



# AirPrime BX310x

## AT Command Reference



**SIERRA**  
WIRELESS®

41111445  
Rev. 7

## Important Notice

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

## Safety and Hazards

Do not operate the Sierra Wireless modem in areas where blasting is in progress, where explosive atmospheres may be present, near medical equipment, near life support equipment, or any equipment which may be susceptible to any form of radio interference. In such areas, the Sierra Wireless modem **MUST BE POWERED OFF**. The Sierra Wireless modem can transmit signals that could interfere with this equipment.

Do not operate the Sierra Wireless modem in any aircraft, whether the aircraft is on the ground or in flight. In aircraft, the Sierra Wireless modem **MUST BE POWERED OFF**. When operating, the Sierra Wireless modem can transmit signals that could interfere with various onboard systems.

---

*Note: Some airlines may permit the use of cellular phones while the aircraft is on the ground and the door is open. Sierra Wireless modems may be used at this time.*

---

The driver or operator of any vehicle should not operate the Sierra Wireless modem while in control of a vehicle. Doing so will detract from the driver or operator's control and operation of that vehicle. In some states and provinces, operating such communications devices while in control of a vehicle is an offence.

## Limitation of Liability

The information in this manual is subject to change without notice and does not represent a commitment on the part of Sierra Wireless. SIERRA WIRELESS AND ITS AFFILIATES SPECIFICALLY DISCLAIM LIABILITY FOR ANY AND ALL DIRECT, INDIRECT, SPECIAL, GENERAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR REVENUE OR ANTICIPATED PROFITS OR REVENUE ARISING OUT OF THE USE OR INABILITY TO USE ANY SIERRA WIRELESS PRODUCT, EVEN IF SIERRA WIRELESS AND/OR ITS AFFILIATES HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR THEY ARE FORESEEABLE OR FOR CLAIMS BY ANY THIRD PARTY.

Notwithstanding the foregoing, in no event shall Sierra Wireless and/or its affiliates aggregate liability arising under or in connection with the Sierra Wireless product, regardless of the number of events, occurrences, or claims giving rise to liability, be in excess of the price paid by the purchaser for the Sierra Wireless product.

## Patents

This product may contain technology developed by or for Sierra Wireless Inc. This product is manufactured or sold by Sierra Wireless Inc. or its affiliates under one or more patents licensed from InterDigital Group and MMP Portfolio Licensing.

## Copyright

©2020 Sierra Wireless. All rights reserved.

## Trademarks

Sierra Wireless<sup>®</sup>, AirPrime<sup>®</sup>, AirLink<sup>®</sup>, AirVantage<sup>®</sup> and the Sierra Wireless logo are registered trademarks of Sierra Wireless, Inc.

Windows<sup>®</sup> and Windows Vista<sup>®</sup> are registered trademarks of Microsoft Corporation.

Other trademarks are the property of their respective owners.

## Contact Information

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

## Revision History

Revision number	Release date	Changes
1	September 2017	Document created
2	October 2017	General release

Revision number	Release date	Changes
3	March 2018	<ul style="list-style-type: none"> <li>• Added Wi-Fi command: +SRWCFGVSIE</li> <li>• Updated Wi-Fi commands: +SRWAPCFG, +SRWAPNETCFG, +SRWCFG, +SRWSTACFG, +SRWSTACON</li> <li>• Added Wi-Fi notification: +SRWSTAIP</li> <li>• Updated BLE commands introduction</li> <li>• Added BLE commands: +SRBLEADDINCSERV, +SRBLECONNPARAMS, +SRBLEDEL, +SRBLEDISCINCSERV</li> <li>• Updated BLE commands: +SRBLE, +SRBLEADDCHAR, +SRBLEADDCHARDESCR, +SRBLEADDSERV, +SRBLEADV, +SRBLEADVPARAMS, +SRBLECFG, +SRBLECLOSE, +SRBLECNX, +SRBLEDELSERV, +SRBLEDISCCHAR, +SRBLEDISCDESC, +SRBLEDISCSERV, +SRBLEINDICATE, +SRBLENOTIFY, +SRBLEREADCHAR, +SRBLEREADDESC, +SRBLEREADRESP, +SRBLESCAN, +SRBLESCANPARAMS, +SRBLESECBOND, +SRBLESECCLEAR, +SRBLESECPARAMS, +SRBLEWRITECHAR, +SRBLEWRITECHARNORSP, +SRBLEWRITEDESC</li> <li>• Updated BLE notifications: +SRBLE_ERROR, +SRBLEREAD</li> <li>• Added BT commands: +SRSPPCFG, +SRSPPEL</li> <li>• Updated BT commands: +SRBTINQ, +SRSPPCLOSE, +SRSPPCNX, +SRSPPSND, +SRSPSTART</li> <li>• Added BT notifications: +SRBTCFG, +SRBTINQ, +SRSPPCNX, +SRSP_DATA</li> <li>• Updated BT notification: +SRSPPCLOSE</li> <li>• Added AirVantage commands: +WDSC, +WDSR</li> <li>• Updated AirVantage commands: +WDSI, +WDSS,</li> <li>• Updated AirVantage notifications: +WDSI</li> <li>• Added Common commands: AT I, +CGMR, +CGSN, +CLAC, &amp;F, +FMI, +FMM, +FMR, +MACADDR</li> <li>• Updated Common commands: +RST</li> <li>• Added MQTT command: +KMQTTSUB</li> <li>• Updated MQTT commands: +KMQTTCFG, +KMQTTCLOSE, +KMQTTCNX, +KMQTTEDEL, +KMQTTPUB, +KMQTTSUB, +KMQTTUNSUB</li> <li>• Updated Network Communication Commands introduction</li> <li>• Updated TCP commands: +KTCPCFG, +KTCPCLOSE, +KTCPCNX, +KTCPDEL, +KTCPSND, +KTCPSTART</li> <li>• Updated TCP notifications: +KTCP_DATA, +KTCP_SRVREQ,</li> <li>• Updated UDP commands: +KUDPCFG, +KUDPCLOSE, +KUDPDEL, +KUDPSND</li> <li>• Updated UDP notifications: +KUDP_DATA</li> <li>• Updated all HTTP commands, HTTPS commands, and SSL commands</li> <li>• Removed all I2C Master commands except +KI2CCFG</li> <li>• Added I2C Master commands: +KI2CREAD, +KI2CWRITE</li> <li>• Added UART commands section</li> <li>• Added GPIO commands section</li> <li>• Added CME Error Codes section</li> </ul>

Revision number	Release date	Changes
4	July 2018	<ul style="list-style-type: none"> <li>• Updated +KHTTPSCFG to note &lt;http_server&gt; FQDN issue</li> <li>• Added Response Format explanation</li> <li>• Updated +SRWAPCFG usage description for &lt;channel&gt;</li> <li>• Clarified +HTTPHEADER/+HTTPSHEADER header contents entry format</li> <li>• Updated '+++' usage issue</li> <li>• Updated +KHTTPSCFG usage description for &lt;cipher_suite&gt;</li> <li>• Updated +KMQTTCFG</li> <li>• Updated +KTCP_CFG to note &lt;URC_ENDTCP_enable&gt; not being checked for validity, &lt;source_port&gt; not being used</li> <li>• Updated +KTCP_CLOSE to note &lt;closing_type&gt; behavior</li> <li>• Updated +WDSG to note incomplete response</li> </ul>
5	December 2018	<ul style="list-style-type: none"> <li>• Updated BLE Commands <ul style="list-style-type: none"> <li>• Updated +SRBLECONNP_PARAMS response formats; +SRBLECLOSE example; +SRBLE_ERROR new values; +SRBLE_IND new parameter; +SRBLEREADCHAR error response format; +SRBLEWRITECHAR error response; +SRBLEWRITECHARNORSP error response format; +SRBLE added &lt;appearance&gt;parameter;</li> <li>• Added +SRBLERSSI, +SRBTNAME, +SRBTPTS, +SRBTSYSTEM</li> </ul> </li> <li>• Updated BT Commands <ul style="list-style-type: none"> <li>• Updated +SRBTSTATE write format parameters; +SRBTCFG updated session types; +SRSPPCFG error response formats, additional CME ERROR values; +SRSPPCNX error response formats, additional CME ERROR values; +SRSPPCLOSE error response formats, additional CME ERROR values; +SRSPPSND error response formats, additional CME ERROR values; +SRSPSTART error response formats, additional CME ERROR values; +SRSPPCNX (notification) &lt;status&gt; parameter, added examples; +SRBTINQ write/response formats; +SRBTPAIR removed write format; +SRBTUNPAIR removed error response; +SRBTPAIR notification, added error example;</li> <li>• Deprecated +SRSP_NOTIFICATION</li> <li>• Added +SRSP_ERROR notification; +SRBCSMARTSTART; +SRBTCSECPARAMS; +SRBTCSECNUMCMP; +SRBTCSECPASSKEY; +SRBTCRSSI; +SRBTSECNUMCMP notification; +SRBTCSECPASSKEY notification; +SRBTSECPASSKEYREQ notification</li> </ul> </li> <li>• Added SPI Commands chapter</li> <li>• Added A2DP Commands chapter</li> </ul>

Revision number	Release date	Changes
6	June 2019	<ul style="list-style-type: none"> <li>• Added <a href="#">Escape sequence guard time</a> f/w revision support note.</li> <li>• Updated Wi-Fi Commands <ul style="list-style-type: none"> <li>• Added new versions: +SRWSTASCN;</li> </ul> </li> <li>• Updated Shared BT/BLE Commands <ul style="list-style-type: none"> <li>• Added new versions: +SRBTSYSTEM;</li> </ul> </li> <li>• Updated BLE Commands <ul style="list-style-type: none"> <li>• Added new versions: +SRBLE, +SRBLECFG, +SRBLESECPARAMS, +SRBLETXPWR, +SRBLETXPWRCFG</li> </ul> </li> <li>• Updated BT Commands <ul style="list-style-type: none"> <li>• Added new commands: +SRBTC_IND (notification), +SRBTCFILES</li> <li>• Added new versions: +SRBTSYSTEM, +SRBTCTXPWR</li> </ul> </li> <li>• Updated Common Commands <ul style="list-style-type: none"> <li>• Added new commands: +LOG</li> </ul> </li> <li>• Updated MQTT Commands <ul style="list-style-type: none"> <li>• Added new commands: +KMQTT_DATA (notification), +KMQTT_IND (notification)</li> <li>• Updated: +KMQTTCNX (Added reconnection note)</li> </ul> </li> <li>• Updated TCP Commands <ul style="list-style-type: none"> <li>• Updated: +KTCPSND (&lt;data&gt; length), +KUDPSND (&lt;data&gt; length)</li> </ul> </li> <li>• Updated HTTP Commands <ul style="list-style-type: none"> <li>• Added new commands: +SRWSSTATE</li> </ul> </li> <li>• Updated Ethernet Commands <ul style="list-style-type: none"> <li>• Added new commands: +SRETHDNSCFG</li> </ul> </li> <li>• Updated A2DP Commands <ul style="list-style-type: none"> <li>• Deprecated: +SRA2DPSTATE</li> </ul> </li> <li>• Updated AVRCP Commands <ul style="list-style-type: none"> <li>• Deprecated: +SRAVRCPSTATE</li> </ul> </li> <li>• Added ICMP Commands chapter</li> <li>• Added I2S Master Commands chapter</li> <li>• Updated CME Error Codes list</li> <li>• Removed Know Issues appendix</li> </ul>

Revision number	Release date	Changes
7	September 2020	<ul style="list-style-type: none"> <li>• Update A2DP Commands <ul style="list-style-type: none"> <li>• Update +SRA2DPMEDIACTRL &lt;control&gt; description</li> </ul> </li> <li>• Update I2S Commands <ul style="list-style-type: none"> <li>• Removed +KI2SCFG &lt;sample_rate&gt; and &lt;bit_per_sample&gt;</li> <li>• Updated +KI2SCFG (&lt;mclk_enable&gt; MCLK output)</li> </ul> </li> <li>• Update MQTT Commands <ul style="list-style-type: none"> <li>• Updated : +KMQTT_IND (&lt;status&gt; Connection or connection event status )</li> <li>• Updated : +KMQTTCFG (&lt;version_indicator&gt; MQTT version indicator)</li> <li>• Added new commands : +KMQTTPUBSTART</li> </ul> </li> <li>• Update Wi-Fi Commands <ul style="list-style-type: none"> <li>• Updated : +SRWSTACFG (&lt;password&gt; AP credentials), +SRWAPCFG (&lt;password&gt; Local device's AP password)</li> </ul> </li> <li>• Update HTTP/S Commands <ul style="list-style-type: none"> <li>• Updated +KCERTSTORE &lt;data_type&gt;[,&lt;NbData&gt;,&lt;index&gt;]</li> <li>• Updated +KPRIVKSTORE &lt;index&gt;[,&lt;NbData&gt;]</li> <li>• Updated +KCERTDELETE &lt;data_type&gt;[,&lt;index&gt;]</li> <li>• Updated +KPRIVDELETE &lt;index&gt;</li> </ul> </li> <li>• Update Bluetooth commands <ul style="list-style-type: none"> <li>• Added new commands: +SRBTLEDIND</li> </ul> </li> <li>• Update PWM commands: <ul style="list-style-type: none"> <li>• Updated +KPWM &lt;&lt;period&gt;&gt;</li> </ul> </li> </ul>

# >> Contents

<b>About This Guide</b> .....	<b>12</b>
Introduction .....	12
Supported Sessions—Types and Quantity .....	12
Command timing .....	12
Interval timing .....	12
Escape sequence guard time .....	12
Result codes .....	13
Response formats .....	13
References .....	13
Terminology and acronyms .....	13
Document structure .....	13
<b>Wi-Fi Commands</b> .....	<b>26</b>
Introduction .....	26
Command summary .....	26
<b>Shared (Common) BT/BLE Commands</b> .....	<b>47</b>
Introduction .....	47
Command summary .....	47
Command reference .....	48
<b>BLE Commands</b> .....	<b>54</b>
Introduction .....	54
Command Summary .....	54
Command Reference .....	57
<b>BT Commands</b> .....	<b>133</b>
Introduction .....	133
Command summary .....	133
Command reference .....	135

<b>AirVantage Commands</b> .....	<b>175</b>
Introduction .....	175
Command summary.....	175
Command reference .....	176
<b>Common Commands</b> .....	<b>184</b>
Introduction .....	184
Command summary.....	184
Command reference .....	185
<b>MQTT Commands</b> .....	<b>195</b>
Introduction .....	195
Command summary.....	195
Command reference .....	196
<b>Network Communication Commands</b> .....	<b>208</b>
Introduction .....	208
Command summary.....	208
Command reference .....	211
<b>I2C Commands</b> .....	<b>254</b>
Introduction .....	254
Command summary.....	254
Command reference .....	255
<b>UART Commands</b> .....	<b>258</b>
Introduction .....	258
Command summary.....	258
Command reference .....	259
<b>GPIO Commands</b> .....	<b>260</b>
Introduction .....	260

Command summary. . . . .	260
Command reference . . . . .	261
<b>SPI Commands . . . . .</b>	<b>263</b>
Introduction . . . . .	263
Command summary. . . . .	263
Command reference . . . . .	264
<b>A2DP Commands . . . . .</b>	<b>265</b>
Introduction . . . . .	265
Command summary. . . . .	265
Command reference . . . . .	266
<b>AVRCP Commands . . . . .</b>	<b>273</b>
Introduction . . . . .	273
Command summary. . . . .	273
Command reference . . . . .	274
<b>HTTP Web Server Commands . . . . .</b>	<b>281</b>
Introduction . . . . .	281
Command summary. . . . .	281
Command reference . . . . .	282
<b>Ethernet Commands . . . . .</b>	<b>287</b>
Introduction . . . . .	287
Command summary. . . . .	287
Command reference . . . . .	288
<b>Power Management Commands . . . . .</b>	<b>293</b>
Introduction . . . . .	293
Command summary. . . . .	293
Command reference . . . . .	294

---

<b>PWM Commands</b> .....	<b>296</b>
Introduction .....	296
Command summary.....	296
Command reference .....	297
 <b>ADC Commands</b> .....	 <b>298</b>
Introduction .....	298
Command summary.....	298
Command reference .....	299
 <b>ICMP Commands</b> .....	 <b>304</b>
Introduction .....	304
Command summary.....	304
Command reference .....	305
 <b>I2S Master Commands</b> .....	 <b>308</b>
Introduction .....	308
Command summary.....	308
Command reference .....	309
 <b>CME Error Codes</b> .....	 <b>314</b>

# >> 1: About This Guide

## Introduction

This document describes proprietary AT commands available for Sierra Wireless' AirPrime® BX310x modules. These commands are intended for use by OEMs.

---

*Note: This document applies to firmware revisions P1.0.0 to 2.7.2.*

---

---

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

---

## Supported Sessions—Types and Quantity

The BX310x module supports up to 64 simultaneous sessions across the supported protocols (BLE, BT Classic, HTTP, HTTPS, TCP, UDP) described in [BLE Commands](#), [BT Commands](#), and [Network Communication Commands](#).

When a session is created (configured), the next-highest available ID is assigned from a shared ID pool (1–64, automatically wrapping around after ID 64 is assigned). IDs are freed for re-use when the sessions are closed. (For example, after session ID 64 is assigned, the next available ID could be 5 (assuming the original session 5 has been closed).)

## Command timing

### Interval timing

Some commands require time to process before additional commands are entered.

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

### Escape sequence guard time

The AT escape sequence “+++” requires a guard time (band) of 1.0 seconds before and after it is used.

---

*Note: The AT escape sequence “+++” guard time is supported in R2.6.1+.*

---

---

**Known Issues:** (Revisions P1.0.0 – 2.6.0) The AT escape sequence currently activates without a guard band, causing data mode to be exited when “+++” is received as part of a data string. For example, if the data string being sent is “abcdefg+msx+++++fgh”, the connection will close when the first “+++” is received.

---

## Result codes

The result code OK is typically 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.

## 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.

## References

For additional product-specific documentation, refer to [source.sierrawireless.com](http://source.sierrawireless.com).

## Terminology and acronyms

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

## Document structure

This document describes the proprietary commands found in the chapters listed below.

**Wi-Fi Commands** — Commands used to configure and operate the device when used as Wi-Fi station or Wi-Fi access point.

**Table 1-1: Wi-Fi Commands (Summary)**

Command	F/W	Description	Page
<b>+SRWAPCFG</b>	P1.0.0+	Configure local device's Wi-Fi access point	27
<b>+SRWAPNETCFG</b>	P1.0.0+	Configure local device's Wi-Fi access point network settings	29
<b>+SRWAPSTA</b>	P1.0.0+	List associated (connected) Wi-Fi stations while in AP mode	30
<b>+SRWAPSTA (notification)</b>	P1.0.0+	Associated Wi-Fi station connection state change occurred (unsolicited notification)	31
<b>+SRWCFG</b>	2.5.0+	Configure local device as Wi-Fi station or access point	32
	P1.0.0	Configure local device as Wi-Fi station or access point	34
<b>+SRWCFGVSIE</b>	P1.0.0+	Configure vendor-specific information element	35
<b>+SRWSTACFG</b>	P1.0.0+	Configure/display Wi-Fi station connection information	36
<b>+SRWSTACON</b>	P1.0.0+	Connect/disconnect to Wi-Fi access point	37
<b>+SRWSTAIP (notification)</b>	P1.0.0+	Wi-Fi station IP address received from Access Point (unsolicited notification)	39
<b>+SRWSTANETCFG</b>	P1.0.0+	Configure/ local device Wi-Fi station interface network IP addresses	40
<b>+SRWSTASCN</b>	2.6.3+	Scan for Wi-Fi access points	41
	P1.0.0+	Scan for Wi-Fi access points	43
<b>+SRWSTASTATUS (notification)</b>	P1.0.0+	Wi-Fi station connection status (unsolicited notification)	44
<b>+SRWSTADNSCFG</b>	2.5.0+	Configure DNS IP address for station interface	46

**Shared (Common) BT/BLE Commands** — Command related to both BT and BLE.

**Table 1-2: Shared (Common) BT/BLE commands (Summary)**

Command	F/W	Description	Page
<b>+SRBTADDR</b>	P1.0.0+	Read Local Bluetooth Address	48
<b>+SRBTNAME</b>	2.5.0+	Read/Write Local Device's Bluetooth Name	49
<b>+SRBTPS</b>	2.5.0+	Enable/disable BT Power Saving mode	50
<b>+SRBTLEDIND</b>	2.7.3	Enable/disable BT LED indicator	51
<b>+SRBTSYSTEM</b>	2.6.0+	Enable/change/disable BT Subsystem	52
	2.5.0+	Enable/disable BT Subsystem	53

**BLE Commands** – BLE (Bluetooth Low Energy) related commands.

**Table 1-3: BLE Commands (Summary)**

Command	F/W	Description	Page
<b>+SRBCSMART (notification)</b>	P1.0.0+	Remote server BC Smart profile support notification (Unsolicited notification)	57
<b>+SRBCSMARTCMD</b>	P1.0.0+	Remotely execute AT command on remote BC Smart server	58
<b>+SRBCSMARTRECV (notification)</b>	P1.0.0+	BC Smart data received (Unsolicited notification)	59
<b>+SRBCSMARTRSP (notification)</b>	P1.0.0+	BC Smart command response received (Unsolicited notification)	60
<b>+SRBCSMARTSEND</b>	P1.0.0+	Send data to remote BC Smart server/client	61
<b>+SRBCSMARTSTART</b>	2.5.0+	Put BC SMART connection into data mode	62
<b>+SRBLE</b>	2.6.0+	Read/write BLE Configuration	63
	2.5.0+	Read/write BLE Configuration	65
	P1.0.0	Read/write BLE Configuration	67
<b>+SRBLEADDCHAR</b>	P1.0.0+	Add BLE service characteristic	68
<b>+SRBLEADDCHARDESCR</b>	2.5.0+	Add BLE service characteristic descriptor	70
	P1.0.0+	Add BLE service characteristic descriptor	72
<b>+SRBLEADDINCSEV</b>	2.5.0+	Add included service to another service	74
	P1.0.0	Add included service to primary service	75
<b>+SRBLEADDSERV</b>	P1.0.0+	Add a BLE service	76
<b>+SRBLEADV</b>	P1.0.0+	Start/stop BLE advertising and set advertising/scan response data	77
<b>+SRBLEADVPARAMS</b>	P1.0.0+	Set BLE advertising parameters	78
<b>+SRBLECFG</b>	2.6.0+	Create BLE session/Print BLE sessions	79
	P1.0.0+	Create BLE session/Print BLE sessions	81
<b>+SRBLECFG (notification)</b>	P1.0.0+	BLE session created (unsolicited notification)	82
<b>+SRBLECLOSE</b>	2.5.0+	Close a BLE connection	83
	P1.0.0	Close a BLE connection	83
<b>+SRBLECNX</b>	P1.0.0+	Open a BLE connection	84
<b>+SRBLECONNPARAMS</b>	2.5.0+	Update BLE connection parameters	85
	P1.0.0	Update BLE connection parameters	87
<b>+SRBLEDEL</b>	P1.0.0+	Delete BLE connection	88
<b>+SRBLEDELSERV</b>	P1.0.0+	Delete primary BLE service	89
<b>+SRBLEDISCCHAR</b>	P1.0.0+	Discover BLE session's service characteristics	90

Table 1-3: BLE Commands (Summary) (Continued)

Command	F/W	Description	Page
<b>+SRBLEDISCDESC</b>	P1.0.0+	Get service characteristic's descriptor ID	92
<b>+SRBLEDISCINCSERV</b>	P1.0.0+	Discover BLE session's included services	93
<b>+SRBLEDISCSERV</b>	P1.0.0+	Discover BLE session's services	94
<b>+SRBLE_ERROR (notification)</b>	P1.0.0+	Indicate BLE command error code (Unsolicited notification)	96
<b>+SRBLE_IND (notification)</b>	2.5.0+	Indicate changed BLE connection status (Unsolicited notification)	98
	P1.0.0	Indicate changed BLE connection status (Unsolicited notification)	99
<b>+SRBLEINDICATE</b>	P1.0.0+	Send characteristic notification to remote GATT client	100
<b>+SRBLEINDICATION (notification)</b>	P1.0.0+	GATT server indication (Unsolicited notification)	101
<b>+SRBLEMTU (notification)</b>	P1.0.0+	Indicate negotiated (exchanged) session MTU value (Unsolicited notification)	102
<b>+SRBLENOTIFICATION (notification)</b>	P1.0.0+	GATT server notification (Unsolicited notification)	103
<b>+SRBLENOTIFY</b>	P1.0.0+	Send characteristic notification to remote GATT client	104
<b>+SRBLERead (notification)</b>	P1.0.0+	'Read' request received from GATT client (Unsolicited notification)	105
<b>+SRBLEReadCHAR</b>	2.5.0+	Read service characteristic's value	106
	P1.0.0	Read service characteristic's value	107
<b>+SRBLEReadDESC</b>	P1.0.0+	Read characteristic's descriptor information	108
<b>+SRBLEReadRESP</b>	P1.0.0+	Send response to remote GATT client's 'read' request	109
<b>+SRBLERSSI</b>	2.5.0+	Read RSSI for BLE Session	110
<b>+SRBLESCAN</b>	P1.0.0+	Configure and start BLE scanning	111
<b>+SRBLESCANPARAMS</b>	P1.0.0+	Set scanning parameters	113
<b>+SRBLESECBOND</b>	P1.0.0+	Send bonding request/response	114
<b>+SRBLESECBOND (notification)</b>	P1.0.0+	Bonding procedure status (unsolicited notification)	115
<b>+SRBLESECBONDREQ (notification)</b>	P1.0.0+	Bonding request received (unsolicited notification)	115
<b>+SRBLESECCLEAR</b>	P1.0.0+	Remove bonded device(s)	116
<b>+SRBLESECNUMCMP</b>	P1.0.0+	Compare numbers from initiator and responder for secure connection	117
<b>+SRBLESECNUMCMP (notification)</b>	P1.0.0+	Request to confirm number comparison for secure connection (unsolicited notification)	117
<b>+SRBLESECPARAMS</b>	2.5.0+	Set/read secure parameters	118
	P1.0.0+	Set/read secure parameters	120

Table 1-3: BLE Commands (Summary) (Continued)

Command	F/W	Description	Page
<b>+SRBLESECPASSKEY</b>	P1.0.0+	Send passkey response to peer device	121
<b>+SRBLESECPASSKEY (notification)</b>	P1.0.0+	Passkey to be entered on remote device	121
<b>+SRBLESECPASSKEYREQ (notification)</b>	P1.0.0+	Passkey request received (unsolicited notification)	122
<b>+SRBLETXPWR</b>	2.6.0+	Read/write connected session transmit power value	123
	2.5.0+	Read/write connected session transmit power value	124
<b>+SRBLETXPWRCFG</b>	2.6.0+	Read/write Transmit power value configuration	125
	2.5.0+	Read/write Transmit power value configuration	126
<b>+SRBLEWRITE (notification)</b>	P1.0.0+	'Write' request received from GATT client (Unsolicited notification)	127
<b>+SRBLEWRITECHAR</b>	2.5.0+	Write service characteristic's value	128
	P1.0.0	Write service characteristic's value	129
<b>+SRBLEWRITECHARNORSP</b>	2.5.0+	Write service characteristic's value, no server response	130
	P1.0.0	Write service characteristic's value, no server response	131
<b>+SRBLEWRITEDESC</b>	P1.0.0+	Write characteristic's descriptor information	132

**BT Commands**— BT and BT Classic related commands.

Table 1-4: BT commands (Summary)

Command	F/W	Description	Page
<b>+SRBTCFG (notification)</b>	2.5.0+	SPP/A2DP/AVRCP connection configuration result (unsolicited notification)	135
	P1.0.0	SPP connection configuration result (unsolicited notification)	136
<b>+SRBTC_IND</b>	2.6.0+	BTC profile status change (unsolicited notification)	137
<b>+SRBTCPIN</b>	2.5.0+	Reply to legacy pairing request	138
<b>+SRBTCPIN (notification)</b>	2.5.0+	Reply to legacy pairing request (notification)	138
<b>+SRBTCPINCFG</b>	2.5.0+	Configure legacy pairing PIN feature	139
<b>+SRBTCFILES</b>	2.6.0+	Enable/disable supported BTC profiles	140
<b>+SRBTCRSSI</b>	2.5.0+	Read RSSI for BTC Session	141
<b>+SRBTCSECCNUMCMP</b>	2.5.0+	Reply to BTC Numeric Comparison Pairing Request	142
<b>+SRBTCSECCNUMCMP (notification)</b>	2.5.0+	BT Numeric Comparison Pairing Request (unsolicited notification)	142
<b>+SRBTCSECCPARAMS</b>	2.5.0+	BT Security Parameters	143
<b>+SRBTCSECCPASSKEY</b>	2.5.0+	Reply to BTC Passkey Comparison Pairing Request	144

Table 1-4: BT commands (Summary) (Continued)

Command	F/W	Description	Page
<b>+SRBTCSECPASSKEY (notification)</b>	2.5.0+	BT Passkey Pairing Information (unsolicited notification)	144
<b>+SRBTCSECPASSKEYREQ (notification)</b>	2.5.0+	BT Passkey Pairing Request (unsolicited notification)	145
<b>+SRBTCTXPWR</b>	2.6.0+	Read/write transmit power configuration	146
	2.5.0+	Read/write transmit power configuration	147
<b>+SRBTINQ</b>	2.5.0+	Start general inquiry	148
	P1.0.0	Start general inquiry	150
<b>+SRBTINQ (notification)</b>	2.5.0+	General Inquiry scan response (unsolicited notification)	151
	P1.0.0	General Inquiry scan response (unsolicited notification)	151
<b>+SRBTPAIR</b>	2.5.0+	List paired BT devices	151
	P1.0.0	Send BT pair request/response to remote device, or list paired BT devices	152
<b>+SRBTPAIR (notification)</b>	2.5.0+	BT pairing process complete (unsolicited notification)	153
	P1.0.0	BT pairing process complete (unsolicited notification)	153
<b>+SRBTPAIRREQ (notification)</b>	P1.0.0	BT pairing request (unsolicited notification)	154
<b>+SRBTSTATE</b>	2.5.0+	Read/write BT device state	154
	P1.0.0	Read/write BT device state	155
<b>+SRBTUNPAIR</b>	2.5.0+	Unpair from paired BT device(s)	156
	P1.0.0	Unpair from paired BT device(s)	157
<b>+SRSPPCFG</b>	2.5.0+	Create SPP connection to remote BT device	158
	P1.0.0	Create SPP connection to remote BT device	160
<b>+SRSPPCLOSE</b>	2.5.0+	Close SPP connection with remote BT device	162
	P1.0.0	Close SPP connection with remote BT device	163
<b>+SRSPPCLOSE (notification)</b>	P1.0.0+	SPP connection closed (unsolicited notification)	164
<b>+SRSPPCNX</b>	2.5.0+	Connect to remote BT device via SPP	165
	P1.0.0	Connect to remote BT device via SPP	166
<b>+SRSPPCNX (notification)</b>	2.5.0+	SPP connection opened by remote request (unsolicited notification)	167
	P1.0.0	SPP connection opened by remote request (unsolicited notification)	168
<b>+SRSPP_DATA (notification)</b>	P1.0.0+	SPP connection data received (unsolicited notification)	168
<b>+SRSPPDEL</b>	P1.0.0+	Delete configured SPP session	169

Table 1-4: BT commands (Summary) (Continued)

Command	F/W	Description	Page
<b>+SRSP_ERROR (notification)</b>	2.5.0+	SPP connection error received (unsolicited notification)	170
<b>+SRSP_NOTIF (notification)</b>	P1.0.0	SPP connection error received (unsolicited notification)	170
<b>+SRSPSND</b>	2.5.0+	Send data to remote BT device via SPP	171
	P1.0.0	Send data to remote BT device via SPP	172
<b>+SRSPSTART</b>	2.5.0+	Put SPP connection into data mode	173
	P1.0.0	Put SPP connection into data mode	174

[AirVantage Commands](#) — AirVantage-related commands.

Table 1-5: AirVantage Commands (Summary)

Command	F/W	Description	Page
<b>+WDSC</b>	P1.0.0+	Configure Device Services	176
<b>+WDSG</b>	P1.0.0+	Device Services General Status	178
<b>+WDSI</b>	P1.0.0+	Enable Device Services Notifications (Indications)	179
<b>+WDSI (notification)</b>	P1.0.0+	Device Services Notification (Indication) received (unsolicited response)	180
<b>+WDSR</b>	P1.0.0+	Reply to AirVantage server request	182
<b>+WDSS</b>	P1.0.0+	Device Services Session	183

[Common Commands](#) — Common BT/BLE-related commands.

Table 1-6: Common Commands (Summary)

Command	F/W	Description	Page
<b>+CGMR</b>	P1.0.0+	Get firmware revision	185
<b>+CGSN</b>	P1.0.0+	Get serial number	185
<b>+CLAC</b>	P1.0.0+	List AT commands	186
<b>&amp;F</b>	P1.0.0+	Reset module and module configuration	186
<b>+FMI</b>	P1.0.0+	Get manufacturer information	186
<b>+FMM</b>	P1.0.0+	Get model information	187
<b>+FMR</b>	P1.0.0+	Get firmware revision	187
<b>+FOTA</b>	2.5.0+	Start non-AV firmware OTA upgrade	188
<b>+FOTA (notification)</b>	2.5.0+	Non-AV firmware OTA progress	189
<b>I</b>	P1.0.0+	Request module identification	190
<b>+LOG</b>	2.6.3+	Enable/disable log messages	191

Table 1-6: Common Commands (Summary) (Continued)

Command	F/W	Description	Page
<b>+MACADDR</b>	P1.0.0+	Get base MAC address	191
<b>+RST</b>	P1.0.0+	Reset module	191
<b>+SRREMCMD (notification)</b>	P1.0.0+	Remote command received (unsolicited notification)	192
<b>+SRREMCTRL</b>	P1.0.0+	Enable/disable remote control	193
<b>+SYSRAM</b>	P1.0.0+	List available heap memory size	194

[MQTT Commands](#) – MQTT-related commands.

Table 1-7: MQTT commands

Command	F/W	Description	Page
<b>+KMQTTCFG</b>	P1.0.0+	Set up MQTT session (configure server and messaging parameters)	196
<b>+KMQTTCLOSE</b>	P1.0.0+	Disconnect from MQTT broker	199
<b>+KMQTTCNX</b>	P1.0.0+	Set up MQTT session (configure server and messaging parameters)	196
<b>+KMQTT_DATA (notification)</b>	2.6.0+	MQTT data received (unsolicited notification)	201
<b>+KMQTTDEL</b>	P1.0.0+	Delete MQTT session	201
<b>+KMQTT_IND</b>	2.7.1+	MQTT status change (unsolicited notification)	202
	2.6.0+	MQTT status change (unsolicited notification)	203
<b>+KMQTT PUB</b>	P1.0.0+	Publish MQTT message	204
<b>+KMQTT PUBSTART</b>	2.7.1+	Publish MQTT into data mode	205
<b>+KMQTT SUB</b>	P1.0.0+	Subscribe to MQTT topic	206
<b>+KMQTT SUB (notification)</b>	P1.0.0+	Message received from subscribed topic (unsolicited notification)	206
<b>+KMQTT UNSUB</b>	P1.0.0+	Unsubscribe from MQTT topic	207

[Network Communication Commands](#) – Network communication-related commands.

Table 1-8: TCP commands

Command	F/W	Description	Page
<b>+KTCP CFG</b>	2.5.0+	TCP Session (Connection) Configuration	211
	P1.0.0	TCP Session (Connection) Configuration	213
<b>+KTCP CLOSE</b>	2.5.0+	Close TCP Connection	215
	P1.0.0	Close TCP Connection	216
<b>+KTCP CNX</b>	P1.0.0+	Start TCP Connection	217
<b>+KTCP_DATA (notification)</b>	P1.0.0+	Incoming Data through a TCP Connection (unsolicited notification)	217

Table 1-8: TCP commands (Continued)

Command	F/W	Description	Page
+KTCPDEL	P1.0.0+	Delete a Configured TCP Session	218
+KTCP_NOTIF (notification)	P1.0.0+	TCP connection failure notification (unsolicited notification)	218
+KTCPSEND	P1.0.0+	Send Data through a TCP Connection	219
+KTCP_SRVREQ (notification)	P1.0.0+	Incoming TCP Client Connection Request (unsolicited notification)	220
+KTCP_START (notification)	P1.0.0+	Start a TCP Connection in Direct Data Flow	221

Table 1-9: UDP commands

Command	F/W	Description	Page
+KUDPCFG	P1.0.0+	UDP Connection Configuration	222
+KUDPCLOSE	P1.0.0+	Close UDP Connection	223
+KUDP_DATA (notification)	P1.0.0+	Incoming Data through a UDP Connection (unsolicited notification)	223
+KUDPDEL	P1.0.0+	Delete a Configured UDP Session	224
+KUDP_NOTIF (notification)	P1.0.0+	UDP error notification (unsolicited notification)	224
+KUDPSND	P1.0.0+	Send Data through a UDP Connection	225

Table 1-10: HTTP commands

Command	F/W	Description	Page
+KHTTPCFG	P1.0.0+	HTTP Connection Configuration	226
+KHTTPCLOSE	P1.0.0+	Close an HTTP Connection	227
+KHTTPCNX	P1.0.0+	Start HTTP Connection	227
+KHTTPDEL	P1.0.0+	Delete a Configured HTTP Session	228
+KHTTPDELETE	P1.0.0+	Perform HTTP Delete	228
+KHTTPGET	P1.0.0+	Get HTTP Server Information	229
+KHTTPHEAD	P1.0.0+	Get HTTP Headers	231
+KHTTPHEADER	P1.0.0+	Set the HTTP Request Header	232
+KHTTPPOST	P1.0.0+	Send Data to HTTP Server	233
+KHTTPPUT	P1.0.0+	Perform HTTP PUT	234

Table 1-11: HTTPS commands

Command	F/W	Description	Page
+KHTTSCFG	2.5.0+	HTTPS Connection Configuration	235
	P1.0.0	HTTPS Connection Configuration	239
+KHTTSCLOSE	P1.0.0+	Close an HTTPS Connection	240

Table 1-11: HTTPS commands (Continued)

Command	F/W	Description	Page
<b>+KHTTPSCNX</b>	P1.0.0+	<a href="#">Start HTTPS Connection</a>	241
<b>+KHTTPSDEL</b>	P1.0.0+	<a href="#">Delete a Configured HTTPS Session</a>	242
<b>+KHTTPSDELETE</b>	P1.0.0+	<a href="#">Perform HTTPS Delete</a>	242
<b>+KHTTPSGET</b>	P1.0.0+	<a href="#">Get HTTPS Server Information</a>	243
<b>+KHTTPSHEAD</b>	P1.0.0+	<a href="#">Get HTTPS Headers</a>	245
<b>+KHTTPSHEADER</b>	P1.0.0+	<a href="#">Set the HTTPS Request Header</a>	246
<b>+KHTTPSPOST</b>	P1.0.0+	<a href="#">Send Data to HTTPS Server</a>	247
<b>+KHTTPSPSK</b>	2.5.0+	<a href="#">Configure PSK for an HTTPS session</a>	248
<b>+KHTTPSPUT</b>	P1.0.0+	<a href="#">Perform HTTPS PUT</a>	249

Table 1-12: SSL Certificate Management commands

Command	F/W	Description	Page
<b>+KCERTDELETE</b>	P1.0.0+	<a href="#">Delete Local Certificate from the Index</a>	249
<b>+KCERTSTORE</b>	P1.0.0+	<a href="#">Store Certificate (Root/Local) to File System</a>	251
<b>+KPRIVDELETE</b>	P1.0.0+	<a href="#">Delete Private Key from the Index</a>	251
<b>+KPRIVKSTORE</b>	2.7.1+	<a href="#">Store Private Key Associated to a Local Certificate</a>	252
	2.5.0+	<a href="#">Store Private Key Associated to a Local Certificate</a>	252
	P1.0.0	<a href="#">Store Private Key Associated to a Local Certificate</a>	253

[I2C Commands](#) — I2C Master-related commands.

Table 1-13: I2C Master commands

Command	F/W	Description	Page
<b>+KI2CCFG</b>	P1.0.0+	<a href="#">Configure/display I2C parameters</a>	255
<b>+KI2CREAD</b>	P1.0.0+	<a href="#">Read I2C data</a>	256
<b>+KI2CWRITE</b>	P1.0.0+	<a href="#">Write I2C data</a>	257

[UART Commands](#) — UART-related commands.

Table 1-14: UART commands

Command	F/W	Description	Page
<b>+IPR</b>	P1.0.0+	<a href="#">Set/display UART baud rate</a>	259
<b>&amp;K</b>	P1.0.0+	<a href="#">Enable/disable hardware UART flow control</a>	259

[GPIO Commands](#) — GPIO-related commands.

Table 1-15: GPIO commands

Command	F/W	Description	Page
<b>+KGPIO</b>	P1.0.0+	<a href="#">Read/write/reset GPIO</a>	261
<b>+KGPIOCFG</b>	P1.0.0+	<a href="#">Configure GPIO</a>	262

[SPI Commands](#) — SPI-related commands.

Table 1-16: SPI commands

Command	F/W	Description	Page
<b>+SRSPI</b>	2.5.0+	<a href="#">Configure SPI slave mode</a>	264

[A2DP Commands](#) — A2DP-related commands.

Table 1-17: A2DP commands/notifications

Command	F/W	Description	Page
<b>+SRA2DPAUDIOCFG</b>	2.5.0+	<a href="#">A2DP media stream configuration (unsolicited notification)</a>	266
<b>+SRA2DPAUDIOSTATE</b>	2.5.0+	<a href="#">A2DP media stream state change (unsolicited notification)</a>	266
<b>+SRA2DPCFG</b>	2.5.0+	<a href="#">Configure A2DP Session</a>	267
<b>+SRA2DPCLOSE</b>	2.5.0+	<a href="#">Disconnect from remote device (A2DP)</a>	268
<b>+SRA2DPCNX</b>	2.5.0+	<a href="#">Connect via A2DP to Remote Device</a>	268
<b>+SRA2DPCODEC</b>	2.6.0+	<a href="#">Enable/disable Dev Kit audio codec</a>	269
<b>+SRA2DPDEL</b>	2.5.0+	<a href="#">Delete A2DP session</a>	270
<b>+SRA2DPMEDIACTRL</b>	2.5.0+	<a href="#">Control A2DP media stream</a>	271
<b>+SRA2DPSTATE</b>	2.5.x	<a href="#">Enable/disable BTC A2DP Profile</a>	272

[AVRCP Commands](#) — AVRCP-related commands.

Table 1-18: AVRCP commands/notifications

Command	F/W	Description	Page
<b>+SRAVRPCCFG</b>	2.5.0+	<a href="#">Configure AVRCP Session</a>	274
<b>+SRAVRCPDEL</b>	P1.0.0+	<a href="#">Delete AVRCP session</a>	275
<b>+SRAVRCPMTD (notification)</b>	P1.0.0+	<a href="#">Metadata information notification (unsolicited notification)</a>	275
<b>+SRAVRCPPTCMD</b>	P1.0.0+	<a href="#">Send AVRCP Passthrough Commands</a>	276
<b>+SRAVRCPPTCMD (notification)</b>	P1.0.0+	<a href="#">AVRCP Passthrough command callback event information (unsolicited notification)</a>	277
<b>+SRAVRCPREQMTD</b>	P1.0.0+	<a href="#">Request remote device metadata information</a>	278

Table 1-18: AVRCP commands / notifications (Continued)

Command	F/W	Description	Page
<b>+SRAVRCPRMTFEAT (notification)</b>	P1.0.0+	AVRCP features supported by the remote device (unsolicited notification)	279
<b>+SRAVRCPSTATE</b>	P1.0.0 – 2.5.xr6	Enable/disable AVRCP Profile	280

[HTTP Web Server Commands](#) — HTTP web server-related commands.

Table 1-19: HTTP Web Server commands / notifications

Command	F/W	Description	Page
<b>+SRWSCHGWEB</b>	2.5.0+	Overwrite index.html web page	282
<b>+SRWS_DATA (notification)</b>	2.5.0+	Data received for the host (unsolicited notification)	284
<b>+SRWSFWDHTTP</b>	2.5.0+	Enable/disable forward HTTP requests to host	285
<b>+SRWSSTATE</b>	2.6.0+	Enable/disable Web Server	286

[Ethernet Commands](#) — Ethernet-related commands.

Table 1-20: Ethernet commands / notifications

Command	F/W	Description	Page
<b>+SRETHCFG</b>	ETH-R1.0.0+	Configure (Enable/Disable) Ethernet interface mode	288
<b>+SRETHDNSCFG</b>	2.6.0+	Configure Ethernet interface DNS IP Addresses	289
<b>+SRETHIP (notification)</b>	ETH-R1.0.0+	Display Ethernet interface IP configuration (unsolicited notification)	290
<b>+SRETHNETCFG</b>	ETH-R1.0.0+	Configure Ethernet interface DHCP/IP settings	291
<b>+SRETHSTATUS</b>	ETH-R1.0.0+	Display Ethernet Interface Status and IP configuration	292
<b>+SRETHSTATUS (notification)</b>	ETH-R1.0.0+	Ethernet Interface Status (notification)	292

[Power Management Commands](#) — Power management-related commands.

Table 1-21: Power Management commands

Command	F/W	Description	Page
<b>+SRPSCFG</b>	2.5.0+	Power Saving Configuration	294
<b>+SRPSMODE</b>	2.5.0+	Select Power Saving Mode	295

[PWM Commands](#) — PWM-related commands.

Table 1-22: PWM commands

Command	F/W	Description	Page
<b>+KPWM</b>	2.5.0+	PWM Control	297

[ADC Commands](#) — ADC-related commands.

**Table 1-23: ADC commands / notifications**

Command	F/W	Description	Page
<b>+KADC</b>	2.5.0+	<a href="#">Read ADC</a>	299
<b>+KADCCFG</b>	2.5.0+	<a href="#">Configure ADC</a>	301
<b>+KADCMODE</b>	2.5.0+	<a href="#">Set ADC precision (bit width)</a>	303

[ICMP Commands](#) — ICMP-related commands.

**Table 1-24: ICMP commands / notifications**

Command	F/W	Description	Page
<b>+KPING</b>	2.6.0+	<a href="#">Ping an IP Address</a>	305
<b>+KPING (notification)</b>	2.6.0+	<a href="#">Ping result received (unsolicited notification)</a>	306
<b>+KPINGSTAT (notification)</b>	2.6.0+	<a href="#">Ping statistics received (unsolicited notification)</a>	306
<b>+KPINGSTOP</b>	2.6.0+	<a href="#">Stop the active ping process</a>	307

[I2S Master Commands](#) — I2S-related commands.

**Table 1-25: I2S Master commands / notifications**

Command	F/W	Description	Page
<b>+KI2SCFG</b>	2.7.1+	<a href="#">Configure I2S Master Tx parameters</a>	309
	2.6.2+	<a href="#">Configure I2S Master Tx parameters</a>	311
	2.6.0+	<a href="#">Configure I2S Master Tx parameters</a>	312

## >> 2: Wi-Fi Commands

### Introduction

This chapter describes Wi-Fi related commands (see section [Command reference](#) on page 27).

### Command summary

The following table lists the commands described in this chapter.

