If the current serving cell is not a UTRA FDD cell, <ecno> is set to 255.<br>• If the current serving cell is not an E-UTRA cell, <rsrq> and <rsrp> are set to 255<br>• Therefore, the RC76xx returns 99 for rxlev/ber, and 255 for rscp/ecno.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CESQ**<br>Response: +CESQ: <rxlev>, <ber>, <rscp>, <ecno>, <rsrq>, <rsrp><br>OK<br>Purpose: Display signal quality parameters.<br>▪ Query List: **AT+CESQ=?**<br>Purpose: Display valid parameter values.<br>**Parameters:**<br><rxlev> (Received signal strength level (see 3GPP TS 45.008 [20] subclause 8.1.4))<br>• 0 — rssi < -110 dBm<br>• 1 — -110 dBm ≤ rssi < -109 dBm<br>• 2 — -109 dBm ≤ rssi < -108 dBm<br>• ...<br>• 61 — -50 dBm ≤ rssi < -49 dBm<br>• 62 — -49 dBm ≤ rssi < -48 dBm<br>• 63 — -48 dBm ≤ rssi<br>• 99 — Not known or not detectable<br><ber> (Channel bit error rate, in percent)<br>• 0–7 — As RXQUAL values in the table in 3GPP TS 45.008 [20] subclause 8.2.4<br>• 99 — Not known or not detectable<br><rscp> (Received signal code power (see 3GPP TS 25.133 [95] subclause 9.1.1.3 and 3GPP TS 25.123 [96] subclause 9.1.1.1.3) )<br>• 0 — rscp < -120 dBm<br>• 1 — -120 dBm ≤ rscp < -119 dBm<br>• 2 — -119 dBm ≤ rscp < -118 dBm<br>• ...<br>• 94 — -27 dBm ≤ rscp < -26 dBm<br>• 95 — -26 dBm ≤ rscp < -25 dBm<br>• 96 — -25 dBm ≤ rscp<br>• 255 — Not known or not detectable |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CESQ (continued)** | **Extended signal quality (continued)**<br><ecno> (Ratio of the received energy per PN chip to the total received power spectral density (see 3GPP TS 25.133 [95] subclause))<br>• 0 — Ec/Io < -24 dBm<br>• 1 — -24 dBm ≤ Ec/Io < -23.5 dBm<br>• 2 — -23.5 dBm ≤ Ec/Io < -23 dBm<br>• ...<br>• 47 — -1 dBm ≤ Ec/Io < -0.5 dBm<br>• 48 — -0.5 dBm ≤ Ec/Io < 0 dBm<br>• 49 — 0 dBm ≤ Ec/Io<br>• 255 — Not known or not detectable<br><rsrq> (Reference signal received quality (see 3GPP TS 36.133 [96] subclause 9.1.7))<br>• 0 — rsrq < -19.5 dBm<br>• 1 — -19.5 dBm ≤ rsrq < -19 dBm<br>• 2 — -19 dBm ≤ rsrq < -18.5 dBm<br>• ...<br>• 32 — -4 dBm ≤ rsrq < -3.5 dBm<br>• 33 — -3.5 dBm ≤ rsrq < -3 dBm<br>• 34 — -3 dBm ≤ rsrq<br>• 255 — Not known or not detectable<br><rsrp> (Reference signal received power (see 3GPP TS 36.133 [96] subclause 9.1.4))<br>• 0 — rsrp < -140 dBm<br>• 1 — -140 dBm ≤ rsrp < -139 dBm<br>• 2 — -139 dBm ≤ rsrp < -18 dBm<br>• ...<br>• 95 — -46 dBm ≤ rsrp < -45 dBm<br>• 96 — -45 dBm ≤ rsrp < -44 dBm<br>• 97 — -44 dBm ≤ rsrp<br>• 255 — Not known or not detectable |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CGACT** | **Activate/deactivate PDP context**<br><br>**Notes:**<br>▪ Up to three (3) PDP contexts can be active at once.<br>▪ Any PDN which is not activated by CGACT AT command cannot be deactivated using the CGACT AT command.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CGACT=[<state>[, <cid>[, <cid>[, ...]]]]**<br>Response: OK<br>or<br>CME ERROR: <err><br>Purpose: Activate or deactivate the specified PDP contexts.<br>▪ Query: **AT+CGACT?**<br>Response: [+CGACT: <cid>, <state>]<br>[+CGACT: <cid>, <state>]...<br>OK<br>Purpose: Display the activation states of all defined PDP contexts.<br>▪ Query List: **AT+CGACT=?**<br>Purpose: Return the supported <state> values.<br>**Parameters:**<br><cid> (PDP context identifier)<br>▪ Valid range: 1–24.<br>▪ Maximum # of usable PDP contexts: 16<br><state> (PDP context activation state)<br>▪ 0 — Deactivated<br>▪ 1 — Activated |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CGAUTH** | **Set/Report PDP connection authentication parameters**<br>Set or report the authentication parameters for a PDP context. The context is identified by the supported profile that was used during the PDP context activation and PDP context modification procedures.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CGAUTH=<cid>,<auth_prot>[, <userid>,<password>]**<br>Response: OK<br>or<br>ERROR<br>Purpose: Set the required authentication type and related values for the specified PDP profile (<cid>).<br>▪ Query: **AT+CGAUTH?**<br>Response: +CGAUTH: <cid>, <auth_prot>[,<userid>]<br>...<br>OK<br>Purpose: Display the authentication type and (if required) the username required for each profile. (Note: The <password> does not appear, for security reasons.)<br>▪ Query List: **AT+CGAUTH=?**<br>Purpose: Return the execution command format and the supported parameter values.<br><br>**Parameters:**<br><cid> (PDP context identifier)<br>• Valid range: 1–24.<br>• Maximum # of usable PDP contexts: 16<br><auth_prot> (Required authentication type)<br>• 0 — None. Username and password are not required.<br>• 1 — PAP. Username and password accepted<br>• 2 — CHAP. Username and password (secret) accepted<br><br><userid> (Username for PAP/CHAP authentication)<br>• ASCII string within quotes (e.g. "userid")<br>• Required for <auth_type> 1 (PAP) and 2 (CHAP)<br><br><password> (Password for PAP/CHAP authentication)<br>• ASCII string within quotes (e.g. "123456")<br>• Required for <auth_type> 1 (PAP) and 2 (CHAP) |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CGDCONT** | **Define PDP context**<br>Define PDP (Packet Data Protocol) parameter values for a specific PDP context.<br><br>**Notes:**<br>• This implementation of +CGDCONT is derived from the 3GPP TS 27.007 version 13.2.0 specification, but does not support the full set of parameters from the specification and has extended usage rules.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CGDCONT=<cid>[, <PDP_type> [, <apn> [, <PDP_addr> [, <d_comp> [, <h_comp> [, <pd1> [... [, <pdN>]]]]]]]]**<br>Response: OK<br>Purpose: Set the specified parameter values for the PDP context identified by <cid>. If only <cid> is specified, all parameter values are stored as undefined.<br>▪ Query: **AT+CGDCONT?**<br>Response: +CGDCONT: <cid>, <PDP_type>, <apn>, <PDP_addr>, <d_comp>, <h_comp>[, <pd1>[, ...[,<pdN>]]]<br>...<br>OK<br>Purpose: Report the current settings for each defined PDP context.<br>▪ Query List: **AT+CGDCONT=?**<br>Purpose: Return the execution command format and the supported parameter values. If multiple PDP types (<PDP_type>) are supported, the parameters for each <PDP_type> are returned on a separate line.<br>**Parameters:**<br><cid> (PDP context identifier)<br>• Valid range: 1–24.<br>• Maximum # of usable PDP contexts: 16<br><PDP_type> (Packet Data Protocol type)<br>• "IP" — Internet Protocol, version 4 (IETF STD 5)<br>• "IPV6" — Internet Protocol, version 6 (IETF RFC 2460)<br>• "IPV4V6" — Virtual type that handles dual IP stack UE capability (3GPP TS 24.301[83])<br>Note: IPv4v6 is compliant up to 3GPP Release 7.<br><APN> (Access Point Name)<br>• ASCII string within quotes<br>• Logical name used to select GGSN or external packet data network<br>• If null or omitted, subscription value will be requested |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CGDCONT (continued)** | **Define PDP context (continued)**<br><PDP_addr> (Access Point Name)<br>• ASCII string within quotes<br>• Identifies the MT in the address space applicable to the PDP.<br>• If the value is null or omitted then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested. The READ command will continue to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using the +CGPADDR command.<br>• When +CGPIAF is supported, its settings can influence the format of this parameter returned with the read form of +CGDCONT.<br>• Note: The value of this parameter is ignored with the set command. The parameter is included in the set command for backwards compatibility reasons only.<br><d_comp> (Data compression)<br>• Applies to SNDCP (Sub Network Dependent Convergence Protocol) only<br>• 0 — (Default) Off.<br>• 1 — On (Manufacturer preferred compression)<br>• 2 — V.42 bis<br><h_comp> (PDP header compression)<br>• 0 — (Default) Off.<br>• 1 — On (Manufacturer preferred compression)<br>• 2 — RFC1144 (applies to SNDCP only)<br>• 3 — RFC2507<br>• 4 — RFC3095 (applies to PDCP only)<br><pd1>, ... <pdN> (<PDP_type>-specific values))<br>• Zero to N string parameters<br>• Parameter meanings are specific to <PDP_type> |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CMEC** | **Mobile equipment control mode**<br><br>**Notes:**<br>• Mandatory when any of keypad, display or indicator or touch screen commands is implemented.<br>• This command has no effect and was only implemented for compatibility.<br>• Parameters are ignored and are not saved in non-volatile memory.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CMEC=[<keyp>[,<disp>[,<ind>[,<tscrn>]]]**<br>Response: OK<br>Purpose: Select the equipment, which operates MT keypad, writes to MT display and sets MT indicators.<br>▪ Query: **AT+CMEC?**<br>Response: +CMEC: <keyp>,<disp>,<ind>,<tscrn><br>OK<br>Purpose: Return the current settings.<br>▪ Query List: **AT+CMEC=?**<br>Response: +CMEC: (list of supported <keyp>s),(list of supported <disp>s),(list of supported <ind>s),(list of supported <tscrn>s)<br>OK<br>Purpose: Return the modes supported as compound values.<br>**Parameters:**<br><keyp> (Integer)<br>▪ Value:<br>• 0—MT can be operated only through its keypad<br>• 1—MT can be operated only from TE<br>• 2—MT can be operated from both MT keypad and TE<br><disp> (Integer)<br>▪ Value:<br>• 0—only MT can write to its display<br><ind> (Integer)<br>▪ Value:<br>• 0—only MT can set the status of its indicators (command +CIND can only be used to read the indicators)<br><tscrn> Integer<br>▪ Value:<br>• 0—only MT can set the status of its indicators<br>• 1—only TE can set the status of MT indicators<br>• 2—MT indicators can be set by both MT and TE |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CMEE** | **Report mobile termination error**<br>Select the method for reporting errors — +CME ERROR with result code, or ERROR.<br><br>**Notes:**<br>• Session must be closed using +KHTTPCLOSE before using this command.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CMEE=[<n>]**<br>Response: OK<br>Purpose: Select the error reporting method.<br>▪ Query: **AT+CMEE?**<br>Response: +CMEE: <n><br>OK<br>Purpose: Display the current error reporting method.<br>▪ Query List: **AT+CMEE=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><n> (CME error reporting state)<br>• 0 — Disabled. Use "ERROR."<br>• 1 — Enabled. Use "+CME ERROR: <err>" with numeric <err> result codes. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CMUX** | **Configure Multiplexing Control Channel**<br>Enable/disable multiplexing protocol control channel over the UART or USB modem port (selected via !MUXMODE).<br>**Notes:**<br>• RC76xx has limitation to access physical ports. When entering CMUX mode, only DLC ports could access. To receive URCs of DLC ports, toggle the DTR of the serial link.<br>**Password required:** No<br>**Requirements:**<br>• AT!MUXMODE must be used to select either the UART or USB port before this command can be used. (The command returns ERROR if a port has not been selected.)<br>**Usage:**<br>▪ Execution: **AT+CMUX=<mode>[,<subset>[,<port_speed>[,N1>[,<T1>[,<N2>[,<T2>[,<T3>[,<k>]]]]]]]]**<br>Response: OK<br>Purpose: Configure the multiplexing control channel.<br>▪ Query: **AT+CMUX?**<br>Response: +CMUX: <mode>,<subset>,<port_speed>,<N1>,<T1>,<N2>,<T2>,<T3>,<k><br>OK<br>Purpose: Report current settings.<br>▪ Query List: **AT+CMUX=?**<br>Purpose: Return the execution command format and the supported parameter values.<br>**Parameters:**<br><mode> (Multiplexer transparency mechanism (mux mode))<br>• 0 — (Default) Basic option<br><subset> (Multiplexer control channel setup)<br>• 0 — (Default) UIH frames<br>• 1 — UI frames<br>• 2 — I frames (Note: Not supported in Basic mux mode (<mode>=0)<br><port_speed> (Transmission rate)<br>• Note: Not supported. Valid value must be specified, but has no effect.<br>• 1 — 9600 bps<br>• 2 — 19200 bps<br>• 3 — 38400 bps<br>• 4 — 57600 bps<br>• 5 — 115200 bps<br>• 6 — 230400 bps |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CMUX** | **Configure Multiplexing Control Channel**<br><N1> (Frame size, in bytes)<br>• Valid range: 1–32786<br>• Default: 31<br>• Note — Selected size should be large enough to contain a complete protocol frame. The default value is recommended.<br><T1> (Acknowledgement Timer, in 0.01 second increments)<br>• Note: Not supported. Valid value must be specified, but has no effect.<br>• Valid range: 1–255<br>• Default: 10<br><N2> (Number of re-transmissions)<br>• Valid range: 0–100<br>• Default: 3<br><T2> (Response timer for multiplexer control channel, in 0.01 second increments)<br>• Valid range: 2–255<br>• Default: 30<br><T3> (Wake-up timer, in seconds)<br>• Valid range: 1–255<br>• Default: 10<br><k> (Window size )<br>• Note: Not supported. Valid value must be specified, but has no effect.<br>• Valid range 1 — 7<br>• Default: 2 |

Table 4-2: Modem Status Command Details (Continued)

| Command | Description |
|---|---|
| **+CPSMS** | **Configure Power Saving Mode (PSM)**<br>Enable/disable and configure the UE's Power Saving Mode parameters.<br><br>**Notes:**<br>• This implementation of +CPSMS follows 3GPP TS 27.007, with exceptions as noted in the parameter descriptions.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CPSMS=<mode>[, <Requested_Periodic-RAU>], [<Requested_GPRS-READY-timer>], [<Requested_Periodic-TAU>], [<Requested_Active-Time>]**<br>Response: OK<br>or<br>+CME ERROR: <err><br>Purpose: Enable/disable PSM, and configure PSM settings.<br>▪ Query: **AT+CPSMS?**<br>Response: +CPSMS: <mode>, [<Requested_Periodic-RAU>], [<Requested_GPRS-READY-timer>], [<Requested_Periodic-TAU>], [<Requested_Active-Time>]<br>OK<br>Purpose: Report current PSM status and settings.<br>▪ Query List: **AT+CPSMS=?**<br>Purpose: Return the execution command format and the supported parameter values.<br><br>**Parameters:**<br><mode> (Enable/Disable PSM)<br>• 0 — Disable PSM<br>• 1 — Enable PSM<br><Requested_Periodic-RAU> (3G Routing Area Update timer)<br>• Leave blank, not used.<br><Requested_GPRS-READY-timer> (2G timer)<br>• Leave blank, not used.<br><Requested_Periodic-TAU> (TAU timer — Amount of time UE will be dormant before timer wakes it)<br>• One byte (8 bits) represented as a string. For coding and value range details, refer to the +CPSMS description in 3GPP TS 27.007.<br>• Default — "00011000" = 4 hours<br>• e.g. "01000111" = 70 hours<br><Requested_Active-Time> (Amount of time UE will remain active (idle) before re-entering PSM)<br>• One byte (8 bits) represented as a string. For coding and value range details, refer to the +CPSMS description in 3GPP TS 27.007.<br>• Default — "00001010" = 20 seconds<br>• e.g. "00100100" = 4 minutes |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CPWROFF** | **Power Off**<br><br>**Notes:**<br>• If no <mode> is specified for the execution command, the module sends an IMSI detach request to the network before powering down.<br>• If <mode>=1 is specified for the execution command, the module performs a fast power down (~1s faster than not specifying the <mode>) without sending an IMSI detach request to the network.<br>• The module can be woken by setting POWER_ON_N low to turn on the system.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CPWROFF [=<mode>]**<br>Response: OK<br>or<br>ERROR<br>Purpose: Power off the module using selected mode.<br>▪ Query List: **AT+CPWROFF=?**<br>Purpose: Display currently selected power off mode.<br>**Parameters:**<br><mode> (Power off mode)<br>• 1 — Fast power down mode |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CSQ** | **Display signal quality**<br>Display the current signal strength and BER. Unsolicited notifications indicating changes in these values can also be received via +CSQ (notification).<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CSQ**<br>Response: +CSQ: <rssi>,<ber><br>OK<br>or<br>+CME ERROR: <err><br>Purpose: Display the current signal strength and BER.<br>▪ Query List: **AT+CSQ=?**<br>Purpose: Display the range of possible values for signal strength and BER.<br>**Parameters:**<br><rssi> (Received Signal Strength Indication offset value)<br>• Integer value. Each step represents 2 dBm increase from base value<br>• 0: -113 dBm or less<br>• 1–30: -111 to -53 dBm<br>• 31: -51 dBm or greater<br>• 99: Not known, or not detectable<br><ber> (Channel Bit Error Rate, in percent)<br>• Integer value.<br>• 0–7: As RXQAL values in the table in 3GPP TS 45.008 subclause 8.2.4<br>• 99: Not known, or not detectable |
| **+CSQ (notification)** | **RSSI change across threshold — Unsolicited notification**<br>Unsolicited notification indicating the signal strength (<rssi>) has changed.<br>To enable +CSQ (and other notifications), use AT+WUSLMSK.<br><br>**Notification format:**<br>**+CSQ: <rssi>,<ber>**<br>**Examples:**<br>• Notification received:<br>+CSQ: 20,99<br>Signal strength (RSSI) -33 dBm, with bit error ration (BER) not known/not detectable<br>**Parameters:**<br><rssi> (Received Signal Strength Indication offset value)<br>• As defined in +CSQ.<br><ber> (Channel Bit Error Rate, in percent)<br>• As defined in +CSQ. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!CUSTOM** | **Set/return customization settings**<br>Set or return several customization values.<br><br>**Notes:**<br>• Some customizations may not be available for certain chipsets, firmware revisions, or devices.<br>**Password required:** Yes (Execution only) (see !ENTERCND for details)<br><br>**Usage:**<br>▪ Execution: **AT!CUSTOM=<customization>, <value>**<br>Response: OK<br>Purpose: Display the customization and value.<br>▪ Query: **AT!CUSTOM?**<br>Response: (list of enabled <feature>s)<br>OK<br>Purpose: Display features that are currently enabled.<br>▪ Query list: **AT!CUSTOM=?**<br>Response: (list of all <customization>s supported)<br>!CUSTOM:<br>"GPSENABLE"<br>"GPSLPM"<br>"GPIOSARENABLE"<br>"GPSSEL"<br>"GPSREFLOC"<br>"IMSWITCHHIDE"<br>"IMCONFIG" |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| | **Set — query customization settings**<br>"WAKEHOSTEN"<br>"SIMHOTSWAPDIS"<br>"CFUNPERSISTEN"<br>"QMIDETACHEN"<br>"UIM2ENABLE"<br>"NETWORKNAMEFMT"<br>"SIMLPM"<br>"USBSERIALENABLE"<br>"PCSCDISABLE"<br>"DHCPRELAYENABLE"<br>"FLOWNOTIDISABLE"<br>"FASTENUMEN"<br>"CSVOICEREJECT"<br>"IPCHANNELRATEEN"<br>"SINGLEAPNSWITCH"<br>"DGENABLE"<br>"TXONINDICATION"<br>"BANDSELEN"<br>"EXITSPYMODEENABLE"<br>"POWERFAULTENABLE"<br>"OSAENABLE"<br>"BOOTQUIETDISABLE"<br>"FASTBOOTEN"<br>"EXTUIMSWITCHEN"<br>"JAMENABLE"<br>"STKUIEN"<br>"BOOTUARTDLOADEN"<br>"EXTGPSLNAEN"<br>"CSDDISABLE"<br>"BPMODEEN"<br>"UIMAUTOSWITCH"<br>"ICMPINTSRVDIS"<br>"LTECOEXUARTENABLE"<br>"SNTPEN"<br>"UAUDLOADDISABLE"<br>"QXDMLOGENABLE"<br>OK<br>Purpose: Return a list of valid <customization> values. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!CUSTOM (continued)** | **Set — query customization settings**<br>**Parameters:**<br><value> (Value being assigned to a specific <customization> setting)<br>• Value of customization as decimal value. For hex input, precede value with '0x'<br><customization> (String identifying customization setting. The default value for all customizations is 0.)<br>*Note:*<br>▪ *Use quotation marks around the customization string. For example, AT!CUSTOM= 'CSDOFF',0.*<br>▪ *Some commands are for SWI internal use only.*<br>▪ *When GPSLPM and GPSREFLOC are enabled, their features will not be displayed in the output.*<br>• "BANDSELEN" — Band selection<br>• <value>:<br>▪ 0x00 - Disable band select (Default)<br>▪ 0x01 - Enable band select<br>• "BPMODEEN" — Enable/disable Bit Pipe mode<br>• <value>:<br>▪ 1 — Enable<br>▪ 0 — Disable<br>• "BOOTQUIETDISABLE" — Enable/disable BOOTQUIET feature<br>• <value>:<br>▪ 0x00 - Enable BOOTQUIET<br>▪ 0x01 - Disable BOOTQUIET (Default)<br>• "BOOTUARTDLOADEN" — Enable/disable firmware download over UART on bootloader.<br>• <value>:<br>▪ 0 — Disable UART download. F/W download over USB only (Default)<br>▪ 1 — Enable UART download. F/W download over USB and UART. Bootloader download mode falls back to UART after USB mode timeout.<br>▪ If the "UAUDLOADDISABLE" customization has been used to disable firmware download, this customization is ignored.<br>• "CFUNPERSISTEN" — Enable/disable persistence (across power cycles) of AT+CFUN setting.<br>• <value>:<br>▪ 0 — Disable (+CFUN setting does not persist across power cycle)<br>Note: If the modem is in P-LPM (persistent low power mode — AT+CFUN mode 0) when this option is used, persistence remains enabled until the modem is put into online mode using an AT or QMI command.<br>▪ 1 — Enable (+CFUN setting persists across power cycle)<br>▪ Note: This customization does not affect operating mode persistence set using other interfaces. For example, the QMI interface can still be used to set the operating mode to LPM or P-LPM, even if this customization is disabled.<br>• "CSDDISABLE" — Disable/enable CSD call<br><value>:<br>▪ 0 — Enable (Default)<br>▪ 1 — Disable |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!CUSTOM** | **Set — query customization settings**<br>• "CSVOICEREJECT" — Enable / disable CS voice rejection<br><value>:<br>▪ 0x00 — No voice rejection (Default)<br>▪ 0x01 — Reject paging type 1 and 2 for voice calls<br>▪ 0x02 — Reject MT voice and MT CSD/UDI calls (cause #88)<br>▪ 0x03 — Accept MT voice and reject MT CSD / UDI calls (cause #88)<br>▪ 0x04 — Reject MT voice (cause #65) and MT CSD (cause #88)<br>• "DHCPRELAYENABLE" — Enable / disable DHCP relay feature.<br><value>:<br>▪ 0 — Disable (Default). Modem filters DHCP requests into internal DHCP server.<br>▪ 1 — Enable. DHCP requests (packets for port 67 with target IP address of DHCP server) go out over the network.<br>• "DGENABLE" — Enable / disable Dying Gasp feature<br><value>:<br>▪ 0x00 — Disable (Default)<br>▪ 0x01 — Enable sending SMS for Dying Gasp<br>▪ 0x02 — Enable sending detach for Dying Gasp<br>• "EXITSPYMODEENABLE" — Enable / disable "exit spymode".<br><value>:<br>▪ 0x00 — Disable (Default)<br>▪ 0x01 — Enable<br>• "EXTGPSLNAEN" — Enable/disable external GPS LNA<br><value>:<br>▪ 0x00 — Disable<br>▪ 0x01 — (Default) Enable<br>• "EXTUIMSWITCHEN" — Enable / disable control of fast SIM switching feature (see +KSIMSEL on page 220 for details)<br><value>:<br>▪ 0 — Disable (Default)<br>▪ 1 — Enable |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!CUSTOM** | **Set/query customization settings**<br>• "FASTBOOTEN" — Enable/disable fast boot.<br><value>:<br>▪ 0x00 — Disable (Default)<br>▪ 0x01 — Enable<br>• "FASTENUMEN" — Enable/disable fast enumeration for warm/cold boot.<br><value>:<br>▪ 0 — Disable fast enumeration (Default)<br>▪ 1 — Enable fast enumeration for cold boot and disable for warm boot<br>▪ 2 — Enable fast enumeration for warm boot and disable for cold boot<br>▪ 3 — Enable fast enumeration for warm and cold boot<br>• "FLOWNOTIDISABLE" — Enable/disable QoS QMI notification events.<br><value>:<br>▪ Bit 0: Disable flow activated event<br>▪ Bit 1: Disable flow modified event<br>▪ Bit 3: Disable flow deleted event<br>▪ Bit 4: Disable flow suspended event<br>▪ Bit 5: Disable flow enabled event<br>▪ Bit 6: Disable flow disabled event<br>• "GPIOSARENABLE" — Indicate whether SAR backoff is controlled by GPIOs or by AT commands.<br><value>:<br>▪ 0 — Controlled by AT commands (default)<br>▪ 1 — Controlled by GPIOs<br>• "GPSENABLE" — Enable/disable the GPS feature.<br><value>:<br>▪ 0 — GPS disabled<br>▪ 1 — GPD enabled<br>• "GPSLPM" — Enable/disable GPS in Low Power Mode.<br><value>:<br>▪ 0 — Enable (Default). GPS engine remains enabled when modem enters LPM.<br>▪ 1 — Disable. GPS engine is disabled when modem enters LPM.<br>• "GPSREFLOC" — Enable/disable reference GPS location reporting.<br><value>:<br>▪ 0 — Enable (Default)<br>▪ 1 — Disable |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!CUSTOM** | **Set/query customization settings**<br>• "GPSSEL" — Select antenna to use for GPS.<br><value>:<br>▪ 0 — Use dedicated GPS antenna<br>▪ 1 — GPS antenna is shared with RxD antenna<br>*Note: GPSSEL is not supported on RC76*<br>• "ICMPINTSRVDIS" — Bitmask for disablement of Modem internal ICMP service<br><value>:<br>▪ 0x00 — Enable IPv4 ICMP service<br>▪ 0x01 — Disable IPv4 ICMP service<br>When internal ICM service is enabled, the modem is capable of replying to ping requests in an LTE attached state without a host or embedded data connection.<br>*Note: IPV6/ICMPV6 stack is always enabled and cannot be disabled.*<br>• "IMCONFIG" — Bitmask to disable/enable selected Image Switching (IM) features. If a bit is set, then the feature is disabled.<br><value>:<br>▪ 0x00 - All IM features enabled (Default)<br>▪ 0x01 - Disable device-based IM<br>▪ 0xFF - Disable all IM features<br>• "IMSWITCHHIDE" — Show/hide Multi-Image Management<br><value>:<br>▪ 0 — Show (Default)<br>▪ 1 — Hide<br>• "IPCHANNELRATEEN" — Disable/Enable IP Channel Rate Feature. If this feature is enabled, a one-second timer will be activated in the modem to compute the average channel rate per second for the current data connection.<br><value>:<br>▪ 0 — Disable (Default)<br>▪ 1 — Enable<br>• "JAMENABLE" — Enable/disable jamming feature.<br><value>:<br>▪ 0x00 — Disable (Default)<br>▪ 0x01 — Enable<br>• "LTECOEXUARTENABLE" — Enable/disable Wi-Fi/LTE Coexistence<br><value>:<br>▪ 0 — Disable (Default)<br>▪ 1 — Enable feature (used on GPIO35 if configured using +WIOCFG)<br>▪ NOTE: This feature cannot be used with UART1 DSR pin. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!CUSTOM** | **Set/query customization settings**<br>• "NETWORKNAMEFMT" — Display format for MBIM network provider name when device is roaming<br><value>:<br>▪ 0 — SPN, LongName, or ShortName in order of priority (default QCT behavior)<br>▪ 1 — LongName or ShortName<br>▪ 2 — [SPN] - [LongName/ShortName] (possibly truncated)<br>▪ 3 — [LongName/ShortName] - [SPN] (possibly truncated)<br>• "OSAENABLE" — Enable/disable OSA (Open SIM Access).<br><value>:<br>▪ 0x00 — Disable (Default)<br>▪ 0x01 — Enable<br>• "PCSCDISABLE" — Determine functionality of PCSC, GSM Algorithm and Authenticate commands, and +CIMI command.<br><value>:<br>▪ 0–7 (Default value: 0 — all functions enabled)<br>▪ Bit 0: Disable PCSC (0=Disable)<br>▪ Bit 1: Disable GSM Algorithm and Authenticate commands (0=Default)<br>▪ Bit 2: AT+CIMI outputs IMSI (0=Default<br>• "POWERFAULTENABLE" — Enable/disable power fault.<br><value>:<br>▪ 0x00 — Disable (Default)<br>▪ 0x01 — Enable<br>• "QMIDETACHEN" — Enable/disable QMI NAS Detach<br><value>:<br>▪ 0 — QMI detach request returns NO_EFFECT response, and no action taken<br>▪ 1 — QMI detach request is acted on, and appropriate response is returned based on detach result<br>• "QXMDLOGENABLE"—Disable/enable QXDM logs.<br><value>:<br>▪ 0x00 — Disable<br>▪ 0x01 — Enable<br>▪ Note: When you set QXDMLOGENABLE, it only becomes effective on the next boot. For 0x00, device reset is required for QXDM reconnection.<br>• "SIMHOTSWAPDIS" — Configure SIM hotswap feature on UIM1 or UIM2.<br><value>:<br>▪ 0 — Enable UIM1 and UIM2<br>▪ 1 — Disable UIM1, enable UIM2<br>▪ 2 — Enable UIM1, disable UIM2<br>▪ 3 — Disable UIM1 and UIM2<br>• "SIMLPM" — Indicate default SIM power state during AT-controlled Low Power Mode.<br><value>:<br>▪ 0 — QCT default behavior (same as <value>=2)<br>▪ 1 — SIM remains powered in LPM<br>▪ 2 — Power down SIM with AT+CFUN=0; Power up SIM with AT+CFUN=1 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!CUSTOM** | **Set/query customization settings**<br>• "SINGLEAPNSWITCH" — Modem operations after switching to a new APN.<br><value>:<br>▪ 0x00 — Do nothing (Default)<br>▪ 0x01 — Device detaches after switching to a new APN<br>• "SMSWAKE" — Enable / disable SMS Wake.<br><value>:<br>▪ 0 — Disable SMS Wake functionality<br>▪ 1 — Enable SMS Wake functionality<br>▪ xx — 32-bit hex value for wakeMask, not applicable when WAKE functionality is disabled<br>• "SMSWAKEWIDTH" — For SMS Wake Signal Width in milliseconds<br><value>:<br>▪ xx — uint16 non-zero decimal value for SMS WAKE signal width in millisecond<br>▪ Example: at!smswakewidth=5000<br>• "SNTPEN" — Bitmask configuration for SNTP client to obtain the time when NITZ is unavailable.<br><value>:<br>▪ 0x00 — Enable modem SNTP<br>▪ 0x01 — SNTP autoconnect. Allows SNTP client to initiate data connection instead of waiting for user-initiated connection.<br>▪ 0x04 — Retry on SNTP failure. Allows SNTP client to retry connection. Maximum number of retries is module-dependent.<br>▪ Note: If enabled, data usage charges may be incurred if NITZ time is not provided by the network.<br>• "STKUIEN" — Indicates if host should display SIM Toolkit menu item.<br><value>:<br>▪ 0 — STK UI enabled via QMI (Default)<br>▪ 1 — Reserved<br>▪ 2 — STK UI enabled via AT<br>• "TXONINDICATION" — Enable/disable TX_ON indication.<br><value>:<br>▪ 0x00 — Disable (Default)<br>▪ 0x01 — Enable<br>• "UAUDLOADDISABLE" — Enable/disable firmware download via unauthenticated channels such as local UART, USB, and X-MODEM interfaces.<br><value>:<br>▪ 0 — (Default) Unauthenticated download enabled<br>▪ 1 — Unauthenticated download disabled, excluding firmware launch failure<br>▪ 2 — Unauthenticated download disabled, including firmware launch failure<br>▪ Important notes:<br>▪ This customization can be used only to disable firmware download. Once disabled, it cannot be re-enabled.<br>▪ If disabled, BOOTUARTDLOADEN customization cannot be used and existing values are ignored.<br>▪ If option 2 is selected, the device may be unrecoverable if a firmware launch failure occurs, since there is no way to update the firmware. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!CUSTOM** | **Set/query customization settings**<br>• "UIMAUTOSWITCH" — Enable/disable Automatic SIM switching ("Auto-SIM-Switch mode").<br><value>:<br>▪ 0 — Disable automatic SIM switching<br>▪ 1 — Enable, UIM Slot 1 preferred (external SIM)<br>▪ 2 — Enable, UIM Slot 2 preferred (eSIM)<br>• "UIM2ENABLE" — Enable/disable UIM2 slot support.<br><value>:<br>▪ 0 — Disable (Default)<br>▪ 1 — Enable<br>• "USBSERIALENABLE" — Use serial number in USB Descriptor<br><value>:<br>▪ 0 — Default (same as 1)<br>▪ 1 — Use FSN as serial number in USBD<br>▪ 2 — Do not use any serial number in USBD<br>• "WAKEHOSTEN" — Enable/disable host wake-up via SMS or incoming data packet.<br><value>:<br>▪ 0—3<br>▪ 0x81—0x83<br>▪ Bit 0: Wake host by SMS<br>▪ 0—Disabled<br>▪ 1—Enabled<br>▪ Bit 1: Wake host by incoming data<br>▪ 0—Disabled<br>▪ 1—Enabled<br>▪ Bit 7: Whether bypass host sleep state is checking when WAKE pin is pulled<br>▪ 0—Check host sleep state<br>▪ 1—Bypass host sleep state checking |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CVMOD** | **Set/query voice call mode**<br>Set command selects the voice call mode for making a Mobile Originated voice call from the module.<br>**Notes:**<br>• Insert SIM before executing this command.<br>**Usage:**<br>▪ Execution: **AT+CVMOD=<voice_mode>**<br>Response: OK<br>or<br>ERROR<br>Purpose: Set the voice call mode.<br>▪ Query: **AT+CVMOD?**<br>Response: +CVMOD: <voice_mode><br>OK<br>Purpose: Query the current voice call mode.<br>▪ Query List: **AT+CVMOD=?**<br>Response: +CVMOD: (list of supported <voice_mode>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><voice_mode> Integer (voice call mode)<br>• 0 — CS_ONLY<br>• 1 — VOIP_ONLY<br>• 2 — CS_PREFERRED<br>• 3 — VOIP_PREFERRED |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+CVMOD** | **Set/query voice call mode**<br>Set command selects the voice call mode for making a Mobile Originated voice call from the module.<br>**Notes:**<br>• Insert SIM before executing this command.<br>**Usage:**<br>▪ Execution: **AT+CVMOD=<voice_mode>**<br>Response: OK<br>or<br>ERROR<br>Purpose: Set the voice call mode.<br>▪ Query: **AT+CVMOD?**<br>Response: +CVMOD: <voice_mode><br>OK<br>Purpose: Query the current voice call mode.<br>▪ Query List: **AT+CVMOD=?**<br>Response: +CVMOD: (list of supported <voice_mode>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><voice_mode> Integer (voice call mode)<br>• 0 — CS_ONLY<br>• 1 — VOIP_ONLY<br>• 2 — CS_PREFERRED<br>• 3 — VOIP_PREFERRED |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!ECMENABLE** | **Enable/disable ECM mode**<br>Enable ECM or disable the feature.<br><br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!ECMENABLE=<mode>**<br>Response: OK<br>Purpose: Enable or disable ECM feature.<br>▪ Query: **AT!ECMENABLE?**<br>Response: !ECMENABLE: <mode><br>OK<br>Purpose: Report current state of ECM feature.<br>▪ Query List: **AT!ECMENABLE=?**<br>Purpose: Return the execution command format and the supported parameter values.<br>**Parameters:**<br><mode> (CMUX feature state)<br>· 0 — Disable (Default)<br>· 1 — Enable ECM |
| **!GCFEN** | **Enable/disable GCF testing mode**<br>**Password required:** Yes (Execution)<br><br>**Usage:**<br>▪ Execution: **AT!GCFEN=<mode>**<br>Response: OK<br>Purpose: Set GCF testing mode state.<br>▪ Query: **AT!GCFEN?**<br>Response: !GCFEN:<br><mode><br><br>OK<br>Purpose: Display current GCF testing mode state.<br>▪ Query List: **AT!GCFEN=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><mode> (GCF testing mode state)<br>· 0 — GCF mode disabled (Default)<br>· 1 — GCF mode enabled |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!GSTATUS** | **Return operational status**<br>Return specific details about the current operational status of the modem.<br><br>**Important:** *Response details vary depending on the current RAT, and may evolve from release to release. Parameter descriptions show all possible values—actual supported values vary depending on module type and current RAT. Contact Semtech for further details if required.*<br><br>**Password required:** No<br><br>**Usage:**<br>▪ Query: **AT!GSTATUS?**<br>Response (As noted above, details vary depending on RAT and module type.):<br>!GSTATUS:<br><param_label>: <param> [[<param_label>:]<param>]<br>...<br>OK<br>Purpose: Display details about the modem's current operational state. Details shown will vary depending on the current RAT, module type, and firmware release.<br>**Example:**<br>!GSTATUS:<br>Current Time: <ctime>Temperature:<temp><br>Reset Counter: <rstcount>Mode:<mode><br>System mode: <smode>PS state:<PSstate><br>IMS Reg State: <imsstate>IMS mode:<ims mode><br>IMS Service: <imssrvstatus><br>WCDMA band: <wband><br>WCDMA channel: <wchan><br>GMM (PS) state: <gmmstate> <gmmsubstate><br>MM (CS) state: <mmstate> <mmsubstate><br><br>WCDMA L1 State: <wrstate>LAC:<LAC><br><br>RRC State: <wrstate>Cell ID:<Cell ID><br>RxMRSSI C0: <wrxlev>RxDRSSI C0:<wrxlev><br>RxMRSSI C1: <wrxlev>RxDRSSI C1:<wrxlev><br><br>OK<br>**Parameters:**<br><param_label><br>• Parameter description. e.g. "WCDMA channel"<br><param><br>• Parameter value. Refer to the parameter descriptions listed below. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!GSTATUS** | **Return operational status**<br><cband> ("CDMA band")<br>• ASCII string (quotation marks do not appear):<br>  • "US Cellular"<br>  • "US PCS"<br>  • "JTACS"<br>  • "JCDMA"<br>  • "Korean PCS"<br>  • "NMT"<br>  • "IMT"<br>  • "No band"<br><cchan> ("CDMA channel" — CDMA Rx channel)<br>• decimal<br><Cell ID> ("Cell ID")<br>• Hex (decimal)<br><cnid> ("NID" — CDMA Network ID)<br>• decimal<br><csid> ("SID" — CDMA System ID)<br>• decimal<br><ctime> ("Current Time" — Number of seconds since the system booted/rebooted)<br>• 32-bit decimal<br><ecio> ("ECIO (db)" — Ratio of received pilot energy (Ec) to total received energy)<br>• -31.5 to 0<br><emmcon> ("EMM connection" — Current EMM connection state)<br>• ASCII string (quotation marks do not appear):<br>  • "RRC Idle"<br>  • "Waiting RRC Cfm"<br>  • "RRC Connecting"<br>  • "RRC Releasing"<br><emmstate> ("EMM state" first field — Current EMM state)<br>• ASCII string (quotation marks do not appear):<br>  • "Deregistered"<br>  • "Reg Initiated"<br>  • "Registered"<br>  • "TAU Initiated"<br>  • "SR Initiated"<br>  • "Dereg Initiated"<br>  • "Invalid"<br>  • "NULL" |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!GSTATUS** | **Return operational status**<br><emmsubstate> ("EMM state" second field — Current EMM sub-state)<br>• ASCII string (quotation marks do not appear):<br>  • For <emmstate> = "Deregistered":<br>  ▪ "No IMSI"<br>  ▪ "PLMN Search"<br>  ▪ "Attach Needed"<br>  ▪ "No Cell"<br>  ▪ "Attaching"<br>  ▪ "Normal Service"<br>  ▪ "Limited Service"<br>  ▪ "Waiting for PDN"<br>  • For <emmstate> = "Reg Initiated":<br>  ▪ "Waiting for NW"<br>  ▪ "Waiting for ESM"<br>  • For <emmstate> = "Registered":<br>  ▪ "Normal Service"<br>  ▪ "Update Needed"<br>  ▪ "Attempt Update"<br>  ▪ "No Cell"<br>  ▪ "PLMN Search"<br>  ▪ "Limited Service"<br>  ▪ "MM Update"<br>  ▪ "IMSI Detach"<br>  ▪ "Waiting for ESM"<br>  • For all other <emmstate>s:<br>  ▪ "---"<br><br><gband> ("GSM band" — Current GSM band being accessed (TCH or BCCH))<br>• ASCII string (quotation marks do not appear):<br>  • "GSM850"<br>  • "GSM900"<br>  • "DCS1800"<br>  • "PCS1900"<br>  • "Unknown"<br><br><gchan> ("GSM channel" — GSM channel number)<br>• 32-bit decimal ASCII<br><br><gmmstate> ("GMM (PS) state" first field — Current GMM state)<br>• ASCII string (quotation marks do not appear):<br>  • "DEREGISTERED"<br>  • "Registering"<br>  • "REGISTERED"<br>  • "Deregistering"<br>  • "RA updating"<br>  • "Requesting srvc"<br>  • "NULL" |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!GSTATUS** | **Return operational status**<br><gmmsubstate> ("GMM (PS) state" second field — Current GMM sub-state)<br>• ASCII string (quotation marks do not appear):<br>  • "NORMAL SERVICE"<br>  • "LIMITED SERVICE"<br>  • "ATT NEEDED"<br>  • "ATTEMPTING ATT"<br>  • "NO IMSI"<br>  • "NO SERVICE"<br>  • "PLMN SEARCH"<br>  • "SUSPENDED"<br>  • "UPDATE NEEDED"<br>  • "UPDATING"<br>  • "DEATACHING"<br>  • "---" — No sub-state, or a sub-state not defined in this command<br><gstate> ("GPRS State" — State of GMM ↔ LLC interface)<br>• ASCII string (quotation marks do not appear):<br>  • "GPRS IDLE"<br>  • "GPRS READY"<br>  • "GPRS STANDBY"<br><hccode> ("Color code" — HDR color code)<br>• decimal<br><hpoff> ("PN offset" — HDR PN offset)<br>• decimal<br><hscid> ("Sector ID" — HDR sector ID)<br>• 32 hexadecimal digits in eight groups of four digits, separated by ":"<br>• Example:<br>ABCD:EF12:3456:7890:ABCD:EF23:ED45:B2C3<br><hsmsk> ("Subnet mask" — HDR subnet mask)<br>• decimal<br><ims mode> ("IMS mode")<br>• ASCII string (quotation marks do not appear):<br>  • "Normal"<br>  • "Test"<br>  • "Not Support" — Device is not configured with IMS<br><IMS state> ("IMS Reg State" — IMS registration state)<br>• ASCII string (quotation marks do not appear):<br>  • "NOT REGISTERED"<br>  • "REGISTERED"<br>  • "UNKNOWN" |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!GSTATUS** | **Return operational status**<br><imssrvstatus> ("IMS Service" — IMS Registered Server status)<br>• ASCII string (quotation marks do not appear):<br>  • "NO SMS,NO VoIP"<br>  • "NO SMS,FULL VOIP"<br>  • "LIMITED SMS,NO VOIP"<br>  • "LIMITED SMS,FULL VOIP"<br>  • "FULL SMS,NO VoIP"<br>  • "FULL SMS,FULL VoIP"<br>  • "LIMITED SMS,UNKNOWN VoIP"<br>  • "UNKNOWN SMS,UNKNOWN VoIP"<br><io> ("IO (dBm)" — Total received energy (Io))<br>• -106 to -21<br><lac> ("LAC" — Location Area Code)<br>• Hex (decimal)<br><lband> ("LTE band")<br>• ASCII string (quotation marks do not appear):<br>  • "B1" .. "B41"<br>  • "No band"<br><lbw> ("LTE bw" — LTE bandwidth)<br>• ASCII string (quotation marks do not appear):<br>  • "1.4 MHz"<br>  • "3 MHz"<br>  • "5 MHz"<br>  • "10 MHz"<br>  • "15 MHz"<br>  • "20 MHz"<br>  • "Unknown"<br><lrchan> ("LTE Rx chan" — LTE Rx channel)<br>• decimal<br><ltchan> ("LTE Tx chan" — LTE Tx channel)<br>• decimal |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!GSTATUS** | **Return operational status**<br><mmstate> ("MM (CS) state" first field — Current MM state)<br>• ASCII string (quotation marks do not appear):<br>  • "NULL"<br>  • "IDLE"<br>  • "LA Rejected"<br>  • "LA Start"<br>  • "CONNECTED"<br>  • "Network Command"<br>  • "IMSI Detach"<br>  • "Wait RR Active"<br>  • "Wait RR LU"<br>  • "Wait RR Detach"<br>  • "Wait RR MM"<br>  • "Wait MM"<br>  • "Wait add'l MM"<br>  • "Wait Re-est Dec"<br>  • "Wait RR Re-est"<br>  • "Re-est"<br>  • "LU Pending"<br>  • "Rel not allowed"<br>  • "Prompt"<br><mmsubstate> ("MM (CS) state" second field — Current MM sub-state)<br>• ASCII string (quotation marks do not appear):<br>  • "NORMAL SERVICE"<br>  • "LIMITED SERVICE"<br>  • "NO IMSI"<br>  • "NO SERVICE"<br>  • "PLMN SEARCH"<br>  • "UPDATE NEEDED"<br>  • "UPDATING"<br>  • "ECALL INACTIVE"<br>  • "---" — No sub-state, or a sub-state not defined in this command<br><mode> ("Mode" — Current module mode)<br>• ASCII string (quotation marks do not appear):<br>  • "POWERING OFF"<br>  • "FACTORY TEST"<br>  • "OFFLINE"<br>  • "ONLINE"<br>  • "LOW POWER MODE"<br>  • "RESETTING"<br>  • "NETWORK TEST"<br>  • "OFFLINE REQUEST"<br>  • "PSEUDO ONLINE"<br>  • "RESETTING MODEM"<br>  • "Unknown" |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!GSTATUS** | **Return operational status**<br><PSstate> ("PS state" — Current PS state of module)<br>• ASCII string (quotation marks do not appear):<br>  • "Attached"<br>  • "Not attached"<br><ri> ("Roaming Indicator")<br>• decimal<br><rsrp> ("RSRP (dBm)" — Reference Signal Receive Power)<br>• -140 to -44<br><rsrq> ("RSRQ (dB)" — Reference Signal Receive Quality)<br>• -20 to -3<br><rssi> ("RSSI", "RxM RSSI", "PCC RxM RSSI" — Total received power)<br>• -120 to 0<br><rstcount> "Reset Counter" — Number of resets since last power cycle)<br>• 32-bit decimal<br>• Value resets to 0 on power cycle/power on/off.<br>• Value increments when a hardware or software reset is performed.<br><rxdivpwr> ("RX1 (dBm)" — Diversity received power)<br>• -106 to -21<br><sinr> ("SINR (dB)" — Signal to Interference plus Noise)<br>• -20 to +30<br><smode> ("System mode" — Current system mode)<br>• ASCII string (quotation marks do not appear):<br>  • "None"<br>  • "No service"<br>  • "AMPS"<br>  • "CDMA"<br>  • "GSM"<br>  • "HDR"<br>  • "WCDMA"<br>  • "GPS"<br>  • "WCDMA+GSM"<br>  • "WLAN"<br>  • "LTE"<br>  • "GWL"<br>  • "TD-SCDMA"<br>  • "eHRPD"<br>  • "Unknown"<br><tac> ("TAC" — Tracking Area Code)<br>• Hex (decimal)<br><temp> ("Temperature" — Temperature (approximate) in °C, accurate within ~5 °C)<br>• 32-bit decimal<br><txpwr> ("Tx Power" — Transmit Power)<br>• -100 to +100<br>• "--" — No transmission |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!GSTATUS** | **Return operational status**<br><wband> ("WCDMA band" — Current WCDMA band being accessed)<br>• ASCII string (quotation marks do not appear):<br>  • "WCDMA 2100"<br>  • "WCDMA 1900"<br>  • "WCDMA BC3"<br>  • "WCDMA 1700"<br>  • "WCDMA 800"<br>  • "WCDMA 900"<br>  • "WCDMA BC9"<br>  • "WCDMA BC11"<br>  • "WCDMA BC19"<br><wchan> ("WCDMA channel" — WCDMA channel number)<br>• 32-bit decimal ASCII<br><wrstate> ("WCDMA L1 State", "RRC State" — WCDMA RRC state)<br>• ASCII string (quotation marks do not appear):<br>  • "DISCONNECTED"<br>  • "CONNECTING"<br>  • "CELL_FACH"<br>  • "CELL_DCH"<br>  • "CELL_PCH"<br>  • "URA_PCH"<br>  • "State N/A"<br>  • "---"<br><wrxlev> ("RxDRSSI", "RxMRSSI" — Receive power in dBm)<br>• decimal<br><wstate> ("WCDMA L1 state")<br>• ASCII string (quotation marks do not appear):<br>  • "L1M_IDLE"<br>  • "L1M_FS"<br>  • "L1M_ACQ"<br>  • "L1M_BCH"<br>  • "L1M_PCH"<br>  • "L1M_FACH"<br>  • "L1M_DCH"<br>  • "L1M_DEACTIVE"<br>  • "L1M_PCH_SLEEP"<br>  • "L1M_DEEP_SLEEP"<br>  • "L1M_STOPPED"<br>  • "L1M_SUSPENDED"<br>  • "L1M_PCH_BPLMN"<br>  • "L1M_WAIT_TRM_STOP"<br>  • "---" |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!HWID** | **Read hardware ID**<br>Return the module's hardware ID, which combines the major and minor version number.<br>**Password required:** Yes<br><br>**Usage:**<br>▪ Query: **AT!HWID?**<br>Response: Revision: <MajorVer>.<MinorVer><br>OK<br>Purpose: Display the module's hardware ID.<br>▪ Query List: **AT!HWID=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><MajorVer> (Major version number)<br>▪ Valid range: 0–9<br><MinorVer> (Minor version number)<br>▪ Valid range: 0–9<br>**Example:**<br>▪ AT!HWID?<br>Revision: 1.7<br>OK |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **I** | **Display product identification information**<br>Display the module's hardware and firmware identification information.<br>**Password required:** No<br><br>**Usage:**<br>▪ Query: **ATI[<n>]**<br>Response (if <n> is 0–7, 10-255, or not entered):<br>Manufacturer: <manufacturer><br>Model: <model><br>Revision: <revision><br>ESN: <esn><br>IMEI: <imei><br>IMEI SV: <imeisv><br>FSN: <fsn><br>+GCAP: <gcap><br><br>OK<br>Response (if <n> is 8):<br>Legato Ver: <legatover><br>Modem Ver: <revision><br>MCU Ver: <mcuver><br>TAOP Ver: <taopver><br><br>OK<br>Response (if <n> is 9):<br>Manufacturer: <manufacturer><br>Model: <model><br>QTI baseline: <qualcomm mpss stack><br>Revision: <revision><br>ESN: <esn><br>IMEI: <imei><br>IMEI SV: <imeisv><br>FSN: <fsn><br>+GCAP: <gcap><br><br>OK<br>Purpose: Display the module's hardware or firmware information. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| I | **Display device information**<br>**Parameters:**<br><n> (Information to display)<br>• Integer<br>• 8 — Firmware information<br>• 0–7; 9–255 — Hardware information<br><manufacturer> (See AT+GMI)<br>• ASCII string<br><model> (See AT+GMM)<br>• ASCII string<br>• Integer<br><revision> (See AT+GMR)<br>• ASCII string<br><esn> (Electronic Serial Number)<br>• Hex string<br><imei> (Mobile Equipment Identifier)<br>• Integer<br><imeisv> (IMEI Software Version)<br>• Integer<br><fsn> (Factory Serial Number)<br>• ASCII string<br><gcap> (Device Capabilities List)<br>• ASCII string<br><legatover> (Legato version)<br>• ASCII string<br><mcuver> (MCU version)<br>• ASCII string<br><qualcomm mpss stack> (Qualcomm baseline information)<br>• ASCII string<br><taopver> (TAOP version)<br>• ASCII string |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!IIDIPV6** | **Configure Unique IPv6 IID**<br>This command configures unique IPv6 IID for internal protocol stack<br>**Password required:** Yes<br><br>**Usage:**<br>▪ Execution: **AT! IIDIPV6=<mode>,[<IID>]**<br>Response: OK<br>or<br>ERROR<br>Purpose: Set the unique IPv6 IID to enable or disable state.<br>▪ Query: **AT!IIDIPV6?**<br>Response: OK<br>or<br>!IIDIPV6: <IID><br><br>OK<br>Purpose: Query the unique IPv6 IID information.<br>▪ Query List: **AT!IIDIPV6=?**<br>Response: !IIDIPV6: (list of supported <mode>s),[<IID>]<br><br>OK<br>Purpose: Display valid execution format and parameter values.<br><br>**Parameters:**<br><mode> (Range: 0-1)<br>▪ 0 — Disable (default value; device will use random IID)<br>▪ 1 — Enable (device will use the IPv6 address set in <IID>)<br><IID> (String)<br>▪ IPv6 address: Consists of colon-separated hexadecimal (0 - FFFF) parameters of the form a1:a2:a3:a4:a5:a6:a7:a8 with abbreviations |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!IMAGE** | **Manage Firmware Images**<br>List or delete stored firmware and configuration (PRI) images.<br><br>**Notes:**<br>• This command is intended for use by advanced users who are familiar with the nuances of firmware and PRI image storage requirements and naming conventions.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!IMAGE=<op>,<type>[,<slot>[,<build_id>,<unique_id>]]**<br>Response: OK<br>Purpose: Delete or list stored FW and/or PRI images.<br>▪ Query: **AT!IMAGE?[<op>,<type>]**<br>Response: TYPESLOTSTATUSLRUFAILURESUNIQUE_ID BUILD_ID<br><TY> <slot><status><lru><f1> <f2><unique_id> <build_id><br>...<br>Max FW images: <max_fw><br>Active FW image is at slot <slot><br><br>TYPE SLOTSTATUSLRUFAILURESUNIQUE_ID BUILD_ID<br><TY> <slot><status><lru><f1> <f2><unique_id> <build_id><br>...<br>Max PRI images: <max_pri><br><br>OK<br>Purpose: Display lists of stored firmware and/or PRI images, or the quantity of stored firmware or PRI images. (In the format shown above, the <TY> value in the first group of responses will be 'FW', and the value in the second group will be 'PRI'.)<br>Note: If the active firmware image has been deleted from storage, the "Active FW image is at slot <slot>" line will show "slot 255".<br>**Parameters:**<br><op> (Operation)<br>• 0 — Delete. (Note: Valid only for Execution format.)<br>• 1 — List stored FW and/or PRI images, depending on <type><br>• 2 — List Max FW images or Max PRI images, depending on <type><br><type> (Image type)<br>• 0 — FW (firmware)<br>• 1 — PRI (configuration)<br><slot> (Firmware image slot ID)<br>• Valid range: 0–FF<br>• Field is ignored for PRI images. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!IMAGE (continued)** | **Manage Firmware Images (continued)**<br><build_id> (Build ID)<br>• ASCII string, including double-quotes (e.g. "01.00.04.00_ATT")<br><unique_id> (Unique ID)<br>• ASCII string, including double-quotes (e.g. "001.000_000")<br><TY> (Image type)<br>• FW<br>• PRI<br><status> (Image status)<br>• EMPTY<br>• GOOD<br><lru> (Least Recently Used count)<br>• Indicates how recently the image has been used.<br>• Used automatically during slot selection process to determine which image to remove if a new image is being loaded and there are no empty slots.<br><f1> (Programming failure count)<br>• 0–255<br><f2> (Switching failure count)<br>• 0–255<br><max_fw> (Programming failure count)<br>• Device-dependent, maximum number of firmware images that can be stored<br><max_pri> (Programming failure count)<br>• Device-dependent, maximum number of PRI images that can be stored |