**Table 2-1: Wi-Fi Commands (Summary)**

Command	F/W	Description	Page
<b>+SRWAPCFG</b>	P1.0.0+	<a href="#">Configure local device's Wi-Fi access point</a>	27
<b>+SRWAPNETCFG</b>	P1.0.0+	<a href="#">Configure local device's Wi-Fi access point network settings</a>	29
<b>+SRWAPSTA</b>	P1.0.0+	<a href="#">List associated (connected) Wi-Fi stations while in AP mode</a>	30
<b>+SRWAPSTA (notification)</b>	P1.0.0+	<a href="#">Associated Wi-Fi station connection state change occurred (unsolicited notification)</a>	31
<b>+SRWCFCG</b>	2.5.0+	<a href="#">Configure local device as Wi-Fi station or access point</a>	32
	P1.0.0	<a href="#">Configure local device as Wi-Fi station or access point</a>	34
<b>+SRWCFCGVSIE</b>	P1.0.0+	<a href="#">Configure vendor-specific information element</a>	35
<b>+SRWSTACFG</b>	P1.0.0+	<a href="#">Configure/display Wi-Fi station connection information</a>	36
<b>+SRWSTACON</b>	P1.0.0+	<a href="#">Connect/disconnect to Wi-Fi access point</a>	37
<b>+SRWSTAIP (notification)</b>	P1.0.0+	<a href="#">Wi-Fi station IP address received from Access Point (unsolicited notification)</a>	39
<b>+SRWSTANETCFG</b>	P1.0.0+	<a href="#">Configure/ local device Wi-Fi station interface network IP addresses</a>	40
<b>+SRWSTASCN</b>	2.6.3+	<a href="#">Scan for Wi-Fi access points</a>	41
	P1.0.0+	<a href="#">Scan for Wi-Fi access points</a>	43
<b>+SRWSTASTATUS (notification)</b>	P1.0.0+	<a href="#">Wi-Fi station connection status (unsolicited notification)</a>	44
<b>+SRWSTADNSCFG</b>	2.5.0+	<a href="#">Configure DNS IP address for station interface</a>	46

## Command reference

Table 2-2: Wi-Fi Commands (Detail)

Command	Description
<b>+SRWAPCFG</b>	<p><b>Configure local device's Wi-Fi access point</b> Configure the local device to be used as an Access Point (AP).</p> <hr/> <p><i>Note: This command is used when local device is configured as an access point or combined station/access point.</i></p> <hr/> <p><i>Note: When configuring the access point, make sure to select a &lt;channel&gt; that is supported in the access point's &lt;country&gt; (set via +SRWCFG). This command does not return an ERROR if the &lt;channel&gt; is not supported in the specified &lt;country&gt;.</i></p> <hr/> <p><b>Category:</b> Wi-Fi access point command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRWAPCFG=&lt;ssid&gt;,&lt;passkey&gt;,&lt;auth_mode&gt;[, &lt;channel&gt;] [,&lt;ssid_hidden&gt;],[&lt;beacon interval&gt;]</b>  Response: OK  or ERROR  or +CME ERROR: &lt;cme_error&gt;  Purpose: Configure the local device's Access Point settings.</li> <li>Read: <b>AT+SRWAPCFG?</b>  Response: +SRWAPCFG: &lt;ssid&gt;,&lt;passkey&gt;,&lt;auth_mode&gt;,&lt;channel&gt;, &lt;ssid_hidden&gt;,&lt;beacon_interval&gt;  OK  Purpose: Display the local device's current AP configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;ssid&gt; (Local device's AP SSID)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Default: "BX31-XXXXXX"</li> <li>• Length—1–32 characters</li> </ul> <p>&lt;passkey&gt; (Local device's AP password)</p> <ul style="list-style-type: none"> <li>• Password external stations use to connect to the local device's AP</li> <li>• ASCII string</li> <li>• Default: "eulerxyz"</li> <li>• Length— 8–63 characters</li> </ul> <p>&lt;auth_mode&gt; (Authentication (security) mode)</p> <ul style="list-style-type: none"> <li>• 0—Open</li> <li>• 1—WEP (not supported, fallback to Open)</li> <li>• 2—WPA</li> <li>• 3—(Default) WPA2</li> <li>• 4—WPA/WPA2</li> </ul> <p>(Continued on next page)</p>

**Table 2-2: Wi-Fi Commands (Detail) (Continued)**

Command	Description
<b>+SRWAPCFG (continued)</b>	<p><b>Configure local device's Wi-Fi access point (continued)</b></p> <p>&lt;channel&gt; (Wi-Fi frequency channel number)</p> <ul style="list-style-type: none"> <li>• 0—(Default) Automatic selection</li> <li>• 1–14—Channel number</li> <li>• NOTE: If the local device is operating in combined station/AP mode and is connected to an external AP, this parameter is ignored and the device continues to use the channel required for the external AP.</li> <li>• NOTE: When setting the &lt;channel&gt;, specify a channel that is supported in the country specified by <a href="#">+SRWAPCFG</a>.</li> </ul> <p>&lt;ssid_hidden&gt; (SSID advertising behavior)</p> <ul style="list-style-type: none"> <li>• 0—(Default) Advertise the SSID</li> <li>• 1—Hide the SSID</li> </ul> <p>&lt;beacon_interval&gt; (Time between beacon frame transmissions (advertising) from the local device's AP, in ms)</p> <ul style="list-style-type: none"> <li>• Default—100</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Configure local device's AP settings:  AT+SRWAPCFG="otherssid","otherpassword",4,5,1,100  OK</li> <li>• Display the current settings:  AT+SRWAPCFG?  +SRWAPCFG: "otherssid","otherpassword",4,5,1,100  OK</li> </ul>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWAPNETCFG</b>	<p><b>Configure local device's Wi-Fi access point network settings</b></p> <p>Configure the local device's Wi-Fi AP network settings (network address, and DHCP server settings).</p> <hr/> <p><i>Note: This command is used when local device is configured as an access point or combined station/access point.</i></p> <hr/> <p><b>Category:</b> Wi-Fi access point command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRWAPNETCFG=&lt;DHCP_enable&gt;[,&lt;interface_IP&gt;, &lt;start_IP&gt;, &lt;end_IP&gt;, &lt;lease_time&gt;]</b>  Response: OK  or ERROR  or +CME ERROR: &lt;cme_error&gt;  Purpose: Configure the specified AP network settings.</li> <li>• Read: <b>AT+SRWAPNETCFG?</b>  Response: +SRWAPCFG: &lt;DHCP_enable&gt;,&lt;interface_IP&gt;,&lt;start_IP&gt;,&lt;end_IP&gt;,&lt;lease_time&gt;  OK  Purpose: Display the local device's current AP network configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;enable&gt; (DHCP server enable/disable)</p> <ul style="list-style-type: none"> <li>• 0—Disable DHCP server</li> <li>• 1—(Default) Enable DHCP server</li> </ul> <p>&lt;interface_IP&gt; (Local device's AP IP address)</p> <ul style="list-style-type: none"> <li>• IPv4 format</li> <li>• Default: 192.168.4.1</li> </ul> <p>&lt;start_IP&gt; (First IP address for DHCP server pool)</p> <ul style="list-style-type: none"> <li>• IPv4 format</li> <li>• Default: 192.168.4.2</li> </ul> <p>&lt;end_IP&gt; (Last IP address for DHCP server pool)</p> <ul style="list-style-type: none"> <li>• IPv4 format</li> <li>• Default: 192.168.4.101</li> </ul> <hr/> <p><i>Note: The maximum DHCP server pool size is 101. &lt;start_IP&gt; and &lt;end_IP&gt; must be set accordingly.</i></p> <hr/> <p>&lt;lease_time&gt; (DHCP server IP address lease time, in minutes)</p> <ul style="list-style-type: none"> <li>• Default: 120</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWAPSTA</b>	<p><b>List associated (connected) Wi-Fi stations while in AP mode</b>  Display a list of all stations that are currently connected to the local device's Access Point.</p> <hr/> <p><i>Note: This command is used when local device is configured as a station or combined station/ access point.</i></p> <hr/> <p><b>Category:</b> Wi-Fi access point command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Read: <b>AT+SRWAPSTA?</b></li> <li>Response: +SRWAPSTA: &lt;status&gt;,&lt;MAC&gt;,&lt;ip&gt;  +SRWAPSTA: &lt;status&gt;,&lt;MAC&gt;,&lt;ip&gt;  ...  OK</li> <li>Purpose: Display a list of all stations that are associated with the local device's Access Point.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;status&gt; (Associated station's connection status)</p> <ul style="list-style-type: none"> <li>• 0—Disconnected</li> <li>• 1—Connected</li> </ul> <p>&lt;MAC&gt; (Associated station's MAC address)</p> <ul style="list-style-type: none"> <li>• 48-bit MAC address</li> <li>• Example: "10:20:30:4a:b5:ff"</li> </ul> <p>&lt;ip&gt; (Associated station's IP address)</p> <ul style="list-style-type: none"> <li>• If station is not known, &lt;ip&gt;="0.0.0.0"</li> <li>Otherwise, a valid IP address</li> <li>• Example: "192.168.100.228"</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Display (two) associated stations:  AT+SRWAPSTA?  +SRWAPSTA: 1,"11:22:33:44:55:66", "192.168.4.2"  +SRWAPSTA: 1,"01:02:03:04:05:06", "192.168.4.3"  OK</li> </ul>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWAPSTA (notification)</b>	<p><b>Associated Wi-Fi station connection state change occurred (unsolicited notification)</b></p> <p>Notification indicating a remote station has connected to, or disconnected from, the local device's Access Point.</p> <p><b>Category:</b> Wi-Fi access point notification</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRWAPSTA: &lt;status&gt;,&lt;MAC&gt;</b>  Purpose: Indicates the station with &lt;MAC&gt; address has connected/disconnected.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;status&gt; (Connection status)</p> <ul style="list-style-type: none"> <li>• 0—Disconnected</li> <li>• 1—Connected</li> </ul> <p>&lt;MAC&gt; (Associated station's MAC address)</p> <ul style="list-style-type: none"> <li>• 48-bit MAC address</li> <li>• Example: "10:20:30:4a:b5:ff"</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Devices connecting and disconnecting: <ul style="list-style-type: none"> <li>+SRWAPSTA: 1, "11:22:33:44:55:66" (Station connected)</li> <li>+SRWAPSTA: 1, "01:02:03:04:05:06" (Another station connected)</li> <li>+SRWAPSTA: 0, "11:22:33:44:55:66" (First station disconnected)</li> </ul> </li> </ul>

**Table 2-2: Wi-Fi Commands (Detail) (Continued)**

Command	Description
<p><b>+SRWCFG</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRWCFG</a>.)</p>	<p><b>Configure local device as Wi-Fi station or access point</b></p> <p>Configure the local device to operate as a Wi-Fi station, Wi-Fi access point, or combined station/access point, or display the current configuration settings.</p> <hr/> <p><i>Note: Configuration changes take effect immediately, and persist across module resets.</i></p> <hr/> <p><i>Note: Before Ethernet can be enabled using +SRETHCFG, the Wi-Fi subsystem must be disabled with this command (set &lt;mode = 0&gt; or &lt;mode=2&gt;).</i></p> <hr/> <p><b>Category:</b> Wi-Fi global command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRWCFG=&lt;mode&gt;[,&lt;country&gt;]</b> Response: OK or ERROR Purpose: Configure the device to operate as a Wi-Fi station, access point, or combined station/access point.</li> <li>Read: <b>AT+SRWCFG?</b> Response: +SRWCFG: &lt;mode&gt;[,&lt;country&gt;,&lt;sta_MAC&gt;,&lt;ap_MAC&gt;] OK Purpose: Display the local device's current Wi-Fi configuration. If &lt;mode=0&gt;, remaining parameters do not appear.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mode&gt; (Operating mode)</p> <ul style="list-style-type: none"> <li>0 — (Default) Wi-Fi subsystem disabled</li> <li>1—Station</li> <li>2—Access Point</li> <li>3—Combined Station + Access Point</li> </ul> <p>&lt;country&gt; (Country of operation)</p> <ul style="list-style-type: none"> <li>0—(Default) China</li> <li>1—Japan</li> <li>2—US</li> <li>3—EU</li> </ul> <p>&lt;sta_MAC&gt; (Station interface MAC address)</p> <ul style="list-style-type: none"> <li>48-bit MAC address</li> <li>Example: "10:20:30:4a:b5:ff"</li> </ul> <p>&lt;ap_MAC&gt; (AP interface MAC address)</p> <ul style="list-style-type: none"> <li>48-bit MAC address</li> <li>Example: "10:20:30:4a:b5:ff"</li> </ul> <p>(Continued on next page)</p>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWCFG (continued)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRWCFG</a> .)	<b>Configure local device as Wi-Fi station or access point (continued)</b> <b>Examples:</b> <ul style="list-style-type: none"> <li>• Configure module as combined Station/AP in Japan:              AT+SRWCFG=3,1              OK</li> <li>• Display module configured as combined Station/AP in Japan:              AT+SRWCFG?              AT+SRWCFG=3,1,"10:20:30:40:50:60","aa:bb:cc:dd:ee:ff"              OK</li> <li>• Display module configured as a Station in China:              AT+SRWCFG?              AT+SRWCFG=1,0,"10:20:30:40:50:60","aa:bb:cc:dd:ee:ff"              OK</li> </ul>

**Table 2-2: Wi-Fi Commands (Detail) (Continued)**

Command	Description
<b>+SRWCFG</b> (F/W rev: P1.0.0 For newer version, see <a href="#">+SRWCFG.</a> )	<p><b>Configure local device as Wi-Fi station or access point</b></p> <p>Configure the local device to operate as a Wi-Fi station, Wi-Fi access point, or combined station/ access point, or display the current configuration settings.</p> <hr/> <p><i>Note: Configuration changes take effect immediately, and persist across module resets.</i></p> <hr/> <p><b>Category:</b> Wi-Fi global command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:       <b>AT+SRWCFG=&lt;mode&gt;[,&lt;country&gt;]</b>                Response:   OK                            or   ERROR                Purpose:    Configure the device to operate as a Wi-Fi station, access point, or combined station/access point.</li> <li>• Read:        <b>AT+SRWCFG?</b>                Response:   +SRWCFG: &lt;mode&gt;,&lt;country&gt;,&lt;sta_MAC&gt;,&lt;ap_MAC&gt;                            OK                Purpose:    Display the local device's current Wi-Fi configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mode&gt; (Operating mode)</p> <ul style="list-style-type: none"> <li>• 1—Station</li> <li>• 2—Access Point</li> <li>• 3—(Default) Combined Station + Access Point</li> </ul> <p>&lt;country&gt; (Country of operation)</p> <ul style="list-style-type: none"> <li>• 0—(Default) China</li> <li>• 1—Japan</li> <li>• 2—US</li> <li>• 3—EU</li> </ul> <p>&lt;sta_MAC&gt; (Station interface MAC address)</p> <ul style="list-style-type: none"> <li>• 48-bit MAC address</li> <li>• Example: "10:20:30:4a:b5:ff"</li> </ul> <p>&lt;ap_MAC&gt; (AP interface MAC address)</p> <ul style="list-style-type: none"> <li>• 48-bit MAC address</li> <li>• Example: "10:20:30:4a:b5:ff"</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Configure module as combined Station/AP in Japan:                AT+SRWCFG=3,1                OK</li> <li>• Display module configured as combined Station/AP in Japan:                AT+SRWCFG?                AT+SRWCFG=3,1,"10:20:30:40:50:60","aa:bb:cc:dd:ee:ff"                OK</li> </ul>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWCFGVSIE</b>	<p><b>Configure vendor-specific information element</b> Configure a vendor-specific information element.</p> <hr/> <p><i>Note: Configuration changes take effect immediately, and persist across module resets.</i></p> <hr/> <p><b>Category:</b> Wi-Fi global command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRWCFGVSIE=&lt;enable&gt;,&lt;type&gt;,&lt;index&gt;,&lt;data&gt;</b></li> <li>Response: OK</li> <li>or ERROR</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Enable/configure or delete a vendor-specific information element.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;enable&gt; (Delete/Add vendor-specific information element from/to the beacon)</p> <ul style="list-style-type: none"> <li>• 0—Delete the element</li> <li>• 1—Add the element</li> </ul> <p>&lt;type&gt; (802.11 management frame type that vendor-specific information element is being added to)</p> <ul style="list-style-type: none"> <li>• 0—Beacon</li> <li>• 1—Probe request</li> <li>• 2—Probe response</li> <li>• 3—Association request</li> <li>• 4—Association response</li> </ul> <p>&lt;index&gt; (Frame field that element is being added to)</p> <ul style="list-style-type: none"> <li>• Each frame can have a maximum of two vendor-specific elements.</li> <li>• 1—First field of frame</li> <li>• 2—Second field of frame</li> </ul> <p>&lt;data&gt; (Vendor-specific information element)</p> <ul style="list-style-type: none"> <li>• ASCII string (format: &lt;0xDD&gt;&lt;length&gt;&lt;string&gt;)</li> <li>• Byte 1—0xDD (WIFI_VENDOR_IE_ELEMENT_ID)</li> <li>• Byte 2—Length of &lt;content&gt; string starting at byte 3</li> <li>• Bytes 3+—&lt;content&gt;</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Add element to the beacon:  <pre>AT+SRWCFGVSIE=1,0,0,"dd\18\00\50\xf2\04\10\4a\00\01\10\10\44\00\01\02\10 \49\00\06\00\37\2a\00\01\20"</pre> </li> </ul>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWSTACFG</b>	<p><b>Configure/display Wi-Fi station connection information</b></p> <p>Configure or display the connection details the local device will use to connect to an AP, include the SSID of the AP to connect to, the password to use, and autoconnect state.</p> <hr/> <p><i>Note: This command is used when local device is configured as a station or combined station/ access point.</i></p> <hr/> <p><b>Category:</b> Wi-Fi station command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRWSTACFG=&lt;ssid&gt;,&lt;password&gt;[,&lt;autoconnect&gt;]</b>  Response: OK  or ERROR  or +CME ERROR: &lt;cme_error&gt;  Purpose: Configure the station connection details.</li> <li>• Read: <b>AT+SRWSTACFG?</b>  Response: +SRWSTACFG: &lt;ssid&gt;,&lt;password&gt;,&lt;autoconnect&gt;  OK  Purpose: Display the current settings to be used to connect to an AP.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;ssid&gt; (AP SSID)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Special characters (if present) appear as hex values (e.g. "\0d")</li> <li>• Length—1–32 characters</li> <li>• Example: "myssid"</li> </ul> <p>&lt;password&gt; (AP credentials)</p> <ul style="list-style-type: none"> <li>• Password used to connect to the AP</li> <li>• ASCII string</li> <li>• Length—8–63 characters</li> <li>• Example: "mypassword"</li> </ul> <p>&lt;autoconnect&gt; (Autoconnect state)</p> <ul style="list-style-type: none"> <li>• 0—(Default) Disabled</li> <li>• 1—Enabled. Module will always attempt to connect to the AP after the device resets or is powered on.</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Configure information and enable autoconnect:  AT+SRWSTACFG="myssid","mypassword",1  OK</li> <li>• Display the current settings:  AT+SRWSTACFG?  +SRWSTACFG: "myssid","mypassword",1  OK</li> </ul>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWSTACON</b>	<p><b>Connect/disconnect to Wi-Fi access point</b> Connect to (or disconnect from) the currently configured Access Point.</p> <hr/> <p><i>Note: This command is used when local device is configured as a station or combined station/ access point, and <b>+SRWSTACFG</b> on page 36 has been used to configure the station to connect to a specific AP.</i></p> <hr/> <p><b>Category:</b> Wi-Fi station command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRWSTACON=&lt;action&gt;</b> Response (Connect): +SRWSTASTATUS: &lt;status&gt;[, &lt;ssid&gt;,&lt;bssid&gt;,&lt;channel&gt;,&lt;authmode&gt;] +SRWSTAIP: &lt;ip&gt;,&lt;netmask&gt;,&lt;gateway&gt; OK or ERROR Response (Disconnect): OK or ERROR Purpose: Connect to (or disconnect from) the currently configured AP.</li> <li>• Read: <b>AT+SRWSTACON?</b> Response: +SRWSTASTATUS: &lt;status&gt;[, &lt;ssid&gt;,&lt;bssid&gt;,&lt;channel&gt;,&lt;authmode&gt;] +SRWSTAIP: &lt;ip&gt;,&lt;netmask&gt;,&lt;gateway&gt; OK Purpose: Display details about the current connection.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;action&gt; (Operating mode)</p> <ul style="list-style-type: none"> <li>• 0—Disconnect</li> <li>• 1—Connect</li> </ul> <p>&lt;status&gt; (Current connection status)</p> <ul style="list-style-type: none"> <li>• 0—Disconnected</li> <li>• 1—Connected</li> </ul> <p>&lt;ssid&gt; (AP SSID)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Special characters (if present) appear as hex values (e.g. "\0d")</li> <li>• Length—1–32 characters</li> <li>• Example: "myssid"</li> </ul> <p>&lt;bssid&gt; (MAC address of the AP)</p> <ul style="list-style-type: none"> <li>• 48-bit MAC address</li> <li>• Example: "10:20:30:4a:b5:ff"</li> </ul> <p>&lt;channel&gt; (AP frequency channel number)</p> <ul style="list-style-type: none"> <li>• Valid range: 1–14</li> </ul> <p>(Continued on next page)</p>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWSTACON</b> (continued)	<p><b>Connect/disconnect to Wi-Fi access point (continued)</b></p> <p>&lt;auth_mode&gt; (Authentication (security) mode)</p> <ul style="list-style-type: none"> <li>• 0—Open</li> <li>• 1—WEP</li> <li>• 2—WPA</li> <li>• 3—WPA2</li> <li>• 4—WPA/WPA2</li> <li>• 5—WPA2 Enterprise (not supported)</li> </ul> <p>&lt;ip&gt; (Station's network address)</p> <ul style="list-style-type: none"> <li>• Address is set statically or obtained from a DHCP server. See <a href="#">+SRWSTANETCFG</a> on page 40 for details.</li> <li>• IPv4 format</li> </ul> <p>&lt;netmask&gt; (Netmask for &lt;ip&gt;)</p> <ul style="list-style-type: none"> <li>• Netmask is set statically or obtained from a DHCP server. See <a href="#">+SRWSTANETCFG</a> on page 40 for details.</li> <li>• IPv4 format</li> </ul> <p>&lt;gateway&gt; (Static network gateway address)</p> <ul style="list-style-type: none"> <li>• Address is set statically or obtained from a DHCP server. See <a href="#">+SRWSTANETCFG</a> on page 40 for details.</li> <li>• IPv4 format</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Connect to access point that has &lt;ssid&gt; = "ssid":  AT+SRWSTACON=1  +SRWSTATUS: 1,"ssid","12:34:56:77:88:99",6,3  +SRWSTAIP: "192.168.100.228","255.255.255.0","192.168.100.1"  OK</li> <li>• Display current connection details:  AT+SRWSTACON?  +SRWSTATUS: 1,"ssid","12:34:56:77:88:99",6,3  +SRWSTAIP: "192.168.100.228","255.255.255.0","192.168.100.1"  OK</li> <li>• Disconnect from the AP:  AT+SRWSTACON=0  +SRWSTASTATUS: 0  OK</li> </ul>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWSTAIP (notification)</b>	<p><b>Wi-Fi station IP address received from Access Point (unsolicited notification)</b></p> <p>Notification indicating an IP address for the station has been received from the connected access point.</p> <p><b>Category:</b> Wi-Fi access point notification</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRWSTAIP: &lt;ip&gt;,&lt;netmask&gt;,&lt;gateway&gt;</b></li> </ul> <p>Purpose: Indicates IP address and netmask received from the connected access point (&lt;gateway&gt;).</p> <p><b>Parameters:</b></p> <p>&lt;ip&gt; (Station's static network address)</p> <ul style="list-style-type: none"> <li>• IPv4 format</li> </ul> <p>&lt;netmask&gt; (Netmask for &lt;ip&gt;)</p> <ul style="list-style-type: none"> <li>• IPv4 format</li> </ul> <p>&lt;gateway&gt; (Static network gateway address)</p> <ul style="list-style-type: none"> <li>• IPv4 format</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• IP address received from gateway +SRWSTAIP:"192.168.100.228","255.255.255.0","192.168.100.1"</li> </ul>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWSTANETCFG</b>	<p><b>Configure/ local device Wi-Fi station interface network IP addresses</b>  Configure or display the network IP details (IP address, netmask, gateway) for the station interface.</p> <hr/> <p><i>Note: This command is used when local device is configured as a station or combined station/ access point.</i></p> <hr/> <p><b>Category:</b> Wi-Fi station command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRWSTANETCFG=&lt;dhcp_enabled&gt;[,&lt;ip&gt;[,&lt;netmask&gt;[,&lt;gateway&gt;]]]</b>  Response: OK  or ERROR  Purpose: Set the specified IP parameters for the station interface.</li> <li>• Read: <b>AT+SRWSTANETCFG?</b>  Response: +SRWSTANETCFG: &lt;dhcp_enabled&gt;,&lt;ip&gt;,&lt;netmask&gt;,&lt;gateway&gt;  OK  Purpose: Display the current IP configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;dhcp_enabled&gt; (DHCP state (enabled/disabled))</p> <ul style="list-style-type: none"> <li>• 0—DHCP disabled, static addresses used</li> <li>• 1—(Default) DHCP enabled, remaining parameters ignored</li> </ul> <p>&lt;ip&gt; (Station's static network address)</p> <ul style="list-style-type: none"> <li>• IPv4 format</li> </ul> <p>&lt;netmask&gt; (Netmask for &lt;ip&gt;)</p> <ul style="list-style-type: none"> <li>• IPv4 format</li> </ul> <p>&lt;gateway&gt; (Static network gateway address)</p> <ul style="list-style-type: none"> <li>• IPv4 format</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Disable DHCP and set static addresses:  AT+SRWSTANETCFG=0,"192.168.100.228","255.255.255.0","192.168.100.1"  OK</li> <li>• Display current IP configuration:  AT+SRWSTANETCFG?  +SRWSTANETCFG=0,"192.168.100.228","255.255.255.0","192.168.100.1"  OK</li> </ul>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWSTASCN</b> (F/W rev: 2.6.3+ For previous version, see <a href="#">+SRWSTASCN</a> .)	<p><b>Scan for Wi-Fi access points</b></p> <p>Scan for Wi-Fi access points within range of the local device.</p> <hr/> <p><i>Note: This command is used when local device is configured as a station or combined station/ access point.</i></p> <hr/> <p><b>Category:</b> Wi-Fi station command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute: <b>AT+SRWSTASCN=&lt;channel_bitmap&gt;[,&lt;scan_mintime&gt;,&lt;scan_maxtime&gt;]</b></li> <li>Response: <b>+SRWSTASCN: &lt;rssI&gt;,&lt;auth_mode&gt;,&lt;channel&gt;,&lt;ssid&gt;,&lt;bssid&gt;</b>  <b>+SRWSTASCN: &lt;rssI&gt;,&lt;auth_mode&gt;,&lt;channel&gt;,&lt;ssid&gt;,&lt;bssid&gt;</b>            ...  <b>OK</b>            or <b>ERROR</b></li> <li>Purpose: Display a sorted list (strongest to weakest &lt;rssI&gt;) of all access points within range of the local device.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;channel_bitmap&gt; (Channels to scan)</p> <ul style="list-style-type: none"> <li>• Hexadecimal value</li> <li>• Scan all channels: 0 (all bits off)</li> <li>• Scan specific channels:           <ul style="list-style-type: none"> <li>• Set bits on for each channel to scan</li> <li>• Bit 0–13 — Channel 1–14</li> <li>• e.g. To scan channels 1, 2, 6, 11:                0x423 = 0000 0100 0010 0011                Enter 423 as the &lt;channel_bitmap&gt; value.</li> </ul> </li> <li>• &lt;scan_mintime&gt; (Minimum scan dwell time per channel, in ms)           <ul style="list-style-type: none"> <li>• Valid range: 120–5000</li> <li>• Default: 500</li> </ul> </li> <li>• &lt;scan_maxtime&gt; (Maximum scan dwell time per channel, in ms)           <ul style="list-style-type: none"> <li>• Valid range: 120–5000</li> <li>• Default: 500</li> </ul> </li> </ul> <p>&lt;rssI&gt; (RSSI value, in dB)</p> <ul style="list-style-type: none"> <li>• e.g. -50 (corresponds to 0.00001 dBm W)</li> </ul> <p>&lt;auth_mode&gt; (Authentication (security) mode)</p> <ul style="list-style-type: none"> <li>• 0—Open</li> <li>• 1—WEP</li> <li>• 2—WPA</li> <li>• 3—WPA2</li> <li>• 4—WPA/WPA2</li> <li>• 5—WPA2 Enterprise (not supported)</li> </ul> <p>&lt;channel&gt; (Wi-Fi frequency channel number)</p> <ul style="list-style-type: none"> <li>• Valid range: 1–14</li> </ul> <p>(Continued on next page)</p>

**Table 2-2: Wi-Fi Commands (Detail) (Continued)**

Command	Description
<b>+SRWSTASCN</b> (F/W rev: 2.6.3+) (continued)	<b>Scan for Wi-Fi access points (continued)</b> <ssid> (Wi-Fi AP SSID) <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Special characters (if present) appear as hex values (e.g. "\0d")</li> <li>• Length—1–32 characters</li> </ul> <bssid> (MAC address of the AP) <ul style="list-style-type: none"> <li>• 48-bit MAC address</li> <li>• Example: "10:20:30:4a:b5:ff"</li> </ul> <b>Example:</b> <ul style="list-style-type: none"> <li>• Display available APs (AP with strongest signal shown first):                AT+SRWSTASCN=423                 +SRSTASCN: -92,3,6,"Wi Fi \0d 14","aa:bb:cc:dd:ee:ff"                +SRWSTASCN: -77,4,1,"Wi Fi 1","aa:bb:cc:dd:ee:ff"                ...                +SRWSTASCN: -92,3,11,"Wi Fi 4","12:23:56:78:9a:bc"             </li> </ul> OK

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWSTASCN</b> (F/W rev: P1.0.0+ For newer version, see <a href="#">+SRWSTASCN.</a> )	<p><b>Scan for Wi-Fi access points</b></p> <p>Scan for Wi-Fi access points within range of the local device.</p> <hr/> <p><i>Note: This command is used when local device is configured as a station or combined station/ access point.</i></p> <hr/> <p><b>Category:</b> Wi-Fi station command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute: <b>AT+SRWSTASCN</b></li> <li>Response: +SRWSTASCN: &lt;rss&gt;, &lt;auth_mode&gt;, &lt;channel&gt;, &lt;ssid&gt;, &lt;bssid&gt;            +SRWSTASCN: &lt;rss&gt;, &lt;auth_mode&gt;, &lt;channel&gt;, &lt;ssid&gt;, &lt;bssid&gt;            ...            OK</li> <li>or ERROR</li> <li>Purpose: Display a sorted list (strongest to weakest &lt;rss&gt;) of all access points within range of the local device.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;rss&gt; (RSSI value, in dB)</p> <ul style="list-style-type: none"> <li>• e.g. -50 (corresponds to 0.00001 dBm W)</li> </ul> <p>&lt;auth_mode&gt; (Authentication (security) mode)</p> <ul style="list-style-type: none"> <li>• 0—Open</li> <li>• 1—WEP</li> <li>• 2—WPA</li> <li>• 3—WPA2</li> <li>• 4—WPA/WPA2</li> <li>• 5—WPA2 Enterprise (not supported)</li> </ul> <p>&lt;channel&gt; (Wi-Fi frequency channel number)</p> <ul style="list-style-type: none"> <li>• Valid range: 1–14</li> </ul> <p>&lt;ssid&gt; (Wi-Fi AP SSID)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Special characters (if present) appear as hex values (e.g. "\0d")</li> <li>• Length—1–32 characters</li> </ul> <p>&lt;bssid&gt; (MAC address of the AP)</p> <ul style="list-style-type: none"> <li>• 48-bit MAC address</li> <li>• Example: "10:20:30:4a:b5:ff"</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Display available APs (AP with strongest signal shown first):            AT+SRWSTASCN            +SRWSTASCN: -77,5,2,"Wi Fi 1","aa:bb:cc:dd:ee:ff"            ...            +SRWSTASCN: -92,3,6,"Wi Fi \0d 14","aa:bb:cc:dd:ee:ff"            OK</li> </ul>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWSTASTATUS (notification)</b>	<p><b>Wi-Fi station connection status (unsolicited notification)</b></p> <p>Notification indicating the current Wi-Fi station connection status.</p> <p><b>Category:</b> Wi-Fi access point notification</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification (Disconnected. &lt;status&gt;=0):           <ul style="list-style-type: none"> <li><b>+SRWSTASTATUS: &lt;status&gt;,&lt;reason&gt;</b></li> <li>Purpose: Indicates the reason the connection failed.</li> </ul> </li> <li>• Notification (Connected. &lt;status&gt;=1):           <ul style="list-style-type: none"> <li><b>+SRWSTASTATUS: &lt;status&gt;,&lt;ssid&gt;,&lt;bssid&gt;,&lt;channel&gt;,&lt;authmode&gt;</b></li> <li>Purpose: Indicates the current connection details.</li> </ul> </li> </ul> <p><b>Parameters:</b></p> <p>&lt;status&gt; (Connection status)</p> <ul style="list-style-type: none"> <li>• 0—Disconnected</li> <li>• 1—Connected</li> </ul> <p>&lt;ssid&gt; (AP SSID)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Special characters (if present) appear as hex values (e.g. "\0d")</li> <li>• Length—1–32 characters</li> <li>• Example: "mysid"</li> </ul> <p>&lt;bssid&gt; (MAC address of the AP)</p> <ul style="list-style-type: none"> <li>• 48-bit MAC address</li> <li>• Example: "10:20:30:4a:b5:ff"</li> </ul> <p>&lt;channel&gt; (AP frequency channel number)</p> <ul style="list-style-type: none"> <li>• Valid range: 1–14</li> </ul> <p>&lt;authmode&gt; (AP security mode)</p> <ul style="list-style-type: none"> <li>• 0—Open</li> <li>• 1—WEP</li> <li>• 2—WPA</li> <li>• 3—WPA2</li> <li>• 4—WPA/WPA2</li> <li>• 5—WPA2 Enterprise (not supported) R6:removed</li> </ul> <p>&lt;reason&gt;&gt; (Reason why connection failed)</p> <ul style="list-style-type: none"> <li>• 1—Internal failure</li> <li>• 2—Authentication no longer valid</li> <li>• 3—De-authenticated, because sending Station is leaving</li> <li>• 4—Disassociated due to inactivity</li> <li>• 5—Disassociated, because AP cannot handle all currently associated STAs at the same time</li> <li>• 6—Packet received from a non-authenticated STA</li> <li>• 7—Packet received from a non-associated STA</li> <li>• 8—Disassociated, because sending STA is leaving (or has left) BSS</li> <li>• 9—STA requesting (re)association is not authenticated by the responding STA</li> <li>• 10—Disassociated, because information in the Power Capability element is unacceptable.</li> <li>• 11—Disassociated, because information in the Supported Channels element is unacceptable.</li> </ul>

Table 2-2: Wi-Fi Commands (Detail) (Continued)

Command	Description
<b>+SRWSTASTATUS (notification) (continued)</b>	<b>Wi-Fi station connection status (unsolicited notification) (continued)</b> <ul style="list-style-type: none"> <li>• 13—Invalid element (an element whose content does not meet specifications of the Standard in Clause 8)</li> <li>• 14—Message integrity code (MIC) failure</li> <li>• 15—Four-way handshake times out</li> <li>• 16—Group-Key handshake times out</li> <li>• 17—Element in the four-way handshake is different from the (Re-)Association Request/Probe and Response/Beacon frame</li> <li>• 18—Invalid group cipher</li> <li>• 19—Invalid pairwise cipher</li> <li>• 20—Invalid AKMP</li> <li>• 21—Unsupported RSNE capabilities</li> <li>• 22—Invalid RSNE capabilities</li> <li>• 23—IEEE 802.1X authentication failed</li> <li>• 24—Cipher suite rejected due to security policies</li> <li>• 200—STA lost N beacons continuously</li> <li>• 201—STA failed to scan the target AP</li> <li>• 202—STA Authentication failed (not because of timeout)</li> <li>• 203—STA Authentication failed (not because of timeout or too many stations)</li> <li>• 204—Handshake failed</li> </ul> <b>Example:</b> <ul style="list-style-type: none"> <li>• Requested AP not found: +SRWSTASTATUS=0,201</li> </ul>

**Table 2-2: Wi-Fi Commands (Detail) (Continued)**

Command	Description
<p><b>+SRWSTADNSCFG</b> (F/W rev: 2.5.0+)</p>	<p><b>Configure DNS IP address for station interface</b> Configure or display the DNS IP addresses for the station interface.</p> <hr/> <p><i>Note: This command is used when local device is configured as a station or combined station/ access point.</i></p> <hr/> <p><b>Category:</b> Wi-Fi Common</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRWSTADNSCFG=[&lt;dns_main&gt;][,&lt;dns_backup&gt;][,&lt;dns_fallback&gt;]</b>                      Response: OK                                or ERROR                      Purpose: Configure IP address(es) for DNS main, backup, and fallback IP addresses.</li> <li>• Read: <b>AT+SRWSTADNSCFG?</b>                      Response: +SRWSTADNSCFG: &lt;dns_main&gt;,&lt;dns_backup&gt;,&lt;dns_fallback&gt;                                OK                      Purpose: Display the current IP configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;dns_main&gt; (DNS main IP address)</p> <ul style="list-style-type: none"> <li>• Configuration value used in static mode (DHCP disabled)</li> <li>• IPv4 format</li> </ul> <p>&lt;dns_backup&gt; (DNS backup IP address)</p> <ul style="list-style-type: none"> <li>• Configuration value used in static mode (DHCP disabled)</li> <li>• Address of backup DNS server to use if the main DS server is not available</li> <li>• IPv4 format</li> </ul> <p>&lt;dns_fallback&gt; (DNS fallback IP address)</p> <ul style="list-style-type: none"> <li>• Configuration value used if no DNS servers are set via DHCP when a DHCP client is enabled in WIFI STA or ETH mode</li> <li>• IPv4 format</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Configure DNS addresses:                      AT+SRWSTADNSCFG="10.10.10.1","10.10.10.2","10.10.10.1"                      OK</li> <li>• Display DNS addresses:                      AT+SRWSTADNSCFG?                      +SRWSTADNSCFG: "10.10.10.1","10.10.10.2","10.10.10.1"                      OK</li> </ul>

## >> 3: Shared (Common) BT/BLE Commands

### Introduction

This chapter describes BT commands that apply to both BT and BLE (see section [Command reference](#) on page 48).

### Command summary

The following table lists the commands described in this chapter.

**Table 3-1: Shared (Common) BT/BLE commands (Summary)**

Command	F/W	Description	Page
+SRBTADDR	P1.0.0+	<a href="#">Read Local Bluetooth Address</a>	48
+SRBTNAME	2.5.0+	<a href="#">Read/Write Local Device's Bluetooth Name</a>	49
+SRBTPS	2.5.0+	<a href="#">Enable/disable BT Power Saving mode</a>	50
+SRBTLEDIND	2.7.3	<a href="#">Enable/disable BT LED indicator</a>	51
+SRBTSYSTEM	2.6.0+	<a href="#">Enable/change/disable BT Subsystem</a>	52
	2.5.0+	<a href="#">Enable/disable BT Subsystem</a>	52

## Command reference

**Table 3-2: Shared (Common) BT/BLE Commands (Detail)**

Command	Description
<b>+SRBTADDR</b>	<p><b>Read Local Bluetooth Address</b></p> <p>Read the local device's Bluetooth address.</p> <p><b>Category:</b> BT/BLE 'common' command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Read: <b>AT+SRBTADDR?</b></li> <li>Response: <b>+SRBTADDR: &lt;bt_addr&gt;</b> OK</li> <li>or ERROR</li> <li>Purpose: Read the local Bluetooth address.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Local Bluetooth address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> <li>• Address is valid for Bluetooth Classic and BLE</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Read: AT+SRBTADDR? +SRBTADDR: "00:11:22:aa:bb:cc" OK</li> </ul>

Table 3-2: Shared (Common) BT/BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBTNAME</b> (F/W rev: 2.5.0+)	<p><b>Read/Write Local Device's Bluetooth Name</b>            Read/write the local device's Bluetooth name (used for BT Classic and BLE).</p> <hr/> <p><i>Note: Equivalent to using +SRBLE. Changing the name with either command affects both BT Classic and BLE.</i></p> <hr/> <p><b>Category:</b> BT/BLE 'common' command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBTNAME=&lt;name&gt;</b>              Response: OK                        or ERROR              Purpose: Write the Bluetooth (BT, BLE) name of the device as a string value.</li> <li>• Read: <b>AT+SRBTNAME?</b>              Response: +SRBTNAME: &lt;name&gt;                        OK              Purpose: Read the device's Bluetooth name.</li> </ul> <p><b>Parameters:</b>            &lt;name&gt; (Local Bluetooth name)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "BX310x-200D46"</li> <li>• Name is valid for Bluetooth Classic and BLE</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Display current Bluetooth name:              AT+SRBTNAME?              +SRBTNAME: "BX310x-200D46"              OK</li> <li>• Change Bluetooth name:              AT+SRBTNAME="MyBX310x"              OK</li> </ul>

**Table 3-2: Shared (Common) BT/BLE Commands (Detail) (Continued)**

Command	Description
<b>+SRBTPS</b> (F/W rev: 2.5.0+)	<p><b>Enable/disable BT Power Saving mode</b></p> <p>Enable or disable BT Power Saving, or report current state.            Note: If enabled, the modem will go to sleep when a BLE action (such as BT scan) is performed.</p> <p><b>Category:</b> BT/BLE 'common' command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:       <b>AT+SRBTPS=&lt;state&gt;</b>                Response:  OK                          or  ERROR                Purpose:   Enable or disable BT Power Saving.</li> <li>• Read:       <b>AT+SRBTPS?</b>                Response:  +SRBTPS: &lt;state&gt;                          OK                Purpose:   Display current BT Power Saving state.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;state&gt; (BT Power Saving state)</p> <ul style="list-style-type: none"> <li>• 0—Off</li> <li>• 1—On</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Enable BT Power Saving:                AT+SRBTPS=1                OK</li> <li>• Report current BT Power Saving state:                AT+SRBTPS?                +SRBTPS: 1               <i>(Power Saving is On)</i>                OK</li> </ul>

Table 3-2: Shared (Common) BT/BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBTLEDIND</b>	<p><b>Enable/disable BT LED indicator</b></p> <p>Enable or disable the Bluetooth LED indicator.</p> <p>Notes: BX310x and BX310x-ETH LED pins are both selected as GPIO-5. For details on LED indicator patterns, see <a href="#">Table 3-3</a>.</p> <p><b>Category:</b> BT/BLE 'common' command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBTLEDIND=&lt;state&gt;</b>  Response: OK  or CME ERROR  or ERROR  Purpose: Enable or disable BT LED indicator.</li> <li>• Read: <b>AT+SRBTLEDIND?</b>  Response: +SRBTLEDIND: &lt;state&gt;  OK  or ERROR  Purpose: Display current BT LED indicator state.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;state&gt; (BT LED indicator state)</p> <ul style="list-style-type: none"> <li>• 0—Disable (default)</li> <li>• 1—Enable</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Enable BT LED indicator:  AT+SRBTLEDIND=1  OK</li> <li>• Report current BT LED indicator state:  AT+SRBTLEDIND?  +SRBTLEDIND: 1      <i>(BT LED indicator is On)</i>  OK</li> </ul>

**Table 3-2: Shared (Common) BT/BLE Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBTSYSTEM</b> (F/W rev: 2.6.0+)</p>	<p><b>Enable/change/disable BT Subsystem</b></p> <p>Once the BT subsystem is enabled (in one of the supported modes—Classic or LE), it is not possible to change the mode while the device is running.</p> <p>For example, to change the BT subsystem mode from BLE (&lt;state=1&gt;) to BT Classic (&lt;state=2&gt;):</p> <ol style="list-style-type: none"> <li>1. Disable the BT subsystem. Use AT+SRBTSYSTEM=0</li> <li>2. Reset the board. Use AT+RST</li> <li>3. Enable BT Classic subsystem mode. Use AT+SRBTSYSTEM=2</li> </ol> <hr/> <p><i>Note: The BT subsystem state persists across device resets.</i></p> <hr/> <p><i>Note: Before Ethernet can be enabled using +SRETHCFG, the BT subsystem must be disabled with this command (set &lt;state=0&gt;).</i></p> <hr/> <p><b>Category:</b> BT/BLE 'common' command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBTSYSTEM=&lt;state&gt;</b> Response: OK or ERROR Purpose: Enable or disable the Bluetooth subsystem.</li> <li>• Read: <b>AT+SRBTSYSTEM?</b> Response: +SRBTSYSTEM: &lt;state&gt; OK or ERROR Purpose: Read the current state of the Bluetooth subsystem.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;state&gt; (BT subsystem state)</p> <ul style="list-style-type: none"> <li>• 0—Disable (OFF)</li> <li>• 1—Enable BLE BT subsystem mode</li> <li>• 2—Enable BT Classic BT subsystem mode</li> <li>• 3—Enable BTDM (BLE &amp; BT Classic) BT subsystem mode</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Enable the BT subsystem: AT+SRBTSYSTEM=1 OK</li> <li>• Check current state of BT subsystem (which is enabled): AT+SRBTSYSTEM? +SRBTSYSTEM: 1 OK</li> </ul>

**Table 3-2: Shared (Common) BT/BLE Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBTSYSTEM</b> (F/W rev: 2.5.0+)</p>	<p><b>Enable/disable BT Subsystem</b> Enable or disable the Bluetooth subsystem.</p> <hr/> <p><i>Note: BT subsystem state persists across device resets.</i></p> <hr/> <p><i>Note: Before Ethernet can be enabled using <b>+SRETHCFG</b>, the BT subsystem must be disabled with this command (set &lt;state=0&gt;).</i></p> <hr/> <p><b>Category:</b> BT/BLE 'common' command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:       <b>AT+SRBTSYSTEM=&lt;state&gt;</b>              Response:    OK                          or    ERROR              Purpose:     Enable or disable the Bluetooth subsystem.</li> <li>• Read:        <b>AT+SRBTSYSTEM?</b>              Response:    +SRBTSYSTEM: &lt;state&gt;                          OK                          or    ERROR              Purpose:     Read the current state of the Bluetooth subsystem.</li> </ul> <p><b>Parameters:</b>            &lt;state&gt; (BT subsystem state)</p> <ul style="list-style-type: none"> <li>• 0—Disable (OFF)</li> <li>• 1—Enable (ON)</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Enable the BT subsystem:              AT+SRBTSYSTEM=1              OK</li> <li>• Check current state of BT subsystem (which is enabled):              AT+SRBTSYSTEM?              +SRBTSYSTEM: 1              OK</li> </ul>

**Table 3-3: Classic and LE LED Patterns**

Modes	LED Patterns
Standby	LED is ON.
Advertising	LED blinks quickly.
Connection	LED flashes once every 2.4 seconds

## >> 4: BLE Commands

### Introduction

This chapter describes BLE (Bluetooth Low Energy) related commands (see section [Command Reference](#) on page 57).

---

**Important:** *The BX310x module supports up to 64 simultaneous sessions across the supported protocols described in this chapter, plus those described in [Network Communication Commands](#) (HTTP, HTTPS, TCP, UDP). When a session is created (configured), the next-highest available ID is assigned from a shared ID pool (1–64, automatically wrapping around after ID 64 is assigned). IDs are freed for re-use when the sessions are closed. (For example, after session ID 64 is assigned, the next available ID could be 5 (assuming the original session 5 has been closed).)*

---

### Command Summary

The following table lists the commands described in this chapter.

**Table 4-1: BLE Commands (Summary)**

Command	F/W	Description	Page
<b>+SRBCSMART (notification)</b>	P1.0.0+	Remote server BC Smart profile support notification (Unsolicited notification)	57
<b>+SRBCSMARTCMD</b>	P1.0.0+	Remotely execute AT command on remote BC Smart server	58
<b>+SRBCSMARTRECV (notification)</b>	P1.0.0+	BC Smart data received (Unsolicited notification)	59
<b>+SRBCSMARTRSP (notification)</b>	P1.0.0+	BC Smart command response received (Unsolicited notification)	60
<b>+SRBCSMARTSEND</b>	P1.0.0+	Send data to remote BC Smart server/client	61
<b>+SRBCSMARTSTART</b>	2.5.0+	Put BC SMART connection into data mode	62
<b>+SRBLE</b>	2.6.0+	Read/write BLE Configuration	63
	2.5.0+	Read/write BLE Configuration	65
	P1.0.0	Read/write BLE Configuration	67
<b>+SRBLEADDCHAR</b>	P1.0.0+	Add BLE service characteristic	68
<b>+SRBLEADDCHARDESCR</b>	2.5.0+	Add BLE service characteristic descriptor	70
<b>+SRBLEADDCHARDESCR</b>	P1.0.0+	Add BLE service characteristic descriptor	72
<b>+SRBLEADDINCSERV</b>	2.5.0+	Add included service to another service	74
	P1.0.0	Add included service to primary service	75
<b>+SRBLEADDSERV</b>	P1.0.0+	Add a BLE service	76
<b>+SRBLEADV</b>	P1.0.0+	Start/stop BLE advertising and set advertising/scan response data	77
<b>+SRBLEADVPARAMS</b>	P1.0.0+	Set BLE advertising parameters	78

Table 4-1: BLE Commands (Summary) (Continued)

Command	F/W	Description	Page
<b>+SRBLECFG</b>	2.6.0+	Create BLE session/Print BLE sessions	79
	P1.0.0+	Create BLE session/Print BLE sessions	81
<b>+SRBLECFG (notification)</b>	P1.0.0+	BLE session created (unsolicited notification)	82
<b>+SRBLECLOSE</b>	2.5.0+	Close a BLE connection	83
	P1.0.0	Close a BLE connection	83
<b>+SRBLECNX</b>	P1.0.0+	Open a BLE connection	84
<b>+SRBLECONNPARAMS</b>	2.5.0+	Update BLE connection parameters	85
	P1.0.0	Update BLE connection parameters	87
<b>+SRBLEDEL</b>	P1.0.0+	Delete primary BLE service	88
<b>+SRBLEDELSERV</b>	P1.0.0+	Delete primary BLE service	89
<b>+SRBLEDISCCHAR</b>	P1.0.0+	Discover BLE session's service characteristics	90
<b>+SRBLEDISCDESC</b>	P1.0.0+	Get service characteristic's descriptor ID	92
<b>+SRBLEDISCINCSERV</b>	P1.0.0+	Discover BLE session's included services	93
<b>+SRBLEDISCSERV</b>	P1.0.0+	Discover BLE session's services	94
<b>+SRBLE_ERROR (notification)</b>	P1.0.0+	Indicate BLE command error code (Unsolicited notification)	96
<b>+SRBLE_IND (notification)</b>	2.5.0+	Indicate changed BLE connection status (Unsolicited notification)	98
	P1.0.0	Indicate changed BLE connection status (Unsolicited notification)	99
<b>+SRBLEINDICATE</b>	P1.0.0+	Send characteristic notification to remote GATT client	100
<b>+SRBLEINDICATION (notification)</b>	P1.0.0+	GATT server indication (Unsolicited notification)	101
<b>+SRBLEMTU (notification)</b>	P1.0.0+	Indicate negotiated (exchanged) session MTU value (Unsolicited notification)	102
<b>+SRBLENOTIFICATION (notification)</b>	P1.0.0+	GATT server notification (Unsolicited notification)	103
<b>+SRBLENOTIFY</b>	P1.0.0+	Send characteristic notification to remote GATT client	104
<b>+SRBLEREAD (notification)</b>	P1.0.0+	'Read' request received from GATT client (Unsolicited notification)	105
<b>+SRBLEREADCHAR</b>	2.5.0+	Read service characteristic's value	106
	P1.0.0	Read service characteristic's value	107
<b>+SRBLEREADDESC</b>	P1.0.0+	Read characteristic's descriptor information	108
<b>+SRBLEREADRESP</b>	P1.0.0+	Send response to remote GATT client's 'read' request	109
<b>+SRBLERSSI</b>	2.5.0+	Read RSSI for BLE Session	110
<b>+SRBLESCAN</b>	P1.0.0+	Configure and start BLE scanning	111

Table 4-1: BLE Commands (Summary) (Continued)

Command	F/W	Description	Page
<b>+SRBLESCANPARAMS</b>	P1.0.0+	Set scanning parameters	113
<b>+SRBLESECBOND</b>	P1.0.0+	Send bonding request/response	114
<b>+SRBLESECBOND (notification)</b>	P1.0.0+	Bonding procedure status (unsolicited notification)	115
<b>+SRBLESECBONDREQ (notification)</b>	P1.0.0+	Bonding request received (unsolicited notification)	115
<b>+SRBLESECCLEAR</b>	P1.0.0+	Remove bonded device(s)	116
<b>+SRBLESECNUMCMP</b>	P1.0.0+	Compare numbers from initiator and responder for secure connection	117
<b>+SRBLESECNUMCMP (notification)</b>	P1.0.0+	Request to confirm number comparison for secure connection (unsolicited notification)	117
<b>+SRBLESECPARAMS</b>	2.5.0+	Set/read secure parameters	118
	P1.0.0+	Set/read secure parameters	120
<b>+SRBLESECPASSKEY</b>	P1.0.0+	Send passkey response to peer device	121
<b>+SRBLESECPASSKEY (notification)</b>	P1.0.0+	Passkey to be entered on remote device	121
<b>+SRBLESECPASSKEYREQ (notification)</b>	P1.0.0+	Passkey request received (unsolicited notification)	122
<b>+SRBLETXPWR</b>	2.6.0+	Read/write connected session transmit power value	123
	2.5.0+	Read/write connected session transmit power value	124
<b>+SRBLETXPWRCFG</b>	2.6.0+	Read/write Transmit power value configuration	125
	2.5.0+	Read/write Transmit power value configuration	126
<b>+SRBLEWRITE (notification)</b>	P1.0.0+	'Write' request received from GATT client (Unsolicited notification)	127
<b>+SRBLEWRITECHAR</b>	2.5.0+	Write service characteristic's value	128
	P1.0.0	Write service characteristic's value	129
<b>+SRBLEWRITECHARNORSP</b>	2.5.0+	Write service characteristic's value, no server response	130
	P1.0.0	Write service characteristic's value, no server response	131
<b>+SRBLEWRITEDESC</b>	P1.0.0+	Write characteristic's descriptor information	132

## Command Reference

Table 4-2: BLE Commands (Detail)

Command	Description
<b>+SRBCSMART (notification)</b>	<p><b>Remote server BC Smart profile support notification (Unsolicited notification)</b></p> <p>Notifies the local device that the remote server supports:</p> <ul style="list-style-type: none"> <li>• BC Smart data transfer (using <a href="#">+SRBCSMARTSEND</a> on page 61)</li> <li>• BC Smart remote commands (using <a href="#">+SRBCSMARTCMD</a> on page 58)</li> </ul> <p>The notification is received as the result of the service discovery that occurs automatically when a connection is established with a remote GATT server.</p> <p><b>Category:</b> BC Smart command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBCSMART: &lt;session_id&gt;, &lt;support data&gt;, &lt;support command&gt;</b> Purpose: Remoter server indicates whether it supports BC Smart profile.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID of remote server)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;support data&gt; (Server support for BC Smart Data transfer)</p> <ul style="list-style-type: none"> <li>• 0—Not supported</li> <li>• 1—Supported</li> </ul> <p>&lt;support command&gt; (Server support for BC Smart Command)</p> <ul style="list-style-type: none"> <li>• 0—Not supported</li> <li>• 1—Supported</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Remote server supports BC Smart profile: +SRBCSMART: 1,1,1</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBCSMARTCMD</b>	<p><b>Remotely execute AT command on remote BC Smart server</b></p> <p>Use this command to have a remote device (that has been enabled as a BC Smart server) run an AT command (&lt;command&gt;). If the remote device is a BX310x with 'remote control' enabled (<a href="#">+SRREMCTRL</a> on page 193), the command will be executed, otherwise it will be ignored.</p> <p>To send a long command, break it up into smaller segments and send each segment using AT+SRBCSMARTCMD, with the last message containing the carriage return character.</p> <p><b>Category:</b> BC Smart command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBCSMARTCMD=&lt;session_id&gt;, &lt;command&gt;</b></li> <li>Response: OK</li> <li>or ERROR</li> <li>Purpose: Send a command to a specific session on the remote BC Smart server.</li> </ul> <hr/> <p><i>Note: An ERROR is returned if:</i></p> <ul style="list-style-type: none"> <li>• the remote server does not support BC Smart Command (<a href="#">+SRBCSMART (notification)</a> on page 57)</li> <li>• the &lt;data&gt; is longer than the negotiated (exchanged) MTU value for this session. See <a href="#">+SRBLEMTU (notification)</a> on page 102 for details.</li> </ul> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID of remote server)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;command&gt; (Command send to server/client)</p> <ul style="list-style-type: none"> <li>• AT command entered as an ASCII string, ending with a carriage return ('\0D'). If the command is too long, it is sent in multiple commands, and the carriage return is used only at the end of the string in the last message.</li> <li>• ASCII string</li> <li>• Max length—MTU-3 bytes. &lt;command&gt; will be truncated if it is longer than the max length.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Send command to remote BC Smart client:  <pre>AT+SRBCSMARTCMD=1,"AT+SRBTADDR?\0D" OK</pre> </li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBCSMARTRECV (notification)</b>	<p><b>BC Smart data received (Unsolicited notification)</b></p> <p>Indicates that BC Smart data has been received from the remote BC Smart server or client.</p> <p><b>Category:</b> BC Smart command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBCSMARTRECV: &lt;session_id&gt;, &lt;gatt role&gt;, &lt;data&gt;</b></li> </ul> <p>Purpose: Indicates data received for specific session from server or client.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID of remote server/client)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;gatt role&gt; (Source of data)</p> <ul style="list-style-type: none"> <li>• 0—GATT server (write request received from a client)</li> <li>• 1—GATT client (notification received from a server)</li> </ul> <p>&lt;data&gt; (Data received from server/client)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Data received from remote BC Smart server: +SRBCSMARTRECV: 1, 1, "Hola!"</li> <li>• Data received from remote BC Smart client: +SRBCSMARTRECV: 1, 0, "Hello"</li> </ul>

**Table 4-2: BLE Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBCSMARTRSP (notification)</b></p>	<p><b>BC Smart command response received (Unsolicited notification)</b></p> <p>Indicates that BC Smart data has been received from a remote BC Smart server that has remote control enabled.</p> <hr/> <p><i>Note: If the remote device is a:</i></p> <ul style="list-style-type: none"> <li>• <i>BX310x module—Remote control must be enabled (on that device) using <a href="#">+SRREMCTRL</a> on page 193.</i></li> <li>• <i>BC127 module—Remote control is always enabled.</i></li> </ul> <hr/> <p><b>Category:</b> BC Smart command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBCSMARTRSP: &lt;session_id&gt;, &lt;response&gt;</b></li> </ul> <p>Purpose: Indicates command response received from remote BC Smart server.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID of remote server)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;response&gt; (Command response received from server)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Local device sends AT+SRBTADDR? to run on the remote device:              AT+SRBCSMARCMD=1,"AT+SRBTADDR?\0D"              OK</li> </ul> <p>(Remote device runs command and sends response back to local device. Response data is split into two notifications since data is too long to fit in one notification.)</p> <pre>+SRBCSMARTRSP: 1,"+SRBTADDR: \2200:11:22:aa:bb:cc\22" +SRBCSMARTRSP: 1,"\0d\0aOK\0d\0a"</pre>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBCSMARTSEND</b>	<p><b>Send data to remote BC Smart server/client</b></p> <p>Send data to a remote BC Smart server or client.</p> <p><b>Category:</b> BC Smart command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBCSMARTSEND=&lt;session_id&gt;, &lt;gatt role&gt;, &lt;data&gt;</b></li> <li>Response: OK or ERROR</li> <li>Purpose: Send data to a specific session on a server or client.</li> </ul> <hr/> <p><i>Note: If sending data as a client (&lt;gatt role&gt;=1), ERROR is returned if the remote server does not support BC Smart Data (+SRBCSMART (notification) on page 57).</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID of remote server/client)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;gatt role&gt; (Sender's role)</p> <ul style="list-style-type: none"> <li>• 0—GATT server (notify request to a client)</li> <li>• 1—GATT client (write request to a server)</li> </ul> <p>&lt;data&gt; (Data received from server/client)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Max length—MTU-3 bytes. &lt;data&gt; will be truncated if it is longer than the max length.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Send data to remote BC Smart client: AT+SRBCSMARTSEND=1,0,"Hello" OK</li> <li>• Send data to remote BC Smart server (after receiving notification that server supports BC Smart profile): +SRBCSMART=1,1,1 AT+SRBCSMARTSEND=1,1,"Hola!" OK</li> </ul>

**Table 4-2: BLE Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBCSMARTSTART</b> (F/W rev: 2.5.0+)</p>	<p><b>Put BC SMART connection into data mode</b> Put an existing BC SMART connection into data mode to transfer data between the devices.</p> <hr/> <p><i>Note: To terminate data mode, copy and paste "+++". This terminates data mode and displays "OK".</i></p> <hr/> <p><b>Category:</b> BLE BC SMART command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBCSMARTSTART=&lt;session_id&gt;,&lt;gatt_role&gt;</b></li> <li>Response: <b>CONNECT</b> (Entering data mode successfully) [Enter data. When finished, enter "+++" to exit data mode] <b>OK</b> (Exiting data mode successfully)</li> <li>or <b>ERROR</b> (Data mode error)</li> <li>or <b>NO CARRIER</b> (Exiting data mode because connection with remote device was lost)</li> <li>or <b>+CME ERROR: &lt;cme_error&gt;</b></li> <li>Purpose: Put the specified BC SMART connection into data mode. When data mode is entered, the message "CONNECT" will be displayed.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured BLE session's ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;gatt_role&gt; (GATT Server or Client)</p> <ul style="list-style-type: none"> <li>• 0—Server (Notify request to a client)</li> <li>• 1—Client (Write request to a server)</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_NO_MORE_SESSIONS</li> <li>• 915—UNEXPECTED_PARAMETER</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• 917—PARAMETER_MISSING</li> <li>• 922—INVALID_SESSION_STATE</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Put existing BC SMART connection to remote device into data mode:  <pre>AT+SRBCSMARTSTART=2,1 CONNECT          (Data mode entered successfully) falfajlfajlfj +++ (In data mode, enter content then enter "+++" to exit data mode) OK              (Data mode exited)</pre> </li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLE</b> (F/W rev: 2.6.0+ For previous version, see <a href="#">+SRBLE</a> .)	<p><b>Read/write BLE Configuration</b>            Read/write the local device's BLE non-volatile configuration.</p> <hr/> <p><i>Note: This command is equivalent to using <a href="#">+SRBTNAME</a>. Changing the name with either command affects both BT and BLE.</i></p> <hr/> <p><b>Category:</b> BLE General command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLE=&lt;name&gt;,&lt;max_mtu&gt;, &lt;ble_init&gt;[, &lt;appearance&gt;]</b>              Response: OK                        or ERROR              Purpose: Set the BLE configuration. To make any changes take effect, reset the device.</li> <li>• Read: <b>AT+SRBLE?</b>              Response: +SRBLE: &lt;name&gt;,&lt;max_mtu&gt;,&lt;ble_init&gt;,&lt;appearance&gt;                        OK              Purpose: Read the BLE configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;name&gt; (BLE name)</p> <ul style="list-style-type: none"> <li>• Value for the "Device Name" characteristic (0x2A00) of the Generic Access Service (0x1800).</li> <li>• ASCII string</li> <li>• Example: "myName"</li> </ul> <p>&lt;max_mtu&gt; (Requested MTU value)</p> <ul style="list-style-type: none"> <li>• Value requested (during exchange MTU procedure) for largest packet size that can be sent in a single transmission. Actual negotiated MTU value is then received via <a href="#">+SRBLEMTU (notification)</a> on page 102.</li> <li>• Valid range: 23–517</li> </ul> <hr/> <p><i>Note: This is the local device's maximum packet size. When a connection is established, an MTU exchange process occurs between the local and remote device. A negotiated MTU is determined and sent to the device by an unsolicited notification (<a href="#">+SRBLEMTU (notification)</a> on page 102).</i></p> <hr/> <p>&lt;ble_init&gt; (BLE profiles states)</p> <ul style="list-style-type: none"> <li>• Decimal value</li> <li>• Bitmap indicating current state (enabled / disabled) of supported BLE profiles             <ul style="list-style-type: none"> <li>• Bit 1 (0x01) — GATT Client enabled</li> <li>• Bit 2 (0x02) — GATT Server enabled</li> <li>• Bit 3 (0x04) — BCSmart Client enabled</li> <li>• Bit 4 (0x08) — BCSmart Server enabled</li> <li>• For example:                0 = All profiles disabled                1 = GATT Client enabled                3 = GATT Client and GATT Server enabled                15 = All profiles enabled</li> </ul> </li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLE (continued)</b> (F/W rev: 2.6.0+ For previous version, see <a href="#">+SRBLE</a> .)	<b>Read/write BLE Configuration (continued)</b> <appearance> (BLE appearance characteristic) <ul style="list-style-type: none"> <li>• Characteristic list available at <a href="https://www.bluetooth.com/specifications/gatt/viewer?attributeXmlFile=org.bluetooth.characteristic.gap.appearance.xml">https://www.bluetooth.com/specifications/gatt/viewer?attributeXmlFile=org.bluetooth.characteristic.gap.appearance.xml</a>. Appearance is a 16-bit value where bits 15–6 represent the category and bits 5–0 represent the subcategory.</li> <li>• Examples:               <ul style="list-style-type: none"> <li>• 0—(Default) Unknown</li> <li>• 64—Generic Phone</li> <li>• 128—Generic Computer</li> <li>• 192—Generic Watch</li> <li>• etc.</li> </ul> </li> </ul> <b>Examples:</b> <ul style="list-style-type: none"> <li>• Write configuration details for a Generic Computer:                AT+SRBLE="myName", 50, 1, 128                OK</li> <li>• Read configuration details for a Generic Computer:                AT+SRBLE?                +SRBLE: "myName", 50, 1, 128                OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<p><b>+SRBLE</b> (F/W rev: 2.5.0+ For next version, see <a href="#">+SRBLE</a>. For previous version, see <a href="#">+SRBLE</a>.)</p>	<p><b>Read/write BLE Configuration</b> Read/write the local device's BLE non-volatile configuration.</p> <hr/> <p><i>Note: This command is equivalent to using +SRBTNAME. Changing the name with either command affects both BT and BLE.</i></p> <hr/> <p><b>Category:</b> BLE General command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLE=&lt;name&gt;,&lt;max_mtu&gt;, &lt;bc_smart_support&gt;[, &lt;appearance&gt;]</b> Response: OK or ERROR Purpose: Set the BLE configuration. To make any changes take effect, reset the device.</li> <li>• Read: <b>AT+SRBLE?</b> Response: +SRBLE: &lt;name&gt;,&lt;max_mtu&gt;,&lt;bc_smart_support&gt;,&lt;appearance&gt; OK Purpose: Read the BLE configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;name&gt; (BLE name)</p> <ul style="list-style-type: none"> <li>• Value for the "Device Name" characteristic (0x2A00) of the Generic Access Service (0x1800).</li> <li>• ASCII string</li> <li>• Example: "myName"</li> </ul> <p>&lt;max_mtu&gt; (Requested MTU value)</p> <ul style="list-style-type: none"> <li>• Value requested (during exchange MTU procedure) for largest packet size that can be sent in a single transmission. Actual negotiated MTU value is then received via <a href="#">+SRBLEMTU (notification)</a> on page 102.</li> <li>• Valid range: 0–517</li> </ul> <hr/> <p><i>Note: This is the local device's maximum packet size. When a connection is established, an MTU exchange process occurs between the local and remote device. A negotiated MTU is determined and sent to the device by an unsolicited notification (<a href="#">+SRBLEMTU (notification)</a> on page 102).</i></p> <hr/> <p>&lt;bc_smart_support&gt; (BC Smart Profile Support state)</p> <ul style="list-style-type: none"> <li>• Indicates if BC Smart profile (which works with the Melody Smart application) is supported.</li> <li>• 0—Disabled</li> <li>• 1—Enabled</li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLE (continued)</b> (F/W rev: 2.5.0+ For next version, see <a href="#">+SRBLE</a> . For previous version, see <a href="#">+SRBLE</a> .)	<b>Read/write BLE Configuration (continued)</b> <appearance> (BLE appearance characteristic) <ul style="list-style-type: none"> <li>• Characteristic list available at <a href="https://www.bluetooth.com/specifications/gatt/viewer?attributeXmlFile=org.bluetooth.characteristic.gap.appearance.xml">https://www.bluetooth.com/specifications/gatt/viewer?attributeXmlFile=org.bluetooth.characteristic.gap.appearance.xml</a>. Appearance is a 16-bit value where bits 15–6 represent the category and bits 5–0 represent the subcategory.</li> <li>• Examples:               <ul style="list-style-type: none"> <li>• 0 — (Default) Unknown</li> <li>• 64 — Generic Phone</li> <li>• 128 — Generic Computer</li> <li>• 192 — Generic Watch</li> <li>• etc.</li> </ul> </li> </ul> <b>Examples:</b> <ul style="list-style-type: none"> <li>• Write configuration details for a Generic Computer:                AT+SRBLE="myName", 50, 1, 128                OK</li> <li>• Read configuration details for a Generic Computer:                AT+SRBLE?                +SRBLE: "myName", 50, 1, 128                OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLE</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBLE</a> .)	<p><b>Read/write BLE Configuration</b>            Read/write the local device's BLE non-volatile configuration.</p> <hr/> <p><i>Note: Any changes to the configuration do not take effect until after the device is reset.</i></p> <hr/> <p><b>Category:</b> BLE General command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+SRBLE=&lt;name&gt;,&lt;max_mtu&gt;, &lt;bc_smart_support&gt;</b>                Response:  OK                          or  ERROR                Purpose:   Set the BLE configuration. To make any changes take effect, reset the device.</li> <li>• Read:         <b>AT+SRBLE?</b>                Response:  +SRBLE: &lt;name&gt;,&lt;max_mtu&gt;,&lt;bc_smart_support&gt;                          OK                Purpose:   Read the BLE configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;name&gt; (BLE name)</p> <ul style="list-style-type: none"> <li>• Value for the "Device Name" characteristic (0x2A00) of the Generic Access Service (0x1800).</li> <li>• ASCII string</li> <li>• Example: "myName"</li> </ul> <p>&lt;max_mtu&gt; (Requested MTU value)</p> <ul style="list-style-type: none"> <li>• Value requested (during exchange MTU procedure) for largest packet size that can be sent in a single transmission. Actual negotiated MTU value is then received via <a href="#">+SRBLEMTU (notification)</a> on page 102.</li> <li>• Valid range: 0–517</li> </ul> <hr/> <p><i>Note: This is the local device's maximum packet size. When a connection is established, an MTU exchange process occurs between the local and remote device. A negotiated MTU is determined and sent to the device by an unsolicited notification (<a href="#">+SRBLEMTU (notification)</a> on page 102).</i></p> <hr/> <p>&lt;bc_smart_support&gt; (BC Smart Profile Support state)</p> <ul style="list-style-type: none"> <li>• Indicates if BC Smart profile (which works with the Melody Smart application) is supported.</li> <li>• 0—Disabled</li> <li>• 1—Enabled</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Write:                AT+SRBLE="myName", 50, 1                OK</li> <li>• Read:                AT+SRBLE?                +SRBLE: "myName", 50, 1                OK</li> </ul>

**Table 4-2: BLE Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBLEADDCHAR</b></p>	<p><b>Add BLE service characteristic</b></p> <p>Add a service characteristic to the local device to be used when acting as a GATT server. Remote GATT clients will be able to discover the service on the local GATT server.</p> <hr/> <p><b>Important:</b> <i>If you are going to add a descriptor for this characteristic, you must use <b>+SRBLEADDCHARDESCR</b> on page 72 before you add another characteristic to the service. (You can add a descriptor only to the most recently added characteristic.)</i></p> <hr/> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Prerequisites:</b></p> <ul style="list-style-type: none"> <li>The service must already have been set up using <b>+SRBLEADDSERV</b> on page 76.</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBLEADDCHAR=&lt;service handle&gt;, &lt;characteristic uuid&gt;, &lt;properties&gt;, &lt;permissions&gt;[, &lt;max_attribute_length&gt;[, &lt;attribute_length&gt;[, &lt;attribute_value&gt;[, &lt;control_policy&gt;]]]]</b></li> <li>Response: <b>+SRBLEADDCHAR: &lt;characteristic handle&gt;</b> OK or ERROR</li> <li>Purpose: Add the specified characteristic.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;service handle&gt; (Service attribute handle)</p> <ul style="list-style-type: none"> <li>Unique identifier for the service</li> <li>Valid range: 1-65535</li> </ul> <p>&lt;characteristic uuid&gt; (Characteristic UUID (Universal Unique Identifier))</p> <ul style="list-style-type: none"> <li>Select predefined UUID from <a href="https://www.bluetooth.com/specifications/gatt/characteristics">https://www.bluetooth.com/specifications/gatt/characteristics</a></li> <li>or</li> <li>Use a unique custom UUID (16-bit, 32-bit, or 128-bit)</li> </ul> <p>&lt;properties&gt; (Characteristic properties)</p> <ul style="list-style-type: none"> <li>Decimal format</li> <li>Decimal bitmap value: <ul style="list-style-type: none"> <li>1—Broadcast</li> <li>2—Read</li> <li>4—Write without response</li> <li>8—Write</li> <li>16—Notify</li> <li>32—Indicate</li> <li>64—Authenticated Signed Writes</li> <li>128—Extended properties</li> </ul> </li> <li>More than one property may be selected (e.g. 10=2 (Read) + 8 (Write))</li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEADDCHAR (continued)</b>	<p><b>Add BLE service characteristic (continued)</b></p> <p>&lt;permissions&gt; (Attribute permissions)</p> <ul style="list-style-type: none"> <li>• Decimal bitmap value: <ul style="list-style-type: none"> <li>• 1—Read</li> <li>• 2—Read encrypted</li> <li>• 4—Read encrypted MITM</li> <li>• 16—Write</li> <li>• 32—Write encrypted</li> <li>• 64—Write encrypted MITM</li> <li>• 128—Write signed</li> <li>• 256—Write signed MITM</li> </ul> </li> <li>• More than one property may be selected (e.g. 17=1 (Read) + 16 (Write))</li> </ul> <p>&lt;max_attribute_length&gt; (Maximum attribute length)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–(MTU-3)</li> <li>• Default—MTU-3</li> </ul> <p>&lt;attribute_length&gt; (Attribute length)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–&lt;max_attribute_length&gt;</li> <li>• Default—1</li> </ul> <p>&lt;attribute value&gt; (Attribute value)</p> <ul style="list-style-type: none"> <li>• Format—ASCII string.</li> <li>• Characters entered as hexadecimal format ('\\nn') or as text (for printable characters). For example, the letter 'M' could be entered as 'M' or as '\\4d'.</li> <li>• Length—&lt;attribute_length&gt; bytes</li> </ul> <p>&lt;attribute_control_policy&gt; (Control policy for the characteristics)</p> <ul style="list-style-type: none"> <li>• 0—Request will be handled by the application</li> <li>• 1—(Default) Request will be handled automatically</li> </ul> <p>&lt;characteristic handle&gt; (Characteristic attribute handle)</p> <ul style="list-style-type: none"> <li>• Unique identifier to refer to the service's characteristic in other AT commands</li> <li>• Valid range: 1-65535</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Add Heart Rate Measurement characteristic to the Heart Rate service (Note: In this example, the Heart Rate service handle is "50"):  AT+SRBLEADDCHAR=50, "2A37", 10, 11  +SRBLEADDCHAR: 52  OK</li> </ul>

**Table 4-2: BLE Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBLEADDCHARDESCR</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLEADDCHARDESCR</a>.)</p>	<p><b>Add BLE service characteristic descriptor</b> Add a configuration descriptor to the characteristic that was most recently added to a BLE service. Remote GATT clients will be able to discover the service on the local GATT server.</p> <hr/> <p><b>Important:</b> <i>There is no way to add a descriptor to any characteristics that were added to the service before the most recent one.</i></p> <hr/> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Prerequisites:</b></p> <ul style="list-style-type: none"> <li>The characteristic must already have been set up using <a href="#">+SRBLEADDCHAR</a> on page 68.</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBLEADDCHARDESCR=&lt;service handle&gt;, &lt;characteristic descriptor uuid&gt;, &lt;permissions&gt;[,&lt;max_attribute_length&gt;[,&lt;attribute_length&gt;[,&lt;attribute_value&gt;[,&lt;control_policy&gt;]]]]</b></li> </ul> <p>Response: +SRBLEADDCHARDESCR: &lt;characteristic descriptor handle&gt; OK or ERROR</p> <p>Purpose: Add the descriptor to the last characteristic that was added to the service.</p> <p><b>Parameters:</b></p> <p>&lt;service handle&gt; (Service attribute handle)</p> <ul style="list-style-type: none"> <li>Unique identifier for the service</li> <li>Decimal value</li> <li>Valid range: 1-65535</li> </ul> <p>&lt;characteristic descriptor uuid&gt; (Characteristic descriptor UUID (Universal Unique Identifier))</p> <ul style="list-style-type: none"> <li>Decimal value</li> <li>Select predefined UUID from <a href="https://www.bluetooth.com/specifications/gatt/descriptors">https://www.bluetooth.com/specifications/gatt/descriptors</a> or Use a unique custom UUID (16-bit, 32-bit, or 128-bit)</li> </ul> <p>&lt;permissions&gt; (Attribute permissions)</p> <ul style="list-style-type: none"> <li>Decimal bitmap value: <ul style="list-style-type: none"> <li>1—Read</li> <li>2—Read encrypted</li> <li>4—Read encrypted MITM</li> <li>16—Write</li> <li>32—Write encrypted</li> <li>64—Write encrypted MITM</li> <li>128—Write signed</li> <li>256—Write signed MITM</li> </ul> </li> <li>More than one property may be selected (e.g. 17= 1 (Read) + 16 (Write))</li> </ul> <p>&lt;max_attribute_length&gt; (Max length of attribute, in bytes)</p> <ul style="list-style-type: none"> <li>Decimal value</li> <li>Length—1—(MTU - 3) (See <a href="#">+SRBLEMTU (notification)</a> on page 102 for details.)</li> <li>Default: (MTU - 3)</li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEADDCHARDESCR (continued)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLEADDCHARDESCR</a> .)	<b>Add BLE service characteristic descriptor (continued)</b> <attribute_length> (Length of service attribute, in bytes) <ul style="list-style-type: none"> <li>• Decimal value</li> <li>• Length—1 to &lt;maximum_attribute_length&gt;j</li> <li>• Default: 1</li> </ul> <attribute value> (Attribute value) <ul style="list-style-type: none"> <li>• Format—ASCII string.</li> <li>• Characters entered as hexadecimal format ('\nn') or as text (for printable characters). For example, the letter 'M' could be entered as 'M' or as '\4d'.</li> <li>• Length—&lt;attribute_length&gt; bytes</li> </ul> <attribute_control_policy> (Control policy for the characteristics) <ul style="list-style-type: none"> <li>• 0—Request will be handled by the application</li> <li>• 1—(Default) Request will be handled automatically</li> </ul> <characteristic descriptor handle> (Characteristic descriptor handle) <ul style="list-style-type: none"> <li>• Unique identifier to refer to the service's characteristic descriptor in other AT commands</li> <li>• Valid range: 1-65535</li> </ul> <b>Examples:</b> <ul style="list-style-type: none"> <li>• Add Heart Rate Measurement client characteristic configuration descriptor to the Heart Rate service (Note: In this example, the Heart Rate service handle is '50', and the Heart Rate Measurement characteristic handle is '52' (0x34)):               <pre>AT+SRBLEADDCHARDESCR=50, "2902", 17 +SRBLEADDCHARDESCR: 53 OK</pre> </li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEADDCHARDESCR</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBLEADDCHARDESCR</a> .)	<p><b>Add BLE service characteristic descriptor</b></p> <p>Add a configuration descriptor to the characteristic that was most recently added to a BLE service. Remote GATT clients will be able to discover the service on the local GATT server.</p> <hr/> <p><b>Important:</b> <i>There is no way to add a descriptor to any characteristics that were added to the service before the most recent one.</i></p> <hr/> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Prerequisites:</b></p> <ul style="list-style-type: none"> <li>The characteristic must already have been set up using <a href="#">+SRBLEADDCHAR</a> on page 68.</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBLEADDCHARDESCR=&lt;service handle&gt;, &lt;characteristic descriptor uuid&gt;, &lt;permissions&gt;</b></li> <li>Response: <b>+SRBLEADDCHARDESCR: &lt;characteristic descriptor handle&gt;</b> OK or ERROR</li> <li>Purpose: Add the descriptor to the last characteristic that was added to the service.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;service handle&gt; (Service attribute handle)</p> <ul style="list-style-type: none"> <li>Unique identifier for the service</li> <li>Decimal value</li> <li>Valid range: 1-65535</li> </ul> <p>&lt;characteristic descriptor uuid&gt; (Characteristic descriptor UUID (Universal Unique Identifier))</p> <ul style="list-style-type: none"> <li>Decimal value</li> <li>Select predefined UUID from <a href="https://www.bluetooth.com/specifications/gatt/descriptors">https://www.bluetooth.com/specifications/gatt/descriptors</a> or Use a unique custom UUID (16-bit, 32-bit, or 128-bit)</li> </ul> <p>&lt;permissions&gt; (Attribute permissions)</p> <ul style="list-style-type: none"> <li>Decimal bitmap value:           <ul style="list-style-type: none"> <li>1—Read</li> <li>2—Read encrypted</li> <li>4—Read encrypted MITM</li> <li>16—Write</li> <li>32—Write encrypted</li> <li>64—Write encrypted MITM</li> <li>128—Write signed</li> <li>256—Write signed MITM</li> </ul> </li> <li>More than one property may be selected (e.g. 17=1 (Read) + 16 (Write))</li> </ul> <p>&lt;characteristic descriptor handle&gt; (Characteristic descriptor handle)</p> <ul style="list-style-type: none"> <li>Unique identifier to refer to the service's characteristic descriptor in other AT commands</li> <li>Valid range: 1-65535</li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEADDCHARDESCR (continued)</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBLEADDCHARDESCR</a> .)	<b>Add BLE service characteristic descriptor (continued)</b> <b>Examples:</b> <ul style="list-style-type: none"><li>• Add Heart Rate Measurement client characteristic configuration descriptor to the Heart Rate service (Note: In this example, the Heart Rate service handle is '50', and the Heart Rate Measurement characteristic handle is '52' (0x34)): AT+SRBLEADDCHARDESCR=50, "2902", 17 +SRBLEADDCHARDESCR: 53 OK</li></ul>

**Table 4-2: BLE Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBLEADDINCSE RV</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLEADDINCSE RV</a>.)</p>	<p><b>Add included service to another service</b></p> <p>Link one service (&lt;included_service_handle&gt;) to another service (&lt;including_service_handle&gt;). This command can be used multiple times to link additional included services to an including service.</p> <hr/> <p><i>Note: Both primary and secondary services can include other services, and can be included in other services.</i></p> <hr/> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBLEADDINCSE RV=&lt;including_service_handle&gt;,&lt;included_service_handle&gt;</b></li> <li>Response: OK or ERROR</li> <li>Purpose: Add the specified primary service.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;including_service handle&gt; (Including service attribute handle)</p> <ul style="list-style-type: none"> <li>Unique primary or non-primary service identifier created in <a href="#">+SRBLEADDSE RV</a> on page 76.</li> <li>Valid range: 1-65535</li> </ul> <p>&lt;included_service handle&gt; (Included service attribute handle)</p> <ul style="list-style-type: none"> <li>Unique primary or non-primary service identifier created in <a href="#">+SRBLEADDSE RV</a> on page 76.</li> <li>Valid range: 1-65535</li> </ul> <p><b>Example:</b></p> <p>Add three services, then add two of them as included services to the remaining (primary) service:</p> <ol style="list-style-type: none"> <li>Add a primary service and receive its service handle (50): AT+SRBLEADDSE RV=1234 (Created as primary by default, no second parameter) +SRBLEADDSE RV: 50 OK</li> <li>Add a non-primary service and receive its service handle (150): AT+SRBLEADDSE RV=6789,0 (Second parameter (0) indicates secondary) +SRBLEADDSE RV: 150 OK</li> <li>Add another primary service and receive its service handle (250): AT+SRBLEADDSE RV=2345,1 (Second parameter (1) explicitly indicates primary) +SRBLEADDSE RV: 250 OK</li> <li>Include the non-primary service on the first primary service: AT+SRBLEADDINCSE RV=50,150 OK</li> <li>Include the second primary service on the first primary service: AT+SRBLEADDINCSE RV=50,250 OK</li> </ol> <p>OK</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEADDINCSE RV</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBLEADDINCSE RV.</a> )	<p><b>Add included service to primary service</b>            Add an existing service as an 'included' service to an existing primary service.</p> <hr/> <p><i>Note: The included service can be either a primary or non-primary serve.</i></p> <hr/> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBLEADDINCSE RV=&lt;primary_service_handle&gt; &lt;included_service_handle&gt;</b></li> </ul> <p>Response: OK            or ERROR</p> <p>Purpose: Add the specified primary service.</p> <p><b>Parameters:</b></p> <p>&lt;primary_service handle&gt; (Service attribute handle)</p> <ul style="list-style-type: none"> <li>Unique primary service identifier created in <a href="#">+SRBLEADDSE RV</a> on page 76.</li> <li>Valid range: 1-65535</li> </ul> <p>&lt;included_service handle&gt; (Service attribute handle)</p> <ul style="list-style-type: none"> <li>Unique primary or non-primary service identifier created in <a href="#">+SRBLEADDSE RV</a> on page 76.</li> <li>Valid range: 1-65535</li> </ul> <p><b>Example:</b></p> <p>Add three services, then add two of them as included services to the remaining (primary) service:</p> <ol style="list-style-type: none"> <li>Add a primary service and receive its service handle (60):            AT+SRBLEADDSE RV=1234            +SRBLEADDSE RV: 60            OK</li> <li>Add a non-primary service and receive its service handle (160):            AT+SRBLEADDSE RV=89AB            +SRBLEADDSE RV: 160            OK</li> <li>Add another primary service and receive its service handle (260):            AT+SRBLEADDSE RV=7654            +SRBLEADDSE RV: 260            OK</li> <li>Include the non-primary service on the first primary service:            AT+SRBLEADDINCSE RV=60,160            OK</li> <li>Include the second primary service on the first primary service:            AT+SRBLEADDINCSE RV=60,260            OK</li> </ol>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEADDSERV</b>	<p><b>Add a BLE service</b></p> <p>Add a primary or non-primary service to the local device to be used when acting as a GATT server. Remote GATT clients will be able to discover the service on the local GATT server via <a href="#">+SRBLEDISCSERV</a> or <a href="#">+SRBLEDISCINCSERV</a>.</p> <hr/> <p><i>Note: As of publication date of this document, up to 5 services can be added.</i></p> <hr/> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEADDSERV=&lt;service uuid&gt;[, &lt;is_primary&gt;]</b></li> <li>Response: +SRBLEADDSERV: &lt;service handle&gt; OK</li> <li>or ERROR</li> <li>Purpose: Add the specified service as a primary service or (if &lt;is_primary&gt; is 0 or not specified) as a non-primary service. An error will be returned if the maximum number of user-added services (5) have already been added.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;service uuid&gt; (Service UUID (Universal Unique Identifier))</p> <ul style="list-style-type: none"> <li>• Hexadecimal value</li> <li>• Select predefined UUID from <a href="https://www.bluetooth.com/specifications/gatt/services">https://www.bluetooth.com/specifications/gatt/services</a></li> <li>or</li> <li>• Use a unique custom UUID (16-bit, 32-bit, or 128-bit)</li> </ul> <p>&lt;is_primary&gt; (Primary/non-primary flag)</p> <ul style="list-style-type: none"> <li>• 0—Non-primary service</li> <li>• 1 (Default)—Primary service</li> </ul> <p>&lt;service handle&gt; (Service attribute handle)</p> <ul style="list-style-type: none"> <li>• Decimal value</li> <li>• Unique identifier to refer to the service in other AT commands</li> <li>• Valid range: 1-65535</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Add Heart Rate service as a primary service (predefined UUID—0x180D): AT+SRBLEADDSERV=180D (or AT+SRBLEADDSERV=180D, 1) +SRBLEADDSERV: 50 OK</li> <li>• Add Heart Rate service as a non-primary service (predefined UUID—0x180D): AT+SRBLEADDSERV=180D, 0 (or AT+SRBLEADDSERV=180D, 1) +SRBLEADDSERV: 50 OK</li> </ul> <hr/> <p><i>Note: In further AT commands, the service handle "50" identifies the Heart Rate service.</i></p> <hr/>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEADV</b>	<p><b>Start/stop BLE advertising and set advertising/scan response data</b>  Start or stop BLE advertising, and set the BLE advertising and scan response data.  Advertising stops automatically when a BLE connection is established.</p> <hr/> <p><i>Note: The module can advertise and scan (+SRBLESCAN on page 111) at the same time.</i></p> <hr/> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBLEADV=&lt;enable&gt;[,&lt;adv_data&gt;[, &lt;scan_rsp_data&gt;]]</b></li> <li>Response: OK or ERROR</li> <li>Purpose: Start/stop BLE advertising, and configure advertising and scan response data.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;enable&gt; (Start/stop BLE advertising)</p> <ul style="list-style-type: none"> <li>0—Stop advertising</li> <li>1—Start advertising</li> </ul> <p>&lt;adv_data&gt; (Raw advertising data)</p> <ul style="list-style-type: none"> <li>Default—Contains the name defined in +SRBLE on page 63 (up to 26 bytes, remainder is truncated), and the flag "\06"</li> <li>Format—ASCII string. Characters entered as hexadecimal format ('\nn') or as text (for printable characters). For example, the letter 'M' could be entered as 'M' or as '\4d'.</li> <li>Length—0–31 bytes</li> <li>Examples (Note: these are equivalent strings, one using all hex characters, one using hex and text): <ul style="list-style-type: none"> <li>(all hex): "\02\01\06\07\09\4d\79\4e\61\6d\65\03\03\cd\ab"</li> <li>(hex + text): "\02\01\06\07\09MyName\03\03\cd\ab"</li> </ul> </li> <li>Note—Advertising data does not persist after a reset.</li> </ul> <p>&lt;scan_rsp_data&gt; (Raw scan response data)</p> <ul style="list-style-type: none"> <li>Default (used if not set using this command)—"" (null string)</li> <li>Format—ASCII string. Characters entered as hexadecimal format ('\nn') or as text (for printable characters). For example, the letter 'M' could be entered as 'M' or as '\4d'.</li> <li>Length—0–31 bytes</li> <li>Example: "\02\0a\ff"</li> <li>Note—Advertising data does not persist after a reset.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Start advertising:  AT+SRBLEADV=1,"\02\01\06\07\09\4d\79\4e\61\6d\65\03\03\cd\ab","\02\0a\ff"  OK  (The &lt;adv_data&gt; above includes three elements:  <b>\02\01\06</b>—(Data length 2 + Data type 1 (flag) + Flag value (6)  <b>\07\09\4d\79\4e\61\6d\65</b>—(Data length 7 + Data type 9 (complete local name)  + data (\4d\79\43\61\6d\65 = "MyName")  <b>\03\03\cd\ab</b>—Data length 3 + Data type 3 (list of 16-bit service class UUIDs +  uuid value (\cd\ab = "abcd"))</li> </ul> <li>Stop advertising:  AT+SRBLEADV=0  OK</li>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEADVPARAMS</b>	<p><b>Set BLE advertising parameters</b></p> <p>Set BLE advertising parameters (timing and type).</p> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEADVPARAMS=&lt;adv_int_min&gt;, &lt;adv_int_max&gt;, &lt;adv_type&gt;</b>  Response: OK  or ERROR  Purpose: Set the specified advertising parameters.</li> <li>• Read: <b>AT+SRBLEADVPARAMS?</b>  Response: +SRBLEADVPARAMS: &lt;adv_int_min&gt;, &lt;adv_int_max&gt;, &lt;adv_type&gt;  OK  or ERROR  Purpose: Read the advertising parameters.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;adv_int_min&gt; (Minimum advertising interval)</p> <ul style="list-style-type: none"> <li>• Applies to undirected advertising and low duty cycle directed advertising. (e.g. ignored for &lt;adv_type&gt;=1, which is high duty cycle directed advertising)</li> <li>• Decimal value</li> <li>• Calculated interval = &lt;adv_int_min&gt; × 0.625 ms</li> <li>• Valid values: <ul style="list-style-type: none"> <li>• 32–16384 (Time range = 20 ms to 10.24 sec)</li> <li>• Default—32</li> </ul> </li> </ul> <p>&lt;adv_int_max&gt; (Maximum advertising interval)</p> <ul style="list-style-type: none"> <li>• Applies to undirected advertising and low duty cycle directed advertising. (e.g. ignored for &lt;adv_type&gt;=1, which is high duty cycle directed advertising)</li> <li>• Calculated interval = &lt;adv_int_max&gt; × 0.625 ms</li> <li>• Valid values: <ul style="list-style-type: none"> <li>• 32–16384 (Time range = 20 ms to 10.24 sec)</li> <li>• Default—64</li> </ul> </li> </ul> <p>&lt;adv_type&gt; (Advertising type)</p> <ul style="list-style-type: none"> <li>• 0—Connectable undirected advertising</li> <li>• 1—Connectable high duty cycle directed advertising</li> <li>• 2—Scannable undirected advertising</li> <li>• 3—Non-connectable undirected advertising</li> <li>• 4—Connectable low duty cycle directed advertising</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Set advertising parameters (Min interval=20 ms; Max interval=40 ms; Type=Connectable undirected advertising)  AT+SRBLEADVPARAMS=32,64,0  OK</li> <li>• Read advertising parameters  AT+SRBLEADVPARAMS?  +SRBLEADVPARAMS: 32,64,0  OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLECFG</b> (F/W rev: 2.6.0+ For previous version, see <a href="#">+SRBLECFG</a> .)	<p><b>Create BLE session/Print BLE sessions</b></p> <p><b>Category:</b> BLE General command</p> <p>Create a new BLE session, or print a list of all BLE sessions.</p> <hr/> <p><i>Note: If a remote non-registered device (no session ID) initiates a connection:</i></p> <ul style="list-style-type: none"> <li>• an unsolicited notification (<a href="#">+SRBLECFG (notification)</a> on page 82) is received when the session is created</li> <li>• another unsolicited notification (<a href="#">+SRBLE_IND (notification)</a> on page 98) is received, indicating the device is connected.</li> </ul> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLECFG=&lt;bt_addr&gt;,&lt;address_type&gt;</b>            Response: +SRBLECFG: &lt;session_id&gt;,&lt;is_connected&gt;,&lt;bt_addr&gt;,&lt;address_type&gt;,&lt;mtu&gt;            OK            or ERROR            Purpose: Create a new session (and return the session information).</li> <li>• Read: <b>AT+SRBLECFG?</b>            Response: +SRBLECFG: &lt;session_id&gt;,&lt;is_connected&gt;,&lt;bt_addr&gt;,&lt;address_type&gt;,&lt;mtu&gt;            ...            +SRBLECFG: &lt;session_id&gt;,&lt;is_connected&gt;,&lt;bt_addr&gt;,&lt;address_type&gt;,&lt;mtu&gt;            OK            Purpose: Print details about all BLE sessions.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;is_connected&gt; (Session state)</p> <ul style="list-style-type: none"> <li>• 0—Not connected</li> <li>• 1—Connected</li> </ul> <p>&lt;bt_addr&gt; (Remote device Bluetooth address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Hexadecimal format</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;address_type&gt; (BT address type)</p> <ul style="list-style-type: none"> <li>• 0—Public. Unique, fixed address assigned to the device.</li> <li>• 1—Random. Randomly generated address (less secure).</li> <li>• 2—Unknown</li> </ul> <p>&lt;mtu&gt; (Maximum Transmission Unit)</p> <ul style="list-style-type: none"> <li>• Valid range: 23–517</li> <li>• Default: 23</li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLECFG (continued)</b> (F/W rev: 2.6.0+ For previous version, see <a href="#">+SRBLECFG</a> .)	<b>Create BLE session/Print BLE sessions (continued)</b> <b>Examples:</b> <ul style="list-style-type: none"> <li>• Write:               <pre>AT+SRBLECFG="00:11:22:aa:bb:cc" +SRBLECFG: 1,0,"00:11:22:aa:bb:cc",0,23 OK (New session is created and not connected.)</pre> </li> <li>• Read:               <pre>AT+SRBLECFG? +SRBLECFG:1,0,"00:11:22:aa:bb:cc",0,23 +SRBLECFG:2,1,"33:44:55:dd:ee:ff",0,23 OK (In this example, session 1 is not connected, session 2 is connected.)</pre> </li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLECFG</b> (F/W rev: P1.0.0+ For next version, see <a href="#">+SRBLECFG</a> .)	<p><b>Create BLE session/Print BLE sessions</b></p> <p><b>Category:</b> BLE General command</p> <p>Create a new BLE session, or print a list of all BLE sessions.</p> <hr/> <p><i>Note: If a remote non-registered device (no session ID) initiates a connection:</i></p> <ul style="list-style-type: none"> <li>• an unsolicited notification (<a href="#">+SRBLECFG (notification)</a> on page 82) is received when the session is created</li> <li>• another unsolicited notification (<a href="#">+SRBLE_IND (notification)</a> on page 98) is received, indicating the device is connected.</li> </ul> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLECFG=&lt;bt_addr&gt;</b>            Response: +SRBLECFG: &lt;session_id&gt;,&lt;is_connected&gt;,&lt;bt_addr&gt;,&lt;mtu&gt;            OK            or ERROR            Purpose: Create a new session (and return the session information).</li> <li>• Read: <b>AT+SRBLECFG?</b>            Response: +SRBLECFG: &lt;session_id&gt;,&lt;is_connected&gt;,&lt;bt_addr&gt;,&lt;mtu&gt;            ...            +SRBLECFG: &lt;session_id&gt;,&lt;is_connected&gt;,&lt;bt_addr&gt;,&lt;mtu&gt;            OK            Purpose: Print details about all BLE sessions.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;is_connected&gt; (Session state)</p> <ul style="list-style-type: none"> <li>• 0—Not connected</li> <li>• 1—Connected</li> </ul> <p>&lt;bt_addr&gt; (Remote device Bluetooth address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Hexadecimal format</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;mtu&gt; (Maximum Transmission Unit)</p> <ul style="list-style-type: none"> <li>• Valid range: 23–517</li> <li>• Default: 23</li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLECFG (continued)</b> (F/W rev: P1.0.0+ For next version, see <a href="#">+SRBLECFG.</a> )	<b>Create BLE session/Print BLE sessions (continued)</b> <b>Examples:</b> <ul style="list-style-type: none"> <li>• Write:               <pre>AT+SRBLECFG="00:11:22:aa:bb:cc" +SRBLECFG: 1,0,"00:11:22:aa:bb:cc",23 OK (New session is created and not connected.)</pre> </li> <li>• Read:               <pre>AT+SRBLECFG? +SRBLECFG:1,0,"00:11:22:aa:bb:cc",23 +SRBLECFG:2,1,"33:44:55:dd:ee:ff",23 OK (Session 1 is not connected, session 2 is connected.)</pre> </li> </ul>
<b>+SRBLECFG (notification)</b>	<b>BLE session created (unsolicited notification)</b> Notifies the local device when a remote device that was not already registered (no session ID) initiates (creates) a connection. This will be followed by another unsolicited notification ( <a href="#">+SRBLE_IND (notification)</a> on page 98), indicating the device is connected. <b>Category:</b> BLE General command  <b>Usage:</b> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBLECFG: &lt;session_id&gt;,&lt;is_connected&gt;,&lt;bt_addr&gt;,&lt;mtu&gt;</b>                Purpose: Indicates session the device at &lt;bt_addr&gt; created the &lt;session_id&gt; connection.</li> </ul> <b>Parameters:</b> <ul style="list-style-type: none"> <li>&lt;session_id&gt; (BLE session identifier)               <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> </li> <li>&lt;is_connected&gt; (Session state)               <ul style="list-style-type: none"> <li>• 0—Not connected</li> <li>• 1—Connected</li> </ul> </li> <li>&lt;bt_addr&gt; (Remote device Bluetooth address)               <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Hexadecimal format</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> </li> <li>&lt;mtu&gt; (Maximum Transmission Unit)               <ul style="list-style-type: none"> <li>• Valid range: 23–517</li> <li>• Default: 23</li> </ul> </li> </ul> <b>Examples:</b> <ul style="list-style-type: none"> <li>• Notification received:               <pre>+SRBLECFG: 1,0,"00:11:22:aa:bb:cc",23</pre> </li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLECLOSE</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLECLOSE</a> .)	<b>Close a BLE connection</b> Close a BLE connection <b>Category:</b> BLE GATT command  <b>Usage:</b> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBLECLOSE=&lt;session_id&gt;</b>                Response: OK                or ERROR                Purpose: Close the BLE connection for the specified session ID. A notification (<a href="#">+SRBLE_IND (notification)</a> on page 98) will be received when the connection closes.</li> </ul> <b>Parameters:</b> <session_id> (BLE session ID) <ul style="list-style-type: none"> <li>Unique integer value assigned to the session</li> <li>Decimal format</li> <li>Valid range: 1–64</li> </ul> <b>Examples:</b> <ul style="list-style-type: none"> <li>Close the connection for session ID #1:                AT+SRBLECLOSE=1                +SRBLE_IND: 1,0,22                OK                (The notification shows session 1 connection closed successfully.)</li> </ul>
<b>+SRBLECLOSE</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBLECLOSE</a> .)	<b>Close a BLE connection</b> Close a BLE connection <b>Category:</b> BLE GATT command  <b>Usage:</b> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBLECLOSE=&lt;session_id&gt;</b>                Response: OK                or ERROR                Purpose: Close the BLE connection for the specified session ID. A notification (<a href="#">+SRBLE_IND (notification)</a> on page 99) will be received when the connection closes.</li> </ul> <b>Parameters:</b> <session_id> (BLE session ID) <ul style="list-style-type: none"> <li>Unique integer value assigned to the session</li> <li>Decimal format</li> <li>Valid range: 1–64</li> </ul> <b>Examples:</b> <ul style="list-style-type: none"> <li>Close the connection for session ID #1:                AT+SRBLECLOSE=1                +SRBLE_IND: 1,0                OK                (The notification shows session 1 connection closed successfully.)</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLECNX</b>	<p><b>Open a BLE connection</b></p> <p>Open a BLE connection.</p> <p><b>Category:</b> BLE GATT command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLECNX=&lt;session_id&gt;]</b></li> </ul> <p>Response: OK or ERROR</p> <p>Purpose: Open a BLE connection for the specified session ID. A notification (<a href="#">+SRBLE_IND (notification)</a> on page 98) will be received when the connection opens.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Open a connection for session ID #1: AT+SRBLECNX=1 +SRBLE_IND: 1,1 OK (The notification shows session 1 connection opened successfully.)</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLECONNPARAMS</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLECONNPARAMS</a> .)	<p><b>Update BLE connection parameters</b></p> <p><b>Category:</b> BLE GAP command</p> <p>Update a specified BLE connection's timing parameters (intervals, latency, timeout).</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLECONNPARAMS=&lt;session_id&gt;, &lt;min_interval&gt;, &lt;max_interval&gt;, &lt;latency&gt;, &lt;timeout&gt;</b></li> <li>Response: OK  +SRBLECONNPARAMS: &lt;session_id&gt;,&lt;conn_interval&gt;,&lt;latency&gt;,&lt;timeout&gt;  or +SRBLE_ERROR: &lt;error_code&gt;  or ERROR</li> <li>Purpose: Update the timing parameters for the specified &lt;session_id&gt;.</li> <li>• Read: <b>AT+SRBLECONNPARAMS?</b></li> <li>Response: +SRBLECONNPARAMS: &lt;session_id&gt;,&lt;conn_interval&gt;, &lt;latency&gt;, &lt;timeout&gt;  ...  +SRBLECONNPARAMS: &lt;session_id&gt;,&lt;conn_interval&gt;, &lt;latency&gt;, &lt;timeout&gt;  OK  or ERROR</li> <li>Purpose: Print timing parameters for all BLE sessions.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;min_interval&gt; (Minimum requested interval multiplier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 6–3200</li> <li>• Connection interval minimum (connIntervalMin)=&lt;min_interval&gt; × 1.25 ms</li> </ul> <p>&lt;max_interval&gt; (Maximum requested interval multiplier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 6–3200</li> <li>• Connection interval maximum (connIntervalMax)=&lt;max_interval&gt; × 1.25 ms</li> </ul> <p>&lt;conn_interval&gt; (Negotiated interval multiplier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid values: <ul style="list-style-type: none"> <li>• 0— Connection parameters have not yet been updated</li> <li>• &lt;min_interval&gt; to &lt;max_interval&gt;</li> </ul> </li> </ul> <p>&lt;latency&gt; (Slave latency, in ms)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 0 to ((connSupervisionTimeout / (connIntervalMax × 2)) - 1)  (Note: Max upper value is 500 ms)</li> </ul> <p>&lt;timeout&gt; (Connection timeout multiplier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 10–3200</li> <li>• Connection timeout (connSupervisionTimeout) = &lt;timeout&gt; × 10 ms</li> </ul> <p>(Continued on next page)</p>

**Table 4-2: BLE Commands (Detail) (Continued)**

Command	Description
<b>+SRBLECONNPARAMS (continued)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLECONNPARAMS</a> .)	<b>Update BLE connection parameters (continued)</b> <b>Examples:</b> <ul style="list-style-type: none"><li>Update (write) connection parameter: AT+SRBLECONNPARAMS=1,32,64,0,400 +SRBLECONNPARAMS: 1,64,0,400 OK</li><li>Read connection parameters: AT+SRBLECONNPARAMS? +SRBLECONNPARAMS: 1,64,0,400 +SRBLECONNPARAMS: 2,12,0,600 OK</li></ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLECONNPARAMS</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBLECONNPARAMS</a> .)	<p><b>Update BLE connection parameters</b></p> <p><b>Category:</b> BLE General command</p> <p>Update a specified BLE connection's timing parameters (intervals, latency, timeout).</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLECONNPARAMS=&lt;session_id&gt;, &lt;min_interval&gt;, &lt;max_interval&gt;, &lt;latency&gt;, &lt;timeout&gt;</b></li> </ul> <p>Response: OK            or +SRBLE_ERROR: &lt;error_code&gt;            ERROR</p> <p>Purpose: Update the timing parameters for the specified &lt;session_id&gt;.</p> <ul style="list-style-type: none"> <li>• Read: <b>AT+SRBLECONNPARAMS?</b></li> </ul> <p>Response: +SRBLECONNPARAMS: &lt;session_id&gt;, &lt;min_interval&gt;, &lt;max_interval&gt;, &lt;latency&gt;, &lt;timeout&gt;            ...            +SRBLECONNPARAMS: &lt;session_id&gt;, &lt;min_interval&gt;, &lt;max_interval&gt;, &lt;latency&gt;, &lt;timeout&gt;            OK</p> <p>Purpose: Print timing parameters for all BLE sessions.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;min_interval&gt; (Minimum requested interval multiplier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 6–3200</li> <li>• Connection interval minimum (connIntervalMin)=&lt;min_interval&gt; × 1.25 ms</li> </ul> <p>&lt;max_interval&gt; (Maximum requested interval multiplier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 6–3200</li> <li>• Connection interval maximum (connIntervalMax)=&lt;max_interval&gt; × 1.25 ms</li> </ul> <p>&lt;timeout&gt; (Connection timeout multiplier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 10–3200</li> <li>• Connection timeout (connSupervisionTimeout) = &lt;timeout&gt; × 10 ms</li> </ul> <p>&lt;latency&gt; (Slave latency, in ms)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 0 to ((connSupervisionTimeout / (connIntervalMax × 2)) - 1)            (Note: Max upper value is 500 ms)</li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLECONNPARAMS (continued)</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBLECONNPARAMS</a> .)	<b>Update BLE connection parameters (continued)</b> <b>Examples:</b> <ul style="list-style-type: none"> <li>Update (write) connection parameter:            AT+SRBLECONNPARAMS=1,32,64,0,400            OK</li> <li>Read connection parameters:            AT+SRBLECONNPARAMS?            +SRBLECONNPARAMS=1,32,64,0,400</li> </ul>
<b>+SRBLEDEL</b>	<b>Delete BLE connection</b> Delete a BLE connection. <hr/> <i>Note: If the BLE connection is running, stop it first and then delete it. +SRBLEDEL cannot delete a running session.</i> <hr/> <b>Category:</b> BLE GATT command  <b>Usage:</b> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBLEDEL=&lt;session_id&gt;</b>            Response: OK            or ERROR            Purpose: Delete the connection for the specified session ID. A notification (<a href="#">+SRBLE_IND (notification)</a> on page 98) will be received when the connection opens.</li> </ul> <b>Parameters:</b> <session_id> (BLE session ID) <ul style="list-style-type: none"> <li>Unique integer value assigned to the session</li> <li>Decimal format</li> <li>Valid range: 1–64</li> </ul> <b>Examples:</b> <ul style="list-style-type: none"> <li>Delete the connection for session ID #1:            AT+SRBLEDEL=1</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEDELSERV</b>	<p><b>Delete primary BLE service</b></p> <p>Delete a primary service from the local device.</p> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEDELSERV=&lt;service handle&gt;</b></li> </ul> <p>Response: OK or ERROR</p> <p>Purpose: Delete the specified primary service. An ERROR is returned if the &lt;service_handle&gt; is not valid.</p> <p><b>Parameters:</b></p> <p>&lt;service handle&gt; (Service attribute handle)</p> <ul style="list-style-type: none"> <li>• Unique identifier for the service</li> <li>• Decimal format</li> <li>• Valid range: 1-65535</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Delete Heart Rate service (0x180D) that was previously created using <a href="#">+SRBLEADDSERV</a> on page 76.) AT+SRBLEDELSERV=50 OK</li> </ul>