**Table 4-2: Modem Status Command Details (Continued)**

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

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCCINFO** | **Enable/disable camped cell information notifications**<br>Enable or disable unsolicated notifications on camped cell parameter changes. For notification format, see +KCCINFOI (notification).<br><br>**Notes:**<br>• This command works with a SIM card.<br>• <mode> is automatically stored in persistent memory.<br>• Settings take effect immediately.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KCCINFO=<mode>**<br>Response: OK<br>or<br>+CME ERROR: <err><br>Purpose: Enable or disable camped cell parameter change notifications.<br>▪ Query: **AT+KCCINFO?**<br>Response: +CCINFO: <mode>,<CI>,<RAC>,<TAC><br>OK<br>Purpose: Display the current state of SIM detection notifications, plus the current camped cell parameter values.<br>▪ Query List: **AT+KCCINFO=?**<br>Purpose: Display valid parameter values.<br>**Parameters:**<br><mode> (Camped cell parameter change notifications state)<br>• 0 — Disable notifications (Default)<br>• 1 — Enable notifications<br><CI> (4-byte location area code, hexadecimal format)<br>• String<br>• e.g. "00C3" equals 195 in decimal format<br><RAC> (1-byte routing area code, hexadecimal format)<br>• String<br>• "FF" will be displayed if routing area identity information is invalid.<br><TAC> (2-byte tracking area code, hexadecimal format)<br>• String<br>• e.g. "00C3" equals 195 in decimal format<br>• "FFFF" will be displayed if tracking area identity information is invalid. |

Table 4-2: Modem Status Command Details (Continued)

| Command | Description |
|---|---|
| **+KCCINFO** | **Enable/disable camped cell information notifications**<br>**Example(s):**<br>/ / Set mode to 1:<br>**AT+KCCINFO=1**<br>OK<br><br>/ /Test command:<br>**AT+KCCINFO=?**<br>+KCCINFO: (0-1)<br>OK<br><br>/ /Attach to network:<br>**AT+COPS=0**<br>OK<br>/ /URC display after attached to network:<br>**+KCCINFOI: "00006773","01","FFFF"**<br><br>/ /Read command:<br>**AT+KCCINFO?**<br>+KCCINFO: 1,"00006773","01","FFFF"<br>OK |
| **+KCCINFOI (notification)** | **Camped cell parameter change — Unsolicited notification**<br>Notification that a camped cell parameter value has been changed.<br>To enable/disable notifications, see +KCCINFO.<br>**Notification format:**<br>**+KCCINFOI: <CI>, <RAC>, <TAC>**<br>**Parameters:**<br><mode> (Camped cell parameter change notifications state)<br>• 0 — Disable notifications<br>• 1 — Enable notifications<br><CI> (4-byte location area code, hexadecimal format)<br>• String<br>• e.g. "00C3" equals 195 in decimal format<br><RAC> (1-byte routing area code, hexadecimal format)<br>• String<br>• "FF" will be displayed if routing area identity information is invalid.<br><TAC> (2-byte tracking area code, hexadecimal format)<br>• String<br>• e.g. "00C3" equals 195 in decimal format<br>• "FFFF" will be displayed if tracking area identity information is invalid. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCELL** | **Display Detected Cell Details**<br>Display information about the cells (serving, neighbor, detected) detected by the module, which are of the currently attached RAT.<br><br>**Notes:**<br>• In UART port, the AT+KCELL only support in MUXMODE=1.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KCELL=<revision>**<br>Response (GSM):<br>+KCELL: <nbGSMcells>[,<cell_type>,<ARFCN>,<BSIC>,<PLMN>,<LAC>,<GSM_CI>,<RXLEV>,<GSM_TA>]<br><br>[,<cell_type,<ARFCNi>,<BSIC>,<PLMN>,<LAC>,<CI>,<RXLEV>][...]]<br>+KCELL: 0<br>+KCELL: 0<br>OK<br>Response (UMTS):<br>+KCELL: 0<br>+KCELL: <nbUMTS-cells>[,<cell_type>,<dl_UARFCN>,<PLMN>,<LAC>,<UMTS_CI>,<scram-bling_code>,<rscp>, <ecio>[,<pathloss>]][...]]<br>+KCELL: 0<br>OK<br>Response (LTE):<br>+KCELL: 0<br>+KCELL: 0<br>+KCELL: <nbLTE-cells>[,<cell_type>,<PLMN>,<LTE_CI>,<PhyCellInd>,<tracking-AreaCode>,<RSRPResult>,<RSRQResult>,<LTE_TA>,<Earfcn>,][<cell_type>,[[<Earfcn>,[<PhyCellID>,[<RSRPResult>,[<RSRQResult>]]]]][...]]<br>OK<br>Purpose: Display details about all cells detected by the module that are of the currently attached RAT:<br>▪ GSM — Active cell first, followed by neighbor cells<br>▪ UMTS — Serving cell first, then neighbor cells, then monitored cells.<br>▪ LTE — Serving cell first, followed by neighbor cells<br>▪ Query: **AT+KCELL?**<br>Response: ! OK<br>Purpose: Display execution format.<br>▪ Query list: **AT+KCELL=?**<br>Purpose: Displays execution format.<br>**Parameters:**<br><revision> (Reserved field)<br>• 0 — Only valid option. Parameter is reserved for future development.<br><nbGSMcells> (Number of available GSM base stations)<br>• Valid range: 0–7 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCELL (continued)** | **Display Detected Cell Details (continued)**<br><cell_type> (Cell type)<br>• 0 — GSM serving cell<br>• 1 — GSM neighbor cell<br>• 2 — UMTS serving cell<br>• 3 — UMTS neighbor cell<br>• 4 — UMTS detected cell<br>• 5 — LTE serving cell<br>• 6 — LTE neighbor cell<br><ARFCN> (Absolute Radio Frequency Channel Number)<br>• Valid range: 0–1023<br>• Decimal format<br><BSIC> (Base Station Identity Code)<br>• Valid range: 0–63<br><PLMN> (PLMN identifier)<br>• Format: Hexadecimal (3 bytes) per GSM 11.11 specification<br>• Combines MCC (Mobile Country Code) and MNC (Mobile Network Code)<br>• Example: 42F618 (Hex value for MCC=246 and MNC=81)<br><LAC> (Location Area Code)<br>• Format: Hexadecimal (4 hex digits)<br><GSM_CI> (GSM Cell Identity)<br>• Format: Hexadecimal (4 hex digits)<br>• Example: ABCD<br><RXLEV> (Received signal level of BCCH carrier)<br>• Valid range: 0–63<br>• Represents signal level in range -110 to -48 dBm. Refer to GSM 05.08 Radio Subsystem Link Control for details.<br><GSM_TA> (GSM Timing Advance for serving cell)<br>• Only available when module is in connected state<br>• Valid values:<br>  • -1 — Not available<br>  • 0–63<br><nbUMTScells> (Number of available UMTS base stations)<br>• Valid range: 0–25<br><dl_UARFCN> (DL UARFCN (UTRA Absolute Radio Frequency Channel Number) of serving cell)<br>• Format: Decimal<br>• For valid range, refer to 3GPP TS 25.101<br><UMTS_CI> (UMTS Cell Identity)<br>• Format: Hexadecimal (8 hex digits)<br>• Example: A12BC3DF<br><scrambling_code> (Downlink scrambling code)<br>• Valid range: 0–511<br>• Format: Decimal<br><br>(Continued on next page) |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCELL (continued)** | **Display Detected Cell Details (continued)**<br><rscp> (Received Signal Code Power, in dBm)<br>• Power level in one chip<br>• Range: 0—91, 255<br>• 255: Not available<br><ecio> (Ec/Io — Energy per chip to Interference power ratio, in dB)<br>Valid range: TBD<br><pathloss> (Path loss, in dB)<br>• Format: Decimal<br>• Appears for <cell_type=2 \| 3><br>• Valid values:<br>  • 46–158 — Path loss in dB<br>  • 255 — Not available<br><nbLTEcells> (Number of available LTE base stations)<br>• Valid range: 0–33<br><LTE_CI> (LTE Cell Identity)<br>• Format: Hexadecimal (8 hex digits; length 28 bits), per 3GPP TS 36.331, 6.3.4, Cell Identity<br>• Example: A12BC3DF<br><TrackingAreaCode> (Tracking Area Code of LTE Cell)<br>• Valid range: 0–65535, per 3GPP TS 36.331, 6.3.4, TrackingAreaCode<br><RSRPResult> (Reference Signal Received Power)<br>• Valid range: 0–97. Refer to 3GPP TS 36.331, 6.3.5, RSRP-Range for details.<br><RSRQResult> (Reference Signal Received Quality)<br>• Valid range: 0–34. Refer to 3GPP TS 36.331, 6.3.5, RSRQ-Range for details.<br><LTE_TA> (LTE Timing advance)<br>• Value available only when module is in connected state.<br>• Valid values:<br>  • -1 — Not available<br>  • 0–63 — Timing advance<br>  • 255 — Module is in a 3G voice call<br><Earfcn> (Neighbor cell carrier frequency<br>• Carrier frequency of the neighbor cell designated by the EUTRA Absolute Radio Frequency Channel Number (EARFCN). Refer to 3GPP TS 36.101, 5.7.3 for details.<br>• Valid range: 0–0xFFFF<br><PhyCellInd> (Physical Cell ID)<br>• Valid range: 0–503, per 3GPP TS 36.331, 6.3.4, PhysCellId IE |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+KGSN** | **Request Product Serial Number Identification and Software Version**<br><br>**Notes:**<br>• This command has been developed to provide the IMEI SV and Serial Number through an AT command and it can work without a SIM.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution : **AT+KGSN=<number_type>**<br>Response (<number_type>=0):<br>+KGSN: <IMEI><br>OK<br>Response (<number_type>=1):<br>+KGSN: <IMEISV><br>OK<br>Response (<number_type>=2):<br>+KGSN: <IMEISV_STR><br>OK<br>Response (<number_type>=3):<br>+KGSN: <FSN><br>OK<br>Response (<number_type>=4):<br>+KGSN: <FSN-BB><br>OK<br>Purpose: Display the requested information type.<br>▪ Query List: **AT+KGSN=?**<br>Purpose: Display valid parameter values.<br>**Parameters:**<br><number_type> (Information type to display)<br>• valid range: 0–4<br><IMEI> (15-digit IMEI)<br>• Format: <8-digit TAC> + <6-digit SNR> + <1-digit check><br>• e.g. 351578000023006<br><IMEISV> (16-digit IMEISV)<br>• Format: <8-digit TAC> + <6-digit SNR> + <2-digit SVN><br>• e.g. 3515780000230001<br><IMEISV_STR> (Formatted IMEISV string)<br>• Format: <15-digit + 1 check digit> SV: <software version><br>• e.g. 35157800002300-6 SV:01<br><FSN> (14-character serial number)<br>• String<br>• e.g. 0123456789ABCD<br><FSN-BB> (14-character serial number) + 2-digit batch revision)<br>• String<br>• e.g. 0123456789ABCD01 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+KMCLASS** | **Set 2G multislot class**<br>Set the device's 2G (GPRS/EGPRS) multislot class. The new setting takes effect after the device is reset.<br>**Password required:** No<br>**Reset required to apply changes:** Yes<br>**Persistent across power cycles:** Yes<br>**Usage:**<br>▪ Execution: **AT+KMCLASS=<mclass>**<br>Response: OK<br>Purpose: Set the desired multislot class.<br>▪ Query: **AT+KMCLASS?**<br>Response: +KMCLASS: <mclass><br>OK<br>Purpose: Report the current multislot class.<br>▪ Query List: **AT+KMCLASS=?**<br>Purpose: Return the execution command format and the supported parameter values. |

**Table 4-2: Modem Status Command Details (Continued)**

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td></td><td>
Parameters:<br>
<mclass> (Multislot class)<br>
• Integer value (Default — 33)<br>
• Valid values:
<table>
<tr><th rowspan="2">Class</th><th colspan="3">Max number of slots</th></tr>
<tr><th>Rx</th><th>Tx</th><th>Total</th></tr>
<tr><td>1</td><td>1</td><td>1</td><td>2</td></tr>
<tr><td>2</td><td>2</td><td>1</td><td>3</td></tr>
<tr><td>3</td><td>2</td><td>2</td><td>3</td></tr>
<tr><td>4</td><td>3</td><td>1</td><td>4</td></tr>
<tr><td>5</td><td>2</td><td>2</td><td>4</td></tr>
<tr><td>6</td><td>3</td><td>2</td><td>4</td></tr>
<tr><td>7</td><td>3</td><td>3</td><td>4</td></tr>
<tr><td>8</td><td>4</td><td>1</td><td>5</td></tr>
<tr><td>9</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td>10</td><td>4</td><td>2</td><td>5</td></tr>
<tr><td>11</td><td>4</td><td>3</td><td>5</td></tr>
<tr><td>12</td><td>4</td><td>4</td><td>5</td></tr>
<tr><td>30</td><td>5</td><td>1</td><td>6</td></tr>
<tr><td>31</td><td>5</td><td>2</td><td>6</td></tr>
<tr><td>32</td><td>5</td><td>3</td><td>6</td></tr>
<tr><td>33</td><td>5</td><td>4</td><td>6</td></tr>
</table>
</td></tr>
</table>

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+KSIMDET** | **Enable / Disable SIM Detection notifications**<br>Enable or disable unsolicited notifications on SIM insertion or removal. For notification format, see +SIM (notification).<br><br>**Notes:**<br>• This command can be supported even without a SIM card.<br>• This command is only applicable to external SIM card detection.<br>• UIM1_DET (GPIO 34) is used for SIM1 detection.<br>**Password required:** No<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT+KSIMDET=<mode>**<br>Response: +KSIMDET: <mode><br>OK<br>Purpose: Enable or disable SIM detection notifications.<br>▪ Query: **AT+KSIMDET?**<br>Response: +KSIMDET: <mode><br>OK<br>Purpose: Display the current state of SIM detection notifications.<br>▪ Query List: **AT+KSIMDET=?**<br>Purpose: Display valid parameter values.<br>**Parameters:**<br><mode> (Unsolicited SIM notifications state)<br>• 0 — Disable SIM detection notifications (Default)<br>• 1 — Enable SIM detection notifications |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| | **Example(s):**<br>/ / Enable SIM detection URC indications<br>**AT+KSIMDET=1**<br>OK<br>/ / SIM card is removed<br>**+SIM: 0**<br>/ / SIM card is inserted<br>**+SIM: 1**<br>/ / No URC indication when SIM card is removed or inserted<br>**AT+KSIMDET=0**<br>OK<br>/ / Read current setting<br>**AT+KSIMDET?**<br>+KSIMDET: 0<br>OK<br>/ / Test command<br>**AT+KSIMDET=?**<br>+KSIMDET: (0-1)<br>OK |

**Table 4-2: Modem Status Command Details (Continued)**

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

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+KSRAT** | **Set the current RAT**<br>Set the current RAT mode(s) for acquisition.<br><br>**Important:** *To avoid issues with incompatible RAT/band combinations, !BAND must be set to 'All Bands', and !SELRAT must not be used.*<br><br>**Password required:** No<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT+KSRAT=<ratInd>**<br>Response: OK<br>Purpose: Set the desired RAT.<br>▪ Query: **AT+KSRAT?**<br>Response: +KSRAT: <ratInd><br>OK<br>*or* Unknown RAT mode. Use AT+KSRAT to set mode.<br>OK<br>Purpose: Return the current RAT (<ratInd>).<br>▪ Query List: **AT+KSRAT=?**<br>Purpose: Return a list of supported RAT index values and their descriptions.<br>**Parameters:**<br><ratInd> (RAT index):<br>▪ 0 — All RATs, automatic<br>▪ 1 — GSM only<br>▪ 2 — UMTS only<br>▪ 4 — UMTS and GSM<br>▪ 5 — LTE only<br>▪ 7 — LTE and UMTS<br>▪ 9 — LTE and GSM |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+KSREP** | **Enable/disable startup reporting**<br>Enable or disable startup reporting.<br>When enabled, the module sends an unsolicited notification (+KSUP (notification)) during startup.<br>By default, startup reporting is disabled.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KSREP=<mode>**<br>Response: OK<br>Purpose: Enable or disable startup reporting.<br>▪ Query: **AT+KSREP?**<br>Response: +KSREP: <mode>,<status><br>OK<br>Purpose: Report current setting for startup reporting, and the current status.<br>▪ Query List: **AT+KSREP=?**<br>Response: +KSREP: (list of supported <mode>s)<br>OK<br>Purpose: Return the execution command format. See the parameter descriptions below for details.<br><br>**Parameters:**<br><mode> (Startup reporting state)<br>• 0 (Default) — Disabled<br>• 1 — Enabled<br><status> (Module status)<br>• 0 — Module is ready to receive commands for the TE. No access code is required. Note: Most of the subsystem is ready for the AT command, except for +KSLEEP. The +KSLEEP command needs about two seconds to finish its initialization.<br>• 1 — Module is waiting for an access code. Use AT+CPIN? to determine the code.<br>• 2 — SIM card is not present.<br>• 3 — Module is in "SIM lock" state.<br>• 4 — Unrecoverable error<br>• 5 — Unknown state |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+KSUP (notification)** | **Startup notification (unsolicited notification)**<br>Unsolicited notification received from the module at startup, if enabled using +KSREP.<br><br>**Usage:**<br>▪ Notification: **+KSUP: <status>**<br>Purpose: Indicates the state of the module at startup time.<br>**Parameters:**<br><status> (Module status)<br>· 0 — Module is ready to receive commands for the TE. No access code is required. Note: Most of the subsystem is ready for the AT command, except for +KSLEEP. The +KSLEEP command needs about two seconds to finish its initialization.<br>· 1 — Module is waiting for an access code. Use AT+CPIN? to determine the code.<br>· 2 — SIM card is not present.<br>· 3 — Module is in "SIM lock" state.<br>· 4 — Unrecoverable error<br>· 5 — Unknown state |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!MAPUART** | **Map services to UART**<br>Map services to the module's physical UARTs. The service will only be remapped to the UART after the modem is power cycled (For example: using AT!RESET).<br><br>**Notes:**<br>• The UART2 is not able to wake up itself by entering inputs while sleeping. The wake up can only be triggered by the activity of other ports.<br>• IP Application commands cannot work via UART using this command. Refer to !MUXMODE to enable IP Application commands via UART.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!MAPUART=<service>[,<uart>]**<br>Response: OK<br>or ERROR<br>Purpose: Map the specified <service> to the specified <uart> (if no <uart> is specified, UART1 is used).<br>▪ Query: **AT!MAPUART?**<br>Response: !MAPUART: <service (UART1)>[, <service (UART2)>]<br>OK<br>Purpose: Report the current mappings for both UARTs.<br>▪ Query List: **AT!MAPUART=?**<br>Response: !MAPUART: (List of supported <service (UART1)>s),(List of supported <service (UART2)>s)<br>OK<br>Purpose: Return the command format and the supported parameter values.<br><br>**Parameters:**<br><service> (Service to map to a UART)<br>• 0 — UART disabled<br>• 1 — AT command service (Note: Not available for UART2)<br>• 2, 3, 5-15 — Not supported<br>• 4 — NMEA service (Not available for UART2)<br>• 16 — Reserved<br>• 17 — Not supported<br><uart> (Physical UART)<br>• 1 — UART1 (Default)<br>• 2 — UART2 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!MUXMODE** | **Enable/disable CMUX mode**<br>This command is used to configure the multiplexing mode for CMUX feature which is enabled by AT+CMUX=0.<br>**Notes:**<br>• This command takes effect upon reboot.<br>• When <mode> = 1 is set, the HW flow control cannot be disabled.<br>• If the <mode> = 0 or 2, the UART1 cannot send the AT command directly unless the UART1 service of AT!MAPUART is set to 1.<br>• Refer to Table 4-3 for the CTS states.<br>• IPR can only be accessed under <mode> = 1.<br>**Password required:** No<br>**Usage:**<br>▪ Execution: **AT!MUXMODE=<mode>**<br>Response: OK<br>Purpose: Enable or disable CMUX feature.<br>▪ Query: **AT!MUXMODE?**<br>Response: !MUXMODE: <mode><br>OK<br>Purpose: Report current state of CMUX feature.<br>▪ Query List: **ATMUXMODE=?**<br>Response: !MUXMODE: (list of supported <mode>s)<br>OK<br>Purpose: Return a list of supported modes.<br>**Parameters:**<br><mode> (CMUX feature state)<br>• 0 — Disable<br>• 1 — Enable CMUX over UART (Default)<br>• 2 — Enable CMUX over USB |
| **!NETNUM** | **Set/report number of supported network interfaces**<br>Configure the modem to support a specific NAS (Non-Access Stratum) release compliance version.<br>**Password required:** No<br>**Usage:**<br>▪ Execution: **AT!NETNUM=<usb_netnum>**<br>Response: OK<br>Purpose: Set the number of supported network interfaces.<br>▪ Query: **AT!NETNUM?**<br>Response: <usb_netnum><br>OK<br>Purpose: Report the number of supported network interfaces.<br>**Parameters:**<br><usb_netnum> (Number of network interfaces supported over USB (RmNet))<br>• 0–255 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!NVBACKUP** | **Backup NV data**<br>**Password required:** Yes (for <category=2>)<br>**Usage:**<br>▪ Execution: **AT!NVBACKUP=<category>, [,<file_name>]**<br>Response: !NVBACKUP:<br>NV Items Saved: <saved><br>[ NV Items Skipped: <skipped> ] OK<br>Purpose: Perform the specified backup type.<br>**Parameters:**<br><category> (Backup type)<br>· 2 — OEM / User<br>· 3 — Cache (Boot and frequently-updated NV items)<br><file_name> (User defined, optional)<br>· ·If set <category>=2, <file_name> is optional. (Default name: unnamed)<br>· <file_name> limits the string length or character type to less than or equal to 32 characters.<br><saved> (Number of NV items saved)<br>· Range: 0–255<br><skipped> (Number of NV items skipped)<br>· Range: 1–255<br>· The 'skipped' response line does not appear if there were no items skipped. |
| **!PACKAGE** | **Return package version string**<br>This command returns the configuration package name loaded in the modem.<br>**Password required:** No<br>**Usage:**<br>▪ Query: **AT!PACKAGE?**<br>Response: !PACKAGE:<PackageName><br>OK<br>Purpose: Return the package name string.<br>**Parameters:**<br><PackageName><br>· Character string, maximum 126 characters<br>· Example: MC7750_01.00.02.03_00_VZW_011.006_000 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!PATEMP** | **Return PA temperature information**<br>Return the module's PA temperature state and current temperature.<br>**Password required:** No<br><br>**Usage:**<br>▪ Query: **AT!PATEMP?**<br>Response: Temp state: <state><br>Temperature: <temperature> degC<br>OK<br>Purpose: Return the module's Power control temperature information.<br>**Parameters:**<br><state> (Temperature state):<br>▪ Valid values:<br>▪ "Initializing"<br>▪ "Normal"<br>▪ "High Warning"<br>▪ "High Critical"<br><temperature> (Current temperature):<br>▪ Decimal ASCII string<br>▪ Current PA temperature in degrees Celsius. This is the temperature reported by a thermistor positioned near the power amplifiers.<br>▪ Example: "32.3" |
| **!PATEMP (notification)** | **PA temperature state change — Unsolicited notification**<br>Unsolicited notification received when the PA temperature state changes.<br>To enable !PATEMP (and other notifications), use AT+WUSLMSK.<br><br>**Notification format:**<br>**!PATEMP: <state>**<br>**Parameters:**<br><state> (PMIC temperature state)<br>▪ Valid range: 1–3<br>▪ 1 — Normal<br>▪ 2 — High Warning<br>▪ 3 — High Critical |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!PCINFO** | **Return power control status information**<br>Return the modem's power control status information.<br>**Password required:** No<br><br>**Usage:**<br>▪ Query: **AT!PCINFO?**<br>Response: State: <state><br>LPM voters – Temp:<lpmvote>, Volt:<lpmvote>, User: <lpmvote>, W_DISABLE: <lpmvote>, IMSWITCH: <lpmvote>, BIOS: <lpmvote>, LWM2M: <lpmvote>, OMADM: <lpmvote>, FOTA: <lpmvote>, RFCAL: <lpmvote>, AVMS:<lpmvote><br>LPM persistence - (list of enabled <lpmname>s:<lpmpersist>)<br>OK<br>Purpose: Return power control information.<br><br>**Parameters:**<br><state> (The modem's power mode)<br>· ASCII string (quotation marks do not appear):<br>· "Emergency Call"<br>· "Emergency Call LPM"<br>· "Emergency Call Power Down"<br>· "Emergency Call Reset"<br>· "Initialization"<br>· "Low Power Mode"<br>· "LPM in Progress"<br>· "Offline"<br>· "Offline In Progress"<br>· "Online"<br>· "Online In Progress"<br>· "Power Down"<br>· "Power Down In Progress"<br>· "Reset"<br>· "Reset In Progress"<br><br><lpmname> (Client name)<br>· Temp: PC Temp client<br>· Volt: PC Volt client<br>· User: User client - AT, QMI, MBIM, DMSS<br>· W_DISABLE: W_DISABLE client<br>· IMSWITCH: Image switch and NV client<br>· BIOS: BIOS lock client<br>· LWM2M: Lightweight M2M<br>· OMADM: OMA-DM<br>· FOTA: Firmware OTA<br>· RFCAL: RF Calibration<br>· AVMS: AVMS status |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| | <lpmvote> (Client's LPM vote)<br>• Range: 0—1<br>• 0: No vote<br>• 1: Vote<br><lpmpersist> (Client's LPM persistence)<br>• 1: Current state of user-initiated Low Power Mode |
| | **Examples:**<br>• If all clients don't have the persistence, set:<br>AT!PCINFO?<br>State: Online<br>LPM voters - Temp:0, Volt:0, User:0, W_DISABLE:0, IMSWITCH:0, BIOS:0, LWM2M:0, OMADM:0, FOTA:0, RFCAL:0, AVMS:0<br>LPM persistence - None<br><br>OK<br>• If one or more clients do have the persistence, set:<br>AT!PCINFO?<br>State: Online<br>LPM voters - Temp:0, Volt:0, User:0, W_DISABLE:0, IMSWITCH:0, BIOS:0, LWM2M:0, OMADM:0, FOTA:0, RFCAL:0, AVMS:0<br>LPM persistence - Temp:1, LWM2M:1, FOTA:1<br><br>OK |

**Table 4-2: Modem Status Command Details (Continued)**

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

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!PCTEMPLIMITS** | **Set/report temperature state limit values**<br>Certain modem functionality is affected by the modem's temperature state. The possible temperature states are high critical, high warning, high normal, low normal, and low critical.<br>Use this command to report or set the limits that correspond to these temperature states.<br>To display the current temperature and temperature state, see !PCTEMP on page 123.<br>**Notes:**<br>• All temperatures are in Celsius.<br>• Minimum separation between threshold values is 4 °C. (e.g. If <hc> = 120, <hw> must be £ 116.)<br>**Password required:** Yes<br>**Usage:**<br>▪ Execution: **AT!PCTEMPLIMITS=<hc>,<hw>,<hn>,<ln>,<lc>**<br>Response: OK<br>Purpose: Set the temperature limits for each state (all five values must be specified).<br>▪ Query: **AT!PCTEMPLIMITS?**<br>Response: HI CRIT: <hc><br>HI WARN: <hw><br>HI NORM: <hn><br>LO NORM: <ln><br>LO CRIT: <lc><br>Purpose: Return the temperature limits for each state.<br>**Parameters:**<br><hc> (High Critical)<br>• Temperature limit varies by device (see device Product Specification Document or Product Technical Specification).<br>• Default = 115 °C.<br><hw> (High Warning)<br>• Temperature limit varies by device (see device Product Specification Document or Product Technical Specification).<br>• Default = 110 °C.<br><hn>(High Normal)<br>• Temperature limit varies by device (see device Product Specification Document or Product Technical Specification).<br>• Default = 100 °C.<br><ln> (Low Normal)<br>• Temperature limit varies by device (see device Product Specification Document or Product Technical Specification).<br>• Default = -40 °C.<br><lc> (Low Critical)<br>• Temperature limit varies by device (see device Product Specification Document or Product Technical Specification).<br>• Default = -45 °C. |

Table 4-2: Modem Status Command Details (Continued)

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

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!PCVOLTLIMITS** | **Set/report power supply voltage state limit values**<br>Certain modem functionality is affected by the modem's power supply voltage state. The possible voltage states are high critical, high normal, low normal, low warning, and low critical.<br>Use this command to report or set the limits that correspond to these voltage states.<br>**Password required:** Yes<br><br>**Note:**<br>▪ For extended power supply voltage usage, set AT!PCVOLTLIMITS=4400,4300,3700,2800,2600 to support the operation of extended supply voltage. It is strongly recommended that this command is implemented from the customer host side right after RC76xx module is initialized.<br><br>**Usage:**<br>▪ Execution: **AT!PCVOLTLIMITS=<hc>,<hn>,<ln>,<lw>,<lc>**<br>Response: OK<br>Purpose: Set the voltage limits for each state (all five values must be specified).<br>▪ Query: **AT!PCVOLTLIMITS?**<br>Response: HI CRIT: <hc><br>HI NORM: <hn><br>LO NORM: <ln><br>LO WARN: <lw><br>LO CRIT: <lc><br>Purpose: Return the voltage limits for each state.<br>**Parameters:**<br><hc> (High Critical)<br>· Voltage limit varies by device (see device Product Specification Document or Product Technical Specification)<br>· Default = 4400 mV<br><hw> (High Normal)<br>· Voltage limit varies by device (see device Product Specification Document or Product Technical Specification)<br>· Default = 4300 mV<br><ln> (Low Normal)<br>· Voltage limit varies by device (see device Product Specification Document or Product Technical Specification)<br>· Default = 3300 mV<br><lw> (Low Warning)<br>· Voltage limit varies by device (see device Product Specification Document or Product Technical Specification)<br>· Default = 3200 mV<br><lc> (Low Critical)<br>· Voltage limit varies by device (see device Product Specification Document or Product Technical Specification)<br>· Default = 3100 mV |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!POWERDOWN** | **Power down system**<br>Power down the system.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!POWERDOWN**<br>Response: OK<br>Purpose: Power the system down. |
| **!POWERMODE** | **Enable/disable PSM**<br>Enable or disable power saving mode (PSM). When this command is used to enable PSM, the +CPSMS parameters will be renegotiated with the network at the same time.<br>A network-connected device will enter PSM only if the PSM parameter's negotiation succeeds. (The parameters (timers) specified in +CPSMS are requested values — the PSM negotiation determines the actual timer values that will be used.)<br>**Password required:** No<br><br>**Requirements:**<br>▪ AT!POWERWAKE must be used to configure wakeup sources before using this command to enable PSM.<br><br>**Usage:**<br>▪ Execution: **AT!POWERMODE=<mode>**<br>Response: OK<br>Purpose: Enable/disable PSM.<br>▪ Query: **AT!POWERMODE?**<br>Response: !POWERMODE: <mode><br>Purpose: Display the current state of PSM.<br>▪ Query List: **AT!POWERMODE=?**<br>Purpose: Return the execution command format and the supported parameter values.<br><br>**Parameters:**<br><mode> (Power saving mode)<br>▪ 0 — Disable PSM.<br>▪ 1 — Enable PSM. When enabled, the module enters PSM, then begins monitoring for wakeup sources that were previously configured using !POWERWAKE.<br>▪ To power down the module use !POWERDOWN. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!POWERWAKE** | **Configure PSM wakeup sources**<br>Configure the wakeup sources (triggers) for Power Saving Mode (PSM)).<br>When a module is in PSM, it is in a network-aware state. The module's low state is registered on the network and sleep time is negotiated. When a configured trigger is detected (e.g. when the trigger meets the <above> and <below> conditions), the module boots.<br>After configuring wakeup triggers, the command AT!POWERMODE can be used to enter PSM.<br>**Notes:**<br>· Use <above> and <below> as follows:<br>· To set a trigger condition inside a range (e.g. trigger in the range 0.5 to 1.0V), set <below> > <above> (e.g. trigger: <above> 0.5V and <below> 1.0V)<br>· To set a trigger condition outside a range (e.g. trigger outside the range 0.5 to 1.0V), set <below> < <above> (e.g. trigger: <below> 0.5V and <above> 1.0V)<br>· Timer must be configured for PSM mode.<br>· At least one wakeup source must be configured before !POWERMODE can be used to select a power saving mode option that requires wakeup sources.<br>· The PSM timer is not cleared by the "Execution (clear)" command format.<br>**Password required:** No<br>**Persistent across power cycles:** Partial (PSM timers persist, GPIO and ADC do not persist)<br>**Usage:**<br>▪ Execution (timer):<br>**AT!POWERWAKE=<type>,<psm>,[<active>]**<br>Response: OK<br>Purpose: Set the timeout period for a wakeup timer. |

Table 4-2: Modem Status Command Details (Continued)

| Command | Description |
|---|---|
| **!POWERWAKE continued** | **Configure ULPS (ULPM / PSM) wakeup sources (continued)**<br>▪ Query: **AT!POWERWAKE?**<br>Response: !POWERWAKE:<type>,<psm>,<active><br>OK<br>Purpose: Show currently configured wakeup sources. If a source is not configured, it will not appear.<br>▪ Query List: **AT!POWERWAKE=?**<br>Purpose: Return the execution command format and the supported parameter values.<br>**Parameters:**<br><type> (Wakeup source type)<br>· 1 — Timer<br><psm> (Requested timer duration for staying in PSM)<br>· Timer is the requested extended periodic TAU value (refer to +CPSMS).<br>· Timer value must be greater than threshold specified in PSM configuration. The threshold specified in PSM configuration is 60s<br>· Max value: 35712000 (Timer duration in seconds)<br>· Note: Power consumption may be impacted if a short timeout is used.<br><active> (Requested active timer duration, in seconds)<br>· 0–3456000 — Active timer duration. The value indicates the period during which the device remains reachable for mobile-terminated (MT) transactions on transition from connected mode to idle mode.<br>· If no value is specified, active time of 0 is configured.<br>· Value must conform to GPRS Timer 2 IE in 3GPP TS 24.008. |
| **!PRIID** | **Report module PRI part number and revision**<br>Report the module's customer and carrier PRI part numbers and revisions.<br>**Password required:** No<br>**Usage:**<br>▪ Query: **AT!PRIID?**<br>Response: PRI Part Number: <priPn><br>Revision: <priRevDisplay><br><br>Carrier PRI: None<br>OK<br>Purpose: Return the module's PRI part number (<priPn>) and revision (<priRev-Display>).<br>(In the example shown above, no Carrier PRI is present. If it were, then the Part Number and Revision would display.)<br>**Parameters:**<br><priPn> (PRI part number)<br>· 7-digit ASCII number<br>· Example: 9991234<br><priRevDisplay> (PRI revision number being read from the module)<br>· 4-digit ASCII: XX.YY<br>· Example: 01.00 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| ***PSRDBS** | **Select operating bands**<br>Select the device's operating bands.<br>**Password required:** No<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT*PSRDBS=<mode>,<band>**<br>Response: OK<br>Purpose: Set a group of bands (<band>) to take effect when specified by <mode>. If the selected bands conflict with the current RAT setting, an error will be returned.<br>If the command succeeds and <band> does not match any of the existing frequency groups from AT!BAND=?, then <band> creates or replaces the "User bands" group in the !BAND list. (This is a persistent change.)<br>▪ Query: **AT*PSRDBS?**<br>Response: *PSRDBS: <band><br>OK<br>Purpose: Report the current <band> value (which identifies the list of operating bands).<br>▪ Query List: **AT*PSRDBS=?**<br>Purpose: Return the execution command format and the supported parameter values.<br><br>**Parameters:**<br><mode> (Time when <band> selection takes effect)<br>• 0 = Set operating bands at next boot<br>• 1 = Set operating bands immediately |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| ***PSRDBS (continued)** | **Select operating bands (continued)**<br><band> (Operating bands to use)<br>• Integer value (sum of values associated with operating bands):<br>• 2 — GSM 900MHz (G900)<br>• 8 — DCS 1800MHz (G1800)<br>• 32 — UMTS Band I (W2100)<br>• 64 — UMTS Band II (W1900)<br>• 128 — UMTS Band IV (W1700)<br>• 256 — UMTS Band V (W850)<br>• 512 — UMTS Band VIII (W900)<br>• 131072 — LTE Band 1 (B1)<br>• 262144 — LTE Band 2 (B2)<br>• 524288 — LTE Band 3 (B3)<br>• 1048576 — LTE Band 4 (B4)<br>• 2097152 — LTE Band 5 (B5)<br>• 8388608 — LTE Band 7 (B7)<br>• 16777216 — LTE Band 8 (B8)<br>• 268435456 — LTE Band 12 (B12)<br>• 536870912 — LTE Band 13 (B13)<br>• 1073741824 — LTE Band 14 (B14)<br>• 8589934592 — LTE Band 17 (B17)<br>• 17179869184 — LTE Band 18 (B18)<br>• 34359738368 — LTE Band 19 (B19)<br>• 137438953472 — LTE Band 21 (B21)<br>• 68719476736 — LTE Band 20 (B20)<br>• 2199023255552 — LTE Band 25 (B25)<br>• 4398046511104 — LTE Band 26 (B26)<br>• 17592186044416 — LTE Band 28 (B28)<br>• 72057594037927936 — LTE Band 40 (B40)<br>• 144115188075855872 — LTE Band 41 (B41)<br>• 2305843009213693952 — LTE Band 66 (B66)<br>• 4611686018427387904 — LTE Band 71 (B71) |
| **!RESET** | **Reset modem**<br>Perform a modem reset.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!RESET**<br>Response: OK<br>Purpose: Reset the modem. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+RSCP** | **Display RSCP value(s) (WCDMA only)**<br>Display the Received Signal Code Power (RSCP) of the active set's neighbor cells (WCDMA only). Values are displayed as signed dBm and listed in order from strongest to weakest cell.<br>**Password required:** No<br><br>**Usage:**<br>▪ Query: **AT+RSCP?**<br>Response (Single-carrier cells):<br>+RSCP: [<nbr_cell PSC>,<freq>,<nbr_cell strength>] [, ...]<br>OK<br>Response (Dual-carrier cells):<br>+RSCP:<br>Car0 RSCP: [<nbr_cell PSC>,<freq>,<nbr_cell strength>] [, ...]<br>Car1 RSCP: [<nbr_cell PSC>,<freq>,<nbr_cell strength>] [, ...]<br>OK<br>Purpose: Display RSCP values for the supported neighbor cells.<br>**Parameters:**<br><nbr_cell PSC> (Neighbor cell's Primary Scrambling Code)<br>▪ signed dBM<br><freq> (Neighbor cell's frequency, in Hz)<br>▪ Integer value<br><nbr_cell strength> (Neighbor cell's strength, in signed dBm)<br>▪ Signed numeric string (quotes included)<br>▪ Format: "±999.999" (e.g. "-070.00")<br>**Examples:**<br>▪ AT!RSCP? *(Single-carrier cells)*<br>+RSCP: 480,10613,"-070.00",488,10613,"-073.00",232,10613,"-075.00",220, 10613,"-078.00"<br><br>OK<br><br>▪ AT!RSCP? *(Dual-carrier cells)*<br>Car0 RSCP: 480,10613,"-070.00",488,10613,"-073.00",232,10613,"-075.00", 220,10613,"-078.00"<br>Car1 RSCP: 480,10613,"-070.00",488,10613,"-073.00",232,10613,"-075.00", 220,10613,"-078.00"<br><br>OK |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **S11** | **Query/set DTMF dialing speed**<br>This command has no effect.<br>**Notes:**<br>• The purpose of including the command is to comply with V.25ter.<br>• Parameters are ignored and are not saved in non-volatile memory.<br>**Password required:** No<br>**Usage:**<br>▪ Execution: **ATS11=<time>**<br>Response: OK<br>Purpose: Set DTMF dialing speed.<br>▪ Query: **ATS11?**<br>Response: <time><br>OK<br>Purpose: Display DTMF dialing speed.<br>**Parameters:**<br><time> (DTMF dialing speed, in milliseconds)<br>• Valid range: 50–255 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!SCACT** | **Activate / deactivate data connection**<br>Activate or deactivate a specific data connection between the host and network.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!SCACT=<state>,<pid>**<br>Response: OK<br>Purpose: Activate or deactivate the connection for the specified <pid>. If <pid> is not included, use the default <pid> (see <pid> for values).<br>▪ Query: **AT!SCACT?[<pid>]**<br>Response: !SCACT: <pid>,<state><br>... *(additional <pid>/<state> combinations)*<br>OK<br>Purpose: Display a list of all defined connections and their current state, or display a specified connection and its state.<br>▪ Query list: **AT!SCACT=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><pid> (PDN connection ID)<br>· Valid values:<br>· GSM / UMTS / LTE:<br>▪ 1–16<br>▪ 3 (Sprint, Verizon)<br>· CDMA:<br>▪ 101–107<br>▪ Default: 101 (all networks except Sprint and Verizon)<br>▪ 103 (Sprint, Verizon)<br><state> (Current state of specified <pid>)<br>· 0 = Deactivated<br>· 1 = Activated<br>· Any other value causes command execution to return ERROR. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!SCUMMTU** | **Set/Report MTU Size**<br>Set or report the MTU (maximum transmission unit) size used by 3GPP/3GPP2 Um and USB Rm interface.<br>**Password required:** Yes<br><br>**Usage:**<br>▪ Execution: **AT!SCUMMTU=<mtu>**<br>Response: OK<br>Purpose: Set the MTU size for all RATs/interfaces.<br>▪ Query: **AT!SCUMMTU?**<br>Response: !SCUMMTU:<br>3GPP MTU : <mtu><br>USB MTU : <mtu><br>OK<br>Purpose: Display the MTU sizes used for supported RATs (only supported RATs will appear).<br>▪ Query list: **AT!SCUMMTU=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><mtu> (Maximum Transmission Unit, in bytes)<br>• 0 — Use default value<br>• 576–2000 — Other values required by carriers. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!SELACQ** | **Select RAT acquisition order**<br>Select the acquisition order for RATs (Radio Access Technologies).<br>**Notes:**<br>• If the last registered PLMN is found from either the SIM / USIM card or NV storage, it takes precedence over the acquisition order from this command for registration.Supporting devices: EM, MC, WP<br>• User can enter 1-3 RATs, which can be: LTE, WCDMA and GSM. If the user enters less than 3 RATs, the missing RATs will be appended to make up for the 3 RATs, based on this default order: LTE, WCDMA, GSM.<br>**Usage:**<br>▪ Execution: **AT!SELACQ=<mode1>[,<mode2>[,<mode3>]]**<br>Response: OK<br>Purpose: Indicate the RAT acquisition order (number of RATs is device dependent). See <mode> parameter description for details.<br>▪ Query: **AT!SELACQ?**<br>Response: <mode1><br><mode2><br><mode3><br>OK<br>Purpose: Show the current acquisition order for the supported RATs.<br>▪ Query list: **AT!SELACQ=?**<br>Response: AT!SELACQ=<mode1>[,<mode2>[,<mode3>]]<br>Possible <mode>:LTE, WCDMA, GSM<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><mode> (RAT types)<br>• Note: Available RAT types are device-dependent. For example, "LTE" is valid only on modules supporting LTE.<br>• Valid values:<br>◦ LTE<br>◦ WCDMA<br>◦ GSM |

**Table 4-2: Modem Status Command Details (Continued)**

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

**Table 4-2: Modem Status Command Details (Continued)**

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

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!SELRAT** | **Set preferred RAT**<br>**Parameters:**<br><ratInd> (RAT index):<br>▪ 00 — Automatic<br>▪ 01 — UMTS 3G only<br>▪ 02 — GSM 2G only<br>▪ 03 — UMTS 3G preferred<br>▪ 04 — GSM 2G preferred<br>▪ 05 — GSM and UMTS only<br>▪ 06 — LTE only<br>▪ 07 — GSM, UMTS, LTE<br>▪ 08 — CDMA, HRPD, GSM, UMTS, LTE<br>▪ 09 — CDMA only<br>▪ 0A — HRPD only<br>▪ 0B — hybrid CDMA/HRPD<br>▪ 0C — CDMA, LTE<br>▪ 0D — HRPD, LTE<br>▪ 0E — CDMA, HRPD, LTE<br>▪ 0F — CDMA, GSM, UMTS<br>▪ 10 — CDMA, HRPD, GSM, UMTS<br>▪ 11 — UMTS and LTE only<br>▪ 12 — GSM and LTE only<br>▪ 13 — TDS and LTE only<br>▪ 14 — TDS, GSM, LTE<br>▪ 15 — TDS, WCDMA, LTE<br>▪ 16 — TDS, GSM, WCDMA, LTE<br>▪ 17 — TDS only<br>▪ 18 — TDS and GSM only<br>▪ 19 — TDS and WCDMA only<br>▪ 1A — TDS, GSM, WCDMA |
| **+SIM (notification)** | **SIM inserted / removed — Unsolicited notification**<br>Notification that a SIM card has been inserted or removed.<br>To enable / disable notifications, see +KSIMDET.<br>**Notification format:**<br>**+SIM: <status>**<br>**Parameters:**<br><status> (Event status)<br>▪ 0 — SIM removed<br>▪ 1 — SIM inserted |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!SKU** | **Read Module SKU**<br>Read the module's SKU value.<br>**Password required:** Yes<br><br>**Usage:**<br>▪ Query: **AT!SKU?**<br>Response: <value$_1$>,<value$_2$>,...,<value$_{40}$><br>OK<br>Purpose: Display the test history 40-byte array.<br>**Parameters:**<br><value> (Test history value)<br>▪ Hex ASCII format<br>▪ Range: 00–FF |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!USBCOMP** | **Set/report USB interface configuration**<br>Use this command with modems that have been configured with multiple USB compositions.<br>By default, devices are typically configured to use a USB composition that presents a minimal set of interfaces to reduce end-user modem enumeration time. If the device also supports other compositions, this command can be used to build and select custom compositions from the supported interfaces.<br>**Important:** *By default, the DIAG (DM) interface is enabled. This command can be used to disable DIAG (DM), but cannot re-enable it.*<br>**Notes:**<br>• Interface support may vary by product and firmware version. Use the Query List command to determine actual support.<br>• Endpoints:<br>  • All interfaces support Bulk In and Bulk Out endpoint.<br>  • NMEA, Modem, Raw Data, and RMNET interfaces also support an Interrupt In endpoint for notifications.<br>  • Endpoint 0 is reserved in both directions.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!USBCOMP=<Config Index>,<Config Type>,<Interface bitmask>**<br>Response: OK<br>Purpose: Set the current composition. For the change to take effect, you must reset the modem.<br>▪ Query: **AT!USBCOMP?**<br>Response: Config Index: <Config Index><br>Config Type: <Config Type> (type string)<br>Interface bitmask: <Interface bitmask> (interface string)<br>OK<br>Purpose: Report the current interface composition.<br>▪ Query List: **AT!USBCOMP=?**<br>Purpose: Display valid execution format and parameter values. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| | **Parameters:**<br><Config Index> (Configuration index to which composition applies)<br>• Valid value(s): 1<br><Config Type> (Configuration type)<br>• Valid value(s):<br>• 1 — Generic<br><Interface bitmask> (Interfaces enabled for selected configuration)<br>• Format: 32-bit bitmask<br>• Valid values:<br>• 00000001 — DIAG (DM). This interface can be disabled, but cannot be re-enabled.<br>• 00000004 — NMEA<br>• 00000008 — MODEM. This interface cannot be disabled. (The command will return ERROR if this is not selected.)<br>• 00000040 — RAWDAT<br>• 00000100 — RMNET0 |
| **!USBINFO** | **Return information from active USB descriptor**<br>Return information from the active USB descriptor.<br>**Password required:** No<br>**Usage:**<br>▪ Query: **AT!USBINFO?**<br>Response: VID: <vendor_id><br>APP PID: <app_product_id><br>BOOT PID: <boot_product_id><br>Manufacturer: <manuString><br>Product: <prodString><br>Purpose: Display USB descriptor information.<br>**Parameters:**<br><vendor_id> (Vendor ID):<br>▪ Valid range: 0000–FFFF<br><app_product_id> (Product ID used when modem is in application mode):<br>▪ Valid range: 0000–FFFF<br><boot_product_id> (Product ID used when modem is in boot loader mode):<br>▪ Valid range: 0000–FFFF<br><manuString> (Manufacturer string):<br>▪ ASCII string (32 characters maximum)<br>▪ Example: "Sierra Wireless, Incorporated"<br><prodString> (Product string):<br>▪ ASCII string (64 characters maximum)<br>▪ Example: "Sierra Wireless RC7620" |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **!USBPID** | **Set/report product ID in USB descriptor**<br>Use this command to set the device's product ID in the USB descriptor. (Some devices may support more than one product ID.)<br>**Notes:**<br>• If a custom PID is used for <app product_id>, then the <boot product_id> must be set at the same time.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!USBPID=<app product_id> [,<boot product_id>]**<br>Response: OK<br>Purpose: Set the application and boot product IDs in the USB descriptor. NOTE: <boot_product_id> is required if <app_product_id> is a custom PID.<br>▪ Query: **AT!USBPID?**<br>Response: !USBPID:<br><app_product_id>[, <boot product_id>]<br>OK<br>Purpose: Report the product ID that is stored in the USB descriptor.<br>▪ Query List: **AT!USBPID=?**<br>Purpose: Display a list of default (non-custom) product IDs for the device.<br>**Parameters:**<br><app product_id><br>• Hexadecimal ASCII value.<br>• Valid range: 0000–FFFF<br>< boot product_id><br>• Hexadecimal ASCII value.<br>• Valid range: 0000–FFFF<br>• In the Execution command format, if the <app product_id> is a custom PID>, then the <boot product_id> must be set at the same time. (To check if the <app product_id> is a custom PID, use AT!UDPID=? to see a list of all available non-custom PIDs.) |

Table 4-2: Modem Status Command Details (Continued)

| Command | Description |
|---|---|
| **!USERAGENT** | **Write/read user-agent of IMS configuration**<br><br>**Notes:**<br>• The user agent setting is not preserved after image-switch.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!USERAGENT="<USER AGENT>"**<br>Response: OK<br>Purpose: Set user-agent of IMS configuration.<br>▪ Query: **AT!USERAGENT?**<br>Response: User Agent: <USER AGENT><br>OK<br>Purpose: Display the current settings.<br>▪ Query List: **AT!USERAGENT=?**<br>Response: AT!USERAGENT="<USER AGENT>"<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><USER AGENT> (The complete user-agent context)<br>• String<br>• Value:<br>• 0—1024 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+WESHDOWN** | **Enable/Disable/Trigger Emergency Shutdown**<br><br>**Notes:**<br>• <gpio_index> is only used when <mode> = 1.<br>• Parameters are not saved in non-volatile memory. They must be configured each time the module boots up.<br>• GPIOs may already be used by +KSIMDET, +KSYNC, +KTEMPMON, +KGSMAD, +KSIMSLOT, etc.<br>• Only GPIO 4 is available for use in the HL7650. Since this GPIO is also used to detect the insertion/removal of SIM2, this feature is disabled when emergency shutdown is activated.<br>• This command can be used without a SIM.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+WESHDOWN= <mode>[,<gpio_index>]**<br>Response: OK<br>or<br>+CME ERROR: <err><br>Purpose: Set emergency shutdown GPIO mode and GPIO pin number.<br>▪ Query: **AT+WESHDOWN?**<br>Response: +WESHDOWN: <mode>, <gpio_index><br>OK<br>Purpose: Query current emergency shutdown GPIO mode and GPIO pin number.<br>▪ Query List: **AT+WESHDOWN=?**<br>Response: +WESHDOWN: (list of supported <mode>s),(list of supported <gpio_index>s)<br>OK<br>Purpose: List supported emergency shutdown GPIO modes and available GPIO pin numbers.<br><br>**Parameters:**<br><mode><br>• 0 — Disable emergency shutdown feature by GPIO<br>• 1 — Enable emergency shutdown feature by GPIO<br>• 2 — Trigger emergency shutdown<br><gpio_index><br>• Defines which GPIO will be used as input to trigger the emergency shutdown on the falling edge.<br>• Values: 1-8, 2,4,7,8,13,21,22,23,24,25,28,29,30,31,32,33,35,42<br>• Default value = 4. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+WFWUPD** | **Download and install the firmware package locally over AT port**<br>This command is used to download and install the firmware package locally over AT port using 1K X-modem protocol.<br>**Password required:** Yes (see !ENTERCND for details)<br><br>**Notes:**<br><br>**After AT+WFWUPD=0 is sent to start XModem download:**<br>• The AT port will be switched to raw data mode.<br>• No reset is made during the package download.<br>• The flow control of the TE has to be set to 'Hardware'.<br>• <NACK> character will be sent to host every second when the device is ready to receive data using the 1K-Xmodem protocol.<br>• A timeout will happen (and a +CME ERROR: 3 is returned) if no data is sent to the device in 5 minutes.<br><br>**Usage:**<br>▪ Execution: **AT+WFWUPD=<op>**<br>Response: OK<br>Or<br>ERROR<br><br>Note:<br>In case of <op>=0:<br>Return OK if download succeeded.<br>Return ERROR if download failed.<br>In case of <op>=1:<br>Return OK if the package is available and the device will reboot immediately to start the firmware update.<br>Return ERROR if no package is available to be installed.<br>Purpose: Start the operation. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+WFWUPD (continued)** | **Download and install the firmware package locally over AT port (continued)**<br>▪ Query: **AT+WFWUPD?**<br>Response: +WFWUPD: <pkg><br>OK<br>Purpose: See the package loading status.<br>▪ Query List: **AT+WFWUPD=?**<br>Response: +WFWUPD: (list of supported <op>s)<br>OK<br>Purpose: Display a list of supported operations.<br>**Parameters:**<br><op> (Operation mode)<br>· Valid values:<br>· 0—Start the XModem protocol download.<br>· 1—Install the firmware update from the downloaded package.<br><pkg> (Package loading status)<br>· Hexadecimal ASCII value.<br>· Valid values:<br>· 0—No package is available to be installed<br>· 1—Package is loaded and available to be installed<br>**Examples:**<br>· AT+WFWUPD=?<br>+WFWUPD: (0-1)<br>OK<br>· AT+WFWUPD?<br>+WFWUPD: 0 / /No package is loaded<br>OK<br>· AT+WFWUPD=0 / /Download a package<br><NACK> / / The device is ready to receive data<br>/ / Send data<br>OK / / All data are received by the device<br>· AT+WFWUPD?<br>+WFWUPD: 1 / /Package is loaded and ready to install<br>OK<br>· AT+WFWUPD=1 / /Launch the firmware update from the package<br>OK<br>/ /device reset and then start the package update<br>· +WFWUPD: 0 / /After bootup, notification is shown that firmware update from the package is successful |

Table 4-2: Modem Status Command Details (Continued)

| Command | Description |
|---|---|
| **+WFWUPD (notification)** | **Package install is launched—Unsolicited notification**<br>Unsolicited notification received after package install is launched with AT+WFWUPD=1<br>The update status <stat> is retrieved from AT!BCFWUPDATESTATUS<br>**Notification format:**<br>**+WFWUPD: <stat>**<br>**Parameters:**<br><stat> (Update status)<br>• 0 - Bootloader reports successful installation<br>• 1 - Package installation result fails or status is unknown<br>*Note: For details, refer to !BCFWUPDATESTATUS for the firmware update status, ATI3 and ATI8 for the updated version information.* |
| **+WJAM (notification)** | **Jamming events — Unsolicited notification**<br>Unsolicited notification received for various jamming events.<br>To enable +WJAM (and other notifications), use AT+WUSLMSK.<br>**Notification format:**<br>**+WJAM: <response type>,<jam status>]**<br>**Examples:**<br>• +WJAM: 0,2<br>*Intermediate report, possible jammer detected*<br>• +WJAM: 1,1<br>*Final result, no jamming detected*<br>**Parameters:**<br><response type> (Response type)<br>• 0 — Final<br>• 1 — Intermediate<br>*Note: If <response_type> = 0 (Final), the <jam status> value can only be 1 (Null) or 5 (Jammed).*<br><jam status> (Jamming status)<br>• 0 — Unknown. Status is unknown.<br>• 1 — Null. No jamming suspicion; radio environment is considered normal.<br>• 2 — Low. Low probability that the device is jammed, but some radio environment parameters are considered abnormal.<br>• 3 — Medium. Medium probability that the device is jammed; a lot of interference in the radio spectrum.<br>• 4 — High. High probability that the device is jammed; radio environment is considered jammed, but there is still a possibility that the module succeeds in synchronizing a cell.<br>• 5 — Jammed. Module is jammed; cell synchronization impossible while sufficient power level is detected on a large number of frequencies. |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+WJAMTHRESH** | **Set/Report Jamming Detection Threshold Value**<br>Set or report (display) the jamming detection threshold values for supported modes.<br><br>**Notes:**<br>• For details on unsolicited jamming notifications received in response to jamming events, see +WJAM for details.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+WJAMTHRESH=<mode>,<threshold>**<br>Response: OK<br>Purpose: Set the jamming threshold value for the specified <mode>.<br>▪ Query: **AT+WJAMTHRESH?**<br>Response: +WJAMTHRESH: <mode>,<threshold><br>...<br>OK<br>Purpose: Display all configured jamming threshold values.<br>▪ Query List: **AT+WJAMTHRESH=?**<br>Purpose: Return the execution command format and the supported parameter values.<br><br>**Parameters:**<br><mode> (Radio Access Technology (RAT))<br>• 0 — GSM<br>• 1 — UMTS<br>• 2 — CDMA<br>• 3 — LTE<br><br><threshold> (Jamming threshold value)<br>• Supported range is <mode>-dependent.<br>• Value corresponds to RSSI value (e.g. '45' represents "-45 dBm")<br>• GSM: 0–63<br>• UMTS: 0–70<br>• CDMA: 0–125<br>• LTE: 0–125 |