**Table 4-2: BLE Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBLEDISCCHAR</b></p>	<p><b>Discover BLE session’s service characteristics</b></p> <p>Discover specific characteristics, a range of characteristics, or all characteristics of a specific service.</p> <hr/> <p><i>Note: Characteristics are identified by ‘handles’—to discover the characteristic handles associated with the service, use <a href="#">+SRBLEDISCSERV</a>.</i></p> <hr/> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEDISCCHAR=&lt;session_id&gt;[, &lt;start_handle&gt;[, &lt;end_handle&gt;]]</b></li> <li>Response: <b>+SRBLEDISCCHAR: &lt;session_id&gt;, &lt;characteristic_uuid&gt;, &lt;characteristic_properties&gt;, &lt;characteristic_handle&gt;</b> OK</li> <li>or ERROR</li> <li>Purpose: For the specified service, discover the characteristics within the specified handle range. (If no handles, discover all. If start handle only, discover &lt;start_handle&gt; to 65535.)</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;start_handle&gt; (Discover characteristics with handles &gt;= this value)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;end_handle&gt; (Discover characteristics with handles &lt;= this value)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;characteristic_uuid&gt; (Characteristic UUID (Universal Unique Identifier))</p> <ul style="list-style-type: none"> <li>• Predefined UUID from <a href="https://www.bluetooth.com/specifications/gatt/characteristics">https://www.bluetooth.com/specifications/gatt/characteristics</a></li> <li>or</li> <li>• Custom UUID (16-bit, 32-bit, or 128-bit)</li> </ul> <p>&lt;characteristic_properties&gt; (Characteristic properties bitmap)</p> <ul style="list-style-type: none"> <li>• Decimal integer bitmap value describing properties of the identified characteristic (&lt;characteristic_uuid&gt;)</li> <li>• Valid range: 0–255</li> <li>• 1—Broadcast</li> <li>• 2—Read</li> <li>• 4—Write without response</li> <li>• 8—Write</li> <li>• 16—Notify</li> <li>• 32—Indicate</li> <li>• 64—Authenticated signed writes</li> <li>• 128—Extended properties</li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEDISCCHAR (continued)</b>	<p><b>Discover BLE session's service characteristics (continued)</b></p> <p>&lt;characteristic_handle&gt; (Handle used to identify the &lt;characteristic_uuid&gt;)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p><b>Examples:</b></p> <p>Continuing from the example used for <b>+SRBLEDISCSERV</b>:</p> <ul style="list-style-type: none"> <li>• Discover all the characteristics associated with service_1 by entering that service's full range of available characteristics:  AT+SRBLEDISCCHAR=1,1,5  +SRBLEDISCCHAR:1,"2a05",32,3  OK</li> <li>• Discover a specific characteristic (3) associated with service_1 by entering that characteristic's handle for both &lt;start_handle&gt; and &lt;end_handle&gt;:  AT+SRBLEDISCCHAR=1,3,3  +SRBLEDISCCHAR:1,"2a05",32,3  OK</li> <li>• Attempt to discover an undefined characteristic (2) associated with service_1 by entering that characteristic's handle for both &lt;start_handle&gt; and &lt;end_handle&gt;:  AT+SRBLEDISCCHAR=1,2,2  OK</li> <li>• Discover all the characteristics with handles in a range (1–23) that covers more than one service:  AT+SRBLEDISCCHAR=1,1,23 (Discover all characteristics from service_1 and services from service_2 up to handle ID 22.)  +SRBLEDISCCHAR:1,"2a05",32,3 (Service_1 characteristic (only one defined))  +SRBLEDISCCHAR:1,"2a00",2,22 (Service_2 characteristic)  OK</li> <li>• Discover all the characteristics that are associated with session ID 1:  AT+SRBLEDISCCHAR=1,1,65535 (Discover *all* characteristics.)  +SRBLEDISCCHAR: 1,"2a05",32,3 (Service_1 characteristic)  +SRBLEDISCCHAR: 1,"2a00",2,22 (Service_2 characteristic)  +SRBLEDISCCHAR: 1,"2a01",2,24 (Service_2 characteristic)  +SRBLEDISCCHAR: 1,"2aa6",2,26 (Service_2 characteristic)  +SRBLEDISCCHAR: 1,"818ae306-9c5b-448d-b51a-7add6a5d314d",52,42 (Service_3 characteristic)  +SRBLEDISCCHAR: 1,"06d1e5e7-79ad-4a71-8faa-373789f7d93c",56,45 (Service_3 characteristic)  +SRBLEDISCCHAR: 1,"9ec7cbfe-2cd2-496d-b02e-d5c8c87106c5",34,48 (Service_3 characteristic)  OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEDISCDESC</b>	<p><b>Get service characteristic's descriptor ID</b></p> <p>Get (discover) the descriptor ID of a specific service characteristic.</p> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEDISCDESC=&lt;session_id&gt;, &lt;characteristic_handle&gt;</b></li> <li>Response: <b>+SRBLEDISCDESC: &lt;session_id&gt;, &lt;descriptor_uuid&gt;, &lt;descriptor_handle&gt;</b> OK</li> <li>or</li> <li>OK</li> <li>Purpose: Get the descriptor ID of the specific service characteristic (if the service contains a descriptor).</li> </ul> <hr/> <p><i>Note: If the service does not contain a descriptor, only "OK" is returned.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;characteristic_handle&gt; (Handle used to identify the characteristic)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;descriptor_uuid&gt; (Descriptor UUID (Universal Unique Identifier))</p> <ul style="list-style-type: none"> <li>• Predefined UUID from <a href="https://www.bluetooth.com/specifications/gatt/descriptors">https://www.bluetooth.com/specifications/gatt/descriptors</a></li> <li>or</li> <li>• Custom UUID (16-bit, 32-bit, or 128-bit)</li> </ul> <p>&lt;descriptor_handle&gt; (Handle used to identify the descriptor (&lt;descriptor_uuid&gt;))</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Service contains a descriptor (descriptor 2902): AT+SRBLEDISCDESC=3,42 +SRBLEDISCDESC: 3,"2902",43 OK</li> <li>• Service does not contain a descriptor: AT+SRBLEDISCDESC=1,3 OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEDISCINCSE RV</b>	<p><b>Discover BLE session's included services</b></p> <p>Discover all of the included services associated with a specific session.</p> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEDISCINCSERV=&lt;session_id&gt;[, &lt;start_handle&gt;[, &lt;end_handle&gt;]]</b></li> </ul> <p>Response: +SRBLEDISCINCSERV: &lt;session_id&gt;, &lt;included_service uuid&gt;, &lt;attribute_handle&gt;, &lt;start_handle_included&gt;, &lt;end_handle_included&gt;</p> <p>...</p> <p>OK</p> <p>or OK</p> <p>or ERROR</p> <p>Purpose: Discover (list) all the included services (and the range of characteristic handles available to those services) of the specified session in the specified handle range.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;included_service uuid&gt; (Included service's UUID (Universal Unique Identifier))</p> <ul style="list-style-type: none"> <li>• Hexadecimal format</li> <li>• Predefined UUID from <a href="https://www.bluetooth.com/specifications/gatt/services">https://www.bluetooth.com/specifications/gatt/services</a></li> <li>or</li> <li>• Custom UUID (16-bit, 32-bit, or 128-bit)</li> </ul> <p>&lt;attribute_handle&gt; (Reference handle of the included service)</p> <ul style="list-style-type: none"> <li>• This handle is stored in the primary service in which this service is included. It cannot be used to add characteristics to the included service. To add characteristics to the included service, use the &lt;start_handle_included&gt;.</li> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;start_handle_included&gt; (First available characteristic handle for &lt;included_service_uuid&gt;)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;end_handle_included&gt; (Last available characteristic handle for &lt;included_service_uuid&gt;)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Display all included services associated with session ID #1: <pre>AT+SRBLEDISCINCSERV=1 +SRBLEDISCINCSERV:1,"6789",51,150,249 +SRBLEDISCINCSERV:1,"2345",52,250,349 OK</pre> </li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEDISCSERV</b>	<p><b>Discover BLE session's services</b></p> <p>Discover either a specific service or all services associated with a specific session. To discover the characteristics associated with the services, use <a href="#">+SRBLEDISCCHAR</a>.</p> <hr/> <p><i>Note: This command does not indicate the included services associated with a displayed service. For included services discovery, see <a href="#">+SRBLEDISCINCSERV</a> on page 93.</i></p> <hr/> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEDISCSERV=&lt;session_id&gt;[, &lt;filter_uuid&gt;]</b></li> <li>Response: <b>+SRBLEDISCSERV: &lt;session_id&gt;, &lt;service uuid&gt;, &lt;is_primary&gt;, &lt;start_handle&gt;, &lt;end_handle&gt;</b>  ...  OK</li> <li>or ERROR</li> <li>Purpose: Discover (list) the services (and the range of characteristic handles available to those services) of the specified session. If &lt;filter_uuid&gt; is specified, discover only that specific service.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;filter uuid&gt; (Service UUID (Universal Unique Identifier) to be discovered)</p> <ul style="list-style-type: none"> <li>• Hexadecimal value</li> <li>• UUID of a service that was added via <a href="#">+SRBLEADDSERV</a> on page 76.</li> <li>• Format: <ul style="list-style-type: none"> <li>• Predefined UUID from <a href="https://www.bluetooth.com/specifications/gatt/services">https://www.bluetooth.com/specifications/gatt/services</a></li> </ul> </li> <li>or</li> <li>• Unique custom UUID (16-bit, 32-bit, or 128-bit)</li> </ul> <p>&lt;service uuid&gt; (Discovered service's UUID (Universal Unique Identifier))</p> <ul style="list-style-type: none"> <li>• Hexadecimal format</li> <li>• UUID of a service that was added via <a href="#">+SRBLEADDSERV</a> on page 76. <ul style="list-style-type: none"> <li>• Predefined UUID from <a href="https://www.bluetooth.com/specifications/gatt/services">https://www.bluetooth.com/specifications/gatt/services</a></li> </ul> </li> <li>or</li> <li>• Unique custom UUID (16-bit, 32-bit, or 128-bit)</li> </ul> <p>&lt;is_primary&gt; (Discovered service is primary/non-primary)</p> <ul style="list-style-type: none"> <li>• 0—Non-primary service</li> <li>• 1—Primary service</li> </ul> <p>&lt;start_handle&gt; (First available characteristic handle for &lt;service_uuid&gt;)</p> <ul style="list-style-type: none"> <li>• Valid range: 1–65535</li> </ul> <p>&lt;end_handle&gt; (Last available characteristic handle for &lt;service_uuid&gt;)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> <li>• If &lt;end_handle&gt; is 65535, this is the last service.</li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
+SRBLEDISCSERV (continued)	<p><b>Discover BLE session's services (continued)</b></p> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Display all services associated with session ID #1:  AT+SRBLEDISCSERV=1  +SRBLEDISCSERV:1,"1801",1,1,5 (For this example, refer to this as Service_1.)  +SRBLEDISCSERV:1,"1800",1,20,28 (For this example, refer to this as Service_2.)  +SRBLEDISCSERV:1,"BC2F4CC6-AAEF-4351-9034-D66268E328F0",1,40,65535  (For this example, refer to this as Service_3.)  +SRBLEDISCSERV:1,"1234",1,50,149  +SRBLEDISCSERV:1,"2345",1,250,65535  +SRBLEDISCSERV:1,"6789",0,150,249  (The non-primary service added in the  AT+SRBLEADDSERV example.)</li> </ul> <p>OK</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLE_ERROR</b> <b>(notification)</b>	<p><b>Indicate BLE command error code (Unsolicited notification)</b></p> <p>Notify the device when a BLE command fails.</p> <p>This notification is received in response to:</p> <ul style="list-style-type: none"> <li>• GATT layer commands: <ul style="list-style-type: none"> <li>• <a href="#">+SRBLEREADCHAR</a> on page 106</li> <li>• <a href="#">+SRBLEWRITECHAR</a> on page 128</li> <li>• <a href="#">+SRBLEWRITECHARNORSP</a> on page 130</li> <li>• <a href="#">+SRBLEWRITEDESC</a> on page 132</li> </ul> </li> <li>• GAP layer commands: <ul style="list-style-type: none"> <li>• <a href="#">+SRBLESECCLEAR</a> on page 116</li> <li>• <a href="#">+SRBLECONNPARAMS</a> on page 85</li> </ul> </li> </ul> <p><b>Category:</b> BLE GATT command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBLE_ERROR: &lt;error_code&gt;</b>  Purpose: Indicates the reason a BLE command failed.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;error_code&gt; (BLE command error code)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• GATT layer command error codes: <ul style="list-style-type: none"> <li>• 1—Invalid handle</li> <li>• 2—Read operation not permitted</li> <li>• 3—Write operation not permitted</li> <li>• 4—Invalid PDU</li> <li>• 5—Insufficient authentication</li> <li>• 6—Request not supported</li> <li>• 8—Insufficient authorization</li> <li>• 10—Not found</li> <li>• 11—Invalid length</li> <li>• 12—Insufficient key size</li> <li>• 13—Invalid attribute length</li> <li>• 14—Error unlikely</li> <li>• 15—Insufficient encryption</li> <li>• 16—Unsupported GRP type</li> <li>• 17—Insufficient resources</li> <li>• 128—GATT no resources</li> <li>• 132—GATT is busy</li> <li>• 133—GATT error</li> <li>• 135—Illegal parameter</li> <li>• 137—Authentication fail</li> <li>• 239—Unknown error</li> </ul> </li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLE_ERROR (notification) (continued)</b>	<p><b>Indicate BLE command error code (Unsolicited notification) (continued)</b></p> <ul style="list-style-type: none"> <li>• GAP layer command error codes: <ul style="list-style-type: none"> <li>• 1—Bluetooth fail</li> <li>• 2—Bluetooth not ready</li> <li>• 3—No memory</li> <li>• 4—Bluetooth busy</li> <li>• 6—Unsupported</li> <li>• 7—Invalid parameters</li> <li>• 8—Unhandled status</li> <li>• 9—Authentication failure</li> <li>• 10—Remote device is down</li> <li>• 11—Authentication rejected</li> <li>• 12—Invalid static random address</li> <li>• 13—Pending</li> <li>• 14—Unaccepted connection interval</li> <li>• 15—Parameters out of range</li> <li>• 16—Time out</li> <li>• 17—Unsupported peer device data length</li> <li>• 18—Unsupported controller data length</li> <li>• 19—Illegal parameter format</li> </ul> </li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Read operation not permitted +SRBLE_ERROR: 2</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<p><b>+SRBLE_IND (notification)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLE_IND (notification)</a>.)</p>	<p><b>Indicate changed BLE connection status (Unsolicited notification)</b> Notifies the device when a BLE connection's status changes. This notification is received in response to:</p> <ul style="list-style-type: none"> <li>• <a href="#">+SRBLECNX</a> on page 84</li> <li>• <a href="#">+SRBLECLOSE</a> on page 83</li> </ul> <p><b>Category:</b> BLE GATT command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBLE_IND: &lt;session_id&gt;, &lt;status&gt;[,&lt;reason&gt;]</b> Purpose: Indicates a specified session's current connection status.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;status&gt; (Session state)</p> <ul style="list-style-type: none"> <li>• 0—Connection closed</li> <li>• 1—Connection open</li> </ul> <p>&lt;reason&gt; (Disconnection reason)</p> <ul style="list-style-type: none"> <li>• Appears only when &lt;status&gt; is 0 (Not connected)</li> <li>• 0—Unknown</li> <li>• 1—General L2CAP failure</li> <li>• 8—Connection timeout</li> <li>• 19—Connection terminated by peer</li> <li>• 22—Connection terminated by localhost</li> <li>• 34—LMP response timeout</li> <li>• 62—Connection failed to establish</li> <li>• 256—L2CAP connection cancelled</li> <li>• 257—No connection to cancel</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Session 1 disconnected due to call termination by localhost: +SRBLE_IND=1,0,22</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<p><b>+SRBLE_IND (notification)</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBLE_IND (notification)</a>.)</p>	<p><b>Indicate changed BLE connection status (Unsolicited notification)</b> Notifies the device when a BLE connection's status changes. This notification is received in response to:</p> <ul style="list-style-type: none"> <li>• <a href="#">+SRBLECNX</a> on page 84</li> <li>• <a href="#">+SRBLECLOSE</a> on page 83</li> </ul> <p><b>Category:</b> BLE GATT command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBLE_IND: &lt;session_id&gt;, &lt;status&gt;</b> Purpose: Indicates a specified session's current connection status.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;status&gt; (Session state)</p> <ul style="list-style-type: none"> <li>• 0—Connection closed</li> <li>• 1—Connection open</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEINDICATE</b>	<p><b>Send characteristic notification to remote GATT client</b>  Send a notification containing a characteristic's data to a remote GATT client.  <b>Category:</b> BLE GATT Server command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEINDICATE=&lt;session_id&gt;, &lt;characteristic handle&gt;, &lt;data&gt;</b></li> <li>Response: OK or ERROR</li> <li>Purpose: Send notification to the GATT client (at &lt;session_id&gt;) containing the specified characteristic's data.</li> </ul> <hr/> <p><i>Note: ERROR is returned if the &lt;data&gt; is longer than the negotiated (exchanged) MTU value for this session. See <a href="#">+SRBLEMTU (notification)</a> on page 102 for details.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;characteristic handle&gt; (Characteristic attribute handle)</p> <ul style="list-style-type: none"> <li>• Unique identifier for the service's characteristic</li> <li>• Decimal format</li> <li>• Valid range: 1-65535</li> </ul> <p>&lt;data&gt; (Characteristic data being 'indicated' to the client)</p> <ul style="list-style-type: none"> <li>• String of hexadecimal ASCII codes</li> <li>• Length—1–(MTU - 3) (See <a href="#">+SRBLEMTU (notification)</a> on page 102 for details.)</li> <li>• Example: "\00\01\02\03"</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Send Heart Rate Measurement notification (Note: In this example, the Heart Rate Measurement characteristic handle is '52' (0x34)):  AT+SRBLEINDICATE=1, 52, "\00\01\02\03"  OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEINDICATION (notification)</b>	<p><b>GATT server indication (Unsolicited notification)</b>  Receive a notification from the GATT server.</p> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBLEINDICATION: &lt;session_id&gt;, &lt;data_len&gt;, &lt;data&gt;</b>  Purpose: Server sending a notification to the GATT client.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned to the session</li> <li>Decimal format</li> <li>Valid range: 1–64</li> </ul> <p>&lt;data_len&gt; (Length of data received)</p> <ul style="list-style-type: none"> <li>Decimal format</li> <li>Valid range: 1–(MTU-3)</li> </ul> <p>&lt;data&gt; (Data sent from server)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Non-printable characters appear as hex codes (e.g. "\1a")</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Server sends a notification containing the message "Hello World!", and the client receives it as:  <pre>+SRBLEINDICATION=1,12,"Hello World!"</pre></li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEMTU (notification)</b>	<p><b>Indicate negotiated (exchanged) session MTU value (Unsolicited notification)</b></p> <p>Show the negotiated (exchanged) MTU value for the specified session. This value minus 3 (&lt;mtu&gt; - 3) is the maximum data length that can be sent by:</p> <ul style="list-style-type: none"> <li>• <a href="#">+SRBLENOTIFY</a> on page 104</li> <li>• <a href="#">+SRBLEINDICATE</a> on page 100</li> <li>• <a href="#">+SRBLERESP</a> on page 109</li> <li>• <a href="#">+SRBLEWRITE (notification)</a> on page 127</li> </ul> <p>The notification is received when the MTU exchange is completed, typically just after receiving notification that a connection is established (<a href="#">+SRBLE_IND (notification)</a> on page 98). Since this notification is received for both GATT client and GATT server, if both are enabled the notification will be displayed twice.</p> <hr/> <p><i>Note: The MTU value can also be shown using at any time using <a href="#">+SRBLECFG</a> on page 79.</i></p> <hr/> <p><b>Category:</b> BLE GATT command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBLEMTU: &lt;session_id&gt;, &lt;mtu&gt;</b> Purpose: Indicates MTU value for the specified session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;mtu&gt; (Exchanged MTU value)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 23–517</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Session ID #1, MTU length 32: +SRBLEMTU: 1, 32</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLENOTIFICATION (notification)</b>	<p><b>GATT server notification (Unsolicited notification)</b></p> <p>Receive a notification from the GATT server.</p> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBLENOTIFICATION: &lt;session_id&gt;, &lt;data_len&gt;, &lt;data&gt;</b></li> <li>Purpose: Server sending a notification to the GATT client.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned to the session</li> <li>Decimal format</li> <li>Valid range: 1–64</li> </ul> <p>&lt;data_len&gt; (Length of data received)</p> <ul style="list-style-type: none"> <li>Decimal format</li> <li>Valid range: 1–(MTU-3)</li> </ul> <p>&lt;data&gt; (Data sent from server)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Non-printable characters appear as hex codes (e.g. "\1a")</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Server sends a notification containing the message "Hello World!", and the client receives it as:  <pre>+SRBLENOTIFICATION=1,12,"Hello World!"</pre></li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLENOTIFY</b>	<p><b>Send characteristic notification to remote GATT client</b></p> <p>Send a notification containing a characteristic's data to a remote GATT client. The notification is received whenever the identified characteristic's value changes.</p> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLENOTIFY=&lt;session_id&gt;, &lt;characteristic handle&gt;, &lt;data&gt;</b></li> <li>Response: OK or ERROR</li> <li>Purpose: Send notification to the GATT client (at &lt;session_id&gt;) containing the specified characteristic's data.</li> </ul> <hr/> <p><i>Note: ERROR is returned if the &lt;data&gt; is longer than the negotiated (exchanged) MTU value for this session. See <a href="#">+SRBLEMTU (notification)</a> on page 102 for details.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;characteristic handle&gt; (Characteristic attribute handle)</p> <ul style="list-style-type: none"> <li>• Unique identifier for the service's characteristic</li> <li>• Decimal format</li> <li>• Valid range: 1-65535</li> </ul> <p>&lt;data&gt; (Characteristic data being 'notified' to the client)</p> <ul style="list-style-type: none"> <li>• String of hexadecimal ASCII codes</li> <li>• Length—1–(MTU - 3) (See <a href="#">+SRBLEMTU (notification)</a> on page 102 for details.)</li> <li>• Example: "\00\01\02\03"</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Send Heart Rate Measurement notification (Note: In this example, the Heart Rate Measurement characteristic handle is '52' (0x34)): AT+SRBLENOTIFY=1, 52, "\00\01\02\03" OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLERead (notification)</b>	<p><b>'Read' request received from GATT client (Unsolicited notification)</b></p> <p>Notification that a GATT client has issued a 'read' request. Respond to the request using <a href="#">+SRBLEReadResp</a> on page 109.</p> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBLERead: &lt;session_id&gt;, &lt;trans id&gt;, &lt;characteristic handle&gt;</b> Purpose: GATT client issued a 'read' request for the specified session's characteristic.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned to the session</li> <li>Decimal format</li> <li>Valid range: 1–64</li> </ul> <p>&lt;trans id&gt; (Transaction ID)</p> <ul style="list-style-type: none"> <li>Unique ID for this Read request. Use this when sending a read response (<a href="#">+SRBLEReadResp</a> on page 109)</li> <li>Decimal format</li> <li>Valid range: 0–4294967295</li> </ul> <p>&lt;characteristic handle&gt; (Characteristic attribute handle)</p> <ul style="list-style-type: none"> <li>Unique identifier for the service's characteristic</li> <li>Decimal format</li> <li>Valid range: 1-65535</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>GATT client requests characteristic data for handle '46' from session ID #1: +SRBLERead: 1,5,46</li> <li>Send a read response to the GATT client: AT+SRBLERead=1,5,46,"00010203" OK</li> </ul>

**Table 4-2: BLE Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBLEReadCHAR</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLEReadCHAR.</a>)</p>	<p><b>Read service characteristic's value</b> Read the value of a specific characteristic of a specific service.</p> <hr/> <p><i>Note: Characteristics are identified by 'handles'—to discover the characteristic handles associated with the service, use <a href="#">+SRBLEDISCSERV</a>.</i></p> <hr/> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEReadCHAR=&lt;session_id&gt;, &lt;characteristic_handle&gt;</b></li> <li>Response: <b>+SRBLEReadCHAR: &lt;session_id&gt;,&lt;characteristic_value_length&gt;, &lt;characteristic_value&gt;</b> OK</li> <li>or <b>+SRBLE_ERROR: &lt;error_code&gt;</b></li> <li>Purpose: Read the value of the specified service's characteristic.</li> </ul> <hr/> <p><i>Note: The command returns a <a href="#">+SRBLE_ERROR (notification)</a> if it fails. The command will fail if the characteristic is not readable or if you do not give the correct service and characteristic information.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;characteristic_handle&gt; (Handle used to identify the characteristic being read)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;characteristic_value_length&gt; (Length of &lt;characteristic_value&gt; string)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–(MTU-1)</li> </ul> <p>&lt;characteristic value&gt;</p> <ul style="list-style-type: none"> <li>• ASCII string (double-quotation delimited)</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Success—For session ID 1, read the characteristic identified by handle 22. (In this example, the characteristic is the module name):  <pre>AT+SRBLEReadCHAR=1,22 +SRBLEReadCHAR:1,13,"BM31xx-05CD96" OK</pre> </li> <li>• Failure—Attempt to read a characteristic that is not readable:  <pre>AT+SRBLEReadCHAR=1,3 +SRBLE_ERROR: 2</pre> </li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEReadCHAR</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBLEReadCHAR</a> .)	<p><b>Read service characteristic's value</b></p> <p>Read the value of a specific characteristic of a specific service.</p> <hr/> <p><i>Note: Characteristics are identified by 'handles'—to discover the characteristic handles associated with the service, use <a href="#">+SRBLEDISCSERV</a>.</i></p> <hr/> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEReadCHAR=&lt;session_id&gt;, &lt;characteristic_handle&gt;</b></li> <li>Response: <b>+SRBLEReadCHAR: &lt;session_id&gt;, &lt;characteristic_value_length&gt;, &lt;characteristic_value&gt;</b> OK</li> <li>or <b>+SRBLE_ERROR: &lt;error_code&gt;</b> ERROR</li> <li>Purpose: Read the value of the specified service's characteristic.</li> </ul> <hr/> <p><i>Note: The command returns a <a href="#">+SRBLE_ERROR (notification)</a> if it fails. The command will fail if the characteristic is not readable or if you do not give the correct service and characteristic information.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;characteristic_handle&gt; (Handle used to identify the characteristic being read)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;characteristic_value_length&gt; (Length of &lt;characteristic_value&gt; string)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–(MTU-1)</li> </ul> <p>&lt;characteristic value&gt;</p> <ul style="list-style-type: none"> <li>• ASCII string (double-quotation delimited)</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Success—For session ID 1, read the characteristic identified by handle 22. (In this example, the characteristic is the module name):  <pre>AT+SRBLEReadCHAR=7,22 +SRBLEReadCHAR:1,13,"BM31xx-05CD96" OK</pre> </li> <li>• Failure—Attempt to read a characteristic that is not readable:  <pre>AT+SRBLEReadCHAR=1,3 +SRBLE_ERROR: 2 ERROR</pre> </li> </ul>

**Table 4-2: BLE Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBLEREADDESC</b></p>	<p><b>Read characteristic's descriptor information</b>                      Read the information contained in a specific characteristic's descriptor.  <b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEREADDESC=&lt;session_id&gt;, &lt;descriptor_handle&gt;</b></li> <li>Response: <b>+SRBLEREADDESC: &lt;session_id&gt;, &lt;descriptor_handle&gt;, &lt;value_length&gt;, &lt;value&gt;</b> OK</li> <li>or OK</li> <li>Purpose: Get the information stored in a specific service characteristic's descriptor, if the service contains a descriptor.</li> </ul> <hr/> <p><i>Note: If the service does not contain a descriptor, only "OK" is returned.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;descriptor_handle&gt; (Handle used to identify the descriptor (&lt;descriptor_uuid&gt;))</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;value_length&gt; (Length of the &lt;value&gt; parameter)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–(MTU-1)</li> </ul> <p>&lt;value&gt; (Descriptor value)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Request value of the descriptor identified by handle 43:                      AT+SRBLEREADDESC=1,43                      +SRBLEREADDESC: 1,43,2,"\03\00"                      OK</li> </ul> <p>(Followed by response from server (in this example, server sends "ab"))                      +SRBLEREADDESC: 1,43,2,"ab"</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLERESP</b>	<p><b>Send response to remote GATT client's 'read' request</b> Send a response (containing characteristic data) to a remote GATT client's 'read' request.</p> <hr/> <p><i>Note: This command is used only to respond to <a href="#">+SRBLERESP (notification)</a> on page 105.</i></p> <hr/> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLERESP=&lt;session_id&gt;, &lt;trans id&gt;, &lt;characteristic handle&gt;, &lt;data&gt;</b></li> <li>Response: OK or ERROR</li> <li>Purpose: Send a response to the GATT client (at &lt;session_id&gt;) containing the specified characteristic's data.</li> </ul> <hr/> <p><i>Note: ERROR is returned if the &lt;data&gt; is longer than the negotiated (exchanged) MTU value for this session. See <a href="#">+SRBLEMTU (notification)</a> on page 102 for details.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;trans id&gt; (Transaction ID)</p> <ul style="list-style-type: none"> <li>• Unique ID of the original Read request received in <a href="#">+SRBLERESP (notification)</a> on page 105</li> <li>• Decimal format</li> <li>• Valid range: 0–4294967295</li> </ul> <p>&lt;characteristic handle&gt; (Characteristic attribute handle)</p> <ul style="list-style-type: none"> <li>• Unique identifier for the service's characteristic</li> <li>• Decimal format</li> <li>• Valid range: 1-65535</li> </ul> <p>&lt;data&gt; (Characteristic data being 'indicated' to the client)</p> <ul style="list-style-type: none"> <li>• Format—ASCII string.</li> <li>• Characters may be hexadecimal format ('\nn') or text (for printable characters). For example, the letter 'M' could appear as 'M' or '\4d'</li> <li>• Length—1–(MTU - 3) (See <a href="#">+SRBLEMTU (notification)</a> on page 102 for details.)</li> <li>• Example: "\00\01\02\03"</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Read request received from GATT client: +SRBLERESP: 1,5,46</li> <li>Send response with requested data: AT+SRBLERESP=1,5,46,"\00\01\02\03" OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLERSSI</b> (F/W rev: 2.5.0+)	<p><b>Read RSSI for BLE Session</b>            Read the RSSI value for a specified connected session.</p> <hr/> <p><i>Note: To read the value for a BTC session, use <b>+SRBTCRSSI</b>.</i></p> <hr/> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLERSSI=&lt;session_id&gt;</b></li> <li>Response: <b>+SRBLERSSI: &lt;rsssi&gt;</b> OK</li> <li>or ERROR</li> <li>Purpose: Read the RSSI value of the currently connected &lt;session_id&gt;.</li> </ul> <hr/> <p><i>Note: The RSSI value can be read only for a connected session.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;rsssi&gt; (BLE session identifier, in dB)</p> <ul style="list-style-type: none"> <li>• Signed integer</li> <li>• Valid range: -127 to 127</li> <li>• For details, refer to BLUETOOTH SPECIFICATION Version 4.2 [Vol 2, Part E], section 7.5.4.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Read RSSI for session 1:  <b>AT+SRBLERSSI=1</b>  <b>+SRBLERSSI: -8</b></li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESCAN</b>	<p><b>Configure and start BLE scanning</b> Configure and start BLE scanning. Scanning stops automatically after the specified &lt;duration&gt;.</p> <hr/> <p><i>Note: The module can advertise and scan (+SRBLEADV on page 77) at the same time.</i></p> <hr/> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLESCAN=&lt;duration&gt;,&lt;scan_result_format&gt;</b> Response (for &lt;scan_result_format&gt;=0): +SRBLESCAN: &lt;bt_addr&gt;,&lt;addr_type&gt;,&lt;rssi&gt;,&lt;flag&gt;[,&lt;name&gt;] ... or ERROR</li> <li>Response (for &lt;scan_result_format&gt;=1): +SRBLESCAN: &lt;bt_addr&gt;,&lt;addr_type&gt;,&lt;rssi&gt;,&lt;adv_data&gt; ... or ERROR</li> </ul> <p>Purpose: Start scanning for BLE devices, and display their details as they are discovered.</p> <p><b>Parameters:</b></p> <p>&lt;duration&gt; (Scan duration, in seconds)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;scan_result_format&gt; (Format of the command response)</p> <ul style="list-style-type: none"> <li>• 0—Parsed advertising data (including flag, and name if present)</li> <li>• 1—Raw advertising data</li> </ul> <p>&lt;bt_addr&gt; (Remote device Bluetooth address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;addr_type&gt; (Remote device address type, as defined in BLUETOOTH SPECIFICATION Version 4.2 [Vol 3, Part H])</p> <ul style="list-style-type: none"> <li>• 0—Public address</li> <li>• 1—Random address</li> </ul> <p>&lt;rssi&gt; (RSSI value, in dB)</p> <ul style="list-style-type: none"> <li>• e.g. -50 (corresponds to 0.00001 dBm W)</li> </ul> <p>&lt;flag&gt; (Advertising flag)</p> <ul style="list-style-type: none"> <li>• For supported values, refer to BLUETOOTH SPECIFICATION Version 4.2 [Vol 3, Part H]</li> </ul> <p>&lt;name&gt; (Remote device name)</p> <ul style="list-style-type: none"> <li>• Name (if present) is contained in the remote device's advertising data.</li> <li>• ASCII string</li> <li>• Length—0–31 bytes</li> <li>• Example: "Device_C"</li> </ul> <p>&lt;adv data&gt; (Raw advertising data)</p> <ul style="list-style-type: none"> <li>• Format—String of ASCII characters in hexadecimal format (all characters are shown as "\nn" where 'nn' is the hex code for a character. e.g. "\4d" = 'M')</li> <li>• Length—0–31 bytes</li> <li>• Example: "\02\01\06\07\09\4d\79\4e\61\6d\65\03\03\cd\ab"</li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESCAN</b> (continued)	<p><b>Configure and start BLE scanning (continued)</b></p> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Scan, and display parsed advertising data:  AT+SRBLESCAN=5,0  +SRBLESCAN: "01.23.45:ab:cd:ef",0,-35,6,"Device_A"  +SRBLESCAN: "66:77:88:dd:ee:ff",1,-40,10,"Device_B"  +SRBLESCAN: "11:22:33:AA:BB:CC",0,-45,6,"Device_C"  +SRBLESCAN: "01.23.45:ab:cd:ef",0,-35,6,"Device_A"  ...  OK</li> <li>Scan, and display raw advertising data:  AT+SRBLESCAN=5,1  +SRBLESCAN: "01:23:45:ab:cd:ef",0,-35,"02\01\06\09\08\44\65\76\69\63\65\5F\41"  +SRBLESCAN: "14:07:a1:82:4d:fe",0,-35,"09\08\44\65\76\69\63\76\01\06\09\08\31"  +SRBLESCAN: "01:23:45:ab:cd:ef",0,-35,"02\01\06\09\08\44\65\76\69\63\65\5F\41"  ...  OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESCANPARAMS</b>	<p><b>Set scanning parameters</b> Set BLE scanning (discovery) parameters. <b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:       <b>AT+SRBLESCANPARAMS=&lt;scanning_type&gt;, &lt;scan_interval&gt;, &lt;scan_window&gt;</b>  Response:    OK                or    ERROR  Purpose:      Set the specified scanning parameters.</li> <li>• Read:       <b>AT+SRBLESCANPARAMS?</b>  Response:    +SRBLESCANPARAMS: &lt;scanning_type&gt;, &lt;scan_interval&gt;, &lt;scan_window&gt;                OK  Purpose:      Read the scanning parameters.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;scanning_type&gt; (BLE scanning type)</p> <ul style="list-style-type: none"> <li>• 0—Passive scanning</li> <li>• 1—Active scanning</li> </ul> <p>&lt;scan_interval&gt; (Time between starts of consecutive scans)</p> <ul style="list-style-type: none"> <li>• Time interval between the start of one LE (Low Energy) scan and the next scan.</li> <li>• Calculated interval = &lt;scan_interval&gt; × 0.625 ms</li> <li>• Decimal format</li> <li>• Valid values (integer): <ul style="list-style-type: none"> <li>• 4–16384 (Time range = 2.5.0 ms to 10.24 sec)</li> <li>• Default—80 (50 msec)</li> </ul> </li> </ul> <p>&lt;scan_window&gt; (LE scan duration)</p> <ul style="list-style-type: none"> <li>• Must be ≤ &lt;scan_interval&gt;</li> <li>• Calculated duration = &lt;adv_int_max&gt; × 0.625 ms</li> <li>• Decimal format</li> <li>• Valid values (integer): <ul style="list-style-type: none"> <li>• 4–16384 (Time range = 4 ms to 10.24 sec)</li> <li>• Default—48 (30 ms)</li> </ul> </li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Set scanning parameters (Scan interval=50 ms; Scan duration=30 ms)  AT+SRBLESCANPARAMS=1,80,48  OK</li> <li>• Read scanning parameters  AT+SRBLESCANPARAMS?  +SRBLESCANPARAMS=1,80,48  OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESECBOND</b>	<p><b>Send bonding request/response</b></p> <p>After a connection (pairing) has been established with a peer device, bond with the peer. See Example section below for details.</p> <hr/> <p><i>Note: The bonding request must be sent after the connection is established, and only the &lt;session_id&gt; should be sent.</i></p> <hr/> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write (Send request): <ul style="list-style-type: none"> <li><b>AT+SRBLESECBOND=&lt;session_id&gt;</b></li> <li>Response: OK or ERROR</li> <li>Purpose: After a connection has been established, send a bonding request to the &lt;session_id&gt;.</li> </ul> </li> <li>• Write (Send response): <ul style="list-style-type: none"> <li><b>AT+SRBLESECBOND=&lt;session_id&gt;, &lt;accept&gt;</b></li> <li>Response: OK or ERROR</li> <li>Purpose: After a connection has been established, accept or deny a bonding request from the &lt;session_id&gt;.</li> </ul> </li> <li>• Read: <b>AT+SRBLESECBOND?</b> <ul style="list-style-type: none"> <li>Response: +SRBLESECBOND: &lt;bt_addr&gt; +SRBLESECBOND: &lt;bt_addr&gt; ... OK or ERROR</li> <li>Purpose: Display the BT addresses of all bonded devices.</li> </ul> </li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Peer device's session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;accept&gt; (Response to bonding request)</p> <ul style="list-style-type: none"> <li>• 0—Deny</li> <li>• 1—Accept</li> </ul> <p>&lt;bt_addr&gt; (Bonded device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESECBOND (notification)</b>	<p><b>Bonding procedure status (unsolicited notification)</b></p> <p>Notification indicating the result of a bonding attempt, received by both the initiator and the responder.</p> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBLESECBOND: &lt;session_id&gt;,&lt;status&gt;[,&lt;fail_reason&gt;]</b></li> <li>Purpose: After a connection has been established, send a bonding request to the &lt;session_id&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Peer device's session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;status&gt; (Bonding procedure result)</p> <ul style="list-style-type: none"> <li>• 0—Failed</li> <li>• 1—Succeeded</li> </ul> <p>&lt;fail_reason&gt; (Bond failure reason)</p> <ul style="list-style-type: none"> <li>• Only appears if &lt;status&gt;=0 (Failed)</li> <li>• Integer value</li> </ul>
<b>+SRBLESECBONDREQ (notification)</b>	<p><b>Bonding request received (unsolicited notification)</b></p> <p>Notifies the local device that a bonding request has been received from a peer device. When this notification is received, reply with <b>+SRBLESECBOND</b> on page 114.</p> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBLESECBONDREQ=&lt;session_id&gt;</b></li> <li>Purpose: Notifies device that bonding request has been received.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Peer device's session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Valid range: 1–64</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESECCLEAR</b>	<p><b>Remove bonded device(s)</b></p> <p>Remove one or all bonded devices. This removes the generated keys used for secure bonding.</p> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute (Remove one bonded device):           <ul style="list-style-type: none"> <li><b>AT+SRBLESECCLEAR=&lt;bt_addr&gt;</b></li> </ul> </li> </ul> <p>Response: OK or +SRBLE_ERROR: &lt;error_code&gt; ERROR</p> <p>Purpose: Remove the specified bonded device.</p> <ul style="list-style-type: none"> <li>• Execute (Remove all bonded devices):           <ul style="list-style-type: none"> <li><b>AT+SRBLESECCLEAR</b></li> </ul> </li> </ul> <p>Response: OK or +SRBLE_ERROR: &lt;error_code&gt; ERROR</p> <p>Purpose: Remove all bonded devices.</p> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Bonded device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Remove one bonded device:           <ul style="list-style-type: none"> <li>AT+SRBLESECCLEAR=24:0a:c4:05:cd:96</li> <li>OK</li> </ul> </li> <li>• Remove all bonded devices:           <ul style="list-style-type: none"> <li>AT+SRBLESECCLEAR</li> <li>OK</li> </ul> </li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESECNUMCMP</b> <b>P</b>	<p><b>Compare numbers from initiator and responder for secure connection</b></p> <p>Reply to a numeric comparison notification to complete the bonding process. The notification can occur only if both devices are configured for MITM protection/secure connections, and both have either I/O capacity Keyboard+Display or Display Yes/No. (See <a href="#">+SRBLESECPARAMS</a> on page 118.)</p> <hr/> <p><i>Note: The numeric comparison request appears on both devices (initiator and responder).</i></p> <hr/> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLESECNUMCMP=&lt;session_id&gt;,&lt;accept&gt;</b></li> <li>Response: OK or ERROR</li> <li>Purpose: Confirm (accept) or deny (refuse) that the number received in the numeric comparison notification is valid.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Peer device's session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;accept&gt; (Accept/refuse bonding procedure)</p> <ul style="list-style-type: none"> <li>• 0—Refuse</li> <li>• 1—Accept</li> </ul>
<b>+SRBLESECNUMCMP</b> <b>P (notification)</b>	<p><b>Request to confirm number comparison for secure connection (unsolicited notification)</b></p> <p>Notifies both devices (initiator and responder) that the numeric comparison must be accepted to complete the bonding process. When this notification is received, reply with <a href="#">+SRBLESECNUMCMP</a> on page 117.</p> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBLESECNUMCMP=&lt;session_id&gt;,&lt;number&gt;</b></li> <li>Purpose: Request received to confirm (accept) or deny (refuse) that the number received in the numeric comparison notification is valid.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Peer device's session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;number&gt; (Numeric comparison value to be accepted/denied)</p> <ul style="list-style-type: none"> <li>• 6-digit number</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESECPARAMS</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLESECPARAMS</a> .)	<p><b>Set/read secure parameters</b>            Set/read the current secure parameters (I/O capability and authorization request type).</p> <hr/> <p><i>Note: To set BTC security parameters, use <a href="#">+SRBTCSECPARAMS</a>.</i></p> <hr/> <p><i>Note: The write command should only be run before the connection is open.</i></p> <hr/> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBLESECPARAMS=&lt;io_cap&gt;,&lt;auth_req&gt;</b>            Response: OK            or ERROR            Purpose: Set the specified parameters. The new parameter values take effect immediately.</li> <li>Read: <b>AT+SRBLESECPARAMS?</b>            Response: +SRBLESECPARAMS: &lt;io_cap&gt;,&lt;auth_req&gt;            OK            or ERROR            Purpose: Display the current secure parameters.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;io_cap&gt; (Device I/O capabilities)</p> <ul style="list-style-type: none"> <li>0—Display only (Device can display/communicate a 6-digit decimal number)</li> <li>1—Display Yes/No (Device can display/communicate 6-digit decimal number, and has method to indicate 'yes'/'no'.)</li> <li>2—Keyboard only (Device has a keyboard to enter numbers '0'–'9' and confirm. Device also has method to indicate 'yes'/'no'.)</li> <li>3—No I/O (Device cannot indicate 'yes'/'no'.)</li> <li>4—Keyboard and Display (Device has keyboard and display.)</li> <li>For details, refer to BLUETOOTH SPECIFICATION Version 4.2 [Vol 3, Part H] section 2.3.2.</li> </ul> <p>&lt;auth_req&gt; (Authorization request type)</p> <ul style="list-style-type: none"> <li>Decimal value</li> <li>Bitmap indicating current state (enabled/disabled) of supported BLE profiles           <ul style="list-style-type: none"> <li>Bit 1 (0x01)—Bonding flag</li> <li>Bit 2 (0x02)—Reserved for future use</li> <li>Bit 3 (0x04)—MITM (Man in the Middle)</li> <li>Bit 4 (0x08)—Secure Connection</li> <li>For example:               <ul style="list-style-type: none"> <li>0 (0x00)=Non-bondable mode (device cannot accept bonding)</li> <li>5 (0x05)=Bonding enabled, MITM required</li> <li>12 (0x0C)=Bonding enabled, MITM required, Secure connection</li> </ul> </li> <li>Known issue—If Secure Connection is selected, a bond is always created even if the Bonding flag is set to 0 (no bonding).</li> </ul> </li> </ul> <p>&lt;bt_addr&gt; (Bonded device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p>(Continued on next page)</p>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESECPARAMS (continued)</b> (F/W rev: 2.6.0+ For previous version, see <a href="#">+SRBLESECPARAMS.</a> )	<b>Set/read secure parameters (continued)</b> <b>Examples:</b> <ul style="list-style-type: none"><li>• AT+SRBLESECPARAMS? +SRBLESCANPARAMS=3,13 OK (No I/O; secure connections supported)</li><li>• AT+SRBLESCANPARAMS=4,4 OK (Keyboard input and Display output; legacy bonding)</li></ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESECPARAMS</b> (F/W rev: P1.0.0+ For next version, see <a href="#">+SRBLESECPARAMS</a> .)	<p><b>Set/read secure parameters</b>            Set/read the current secure parameters (I/O capability and authorization request type).</p> <hr/> <p><i>Note: To set BTC security parameters, use <a href="#">+SRBTCSECPARAMS</a>.</i></p> <hr/> <p><i>Note: The write command should only be run before the connection is open.</i></p> <hr/> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:           <b>AT+SRBLESECPARAMS=&lt;io_cap&gt;,&lt;auth_req&gt;</b>              Response:    OK                          or    ERROR              Purpose:     Set the specified parameters. The new parameter values take effect immediately.</li> <li>• Read:           <b>AT+SRBLESECPARAMS?</b>              Response:    +SRBLESECPARAMS: &lt;io_cap&gt;,&lt;auth_req&gt;                          OK                          or    ERROR              Purpose:     Display the current secure parameters.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;io_cap&gt; (Device I/O capabilities)</p> <ul style="list-style-type: none"> <li>• 0—Display only (Device can display/communicate a 6-digit decimal number)</li> <li>• 1—Display Yes/No (Device can display/communicate 6-digit decimal number, and has method to indicate 'yes'/'no'.)</li> <li>• 2—Keyboard only (Device has a keyboard to enter numbers '0'-'9' and confirm. Device also has method to indicate 'yes'/'no'.)</li> <li>• 3—No I/O (Device cannot indicate 'yes'/'no'.)</li> <li>• 4—Keyboard and Display (Device has keyboard and display.)</li> <li>• For details, refer to BLUETOOTH SPECIFICATION Version 4.2 [Vol 3, Part H] section 2.3.2.</li> </ul> <p>&lt;auth_req&gt; (Authorization request type)</p> <ul style="list-style-type: none"> <li>• 0—Non-bondable mode (device cannot accept bonding)</li> <li>• 4—Require MITM protection, legacy bonding</li> <li>• 13—Require MITM protection, secure connections supported</li> </ul> <p>&lt;bt addr&gt; (Bonded device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• AT+SRBLESECPARAMS?              +SRBLESCANPARAMS=3,13              OK              (No I/O; secure connections supported)</li> <li>• AT+SRBLESCANPARAMS=4,4              OK              (Keyboard input and Display output; legacy bonding)</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESECPASSKEY</b>	<p><b>Send passkey response to peer device</b></p> <p>Respond to a peer device's request (<a href="#">+SRBLESECPASSKEYREQ (notification)</a>) for a passkey to bond.</p> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLESECPASSKEY=&lt;session_id&gt;,&lt;passkey&gt;</b></li> <li>Response: OK or ERROR</li> <li>Purpose: If requested by the peer device, send the peer device's passkey to complete the bonding process.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Passkey requirement device's session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;passkey&gt; (Peer device's passkey)</p> <ul style="list-style-type: none"> <li>• 6-digit ASCII string (including leading zeros (0))</li> <li>• Example: "012345"</li> </ul>
<b>+SRBLESECPASSKEY (notification)</b>	<p><b>Passkey to be entered on remote device</b></p> <p>Notification indicating a passkey must be entered for a bonding request.</p> <p>For example, the notification could be received by the local device (the initiator of a bonding request) indicating the passkey that must be displayed on the local device and entered on the peer device (acceptor). When the notification is received by the local device, a similar <a href="#">+SRBLESECPASSKEYREQ (notification)</a> is received by the peer device. The peer device then responds using <a href="#">+SRBLESECPASSKEY</a>.</p> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBLESECPASSKEY=&lt;session_id&gt;,&lt;passkey&gt;</b></li> <li>Purpose: Notifies initiator to display passkey, which must then be entered on peer device.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Peer device's session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;passkey&gt; (Peer device's passkey)</p> <ul style="list-style-type: none"> <li>• 6-digit ASCII string (including leading zeros (0))</li> <li>• Example: "012345"</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLESECPASSKEYREQ (notification)</b>	<p><b>Passkey request received (unsolicited notification)</b></p> <p>Notifies the local device that a passkey request has been received from a peer device. When this notification is received, send the peer device's passkey with <a href="#">+SRBLESECPASSKEY</a> on page 121.</p> <p><b>Category:</b> BLE GAP command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"><li>Notification: <b>+SRBLESECPASSKEYREQ=&lt;session_id&gt;</b> Purpose: Notifies device that passkey request has been received.</li></ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Peer device's session ID)</p> <ul style="list-style-type: none"><li>Unique integer value assigned to the session</li><li>Decimal format</li><li>Valid range: 1–64</li></ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEXPWR</b> (F/W rev: 2.6.0+ For previous version, see <a href="#">+SRBLEXPWR</a> .)	<p><b>Read/write connected session transmit power value</b></p> <p>Read the transmit power levels for configured sessions, or write the transmit power level for a connected BLE session.</p> <p><b>Category:</b> BLE General command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEXPWR=&lt;session_id&gt;,&lt;tx_power&gt;</b>              Response: OK              or ERROR              Purpose: Write the BLE transmit power for the specified transmit &lt;type&gt;.</li> <li>• Read: <b>AT+SRBLEXPWR?</b>              Response: +SRBLEXPWR: &lt;session_id&gt;,&lt;is_connected&gt;,&lt;tx_power&gt;              +SRBLEXPWR: &lt;session_id&gt;,&lt;is_connected&gt;,&lt;tx_power&gt;              ...              OK              or ERROR              Purpose: Read the transmit power values for all BLE sessions.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID of remote server)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;is_connected&gt; (Session state)</p> <ul style="list-style-type: none"> <li>• 0—Not connected</li> <li>• 1—Connected</li> </ul> <p>&lt;tx_power&gt; (Tx power level)</p> <ul style="list-style-type: none"> <li>• 0—-12 dBm</li> <li>• 1—-9 dBm</li> <li>• 2—-6 dBm</li> <li>• 3—-3 dBm</li> <li>• 4—0 dBm</li> <li>• 5—+3 dBm</li> <li>• 6—+6 dBm</li> <li>• 7—+9 dBm</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Set Tx power level for session 0:              AT+SRBLEXPWR=0,4              OK</li> <li>• Show Tx power levels for all sessions:              AT+SRBLEXPWR?              +SRBLEXPWR: 0,1,5              +SRBLEXPWR: 1,0,6              ..              +SRBLEXPWR:13,0,5              OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEXPWR</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLEXPWR</a> .)	<p><b>Read/write connected session transmit power value</b></p> <p>Read the transmit power levels for configured sessions, or write the transmit power level for a connected BLE session.</p> <p><b>Category:</b> BLE General command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEXPWR=&lt;session_id&gt;,&lt;tx_power&gt;</b>              Response: OK                        or ERROR              Purpose: Write the BLE transmit power for the specified transmit &lt;type&gt;.</li> <li>• Read: <b>AT+SRBLEXPWR?</b>              Response: +SRBLEXPWR: &lt;session_id&gt;,&lt;is_connected&gt;,&lt;tx_power&gt;                        +SRBLEXPWR: &lt;session_id&gt;,&lt;is_connected&gt;,&lt;tx_power&gt;                        ...                        OK                        or ERROR              Purpose: Read the transmit power values for all BLE sessions.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID of remote server)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;is_connected&gt; (Session state)</p> <ul style="list-style-type: none"> <li>• 0—Not connected</li> <li>• 1—Connected</li> </ul> <p>&lt;tx_power&gt; (Tx power level)</p> <ul style="list-style-type: none"> <li>• 0—-12 dBm</li> <li>• 1—-9 dBm</li> <li>• 2—-6 dBm</li> <li>• 3—-3 dBm</li> <li>• 4—0 dBm</li> <li>• 5—+3 dBm</li> <li>• 6—+6 dBm</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Set Tx power level for session 0:              AT+SRBLEXPWR=0,4              OK</li> <li>• Show Tx power levels for all sessions:              AT+SRBLEXPWR?              +SRBLEXPWR: 0,1,5              +SRBLEXPWR: 1,0,6              ..              +SRBLEXPWR:13,0,5              OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEXPWRCFG</b> (F/W rev: 2.6.0+ For previous version, see <a href="#">+SRBLEXPWRCFG.</a> )	<p><b>Read/write Transmit power value configuration</b></p> <p>Read or write the current BLE transmit power configuration. The write command sets the power for one of the BLE transmit types (default, advertise, scan) at a time.</p> <p><b>Category:</b> BLE General command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEXPWRCFG=&lt;type&gt;,&lt;tx_power&gt;</b>              Response: OK                        or ERROR              Purpose: Write the BLE transmit power for the specified transmit &lt;type&gt;.</li> <li>• Read: <b>AT+SRBLEXPWRCFG?</b>              Response: +SRBLEXPWRCFG: &lt;state=0&gt;,&lt;tx_power&gt;                        +SRBLEXPWRCFG: &lt;state=1&gt;,&lt;tx_power&gt;                        +SRBLEXPWRCFG: &lt;state=2&gt;,&lt;tx_power&gt;                        OK                        or ERROR              Purpose: Read the current BLE transmit power configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;type&gt; (BLE transmit type)</p> <ul style="list-style-type: none"> <li>• 0—Default transmit power if not set by <a href="#">+SRBLEXPWR</a></li> <li>• 1—Advertise (Tx power during advertising)</li> <li>• 2—Scan (Tx power during scanning)</li> </ul> <p>&lt;tx_power&gt; (Tx power level)</p> <ul style="list-style-type: none"> <li>• 0—-12 dBm</li> <li>• 1—-9 dBm</li> <li>• 2—-6 dBm</li> <li>• 3—-3 dBm</li> <li>• 4—0 dBm</li> <li>• 5—+3 dBm</li> <li>• 6—+6 dBm</li> <li>• 7—+9 dBm</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Set different power levels for each transmit &lt;type&gt;:              AT+SRBLEXPWRCFG=0,5              AT+SRBLEXPWRCFG=2,6              AT+SRBLEXPWRCFG=1,6              OK</li> <li>• Show power levels for all transmit types:              AT+SRBLEXPWRCFG?              +SRBLEXPWRCFG: 0,5              +SRBLEXPWRCFG: 1,6              +SRBLEXPWRCFG: 2,6              OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLETXPWRCFG</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLETXPWRCFG.</a> )	<p><b>Read/write Transmit power value configuration</b></p> <p>Read or write the current BLE transmit power configuration. The write command sets the power for one of the BLE transmit types (default, advertise, scan) at a time.</p> <p><b>Category:</b> BLE General command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLETXPWRCFG=&lt;type&gt;,&lt;tx_power&gt;</b>              Response: OK                        or ERROR              Purpose: Write the BLE transmit power for the specified transmit &lt;type&gt;.</li> <li>• Read: <b>AT+SRBLETXPWRCFG?</b>              Response: +SRBLETXPWRCFG: &lt;state=0&gt;,&lt;tx_power&gt;                        +SRBLETXPWRCFG: &lt;state=1&gt;,&lt;tx_power&gt;                        +SRBLETXPWRCFG: &lt;state=2&gt;,&lt;tx_power&gt;                        OK                        or ERROR              Purpose: Read the current BLE transmit power configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;type&gt; (BLE transmit type)</p> <ul style="list-style-type: none"> <li>• 0—Default transmit power if not set by <a href="#">+SRBLETXPWR</a></li> <li>• 1—Advertise (Tx power during advertising)</li> <li>• 2—Scan (Tx power during scanning)</li> </ul> <p>&lt;tx_power&gt; (Tx power level)</p> <ul style="list-style-type: none"> <li>• 0—-12 dBm</li> <li>• 1—-9 dBm</li> <li>• 2—-6 dBm</li> <li>• 3—-3 dBm</li> <li>• 4—0 dBm</li> <li>• 5—+3 dBm</li> <li>• 6—+6 dBm</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Set different power levels for each transmit &lt;type&gt;:              AT+SRBLETXPWRCFG=0,5              AT+SRBLETXPWRCFG=2,6              AT+SRBLETXPWRCFG=1,6              OK</li> <li>• Show power levels for all transmit types:              AT+SRBLETXPWRCFG?              +SRBLETXPWRCFG: 0,5              +SRBLETXPWRCFG: 1,6              +SRBLETXPWRCFG: 2,6              OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEWRITE (notification)</b>	<p><b>'Write' request received from GATT client (Unsolicited notification)</b></p> <p>Notification that a GATT client has issued a write request for a service's characteristic or characteristic descriptor.</p> <p><b>Category:</b> BLE GATT Server command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBLEWRITE: &lt;session_id&gt;, &lt;characteristic handle&gt;, &lt;data&gt;</b> or <b>+SRBLEWRITE: &lt;session_id&gt;, &lt;characteristic descriptor handle&gt;, &lt;data&gt;</b></li> <li>Purpose: GATT client issued a 'write' request for the specified session's characteristic or characteristic descriptor.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;characteristic handle&gt; (Characteristic attribute handle)</p> <ul style="list-style-type: none"> <li>• Unique identifier for the service's characteristic</li> <li>• Decimal format</li> <li>• Valid range: 1-65535</li> </ul> <p>&lt;characteristic descriptor handle&gt; (Characteristic descriptor handle)</p> <ul style="list-style-type: none"> <li>• Unique identifier for the service's characteristic descriptor</li> <li>• Decimal format</li> <li>• Valid range: 1-65535</li> </ul> <p>&lt;data&gt; (Data to write to characteristic or characteristic descriptor)</p> <ul style="list-style-type: none"> <li>• String of hexadecimal ASCII codes</li> <li>• Length—1–(MTU - 3) (See <a href="#">+SRBLEMTU (notification)</a> on page 102 for details.)</li> <li>• Example: "\00\01\02\03"</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• GATT client requests data to be written to characteristic/descriptor 46 from session ID #1: AT+SRBLEWRITE=1,46,"00\01\02\03"</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEWRITECHAR</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLEWRITECHAR.</a> )	<p><b>Write service characteristic's value</b></p> <p>Write a value to a specific characteristic of a specific service.</p> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEWRITECHAR=&lt;session_id&gt;, &lt;characteristic_handle&gt;, &lt;characteristic_value&gt;</b></li> </ul> <p>Response: OK            or +SRBLE_ERROR: &lt;error_code&gt;</p> <p>Purpose: Write the value to the specified service's characteristic identified by the &lt;characteristic_handle&gt;.</p> <hr/> <p><i>Note: The command may return a <b>+SRBLE_ERROR (notification)</b> (for example, if the characteristic is not writable or if you do not give the correct service and characteristic information). If the command is incorrectly formed (for example, wrong parameter types or if the &lt;characteristic_value&gt; is longer than the negotiated (exchanged) MTU for this session), the command will only return ERROR.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;characteristic_handle&gt; (Handle used to identify the characteristic being written)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;characteristic_value&gt;</p> <ul style="list-style-type: none"> <li>• Format—ASCII string.</li> <li>• Characters may be hexadecimal format ('\nn') or text (for printable characters). For example, the letter 'M' could appear as 'M' or '\4d'</li> <li>• Example: "hello" or "\002"</li> <li>• Length: 1–(MTU-3)</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Write "abcd" to the specified characteristic:            AT+SRBLEWRITECHAR=1,42,abcd            OK            (The server then receives the value "abcd".)</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEWRITECHAR</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBLEWRITECHAR.</a> )	<p><b>Write service characteristic's value</b></p> <p>Write a value to a specific characteristic of a specific service.</p> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEWRITECHAR=&lt;session_id&gt;, &lt;characteristic_handle&gt;, &lt;characteristic_value&gt;</b></li> </ul> <p>Response: OK            or [+SRBLE_ERROR: &lt;error_code&gt;]            ERROR</p> <p>Purpose: Write the value to the specified service's characteristic identified by the &lt;characteristic_handle&gt;.</p> <hr/> <p><i>Note: The command may return a +SRBLE_ERROR notification (for example, if the characteristic is not writable or if you do not give the correct service and characteristic information). If the command is incorrectly formed (for example, wrong parameter types or if the &lt;characteristic_value&gt; is longer than the negotiated (exchanged) MTU for this session), the command will only return ERROR.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;characteristic_handle&gt; (Handle used to identify the characteristic being written)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;characteristic_value&gt;</p> <ul style="list-style-type: none"> <li>• Format—ASCII string.</li> <li>• Characters may be hexadecimal format ('\nn') or text (for printable characters). For example, the letter 'M' could appear as 'M' or '\4d'</li> <li>• Example: "hello" or "\0\02"</li> <li>• Length: 1–(MTU-3)</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Write "abcd" to the specified characteristic:            AT+SRBLEWRITECHAR=1,42,abcd            OK            (The server then receives the value "abcd".)</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEWRITECHARNORSP</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBLEWRITECHARNORSP</a> .)	<p><b>Write service characteristic's value, no server response</b></p> <p>Write a value to a specific characteristic of a specific service. A response is not required from the server.</p> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEWRITECHARNORSP=&lt;session_id&gt;, &lt;characteristic_handle&gt;, &lt;characteristic_value&gt;</b></li> </ul> <p>Response: OK            or +SRBLE_ERROR: &lt;error_code&gt;</p> <p>Purpose: Write the value to the specified service's characteristic identified by the &lt;characteristic_handle&gt;.</p> <hr/> <p><i>Note: The command returns a +SRBLE_ERROR notification if it fails. The command will fail if the characteristic is not readable or if you do not give the correct service and characteristic information.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;characteristic_handle&gt; (Handle used to identify the characteristic being written)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;characteristic_value&gt;</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "hello" or "\0\02"</li> <li>• Length: 1–(MTU-3)</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Write "abcd" to the specified characteristic:              AT+SRBLEWRITECHARNORSP=1,42,abcd              OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEWRITECHARNORSP</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBLEWRITECHARNORSP</a> .)	<p><b>Write service characteristic's value, no server response</b></p> <p>Write a value to a specific characteristic of a specific service. A response is not required from the server.</p> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEWRITECHARNORSP=&lt;session_id&gt;, &lt;characteristic_handle&gt;, &lt;characteristic_value&gt;</b></li> </ul> <p>Response: OK            or +SRBLE_ERROR: &lt;error_code&gt;            ERROR</p> <p>Purpose: Write the value to the specified service's characteristic identified by the &lt;characteristic_handle&gt;.</p> <hr/> <p><i>Note: The command returns a +SRBLE_ERROR notification if it fails. The command will fail if the characteristic is not readable or if you do not give the correct service and characteristic information.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;characteristic_handle&gt; (Handle used to identify the characteristic being written)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;characteristic_value&gt;</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "hello" or "\0\02"</li> <li>• Length: 1–(MTU-3)</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Write "abcd" to the specified characteristic:              AT+SRBLEWRITECHARNORSP=1,197,abcd              OK</li> </ul>

Table 4-2: BLE Commands (Detail) (Continued)

Command	Description
<b>+SRBLEWRITEDESC</b>	<p><b>Write characteristic's descriptor information</b></p> <p>Write information into a specific characteristic's descriptor.</p> <p><b>Category:</b> BLE GATT Client command</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBLEWRITEDESC=&lt;session_id&gt;, &lt;descriptor_handle&gt;, &lt;descriptor_value&gt;</b></li> </ul> <p>Response: OK or +SRBLE_ERROR: &lt;error_code&gt; ERROR</p> <p>Purpose: Write a value into specific service characteristic's descriptor.</p> <hr/> <p><i>Note: The command returns a +SRBLE_ERROR notification if the &lt;data&gt; is longer than the negotiated (exchanged) MTU value for this session. See +SRBLEMTU (notification) on page 102 for details.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session identifier)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session</li> <li>• Decimal format</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;descriptor_handle&gt; (Handle used to identify the descriptor (&lt;descriptor_uuid&gt;))</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Valid range: 1–65535</li> </ul> <p>&lt;descriptor_value&gt; (Descriptor value)</p> <ul style="list-style-type: none"> <li>• String of hexadecimal ASCII codes</li> <li>• Length and content id descriptor type-dependent. Refer to the Bluetooth Core Specification for details.</li> <li>• Example for descriptor 0x2902 Client Characteristic Configuration: <ul style="list-style-type: none"> <li>• "\00\00"—Disable notification/indication</li> <li>• "\00\01"—Enable notification</li> <li>• "\00\02"—Enable indication</li> </ul> </li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Write value ("\00\01"—enable notification) to the descriptor identified by handle 43 (In this case, the Client Characteristic Configuration attribute): <pre>AT+SRBLEWRITEDESC=1,43,"\00\01" OK</pre> </li> </ul>

## >> 5: BT Commands

### Introduction

This chapter describes BT/BTC (Bluetooth Classic) related commands (see section [Command reference](#) on page 135).

### Command summary

The following table lists the commands described in this chapter.

**Table 5-1: BT commands (Summary)**

Command	F/W	Description	Page
<b>+SRBTCFG (notification)</b>	2.5.0+	SPP/A2DP/AVRCP connection configuration result (unsolicited notification)	135
	P1.0.0	SPP connection configuration result (unsolicited notification)	136
<b>+SRBTC_IND (notification)</b>	2.6.0+	BTC profile status change (unsolicited notification)	137
<b>+SRBTCPIN</b>	2.5.0+	Reply to legacy pairing request	138
<b>+SRBTCPIN (notification)</b>	2.5.0+	Reply to legacy pairing request (notification)	138
<b>+SRBTCPINCFG</b>	2.5.0+	Configure legacy pairing PIN feature	139
<b>+SRBTCPROFILES</b>	2.6.0+	Enable/disable supported BTC profiles	140
<b>+SRBTCRSSI</b>	2.5.0+	Read RSSI for BTC Session	141
<b>+SRBTCSECNUMCMP</b>	2.5.0+	Reply to BTC Numeric Comparison Pairing Request	142
<b>+SRBTCSECNUMCMP (notification)</b>	2.5.0+	BT Numeric Comparison Pairing Request (unsolicited notification)	142
<b>+SRBTCSECPARAMS</b>	2.5.0+	BT Security Parameters	143
<b>+SRBTCSECPASSKEY</b>	2.5.0+	Reply to BTC Passkey Comparison Pairing Request	144
<b>+SRBTCSECPASSKEY (notification)</b>	2.5.0+	BT Passkey Pairing Information (unsolicited notification)	144
<b>+SRBTCSECPASSKEYREQ (notification)</b>	2.5.0+	BT Passkey Pairing Request (unsolicited notification)	145
<b>+SRBTCTXPWR</b>	2.6.0+	Read/write transmit power configuration	146
	2.5.0+	Read/write transmit power configuration	147
<b>+SRBTINQ</b>	2.5.0+	Start general inquiry	148
	P1.0.0	Start general inquiry	150
<b>+SRBTINQ (notification)</b>	2.5.0+	General Inquiry scan response (unsolicited notification)	151
	P1.0.0	General Inquiry scan response (unsolicited notification)	151
<b>+SRBTPAIR</b>	2.5.0+	List paired BT devices	151
	P1.0.0	Send BT pair request/response to remote device, or list paired BT devices	152

Table 5-1: BT commands (Summary) (Continued)

Command	F/W	Description	Page
<b>+SRBTPAIR (notification)</b>	2.5.0+	BT pairing process complete (unsolicited notification)	153
	P1.0.0	BT pairing process complete (unsolicited notification)	153
<b>+SRBTPAIRREQ (notification)</b>	P1.0.0	BT pairing request (unsolicited notification)	154
<b>+SRBTSTATE</b>	2.5.0+	Read/write BT device state	154
	P1.0.0	Read/write BT device state	155
<b>+SRBTUNPAIR</b>	2.5.0+	Unpair from paired BT device(s)	156
	P1.0.0	Unpair from paired BT device(s)	157
<b>+SRSPPCFG</b>	2.5.0+	Create SPP connection to remote BT device	158
	P1.0.0	Create SPP connection to remote BT device	160
<b>+SRSPPCLOSE</b>	2.5.0+	Close SPP connection with remote BT device	162
	P1.0.0	Close SPP connection with remote BT device	163
<b>+SRSPPCLOSE (notification)</b>	P1.0.0+	SPP connection closed (unsolicited notification)	164
<b>+SRSPPCNX</b>	2.5.0+	Connect to remote BT device via SPP	165
	P1.0.0	Connect to remote BT device via SPP	166
<b>+SRSPPCNX (notification)</b>	2.5.0+	SPP connection opened by remote request (unsolicited notification)	167
	P1.0.0	SPP connection opened by remote request (unsolicited notification)	168
<b>+SRSPPCNX (notification)</b>	P1.0.0+	SPP connection data received (unsolicited notification)	168
<b>+SRSPPCNX (notification)</b>	P1.0.0+	Delete configured SPP session	169
<b>+SRSPPCNX (notification)</b>	2.5.0+	SPP connection error received (unsolicited notification)	170
<b>+SRSPPCNX (notification)</b>	P1.0.0	SPP connection error received (unsolicited notification)	170
<b>+SRSPPCND</b>	2.5.0+	Send data to remote BT device via SPP	171
	P1.0.0	Send data to remote BT device via SPP	172
<b>+SRSPPCSTART</b>	2.5.0+	Put SPP connection into data mode	173
	P1.0.0	Put SPP connection into data mode	174

## Command reference

Table 5-2: BT Commands (Detail)

Command	Description
<b>+SRBTCFG (notification)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBTCFG (notification)</a> .)	<p><b>SPP/A2DP/AVRCP connection configuration result (unsolicited notification)</b></p> <p>Notify local device of the result of a connection configuration attempt (via <a href="#">+SRA2DPCFG</a>, <a href="#">+SRAVRCPCFG</a>, or <a href="#">+SRSPPCFG</a>).</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;, &lt;additional_information&gt;</b></li> </ul> <p>Purpose: Notifies local device of the result of a connection configuration attempt.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>Decimal format</li> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <p>&lt;status&gt; (SPP connection status code)</p> <ul style="list-style-type: none"> <li>0—Not connected</li> <li>1—Connected</li> </ul> <p>&lt;bt_addr&gt; (Remote device's BT address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;session_type&gt; (Session type)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>"SPP"—SPP session</li> <li>"A2DP"—A2DP session</li> <li>"AVRCP"—AVRCP session</li> </ul> <p>&lt;additional_information&gt; (Session type-dependent data)</p> <ul style="list-style-type: none"> <li>For SPP sessions:           <ul style="list-style-type: none"> <li>&lt;spp_handle&gt; (SPP connection handle)</li> <li>Valid range: 2–65535</li> </ul> </li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>SPP connection successfully established to remote device:            AT+SRSPPCFG=20:fa:bb:00:01:79            +SRBTCFG: 1,0,"20:fa:bb:00:01:79",SPP,0</li> <li>A2DP connection successfully established to remote device:            AT+SRSPPCFG=20:fa:bb:00:01:79            +SRBTCFG: 1,0,"20:fa:bb:00:01:79",A2DP</li> <li>AVRCP connection successfully established to remote device:            AT+SRSPPCFG=20:fa:bb:00:01:79            +SRBTCFG: 1,0,"20:fa:bb:00:01:79",AVRCP</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<p><b>+SRBTCFG (notification)</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBTCFG (notification)</a>.)</p>	<p><b>SPP connection configuration result (unsolicited notification)</b> Notify local device of the result of an SPP connection configuration attempt (via <a href="#">+SRSPPCFG</a>).</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;, &lt;additional_information&gt;</b></li> </ul> <p>Purpose: Notifies local device of the result of a connection configuration attempt.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>Decimal format</li> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <p>&lt;status&gt; (SPP connection status code)</p> <ul style="list-style-type: none"> <li>0—Not connected</li> <li>1—Connected</li> </ul> <p>&lt;bt_addr&gt; (Remote device's BT address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;session_type&gt; (Session type)</p> <ul style="list-style-type: none"> <li>ASCII string (does not include quotation marks)</li> <li>"SPP"—SPP session</li> </ul> <p>&lt;additional_information&gt; (Session type-dependent data)</p> <ul style="list-style-type: none"> <li>For SPP sessions: <ul style="list-style-type: none"> <li>&lt;spp_handle&gt; (SPP connection handle)</li> <li>Valid range: 2–65535</li> </ul> </li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>SPP connection successfully established to remote device: AT+SRSPPCFG=20:fa:bb:00:01:79 +SRBTCFG: 1,0,"20:fa:bb:00:01:79",SPP,0</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTC_IND (notification)</b> (F/W rev: 2.6.0+)	<p><b>BTC profile status change (unsolicited notification)</b></p> <p>Notify local device of a status change on any BTC profile.            (Notifications are received after <b>+SRBTSYSTEM</b> or <b>+SRBTCFILES</b> commands are issued.)</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBTC_IND: &lt;status&gt;</b>              Purpose: Notifies local device of a change in status of a BTC profile.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;status&gt; (BTC profile status)</p> <ul style="list-style-type: none"> <li>Decimal value</li> <li>0—GAP enabled</li> <li>1—GAP enable error</li> <li>2—GAP disabled</li> <li>3—GAP disable error</li> <li>4—AVRCP enabled</li> <li>5—AVRCP enable error</li> <li>6—AVRCP disabled</li> <li>7—AVRCP disable error</li> <li>8—A2DP enabled</li> <li>9—A2DP enable error</li> <li>10—A2DP disabled</li> <li>11—A2DP disable error</li> <li>12—SPP enabled</li> <li>13—SPP enable error</li> <li>14—SPP disabled</li> <li>15—SPP disable error</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Error trying to enable BTC GAP profile:              +SRBTC_IND: 1</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTCPIN</b> (F/W rev: 2.5.0+)	<p><b>Reply to legacy pairing request</b>            Reply to a 'variable'-type legacy pairing request.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBTCPIN=&lt;bt_addr&gt;,&lt;accept&gt;[,&lt;pin_code&gt;]</b></li> <li>Response: OK or ERROR</li> <li>Purpose: Accept or deny a pairing request from &lt;bt_addr&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's BT address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;accept&gt; (Pairing response type)</p> <ul style="list-style-type: none"> <li>• 0—Deny the pairing request. (Note: &lt;pin_code&gt; parameter must not be included.)</li> <li>• 1—Accept the pairing request. (Note: &lt;pin_code&gt; is required.)</li> </ul> <p>&lt;pin_code&gt; (PIN code required to connect to remote device)</p> <ul style="list-style-type: none"> <li>• 1–16 digit value</li> <li>• e.g. 1234567890987654</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Accept a pairing request:            +SRBTCPIN: "20:fa:bb:00:01:79"            AT+SRBTCPIN="20:fa:bb:00:01:79",1,1234            OK</li> </ul>
<b>+SRBTCPIN (notification)</b> (F/W rev: 2.5.0+)	<p><b>Reply to legacy pairing request (notification)</b>            Notify local device when a legacy pairing request is received.            Respond to this notification with AT+SRBTCPIN.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRBTCPIN: &lt;bd_address&gt;</b></li> <li>Purpose: Notifies local device that the remote devices wants to pair.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's BT address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Remote device wants to pair:            +SRBTCPIN="20:fa:bb:00:01:79"</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTCPCINCFG</b> (F/W rev: 2.5.0+)	<p><b>Configure legacy pairing PIN feature</b></p> <p>Configure the legacy pairing PIN feature to use a fixed or variable PIN for pairing requests.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBTCPCINCFG=&lt;type&gt;[,&lt;pin_code&gt;]</b></li> <li>Response: OK or ERROR</li> <li>Purpose: Configure legacy pairing to require a variable or fixed PIN.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;type&gt; (PIN type)</p> <ul style="list-style-type: none"> <li>• 0—Variable. A +SRBTCPCIN notification will be displayed when a remote device requests a pairing, and the host can reply with AT+SRBTCPCIN. (Note: &lt;pin_code&gt; parameter must not be included.)</li> <li>• 1—Fixed. The BX310x will automatically accept pairing requests from remote devices and answer them with the specified &lt;pin_code&gt;. (Note: &lt;pin_code&gt; parameter is required.)</li> </ul> <p>&lt;pin_code&gt; (Fixed-value PIN code)</p> <ul style="list-style-type: none"> <li>• 1–16 digit value</li> <li>• e.g. 1234567890987654</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Configure legacy pairing using fixed PIN (1234): AT+SRBTCPCINCFG=1,1234 OK</li> <li>• Configure legacy pairing using variable PIN: AT+SRBTCPCINCFG=0 OK</li> </ul>

**Table 5-2: BT Commands (Detail) (Continued)**

Command	Description
<b>+SRBTCFILES</b> (F/W rev: 2.6.0+)	<p><b>Enable/disable supported BTC profiles</b></p> <p>Enable/disable supported BTC profiles.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>The I2S port must be configured with AT+KI2SCFG before using this command.</li> <li>The host application's audio codec must be correctly configured.</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBTCFILES=&lt;profiles&gt;</b>            Response: OK                      or ERROR            Purpose: Enable/disable the supported BTC profiles.</li> <li>Read: <b>AT+SRBTCFILES?</b>            Response: +SRBTCFILES: &lt;profiles&gt;                      OK            Purpose: Show the current state of the BTC profiles.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;profiles&gt; (BTC profile states)</p> <ul style="list-style-type: none"> <li>Decimal value</li> <li>Bitmap indicating current state (enabled/disabled) of supported BTC profiles               <ul style="list-style-type: none"> <li>Bit 1 (0x01)—BTC SPP (On=enabled)</li> <li>Bit 2 (0x02)—BTC A2DP (On=enabled)</li> <li>Bit 3 (0x04)—BTC AVRCP (On=enabled)</li> </ul> </li> <li>For example:                0 (0x00)=All disabled                6 (0x06)=A2DP and AVRCP enabled                7 (0x07)=SPP, BTC, and AVRCP enabled</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Enable all BTC profiles:            AT+SRBTCFILES=7            OK</li> <li>Show state of all BTC profiles:            AT+SRBTCFILES: 6            OK</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTCRSSI</b> (F/W rev: 2.5.0+)	<p><b>Read RSSI for BTC Session</b></p> <p>Read the RSSI value for a specified connected session.</p> <hr/> <p><i>Note: To read the value for a BLE session, use <b>+SRBLERSSI</b>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:       <b>AT+SRBTCRSSI=&lt;session_id&gt;</b></li> <li>  Response:  <b>+SRBTCRSSI: &lt;rss&gt;</b></li> <li>                  OK</li> <li>          or    <b>ERROR</b></li> <li>  Purpose:    Read the RSSI value of the currently connected &lt;session_id&gt;.</li> </ul> <hr/> <p><i>Note: The RSSI value can be read only for a connected session.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;rss&gt; (BTC session identifier, in dB)</p> <ul style="list-style-type: none"> <li>• Signed integer</li> <li>• Valid range: -127 to 127</li> <li>• For details, refer to BLUETOOTH SPECIFICATION Version 4.2 [Vol 2, Part E], section 7.5.4.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Read RSSI for session 1:                <b>AT+SRBTCRSSI=1</b>                <b>+SRBTCRSSI: -8</b></li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTCSECNUMCMP</b> <b>P</b> (F/W rev: 2.5.0+)	<p><b>Reply to BTC Numeric Comparison Pairing Request</b></p> <p>Reply to a numeric comparison pairing request notification (<b>+SRBTCSECNUMCMP (notification)</b>).</p> <p>The numeric comparison method is designed for scenarios where both devices (e.g. a PC and cell phone) are able to display a 6-digit number and able to have the user enter "yes" or "no" to indicate if the numbers displayed on both devices are the same.</p> <p>If the user indicates on both devices that the numbers are the same (by setting &lt;accept=1&gt;), the pairing is successful.</p> <hr/> <p><i>Note: To read or set the device's I/O capabilities, see <b>+SRBTCSECPARAMS</b>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBTCSECNUMCMP=&lt;bt_addr&gt;,&lt;accept&gt;</b></li> <li>Response: OK</li> <li>Purpose: Respond to a pairing request sent from remote device at &lt;bt_addr&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;accept&gt; (Accept/deny pairing request)</p> <ul style="list-style-type: none"> <li>0—Deny request</li> <li>1—Accept request</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Accept request from remote device:            +SRBTCSECNUMCMP: "20:fa:bb:00:01:79",123456            AT+SRBTCSECNUMCMP="20:fa:bb:00:01:79",1            OK</li> </ul>
<b>+SRBTCSECNUMCMP</b> <b>P (notification)</b> (F/W rev: 2.5.0+)	<p><b>BT Numeric Comparison Pairing Request (unsolicited notification)</b></p> <p>Notification received during a pairing attempt. A 6-digit number is displayed on both devices (e.g. a PC and cell phone). The user must compare the values displayed with the notification's &lt;numerical_value&gt; and respond with <b>+SRBTCSECNUMCMP</b>, indicating whether the numbers are the same (accept the pairing) or different (deny the pairing).</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBTCSECNUMCMP: &lt;bt_addr&gt;, &lt;numerical_value&gt;</b></li> <li>Purpose: Notifies local device that remote device at &lt;bt_addr&gt; wants to pair using the &lt;numerical_value&gt; key.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;numerical_value&gt; (Number to compare to local device's numeric key)</p> <ul style="list-style-type: none"> <li>6-digit value</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Pairing request from remote device:            +SRBTCSECNUMCMP="20:fa:bb:00:01:79",123456</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTCSECPARAMS</b> (F/W rev: 2.5.0+)	<p><b>BT Security Parameters</b></p> <p>Read/write BT pairing security parameters. Parameter changes take effect immediately (no reset required).</p> <hr/> <p><i>Note: To set BLE security parameters, use <a href="#">+SRBTCSECPARAMS</a>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBTCSECPARAMS=&lt;io_cap&gt;</b>            Response: OK            Purpose: Set the pairing security parameters.</li> <li>• Read: <b>AT+SRBTCSECPARAMS?</b>            Response: +SRBTCSECPARAMS: &lt;io_cap&gt;            OK            Purpose: Show the pairing security parameters.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;io_cap&gt; (Device I/O capabilities)</p> <ul style="list-style-type: none"> <li>• 0—Display only (Device can display/communicate a 6-digit decimal number)</li> <li>• 1—Display Yes/No (Device can display/communicate 6-digit decimal number, and has method to indicate 'yes'/'no'.)</li> <li>• 2—Keyboard only (Device has a keyboard to enter numbers '0'-'9' and confirm. Device also has method to indicate 'yes'/'no'.)</li> <li>• 3—No I/O (Device cannot indicate 'yes'/'no'.)</li> <li>• For details, refer to BLUETOOTH SPECIFICATION Version 4.2 [Vol 3, Part H] section 2.3.2.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Configure pairing parameter to Keyboard only:            AT+SRBTCSECPARAMS=2            OK</li> <li>• Show pairing parameter:            AT+SRBTCSECPARAMS?            +SRBTCSECPARAMS: 2 (Keyboard only)</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTCSECPASSKEY</b> (F/W rev: 2.5.0+)	<p><b>Reply to BTC Passkey Comparison Pairing Request</b></p> <p>Reply to a passkey comparison pairing request notification (<a href="#">+SRBTCSECPASSKEY (notification)</a>). The user is shown a 6-digit passkey on a display device (e.g. a PC monitor) and enters the passkey on an input device (e.g. a keyboard). The entered &lt;passkey&gt; is sent in this reply. If &lt;accept=1&gt; and the value entered matches the &lt;passkey&gt; in the notification, then the pairing is successful.</p> <hr/> <p><i>Note: To read or set the device's I/O capabilities, see <a href="#">+SRBTCSECPARAMS</a>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBTCSECPASSKEY=&lt;bt_addr&gt;,&lt;accept&gt;, &lt;passkey&gt;</b></li> <li>Response: OK</li> <li>Purpose: Respond to a pairing request sent from remote device at &lt;bt_addr&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;accept&gt; (Accept/deny pairing request)</p> <ul style="list-style-type: none"> <li>0—Deny request</li> <li>1—Accept request</li> </ul> <p>&lt;passkey&gt; (Passkey)</p> <ul style="list-style-type: none"> <li>6-digit value</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Accept request from remote device and indicate required passkey:  <pre>+SRBTSECPASSKEYREQ: "20:fa:bb:00:01:79" AT+SRBTCSECPASSKEY="20:fa:bb:00:01:79",1,123456 OK</pre></li> </ul>
<b>+SRBTCSECPASSKEY (notification)</b> (F/W rev: 2.5.0+)	<p><b>BT Passkey Pairing Information (unsolicited notification)</b></p> <p>Notification received by the initiator of a pairing attempt containing a 6-digit passkey that must be displayed on an output device (e.g. a hotspot display). A corresponding <a href="#">+SRBTCSECPASSKEYREQ (notification)</a> will be received by the acceptor of the pairing attempt to notify the user that they must enter the passkey that has been displayed on the output device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBTSECPASSKEY: &lt;bt_addr&gt;, &lt;passkey&gt;</b></li> <li>Purpose: Notification indicating the &lt;passkey&gt; that must be displayed on an output device.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;passkey&gt; (Passkey to compare to local device's numeric key)</p> <ul style="list-style-type: none"> <li>6-digit value</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Pairing information response from remote device:  <pre>AT+SRBTSECPASSKEY="20:fa:bb:00:01:79",123456</pre></li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTCSECPASSKEYREQ (notification)</b> (F/W rev: 2.5.0+)	<p><b>BT Passkey Pairing Request (unsolicited notification)</b></p> <p>Notification received by local device during a pairing attempt.</p> <p>The user must enter a 6-digit passkey on an input device (e.g. keyboard) that has been displayed on an output device (e.g. PC monitor). The entered passkey must be sent in a <b>+SRBTCSECPASSKEY</b> response and if the numbers match, the pairing will be accepted.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBTSECPASSKEYREQ: &lt;bt_addr&gt;</b>            Purpose: Notifies local device that remote device at &lt;bt_addr&gt; wants to pair using a passkey.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Pairing request from remote device:            AT+SRBTSECPASSKEYREQ="20:fa:bb:00:01:79"</li> </ul>

**Table 5-2: BT Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBTCTXPWR</b> (F/W rev: 2.6.0+ For previous version, see <a href="#">+SRBTCTXPWR</a>.)</p>	<p><b>Read/write transmit power configuration</b> Read or write the BTC Tx power configuration values.</p> <hr/> <p><i>Note: To read/write the value for a BLE session, use <a href="#">+SRBLETXPWR</a>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBTCTXPWR=&lt;min_tx_power&gt;,&lt;max_tx_power&gt;</b> Response: OK or ERROR Purpose: Write the BT transmit power configuration values.</li> <li>Read: <b>AT+SRBTCTXPWR?</b> Response: +SRBTCTXPWR: &lt;min_tx_power&gt;,&lt;max_tx_power&gt; OK Purpose: Read the BTC transmit power configuration values.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;min_tx_power&gt; (Minimum BTC Tx power level)</p> <ul style="list-style-type: none"> <li>0—-12 dBm</li> <li>1—-9 dBm</li> <li>2—-6 dBm</li> <li>3—-3 dBm</li> <li>4—0 dBm (Default)</li> <li>5—+3 dBm</li> <li>6—+6 dBm</li> <li>7—+9 dBm</li> </ul> <p>&lt;max_tx_power&gt; (Maximum BTC Tx power level)</p> <ul style="list-style-type: none"> <li>0—-12 dBm</li> <li>1—-9 dBm</li> <li>2—-6 dBm</li> <li>3—-3 dBm</li> <li>4—0 dBm</li> <li>5—+3 dBm (Default)</li> <li>6—+6 dBm</li> <li>7—+9 dBm</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>AT+SRBTCTXPWR? +SRBTCTXPWR: 4,5 OK</li> </ul> <p>AT+SRBTCTXPWR=2,4 OK</p> <p>AT+SRBTCTXPWR? +SRBTCTXPWR: 2,4 OK</p>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTCTXPWR</b> (F/W rev: 2.5.0+ For next version, see <a href="#">+SRBTCTXPWR.</a> )	<p><b>Read/write transmit power configuration</b>            Read or write the BTC Tx power configuration values.</p> <hr/> <p><i>Note: To read/write the value for a BLE session, use <a href="#">+SRBLETXPWR</a>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBTCTXPWR=&lt;min_tx_power&gt;,&lt;max_tx_power&gt;</b>            Response: OK                      or ERROR            Purpose: Write the BT transmit power configuration values.</li> <li>Read: <b>AT+SRBTCTXPWR?</b>            Response: +SRBTCTXPWR: &lt;min_tx_power&gt;,&lt;max_tx_power&gt;                      OK            Purpose: Read the BTC transmit power configuration values.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;min_tx_power&gt; (Minimum BTC Tx power level)</p> <ul style="list-style-type: none"> <li>0—-12 dBm</li> <li>1—-9 dBm</li> <li>2—-6 dBm</li> <li>3—-3 dBm</li> <li>4—0 dBm (Default)</li> <li>5—+3 dBm</li> <li>6—+6 dBm</li> </ul> <p>&lt;max_tx_power&gt; (Maximum BTC Tx power level)</p> <ul style="list-style-type: none"> <li>0—-12 dBm</li> <li>1—-9 dBm</li> <li>2—-6 dBm</li> <li>3—-3 dBm</li> <li>4—0 dBm</li> <li>5—+3 dBm (Default)</li> <li>6—+6 dBm</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>AT+SRBTCTXPWR?            +SRBTCTXPWR: 4,5            OK</li> </ul> <p>AT+SRBTCTXPWR=2,4            OK</p> <ul style="list-style-type: none"> <li>AT+SRBTCTXPWR?            +SRBTCTXPWR: 2,4            OK</li> </ul>

**Table 5-2: BT Commands (Detail) (Continued)**

Command	Description
<p><b>+SRBTINQ</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBTINQ</a>.)</p>	<p><b>Start general inquiry</b></p> <p>Start a general/limited inquiry scan to discover remote devices (BR/EDR devices, or BTDM-supported devices) in range of local device's signal.</p> <p>A single general inquiry scan takes 1.28 seconds, with the local device scanning every channel for 11.25 ms, then continuing to the next channel.</p> <p>Use this command to run one or more consecutive scans.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBTINQ=&lt;duration&gt;, &lt;inquiry_mode&gt;,&lt;inquiry_result_format&gt;</b></li> </ul> <p>Response (&lt;inquiry_result_format = 0):</p> <pre>+SRBTINQ: &lt;bt_addr&gt;, &lt;device_class&gt;, &lt;rssi&gt;[, &lt;name&gt;] +SRBTINQ: &lt;bt_addr&gt;, &lt;device_class&gt;, &lt;rssi&gt;[, &lt;name&gt;] ... OK</pre> <p>Response (&lt;inquiry_result_format = 1):</p> <pre>+SRBTINQ: &lt;bt_addr&gt;, &lt;device_class&gt;, &lt;rssi&gt;[, &lt;eir&gt;] +SRBTINQ: &lt;bt_addr&gt;, &lt;device_class&gt;, &lt;rssi&gt;[, &lt;eir&gt;] ... OK</pre> <p>Purpose: Run one or more (&lt;duration&gt;) consecutive general inquiry scans of remote devices. While the scan is running, unsolicited responses are received for each device detected. When the scan finishes, 'OK' displays.</p> <p><b>Parameters:</b></p> <p>&lt;duration&gt; (Number of inquiry scans)</p> <ul style="list-style-type: none"> <li>Actual time duration=&lt;duration&gt; * 1.28 sec</li> </ul> <p>&lt;inquiry_mode&gt; (Type of inquiry scan mode)</p> <ul style="list-style-type: none"> <li>1—BR/EDR general inquiry mode</li> <li>2—BR/EDR limited inquiry mode</li> </ul> <p>&lt;inquiry_result_format&gt; (Response format)</p> <ul style="list-style-type: none"> <li>0—Parsed Extended Inquiry Response (device name if present)</li> <li>1—Raw Extended Inquiry Response</li> </ul> <p>&lt;bt_addr&gt; (Remote device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;device_class&gt; (Remote device's Class of Device)</p> <ul style="list-style-type: none"> <li>Bit-masked value indicating the remote device's Class of device (major/minor) and service</li> </ul> <p>&lt;rssi&gt; (Remote device's RSSI value, in dB)</p> <ul style="list-style-type: none"> <li>e.g. -51</li> </ul> <p>&lt;name&gt; (Remote device's name)</p> <ul style="list-style-type: none"> <li>Name (if present) in the Extended Inquiry Response</li> <li>ASCII string</li> <li>Length—0–240 bytes</li> <li>Example: "BM31xx-200D46"</li> </ul> <p>(Continued on next page)</p>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTINQ (continued)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBTINQ.</a> )	<b>Start general inquiry (continued)</b> <eir> (Raw Extended Inquiry Response) <ul style="list-style-type: none"> <li>• ASCII string (hexadecimal characters; all characters in format "\nn"—e.g. "\4D" = 'M')</li> <li>• Length—0–240 bytes</li> <li>• Example: "\0E\09\42\4D\33\31\78\78\2D\32\30\30\44\34\36\01\03\01\05\01\07"</li> </ul> <b>Examples:</b> <ul style="list-style-type: none"> <li>• Run General Inquiry scan for 10 time slots (10 * 1.28 s = 12.80 seconds duration):                AT+SRBTINQ=10,1                +SRBTINQ: "20:fa:bb:00:01:79",240404,-53,"BC-000179"      (Scan #1)                +SRBTINQ: "20:cb:aa:02:01:45",240204,-55,"BC-000184"                +SRBTINQ: "20:fa:bb:00:01:79",240404,-54,"BC-000179"      (Scan #2)                +SRBTINQ: "20:fc:aa:02:01:45",240204,-55,"BC-000184"                +SRBTINQ: "20:fa:bb:00:01:79",240404,-53,"BC-000179"      (Scan #3)                +SRBTINQ: "20:cb:aa:02:01:45",240204,-55,"BC-000184"                OK                 Two remote devices were found by the scan:                    —Audio/Video, Wearable headset device (240404)                    —Phone, Cellular (240204)             </li> </ul>

**Table 5-2: BT Commands (Detail) (Continued)**

Command	Description
<b>+SRBTINQ</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBTINQ.</a> )	<p><b>Start general inquiry</b></p> <p>Start a general/limited inquiry scan to discover remote devices (BR/EDR devices, or BTDM-supported devices) in range of local device's signal.</p> <p>A single general inquiry scan takes 1.28 seconds, with the local device scanning every channel for 11.25 ms, then continuing to the next channel.</p> <p>Use this command to run one or more consecutive scans.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRBTINQ=&lt;duration&gt;, &lt;inquiry_mode&gt;</b></li> <li>Response: +SRBTINQ: &lt;bt_addr&gt;, &lt;device_class&gt;, &lt;rsssi&gt; +SRBTINQ: &lt;bt_addr&gt;, &lt;device_class&gt;, &lt;rsssi&gt; ... OK</li> <li>Purpose: Run one or more (&lt;duration&gt;) consecutive general inquiry scans of remote devices. While the scan is running, unsolicited responses are received for each device detected. When the scan finishes, 'OK' displays.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;duration&gt; (Number of inquiry scans)</p> <ul style="list-style-type: none"> <li>• Actual time duration = &lt;duration&gt; * 1.28 sec</li> </ul> <p>&lt;inquiry_mode&gt; (Type of inquiry scan mode)</p> <ul style="list-style-type: none"> <li>• 1—BR/EDR general inquiry mode</li> <li>• 2—BR/EDR limited inquiry mode</li> </ul> <p>&lt;bt_addr&gt; (Remote device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;device_class&gt; (Remote device's Class of Device)</p> <ul style="list-style-type: none"> <li>• Bit-masked value indicating the remote device's Class of device (major/minor) and service</li> </ul> <p>&lt;rsssi&gt; (Remote device's RSSI value, in dB)</p> <ul style="list-style-type: none"> <li>• e.g. -51</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Run General Inquiry scan for 10 time slots (10 * 1.28 s = 12.80 seconds duration):            AT+SRBTINQ=10,1            +SRBTINQ: "20:fa:bb:00:01:79",240404,-53 (Scan #1)            +SRBTINQ: "20:cb:aa:02:01:45",240204,-55            +SRBTINQ: "20:fa:bb:00:01:79",240404,-54 (Scan #2)            +SRBTINQ: "20:fc:aa:02:01:45",240204,-55            +SRBTINQ: "20:fa:bb:00:01:79",240404,-53 (Scan #3)            +SRBTINQ: "20:cb:aa:02:01:45",240204,-55            OK</li> </ul> <p>Two remote devices were found by the scan:            —Audio/Video, Wearable headset device (240404)            —Phone, Cellular (240204)</p>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTINQ (notification)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBTINQ (notification)</a> .)	<b>General Inquiry scan response (unsolicited notification)</b> Unsolicited response received during the duration of a general inquiry scan (to find local devices). See details in <a href="#">+SRBTINQ</a> (F/W rev 2.5.0).
<b>+SRBTINQ (notification)</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBTINQ (notification)</a> .)	<b>General Inquiry scan response (unsolicited notification)</b> Unsolicited response received during the duration of a general inquiry scan (to find local devices). See details in <a href="#">+SRBTINQ</a> (F/W rev P1.0.0).
<b>+SRBTPAIR</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBTPAIR</a> .)	<b>List paired BT devices</b> List all paired BT devices.  <b>Usage:</b> <ul style="list-style-type: none"> <li>• Read: <b>AT+SRBTPAIR?</b></li> <li>Response: <b>+SRBTPAIR: "&lt;bt_addr&gt;"</b>  <b>+SRBTPAIR: "&lt;bt_addr&gt;"</b>            ...            OK</li> <li>or ERROR</li> <li>Purpose: Display a list of all paired devices.</li> </ul> <b>Parameters:</b> <bt_addr> (Remote device's Bluetooth address) <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <b>Examples:</b> <ul style="list-style-type: none"> <li>• List all paired devices (in this example, two devices):  <b>AT+SRBTPAIR?</b>  <b>+SRBTPAIR: "20:fa:bb:00:01:79"</b>  <b>+SRBTPAIR: "20:dc:aa:00:02:45"</b>  <b>OK</b></li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTPAIR</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBTPAIR.</a> )	<p><b>Send BT pair request/response to remote device, or list paired BT devices</b>            Send a pairing request or pairing request response to a remote device, or list all paired devices.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+SRBTPAIR=&lt;bt_addr&gt;[, &lt;accept&gt;]</b>                Response:    OK                            or    ERROR                Purpose:     Send a pairing request to a remote device, or send a response to a pairing request received from the remote device.</li> <li>• Read:        <b>AT+SRBTPAIR?</b>                Response:    +SRBTPAIR: "&lt;bt_addr&gt;"                            +SRBTPAIR: "&lt;bt_addr&gt;"                            ...                            OK                            or    ERROR                Purpose:     Display a list of all paired devices.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;accept&gt; (Response to pairing request from remote device)</p> <ul style="list-style-type: none"> <li>• This parameter is used when responding to an +SRBTPAIRREQ received from a remote device.</li> <li>• 0—Reject</li> <li>• 1—Accept</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Send a pairing request to a device:                AT+SRBTPAIR=20:fa:bb:00:01:79                OK</li> <li>• Accept a pairing request from a device:                +SRBTPAIRREQ: "20:fa:bb:00:01:79"                AT+SRBTPAIR=20:fa:bb:00:01:79, 1                OK</li> <li>• List all paired devices (in this example, two devices):                AT+SRBTPAIR?                +SRBTPAIR: "20:fa:bb:00:01:79"                +SRBTPAIR: "20:dc:aa:00:02:45"                OK</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<p><b>+SRBTPAIR (notification)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBTPAIR (notification)</a>.)</p>	<p><b>BT pairing process complete (unsolicited notification)</b> Notification received when BT pairing process completes, indicating success or failure (with a failure reason). The notification is received as the response for <a href="#">+SRBTCSECCNUMCMP</a> and <a href="#">+SRBTCSECPASSKEY</a> commands, and is received as an unsolicited notification during the SPP connection process (which requires pairing to occur before connection can be established.)</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBTPAIR: &lt;bt_addr&gt;, &lt;status_code&gt;[, &lt;fail_reason&gt;]</b> Purpose: Notify device of a pairing process result.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device Bluetooth address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;status_code&gt; (Pairing process result)</p> <ul style="list-style-type: none"> <li>0—Failure</li> <li>1—Success</li> </ul> <p>&lt;fail_reason&gt; (HCI reason code)</p> <ul style="list-style-type: none"> <li>Integer</li> <li>Refer to the Bluetooth Core Specification 4.2, Vol 2, Part D, page 374 for details.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Refer to usage scenarios (forthcoming).</li> </ul>
<p><b>+SRBTPAIR (notification)</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBTPAIR (notification)</a>.)</p>	<p><b>BT pairing process complete (unsolicited notification)</b> Notification received when BT pairing process completes, indicating success or failure (with a failure reason). The notification is received as the response for AT+SRBTPAIR commands, and is received as an unsolicited notification during the SPP connection process (which requires pairing to occur before connection can be established.)</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBTPAIR: &lt;bt_addr&gt;, &lt;status_code&gt;[, &lt;fail_reason&gt;]</b> Purpose: Notify device of a pairing process result.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device Bluetooth address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;status_code&gt; (Pairing process result)</p> <ul style="list-style-type: none"> <li>0—Failure</li> <li>1—Success</li> </ul> <p>&lt;fail_reason&gt; (HCI reason code)</p> <ul style="list-style-type: none"> <li>Integer</li> <li>Refer to the Bluetooth Core Specification 4.2, Vol 2, Part D for details.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Pairing request received from remote device: +SRBTPAIRREQ="20:fa:bb:00:01:79" (Receive pairing request) AT+SRBTPAIR=20:fa:bb:00:01:79,1 (Accept pairing request) +SRBTPAIR: "20:fa:bb:00:01:79",1 (Paired successfully)</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTPAIRREQ (notification)</b> (F/W rev: P1.0.0)	<p><b>BT pairing request (unsolicited notification)</b></p> <p>Notification received when a remote device requests to pair.            To accept or deny the pairing, reply with AT+<a href="#">SRBTPAIR</a> on page 151.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRBTPAIRREQ: &lt;bt_addr&gt;</b>                Purpose: Notify local device that remote devices requested to pair with local device.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Bluetooth address of remote device requesting to pair)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Pairing request received from remote device:                +SRBTPAIRREQ="20:fa:bb:00:01:79" (Receive pairing request)                AT+SRBTPAIR=20:fa:bb:00:01:79,1 (Accept pairing request)                +SRBTPAIR: "20:fa:bb:00:01:79",1 (Paired successfully)</li> </ul>
<b>+SRBTSTATE</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBTSTATE</a> .)	<p><b>Read/write BT device state</b></p> <p>Read or write the device's state, which indicates if the device can be discovered or connected.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRBTSTATE=&lt;connectable_mode&gt;, &lt;discoverable_mode&gt;</b>                Response: OK                or ERROR                Purpose: Write (configure) the device's state.</li> <li>Read: <b>AT+SRBTSTATE?</b>                Response: +SRBTSTATE: &lt;connectable_mode&gt;, &lt;discoverable_mode&gt;                OK                or ERROR                Purpose: Read the device's state.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;connectable_mode&gt; (Device connectability state)</p> <ul style="list-style-type: none"> <li>0—Non-connectable</li> <li>1—Connectable</li> </ul> <p>&lt;discoverable_mode&gt; (Device discoverability state)</p> <ul style="list-style-type: none"> <li>0—Non-discoverable</li> <li>1—Limited discoverable</li> <li>2—General discoverable</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Check current device state:                AT+SRBTSTATE?                +SRBTSTATE: 1,2                OK</li> <li>Set device to be connectable and general discoverable:                AT+SRBTSTATE=1,2                OK</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTSTATE</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBTSTATE.</a> )	<p><b>Read/write BT device state</b></p> <p>Read or write the device's state, which indicates if the device can be discovered, connected, or paired.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:           <b>AT+SRBTSTATE=&lt;connectable_mode&gt;, &lt;discoverable_mode&gt;, &lt;pairable_mode&gt;</b>                Response:    OK                              or    ERROR                Purpose:     Write (configure) the device's state.</li> <li>• Read:           <b>AT+SRBTSTATE?</b>                Response:    +SRBTSTATE: &lt;connectable_mode&gt;, &lt;discoverable_mode&gt;, &lt;pairable_mode&gt;                              OK                              or    ERROR                Purpose:     Read the device's state.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;connectable_mode&gt; (Device connectability state)</p> <ul style="list-style-type: none"> <li>• 0—Non-connectable</li> <li>• 1—Connectable</li> </ul> <p>&lt;discoverable_mode&gt; (Device discoverability state)</p> <ul style="list-style-type: none"> <li>• 0—Non-discoverable</li> <li>• 1—Limited discoverable</li> <li>• 2—General discoverable</li> </ul> <p>&lt;pairable_mode&gt; (Device pairability state)</p> <ul style="list-style-type: none"> <li>• 0—Non-pairable</li> <li>• 1—Pairable</li> </ul> <hr/> <p><i>Note: If the device is configured as pairable, it must also be configured as connectable. (You can only pair connected devices.)</i></p> <hr/> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Check current device state:                AT+SRBTSTATE?                +SRBTSTATE: 1,2,1                OK</li> <li>• Set device to be connectable, general discoverable, and pairable:                AT+SRBTSTATE=1,2,1                OK</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTUNPAIR</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRBTUNPAIR</a> .)	<p><b>Unpair from paired BT device(s)</b></p> <p>Unpair from one or all paired BT devices. This removes shared keys between the local and remote devices.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Execute—Unpair one device:  <code>AT+SRBTUNPAIR=&lt;bt_addr&gt;</code>            Response: OK            Purpose: Unpair the device from the remote BT device at &lt;bt_addr&gt;.</li> <li>Execute—Unpair all devices:  <code>AT+SRBTUNPAIR</code>            Response: OK            Purpose: Unpair the device all remote BT devices.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Unpair from specific BT device:  <code>AT+SRBTUNPAIR=20:fa:bb:00:01:79</code>            OK</li> <li>Unpair from all BT devices:  <code>AT+SRBTUNPAIR</code>            OK</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRBTUNPAIR</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRBTUNPAIR</a> .)	<p><b>Unpair from paired BT device(s)</b></p> <p>Unpair from one or all paired BT devices. This removes shared keys between the local and remote devices.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute—Unpair one device:                  <b>AT+SRBTUNPAIR=&lt;bt_addr&gt;</b>              Response: OK                        or ERROR              Purpose: Unpair the device from the remote BT device at &lt;bt_addr&gt;.</li> <li>• Execute—Unpair all devices:                  <b>AT+SRBTUNPAIR</b>              Response: OK                        or ERROR              Purpose: Unpair the device all remote BT devices.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's Bluetooth address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Unpair from specific BT device:                  AT+SRBTUNPAIR=20:fa:bb:00:01:79                  OK</li> <li>• Unpair from all BT devices:                  AT+SRBTUNPAIR                  OK</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPPCFG</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRSPPCFG</a> .)	<p><b>Create SPP connection to remote BT device</b>            Create an SPP connection to a remote device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRSPPCFG=&lt;bt_addr&gt;</b>              Response: +SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;, &lt;spp_handle&gt;              OK              or +CME ERROR: &lt;cme_error&gt;</li> <li>• Read: <b>AT+SRSPPCFG?</b>              Response: +SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;, &lt;spp_handle&gt;              ...              OK              or ERROR</li> </ul> <p>Purpose: Attempt to open an SPP connection to a remote BT device and (if successful) return an &lt;spp_handle&gt; to access it.            Purpose: Print details about all configured SPP sessions.</p> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's BT address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;session_id&gt; (SPP session identifier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;status&gt; (SPP connection status code)</p> <ul style="list-style-type: none"> <li>• 0—Not connected</li> <li>• 1—Connected</li> </ul> <p>&lt;session_type&gt; (Session type)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• "SPP"—SPP session</li> </ul> <p>(Continued on next page)</p>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPPCFG (continued)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRSPPCFG</a> .)	<b>Create SPP connection to remote BT device (continued)</b> <spp_handle> (SPP connection handle) <ul style="list-style-type: none"> <li>Valid range: 0–65535</li> </ul> <cme_error> (CME error code) <ul style="list-style-type: none"> <li>912—EUL_AT_COMMAND_RESPONSE_ERROR_NO_MORE_SESSIONS</li> <li>915—UNEXPECTED_PARAMETER</li> <li>916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>917—PARAMETER_MISSING</li> <li>933—SESSION_EXISTS</li> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <b>Example:</b> <ul style="list-style-type: none"> <li>Configure a connection to a remote device:                AT+SRSPPCFG=20:fa:bb:00:01:79                +SRBTCFG=1,0,"20:fa:bb:00:01:79",SPP,0                OK</li> <li>Print all configured SPP connections:                AT+SRSPPCFG?                +SRBTCFG=1,0,"20:fa:bb:00:01:79",SPP,0                +SRBTCFG=2,1,"20:fa:bb:00:01:79",SPP,130                OK</li> </ul>

**Table 5-2: BT Commands (Detail) (Continued)**

Command	Description
<p><b>+SRSPPCFG</b>                      (F/W rev: P1.0.0                      For next version, see <a href="#">+SRSPPCFG</a>.)</p>	<p><b>Create SPP connection to remote BT device</b>                      Create an SPP connection to a remote device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRSPPCFG=&lt;bt_addr&gt;</b>                              Response: +SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;, &lt;spp_handle&gt;                              OK                              or ERROR                              or +CME ERROR: &lt;cme_error&gt;</li> <li>• Read: <b>AT+SRSPPCFG?</b>                              Response: +SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;, &lt;spp_handle&gt;                              ...                              OK                              or ERROR</li> </ul> <p>Purpose: Attempt to open an SPP connection to a remote BT device and (if successful) return an &lt;spp_handle&gt; to access it.</p> <p>Purpose: Print details about all configured SPP sessions.</p> <p><b>Parameters:</b></p> <p>&lt;bt_addr&gt; (Remote device's BT address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;session_id&gt; (SPP session identifier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;status&gt; (SPP connection status code)</p> <ul style="list-style-type: none"> <li>• 0—Not connected</li> <li>• 1—Connected</li> </ul> <p>&lt;session_type&gt; (Session type)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• "SPP"—SPP session</li> </ul> <p>(Continued on next page)</p>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPPCFG (continued)</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRSPPCFG.</a> )	<b>Create SPP connection to remote BT device (continued)</b> <spp_handle> (SPP connection handle) <ul style="list-style-type: none"> <li>Valid range: 0–65535</li> </ul> <cme_error> (CME error code) <ul style="list-style-type: none"> <li>912—EUL_AT_COMMAND_RESPONSE_ERROR_NO_MORE_SESSIONS</li> <li>916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <b>Example:</b> <ul style="list-style-type: none"> <li>Configure a connection to a remote device:                AT+SRSPPCFG=20:fa:bb:00:01:79                +SRBTCFG=1,0,"20:fa:bb:00:01:79",SPP,0                OK             </li> <li>Print all configured SPP connections:                AT+SRSPPCFG?                +SRBTCFG=1,0,"20:fa:bb:00:01:79",SPP,0                +SRBTCFG=2,1,"20:fa:bb:00:01:79",SPP,2                OK             </li> </ul>