**Table 4-2: Modem Status Command Details (Continued)**

| Command | Description |
|---|---|
| **+WUSLMSK** | **Enable/disable unsolicited notifications**<br>Enable or disable unsolicited notifications. When enabled, unsolicited notifications are output to the AT port when specific events occur.<br>By default, unsolicited notifications are disabled.<br>**Password required:** No<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT+WUSLMSK=<bitmask>,<mask_position>**<br>Response: OK<br>Purpose: Enable or disable the selected notifications (in <bitmask>) defined in the specified 32-bit <mask_position>.<br>▪ Query: **AT+WUSLMSK?**<br>Response: +WUSLMSK: <bitmask><mask_position><br>OK<br>Purpose: Report current state of system mode indications (enabled/disabled), showing the upper 32-bit mask followed by the lower 32-bit mask.<br>Example: +WUSLMSK: 00002B0E710241D0<br>OK<br>(The upper mask is 00002B0E, and lower mask is 710241D0.)<br>▪ Query List: **AT+WUSLMSK=?**<br>Purpose: Return the execution command format. See the parameter descriptions below for details.<br><br>**Parameters:**<br><bitmask> (Unsolicited notifications bit mask, applied to the specified 32-bit <mask_position>)<br>• Bit mask indicating which notifications to enable/disable.<br>• Range: 00000000–FFFFFFFF. For example:<br>• 00000000=All bits off (Default value)<br>• FFFFFFFF=All bits on<br>• Any other combination=Combination of bits off and on<br>• See LOWER unsolicited notifications mask on page 151 and UPPER unsolicited notifications mask on page 152 for supported messages<br><br><mask_position> (The 32-bit mask of notifications that the <bitmask> is to be applied to.)<br>• 0=Lower 32-bit mask<br>• 1=Upper 32-bit mask |

Table 4-2: Modem Status Command Details (Continued)

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>+WUSLMSK (continued)</td><td>
Enable/disable unsolicited notifications (continued)<br><br>
Note: Notification support is firmware-dependent. Some of these notifications may not be supported or applicable.<br><br>
LOWER unsolicited notifications mask
<table>
<tr><th>Bit</th><th>Mask value</th><th>Unsolic. Notif.</th><th>Responsible for:</th></tr>
<tr><td>0</td><td>0x00000001</td><td>---</td><td>Reserved</td></tr>
<tr><td>1</td><td>0x00000002</td><td>---</td><td>Reserved</td></tr>
<tr><td>2</td><td>0x00000004</td><td>+CSQ (notification)</td><td>RSSI change across threshold</td></tr>
<tr><td>3</td><td>0x00000008</td><td>---</td><td>Reserved</td></tr>
<tr><td>4</td><td>0x00000010</td><td>---</td><td>Reserved</td></tr>
<tr><td>5</td><td>0x00000020</td><td>---</td><td>Reserved</td></tr>
<tr><td>6</td><td>0x00000040</td><td>---</td><td>Reserved</td></tr>
<tr><td>7</td><td>0x00000080</td><td>---</td><td>Reserved</td></tr>
<tr><td>8</td><td>0x00000100</td><td>---</td><td>Reserved</td></tr>
<tr><td>9</td><td>0x00000200</td><td>---</td><td>Reserved</td></tr>
<tr><td>10</td><td>0x00000400</td><td>---</td><td>Reserved</td></tr>
<tr><td>11</td><td>0x00000800</td><td>---</td><td>Reserved</td></tr>
<tr><td>12</td><td>0x00001000</td><td>---</td><td>Reserved</td></tr>
<tr><td>13</td><td>0x00002000</td><td>---</td><td>Reserved</td></tr>
<tr><td>14</td><td>0x00004000</td><td>---</td><td>Reserved</td></tr>
<tr><td>15</td><td>0x00008000</td><td>---</td><td>Reserved</td></tr>
<tr><td>16</td><td>0x00010000</td><td>---</td><td>Reserved</td></tr>
<tr><td>17</td><td>0x00020000</td><td>---</td><td>Reserved</td></tr>
<tr><td>18</td><td>0x00040000</td><td>---</td><td>Reserved</td></tr>
<tr><td>19</td><td>0x00080000</td><td>---</td><td>Reserved</td></tr>
<tr><td>20</td><td>0x00100000</td><td>---</td><td>Reserved</td></tr>
<tr><td>21</td><td>0x00200000</td><td>---</td><td>Reserved</td></tr>
<tr><td>22</td><td>0x00400000</td><td>---</td><td>Reserved</td></tr>
<tr><td>23</td><td>0x00800000</td><td>---</td><td>Reserved</td></tr>
<tr><td>24</td><td>0x01000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>25</td><td>0x02000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>26</td><td>0x04000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>27</td><td>0x08000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>28</td><td>0x10000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>29</td><td>0x20000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>30</td><td>0x40000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>31</td><td>0x80000000</td><td>---</td><td>Reserved</td></tr>
</table>
</td></tr>
</table>

**Table 4-2: Modem Status Command Details (Continued)**

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>+WUSLMSK</td><td>
Enable/disable unsolicited notifications<br>
UPPER unsolicited notifications mask<br><br>
Note: Notification support is firmware-dependent. Some of these notifications may not be supported or applicable.<br><br>
<table>
<tr><th>Bit</th><th>Mask value</th><th>Unsolic. Notif.</th><th>Responsible for:</th></tr>
<tr><td>0</td><td>0x00000001</td><td>---</td><td>Reserved</td></tr>
<tr><td>1</td><td>0x00000002</td><td>!PCVOLT</td><td>PMIC voltage state change</td></tr>
<tr><td>2</td><td>0x00000004</td><td>!PCTEMP</td><td>PMIC temperature state change</td></tr>
<tr><td>3</td><td>0x00000008</td><td>!PATEMP</td><td>PA Temperature state change</td></tr>
<tr><td>4</td><td>0x00000010</td><td>+WJAM</td><td>Jamming event</td></tr>
<tr><td>5</td><td>0x00000020</td><td>---</td><td>Reserved</td></tr>
<tr><td>6</td><td>0x00000040</td><td>---</td><td>Reserved</td></tr>
<tr><td>7</td><td>0x00000080</td><td>---</td><td>Reserved</td></tr>
<tr><td>8</td><td>0x00000100</td><td>---</td><td>Reserved</td></tr>
<tr><td>9</td><td>0x00000200</td><td>---</td><td>Reserved</td></tr>
<tr><td>10</td><td>0x00000400</td><td>---</td><td>Reserved</td></tr>
<tr><td>11</td><td>0x00000800</td><td>---</td><td>Reserved</td></tr>
<tr><td>12</td><td>0x00001000</td><td>---</td><td>Reserved</td></tr>
<tr><td>13</td><td>0x00002000</td><td>---</td><td>Reserved</td></tr>
<tr><td>14</td><td>0x00004000</td><td>+WDDI (notification)</td><td>DTMF tone Detection notification</td></tr>
<tr><td>15</td><td>0x00008000</td><td>---</td><td>Reserved</td></tr>
<tr><td>16</td><td>0x00010000</td><td>---</td><td>Reserved</td></tr>
<tr><td>17</td><td>0x00020000</td><td>---</td><td>Reserved</td></tr>
<tr><td>18</td><td>0x00040000</td><td>---</td><td>Reserved</td></tr>
<tr><td>19</td><td>0x00080000</td><td>---</td><td>Reserved</td></tr>
<tr><td>20</td><td>0x00100000</td><td>---</td><td>Reserved</td></tr>
<tr><td>21</td><td>0x00200000</td><td>---</td><td>Reserved</td></tr>
<tr><td>22</td><td>0x00400000</td><td>---</td><td>Reserved</td></tr>
<tr><td>23</td><td>0x00800000</td><td>---</td><td>Reserved</td></tr>
<tr><td>24</td><td>0x01000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>25</td><td>0x02000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>26</td><td>0x04000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>27</td><td>0x08000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>28</td><td>0x10000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>29</td><td>0x20000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>30</td><td>0x40000000</td><td>---</td><td>Reserved</td></tr>
<tr><td>31</td><td>0x80000000</td><td>---</td><td>Reserved</td></tr>
</table>
</td></tr>
</table>

**Table 4-3: CTS States**

| CTS Level | AT+KSLEEP = 1 | | AT+KSLEEP = 0 | |
|---|---|---|---|---|
| | Sleep | Wake Up | Sleep | Wake Up |
| AT!MUXMODE = 1 | Low | Low | Low | Low |
| AT!MUXMODE = 0 | High | Low | High | Low |

# 5: Diagnostic Commands

## 5.1 Introduction

This chapter describes commands used to diagnose modem problems.

## 5.2 Command Summary

The table below lists the commands described in this chapter.

**Table 5-1: Diagnostic Commands**

| Command | Description | Page |
|---|---|---|
| !BCFWUPDATESTATUS | Report status of most recent firmware update attempt | 155 |
| !ERR | Display/clear diagnostic information | 156 |
| !GCCLR | Clear crash dump data | 156 |
| !GCDUMP | Display crash dump data | 157 |
| !RXDEN | Enable/disable WCDMA/LTE receive diversity | 157 |

# 5.3 Command Reference

**Table 5-2: Diagnostic Command Details**

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

**Table 5-2: Diagnostic Command Details (Continued)**

| Command | Description |
|---|---|
| **!ERR** | **Display / clear diagnostic information**<br>This command is used to display or clear diagnostic information (logged error conditions) that Semtech uses to assist in resolving technical issues.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!ERR=<clear>**<br>Response: OK<CR><br>Purpose: Clear the logged error conditions. Use this command before running tests to make sure that details displayed using AT!ERR are relevant to the tests being performed.<br>▪ Query: **AT!ERR**<br>Response: MODEM APPS<br>00 [F] <count> <file> <line><br>01 [F] <count> <file> <line><br>...<br>n [F] <count> <file> <line><br>OK<br>Purpose: Return all logged error conditions that are stored in NVRAM.<br>**Parameters:**<br><count> (Number of occurrences)<br>• Valid range: 0x00–0xFF<br><file> (Log file name)<br>• Name of log file using ASCII characters<br><line> (Line number in log file)<br>• Valid range: 1–99999<br><clear> (Clear the logged error conditions)<br>• Valid range: 0 |
| **!GCCLR** | **Clear crash dump data**<br>Clear crash dump data.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!GCCLR**<br>Response: Crash data cleared<br>OK<br>Purpose: Clear crash dump data.<br>**Parameters:**<br>None |

Table 5-2: Diagnostic Command Details (Continued)

| Command | Description |
|---|---|
| **!GCDUMP** | **Display crash dump data**<br>Display crash dump data.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!GCDUMP**<br>Response: (crash dump data)<br>OK<br>or No crash data available<br>OK<br>Purpose: Display crash dump data. |
| **!RXDEN** | **Enable / disable WCDMA / LTE receive diversity**<br>Enable or disable WCDMA / LTE receive diversity, or establish receive diversity as the primary path. The new state takes effect the next time the modem is reset.<br><br>**Notes:**<br>• To change from <state=0> to <state=2> (or from <state=2> to <state=0>, you must issue AT!RXDEN=1, reset the modem, and then make the final state change.<br>**Password required:** Yes — Execution format only<br>**Reset required to apply changes:** Yes<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT!RXDEN = <state>**<br>Response: OK<br>Purpose: Set the current receive diversity state.<br>▪ Query: **AT!RXDEN?**<br>Response: !RXDEN:<br><state><br>OK<br>Purpose: Return the current receive diversity <state>.<br>▪ Query List: **AT!RXDEN = ?**<br>Purpose: Return a list of available <state> values to use in this command.<br>**Parameters:**<br><state> (Current / requested receive diversity state)<br>• 0 = Rx diversity disabled<br>• 1 = Rx diversity enabled<br>• 2 = Rx diversity is primary path |

# 6: Test Commands

## 6.1 Introduction

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

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

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

Three AT commands are important in setting the mode:!DAFTMACT—puts the modem in factory test mode (a non-signaling mode). You must issue **AT!DAFTMACT** before issuing any other command that starts with "!DA".

- !DASBAND—selects the frequency band.
- !DASCHAN—selects the channel. This command must be run after you have selected the band with **!DASBAND**. (If you don't select a channel, the modem uses a default.)

## 6.2 Command Summary

The table below lists the commands described in this chapter.

**Table 6-1: Test Commands**

| Command | Description | Page |
|---|---|---|
| !DACGPSCTON | Return CGPS C/N and frequency | 160 |
| !DACGPSMASKON | Set CGPS log mask | 160 |
| !DACGPSSTANDALONE | Enter/exit Stand Alone RF mode | 161 |
| !DACGPSTESTMODE | Start/stop CGPS diagnostic task | 161 |
| !DAFTMACT | Put modem into Factory Test Mode | 162 |
| !DAFTMDEACT | Put modem into Online Mode from Factory Test Mode | 162 |
| !DAGGAVGRSSI | Return averaged RSSI value in dBm (GSM only) | 163 |
| !DAGSRXBURST | Set GSM receiver to burst mode (GSM only) | 163 |
| !DAGSTXFRAME | Set GSM Tx frame structure (GSM only) | 164 |
| !DALGAVGAGC | Return averaged Rx AGC value (LTE only) | 165 |
| !DALSNSVAL | Configure LTE Net Sig value (LTE only) | 166 |
| !DALSPARANGE | Set LTE PA range (LTE only) | 166 |
| !DALSRXBW | Set LTE Rx bandwidth (LTE only) | 167 |
| !DALSTXBW | Set LTE Tx bandwidth (LTE only) | 167 |
| !DALSTXMOD | Set LTE Tx modulation type (LTE only) | 168 |

**Table 6-1: Test Commands (Continued)**

| Command | Description | Page |
|---|---|---|
| !DALSTXPWR | Set LTE Tx power level (LTE only) | 169 |
| !DALSWAVEFORM | Set LTE TX waveform (LTE only) | 170 |
| !DASBAND | Set frequency band | 171 |
| !DASCALSTATE | Enter/exit modem calibration state | 172 |
| !DASCHAN | Set modem channel (frequency) | 173 |
| !DASLNAGAIN | Set LNA gain state | 174 |
| !DASPDM | Set PDM value (WCDMA and GSM only) | 175 |
| !DASTXOFF | Turn Tx PA off | 175 |
| !DASTXON | Turn Tx PA on | 176 |
| !DAWGAVGAGC | Return averaged Rx AGC value (WCDMA only) | 176 |
| !DAWGRXAGC | Return Rx AGC value (WCDMA only) | 177 |
| !DAWSCONFIGRX | Configure receiver (WCDMA only) | 178 |
| !DAWSPARANGE | Set PA range state machine (WCDMA only) | 179 |
| !DAWSSCHAIN | Enable secondary receive chain (WCDMA only) | 179 |
| !DAWSTXCW | Set waveform used by the transmitter (WCDMA only) | 180 |
| !DAWSTXPWR | Set desired Tx power level (WCDMA mode only) | 180 |
| !LEDTEST | Test LED | 181 |

# 6.3 Command Reference

**Table 6-2: Test Command Details**

| Command | Description |
|---|---|
| **!DACGPSCTON** | **Return CGPS C/N and frequency**<br>Return the CGPS C/N (signal strength) and frequency measurement.<br>**Requirements:**<br>Before this command can be used:<br>• Use !DACGPSTESTMODE=1 to start the CGPS diagnostic task<br>• Use !DACGPSSTANDALONE=1 to enter standalone RF mode<br>• Use !DACGPSMASKON to enable the CGPS log mask<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!DACGPSCTON**<br>Response: CtoN=<CtoN>,Freq=<freq><br>OK<br>Purpose: Return the current CGPS signal strength and frequency.<br>**Parameters:**<br><CtoN> (Signal strength)<br>• 0.0–99.0 — Signal strength calculated in 0.1 dBHz.<br><freq> (Frequency offset)<br>• 0–4294967295 — Frequency offset in Hz. |
| **!DACGPSMASKON** | **Set CGPS log mask**<br>Set the CGPS IQ log mask.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!DACGPSMASKON**<br>Response: <logmask><br>OK<br>Purpose: Enter or exit Stand Alone RF mode.<br>**Parameters:**<br><logmask> (CGPS IQ log mask)<br>• 288-character hexadecimal string<br>• The <logmask> is the raw data returned by the Qualcomm GPS Diag module. This value does not affect the GPS test and can be ignored. |

Table 6-2: Test Command Details (Continued)

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

**Table 6-2: Test Command Details (Continued)**

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

Table 6-2: Test Command Details (Continued)

| Command | Description |
|---|---|
| **!DAGGAVGRSSI** | **Return averaged RSSI value in dBm (GSM only)**<br>Return an averaged RSSI (Received Signal Strength Indicator) value in dBm.<br>**Requirements:**<br>Before this command can be used:<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the device to a GSM band.<br>**Password required:** Yes<br>**Usage:**<br>▪ Execution: **AT!DAGGAVGRSSI=<channel>, <LNA Index>**<br>Response: OK<br>Purpose: Return the averaged RSSI for the specified channel and LNA offset index.<br>**Parameters:**<br><channel> (Channel number for the band specified using !DASBAND)<br>• Valid values depend on the selected band<br><LNA Index> (LNA offset index)<br>• 0=R0 (highest gain)<br>• 1=R1<br>• 2=R2<br>• 3=R3 (lowest gain) |
| **!DAGSRXBURST** | **Set GSM receiver to burst mode (GSM only)**<br>Set the receiver to start or stop sending bursts. (The receiver must be in burst mode to read the RSSI.<br>**Requirements:**<br>Before this command can be used:<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the device to a GSM band.<br>• Use !DASCHAN to set the uplink channel for the selected band.<br>**Password required:** Yes<br>**Usage:**<br>▪ Execution: **AT!DAGSRXBURST=<function>**<br>Response: <function><br>OK<br>Purpose: Set the receiver to burst mode<br>**Parameters:**<br><function><br>• 0=Get RSSI (Burst mode)<br>• 2=Stop continuous Rx |

**Table 6-2: Test Command Details (Continued)**

| Command | Description |
|---|---|
| **!DAGSTXFRAME** | **Set GSM Tx frame structure (GSM only)**<br>This command configures the Tx slots for GSM operation. It must be issued eight times to set all eight slots.<br><br>**Requirements:**<br>Before this command can be used:<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the device to a GSM band.<br>• Use !DASCHAN to set the uplink channel for the selected band.<br>**Password required:** Yes<br><br>**Usage:**<br>▪ Execution: **AT!DAGSTXFRAME=<slotnum>, <onoff>, <pwr>, <mcs>**<br>Response: <slotnum> <onoff> <pwr> <mcs><br>OK<br>Purpose: Set the Tx frame structure.<br>**Parameters:**<br><slotnum> (Slot number)<br>• Valid range: 0–7 (eight available Tx slots)<br><onoff> (Enable/disable the specified slot)<br>• 0=Off (disable)<br>• 1=On (enable)<br><pwr> (Slot power level)<br>• Measured in dB*100<br>• Maximum values:<br>• GMSK Mode<br>850/900 bands: 3200 (32 dBm)<br>1800/1900 bands: 2900 (29 dBm)<br>• 8PSK (EDGE) Mode<br>850/900 bands: 2700 (27 dBm)<br>1800/1900 bands: 2600 (26 dBm)<br><mcs> (Modulation code scheme)<br>• Valid range: 0–8 (MCS1 to MCS9) |

Table 6-2: Test Command Details (Continued)

| Command | Description |
|---|---|
| **!DALGAVGAGC** | **Return averaged Rx AGC value (LTE only)**<br>Return the averaged AGC (Automatic Gain Control) readings for a specific uplink channel on the main and diversity paths.<br><br>**Requirements:**<br>Before this command can be used:<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the device to an LTE band.<br>• Use !DALSRXBW to set the LTE Rx bandwidth.<br>**Password required:** Yes<br><br>**Usage:**<br>▪ Execution: **AT!DALGAVGAGC=<channel>, <LNA Index>**<br>Response: Paths: <paths><br>Rx<n>: AGC: <agc> dBm LNA: <lna> Chain: <chain><br>Rx<n>: AGC: <agc> dBm LNA: <lna> Chain: <chain><br>OK<br>Purpose: Return the averaged AGC for <channel> on the main and diversity paths.<br><br>**Parameters:**<br><channel> (Uplink channel number (UARFCN) for the band specified using !DASBAND)<br>• Valid values depend on the selected band<br><LNA Index> (LNA offset index)<br>• 0 — R0 (Highest gain)<br>• 1 — R1<br>• 2 — R2<br>• 3 — R3 (Lowest gain)<br><paths> (Number of receive paths)<br>• 2<br><agc> (AGC value in dBm)<br>• Valid values: Dynamic Rx range<br><chain> (Receive paths)<br>• 0 — Rx Main<br>• 1 — Rx Diversity |

Table 6-2: Test Command Details (Continued)

| Command | Description |
|---|---|
| **!DALSNSVAL** | **Configure LTE Net Sig value (LTE only)**<br>Configure the LTE Net Sig (NS) value, which will be used to configure Tx power. The NS value is used to determine the additional max power backoff to reduce spectrum emissions.<br>**Command Availability:** WP76, WP77. Valid in WP75xx/WP85xx Release 16 and later.<br>**Requirements:**<br>Before this command can be used, set the following commands:<br>• Use !DASBAND to set the device to an LTE band.<br>• Use !DASCHAN to set the uplink channel for the selected band.<br>• Use !DALSRXBW to set the LTE Rx bandwidth.<br>• Use !DALSTXBW to set the LTE Tx bandwidth.<br>• Use !DALSTXMOD to set the LTE Tx modulation type.<br>• Use !DALSWAVEFORM to set the LTE Tx waveform characteristics.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!DALSNSVAL=<ns_val>**<br>Response: OK<br>Purpose: Set the LTE Net Sig value.<br>**Parameters:**<br><ns_val> (Net Sig value)<br>• 1–32 |
| **!DALSPARANGE** | **Set LTE PA range (LTE only)**<br>Set the LTE PA (Power Amplifier) range.<br>**Requirements:**<br>Before this command can be used:<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the device to an LTE band.<br>• Use !DALSTXBW to set the LTE Tx bandwidth.<br>• Use !DASCHAN to set the uplink channel for the selected band.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!DALSPARANGE=<pa_range>**<br>Response: OK<br>Purpose: Set the LTE PA range.<br>**Parameters:**<br><pa_range> (PA range)<br>• 0–3 |

Table 6-2: Test Command Details (Continued)

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

**Table 6-2: Test Command Details (Continued)**

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

Table 6-2: Test Command Details (Continued)

| Command | Description |
|---|---|
| **!DALSTXPWR** | **Set LTE Tx power level (LTE only)**<br>Set the desired LTE Tx power level.<br>**Notes:**<br>This command cannot support a PUCCH waveform. (Waveform type is set using !DALSWAVEFORM)<br>**Password required:** Yes (see !ENTERCND for details)<br>**Requirements:**<br>Before using this command, perform the following steps:<br>a. Use !DAFTMACT to enter FTM mode.<br>b. Use !DASBAND to set the device to an LTE band.<br>c. Use !DASCHAN to set the uplink channel for the selected band.<br>d. Use !DALSRXBW to set the LTE Rx bandwidth.<br>e. Use !DALSTXBW to set the LTE Tx bandwidth.<br>f. Use !DALSTXMOD to set the LTE Tx modulation type.<br>g. Use !DALSWAVEFORM to set the LTE Tx waveform characteristics.<br>h. Use !DALSNSVAL to set the LTE Net Sig value.<br>i. Use !DASTXON to turn the LTE transceiver PA on.<br>**Usage:**<br>▪ Execution: **AT!DALSTXPWR=<enable>,<power_dBm>**<br>Response: OK<br>Purpose: Set the LTE Tx modulation type.<br>**Parameters:**<br><enable> (Enable/disable Tx power output)<br>• 0 — Disable<br>• 1 — Enable<br><power_dBm> (Desired Tx power)<br>• -57 to 23 — Tx power in dBm<br>• Field is ignored if <enable>=0 |

**Table 6-2: Test Command Details (Continued)**

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>!DALSWAVEFORM</td><td>
Set LTE TX waveform (LTE only)<br>
Set the LTE Tx waveform characteristics.<br><br>
Requirements:<br>
Before this command can be used:<br>
• Use !DAFTMACT to enter FTM mode.<br>
• Use !DASBAND to set the device to an LTE band.<br>
• Use !DALSTXBW to set the LTE Tx bandwidth.<br>
• Use !DASCHAN to set the uplink channel for the selected band.<br>
Password required: Yes (see !ENTERCND for details)<br><br>
Usage:<br>
▪ Execution: AT!DALSWAVEFORM=<waveform>[,<PUSCH RBs>,<PUCCH RBs>,<PUSCH start RB index>]<br>
Response: OK<br>
Purpose: Set the LTE Tx waveform characteristics.<br>
Parameters:<br>
<waveform> (Tx waveform)<br>
• 1=LTE PUSCH (Physical Uplink Shared Channel)<br>
• 2=LTE PUCCH (Physical Uplink Control Channel)<br>
<PUSCH RBs> (Number of PUSCH resource blocks)<br>
• Valid rnage: 0–100<br>
• Recommended number of PUSCH RBs:
<table>
<tr><th>Bandwidth (MHz)</th><th>PUSCH RBs</th></tr>
<tr><td>1.4</td><td>6</td></tr>
<tr><td>3</td><td>15</td></tr>
<tr><td>5</td><td>25</td></tr>
<tr><td>10</td><td>50</td></tr>
<tr><td>15</td><td>75</td></tr>
<tr><td>20</td><td>100</td></tr>
</table>
<PUCCH RBs> (Number of PUCCH resource blocks)<br>
• Valid range: 0–12<br>
<PUSCH start RB index> (PUSCH starting resource block index)<br>
• Valid range: 0–255
</td></tr>
</table>

Table 6-2: Test Command Details (Continued)

| Command | Description |
|---|---|
| **!DASBAND** | **Set frequency band**<br>Set the modem to use a particular frequency band. You must use this command to select an appropriate band before running LTE, WCDMA, or GSM commands. See page 158.<br><br>**Requirements:**<br>Before this command can be used:<br>• Use !DAFTMACT to enter FTM mode.<br>**Password required:** Yes (see !ENTERCND for details)<br><br>**Usage:**<br>▪ Execution: **AT!DASBAND=<rfband>**<br>Response (GSM/WCDMA):<br><rfband><br>OK<br>Response (LTE):<br>0<br>OK<br>*(Note: For LTE frequency bands, even though the response shows 0 instead of <rfband>, the band has been set correctly if the response shows 'OK'.)*<br>Purpose: Set frequency band.<br>**Parameters:**<br><rfband> (Unique value corresponding to an RF band and technology.)<br>• Unique value that maps to an RF band and technology. It is not an actual 3GPP band number. For example, '18' is GSM 850, which corresponds to 3GPP band 5 (on a GSM network).<br>• Band support is product-dependent — see the device's Product Specification or Product Technical Specification document for details.<br>• Examples (for a full listing, see Table 20-1 on page 397):<br>• GSM<br>▪ 10=GSM 900<br>▪ 11=GSM 1800<br>▪ 12=GSM 1900<br>▪ 18=GSM 850<br>• WCDMA<br>▪ 9=WCDMA 2100<br>▪ 16=WCDMA 1900B<br>▪ 22=WCDMA 850<br>▪ 29=WCDMA 900 (BC8)<br>• LTE<br>▪ 34=LTE B1<br>▪ 35=LTE B7<br>▪ 36=LTE B13<br>▪ 37=LTE B17<br>▪ 42=LTE B4<br>▪ 44=LTE B3<br>▪ 47=LTE B8<br>▪ 56=LTE B20 |

**Table 6-2: Test Command Details (Continued)**

| Command | Description |
|---|---|
| **!DASCALSTATE** | **Enter / exit modem calibration state**<br>Put the modem into (or exit from) calibration state.<br>**Requirements:**<br>• Use !DASBAND to set the device to an LTE, WCDMA, or GSM band.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!DASCALSTATE=<cal_state>**<br>Response: OK<br>Purpose: Set the modem's calibration state.<br>**Parameters:**<br><cal_state> (Calibration state)<br>• 0 — Exit calibration state<br>• 1 — Enter calibration state |

Table 6-2: Test Command Details (Continued)

| Command | Description |
|---|---|
| **!DASCHAN** | **Set modem channel (frequency)**<br>Set the modem to operate on a particular frequency channel. Before using this command, use the command !DASBAND (described on page 171) to set the band.<br>Once a channel is set, the modem continues to use that channel until the modem is reset or powered off and on.<br><br>**Requirements:**<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the device to an LTE, WCDMA, or GSM band.<br>• If In LTE mode (an LTE band was selected):<br>  • Use !DALSRXBW to set the LTE Rx bandwidth.<br>  • Use !DALSTXBW to set the LTE Tx bandwidth.<br>• Use !DASCHAN to set the uplink channel for the selected band.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** No<br><br>**Usage:**<br>▪ Execution: **AT!DASCHAN=<rfchannel>**<br>Response: <rfchannel><br>OK<br>Purpose: Set modem channel (frequency).<br>**Parameters:**<br><rfchannel> (Uplink channel number (ARFCN)—depends on frequency band being used)<br>• 128–251: GSM 850 MHz<br>• 1–24: GSM 900 MHz<br>• 975–1023: GSM 900 MHz<br>• 512–885: GSM 1800 MHz<br>• 512–810: GSM 1900 MHz<br>• 9612–9888: WCDMA 2100<br>• 9262–9538: WCDMA 1900<br>• 4132–4233: WCDMA 850<br>• 2712–2863: WCDMA 900<br>• 18000–18599: LTE B1<br>• 19200–19949: LTE B3<br>• 19950–20399 LTE B4<br>• 20750–21449: LTE B7<br>• 21450–21799: LTE B8<br>• 23180–23279: LTE B13<br>• 23730–23849: LTE B17<br>• 24150–24449: LTE B20 |

**Table 6-2: Test Command Details (Continued)**

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

Table 6-2: Test Command Details (Continued)

| Command | Description |
|---|---|
| **!DASPDM** | **Set PDM value (WCDMA and GSM only)**<br>Adjust the PDM (Pulse Duration Modulation), allowing you to apply frequency offset to the LO (Local Oscillator) or Tx AGC.<br>When you adjust the Tx AGC (<PDM ID> = 2), the modem does not use a calibrated result but uses the raw AGC value. The resulting change in Tx power will vary from modem to modem, so it is usually necessary to tune this value by executing the command repeatedly with different settings for the <PDMvalue> until you obtain the desired Tx power.<br>When adjusting the tracking LO, you also need to execute the command repeatedly with different settings for the <PDMvalue> until you obtain the desired frequency offset.<br>**Requirements:**<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the device to a WCDMA or GSM band.<br>• Use !DASCHAN to set the uplink channel for the selected band.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!DASPDM=<PDM ID>, <PDMvalue>**<br>Response: <PDM ID> <PDMvalue><br>OK<br>Purpose: Set the tracking LO and Tx AGC PDM.<br>**Parameters:**<br><PDM ID> (LO (Local Oscillator) or Tx AGC (Automatic Gain Control) to adjust)<br>• 0 — Tracking LO adjust (GSM only)<br>• 2 — Tx AGC adjust (WCDMA only)<br>• 4 — Tracking LO adjust (WCDMA only)<br><PDMvalue> (Frequency offset value)<br>• If <PDM ID>=0: 0–511<br>• If <PDM ID>=2: 0–511<br>• If <PDM ID>=4: 0–65535 |
| **!DASTXOFF** | **Turn Tx PA off**<br>Turn the transceiver PA off, after it has been turned on with !DASTXON.<br>**Requirements:**<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the band.<br>• Use !DASCHAN to set the uplink channel for the selected band.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** No<br>**Usage:**<br>▪ Execution: **AT!DASTXOFF**<br>Response: OK<br>Purpose: Turn the Tx PA off.<br>**Parameters:**<br>None |

Table 6-2: Test Command Details (Continued)

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

Table 6-2: Test Command Details (Continued)

| Command | Description |
|---|---|
| **!DAWGRXAGC** | **Return Rx AGC value (WCDMA only)**<br>Return the Rx AGC (Automatic Gain Control) reading for a specific band for either the main path or diversity path (if applicable).<br><br>**Requirements:**<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the device to a WCDMA band.<br>• Use !DASCHAN to set the device to a specific channel on the WCDMA band.<br>**Password required:** Yes (see !ENTERCND for details)<br><br>**Usage:**<br>▪ Execution: **AT!DAWGRXAGC**<br>Response: <agc><br>OK<br>Purpose: Return the AGC for the current band / channel on the main path.<br>▪ Query: **AT!DAWGRXAGC?<path>**<br>Response: <agc><br>OK<br>Purpose: Return the AGC for the current band / channel on the specified path.<br>**Parameters:**<br><path> (For modules supporting diversity)<br>• 0 — Main path<br>• 1 — Diversity path<br><agc> (Averaged Rx AGC)<br>• -512 to 511<br>• To convert <agc> to RxAGC value in dBm:<br>• If (<agc> < 511):<br>RxAGC = -106 + ((<agc> + 512) / 12)<br>• If (<agc> = 511):<br>RxAGC = -106 + (((<agc> - 1024) + 512) / 12) |

Table 6-2: Test Command Details (Continued)

| Command | Description |
|---|---|
| **!DAWSCONFIGRX** | **Configure receiver (WCDMA only)**<br>Configure the receiver using the calibration NV file.<br>**Requirements:**<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the device to a WCDMA band.<br>• Use !DASCHAN to set the device to a specific channel on the WCDMA band.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!DAWSCONFIGRX=<channel>,<Rx_level_dBm>**<br>Response: <LNA_Index> <LNA_Value><br>OK<br>Purpose: Configure the Rx level for the specified uplink channel.<br>**Parameters:**<br><channel> (Uplink channel number (UARFCN) for the band specified using !DASBAND)<br>• Valid values depend on the selected band<br><Rx_level_dBm> (Rx level, in dBm)<br>• Signed integer<br>• Valid range: -113 to 20<br><LNA_Index> (LNA offset index)<br>• 0 — R0 (Highest gain)<br>• 1 — R1<br>• 2 — R2<br>• 3 — R3 (Lowest gain)<br><LNA_Value> (LNA offset value, in 1/12 dB resolution)<br>• Signed integer<br>**Example(s):**<br>AT!DAWSCONFIGRX=9612,-100<br>0 0<br>OK |

Table 6-2: Test Command Details (Continued)

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

Table 6-2: Test Command Details (Continued)

| Command | Description |
|---|---|
| **!DAWSTXCW** | **Set waveform used by the transmitter (WCDMA only)**<br>Set the waveform used by the transmitter — the modem can transmit either in carrier wave or WCDMA modulated.<br>**Requirements:**<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the device to a WCDMA band.<br>• Use !DASCHAN to set the uplink channel for the selected band.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!DAWSTXCW=<waveform>**<br>Response: OK<br>Purpose: Set the transmitter waveform.<br>**Parameters:**<br><waveform> (Waveform used by the transmitter)<br>• 0=WCDMA<br>• 1=Carrier wave (no modulating signal applied) |
| **!DAWSTXPWR** | **Set desired Tx power level (WCDMA mode only)**<br>Enable/disable Tx power output and set the desired Tx power level in dBm.<br>**Requirements:**<br>• The modem must be in WCDMA mode.<br>• Use !DAFTMACT to enter FTM mode.<br>• Use !DASBAND to set the device to a WCDMA band.<br>• Use !DASCHAN to set the uplink channel for the selected band.<br>• Use !DASTXON to turn the transceiver PA.<br>**Password required:** Yes<br>**Usage:**<br>▪ Execution: **AT!DAWSTXPWR=<enable>,<power_dBm>**<br>Response: OK<br>Purpose: Enable/disable Tx power output and set the Tx power level to the requested <dBm> level.<br>**Parameters:**<br><enable> (Enable/disable Tx power output)<br>• 0 — Disable<br>• 1 — Enable<br><power_dBm> (Desired Tx power in dBm)<br>• -57 to 23 |

**Table 6-2: Test Command Details (Continued)**

| Command | Description |
|---|---|
| **!LEDTEST** | **Test LED**<br>Test an LED by turning it on (light) or off (dark). When finished testing the LED, reboot the device to return to normal LED operation.<br>**Notes:**<br>• Only one LED can be tested at a time.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!LEDTEST=<led_no>,<state>**<br>Response: OK<br>Purpose: Turn the specified LED on (light) or off (dark).<br>▪ Query List: **AT!LEDTEST=?**<br>Purpose: Display the assignment command format and valid parameter options.<br>**Parameters:**<br><led no> (LED to test)<br>• 0 — WWAN_LED<br><state> (LED state)<br>• 0 — Off (Dark)<br>• 1 — On (Light) |

# 7: Memory Management Commands

## 7.1 Introduction

The modem uses non-volatile memory to store:
- Factory calibration data
- Settings made in a host application such as Skylight.

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

## 7.2 Command Summary

The table below lists the commands described in this chapter:

**Table 7-1: Memory Management Commands**

| Command | Description | Page |
|---|---|---|
| !RMARESET | Restore device | 182 |

## 7.3 Command Reference

**Table 7-2: Memory Management Command Details**

| Command | Description |
|---|---|
| **!RMARESET** | **Restore device**<br>Restore the device to its original provisioned (OEM default) state, or to the latest backed-up state.<br>**Notes:**<br>· The module does not reboot automatically. It must be manually rebooted to use the restored settings.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!RMARESET=<level>**<br>Response: !RMARESET: DEVICE REBOOT REQUIRED<br>Items Restored: #####<br>Items Deleted: #####<br>Items Defaulted: #####<br>Items Skipped: #####<br>OK<br>Purpose: Restore device to the requested state.<br>**Parameters:**<br><level> (Restoration type)<br>· 1=Default OEM provisioned state<br>· 2=OEM / User state<br>· 3=Latest backed-up state |

# 8: GNSS Commands

## 8.1 Introduction

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

When using these commands, the following considerations apply:

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

## 8.2 GNSS Setup Flow

Refer to the following steps and corresponding AT commands when setting up the GNSS:

1. Enable NMEA sentences: AT!GPSNMEASENTENCE=C01BDFFF
2. Configure Network APN: AT+CGDCONT=1,"IPV4V6","INTERNET"
3. Clear GPS APN: AT!GPSLBSAPN=3
4. Configure GPS APN: AT!GPSLBSAPN=1,0x18,"IPV4V6","internet"
5. Disable GPS Auto Start: AT!GPSAUTOSTART=0
6. Configure GNSS engine: AT!GNSSCONFIG=1,1,1,1,1
7. Set SULP version: AT!GPSSUPLVER=2
8. Close the authentication: AT!GPSTRANSSEC=0
9. Set SUPL URL to Google SUPL: AT!GPSSUPLURL="supl.google.com:7276"
10. Configure GPS Positioning Modes Support: AT!GPSPOSMODE=FFFFFFFF
11. Reset module: AT!RESET
12. Check if module has registered to the network: AT+COPS?
13. End an active position location session: AT!GPSEND=0
14. To clear the aiding data of the GNSS engine: AT!GPSCOLDSTART
15. Initiate a location fix based on the parameters supplied: AT!GPSFIX=2,100,5000
16. Check GPS status: AT!GPSSTATUS?

## 8.3 Command Summary

The table below lists the commands described in this chapter.

**Table 8-1: GPS Commands**

| Command | Description | Page |
|---|---|---|
| !GNSSCONFIG | Configure GNSS satellite constellation support | 185 |
| !GPSAUTOSTART | Configure GPS auto-start features | 186 |

**Table 8-1: GPS Commands (Continued)**

| Command | Description | Page |
|---|---|---|
| !GPSCLRASSIST | Clear specific GPS assistance data | 188 |
| !GPSCOLDSTART | Clear all GNSS assistance data | 189 |
| !GPSEND | End an active session | 189 |
| !GPSFIX | Initiate GPS position fix | 190 |
| !GPSIDREN | Enable/disable "Info for DR" feature | 191 |
| !GPSLBSAPN | Configure the APN for GPS SUPL related data session | 191 |
| !GPSLOC | Return last known location of the modem | 193 |
| !GPSMOMETHOD | Set/report GPS MO method | 194 |
| !GPSMTLRSETTINGS | Set/report MT location request settings | 195 |
| !GPSNMEACONFIG | Enable/disable NMEA reporting | 196 |
| !GPSNMEASENTENCE | Set/report NMEA sentence type | 197 |
| !GPSSATINFO | Request satellite information | 198 |
| !GPSSTATUS | Request current status of a position fix session | 199 |
| !GPSSUPLURL | Set/query SUPL server URL | 200 |
| !GPSSUPLVER | Set/report SUPL server version | 201 |
| !GPSTRACK | Initiate local tracking (multiple fix) session | 202 |
| !GPSTRANSSEC | Control GPS transport security | 203 |
| !GPSXTRADATAENABLE | Set/report GPS XTRA settings | 204 |
| !GPSXTRADATAURL | Set/report GPS XTRA data server URLs | 205 |
| !GPSXTRASTATUS | Return current status of XTRA | 206 |
| !GPSXTRATIME | Inject GPS or UTC time into XTRA system | 207 |
| !GPSXTRATIMEENABLE | Set/report GPS XTRA time settings | 208 |
| !GPSXTRATIMEURL | Set/report GPS XTRA SNTP server URLs | 209 |

# Command reference

**Table 8-2: GPS Command Details**

| Command | Description |
|---|---|
| **!GNSSCONFIG** | **Configure GNSS satellite constellation support**<br>Configure GNSS engine to support various GNSS satellite systems.<br><br>**Password required: No**<br>**Reset required to apply changes:** Yes<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT!GNSSCONFIG=<GPS>,<GLO>,<BDS>,<GAL>,<QZS>**<br>Response: OK<br>Purpose: Enable or disable satellite systems.<br>▪ Query: **AT!GNSSCONFIG?**<br>Response: GPS: <GPS><br>GLONASS: <GLO><br>BDS: <BDS><br>GAL: <GAL><br>QZSS: <QZS><br>OK<br>Purpose: Display state of each satellite system (enabled/disabled).<br>▪ Query List: **AT!GNSSCONFIG=?**<br>Purpose: Return the expected command format.<br>**Parameters:**<br><GPS> (GPS satellite system state)<br>· 1 — Enable<br>· Note: GPS support cannot be disabled.<br><GLO> (GLONASS satellite system state)<br>· 0 — Disable<br>· 1 — Enable<br><BDS> (Beidou satellite system state)<br>· 0 — Disable<br>· 1 — Enable worldwide<br>· 2 — Enable outside US<br><GAL> (Galileo satellite system state)<br>· 0 — Disable<br>· 1 — Enable worldwide<br>· 2 — Enable outside U.S.<br><QZS> (Quasi-Zenith state)<br>· 0 — Disable<br>· 1 — Enable worldwide<br>· 2 — Enable outside U.S.<br>· Note: Disable means QZSS satellites will not be used in GNSS position fix calculation. However, QZSS satellites are still being tracked for the purpose of cross-correlation detection and mitigation. |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSAUTOSTART** | **Configure GPS auto-start features**<br>Configure the GPS auto-start features. Any changes take effect the next time the modem is reset.<br><br>**Notes:**<br>• MS Assisted only mode could not update the time of GPS engine in module.<br>• If auto-start is enabled, another GPS session cannot be started.<br><br>**Password required: No**<br><br>**Usage:**<br>▪ Execution: **AT!GPSAUTOSTART=<function>[, <fixtype>, <maxtime>, <maxdist>, <fixrate>]**<br>Response: OK<br>or<br>ERROR<br>Purpose: Assign start values for various GPS settings<br>▪ Query: **AT!GPSAUTOSTART?**<br>Response: at!gpsautostart?<br>function: <function><br>fixtype: <fixtype><br>maxtime: <maxtime> seconds<br>maxdist: <maxdist> meters<br>fixrate: <fixrate> seconds<br>OK<br>Purpose: Display the current values for auto-start features<br>▪ Query List: **AT!GPSAUTOSTART=?**<br>Response: !GPSAUTOSTART:<br><function>[,<fixtype>,<maxtime>,<maxdist>,<fixrate>]<br><function>: 0-Disabled, 1-Enabled<br><fixtype>: 1-Standalone, 2-MS-Based, 3-MS-Assisted<br><maxtime>: 1-255 seconds<br><maxdist>: 1-4294967280 meters<br><fixrate>: 1-65535 seconds<br>OK<br>Purpose: Return the expected command format. |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSAUTOSTART** | **Configure GPS auto-start features**<br>**Parameters:**<br><function> (When GPS auto-start will occur)<br>• 0 — Disabled<br>• 1 — Enabled<br><fixtype> (Type of fix to establish)<br>• 1—Standalone<br>• 2—MS-Based Only<br>• 3—MS_Assisted Only<br><maxtime> (Maximum time allowed for the receiver to get a fix)<br>• Valid range: 1–255 — Number of seconds to wait<br><maxdist> (Maximum distance uncertainty of a fix)<br>• Entered in decimal format<br>• Valid range: 1–4294967280 meters<br><fixrate> (Time to wait between fixes)<br>• Valid range: 1–65535 seconds |

**Table 8-2: GPS Command Details (Continued)**

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

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSCOLDSTART** | **Clear all GNSS assistance data**<br>Clear all GNSS assistance details from the modem and put the modem into a coldstart state. Data cleared includes Almanac, Ephemeris, Previous Position, Ionosphere, and GPS time. This forces a cold start for GPS acquisition the next time a session starts.<br>**Requirements:**<br>• Device must not have an active GPS session (the GPS receiver is off and no position fix is being calculated).<br>**Password required: Yes (see !ENTERCND for details)**<br>**Usage:**<br>▪ Execution: **AT!GPSCOLDSTART**<br>Response: OK<br>Purpose: Clear the modem's GPS details<br>**Parameters:**<br>None |
| **!GPSEND** | **End an active session**<br>End an active position fix session.<br>**Password required: No**<br>**Usage:**<br>▪ Execution: **AT!GPSEND=<sessType>**<br>Response: ERRCODE = <value><br>OK<br>*or* OK<br>Purpose: End the current session.<br>**Parameters:**<br><sessType> (Type of session to end)<br>• 0=Position fix session<br><value> (Error code returned when command fails for any reason)<br>• See Table 8-4 on page 210 for a list of possible error codes. |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSFIX** | **Initiate GPS position fix**<br>Initiates a location fix based on the parameters supplied. If the modem is unable to initiate the location fix, an error code will be returned, common error code as below.<br>**Error Codes:**<br>▪ 15 = Device is offline<br>▪ 17 = Locked GPS<br>▪ 26 = Disabled GPS<br>If the modem can initiate the location fix, then the OK message is displayed. While the fix is in progress, the application may query the status of the session using the !GPSSTATUS. Once the status shows that the fix is complete, the application should use the !GPSLOC to obtain results.<br>**Password required: No**<br>**Usage:**<br>▪ Execution: **AT!GPSFIX=<fixType>, <maxTime>, <maxDist>**<br>Response: OK<br>*or* ERROR CODE = <value><br>OK<br>Purpose: Initiate a time-limited position fix with a specified accuracy.<br>▪ Query List: **AT!GPSFIX=?**<br>Response: !GPSFIX: <fixtype>,<maxtime>,<maxdist><br><fixtype>: 1-Standalone, 2-MS-Based Only, 3-MS-Assisted<br><maxtime>: 1-255 seconds<br><maxdist>: 1-4294967280 meters<br>OK<br>Purpose: Initiate a time-limited position fix with a specified accuracy.<br>**Parameters:**<br><fixType> (Type of fix to establish)<br>· 1=Standalone (not supported by a mobile station)<br>· 2=MS-based only<br>· 3=MS-assisted only<br>· Note: MS-assisted only mode could not update the time of GPS engine in the module.<br><maxTime> (Number of seconds allowed to capture satellite information)<br>· Valid range: 1–255 seconds<br><maxDist> (Accuracy the application prefers)<br>· Measured in meters<br>· Entered in decimal format<br>· Valid range:<br>· 1–4294967279 meters<br>· 4294967280=No preference<br><value> (Error code value)<br>· N/A = not available<br>· See Table 8-4 on page 210 for a list of possible error codes. |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSIDREN** | **Enable / disable "Info for DR" feature**<br>Enable or disable the "Info for DR" feature.<br>**Password required: No**<br>**Usage:**<br>▪ Execution: **AT!GPSIDREN=<switch>**<br>Response: OK<br>*or* ERROR<br>OK<br>Purpose: Enable or disable the "Info for DR" feature.<br>▪ Query: **AT!GPSIDREN?**<br>Response: !GPSIDREN: <switch><br>Purpose: Return current state of the "Info for DR" feature.<br>▪ Query List: **AT!GPSIDREN=?**<br>Purpose: Return supported <switch> values.<br>**Parameters:**<br><switch> ("Info for DR" feature state)<br>· 0 — Disabled (Default)<br>· 1 — Enabled |
| **!GPSLBSAPN** | **Configure the APN for GPS SUPL related data session**<br>Set the APN for GPS SUPL related data session.<br>**Password required: Yes (see !ENTERCND for details)**<br>**Usage:**<br>▪ Execution: **AT!GPSLBSAPN=<operation>[,<ratmask>[,<IP type>,<APN>]]**<br>Response: OK<br>Purpose: Set the APN for GPS SUPL related data session.<br>▪ Query: **AT!GPSLBSAPN?**<br>Response: <ratmask>,<IP type>,<APN><br>OK<br>or<br>Empty<br>OK<br>Purpose: Read the APN for GPS SUPL related data session. |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSLBSAPN** | ▪ Query List: **AT!GPSLBSAPN=?**<br>Response: !GPSLBSAPN:<operation>[,<ratmask>[,<IPType>,<APN>]]<br><operation>: 1 - Add, all parameters must be present<br>2 - Delete, only <rat> is required<br>3 - Delete All, no other parameters required<br><ratmask>: 0x01 - CDMA<br>0x02 - HDR<br>0x04 - GSM<br>0x08 - WCDMA<br>0x10 - LTE<br><IP Type>: IPV4, IPV6, IPV4V6<br><APN>: Quoted APN String<br>OK<br>Purpose: Display valid parameter options.<br>**Parameters:**<br><operation><br>• Valid range: 1–3<br>• 1— Add, all parameters must be present<br>• 2— Delete, only <rat> is required<br>• 3— Delete all, no other parameters required<br><Rat mask><br>• Valid range: 0x1–0x1F<br>• Bit 0x1 – CDMA<br>• Bit 0x2 – HDR<br>• Bit 0x4 – GSM<br>• Bit 0x8 – WCDMA<br>• Bit 0x10 – LTE<br><IP type> (String)<br>• IPV4<br>• IPV6<br>• IPV4V6<br><APN> (String)<br>• Quoted APN string |