**Table 5-2: BT Commands (Detail) (Continued)**

Command	Description
<b>+SRSPPCLOSE</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRSPPCLOSE</a> .)	<p><b>Close SPP connection with remote BT device</b></p> <p>Close the SPP connection between the device and a remote BT device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRSPPCLOSE=&lt;session_id&gt;</b></li> </ul> <p>Response: +SRSPPCLOSE: &lt;session_id&gt;, &lt;status=0&gt;            OK</p> <p style="padding-left: 20px;">or +SRSPPCLOSE: &lt;status code&gt;            or +CME ERROR: &lt;cme_error&gt;            or ERROR</p> <p>Purpose: Close the SPP connection between the device and a remote BT device.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (SPP session identifier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;status&gt; (SPP connection status code)</p> <ul style="list-style-type: none"> <li>• 0—Not connected</li> <li>• 1—Connected</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 915—UNEXPECTED_PARAMETER</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• 917—PARAMETER_MISSING</li> <li>• 922—INVALID_SESSION_STATE</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Close a specific SPP connection:              AT+SRSPPCLOSE=2              +SRSPPCLOSE: 2,0              OK</li> <li>• Attempt to close an SPP connection but fail for some reason:              +SRSPPCLOSE: 1</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPPCLOSE</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRSPPCLOSE.</a> )	<p><b>Close SPP connection with remote BT device</b></p> <p>Close the SPP connection between the device and a remote BT device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRSPPCLOSE=&lt;session_id&gt;</b></li> </ul> <p>Response: +SRSPPCLOSE: &lt;session_id&gt;, &lt;status&gt;            OK</p> <p style="padding-left: 40px;">or +SRSPPCLOSE: &lt;status&gt;            ERROR</p> <p style="padding-left: 40px;">or +CME ERROR: &lt;cme_error&gt;            ERROR</p> <p>Purpose: Close the SPP connection between the device and a remote BT device.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (SPP session identifier)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;status&gt; (SPP connection status code)</p> <ul style="list-style-type: none"> <li>• 0—Success</li> <li>• 1—Non-specific failure (e.g. No memory, handle busy, etc.)</li> <li>• 7—Invalid &lt;spp_handle&gt;</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Close a specific SPP connection:              AT+SRSPPCLOSE=2              +SRSPPCLOSE: 2,0              OK</li> <li>• Attempt to close an SPP connection but fail for some reason:              AT+SRSPPCLOSE=17              +SRSPPCLOSE: 2,1              OK</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPPCLOSE (notification)</b>	<p><b>SPP connection closed (unsolicited notification)</b></p> <p>Notification received by local device (SPP server) when an SPP connection closes as the result of an SPP disconnect request from a remote device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRSPPCLOSE: &lt;session_id&gt;, &lt;status&gt;</b></li> <li>    Purpose: Notifies local device (SPP server) that connection (&lt;session_id&gt;) was closed due to remote device disconnect request.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;status&gt; (SPP status code)</p> <ul style="list-style-type: none"> <li>• 0—Not connected</li> <li>• 1—Connected</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Connection 2 closed by remote device:     +SRSPPCLOSE: 2,0</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPPCNX</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRSPPCNX</a> .)	<p><b>Connect to remote BT device via SPP</b></p> <p>Create an SPP connection to a remote device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRSPPCNX=&lt;session_id&gt;</b></li> </ul> <p>Response: +SRSPPCNX: &lt;session_id&gt;,&lt;status&gt;,&lt;spp_handle&gt;            OK (Connected successfully)            or +SRSPPCNX_ERROR: &lt;status&gt;            or +CME ERROR: &lt;cme_error&gt;            or ERROR</p> <p>Purpose: Attempt to open an SPP connection to a remote BT device. Notifications will be received indicating if the connection failed, or if an error occurred.</p> <hr/> <p><i>Note: If the remote device is a BC127 or Melody Classic APP, the pair procedure executes automatically—the local device will not receive +SRBTSECNUMCMP or +SRBTSECPASS-KEYREQ unsolicited responses.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;status&gt; (SPP connection status code)</p> <ul style="list-style-type: none"> <li>• 0—Not connected</li> <li>• 1—Connected</li> </ul> <p>&lt;spp_handle&gt; (SPP connection handle)</p> <ul style="list-style-type: none"> <li>• Valid range: 2–65535</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 911—SESSION_RUNNING</li> <li>• 915—UNEXPECTED_PARAMETER</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• 917—PARAMETER_MISSING</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Connect to a specific remote BT device:            AT+SRSPPCNX=1            +SRBTPAIR="20:fa:bb:00:01:79",1 (paired automatically to remote device)            +SRSPPCNX: 1,1,2 (session_id 1, spp_handle 2, status 0 (success))            OK</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPPCNX</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRSPPCNX</a> .)	<p><b>Connect to remote BT device via SPP</b>            Create an SPP connection to a remote device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRSPPCNX=&lt;session_id&gt;</b></li> <li>Response: <b>+SRBTPAIR=&lt;bt_addr&gt;,1</b>  <b>+SRSPPCNX: &lt;session_id&gt;,&lt;status&gt;,&lt;spp_handle&gt;</b>  <b>OK</b> (Connected successfully)           <ul style="list-style-type: none"> <li>or <b>+SRBTPAIR: &lt;bt_addr&gt;, &lt;status_code&gt;[, &lt;fail_reason&gt;]</b>                (Pair procedure failed)</li> <li>or <b>+SRSPPCNX: &lt;status&gt;</b>  <b>ERROR</b></li> <li>or <b>+CME ERROR: &lt;cme_error&gt;</b>  <b>ERROR</b></li> </ul> </li> </ul> <p>Purpose: Attempt to open an SPP connection to a remote BT device. Notifications will be received indicating if the connection failed, or if an error occurred.</p> <hr/> <p><i>Note: If the remote device is a BC127 or Melody Classic APP, the pair procedure executes automatically—the local device will not receive +SRBTPAIRREQ unsolicited responses.</i></p> <hr/> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>Decimal format</li> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <p>&lt;bt_addr&gt; (Remote device's BT address)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "00:11:22:aa:bb:cc"</li> </ul> <p>&lt;status&gt; (SPP connection status code)</p> <ul style="list-style-type: none"> <li>0—Success</li> <li>1—Non-specific failure (e.g. No memory, handle busy, etc.)</li> <li>7—Invalid &lt;spp_handle&gt;</li> </ul> <p>&lt;spp_handle&gt; (SPP connection handle)</p> <ul style="list-style-type: none"> <li>Valid range: 2–65535</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Connect to a specific remote BT device:  <b>AT+SRSPPCNX=1</b>  <b>+SRBTPAIR="20:fa:bb:00:01:79",1</b> (paired automatically to remote device)  <b>+SRSPPCNX: 1,1,2</b> (session_id 1, spp_handle 2, status 0 (success))  <b>OK</b></li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<p><b>+SRSPPCNX (notification)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRSPPCNX (notification)</a>.)</p>	<p><b>SPP connection opened by remote request (unsolicited notification)</b> Notification received by local device (SPP server) when an SPP connection opens as the result of an SPP connection request from a remote device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRSPPCNX: &lt;session_id&gt;, &lt;status&gt;, &lt;spp_handle&gt;</b> Purpose: Notifies local device (SPP server) of the result of a remote device connection request attempt on &lt;session_id&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>Decimal format</li> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <p>&lt;status&gt; (SPP connection status code)</p> <ul style="list-style-type: none"> <li>0—Not connected</li> <li>1—Connected</li> </ul> <p>&lt;spp_handle&gt; (SPP connection handle)</p> <ul style="list-style-type: none"> <li>Valid range: 2–65535</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Initiating a connection with a remote device AT+SRSPPCNX=1 +SRBTPAIR="20:fa:bb:00:01:79", 1 +SRSPPCNX: 1,1,130 OK</li> <li>Accepting a connection from a remote device +SRBTPAIR="20:fa:bb:00:01:79", 1 +SRBTCFG: 1,0,"20:fa:bb:20:02:72",SPP,0 +SRSPPCNX: 1,1,129</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPPCNX (notification)</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRSPPCNX (notification)</a> .)	<p><b>SPP connection opened by remote request (unsolicited notification)</b></p> <p>Notification received by local device (SPP server) when an SPP connection opens as the result of an SPP connection request from a remote device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRSPPCNX: &lt;session_id&gt;, &lt;status&gt;, &lt;spp_handle&gt;</b>            Purpose: Notifies local device (SPP server) of the result of a remote device connection request attempt on &lt;session_id&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>Decimal format</li> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <p>&lt;status&gt; (SPP connection status code)</p> <ul style="list-style-type: none"> <li>0—Success</li> <li>1—Non-specific failure (e.g. No memory, handle busy, etc.)</li> <li>7—Invalid &lt;spp_handle&gt;</li> </ul> <p>&lt;spp_handle&gt; (SPP connection handle)</p> <ul style="list-style-type: none"> <li>Valid range: 2–65535</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Connection created after request from remote device:            AT+SRSPPCNX=1            +SRBTPAIR="20:fa:bb:00:01:79", 1            +SRSPPCNX: 1,1,2            OK</li> </ul>
<b>+SRSP_DATA (notification)</b>	<p><b>SPP connection data received (unsolicited notification)</b></p> <p>Notify local device that SPP connection has received data from remote device.</p> <hr/> <p><i>Note: This notification is only received when the connection is in command mode (not data mode), the session is open, and data has been sent out by the peer device.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRSP_DATA: &lt;session_id&gt;, &lt;data_len&gt;, &lt;data&gt;</b>            Purpose: Notifies local device that &lt;data&gt; has been received.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>Decimal format</li> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <p>&lt;data_len&gt; (Length of received &lt;data&gt; string)</p> <ul style="list-style-type: none"> <li>1–TBD</li> </ul> <p>&lt;data&gt; (Data received on SPP connection)</p> <ul style="list-style-type: none"> <li>ASCII string</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>SPP connection receives the string "fjalfla":            +SRSP_DATA: 2,8,fjalfla</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPDEL</b>	<p><b>Delete configured SPP session</b> Delete a configured SPP session.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRSPDEL=&lt;session_id&gt;</b></li> </ul> <p>Response: OK or ERROR or +CME ERROR: &lt;cme_error&gt; ERROR</p> <p>Purpose: Close the SPP connection between the device and a remote BT device.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 911—EUL_AT_COMMAND_RESPONSE_ERROR_SESSION_RUNNING</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Delete session 1: AT+SRSPDEL=1 OK</li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSP_ERROR</b> <b>(notification)</b> (F/W rev: 2.5.0+)	<p><b>SPP connection error received (unsolicited notification)</b></p> <p>Notify device that an error occurred during SPP connection, disconnection, or send/receive data operations.</p> <hr/> <p><i>Note: To avoid errors, make sure to use a valid &lt;session_id&gt; in commands, and make sure the device is connectable.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRSP_ERROR: &lt;error_number&gt;</b>            Purpose: Notifies local device that an error occurred.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;error_number&gt; (Error code identifying reason for SPP event error.)</p> <ul style="list-style-type: none"> <li>1—Failure</li> <li>2—Busy</li> <li>3—No data</li> <li>4—No resource</li> <li>5—No more sessions</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Error notification received when sending data to incorrect &lt;spp_handle&gt;:            AT+SRSPPCNX=20:fa:bb:00:01:79 (Connection opened)            +SRSPPCNX: 10,0 (Connection's &lt;spp_handle&gt; = 10)            AT+SRSPPSND=2,fjalfjla (Send data to wrong handle (2))            +SRSP_ERROR: 1 (Notification received with error code 7            indicating data transfer failed)</li> </ul>
<b>+SRSP_NOTIF</b> <b>(notification)</b> (F/W rev: P1.0.0)	<p><b>SPP connection error received (unsolicited notification)</b></p> <p>Notify device that an error occurred during SPP connection, disconnection, or send/receive data operations.</p> <hr/> <p><i>Note: To avoid errors, make sure to use a valid &lt;session_id&gt; in commands, and make sure the device is connectable.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRSP_NOTIF: &lt;error_code&gt;</b>            Purpose: Notifies local device that an error occurred.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;error_code&gt; (Error code identifying reason for SPP event error.)</p> <ul style="list-style-type: none"> <li>Integer value, ≥0</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Error notification received when sending data to incorrect &lt;spp_handle&gt;:            AT+SRSPPCNX=20:fa:bb:00:01:79 (Connection opened)            +SRSPPCNX: 10,0 (Connection's &lt;spp_handle&gt; = 10)            AT+SRSPPSND=2,fjalfjla (Send data to wrong handle (2))            +SRSP_NOTIF: 7 (Notification received with error code 7            indicating handle does not exist)</li> </ul> <p>ERROR</p>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPPSND</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRSPPSND</a> .)	<p><b>Send data to remote BT device via SPP</b></p> <p>Send data to a remote BT device via the SPP connection that has previously been created.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRSPPSND=&lt;session_id&gt;, &lt;data&gt;</b></li> <li>Response: OK</li> <li>or +SRSP_ERROR: &lt;status&gt;</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>or ERROR</li> </ul> <p>Purpose: Send the &lt;data&gt; to the remote device via the specified SPP connection.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;data&gt; (Data to send to remote device)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> </ul> <p>&lt;status&gt; (SPP connection status)</p> <ul style="list-style-type: none"> <li>• 0—Not connected</li> <li>• 1—Connected</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 903—MEMORY_PROBLEM</li> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 915—UNEXPECTED_PARAMETER</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• 917—PARAMETER_MISSING</li> <li>• 922—INVALID_SESSION_STATE</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Send "Hello World" message to remote device (BX310x acting as SPP Server):              AT+SRSPPSND=2, "Hello World"              OK               The remote device (SPP server) receives:              +SRSP_DATA: 2,11,Hello World</li> <li>• Send "Hello World" message to remote device (BC127):              AT+SRSPPSND=2, "Hello World"              OK               The remote device (SPP server) receives:              RECV 15 11 Hello World</li> <li>• Send "012" message to remote device using hex characters:              AT+SRSPPSND=2, "\30\31\32"              OK               The remote device receives:              +SRSP_DATA: 2,3,012 (BX310x)              RECV 15 3 012 (BC127)</li> </ul>

**Table 5-2: BT Commands (Detail) (Continued)**

Command	Description
<b>+SRSPPSND</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRSPPSND</a> .)	<p><b>Send data to remote BT device via SPP</b></p> <p>Send data to a remote BT device via the SPP connection that has previously been created.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRSPPSND=&lt;session_id&gt;, &lt;data&gt;</b></li> <li>Response: OK</li> <li>or ERROR</li> <li>or +CME ERROR: &lt;cme_error&gt; ERROR</li> </ul> <p>Purpose: Send the &lt;data&gt; to the remote device via the specified SPP connection.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;data&gt; (Data to send to remote device)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Send "Hello World" message to remote device (BX310x acting as SPP Server):            AT+SRSPPSND=2, "Hello World"            OK             The remote device (SPP server) receives:            +SRSP_DATA: 2,11,"Hello World"         </li> <li>• Send "Hello World" message to remote device (BC127):            AT+SRSPPSND=2, "Hello World"            OK             The remote device (SPP server) receives:            RECV 15 11 Hello World         </li> <li>• Send "012" message to remote device using hex characters:            AT+SRSPPSND=2, "\30\31\32"            OK             The remote device receives:            +SRSP_DATA: 2, 3, 012 (BX310x)            RECV 15 3 012 (BC127)         </li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPSTART</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+SRSPSTART</a> .)	<p><b>Put SPP connection into data mode</b></p> <p>Put an existing SPP connection into data mode to transfer data between the devices.</p> <hr/> <p><i>Note: To terminate data mode, copy and paste "+++". This terminates data mode and displays "OK".</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:       <b>AT+SRSPSTART=&lt;session_id&gt;</b></li> <li>  Response:   CONNECT    <i>(Entering data mode successfully)</i>                          [Enter data. When finished, enter "+++\" to exit data mode]                          OK        <i>(Exiting data mode successfully)</i></li> <li>          or    ERROR     <i>(Data mode error)</i></li> <li>          or    NO_CARRIER   <i>(Exiting Data mode—connection with remote device was lost)</i></li> <li>          or    +CME ERROR: &lt;cme_error&gt;</li> <li>  Purpose:     Put the specified SPP connection into data mode. When data mode is entered, the message "CONNECT" will be displayed.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 915—UNEXPECTED_PARAMETER</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• 917—PARAMETER_MISSING</li> <li>• 922—INVALID_SESSION_STATE</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Put existing SPP connection to remote device into data mode:           <pre> AT+SRSPSTART=2 CONNECT           (Data mode entered successfully) falfajfajfjl+++   (In data mode, enter content then enter "+++\" to exit data mode) OK                (Data mode exited) </pre> </li> </ul>

Table 5-2: BT Commands (Detail) (Continued)

Command	Description
<b>+SRSPSTART</b> (F/W rev: P1.0.0 For next version, see <a href="#">+SRSPSTART.</a> )	<p><b>Put SPP connection into data mode</b></p> <p>Put an existing SPP connection into data mode to transfer data between the devices.</p> <hr/> <p><i>Note: To terminate data mode, copy and paste "+++". This terminates data mode and displays "DISCONNECTED".</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRSPSTART=&lt;session_id&gt;</b></li> <li>Response: CONNECT            [Enter data. When finished, enter "+++\" to exit data mode]            OK</li> <li>or ERROR</li> <li>or +CME ERROR: &lt;cme_error&gt;            ERROR</li> </ul> <p>Purpose: Put the specified SPP connection into data mode. When data mode is entered, the message "CONNECT" will be displayed.</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Configured SPP session's ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Put existing SPP connection to remote device into data mode:           <pre>AT+SRSPSTART=2 CONNECT           (Data mode entered successfully) falfajfajfj +++ (In data mode, enter content then enter "+++\" to exit data mode) OK                (Data mode exited)</pre> </li> </ul>

## >> 6: AirVantage Commands

### Introduction

This chapter describes AirVantage-related commands.

### Command summary

The following table lists the commands described in this chapter.

**Table 6-1: AirVantage Commands (Summary)**

Command	F/W	Description	Page
<b>+WDSC</b>	P1.0.0+	<a href="#">Configure Device Services</a>	176
<b>+WDSG</b>	P1.0.0+	<a href="#">Device Services General Status</a>	178
<b>+WDSI</b>	P1.0.0+	<a href="#">Enable Device Services Notifications (Indications)</a>	179
<b>+WDSI (notification)</b>	P1.0.0+	<a href="#">Device Services Notification (Indication) received (unsolicited response)</a>	180
<b>+WDSR</b>	P1.0.0+	<a href="#">Reply to AirVantage server request</a>	182
<b>+WDSS</b>	P1.0.0+	<a href="#">Device Services Session</a>	183

## Command reference

**Table 6-2: AirVantage Commands (Detail)**

Command	Description
<p><b>+WDSC</b></p>	<p><b>Configure Device Services</b></p> <p>Configure the following Device Services parameters:</p> <ul style="list-style-type: none"> <li>User agreements for connection, package download, package install, and package uninstall</li> <li>Polling mode to make a connection to the AirVantage server</li> <li>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</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write (&lt;Mode&gt; = 0, 1, 2, 3, 5):                             <p style="margin-left: 40px;"><b>AT+WDSC=&lt;Mode&gt;,&lt;State&gt;</b></p> <p>Response: OK                                      or ERROR                                      or +CME ERROR: &lt;cme_error&gt;</p> <p>Purpose: Enable or disable the selected &lt;Mode&gt;.</p> </li> <li>Write (&lt;Mode&gt; = 4):                             <p style="margin-left: 40px;"><b>AT+WDSC=&lt;Mode&gt;,&lt;Timer_1&gt;[[,&lt;Timer_2&gt;]...[,&lt;Timer_8&gt;]]]]]]]]</b></p> <p>Response: OK</p> <p>Purpose: Set interval timers for successive connection attempts.</p> </li> <li>Read: <b>AT+WDSC?</b> <p>Response: +WDSC: 0,&lt;State&gt;                                      +WDSC: 1,&lt;State&gt;                                      +WDSC: 2,&lt;State&gt;                                      +WDSC: 3,&lt;State&gt;                                      +WDSC: 4,&lt;Timer_1&gt;,&lt;Timer_2&gt;,...,&lt;Timer_n&gt;                                      +WDSC: 5,&lt;State&gt;                                      OK</p> <p>Purpose: Show the current &lt;Mode&gt; configurations.</p> </li> </ul> <p><b>Parameters:</b></p> <p>&lt;Mode&gt; (Mode being configured)</p> <ul style="list-style-type: none"> <li>0—User agreement for AVMS connection. When enabled, the module returns an unsolicited notification to request an agreement before connecting to the server. See <a href="#">+WDSI</a> on page 179 for details.</li> <li>1—User agreement for package download. When enabled, the module returns an unsolicited notification to request an agreement before downloading any package. See <a href="#">+WDSI</a> on page 179 for details.</li> <li>2—User agreement for package install. When enabled, the module returns an unsolicited notification to request an agreement before installing any package. See <a href="#">+WDSI</a> on page 179 for details.</li> <li>3—Polling mode. When enabled (&lt;State&gt; &gt; 0), the module waits for the number of minutes, then will initiate a connection to the Device Services server if the device is registered on the network.</li> <li>4—Retry mode. If an error occurs during a connection to the Device Services 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.)</li> </ul> <p>(Continued on next page)</p>

Table 6-2: AirVantage Commands (Detail) (Continued)

Command	Description
<b>+WDSC (continued)</b>	<p><b>Configure Device Services (continued)</b></p> <ul style="list-style-type: none"> <li>5—User agreement for device reboot. When enabled, the module returns an unsolicited notification to request an agreement before rebooting the device. See <a href="#">+WDSI</a> on page 179 for details.</li> </ul> <p>&lt;State&gt; (For &lt;Mode&gt; = 0, 1, 2, 5: Activation state of &lt;Mode&gt;)</p> <ul style="list-style-type: none"> <li>0=Disabled (Default value)</li> <li>1=Enabled</li> </ul> <p>&lt;State&gt; (For &lt;Mode&gt; = 3: Activation state/timer of &lt;Mode&gt;)</p> <ul style="list-style-type: none"> <li>0=Disabled (Default value)</li> <li>1–525600=Polling timer (in minutes)</li> </ul> <p>&lt;Timer_1&gt;..&lt;Timer_n&gt; (Connection attempt interval timers)</p> <ul style="list-style-type: none"> <li>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.)</li> <li>Valid range: 1–20160</li> <li>Default values: <ul style="list-style-type: none"> <li>&lt;Timer_1&gt;=15 (Time to wait after first failed connection attempt) If &lt;Timer_1&gt; is 0, Retry mode is disabled.</li> <li>&lt;Timer_2&gt;=60 (Time to wait after second failed connection attempt.)</li> <li>&lt;Timer_3&gt;=240 (Time to wait after third failed connection attempt.)</li> <li>&lt;Timer_4&gt;=960 (Time to wait after fourth failed connection attempt.)</li> <li>&lt;Timer_5&gt;=2880 (Time to wait after fifth failed connection attempt.)</li> <li>&lt;Timer_6&gt;=10080 (Time to wait after sixth failed connection attempt.)</li> <li>&lt;Timer_7&gt;=10080 (Time to wait after seventh failed connection attempt.)</li> <li>&lt;Timer_8&gt;=not used</li> </ul> </li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>915—EUL_AT_COMMAND_RESPONSE_ERROR_UNEXPECTED_PARAMETER</li> <li>916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>917—EUL_AT_COMMAND_RESPONSE_ERROR_PARAMETER_MISSING</li> <li>919—EUL_AT_COMMAND_RESPONSE_ERROR_FEATURE_NOT_AVAILABLE</li> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Set user agreement for package download: AT+WDSC=2,1 OK</li> </ul>

Table 6-2: AirVantage Commands (Detail) (Continued)

Command	Description
<b>+WDSG</b>	<p><b>Device Services General Status</b> Return general status details about Device Services.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute: <b>AT+WDSG</b></li> <li>Response: <b>+WDSG: &lt;notification&gt;,&lt;state&gt;</b> <b>[+WDSG: &lt;notification&gt;,&lt;state&gt;]</b> <b>[...]</b> <b>OK</b></li> <li>Purpose: Display the Device Services activation state. If active, also display session/package notifications.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;notification&gt; (Notification type)</p> <ul style="list-style-type: none"> <li>• 0—Device Services activation state</li> <li>• 1—Session and package notification</li> </ul> <p>&lt;state&gt; (Notification status)</p> <ul style="list-style-type: none"> <li>• For &lt;notification&gt;=0 <ul style="list-style-type: none"> <li>• 0—Device services are prohibited. Device services will never be activated.</li> <li>• 1—Device services are deactivated. Connection parameters to a Device Services server have to be provisioned.</li> <li>• 2—Device services have to be provisioned. A bootstrap session is required.</li> <li>• 3—Device services are activated. For LWM2M protocol, this notification means a bootstrap session was already made and the device is able to initiate a Device Management session with the AirVantage server.</li> <li>• Notes: <ul style="list-style-type: none"> <li>• If a device has never been activated (first used of device services on this device), the &lt;State&gt; is set to 1.</li> <li>• The connection parameters are automatically provisioned, no actions are needed by the user (&lt;State&gt;=2 or &lt;State&gt;=3).</li> <li>• The device will be activated (&lt;State&gt;=3) automatically at the first session (see <a href="#">+WDSS</a> on page 183 for more information).</li> </ul> </li> </ul> </li> <li>• For &lt;notification&gt;=1 <ul style="list-style-type: none"> <li>• 0—No session or package.</li> <li>• 1—A session is under treatment.</li> <li>• 2—A package is available on the server.</li> <li>• 3—A package was downloaded and is ready to install. When a package was installed or not (not certified to be sent by the AirPrime Management Services server, see <a href="#">+WDSI</a> on page 179 for more information), the &lt;state&gt; is set to 0.</li> </ul> </li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Execute: <pre> AT+WDSG +WDSG: 0,3           (Device services activated) +WDSG: 1,0           (No session to server, no patch to download or install) OK </pre> </li> </ul>

Table 6-2: AirVantage Commands (Detail) (Continued)

Command	Description
<b>+WDSI</b>	<p><b>Enable Device Services Notifications (Indications)</b>            Enable unsolicited notifications for selected Device Services.</p> <hr/> <p><i>Note: To receive +WDSI notifications, Device Services must be activated. See <a href="#">+WDSG</a> on page 178 for details.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+WDSI=&lt;level&gt;</b>                Response:    OK                Purpose:     Enable the notifications identified in the &lt;level&gt; bitmap parameter.</li> <li>• Read:         <b>AT+WDSI?</b>                Response:    [+WDSI: &lt;level&gt;]                              OK                Purpose:     Display the &lt;level&gt; bitmap value.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;level&gt; (Notification states)</p> <ul style="list-style-type: none"> <li>• 2-byte Bitmap field, value entered/displayed as integer</li> <li>• Bit settings—0 (Notification deactivated), 1 (Notification activated)</li> <li>• Notifications (Value (bit positions)):           <ul style="list-style-type: none"> <li>• Default—0 (all bits set to 0)</li> <li>• 1 (bit 0)—Initialization end notification (&lt;Event&gt;=0)</li> <li>• 2 (bit 1)—Server request for a user agreement notification (&lt;Event&gt;=1,2,3,24)</li> <li>• 4 (bit 2)—Authentication notifications (&lt;Event&gt;=4,5)</li> <li>• 8 (bit 3)—Session notification (&lt;Event&gt;=6,7,8)</li> <li>• 16 (bit 4)—Package download notifications (&lt;Event&gt;=9,10,11)</li> <li>• 32 (bit 5)—Certified download package notification (&lt;Event&gt;=12,13)               <ul style="list-style-type: none"> <li>• Note: When a package is available on the AirPrime Management Services server, the module checks if enough space is available in a dedicated memory area (SWI_FOTA_partition).</li> <li>• Note: If the downloaded package is not certified (bad CRC, bad signature, not correspond to the current software), this package is not deleted.</li> </ul> </li> <li>• 64 (bit 6)—Update notifications (&lt;Event&gt;=14,15,16)</li> <li>• 128 (bit 7)—Reserved</li> <li>• 256 (bit 8)—Download progress notification (&lt;Event&gt;=18)</li> <li>• 512 (bit 9)—Reserved</li> <li>• 1024 (bit 10)—Reserved</li> <li>• 2048 (bit 11)—Reserved</li> <li>• 4096 (bit 12)—Bootstrap event notification (&lt;Event&gt;=23)</li> </ul> </li> <li>• Note: &lt;level&gt; is stored in NV (persistent). The default value can be restored using AT&amp;F.</li> </ul> <hr/> <p><i>Note: See <a href="#">+WDSI (notification)</a> on page 180 for notification &lt;Event&gt; details.</i></p> <hr/>

Table 6-2: AirVantage Commands (Detail) (Continued)

Command	Description
<b>+WDSI (notification)</b>	<p><b>Device Services Notification (Indication) received (unsolicited response)</b></p> <p>A notification has been received for a Device Services event. (To enable specific notifications, see <a href="#">Enable Device Services Notifications (Indications)</a> on page 179.)</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+WDSI: &lt;event&gt;[,&lt;data&gt;]</b></li> <li>• Purpose: Notification received that &lt;event&gt; has occurred, with &lt;data&gt; if appropriate.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;event&gt; (Event that triggers an enabled notification)</p> <ul style="list-style-type: none"> <li>• Valid values: <ul style="list-style-type: none"> <li>• 0—device services are initialized and can be used.</li> <li>• 1—the Device Services server requests the device to make a connection. The device requests a user agreement to allow the embedded module to make the connection. The response can be sent using +WDSR command and this notification can be returned by the device if the user has activated the user agreement for connection (see +WDSC command for more information)</li> <li>• 2—the Device Services server requests the device to make a package download. The device requests a user agreement to allow the embedded module to make the download. The response can be sent using +WDSR command and this notification can be returned by the device if the user has activated the user agreement for download (see +WDSC command for more information).</li> <li>• 3—the device has downloaded a package. The device requests a user agreement to install the downloaded package. The response can be sent using +WDSR command and this notification can be returned by the device if the user has activated the user agreement for install (see +WDSC command for more information).</li> <li>• 4—the embedded module starts authentication with the server</li> <li>• 5—authentication with the server failed</li> <li>• 6—authentication has succeeded and session with the server started</li> <li>• 7—session with the server failed</li> <li>• 8—session with the server is finished</li> <li>• 9—a package is available on the server and can be downloaded by the embedded module. A &lt;Data&gt; parameter is returned indicating the package size in kB</li> <li>• 10—a package was successfully downloaded and stored in flash</li> <li>• 11—an issue happens during the package download.</li> <li>• 12—downloaded package is certified to be sent by the AirPrime Management Services server</li> <li>• 13—downloaded package is not certified to be sent by the AirPrime Management Services server</li> <li>• 14—update will be launched</li> <li>• 15—OTA update client has finished unsuccessfully</li> <li>• 16—OTA update client has finished successfully</li> <li>• 17—Reserved</li> <li>• 18—download progress. A percentage progress is indicated in &lt;Data&gt; parameter.</li> <li>• 19–22—Reserved</li> <li>• 23—Session type (only in LWM2M protocol)</li> </ul> </li> </ul> <p>(Continued on next page)</p>

Table 6-2: AirVantage Commands (Detail) (Continued)

Command	Description
+WDSI (notification) (continued)	<p><b>Device Services Notification (Indication) received (unsolicited response) (continued)</b></p> <ul style="list-style-type: none"> <li>• 24—the Device Services server requests the device to make a reboot. The device requests a user agreement to allow the embedded module to reboot. The response can be sent using +WDSR command and this notification can be returned by the device if the user has activated the user agreement for connection (see +WDSC command for more information)</li> </ul> <p>&lt;data&gt; (Data for specific event types)</p> <ul style="list-style-type: none"> <li>• For &lt;event&gt;=9: <ul style="list-style-type: none"> <li>• &lt;data&gt; indicates the package size in kBytes, which will be downloaded</li> </ul> </li> <li>• For &lt;event&gt;=18: <ul style="list-style-type: none"> <li>• &lt;Data&gt; indicates the download progress in percentage</li> </ul> </li> <li>• For &lt;event&gt;=23: <ul style="list-style-type: none"> <li>• &lt;Data&gt; indicates the session type: <ul style="list-style-type: none"> <li>• 0—Bootstrap session</li> <li>• 1—Device management session</li> </ul> </li> </ul> </li> </ul> <p><b>Examples:</b></p> <p>Receive connection request:</p> <pre>+WDSI: 1                (Device Services server requests connection)</pre> <p>Check current notification selections:</p> <pre>AT+WDSI? +WDSI: 0                (All notifications are deactivated) OK</pre> <p>Enable all notifications:</p> <pre>AT+WDSI=8191 OK</pre> <p>Check current notification selections:</p> <pre>AT+WDSI? +WDSI: 8191            (All notifications are activated) OK +WDSI: 1                (Device Services server is requesting connection)</pre> <p>Accept the connection:</p> <pre>AT+WDSR=1 OK +WDSI: 4                (Module will send first data to the AirPrime Management Services server) +WDSI: 6                (Authentication succeeded) +WDSI: 23,1            (Device management session) +WDSI: 9,1000          (Package will be downloaded, size= 1000 bytes) +WDSI: 18,1            (1% has been downloaded) +WDSI: 18,100          (Whole package has been downloaded) +WDSI: 10              (Whole package stored in Flash) +WDSI: 8                (Session with server is over.)</pre>

Table 6-2: AirVantage Commands (Detail) (Continued)

Command	Description
<b>+WDSR</b>	<p><b>Reply to AirVantage server request</b></p> <p>Reply to a user agreement request (see <a href="#">+WDSI (notification)</a> on page 180 for details) from the module.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+WDSR=&lt;Reply&gt;[,&lt;Timer&gt;]</b></li> <li>Response: OK</li> <li style="padding-left: 20px;">or ERROR</li> <li style="padding-left: 20px;">or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Send &lt;Reply&gt; to a user agreement request from the module. For specific &lt;Reply&gt; types, include a &lt;Timer&gt; to have the module send a new user agreement request after the specified delay.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;Reply&gt; (Reply type)</p> <ul style="list-style-type: none"> <li>• 0—Delay the connection to server (Connect later)</li> <li>• 1—Accept the connection to server (Connect now)</li> <li>• 2—Delay the download. (Download later)</li> <li>• 3—Accept the download (Download it now)</li> <li>• 4—Accept the install (Install it now)</li> <li>• 5—Delay the install. (Install later)</li> <li>• 6—Accept the device reboot (Reboot now)</li> <li>• 7—Delay the device reboot. (Reboot later)</li> </ul> <p>&lt;Timer&gt; (Interval before new user agreement request to be sent by module)</p> <ul style="list-style-type: none"> <li>• Applies to &lt;Reply&gt; types 0, 2, 5, 7</li> <li>• Valid values: <ul style="list-style-type: none"> <li>• Valid range: 1–1440 (minutes)</li> <li>• Default (if not specified): 30 (minutes)</li> </ul> </li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 3—EUL_AT_COMMAND_RESPONSE_ERROR_NOT_ALLOWED</li> <li>• 915—EUL_AT_COMMAND_RESPONSE_ERROR_UNEXPECTED_PARAMETER</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• 917—EUL_AT_COMMAND_RESPONSE_ERROR_PARAMETER_MISSING</li> <li>• 919—EUL_AT_COMMAND_RESPONSE_ERROR_FEATURE_NOT_AVAILABLE</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 6-2: AirVantage Commands (Detail) (Continued)

Command	Description
<b>+WDSS</b>	<p><b>Device Services Session</b> Configure a Device Services session.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+WDSS=&lt;mode=1&gt;,&lt;action&gt;</b>  Response:    OK                or    ERROR                or    +CME ERROR: &lt;cme_error&gt;</li> <li>• Read:         <b>AT+WDSS?</b>  Response:    [+WDSS: 1,&lt;action&gt;]                OK</li> </ul> <p>Purpose:        Connect to, or disconnect from, the Device Services server.  Note: If trying to disconnect from a nonexistent session (&lt;action&gt;=0), "OK" is returned.</p> <ul style="list-style-type: none"> <li>• Read:         <b>AT+WDSS?</b>  Response:    [+WDSS: 1,&lt;action&gt;]                OK</li> <li>• Purpose:     Display Device Services connection status.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mode&gt; (Command execution mode)</p> <ul style="list-style-type: none"> <li>• 1—User-initiated connection to the Device Services server</li> </ul> <p>&lt;action&gt; (Device Services connection action/state)</p> <ul style="list-style-type: none"> <li>• 0—(Default) Release current connection to the Device Services server</li> <li>• 1—Establish connection to the Device Services server</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 915—EUL_AT_COMMAND_RESPONSE_ERROR_UNEXPECTED_PARAMETER</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• 917—EUL_AT_COMMAND_RESPONSE_ERROR_PARAMETER_MISSING</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Establish connection to Device Services server:  AT+WDSS=1,1  OK  +WDSI: 4            (Authentication started)  +WDSI: 6            (Authentication succeeded, bootstrap session started)  +WDSI: 23,0  +WDSI: 4            (Authentication started)  +WDSI: 6            (Authentication succeeded, device management session initiated)  +WDSI: 23,1</li> <li>• Disconnect from Device Services server:  AT+WDSS=1,0  OK  +WDSI: 8            (Session stopped)</li> </ul>

## >> 7: Common Commands

### Introduction

This chapter describes Common BT/BLE commands.

### Command summary

The following tables list the commands described in this chapter.

**Table 7-1: Common Commands (Summary)**

Command	F/W	Description	Page
<b>+CGMR</b>	P1.0.0+	<a href="#">Get firmware revision</a>	185
<b>+CGSN</b>	P1.0.0+	<a href="#">Get serial number</a>	185
<b>+CLAC</b>	P1.0.0+	<a href="#">List AT commands</a>	186
<b>&amp;F</b>	P1.0.0+	<a href="#">Reset module and module configuration</a>	186
<b>+FMI</b>	P1.0.0+	<a href="#">Get manufacturer information</a>	186
<b>+FMM</b>	P1.0.0+	<a href="#">Get model information</a>	187
<b>+FMR</b>	P1.0.0+	<a href="#">Get firmware revision</a>	187
<b>+FOTA</b>	2.5.0+	<a href="#">Start non-AV firmware OTA upgrade</a>	188
<b>+FOTA (notification)</b>	2.5.0+	<a href="#">Non-AV firmware OTA progress</a>	189
<b>I</b>	P1.0.0+	<a href="#">Request module identification</a>	190
<b>+LOG</b>	2.6.3+	<a href="#">Enable/disable log messages</a>	191
<b>+MACADDR</b>	P1.0.0+	<a href="#">Get base MAC address</a>	191
<b>+RST</b>	P1.0.0+	<a href="#">Reset module</a>	191
<b>+SRREMCMD (notification)</b>	P1.0.0+	<a href="#">Remote command received (unsolicited notification)</a>	192
<b>+SRREMCtrl</b>	P1.0.0+	<a href="#">Enable/disable remote control</a>	193
<b>+SYSRAM</b>	P1.0.0+	<a href="#">List available heap memory size</a>	194

## Command reference

Table 7-2: Common Commands (Detail)

Command	Description
<b>+CGMR</b>	<p><b>Get firmware revision</b> Display the module's firmware revision.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Execute: <b>AT+CGMR</b> Response: &lt;revision&gt; OK Purpose: Display the module's firmware revision.</li> </ul> <p><b>Parameters:</b> &lt;revision&gt; (Firmware revision)</p> <ul style="list-style-type: none"> <li>ASCII string</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Display module's firmware revision (module with 2.5.0 firmware): AT+CGMR BX310x.2.5.0-2 OK</li> <li>Display module's firmware revision number (module with P1.0.x firmware): AT+CGMR R1.1.0.201710271637.BX310x_1 OK</li> </ul>
<b>+CGSN</b>	<p><b>Get serial number</b> Display the module's serial number.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Execute: <b>AT+CGSN</b> Response: &lt;serial&gt; OK Purpose: Display the module's serial number.</li> </ul> <p><b>Parameters:</b> &lt;serial&gt; (Serial number)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>e.g. "X2735200279901"</li> </ul>

Table 7-2: Common Commands (Detail) (Continued)

Command	Description
<b>+CLAC</b>	<p><b>List AT commands</b></p> <p>List all AT commands supported by the module.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute: <b>AT+CLAC</b></li> </ul> <p>Response: +CLAC: &lt;command&gt; ... OK</p> <p>Purpose: Display a list of all supported AT commands.</p> <p><b>Parameters:</b></p> <p>&lt;command&gt; (AT command name)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• e.g. "AT+SRBLE", "AT+WDSC", etc.</li> </ul>
<b>&amp;F</b>	<p><b>Reset module and module configuration</b></p> <p>Reset the module configuration to original settings. Persistent settings are also reset to original settings.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute: <b>AT&amp;F</b></li> </ul> <p>Response: OK ... (boot messages) READY</p> <p>Purpose: Reset the module to original configuration.</p> <p><b>Parameters:</b></p> <p>None</p>
<b>+FMI</b>	<p><b>Get manufacturer information</b></p> <p>Display the name of the module's manufacturer.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute: <b>AT+FMI</b></li> </ul> <p>Response: &lt;man_name&gt; OK</p> <p>Purpose: Display the module manufacturer's name.</p> <p><b>Parameters:</b></p> <p>&lt;man_name&gt; (Module manufacturer's name)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• e.g. "Sierra Wireless"</li> </ul>

Table 7-2: Common Commands (Detail) (Continued)

Command	Description
<b>+FMM</b>	<p><b>Get model information</b> Display the module model name.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute: <b>AT+FMM</b></li> <li>Response: &lt;model&gt; OK</li> <li>Purpose: Display the module model name.</li> </ul> <p><b>Parameters:</b> &lt;model&gt; (Module model name)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• e.g. "BX310x"</li> </ul>
<b>+FMR</b>	<p><b>Get firmware revision</b> Display the module's firmware revision.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute: <b>AT+FMR</b></li> <li>Response: &lt;revision&gt; OK</li> <li>Purpose: Display the module's firmware revision.</li> </ul> <p><b>Parameters:</b> &lt;revision&gt; (Firmware revision)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Display module's firmware revision (module with 2.5.0 firmware): AT+FMR BX310x.2.5.0-2 OK</li> <li>• Display module's firmware revision (module with P1.0.x firmware): AT+FMR R1.1.0.201710271637.BX310x_1 OK</li> </ul>

Table 7-2: Common Commands (Detail) (Continued)

Command	Description
<b>+FOTA</b> (F/W rev: 2.5.0+)	<p><b>Start non-AV firmware OTA upgrade</b></p> <p>Start a non-AirVantage firmware over-the-air upgrade.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute: <b>AT+FOTA=&lt;url&gt;</b></li> <li>Response: <b>OK</b></li> <li>Purpose: Start an upgrade using the image at the specified URL.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;url&gt; (URL of upgrade firmware image)</p> <ul style="list-style-type: none"> <li>• Non-blank ASCII string, quotation marks allowed</li> <li>• Max length—128 characters</li> <li>• (e.g. "/myprofile" is valid, "" is not valid)</li> <li>• Examples:               <ul style="list-style-type: none"> <li>• Valid—http://example.com/fw/bx310x-v1.2.3.bin</li> <li>• Valid—"http://example.com/fw/bx310x-v1.2.3.bin"</li> <li>• Not valid—""</li> </ul> </li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Start upgrade:               <pre>AT+FOTA=http://example.com/fw/bx310x-v1.2.3.bin OK &lt;fota notifications&gt;</pre> </li> </ul>

Table 7-2: Common Commands (Detail) (Continued)

Command	Description
<b>+FOTA (notification)</b> (F/W rev: 2.5.0+)	<p><b>Non-AV firmware OTA progress</b></p> <p>Notification indicating progress of non-AV FOTA upgrade.            After &lt;event=16&gt; is received, the module automatically reboots into the new firmware.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+FOTA: &lt;event&gt;,&lt;data&gt;</b>              Purpose: Upgrade progress notification.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;event&gt; (Upgrade event)</p> <ul style="list-style-type: none"> <li>9—Package available on server and can be downloaded by the module. The &lt;data&gt; parameter indicates the package size in kB.</li> <li>10—Package successfully downloaded and stored in flash.</li> <li>11—Issue occurred during the package download.</li> <li>12—Downloaded package is certified to be sent by the AirPrime Management Services server.</li> <li>13—Downloaded package is not certified to be sent by the AirPrime Management Services server.</li> <li>14—Update will be launched.</li> <li>15—OTA update client has finished unsuccessfully.</li> <li>16—OTA update client has finished successfully.</li> <li>17—Reserved</li> <li>18—Download progress. The &lt;data&gt; parameter indicates the percentage complete.</li> </ul> <p>&lt;data&gt; (Event data)</p> <ul style="list-style-type: none"> <li>For &lt;event=9&gt;—Package size in kB</li> <li>For &lt;event=18&gt;—Download progress percentage</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Notifications received during upgrade:              +FOTA: 9,970              +FOTA: 18,1              ...              FOTA: 18,42              ...              FOTA: 18,100              FOTA: 10              FOTA: 12              FOTA: 16</li> </ul>

Table 7-2: Common Commands (Detail) (Continued)

Command	Description
I	<p><b>Request module identification</b> Display the module's identification information.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute: <b>ATI[&lt;value&gt;]</b></li> <li>Response: &lt;data&gt; OK</li> <li>Purpose: Display the requested &lt;value&gt; module identification data.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;value&gt; (Type of information to display)</p> <ul style="list-style-type: none"> <li>• 0 (or not specified)—Model</li> <li>• 3—Firmware revision</li> </ul> <p>&lt;data&gt; (Module identification information)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Display module model number: ATI0 (or ATI) BX310x OK</li> <li>• Display module's firmware revision number (module with 2.5.0 firmware): ATI3 BX310x.2.5.0-2 OK</li> <li>• Display module's firmware revision number (module with P1.0.x firmware): ATI3 R1.1.0.201710271637.BX310x_1 OK</li> </ul>

Table 7-2: Common Commands (Detail) (Continued)

Command	Description
<b>+LOG</b> (F/W rev: 2.6.3+)	<p><b>Enable/disable log messages</b>            Enable or disable log messages (Wi-Fi and some Bluetooth).</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+LOG=&lt;log_switch&gt;</b>                Response:    OK                            or    ERROR                Purpose:     Set the log messages status.</li> <li>• Read:         <b>AT+LOG?</b>                Response:    +LOG: &lt;log_switch&gt;                            OK                Purpose:     Display the current state of log message output.</li> </ul> <p><b>Parameters:</b>            &lt;log_switch&gt; (Log message output status)</p> <ul style="list-style-type: none"> <li>• 0—Disabled</li> <li>• 1—Enabled</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Enable output of log messages:                AT+LOG=1                OK</li> <li>• Display current status of log message output (disabled):                AT+LOG?                +LOG: 0                OK</li> </ul>
<b>+MACADDR</b>	<p><b>Get base MAC address</b>            Display the module's base MAC address.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Read:         <b>AT+MACADDR?</b>                Response:    +MACADDR: &lt;base_mac_addr&gt;                            OK                Purpose:     Display the module's base MAC address.</li> </ul> <p><b>Parameters:</b>            &lt;base_mac_addr&gt; (Module's base MAC address)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• e.g. "20:fa:bb:20:02:70"</li> </ul>
<b>+RST</b>	<p><b>Reset module</b>            Reset the module. Persistent configuration settings are not changed.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute:      <b>AT+RST</b>                Response:    OK                            ... (boot messages)                            READY</li> <li>  Purpose:     Reset the module. When module resets, READY response is received.</li> </ul> <p><b>Parameters:</b>            None</p>

Table 7-2: Common Commands (Detail) (Continued)

Command	Description
<b>+SRREMCMD (notification)</b>	<p><b>Remote command received (unsolicited notification)</b></p> <p>Notification indicating that the remote-controlling device has sent a command to be run on the local device.</p> <p>The local device automatically runs the command and the response is returned to both the local device (over UART) and to the remote-controlling device where it appears as an unsolicited response (<a href="#">+SRBCSMARTRSP (notification)</a> on page 60).</p> <p>Notification can only be received when <a href="#">+SRREMCTRL</a> on page 193 has been used to enable remote control by a specific connected device (via &lt;session_id&gt;).</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRREMCMD: &lt;remote_command&gt;]</b>  Purpose: Remote command received from remote-controlling device. Command is run automatically and response returned to local device (over UART) and remote-controlling device.</li> </ul> <p><b>Parameters:</b></p> <remote_command> (AT command to run on local device) <ul style="list-style-type: none"> <li>ASCII string</li> <li>e.g. "AT+SRSYSRAM?"</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Command received and automatically run: <pre> +SRREMCMD: "AT+SRSYSRAM?"      (Notification received) +SYSRAM: 66496                  (Command run, response received) OK </pre> </li> </ul>

Table 7-2: Common Commands (Detail) (Continued)

Command	Description
<b>+SRREMCTRL</b>	<p><b>Enable/disable remote control</b></p> <p>Enable or disable remote control of the local device, or display the state of the remote control feature.</p> <p>When remote control is enabled, a remote (connected) device can use <a href="#">+SRBCSMARTCMD</a> on page 58 to send an AT command to run on the local device. The response from that command is received by both the local device (over UART) and by the remote device (via <a href="#">+SRBCSMARTRSP (notification)</a> on page 60).</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write (Enable remote control):  <b>AT+SRREMCTRL=&lt;session_id&gt;</b>  Response: OK  or ERROR  Purpose: Enable remote control of local device by remote device connected over &lt;session_id&gt;.</li> </ul> <hr/> <p><i>Note: Remote control can be enabled on only one session at any time. If you enable remote control on a different session, it is automatically disabled on the original session.</i></p> <hr/> <ul style="list-style-type: none"> <li>Write (Disable remote control):  <b>AT+SRREMCTRL=0</b>  Response: OK  or ERROR  Purpose: Disable remote control.</li> <li>Read: <b>AT+SRREMCTRL?</b>  Response: +SRREMCTRL: &lt;session_id&gt;  or +SRREMCTRL: 0  OK  Purpose: Display the current remote control state (0—disabled, 1+—enabled for &lt;session_id&gt;).</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (BLE session ID of remote device)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned to the session</li> <li>Valid range: 1–64</li> <li>If value displayed is 0, remote control is disabled.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Sample sequence with explanations:  AT+SRREMCTRL? (Check remote control state)  +SRREMCTRL: 0 (Remote control is disabled)  OK</li> <li>AT+SRREMCTRL=3 (Enable remote control for &lt;session_id&gt;=3)  OK</li> <li>AT+SRREMCTRL=1 (Enable remote control for &lt;session_id&gt;=1. This automatically disables remote control for &lt;session_id&gt;=3)  OK  ...  +SRREMCMD: "AT+SYSRAM?"(Command received from remote device)</li> </ul>

Table 7-2: Common Commands (Detail) (Continued)

Command	Description
<b>+SYSRAM</b>	<p><b>List available heap memory size</b> Display the amount of available (unused) heap memory.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"><li>Execute: <b>AT+SYSRAM</b></li></ul> <p>Response: +SYSRAM: &lt;bytes_free&gt; OK</p> <p>Purpose: Display amount of available heap memory.</p> <p><b>Parameters:</b></p> <p>&lt;bytes_free&gt; (Available heap memory, in bytes)</p> <ul style="list-style-type: none"><li>0–(max heap size)</li></ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"><li>Heap has 83212 bytes of unused space: AT+SYSRAM +SYSRAM: 83212 OK</li></ul>

## >> 8: MQTT Commands

### Introduction

This chapter describes MQTT (MQ Telemetry Transport)-related commands. These commands are used to set up a session between the BX310X module (client) and an MQTT broker, connect to the broker, and publish and/or subscribe to topics.

### Command summary

The following table summarizes the commands described in this chapter.

**Table 8-1: MQTT commands**

Command	F/W	Description	Page
<b>+KMQTTCFG</b>	P1.0.0+	<a href="#">Set up MQTT session (configure server and messaging parameters)</a>	196
<b>+KMQTTCLOSE</b>	P1.0.0+	<a href="#">Disconnect from MQTT broker</a>	199
<b>+KMQTTCNX</b>	P1.0.0+	<a href="#">Set up MQTT session (configure server and messaging parameters)</a>	196
<b>+KMQTTDEL</b>	P1.0.0+	<a href="#">Delete MQTT session</a>	201
<b>+KMQTT_IND</b>	2.7.1+	<a href="#">MQTT status change (unsolicited notification)</a>	202
	2.6.0+	<a href="#">MQTT status change (unsolicited notification)</a>	203
<b>+KMQTT PUB</b>	P1.0.0+	<a href="#">Publish MQTT message</a>	204
<b>+KMQTT PUBSTART</b>	2.7.1+	<a href="#">Publish MQTT into data mode</a>	205
<b>+KMQTT SUB</b>	P1.0.0+	<a href="#">Subscribe to MQTT topic</a>	206
<b>+KMQTT SUB (notification)</b>	P1.0.0+	<a href="#">Message received from subscribed topic (unsolicited notification)</a>	206
<b>+KMQTT UNSUB</b>	P1.0.0+	<a href="#">Unsubscribe from MQTT topic</a>	207

## Command reference

Table 8-2: MQTT commands

Command	Description
<b>+KMQTTCFG</b>	<p><b>Set up MQTT session (configure server and messaging parameters)</b> Configure the MQTT server and messaging protocol parameters.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>Must be connected to the access point.</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write (&lt;will_flag=0&gt;):  <b>AT+KMQTTCFG=&lt;secure&gt;, &lt;server&gt;, &lt;port&gt;, &lt;version_indicator&gt;, &lt;client_id&gt;[, &lt;keepalive_interval&gt;], [&lt;clean_session&gt;], [&lt;will_flag=0&gt;],,,,,[&lt;username&gt;], [&lt;password&gt;]]</b>            Response: +KMQTTCFG: &lt;mqtt_session_id&gt;            OK            or ERROR            Purpose: Format used when Last Will &amp; Testament feature is disabled. Configure the specified MQTT server and (optionally) configure the message protocol parameters.</li> <li>Write (&lt;will_flag=1&gt;):  <b>AT+KMQTTCFG=&lt;secure&gt;, &lt;server&gt;, &lt;port&gt;, &lt;version_indicator&gt;, &lt;client_id&gt;[, &lt;keepalive_interval&gt;], [&lt;clean_session&gt;], &lt;will_flag=1&gt;, &lt;topic_name&gt;, &lt;message&gt;, &lt;retained&gt;, &lt;qos&gt;[, [&lt;username&gt;], [&lt;password&gt;]]]</b>            Response: +KMQTTCFG: &lt;mqtt_session_id&gt;            OK            or ERROR            Purpose: Format used when Last Will &amp; Testament feature is enabled. Configure the specified MQTT server and (optionally) configure the message protocol parameters.</li> <li>Read:  <b>AT+KMQTTCFG?</b>            Response: +KMQTTCFG=&lt;secure&gt;, &lt;server&gt;, &lt;port&gt;, &lt;version_indicator&gt;, &lt;client_id&gt;, &lt;keepalive_interval&gt;, &lt;clean_session&gt;, &lt;will_flag&gt;, &lt;topic_name&gt;, &lt;message&gt;, &lt;retained&gt;, &lt;qos&gt;, &lt;username&gt;, &lt;password&gt;            OK            Purpose: Display the service configuration and MQTT messaging protocol parameters for a specified &lt;mqtt_session_id&gt;.</li> </ul> <p><b>Parameters:</b>            &lt;secure&gt; (MQTT connection security method)</p> <ul style="list-style-type: none"> <li>0—No security</li> <li>1—TLS (Transport Layer)</li> </ul> <p>(Continued on next page)</p>

Table 8-2: MQTT commands (Continued)

Command	Description
+KMQTTCFG (continued)	<p><b>Set up MQTT session (configure server and messaging parameters (continued))</b></p> <p>&lt;server&gt; (MQTT broker server)</p> <ul style="list-style-type: none"> <li>• ASCII string—FQDN or IPv4 address</li> <li>• Quotation marks allowed, and will appear in response</li> <li>• Examples: "broker.hivemq.com", "192.168.1.1"</li> </ul> <p>&lt;port&gt; (MQTT broker server port)</p> <ul style="list-style-type: none"> <li>• Valid range—0–65535</li> </ul> <p>&lt;version_indicator&gt; (MQTT version indicator)</p> <hr/> <p><i>Note: Euler MQTT only supported 3.1.1 version</i></p> <hr/> <ul style="list-style-type: none"> <li>• Valid values: <ul style="list-style-type: none"> <li>• 3—MQTT version 3.1</li> <li>• 4—MQTT version 3.1.1 (Default)</li> </ul> </li> </ul> <p>&lt;client_id&gt; (MQTT client ID)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Quotation marks allowed, and will appear in response</li> <li>• Example: "test_id"</li> </ul> <p>&lt;keep_alive_interval&gt; (Time (in seconds) between 'keep alive' ping requests sent from client (module) to broker)</p> <ul style="list-style-type: none"> <li>• Valid values: <ul style="list-style-type: none"> <li>• 0–65535</li> <li>• Default: 0</li> </ul> </li> </ul> <p>&lt;clean_session&gt; (Clean/persistent session request)</p> <ul style="list-style-type: none"> <li>• 0—Client requests a clean session from MQTT broker</li> <li>• 1 (Default)—Client requests a persistent session from MQTT broker</li> </ul> <p>&lt;will_flag&gt; (Enable/disable Last Will &amp; Testament (LWT) feature)</p> <ul style="list-style-type: none"> <li>• 0 (Default)—Disable</li> <li>• 1—Enable</li> </ul> <p>&lt;topic_name&gt; (LWT topic name)</p> <ul style="list-style-type: none"> <li>• ASCII string, defined by MQTT protocol</li> <li>• Quotation marks allowed, and will appear in response</li> <li>• Optional parameter, default value "0"</li> <li>• Case-sensitive</li> <li>• Length—1–65535</li> <li>• Example: "home/off"</li> </ul> <p>&lt;message&gt; (LWT message)</p> <ul style="list-style-type: none"> <li>• ASCII string, defined by MQTT protocol</li> <li>• Quotation marks allowed, and will appear in response</li> <li>• Length—0–268,435,456</li> <li>• Example: "off"</li> </ul> <p>&lt;retained&gt; (LWT 'retained flag' configuration)</p> <ul style="list-style-type: none"> <li>• 0—Not retained</li> <li>• 1—Retained</li> </ul> <p>(Continued on next page)</p>

Table 8-2: MQTT commands (Continued)

Command	Description
<b>+KMQTTCFG</b> <b>(continued)</b>	<p><b>Set up MQTT session (configure server and messaging parameters (continued))</b></p> <p>&lt;qos&gt; (LWT QoS configuration)</p> <ul style="list-style-type: none"> <li>• 0—At most once. Broker will make one attempt to send messages to subscribed clients. No message acknowledgement is received.</li> <li>• 1—At least once. Broker will make sure messages are received by subscribed clients. Clients may receive duplicate messages.</li> <li>• 2—Exactly once. Broker sends messages to clients and confirms that they are received, without sending duplicates.</li> </ul> <p>&lt;username&gt; (Username for MQTT broker server authentication when connecting)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Quotation marks allowed, and will appear in response</li> <li>• Optional parameter, default value "0"</li> </ul> <p>&lt;password&gt; (Password for MQTT broker server authentication when connecting)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Quotation marks allowed, and will appear in response</li> <li>• Optional parameter, default value "0"</li> </ul> <p>&lt;mqtt_session_id&gt; (MQTT session ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• willflag=0: AT+KMQTTCFG=0,iot.eclipse.org,1883,4,"BX3101",30,1,0,,,,username,password</li> <li>• willflag=1: AT+KMQTTCFG=0,iot.eclipse.org,1883,4,"BX3101",30,1,1,"home/LWTMessage","BX3101 offline",0,1,username,password</li> <li>• willflag=1: AT+KMQTTCFG=0,"broker.hivemq.com",1883,4,"test_id",60,1,1,"home/off", "off", 0,1,"username","password"</li> <li>• willflag=1: AT+KMQTTCFG? +KMQTTCFG=0,"broker.hivemq.com",1883,4,"test_id",60,1,1,"home/off","off",0,1,"username","password" OK</li> </ul>

Table 8-2: MQTT commands (Continued)

Command	Description
<b>+KMQTTCLOSE</b>	<p><b>Disconnect from MQTT broker</b> Disconnect from the MQTT broker.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KMQTTCLOSE=&lt;mqtt_session_id&gt;</b></li> <li>Response: OK</li> <li>or ERROR</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Disconnect from the broker.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mqtt_session_id&gt; (MQTT session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned by the broker when session was set up via AT+KMQTTCNX</li> <li>• Valid range: 0–65535</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Close session #1: AT+KMQTTCLOSE=1</li> </ul>

Table 8-2: MQTT commands (Continued)

Command	Description
<b>+KMQTTCNX</b>	<p><b>Connect to MQTT broker</b> Connect to the MQTT broker.</p> <hr/> <p><i>Note: In firmware versions P1.0.0–2.5.x, the MQTT client automatically tries to reconnect to the server when Wi-Fi errors occur or the device disconnects. If the reconnect attempt fails, ERROR messages will be generated.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KMQTTCNX=&lt;mqtt_session_id&gt;</b></li> <li>Response: OK</li> <li>or ERROR</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Connect to the broker using the &lt;mqtt_session_id&gt; obtained previously using AT+KMQTTCFG.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mqtt_session_id&gt; (MQTT session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned by the broker when session was set up via AT+KMQTTCFG</li> <li>• Valid range: 0–65535</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• 922—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_SESSION_STATE</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Connect to session #1: AT+KMQTTCNX=1 OK +KMQTT_IND: 1,1</li> </ul>

Table 8-2: MQTT commands (Continued)