**Table 8-2: GPS Command Details (Continued)**

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

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSLOC** | **Return last known location of the modem**<br><heading> (Direction of MS)<br>· Example: "0.0 deg"<br><vH> (Horizontal velocity)<br>· Example: "0.0 m/s"<br><vV> (Vertical velocity)<br>· Example: "0.0 m/s" |
| **!GPSMOMETHOD** | **Set / report GPS MO method**<br>Set or report the GPS MO (Mode of Operation).<br>**Password required: No**<br>**Reset required to apply changes:** Yes<br>**Persistent across power cycles:** Yes<br>**Usage:**<br>▪ Execution: **AT!GPSMOMETHOD=<MO_method>**<br>Response: OK<br>*or* ERROR<br>Purpose: Set the specified MO method.<br>▪ Query: **AT!GPSMOMETHOD?**<br>Response: <MO_method><br>OK<br>Purpose: Return the configured MO method.<br>**Parameters:**<br><MO_method> (Mode of Operation)<br>· 0 — CP (Control Plane)<br>· 1 — UP (User Plane) |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSMTLRSETTINGS** | **Set / report MT location request settings**<br>Set or report the current MT (mobile-terminated) Location Request settings, which control how the UE responds to network-initiated notifications.<br><br>**Password required: Yes**<br>**Reset required to apply changes:** Yes<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT!GPSMTLRSETTINGS=<response>**<br>Response: OK<br>*or* ERROR<br>Purpose: Indicate how MT location request will be handled.<br>▪ Query: **AT!GPSMTLRSETTINGS?**<br>Response: Notification Response Setting: <response><br>OK<br>Purpose: Return the current <response> setting.<br>▪ Query List: **AT!GPSMTLRSETTINGS=?**<br>Purpose: Return valid <response> values.<br>**Parameters:**<br><response> (Notification response setting)<br>• 0=Default setting as defined in *3GPP specification 29.002*, 'NotificationToMSUser' enumeration.<br>• 1=Accept all MT location requests.<br>• 2=Reject all MT location requests.<br>• 3=Verify all — User will be asked to accept or reject every MT location request. |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSNMEACONFIG** | **Enable / disable NMEA reporting**<br>Enable (and configure output rate) or disable NMEA reporting for tracking sessions.<br><br>**Password required: No**<br>**Reset required to apply changes:** Yes<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT!GPSNMEACONFIG=<enable>[,<output_rate>]**<br>Response: OK<br>*or* ERROR<br>Purpose: Enable (and set the output rate) or disable NMEA reporting.<br>▪ Query: **AT!GPSNMEACONFIG?**<br>Response: Enabled: <enable><br><br>Output Rate: <output_rate><br><br>OK<br>Purpose: Indicate the current NMEA reporting state.<br>▪ Query List: **AT!GPSNMEACONFIG=?**<br>Purpose: Return valid parameter values.<br>**Parameters:**<br><enable> (NMEA reporting state)<br>• 0 — Disable<br>• 1 — Enable<br><output_rate> (Reporting rate, in seconds)<br>• Integer<br>• Valid range: 1–255<br>*Note: <output_rate> cannot be set on RC76. The default value is 1.* |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSNMEASENTENCE** | **Set / report NMEA sentence type**<br>Set or report the current GPS NMEA sentence types.<br><br>**Password required: No**<br>**Reset required to apply changes:** Yes<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT!GPSNMEASENTENCE=<nmea type>**<br>Response: OK<br>*or* ERROR<br>Purpose: Enable or disable NMEA sentence types.<br>▪ Query: **AT!GPSNMEASENTENCE?**<br>Response: !GPSNMEASENTENCE: <nmea type><br>OK<br>Purpose: Indicate the currently enabled GPS NMEA sentence types.<br>▪ Query List: **AT!GPSNMEASENTENCE=?**<br>Purpose: Return valid parameter values.<br>**Parameters:**<br><nmea type> (NMEA sentence types)<br>• 2-byte hex format mask (Note: In the execution format, do not include '0x' before the mask value)<br>• Each bit: 0=Disabled; 1=Enabled, for more details refer to Table 8-3. |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSSATINFO** | **Request satellite information**<br>Return the following information for all satellites in view (including those used in the latest position fix): satellite vehicle number (SV), elevation (ELEV), azimuth (AZI), and signal to noise ratio (SNR).<br>The information returned is valid regardless of the current fix mode or whether the PDE or the modem performs the fix calculations.<br>**Password required: No**<br>**Usage:**<br>▪ Query: **AT!GPSSATINFO?**<br>Response: NO SAT INFO<br>OK<br>*or* Satellites in view: <numSats><br>* SV: <SV 1> ELEV:<ELEV 1> AZI:<AZI 1> SNR:<SNR 1><br>...<br>* SV: <SV n> ELEV:<ELEV n> AZI:<AZI n> SNR:<SNR n><br>OK<br>Purpose: Return the number of satellites in view (including those used in the latest position fix) and details for each satellite (or return an error message).<br>*Note: An asterisk (*) at the beginning of a line indicates the satellite was used in the fix location calculation.*<br>**Parameters:**<br><numSats> (Number of satellites in view)<br>• 1 or more<br><SV n> (Satellite vehicle number for the nth satellite in the list)<br>• 1 or more<br>• 1-32 — GPS<br>• 65-96 — GLONASS<br>• 201–237 — Beidou<br>• 301-336 — Galileo<br><ELEV n> (Satellite elevation relative to modem location, in degrees)<br>• Valid range: 0–90<br><AZI n> (Satellite azimuth relative to modem location, in degrees)<br>• Valid range: 0–360<br><SNR n> (Signal to noise ratio, in dB)<br>• Valid range: 0–99 |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSSTATUS** | **Request current status of a position fix session**<br>Return the current status of a position fix session.<br>**Password required: No**<br>**Usage:**<br>▪ Query: **AT!GPSSTATUS?**<br>Response: <year> <month> <day> <day of week> <time of day> Last Fix Status = <status><br><year> <month> <day> <day of week> <time of day> Fix Session Status = <status><br>Purpose: Return timestamps and status of a position fix session.<br>**Parameters (Timestamp):**<br><year><br>· Example: "2007"<br><month><br>· 01–12 (Jan–Dec)<br><day><br>· 01–31<br><day of week><br>· 0–6 (0=Monday)<br><time of day><br>· 24-hour clock format<br>· Example: "13:25:48"<br>**Parameters (Status):**<br><status> (Session status)<br>· "NONE": No session of this type has occurred since the modem powered up.<br>· The timestamp is the current time.<br>· "ACTIVE": A session of this type is currently active.<br>· The timestamp is the time when the session entered this state.<br>· "SUCCESS": The most recent session of this type succeeded.<br>· The timestamp is the time when the previous session completed successfully.<br>· "FAIL": The most recent session of this type failed.<br>· The timestamp is the time when the previous session failed.<br>· An error code is displayed with the "FAIL" string. See Table 8-4 for a list of error codes.<br>**Example(s):**<br>AT!GPSSTATUS? returns:<br>2007 01 06 6 00:25:01 Last Fix Status = SUCCESS<br>2007 01 06 6 00:25:02 Fix Session Status = ACTIVE |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSSUPLURL** | **Set / query SUPL server URL**<br>Queries or sets the SUPL URL string to be used when TCP/IP is the transport mechanism for Location Processing.<br><br>**Notes:**<br>• This command does not perform any checks on the URL string. If it is incorrectly defined, the modem will fail to perform a MS assisted GPS fix.<br>• A reset is required for the reconfiguration to take effect.<br><br>**Password required: Yes (see !ENTERCND for details)**<br><br>**Usage:**<br>▪ Execution: **AT!GPSSUPLURL="<SUPL SERVER URL>[:<PORTNUM>]**<br>Response: OK<br><br>Or<br>ERROR<br><br>Example:<br>AT!GPSSUPLURL="supl.url.net"<br><br>OK<br><br>Or<br>AT!GPSSUPLURL="123.123.123.123"<br><br>Or<br>AT!GPSSUPLURL="123.123.123.123:17432"<br>Purpose: Identify the SUPL server URL.<br>▪ Query: **AT!GPSSUPLURL?**<br>Response: <SUPL SERVER URL><br><br>Example:<br><br>AT!GPSSUPLURL?<br>supl.url.net<br>OK<br>Purpose: Return the SUPL server's URL.<br>▪ Query List: **AT!GPSSUPLURL=?**<br>Response: <SUPL SERVER URL>[:<PORTNUM>]<br>OK<br>Purpose: Return the execution command format. |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSSUPLURL** | **Set / query SUPL server URL**<br>**Parameters:**<br><SUPL SERVER URL> (FQDN of the SUPL Server)<br>· String<br>· Must be a fully qualified domain name (FQDN) or address<br>· The <SUPL SERVER URL> is not checked for correctness — if the string is invalid, the modem will not be able to perform MS-assisted GPS fixes.<br><PORTNUM> (Port ID to use over TCP/IP)<br>· Valid range: 0–65535 |
| **!GPSSUPLVER** | **Set / report SUPL server version**<br>Set or return the version of the SUPL server.<br>**Password required: No**<br>**Reset required to apply changes:** Yes<br>**Persistent across power cycles:** Yes<br>**Usage:**<br>▪ Execution: **AT!GPSSUPLVER=<supl ver>**<br>Response: OK<br>or ERROR<br>Purpose: Identify the SUPL server version.<br>▪ Query: **AT!GPSSUPLVER?**<br>Response: <supl ver><br>OK<br>Purpose: Return the SUPL server's version.<br>▪ Query List: **AT!GPSSUPLVER=?**<br>Purpose: Return the execution command format.<br>**Parameters:**<br><supl ver> (SUPL server version)<br>· 1 — SUPL version 1<br>· 2 — SUPL version 2 |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSTRACK** | **Initiate local tracking (multiple fix) session**<br>Initiate a local tracking session comprising a specific number of position fixes taken at regular time intervals.<br><br>**Password required: No**<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** No<br><br>**Usage:**<br>▪ Execution: **AT!GPSTRACK = <fixType>, <maxTime>, <maxDist>, <fixCount>, <fixRate>**<br>Response: OK<br>*or* ERROR CODE = <value><br>OK<br>Purpose: Initiate a series of time-limited position fixes.<br>▪ Query List: **AT!GPSTRACK=?**<br>Purpose: Return supported <fixType>, <maxTime>, <maxDist>, <fixCount>, and <fixRate> values.<br><br>**Parameters:**<br><fixType> (Type of fix to establish)<br>· 1—Standalone<br>· 2—MS-Based Only<br>· 3—MS_Assisted Only<br><br>*Note: MS Assited only mode could not update the time of GPS engine in module.*<br><br><maxTime> (Maximum time to wait for satellite information)<br>· Valid range: 1–255 seconds<br><maxDist> (Requested accuracy of fix)<br>· Entered in decimal format<br>· Valid range:<br>· 1–4294967279 meters<br>· 4294967280=No preference<br><fixCount> (Number of position fixes requested)<br>· Valid range: 1–1000 (1000 — Take a continuous series of position fixes)<br><fixrate> (Amount of time to wait between fix attempts)<br>· Valid range: 1–65535 seconds |

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSTRACK** | **Initiate local tracking (multiple fix) session**<br>**Failure conditions:**<br>The request fails if the tracking session fails to initiate.<br>If the request fails, the message ERROR CODE = <value> is returned. See Table 8-4 on page 210 for a list of error codes.<br>*Note: The 'time to first fix' may require more time than subsequent fixes, if almanac, ephemeris, or location data needs to be updated. (Almanac data is valid for 3–4 days, ephemeris for 30–120 minutes, and location data for 4 minutes). To avoid a timeout error (time spent > <maxtime>), your application could precede the **!GPSTRACK** call with a single position fix (**AGPSFIX**) with a greater <maxTime> value.*<br>**Example(s):**<br>AT!GPSTRACK=1, 15, 10, 20, 60 requests a series of 20 standalone position fixes to 10 meters accuracy — fixes are taken every 60 seconds.<br>One of the following responses will be received:<br>• "OK" if the request is successful, or<br>• "ERROR CODE = <value>" if the request fails for any reason. See Table 8-4 on page 210 for a list of error codes.<br>**Related commands:**<br>▪ **!GPSSTATUS**—Use this command while the tracking session is in progress.<br>▪ **!GPSLOC**—Use this command after the session completes to obtain the result. |
| **!GPSTRANSSEC** | **Control GPS transport security**<br>Enable or disable GPS transport security for SUPL GPS fixes.<br>**Password required: Yes (see !ENTERCND for details)**<br>**Reset required to apply changes:** Yes<br>**Persistent across power cycles:** Yes<br>**Usage:**<br>▪ Execution: **AT!GPSTRANSSEC=<security>**<br>Response: OK<br>*or* ERROR<br>Purpose: Indicate if transport security is used.<br>▪ Query: **AT!GPSTRANSSEC?**<br>Response: Transport security: <security><br>OK<br>Purpose: Return the current <security> setting.<br>▪ Query List: **AT!GPSTRANSSEC=?**<br>Purpose: Display the command format and valid parameter options.<br>**Parameters:**<br><security> (Transport security state)<br>• Bit mask:<br>◦ Bit 0: 0=Disabled (No security); 1=Enabled (Security)<br>◦ Bit 1: 0=SSL Version TLS 1.1; 1=SSL Version TLS 1.0<br>◦ Bit 2: 0=SHA256; 1=SHA1 |

**Table 8-2: GPS Command Details (Continued)**

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

**Table 8-2: GPS Command Details (Continued)**

| Command | Description |
|---|---|
| **!GPSXTRADATAURL** | **Set / report GPS XTRA data server URLs**<br>Set or report the URLs of up to three GPS XTRA data servers.<br><br>**Password required: Yes (see !ENTERCND for details)**<br>**Reset required to apply changes:** Yes<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT!GPSXTRADATAURL=<urlIndex>,<url>**<br>Response: OK<br>*or* ERROR<br>Purpose: Set the URL used for the primary, secondary, or tertiary data server.<br>▪ Query: **AT!GPSXTRADATAURL?**<br>Response: XTRA Primary Server: <url1><br>XTRA Secondary Server: <url2><br>XTRA Tertiary Server: <url3><br>OK<br>Purpose: Return the URLs of the primary, secondary, and tertiary data servers.<br><br>**Parameters:**<br><urlIndex> (Server index)<br>• 1=Primary server<br>• 2=Secondary server<br>• 3=Tertiary server<br><url> (Server URL)<br>• URL string includes quotes<br>• Example: “http:/ /xtra1.gpsoneextra.net/xtra.bin”<br>• URL must be complete, including the “http:/ /”<br>• Maximum string length: 128 characters |

**Table 8-2: GPS Command Details (Continued)**

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

**Table 8-2: GPS Command Details (Continued)**

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

**Table 8-2: GPS Command Details (Continued)**

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

**Table 8-2: GPS Command Details (Continued)**

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

**Table 8-3: NMEA Sentence Types**

| Bit | Description |
|---|---|
| 0 | GPGGA (Fix information) |
| 1 | GPRMC (Recommended minimum data for GPS) |
| 2 | GPGSV (Detailed satellite data) |
| 3 | GPGSA (Overall satellite data) |
| 4 | GPVTG (Vector track and speed over the ground) |
| 5 | PQXFI (Proprietary Qualcomm eXtended Fix Information) |
| 6 | GLGSV (GLONASS GSV) |
| 7 | GNGSA (GLONASS GSA) |

**Table 8-3: NMEA Sentence Types**

| Bit | Description |
|---|---|
| 8 | GNGNS (Time, position, fixed related data for GLONASS receiver) |
| 9 | GARMC (Galileo RMC) |
| 10 | GAGSV (Galileo Satellites in View) |
| 11 | GAGSA (Galileo GSA) |
| 12 | GAVTG (Galileo VTG) |
| 13 | Reserved |
| 14 | GSV_EXTENDED (Enable/disable Extended GGSV) |
| 15 | GAGGA (Galileo GGA) |
| 16 | PQGSA (Beidou GSA) |
| 17 | PQGSV (Beidou GSV) |
| 18 | Reserved |
| 19 | GAGNS (Galileo new GGA) |
| 20 | GPDTM (Datum Reference) |
| 21 | GNGGA (GNSS GGA) |
| 22 | GNRMC (GNSS RMC) |
| 23 | GNVTG (GNSS VTG) |
| 24–29 | Reserved |
| 30 | GPGLL (Geographic Position) |
| 31 | GPGRS (GPS Range Residuals) |

## 8.3.1 Error codes

Table 8-4 describes error codes that can be returned by **!GPSEND** (page 189), **!GPSSTATUS** (page 199), and **!GPSTRACK** (page 202).

Table 8-5 on page 212 describes error codes that can be returned by **!GPSFIX** (page 190).

**Table 8-4: AT Command Error Codes (!GPSEND, !GPSSTATUS, !GPSTRACK)**

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

**Table 8-4: AT Command Error Codes (!GPSEND, !GPSSTATUS, !GPSTRACK) (Continued)**

| Error code | Description |
|---|---|
| 5 | Reserved |
| 6 | Phone is GPS-locked |
| 7 | Connection failure with PDE |
| 8 | Session ended because of error condition |
| 9 | User ended the session |
| 10 | End key pressed from UI |
| 11 | Network session was ended |
| 12 | Timeout (for GPS search) |
| 13 | Conflicting request for session and level of privacy |
| 14 | Could not connect to the network |
| 15 | Error in fix |
| 16 | Reject from PDE |
| 17 | GPS is disabled |
| 18 | Ending session due to E911 call |
| 19 | Server error |
| 20 | Reserved |
| 21 | Reserved |
| 22 | Unknown system error |
| 23 | Unsupported service |
| 24 | Subscription violation |
| 25 | Desired fix method failed |
| 26 | Reserved |
| 27 | No fix reported because no Tx confirmation was received |
| 28 | Network indicated normal end of session |
| 29 | No error specified by the network |
| 30 | No resources left on the network |
| 31 | Position server not available |
| 32 | Network reported an unsupported version of protocol |

**Table 8-5: AT Command Error Codes (!GPSFIX)**

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

# 9: SIM Commands

## 9.1 Introduction

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

## 9.2 Command Summary

Table 9-1 lists the commands described in this chapter:

**Table 9-1: SIM Commands**

| Command | Description | Page |
|---|---|---|
| +CCHC | Close a Local Channel by Session ID | 214 |
| +CCHO | Open a Local Channel and Return the Session ID | 215 |
| +CGLA | Send APDU Command to SIM Card | 216 |
| +CCID | Return SIM/eUICC ICCID and EID | 217 |
| +CCID (notification) | eUICC profile switch — Unsolicited notification | 217 |
| +CPINR | Display remaining number of SIM unlock retries | 218 |
| +CSPN | Display SIM card service provider's name (SPN) | 219 |
| !ICCID | Return SIM card's ICCID | 219 |
| +KSIMSEL | Select External SIM interface | 220 |
| !UIMS | Select active UIM interface | 221 |

# 9.3 Command Reference

**Table 9-2: SIM Command Details**

| Command | Description |
|---|---|
| **+CCHC** | **Close a Local Channel by Session ID**<br><br>**Password required:**<br><br>**Usage:**<br>▪ Execution: **AT+CCHC= <session_id>**<br>Response: OK<br>or<br>+CME ERROR: <err><br>Purpose: Close a local channel.<br>▪ Query: **AT+CCHC=?**<br>Response: OK<br>Purpose: Query list supported.<br>**Parameters:**<br><session_id> (Integer)<br>• Session ID to target a specific application on the USIM using logical channels mechanisms. |

**Table 9-2: SIM Command Details (Continued)**

| Command | Description |
|---|---|
| **+CCHO** | **Open a Local Channel and Return the Session ID**<br><br>Notes:<br><br>The +CCHO execute command gives the <session_id> when it receives SIM application response status words as shown below:<br>• '90' '00'—normal ending of the command<br>• '91' 'XX'—normal ending of the command with extra information from the proactive UICC containing a command for the terminal length 'XX' of the response data<br>• '92' 'XX'—normal ending of the command with extra information concerning an ongoing data transfer session<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CCHO=<dfname>**<br>Response: <session_id><br>OK<br>or<br>+CME ERROR: <err><br>Purpose: Open a local channel<br>▪ Query: **AT+CCHO=?**<br>Response: OK<br>Purpose: Query list supported<br>**Parameters:**<br><dfname> (Integer)<br>• All selectable applications in the UICC are referenced by a DF name coded on 1 – 16 bytes<br><session_id> (Integer)<br>• Session ID to target a specific application on the USIM using logical channels mechanisms. |

**Table 9-2: SIM Command Details (Continued)**

| Command | Description |
|---|---|
| **+CGLA** | **Send APDU Command to SIM Card**<br><br>Notes:<br>• When invalid parameter is given, an empty response is returned:<br>AT+CGLA=257,14,"TW010100002100" //invalid parameter<br>+CGLA: 0,""<br>OK<br>**Password required:**<br><br>**Usage:**<br>▪ Execution: **AT+CGLA= <sessionid>, <length>, <command>**<br>Response: +CGLA: <length>,<response><br>OK<br>or<br>+CME ERROR: <err><br>Purpose: Sends APDU command to SIM card.<br>**Parameters:**<br><session_id> (Integer)<br>• Used as the identifier of the session to be used in order to send the APDU commands to the UICC. It is mandatory in order to send commands to the UICC when targeting applications on the smart card using a logical channel other than the default channel (channel "0").<br><length (Integer)<br>• Length of the characters that are sent to TE in <command> or <response> (two times the actual length of the command or response).<br><command> (String)<br>• Command passed on by the MT to the UICC in the format as described in 3GPP TS 31.101 in hexadecimal format (refer to +CSCS).<br><response> (String)<br>• Response to the command passed on by the UICC to the MT in the format as described in 3GPP TS 31.101 in hexadecimal format (refer to +CSCS). |

**Table 9-2: SIM Command Details (Continued)**

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

**Table 9-2: SIM Command Details (Continued)**

| Command | Description |
|---|---|
| **+CPINR** | **Display remaining number of SIM unlock retries**<br>Display the number of remaining SIM unlock retries.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+CPINR=<CPIN TYPE>**<br>Response: +CPINR: <CPIN TYPE>,<remaining><br>OK<br>Purpose: Display the number of remaining retries for the specified PIN/PUK type.<br>▪ Query: **AT+CPINR**<br>Response: +CPINR: SIM PIN,<remaining><br>+CPINR: SIM PUK,<remaining><br>+CPINR: SIM PIN2,<remaining><br>+CPINR: SIM PUK2,<remaining><br>+CPINR: PH-FSIM PIN,<remaining><br>+CPINR: PH-NET PIN,<remaining><br>+CPINR: PH-NETSUB PIN,<remaining><br>+CPINR: PH-SP PIN,<remaining><br>+CPINR: PH-CORP PIN,<remaining><br>+CPINR: PH-FSIM PUK,<remaining><br>+CPINR: PH-NET PUK,<remaining><br>+CPINR: PH-NETSUB PUK,<remaining><br>+CPINR: PH-SP PUK,<remaining><br>+CPINR: PH-CORP PUK,<remaining><br>OK<br>Purpose: Display the number of remaining retries for all PIN/PUK types.<br>**Parameters:**<br><CPIN TYPE> (PIN/PUK type) ASCII string enclosed within quotes.<br>Valid values: (Note: If there are any errors in this list, use AT+CPINR to display the full listof available types.)<br>▪ "SIM PIN"<br>▪ "SIM PUK"<br>▪ "SIM PIN2"<br>▪ "SIM PUK2"<br>▪ "PH-FSIM PIN"<br>▪ "PH-NET PIN"<br>▪ "PH-NETSUB PIN"<br>▪ "PH-SP PIN"<br>▪ "PH-CORP PIN"<br>▪ "PH-FSIM PUK"<br>▪ "PH-NET PUK"<br>▪ "PH-NETSUB PUK"<br>▪ "PH-SP PUK"<br>▪ "PH-CORP PUK"<br><remaining> (Number of retries remaining for specified PIN/PUK type)<br>▪ 0–255 (maximum value is type-dependent) |

**Table 9-2: SIM Command Details (Continued)**

| Command | Description |
|---|---|
| **+CSPN** | **Display SIM card service provider's name (SPN)**<br>Display the service provider name for the SIM card.<br>**Password required:** No<br><br>**Usage:**<br>(Note: Execution and Query formats return the same response.)<br>▪ Execution:<br>**AT+CSPN**<br>Response: +CSPN: <spn><br>OK<br>or<br>+ERROR<br>Purpose: Display the SIM card's service provider name.<br>▪ Query:<br>**AT+CSPN?**<br>Response: +CSPN: <spn><br>OK<br>or<br>+ERROR<br>Purpose: Display the SIM card's service provider name.<br>▪ Query List: **AT+CSPN=?**<br>Response: OK<br>Purpose: None.<br>**Parameters:**<br><spn> (Service provider name):<br>▪ ASCII string enclosed within quotes. |
| **!ICCID** | **Return SIM card's ICCID**<br>Return a SIM's ICCID (Integrated Circuit Card ID).<br>**Password required:** No<br><br>**Usage:**<br>▪ Query: **AT!ICCID?**<br>Response: !ICCID: <iccid><br>OK<br>Purpose: Display the ICCID.<br>**Parameters:**<br><iccid> (ICCID of the SIM currently being tested):<br>▪ 20 digit decimal number — This number is often printed on the SIM card. |

**Table 9-2: SIM Command Details (Continued)**

| Command | Description |
|---|---|
| **+KSIMSEL** | **Select External SIM interface**<br>This command is used for hardware designs with an external SIM multiplexer connected to the UIM1 RC interface. The active SIM is controlled by GPIO6 to the multiplexer according to AT+KSIMSEL.<br>**Password required:** No<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br><br>**Requirements:**<br>• The fast SIM switch feature must be enabled using the !CUSTOM EXTUIMSWITCHEN customization before +KSIMSEL can be used. See !CUSTOM.<br><br>**Usage:**<br>▪ Execution: **AT+KSIMSEL=<sim_mode>**<br>Response: OK<br>Purpose: Select SIM interface.<br>▪ Query: **AT+KSIMSEL?**<br>Response:! +KSIMSEL: <sim_mode>,<gpio_sim>,<sim_slot>,<remote_enable><br>OK<br>Purpose: Indicate the active external SIM interface.<br>▪ Query List: **AT+KSIMSEL=?**<br>Response: +KSIMSEL: (list of supported <sim_mode>s)<br>OK<br>Purpose: Return a list of supported <sim_mode> values.<br>**Parameters:**<br><sim_mode> (External SIM being used)<br>• 0 — (Query only) External SIM select feature disabled. This value is returned when the !CUSTOM EXTUIMSWITCHEN customization is 0.<br>• 1 — External SIM slot 1 (GPIO6 low)<br>• 2 — External SIM slot 2 (GPIO6 high)<br>• 9—Select internal SIM if present. The presence of an external SIM will be ignored<br>• 20—Select external SIM if present, else select internal SIM<br>• 21—Select external SIM slot 1 (with GPIO to mux) if present, else select internal SIM<br>• 22—Select external SIM slot 2 (with GPIO to mux) if present, else select internal SIM<br>• 30—Select SoftSIM<br><gpio_sim><br>• Not supported currently. Parameter has no effect.<br><sim_slot><br>• 1—External SIM1 is used<br>• 2—External SIM2 is used with GPIO to mux<br>• 3—Embedded SIM (eSIM) is used<br><remote_enable><br>• 0—Disable<br>• 1—Enable |

**Table 9-2: SIM Command Details (Continued)**

| Command | Description |
|---|---|
| **!UIMS** | **Select active UIM interface**<br>On a module that supports multiple UIM interfaces, select the active UIM interface.<br>**Password required:** No<br>**Persistent across power cycles:** Yes, unless overridden by !CUSTOM="UIMAUTOSWITCH", which, when enabled, sets the preferred UIM interface when the module boots.<br>**Usage:**<br>▪ Execution: **AT!UIMS=<uim>**<br>Response: OK<br>or<br>ERROR<br>Purpose: Configure the module to use the selected UIM interface.<br>▪ Query: **AT!UIMS?**<br>Response: !UIMS: <uim>[,<used uim>]<br>OK<br>Purpose: Display the currently selected interface.<br>▪ Query List: **AT!UIMS=?**<br>Response: !UIMS: (List of supported <uim>s)<br>OK<br>Purpose: Return the command format and the supported parameter values.<br>**Parameters:**<br><uim> (SIM interface):<br>▪ 0 — UIM1. External UIM interface #1<br>▪ 1 — UIM2. eSIM (embedded SIM).<br>Note: Depending on the module, the interface may be exposed to an external SIM connector or may be connected internally to an eSIM installed directly on the module.<br>▪ 2 — Reserved. Do not use.<br>▪ 3 — Auto-SIM-Switch activated. Refer to !CUSTOM="UIMAUTOSWITCH" for details.<br><used uim> (UIM slot used when Auto-SIM-Switch is activated):<br>▪ 0 — UIM1. External UIM interface #1<br>▪ 1 — UIM2. eSIM (embedded SIM) |

# 10: SD Commands

## 10.1 Introduction

This chapter describes commands used to communicate with an installed SD card.

## 10.2 Command Summary

Table 10-1 lists the commands described in this chapter:

**Table 10-1: SD Commands**

| Command | Description | Page |
|---|---|---|
| !SDINFO | Display SD card status | 222 |

## 10.3 Command Reference

**Table 10-2: SD Command Details**

| Command | Description |
|---|---|
| **!SDINFO** | **Display SD card status**<br>Check whether an SD card is present or not.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!SDINFO**<br>Response: !SDINFO:<br>Card is Present<br>OK<br>or<br>!SDINFO:<br>Card is not present<br>OK<br>Purpose: Check whether an SD card is present.<br>**Parameters:**<br>None |

# 11: SAR Backoff Commands

## 11.1 Introduction

This chapter describes:

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

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

## 11.2 Command Summary

The table below lists the commands described in this chapter.

**Table 11-1: SAR Backoff and Thermal Control Commands**

| Command | Description | Page |
|---|---|---|
| +KRFMUTE | Enable/disable RAT-specific Tx muting | 224 |
| +KRFMUTE (notification) | RAT Tx mute mode status change (unsolicited notification) | 225 |
| !MAXPWR | Set/report maximum Tx power | 226 |
| !SARBACKOFF | Set/report offset from maximum Tx power | 228 |
| !SARGPIO | Set/report External GPIO controlling SAR | 231 |
| !SARINTGPIOMODE | Set/report default pull mode for SAR interrupt GPIOs | 232 |
| !SARSTATE | Set/report SAR backoff state | 232 |
| !SARSTATEDFLT | Set/report default SAR backoff state | 233 |

# 11.3 Command Reference

**Table 11-2: SAR Backoff and Thermal Control Command Details**

| Command | Description |
|---|---|
| **+KRFMUTE** | **Enable/disable RAT-specific Tx muting**<br>Enable or disable RF Tx muting a combination of RATs for a specific duration, and enable/disable unsolicited notifications for this command.<br>If enabled, unsolicited notifications (+KRFMUTE (notification)) will be received when:<br>▪ The mute duration is enabled or expired.<br>▪ This command is used to disable RF Tx muting while Tx muting is in progress (that is, sometime during the mute duration).<br>**Password required:** No<br>**Usage:**<br>▪ Execution: **AT+KRFMUTE=<mode>[,<duration>[,<indication>]]**<br>Response: OK<br>Purpose: Enable or disable Tx muting for the RATs specified by the <mode>.<br>▪ Query: **AT+KRFMUTE?**<br>Response: +KRFMUTE: <mode>,<duration>,<indication><br>OK<br>Purpose: Display the current RF Tx mute state.<br>▪ Query list: **AT+KRFMUTE=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><mode> (RF mute mode)<br>· 0 (Default) — Disable<br>· 1 — Mute GSM only<br>· 2 — Mute UMTS only<br>· 3 — Mute GSM and UMTS<br>· 4 — Mute LTE only<br>· 5 — Mute GSM and LTE<br>· 6 — Mute UMTS and LTE<br>· 7 — Mute GSM, UMTS, and LTE<br><duration> (Mute duration in seconds)<br>· 0.5 — 120<br>· Default: 30.0<br><indication> (Enable/disable mute mode unsolicited notifications))<br>· 0 (Default) — Disable<br>· 1 — Enable |

**Table 11-2: SAR Backoff and Thermal Control Command Details (Continued)**

| Command | Description |
|---|---|
| **+KRFMUTE (notification)** | **RAT Tx mute mode status change (unsolicited notification)**<br>Notification received when RAT Tx mute mode is enabled, expires, or is disabled while in progress.<br>**Notes:**<br>• This notification is enabled / disabled using +KRFMUTE.<br>**Usage:**<br>▪ Notification: **+KRFMUTE: <mode>[,<duration>]**<br>Purpose: Indicates RAT Tx muting has begun (been enabled) or stopped (mute period expired, or muting disabled).<br>**Parameters:**<br><mode> (RF mute mode)<br>• 0 (Default) — Disable<br>• 1 — Mute GSM only<br>• 2 — Mute UMTS only<br>• 3 — Mute GSM and UMTS<br>• 4 — Mute LTE only<br>• 5 — Mute GSM and LTE<br>• 6 — Mute UMTS and LTE<br>• 7 — Mute GSM, UMTS, and LTE<br><duration> (Mute duration in seconds)<br>• 0.5—120<br>• This parameter is included when mute is enabled. If mute is disabled/expired, this parameter does not appear.<br>**Examples:**<br>• Notification received when RAT Tx mute is set to Enabled:<br>+KRFMUTE: 1, 30.0<br>• Notification received when RAT Tx mute is expired, or is disabled while in progress:<br>+KRFMUTE: 0 |

**Table 11-2: SAR Backoff and Thermal Control Command Details (Continued)**

| Command | Description |
|---|---|
| **!MAXPWR** | **Set/report maximum Tx power**<br>Set or report the maximum Tx power for a specific technology/band combination.<br><br>**Caution:** *Any adjustments of Tx power may impact regulatory certification of the module in the host platform. The OEM is responsible for ensuring that the final module configuration in the host platform meets all regulatory requirements.*<br><br>**Notes:**<br>• Increasing Tx power affects the module's current consumption and thermal performance.<br>**Password required:** Yes<br><br>**Usage:**<br>▪ Execution (WCDMA/LTE):<br>**AT!MAXPWR=<band>,<tech>,<max_tx_pwr>**<br>Response: OK<br>Purpose: Set the maximum Tx power for the specified technology/band combination.<br>▪ Execution (CDMA):<br>**AT!MAXPWR=<band>,<tech>,<temperature_bin>,<max_tx_pwr>**<br>Response: OK<br>Purpose: Set the maximum Tx power for the specified technology/band/temperature bin combination.<br>▪ Query (WCDMA/LTE):<br>**AT!MAXPWR?<band>,<tech>**<br>Response: <max_tx_pwr> dBm<br>OK<br>Purpose: Indicate the maximum Tx power for the specified technology/band combination.<br>▪ Query (CDMA):<br>**AT!MAXPWR?<band>,<tech>**<br>Response: Max Tx value for temperature bin 0 = <Max Tx power> dBm<br>...<br>Max Tx value for temperature bin 7 = <Max Tx power> dBm<br>OK<br>Purpose: For the specified tech/band combination, display the offset from maximum Tx power for the tech/band combination and the SAR limits for each temperature bin. (For 'bin' definition, see <temperature_bin> description.) |

**Table 11-2: SAR Backoff and Thermal Control Command Details (Continued)**

| Command | Description |
|---|---|
| **!MAXPWR (continued)** | **Set/report maximum Tx power (continued)**<br>▪ Query list: **AT!MAXPWR=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><band> (RF band)<br>• 3GPP band number. For a full listing of 3GPP band numbers, see Table 20-2 on page 398.<br>• Band support is product specific — see the device's Product Specification or Product Technical Specification document for details.<br>• Valid range: 0–89<br>(<tech> (Network technology)<br>• 0 = WCDMA<br>• 1 = CDMA<br>• 2 = LTE<br><temperature_bin> (Temperature bin identifier. CDMA only)<br>• Valid range: 0–7<br>• The module has minimum and maximum operating temperature thresholds and throughout the temperature range, eight different temperatures are defined during calibration and stored as temperature bins. Temperature values stored correspond to bin boundaries, which map to seven temperature ranges.<br><max_tx_pwr> (Maximum Tx power in dB)<br>• Valid range: 20.0–24.5 |

**Table 11-2: SAR Backoff and Thermal Control Command Details (Continued)**

| Command | Description |
|---|---|
| **!SARBACKOFF** | **Set/report offset from maximum Tx power**<br><br>Set or report the offset from maximum Tx power limit for a specific technology/band combination. Changes take place after the next modem reset.<br><br>**Password required:** Yes (see !ENTERCND for details)<br><br>**Usage:**<br>▪ Execution (WCDMA, CDMA, LTE):<br>**AT!SARBACKOFF=<Technology>,<Band>,<State>,<Backoff offset>**<br>Response: OK<br>Purpose: Set the maximum Tx power for the tech/band/state combination.<br>▪ Execution (GSM):<br>**AT!SARBACKOFF=<Technology>,<Band>,<Slot>,<State>,<Modulation>,<Backoff offset>**<br>Response: OK<br>Purpose: Set the maximum Tx power for the tech/band/state combination.<br>▪ Query (WCDMA, LTE):<br>**AT!SARBACKOFF?<Technology>,<Band>,<State>**<br>Response: SAR Backoff: <offset> dBm<br>SAR Limit: <SAR limit> dBm<br>*or*<br>NV Not Set<br><br>OK<br>Purpose: For the specified tech/band/state combination, display the offset from maximum Tx power and the SAR limit. |

**Table 11-2: SAR Backoff and Thermal Control Command Details (Continued)**

| Command | Description |
|---|---|
| **!SARBACKOFF** | **Set/report offset from maximum Tx power**<br><br>▪ Query (CDMA):<br>**AT!SARBACKOFF?<Technology>,<Band>,<State>**<br>Response: SAR Backoff: <offset> dBm<br>Max Tx value for temperature bin 0 = <SAR limit> dBm<br>...<br>Max Tx value for temperature bin 7 = <SAR limit> dBm<br>*or*<br>NV Not Set<br><br>OK<br>Purpose: For the specified tech/band/state combination, display the offset from maximum Tx power for the tech/band/state combination and the SAR limits for each temperature bin. (For 'bin' definition, see <temperature_bin> in !MAXPWR.)<br>▪ Query (GSM):<br>**AT!SARBACKOFF?<Technology>,<Band>,<Slot>,<State>,<Modulation>**<br>Response: SAR Backoff: <offset> dBm<br>SAR Limit: <SAR limit> dBm<br>*or*<br>NV Not Set<br><br>OK<br>Purpose: For the specified tech/band/slot/state/modulation combination, display the offset from maximum Tx power and the SAR limit.<br>▪ Query list: **AT!SARBACKOFF=?<Technology>**<br>Purpose: Display valid execution format and parameter values for LTE/WCDMA/CDMA and GSM queries.<br><br>**Parameters:**<br><Technology> (Network technology)<br>• 0=WCDMA<br>• 1=CDMA<br>• 2=LTE<br>• 3=GSM<br><Band> (RF band)<br>• Valid values (Absolute ranges shown below for convenience. Use the Query list format to display full details.):<br>• LTE: 1–41<br>• WCDMA: 1–19<br>• GSM: 0–3<br>• CDMA: 0–15<br>• Band support is device-dependent. See the device's Product Technical Specification for details.<br><Slot> (Tx slot. GSM only)<br>• 1–5 |

**Table 11-2: SAR Backoff and Thermal Control Command Details (Continued)**

| Command | Description |
|---|---|
| **!SARBACKOFF** | **Set/report offset from maximum Tx power**<br><br><State> (SAR backoff state)<br>• 0=No backoff<br>• 1–8=Backoff state 1 to 8<br><Modulation> (Modulation method. GSM only.)<br>• 0=GMSK (GPRS)<br>• 1=8PSK (EDGE)<br><Backoff offset> (Offset from max Tx power, in dBm)<br>• Valid values: use the Query List command to display valid values.<br>• Value may be integer or decimal. (For example, "4" or "6.8")<br><SAR limit> (SAR limit, in dBm)<br>• Integer or decimal (e.g. "4" or "6.8")<br>• Valid values: Use the Query List command to display valid values. Values will be in the range 0–MaxPower. |

**Table 11-2: SAR Backoff and Thermal Control Command Details (Continued)**

| Command | Description |
|---|---|
| **!SARGPIO** | **Set/report External GPIO controlling SAR**<br>Set or report the external GPIO used to control SAR. This command can be used to set any unallocated external GPIO to control SAR.<br>To check the configuration of a GPIO (e.g. pull mode or function), use +WIOCFG.<br><br>**Requirements:**<br>Before this command can be used:<br>• Use !CUSTOM="GPIOSARENABLE" to enable SAR customization.<br><br>**Notes:**<br>• If a GPIO is currently set to control SAR and !CUSTOM="GPIOSARENABLE" is used to disable SAR customization, the GPIO will be deallocated when the device resets.<br>• If the GPIO pull mode must be changed, use !SARINTGPIOMODE to set the mode, and then reset the device.<br>• If a GPIO is currently set to control SAR and is to be replaced with a different GPIO, use this command to disable the current GPIO and then use it again to set the new GPIO.<br>**Password required:** Yes (see !ENTERCND for details)<br><br>**Usage:**<br>▪ Execution: **AT!SARGPIO=<GPIO>,<mode>**<br>Response: OK<br>*or* ERROR *(If any GPIO is currently set to control SAR)*<br>Response: OK<br>Purpose: Set the external GPIO to be used for controlling SAR.<br>▪ Query: **AT!SARGPIO?**<br>Response: <GPIO>,<mode><br>OK<br>Purpose: Indicate the external GPIO used to control SAR, and its state (disabled/enabled).<br>▪ Query list: **AT!SARGPIO=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><GPIO> (External GPIO used to control SAR)<br>• Valid values: 2, 7, 8, 13, 21, 22, 23, 24, 25, 28, 29, 30, 31, 32, 42<br><mode> (SAR GPIO mode)<br>• 0 — Disabled<br>• 1 — Enabled |

**Table 11-2: SAR Backoff and Thermal Control Command Details (Continued)**

| Command | Description |
|---|---|
| **!SARINTGPIOMODE** | **Set/report default pull mode for SAR interrupt GPIOs**<br>Set or report the default pull mode (high/low) for SAR interrupt GPIOs. This setting applies to all SAR interrupt GPIOs.<br>**Password required:** Yes (see !ENTERCND for details)<br>**Usage:**<br>▪ Execution: **AT!SARINTGPIOMODE=<mode>**<br>Response: OK<br>Purpose: Set the default pull mode for all SAR interrupt GPIOs.<br>▪ Query: **AT!SARINTGPIOMODE?**<br>Response: <mode><br>OK<br>Purpose: Indicate the default pull mode.<br>▪ Query list: **AT!SARINTGPIOMODE=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><mode> (SAR GPIO interrupt pull mode default setting)<br>• 0=Standard mode — Default pull is HIGH/DAL_GPIO_PULL_UP<br>• 1=Inverse mode — Default pull is LOW/DAL_GPIO_PULL_DOWN |
| **!SARSTATE** | **Set/report SAR backoff state**<br>Set or report the current SAR (Specific Absorption Rate) backoff state.<br>**Notes:**<br>• This setting is not persistent. To change the default backoff state (persistent), use !SARSTATEDFLT.<br>**Password required:** No<br>**Persistent across power cycles:** No<br>**Usage:**<br>▪ Execution: **AT!SARSTATE=<state>**<br>Response: OK<br>Purpose: Temporarily set the SAR backoff state.<br>▪ Query: **AT!SARSTATE?**<br>Response: !SARSTATE: <state><br>OK<br>Purpose: Indicate the current SAR backoff state.<br>▪ Query list: **AT!SARSTATE=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><state> (SAR backoff state)<br>• 0=No backoff<br>• 1–8=Backoff state 1 to 8 |

**Table 11-2: SAR Backoff and Thermal Control Command Details (Continued)**

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

# 12: Audio Commands

## 12.1 Introduction

This chapter describes commands used to configure and manage audio-capable RC76xx devices.

## 12.2 Command Summary

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

**Table 12-1: Audio Commands**

| Command | Description | Page |
|---|---|---|
| !AVAUDIOLPBK | Start / stop audio loopback | 235 |
| !AVCFG | Bind audio profile to device/physical interface | 236 |
| !AVDEF | Reset configurable audio parameters to default settings | 238 |
| !AVEC | Enable / disable Echo Cancellation mode for audio profile | 239 |
| !AVRXG | Query/Set audio profile decoder gain | 240 |
| !AVSETPROFILE | Select/configure audio profile for CS call | 241 |
| !AVSTG | Configure AFE side tone gain | 241 |
| !AVTXG | Query/Set audio profile encoder gain | 242 |
| +CLVL | Set active audio profile's Rx volume | 242 |
| !IIC | Used to read or write the IIC interface | 243 |
| +VTD | Configure in-band continuous DTMF tone duration | 244 |
| +VTS | Send DTMF tone | 244 |

# 12.3 Command Reference

**Table 12-2: Audio Command Details**

| Command | Description |
|---|---|
| **!AVAUDIOLPBK** | **Start / stop audio loopback**<br>Set up (start/stop) an audio loopback at some point in the audio chain.<br><br>**Password required:** Yes (see !ENTERCND for details)<br><br>**Usage:**<br>▪ Execution: **AT!AVAUDIOLPBK=<enable>**<br>Response: OK<br>or<br>ERROR<br>Purpose: Start or stop an audio loopback.<br>▪ Query: **AT!AVAUDIOLPBK?**<br>Response: !AVAUDIOLPBK: <enable><br>OK<br>Purpose: Return the current audio loopback status<br>▪ Query List: **AT!AVAUDIOLPBK=?**<br>Response: !AVAUDIOLPBK: (List of supported <enable>s)<br>OK<br>Purpose: DIdsplay valid execution format and parameter values.<br>**Parameters:**<br><enable> (Audio loopback)<br>▪ Valid range: 0, 3<br>▪ 0: Stop the loopback<br>▪ 3: PCM loopback |

**Table 12-2: Audio Command Details (Continued)**

| Command | Description |
|---|---|
| **!AVCFG** | **Bind audio profile to device / physical interface**<br>This setting is persistent across power cycles<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!AVCFG=<profile>,<device>, <interface>[,<param1>[,...<paramN>]]**<br>Response: OK<br>Purpose: Bind the specified <profile> to a <device> / <interface> combination. If applicable, specify required parameters.<br>▪ Query: **AT!AVCFG?**<br>Response: !AVCFG:<br><profile0>,<device>,<interface> [<param1> [,...<paramN>]]<br>...<profile5>,<device>,<interface>[<param1>[,...<paramN>]]<br>OK<br>Purpose: Show current bindings for all audio profiles.<br>▪ Query List: **AT!AVCFG=?**<br>Response: !AVCFG: (list of supported <profile>s), (list of supported <device>s), (list of supported <interface>s), (list of supported <param>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><profile> (Audio profile)<br>• 0–9: Audio profile number (10 profiles are supported)<br>• Default: 5<br><device> (ACDB device type)<br>• 0: Handset device<br><interface> (Physical interface type)<br>• 0: PCM<br>• 1: I2S (No <param> required) |

**Table 12-2: Audio Command Details (Continued)**

| Command | Description |
|---|---|
| **!AVCFG (continued)** | **Bind audio profile to device / physical interface (continued)**<br><param> (Interface configuration parameters)<br>· For <interface>=0 (PCM):<br>· <param1> (Mode)<br>▪ 0: Reserved<br>· <param2> (Sample rate)<br>▪ 0: 8K<br>▪ 1: 16K<br>· <param3> (Format)<br>▪ 0: Reserved<br>· <param4> (Padding)<br>▪ 0: Reserved<br>· <param5> (Bits per frame (bpf))<br>▪ Note: The PCM frequency must be set at a minimum of 256 kHz.<br>▪ 0: 8 bits<br>▪ 1: 16 bits<br>▪ 2: 32 bits<br>▪ 3: 64 bits<br>▪ 4: 128 bits<br>▪ 5: 256 bits<br>**Example(s):**<br>▪ Bind profile 1 to the handset device via I2S.<br>AT!AVCFG=1,0,1<br>OK<br>▪ Bind profile 1 to the handset device via PCM.<br>AT!AVCFG=1,0,0,0,0,0,0,2<br>OK |

**Table 12-2: Audio Command Details (Continued)**

| Command | Description |
|---|---|
| **!AVDEF** | **Reset configurable audio parameters to default settings**<br>Reset all of the configurable audio parameters that are stored in non-volatile (NV) memory to default values.<br><br>**Notes:**<br>• Some values that affect ACDB (Audio Calibration Database) devices are stored in NV, and some are stored on the device. Values that are stored on the device are not affected by this command.<br><br>**Supporting devices:** Audio-capable RC76xx devices<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!AVDEF[=<profile>]**<br>Response: OK<br>Purpose: Reset all parameters for the specified <profile> (or all profiles if "=<profile> is not used) to default values.<br><br>**Parameters:**<br><profile> (Audio profile)<br>• Valid values:<br>• No value (e.g. "AT!AVDEF") — Reset parameters for all profiles to default values.<br>• 0–9 — Audio profile number (10 profiles are supported). Resets parameters for the specified profile number. |

**Table 12-2: Audio Command Details (Continued)**

| Command | Description |
|---|---|
| **!AVEC** | **Enable / disable Echo Cancellation mode for audio profile**<br>Enables or disables Echo Cancellation (EC) mode for a specific audio profile.<br><br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!AVEC=<profile>,<value>**<br>Response: OK<br>or<br>ERROR<br>Purpose: Enable or disable EC mode for the selected profile.<br>▪ Query: **AT!AVEC?<profile>**<br>Response: !AVEC: <value><br>OK<br>Purpose: Show the current EC mode state (enabled/disabled) for the selected profile.<br>▪ Query List: **AT!AVEC=?**<br>Response: !AVEC: (list of supported <profile>s), (list of supported <value>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><profile> (Audio profile)<br>▪ Integer<br>▪ 0–9: Audio profile number (10 profiles are supported)<br><value> (EC mode state)<br>▪ Integer<br>▪ 0: Disable<br>▪ 1: Enable |

**Table 12-2: Audio Command Details (Continued)**

| Command | Description |
|---|---|
| **!AVRXG** | **Query/Set audio profile decoder gain**<br>Query/set the decoder gain for a specified audio profile. This setting is stored in NV memory.<br>**Password required:** Yes<br>**Reset required to apply changes:** Yes<br>**Persistent across power cycles:** Yes<br>**Usage:**<br>▪ Execution: **AT!AVRXG=<profile>,<value>**<br>Response: OK<br>Purpose: Set decoder gain for the specified profile.<br>▪ Query: **AT!AVRXG?<profile>**<br>Response: !AVRXG: <value><br>OK<br>Purpose: Display the specified profile's decoder gain.<br>▪ Query List: **AT!AVRXG=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><profile> (Audio profile number)<br>• Valid range: 0–9<br><value> (Decoder gain, in 1 dB steps)<br>• Hexadecimal<br>• Gain calculation: 20×LOG(<value> / 0x2000)<br>• Valid range: 0001–FE2F (-78 to +18)<br>• Recommended range: 2000–FE2F (0 to +18) |

**Table 12-2: Audio Command Details (Continued)**

| Command | Description |
|---|---|
| **!AVSETPROFILE** | **Select/configure audio profile for CS call**<br>Select and configure an audio profile to be used for a circuit-switched call. (To view the current audio profile configurations, use **AT!AVCFG?**).<br><br>**Supporting devices:** Audio-capable RC76xx devices<br>**Password required:** No<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT!AVSETPROFILE=<profile>[,<earmute>,<micmute>,<generator>,<volume>[,<cwtmute>]]**<br>Response: OK<br>Purpose: Select the profile to use for a circuit switched call and, if needed, configure the mute and volume settings for the profile.<br>▪ Query: **AT!AVSETPROFILE?[<generator>]**<br>Response: !AVSETPROFILE: <profile>,<earmute>,<micmute>,[<generator>,]<volume>,<cwtmute><br>Purpose: Show the profile that has been selected for circuit switched calls, and its configuration parameters. (The <generator> field does not appear if <generator> is used in the query.)<br>▪ Query List: **AT!AVSETPROFILE=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><profile> (Audio profile used for CS call)<br>· 0–9=Audio profile number (10 profiles are supported)<br><earmute> (Earpiece mute state)<br>· 0=Unmuted<br>· 1=Muted<br><micmute> (Microphone mute state)<br>· 0=Unmuted<br>· 1=Muted<br><generator><br>· 0=Voice synthesizer (Note: This is the only option at this time.)<br><volume> (Rx volume level)<br>· Valid range: 0 (quietest) – 5 (loudest)<br>NOTE: The Query List format incorrectly indicates valid range as 0–8.<br><cwtmute> (Call waiting tone mute state)<br>· 0=Unmuted<br>· 1=Muted |
| **!AVSTG** | **Configure AFE side tone gain**<br>This command is not implemented and has no effect. |

**Table 12-2: Audio Command Details (Continued)**

| Command | Description |
|---|---|
| **!AVTXG** | **Query/Set audio profile encoder gain**<br>Query/set the encoder gain for a specified audio profile. This setting is stored in NV memory.<br>**Password required:** Yes<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br>**Usage:**<br>▪ Execution: **AT!AVTXG=<profile>,<value>**<br>Response: OK<br>Purpose: Set encoder gain for the specified profile.<br>▪ Query: **AT!AVTXG?<profile>**<br>Response: !AVTXG: <value><br>OK<br>Purpose: Display the specified profile's encoder gain.<br>▪ Query List: **AT!AVTXG=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><profile> (Audio profile number)<br>· Valid range: 0–9<br><value> (encoder gain, in 1 dB steps)<br>· Hexadecimal<br>· Gain calculation: 20×LOG(<value>/0x2000)<br>· Valid range: 0–FFFF (-78 to +18<br>· Recommended range: 0 to +18 |
| **+CLVL** | **Set active audio profile's Rx volume**<br>Set the Rx volume for the active audio profile.<br>**Supporting devices:** Audio-capable RC76xx devices<br>**Password required:** No<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br>**Usage:**<br>▪ Execution: **AT+CLVL=<level>**<br>Response: OK<br>Purpose: Set the Rx volume gain for the active profile.<br>▪ Query: **AT+CLVL?**<br>Response: +CLVL: <level><br>Purpose: Show the Rx volume for the active profile.<br>▪ Query List: **AT+CLVL=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><level> (Rx level for the active profile)<br>· Valid range: 0–5 (Level 0–Level 5) |

**Table 12-2: Audio Command Details (Continued)**

| Command | Description |
|---|---|
| **!IIC** | **Used to read or write the IIC interface**<br>This command is used to read or write the IIC interface<br><br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT!IIC=<rw_mode>,<dev_addr>,<addr>,<bytes>[,<value>]**<br>Response: For <rw_mode> = 0 is Write mode<br>OK<br>Or<br>ERROR<br><br>For <rw_mode> = 1 is Read mode<br>!IIC: <result><br>OK<br>Or<br>ERROR<br>Purpose: Read or write the IIC interface.<br>▪ Query List: **AT!IIC=?**<br>Response: !IIC: (0,1),(0x0~0xff),(0x0~0xff),(1,2),(0x0~0xffff)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><rw_mode> (Read or write mode)<br>• Valid range: 0–1<br>• 0: Write mode<br>• 1: Read mode<br><dev_addr> (Device address: 7-bit)<br>• Valid range: 0x0–0xff<br><addr> (Registers address)<br>• Valid range: 0x0-0xff<br><bytes> (Read or write 1 or 2 bytes)<br>• Valid range: 1–2<br><value> (Registers value)<br>• The <value> only use Write mode<br>• Valid range: 0x0 –0xffff |

**Table 12-2: Audio Command Details (Continued)**

| Command | Description |
|---|---|
| **+VTD** | **Configure in-band continuous DTMF tone duration**<br>This command is used to configure the in-band continuous DTMF tone duration.<br><br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+VTD=<duration>**<br>Response: OK<br>Purpose: Set the duration for DTMF tones.<br>▪ Query: **AT+VTD?**<br>Response: +VTD: <duration><br>OK<br>Purpose: Display the current DTMF tone duration.<br>▪ Query List: **AT+VTD=?**<br>Response: +VTD: (0-255)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><duration> (DTMF tone duration)<br>• Valid range: 0–255<br>• (100msec/unit). 0 for default duration 20 msec |
| **+VTS** | **Send DTMF tone**<br>Send continuous in-band DTMF tones (for UMTS and CDMA networks) while on an active call.<br>Use **AT+VTD** to set the tone duration.<br><br>**Supporting devices:** Audio-capable RC76xx devices<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+VTS=<tone>**<br>Response: OK<br>Purpose: Send the specified DTMF tone.<br>▪ Query List: **AT+VTS=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><tone> (DTMF tone)<br>• UMTS networks: 0–9, A–D, a–d, *, #<br>• CDMA networks: 0–9, *, #<br>• Examples:<br>• AT+VTS=1 (Send the DTMF tone for '1'.)<br>• AT+VTS=# (Send the DTMF tone for '#'.) |

**Table 12-2: Audio Command Details (Continued)**

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

# 13: I/O Commands

## 13.1 Introduction

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

## 13.2 Command Summary

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

**Table 13-1: I/O Commands**

| Command | Description | Page |
|---|---|---|
| !MADC | Displays ADC values | 247 |
| +WEXTCLK | Enable/Disable user clock mode | 248 |
| +WIOCFG | GPIO Configuration | 249 |
| +WIOR | Read GPIO Value | 252 |
| +WIOW | Write GPIO Value | 253 |
| +WRID | Set/query Ring Indicator Duration | 254 |
| +WWAKESET | Set/query Wake Up Event Mask | 255 |
| !RIOWNER | Set/query ring indicator owner | 256 |

# 13.3 Command Reference

**Table 13-2: I/O Command Details**

| Command | Description |
|---|---|
| **!MADC** | **Displays ADC values**<br>Reads one of the available ADCs (Analog to Digital Converters)<br><br>**Notes:**<br>▪ MADC does the unit conversion and displays the ADC value with units as mV, V, Celcius etc, whereas AT!ADC only displays the raw value of ADC sensor.<br>**Password required:** No<br><br>**Usage:**<br>▪ Query: **AT!MADC?<adc>**<br>Response: !MADC: <value><br>OK<br>Purpose: Show the value being reported by the specified ADC.<br>▪ Query List: **AT!MADC=?**<br>Response: AT!MADC?<input adc><br>input adc:<br>0: VBATT<br>2: PA_THERM<br>3: PMIC_THERM<br>4: XO_THERM<br>5: ADC1<br>10: ADC0<br>OK<br>Purpose: Displays the valid execution format and parameter values.<br>**Parameters:**<br><adc> (Analog to Digital Converters)<br>▪ Integer<br>▪ 0: VBATT (Battery voltage)<br>▪ 2: PA_THERM (Power Amplifier Thermistor)<br>▪ 3: PMIC_THERM (Power Management Integrated Circuit Thermistor)<br>▪ 4: XO_THERM (Crystal Oscillator Thermistor)<br>▪ 5: ADC1<br>▪ 10: ADC0<br><value (Value returned from ADC)<br>▪ ASCII string<br>▪ Note: Contents depend on the ADC being polled. |

**Table 13-2: I/O Command Details (Continued)**

| Command | Description |
|---|---|
| **+WEXTCLK** | **Enable / Disable user clock mode**<br>Enable / disable generation of 19.2 MHz on the user output clock pins.<br>**Password required:** No<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT+WEXTCLK=<port>,<mode_select>**<br>Response: OK<br>Purpose: Enable or disable the user clock pin.<br>▪ Query: **AT+WEXTCLK?**<br>Response: +WEXTCLK: <port>,<mode_select><br>Purpose: Display the current clock mode setting.<br>▪ Query List: **AT+WEXTCLK=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><port> (Output port)<br>· 1<br><mode_select> (Enable / disable output)<br>· 0 — Off (disable)<br>· 1 — On (enable) |

**Table 13-2: I/O Command Details (Continued)**

| Command | Description |
|---|---|
| **+WIOCFG** | **GPIO Configuration**<br>Configure a specific GPIO (I/O port) for one of the following uses (indicated by the <func> parameter):<br>▪ GPIO, accessible via AT commands (<func> = 4)<br>▪ Usage by the embedded Linux host (<func> = 16)<br>▪ Deallocate port (<func> = 0)<br>▪ Antenna select using GPIOs 28–31 (<func> = 0, then !ANTSEL can be used)<br><br>**Notes:**<br>▪ To enable 'Reset Out', set <gpio> = 6 and <func> = 0. Refer to the AirPrime RC76xx Product Technical Specification for details.<br>**Password required:** No<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution (for <func>=0; Mark GPIO as unallocated):<br>**AT+WIOCFG=<gpio>,<func>**<br>Response: OK *(If the port configuration works as requested)*<br>Purpose: Deallocate a GPIO. (Note: This must be done for GPIO28–GPIO31 if !ANTSEL is to be used for antenna select.)<br>▪ Execution (for <func>=4 or 16; Allocate GPIO for General use or for Embedded Host use:<br>**AT+WIOCFG=<gpio>,<func>[,<dir>,<state>,<pull>,<trigger>,<intrvl>]**<br>Response: OK *(If the port configuration works as requested)*<br>*or* ERROR *(If the port is already allocated — the current <func> value is not 0)*<br>Purpose: Allocate the requested port (<idx>) for use as a GPIO or for control by the embedded host.<br>▪ Query: **AT+WIOCFG?[<gpio>]**<br>Response: *(if <gpio> is specified>)*<br>+WIOCFG:<gpio>,<func>,<dir>,<state>,<pull>,<trigger>,<intrvl><br>OK<br>*or (if <gpio> is not specified, shows all ports (<gpio> values))*<br>+WIOCFG:<gpio>,<func>,<dir>,<state>,<pull>,<trigger>,<intrvl><br>...<br>+WIOCFG:<gpio>,<func>,<dir>,<state>,<pull>,<trigger>,<intrvl><br>OK<br>Purpose: Report the configuration for the specified port (<gpio>), or for all ports (no <gpio> specified)<br>▪ Query List: **AT+WIOCFG=?**<br>Purpose: Display valid execution format and parameter values. |

**Table 13-2: I/O Command Details (Continued)**

| Command | Description |
|---|---|
| **+WIOCFG** | **GPIO Configuration**<br>**Parameters:**<br><gpio> (Index of I/O port to be configured)<br>• Valid range: 1–46. Use AT+WIOCFG? to view supported <gpio> values.<br>• Example:<br>AT+WIOCFG?<br>+WIOCFG: 2,16,0,0,1,0,0<br>+WIOCFG: 7,16,0,0,1,0,0<br>...<br>The first parameters of each line of output are the valid <gpio> values (e.g. 2, 7, ...).<br>• Note: To enable 'Reset Out', set <gpio> = 6 and <func> = 0. Refer to the RC76xx Product Technical Specification document for details.<br><func> (I/O port usage)<br>• Valid values for Execution format:<br>  • 0 — Unallocated<br>  • 4 — General GPIO<br>  • 16 — Embedded host<br>• Valid values for Query format:<br>  • 0 — Unallocated<br>  • 2 — Antenna Select (applies only to GPIO28–31). GPIO28–GPIO31 can be allocated for external antenna selection using !ANTSEL.<br>  • 3 — External SIM2_DET<br>  Applies only to GPIO4, allocated for external SIM2 detection when "EXTUIMSWITCHEN" customization is enabled.<br>  • 4 — General GPIO<br>  • 8 — External SIM Switch (applies only to GPIO6, when EXTUIMSWITCHEN customization is enabled)<br>  • 9 — SAR DPR (set by AT!SARGPIO)<br>  • 16 — Embedded host<br>  • 26 — Wi-Fi/LTE Coexistence control UART (applies only to GPIO35)<br>• Note: To enable 'Reset Out', set <gpio> = 6 and <func> = 0.<br><dir> (GPIO direction)<br>• 0 — Input<br>• 1 — Output<br><state> (Power-up state for external GPIO configured as an output)<br>• 0 — Output low level at power-up<br>• 1 — Output high level at power-up<br><pull> (Internal pull type for the I/O port)<br>• 0 — No pull<br>• 1 — Pull down<br>• 2 — Keeper<br>• 3 — Pull up |

**Table 13-2: I/O Command Details (Continued)**

| Command | Description |
|---|---|
| **+WIOCFG** | **GPIO Configuration**<br><trigger> (Trigger type for I/O port configured as an input)<br>• Note: <trigger> is not supported if <gpio>=6 (GPIO6)<br>• 0 — No trigger<br>• 1 — Trigger high<br>• 2 — Trigger low<br>• 3 — Trigger rising<br>• 4 — Trigger falling<br><intrvl> (Interval at which the I/O port is checked for the specified level trigger (<trig>))<br>• Note: <intrvl> is not supported if <gpio>=6 (GPIO6)<br>• 0 — 50 ms<br>• 1 — 1000 ms<br>*Note: For edge interrupt, the module can only respond one time per 10 ms per GPIO.* |

**Table 13-2: I/O Command Details (Continued)**

| Command | Description |
|---|---|
| **+WIOR** | **Read GPIO Value**<br>Reads the pin value of a GPIO (General Purpose I/O port) that has been configured as an input.<br>When using this command, check the AT+WIOCFG setting as below:<br>▪ <func> = 4 (General GPIO) or 9 (SAR DPR)<br>▪ <dir> = 0 (Input)<br>**Notes:**<br>• This command returns an ERROR if the GPIO has been configured as an output.<br>**Password required:** No<br>**Usage:**<br>▪ Execution: **AT+WIOR=<gpio>**<br>Response: +WIOR: <value><br>OK<br>or (if <gpio> is configured as an output)<br>ERROR<br>Purpose: Reads the specified GPIO's pin value.<br>▪ Query List: **AT+WIOR=?**<br>Response: +WIOR: (list of supported <gpio>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><gpio> (External GPIO number)<br>• Valid range: 1—46<br>• Use +WIOCFG to view supported values.<br>• Example:<br>AT+WIOCFG?<br>+WIOCFG: 2,16,0,0,1,0,0<br>+WIOCFG: 7,16,0,0,1,0,0<br>...<br>The first parameters of each line of output are the<br>valid <gpio> values (e.g. 2, 7, ...).<br><value> (GPIO pin value)<br>• Integer<br>• 0: Low level |

**Table 13-2: I/O Command Details (Continued)**

| Command | Description |
|---|---|
| **+WIOW** | **Write GPIO Value**<br>Writes a GPIO (General Purpose I/O port) pin value.<br>When using this command, check the AT+WIOCFG setting as below:<br>▪ <func> = 4 (General GPIO) or 9 (SAR DPR)<br>▪ <dir> = 1 (Output)<br><br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+WIOW=<gpio>,<value>**<br>Response: OK<br>Purpose: Write the specified GPIO's pin value.<br>▪ Query List: **AT+WIOW=?**<br>Response: +WIOW: (1-46),(0-1)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><gpio> (External GPIO number)<br>▪ Note: Not all values are valid. Use +WIOCFG to view supported values.<br>▪ Valid range: 1—42<br><value> (GPIO pin value)<br>▪ Valid range: 0—1<br>▪ 0: Low level<br>▪ 1: High level |

**Table 13-2: I/O Command Details (Continued)**

| Command | Description |
|---|---|
| **+WRID** | **Set/query Ring Indicator Duration**<br>Set or return the duration of the pulse that is asserted on the Ring Indicator line (pin RI1). (The pulse may be asserted under several different event conditions, but the pulse duration is the same.)<br>Make sure to set the duration appropriately. While long durations may make sense for some events, it is possible that shorter events may expire before the pulse finishes (for example, an incoming call could expire or be re-routed to voicemail).<br>The design is such that if an event expires before the pulse finishes, the wakeup reason and ring indicator will not be reset.<br>**Password required:** No<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br>**Usage:**<br>▪ Execution: **AT+WRID[=<n>]**<br>Response: OK, or ERROR *(If invalid assignment)*<br>Purpose: Set the ring indicator pulse duration. If "=<n>" is not entered, the default pulse duration value (50 ms) is used.<br>▪ Query: **AT+WRID?**<br>Response: +WRID: <n><br>Purpose: Display the ring indicator pulse duration.<br>▪ Query List: **AT+WRID=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><n> (Ring indicator pulse duration, in ms units)<br>• 50–10000 (Default=50 ms). Range equates to 0.05–10.0 seconds.<br>• Integer values only (pulse is set in 1 ms steps) |

**Table 13-2: I/O Command Details (Continued)**

| Command | Description |
|---|---|
| **+WWAKESET** | **Set/query Wake Up Event Mask**<br>Set or query the WAKE mask setting, which indicates the actions that will generate a pulse on the Ring Indicator (RI1) output signal to "wake up" an application.<br>The WAKE mask indicates all events that can generate the wake pulse. When an event occurs, the RI is asserted for the duration defined via AT+WRID and then de-asserts.<br>If additional events occur while the RI is asserted, the RI is not re-asserted and the duration is not extended; it is assumed that the external processor is awakened by the first assertion.<br><br>**Notes:**<br>• Each time this command is used to set the mask, the previous setting is replaced. That is, the mask value must indicate all the events that will generate a pulse.<br>• RC76XX does not have RI PIN. Detecting TCP/UDP through PIN is not supported.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+WWAKESET[=<bitmask>]**<br>Response: OK<br>Purpose: Indicate which events pulse the RI pin. If "=<bitmask>" is not entered, the default mask value (4 — Incoming voice call) is used.<br>▪ Query: **AT+WWAKESET?**<br>Response: +WWAKESET: <bitmask><br>Purpose: Display the current mask value.<br>▪ Query List: **AT+WWAKESET=?**<br>Response: +WRID: (list of supported <bitmask>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><bitmask> (Events that will assert (pulse) the RI signal)<br>• If more than one event will assert the signal, add the values. For example, to get notifications for both lost service and incoming voice calls, the <bitmask> value is 5.<br>• 0 — No notifications<br>• 1 — Lost service (for example, going from digital service to no service) — If the module is in deep sleep (32 kHz), the RI will assert and the module will remain asleep<br>• 2 — Service regained (going from no service to service) — If the module is in deep sleep (32 kHz), the RI will assert and the module will remain asleep.<br>NOTE: Changing the SID and remaining on the same service type will NOT trigger the RI signal.<br>• 4 — Incoming voice call (Default setting)<br>• 8 — Incoming data call<br>• 16 — Incoming SMS message<br>• 32 — Reserved<br>• 64 — Module restart (includes the first power up)<br>• 128 — Module has undergone Sudden Momentary Power Loss<br>• 256 — Reserved<br>• 512 — Antenna status change<br>• 1024 — Reserved<br>• 2048 — Legato application event<br>• 4095 — All events as listed above |

**Table 13-2: I/O Command Details (Continued)**

| Command | Description |
|---|---|
| **!RIOWNER** | **Set/query ring indicator owner**<br>Set or return the core that controls the module's Ring Indicator (RI) pin.<br>**Usage:**<br>▪ Execution: **AT!RIOWNER=<owner>**<br>Response: OK<br>Purpose: Set the core that controls the module's Ring Indicator (RI) pin.<br>▪ Query: **AT!RIOWNER?**<br>Response: !RIOWNER: <owner><br>Purpose: Display the core that controls the module's Ring Indicator (RI) pin.<br>Query List:**AT!RIOWNER=?**<br>Purpose: Display the valid execution format and parameter values.<br>**Parameters:**<br><owner> (The core that controls the module's RI pin)<br>• Valid range: Integer<br>• 0—Modem<br>• 1—Application |

# 14: AirVantage Commands

## 14.1 Introduction

This chapter describes AirVantage (AV) related commands.

## 14.2 Command Summary

Table 14-1 lists the commands described in this chapter.

**Table 14-1: AirVantage Device Services Commands**

| Command | Description | Page |
|---|---|---|
| +WDSC | Configure AirVantage Management Services | 258 |
| +WDSE | Display most recent AirVantage Management Services error | 260 |
| +WDSG | Display AirVantage Management Services status information | 261 |
| +WDSI | Activate/deactivate AirVantage Management Services unsolicited notifications | 262 |
| +WDSR | Reply to AirVantage server request | 267 |
| +WDSS | Configure/connect AirVantage Management Services session | 268 |
| +WDSTPF | Device Services Third Party FOTA | 271 |

# 14.3 Command Reference

**Table 14-2: AirVantage Device Services Command Details**

| Command | Description |
|---|---|
| **+WDSC** | **Configure AirVantage Management Services**<br>Configure the following AirVantage Management Services parameters:<br>▪ User agreement for connection, package download, package install, and package uninstall<br>▪ Polling mode to make a connection to the AirVantage server<br>▪ Retry mode to attempt a new connection to the AirVantage server when the WWAN DATA service is temporarily out of order or when an http/CoAP error occurs<br>**SIM card requirement:** Not required<br>**Password required:** No<br>**Persistent across power cycles:** Yes (<State>, <Timer_1>, <Timer_n><br>**Usage:**<br>▪ Execution (<Mode> = 0, 1, 2, 3, 5, 6):<br>**AT+WDSC=<Mode>,<State>**<br>Response: OK<br>Purpose: Enable or disable the selected <Mode>.<br>▪ Execution (<Mode> = 4):<br>**AT+WDSC=<Mode>,<Timer_1>[[,<Timer_2>]...[,<Timer_n>]]**<br>Response: OK<br>Purpose: Set interval timers for successive connection attempts.<br>▪ Query: **AT+WDSC?**<br>Response: +WDSC: 0,<State><br>+WDSC: 1,<State><br>+WDSC: 2,<State><br>+WDSC: 3,<State><br>+WDSC: 4,<Timer_1>[[,<Timer_2>]...[,<Timer_n>]]<br>+WDSC: 5,<State><br>+WDSC: 6,<State><br>OK<br>Purpose: Show the current <Mode> configurations.<br>▪ Query List: **AT+WDSC=?**<br>Purpose: Display valid execution format and parameter values. |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSC** | **Configure AirVantage Management Services**<br>**Parameters:**<br><Mode> (Mode being configured)<br>• 0 — User agreement for AVMS connection. When enabled, the module returns an unsolicited notification to request an agreement before connecting to the server. See +WDSI on page 262 for details.<br>Note: If a FOTA session begins and user agreement for package download (<mode> 1) is disabled, an AVMS connection is initiated, regardless of whether user agreement for AVMS connection (<mode> 0) is enabled or disabled.<br>• 1 — User agreement for package download. When enabled, the module returns an unsolicited notification to request an agreement before downloading any package. See +WDSI on page 262 for details.<br>• 2 — User agreement for package install. When enabled, the module returns an unsolicited notification to request an agreement before installing any package. See +WDSI on page 262 for details.<br>• 3 — Polling mode. When enabled (<State> > 0), the module waits for the number of minutes specified in <State>, then will initiate a connection to the AirVantage server based if the device is registered on the network.<br>• 4 — Retry mode. If an error occurs during a connection to the AirVantage server (e.g. WWAN DATA establishment failed, http error code received), the module will initiate a new connection according to the defined timers. (Note: This is a persistent setting.)<br>• 5 — User agreement for device reboot. When enabled, the module returns an unsolicited notification to request an agreement before rebooting the device. See +WDSI on page 262 for details.<br>• 6 — User agreement for application uninstall (software update). When enabled, the module returns an unsolicited notification to request an agreement before uninstalling an application. See +WDSI on page 262 for details.<br><State> (For <Mode> = 0, 1, 2, 5, 6: Activation state of <Mode>)<br>• 0=Disabled<br>• 1=Enabled<br><State> (For <Mode> = 3: Activation state/timer of <Mode>)<br>• 0=Disabled<br>• 1–525600=Polling timer (in minutes)<br><Timer_1>..<Timer_n> (Connection attempt interval timers)<br>• The number of minutes to wait after connection attempt (n-1) before making connection attempt (n). (Note: There is a maximum of 8 connection attempts.)<br>• Valid range: 1–20160<br>• Default values:<br>  • <Timer_1>=15 (Time to wait after first failed connection attempt.)<br>  • <Timer_2>=60 (Time to wait after second failed connection attempt.)<br>  • <Timer_3>=240 (Time to wait after third failed connection attempt.)<br>  • <Timer_4>=960 (Time to wait after fourth failed connection attempt.)<br>  • <Timer_5>=2880 (Time to wait after fifth failed connection attempt.)<br>  • <Timer_6>=10080 (Time to wait after sixth failed connection attempt.)<br>  • <Timer_7>=10080 (Time to wait after seventh failed connection attempt.) |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSE** | **Display most recent AirVantage Management Services error**<br>Display the most recent HTTP(S) response received by the device for the package download.<br><br>**Requirements:**<br>• AirVantage Management Services must be activated (See +WDSG on page 261 for details).<br>• Session must be initiated using AT+WDSS=1,1. (See +WDSS on page 268 for details).<br>**SIM card requirement:** Not required<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+WDSE**<br>Response: [+WDSE: <HTTP_Status>]<br>OK<br>*or*<br>+CME ERROR: 3<br>*(If AirVantage Management services are not in the Activated state.)*<br>Purpose: Display most recent response. (If HTTP/HTTPS is not yet used, return only OK.)<br><br>**Parameters:**<br><HTTP_Status> (Standard HTTP status code)<br>• none — No response shown if HTTP/HTTPS has not yet been used.<br>• Supported statuses:<br>• 1xx Informational:<br>100 (Continue) 101 (Switching protocols)<br>• 2xx Success:<br>200 (OK) 201 (Created)<br>202 (Accepted) 203 (Non-authoritative information)<br>204 (No content) 205 (Reset content)<br>206 (Partial content)<br>• 3xx Redirection:<br>300 (Multiple choices) 301 (Moved permanently)<br>302 (Found) 303 (See other)<br>304 (Not modified) 305 (Use proxy)<br>307 (Temporary redirect)<br>• 4xx Client Error:<br>400 (Bad request) 401 (Unauthorized)<br>402 (Payment required) 403 (Forbidden)<br>404 (Not found) 405 (Method not allowed)<br>406 (Not acceptable) 407 (Proxy authentication required)<br>408 (Request time-out) 409 (Conflict)<br>410 (Gone) 411 (Length required)<br>412 (Precondition failed) 413 (Request entity too large)<br>414 (Request URI too large) 415 (Unsupported media type)<br>416 (Requested range not satisfiable) 417 (Expectation failed)<br>• 5xx Server Error:<br>500 (Internal server error) 501 (Not implemented)<br>502 (Bad gateway) 503 (Service unavailable)<br>504 (Gateway time-out) 505 (HTTP version not supported) |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSG** | **Display AirVantage Management Services status information**<br>Display general AirVantage Management Services status details.<br>**SIM card requirement:** Not required<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+WDSG**<br>Response: +WDSG: <Status>, <Value><br>+WDSG: <Status>, <Value><br>OK<br>Purpose: Returns the current <Value>s for <Status>=1 and <Status>=2.<br><br>**Parameters:**<br><Status> (Information type to display)<br>· 0 — AirVantage Management Services activation state<br>· For <Value>=2 and <Value>=3, connection parameters are automatically provisioned and no actions are required by the user.<br>· Device is activated (<Value>=3) when a dedicated APN (Access Point Name) is set manually or automatically in the first session. See +WDSS on page 268 for details.<br>· 1 — Session and package indication<br><Value> (Detail for the <Status>)<br>· For <Status>=0:<br>· 0 — AirVantage Management Services prohibited. Management Services will never be activated.<br>· 1 — AirVantage Management Services deactivated. Connection parameters to an AirVantage server must be provisioned.<br>This is the default state when a device has never been activated (first use of device services on this device).<br>· 2 — AirVantage Management Services must be provisioned. A bootstrap session is required.<br>· 3 — AirVantage Management Services are activated.<br>· For <Status>=1:<br>· 0 — No session or package.<br>· 1 — A session is under treatment.<br>· 2 — A package is available on the server.<br>· 3 — A package was downloaded and ready to install.<br>· Note: If a package is downloaded unsuccessfully, the <Value> is set to 0. If it downloads successfully, the <Value> is set to 3. |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSI** | **Activate/deactivate AirVantage Management Services unsolicited notifications**<br>Activate/deactivate specific AirVantage Management Services unsolicited notifications.<br><br>**Requirements:**<br>• To receive unsolicited notifications, AirVantage Management Services must be activated (see +WDSG on page 261 for details).<br>**SIM card requirement:** Not required<br>**Password required:** No<br>**Reset required to apply changes:** No<br>**Persistent across power cycles:** Yes<br><br>**Usage:**<br>▪ Execution: **AT+WDSI=<Level>**<br>Response: OK<br>Purpose: Activate/deactivate identifications as specified in the <Level> bitmask parameter.<br>▪ Query: **AT+WDSI?**<br>Response: +WDSI: <Level>]<br>OK<br>Purpose: Indicates the current state (activated/deactivated) of indications using the <Level> bitmask parameter.<br>▪ Query List: **AT+WDSI=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><Level> (Unsolicited AirVantage Management Services notifications bit mask)<br>• Bit mask indicating which notifications to enable/disable entered as integer value<br>• Default: 0= No indications activated<br>• Bit value:<br>• 0=Indication deactivated<br>• 1=Indication activated |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| | • Valid ranges: 0-127, 256-383, 4096-4223, 4352-4479.<br>Add the values of each bit listed below. (See +WDSI (notification) on page 264 for <Event> details.)<br>Note that bit combinations must add up to values in the valid ranges — combinations outside the ranges are not valid.<br>• 1 (Bit 0) — Initialization end indication (<Event> = 0)<br>• 2 (Bit 1) — Server request for user agreement indication (<Event> = 1, 2, 3, 24)<br>• 4 (Bit 2) — Authentication indications (<Event> = 4, 5)<br>• 8 (Bit 3) — Session indication (<Event> = 6, 7, 8)<br>• 16 (Bit 4) — Package download indications (<Event> = 9, 10, 11)<br>• 32 (Bit 5) — Certified downloaded package indication (<Event> = 12, 13)<br>• 64 (Bit 6) — Update indications (<Event> = 14, 15, 16)<br>• 128 (Bit 7) — Fallback indication (<Event> = 17)<br>• 256 (Bit 8) — Download progress indication (<Event> = 18)<br>• 512 (Bit 9) — Memory preemption indication (<Event> = 19)<br>• 1024 (Bit 10) — User PIN request indication for bootstrap (<Event> = 20)<br>• 2048 (Bit 11) — Reserved<br>• 4096 (Bit 12) — Bootstrap event indication (<Event> = 23) |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSI (notification)** | **AirVantage Management Services events — Unsolicited notification**<br>Unsolicited notification received for various AirVantage Management Services events.<br>**Requirements:**<br>• To receive unsolicited notifications, AirVantage Management Services must be activated (see +WDSG on page 261 for details).<br>**Notification format:**<br>**+WDSI: <Event>[,<Data>]**<br>**Notes:**<br>• <Event> parameter descriptions below indicate when a <Data> parameter is included in the response.When a package is available on the AirPrime Management Services server, the embedded module checks if enough space is available in a dedicated memory area, SWI_FOTA_partition: If the downloaded package is not certified (bad CRC, bad signature, not correspond to the current software), this package is not deleted.<br>**Examples:**<br>• +WDSI: 9,1000<br>*A package will be downloaded, or the previous downloading is retried, the size is 1000 bytes.*<br>• +WDSI: 18,1<br>*1% of package has been downloaded*<br>• +WDSI: 18, 100<br>*Entire package (100%) has been downloaded*<br>• +WDSI: 11,2<br>*Package download failue due to HTTP(S) error (see +WDSE* on page 260 *for error values)*<br>**Parameters:**<br><Event> (AirVantage Management Services event)<br>• 0 — AirVantage Management Services are initialized and can be used. (Note: Management Services are initialized when the SIM PIN code is entered and a dedicated NAP is configured. See +WDSS on page 268 for details.)<br>• 1 — AirVantage server requests that the device make a connection. The device requests a user agreement to allow the module to make the connection. The response can be sent using +WDSR (see +WDSR on page 267) and this indication can be returned by the device if the user has activated the user agreement for connection (see +WDSC on page 259 for details).<br>• 2 — AirVantage server requests that the device make a package download. The device requests a user agreement to allow the module to make the download. The response can be sent using +WDSR (see +WDSR on page 267) and this indication can be returned by the device if the user has activated the user agreement for download (see +WDSC on page 259 for details).<br>• 3 — Device has downloaded a package. The device requests a user agreement to install the downloaded package. The response can be sent using +WDSR (see +WDSR on page 267) and this indication can be returned by the device if the user has activated the user agreement for install (see +WDSC on page 259 for details).<br>• 4 — Module starts authentication with the server.<br>• 5 — Authentication with the server failed. |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSI (notification)** | **AirVantage Management Services events — Unsolicited notification**<br>• 6 — Authentication has succeeded and session with the server has started.<br>• 7 — Session with the server failed.<br>• 8 — Session with the server is finished.<br>• 9 — Package is available on the server and can be downloaded by the module. A <Data> parameter is returned indicating the package size in kB. When downloading session is retried, it will notify this event again, user application should be prepared to handle this event in downloading.<br>• 10 — Package was successfully downloaded and stored in flash.<br>• 11 — One of the following issues happened during the package download:<br>  • If the download did not start (a +WDSI <Event>=9 indication has not been received), there is not enough space in the device to download the package.<br>  • If the download started (a +WDSI <Event>=9 indication has been received), a flash problem implies that the package has not been saved in the device.<br>• 12 — Downloaded package is certified to be sent by the AirVantage server.<br>• 13 — Downloaded package is not certified to be sent by the AirVantage server.<br>• 14 — Update will be launched.<br>• 15 — OTA update client has finished unsuccessfully.<br>• 16 — OTA update client has finished successfully.<br>• 17 — Reserved<br>• 18 — Download progress:<br>  • No <Data> parameter — Download start<br>  • <Data> parameter — Percentage progress<br>• 19–22 — Reserved<br>• 23 — Session type (only in LWM2M protocol)<br>• 24 — AirVantage server requests that the device make a reboot. The device requests a user agreement to allow the module to reboot. The response can be sent using +WDSR (see +WDSR) and this indication can be returned by the device if the user has activated the user agreement for connection (see +WDSC for details).<br>• 25 — AirVantage server requests that the device make an application uninstall (software update). The device requests a user agreement before uninstalling. The response can be sent using +WDSR (see +WDSR on page 267) and this indication can be returned by the device if the user has activated the user agreement for connection (see +WDSC for details). |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSI (notification)** | <Data> (Additional data for specific <Event>s)<br>· (<Event>=5) To be defined<br>· (<Event>=9) Package size:<br>· Package size in bytes, which will be downloaded<br>· Preempted DOTA area size needed to download an update package<br>· If preemption is not made, this parameter is not returned for this event.<br>· If a reverse package is not downloaded and stored, the preempted area will be released after the installation.<br>· (<Event>=11) Download failure reason:<br>· 0=Insufficient memory in device to save firmware update package. Package was not downloaded.<br>· 1=HTTP/HTTPS error occurred. See +WDSE on page 249 for possible error values.<br>· 2=Corrupted firmware update package, did not store correctly. Reasons include (or example), mismatched CRCs between actual and expected, or signature check error.<br>· 3=RAM issue (resume is possible but suggest rebooting the platform before the resume).<br>· 4=Download issue but the package download could be resumed.<br>· 5=Flash issue during package download.<br>· (<Event>=18) Download progress:<br>· Integer value (% complete)<br>· (<Event>=23) Session event type:<br>· 0=Bootstrap session<br>· 1=Device management session |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSR** | **Reply to AirVantage server request**<br>Reply to a user agreement request (see +WDSI (notification) for details) from the module.<br>**SIM card requirement:** Required, and PIN 1/CHV 1 code must be entered.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+WDSR=<Reply>[,<Timer>]**<br>Response: OK<br>Purpose: Send <Reply> to a user agreement request from the module. For specific <Reply> types, include a <Timer> to have the module send a new user agreement request after the specified delay.<br>▪ Query List: **AT+WDSR=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><Reply> (Reply type)<br>· 0 — Delay the connection to server (Connect later)<br>· 1 — Accept the connection to server (Connect now)<br>· 2 — Delay or refuse to download. New user agreement request to be sent by module after <Timer> minutes:<br>· Delay — <Timer> must be > 0, or blank (Default 30). New user agreement request to be sent by module after <Timer> minutes.<br>· Refuse — <Timer>=0. Usage restrictions include:<br>▪ Option available only if OMA DM protocol is used.<br>▪ Not supported for install request (AT+WDSR=5,0). Returns +CME ERROR: 3<br>▪ Not supported for device reboot request (AT+WDSR=7,0). Returns +CME_ERROR: 3<br>▪ Not supported for uninstall request (AT+WDSR=9,0). Returns +CME_ERROR: 3<br>· 3 — Accept the download (download it now)<br>· 4 — Accept the install (install it now)<br>· 5 — Delay the install. New user agreement request to be sent by module after <Timer> minutes.<br>· 6 — Accept the device reboot (reboot now)<br>· 7 — Delay the device reboot. New user agreement request to be sent by module after <Timer> minutes.<br>· 8 — Accept the application uninstall (uninstall it now)<br>· 9 — Delay the application uninstall (uninstall it later after <Timer> minutes)<br>· Note: If the module is powered down before a delay (install, download, or reboot) finishes, the new user agreement request will be returned during the next start up.<br><Timer> (Interval before new user agreement request to be sent by module)<br>· Applies to <Reply> types 2, 5, 7, 9<br>· Valid values:<br>· Valid range: 0–1440 (minutes)<br>· 0 — If <Reply>=2 and OMA DM protocol is used, refuse the user agreement request.<br>· Default (if not specified): 30 (minutes) |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSS** | **Configure / connect AirVantage Management Services session**<br>This Sierra Wireless proprietary command allows users to manage the device services session. It can be used to:<br>▪ Change the current PDP context identifier.<br>▪ Restore the default PDP context identifier.<br>▪ Initiate a connection to the device service server.<br>▪ Activate an automatic registration to the AirVantage server.<br>**Notes:**<br>· There is no dedicated PDP context for AVMS. Instead, AVMS shares the same context with other applications and thus the same data connection.<br>· It is possible to change the current PDP context using +WDSS command. However, there is no guarantee that the newly chosen identifier contains a valid configuration.<br>· To configure PDP context, dedicated AT commands (e.g: +CGDCONT) should be called with the right parameters.<br>· It is also possible to fall-back to the default PDP profile index by calling +WDSS=2 without specifying <Cid>.<br>**Password required:** No<br>**Usage:**<br>▪ Execution (<Mode> = 0):<br>Deprecated and cannot be used anymore. Instead, use <Mode>=2 to set the profile to be used, and configure it using the dedicated AT commands (e.g: AT+CGDCONT).<br>▪ Execution (<Mode> = 1):<br>**AT+WDSS=<Mode>[,<Action>]**<br>Response: OK<br>Purpose: Connect to / disconnect from the AirVantage server.<br>▪ Execution (<Mode> = 2):<br>**AT+WDSS=<Mode>[,<Cid>]**<br>Response: OK<br>Purpose: Set the PDP context ID for the AirVantage server connection. If no <Cid> is entered, the default PDP context ID is used.<br>▪ Query: **AT+WDSS?**<br>Response: [+WDSS: 1,<Action>]<br>[+WDSS: 2,<Cid>]<br>OK<br>Purpose: Display the current AirVantage server connection state, and the PDP context ID for the connection.<br>▪ Query List: **AT+WDSS=?**<br>Response: +WDSS: 1,(list of supported <Action>s for this <Mode>)<br>+WDSS: 2,(range of supported PDP context identifiers)<br>OK<br>Purpose: Display valid execution format and parameter values. |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSS** | **Configure / connect AirVantage Management Services session**<br>**Parameters:**<br><Mode> (Connection method)<br>• 1 — User-initiated connection to the AirVantage server<br>• 2 — PDP context configuration for AirVantage server<br>• Note: Mode 0 is deprecated; use Mode 2 instead.<br><Cid> (PDP context identifier)<br>• String<br><Action> (Connect to / disconnect from AirVantage server)<br>• For <Mode>=1 only<br>• 0 — Release connection (Default)<br>• 1 — Establish connection<br><br>**Restore default PDP context**<br>When +WDSS=2 is called without specifying a <Cid>, a fall-back to default PDP context is performed.<br><br>**Example(s):**<br>• Command:<br>AT+WDSS=?<br>Response:<br>+WDSS: 1,(0-1)<br>+WDSS: 2,1<br>OK<br>• Command:<br>AT+WDSS?<br>Response:<br>at+wdss?<br>+WDSS: 1,1<br>+WDSS: 2,1<br>OK<br>• Command:<br>AT+WDSS=1,1<br>Response:<br>OK<br>Note: The user initiates a connection to the Device Services server<br><br>+WDSI: 4<br>+WDSI: 6<br>+WDSI: 23,0<br>Note: a bootstrap session was initiated<br><br>+WDSI: 4<br>+WDSI: 6<br>+WDSI: 23,1<br>Note: a device management session was initiated |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSS** | **Configure / connect AirVantage Management Services session**<br>• Command:<br>AT+WDSS=1,0<br>Response:<br>OK<br>Note: The user releases the current connection to the Device Services server.<br><br>+WDSI: 8<br>Note: Session was stopped. |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| **+WDSTPF** | **Device Services Third Party FOTA**<br><br>**Notes:**<br>• The user agreements for download and install are applicable for the third-party FOTA service. These user agreements are controlled by +WDSC and +WDSR.<br>• User agreement for reboot is not supported for +WDSTPF.<br>• Refuse a download is not supported for +WDSTPF.<br>• +WDSI is available under third-party FOTA service. The sent indications notify the different states of FOTA.<br>• FOTA from the Sierra Wireless server must not be used simultaneously with this third-party FOTA update. Cross effects are not guaranteed.<br>• If user did not select any cipher suite when setting the package URL, <cipher_index> will be "-1" to present this session did not use SSL profile.<br><br>**Usage:**<br>▪ Execution: **AT+WDSTPF=<mode>,<addr>[,<cipher_index>]**<br>Response: OK<br>Purpose:<br>▪ Query: **AT+WDSTPF?**<br>Response: +WDSTPF:0,(<addr> length range),<cipher_index><br>+WDSTPF:1,<state><br>OK<br>Purpose:<br>▪ Query List: **AT+WDSTPF=?**<br>Response: +WDSTPF:0,(<addr> length range),<cipher_index><br>+WDSTPF:1<br>OK<br>Purpose:<br><br>**Parameters:**<br><mode> Mode of operation<br>• 0 — Set the package URL. This address is stored in memory and is persistent to reset<br>• 1 — Start FOTA operation. When this mode is activated, download starts depending on user<br>• agreement configuration (see +WDSC)<br><addr> String parameter containing the package address with format "<url>[:port>]" maximum length = 255<br><url> String parameter containing the package URL<br><port> String parameter with maximum length = 5. Optional parameter. Default value = 80<br><state> FOTA operation status<br>• 0 — Not started<br>• 1 — Started<br><cipher_index> Cipher suite profile index to use for a secured socket, defined by +KSSLCRYPTO, integer value starting from 0-7. Optional parameter.<br>Default value = "-1" to present when user did not select any cipher suite. |

**Table 14-2: AirVantage Device Services Command Details (Continued)**

| Command | Description |
|---|---|
| | **Example(s):**<br>• Command:<br>AT+WDSTPF=?<br>+WDSTPF: 0, <addr>,<cipher_index><br>+WDSTPF: 1<br>OK<br>• Command:<br>AT+WDSTPF?<br>+WDSTPF: 0, "http://abcd.net:80/1234",-1<br>+WDSTPF: 1,0<br>OK<br>• Command:<br>AT+WDSC?<br>+WDSC: 0,1<br>+WDSC: 1,0<br>+WDSC: 2,1<br>+WDSC: 3,0<br>+WDSC: 4,15,60,240,480,1440,2880,0,0<br>+WDSC: 5,0<br>+WDSC: 6,0<br>• Command:<br>AT+WDSTPF=1 // Set start download<br>OK<br>+WDSI: 9,<package Size><br>+WDSI: 18,1<br>+WDSI: 18,5<br>+WDSI: 18,70<br>+WDSI: 18,100<br>+WDSI: 12<br>+WDSI: 10<br>+WDSI: 14<br>+WDSI: 16 |

# 15: Protocol Commands

## 15.1 Introduction

This chapter describes Internet Protocol (TCP, UDP, FTP, HTTP, SSL Certificate Manager) related commands.

### 15.1.1 Usage Notes

The following general usage notes apply to the AT commands described in this chapter:

- Session IDs — These protocol-specific AT commands share the same range of session IDs. Each session ID (<session_id> is a unique number in the range 1–32).
- IP address format — Unless otherwise specified, IP address parameters in the AT commands described in this chapter use the following formats:
  - IPv4 — Dot-separated decimal (0–255) values using the format a1.a2.a3.a4
  - IPv6 — Colon-separated hexadecimal (0–FFFF) values in the format a1:a2:a3:a4:a5:a6:a7:a8. Abbreviations are supported (e.g. 2001:0db8:3c4d:0015:0000:0000:1a2f:1a2b can be abbreviated as 2001:db8:3c4d:15::1a2f:1a2b)
- PDP context connection
  - A PDP connection starts when a session becomes active (e.g. using +KTCPNCX) and stops only if all sessions are closed or all sessions request to stop the connection.
    - By default, a PDP connection is requested to stop only when a session is closed by an Internet AT command (e.g. +KTCPCLOSE).
    - To configure the PDP connection deactivation behavior with respect to session errors, use +KIPOPT with <option_id>=3.
  - When a context is active, its configuration (+KCNXCFG) must be consistent with the +CGDCONT configuration, otherwise an error will be returned when creating a connection with +KCNXUP, +KCTPCNX or +KUDPCFG. Therefore, an active PDP context must have include the following +KCNXCFG configurations:
    - <af> must be consistent with +CGDCONT <PDP_type>, and
    - <APN> must be identical to +CGDCONT <APN> or must be set to the empty string ("").

*Note: RC76xx only supports a maximum of four PDN connections.*

- Buffer length — The maximum length of an AT command in AT command mode is 513 characters. Any AT command input longer than this will produce an error response. If the maximum length of a parameter is not specified in this document, it may vary but is still bound by this limit.
- CMUX application platform limitation — When CMUX mode is activated, data transfer in one DLC port will block the AT command of other DLC ports until the entire data transfer is complete.
- Note — Use Protocol Commands via UART and make sure AT!MUXMODE is set to 1. In RC76 modules, the AT!MUXMODE default value is 1.

## 15.1.2 FTP Reply Codes

**Table 15-1: FTP Reply Code Reference**

| FTP Reply Code | Meaning |
|---|---|
| 110 | Restart marker reply |
| 120 | Service ready in nnn minutes |
| 125 | Data connection already open: transfer starting |
| 150 | File status okay; about to open data connection |
| 200 | Command okay |
| 202 | Command not implemented, superfluous at this site |
| 211 | System status or system help reply |
| 212 | Directory status |
| 213 | File status |
| 214 | Help message |
| 215 | NAME system type |
| 220 | Service ready for new user |
| 221 | Service closing control connection. Logged out if appropriate. Unassigned (unallocated) number |
| 225 | Data connection open; no transfer in progress |
| 226 | Closing data connection. Requested file action successful (for example, file transfer or file abort) |
| 227 | Entering Passive Mode (<comma-separated IP address>,<comma-separated port>) |
| 22 | User logged in, proceed |
| 250 | Requested file action okay, completed |
| 257 | "PATHNAME" created |
| 331 | User name okay, need password |
| 332 | Need account for login |
| 350 | Requested file action pending further information |
| 421 | Service not available, closing control connection. This may be a reply to any command if the service knows it must shut down |
| 425 | Can't open data connection |
| 426 | Connection closed; transfer aborted |
| 450 | Requested file action not taken. File unavailable (e.g., file busy) |
| 451 | Requested action aborted: local error in processing |
| 452 | Requested action not taken. Insufficient storage space in system |
| 500 | Syntax error, command unrecognized. This may include errors such as command line too long |

| | |
|---|---|
| 501 | Syntax error in parameters or arguments |
| 502 | Command not implemented |
| 503 | Bad sequence of commands |
| 504 | Command not implemented for that parameter |
| 530 | Not logged in |
| 532 | Need account for storing files |
| 550 | Requested action not taken. File unavailable (e.g., file not found, no access) |
| 551 | Requested action aborted: page type unknown |
| 552 | Requested file action aborted. Exceeded storage allocation (for current directory or dataset) |
| 553 | Requested action not taken. File name not allowed |

# 15.2 Command Summary

Table 15-2 lists the commands described in this chapter:

**Table 15-2: Protocol Commands**

| Command | Description | Page |
|---|---|---|
| +KCERTDELETE | Delete local certificate from the index | 277 |
| +KCERTSTORE | Store root CA and local certificates to internal storage | 278 |
| +KCGPADDR | Display module's PDP context addresses | 279 |
| +KCNX_IND (notification) | Connection Status Notification — Unsolicited notification | 280 |
| +KCNXCFG | Configure GPRS Connection | 281 |
| +KCNXDOWN | Bring down PDP connection | 283 |
| +KCNXPROFILE | Query/Set default PDP context | 283 |
| +KCNXTIMER | Configure TCP/UDP Connection Timer | 284 |
| +KCNXUP | Bring up PDP connection | 285 |
| +KFTPCFG | FTP configuration | 286 |
| +KFTPCNX | Start the FTP connection | 288 |
| +KFTPRCV | Receive FTP files | 291 |
| +KFTPSND | Send FTP files | 294 |
| +KFTPDEL | Delete FTP files | 296 |
| +KFTP_IND | FTP status—Unsolicited notification | 298 |
| +KFTPCLOSE | Close the FTP connection | 299 |
| +KFTPCFGDEL | Delete a configured FTP session | 300 |

**Table 15-2: Protocol Commands**

| Command | Description | Page |
|---|---|---|
| +KFTPLS | List the size of a specific file | 301 |
| +KHTTPCFG | Configure HTTP connection | 303 |
| +KHTTPCLOSE | Close HTTP connection | 304 |
| +KHTTPCNX | Start the HTTP connection | 305 |
| +KHTTPDEL | Delete configured HTTP session | 306 |
| +KHTTPGET | Get HTTP server information | 307 |
| +KHTTPHEAD | Get HTTP Headers | 308 |
| +KHTTPHEADER | Set the HTTP request header | 309 |
| +KHTTPPOST | Send data to HTTP server | 310 |
| +KHTTP_IND | HTTP status—Unsolicited notification | 311 |
| +KIPOPT | Configure general protocol options | 312 |
| +KPATTERN | Set/query the custom end of data/file pattern | 315 |
| +KPRIVKDELETE | Delete private key from the index | 316 |
| +KPRIVKSTORE | Store private key associated to a local certificate | 317 |
| +KSSLCRYPTO | Cipher suite configuration | 318 |
| +KSSLCFG | SSL configuration | 320 |
| +KTCP_DATA (notification) | Incoming Data through TCP connection — Unsolicited notification | 321 |
| +KTCP_IND (notification) | TCP status — Unsolicited notification | 321 |
| +KTCP_SRVREQ (notification) | Incoming client connection request — Unsolicited notification | 322 |
| +KTCPCFG | Configure TCP connection | 324 |
| +KTCPCLOSE | Close current TCP connection | 326 |
| +KTCPCNX | Start TCP connection | 327 |
| +KTCPDEL | Delete configured TCP session | 328 |
| +KTCPRCV | Receive data through TCP connection | 329 |
| +KTCPSND | Send data through TCP connection | 330 |
| +KTCPSTART | Start TCP connection in Direct Data Flow | 331 |
| +KTCPSTAT | Get TCP socket status | 332 |
| +KUDP_DATA (notification) | Incoming Data through UDP connection — Unsolicited notification | 333 |
| +KUDP_IND (notification) | UDP status — Unsolicited notification | 333 |
| +KUDPCFG | Configure UDP connection | 334 |
| +KUDPCLOSE | Close current UDP connection | 336 |

**Table 15-2: Protocol Commands**

| Command | Description | Page |
|---|---|---|
| +KUDPDEL | Delete configured UDP session | 336 |
| +KUDPRCV | Receive data through UDP connection | 337 |
| +KUDPSND | Send data through UDP connection | 338 |
| +KURCCFG | Enable/Disable Protocol Notifications (URCs) | 339 |