Command	Description
<b>+KMQTT_DATA (notification)</b> (F/W rev: 2.6.0+)	<p><b>MQTT data received (unsolicited notification)</b></p> <p>Notification indicating that data has been received on the MQTT connection.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+KMQTT_DATA: &lt;mqtt_session_id&gt;, "&lt;topicName&gt;","&lt;payload&gt;"</b>            Purpose: Indicates message (&lt;payload&gt;) has been received from the &lt;topic_name&gt; topic.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mqtt_session_id&gt; (MQTT session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned by the broker when session was set up via AT+KMQTTTCNX</li> <li>Valid range: 0–65535</li> </ul> <p>&lt;topicName&gt; (Topic name)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "home/led"</li> </ul> <p>&lt;payload&gt; (Message payload (data))</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Example: "LED ON"</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Data received on MQTT session 1:            +KMQTT_DATA: 1,"home/led","LED ON" (Notification received)</li> </ul>
<b>+KMQTTDEL</b>	<p><b>Delete MQTT session</b></p> <p>Delete the MQTT session.</p> <hr/> <p><i>Note: The session must have been closed using <a href="#">+KMQTTCLOSE</a> on page 199 before it can be deleted with this command.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KMQTTDEL=&lt;mqtt_session_id&gt;</b>            Response: OK                      or ERROR                      or +CME ERROR: &lt;cme_error&gt;            Purpose: Delete the session that was previously set up using AT+KMQTTTCFG.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mqtt_session_id&gt; (MQTT session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned by the broker when session was set up via AT+KMQTTTCFG</li> <li>Valid range: 0–65535</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Delete session #1:            AT+KMQTTDEL=1</li> </ul>

Table 8-2: MQTT commands (Continued)

Command	Description
<b>+KMQTT_IND (notification)</b> (F/W rev: 2.7.1+)	<p><b>MQTT status change (unsolicited notification)</b></p> <p>Notification indicating a change in the status of an MQTT connection or the result of an action on the connection.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+KMQTT_IND: &lt;mqtt_session_id&gt;, &lt;status&gt;</b>            Purpose: Indicates the MQTT session has had a status change..</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mqtt_session_id&gt; (MQTT session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned by the broker when session was set up via AT+KMQTTCNX</li> <li>Valid range: 0–65535</li> </ul> <p>&lt;status&gt; (Connection or connection event status)</p> <ul style="list-style-type: none"> <li>Decimal value</li> <li>0—MQTT connection aborted error (Connection establishment or maintenance using MQTT broker failed)</li> <li>1—MQTT connection successful (CONNACK received from the MQTT broker)</li> <li>2—MQTT topic subscribe successful (SUBACK received from the MQTT broker)</li> <li>3—MQTT topic unsubscribe successful (UNSUBACK received from the MQTT broker)</li> <li>4—MQTT message publish successful (ACK received from the MQTT broker). (Only received when <b>+KMQTT_PUB</b> is used to publish messages with QOS &gt; 0.)</li> <li>5—MQTT generic error</li> <li>6—MQTT begin connecting</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Session 1 MQTT connection was successful:            +KMQTT_IND: 1,1 (Notification received)            OK</li> </ul>

Table 8-2: MQTT commands (Continued)

Command	Description
<b>+KMQTT_IND (notification)</b> (F/W rev: 2.6.0+)	<p><b>MQTT status change (unsolicited notification)</b></p> <p>Notification indicating a change in the status of an MQTT connection or the result of an action on the connection.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+KMQTT_IND: &lt;mqtt_session_id&gt;, &lt;status&gt;</b>            Purpose: Indicates the MQTT session has had a status change..</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mqtt_session_id&gt; (MQTT session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned by the broker when session was set up via AT+KMQTTCNX</li> <li>Valid range: 0–65535</li> </ul> <p>&lt;status&gt; (Connection or connection event status)</p> <ul style="list-style-type: none"> <li>Decimal value</li> <li>0—MQTT connection aborted error (Connection establishment or maintenance using MQTT broker failed)</li> <li>1—MQTT connection successful (CONNACK received from the MQTT broker)</li> <li>2—MQTT topic subscribe successful (SUBACK received from the MQTT broker)</li> <li>3—MQTT topic unsubscribe successful (UNSUBACK received from the MQTT broker)</li> <li>4—MQTT message publish successful (ACK received from the MQTT broker). (Only received when <b>+KMQTT_PUB</b> is used to publish messages with QOS &gt; 0.)</li> <li>5—MQTT generic error</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Session 1 MQTT connection was successful:            +KMQTT_IND: 1,1 (Notification received)            OK</li> </ul>

Table 8-2: MQTT commands (Continued)

Command	Description
<b>+KMQTTPUB</b>	<p><b>Publish MQTT message</b> Publish a message to a specific MQTT session.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KMQTTPUB=&lt;mqtt_session_id&gt;,&lt;topic_name&gt;,&lt;qos&gt;,&lt;retained&gt;,&lt;payload&gt;</b></li> </ul> <p>Response: OK or ERROR or +CME ERROR: &lt;cme_error&gt;</p> <p>Purpose: Publish the message (&lt;payload&gt;).</p> <p><b>Parameters:</b></p> <p>&lt;mqtt_session_id&gt; (MQTT session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned by the broker when session was set up via AT+KMQTTCNX</li> <li>• Valid range: 0–65535</li> </ul> <p>&lt;topic_name&gt; (Topic name to associate with the &lt;payload&gt;)</p> <ul style="list-style-type: none"> <li>• ASCII string—Recommendation: Use printable characters only.</li> <li>• Case-sensitive</li> <li>• Example: "home/temp"</li> </ul> <p>&lt;qos&gt; (Message QoS configuration)</p> <ul style="list-style-type: none"> <li>• 0—At most once. Broker will make one attempt to send the message to subscribed clients.</li> <li>• 1—At least once. Broker will make sure the message is received by subscribed clients. Clients may receive duplicates of the message.</li> <li>• 2—Exactly once. Broker sends the message to clients and confirms that it is received, without sending duplicates.</li> </ul> <p>&lt;retained&gt; (LWT 'retained flag' configuration)</p> <ul style="list-style-type: none"> <li>• 0—Not retained</li> <li>• 1—Retained</li> </ul> <p>&lt;payload&gt; (Message)</p> <ul style="list-style-type: none"> <li>• ASCII string—Recommendation: Use printable characters only.</li> <li>• Case-sensitive</li> <li>• Example: "temp is 10"</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Publish a message indicating the current temperature at home: AT+KMQTTPUB=1,"home/temp",1,0,"temp is 10"</li> </ul>

Table 8-2: MQTT commands (Continued)

Command	Description
<b>+KMQTTPUBSTART</b> (F/W rev: 2.7.1+)	<p><b>Publish MQTT into data mode</b></p> <p>Publish a message to a specific MQTT session.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KMQTTPUBSTART=&lt;session_id&gt;,&lt;topicName&gt;,&lt;qos&gt;,&lt;retained&gt;</b></li> </ul> <p>Response: CONNECT (entering data mode successfully)            or OK (exiting data mode successfully)            or ERROR (data mode error)            or +CME ERROR: 903 (MEMORY_PROBLEM)            +CME ERROR: 910 (ERROR_BAD_SESSION_ID)            +CME ERROR: 910 (ERROR_BAD_SESSION_ID)            +CME ERROR: 916 (ERROR_INVALID_PARAMETER)            +CME ERROR: 919 (FEATURE_NOT_AVAILABLE)</p> <p>Purpose: Publish the message (&lt;payload&gt;).</p> <p><b>Parameters:</b></p> <p>&lt;session_id&gt;</p> <ul style="list-style-type: none"> <li>• Numeric parameter given by AT+KMQTTCFG</li> <li>• Valid range: 0–65535</li> </ul> <p>&lt;topicName&gt;</p> <ul style="list-style-type: none"> <li>• Indicates the topic name.</li> <li>• String type</li> </ul> <p>&lt;qos&gt; (Message QoS configuration)</p> <ul style="list-style-type: none"> <li>• 0—At most once. Broker will make one attempt to send the message to subscribed clients.</li> <li>• 1—At least once. Broker will make sure the message is received by subscribed clients. Clients may receive duplicates of the message.</li> <li>• 2—Exactly once. Broker sends the message to clients and confirms that it is received, without sending duplicates.</li> </ul> <p>&lt;retained&gt; (LWT 'retained flag' configuration)</p> <ul style="list-style-type: none"> <li>• 0—Not retained</li> <li>• 1—Retained</li> </ul> <hr/> <p><i>Note: CONNECT is displayed after successfully entering data mode. To exit data mode, use the espace sequence +++. After successfully exiting data mode, OK is displayed.</i></p> <hr/> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• AT+KMQTTPUBSTART=1,BX310x,1,0</li> <li>• CONNECT (successfully entering data mode)</li> <li>• falfajlfajfjl+++ (some data entered in data mode—Recommendation: Use printable characters only, then input espace sequence +++. The payload allows a maximum of 2048 bytes.)</li> </ul>

Table 8-2: MQTT commands (Continued)

Command	Description
<b>+KMQTTSUB</b>	<p><b>Subscribe to MQTT topic</b></p> <p>Subscribe to a specific MQTT topic identified by the &lt;topic_name&gt; used in AT+MQTTPUB messages.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+MQTTSUB=&lt;mqtt_session_id&gt;,&lt;topic_name&gt;,&lt;qos&gt;</b></li> <li>Response: OK</li> <li>or ERROR</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Subscribe to the specified topic.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mqtt_session_id&gt; (MQTT session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned by the broker when session was set up via AT+KMQTTCNX</li> <li>• Valid range: 0–65535</li> </ul> <p>&lt;topic_name&gt; (Topic name to subscribe to)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Case-sensitive—Make sure to enter the name correctly (e.g. "temp" != "Temp")</li> <li>• Example: "home/temp"</li> </ul> <p>&lt;qos&gt; (Message QoS configuration)</p> <ul style="list-style-type: none"> <li>• 0—At most once. Broker will make one attempt to send the message to subscribed clients.</li> <li>• 1—At least once. Broker will make sure the message is received by subscribed clients. Clients may receive duplicates of the message.</li> <li>• 2—Exactly once. Broker sends the message to clients and confirms that it is received, without sending duplicates.</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• AT+KMQTTSUB=1,"home/temp",1</li> </ul>
<b>+KMQTTSUB (notification)</b>	<p><b>Message received from subscribed topic (unsolicited notification)</b></p> <p>Notification indicating a message has been received from a subscribed topic. Notification can only be received when <a href="#">+KMQTTSUB</a> on page 206 has been used to subscribe to an MQTT topic.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+KMQTTSUB: "&lt;topic_name&gt;", "&lt;payload&gt;"</b></li> <li>Purpose: Indicates message (&lt;payload&gt;) has been received from the &lt;topic_name&gt; topic.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;topic_name&gt; (Subscribed topic name)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Example: "home/temp"</li> </ul>

Table 8-2: MQTT commands (Continued)

Command	Description
<b>+KMQTTUNSUB</b>	<p><b>Unsubscribe from MQTT topic</b></p> <p>Unsubscribe from a specific MQTT topic identified by the &lt;topic_name&gt; used in AT+MQTTPUB messages.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+MQTTUNSUB=&lt;mqtt_session_id&gt;,&lt;topic_name&gt;</b></li> <li>Response: OK</li> <li>or ERROR</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Unsubscribe from the specified topic.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mqtt_session_id&gt; (MQTT session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned by the broker when session was set up via AT+KMQTTCNX</li> <li>• Valid range: 0–65535</li> </ul> <p>&lt;topic_name&gt; (Topic name to be unsubscribed)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Case-sensitive—Make sure to enter the name correctly (e.g. "temp" != "Temp")</li> <li>• Example: "home/temp"</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 910—EUL_AT_COMMAND_RESPONSE_ERROR_BAD_SESSION_ID</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• AT+KMQTTUNSUB=1,"home/temp"</li> </ul>

# >> 9: Network Communication Commands

## Introduction

This chapter describes commands that you can use to communicate with an external host through the TCP, UDP, HTTP, and HTTPS protocols. The following commands are used to reset the modem, adjust customization settings, retrieve the hardware version, and monitor the temperature, voltage, and modem status.

---

**Important:** *The BX310x module supports up to 64 simultaneous sessions across the supported protocols described in this chapter, plus BLE and BTE Classic. When a session is created (configured), the next-highest available ID is assigned from a shared ID pool (1–64, automatically wrapping around after ID 64 is assigned). IDs are freed for re-use when the sessions are closed. (For example, after session ID 64 is assigned, the next available ID could be 5 (assuming the original session 5 has been closed).)*

---

## Command summary

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

Table 9-1: TCP commands

Command	F/W	Description	Page
+KTCPCFG	2.5.0+	TCP Session (Connection) Configuration	214
	P1.0.0	TCP Session (Connection) Configuration	213
+KTCPCLOSE	2.5.0+	Close TCP Connection	215
	P1.0.0	Close TCP Connection	216
+KTCPCNX	P1.0.0+	Start TCP Connection	217
+KTCP_DATA (notification)	P1.0.0+	Incoming Data through a TCP Connection (unsolicited notification)	217
+KTCPDEL	P1.0.0+	Delete a Configured TCP Session	218
+KTCP_NOTIF (notification)	P1.0.0+	TCP connection failure notification (unsolicited notification)	218
+KTCPSND	P1.0.0+	Send Data through a TCP Connection	219
+KTCP_SRVREQ (notification)	P1.0.0+	Incoming TCP Client Connection Request (unsolicited notification)	220
+KTCP_START	P1.0.0+	Start a TCP Connection in Direct Data Flow	221

Table 9-2: UDP commands

Command	F/W	Description	Page
+KUDPCFG	P1.0.0+	UDP Connection Configuration	222
+KUDPCLOSE	P1.0.0+	Close UDP Connection	223
+KUDP_DATA (notification)	P1.0.0+	Incoming Data through a UDP Connection (unsolicited notification)	223
+KUDPDEL	P1.0.0+	Delete a Configured UDP Session	224

Table 9-2: UDP commands (Continued)

Command	F/W	Description	Page
<b>+KUDP_NOTIF (notification)</b>	P1.0.0+	UDP error notification (unsolicited notification)	224
<b>+KUDPSND</b>	P1.0.0+	Send Data through a UDP Connection	225

Table 9-3: HTTP commands

Command	F/W	Description	Page
<b>+KHTTPCFG</b>	P1.0.0+	HTTP Connection Configuration	226
<b>+KHTTPCLOSE</b>	P1.0.0+	Close an HTTP Connection	227
<b>+KHTTPCNX</b>	P1.0.0+	Start HTTP Connection	227
<b>+KHTTPDEL</b>	P1.0.0+	Delete a Configured HTTP Session	228
<b>+KHTTPDELETE</b>	P1.0.0+	Perform HTTP Delete	228
<b>+KHTTPGET</b>	P1.0.0+	Get HTTP Server Information	229
<b>+KHTTPHEAD</b>	P1.0.0+	Get HTTP Headers	231
<b>+KHTTPHEADER</b>	P1.0.0+	Set the HTTP Request Header	232
<b>+KHTTPPOST</b>	P1.0.0+	Send Data to HTTP Server	233
<b>+KHTTPPUT</b>	P1.0.0+	Perform HTTP PUT	234

Table 9-4: HTTPS commands

Command	F/W	Description	Page
<b>+KHTTPSCFG</b>	2.5.0+	HTTPS Connection Configuration	235
	P1.0.0	HTTPS Connection Configuration	239
<b>+KHTTPSCLOSE</b>	P1.0.0+	Close an HTTPS Connection	240
<b>+KHTTPSCNX</b>	P1.0.0+	Start HTTPS Connection	241
<b>+KHTTPSDDEL</b>	P1.0.0+	Delete a Configured HTTPS Session	242
<b>+KHTTPSDDELETE</b>	P1.0.0+	Perform HTTPS Delete	242
<b>+KHTTPSGET</b>	P1.0.0+	Get HTTPS Server Information	243
<b>+KHTTPSHEAD</b>	P1.0.0+	Get HTTPS Headers	245
<b>+KHTTPSHEADER</b>	P1.0.0+	Set the HTTPS Request Header	246
<b>+KHTTPSPOST</b>	P1.0.0+	Send Data to HTTPS Server	247
<b>+KHTTPSPSK</b>	2.5.0+	Configure PSK for an HTTPS session	248
<b>+KHTTPSPUT</b>	P1.0.0+	Perform HTTPS PUT	249

**Table 9-5: SSL Certificate Management commands**

Command	F/W	Description	Page
<b>+KCERTDELETE</b>	P1.0.0+	<a href="#">Delete Local Certificate from the Index</a>	249
<b>+KCERTSTORE</b>	P1.0.0+	<a href="#">Store Certificate (Root/Local) to File System</a>	251
<b>+KPRIVDELETE</b>	P1.0.0+	<a href="#">Delete Private Key from the Index</a>	251
<b>+KPRIVKSTORE</b>	2.7.1+	<a href="#">Store Private Key Associated to a Local Certificate</a>	252
	2.5.0+	<a href="#">Store Private Key Associated to a Local Certificate</a>	253
	P1.0.0	<a href="#">Store Private Key Associated to a Local Certificate</a>	253

## Command reference

Table 9-6: TCP commands

Command	Description
<b>+KTCPCFG</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+KTCPCFG</a> .)	<p><b>TCP Session (Connection) Configuration</b></p> <p>Set up (configure) a TCP session, or display the current configuration of all sessions.</p> <hr/> <p><b>Known Issues:</b> <i>The following are known issues as of publication date of this document:</i></p> <ul style="list-style-type: none"> <li>• <code>&lt;URC_ENDTCP_enable&gt;</code> parameter accepts invalid values (no <code>+CME ERROR</code> is received). Make sure to use a valid value (0 or 1).</li> <li>• <code>&lt;source_port&gt;</code> parameter value is ignored.</li> </ul> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KTCPCFG=[&lt;cnx_cnf&gt;], &lt;mode&gt;, [&lt;tcp_remote_address&gt;[, &lt;tcp_port&gt;[,&lt;source_port&gt;[, &lt;data_mode&gt;], [&lt;URC_ENDTCP_enable&gt;]]]]]</b>            Response: <code>+KTCPCFG: &lt;tcp_session_id&gt;</code>  <code>OK</code>            or <code>ERROR</code>            or <code>+CME ERROR: &lt;cme_error&gt;</code>            Purpose: Set up a TCP session with the stated configuration parameters.</li> <li>• Read: <b>AT+KTCPCFG?</b>            Response: <code>+KTCPCFG: &lt;tcp_session_id&gt;,&lt;status&gt;,[&lt;cnx_cnf&gt;],&lt;mode&gt;</code>  <code>[,&lt;server_ID&gt;], &lt;tcp_remote_address&gt;, &lt;tcp_port&gt;, [&lt;source_port&gt;],</code>  <code>&lt;data_mode&gt;,&lt;URC_ENDTCP_enable&gt;</code>  <code>...</code>  <code>OK</code>            Purpose: Display the current configuration of all TCP connections.</li> </ul> <p><b>Parameters:</b></p> <p><code>&lt;cnx_cnf&gt;</code></p> <ul style="list-style-type: none"> <li>• Not used</li> </ul> <p><code>&lt;tcp_session_id&gt;</code> (TCP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p><code>&lt;mode&gt;</code> (BX310X module's TCP mode)</p> <ul style="list-style-type: none"> <li>• 0—Client</li> <li>• 1—Server</li> <li>• 2—Child (Generated by server sockets)</li> <li>• 3—Secure client (TLS)</li> </ul> <p><code>&lt;tcp_remote_address&gt;</code> (Remote TCP server's address)</p> <ul style="list-style-type: none"> <li>• Format depends on <code>&lt;mode&gt;</code>.</li> </ul> <p>If <code>&lt;mode&gt;</code> is:</p> <ul style="list-style-type: none"> <li>• 0, 2—FQDN or IPv4 address</li> <li>• 1—Leave field blank (server configuration)</li> </ul> <p><code>&lt;tcp_port&gt;</code> (TCP port)</p> <ul style="list-style-type: none"> <li>• 0–65535</li> <li>• Note: If <code>&lt;mode&gt;</code> is 0 (Client), this is the remote TCP server's port.</li> </ul> <p>(Continued on next page)</p>

**Table 9-6: TCP commands (Continued)**

Command	Description
<b>+KTCPCFG (continued)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+KTCPCFG</a> .)	<b>TCP Connection Configuration (continued)</b> <status> (Connection state of the selected session) <ul style="list-style-type: none"> <li>• 0—Disconnected</li> <li>• 1—Connected</li> </ul> <server_ID> (Server session ID) <ul style="list-style-type: none"> <li>• Applies only for session in &lt;mode&gt;=2 (Child)</li> <li>• Integer</li> <li>• Valid range: 1–64</li> </ul> <source_port> (Local TCP client port number) <ul style="list-style-type: none"> <li>• Leave this value blank</li> <li>• Note: As of publication date, &lt;source_port&gt; value is ignored.</li> </ul> <data_mode> (URC display?) <ul style="list-style-type: none"> <li>• 1—(Default) Display &lt;data&gt; in URC</li> <li>• Note: For a child session, the &lt;data_mode&gt; will be the same as the server socket's setting.</li> </ul> <URC_ENDTCP_enable> (Display URC acknowledgement) <ul style="list-style-type: none"> <li>• A valid value must be entered, but is not currently used.</li> <li>• 0 (Default)—Do not display URC "+KTCP_ACK"</li> <li>• 1—Display URC "+KTCP_ACK"</li> <li>• NOTE: Make sure to use a valid value (0 or 1).</li> </ul> <cme_error> (CME error code) <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <b>Example:</b> <ul style="list-style-type: none"> <li>• Configure a server:                AT+KTCPCFG=,1,,5005                +KTCPCFG: 1                OK</li> <li>• Configure a CLIENT:                AT+KTCPCFG=,0,192.168.100.183,5005                +KTCPCFG: 2                OK</li> <li>• Display configuration of all TCP connections:                +KTCPCFG: 1,0,,1,"",5005,,1,0                +KTCPCFG: 2,0,,0,"192.168.100.100",5005,,1,0                OK</li> </ul>

Table 9-6: TCP commands (Continued)

Command	Description
<b>+KTCPCFG</b> (F/W rev: P1.0.0 For next version, see <a href="#">+KTCPCFG</a> .)	<p><b>TCP Session (Connection) Configuration</b>            Set up (configure) a TCP session, or display the current configuration of all sessions.</p> <hr/> <p><b>Known Issues:</b> <i>The following are known issues as of publication date of this document:</i></p> <ul style="list-style-type: none"> <li>• <code>&lt;URC_ENDTCP_enable&gt;</code> parameter accepts invalid values (no +CME ERROR is received). Make sure to use a valid value (0 or 1).</li> <li>• <code>&lt;source_port&gt;</code> parameter value is ignored.</li> </ul> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KTCPCFG=[&lt;cnx_cnf&gt;], &lt;mode&gt;, [&lt;tcp_remote_address&gt;[, &lt;tcp_port&gt;[,&lt;source_port&gt;[, &lt;data_mode&gt;, [&lt;URC_ENDTCP_enable&gt;]]]]]</b>            Response: +KTCPCFG: &lt;tcp_session_id&gt;            OK            or ERROR            or +CME ERROR: &lt;cme_error&gt;            Purpose: Set up a TCP session with the stated configuration parameters.</li> <li>• Read: <b>AT+KTCPCFG?</b>            Response: +KTCPCFG: &lt;tcp_session_id&gt;, &lt;status&gt;, [&lt;cnx_cnf&gt;], &lt;mode&gt; [, &lt;server_ID&gt;], &lt;tcp_remote_address&gt;, &lt;tcp_port&gt;, [&lt;source_port&gt;], &lt;data_mode&gt;, &lt;URC_ENDTCP_enable&gt;            ...            OK            Purpose: Display the current configuration of all TCP connections.</li> </ul> <p><b>Parameters:</b></p> <p><code>&lt;cnx_cnf&gt;</code></p> <ul style="list-style-type: none"> <li>• Not used</li> </ul> <p><code>&lt;tcp_session_id&gt;</code> (TCP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p><code>&lt;mode&gt;</code> (BX310X module's TCP mode)</p> <ul style="list-style-type: none"> <li>• 0—Client</li> <li>• 1—Server</li> <li>• 2—Child (Generated by server sockets)</li> </ul> <p><code>&lt;tcp_remote_address&gt;</code> (Remote TCP server's address)</p> <ul style="list-style-type: none"> <li>• Format depends on <code>&lt;mode&gt;</code>.            If <code>&lt;mode&gt;</code> is:           <ul style="list-style-type: none"> <li>• 0, 2—FQDN or IPv4 address</li> <li>• 1—Leave field blank (server configuration)</li> </ul> </li> </ul> <p><code>&lt;tcp_port&gt;</code> (TCP port)</p> <ul style="list-style-type: none"> <li>• 0–65535</li> <li>• Note: If <code>&lt;mode&gt;</code> is 0 (Client), this is the remote TCP server's port.</li> </ul> <p>(Continued on next page)</p>

**Table 9-6: TCP commands (Continued)**

Command	Description
<b>+KTCPCFG (continued)</b> (F/W rev: P1.0.0 For next version, see <a href="#">+KTCPCFG.</a> )	<b>TCP Connection Configuration (continued)</b> <status> (Connection state of the selected session) <ul style="list-style-type: none"> <li>• 0—Disconnected</li> <li>• 1—Connected</li> </ul> <server_ID> (Server session ID) <ul style="list-style-type: none"> <li>• Applies only for session in &lt;mode&gt;=2 (Child)</li> <li>• Integer</li> <li>• Valid range: 1–64</li> </ul> <source_port> (Local TCP client port number) <ul style="list-style-type: none"> <li>• 0–65535</li> <li>• Note: As of publication date, &lt;source_port&gt; value is ignored.</li> </ul> <data_mode> (URC display?) <ul style="list-style-type: none"> <li>• 0—(Default) Do not display &lt;data&gt; in URC</li> <li>• 1—Display &lt;data&gt; in URC</li> <li>• Note: For a child session, the &lt;data_mode&gt; will be the same as the server socket's setting.</li> </ul> <URC_ENDTCP_enable> (Display URC acknowledgement) <ul style="list-style-type: none"> <li>• 0 (Default)—Do not display URC "+KTCP_ACK"</li> <li>• 1—Display URC "+KTCP_ACK"</li> <li>• NOTE: Make sure to use a valid value (0 or 1). Currently, invalid values are accepted (no +CME ERROR is received.)</li> </ul> <cme_error> (CME error code) <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <b>Example:</b> <ul style="list-style-type: none"> <li>• Configure a server:                AT+KTCPCFG=,1,,5005                +KTCPCFG: 1                OK</li> <li>• Configure a CLIENT:                AT+KTCPCFG=,0,192.168.100.183,5005                +KTCPCFG: 2                OK</li> <li>• Display configuration of all TCP connections:                +KTCPCFG: 1,0,,1,"",5005,,1,0                +KTCPCFG: 2,0,0,"192.168.100.100",5005,,1,0                OK</li> </ul>

Table 9-6: TCP commands (Continued)

Command	Description
<p><b>+KTCPCLOSE</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+KTCPCLOSE</a>.)</p>	<p><b>Close TCP Connection</b> Close the specified TCP session.</p> <hr/> <p><b>Known Issues:</b> <i>As of publication date of this document, if the TCP session mode (reported by AT+KTCPCFG?) is "1: Server":</i></p> <ul style="list-style-type: none"> <li>• <i>&lt;closing_type&gt;=0 (Abort) 'fast' closes the connection</i></li> <li>• <i>&lt;closing_type&gt;=1 (Complete close) closes the session, but the module must be rebooted to continue.</i></li> </ul> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+KTCPCLOSE=&lt;tcp_session_id&gt;,&lt;closing_type&gt;</b> Response:    OK               or    ERROR               or    +CME ERROR:&lt;cme_error&gt;               or    +KTCP_NOTIF:&lt;tcp_session_id&gt;,&lt;tcp_notif&gt;</li> <li>Purpose:       Close the specified TCP session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;tcp_session_id&gt; (TCP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session by <a href="#">+KTCPCFG</a></li> <li>• Valid range: 1–64</li> </ul> <p>&lt;closing_type&gt; (Method used to close TCP session)</p> <ul style="list-style-type: none"> <li>• 0—Fast closing of the TCP connection (abort)</li> <li>• 1—Complete close (TCP connection is properly closed; data sent to the module by <a href="#">+KTCPSND</a> will be sent to the TCP server and acknowledged before the session is closed.)</li> </ul> <p>&lt;tcp_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• See <a href="#">+KTCP_NOTIF (notification)</a> for details</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Do a complete close of session 2:   AT+KTCPCLOSE=2,1   OK</li> </ul>

**Table 9-6: TCP commands (Continued)**

Command	Description
<p><b>+KTCPCLOSE</b> (F/W rev: P1.0.0 For next version, see <a href="#">+KTCPCLOSE</a>.)</p>	<p><b>Close TCP Connection</b> Close the specified TCP session.</p> <hr/> <p><b>Known Issues:</b> <i>As of publication date of this document, if the TCP session mode (reported by AT+KTCPCFG?) is "1: Server":</i></p> <ul style="list-style-type: none"> <li>• <i>&lt;closing_type&gt;=0 (Abort) 'fast' closes the connection</i></li> <li>• <i>&lt;closing_type&gt;=1 (Complete close) closes the session, but the module must be rebooted to continue.</i></li> </ul> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+KTCPCLOSE=&lt;tcp_session_id&gt;,&lt;closing_type&gt;</b>  Response:    OK                or    ERROR                or    +CME ERROR:&lt;cme_error&gt;                or    +KTCP_NOTIF:&lt;tcp_session_id&gt;,&lt;tcp_notif&gt;</li> <li>• Purpose:     Close the specified TCP session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;tcp_session_id&gt; (TCP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session by <a href="#">+KTCPCFG</a></li> <li>• Valid range: 1–64</li> </ul> <p>&lt;closing_type&gt; (Method used to close TCP session)</p> <ul style="list-style-type: none"> <li>• 0—Abort (Fast closing of the TCP connection)</li> <li>• 1—Complete close (TCP connection is properly closed; data sent to the module by <a href="#">+KTCPSND</a> will be sent to the TCP server and acknowledged before the session is closed.)</li> <li>• Note: If the TCP session mode is "1: Server", the module must be rebooted if closing type 1 (Complete close) is used.</li> </ul> <p>&lt;tcp_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• See <a href="#">+KTCP_NOTIF (notification)</a> for details</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-6: TCP commands (Continued)

Command	Description
<b>+KTCP CNX</b>	<p><b>Start TCP Connection</b></p> <p>Start a TCP connection by connecting to a remote server (as a client) or listening to a bound port (as a server).</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KTCP CNX=&lt;tcp_session_id&gt;</b></li> <li>Response: OK</li> <li>or ERROR</li> <li>or +CME ERROR:&lt;cme_error&gt;</li> <li>or +KTCP_NOTIF:&lt;tcp_session_id&gt;,&lt;tcp_notif&gt;</li> </ul> <p>Purpose: Start the specified TCP connection.</p> <p><b>Parameters:</b></p> <p>&lt;tcp_session_id&gt; (TCP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session by <a href="#">+KTCP CFG</a> on page 213</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;tcp_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• See <a href="#">+KTCP_NOTIF (notification)</a> for details</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>
<b>+KTCP_DATA (notification)</b>	<p><b>Incoming Data through a TCP Connection (unsolicited notification)</b></p> <p>Notification is received when data is available in the receive buffer. (Notifications can be received as soon as the connection is established and data is available in the receive buffer.) This notification is sent for each TCP packet received.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+KTCP_DATA: &lt;tcp_session_id&gt;,&lt;ndata_available&gt;, &lt;data&gt;</b></li> <li>Purpose: Notification indicates a TCP packet is available.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;tcp_session_id&gt; (TCP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session by <a href="#">+KTCP CFG</a> on page 213</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;ndata_available&gt; (Length of &lt;data&gt; field)</p> <ul style="list-style-type: none"> <li>• Valid range: 1–512</li> <li>• If user application sends &gt;512 bytes of data to the module, the data is separated into multiple URCS.</li> </ul> <p>&lt;data&gt; (TCP data packet received)</p> <ul style="list-style-type: none"> <li>• Data in octet format (raw bytes, no encoding)</li> </ul>

**Table 9-6: TCP commands (Continued)**

Command	Description
<b>+KTCPDEL</b>	<p><b>Delete a Configured TCP Session</b> Delete a specified TCP session.</p> <hr/> <p><i>Note: The session must be closed using <b>+KTCPCLOSE</b> on page 216 before it can be deleted with this command.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KTCPDEL=&lt;tcp_session_id&gt;</b></li> <li>Response: OK</li> <li>or ERROR</li> <li>or +CME ERROR:&lt;cme_error&gt;</li> <li>Purpose: Delete the specified TCP session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;tcp_session_id&gt; (TCP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session by <b>+KTCPCFG</b> on page 213</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>
<b>+KTCP_NOTIF (notification)</b>	<p><b>TCP connection failure notification (unsolicited notification)</b> Notification received by local device when a TCP connection/action fails.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+KTCP_NOTIF: &lt;tcp_session_id&gt;, &lt;tcp_notif&gt;</b></li> <li>Purpose: Notifies local device that the specified TCP connection failed.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;tcp_session_id&gt; (Configured TCP session's ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;tcp_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• 0—Network error</li> <li>• 1—No more sockets available (max number already reached)</li> <li>• 2—Memory problem</li> <li>• 3—DNS error</li> <li>• 4—TCP disconnection by the server or remote client</li> <li>• 5—TCP connection error</li> <li>• 6—Generic error</li> <li>• 7—Fail to accept client requests</li> <li>• 8—Data sending is OK, but +KTCPSND was waiting for more or fewer characters</li> <li>• 9—Bad session ID</li> <li>• 10—Session is already running</li> <li>• 11—All sessions are used</li> </ul>

Table 9-6: TCP commands (Continued)

Command	Description
<b>+KTCPSND</b>	<p><b>Send Data through a TCP Connection</b> Send a data string over a specified TCP connection.</p> <hr/> <p><i>Note: This does not cause data mode to be entered/exited.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+KTCPSND=&lt;tcp_session_id&gt;,&lt;data&gt;</b></li> <li>  Response:    OK</li> <li>                or    ERROR</li> <li>                or    +CME ERROR:&lt;cme_error&gt;</li> <li>                or    +KTCP_NOTIF:&lt;tcp_session_id&gt;,&lt;tcp_notif&gt;</li> <li>  Purpose:      Send the &lt;data&gt; over the specified TCP connection.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;tcp_session_id&gt; (TCP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session by <a href="#">+KTCP_CFG</a></li> <li>• Valid range: 1–64</li> </ul> <p>&lt;data&gt; (Data to send over TCP connection)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Length—1–242</li> <li>• Special characters (if present) entered as hex values (e.g. "\0d")</li> </ul> <p>&lt;tcp_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• See <a href="#">+KTCP_NOTIF (notification)</a> for details</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-6: TCP commands (Continued)

Command	Description
<b>+KTCP_SRVREQ (notification)</b>	<p><b>Incoming TCP Client Connection Request (unsolicited notification)</b></p> <p>Notification is received when a remote client requests a connection to the BX310x (server TCP session identified by &lt;tcp_session_id&gt;).</p> <p>The connection is automatically accepted by the module, and a session ID (from the common session ID pool (1–64)) and client session ID are automatically assigned to the connection.</p> <hr/> <p><i>Note: The TCP server corresponding to the session ID is still able to receive +KTCP_SRVREQ connection requests from other clients.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+KTCP_SRVREQ: &lt;tcp_session_id&gt;,&lt;tcp_client_session_id&gt;, &lt;client_ip&gt;, &lt;client_port&gt;</b></li> </ul> <p>Purpose: Notification indicates that the identified TCP client has initiated a connection to the module (the server).</p> <p><b>Parameters:</b></p> <p>&lt;tcp_session_id&gt; (Server's TCP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session by <a href="#">+KTCPCFG</a> on page 213</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;tcp_client_session_id&gt; (TCP child session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value automatically assigned to the requested session.</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;client_ip&gt; (Remote client's TCP IP address)</p> <ul style="list-style-type: none"> <li>• IPv4 format</li> <li>• Example: 192.168.1.49</li> </ul> <p>&lt;client_port&gt; (Remote client's TCP port)</p> <ul style="list-style-type: none"> <li>• 0–65535</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• +KTCP_SRVREQ: 3,4,"1.2.3.4",3567</li> </ul> <p>This indicates a new connection was requested on the TCP server session with &lt;tcp_session_id&gt;=3.  A new child socket is created for the connection with &lt;tcp_client_session_id&gt;=4.  The connection was initiated by a client at the IP address "1.2.3.4" from port 3567.</p>

Table 9-6: TCP commands (Continued)

Command	Description
<b>+KTCPSTART</b>	<p><b>Start a TCP Connection in Direct Data Flow</b></p> <p>Start a connection in Direct Data Flow to send and receive data through a TCP connection. If the specified connection has already been connected with <a href="#">+KTCP CNX</a>, the module enters direct data flow without having to restart the connection.</p> <hr/> <p><i>Note: Before using this command, it is highly recommended to configure the module for hardware flow control, using the command <a href="#">AT&amp;K3</a>.</i></p> <hr/> <p><i>Note: Only one +KTCPSTART session can be used.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KTCPSTART=&lt;tcp_session_id&gt;</b></li> <li>Response: CONNECT</li> <li style="padding-left: 20px;">or +CME ERROR: &lt;cme_error&gt;</li> <li style="padding-left: 20px;">or +KTCP_NOTIF: &lt;tcp_session_id&gt;,&lt;tcp_notif&gt;</li> <li>Purpose: Start the specified session in Direct Data Flow.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;tcp_session_id&gt; (TCP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to the session by <a href="#">+KTCP CFG</a> on page 213</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;tcp_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• See <a href="#">+KTCP_NOTIF (notification)</a> for details</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-7: UDP commands

Command	Description
<b>+KUDPCFG</b>	<p><b>UDP Connection Configuration</b></p> <p>Set up (configure) a UDP session, or display the current configuration of all sessions.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KUDPCFG=&lt;cnx_cnf&gt;, &lt;mode&gt;[, [&lt;udp_port&gt;],[&lt;data_mode&gt;]]</b>  Response: +KUDPCFG: &lt;udp_session_id&gt;  OK  or NO CARRIER  or +CME ERROR: &lt;cme_error&gt;</li> <li>• Read: <b>AT+KUDPCFG?</b>  Response: +KUDPCFG: &lt;udp_session_id&gt;, &lt;cnx_cnf&gt;, &lt;mode&gt;, &lt;port&gt;, &lt;data_mode&gt;  ...  OK</li> </ul> <p>Purpose: Set up a UDP session with the stated configuration parameters.</p> <p>Purpose: Display the current configuration of all UDP connections.</p> <p><b>Parameters:</b></p> <p>&lt;cnx_cnf&gt; (PDP context configuration Index (parameter set for configuring one UDP session))</p> <ul style="list-style-type: none"> <li>• Valid range: 0–7</li> </ul> <p>&lt;udp_session_id&gt; (UDP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;mode&gt; (BX310X module's UDP mode)</p> <ul style="list-style-type: none"> <li>• 0—Client</li> <li>• 1—Server</li> </ul> <p>&lt;udp_port&gt; (UDP port)</p> <ul style="list-style-type: none"> <li>• 0–65535</li> </ul> <p>&lt;data_mode&gt; (Display data in URC?)</p> <ul style="list-style-type: none"> <li>• 0 (Default)—Do not display &lt;data&gt; in URC</li> <li>• 1—Display &lt;data&gt; in URC</li> </ul> <p>&lt;udp_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• 0—Network error</li> <li>• 1—No more sockets available; max. number already reached</li> <li>• 2—Memory problem</li> <li>• 3—DNS error</li> <li>• 5—UDP connection error (Host unreachable)</li> <li>• 6—Generic error</li> <li>• 8—Data sending is OK, but KUDPSND was waiting for more or fewer characters</li> <li>• 9—Bad session ID</li> <li>• 10—Session is already running</li> <li>• 11—All sessions are used</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-7: UDP commands (Continued)

Command	Description
<b>+KUDPCLOSE</b>	<p><b>Close UDP Connection</b> Close the specified UDP session.</p> <hr/> <p><i>Note: This does not delete the session configuration.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KUDPCLOSE=&lt;udp_session_id&gt;</b> Response: OK or +CME ERROR:&lt;cme_error&gt; Purpose: Close the specified UDP session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;udp_session_id&gt; (UDP session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value automatically assigned to the session by <b>+KUDPCFG</b>.</li> <li>Valid range: 1–64</li> </ul> <p>&lt;udp_notif&gt; (Close Connection failure cause)</p> <ul style="list-style-type: none"> <li>Integer</li> <li>See <b>+KUDPCFG</b> for valid values</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>
<b>+KUDP_DATA (notification)</b>	<p><b>Incoming Data through a UDP Connection (unsolicited notification)</b> Notification is received when data is available in the receive buffer. (Notifications can be received as soon as the connection is established and data is available in the receive buffer.)</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+KUDP_DATA: &lt;udp_session_id&gt;, &lt;ndata_available&gt;[, &lt;udp_remote_address&gt;, &lt;udp_remote_port&gt;, &lt;data&gt;]</b> Purpose: Notification indicates a UDP packet is available.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;udp_session_id&gt; (UDP session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value automatically assigned to the session by <b>+KUDPCFG</b>.</li> <li>Valid range: 1–64</li> </ul> <p>&lt;ndata_available&gt; (Length of &lt;data&gt; field)</p> <ul style="list-style-type: none"> <li>1–512</li> <li>If user application sends &gt;512 bytes of data to the module, only the first 512 bytes of data are displayed.</li> </ul> <p>&lt;udp_remote_address&gt; (Remote UDP server's address)</p> <ul style="list-style-type: none"> <li>IPv4 address (dot-separated, each octet = (0..255))</li> <li>Format: a1.a2.a3.a4</li> </ul> <p>&lt;udp_remote_port&gt; (Remote server's UDP port)</p> <ul style="list-style-type: none"> <li>0–65535</li> </ul> <p>&lt;data&gt; (UDP data packet received)</p> <ul style="list-style-type: none"> <li>Data in octet format (raw bytes, no encoding)</li> </ul>

Table 9-7: UDP commands (Continued)

Command	Description
<b>+KUDPDEL</b>	<p><b>Delete a Configured UDP Session</b> Delete a specified UDP session.</p> <hr/> <p><i>Note: The session must be closed using +KUDPCLOSE before it can be deleted with this command.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KUDPDEL=&lt;udp_session_id&gt;</b></li> <li>Response: OK or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Delete the specified UDP session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;udp_session_id&gt; (UDP session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value automatically assigned to the session by <a href="#">+KUDPCFG</a>.</li> <li>Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>
<b>+KUDP_NOTIF (notification)</b>	<p><b>UDP error notification (unsolicited notification)</b> Notification received when a UDP error occurs.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+KUDP_NOTIF: &lt;udp_session_id&gt;, &lt;notif_id&gt;</b></li> <li>Purpose: Notification indicates an error related to the specified UDP session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;udp_session_id&gt; (UDP session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value automatically assigned to the session by <a href="#">+KUDPCFG</a>.</li> <li>Valid range: 1–64</li> </ul> <p>&lt;notif_id&gt; (UDP error code)</p> <ul style="list-style-type: none"> <li>3—NETWORK_NOTIF_DNS_ERROR</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Error on UDP session #1: +KUDP_NOTIF: 1, 3</li> </ul>

Table 9-7: UDP commands (Continued)

Command	Description
<b>+KUDPSND</b>	<p><b>Send Data through a UDP Connection</b> Send data over a specified UDP connection.</p> <hr/> <p><i>Note: This does not cause data mode to be entered/exited.</i></p> <hr/> <p><i>Note: Before using this command, it is highly recommended to configure the module for hardware flow control, using the command AT&amp;K3.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:           <div style="margin-left: 2em;"> <b>AT+KUDPSND=&lt;udp_session_id&gt;,&lt;udp_remote_address&gt;,&lt;udp_remote_port&gt;,&lt;data&gt;</b> </div> </li> <li>Response: OK</li> <li>Purpose: Send the &lt;data&gt; over the specified UDP connection.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;udp_session_id&gt; (UDP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value automatically assigned to the session by +KUDPCFG.</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;udp_remote_address&gt; (Remote UDP server's address)</p> <ul style="list-style-type: none"> <li>• IPv4 address (dot-separated, each octet = (0..255))</li> <li>• Format: a1.a2.a3.a4</li> </ul> <p>&lt;udp_remote_port&gt; (Remote server's UDP port)</p> <ul style="list-style-type: none"> <li>• 0–65535</li> </ul> <p>&lt;data&gt; (Data to send over UDP connection)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Length—1–218</li> <li>• Special characters (if present) entered as hex values (e.g. "\0d")</li> </ul>

Table 9-8: HTTP commands

Command	Description
<b>+KHTTPCFG</b>	<p><b>HTTP Connection Configuration</b></p> <p>Set up (configure) an HTTP session to a specified remote HTTP server, or display the current configuration of the session.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KHTTPCFG=[&lt;cnx_cnf&gt;,&lt;http_server&gt;,&lt;http_port&gt;,&lt;http_version&gt;,&lt;login&gt;,&lt;password&gt;]</b></li> <li>Response: +KHTTPCFG: &lt;http_session_id&gt; OK</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Set up an HTTP session with the stated configuration parameters.</li> <li>Read: <b>AT+KHTTPCFG?</b></li> <li>Response: +KHTTPCFG: &lt;http_session_id&gt;,&lt;cnx_cnf&gt;,&lt;http_server&gt;,&lt;http_port&gt;,&lt;http_version&gt;,&lt;login&gt;,&lt;password&gt;,&lt;started&gt;,&lt;af&gt; ... OK</li> <li>Purpose: Display the current configuration of the HTTP connection for all sessions.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;cnx_cnf&gt; (PDP context configuration Index (parameter set for configuring one HTTP session))</p> <ul style="list-style-type: none"> <li>Valid range: 0–7</li> </ul> <p>&lt;http_session_id&gt; (HTTP session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <p>&lt;http_server&gt; (Remote server's address)</p> <ul style="list-style-type: none"> <li>Valid formats: <ul style="list-style-type: none"> <li>FQDN</li> <li>IPv4 address (dot-separated, each octet = (0..255)) e.g. 192.168.10.1</li> </ul> </li> </ul> <p>&lt;http_port&gt; (Remote server's HTTP port)</p> <ul style="list-style-type: none"> <li>Valid range: 0–65535</li> <li>Default: 80</li> </ul> <p>&lt;http_version&gt; (HTTP version used for connection)</p> <ul style="list-style-type: none"> <li>0—HTTP 1.1</li> <li>1—HTTP 1.0</li> </ul> <p>&lt;login&gt; (User name to use during HTTP connection)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Length—Variable, maximum command line length = 255 characters, plus &lt;CR&gt;</li> </ul> <p>&lt;password&gt; (Password to use during HTTP connection)</p> <ul style="list-style-type: none"> <li>ASCII string</li> <li>Length—Variable, maximum command line length = 255 characters, plus &lt;CR&gt;</li> </ul> <p>&lt;started&gt; (HTTP connection status)</p> <ul style="list-style-type: none"> <li>0—The HTTP connection has not been started yet</li> <li>1—The HTTP connection has already been started</li> </ul> <p>&lt;af&gt; (Address family used for the connection)</p> <ul style="list-style-type: none"> <li>0 (Default)—IPv4</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-8: HTTP commands (Continued)

Command	Description
<b>+KHTTPCLOSE</b>	<p><b>Close an HTTP Connection</b> Close the HTTP session.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KHTTPCLOSE=&lt;http_session_id&gt;</b></li> <li>Response: OK or +CME ERROR:&lt;cme_error&gt;</li> <li>Purpose: Close the specified session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;http_session_id&gt; (HTTP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>
<b>+KHTTPCNX</b>	<p><b>Start HTTP Connection</b> Start the HTTP connection that was created earlier using <b>+KHTTPCFG</b>.</p> <hr/> <p><i>Note: <b>+KHTTPGET</b>, <b>+KHTTPHEAD</b>, and <b>+KHTTPPOST</b> will automatically start the connection if it has not already been started using <b>+KHTTPCNX</b>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KHTTPCNX=&lt;http_session_id&gt;</b></li> <li>Response: OK or +CME ERROR:&lt;cme_error&gt; or +KHTTP_ERROR:&lt;http_session_id&gt;,&lt;http_notif&gt;</li> <li>Purpose: Set up an HTTP session with the stated configuration parameters.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;http_session_id&gt; (HTTP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;http_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• 4—DNS error</li> <li>• 5—HTTP connection error due to internal trouble</li> <li>• 6—HTTP connection timeout</li> <li>• 7—Flash access trouble</li> <li>• 8—Flash memory full</li> <li>• 9—Triple plus (+++) error (switch to command mode)</li> <li>• 10—HTTP got no data</li> <li>• 11—HTTP got partial data</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-8: HTTP commands (Continued)

Command	Description
<b>+KHTTPDEL</b>	<p><b>Delete a Configured HTTP Session</b> Delete a specified HTTP session.</p> <hr/> <p><i>Note: The session must be closed using <b>+KHTTPCLOSE</b> before it can be deleted with this command.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KHTTPDEL=&lt;http_session_id&gt;</b></li> <li>Response: OK or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Delete the specified HTTP session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;http_session_id&gt; (HTTP session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>
<b>+KHTTPDELETE</b>	<p><b>Perform HTTP Delete</b> Send an HTTP DELETE request to the remote HTTP server.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KHTTPDELETE=&lt;http_session_id&gt;,&lt;request_uri&gt;</b></li> <li>Response: CONNECT ... [Enter the EOF pattern ("+++")] OK or NO CARRIER or +CME ERROR: &lt;cme_error&gt; or +KHTTP_ERROR:&lt;http_session_id&gt;,&lt;http_notif&gt;</li> <li>Purpose: Send a request to delete the specified &lt;request_uri&gt; resource from the specified http session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;http_session_id&gt; (HTTP session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <p>&lt;request_uri&gt; (Information URL—the path of the resource to be deleted on the HTTP server)</p> <ul style="list-style-type: none"> <li>Non-blank ASCII string, plus quotation marks (e.g. "/myprofile" is valid, "" is not valid)</li> <li>Example: If &lt;request_uri&gt; is "/myprofile" and the connected server is "http://example_site.com", then +KHTTPDELETE deletes "http://example.site.com/myprofile".</li> </ul> <p>&lt;http_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>Integer</li> <li>See <a href="#">+KHTTPCNX</a> on page 227 for supported values</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-8: HTTP commands (Continued)

Command	Description
<b>+KHTTPGET</b>	<p><b>Get HTTP Server Information</b> Display information about the HTTP server.</p> <hr/> <p><i>Note: This command automatically starts the connection if it has not already been started using <b>+KHTTPCNX</b>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:       <b>AT+KHTTPGET=&lt;http_session_id&gt;, &lt;request_uri&gt;</b></li> <li>  Response:   CONNECT [Multiple lines of information about the HTTP server] +++       <i>(Known issue—'+++' should be returned, but is not.)</i> OK</li> <li>          or   NO CARRIER</li> <li>          or   +CME ERROR:&lt;cme_error&gt;</li> <li>          or   +KHTTP_ERROR:&lt;http_session_id&gt;,&lt;http_notif&gt;</li> <li>  Purpose:     Display details about the HTTP server.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;http_session_id&gt; (HTTP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;request_uri&gt; (Information URL—the path on the HTTP server to be retrieved)</p> <ul style="list-style-type: none"> <li>• Non-blank ASCII string, plus quotation marks (e.g. "/myprofile" is valid, "" is not valid)</li> <li>• Example: If &lt;request_uri&gt; is "/myprofile" and the connected server is "http://example_site.com", then +KHTTPGET retrieves "http://example.site.com/myprofile".</li> </ul> <p>&lt;http_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• See <b>+KHTTPCNX</b> on page 227 for supported values</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p>(Continued on next page)</p>

Table 9-8: HTTP commands (Continued)

Command	Description
<b>+KHTTPGET</b> (continued)	<p><b>Get HTTP Server Information (continued)</b></p> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• AT+KHTTPGET=0, "/index.html"</li> </ul> <pre>CONNECT HTTP/1.0 200 OK Cache-Control: private, max-age=0 Date: Tue, 24 Jun 2008 02:11:35 GMT Expires: -1 Content-Type: text/html; charset=ISO-8859-1 Set-Cookie: PREF=ID=ae1c663417e7799e:NW=1:TM=1214273495:LM=1214273495:S=5Uq9kEx K4aTEv_cx; expires=Thu, 24-Jun-2010 02:11:35 GMT; path=/; domain=.google.com Server: gws Connection: Close  &lt;html&gt;&lt;head&gt;&lt;meta http-equiv="content-type" ... a lot of data... +++      (Known issue—'+++' should be returned, but is not.)</pre>

Table 9-8: HTTP commands (Continued)

Command	Description
<b>+KHTTPHEAD</b>	<p><b>Get HTTP Headers</b></p> <p>Display information about the remote HTTP server and display the head of the specified URL.</p> <hr/> <p><i>Note: This method is identical to <a href="#">+KHTTPGET</a> except the server <b>MUST NOT</b> return a message-body in the response. The meta-information contained in the HTTP headers in response to a HEAD request <b>SHOULD</b> be identical to the information sent in response to a GET request.</i></p> <hr/> <p><i>Note: This command automatically starts the connection if it has not already been started using <a href="#">+KHTTPCNX</a>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KHTTPHEAD=&lt;http_session_id&gt;, &lt;request_uri&gt;</b></li> <li>Response: CONNECT [Multiple lines of information about the head of the specified URL] +++ <i>(Known issue—'+++' should be returned, but is not.)</i> OK</li> <li>or NO CARRIER</li> <li>or +CME ERROR:&lt;cme_error&gt;</li> <li>or +KHTTP_ERROR:&lt;http_session_id&gt;,&lt;http_notif&gt;</li> </ul> <p>Purpose: Display the head of the specified URL.</p> <p><b>Parameters:</b></p> <p>&lt;http_session_id&gt; (HTTP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;request_uri&gt; (Information URL—the path on the HTTP server to be retrieved)</p> <ul style="list-style-type: none"> <li>• Non-blank ASCII string, plus quotation marks (e.g. "/myprofile" is valid, "" is not valid)</li> <li>• Example: If &lt;request_uri&gt; is "/myprofile" and the connected server is "http://example_site.com", then +KHTTPGET retrieves "http://example.site.com/myprofile".</li> </ul> <p>&lt;http_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• See <a href="#">+KHTTPCNX</a> on page 227 for supported values</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p>(Continued on next page)</p>

Table 9-8: HTTP commands (Continued)

Command	Description
<b>+KHTTPHEAD</b> (continued)	<p><b>Get HTTP Headers (continued)</b></p> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>AT+KHTTPHEAD=1, "/index.html"</li> </ul> <pre>CONNECT HTTP/1.0 200 OK Cache-Control: private, max-age=0 Date: Tue, 24 Jun 2008 02:11:35 GMT Expires: -1 Content-Type: text/html; charset=ISO-8859-1 Set-Cookie:   PREF=ID=ae1c663417e7799e:NW=1:TM=1214273495:LM=1214273495:S=5Uq9kEx   K4aTEv_cx; expires=Thu, 24-Jun-2010 02:11:35 GMT; path=/; domain=.google.com Server: gws Connection: Close +++      (Known issue—'+++' should be returned, but is not.) OK</pre>
<b>+KHTTPHEADER</b>	<p><b>Set the HTTP Request Header</b></p> <p>Set the HTTP Request header. Data is always input from the serial link. Data is terminated by exiting data mode using '+++'. <b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KHTTPHEADER=&lt;http_session_id&gt;</b> Response: CONNECT</li> </ul> <p>[Enter header contents, followed by \r\n to indicate CR/LF.] [Enter the EOF pattern ("+++")]</p> <pre>OK or ERROR</pre> <p>Purpose: Set the Request header for the specified HTTP session. (Example header contents: headerexample@example.net\r\n )</p> <ul style="list-style-type: none"> <li>Read: <b>AT+KHTTPHEADER?</b> Response: +KHTTPHEADER:</li> </ul> <pre>[header contents] ... OK</pre> <p>Purpose: Display the header contents.</p> <p><b>Parameters:</b> &lt;http_session_id&gt; (HTTP session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul>