# 15.3 Command Reference

**Table 15-3: Protocol Command Details**

| Command | Description |
|---|---|
| **+KCERTDELETE** | **Delete local certificate from the index**<br>Enables choosing which certificate to delete from the index.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KCERTDELETE=<data_type>[,<index>]**<br>Response: OK<br>or<br>+CME ERROR: <err><br>Purpose: Select which local certificate to delete.<br>▪ Query: **AT+KCERTDELETE?**<br>Response: +KCERTDELETE:<br>OK<br>or<br>+CME ERROR: <err><br>Purpose: Delete certificate.<br>▪ Query List: **AT+KCERTDELETE=?**<br>Response: +KCERTDELETE: (list of possible <data_type>s),<br>(list of possible <index>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><data_type> (Certificate type)<br>· Valid range:<br>· 0—Root certificate<br>· 1—Local certificate<br><br><index> (Stored local certificate index)<br>· Valid range:<br>· 0—3: If <data_type> = 0<br>· 0—2: If <data_type> = 1 |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCERTSTORE** | **Store root CA and local certificates to internal storage**<br>Enables storing certificates to an internal storage<br><br>**Notes:**<br>• The <index> parameter is the link between a local certificate and a private key (refer to +KPRIVKSTORE and +KCERTDELETE for more information).<br>• The data session is automatically ended when <ndata> data bytes are sent or received, and the module returns to command state and returns OK.<br>• The data session can also be ended by <EOF pattern>, +++.<br>• ATO is not available for this command.<br>• It is highly recommended to configure the module for hardware flow control before using this command.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KCERTSTORE=<data_type>[,<NbData>[,<index>]]**<br>Response: CONNECT<br>OK<br>or<br>+CME ERROR: <err><br>Purpose: Select which local certificate and how much bytes to store.<br>▪ Query: **AT+KCERTSTORE?**<br>Response: CONNECT<br>[root_cert,<index>,<NbData><br><File_data>]<br>[local_cert,<index>,<NbData><br><File_data>]<br>[...]<br>OK<br>or<br>+CME ERROR: <err><br>Purpose: Checks which certificate to store.<br>▪ Query List: **AT+KCERTSTORE=?**<br>Response: +KCERTSTORE: (list of possible <data_type>s),<br>(range of possible lengths of <NbData>),<br>(list of possible <index>es)<br>Purpose: Display valid execution format and parameter values. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCERTSTORE** | **Store root CA and local certificates to internal storage**<br><data_type> (Certificate type)<br>• Valid range:<br>  • 0—Root certificate<br>  • 1—Local certificate<br><NbData> (Amount of bytes to be read or written)<br>• Valid range: 1—4096<br><index> (Stored local certificate index)<br>• Valid range:<br>  • 0—3: If <data_type> = 0<br>  • 0—2: If <data_type> = 1<br><File_data> (File data in bytes)<br>• String |
| **+KCGPADDR** | **Display module's PDP context addresses**<br>Display the module's address for a specific PDP context, or all contexts.<br>**Password required:** No<br>**Notes:**<br>• Command can be used after +KTCPCNX, +KUDPCFG, etc., to display the local IP address of the module.<br>• For IPv6, more than one PDP address corresponding to the interface may be displayed.<br>**Usage:**<br>▪ Execution (one context):<br>**AT+KCGPADDR=<cnx_cnf>**<br>Response: +KCGPADDR: <cnx_cnf>, <PDP_addr$_1$><br>OK<br>Purpose: Display the address for the specified context.<br>▪ Execution (all contexts):<br>**AT+KCGPADDR**<br>Response: +KCGPADDR: <cnx_cnf$_1$>, <PDP_addr$_1$><br>[+KCGPADDR: <cnx_cnf$_2$>, <PDP_addr$_2$>]<br>[...]<br>OK<br>Purpose: Display the addresses for all contexts.<br>▪ Query List: **AT+KCGPADDR=?**<br>Purpose: Display valid parameter values.<br>**Parameters:**<br><cnx_cnf> (PDP context configuration)<br>• Specifies a particular PDP context configuration that has been defined by +CGDCONT. (e.g. <cnx_cnv=3> corresponds to CID=3 in +CGDCONT and +CGACT)<br><PDP_addr> (IP Address of module in PDP address space)<br>• ASCII string |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCNX_IND** | **Connection Status Notification — Unsolicited notification**<br>Unsolicited notification indicating the status of a connection attempt.<br>To enable this notification, use +KURCCFG.<br><br>**Notification format:**<br>▪ For <status> = 0 or 1:<br>**+KCNX_IND: <cnx_cnf>,<status>,<af>**<br>▪ For <status> = 2:<br>**+KCNX_IND: <cnx_cnf>,<status>,<attempt>,<nbtrial>,<tim1>**<br>▪ For <status> = 3 or 6:<br>**+KCNX_IND: <cnx_cnf>,<status>**<br>▪ For <status> = 4:<br>**+KCNX_IND: <cnx_cnf>,<status>,<attempt>**<br>▪ For <status> = 5:<br>**+KCNX_IND: <cnx_cnf>,<status>,<idletime>**<br>**Parameters:**<br><cnx_cnf> (PDP context configuration)<br>· Specifies a particular PDP context configuration that has been defined by +CGDCONT. (e.g. <cnx_cnv=3> corresponds to CID=3 in +CGDCONT and +CGACT)<br><status> (PDP connection status)<br>· 0 — Disconnected due to network<br>· 1 — Connected<br>· 2 — Failed to connect. <tim1> timer is started if <attempt> is less than <nbtrial>.<br>· 3 — Closed<br>· 4 — Connecting<br>· 5 — Idle time down counting started for disconnection<br>· 6 — Idle time down counting canceled<br><af> (IP address family type used for connection, compliant up to 3GPP Release 7)<br>· Valid values:<br>· 0 — IPv4<br>· 1 — IPv6<br><tim1> (PDP activation reattempt timer, in seconds)<br>· Integer<br>· Valid range: 1–120<br>· See +KCNXTIMER for details<br><attempt> (PDP connection attempt number)<br>· Integer<br><nbtrial> (Max number of PDP activation attempts)<br>· Integer<br>· Valid range: 1–4<br>· See +KCNXTIMER for details<br><idletime> (Max idle time, in seconds)<br>· Integer<br>· Valid range: 0–1800<br>· See +KCNXTIMER for details |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCNXCFG** | **Configure GPRS Connection**<br>**Password required:** No<br><br>**Notes:**<br>• Command is used to configure the bearer to be used for future IP services.<br>• By default, the IP and DNS addresses are dynamic (values would be affected by the network during the PDP connection).<br>• Connection will be used by the module to access IP services. +KCNXCFG defines only the parameters for the specified connection. The defined connection will be opened automatically when needed by the IP services (e.g. UDP service).<br>• The use of IPv4 and/or IPv6 addresses is configured by PDP context configuration.<br>• <cnx cnf> values correspond to PDP context ID.<br>• When the connection is up, the query command returns the actual values used by the connection interface. When the connection is down, it returns the configured values.<br>• If reuse of existing activated PDP context is required, <apn> can be set as an empty string or as the existing APN string returned by the +CGDCONT query command.<br><br>**Usage:**<br>▪ Execution: **AT+KCNXCFG=<cnx_cnf>, "GPRS", <apn> [,[<login>] [,[<password>] [,<af> [,[<ip>] [,[<dns1>] [,<dns2>]]]] [,[<ip_v6>] [,[<dns1_v6>] [,<dns2_v6>]]]]]]**<br>Response: OK<br>Purpose: Set the GPS connection parameters for the specified connection.<br>▪ Query: **AT+KCNXCFG?**<br>Response: +KCNXCFG: <cnx_cnf>,"GPRS",<apn>,<login>,<password>,<af>,<ip>,<dns1>,<dns2>[,<ip_v6>,<dns1_v6>,<dns2_v6>],<state><br>[...]<br>OK<br>Purpose: Display the actual values used by the connection interface (if the connection is up), or the configured values (if the connection is down).<br>▪ Query List: **AT+KCNXCFG=?**<br>Response: +KCNXCFG: (list of possible <cnx conf>s),"GPRS",(range of possible length of <apn>),(range of possible length of <login>),(range of possible length of <password>),<br><af>,<ip>,<dns1>,<dns2>,<ip_v6>,<dns1_v6>,<dns2_v6><br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><cnx_cnf> (PDP context configuration)<br>• Integer<br>• Numeric parameter which specifies a particular PDP context configuration.<br><apn> (Access Point Name)<br>• ASCII string, max. length = 63 bytes<br>• Logical name used to select the GGSN or the external packet data network.<br><login> (cnx user name)<br>• ASCII string, max. length = 64 bytes |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCNXCFG** | **Configure GPRS Connection**<br><password> (cnx password)<br>• ASCII string, max. length = 64 bytes<br><af> (IP address family type used for connection, compliant up to 3GPP Release 7)<br>• ASCII string<br>• Valid values:<br>  • IPV4 — IPv4 only<br>  • IPV6 — IPv6 only<br>  • IPV4V6 — IPv4 and IPv6<br><ip> (IPv4 address)<br>• String<br>• The value should be "0.0.0.0" or an empty string.<br><dns1>, <dns2> (DNS addresses)<br>• String<br>• If the mobile is supposed to work with dynamic DNS addresses, the value should be "0.0.0.0" or an empty string.<br><ip_v6> (IPv6 address)<br>• String<br>• If the module is to work with a dynamic address, use "::" or an empty string.<br><dns1_v6>, <dns2_v6> (IPv6 addresses)<br>• String<br>• If the module is to work with a dynamic address, use "::" or an empty string.<br><state> (Connection state)<br>• 0 — Disconnected<br>• 1 — Connecting<br>• 2 — Connected<br>• 3 — Idle, down counting for disconnection<br>• 4 — Disconnecting |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCNXDOWN** | **Bring down PDP connection**<br>Bring down a specific PDP connection.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KCNXDOWN=<cnx_cnf>[,<mode>]**<br>Response: OK<br>Purpose: Bring down the specified connection.<br>▪ Query List: **AT+KCNXDOWN=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><cnx_cnf> (PDP context configuration)<br>· Specifies a particular PDP context configuration that has been defined by +CGDCONT. (e.g. <cnx_cnv=3> corresponds to CID=3 in +CGDCONT and +CGACT)<br><mode> (Effect of bring down connection)<br>· 0 — Cancels the reservation of the activated PDP connection that was previously configured by +KCNXUP.<br>· 1 — Similar to <mode>=0, but deactivates the PDP connection even if the active session exists. |
| **+KCNXPROFILE** | **Query/Set default PDP context**<br>Display or set the default PDP profile that will be used by +KTCPCFG and +KUDPCFG if those commands do not specify a context.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KCNXPROFILE=<cnx_cnf>**<br>Response: OK<br>Purpose: Set the current profile.<br>▪ Query: **AT+KCNXPROFILE?**<br>Response: +KCNXPROFILE: <cnx_cnf><br>OK<br>Purpose: Display the current profile.<br>▪ Query List: **AT+KCNXPROFILE=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><cnx_cnf> (PDP context configuration)<br>· Specifies a particular PDP context configuration that has been defined by +CGDCONT. (e.g. <cnx_cnv=3> corresponds to CID=3 in +CGDCONT and +CGACT) |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCNXTIMER** | **Configure TCP/UDP Connection Timer**<br>Configure the connection timer for TCP/UDP connections.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KCNXTIMER=<cnx_cnf> [,[<tim1>][,[<nbrtrial>][,<tim2>][,<idletime>]]]**<br>Response: OK<br>Purpose: Configure the timer for the specified connection.<br>▪ Query: **AT+KCNXTIMER?**<br>Response: +KCNXTIMER: <cnx_cnf>, <tim1>, <nbtrial>, <tim2>, <idletime><br>[...]<br>OK<br>Purpose: Display configured connection timers.<br>▪ Query List: **AT+KCNXTIMER=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><cnx_cnf> (PDP context configuration)<br>• Specifies a particular PDP context configuration that has been defined by +CGDCONT. (e.g. <cnx_cnv=3> corresponds to CID=3 in +CGDCONT and +CGACT)<br><tim1> (PDP activation reattempt timer, in seconds)<br>• Integer<br>• Valid range: 1–120<br>• Default: 30 seconds<br>• If the module fails to activate the PDP context, this timer starts. When this timer expires, the module will tryagain to activate the PDP context.<br><nbtrial> (Max number of PDP activation attempts)<br>• Integer<br>• Valid range: 1–4<br>• Default: 2<br><tim2> (Connection attempt timer, in seconds)<br>• Integer<br>• Valid range: 1–300<br>• Default: 60 seconds<br>• 0 — Deactivated (connection will not close by itself)<br>• For client sockets, the module will try to connect to the server within <tim2> seconds. If <tim2> expires, the module gives up the connection.<br><idletime> (Max idle time, in seconds)<br>• Integer<br>• Valid range: 0–1800<br>• Default: 30 seconds<br>• When all sessions are closed, module can stay idle for <idletime> while waiting for another session to connect and reuse the PDP context. If this timer expires, the module tries to deactivate the PDP context. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KCNXUP** | **Bring up PDP connection**<br>Bring up a specific PDP connection.<br>**Notes:**<br>• The activated connection is reserved — it remains up even after the last session is closed.<br>• If this command is not used to reserve the connection, the context will be brought down after the last session is closed unless +KCNXDOWN is used.<br>• The specified connection will not be requested if the +KCNXCFG and +CGDCONT configurations are different.<br>• When the connection is brought up, it sets the PDP into modemData and writes it back into the modem.<br>**Password required:** No<br>**Usage:**<br>▪ Execution: **AT+KCNXUP=<cnx_cnf>**<br>Response: OK<br>Purpose: Bring up the specified connection.<br>▪ Query List: **AT+KCNXUP=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><cnx_cnf> (PDP context configuration)<br>• Specifies a particular PDP context configuration that has been defined by +CGDCONT. (e.g. <cnx_cnv=3> corresponds to CID=3 in +CGDCONT and +CGACT) |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPCFG** | **FTP configuration**<br>Shows FTP configuration<br><br>**Notes:**<br>• Execution command sets the server name, the login, the password, the port number and the mode for FTP operations.<br>• This command (with <start> = 0) can be used before setting up +KCNXCFG configuration. Note however that the latter is required to start the connection properly.<br>• The connection timeout for TCP socket is about 9 seconds with 3 retransmissions with a 3-second delay.<br>• The result of the FTP connection is indicated by URC.<br>• The default timeout for FTP is 30 seconds.<br>• The maximum number of FTP connections is limited to 6.<br>**Password required:** Yes<br><br>**Usage:**<br>▪ Execution: **AT+KFTPCFG=[<cnx cnf>],<server_name>[,<login>[,<password>[,<port_number>[,<mode>][,<start>][,<af>]**<br>Response: +KFTPCFG:<session_id><br>OK<br>or<br>+KFTP_ERROR: <session_id>,<ftp cause><br>Purpose: Show the session ID.<br>▪ Query: **AT+KFTPCFG?**<br>Response: +KFTPCFG: <session_id>,<cnx cnf>,<server_name>,<login>,<password>,<port_number>,<mode>,<started>,<af><br>Purpose: Display valid execution format and parameter values.<br>▪ Query List: **AT+KFTPCFG=?**<br>Response: +KFTPCFG: (list of possible <cnx cnf>s), <server_name>,(range of possible length of <login>),(range of possible length of <password>), (list of possible <port_number>s),(list of possible <mode>s),(list of possible <start>s),(list of possible <af>s)<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><cnx cnf> (Index of a set of parameters)<br>• Valid range: 1<br>• This command is used for configuring one FTP session. For details, see +KCNXCFG<br><session_id> (FTP session index)<br>• Integer<br><server_name> (FTP server IP address string or server's domain name)<br>• String |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPCFG** | **FTP configuration**<br><login> (User name to be used during the FTP connection)<br>• String<br>• Valid range: 0–64<br><password> (Password to be used during the FTP connection)<br>• String<br>• Valid range: 0–64<br><port_number> (Numeric parameter)<br>• Indicates the remote command port.<br>• Default: 21<br>• Valid range: 1–65535<br><mode> (Numeric number)<br>• Indicates the initiator of the FTP connection.<br>• Valid range:<br>• 0: Active. Indicates that the server is the initiator of the FTP data connection.<br>• 1: Passive. Indicates that the client is the initiator of the FTP data connection to avoid the proxy filtrate.<br>Note: The passive data transfer process listens on the data port for a connection from the active transfer process in order to open the data connection. Only passive mode is currently supported. Active mode is internally switched to passive.<br><start> (Starts the FTP connection)<br>• Indicates the remote command port.<br>• 0—Starts the FTP connection using +KFTPCNX<br>• 1—Starts the FTP connection immediately<br><started> (Indicates where the FTP connection has been started)<br>• Indicates the remote command port.<br>• 0—FTP connection not yet started<br>• 1—FTP connection was started<br><af> (Family address used for the connection)<br>• 0—IPV4<br>• 1—IPV6 |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPCFG** | **FTP configuration**<br><ftp_cause> (Indicates the cause of FTP connection failure)<br>• Integer<br>• 0—Sending or retrieving failed due to request timeout<br>• 1—Failed to connect to the server due to DNS resolution failure<br>• 2—FTP connection error due to internal trouble<br>• 3—Failed to download due to connection timeout<br>• 4—No network available<br>• 5—Flash access error<br>• 6—Flash memory full<br>• Note: For XXX or three-digit reply codes from the FTP server, see FTP Reply Codes table.<br>**Example(s):**<br>• Command:<br>AT+KFTPCFG=1,"ftp.connect.com","username","password",21,1<br>Response:<br>+KFTPCFG: 1<br>OK<br>• Command:<br>AT+KFTPCFG=?<br>Response:<br>+KFTPCFG: (1),<server_name>,(0-64),(0-64),(1-65535),(0-1),(0-1),(0-1)<br>OK<br>• Command:<br>AT+KFTPCFG?<br>Response:<br>+KFTPCFG: 1,1,"ftp.connect.com","username","",21,1,0,0<br>OK |
| **+KFTPCNX** | **Start the FTP connection**<br>Enables connection to the FTP.<br>**Notes:**<br>• This command is used to start the FTP connection, created by +KFTPCFG, with <start>=0.<br>• The result of the FTP connection is indicated by URC.<br>**Password required:** No |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPCNX** | **Start the FTP connection**<br><br>**Usage:**<br>▪ Execution: **AT+KFTPCNX=<session_id>**<br>Response: OK<br>or<br>NO CARRIER<br>+CME ERROR: <err><br>+KFTP_ERROR: <session_id>,<ftp cause><br>Purpose: Configure a connection and receive a session ID.<br>▪ Query: **AT+KFTPCNX?**<br>Response: OK<br>Purpose: Display the configurations for the sessions.<br>▪ Query List: **AT+KFTPCNX=?**<br>Response: +KFTPCNX: (list of possible <session_id>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (FTP session index)<br>▪ Integer<br>▪ Valid range: 1—32<br><ftp_cause> (Indicates the cause of FTP connection failure)<br>▪ Integer<br>▪ 0—Sending or retrieving failed due to request timeout<br>▪ 1—Failed to connect to the server due to DNS resolution failure<br>▪ 2—FTP connection error due to internal trouble<br>▪ 3—Failed to download due to connection timeout<br>▪ 4—No network available<br>▪ 5—Flash access error<br>▪ 6—Flash memory full<br>▪ Note: For XXX or three-digit reply codes from the FTP server, see FTP Reply Codes. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| | **Example(s):**<br>• Command:<br>AT+KFTPCNX=?<br><br>Response:<br>+KFTPCNX: (1-32)<br>OK<br>• Command:<br>AT+KFTPCNX=1<br><br>Responses:<br>ERROR<br>+KFTP_ERROR: 1,2<br>OK<br><br>or<br>+KCNX_IND: 1,1,0<br>+KFTP_IND: 1,1 |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPRCV** | **Receive FTP files**<br>Enables receiving FTP files.<br><br>**Notes:**<br>• Before using this command, an FTP connection must have been achieved using AT+KFTPCFG.<br>• After sending the +KFTPRCV command, the user will receive the entire data stream<br>• The user can abort the download by sending the **end of data pattern** from the host. In this case, the module will end the transfer by transmitting the EOF followed by NO CARRIER.<br>• Download can also be aborted or disconnected using +++.<br>• If set, AT&C1 and DCD will be ON after CONNECT while DCD will be OFF when the download is done.<br>• If the FTP server does not support the resume feature, module will output KFTP_ERROR. The <ftp_cause> will be in sets {500, 501, 502, 421, 530}. See FTP Reply Codes for error codes.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KFTPRCV=<session_id>,[<local_uri>],[<server_path>],<file_name>[,<type_of_file>[,<offset>][,<size>]]**<br>Response: CONNECT<br><EOF_pattern><br>OK<br><br>or<br><br>+CME ERROR<err><br>NO CARRIER<br>+KFTP_ERROR: <session_id>,<ftp cause><br>Purpose: Configure a connection and receive a session ID and error notice if applicable.<br>▪ Query: **AT+KFTPRCV?**<br>Response: ERROR<br>Purpose: Produces an error response.<br>▪ Query List: **AT+KFTPRCV=?**<br>Response: +KFTPRCV: (list of possible <session_id>s),<br><local_uri>,<server_path>,<file_name>,<br>(list of possible <type_of_file>s),(list of possible <offset>s),<br>(list of possible <size>s)<br>OK<br>Purpose: Display valid execution format and parameter values. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPRCV** | **Receive FTP files**<br>**Parameters:**<br><session_id> (FTP session index)<br>• Integer<br><local_uri> (Reserved for compatibility of command syntax)<br>• String<br>• This argument must be empty.<br><server_path> (Indicates the file path for the download)<br>• String<br>• An empty string or no string indicates that the download is done from the path given by the FTP server.<br><file_name> (Indicates the file name to be downloaded)<br>• String<br><type_of_file> (Indicates the file type, ASCII or binary, to be transferred)<br>• Numeric type<br>• Valid values:<br>  • 0–Binary (default value)<br>  • 1–ASCII (not supported)<br><offset> (Indicates the offset to resume transfer)<br>• Integer<br>• Valid range: 0–4294967295<br>• Note: When downloading a file and transmitting to a serial link, the module will use the <offset> value and resume transfer from here.<br><size> (Indicates the size to resume transfer)<br>• Integer<br>• Valid range: 0–4294967295<br>• Note: When a downloading file and transmitting to a serial link, the module will use the <size> value to indicate the amount of bytes to be received.<br><EOF_pattern> (End of file notification)<br>• String<br>• See +KPATTERN for details.<br><<ftp_cause> (Indicates the cause of the FTP connection failure)<br>• Integer<br>• Valid values:<br>  • 0–Sending or the retrieving was impossible due to request timeout<br>  • 1–Cannot connect to the server due to DNS resolution failure<br>  • 2–FTP connection error due to internal trouble<br>  • 3–Unable to download due to connection timeout<br>  • 4–No network available<br>  • 5–Unable to access flash<br>  • 6–Flash memory full<br>• Note: XXX three digits, reply codes from FTP server. See FTP Reply Codes. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPRCV** | **Receive FTP files**<br><br>**Example(s):**<br>• Command:<br>AT+KFTPRCV?<br><br>Response:<br>ERROR<br>• Command:<br>AT+KFTPRCV=?<br><br>Responses:<br>+KFTPRCV: (1-32),<local_uri>,<server_path>,<file_name>,(0),(0-4294967295),<br>(0-4294967295)<br><br>OK<br>• Command:<br>AT+KFTPRCV=1,,,"filename.txt"<br><br>Response:<br>CONNECT<br>...data...<br>OK<br>+KFTP_IND: 1,2,10 |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPSND** | **Send FTP files**<br>Enables sending FTP files.<br><br>**Notes:**<br>• Before using this command, you must have an FTP connection via AT+KFTPCFG.<br>• After sending the +KFTPSND command, the host must send the entire data stream of the file.<br>• Upload can also be disconnected using +++.<br>• ATO is not available for this command.<br>• If AT&C1 is set, DCD will be ON after CONNECT, and it will be OFF after the upload is done.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KFTPSND=<session_id>,[<local_uri>],[<server_path>],<file_name>[,<type_of_life>][,<append>][,<offset>][,<size>]**<br>Response: CONNECT<br>data ... \| OK<br><EOF pattern><br>OK<br><br>or<br>+CME ERROR <err><br>NO CARRIER<br>+KFTP_ERROR: <session_id>,<ftp cause><br>Purpose: Configure a connection and receive a session ID and error notice if applicable.<br>▪ Query: **AT+KFTPSND?**<br>Response: ERROR<br>Purpose: Produces an error response.<br>▪ Query List: **AT+KFTPSND=?**<br>Response: +KFTPSND: (list of possible <session_id>s),<br><local_uri>,<server_path>,<file_name>,<br>(list of possible <type of file>s),(list of possible <append>s),(list of possible <offset>s),(list of possible <size>s)<br><br>OK<br>Purpose: Display valid execution format and parameter values. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPSND** | **Send FTP files**<br>**Parameters:**<br><session_id> (FTP session index)<br>• Integer<br>• Valid range: 1–32<br><local_uri> (Reserved for compatibility of command syntax)<br>• String<br>• Note: This argument must be empty.<br><server_path> (Indicates the file path for the upload)<br>• String<br>• An empty string or no string indicates that the upload is done from the path given by the FTP server.<br><file_name> (Indicates the file name to be uploaded)<br>• String<br><type_of_file> (Indicates the file type, ASCII or binary, to be transferred)<br>• Numeric type<br>• Valid values:<br>  • 0–Binary (default value)<br>  • 1–ASCII (not supported)<br><append> (Indicates when to use append for uploading)<br>• Numeric type<br>• Valid values:<br>  • 0–Do not use append. (default value). If the file already exists then the file will be overridden<br>  • 1: Use append. If the file already exists then the data will be appended at the end of the file. Otherwise, the file will be created.<br><offset> (Indicates the offset to resume transfer)<br>• Integer<br>• Valid range: 0–4294967295<br>• Note: When sending a file and transmitting to a serial link, the module will use the <offset> value and resume transfer from here.<br><size> (Indicates the size to resume transfer)<br>• Integer<br>• Valid range: 0–4294967295<br>• Note: When sending a file and transmitting to a serial link, the module will use the <size> value to indicate the amount of bytes to send.<br><EOF_pattern> (End of file notification)<br>• String<br>• See +KPATTERN for details. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPSND** | **Send FTP files**<br><ftp_cause> (Indicates the cause of the FTP connection failure)<br>• Integer<br>• Valid values:<br>  • 0–Sending or the retrieving was impossible due to request timeout<br>  • 1–Cannot connect to the server due to DNS resolution failure<br>  • 2–Unable to download a file due to connection issues<br>  • 3–Unable to download due to connection timeout<br>  • 4–No network available<br>  • 5–Unable to access flash<br>  • 6–Flash memory full<br>• Note: XXX three digits, reply codes from FTP server. See FTP Reply Codes.<br><br>**Example(s):**<br>• Command:<br>AT+KFTPSND=?<br>Response:<br>+KFTPSND: (1-32),<local_uri>,<server_path>,<file_name>,(0),(0-1),<br>(0-4294967295),(0-4294967295)<br><br>OK |
| **+KFTPDEL** | **Delete FTP files**<br>Enables deleting FTP files.<br><br>**Notes:**<br>• Before using this command, you must have an FTP connection via AT+KFTPCFG.<br>• Results are indicated via URC.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KFTPDEL=<session_id>,[<server_path>],<file_name>[,<type>]**<br>Response: OK<br><br>or<br>+CME ERROR <err><br>NO CARRIER<br>+KFTP_ERROR: <session_id>,<ftp cause><br>Purpose: Configure a connection and receive a session ID and error notice if applicable.<br>▪ Query: **AT+KFTPDEL?**<br>Response: ERROR<br>Purpose: Produces an error response.<br>▪ Query List: **AT+KFTPDEL=?**<br>Response: +KFTPDEL: (list of possible <session_id>s),<br><server_path>,<file_name>,(list of possible <type>s)<br>OK<br>Purpose: Display valid execution format and parameter values. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPDEL** | **Delete FTP files**<br>**Parameters:**<br><session_id> (FTP session index)<br>• Integer<br>• Valid range: 1–32<br><server_path> (Indicates the file path to be deleted)<br>• String<br>• An empty string or no string indicates that the upload is done from the path given by the FTP server.<br><file_name> (Indicates the file name to be deleted)<br>• String<br><type> (Indicates the file type, ASCII or binary, to be transferred)<br>• Numeric type<br>• Valid values:<br>  • 0–Binary (default value)<br>  • 1–ASCII (not supported)<br><ftp_cause> (Indicates the cause of the FTP connection failure)<br>• Integer<br>• Valid values:<br>  • 0–Sending or the retrieving was impossible due to request timeout<br>  • 1–Cannot connect to the server due to DNS resolution failure<br>  • 2–Unable to download a file due to connection issues<br>  • 3–Unable to download due to connection timeout<br>  • 4–No network available<br>  • 5–Flash access trouble<br>  • 6–Flash memory full<br>  • Note: XXX three digits, reply codes from FTP server. See FTP Reply Codes.<br>**Example(s):**<br>• Command:<br>AT+KFTPDEL=?<br>Response:<br>+KFTPDEL: (1-32),<server_path>,<file_name>,(0)<br>OK |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTP_IND (notification)** | **FTP status—Unsolicited notification**<br>Unsolicited notification that indicates the FTP's status.<br>**Usage:**<br>▪ Notification: **+KFTP_IND: <session_id>,<status>[,<data_len>]**<br>Purpose: Indicate the FTP status together with the session ID and the data's byte length.<br>**Parameters:**<br><session_id> (FTP session index)<br>· Integer<br>· Valid range: 1–32<br><status> (Indicates the status of the FTP session)<br>· Integer<br>· Valid range:<br>· 1–Session is set up and ready for operation<br>· 2–The last FTP command has been executed successfully<br><data_len> (Data byte length)<br>· Byte length of data downloaded or uploaded to and from the terminal via +KFTPRCV or +KFTPSND. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPCLOSE** | **Close the FTP connection**<br>Closes the FTP server connection.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KFTPCLOSE=<session_id>[,<keep_cfg>]**<br>Response: OK<br>Purpose: Close a specific FTP session.<br>▪ Query List: **AT+KFTPCLOSE=?**<br>Response: +KFTPCLOSE: (list of possible <session_id>s),<br>(list of possible <keep_cfg>s)<br>OK<br>Purpose: Display possible FTP sessions to close.<br>**Parameters:**<br><session_id> (FTP session index)<br>• Integer<br>• Valid range: 1–32<br><status> (Specifies whether to delete the session configuration after closing it)<br>• Integer<br>• Valid range:<br>• 0—Delete the session configuration<br>• 1—Keep the session configuration<br><br>**Example(s):**<br>• Command:<br>AT+KFTPCLOSE=?<br>Response:<br>+KFTPCLOSE: (1-32),(0-1)<br>OK<br>• Command:<br>AT+KFTPCLOSE=1,1<br>Response:<br>OK |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPCFGDEL** | **Delete a configured FTP session**<br>Enables deleting a specific FTP session that was previously configured.<br>**Notes:**<br>• The session must be closed (using +KFTPCLOSE) before using this command<br>**Password required:** No<br>**Usage:**<br>▪ Execution: **AT+KFTPCFGDEL=<session_id>**<br>Response: OK<br>or<br>+CME ERROR: <err><br>Purpose: Delete a specific FTP session.<br>▪ Query List: **AT+KFTPCFGDEL=?**<br>Response: +KFTPCFGDEL: (list of possible <session_id>s)<br>OK<br>Purpose: Display possible FTP sessions to delete.<br>**Parameters:**<br><session_id> (FTP session index)<br>• Integer<br>• Valid range: 1–32<br>**Example(s):**<br>• Command:<br>AT+KFTPCFGDEL=?<br>Response:<br>+KFTPDEL: (1-32)<br>OK<br>• Command:<br>AT+KFTPCFGDEL=1<br>Response:<br>OK |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPLS** | **List the size of a specific file**<br><br>**Notes:**<br>• Before using this command, you must have an FTP connection via AT+KFTPCFG.<br>• Results are indicated via URC<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KFTPLS=<session_id>,[<server_path>],<file_name>[,<type>]**<br>Response: OK<br>or<br>+CME ERROR <err><br>NO CARRIER<br>+KFTP_ERROR: <session_id>,<ftp cause><br>Purpose: Show the size of a specific file name.<br>▪ Query List: **AT+KFTPLS=?**<br>Response: +KFTPLS: (list of possible <session_id>s),<br><server_path>,<file_name>,(list of possible <type>s)<br>OK<br>Purpose: Display possible FTP sessions to list.<br>**Parameters:**<br><session_id> (FTP session index)<br>• Integer<br>• Valid range: 1–32<br><server_path> (Indicates the file path to be deleted)<br>• String<br>• An empty string or no string indicates that the upload is done from the path given by the FTP server.<br><file_name> (Indicates the file name to be listed<br>• String<br><type> (Indicates the file type, ASCII or binary, to be transferred)<br>• Numeric type<br>• Valid values:<br>• 0–Binary (default value)<br>• 1–ASCII (not supported) |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KFTPLS** | **List the size of a specific file**<br><ftp_cause> (Indicates the cause of the FTP connection failure)<br>• Integer<br>• Valid values:<br>  • 0–Sending or the retrieving was impossible due to request timeout<br>  • 1–Cannot connect to the server due to DNS resolution failure<br>  • 2–Unable to download a file due to connection issues<br>  • 3–Unable to download due to connection timeout<br>  • 4–No network available<br>  • 5–Flash access trouble<br>  • 6–Flash memory full<br>  • Note: XXX three digits, reply codes from FTP server. See FTP Reply Codes.<br><br>**Example(s):**<br>• Command:<br>AT+KFTPLS=?<br>Response:<br>+KFTPLS: (1-32),<server_path>,<file_name>,(0)<br>OK<br>• Command:<br>AT+KFTPLS=1,,"filename.txt"<br>Response:<br>+KFTPLS: filename.txt 24<br>OK |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KHTTPCFG** | **Configure HTTP connection**<br>Set or display HTTP connection configuration.<br><br>**Notes:**<br>· <http_port> and <http_server> define the port and the IP address of the remote server one wants to connect<br>· This command can be used before setting up +KCNXCFG. Note however that the latter is required to start the connection properly<br>· For <af> = 1 (IPV6), server address (<http_server>) in IP address string format can be optionally quoted with square brackets "[]", e.g. [FEDC:BA98:7654:3210:FEDC:BA98:7654:3210]<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KHTTPCFG=<cnx_cnf>, <server-name/ip>[, <http_port>[, <http_version>[,<login>[, <password>[, <start>[, <af>[, <cipher_index>]]]]]]]**<br>Response: +KHTTPCFG: <session_id><br>OK<br>or<br>+CME ERROR: <err><br>Purpose: Configure a connection and receive an HTTP session ID.<br>▪ Query: **AT+KHTTPCFG?**<br>Response: +KHTTPCFG: <session_id>, <cnx_cnf>, <server-name/ip>, <http_port>, <http_version>, <login>, <password>, <started>, <af>, <cipher_index><br>OK<br>Purpose: Display the configurations for all HTTP sessions.<br>▪ Query List: **AT+KHTTPCFG=?**<br>Response: +KHTTPCFG: (list of possible <cnx_cnf>s),<server-name/ip>,(list of possible <http_port>s),(list of possible <http_version>s),(range of possible length of <login>),(range of possible length of <password>),(list of possible <started>s),(list of possible <af>s,(list of <cipher_index>es))<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><cnx_cnf> (PDP context configuration)<br>· Specifies a particular PDP context configuration that has been defined by +KCNXCFG. (e.g. <cnx_cnv=3> corresponds to CID=3 in +CGDCONT and +CGACT)<br>· Note — Maximum number of simultaneous connections is 2.<br><session_id> (HTTP session index)<br>· Integer<br><server-name/ip> (IP address string or explicit name of the remote server)<br>· String |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KHTTPCFG** | **Configure HTTP connection**<br><http_port> (Port on remote server)<br>• Valid range: 1–65535<br>• 80 — HTTP 1.1 (Default)<br>• 443 — HTTP 1.1 over TLS (HTTPS)<br><http_version> (HTTP version)<br>• 0 — HTTP 1.1 (Default)<br>• 2 — HTTP 1.1 over TLS (HTTPS)<br><login> (User name to be used during the HTTP connection)<br>• String<br><password> (Password to be used during the HTTP connection)<br>• String<br><start> (When to start the HTTP connection)<br>• 0 — Start the HTTP connection later using +KHTTPCNX<br>• 1 — Start the HTTP connection immediately<br><started> (HTTP connectdion start status)<br>• 0 — Connection has not started yet<br>• 1 — Connection has started<br><af> (IP address family type used for connection)<br>• Valid values:<br>• 0 — IPv4 (Default)<br>• 1 — IPv6<br><cipher_suite> (Cipher suite profile index to use for a secured socket)<br>• Integer value<br>• Defined by +KSSLCRYPTO |
| **+KHTTPCLOSE** | **Close HTTP connection**<br>Close an HTTP session.<br><br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KHTTPCLOSE=<session_id>[,<keep_cfg>]**<br>Response: OK<br>or<br>CME ERROR: <err><br>Purpose: Close the specified HTTP connection.<br>▪ Query List: **AT+KHTTPCLOSE=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (HTTP session index)<br>• Integer<br><keep_cfg> (Delete/keep session configuration after closing)<br>• 0 — Delete the session configuration<br>• 1 — Keep the session configuration |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KHTTPCNX** | **Start the HTTP connection**<br><br>**Notes:**<br>• This command is used to start the HTTP connection created by +KHTTPCFG with <start>=0.<br>• +KHTTPGET automatically starts the connection if it has not been started before using AT+KHTTPCNX.<br><br>**Usage:**<br>▪ Execution: **AT+KHTTPCNX=<session_id>**<br>Response: OK<br>+KHTTP_IND: <session_id>,<status>[,<data_len>,<st_code>,<st_reason>]<br><br>or<br>+KHTTP_ERROR: <session_id>,<http_notif><br><br>or<br>+CME ERROR: <err><br>Purpose: Start the specified HTTP connection.<br>▪ Query List: **AT+KHTTPCNX=?**<br>Request: +KHTTPCNX: (list of possible <session_id>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (HTTP session index)<br>• Integer<br><http_notif> (Cause of HTTP connection failure)<br>• Integer<br>• Valid values:<br>• 4 — DNS error<br>• 5 — HTTP connection error due to internal trouble<br>• 6 — HTTP connection timeout<br>• 7 — Flash access trouble<br>• 8 — Flash memory full<br>• 9 — Triple-plus (+++) error (switch to command mode)<br>• 10 — HTTP got no data<br>• 11 — HTTP got partial data |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KHTTPDEL** | **Delete configured HTTP session**<br><br>**Notes:**<br>• Session must be closed using +KHTTPCLOSE before using this command.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KHTTPDEL=<session_id>**<br>Response: OK<br>or<br>+CME ERROR: <err><br>Purpose: Delete the specified HTTP connection.<br>▪ Query List: **AT+KHTTPDEL=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (HTTP session index)<br>• Integer |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KHTTPGET** | **Get HTTP server information**<br>Get the server information for an HTTP session.<br><br>**Notes:**<br>• The user can abort the download by sending "End of Data pattern" from the host. In this case, the module will end the transfer by transmitting the EOF followed by NO CARRIER.<br>• Download can also be aborted (disconnected) by +++ or DTR.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KHTTPGET=<session_id>,<request_uri>[, <show_resp>]**<br>Response: CONNECT<br>...<EOF pattern><br>OK<br>+KHTTP_IND: <session_id>,<status>[,<data_len>,<br><st_code>,<st_reason>]<br><br>or<br>NO CARRIER<br>+KHTTP_ERROR: <session_id>,<http_notif><br><br>or<br>+CME ERROR: <err><br>Purpose: Get server information for the specified HTTP session.<br>▪ Query List: **AT+KHTTPGET=?**<br>Response: +KHTTPGET: (list of possible <session_id>s), <request_uri>,<br>(list of possible <show_resp>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (HTTP session index)<br>• Integer<br><request_uri> (Information URL to get during the HTTP connection)<br>• String<br><http_notif> (Cause of HTTP connection failure)<br>• 4 — DNS error<br>• 5 — HTTP connection error due to internal trouble<br>• 6 — HTTP connection timeout<br>• 7 — Flash access trouble<br>• 8 — Flash memory full<br>• 9 — Triple-plus (+++) error (switch to command mode)<br>• 10 — HTTP got no data<br>• 11 — HTTP got partial data<br><show_resp> (Show or hide HTTP response and HTTP headers)<br>• 0 — Do not show response and headers<br>• 1 — Show response and headers (Default) |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KHTTPHEAD** | **Get HTTP Headers**<br><br>**Notes:**<br>• This method is identical to GET except that the server MUST NOT return a message-body in the response. The meta-information contained in the HTTP headers in response to a HEAD request SHOULD be identical to the information sent in response to a GET request.<br>• HTTP does not support DTR1.<br>• HTTP does not support ATO.<br><br>**Usage:**<br>▪ Execution: **AT+KHTTPHEAD=<session_id>,<request_uri>**<br>Response: CONNECT<br>...<EOF pattern><br>OK<br>+KHTTP_IND: <session_id>,<status>[,<data_len>,<br><st_code>,<st_reason>]<br><br>or<br>NO CARRIER<br>+KHTTP_ERROR: <session_id>,<http_notif><br><br>or<br>+CME ERROR: <err><br>Purpose: Request HTTP headers from the server.<br>▪ Query List: **AT+KHTTPHEAD=?**<br>Response: +KHTTPHEAD: (list of possible <session_id>s), <request_uri><br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (HTTP session index)<br>• Integer<br><request_uri> (Information URL to get during the HTTP connection)<br>• String<br><http_notif> (Cause of HTTP connection failure)<br>• Integer<br>• Refer to +KHTTPGET |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KHTTPHEADER** | **Set the HTTP request header**<br><br>**Notes:**<br>• User must use <EOF pattern> to finish sending, then the module will return to command mode.<br><br>**Usage:**<br>▪ Execution: **AT+KHTTPHEADER=<session_id>**<br>Response: CONNECT<br>OK<br><br>or<br>NO CARRIER<br>+KHTTP_ERROR: <session_id>,<http_notif><br><br>or<br>+CME ERROR: <err><br>Purpose: Request HTTP headers from the server.<br>▪ Query: **AT+KHTTPHEADER?**<br>Response: +KHTTPHEADER: <session_id>,<count><br>[...]<br>OK<br>Purpose: Display valid execution format and parameter values.<br>▪ Query List: **AT+KHTTPHEADER=?**<br>Response: +KHTTPHEADER: (list of possible <session_id>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (HTTP session index)<br>• Integer<br><count> (Count of HTTP headers)<br>• Integer |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KHTTPPOST** | **Send data to HTTP server**<br><br>**Notes:**<br>• Upload can be ended (disconnected) by +++.<br>• ATO is not available for this command.<br><br>**Usage:**<br>▪ Execution: AT+KHTTPPOST=<session_id>,<local_uri>,<request_uri>[,<show_resp>]<br>Response: CONNECT<br>...<EOF pattern><br>OK<br>+KHTTP_IND:<br><session_id>,<status>[,<data_len>,<st_code>,<st_reason>]<br><br>or<br>NO CARRIER<br>+KHTTP_ERROR: <session_id>,<http_notif><br><br>or<br>+CME ERROR: <err><br>Purpose: Send data to HTTP server.<br>▪ Query List: **AT+KHTTPPOST=?**<br>Response: +KHTTPPOST: (list of possible<session_id>s),<br><local_uri>,<request_uri>,(list of possible <show_resp>s)<br>OK<br>Purpose: Display valid execution format and parameter values. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| | **Parameters:**<br><session_id> (HTTP session index)<br>• Integer<br><local_uri> (Reserved for compatibility of command syntax)<br>• String<br>• This argument must be empty.<br><request_uri> (Request data of the HTTP connection)<br>• String<br><http_notif> (Cause of HTTP connection failure)<br>• Integer<br>• Valid values:<br>• 4 — DNS error<br>• 5 — HTTP connection error due to internal trouble<br>• 6 — HTTP connection timeout<br>• 7 — Flash access trouble<br>• 8 — Flash memory full<br>• 9 — Triple-plus (+++) error (switch to command mode)<br>• 10 — HTTP got no data<br>• 11 — HTTP got partial data<br><show_resp> (Shows or hides HTTP headers)<br>• Valid values:<br>• 0—Do not show HTTP headers, show HTTP body only<br>• 1—Show HTTP headers and Body (Default) |
| **+KHTTP_IND (notification)** | **HTTP status—Unsolicited notification**<br>Unsolicited notification indicating the HTTP's status.<br>**Notification format:**<br>**+KHTTP_IND: <session_id>,<status>[,<data_len>, <st_code>, <st_reason>]**<br>**Parameters:**<br><session_id> (HTTP session index)<br>• Integer<br><status> (Indicates the status of the HTTP session)<br>• Integer<br>• Valid range:<br>• 0—Session is disconnected<br>• 1—Session is set up and ready for operation<br>• 3—The last HTTP command has been executed successfully<br><data_len> (Data byte length)<br>• Byte length of data downloaded or uploaded to and from the terminal (using +KHTTPHEAD, +KHTTPGET or +KHTTPPOST).<br><st_code> (HTTP response status code)<br>• Integer<br><st_reason> (HTTP response status reason string<br>• String |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KIPOPT** | **Configure general protocol options**<br>General IP protocol option configuration.<br><br>**Notes:**<br>• Default setting of <option_id>=3 is (<stop_on_error>=0; <stop_on_peer>=0) after module boot-up. This means a PDP connection is requested to stop only when a session is closed by an AT command (e.g. +KTCPCLOSE).<br>• Threshold values (<send_size_v4>, <send_size_v6>) control the minimum size of data received from the AT terminal to be buffered within the <wait_time> timeout period. When the threshold is reached or after timeout, the buffered data is sent to the socket layer for transmission.<br>For UDP, data is sent as a UDP packet.<br>For TCP, data is copied to the socket first-in-first-out buffer for transmission, but packet segmentation is not guaranteed to be <send_size>.<br>• By default, the maximum transmission unit (MTU) for <send_size_v4> and <send_size_v6> is 1500 bytes. The network operator can set a lower value, in which case the upper limit of the minimum data packet size is the one set by the operator (e.g. if the network operator MTU is 1318, then the maximum <send_size_v4> for TCP is 1318).<br>• <send_size_v4> and <send_size_v6> impact the detection of <EOF_pattern>. For details, refer to +KPATTERN notes.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution (<option_id> = 0):<br>**AT+KIPOPT=<option_id>, <proto>, <wait_time>[, <send_size_v4>[, <send_size_v6>]]**<br>Response: OK<br>or CME ERROR <err><br>Purpose: Configure wait time, and data packet size thresholds<br>▪ Execution (<option_id> = 1 or 2):<br>**AT+KIPOPT=<option_id>**<br>Response: OK<br>or CME ERROR <err><br>Purpose: Not for general use. Provided for internal use or compatibility purposes.<br>▪ Execution (<option_id> = 3):<br>**AT+KIPOPT=<option_id>, <stop_on_error>, <stop_on_peer>**<br>Response: OK<br>or CME ERROR <err><br>Purpose: Configure action to take when PDP connection deactivates.<br>▪ Execution (<option_id> = 4):<br>**AT+KIPOPT=<option_id>,<ssl_ver>**<br>Response: OK<br>or CME ERROR <err><br>Purpose: Not for general use. Provided for internal use or compatibility purposes. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KIPOPT** | **Configure general options**<br>▪ Query: **AT+KIPOPT?**<br>Response: +KIPOPT:<br>+KIPOPT: 0, <proto>, <wait_time>, <send_size_v4>, <send_size_v6><br>...<br>+KIPOPT: 3, <stop_on_error>, <stop_on_peer><br>OK<br>Purpose: Display the general options.<br>▪ Query List: **AT+KIPOPT=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><option_id> (Option to configure)<br>• 0 — Wait time, send size threshold configuration<br>• 1 — Internal use or compatibility purposes<br>• 2 — Internal use or compatibility purposes<br>• 3 — PDP connection deactivated behavior<br>• 4 — Internal use or compatibility purposes<br><proto> (Protocol)<br>• String format<br>• "TCPC" — TCP client session<br>• "TCPS" — TCP server session<br>• "UDPC" — UDP client session<br>• "UDPS" — UDP server session<br>• "HTTP" — HTTP client session<br>• "HTTPS" — HTTPS client session<br>• "TCP" — Both TCP client and server sessions<br>• "UDP" — Both UDP client and server sessions<br><wait_time> (Timeout, in 100 ms units)<br>• Timeout for configuring the packet segmentation on the IP network side. After timeout, buffered data will be sent to the peer regardless of data packet size.<br>• Valid range:<br>• UDP: 1–100. Default=2<br>• TCP: 0–100. Default=1<br>Note: <wait_time>=0 has the same effect as <wait_time>=1 due to the limitation from +KPATTERN detection timing. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KIPOPT** | **Configure general options**<br><send_size_v4> (Data packet size for IPv4 sessions)<br>• Specifies size of data packets to be sent to the peer.<br>• Valid range:<br>  • UDP: 8–1472. Default=1020<br>  • TCP: 0, 8–1440. Default=0 (disabled)<br>  Note: <send_size_v4>=0 uses wait time of 100 ms.<br><send_size_v6> (Data packet size for IPv6 sessions)<br>• Specifies size of data packets to be sent to the peer.<br>• Valid range:<br>  • UDP: 8–1452. Default=1020<br>  • TCP: 0, 8–1440. Default=0 (disabled)<br>  Note: <send_size_v4>=0 uses wait time of 100 ms.<br><stop_on_error> (PDP connection deactivation behavior when session closed due to any error)<br>• 0 — Do not request to stop the connection<br>• 1 — Request to stop the connection<br><stop_on_peer> (PDP connection deactivation behavior when session closed by peer/server)<br>• 0 — Do not request to stop the connection<br>• 1 — Request to stop the connection |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KPATTERN** | **Set/query the custom end of data/file pattern**<br>Display or set a custom 'end of data' pattern to be used to notify the end of data/file during data/file transfer.<br><br>**Notes:**<br>• AT command input as ASCII only reads 7 bits from a byte.<br>• The default value of the pattern is: "--EOF--Pattern--".<br>• It is the responsibility of the user to select an appropriate pattern according to the data transferred (i.e. numeric pattern for text files and readable string for binary files).<br>• The <EOF pattern> pattern is detected within a 100ms or higher timeout. The timeout value is equal to the <wait_time> of +KIPOPT.<br>• The received data is stored with a buffer size <send size v4> or <send size v6> so that the <EOF pattern> with a size larger than it is not detected. The user application should ensure that the value of <send size v4> or <send size v6> is larger than the size of the <EOF pattern>.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KPATTERN=<EOF_pattern>**<br>Response: OK<br>or<br>+CME ERROR <err><br>Purpose: Set the end of data file pattern as indicated.<br>▪ Query: **AT+KPATTERN?**<br>Response: +KPATTERN: <EOF_pattern><br>OK<br>Purpose: Display the end of data file pattern.<br>▪ Query List: **AT+KPATTERN=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><EOF_pattern> (Pattern sent at end of data/file transfer)<br>• String format; non-printable characters are allowed<br>• Default pattern: "--EOF--Pattern--" |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KPRIVKDELETE** | **Delete private key from the index**<br><br>**Usage:**<br>▪ Execution: **AT+KPRIVKDELETE=<index>**<br>Response: OK<br>or<br>+CME ERROR: <err><br>Purpose: Delete private key.<br>▪ Query: **AT+KPRIVKDELETE=?**<br>Response: +KPRIVKDELETE: (list of possible <index>es)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><index> (Stored private key index)<br>• Valid range: 0—2 |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KPRIVKSTORE** | **Store private key associated to a local certificate**<br><br>**Notes:**<br>• The data session automatically ends when <ndata> data bytes are sent or received, and the module returns to the command state with an OK.<br>• The data session can also be ended by <EOF pattern>, +++.<br>• ATO is not available for this command.<br>• It is highly recommended to configure the module for hardware flow control before using this command.<br><br>**Usage:**<br>▪ Execution: **AT+KPRIVKSTORE=<index>[,<NbData>]**<br>Response: CONNECT<br>OK<br>or<br>+CME ERROR: <err><br>Purpose: Store private key.<br>▪ Query: **AT+KPRIVKSTORE?**<br>Response: private_key,<index>,<NbData><br>or<br>+CME ERROR: <err><br>Purpose: Display details of the private key to be stored.<br>▪ Query List: **AT+KPRIVKSTORE=?**<br>Response: +KPRIVKSTORE: (list of possible <index>s),<br>(range of possible lengths of <NbData>)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><index> (Stored private key index)<br>• Valid range: 0—2<br><NbData> (Mandatory for both reading and writing)<br>• Number of bytes to read or write<br>• Valid range: 1—3000<br><File data> (Data bytes)<br>• String |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KSSLCRYPTO** | **Cipher suite configuration**<br><br>**Note:** Refer to Table 15-4 for the list of cipher suites supported by the RC76xx module.<br><br>**Usage:**<br>▪ Execution: **AT+KSSLCRYPTO=<profile_idx>,<mkey_algo>,<auth_algo>, <enc_algo>,<mac_algo>,<tls_ver>,<auth>[,<root_cert_idx>]**<br>▪ Response: OK<br>▪ Query: **AT+KSSLCRYPTO?**<br>Response: +KSSLCRYPTO: <profile_idx>,<mkey_algo>,<auth_algo>, <enc_algo>,<mac_algo>,<tls_ver>,<auth>,<root_cert_idx>[...]]<br>OK<br>Purpose: Display the end of data file pattern.<br>▪ Query List: **AT+KSSLCRYPTO=?**<br>Response:<br>+KSSLCRYPTO:<profile_idx>,<mkey_algo>,<auth_algo>, <enc_algo>,<mac_algo>,<tls_ver>,<auth>[,<root_cert_idx>]<br>OK<br>Purpose: Display the end of data file pattern.<br><br>**Notification format:**<br>**+KTCP_DATA: <session_id>,<ndata_available>[,<data>]**<br>**Parameters:**<br><profile_idx> (Index of a set of parameters for configuring one SSL profile)<br>• Integer<br><mkey_algo> (Key exchange algorithm selection)<br>• Integer<br>• 8—ECDHE<br><auth_algo> (Authentication algorithm selection)<br>• Integer<br>• 1—RSA<br>• 2—ECDSA |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| | <enc_algo> (Encryption algorithm selection)<br>• Integer<br>• 16—AES-128-CCM<br>• 32—AES-256-CCM<br>• 256—AES-128-CCM-8<br>• 512—AES-256-CCM-8<br>• 8192—AES-128-GCM<br>• 16384—AES-256-GCM<br><mac_algo> (Message authentication code for the algorithm selection)<br>• Integer<br>• 0—NULL<br>• 4—SHA256<br>• 8—SHA384<br><tls_ver> (Cipher suite version selection)<br>• Integer<br>• 4—TLS 1.2<br><auth> (Authentication)<br>• String<br>• 1—Authenticate server<br>• 3—Mutual authentication<br><root_cert_idx> (Root certificate index<br>• Integer<br>• Valid range:<br>  • 0—3: Stored root certificate index. Defaults to 0 if not specified. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KSSLCFG** | **SSL configuration**<br><br>**Usage:**<br>▪ Assignment: **AT+KSSLCFG=<option_id>,<option>**<br>Response: If <option_id> = 0:<br>AT+KSSLCFG=<option_id>,<TLS Version><br>OK<br>or If <option_id> = 1:<br>AT+KSSLCFG=<option_id>,<Random Seed><br>OK<br>or If <option_id> = 2:<br>AT+KSSLCFG=<option_id>,<Session Mode><br>OK<br>Query: **AT+KSSLCFG?**<br>Response: +KSSLCFG:0,<TLS Version><br>+KSSLCFG:2,<Session Mode><br>OK<br>Purpose: Display the end of data file pattern.<br>▪ Query List: **AT+KSSLCFG=?**<br>+KSSLCFG:<option id>,<option><br>OK<br><br>**Parameters:**<br><option_id><br>Integer<br>• 0—Specify a TLS version to be used for the hand shake<br>• 1—Set up random seed<br>• 2—Specify session mode<br><TLS Version><br>• Integer<br>• 0—Highest possible<br>• 3—TLS 1.2<br><Random Seed> (String to be added into the entropy of the random number generator)<br>• String<br><Session Mode><br>• Integer<br>• 0—Automatic<br>• 1—Always start a new session (not supported) |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCP_DATA (notification)** | **Incoming Data through TCP connection — Unsolicited notification**<br>Unsolicited notification indicating data is incoming.<br>**Notes:**<br>• As soon as the connection is established, the module can receive data through the TCP socket. This notification is sent when data are available in the receive buffer.<br>• This notification is sent for each TCP packet received sequentially. Notification of the following received packet is sent only when the current notification has been read with a +KTCP_RCV command.<br>• When <data_mode> is set to 1, <ndata_available> will range from 1 to 1500 in the URC. If the user application sends over 1500 bytes of data to the module, the module will display those data with several URCs.<br>**Notification format:**<br>**+KTCP_DATA: <session_id>,<ndata_available>[,<data>]**<br>**Parameters:**<br><session_id> (TCP session index)<br>• Integer<br>• Maximum value: 32<br><ndata_available> (Amount of data to be read)<br>• Integer<br>• For <data_mode>=0, maximum number of bytes to be read in the TCP receive buffer.<br>• For <data_mode>=1, maximum number of bytes to be read in <data><br><data> (Data, in octet)<br>• String<br>• Length of data is specified in <ndata_available>. |
| **+KTCP_IND (notification)** | **TCP status — Unsolicited notification**<br>Notification of TCP session status.<br>**Notification format:**<br>**+KTCP_IND: <session_id>,<status>**<br>**Parameters:**<br><session_id> (TCP session index)<br>• Integer<br>• Maximum value: 32<br><status> (TCP session status)<br>• 1 — Session is set up and ready for operation |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCP_SRVREQ (notification)** | **Incoming client connection request — Unsolicited notification**<br>Notification received when a client requests a connection to the server.<br><br>**Notes:**<br>• This notification is sent when a client requests a connection to the server. The connection is automatically accepted.<br>• The created session is driven as any other TCP session with its own session ID. Use +KTCPSND, +KTCPRCV, +KTCPCLOSE, etc. to provide the service associated to this TCP server.<br>• The TCP server corresponding to the session ID is still able to receive connection requests from other clients. These requests are notified with +KTCP_SRVREQ.<br>• The client IP address and port can also be checked using AT+KTCPCFG? after the client is connected to the TCP server.<br><br>**Notification format:**<br>**+KTCP_SRVREQ: <session_id>, <subsession_id>, <client_ip>, <client_port>**<br>**Parameters:**<br><session_id> (TCP session index)<br>• Integer<br>• Maximum value: 32<br><subsession_id> (Newly created TCP session index)<br>• Integer<br>• Maximum value: 32<br><client_ip> (IP address of incoming socket)<br>• String<br><client_port> (Port of the incoming client)<br>• Valid range: 0–65535<br><br>**Example(s):**<br>• Configure the module to TCP servers<br>AT+KCNXCFG=0,"GPRS","szsjmc.gd";<br>+KTCPCFG=0,1,,179<br>+KTCPCFG: 1<br>OK<br><br>AT+KCNXCFG=0,"GPRS","szsjmc.gd";<br>+KTCPCFG=0,1,,180<br>+KTCPCFG: 2<br>OK<br>• Start the TCP servers<br>- listen on port 179<br>AT+KTCPCNX=1<br>OK<br>- listen on port 180<br>AT+KTCPCNX=2<br>OK |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCP_SRVREQ (notification)** | **Incoming client connection request — Unsolicited notification**<br>• Show the TCP servers' IP address — Incoming connection request from remote client, shows ip address and port of remote client<br>AT+KCGPADDR<br>+KCGPADDR: 0,"192.168.1.49"<br>OK<br><br>/ / incoming a connection request from "192.168.0.32" via listening port 179, the remote port is 4614<br>+KTCP_SRVREQ: 1,3,"192.168.0.32",4614<br><br>/ / incoming a connection request from "10.10.10.110" via listening port 180, the remote port is 4665<br>+KTCP_SRVREQ: 2,4,"10.10.10.110",4665<br><br>/ / incoming a connection request from the same ip via the same listening port, the remote port is 4668<br>+KTCP_SRVREQ: 2,5,"10.10.10.110",4668<br><br>/ / incoming a connection request from "192.168.1.117" via listening port 179, the remote port is 1739<br>+KTCP_SRVREQ: 1,6,"192.168.1.117",1739<br><br>/ / the connection of sub session id 4 (on listening port 180) is closed.<br>+KTCP_NOTIF: 4,4<br><br>/ / incoming a connection request from "10.10.10.8" via listening port 180, the remote port is 4672<br>+KTCP_SRVREQ: 2,4,"10.10.10.8",4672 |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCPCFG** | **Configure TCP connection**<br>Set or display the TCP connection configuration.<br><br>**Notes:**<br>• If the socket is defined as a <CLIENT> socket, <tcp_port> and <tcp_remote_address> define the port and IP address of the remote server to be connected.<br>• For child session, the <data_mode> will be kept the same as the server socket's setting.<br>• This command can be used before setting up the configuration with +KCNXCFG, but the configuration command is required to start the connection properly.<br>• Connection timeout for TCP socket is ~9 seconds with 3 retransmissions with 3 seconds delay.<br>• For the <restore_on_boot> parameter, only the first server session is restored.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KTCPFG=[<cnx_cnf>], <mode>, [<tcp_remote_address>], <tcp_port>[,[<source_port>][,[<data_mode>][,[<URC_ENDTCP_enable>][,[<af>][,[<cipher_suite>][,[<restore_on_boot>]]]]]]]**<br>Response: +KTCPCFG: <session_id><br>OK<br>Purpose: Configure a connection and receive a TCP session ID.<br>▪ Query: **AT+KTCPCFG?**<br>Response: +KTCPCFG: <session_id>,<status>,<cnx_cnf>,<mode>[,<serverID>], <tcp_remote_address>, <tcp_port>[,<source_port>], <data_mode>, <URC_ENDTCP_enable>, <af>, <cipher_index>[,<restore_on_boot>] [...]<br>OK<br>Purpose: Display the configurations for all TCP sessions.<br>▪ Query List: **AT+KTCPCFG=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><cnx_cnf> (PDP context configuration)<br>• Integer<br>• Index of set of parameters for configuring one TCP session (see +KCNXCFG)<br><session_id> (TCP session index)<br>• Integer<br>• Maximum value: 32<br><mode> (Connection mode)<br>• 0 — Client<br>• 1 — Server<br>• 2 — Child (generated by server sockets)<br>• 3 — Secure client |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCPCFG** | **Configure TCP connection**<br><tcp_remote_address> (IP address string or explicit name of remote server)<br>• String<br>• For server configuration, this parameter is left blank<br><tcp_port> (TCP port number)<br>• Listening port for a server configuration.<br>• Valid range: 1–65535<br><status> (Connection state of the selected socket)<br>• 0 — Disconnected<br>• 1 — Connected<br><serverID> (Server session ID index)<br>• Only for sockets in Child mode<br>• Integer value<br><source_port> (Local TCP port number)<br>• Valid range: 0–65535<br>• For server configuration, this parameter is left blank<br><data_mode> (Enable/disable display of <data> in URC)<br>• 0 — Do not display (Default)<br>• 1 — Display (This option is not supported.)<br><URC_ENDTCP_enable> (Enable/disable display of URC "+KTCP_ACK")<br>• 0 — Do not display (Default)<br>• 1 — Display<br><af> (IP address family type used for connection)<br>• Valid values:<br>  • 0 — IPv4<br>  • 1 — IPv6<br><cipher_index> (Cipher suite profile index to use for a secured socket)<br>• Integer value<br>• Defined by +KSSLCRYPTO<br><restore_on_boot> (Restore server session on boot (only for server socket))<br>• 0 — First server session is not restored on boot. (Default)<br>• 1 — First server session is restored on boot. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCPCLOSE** | **Close current TCP connection**<br>Close a TCP socket and, if no other sessions are running, then release the PDP context.<br>**Notes:**<br>• AT+KTCPDEL=<session_id> can be used to delete the socket configuration after it has been closed.<br>**Password required:** No<br>**Usage:**<br>▪ Execution: **AT+KTCPCLOSE=<session_id>[,<closing_type>]**<br>Response: OK<br>or<br>+CME ERROR: <err><br>NO CARRIER<br>+KTCP_NOTIF: <session_id>,<tcp_notif><br>Purpose: Close the specified TCP connection.<br>▪ Query List: **AT+KTCPCLOSE=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (TCP session index)<br>• Integer<br>• Maximum value: 32<br><closing_type> (Method used to close the TCP connection)<br>• 1 — Close TCP connection properly. Data sent to the module by +KTCPSND will be send to the TCP server and acknowledged before the socket is closed.<br><tcp_notif> (Cause of TCP connection failure)<br>• See +KTCPCNX for details |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCPCNX** | **Start TCP connection**<br>Connect to a remote server or listen to a bound port, depending on the selected mode of <session_id><br><br>**Notes:**<br>• The socket connection will not be requested when the specified PDP session is active and the +KCNXCFG and +CGDCONT configurations are not the same.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KTCPCNX=<session_id>**<br>Response: OK<br>or<br>+CME ERROR: <err><br>+KTCP_NOTIF: <session_id>,<tcp_notif><br>Purpose: Start a connection on the specified TCP session.<br>▪ Query List: **AT+KTCPCNX=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (TCP session index)<br>• Integer<br>• Maximum value: 32<br><tcp_notif> (Cause of TCP connection failure)<br>• 0 — Network error<br>• 1 — No more sockets available; max. number already reached<br>• 2 — Memory problem<br>• 3 — DNS error<br>• 4 — TCP disconnection by the server or remote client<br>• 5 — TCP connection error<br>• 6 — Generic error<br>• 7 — Fail to accept client requests<br>• 8 — Data sending is OK but +KTCPSND was waiting more or less characters<br>• 9 — Bad session ID<br>• 10 — Session is already running<br>• 11 — All sessions are used<br>• 12 — Socket connection timeout error<br>• 13 — SSL connection error<br>• 14 — SSL initialization error |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCPDEL** | **Delete configured TCP session**<br><br>**Notes:**<br>• Session must be closed using +KTCPCLOSE before using this command.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KTCPDEL=<session_id>**<br>Response: OK<br>or<br>+CME ERROR: <err><br>Purpose: Delete the specified TCP connection.<br>▪ Query List: **AT+KTCPDEL=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (TCP session index)<br>• Integer<br>• Maximum value: 32 |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCPRCV** | **Receive data through TCP connection**<br>Receive data through a previously opened TCP socket.<br><br>**Notes:**<br>· <ndata> indicates the max data number that the terminal wishes to receive. If the TCP socket contains more data than <ndata> bytes, then only <ndata> bytes will be received. If the TCP socket contains less data than <ndata> bytes, then only TCP socket's data will be received.<br>· <EOF pattern> would be added at the end of data automatically.<br>· When <ndata> (max value) bytes or only available data in the TCP socket have been received, the module returns to command state and returns OK.<br>· It is highly recommended to configure the module for hardware flow control using AT&K3 before using this command.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KTCPRCV=<session_id>,<ndata>**<br>Response: CONNECT<br>...<EOF_pattern><br>OK<br>or<br>+KTCP_NOTIF: <session_id>,<tcp_notif><br>Purpose: Receive <ndata> bytes of data from the specified socket.<br>▪ Query List: **AT+KTCPRCV=?**<br>Response: +KTCPRCV: (list of possible <session_id>s),(list of possible <ndata>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (TCP session index)<br>· Integer<br><ndata> (Number of bytes that device wants to receive)<br>· Maximum value is limited to 1629 bytes due to internal buffer size. Using an input value that is higher than that number will have no effect<br><tcp_notif> (Cause of TCP connection failure)<br>· See +KTCPCNX for details |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCPSND** | **Send data through TCP connection**<br>Send data through a previously opened TCP socket.<br><br>**Notes:**<br>• All the data will be sent out ignoring <ndata>. If data sent is not equal to <ndata> then +KTCP_NOTIF will be displayed.<br>• <ndata> is the data size without <EOF pattern>.<br>• It is highly recommended to configure the module for hardware flow control using AT&K3 before using this command.<br>• The data session can be ended by <EOF pattern>, +++ or DTR.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KTCPSND=<session_id>,<ndata>**<br>Response: CONNECT<br>OK<br>or<br>NO CARRIER<br>+CME ERROR: <err><br>+KTCP_NOTIF: <session_id>,<tcp_notif><br>Purpose: Send <ndata> bytes of data to the specified socket.<br>▪ Query List: **AT+KTCPSND=?**<br>Response: +KTCPSND: (list of possible <session_id>s),(list of possible <ndata>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (TCP session index)<br>• Integer<br><ndata> (Number of bytes that device will send)<br>• Max value: 4294967295<br><tcp_notif> (Cause of TCP connection failure)<br>• See +KTCPCNX for details |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCPSTART** | **Start TCP connection in Direct Data Flow**<br>Start a TCP connection in Direct Data Flow.<br><br>**Notes:**<br>• Command is used to send and receive data bytes through a TCP socket.<br>• It is highly recommended to configure the module for hardware flow control using AT&K3 before using this command.<br>• Refer to AT&D for the behavior of DTR drop.<br>• Only one +KTCPSTART session can be used.<br>• Can be used in 07.10 multiplexer.<br>• If the session is successfully connected by +KTCPCNX, this command does not restart the connection and the module directly enters direct data flow.<br>• The data session can also be ended by <EOF_pattern>, +++, or DTR.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KTCPSTART=<session_id>**<br>Response: CONNECT<br>OK<br><br>or<br>+CME ERROR: an error occurs, syntax error<br>+KTCP_NOTIF: <session_id>,<tcp_notif> : an error occurs<br>Purpose: Start a TCP session in direct data flow.<br>▪ Query: **AT+KTCPSTART?**<br>Response: OK<br>Purpose:<br>▪ Query List: **AT+KTCPSTART=?**<br>Response: OK<br>Purpose:<br>**Parameters:**<br><session_id> (TCP session index)<br>• Integer<br><tcp_notif> (Cause of TCP connection failure)<br>• See +KTCPCNX for details |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KTCPSTAT** | **Get TCP socket status**<br><br>**Notes:**<br>• Command returns +CME ERROR: 910 (Bad Session ID) for undefined <session_id>s.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution (for all TCP session IDs):<br>**AT+KTCPSTAT**<br>Response: +KTCPSTAT: <session_id>, <status>, <tcp_notif>, <rem_data>, <rcv_data><br>[...]<br>OK<br>Purpose: Display socket statuses for all TCP sessions.<br>▪ Execution (single TCP session ID):<br>**AT+KTCPSTAT=<session_id>**<br>Response: +KTCPSTAT: <status>, <tcp_notif>, <rem_data>, <rcv_data><br>OK<br>Purpose: Display socket status for the specified TCP session.<br>▪ Query: **AT+KTCPSTAT?**<br>Response: OK<br>Purpose:<br>▪ Query List: **AT+KTCPSTART=?**<br>Response: OK<br>Purpose:<br>**Parameters:**<br><session_id> (TCP session index)<br>• Integer<br>• Maximum value: 32<br><status> (TCP socket state)<br>• 0 — Socket not defined, use +KTCPCFG to create a TCP socket<br>• 1 — Socket is defined, but not used<br>• 2 — Socket is opening and connecting to the server, cannot be used<br>• 3 — Connection is up, socket can be used to send/receive data<br>• 4 — Connection is closing, cannot be used, wait for <status>=5<br>• 5 — Socket is closed<br><tcp_notif> (TCP connection status)<br>• -1 — Socket/connection is OK<br>• ≥0 — TCP connection failure. See +KTCPCNX for details.<br><rem_data> (Remaining bytes in socket buffer, waiting to be sent)<br>• String<br><rcv_data> (Received bytes, can be read with +KTCPRCV)<br>• String |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KUDP_DATA (notification)** | **Incoming Data through UDP connection — Unsolicited notification**<br>Unsolicited notification indicating data is incoming.<br>**Notes:**<br>• As soon as the UDP socket is created, the module can receive data through this socket. This notification is sent when data are available in the receive buffer.<br>• This notification will be sent one time. When <data_mode> was set to 0 (do not display data in URC), the controlling software must read the buffer with +KUDPRCV to activate the notification again.<br>• When <data_mode> was set to 1, <ndata_available> will range from 1 - 1500 in the URC. If the user application sends over 1500 bytes of data to the module, the module will display those data with several URCs. It is possible for other applications (e.g. from Windows) to send more than 1472 bytes UDP packets to the module but the packet will be segmented and reassembled by the network stack.<br>• When <data_mode> is set to 1, URC +KUDP_RCV will not be displayed after +KUDP_DATA.<br>• When <data_mode> was set to 1, the fields <udp remote address> and <udp remote port> will be displayed in URC +KUDP_DATA. When <data_mode> was set to 0, they will be displayed in URC +KUDP_RCV.<br>**Notification format:**<br>**+KUDP_DATA: <session_id>,<ndata_available>[,<udp_remote_address>, <udp_remote_port>, <data>]**<br>**Parameters:**<br><session_id> (UDP session index)<br>• Integer<br><ndata_available> (Amount of data to be read)<br>• String<br><udp_remote_address> (IP address string of remote host)<br>• String<br><udp_remote_port> (Remote UDP port)<br>• Valid range: 0–65535<br><data> (Data, in octet)<br>• String<br>• Length of data is specified in <ndata_available>. |
| **+KUDP_IND (notification)** | **UDP status — Unsolicited notification**<br>Notification of UDP session status.<br>**Notification format:**<br>**+KUDP_IND: <session_id>,<status>**<br>**Parameters:**<br><session_id> (UDP session index)<br>• Integer<br><status> (UDP session status)<br>• 1 — Session is set up and ready for operation |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KUDPCFG** | **Configure UDP connection**<br>Set or display UDP connection configuration.<br><br>**Notes:**<br>• For UDP socket in server mode, it is bound to a defined port number, incoming connection are notified by +KUDP_DATA. If remote address and port are given, they are saved for use in +KUDPSND.<br>• Maximum <session_id> is 32.<br>• +KCNXCFG configuration should be set up in order to start the connection properly.<br>• The socket connection will not be requested when the specified session is active and the +KCNXCFG and +CGDCONT configurations are not the same.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KUDPFG=[<cnx_cnf>], <mode> [,[<port>] [,[<data_mode>] [, [<udp_remote_address>] [, [<udp_port>] [, [<af>] [, [<restore_on_boot>][,[<cipher_index>] [,[<rcv_timeout>][,[<cid_enabled>][,[<cid_value>]]]]]]]]]**<br>Response: +KUDPCFG: <session_id><br>OK<br>or<br>+CME ERROR: <err><br>+KUDP_NOTIF: <session_id>, <udp_notif><br>Purpose: Configure a connection and receive a UDP session ID.<br>▪ Query: **AT+KUDPCFG?**<br>Response: **+KUDPCFG: <session_id>, <cnx_cnf>, <mode>, <port>, <data_mode>,<udp_remote_address>, <udp_port>, <af>, <restore_on_boot>, <cipher_idx>,<rcv_timeout>,<cid_enabled>,<cid_value>**<br>**OK**<br>Purpose: Display the configurations for all UDP sessions.<br>▪ Query List: **AT+KUDPCFG=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (UDP session index)<br>• Integer<br><mode> (Connection mode)<br>• 0 — Client<br>• 1 — Server<br>• 3 — Secure client<br><port><br>• Valid range: 0–65535 (0 = random)<br><cnx_cnf> (PDP context configuration)<br>• Integer<br>• Index of set of parameters for configuring one UDP session (see +KCNXCFG) |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KUDPCFG** | **Configure UDP connection**<br><udp_notif> (Cause of UDP connection failure)<br>• 0 — Network error<br>• 1 — No more sockets available; max number already reached<br>• 2 — Memory problem<br>• 3 — DNS error<br>• 5 — UDP connection error (Host unreachable)<br>• 6 — Generic error<br>• 8 — Data sending is OK but +KUDPSND was waiting more or less characters<br>• 9 — Bad session ID<br>• 10 — Session is already running<br>• 11 — All sessions are used<br><data_mode> (Enable/disable display of <data> in URC)<br>• 0 — Do not display data in URC<br>• 1 — Display data in URC automatically<br>• 2 — Do not display data in URC and KUDPRCV command is required to dump data. If there is no KUDPRCV command after rcv_timeout, the original data is dropped and URC is re-enabled.<br><udp_remote_address> (IP address string or explicit name of remote server)<br>• String<br>• Default is empty (given by +KUDPSND)<br><udp_port> (UDP peer port)<br>• Valid range: 0–65535<br>• Given by +KUDPSND<br><af> (IP address family type used for connection)<br>• Valid values:<br>  • 0 — IPv4<br>  • 1 — IPv6<br><restore_on_boot> (Restore server session on boot (only for server socket))<br>• 0 — First server session is not restored on boot. (Default)<br>• 1 — First server session is restored on boot.<br><cipher_index> Cipher suite profile index to use for a secured socket; defined by +KSSLCRYPTO<br><rcv_timeout> Receive time out for KUDPCFG data_mode=2. Range: 1–16 seconds, default: 3.<br><cid_enabled> Enable CID or not.<br>• 0—Disable<br>• 1—Enable<br><cid_value> CID value string in hex. Empty is accepted. |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KUDPCLOSE** | **Close current UDP connection**<br>Close a UDP session and then, if no other sessions are running, release the PDP context.<br>**Notes:**<br>• This function will delete the session configuration if <keep_cfg> = 0<br>**Password required:** No<br>**Usage:**<br>▪ Execution: **AT+KUDPCLOSE=<session_id>[,<keep_cfg>]**<br>Response: OK<br>or<br>+KUDP_NOTIF: <session_id>,<udp_notif><br>Purpose: Close the specified UDP connection.<br>▪ Query List: **AT+KUDPCLOSE=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (UDP session index)<br>• Integer<br><udp_notif> (Cause of UDP connection failure)<br>• See +KUDPCFG for details<br><keep_cfg> (Delete/keep session configuration after closing)<br>• 0 — Delete the session configuration<br>• 1 — Keep the session configuration |
| **+KUDPDEL** | **Delete configured UDP session**<br>**Notes:**<br>• Session must be closed using +KUDPCLOSE before using this command.<br>**Password required:** No<br>**Usage:**<br>▪ Execution: **AT+KUDPDEL=<session_id>**<br>Response: OK<br>or<br>+CME ERROR: <err><br>Purpose: Delete the specified UDP connection.<br>▪ Query List: **AT+KUDPDEL=?**<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (UDP session index)<br>• Integer |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KUDPRCV** | **Receive data through UDP connection**<br>Receive data through a previously opened UDP socket.<br><br>**Notes:**<br>• <ndata> indicates the max data number that the terminal wishes to receive. If the UDP socket contains more data than <ndata> bytes, then only <ndata> bytes will be received and more data can be read by running this command again.<br>• <EOF pattern> would be added at the end of data automatically.<br>• When <ndata> (max value) bytes or only available data in the UDP socket have been received, the module returns to command mode.<br>• It is highly recommended to configure the module for hardware flow control using AT&K3 before using this command.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KUDPRCV=<session_id>,<ndata>**<br>Response: CONNECT<br>...<EOF_pattern><br>OK<br>+KUDP_RCV: <udp_remote_address>, <udp_remote_port><br>or<br>NO CARRIER<br>+CME ERROR: <err><br>+KUDP_NOTIF: <session_id>,<udp_notif><br>Purpose: Receive <ndata> bytes of data from the specified socket.<br>▪ Query List: **AT+KUDPRCV=?**<br>Response: +KUDPRCV: (list of possible <session_id>s),(list of possible <ndata>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (UDP session index)<br>• Integer<br><ndata> (Number of bytes that device wants to receive)<br>• Max value: 4294967295<br><udp_remote_address> (IP address string of the remote host)<br>• String<br><udp_remote_port> (Remote UDP port)<br>• Valid range: 0–65535<br><udp_notif> (Cause of UDP connection failure)<br>• Integer<br>• See +KUDPCFG for details |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KUDPSND** | **Send data through UDP connection**<br>Send data through a previously opened UDP connection.<br><br>**Notes:**<br>• All data will be sent out ignoring <ndata>. If data sent is not equal to <ndata> then +KUDP_NOTIF will be displayed.<br>• <ndata> is the data size without <EOF pattern>.<br>• It is highly recommended to configure the module for hardware flow control using AT&K3 before using this command.<br>• The maximum transmission unit (MTU) is 1500 Bytes.<br>• The <udp remote address> and <udp_port> are saved internally such that they can be omitted in subsequent calls of +KUDPSND.<br>• The packet segmentation is controlled by +KIPOPT with <option_id>=0, and the maximum UDP packet size is limited by <send size v4> (1472 bytes) or <send size v6> (1452 bytes). Default value for both parameters is 1020 bytes.<br>• The data session can be ended by <EOF pattern>, +++ or DTR.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KUDPSND=<session_id>, <udp_remote_address>, <udp_port>, <ndata>**<br>Response: CONNECT<br>OK<br>or<br>NO CARRIER<br>+CME ERROR: <err><br>+KTCP_NOTIF: <session_id>,<udp_notif><br>Purpose: Send <ndata> bytes of data over the specified connection.<br>▪ Query List: **AT+KUDPSND=?**<br>Response: +KUDPSND: (list of possible <session_id>s),<remote-name/ip>,(list of possible <udp_port>s),(list of possible <ndata>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><session_id> (UDP session index)<br>• Integer<br><udp_remote_address> (IP address string or explicit name of remote server)<br>• String<br><udp_port> (UDP peer port)<br>• Valid range: 1–65535<br><ndata> (Number of bytes that device will send)<br>• Max value: 4294967295<br><udp_notif> (Cause of UDP connection failure)<br>• See +KUDPCFG for details |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| **+KURCCFG** | **Enable/Disable Protocol Notifications (URCs)**<br>Enable or disable specific protocol notifications (URCs).<br><br>**Notes:**<br>• Enabling/disabling +KTCP_NOTIF unsolicited notifications is only useful when in polling mode with +KTCPSTAT.<br>• If notifications and/or indications are disabled, the URCs are discarded and not stored.<br>• Can be used in 07.10 multiplexer.<br>**Password required:** No<br><br>**Usage:**<br>▪ Execution: **AT+KURCFG=<protoopt>,<noti_act>[,<indi_act>][<ext_act>]**<br>Response: OK<br>Purpose: Enable/disable specified URC notifications and/or indications for the specified protocol.<br>▪ Query: **AT+KURCCFG?**<br>Response: +KURCCFG: (list of supported <protoopt>,<noti_act>,<indi_act>,<ext_act>)<br>OK<br>Purpose: Display the status of URC notifications/indications for each protocol.<br>▪ Query List: **AT+KURCCFG=?**<br>Response: +KURCCFG: (list of supported <protoopt>s),(list of supported <noti_act>s),(list of supported <indi_act>s),(list of supported <ext_act>s)<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><protoopt> (Protocol option to enable/disable URC)<br>• String format<br>• "TCPC" — TCP client session<br>• "TCPS" — TCP server session<br>• "UDPC" — UDP client session<br>• "UDPS" — UDP server session<br>• "HTTP" — HTTP client session<br>• "HTTPS" — HTTPS client session<br>• "FTP" — FTP client session<br>• "TCP" — Both TCP client and server sessions<br>• "UDP" — Both UDP client and server sessions<br><noti_act> (Enable/disable URC notifications)<br>• 0 — Disable URC<br>• 1 — Enable URC (such as +KTCP_NOTIF) |

**Table 15-3: Protocol Command Details (Continued)**

| Command | Description |
|---|---|
| | <indi_act> (Enable/disable URC indications)<br>• 0 — Disable URC<br>• 1 — Enable URC (such as +KTCP_SRVREQ, +KTCP_IND, +KTCP_DATA, +KUDP_DATA, +KUDP_RCV, etc.)<br><ext_act><br>• 1 Enable extend error code (same as +KHTTP_ERROR)<br>• 0 Disable URC |
| **+KURCCFG** | **Enable/Disable Protocol Notifications (URCs)**<br>**Example(s):**<br>• Disable URC notifications:<br>AT+KURCCFG="TCP",0<br>OK<br>• Test and read commands:<br>AT+KURCCFG=?+KURCCFG:<br>("TCPC","TCPS","UDPC","UDPS","HTTP","HTTPS","FTP","TCP","UDP"),(0,-1),(0-1),(0-1)<br>OK<br><br>AT+KURCCFG?<br>+KURCCFG: "TCPC",1,1,1<br>+KURCCFG: "TCPS",1,1,1<br>+KURCCFG: "UDPC",1,1,1<br>+KURCCFG: "UDPS",1,1,1<br>+KURCCFG: "HTTP",1,1,1<br>+KURCCFG: "HTTPS",1,1,1<br>+KURCCFG: "FTP",1,1,1<br>+KURCCFG: "TCP",1,1,1<br>+KURCCFG: "UDP",1,1,1<br>OK |

**Table 15-4: Supported Cipher Suites**

| NIST Name | <mkey_algo> | <auth_algo> | <enc_algo> | <mac_algo> |
|---|---|---|---|---|
| TLS-ECDHE-RSA-WITH-AES-128-GCM-SHA256 | ECDHE | RSA | AES-128-GCM | SHA256 |
| TLS-ECDHE-ECDSA-WITH-AES-128-GCM-SHA256 | ECDHE | ECDSA | AES-128-GCM | SHA256 |
| TLS-ECDHE-ECDSA-WITH-AES-256-GCM-SHA384 | ECDHE | ECDSA | AES-256-GCM | SHA384 |
| TLS-ECDHE-ECDSA-WITH-AES-128-CCM | ECDHE | ECDSA | AES-128-CCM | NULL |
| TLS-ECDHE-ECDSA-WITH-AES-256-CCM | ECDHE | ECDSA | AES-256-CCM | NULL |
| TLS-ECDHE-ECDSA-WITH-AES-128-CCM-8 | ECDHE | ECDSA | AES-128-CCM-8 | NULL |
| TLS-ECDHE-ECDSA-WITH-AES-256-CCM-8 | ECDHE | ECDSA | AES-256-CCM-8 | NULL |

# 15.4 Sample IP Application Command Usage

## 15.4.1 How to Use TCP Commands

**Table 15-5: Client Mode**

| Example | Description |
|---|---|
| **AT+KCNXTIMER=1,30,2,20,1800**<br>**OK** | Set connection timer configuration before PDP connection |
| **AT+KCNXCFG=1,"GPRS","APN","log","password","IP V4","0.0.0.0","0.0.0.0","0.0.0.0"**<br>**OK** | Set GPRS parameters (APN, login, password) |
| **AT+KTCPCFG=1,0,"www.google.com",80**<br>**+KTCPCFG: 1**<br>**OK** | Set IP address and port number<br>Returns session ID |
| **AT+KTCPCNX=1**<br>**OK** | Initiate the connection. |
| **AT+KTCPSND=1,18**<br>**CONNECT**<br>**...Data send...**<br>**OK** | Send data after CONNECT. To finish sending the KPATTERN (EOF), you can define this with the +KPATTERN command. |
| **+KTCP_DATA: 1,1380** | +KTCP_DATA notification |
| **AT+KTCPRCV=1, 1380**<br>**CONNECT**<br>**... data...**<br>**--EOF--Pattern--**<br>**OK** | DATA read |
| **+KTCP_DATA: 1,1380** | +KTCP_DATA notification |

**Table 15-5: Client Mode (Continued)**

| Example | Description |
|---|---|
| AT+KTCPRCV=1,1380<br>CONNECT<br>... a lot of data...<br>--EOF--Pattern--<br>OK | DATA read |
| +KTCP_DATA: 1,1380 | +KTCP_DATA notification |
| AT+KTCPCLOSE=1,1<br>OK | Close session 1 |
| AT+KTCPDEL=1<br>OK | Delete session 1 |
| AT+KTCPCFG?<br>OK | No session is available |

A TCP server is emulated in the following example. The server listens to port 13 and returns the date for each connection.

**Table 15-6: Server Mode**

| Example | Description |
|---|---|
| **AT+KCNXTIMER=1,30,2,20,1800**<br>**OK** | Set connection timer configuration before PDP connection |
| **AT+KCNXCFG=1,"GPRS","APN","log","password","IP V4","0.0.0.0","0.0.0.0","0.0.0.0"**<br>**OK** | Set GPRS parameters (APN, login, password) |
| **AT+KTCPCFG=1,1,,13**<br>**+KTCPCFG: 1**<br>**OK** | Set TCP listener and port number<br>Returns session 1 |
| **AT+KTCPCNX=1**<br>**OK** | Initiate the server. |
| **AT+KCGPADDR**<br>**+KCGPADDR: 0,"10.35.125.89"**<br>**OK** | Get the IP address to initiate a connection request with a client |
| **+KTCP_SRVREQ: 1,2** | A client requests a connection (sub-session 2) |
| **AT+KTCPSND=2,15**<br>**CONNECT**<br>**...Date and time...**<br>**OK** | Data is sent to the client read (based on sub-session 2) |
| **+KTCP_SRVREQ: 1,3** | Another client requests a connection (sub-session 3); child mode for session 3 |
| **+KTCP_NOTIF: 2,4** | Client (sub-session 2) closes the connection |
| **AT+KTCPSND=3,15**<br>**CONNECT**<br>**...Date and time...**<br>**OK** | Data is sent to the client |
| **+KTCP_DATA: 3,6** | Data received from the client (sub-session 3) |
| **AT+KTCPRCV=3,6**<br>**CONNECT**<br>**... Data... --EOF--Pattern--**<br>**OK** | Read data received from client |
| **AT+KTCPCLOSE=3,1**<br>**OK** | Close client sub-session 3 and then sub-session 3 is deleted automatically |
| **AT+KTCPCLOSE=1,1**<br>**OK** | Close server session 1 |
| **AT+KTCPDEL=1**<br>**OK** | Delete session 1 |

**Table 15-7: Polling for the Status of a Socket**

| Example | Description |
|---|---|
| AT+KCNXTIMER=1,30,2,20,1800<br>OK | Set connection timer configuration before PDP connection |
| AT+KCNXCFG=1,"GPRS","APN","log","password","0.<br>0.0.0","0.0.0.0","0.0.0.0"<br>OK | Set GPRS parameters (APN, login, password) |
| AT+KTCPCFG=1,0,"www.google.com",80<br>+KTCPCFG: 1<br>OK | The set TCP Server address and port number,<br>Returns the session ID |
| AT+KURCCFG="TCP",0<br>OK | Disable TCP unsolicited messages |
| AT+KTCPCNX=1<br>OK | Initiate the connection, use session 1 |
| AT+KTCPSTAT=1<br>+KTCPSTAT : 3,-1,0,0<br>OK | Poll the connection status<br>Connection is UP |
| AT+KTCPSND=1,3000 | Send data on socket 1, we expect to send 3000 bytes but you can send less. |
| CONNECT | You can send data after CONNECT |
| ...Data send...<br>OK | To finish sending the KPATTERN (EOF), you can define this with the +KPATTERN command. |
| AT+KTCPSTAT=1 | Poll the connection status |
| +KTCPSTAT : 3,-1,1234,0<br>OK | Connection is UP, there are 1234 bytes not yet sent |
| AT+KTCPSTAT=1<br>+KTCPSTAT : 3,-1,100,0<br>OK | Poll the connection status<br>Connection is UP, there are 100 bytes not yet sent |
| AT+KTCPSTAT=1<br>+KTCPSTAT : 3,-1,0,0<br>OK | Poll the connection status<br>Connection is UP, all bytes have been sent |
| AT+KTCPSTAT=1<br>+KTCPSTAT : 3,-1,0,320<br>OK | Poll the connection status<br>Connection is UP, 320 bytes are available for reading |
| AT+KTCPRCV=1,320<br>CONNECT<br>... a lot of data...<br>--EOF--Pattern--<br>OK | Read 320 bytes on socket 1<br><br>Data are sent after CONNECT<br>Receive KPATTERN |
| AT+KTCPCLOSE=1,1<br>OK | Close session 1 |
| AT+KTCPDEL=1<br>OK | Delete session 1 |

**Table 15-8: End to End TCP Connection**

| Example | Description |
|---|---|
| AT+KCNXTIMER=1,30,2,20,1800<br>OK | Set connection timer configuration before PDP connection |
| AT+KCNXCFG=1,"GPRS","APN","log","password","0.<br>0.0.0","0.0.0.0","0.0.0.0"<br>OK | Set GPRS parameters (APN, login, password) |
| AT+KTCPCFG=1,0,"www.google.com",80<br>+KTCPCFG: 1<br>OK | The set TCP Server address and port number<br>Returns session ID |
| AT+KTCPSTART=1 | Initiate the connection, use session 1 |
| CONNECT | Message CONNECT: connection to the server is established, you can send data |
| ...Data sent.....Data received.....Data sent...<br>...Data sent.....Data received.....Data sent...<br>+++<br>OK | Use +++ to enter in command mode |
| AT+KTCPCLOSE=1,1<br>OK | Use KTCPCLOSE to close the session |
| AT+KTCPDEL=1<br>OK | Delete the configured session |

**Table 15-9: Error Case for End to End TCP Connection**

| Example | Description |
|---|---|
| AT+KTCPSTART=1<br>NO CARRIER<br>+KTCP_NOTIF: 1,<tcp_notif> | Try to initiate the connection<br>Connection fails, see the value of <tcp_notif> |
| AT+KTCPSTART=1<br>CONNECT<br>...Data sent.....Data received.....Data sent...<br>...Data sent.....Data received.....Data sent...<br>NO CARRIER | Initiate the connection<br><br>Exchange some data |
| +KTCP_NOTIF: 1,<tcp_notif> | An error occurs during connection (network lost, the server closed, etc.) |

## 15.4.2 How to Use UDP Specific Commands

**Table 15-10: Client Mode**

| Example | Description |
|---|---|
| AT+KCNXTIMER=1,30,2,20,1800<br>OK | Set connection timer configuration before PDP connection |
| AT+KCNXCFG=1,"GPRS","APN"<br>OK | Set the GPRS parameters |
| AT+KUDPCFG=1,0,1025<br>+KUDPCFG: 1<br>OK<br>+KCNX_IND: 1,1,0<br>+KUDP_IND: 1,1 | Create a new UDP socket with port number (returned session 1) with the parameters associated to the connection profile id number 1 |
| AT+KUDPSND=1,"213.41.22.60",1025,10<br>CONNECT<br>...Data Sent...<br>--EOF--Pattern--<br>OK | Send UDP data after "CONNECT" |
| +KUDP_DATA: 1,10 | Received notification that indicates the presence of 10 bytes in the socket |
| AT+KUDPRCV=1,5<br>CONNECT<br>12345--EOF—Pattern--<br>OK<br>+KUDP_RCV: "213.41.22.60",1025<br>+KUDP_DATA: 1,5 | Try to read 5 bytes from session 1<br><br>Received notification that indicates the presence of 5 bytes in the socket |
| AT+KUDPRCV=1,5<br>CONNECT<br>67890--EOF—Pattern--<br>OK<br>+KUDP_RCV: "213.41.22.60",1025 | Try to read 5 bytes from session 1 |
| AT+KUDPCLOSE=1<br>OK | Close the UDP session 1 |
| AT+KUDPDEL=1<br>OK | Delete session 1 |

## 15.4.3 How to Use UDP and TCP Simultaneously

**Table 15-11: Client Mode**

| Example | Description |
|---|---|
| AT+KCNXTIMER=1,30,2,20,1800<br>OK | Set connection timer configuration before PDP connection |
| AT+KCNXCFG=1,"GPRS","APN","log","password","IP V4","0.0.0.0","0.0.0.0","0.0.0.0"<br>OK | Set GPRS parameters (APN, login, password) |
| AT+KUDPCFG=1,0,1025<br>+KUDPCFG: 1<br>OK<br>+KCNX_IND: 1,1,0<br>+KUDP_IND: 1,1 | Create a new UDP socket with port number (returned session 1) with the parameters associated with the connection profile id number 1 |
| AT+KUDPSND=1,"213.41.22.60",1025,10<br>CONNECT<br>...Data Sent...<br>--EOF--Pattern--<br>OK | Send UDP data after "CONNECT" |
| AT+KTCPCFG=1,0,"www.google.com",80<br>+KTCPCFG: 2<br>OK | Set TCP Server address and port number Returns session ID |
| AT+KTCPCNX=2<br>OK | Initiate the connection |
| AT+KTCPSND=2,10<br>CONNECT<br>...Data send...<br>OK<br>+KTCP_DATA: 2,10 | Send data with KPATTERN string at the end<br><br>--EOF--Pattern--" |
| AT+KTCPRCV=2,10<br>CONNECT<br>... data...<br>--EOF--Pattern--<br>OK | DATA read |
| AT+KUDPCLOSE=1<br>OK | Close the UDP session 1 |
| AT+KTCPCLOSE=2,1<br>OK | Close the TCP session 2 |
| AT+KTCPDEL=2<br>OK | Delete the TCP session 2 |

## 15.4.4 How to Wake the WAKE_ON_WWAN pin by Detecting TCP/UDP URC

**Table 15-12: TCP Client**

| Example | Description |
|---|---|
| AT+KURCCFG="TCP",1,1,1<br>OK | Enable TCP URC |
| AT!CUSTOM="WAKEHOSTEN",0x82<br>OK | Set the WAKE_ON_WWAN bitmask (0x82 wake by incoming data) |
| AT!SMSWAKEWIDTH=10000<br>OK | Set WAKE_ON_WWAN width with 10seconds |
| AT+KCNXCFG=1,"GPRS","APN"<br>OK | Set GPRS parameters (APN, login, password) |
| AT+KTCPCFG=1,0,"192.168.5.34",1234<br>+KTCPCFG: 1<br>OK | Config TCP client to connect TCP sever and port |
| AT+KTCPCNX=1<br>OK<br>+KCNX_IND: 1,4,1<br>+KCNX_IND: 1,1,0<br>+KTCP_IND: 1,1 | Initiate the connection |
| Send data from server to client | |
| +KTCP_DATA: 1,20 | Data received from TCP server.<br>Monitor Wake_on_wwan pin to check whether it wakes after receiving URC. |

**Table 15-13: UDP Client**

| Example | Description |
|---|---|
| AT+KURCCFG="UDP",1,1,1<br>OK | Enable UDP URC |
| AT!CUSTOM="WAKEHOSTEN",0x82<br>OK | Set the WAKE_ON_WWAN bitmask (0x82 wake by incoming data) |
| AT!SMSWAKEWIDTH=10000<br>OK | Set WAKE_ON_WWAN width with 10seconds |
| AT+KCNXCFG=1,"GPRS","APN"<br>OK | Set GPRS parameters (APN, login, password) |
| AT+KUDPCFG=1,0,1234<br>+KUDPCFG: 1<br>OK<br>+KCNX_IND: 1,4,1<br>+KCNX_IND: 1,1,0<br>+KUDP_IND: 1,1 | Config UDP client with port number |

**Table 15-13: UDP Client**

| Example | Description |
|---|---|
| **Send data from server to client** | |
| **+KUDP_DATA: 1,10** | Data received from UDP server.<br>Monitor Wake_on_wwan pin to check whether it wakes after receiving URC. |

# 16: LGU+ RASS Commands

## 16.1 Introduction

This chapter shows the commands that are applicable to LGU+ RASS services only.

### 16.1.1 Usage Notes

The following general usage notes apply to the AT commands described in this chapter:

- RASS and AVMS services cannot work at the same time.

### 16.1.2 Command Summary

Table 16-1 lists the commands described in this chapter:

**Table 16-1: LGU+ RASS Commands**

| Command | Description | Page |
|---|---|---|
| $LGTRMODRDY | Modem-ready indication | 352 |
| $LGTRMSISDN | Read MSISDN | 352 |
| $LGTRTIME | Current time inquiry | 353 |
| $LGTRVER | Software version inquiry | 354 |
| $LGTRMTYPE | Modem manufacturer information inquiry | 355 |
| $LGTRSTA | Check modem status (LTE state) | 356 |
| $LGTRCHINF | Channel information inquiry | 358 |
| $LGTRESET | Initialize the modem (MT2) status | 358 |
| $LGTRMODFWI | Modem firmware download | 359 |
| $LGTRMODFW (notification) | Modem firmware indication—Unsolicited notification | 359 |
| $LGTRRASSON | Close all socket sessions and restart | 360 |
| $LGTRBAND | LTE band and antenna count query | 361 |
| $LGTRBANDST | LTE band and antenna count setting | 362 |
| $LGTRRASSSTA | Check modem status (Listen Port) | 363 |
| $LGTRQOS | Call quality information inquiry | 364 |
| $LGTRSVRIP | Set server IP address | 365 |
| $LGTRSVRDNS | Server DNS settings | 366 |
| $LGTRTPS | Start throughput record | 367 |
| $LGTRTPR (notification) | Throughput test indication | 368 |

**Table 16-1: LGU+ RASS Commands**

| Command | Description | Page |
|---|---|---|
| @DBG | Call quality information inquiry | 369 |
| $LGTDBGSCR | Call quality information inquiry | 372 |
| $LGTRIP | Modem IP address inquiry | 374 |
| $LGTRSEND | Send data | 375 |
| $LGTRRCV (notification) | Received data notification | 376 |

# 16.2 Command Reference

**Table 16-2: LGU+ RASS Command Details**

| Command | Description |
|---|---|
| **$LGTRMODRDY** | **Modem-ready indication**<br>The notification indicates that the modem operates normally.<br>**Notes:**<br>• The unsolicited notification is received when the modem is ready.<br>• The module sends an unsolicited notification to the UE. The UE would then reply with the ready status.<br>**Usage:**<br>▪ Execution: **AT$LGTRMODRDY=<ready>**<br>Response: OK<br>Purpose: Set the status of the modem.<br>**Notification format:**<br>**$LGTRMODRDY**<br>**Parameters:**<br><ready> (Modem Status)<br>• Integer<br>• 1—Success<br>• 0—Fail |
| **$LGTRMSISDN** | **Read MSISDN**<br>Queries the MSISDN (Mobile Station International ISDN Number).<br>**Note:s:**<br>• MSISDN = CC + NDC + SN.<br>**Usage:**<br>▪ Execution: **AT$LGTRMSISDN**<br>Response: $LGTRMSISDN:<value><br>OK<br>Purpose: Return the MSISDN.<br>▪ Query: **AT$LGTRMSISDN?**<br>Response: $LGTRMSISDN:<value><br>OK<br>Purpose: Display the MSISDN.<br>**Parameters:**<br><value> (MSISDN)<br>• String<br>• Note: Only the NDC + SN of MSISDN is used and it should be printed with “0” at the beginning. |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRTIME** | **Current time inquiry**<br>Inquires the current time (TE2 to MT2).<br>**Usage:**<br>▪ Execution: **AT$LGTRTIME**<br>Response: $LGTRTIME:<value><br>OK<br>or<br>ERROR<br>Purpose: Inquire the current time.<br>▪ Query: **AT$LGTRTIME?**<br>Response: $LGTRTIME:<value><br>OK<br>or<br>ERROR<br>Purpose: Display the current time.<br>**Parameters:**<br><value> (Date and time information)<br>· String<br>· Format: YYYYMMDDhhmmss<br>· YYYY—Year<br>· MM—Month<br>· hh—Hour<br>· mm—Minute<br>· ss—Second<br>**Example(s):**<br>· Read command:<br>AT$LGTRTIME?<br>$LGTRTIME:20120920143015 ?(September 20, 2012, 2:30 pm 15 seconds)<br>OK<br>AT$LGTRTIME<br>$LGTRTIME:20120920143015 ?(September 20, 2012, 2:30 pm 15 seconds)<br>OK |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRVER** | **Software version inquiry**<br>Inquires modem's software version.<br>**Usage:**<br>▪ Execution: **AT$LGTRVER**<br>Response: $LGTRVER:<value><br>OK<br>or<br>ERROR<br>Purpose: Inquire the software version.<br>▪ Query: **AT$LGTRVER?**<br>Response: $LGTRVER:<value><br>OK<br>or<br>ERROR<br>Purpose: Display the software version.<br>**Parameters:**<br><value> (Modem version information)<br>▪ Range: 00—99<br>**Example(s):**<br>▪ Read command:<br>AT$LGTRVER?<br>$LGTRVER:10 / /Modem F/W version is 1.0<br><br>OK<br><br>AT$LGTRVER<br>$LGTRVER:10 / /Modem F/W version is 1.0<br>OK |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRMTYPE** | **Modem manufacturer information inquiry**<br>Inquire the company code that corresponds to the modem's manufacturer information.<br>**Usage:**<br>▪ Execution: **AT$LGTRMTYPE**<br>Response: $LGTRMTYPE:<value><br>OK<br>or<br>ERROR<br>Purpose: Inquire the modem manufacturer information.<br>▪ Query List: **AT$LGTRMTYPE?**<br>Response: $LGTRMTYPE:<value><br>OK<br>or<br>ERROR<br>Purpose: Display the modem manufacturer information.<br>**Parameters:**<br><value> (Modem manufacturer information)<br>· Examples:<br>AnyData—7<br>AMT—8<br>IG Innotek—9<br>· Note: Follow the technical definition of the NMS technical team.<br>**Example(s):**<br>· Read command:<br>AT$LGTRMTYPE?<br>$LGTRMTYPE:7 -> Anydata<br><br>OK<br><br>AT$LGTRMTYPE<br><br>$LGTRMTYPE:7 -> Anydata<br><br>OK |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRSTA** | **Check modem status (LTE state)**<br>When a terminal acquires an LTE network, check the idle status of the LTE.<br>**Usage:**<br>▪ Execution: **AT$LGTRSTA**<br>Response: $LGTRSTA:<value1>,<value2>,<value3>,<br><value4>,<value5>,<value6>,<value7>,<br><value8>,<value9>,<value10>,<value11><br>OK<br>or<br>ERROR<br>Purpose: Check the modem LTE status.<br>▪ Query: **AT$LGTRSTA?**<br>Response: $LGTRSTA:<value1>,<value2>,<value3>,<br><value4>,<value5>,<value6>,<value7>,<br><value8>,<value9>,<value10>,<value11><br>OK<br>or<br>ERROR<br>Purpose: Display the modem LTE status.<br>**Parameters:**<br><value1> (Terminal-acquired RAT)<br>· Integer<br>· 0—GSM<br>· 1—UMTS<br>· 2—LTE<br><value2> (Acquisition network service status)<br>· Integer<br>· 0—No service<br>· 1—Limited<br>· 2—Service available<br>· 3—Limited regional service<br>· 4—Power Save or Deep Sleep<br><value3> (LTE band = FDD band)<br>· Integer<br>· 0—None state<br>· 1—FDD state |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| | <value4> (LTE mode status)<br>• Integer<br>• 0—INIT<br>• 1—LTE idle<br>• 2—LTE FDD RX warm-up<br>• 3—LTE FDD RXTX<br>• 4—LTE TDD RX warm-up<br>• 5—LTE TDD RXTX<br>• 6—LTE sleep<br><value5> (Serving cell EARFCN VALUE)<br>• Integer<br>• EARFCN: E-UTRA Absolute Radio Frequency Channel Number<br><value6> (Serving cell BAND)<br>• Integer<br><value7> (Downlink bandwidth)<br>• Integer<br><value8> (TX ANTENNA detection)<br>• Integer<br><value9> (Sensitivity of receiving RSSI)<br>• Range: -120 to 0 dBm<br><value10> (TX POWER VALUE)<br>• Range: -100 to +100 dBm<br><value11> (Receiving RSRP strength)<br>• Range: -44 to -140 dBm<br>**Example(s):**<br>• Read command:<br>AT$LGTRSTA?<br>$LGTRSTA:2,2,1,0,1,11,23,10,1,65,-65<br><br>OK<br><br>AT$LGTRSTA<br>$LGTRSTA:2,2,1,0,1,11,23,10,1,65,-65<br><br>OK<br><br>/ /None LTE status<br>AT$LGTRSTA<br>$LGTRSTA:2,0,1,0,0,0,0,1,0,0,0<br><br>OK |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRCHINF** | **Channel information inquiry**<br>Gets all available information about the Channel.<br>**Usage:**<br>▪ Query: **AT$LGTRCHINF?**<br>Response: $LGTRCHINF:<pci>,<band>,<dl-bw><br>OK<br>or<br>ERROR<br>Purpose: Display the channel information.<br>**Parameters:**<br><pci> (PCI: Physical Cell Identifier)<br>· Range: 0—504<br><band> (Current band value)<br>· Integer<br>· 800—800 MHz band<br>· 2100—2.1 GHz band<br>· 1800—1.8 GHz band<br><dl-bw> (D/L bandwidth)<br>· Integer<br>**Example(s):**<br>· Read command:<br>AT$LGTRCHINF?<br>$LGTRCHINF:28,800,10<br><br>OK |
| **$LGTRESET** | **Initialize the modem (MT2) status**<br>This command is the same as AT!RESET.<br>**Usage:**<br>▪ Execution: **AT$LGTRESET**<br>Response: OK<br>or<br>ERROR<br>Purpose: Reset the modem. |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRMODFWI** | **Modem firmware download**<br>Modem firmware update information<br>**Note:s:**<br>When the download is finished, a $LGTRMODFW notification is sent to the UE.<br>**Usage:**<br>▪ Execution: **AT$LGTRMODFWI=<url_port>,<id>,<pwd>,<file_name>**<br>Response: $LGTRMODFWI:<result><br>OK<br>or<br>ERROR<br>Purpose: Modem firmware download<br>**Parameters:**<br><URL port> (HTTP/HTTPS Server URL:port)<br>· String<br><id> (Server ID)<br>· String<br><pwd> (Server password)<br>· String<br><file_name> (Server file path + file name)<br>· String<br><result><br>· Integer<br>· 1—Ready<br>· 0—Not ready<br>**Example(s):**<br>· Set command:<br>AT$LGTRMODFWI= download.lguplus.co.kr:8080,01080801234,100.191.128.161,<br>/inms/rass/firmware/MODEM/L01_ANY__V10.mod<br>$LGTRMODFWI:1<br><br>OK |
| **$LGTRMODFW (notification)** | **Modem firmware indication—Unsolicited notification**<br>Unsolicited notification to indicate the modem firmware status.<br>**Notification format:**<br>**$LGTRMODFW:<result>**<br>**Parameters:**<br><result> (Modem firmware result)<br>· Integer<br>· 0—Start<br>· 1—Finished<br>· 2—Failed |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRRASSON** | **Close all socket sessions and restart**<br>Modem (MT2) restarts Server Mode after all TCP sessions are over.<br>Listen Port used in Server Mode: Defined as 9001.<br><br>**Note:s:**<br>This command closes all TCP sessions after which all server sessions are restarted again.<br><br>**Usage:**<br>▪ Execution: **AT$LGTRRASSON**<br>Response: $LGTRRASSON:<result><br>OK<br>or<br>ERROR<br>Purpose: Modem restarts Server Mode after all TCP sessions are done.<br>**Parameters:**<br><result> (Socket status)<br>· Integer<br>· 0—Fail<br>· 1—Success |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRBAND** | **LTE band and antenna count query**<br>Queries the number of LTE band and antenna that are currently in service.<br>**Note:s:**<br>Modem in SISO supported transponder may work as MIMO by default.<br>**Usage:**<br>▪ Query: **AT$LGTRBAND?**<br>Response: $LGTRBAND:<band>,<antennas><br>OK<br>or<br>ERROR<br>Purpose: Display the LTE band and antenna<br>**Parameters:**<br><band> (Current band value)<br>· Integer<br>· 800: 800 MHz band<br>· 1800: 1800 MHz band<br>· 2100: 2100 MHz band<br><antennas> (Number of antennas)<br>· Integer<br>· 1: MIMO<br>· 2: SISO (Primary antenna only)<br>**Example(s):**<br>· Read command:<br>AT$LGTRBAND?<br>$LGTRBAND:800,1<br><br>OK |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRBANDST** | **LTE band and antenna count setting**<br>If the setting fails for more than 30 seconds, the modem provides a failure value to DTE.<br><br>**Notes:**<br>▪ Modem in SISO supported transponder may work as MIMO by default.<br>▪ Ant or the number is selected according to the type of transponder, so the number of Ants must be configurable.<br>▪ Reset command is required after the current number of antennas is set, but can be modified without reset later.<br><br>**Usage:**<br>▪ Execution: **AT$LGTRBANDST=<band>,<antennas>**<br>Response: $LGTRBANDST:<result><br>OK<br>or<br>ERROR<br>Purpose: Set the LTE band and antenna.<br>**Parameters:**<br><band> (Current band value)<br>▪ Integer<br>▪ 800: 800 MHz band<br>▪ 1800: 1800 MHz band<br>▪ 2100: 2100 MHz band<br><antennas> (Number of antennas)<br>▪ Integer<br>▪ 1: MIMO<br>▪ 2: SISO (primary antenna only)<br><result> (LTE and antenna count setting)<br>▪ Integer<br>▪ 0: Fail<br>▪ 1: OK<br><br>**Example(s):**<br>▪ Set command:<br>AT$LGTRLTEBANDST=800,1<br>$LGTRBANDST:1<br><br>OK |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRRASSSTA** | **Check modem status (Listen Port)**<br>Checks the status of the RASS modem listen port.<br>**Usage:**<br>▪ Execution: **AT$LGTRRASSSTA**<br>Response:<br>$LGTRRASSSTA:<network_state>,<family>,<remote_port>,<remote_ip><br>OK<br>or<br>ERROR<br>Purpose: Display the modem status.<br>**Parameters:**<br><network_state><br>• Integer<br>• 0: AMT_NET_NULL_S<br>• 1: AMT_NET_PPPOPENING_S<br>• 2: AMT_NET_PPPOPEN_S<br>• 3: AMT_NET_SOCKLISTEN_S (socket listen state)<br>• 4: AMT_NET_SOCKCONNECTING_S<br>• 5: AMT_NET_SOCKCONNECT_S (socket connect status)<br>• 6: AMT_NET_SENDING_S<br>• 7: AMT_NET_RECVING_S<br>• 8: AMT_NET_SOCKCLOSING_S<br>• 9: AMT_NET_SOCKCLOSED_S<br>• 10: AMT_NET_PPPCLOSING_S<br>• 11: AMT_NET_PPPCLOSED_S<br>• 12: AMT_NET_STATUS_NUM<br><family> (Internetworking protocol)<br>• String<br>• IPV4<br>• IPV6<br>• 0 (unspecified)<br><remote_port> (Remote port number address)<br>• Integer<br><remote_ip> (Remote IP address)<br>• String<br>**Example(s):**<br>• Read command:<br>AT$LGTRRASSSTA<br>$LGTRRASSSTA:5,IPV4,49722,10.227.53.14<br><br>OK |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRQOS** | **Call quality information inquiry**<br>Inquires information related to call quality after T/P measurement.<br>**Usage:**<br>▪ Execution: **AT$LGTRQOS?**<br>Response: $LGTRQOS:<rsrp>,<rsrq>,<sinr>,<cqi>,<mcs>,<tx_pwr>,<rssi>,<ri>,<DL throughput>,<UL throughput>,<time>,<band><br>OK<br>or<br>ERROR<br>Purpose: Display the call quality information.<br>**Parameters:**<br><rsrp> (Reference signal received)<br>• Integer<br>• Note: The measured value of L1 is displayed up to the first decimal place, and the measured value is *10 and expressed in dB (Example: -200 = 20.0 dB).<br>• Range: -200 to -30 dB<br><rsrq> (Reference signal received quality)<br>• Note: Measured in L1 and expressed in dB.<br>• Range: -20 to -3 dB<br><sinr> (Signal to Interference-plus-Noise Radio)<br>• Integer, expressed in dB<br><cqi> (Channel quality indicator)<br>• Range: 0 to 15<br><mcs> (Modulation and coding scheme)<br>• Range: 0 to 28<br><tx_pwr> (Transmit power)<br>• Range: -100 to 100 dBm<br><rssi> (Receive signal strength indicator)<br>• Measured in L1, expressed in dBm<br>• Range: -120 to 0 dBm<br><ri> (Rank indicator)<br>• 1 or 2<br><DL throughput><br>• D/L Throughput ##### ? ###.##(Mbps) (FFFFF when measuring U/L)<br><UL throughput><br>• U/L Throughput ##### ? ###.##(Mbps) (FFFFF when measuring D/L) |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRQOS** | <time> (Measures time completion)<br>• String<br>• YYYY(Year), M(Month), d(Day), h(Hour), m(Minute), s(Second)<br><band> (Measures band information)<br>• Integer<br>• 800: Band 5 (800 MHz)<br>• 2100: Band 1 (2100 MHz)<br>• 2600: Band 7(2600 MHz) |
| **$LGTRSVRIP** | **Set server IP address**<br>IP address setting of the RASS server connected from the modem.<br>**Note:s:**<br>• This command functions the same as AT$LGTRDNS.<br>• This command must be called prior to AT$LGTRSEND.<br>**Usage:**<br>▪ Execution: **AT$LGTRSVRIP=<ip>,<port>**<br>Response: $LGTRSVRIP:<result><br>OK<br>or<br>ERROR<br>Purpose: Set server IP address.<br>**Parameters:**<br><ip> (Server IP)<br>• String<br><port> (Server port)<br>• Integer<br><result><br>• Integer<br>• 0: Fail<br>• 1: Success<br>**Example(s):**<br>• Set command:<br>AT$LGTSVRIP=192.168.1.100,8080<br>$LGTRSVRIP:1<br><br>OK |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRSVRDNS** | **Server DNS settings**<br>DNS setting of the RASS server, accessed from the modem.<br>**Usage:**<br>▪ Execution: **AT$LGTRSVRDNS=<dns>,<port>**<br>Response: $LGTRSVRDNS:<result><br>OK<br>or<br>ERROR<br>Purpose: Set server DNS.<br>**Parameters:**<br><dns> (Server URL)<br>· String<br><port> (Server port)<br>· Integer<br><result><br>· Integer<br>· 0: Fail<br>· 1: Success<br>**Example(s):**<br>· Set command:<br>AT$LGTSVRDNS=lrass.lguplus.co.kr,8080<br>$LGTRSVRDNS=1<br><br>OK |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRTPS** | **Start throughput record**<br>LTE network call quality measurement start command.<br>**Notes:**<br>• <file_name> must include file path + file name in the download test.<br>• <file_name> only includes the file path in the upload test.<br>• Field name: Provided below according to the link to be tested by the RASS server.<br>• Downlink: (path + file name) is transmitted to the modem.<br>• Uplink: Path is transmitted to the modem. The name of the uplink test file is used by making the file name ""L01_CTN.UL" in the modem (e.g., L01_01080801234.UL).<br>**Usage:**<br>▪ Execution: **AT$LGTRSVRDNS=<ip_port>,<id>,<pwd>,<dl>,<file_name>,<duration>**<br>Response: $LGTRSVRDNS:<result><br>OK<br>or<br>ERROR<br>Purpose: Start throughput record.<br>**Parameters:**<br><ip_port> (FTP Server IP Port)<br>• String<br>• FTP Server IP: port (210.75.14.4:21)<br><id> (FTP ID)<br>• String<br><pwd>(FTP password)<br>• String<br><dl><br>• Integer<br>• 0: Download<br>• 1: Upload<br><file_name> (File path + name)<br>• String<br><duration> (Test duration limit: second)<br>• Integer<br><result><br>• Integer<br>• 0: Fail<br>• 1: Success |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| | **Example(s):**<br>• Set command:<br>DownLink Test: path = /inms/rass/firmware/Download, test file name= L01_50M.DL<br>AT$LGTRTPS="download.lguplus.co.kr:8080","01080801234","100.191.128.161",0,"/inms/rass/firmware/Download/L01_50M.DL",60<br><br>UpLink Test: Path = /inms/rass/firmware/Upload<br>AT$LGTRTPS="download.lguplus.co.kr:8080","01080801234","100.191.128.161",1,"/inms/rass/firmware/Upload",60<br><br>$LGTRTPS:1<br>OK |
| **$LGTRTPR (notification)** | **Throughput test indication**<br>LTE network data throughput measurement completion report<br><br>**Usage:**<br>▪ Execution: **AT$LGTRTPR**<br>Response: $LGTRTPR:<result><br>OK<br>or<br>ERROR<br>Purpose: Display the throughput test result.<br><br>**Notification format:**<br>**$LGTRTPR:<result>**<br>**Parameters:**<br><result><br>• 0: Test started<br>• 1: Test finished<br>• 2: Test failed |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **@DBG** | **Call quality information inquiry**<br>Used to search RSRP, RSRQ, and SINR values that are difficult to check in real time in the existing commands AT$LGTRSTA and AT$LGTRQOS.<br>This command is implemented to report the call quality (RSRP, RSRQ, SINR) of Band 5 in the periodic IDLE Report of the RF transponder, and implemented by AMTelecom (AT@DBG) and Sierra Wireless (AT$LGTDBGSCR) with different commands.<br><br>**Usage:**<br>▪ Execution: **AT@DBG**<br>Response: @DBG:EARFCN(DL/UL):<EARFCN(Downlink/Uplink)>, BAND:<Band>,BW:<Bandwidth>MHz,PLMN:<PLMN>,TAC:<TAC>,Cell(PCI):<CELL(PCI)>,ESM CAUSE:<ESM Cause>,DRX:<DRX>ms,RSRP:<RSRP>,RSRQ:<RSRQ>,RSSI:<RSSI>,L2W:<L2W>,RI:<RI>,CQI:<CQI>,STATUS:SRV/<EMM>,SUB STATUS:<EMM Sub State>,RRC:<RRC State>,SVC:<Service Domain>,SINR:<SINR>,Tx Pwr:<Tx Power>,TMSI:<TMSI>,IP:<IP>,AVG RSRP:<Average RSRP>,ANTBAR:<Antenna Bar>,SINR(dB):<Sinr>dB<br><br>OK<br>or<br>ERROR<br>Purpose: Display the call quality information.<br>▪ Query List: **AT@DBG=?**<br>Response: @DBG:<EARFCN(Downlink/Uplink)>,<Band>,<Bandwidth>,<PLMN>,<TAC>,<Cell(PCI)>,<ESM Cause>,<DRX>,<RSRP>,<RSRQ>,<RSSI>,<L2W>,<RI>,<CQI>,<Status(Service/EMM)>,<EMM Sub State>,<RRC State>,<Service Domain>,<SINR>,<Tx Power>,<TMSI>,<IP>,<Average RSRP>,<Antenna Bar>,<SINR(dB)><br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><EARFCN(Downlink/Uplink)> (E-UTRA Absolute Radio Frequency Channel Number)<br>· Integer<br><Band> (Current band value)<br>· Integer<br><Bandwidth)> (Download bandwidth)<br>· Integer<br><PLMN> (PLMN identifiers in hexadecimal format)<br>· Hex string<br>· 3 bytes<br>· Includes the following:<br>· MCC (Mobile Country Code)<br>· MNC (Mobile Network Code)<br><TAC> (Two-byte tracking area code)<br>· Hex string |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| | <Cell (PCI)> (PCI: Physical Cell Identifier)<br>• Hex (decimal)<br><ESM Cause> (PDP context reject code)<br>• Integer<br><DRX> (Discontinuous reception)<br>• Integer<br><RSRP> (Reference Signal Received Power)<br>• Integer<br><RSRQ> (Reference Signal Received Quality)<br>• Range: -20 to -3 dB<br><RSSI> (Radio Signal Strength Indication)<br>• Range: -120 to 0 dBm<br><L2W> (LTE to WCDMA)<br>• Integer<br><RI> (Rank Indicator)<br>• Integer<br><CQI> (Channel Quality Indicator)<br>• Range: 0—15<br><Status Service/EMM)> (EMM Status)<br>• Format: SRV/<EMM><br>• Integer<br>• 0 EMM_NULL<br>• 1 EMM_DEREGISTERED<br>• 2 EMM_REGISTERED_INITIATED<br>• 3 EMM_REGISTERED<br>• 4 EMM_DEREGISTERED<br>• 5 EMM_TRACKING_AREA_UPDATING_INITIATED<br>• 6 EMM_SERVICE_REQUEST_INITIATED |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| | <EMM Sub State> EMM SubState<br>• Integer<br>• 0 EMM_SUBSTATE_ANY<br>• 1 EMM_SUBSTATE_NORMAL_SERVICE<br>• 2 EMM_SUBSTATE_LIMITED_SERVICE<br>• 3 EMM_SUBSTATE_PLMN_SEARCH<br>• 4 EMM_SUBSTATE_NO_CELL_AVAILABLE<br>• 5 EMM_DEREGISTERED_ATTEMPTING_TO_ATTACH<br>• 6 EMM_DEREGISTERED_NO_IMSI<br>• 7 EMM_DEREGISTERED_ATTACH_NEEDED<br>• 8 EMM_REGISTERED_ATTEMPTING_TO_UPDATE<br>• 9 EMM_REGISTERED_UPDATE_NEEDED<br>• 10 EMM_REGISTERED_ATTEMPTING_TO_UPDATE_MM<br>• 11 EMM_REGISTERED_IMSI_DETACH_INITIATED<br>• 12 EMM_REGISTERED_WAITING_FOR_ESM_ISR_STATUS<br>• 13 EMM_DEREGISTERED_PLMN_SEARCH<br>• 14 EMM_DEREGISTERED_NO_CELL_AVAILABLE<br>• 15 EMM_DEREGISTERED_NORMAL_SERVICE<br>• 16 EMM_DEREGISTERED_LIMITED_SERVICE<br>• 17 EMM_DEGEGISTERED_WAITING_PDN_CONN_REQ<br>• 18 EMM_DEREGISTERED_WAITING_PSM_RESTORE_RSP<br>• 19 EMM_WAITING_FOR_NW_RESPONSE<br>• 20 EMM_WAITING_FOR_ESM_RESPONSE<br><RRC State> (Connection state)<br>• Integer<br>• 0 NULL<br>• 1 IDLE<br>• 2 CONNECTED<br>• 3 WAITING_RRC_CONFIRMATION<br>• 4 RELEASING<br><Service Domain> (Service domain setting)<br>• Integer<br><SINR> (Signal to Interference-plus-Noise Ratio)<br>• Range: 0—250<br><Tx Power> (TX power in dBm)<br>• Range: -100 to 100 dBm<br><TMSI> (Temporary Mobile Subscriber Identity)<br>• 4 bytes<br><IP> (IPV4 address)<br>• String<br><Average RSRP> (Average RSRP)<br>• Integer<br><Antenna Bar> (Antenna signal strength)<br>• Range: 0—5<br><SINR (dB)> (Signal to Interference-plus-Noise Ratio)<br>• Integer |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTDBGSCR** | **Call quality information inquiry**<br>Used to search RSRP, RSRQ, and SINR values that are difficult to check in real time in the existing commands AT$LGTRSTA and AT$LGTRQOS.<br>This command is implemented to report the call quality (RSRP, RSRQ, SINR) of Band5 in the periodic IDLE Report of the RF transponder, and implemented by AMTelecom (AT@DBG) and Sierra Wireless (AT$LGTDBGSCR) with different commands.<br><br>**Usage:**<br>▪ Execution: **AT$LGTDBGSCR**<br>Response: $LGTDBGSCR::<PREF>,<MCC-MNC>,<SERVICE>,<BAND>,<br><DL_BW>,<EMM>,<EMM-CON>,<FREQ>,<CELL>,<PCI>,<br><RSRQ>,<RSRP>,<RSSI>,<SINR>,<TX-PWR>,<IMSI><MCC-MNC>,<IP><br>OK<br>or<br>ERROR<br>Purpose: Display the call quality information.<br>▪ Query List: **AT$LGTDBGSCR=?**<br>Response: $LGTDBGSCR:<PREF>,<MCC-MNC>,<SERVICE>,<BAND>,<br><DL_BW>,<EMM>,<EMM-CON>,<FREQ>,<CELL>,<PCI>,<br><RSRQ>,<RSRP>,<RSSI>,<SINR>,<TX-PWR>,<GUTI>,<IP><br>Purpose: Display the modem IP address.<br>**Parameters:**<br><PREF> (Preferred network type)<br>• Integer<br><MCC-MNC> (Numeric format representing country and network codes)<br>• String<br>• Country code: 3 digits<br>• Network code: 2 or 3 digits<br><SERVICE> (Service status)<br>• Integer<br><BAND> (Current band value)<br>• Integer<br><DL_BW> (D/L Bandwidth)<br>• Integer<br><FREQ> (Band frequency)<br>• Integer<br><CELLy> (Cell ID)<br>• Hex string<br><PCI> (Physical Cell Identifier)<br>• Decimal ASCII |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| | <EMM> (EMM state)<br>• Integer<br>• 0 EMM_NULL<br>• 1 EMM_DEREGISTERED<br>• 2 EMM_REGISTERED_INITIATED<br>• 3 EMM_REGISTERED<br>• 4 EMM_DEREGISTERED_INITIATED<br>• 5 EMM_TRACKING_AREA_UPDATING_INITIATED<br>• 6 EMM_SERVICE_REQUEST_INITIATED<br><EMM-CON> (EMM RRC Connection state)<br>• Integer<br><RSRP> (Reference Signal Received Power)<br>• Integer<br><RSRQ> (Reference Signal Received Quality)<br>• Range: -20 to -3 dB<br><RSSI> (Radio Signal Strength Indication)<br>• Range: -120 to 0 dBm<br><SINR> (Signal to Interference-plus-Noise Ratio)<br>• Integer<br><TX-PWR> (TX power in dBm)<br>• Range: -100 to 100 dBm<br><GUTI> (Global Unique Temporary Identifier)<br>• Integer<br><IP> (IPV4 address)<br>• String |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRIP** | **Modem IP address inquiry**<br>Query the modem's current IP address.<br><br>**Notes:**<br>• If the current IP of the modem is changed, the DTE must report the IP information of the modem to the supervisory/control server.<br><br>**Usage:**<br>▪ Execution: **AT$LGTRIP?**<br>Response: $LGTRIP:<ip_addr><br>OK<br>Purpose: Display the modem IP address.<br>**Parameters:**<br><ip_addr> (IPV4 address)<br>• String<br><br>**Example(s):**<br>• If the module gets IPV4:<br>AT$LGTRIP?<br>$LGTRIP:100.0.0.1<br><br>OK<br>• If the module does not get IPV4:<br>AT$LGTRIP?<br>$LGTRIP:0.0.0.0<br><br>OK |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRSEND** | **Send data**<br>Sends the transponder payload to the RASS server.<br>**Notes:**<br>• All data input are in ASCII hex mode and convert to ASCII string "303132" to "012".<br>**Usage:**<br>▪ Execution: **AT$LGTRSEND=<ack>,<more>,<length>,<data>**<br>Response: $LGTRSEND:<result><br>OK<br>or<br>ERROR<br>Purpose: Send the transponder payload to the RASS server.<br>**Parameters:**<br><ack> (Server response)<br>• Integer<br>• 0: No need for server response data<br>• 1: Need server response data<br><more> (Packet)<br>• Integer<br>• 0: Last packet<br>• 1: More packets to follow<br><length> (Current packet length)<br>• Integer<br>• Range: 1—512<br><data> (Payload data for sending)<br>• Hex ASCII string: 00—FF<br>• Note: ASCII hex mode is converted to ASCII string<br><result> (Send data result)<br>• Integer<br>• 0: Fail<br>• 1: OK<br>• 2: Server connect fail<br>• 3: DNS fail<br>**Example(s):**<br>• Set command:<br>AT$LGTRSEND=1,0,512,FF313233...<br>$LGTRSVRSEND:1<br>OK |

**Table 16-2: LGU+ RASS Command Details (Continued)**

| Command | Description |
|---|---|
| **$LGTRRCV (notification)** | **Received data notification**<br>Sends the payload received from the RASS server to the transponder.<br>**Notes:**<br>• When set, the command returns OK without other actions.<br>**Usage:**<br>▪ Execution: **AT$LGTRRCV=<result>**<br>Response: $LGTRRCV:<result><br>OK<br>or<br>ERROR<br>Purpose: Send the payload received from the RASS server to the transponder.<br>**Notification format:**<br>**$LGTRRCV:<more>,<length>,<data>**<br>**Parameters:**<br><result> (Received data result)<br>• Integer<br>• 0: Fail<br>• 1: OK<br><more> (Packet)<br>• Integer<br>• 0: Last packet<br>• 1: More packets to follow<br><length> (Current packet length)<br>• Integer<br><data> (Received data)<br>• Hex ASCII string: 00—FF<br>• Note: ASCII hex mode is converted to ASCII string |

# 17: Unsolicited Message Commands

## 17.1 Introduction

This chapter shows the commands related to USL.

## 17.2 Command Summary

Table 17-1 lists the commands described in this chapter:

**Table 17-1: Unsolicited Message Commands**

| Command | Description | Page |
|---|---|---|
| !MUSLEN | Enable or disable unsolicited message feature | 377 |

## 17.3 Command Reference

**Table 17-2: Unsolicited Message Command Details**

| Command | Description |
|---|---|
| **!MUSLEN** | **Enable or disable unsolicited message feature**<br>This command is used to enable or disable the unsolicited message feature.<br><br>**Usage:**<br>▪ Execution: **AT!MUSLEN=<enable>**<br>Response: OK<br>or<br>ERROR<br>Purpose: Enable the unsolicited message feature.<br>▪ Query: **AT!MUSLEN?**<br>Response: !MUSLEN: <enable><br>OK<br>Purpose: Query the current feature's status.<br>▪ Query List: **AT!MUSLEN=?**<br>Response: !MUSLEN: (0-1)<br>OK<br>Purpose: Return the execution command format and the supported parameter values.<br><br>**Parameters:**<br><enable> (Enable or disable the feature)<br>· Valid values:<br>· 0—Disable<br>· 1—Enable |

# 18: MQTT AT Commands

This chapter describes MQTT related commands.

## 18.1 Command Summary

Table 18-1 lists the commands described in this chapter:

**Table 18-1: Unsolicited Message Commands**

| Command | Description | Page |
|---|---|---|
| **+KMQTTCFG** | Configure Server and MQTT Messaging Protocol | 379 |
| **+KMQTTCNX** | Connect to the MQTT Broker | 381 |
| **+KMQTTCLOSE** | Close Connection to a Remote MQTT Broker | 382 |
| **+KMQTTDEL** | Delete Session Created by AT+KMQTTCFG | 382 |
| **+KMQTTPUB** | Publish Message to an MQTT Session and Topic | 383 |
| **+KMQTTSUB** | Subscribe to a Specific MQTT Topic | 384 |
| **+KMQTTUNSUB** | Unsubscribe from a Specific MQTT Topic | 385 |
| **+KMQTT_DATA** | MQTT Data Received - Unsolicited Notification | 385 |
| **+KMQTT_IND** | MQTT Status - Unsolicited Notification | 386 |

# 18.2 Command Reference

**Table 18-2: MQTT Command Details**

| Command | Description |
|---|---|
| **+KMQTTCFG** | **Configure Server and MQTT Messaging Protocol Parameters**<br>This command is used to configure the server and MQTT messaging protocol parameters.<br>**Password required:** No<br><br>**Notes:**<br>• This command requires that the PDP profile indicated by cnx_cnf to be created via +KCNXCFG, otherwise, this command returns an error.<br>• The ALPN protocol list currently supports a single (1) ALPN name.<br><br>**Usage:**<br>▪ Execution: **AT+KMQTTCFG=<cnx_cnf>,<secure>,<server>,<port>,<version>,<client_id>[,[<keepalive_interval>],[<clean_session>],<will_flag>,<topic_name>,<message>,<retained>,<qos>[,[<username>],[<password>]],[<cipher_index>],[<alpn_list>]]**<br>Response: +KMQTTCFG:<session_id><br>OK<br>or<br>ERROR<br>Purpose: Configure a connection and receive an MQTT session ID<br>Query: **AT+KMQTTCFG?**<br>Response: +KMQTTCFG: <session_id>,<cnx_cnf>,<secure>,<server>,<port>,<version>,<client_id>, <keepalive_interval>,<clean session>,<will_flag>,<topic_name>,<message>,<retained>,<qos>,<username>,<password>,<cipher_index>,<alpn_list><br>OK<br>Purpose: Display the configurations for all MQTT sessions.<br>▪ Query List: **AT+KMQTTCFG=?**<br>Response: +KMQTTCFG: (list of possible: <cnx_cnf>),<secure>,<server>,<port>,<version>,<client_id>[,[<keepalive_interval>],[<cleansession>],<will_flag>,<topic_name>,<message>,<retained>,<qos>[,[<username>],[<password>]],[<cipher_index>],[<alpn_list>]]<br>OK<br>Purpose: Display valid execution format and parameter values.<br>**Parameters:**<br><cnx_cnf> Index of a set of parameters for configuring one MQTT session (see +KCNXCFG)<br><secure> MQTT connection security method.<br>• 0 — No security<br>• 1 — TLS (Transport Layer) |

**Table 18-2: MQTT Command Details (Continued)**

| Command | Description |
|---|---|
| | <server> String type which indicates the MQTT broker server.<br><port> [0–65535] Numeric parameter. Indicates MQTT broker server port.<br><version> Numeric parameter. Specifies MQTT version.<br>• 3 — for MQTT version 3.1<br>• 4 — for MQTT version 3.1.1 (Default)<br><client_id> String type. Indicates the MQTT client ID.<br><keepalive_interval> [0–65535] Numeric parameter. The keep-alive is a time interval in seconds.<br>• 120 — Default<br><clean_session> [0...1] Numeric parameter. Specifies the clean session flag configuration.<br>• 0 — Client requests a clean session from MQTT broker<br>• 1 — Client requests a persistent session from MQTT broker (Default)<br><will_flag> [0...1] Numeric parameter. Specifies the will session flag configuration.<br>• 0 — Disable the Last Will and Testament (LWT)<br>• 1 — Enable the Last Will and Testament<br><topicName> String type. Indicates the topic name of the Last Will and Testament (LWT) feature.<br><message> String type. Indicates the message of the Last Will and Testament (LWT) feature.<br><retained> [0...1] Numeric parameter. Specifies the retained flag configuration for the Last Will and Testament (LWT) feature.<br>• 0 — Not retained<br>• 1 — Retained<br><qos> [0...1] Numeric parameter. Specifies the QOS configuration for the Last Will and Testament (LWT) feature.<br>• 0 — At most once<br>• 1 — At least once<br>• 2 — Exactly once<br><username> String type. Indicates MQTT username for broker server authentication.<br><password> String type. Indicates MQTT password for broker server authentication.<br><cipher_index> Cipher suite profile index to use for a secured socket. Defined by KSSLCRYPTO<br><alpn_list> String type. Indicates the ALPN protocol name list for MQTT broker authentication.<br>**Example(s):**<br>• AT+KMQTTCFG=1,0,iot.eclipse.org,1883,4,"BX3101",30,1,1,"home/LWTMessage","BX3101offline",0,1,username,password<br>+KMQTTCFG: 1<br>OK |

**Table 18-2: MQTT Command Details (Continued)**

| Command | Description |
|---|---|
| **+KMQTTCNX** | **Connect to the MQTT Broker**<br><br>**Notes:**<br>• This command requires that the PDP profile indicated by cnx_cnf to be created via +KCNXCFG, otherwise, this command returns an error.<br>• The ALPN protocol list currently supports a single (1) ALPN name.<br><br>**Usage:**<br>▪ Execution: **AT+KMQTTCNX=<session_id>**<br>Response: +KMQTTCNX: <session_id><br>OK<br>or<br>+CME ERROR: <cme_err>.<br>+KMQTT_IND: <session_id>, <status><br>Purpose: Start the specified MQTT connection.<br>**Parameters:**<br><session_id> MQTT session ID. Unique integer value assigned by the broker when session was setup via +KMQTTCFG.<br><secure> MQTT connection security method.<br>• 0 — No security<br>• 1 — TLS (Transport Layer)<br><status> Integer type. Indicates the status of the MQTT operation.<br>• 0 — Connection aborted error<br>• 1 — Connection successful (CONNACK received from the MQTT broker)<br>• 2 — Subscribed to a topic successful (SUBACK received from the MQTT broker)<br>• 3 — Unsubscribed to a topic successful (UNSUBACK received from the MQTT broker)<br>• 4 — Message published successful (PUBACK received from the MQTT broker)<br>• 5 — Generic error<br><cme_err> CME error code<br>• 910 — CME_ER_BAD_SESSION_ID<br>• 916 — CME_ER_PARAMETER_INVALID_RANGE<br>• 922 — CME_ER_SESSION_INVALID_STAT<br><br>**Example(s):**<br>• AT+KMQTTCNX=1<br>+KMQTTCNX: 1<br>OK<br>+KMQTT_IND: 1,6<br>+KMQTT_IND: 1,1 |

**Table 18-2: MQTT Command Details (Continued)**

| Command | Description |
|---|---|
| **+KMQTTCLOSE** | **Close Connection to a Remote MQTT Broker**<br>**Password required:** No<br><br>**Notes:**<br>• This command does not delete the session configuration.<br><br>**Usage:**<br>▪ Execution: **AT+KMQTTCLOSE=<session_id>**<br>Response: +KMQTTCLOSE: <session_id><br>OK<br>or<br>+CME ERROR: <cme_err><br>Purpose: Close a MQTT session.<br>**Parameters:**<br><session_id> MQTT session ID. Unique integer value assigned by the broker when session was setup via +KMQTTCFG.<br><cme_err> CME error code<br>• 910 — CME_ER_BAD_SESSION_ID<br>• 916 — CME_ER_PARAMETER_INVALID_RANGE |
| **+KMQTTDEL** | **Delete Session Created by AT+KMQTTCFG**<br>**Password required:** No<br><br>**Notes:**<br>• The session must be closed using +KMQTTCLOSE before it can be deleted using this Command.<br><br>**Usage:**<br>▪ Execution: **AT+KMQTTDEL=<session_id>**<br>Response: +KMQTTDEL: <session_id><br>OK<br>or<br>+CME ERROR: <cme_err><br>Purpose: Delete a MQTT session.<br>**Parameters:**<br><session_id> MQTT session ID. Unique integer value assigned by the broker when session was setup via +KMQTTCFG.<br><cme_err> CME error code<br>• 910 — CME_ER_BAD_SESSION_ID<br>• 916 — CME_ER_PARAMETER_INVALID_RANGE<br><br>**Example(s):**<br>• AT+KMQTTDEL=1<br>+KMQTTDEL: 1<br>OK |

**Table 18-2: MQTT Command Details (Continued)**

| Command | Description |
|---|---|
| **+KMQTTPUB** | **Publish Message to an MQTT Session**<br>**Password required:** No<br><br>**Notes:**<br>• The session indicated by session_id needs to be connected first via +KMQTTCNX.<br><br>**Usage:**<br>▪ Execution: **AT+KMQTTPUB=<session_id>,<topic_name>,<qos>,<retained>, <payload>**<br>Response: +KMQTTPUB: <session_id><br>OK<br>or<br>+CME ERROR: <cme_err>.<br>+KMQTT_IND: <session_id>,<status><br>Purpose: Publish Message to an MQTT Session<br><br>**Parameters:**<br><session_id> Numeric parameter that is given by +KMQTTCFG.<br><topic_name> String type. Indicates topic name.<br><qos> Numeric parameter. Specifies QOS configuration for the Last Will and Testament (LWT) feature.<br>• 0 — At most once<br>• 1 — At least once<br>• 2 — Exactly once<br><retained> Numeric parameter. Specifies retained flag configuration.<br>• 0 — Not retained<br>• 1 — Retained<br><payload> String type. Indicates the message payload. Maximum payload size is 80 bytes.<br><status> Integer type. Indicates the status of the MQTT operation.<br>• 0 — Connection aborted error<br>• 1 — Connection successful (CONNACK received from the MQTT broker)<br>• 2 — Subscribed to a topic successful (SUBACK received from the MQTT broker)<br>• 3 — Unsubscribed to a topic successful (UNSUBACK received from the MQTT broker)<br>• 4 — Message published successful (PUBACK received from the MQTTbroker)<br>• 5 — Generic error<br><cme_err> CME error code<br>• 910 — CME_ER_BAD_SESSION_ID<br>• 916 — CME_ER_PARAMETER_INVALID_RANGE |

**Table 18-2: MQTT Command Details (Continued)**

| Command | Description |
|---|---|
| **+KMQTTSUB** | **Subscribe to a Specific MQTT Topic**<br>**Password required:** No<br><br>**Notes:**<br>• The session indicated by session_id needs to be connected first via +KMQTTCNX.<br>• Any incoming messages to the subscribed topic will be shown as URC in format of +KMQTT_DATA: <session_id>,"<topic_name>"","<payload>".<br><br>**Usage:**<br>▪ Execution: **AT+KMQTTSUB=<session_id>,<topic_name>,<qos>**<br>Response: +KMQTTSUB: <session_id><br>OK<br>or<br>+CME ERROR: <cme_err>.<br>+KMQTT_IND: <session_id>,<status><br>Purpose: Subscribe to a Specific MQTT Topic<br>**Parameters:**<br><session_id> Numeric parameter that is given by +KMQTTCFG.<br><topic_name> String type. Indicates topic name.<br><qos> Numeric parameter. Specifies QOS configuration for the Last Will and<br>Testament (LWT) feature.<br>• 0 — At most once<br>• 1 — At least once<br>• 2 — Exactly once<br><status> Integer type. Indicates the status of the MQTT operation.<br>• 0 — Connection aborted error<br>• 1 — Connection successful (CONNACK received from the MQTT broker)<br>• 2 — Subscribed to a topic successful (SUBACK received from the MQTT broker)<br>• 3 — Unsubscribed to a topic successful (UNSUBACK received from the MQTT broker)<br>• 4 — Message published successful (PUBACK received from the MQTTbroker)<br>• 5 — Generic error<br><cme_err> CME error code<br>• 910 — CME_ER_BAD_SESSION_ID<br>• 916 — CME_ER_PARAMETER_INVALID_RANGE<br><br>**Example(s):**<br>• AT+KMQTTSUB=1,"home/temp",1<br>+KMQTTSUB: 1<br>OK<br>+KMQTT_IND: 1, 2 |

**Table 18-2: MQTT Command Details (Continued)**

| Command | Description |
|---|---|
| **+KMQTTUNSUB** | **Unsubscribe from a Specific MQTT Topic**<br><br>**Usage:**<br>▪ Execution: **AT+KMQTTUNSUB=<session_id>,<topic_name>**<br>Response: +KMQTTUNSUB: <session_id><br>OK<br>or<br>+CME ERROR: <cme_err>.<br>+KMQTT_IND: <session_id>,<status><br>Purpose: Subscribe to a Specific MQTT Topic<br>**Parameters:**<br><session_id> Numeric parameter that is given by +KMQTTCFG.<br><topic_name> String type. Indicates topic name.<br><status> Integer type. Indicates the status of the MQTT operation.<br>• 0 — Connection aborted error<br>• 1 — Connection successful (CONNACK received from the MQTT broker)<br>• 2 — Subscribed to a topic successful (SUBACK received from the MQTT broker)<br>• 3 — Unsubscribed to a topic successful (UNSUBACK received from the MQTT broker)<br>• 4 — Message published successful (PUBACK received from the MQTTbroker)<br>• 5 — Generic error<br><cme_err> CME error code<br>• 910 — CME_ER_BAD_SESSION_ID<br>• 916 — CME_ER_PARAMETER_INVALID_RANGE<br><br>**Example(s):**<br>• AT+KMQTTUNSUB=1,"home/temp"<br>+KMQTTUNSUB: 1<br>+KMQTT_IND: 1, 3 |
| **+KMQTT_DATA** | **MQTT Data Received - Unsolicited Notification**<br><br>**Usage:**<br>Response: **+KMQTT_DATA: <session_id>,"<topicName>","<payload>"**<br>**Parameters:**<br><session_id> [0–65535] Numeric parameter. From +KMQTTCFG.<br><topicName> String type. Indicates topic name.<br><payload> String type<br><br>**Example(s):**<br>• +KMQTT_DATA: 1,"home/led",""LED ON" |

**Table 18-2: MQTT Command Details (Continued)**

| Command | Description |
|---|---|
| **+KMQTT_IND** | **MQTT Status - Unsolicited Notification**<br>**Password required:** No<br><br>**Usage:**<br>Response: +**KMQTT_IND: <session id>, <status>**<br>**Parameters:**<br><br><session_id> MQTT session in decimal format<br><br><status> String type. [0–6] Numeric parameter.<br>• 0 — MQTT connection aborted error. The process to establish or maintain the connection with the MQTT broker failed.<br>• 1 — MQTT connection successful (CONNACK received from the MQTT broker)<br>• 2 — MQTT subscribe to a topic successful (SUBACK received from the MQTT broker)<br>• 3 — MQTT unsubscribe to a topic successful (UNSUBACK received from the MQTT broker)<br>• 4 — MQTT message publish successful (PUBACK received if QoS=1 or PUBCOMP received if QoS=2 from the MQTT broker). It is only generated when publishing messaged with QOS > 0.<br>• 5 — MQTT generic error<br><br>**Example(s):**<br>• +MQTT_IND: 1,1 |

# 19: Supported GSM/WCDMA AT Commands

This chapter identifies standard AT commands that are supported by most Semtech devices. These commands:

- Control serial communications over an asynchronous interface (*ITU-T Serial Asynchronous Dialling and Control (Recommendation V.250*), available on the International Telecommunication Union web site, www.itu.int).
  See Table 19-1 below.
- Control SMS functions for devices on GSM/WCDMA networks (*3GPP TS 27.005*, available on the 3GPP web site, www.3gpp.org)
  See Table 19-2 on page 389.
- Control devices operating on GSM/WCDMA networks (*3GPP TS 27.007,* available on the 3GPP web site, www.3gpp.org)
  See Table 19-3 on page 390.

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

Commands that are partially supported include descriptions identifying any limitations on command usage. Also, some commands are described in more detail in other chapters — the descriptions for these commands link to those detailed entries (for example, **&V** in Table 19-1).

**Table 19-1: Supported ITU-T Recommendation V.250 AT Commands**

| Command | Description | Supported<br>4=Yes; 8=No |
|---|---|---|
| **Commands** | | |
| **&C** | Set Data Carrier Detected (Received line signal detector) function mode<br>Format<br>▪ &C<value><br>Limitations<br>▪ Default <value> = 2<br>▪ <value> = 2 causes the AT/Data carrier detect pin to 'wink' (briefly switch off and on) when data calls end.<br>▪ <value> = 0 or 1 performs as defined in the standard | 4 |
| **&D** | Set Data Terminal Ready function mode | 4 |
| **&F** | Set all current parameters to manufacturer's defaults | 4 |
| **&K** | Flow control | 4<br>For details, see &K |
| **&S** | Set DSR signal | 4 |
| **&T** | Auto tests | 8 |
| **&V** | Return operating mode AT configuration parameters | 4 |
| **&W** | Store current parameter to user-defined profile | 4 |
| **+++** | Switch from Data Mode to Command Mode | 4<br>For details, see +++ |

**Table 19-1: Supported ITU-T Recommendation V.250 AT Commands (Continued)**

| Command | Description | Supported 4=Yes; 8=No |
|---|---|---|
| **+DR** | V42bis data compression report | 4 |
| **+DS** | V42bis data compression | 4 |
| **+GCAP** | Request complete TA capabilities list | 4 |
| **+GMI** | Request manufacturer identification | 4 |
| **+GMM** | Request TA model identification | 4 |
| **+GMR** | Request TA revision identification | 4 |
| **+GOI** | Request global object identification | 8 |
| **+GSN** | Request TA serial number identification | 4 |
| **+ICF** | Set TE-TA control character framing | 4 |
| **+IFC** | Set TE-TA local data flow control | 4 |
| **+ILRR** | Set TE-TA local rate reporting mode | 8 |
| **+IPR** | Note: Set fixed local rate (default rate is 115200). | 4 |
| **A** | Answer incoming call | 4 |
| **A/** | Re-issues last AT command given | 4 |
| **D** | Dial | 4 |
| **D><MEM><N>** | Originate call to phone number in memory <MEM> | 8 |
| **D><N>** | Originate call to phone number in current memory | 4 |
| **D><STR>** | Originate call to phone number in memory which corresponds to alphanumeric field <STR> | 8 |
| **DL** | Redial last telephone number used | 8 |
| **E** | Set command echo mode | 4 |
| **H** | Disconnect existing connections | 4 |
| **I** | Display product identification information | 4 For details, see !HWID |
| **L** | Set monitor speaker loudness | 8 |
| **M** | Set monitor speaker mode | 8 |
| **O** | Switch from command mode to data mode | 4 |
| **P** | Select pulse dialing | 8 |
| **Q** | Set Result code presentation mode | 4 |
| **S0** | Set number of rings before automatically answering the call | 4 |

**Table 19-1: Supported ITU-T Recommendation V.250 AT Commands (Continued)**

| Command | Description | Supported 4=Yes; 8=No |
|---|---|---|
| S10 | Set disconnect delay after indicating the absence of data carrier | 4 |
| S3 | Set command line termination character | 4 |
| S4 | Set response formatting character | 4 |
| S5 | Set command line editing character | 4 |
| S6 | Set pause before blind dialing | 4 |
| S7 | Set number of seconds to wait for connection completion | 4 |
| S8 | Set number of seconds to wait when comma dial modifier used | 4 |
| S11 | Query/set DTMF dialing speed | 4 For details, see S11 |
| T | Select tone dialing | 4 |
| V | Set result code format mode | 4 |
| X | Set connect result code format and call monitoring | 4 |
| Z | Set all current parameters to user-defined profile | 4 |
| Result Codes | | |
| OK | Acknowledges execution of a command | 4 |
| CONNECT | A connection has been established | 4 |
| RING | Unsolicited notification of an incoming call signal from the network | 4 |
| NO CARRIER | The connection has been terminated or the attempt to establish a connection failed | 4 |
| ERROR | Command not recognized, command line maximum length exceeded, parameter value invalid, or other problem with processing the command line | 4 |
| NO DIALTONE | No dial tone detected | 4 |
| BUSY | Engaged (busy) signal detected | 4 |

**Table 19-2: Supported 27.005 AT Commands**

| Command | Description | Supported 4=Yes; 8=No |
|---|---|---|
| +CBM | Cell broadcast message directly displayed | 4 |
| +CBMI | Cell broadcast message stored in memory at specified <index> location | 8 |
| +CDS | SMS status report after sending a SMS | 4 |
| +CDSI | Incoming SMS status report | 4 |
| +CMGC | Send command | 4 |

**Table 19-2: Supported 27.005 AT Commands (Continued)**

| Command | Description | Supported 4=Yes; 8=No |
|---|---|---|
| **+CMGD** | Delete message | 4 |
| **+CMGF** | Message format | 4 |
| **+CMGL** | List messages | 4 |
| **+CMGR** | Read message | 4 |
| **+CMGS** | Send message | 4 |
| **+CMGW** | Write message to memory | 4 |
| **+CMMS** | More messages to send | 4 |
| **+CMS ERROR: <err>** | SMS error (mobile or network error) | 4 |
| **+CMSS** | Send message from storage | 4 |
| **+CMT** | Incoming message directly displayed | 4 |
| **+CMTI** | Incoming message stored in <mem> ("SM" — SIM message storage) at location <index> | 4 |
| **+CNMA** | New message acknowledgment to mobile equipment | 4 |
| **+CNMI** | New message indications to TE<br>*Note: The following parameter settings are not supported:*<br>▪ *<mode>=0 or 2, <mt>=2 or 3*<br>▪ *<mode>=0 or 2, <ds>=1*<br>▪ *<bm>=1* | Partial |
| **+CPMS** | Preferred message storage | 4 |
| **+CRES** | Restore settings | 8 |
| **+CSAS** | Save settings | 8 |
| **+CSCA** | Service center address | 4 |
| **+CSCB** | Select cell broadcast message types | 4 |
| **+CSDH** | Show text mode parameters | 4 |
| **+CSMP** | Set text mode parameters | 4 |
| **+CSMS** | Select message service | 4 |

**Table 19-3: Supported 27.007 AT Commands**

| Command | Description | Supported 4=Yes; 8=No |
|---|---|---|
| **C** | ITU T V.24 circuit 109 carrier detect signal behavior command | 8 |
| **+CACM** | Accumulated call meter | 8 |

**Table 19-3: Supported 27.007 AT Commands (Continued)**

| Command | Description | Supported 4=Yes; 8=No |
|---|---|---|
| **+CACSP** | Voice Group or Voice Broadcast Call State Attribute Presentation | N/A |
| **+CAEMLPP** | eMLPP Priority Registration and Interrogation | 8 |
| **+CAHLD** | Leave an ongoing Voice Group or Voice Broadcast Call | N/A |
| **+CAJOIN** | Accept an incoming Voice Group or Voice Broadcast Call | N/A |
| **+CALA** | Alarm | N/A |
| **+CALCC** | List current Voice Group and Voice Broadcast Calls | N/A |
| **+CALD** | Delete alarm | N/A |
| **+CALM** | Alert sound mode | 8 |
| **+CAMM** | Accumulated call meter maximum | 8 |
| **+CANCHEV** | NCH Support Indication | 8 |
| **+CAOC** | Advice of Charge | 4 |
| **+CAPD** | Postpone or dismiss an alarm | N/A |
| **+CAPTT** | Talker Access for Voice Group Call | N/A |
| **+CAREJ** | Reject an incoming Voice Group or Voice Broadcast Call | N/A |
| **+CAULEV** | Voice Group Call Uplink Status Presentation | N/A |
| **+CBC** | Battery charge | 8 |
| **+CBST** | Select bearer service type | 4 |
| **+CCCM** | Current call meter value | 8 |
| **+CCFC** | Call forwarding number and conditions | 4 |
| **+CCLK** | Clock | 4 |
| **+CCUG** | Closed user group | 4 |
| **+CCWA** | Call waiting | 4 |
| **+CCWE** | Call Meter maximum event | 8 |
| **+CDIP** | Called line identification presentation | 8 |
| **+CDIS** | Display control | 8 |
| **+CEER** | Extended error report | 8 |
| **+CEREG** | EPS network registration status<br>Note: Command implementation based on 3GPP 27.007 rel 8.11.0. | 4 |

**Table 19-3: Supported 27.007 AT Commands (Continued)**

| Command | Description | Supported 4=Yes; 8=No |
|---|---|---|
| **+CFUN** | Set phone functionality<br>Format<br>▪ +CFUN = [ <fun> [, <rst>] ]<br>Limitations<br>▪ Valid <fun> values:<br>· 0 (minimum functionality, low power draw)<br>· 1 (full functionality, high power draw)<br>· 4 (Airplane mode, low power draw)<br>· 5 (Factory Test Mode)<br>· 6 (Reset UE)<br>· 7 (Offline mode) | 4 |
| **+CGACT** | PDP context activate or deactivate | 4 |
| **+CGANS** | Manual response to a network request for PDP context activation | 8 |
| **+CGATT** | PS attach or detach | 4 |
| **+CGAUTO** | Automatic response to a network request for PDP context activation | 8 |
| **+CGCLASS** | GPRS mobile station class | 4 |
| **+CGCLOSP** | Configure local octet stream PAD parameters | 8 |
| **+CGCMOD** | PDP Context Modify | 4 |
| **+CGCONTRDP** | PDP Context Read Dynamic Parameters | 4 |
| **+CGDATA** | Enter data state | 4 |
| **+CGDCONT** | Define PDP Context | 4<br>For details, see +CGDCONT. |
| **+CGDSCONT** | Define Secondary PDP Context | 4 |
| **+CGEQMIN** | 3G Quality of Service Profile (Minimum acceptable) | 4 |
| **+CGEQNEG** | 3G Quality of Service Profile (Negotiated) | 4 |
| **+CGEQOS** | Define EPS Quality of Service | 4 |
| **+CGEQREQ** | 3G Quality of Service Profile (Requested) | 4 |
| **+CGEREP** | Packet Domain event reporting | 4 |
| **+CGEV** | GPRS network event indication | 4 |
| **+CGMI** | Request manufacturer identification | 4 |
| **+CGMM** | Request model identification | 4 |
| **+CGMR** | Request revision identification | 4 |
| **+CGPADDR** | Show PDP address | 4 |
| **+CGQMIN** | Quality of Service Profile (Minimum acceptable) | 4 |

**Table 19-3: Supported 27.007 AT Commands (Continued)**

| Command | Description | Supported 4=Yes; 8=No |
|---|---|---|
| +CGQREQ | Quality of Service Profile (Requested) | 4 |
| +CGREG | GPRS network registration status | 4 |
| +CGSCONTRDP | Secondary PDP Context Read Dynamic Parameters | 4 |
| +CGSMS | Select service for MO SMS messages | 4 |
| +CGSN | Request product serial number identification | 4 |
| +CGTFT | Traffic Flow Template | 4 |
| +CGTFTRDP | Traffic Flow Template Read Dynamic Parameters | 4 |
| +CHLD | Call related supplementary services | 4 |
| +CHSA | HSCSD non-transparent asymmetry configuration | N/A |
| +CHSC | HSCSD current call parameters | N/A |
| +CHSD | HSCSD device parameters | N/A |
| +CHSR | HSCSD parameters report | N/A |
| +CHST | HSCSD transparent call configuration | N/A |
| +CHSU | HSCSD automatic user initiated upgrading | N/A |
| +CHUP | Hangup call | 4 |
| +CIEV | Indicator event | 4 |
| +CIMI | Request international mobile subscriber identity | 4 |
| +CIND | Indicator control | 4 |
| +CKEV | Key press or release event | 8 |
| +CKPD | Keypad control | 8 |
| +CLAC | List all available AT commands | 8 |
| +CLAE | Language Event | 8 |
| +CLAN | Set Language | 8 |
| +CLCC | List current calls | 4 |
| +CLCK | Facility lock | 4 |
| +CLIP | Calling line identification presentation | 4 |
| +CLIR | Calling line identification restriction | 4 |
| +CLVL | Set/return internal loudspeaker volume | 4 |
| +CMAR | Master Reset | 8 |
| +CME ERROR: <err> | Mobile Termination error result code | 4 |

**Table 19-3: Supported 27.007 AT Commands (Continued)**

| Command | Description | Supported 4=Yes; 8=No |
|---|---|---|
| **+CMEC** | Mobile Termination control mode | 4 |
| **+CMEE** | Report Mobile Termination error | 4 For details, see +CMEE |
| **+CMER** | Mobile Termination event reporting<br>*Note: The following parameter values are not supported:*<br>▪ *<mode> = 2*<br>▪ *<bfr> = 1* | Partial |
| **+CMOD** | Call mode | 4 |
| **+CMUT** | Enable/disable uplink voice muting | 4 |
| **+CMUX** | Multiplexing mode | 4 (When MUX mode configured on USB or UART interface.) |
| **+CNUM** | Subscriber number | 4 |
| **+COLP** | Connected line identification presentation | 4 |
| **+COPN** | Read operator names | 4 |
| **+COPS** | Operator selection | 4 |
| **+CPAS** | Phone activity status | 4 |
| **+CPBF** | Find phonebook entries | 4 |
| **+CPBR** | Read phonebook entries | 4 |
| **+CPBS** | Select phonebook memory storage | 4 |
| **+CPBW** | Write phonebook entry | 4 |
| **+CPIN** | Enter PIN | 4 |
| **+CPLS** | Preferred PLMN list selection | 4 |
| **+CPOL** | Preferred operator list | 4 |
| **+CPROT** | Enter protocol mode | 8 |
| **+CPUC** | Price per unit and currency table | 4 |
| **+CPWC** | Power class | 8 |
| **+CPWD** | Change password | 4 |
| **+CR** | Service reporting control | 4 |
| **+CRC** | Cellular result codes | 4 |
| **+CREG** | Network registration | 4 |
| **+CRING** | Incoming call type | 4 |

**Table 19-3: Supported 27.007 AT Commands (Continued)**

| Command | Description | Supported 4=Yes; 8=No |
|---|---|---|
| **+CRLP** | Radio link protocol | 4 |
| **+CRMP** | Ring Melody Playback | N/A |
| **+CRSL** | Ringer sound level | N/A |
| **+CRSM** | Restricted SIM access | 4 |
| **+CSCC** | Secure control command | 8 |
| **+CSCS** | Select TE character set | 4 |
| **+CSDF** | Settings date format | N/A |
| **+CSGT** | Set Greeting Text | N/A |
| **+CSIL** | Silence Command | N/A |
| **+CSIM** | Generic SIM access | 4 |
| **+CSNS** | Single numbering scheme | 8 |
| **+CSQ** | Signal quality | 4 |
| **+CSSN** | Supplementary service notifications | 4 |
| **+CSTA** | Select type of address | 4 |
| **+CSTF** | Settings time format | 4 |
| **+CSVM** | Set Voice Mail Number | 8 |
| **+CTFR** | Call deflection | 4 |
| **+CTZR** | Time Zone Reporting | 4 (Release 10 BP2) |
| **+CTZU** | Automatic Time Zone Update | 4 |
| **+CUSD** | Unstructured supplementary service data | 4 |
| **+CV120** | V.120 rate adaptation protocol | 8 |
| **+CVHU** | Voice Hangup Control | 8 |
| **+CVIB** | Vibrator mode | N/A |
| **D** | ITU T V.25ter [14] dial command | 4 |
| **D*99#** | Sets up a packet data call (PDP context) based on profile ID #1 | 4 |
| **D*99***<n>#** | Sets up a packet data call (PDP context) based on profile ID #<n> (<n> is the <cid> in the +CGDCONT command) | 4 |
| **+VTD** | Tone duration | 4 |
| **+VTS** | DTMF and arbitrary tone generation | 4 |
| **+WS46** | PCCA STD 101 [17] select wireless network | 8 |

# 20: Band Definitions

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

- An enumerated value representing a network technology and band (Table 20-1).
  Commands using this table:
  - !DASBAND
- A 3GPP band number (Table 20-2).
  Commands using this table:
  - !ANTSEL
  - !MAXPWR

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

**Table 20-1: Band / technology Enumerations[a,b]**

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

a. Band values not listed (e.g. 1, 3, 4) are reserved.
b. Commands using this table are identified in the chapter introduction.

**Table 20-2: 3GPP Bands[a,b]**

| 3GPP Band | Frequency ranges (MHz) | | 3GPP Band | Frequency ranges (MHz) | |
|---|---|---|---|---|---|
| | Tx | Rx | | Tx | Rx |
| 1 | 1920–1980 | 2110–2170 | 30 | 2305–2315 | 2350–2360 |
| 2 | 1850–1910 | 1930–1990 | 31 | 452.5–457.5 | 462.5–467.5 |
| 3 | 1710–1785 | 1805–1880 | 32 | n/a | 1452–1496 |
| 4 | 1710–1755 | 2110–2155 | 33 | 1900–1920 | |
| 5 | 824–849 | 869–894 | 34 | 2010–2025 | |
| 6 | 830–840 | 875–885 | 35 | 1850–1910 | |
| 7 | 2500–2570 | 2620–2690 | 36 | 1930–1990 | |
| 8 | 880–915 | 925–960 | 37 | 1910–1930 | |
| 9 | 1749.9–1784.9 | 1844.9–1879.9 | 38 | 2570–2620 | |
| 10 | 1710–1770 | 2110–2170 | 39 | 1880–1920 | |
| 11 | 1427.9–1447.9 | 1475.9–1495.9 | 40 | 2300–2400 | |
| 12 | 699–716 | 729–746 | 41 | 2496–2690 | |
| 13 | 777–787 | 746–756 | 42 | 3400–3600 | |
| 14 | 788–798 | 758–768 | 43 | 3600–3800 | |
| 15 | Reserved | Reserved | 44 | 703–803 | |
| 16 | Reserved | Reserved | 45 | 1447–1467 | |
| 17 | 704–716 | 734–746 | 46 | 5150–5925 | |
| 18 | 815–830 | 860–875 | 47 | 5855–5925 | |
| 19 | 830–845 | 875–890 | 48 | 3550–3700 | |
| 20 | 832–862 | 791–821 | 49 | 3550–3700 | |
| 21 | 1447.9–1462.9 | 1495.9–1510.9 | 50 | 1432–1517 | |
| 22 | Reserved | Reserved | 51 | 1427–1432 | |
| 23 | 2000–2020 | 2180–2200 | 52 | 3300–3400 | |
| 24 | 1626.5–1660.5 | 1525–1559 | 53-64 | Reserved | Reserved |
| 25 | 1850–1915 | 1930–1995 | 65 | 1920–2010 | 2110–2200 |
| 26 | 814–849 | 859–894 | 66 | 1710–1780 | 2110–2200 |
| 27 | 807–824 | 852–869 | 67-70 | Reserved | Reserved |
| 28 | 703–748 | 758–803 | 71 | 663–698 | 617–652 |
| 29 | n/a | 717–728 | | | |

a. For CDMA bands, use these equivalents: BC0 (Band 5), BC1 (Band 2), BC10 (Band 6).
b. Commands using this table are identified in the chapter introduction.

# A: Appendix

## A.1 ASCII Values

**Table A-1: ASCII Values**

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

# A.2 CME Error Codes

**Table A-2: CME Error Codes**

| <err> Code | Meaning |
|---|---|
| 0 | Phone failure |
| 1 | No connection to phone |
| 2 | Phone?adapter link reserved |
| 3 | Operation not allowed |
| 4 | Operation not supported |
| 5 | PH-SIM PIN required |
| 6 | PH-FSIM PIN required |
| 7 | PH-FSIM PUK required |
| 10 | SIM not inserted |
| 11 | SIM PIN required |
| 12 | SIM PUK required |
| 13 | SIM failure |
| 14 | SIM busy |
| 15 | SIM wrong |
| 16 | Incorrect password |
| 17 | SIM PIN2 required |
| 18 | SIM PUK2 required |
| 20 | Memory full |
| 21 | Invalid index |
| 22 | Not found |
| 23 | Memory failure |
| 24 | Text string too long |
| 25 | Invalid characters in text string |
| 26 | Dial string too long |
| 27 | Invalid characters in dial string |
| 30 | No network service |
| 31 | Network timeout |
| 32 | Network not allowed - emergency call only |
| 40 | Network personalization PIN required |

**Table A-2: CME Error Codes (Continued)**

| <err> Code | Meaning |
|---|---|
| 41 | Network personalization PUK required |
| 42 | Network subset personalization PIN required |
| 43 | Network subset personalization PUK required |
| 44 | Service provider personalization PIN required |
| 45 | Service provider personalization PUK required |
| 46 | Corporate personalization PIN required |
| 47 | Corporate personalization PUK required |
| 49 | EAP method not supported |
| 50 | Incorrect parameters |
| 51 | Parameter length error for all Auth commands |
| 52 | Temporary error for all auth cmds |
| 100 | Unknown error |
| 103 | Illegal Mem_Store |
| 106 | Illegal ME |
| 107 | GPRS services not allowed |
| 111 | PLMN not allowed |
| 112 | Location area not allowed |
| 113 | Roaming not allowed in this location area |
| 132 | Service option not supported |
| 133 | Requested service option not subscribed |
| 134 | Service option temporarily out of order |
| 148 | Unspecified GPRS error |
| 149 | PDP authentication failure |
| 150 | Invalid mobile class |
| 257 | network rejected supserv request |
| 258 | retry operation |
| 259 | invalid deflected to number |
| 260 | deflected to own number |
| 261 | unknown subscriber |
| 262 | service not available |
| 263 | unknown class |

**Table A-2: CME Error Codes (Continued)**

| <err> Code | Meaning |
|---|---|
| 264 | unknown network message |
| 273 | Minimum TFT per PDP address error |
| 274 | Duplicate TFT eval prec index |
| 275 | Invalid TFT param combination |
| 320 | Call Index Error |
| 321 | Call State Error |
| 322 | Sys State Error |
| 323 | Parameter Error |
| 652 | LWM2M session in progress |
| 654 | RDMS services are in “deactivated” state |
| 655 | RDMS services are in “prohibited” state (see +WDSG command) |
| 656 | RDMS services are in “to be provisioned” state; no available NAP |
| 800 | SIM Security unspecified error |
| 902 | No more sockets available; the maximum number has been reached |
| 903 | Memory problem |
| 904 | DNS error |
| 905 | TCP disconnection by the server |
| 906 | TCP/UDP connection error |
| 907 | Generic error |
| 908 | Fail to accept client request's |
| 909 | Data send by KTCPSND/KUDPSND are incoherent |
| 910 | Bad session ID |
| 911 | Session is already running |
| 912 | No more sessions can be used |
| 913 | Socket connection timer timeout |
| 914 | Control socket connection timer timeout |
| 915 | A parameter is not expected |
| 916 | A parameter has an invalid range of values |
| 917 | A parameter is missing |
| 918 | Feature is not supported |
| 919 | Feature is not available |

**Table A-2: CME Error Codes (Continued)**

| <err> Code | Meaning |
|---|---|
| 920 | Protocol is not supported |
| 921 | Error due to invalid state of bearer connection |
| 922 | Error due to invalid state of session |
| 923 | Error due to invalid state of terminate port data mode |
| 924 | Error due to session busy, retry later |
| 925 | Failed to decode HTTP header's name, missing ':' |
| 926 | Failed to decode HTTP header's value, missing 'cr/lf' |
| 927 | HTTP header's name is an empty string |
| 928 | HTTP header's value is an empty string |
| 929 | Format of input data is invalid |
| 930 | Content of input data is invalid or not supported |
| 931 | The length of a parameter is invalid |
| 932 | The format of a parameter is invalid |

# A.3 Command Timeout and Other Information

The following table provides additional information for commands supported by the RC76xx modules. Cells in the following table are color-coded to indicate the recommended timeout for AT commands. Time is subject to change depending on several factors such as SIM cards, networks, or the amount of data to be written on non-volatile memory.

*Note: This table for reference only, may be different by firmware version and environment testing*

Legend:

| | |
|---|---|
| | 2 seconds |
| | 5 seconds |
| | 30 seconds |
| | 60 seconds |
| | 120 seconds |
| | No advised timeout: Data size dependent |
| **?** | Command can be written in non-volatile memory |

**Table A-3: Command Timeout (Unlisted commands timeout value: 2 seconds)**

| Page # | Command Description | RC76xx |
|---|---|---|
| **ITU-T V.250 AT Commands** | | |
| 48 | +++ Command: Switch from Data Mode to Command Mode | 2 |
| 388 | O Command: Switch from Command Mode to Data Mode | 2 |
| 388 | E Command: Enable Command Echo | 2 |
| 387 | &K Command: Flow Control Option | 2 |
| 387 | &F Command: Restore Manufactory Configuration | 2 |
| 387 | &V Command: Display Current Configuration | 2 |
| 387 | &W Command: Save Stored Profile | ? 30 |
| 389 | Z Command: Reset and Restore User Configuration | 5 |
| 388 | +IPR Command: Set Fixed Local Rate | ? 2 |
| 387 | &C Command: Set Data Carrier Detect (DCD) Function Mode | 2 |
| 387 | &D Command: Set Data Terminal Ready (DTR) Function Mode | 2 |
| 387 | &S Command: DSR Option | 2 |
| 389 | S4 Command: Set Response Formatting Character | 2 |
| 388 | +IFC Command: Set TE-TA local data flow control | 2 |
| **General AT Commands** | | |
| 388 | I Command: Display product identification information | 2 |
| 392 | +CGMI/+GMI Command: Request Manufacturer Identification | 2 |
| 392 | +CGMM/+GMM Command: Request Model Identification | 2 |
| 392 | +CGMR/+GMR Command: Request Revision Identification | 2 |
| 393 | +CGSN Command: Request product serial number identification | 2 |
| 108 | +KGSN Command: Request Product Serial Number Identification and Software Version | 2 |
| 395 | +CSCS Command: Set TE Character Set | ? 2 |
| 393 | +CIMI Command: Request International Subscriber Identity | 2 |
| 388 | +GSN Command: Request Product Serial Number Identification (IMEI) | 2 |
| 388 | +GCAP Command: Request complete TA capabilities list | 2 |
| 48 | +CMUX Command: Configure Multiplexing Control Channel | 2 |
| **Call Control Commands** | | |
| 48 | +CMEE Command: Report Mobile Termination error | ? 2 |

**Table A-3: Command Timeout (Unlisted commands timeout value: 2 seconds) (Continued)**

| | | |
|---|---|---|
| **Mobile Equipment Control and Status Commands** | | |
| 391 | +CCLK Command: Clock | 30 |
| 213 | +CCID Command: SIM Card Identification (Unsolicited Notification) | 2 |
| 392 | +CFUN Command: Set Phone Functionality | 30 |
| 394 | +CPIN Command: Enter PIN | 60 |
| 394 | +CPAS Command: Phone Activity Status | 2 |
| 395 | +CSQ Command: Signal Quality | 2 |
| 115 | +KSREP Command: start-up reporting, enable/disable | ? 2 |
| 395 | +CSIM Command: Generic SIM Access | 5 |
| 395 | +CRSM Command: SIM Restricted Access | 5 |
| 395 | +CTZU Command: Automatic Time Zone Update | ? 2 |
| 73 | +CPSMS Command: Configure Power Saving Mode (PSM) | 2 |
| 63 | +CESQ Command: Extended Signal Quality | 2 |
| 105 | +KCELL Display Detected Cell Details | 2 |
| 113 | +KSLEEP Configure UART1 power management (sleep mode entry conditions) | ? 2 |
| 74 | +CPWROFF Command: Power Off | 120 |
| 74 | +CPWROFF Command: Power Off (when +CPWROFF=1) | 2 |
| 114 | +KSRAT Set the current RAT | ? 2 |
| 220 | +KSIMSEL Command: SIM Selection | |
| 111 | +KSIMDET Command: SIM Detection | |
| **Network Service Related Commands** | | |
| 394 | +CPWD Command: Change Password | 2 |
| 394 | +COPN Command: Read Operator Name | 30 |
| 394 | +COPS Command: Operator Selection | 180 |
| 394 | +CPOL Command: Preferred PLMN List | 2 |
| 394 | +CREG Command: Network Registration | ? 2 |
| 394 | +CPLS Command: Selection of Preferred PLMN List | 2 |
| 391 | +CEREG Command: EPS Network Registration Status | ? 2 |
| 394 | +CNUM Command: Subscriber Number | |
| **SMS AT Commands** | | |
| 390 | +CMGD Command: Delete SMS Message | 2 |
| 390 | +CMGF Command: Select SMS Message Format | ? 2 |

**Table A-3: Command Timeout (Unlisted commands timeout value: 2 seconds) (Continued)**

| | | |
|---|---|---|
| 390 | +CMGL Command: List SMS Messages from Preferred Storage | 30 |
| 390 | +CMGR Command: Read SMS Message | 30 |
| 390 | +CMGS Command: Send SMS Message | 30 |
| 390 | +CMGW Command: Write SMS Message to Memory | 30 |
| 390 | +CMSS Command: Send SMS Message from Storage | 30 |
| 390 | +CNMI Command: New SMS Message Indication | ? 2 |
| 390 | +CSCA Command: SMS Service Center Address | ? 2 |
| 390 | +CSMP Command: Set SMS Text Mode Parameters | 2 |
| 390 | +CSMS Command: Select Message Service | 2 |
| 390 | +CPMS Command: Preferred Message Storage | 2 |
| 390 | +CSDH Command: Show Text Mode Parameters | 2 |
| 390 | +CMT Notification: incoming message directly displayed | 2 |
| | **Packet Domain Commands** | |
| 392 | +CGATT Command: PS Attach or Detach | 60 |
| 392 | +CGACT Command: PDP Context Activate or Deactivate | 60 |
| 392 | +CGCMOD Command: Modify PDP Context | 60 |
| 392 | +CGTFT Command: Traffic Flow Template | 2 |
| 392 | +CGDCONT Command: Define PDP Context | 5 |
| 392 | +CGEREP Command: GPRS Event Reporting | ? 2 |
| 392 | +CGPADDR Command: Show PDP Address | 2 |
| 393 | +CGSMS Command: Select Service for MO SMS Messages | 2 |
| | **Protocol Specific Commands – Connection Configuration** | |
| 281 | +KCNXCFG Command: GPRS Connection Configuration | 2 |
| 284 | +KCNXTIMER Command: Configure TCP/UDP Connection Timer | 2 |
| 283 | +KCNXPROFILE Command: Query/Set Default PDP Context | 2 |
| 279 | +KCGPADDR Command: Display PDP Context Addresses | 2 |
| 280 | +KCNX_IND Notification: Connection Attempt Status (Unsolicited Notification) | 2 |
| 285 | +KCNXUP Command: Bring up PDP connection | 2 |
| 283 | +KCNXDOWN Command: Bring the PDP Connection Down | 2 |
| | **Protocol Specific Commands – Common Configuration** | |
| 315 | +KPATTERN Command: Custom End Of Data Pattern | 2 |
| 339 | +KURCCFG Command: Enable/Disable Protocol Notifications (URCs) | 2 |

**Table A-3: Command Timeout (Unlisted commands timeout value: 2 seconds) (Continued)**

| | | |
|---|---|---|
| 312 | +KIPOPT Command: General Options Configuration | |
| | **TCP Specific Commands** | |
| 286 | +KTCPCFG Command: TCP Connection Configuration | 2 |
| 288 | +KTCPCNX Command: Start TCP Connection | 30 |
| 291 | +KTCPRCV Command: Receiving Data through a TCP Connection | 60 |
| 330 | +KTCPSND Command: Sending Data through a TCP Connection | 60 |
| 326 | +KTCPCLOSE Command: Closing Current TCP Connection | 60 |
| 328 | +KTCPDEL Command: Delete Configured TCP Session | 2 |
| 322 | +KTCP_SRVREQ Notification: Incoming client connection request (Unsolicited Notification) | 2 |
| 321 | +KTCP_DATA Notification: Incoming Data through a TCP Connection | 60 |
| 321 | +KTCP_IND Notification: TCP Status | 2 |
| 332 | +KTCPSTAT Command: Get TCP Socket Status | 2 |
| 331 | +KTCPSTART Command: Start TCP Connection in Direct Data Flow | 60 |
| | **UDP Specific Commands** | |
| 334 | +KUDPCFG Command: UDP Connection Configuration | 2 |
| 337 | +KUDPRCV Command: Receive data through an UDP Connection | 60 |
| 338 | +KUDPSND Command: Send data through an UDP Connection | 60 |
| 336 | +KUDPCLOSE Command: Close current UDP operation | 60 |
| 336 | +KUDPDEL Command: Delete a Configured UDP Session | 2 |
| 333 | +KUDP_IND Notification: UDP Status | 2 |
| 333 | +KUDP_DATA Notification: Incoming data through a UDP Connection | 2 |
| | **HTTP Client Specific Commands** | |
| 303 | +KHTTPCFG Command: HTTP Connection Configuration | 2 |
| 305 | +KHTTPCNX Command: Start HTTP Connection | 2 |
| 307 | +KHTTPGET Command: Get HTTP Server Information | 2 |
| 308 | +KHTTPHEAD Command: Get HTTP Headers | 2 |
| 309 | +KHTTPHEADER Command: Set the HTTP request header | 30 |
| 310 | +KHTTPPOST Command: Send data to HTTP server | 30 |
| 304 | +KHTTPCLOSE Command: Close HTTP Connection | 2 |
| 306 | +KHTTPDEL Command: Delete a Configured HTTP Connection | 2 |
| | **FTP Client Specific Commands** | |

**Table A-3: Command Timeout (Unlisted commands timeout value: 2 seconds) (Continued)**

| | AVMS Commands | |
|---|---|---|
| 258 | +WDSC Command: Device Services Configuration 2 | 2 |
| 260 | +WDSE Command: Device Services Error 2 | 2 |
| 261 | +WDSG Command: Device Services General Status 2 | 2 |
| 262 | +WDSI Command: Device Services Indications 2 | 2 |
| 267 | +WDSR Command: Device Services Reply 2 | 2 |
| 268 | +WDSS Command: Device Services Session 2 | 2 |
| | **GNSS Commands** | |
| 186 | !GPSAUTOSTART Command: Configure GPS auto-start features | 2 |
| 185 | !GNSSCONFIG Command: Configure the Location Service and GNSS Receiver | 2 |