Table 9-8: HTTP commands (Continued)

Command	Description
<b>+KHTTPPOST</b>	<p><b>Send Data to HTTP Server</b></p> <p>Send data to the remote HTTP server via a POST request. Data is always input from the serial link. Data is terminated by exiting data mode using '+++'. <hr/></p> <p><i>Note: Before using this command, it is highly recommended to configure the module for hardware flow control, using the command AT&amp;K3.</i> <hr/></p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KHTTPPOST=&lt;http_session_id&gt;, &lt;request_uri&gt;</b></li> <li>Response: CONNECT [Send request data over serial link] [Receive server response] [Enter the EOF pattern ("+++")] OK</li> <li>or NO CARRIER</li> <li>or +CME ERROR:&lt;cme_error&gt;</li> <li>or +KHTTP_ERROR:&lt;http_session_id&gt;,&lt;http_notif&gt;</li> </ul> <p>Purpose: Send a POST request to the HTTP server and then send data over the serial link.</p> <p><b>Parameters:</b></p> <p>&lt;http_session_id&gt; (HTTP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;request_uri&gt; (Information URL—the path on the HTTP server where data is to be posted)</p> <ul style="list-style-type: none"> <li>• Non-blank ASCII string, plus quotation marks (e.g. "/myprofile" is valid, "" is not valid)</li> <li>• Example: If &lt;request_uri&gt; is "/myprofile" and the connected server is "http://example_site.com", then +KHTTPPOST posts the data to "http://example.site.com/myprofile".</li> </ul> <p>&lt;http_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• See <a href="#">+KHTTPCNX</a> on page 227 for supported values</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• AT+KHTTPPOST=0, "/get.cgi" CONNECT (...Data send...) HTTP/1.0 200 OK Content-Type: text/plain Context-Length: 37</li> </ul> <p>Your data have been accepted. [Enter the EOF pattern ("+++")] OK</p>

**Table 9-8: HTTP commands (Continued)**

Command	Description
<b>+KHTTTPUT</b>	<p><b>Perform HTTP PUT</b></p> <p>Send data to the remote HTTP server via a PUT request. Data is always input from the serial link. Data is terminated by exiting data mode using '+++'.  <hr/> <i>Note: Before using this command, it is highly recommended to configure the module for hardware flow control, using the command AT&amp;K3.</i>  <hr/> <b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:           <b>AT+KHTTTPUT=&lt;http_session_id&gt;, &lt;request_uri&gt;</b></li> <li>  Response:       CONNECT</li> <li>                  ...</li> <li>                  [Enter the EOF pattern ("+++")]</li> <li>                  OK</li> <li>                  or NO CARRIER</li> <li>                  or +CME ERROR:&lt;cme_error&gt;</li> <li>                  or +KHTTP_ERROR:&lt;http_session_id&gt;,&lt;http_notif&gt;</li> <li>  Purpose:        Send an HTTP PUT request.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;http_session_id&gt; (HTTP session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;request_uri&gt; (Information URL—the path on the HTTP server where data is to be put)</p> <ul style="list-style-type: none"> <li>• Non-blank ASCII string, plus quotation marks (e.g. "/myprofile" is valid, "" is not valid)</li> <li>• Example: If &lt;request_uri&gt; is "/myprofile" and the connected server is "http://example_site.com", then +KHTTTPUT puts the data to "http://example_site.com/myprofile".</li> </ul> <p>&lt;http_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• See <a href="#">+KHTTTPCNX</a> on page 227 for supported values</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-9: HTTPS commands

Command	Description
<p><b>+KHTTPSCFG</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+KHTTPSCFG</a>.)</p>	<p><b>HTTPS Connection Configuration</b></p> <p>Set up (configure) an HTTPS session to a specified remote HTTP server, or display the current configuration of the session.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>Pre-Shared Key and Pre-Shared Key Identity must be configured when using a PSK cipher suite (see <a href="#">+KHTTPSPSK</a>).</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KHTTPSCFG=[&lt;cnx_cnf&gt;,&lt;http_server&gt;,&lt;https_port&gt;,&lt;http_version&gt;,&lt;cipher_suite&gt;,&lt;sec_level&gt;,&lt;login&gt;,&lt;password&gt;,&lt;min_tls_version&gt;,&lt;max_tls_version&gt;]]]]]]]]</b>  Response: +KHTTPSCFG: &lt;https_session_id&gt;  OK  or +CME ERROR: &lt;cme_error&gt;  Purpose: Set up an HTTP session with the stated configuration parameters.</li> <li>Read: <b>AT+KHTTPSCFG?</b>  Response: +KHTTPSCFG: &lt;https_session_id&gt;,&lt;cnx_cnf&gt;,&lt;http_server&gt;,&lt;https_port&gt;,&lt;http_version&gt;,&lt;cipher_suite&gt;,&lt;sec_level&gt;,&lt;login&gt;,&lt;password&gt;,&lt;started&gt;,&lt;af&gt;,&lt;min_tls_version&gt;,&lt;max_tls_version&gt;  ...  OK  Purpose: Display the current configuration of the HTTPS connection for all sessions.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;cnx_cnf&gt;</p> <ul style="list-style-type: none"> <li>Not used, leave blank</li> </ul> <p>&lt;https_session_id&gt; (HTTPS session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <p>&lt;http_server&gt; (Remote server's address)</p> <ul style="list-style-type: none"> <li>Valid formats: <ul style="list-style-type: none"> <li>FQDN</li> <li>Valid characters: A-Z, a-z, 0-9</li> <li>IPv4 address (dot-separated, each octet = (0..255)) e.g. 192.168.10.1</li> </ul> </li> </ul> <p>&lt;https_port&gt; (Remote server's HTTP port)</p> <ul style="list-style-type: none"> <li>Valid range: 0–65535</li> <li>Default: 443</li> </ul> <p>&lt;http_version&gt; (HTTP version used for connection)</p> <ul style="list-style-type: none"> <li>0—HTTP 1.1</li> <li>1—HTTP 1.0</li> </ul> <p>(Continued on next page)</p>

Table 9-9: HTTPS commands (Continued)

Command	Description
<b>+KHTTPSCFG</b> <b>(continued)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+KHTTPSCFG</a> .)	<b>HTTPS Connection Configuration (continued)</b> <cipher_suite> (Security settings) <ul style="list-style-type: none"> <li>• 0—(Default) TLS_RSA_CHOOSE_BY_SERVER</li> <li>• 1—TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384</li> <li>• 2—TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384</li> <li>• 3—TLS_DHE_RSA_WITH_AES_256_GCM_SHA384</li> <li>• 4—TLS_ECDHE_ECDSA_WITH_AES_256_CCM</li> <li>• 5—TLS_DHE_RSA_WITH_AES_256_CCM</li> <li>• 6—TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384</li> <li>• 7—TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384</li> <li>• 8—TLS_DHE_RSA_WITH_AES_256_CBC_SHA256</li> <li>• 9—TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA</li> <li>• 10—TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA</li> <li>• 11—TLS_DHE_RSA_WITH_AES_256_CBC_SHA</li> <li>• 12—TLS_ECDHE_ECDSA_WITH_AES_256_CCM_8</li> <li>• 13—TLS_DHE_RSA_WITH_AES_256_CCM_8</li> <li>• 14—TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256</li> <li>• 15—TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256</li> <li>• 16—TLS_DHE_RSA_WITH_AES_128_GCM_SHA256</li> <li>• 17—TLS_ECDHE_ECDSA_WITH_AES_128_CCM</li> <li>• 18—TLS_DHE_RSA_WITH_AES_128_CCM</li> <li>• 19—TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256</li> <li>• 20—TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256</li> <li>• 21—TLS_DHE_RSA_WITH_AES_128_CBC_SHA256</li> <li>• 22—TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA</li> <li>• 23—TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA</li> <li>• 24—TLS_DHE_RSA_WITH_AES_128_CBC_SHA</li> <li>• 25—TLS_ECDHE_ECDSA_WITH_AES_128_CCM_8</li> <li>• 26—TLS_DHE_RSA_WITH_AES_128_CCM_8</li> <li>• 27—TLS_DHE_PSK_WITH_AES_256_GCM_SHA384</li> <li>• 28—TLS_DHE_PSK_WITH_AES_256_CCM</li> <li>• 29—TLS_ECDHE_PSK_WITH_AES_256_CBC_SHA384</li> <li>• 30—TLS_DHE_PSK_WITH_AES_256_CBC_SHA384</li> <li>• 31—TLS_ECDHE_PSK_WITH_AES_256_CBC_SHA</li> <li>• 32—TLS_DHE_PSK_WITH_AES_256_CBC_SHA</li> <li>• 33—TLS_DHE_PSK_WITH_AES_256_CCM_8</li> <li>• 34—TLS_DHE_PSK_WITH_AES_128_GCM_SHA256</li> <li>• 35—TLS_DHE_PSK_WITH_AES_128_CCM</li> <li>• 36—TLS_ECDHE_PSK_WITH_AES_128_CBC_SHA256</li> <li>• 37—TLS_DHE_PSK_WITH_AES_128_CBC_SHA256</li> <li>• 38—TLS_ECDHE_PSK_WITH_AES_128_CBC_SHA</li> <li>• 39—TLS_DHE_PSK_WITH_AES_128_CBC_SHA</li> <li>• 40—TLS_DHE_PSK_WITH_AES_128_CCM_8</li> <li>• 41—TLS_RSA_WITH_AES_256_GCM_SHA384</li> <li>• 42—TLS_RSA_WITH_AES_256_CCM</li> <li>• 43—TLS_RSA_WITH_AES_256_CBC_SHA256</li> <li>• 44—TLS_RSA_WITH_AES_256_CBC_SHA</li> </ul> (Continued on next page)

Table 9-9: HTTPS commands (Continued)

Command	Description
<b>+KHTTPSCFG</b> <b>(continued)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+KHTTPSCFG</a> .)	<b>HTTPS Connection Configuration (continued)</b> <ul style="list-style-type: none"> <li>• 45—TLS_ECDH_RSA_WITH_AES_256_GCM_SHA384</li> <li>• 46—TLS_ECDH_RSA_WITH_AES_256_CBC_SHA384</li> <li>• 47—TLS_ECDH_RSA_WITH_AES_256_CBC_SHA</li> <li>• 48—TLS_ECDH_ECDSA_WITH_AES_256_GCM_SHA384</li> <li>• 49—TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA384</li> <li>• 50—TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA</li> <li>• 51—TLS_RSA_WITH_AES_256_CCM_8</li> <li>• 52—TLS_RSA_WITH_AES_128_GCM_SHA256</li> <li>• 53—TLS_RSA_WITH_AES_128_CCM</li> <li>• 54—TLS_RSA_WITH_AES_128_CBC_SHA256</li> <li>• 55—TLS_RSA_WITH_AES_128_CBC_SHA</li> <li>• 56—TLS_ECDH_RSA_WITH_AES_128_GCM_SHA256</li> <li>• 57—TLS_ECDH_RSA_WITH_AES_128_CBC_SHA256</li> <li>• 58—TLS_ECDH_RSA_WITH_AES_128_CBC_SHA</li> <li>• 59—TLS_ECDH_ECDSA_WITH_AES_128_GCM_SHA256</li> <li>• 60—TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA256</li> <li>• 61—TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA</li> <li>• 62—TLS_RSA_WITH_AES_128_CCM_8</li> <li>• 63—TLS_RSA_PSK_WITH_AES_256_GCM_SHA384</li> <li>• 64—TLS_RSA_PSK_WITH_AES_256_CBC_SHA384</li> <li>• 65—TLS_RSA_PSK_WITH_AES_256_CBC_SHA</li> <li>• 66—TLS_RSA_PSK_WITH_AES_128_GCM_SHA256</li> <li>• 67—TLS_RSA_PSK_WITH_AES_128_CBC_SHA256</li> <li>• 68—TLS_RSA_PSK_WITH_AES_128_CBC_SHA</li> <li>• 69—TLS_PSK_WITH_AES_256_GCM_SHA384</li> <li>• 70—TLS_PSK_WITH_AES_256_CCM</li> <li>• 71—TLS_PSK_WITH_AES_256_CBC_SHA384</li> <li>• 72—TLS_PSK_WITH_AES_256_CBC_SHA</li> <li>• 73—TLS_PSK_WITH_AES_256_CCM_8</li> <li>• 74—TLS_PSK_WITH_AES_128_GCM_SHA256</li> <li>• 75—TLS_PSK_WITH_AES_128_CCM</li> <li>• 76—TLS_PSK_WITH_AES_128_CBC_SHA256</li> <li>• 77—TLS_PSK_WITH_AES_128_CBC_SHA</li> <li>• 78—TLS_PSK_WITH_AES_128_CCM_8</li> </ul> <p>&lt;sec_level&gt; (Authentication type)</p> <ul style="list-style-type: none"> <li>• 1—No authentication</li> <li>• 2—Manage server authentication</li> <li>• 3—Manage server and client authentication if requested by remote server</li> <li>• Note: For levels 2 and 3, certificates or private keys must be loaded using <a href="#">+KCERT-STORE</a> and <a href="#">+KPRIVKSTORE</a>.</li> <li>• Note: All certificates and private keys should be PEM-encoded or DER-encoded.</li> </ul> <p>&lt;login&gt; (User name to use during HTTPS connection)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Length—Variable, maximum command line length = 255 characters, plus &lt;CR&gt;</li> </ul> <p>(Continued on next page)</p>

**Table 9-9: HTTPS commands (Continued)**

Command	Description
<b>+KHTTPSCFG (continued)</b> (F/W rev: 2.5.0+ For previous version, see <a href="#">+KHTTPSCFG</a> .)	<b>HTTPS Connection Configuration (continued)</b> <password> (Password to use during HTTPS connection) <ul style="list-style-type: none"> <li>• ASCII string</li> <li>• Length—Variable, maximum command line length = 255 characters, plus &lt;CR&gt;</li> </ul> <started> (HTTPS connection status) <ul style="list-style-type: none"> <li>• 0—The HTTPS connection has not been started yet</li> <li>• 1—The HTTPS connection has already been started</li> </ul> <af> (Address family used for the connection) <ul style="list-style-type: none"> <li>• 0 (Default)—IPv4</li> </ul> <min_tls_version> (Minimum TLS version) <ul style="list-style-type: none"> <li>• 0—TLS Version 1.0</li> <li>• 1—TLS Version 1.1</li> <li>• 2—(Default) TLS Version 1.2</li> <li>• Must be less than or equal to &lt;max_tls_version&gt;</li> </ul> <max_tls_version> (Maximum TLS version) <ul style="list-style-type: none"> <li>• 0—TLS Version 1.0</li> <li>• 1—TLS Version 1.1</li> <li>• 2—(Default) TLS Version 1.2</li> <li>• Must be greater than or equal to &lt;min_tls_version&gt;</li> </ul> <cme_error> (CME error code) <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-9: HTTPS commands (Continued)

Command	Description
<b>+KHTTPSCFG</b> (F/W rev: P1.0.0 For next version, see <a href="#">+KHTTPSCFG</a> .)	<p><b>HTTPS Connection Configuration</b></p> <p>Set up (configure) an HTTPS session to a specified remote HTTP server, or display the current configuration of the session.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KHTTPSCFG=[&lt;cnx_cnf&gt;,&lt;http_server&gt;,&lt;https_port&gt;,&lt;http_version&gt;,&lt;cipher_suite&gt;,&lt;sec_level&gt;,&lt;login&gt;,&lt;password&gt;][][]]</b></li> <li>Response: +KHTTPSCFG: &lt;https_session_id&gt; OK</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Set up an HTTP session with the stated configuration parameters.</li> <li>• Read: <b>AT+KHTTPSCFG?</b></li> <li>Response: +KHTTPSCFG: &lt;https_session_id&gt;,&lt;cnx_cnf&gt;,&lt;http_server&gt;,&lt;https_port&gt;,&lt;http_version&gt;,&lt;cipher_suite&gt;,&lt;sec_level&gt;,&lt;login&gt;,&lt;password&gt;,&lt;started&gt;,&lt;af&gt; ... OK</li> <li>Purpose: Display the current configuration of the HTTPS connection for all sessions.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;cnx_cnf&gt;</p> <ul style="list-style-type: none"> <li>• Not used, leave blank</li> </ul> <p>&lt;https_session_id&gt; (HTTPS session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;http_server&gt; (Remote server's address)</p> <ul style="list-style-type: none"> <li>• Valid formats:           <ul style="list-style-type: none"> <li>• FQDN</li> <li>• Valid characters: A-Z, a-z, 0-9</li> <li>• IPv4 address (dot-separated, each octet = (0..255)) e.g. 192.168.10.1</li> </ul> </li> <li>• Note: As of publication date of this document, &lt;http_server&gt; allows invalid FQDN to be specified. Make sure to use a properly-formed FQDN.</li> </ul> <p>&lt;https_port&gt; (Remote server's HTTP port)</p> <ul style="list-style-type: none"> <li>• Valid range: 0–65535</li> <li>• Default: 443</li> </ul> <p>&lt;http_version&gt; (HTTP version used for connection)</p> <ul style="list-style-type: none"> <li>• 0—HTTP 1.1</li> <li>• 1—HTTP 1.0</li> </ul> <p>(Continued on next page)</p>

Table 9-9: HTTPS commands (Continued)

Command	Description
<b>+KHTTPSCFG</b> <b>(continued)</b> (F/W rev: P1.0.0 For next version, see <a href="#">+KHTTPSCFG</a> .)	<b>HTTPS Connection Configuration (continued)</b> <cipher_suite> (Security settings) <ul style="list-style-type: none"> <li>NOTE: As of publication date of this document, &lt;cipher_suite&gt; is ignored.</li> <li>0—TLS_RSA_CHOOSE_BY_SERVER</li> <li>1—TLS_RSA_WITH_RC4_128_MD5</li> <li>2—TLS_RSA_WITH_RC4_128_SHA</li> <li>3—TLS_RSA_WITH_DES_CBC_SHA</li> <li>4—TLS_RSA_WITH_3DES_EDE_CBC_SHA</li> <li>5—TLS_RSA_EXPORT1024_WITH_DES_CBC_SHA</li> <li>6—TLS_RSA_WITH_AES_128_CBC_SHA</li> <li>7—TLS_RSA_WITH_AES_256_CBC_SHA</li> </ul> <sec_level> (Authentication type) <ul style="list-style-type: none"> <li>1—No authentication</li> <li>2—Manage server authentication</li> <li>3—Manage server and client authentication if requested by remote server</li> <li>Note: For levels 2 and 3, certificates or private keys must be loaded using <a href="#">+KCERT-STORE</a> and <a href="#">+KPRIVKSTORE</a>.</li> <li>Note: All certificates and private keys should be PEM-encoded or DER-encoded.</li> </ul> <login> (User name to use during HTTPS connection) <ul style="list-style-type: none"> <li>ASCII string</li> <li>Length—Variable, maximum command line length = 255 characters, plus &lt;CR&gt;</li> </ul> <password> (Password to use during HTTPS connection) <ul style="list-style-type: none"> <li>ASCII string</li> <li>Length—Variable, maximum command line length = 255 characters, plus &lt;CR&gt;</li> </ul> <started> (HTTPS connection status) <ul style="list-style-type: none"> <li>0—The HTTPS connection has not been started yet</li> <li>1—The HTTPS connection has already been started</li> </ul> <af> (Address family used for the connection) <ul style="list-style-type: none"> <li>0 (Default)—IPv4</li> </ul> <cme_error> (CME error code) <ul style="list-style-type: none"> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>
<b>+KHTTPSCLOSE</b>	<b>Close an HTTPS Connection</b> Close the HTTPS session.  <b>Usage:</b> <ul style="list-style-type: none"> <li>Write: <b>AT+KHTTPSCLOSE=&lt;https_session_id&gt;</b></li> <li>Response: OK</li> <li>or +CME ERROR:&lt;cme_error&gt;</li> <li>Purpose: Close the specified session.</li> </ul> <b>Parameters:</b> <https_session_id> (HTTPS session ID) <ul style="list-style-type: none"> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <cme_error> (CME error code) <ul style="list-style-type: none"> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-9: HTTPS commands (Continued)

Command	Description
<b>+KHTTPSCNX</b>	<p><b>Start HTTPS Connection</b></p> <p>Start an HTTPS connection that was created earlier using <a href="#">+KHTTPSCFG</a>.</p> <hr/> <p><i>Note: <a href="#">+KHTTPSGET</a>, <a href="#">+KHTTPSHEAD</a>, and <a href="#">+KHTTPSPOST</a> will automatically start the connection if it has not already been started using <a href="#">+KHTTPSCNX</a>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+KHTTPSCNX=&lt;https_session_id&gt;</b></li> <li>  Response:    OK</li> <li>                or +CME ERROR:&lt;cme_error&gt;</li> <li>                or +KHTTPS_ERROR:&lt;https_session_id&gt;,&lt;https_notif&gt;</li> <li>  Purpose:      Set up an HTTPS session with the stated configuration parameters.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;https_session_id&gt; (HTTPS session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;https_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• 4—DNS error</li> <li>• 5—HTTPS connection error due to internal trouble</li> <li>• 6—HTTPS connection timeout</li> <li>• 7—Flash access trouble</li> <li>• 8—Flash memory full</li> <li>• 9—Triple plus (+++) error (switch to command mode)</li> <li>• 10—HTTPS got no data</li> <li>• 11—HTTPS got partial data</li> <li>• 12—HTTPS validate server certificate error</li> <li>• 13—HTTPS initialize SSL error</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-9: HTTPS commands (Continued)

Command	Description
<b>+KHTTPSDEL</b>	<p><b>Delete a Configured HTTPS Session</b> Delete a specified HTTPS session.</p> <hr/> <p><i>Note: The session must be closed using <b>+KHTTSCLOSE</b> before it can be deleted with this command.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KHTTPSDEL=&lt;https_session_id&gt;</b></li> <li>Response: OK</li> <li style="padding-left: 2em;">or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Delete the specified HTTP session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;https_session_id&gt; (HTTPS session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>
<b>+KHTTPSDELETE</b>	<p><b>Perform HTTPS Delete</b> Send an HTTPS DELETE request to the remote HTTPS server.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KHTTPSDELETE=&lt;https_session_id&gt;,&lt;request_uri&gt;</b></li> <li>Response: CONNECT</li> <li style="padding-left: 2em;">...</li> <li style="padding-left: 2em;">[Enter the EOF pattern ("+++")]</li> <li style="padding-left: 2em;">OK</li> <li style="padding-left: 2em;">or NO CARRIER</li> <li style="padding-left: 2em;">or +CME ERROR:&lt;cme_error&gt;</li> <li style="padding-left: 2em;">or +KHTTPS_ERROR:&lt;https_session_id&gt;,&lt;https_notif&gt;</li> <li>Purpose: Send a request to delete the specified &lt;request_uri&gt; resource from the specified https session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;https_session_id&gt; (HTTPS session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;request_uri&gt; (Information URL—the path of the resource to be deleted on the HTTPS server)</p> <ul style="list-style-type: none"> <li>• Non-blank ASCII string, plus quotation marks (e.g. "/myprofile" is valid, "" is not valid)</li> <li>• Example: If &lt;request_uri&gt; is "/myprofile" and the connected server is "https://example_site.com", then +KHTTPSDELETE deletes "https://example.site.com/myprofile".</li> </ul> <p>&lt;https_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• See <a href="#">+KHTTSCNX</a> on page 241 for supported values.</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

Table 9-9: HTTPS commands (Continued)

Command	Description
<b>+KHTTPSGET</b>	<p><b>Get HTTPS Server Information</b> Display information about the HTTPS server.</p> <hr/> <p><i>Note: This command will automatically start the connection if it has not already been started using <a href="#">+KHTTPSCNX</a>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:       <b>AT+KHTTPSGET=&lt;https_session_id&gt;, &lt;request_uri&gt;</b></li> <li>  Response:   CONNECT [Multiple lines of information about the HTTPS server] +++       <i>(Known issue—'+++' should be returned, but is not.)</i> OK</li> <li>          or   NO CARRIER</li> <li>          or   +CME ERROR:&lt;cme_error&gt;</li> <li>          or   +KHTTPS_ERROR:&lt;https_session_id&gt;,&lt;https_notif&gt;</li> <li>  Purpose:     Display details about the HTTPS server.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;https_session_id&gt; (HTTPS session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;request_uri&gt; (Information URL—the path on the HTTP server to be retrieved)</p> <ul style="list-style-type: none"> <li>• Non-blank ASCII string, plus quotation marks (e.g. "/myprofile" is valid, "" is not valid)</li> <li>• Example: If &lt;request_uri&gt; is "/myprofile" and the connected server is "https://example_site.com", then +KHTTPGET retrieves "https://example.site.com/myprofile".</li> </ul> <p>&lt;https_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• See <a href="#">+KHTTPSCNX</a> on page 241 for supported values.</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p>(Continued on next page)</p>

Table 9-9: HTTPS commands (Continued)

Command	Description
<b>+KHTTPSGET</b> (continued)	<p><b>Get HTTPS Server Information (continued)</b></p> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>AT+KHTTPSGET=0, "/"</li> </ul> <pre>CONNECT HTTP/1.0 200 OK Cache-Control: private, max-age=0 Date: Tue, 24 Jun 2008 02:11:35 GMT Expires: -1 Content-Type: text/html; charset=ISO-8859-1  Set-Cookie: PREF=ID=ae1c663417e7799e:NW=1:TM=1214273495:LM=1214273495:S=5Uq9kEx K4aTEv_cx; expires=Thu, 24-Jun-2010 02:11:35 GMT; path=/; domain=.google.com Server: gws Connection: Close &lt;html&gt;&lt;head&gt;&lt;meta http-equiv="content-type" ... a lot of data... +++      (Known issue—'+++' should be returned, but is not.) OK</pre>

Table 9-9: HTTPS commands (Continued)

Command	Description
<b>+KHTTPSHEAD</b>	<p><b>Get HTTPS Headers</b></p> <p>Display information about the remote HTTPS server and display the head of the specified URL.</p> <hr/> <p><i>Note: This method is identical to <a href="#">+KHTTPSGET</a> except 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.</i></p> <hr/> <p><i>Note: This command automatically starts the connection if it has not already been started using <a href="#">+KHTTPCNX</a>.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KHTTPSHEAD=&lt;https_session_id&gt;, &lt;request_uri&gt;</b></li> <li>Response: CONNECT [Multiple lines of information about the head of the specified URL] +++ <i>(Known issue—'+++' should be returned, but is not.)</i> OK</li> <li>or NO CARRIER</li> <li>or +CME ERROR:&lt;cme_error&gt;</li> <li>or +KHTTPS_ERROR:&lt;http_session_id&gt;,&lt;http_notif&gt;</li> </ul> <p>Purpose: Display the head of the specified URL.</p> <p><b>Parameters:</b></p> <p>&lt;https_session_id&gt; (HTTPS session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;request_uri&gt; (Information URL—the path on the HTTP server to be retrieved)</p> <ul style="list-style-type: none"> <li>• Non-blank ASCII string, plus quotation marks (e.g. "/myprofile" is valid, "" is not valid)</li> <li>• Example: If &lt;request_uri&gt; is "/myprofile" and the connected server is "https://example_site.com", then +KHTTPSGET retrieves "https://example.site.com/myprofile".</li> </ul> <p>&lt;https_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• See <a href="#">+KHTTPCNX</a> on page 241 for supported values.</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p>(Continued on next page)</p>

Table 9-9: HTTPS commands (Continued)

Command	Description
<b>+KHTTPSHEAD</b> (continued)	<p><b>Get HTTPS Headers (continued)</b></p> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>AT+KHTTPSHEAD=0, "/" CONNECT HTTP/1.0 200 OK Cache-Control: private, max-age=0 Date: Tue, 24 Jun 2008 02:11:35 GMT Expires: -1 Content-Type: text/html; charset=ISO-8859-1 Set-Cookie: PREF=ID=ae1c663417e7799e:NW=1:TM=1214273495:LM=1214273495:S=5Uq9kEx K4aTEv_cx; expires=Thu, 24-Jun-2010 02:11:35 GMT; path=/; domain=.google.com Server: gws Connection: Close +++ (Known issue—'+++' should be returned, but is not.) OK</li> </ul>
<b>+KHTTPSHEADER</b>	<p><b>Set the HTTPS Request Header</b></p> <p>Set the HTTPS Request header. Data is always input from the serial link. Data is terminated by exiting data mode using '+++'. <b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KHTTPSHEADER=&lt;https_session_id&gt;</b> Response: CONNECT  [Enter header contents, followed by \r\n to indicate CR/LF.] [Enter the EOF pattern ("+++")]  OK or ERROR Purpose: Set the Request header for the specified HTTPS session. (Example header contents: headerexample@example.net\r\n )</li> <li>Read: <b>AT+KHTTPSHEADER?</b> Response: +KHTTPSHEADER:  [header contents] ... OK Purpose: Display the header contents</li> </ul> <p><b>Parameters:</b> &lt;https_session_id&gt; (HTTPS session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul>

**Table 9-9: HTTPS commands (Continued)**

Command	Description
<p><b>+KHTTPSPPOST</b></p>	<p><b>Send Data to HTTPS Server</b></p> <p>Send data to the remote HTTPS server via a POST request. Data is always input from the serial link. Data is terminated by exiting data mode using '+++'. <hr/></p> <p><i>Note: Before using this command, it is highly recommended to configure the module for hardware flow control, using the command AT&amp;K3.</i> <hr/></p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KHTTPSPPOST=&lt;https_session_id&gt;, &lt;request_uri&gt;</b></li> <li>Response: CONNECT [Send request data over serial link] [Receive server response] [Enter the EOF pattern ("+++")] OK</li> <li>or NO CARRIER</li> <li>or +CME ERROR:&lt;cme_error&gt;</li> <li>or +KHTTPS_ERROR:&lt;http_session_id&gt;,&lt;http_notif&gt;</li> </ul> <p>Purpose: Send a POST request to the HTTPS server and then send data over the serial link.</p> <p><b>Parameters:</b></p> <p>&lt;https_session_id&gt; (HTTPS session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;request_uri&gt; (Information URL—the path on the HTTPS server where data is to be posted)</p> <ul style="list-style-type: none"> <li>• Non-blank ASCII string, plus quotation marks (e.g. "/myprofile" is valid, "" is not valid)</li> <li>• Example: If &lt;request_uri&gt; is "/myprofile" and the connected server is "https://example_site.com", then +KHTTPSPPOST posts the data to "https://example.site.com/myprofile".</li> </ul> <p>&lt;https_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• See <a href="#">+KHTTPSCNX</a> on page 241 for supported values.</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• AT+KHTTPSPPOST=0,,"/get.cgi" CONNECT (...Data send...) HTTP/1.0 200 OK Content-Type: text/plain Context-Length: 37</li> </ul> <p>Your data have been accepted. [Enter the EOF pattern ("+++")] OK</p>

**Table 9-9: HTTPS commands (Continued)**

Command	Description
<b>+KHTTPSPSK</b> (F/W rev: 2.5.0+)	<p><b>Configure PSK for an HTTPS session</b></p> <p>Configure PSK (Pre-Shared Key) or PSK Identity for an HTTPS session. Data is always input from the serial link. Data is terminated by exiting data mode using '+++'.  <b>Requirements:</b></p> <ul style="list-style-type: none"> <li>Pre-Shared Key and Pre-Shared Key Identity must be configured when using a PSK cipher suite (see <a href="#">+KHTTPSCFG</a>).</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KHTTPSPSK=&lt;https_session_id&gt;, &lt;type&gt;</b>            Response: CONNECT            [Enter &lt;data&gt;]            [Enter the EOF pattern ("+++")]            OK            or +CME ERROR:&lt;cme_error&gt;            or ERROR            Purpose: Configure PSK or PSK Identity for the HTTPS session.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;https_session_id&gt; (HTTPS session ID)</p> <ul style="list-style-type: none"> <li>Unique integer value assigned to a specific session</li> <li>Valid range: 1–64</li> </ul> <p>&lt;type&gt; (PSK authentication type)</p> <ul style="list-style-type: none"> <li>0—PSK (Pre-Shared Key)</li> <li>1—PSK Identity</li> </ul> <p>&lt;data&gt; (&lt;type&gt;-dependent data)</p> <ul style="list-style-type: none"> <li>for &lt;type=0&gt;:           <ul style="list-style-type: none"> <li>Enter PSK in hexadecimal</li> <li>e.g. 53C08299FBE3A80533BE9D330232CEC6</li> </ul> </li> <li>for &lt;type=1&gt;:           <ul style="list-style-type: none"> <li>Enter PSK Identity</li> <li>e.g. BX310x_client</li> </ul> </li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>910—EUL_AT_COMMAND_RESPONSE_ERROR_NO_MORE_SESSIONS</li> <li>915—UNEXPECTED_PARAMETER</li> <li>916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>917—PARAMETER_MISSING</li> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Configure HTTPS session 1 to use PSK:            AT+KHTTPSPSK=1,0            CONNECT            53C08299FBE3A80533BE9D330232CEC6+++            OK</li> </ul>

Table 9-9: HTTPS commands (Continued)

Command	Description
<b>+KHTTPSPUT</b>	<p><b>Perform HTTPS PUT</b></p> <p>Send an HTTPS PUT request. Data is always input from the serial link. Data is terminated by exiting data mode using '+++'. <hr/></p> <p><i>Note: Before using this command, it is highly recommended to configure the module for hardware flow control, using the command AT&amp;K3.</i> <hr/></p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+KHTTPSPUT=&lt;https_session_id&gt;, &lt;request_uri&gt;</b></li> <li>  Response:    CONNECT</li> <li>                  ...</li> <li>                  [Enter the EOF pattern ("+++")]</li> <li>                  OK</li> <li>                  or   NO CARRIER</li> <li>                  or   +CME ERROR:&lt;cme_error&gt;</li> <li>                  or   +KHTTPS_ERROR:&lt;https_session_id&gt;,&lt;https_notif&gt;</li> <li>  Purpose:      Send an HTTP PUT request.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;https_session_id&gt; (HTTPS session ID)</p> <ul style="list-style-type: none"> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;request_uri&gt; (Information URL—the path on the HTTPS server where data is to be put)</p> <ul style="list-style-type: none"> <li>• Non-blank ASCII string, plus quotation marks (e.g. "/myprofile" is valid, "" is not valid)</li> <li>• Example: If &lt;request_uri&gt; is "/myprofile" and the connected server is "https://example_site.com", then +KHTTPSPUT puts the data to "https://example.site.com/myprofile".</li> </ul> <p>&lt;https_notif&gt; (Connection failure cause)</p> <ul style="list-style-type: none"> <li>• Integer</li> <li>• See <a href="#">+KHTTPSCNX</a> on page 241 for supported values.</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

**Table 9-10: SSL Certificate Management commands**

Command	Description
<b>+KCERTDELETE</b>	<p><b>Delete Local Certificate from the Index</b></p> <p>Delete a specified local certificate.</p> <hr/> <p><i>Note: A local certificate will be automatically deleted if a new certificate is stored in the same index location using +KCERTSTORE.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"><li>• Write:        <b>AT+KCERTDELETE=&lt;data_type&gt;,&lt;index&gt;</b></li><li>  Response:    OK</li><li>                or    +CME ERROR: &lt;err&gt;</li><li>  Purpose:     Delete the specified certificate.</li></ul> <p><b>Parameters:</b></p> <p>&lt;data_type&gt; (Certificate type)</p> <ul style="list-style-type: none"><li>• 0—Root certificate</li><li>• 1—Local certificate</li></ul> <p>&lt;index&gt; (Stored local certificate index)</p> <ul style="list-style-type: none"><li>• Valid value: 0 (Only one local certificate can be stored, so &lt;index&gt; is always 0.)</li></ul>

Table 9-10: SSL Certificate Management commands (Continued)

Command	Description
<b>+KCERTSTORE</b>	<p><b>Store Certificate (Root/Local) to File System</b> Store the root certificate or a local certificate.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:           <b>AT+KCERTSTORE=&lt;data_type&gt;,&lt;reserved&gt;[,&lt;index&gt;]</b>  Response:       CONNECT                    [Enter data to store]                    [Eof pattern]: +++                    OK</li> <li>                  or    <b>+CME ERROR: &lt;err&gt;</b></li> <li>  Purpose:       Store the specified local certificate or Root CA.</li> <li>• Read:           <b>AT+KCERTSTORE?</b>  Response:       <b>+KCERTSTORE</b>                    [<i>root_cert</i>, &lt;index&gt;, &lt;NbData&gt;&lt;CR&gt;&lt;LF&gt;                    &lt;File_data&gt;&lt;CR&gt;&lt;LF&gt;]                    [<i>local_cert</i>, &lt;index&gt;, &lt;NbData&gt;&lt;CR&gt;&lt;LF&gt;                    &lt;File_data&gt;&lt;CR&gt;&lt;LF&gt;]                    [...]                    OK</li> <li>                  or    <b>+CME ERROR: &lt;err&gt;</b></li> <li>  Purpose:       Display the current certificate data.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;data_type&gt; (Certificate type)</p> <ul style="list-style-type: none"> <li>• Valid range: 0–1</li> <li>• 0—Root certificate</li> <li>• 1—Local certificate</li> </ul> <p>&lt;reserved&gt; (Reserved parameter)</p> <ul style="list-style-type: none"> <li>• Optional field, parameter can be left blank</li> </ul> <p>&lt;index&gt; (Stored local certificate index)</p> <ul style="list-style-type: none"> <li>• Valid value: 0 (Only one local certificate can be stored, so &lt;index&gt; is always 0.)</li> <li>• Note: If a local certificate is already stored, it will be replaced.</li> </ul> <p>&lt;File_data&gt; (File data, in bytes)</p>
<b>+KPRIVDELETE</b>	<p><b>Delete Private Key from the Index</b> Delete the private key associated with a specified local certificate.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:           <b>AT+KPRIVDELETE=&lt;index&gt;</b>  Response:       OK</li> <li>                  or    <b>+CME ERROR: &lt;err&gt;</b></li> <li>  Purpose:       Delete the private key associated with the specified certificate.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;index&gt; (Index of stored local certificate associated to the private key)</p> <ul style="list-style-type: none"> <li>• Valid value: 0 (Only one local certificate can be stored, so &lt;index&gt; is always 0.)</li> </ul>

**Table 9-10: SSL Certificate Management commands (Continued)**

Command	Description
<b>+KPRIVKSTORE</b> (F/W rev: 2.7.1+ For previous version, see <a href="#">+KPRIVKSTORE</a> .)	<p><b>Store Private Key Associated to a Local Certificate</b></p> <p>Store the private key associated with a local certificate that has already been stored using <a href="#">+KCERTSTORE</a>.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KPRIVKSTORE=&lt;index&gt;,&lt;NbData&gt;</b></li> <li>Response: CONNECT [Enter data to store] [EOF pattern]: +++ OK</li> <li>or +CME ERROR: &lt;err&gt;</li> </ul> <p>Purpose: Store the private key associated with the specified local certificate.</p> <p><b>Parameters:</b></p> <p>&lt;index&gt; (Index of stored local certificate associated to the private key)</p> <ul style="list-style-type: none"> <li>• Valid value: 0 (Only one local certificate can be stored, so &lt;index&gt; is always 0.)</li> </ul> <p>&lt;nb_data&gt; (Number of bytes to read/write)</p> <ul style="list-style-type: none"> <li>• Value is not used</li> <li>• Largest packet size that can be sent in a single transmission.</li> <li>• Valid range: 1–3000</li> </ul> <p>&lt;File_data&gt; (File data, in bytes)</p> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>
<b>+KPRIVKSTORE</b> (F/W rev: 2.5.0 For previous version, see <a href="#">+KPRIVKSTORE</a> )	<p><b>Store Private Key Associated to a Local Certificate</b></p> <p>Store the private key associated with a local certificate that has already been stored using <a href="#">+KCERTSTORE</a>.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KPRIVKSTORE=&lt;index&gt;,&lt;NbData&gt;</b></li> <li>Response: CONNECT [Enter data to store] [Enter the EOF pattern ("+++")] OK</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> </ul> <p>Purpose: Store the private key associated with the specified local certificate.</p> <p><b>Parameters:</b></p> <p>&lt;index&gt; (Index of stored local certificate associated to the private key)</p> <ul style="list-style-type: none"> <li>• Valid value: 0 (Only one local certificate can be stored, so &lt;index&gt; is always 0.)</li> </ul> <p>&lt;NbData&gt; (Number of bytes to read/write)</p> <ul style="list-style-type: none"> <li>• Largest packet size that can be sent in a single transmission.</li> <li>• Valid range: 1–3000</li> </ul> <p>&lt;File_data&gt; (Private key length, in bytes)</p> <ul style="list-style-type: none"> <li>• Integer value</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

**Table 9-10: SSL Certificate Management commands (Continued)**

Command	Description
<b>+KPRIVKSTORE</b> (F/W rev: P1.0.0 For next version, see <a href="#">+KPRIVKSTORE.</a> )	<p><b>Store Private Key Associated to a Local Certificate</b></p> <p>Store the private key associated with a local certificate that has already been stored using <a href="#">+KCERTSTORE</a>.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KPRIVKSTORE=&lt;index&gt;,&lt;NbData&gt;</b>              Response: CONNECT              [Enter data to store]              [Enter the EOF pattern ("+++")]              OK              or +CME ERROR: &lt;cme_error&gt;</li> <li>• Read: <b>AT+KPRIVKSTORE?</b>              Response: +KPRIVKSTORE              private_key, &lt;index&gt;, &lt;NbData&gt;&lt;CR&gt;&lt;LF&gt;              &lt;File_data&gt;&lt;CR&gt;&lt;LF&gt;              OK              or +CME ERROR: &lt;cme_error&gt;</li> </ul> <p>Purpose: Store the private key associated with the specified local certificate.</p> <p>Purpose: Display the private key associated with the local certificate stored at &lt;index&gt; position.</p> <p><b>Parameters:</b></p> <p>&lt;index&gt; (Index of stored local certificate associated to the private key)</p> <ul style="list-style-type: none"> <li>• Valid value: 0 (Only one local certificate can be stored, so &lt;index&gt; is always 0.)</li> </ul> <p>&lt;NbData&gt; (Number of bytes to read/write)</p> <ul style="list-style-type: none"> <li>• Largest packet size that can be sent in a single transmission.</li> <li>• Valid range: 1–3000</li> </ul> <p>&lt;File_data&gt; (Private key length, in bytes)</p> <ul style="list-style-type: none"> <li>• Integer value</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul>

## >> 10: I2C Commands

### Introduction

This chapter describes I2C Master-related commands for configuring the I2C port and building/sending I2C commands.

---

*Note: BX310x-ETH modules support only I2C port 0.*

---

### Command summary

The following table summarizes the commands described in this chapter.

**Table 10-1: I2C Master commands**

Command	F/W	Description	Page
<b>+KI2CCFG</b>	P1.0.0+	<a href="#">Configure/display I2C parameters</a>	<a href="#">255</a>
<b>+KI2CREAD</b>	P1.0.0+	<a href="#">Read I2C data</a>	<a href="#">256</a>
<b>+KI2CWRITE</b>	P1.0.0+	<a href="#">Write I2C data</a>	<a href="#">257</a>

## Command reference

Table 10-2: I2C Master commands

Command	Description
<b>+KI2CCFG</b>	<p><b>Configure/display I2C parameters</b> Configure or display the local device's I2C parameters for the specified I2C port.</p> <hr/> <p><i>Note: BX310x-ETH modules support only I2C port 0.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KI2CCFG=&lt;port_number&gt;, &lt;enable&gt;[, &lt;freq&gt;]</b> Response: OK or ERROR Purpose: Set the I2C parameters to the specified values.</li> <li>• Read: <b>AT+KI2CCFG?</b> Response: +KI2CCFG: &lt;port_number&gt;, &lt;enable&gt;, &lt;freq&gt; OK Purpose: Display the active I2C port's current configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;port_number&gt; (I2C port number)</p> <ul style="list-style-type: none"> <li>• 0—I2C port number 0</li> <li>• 1—I2C port number 1 (Not supported by BX310x-ETH modules)</li> </ul> <p>&lt;enable&gt; (Enable/disable port)</p> <ul style="list-style-type: none"> <li>• 0—Disable port &lt;port_number&gt;</li> <li>• 1—Enable port &lt;port_number&gt;</li> </ul> <p>&lt;freq&gt; (Master clock frequency, in Hz)</p> <ul style="list-style-type: none"> <li>• Value required and applies only if &lt;enable&gt;=1</li> <li>• 0—100 KHz (slow mode)</li> <li>• 1—400 KHz (fast mode)</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Enable I2C: AT+KI2CCFG=0,1,1 OK</li> <li>• Disable I2C: AT+KI2CCFG=0,0 OK</li> </ul>

Table 10-2: I2C Master commands (Continued)

Command	Description
<b>+KI2CREAD</b>	<p><b>Read I2C data</b> Read data from the specified I2C port.</p> <hr/> <p><i>Note: BX310x-ETH modules support only I2C port 0.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+KI2CREAD=&lt;port_number&gt;, &lt;slave_addr&gt;[, &lt;opcode&gt;],&lt;read_length&gt;</b></li> <li>Response:    <b>+KI2CREAD: &lt;data&gt;</b>                   OK</li> <li>                  or    ERROR</li> <li>Purpose:        Read up to &lt;read_length&gt; bytes of data from the specified I2C port.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;port_number&gt; (I2C port number)</p> <ul style="list-style-type: none"> <li>• 0—I2C port number 0</li> <li>• 1—I2C port number 1 (Not supported by BX310x-ETH modules)</li> </ul> <p>&lt;slave_addr&gt; (I2C slave address)</p> <ul style="list-style-type: none"> <li>• Hexadecimal format—Each byte entered as '\hh'.</li> <li>• Example—"6A"</li> </ul> <p>&lt;opcode&gt; (Operational code)</p> <ul style="list-style-type: none"> <li>• Hexadecimal format—Each byte entered as '\hh'.</li> <li>• Used by some devices to specify the I2C register value to read from.</li> <li>• Example—"0F"</li> </ul> <p>&lt;read_length&gt; (Number of bytes to read from I2C port)</p> <ul style="list-style-type: none"> <li>• Decimal format integer</li> </ul> <p>&lt;data&gt; (Data read from I2C port)</p> <ul style="list-style-type: none"> <li>• Hexadecimal format string—Each byte entered as '\hh'.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Read data:       <b>AT+KI2CREAD=0,"6A","0F",2</b>       OK</li> </ul>

Table 10-2: I2C Master commands (Continued)

Command	Description
<b>+KI2CWRITE</b>	<p><b>Write I2C data</b> Write data to the specified I2C port.</p> <hr/> <p><i>Note: BX310x-ETH modules support only I2C port 0.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+KI2CWRITE=&lt;port_number&gt;, &lt;slave_addr&gt;, &lt;data&gt;</b></li> <li>  Response:    OK</li> <li>                or    ERROR</li> <li>  Purpose:      Write &lt;data&gt; to the specified I2C port.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;port_number&gt; (I2C port number)</p> <ul style="list-style-type: none"> <li>• 0—I2C port number 0</li> <li>• 1—I2C port number 1 (Not supported by BX310x-ETH modules)</li> </ul> <p>&lt;slave_addr&gt; (I2C slave address)</p> <ul style="list-style-type: none"> <li>• Hexadecimal format—Each byte entered as '\hh'.</li> <li>• Example—"6A"</li> </ul> <p>&lt;data&gt; (Data being written to I2C port)</p> <ul style="list-style-type: none"> <li>• Hexadecimal format string—Each byte entered as '\hh'.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Read data:     <b>AT+KI2CREAD=0,"6A","5D02"</b>     OK</li> </ul>

# >> 11: UART Commands

## Introduction

This chapter describes UART interface-related commands.

## Command summary

The following table summarizes the commands described in this chapter.

Table 11-1: UART commands

Command	F/W	Description	Page
+IPR	P1.0.0+	<a href="#">Set/display UART baud rate</a>	259
&K	P1.0.0+	<a href="#">Enable/disable hardware UART flow control</a>	259

## Command reference

Table 11-2: UART commands

Command	Description
<b>+IPR</b>	<p><b>Set/display UART baud rate</b> Set or display the UART interface baud rate.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+IPR=&lt;uart_baud_rate&gt;</b> Response: OK or ERROR Purpose: Set the UART baud rate.</li> <li>• Read: <b>AT+IPR?</b> Response: +IPR=&lt;uart_baud_rate&gt; OK Purpose: Show the current UART interface baud rate.</li> </ul> <p><b>Parameters:</b> &lt;uart_baud_rate&gt; (UART Interface speed)</p> <ul style="list-style-type: none"> <li>• Valid range: TBD</li> <li>• 115200 (default)</li> </ul>
<b>&amp;K</b>	<p><b>Enable/disable hardware UART flow control</b> Enable/disable (or show current state of) hardware UART flow control.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Execute: <b>AT&amp;K&lt;uart_hw_flowcontrol&gt;</b> Response: OK or ERROR Purpose: Enable or disable hardware flow control.</li> <li>• Read: <b>AT&amp;K?</b> Response: &amp;K=&lt;uart_hw_flowcontrol&gt; OK Purpose: Show the current hardware flow control state.</li> </ul> <p><b>Parameters:</b> &lt;uart_hw_flowcontrol&gt; (Hardware flow control state)</p> <ul style="list-style-type: none"> <li>• 0 (Default)—Disable</li> <li>• 3—Enable</li> </ul>

## >> 12: GPIO Commands

### Introduction

This chapter describes GPIO interface-related commands.

### Command summary

The following table summarizes the commands described in this chapter.

**Table 12-1: GPIO commands**

Command	F/W	Description	Page
+KGPIO	P1.0.0+	<a href="#">Read/write/reset GPIO</a>	261
+KGPIOCFG	P1.0.0+	<a href="#">Configure GPIO</a>	262

## Command reference

Table 12-2: GPIO commands

Command	Description
<b>+KGPIO</b>	<p><b>Read/write/reset GPIO</b> Read, write, or reset a GPIO.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KGPIO=&lt;gpio&gt;, &lt;operation&gt;</b> Response (&lt;operation&gt;=0 or 1): OK or ERROR Response (&lt;operation&gt;=2): +KGPIO: &lt;io&gt;, &lt;value&gt; OK or ERROR Purpose: Perform the requested &lt;operation&gt; on the &lt;gpio&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;gpio&gt; (GPIO number to read,write,or reset)</p> <ul style="list-style-type: none"> <li>• 0–19, 21–23, 25–27, 32–33—GPIO for input/output</li> <li>• 34–39—GPIO for input only</li> <li>• &lt;gpio&gt; value refers to GPIO&lt;gpio&gt;. For example, &lt;gpio&gt;=3 represents GPIO3.</li> </ul> <p>&lt;operation&gt; (Operation to perform on &lt;gpio&gt;)</p> <ul style="list-style-type: none"> <li>• 0—Reset</li> <li>• 1—Set (Write)</li> <li>• 2—Request (Read) current value</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Set GPIO5: AT+KGPIO=5,1 OK</li> </ul>

**Table 12-2: GPIO commands (Continued)**

Command	Description
<b>+KGPIOCFG</b>	<p><b>Configure GPIO</b> Configure a GPIO's direction (input/output) and pull mode (up/down/none).</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KGPIOCFG=&lt;gpio&gt;, &lt;dir&gt;, &lt;pull_mode&gt;</b></li> <li>Response: OK or ERROR</li> <li>Purpose: Set the &lt;gpio&gt; direction and pull mode.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;gpio&gt; (GPIO number to configure)</p> <ul style="list-style-type: none"> <li>• 0–19, 21–23, 25–27, 32–33—GPIO for input/output</li> <li>• 34–39—GPIO for input only</li> <li>• &lt;gpio&gt; value refers to GPIO&lt;gpio&gt;. For example, &lt;gpio&gt;=3 represents GPIO3.</li> </ul> <p>&lt;dir&gt; (GPIO direction)</p> <ul style="list-style-type: none"> <li>• 0—Output</li> <li>• 1—Input</li> </ul> <p>&lt;pull_mode&gt; (Internal pull resistor type)</p> <ul style="list-style-type: none"> <li>• 0—Pull up</li> <li>• 1—Pull down</li> <li>• 2—No pull</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Set GPIO5 as an output with no pull: AT+KGPIOCFG=5,0,2 OK</li> </ul>

## >> 13: SPI Commands

### Introduction

This chapter describes SPI interface-related commands.

### Command summary

The following table summarizes the commands described in this chapter.

**Table 13-1: SPI commands**

Command	F/W	Description	Page
+SRSPI	2.5.0+	<a href="#">Configure SPI slave mode</a>	264

## Command reference

Table 13-2: SPI commands

Command	Description
<b>+SRSPI</b> (F/W rev: 2.5.0+)	<p><b>Configure SPI slave mode</b></p> <p>Configure SPI slave mode and bit numbering method.            Note that a module reboot is required for the changes to take effect.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRSPI=&lt;mode&gt;, &lt;bit_format&gt;</b>                Response: OK                Purpose: Configure the slave &lt;mode&gt; and bit numbering method. New settings stored in flash memory, and module reboot is required before changes take effect.</li> <li>• Read: <b>AT+SRSPI?</b>                Response: +SRSPI: &lt;mode&gt;,&lt;flags&gt;                OK                Purpose: Display the configuration currently stored in flash memory.                Note—If the write command was used to change the settings while the module was already in SPI mode, the values displayed (from flash) will not match the currently running values.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mode&gt; (Slave mode configuration)</p> <ul style="list-style-type: none"> <li>• Mode indicates Clock Polarity (CPOL) and Clock Phase (CPHA)</li> <li>• 0—(Default) CPOL 0, CPHA 0</li> <li>• 1—CPOL 0, CPHA 1</li> <li>• 2—CPOL1, CPHA 0</li> <li>• 3—CPOL1, CPHA 1</li> </ul> <p>&lt;bit_format&gt; (Bit numbering method)</p> <ul style="list-style-type: none"> <li>• 0—(Default) Transmit and receive MSB first</li> <li>• 1—Transmit LSB first, receive MSB first</li> <li>• 2—Transmit MSB first, receive LSB first</li> <li>• 3—Transmit and receive LSB first</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Set mode to 1 (CPOL=0, CPHA=1) and bit numbering to 0 (transmit/receive MSB first)                AT+SRSPI=1,0                OK</li> <li>• Display configuration currently stored in flash memory:                AT+SRSPI?                +SRSPI: 1,0</li> </ul>

## >> 14: A2DP Commands

### Introduction

This chapter describes A2DP interface-related commands.

### Command summary

The following table summarizes the commands described in this chapter.

**Table 14-1: A2DP commands/notifications**

Command	F/W	Description	Page
<b>+SRA2DPAUDIOCFG</b>	2.5.0+	<a href="#">A2DP media stream configuration (unsolicited notification)</a>	266
<b>+SRA2DPAUDIOSTATE</b>	2.5.0+	<a href="#">A2DP media stream state change (unsolicited notification)</a>	266
<b>+SRA2DPCFG</b>	2.5.0+	<a href="#">Configure A2DP Session</a>	267
<b>+SRA2DPCLOSE</b>	2.5.0+	<a href="#">Disconnect from remote device (A2DP)</a>	268
<b>+SRA2DPCODEC</b>	2.6.0+	<a href="#">Enable/disable Dev Kit audio codec</a>	269
<b>+SRA2DPCNX</b>	2.5.0+	<a href="#">Connect via A2DP to Remote Device</a>	268
<b>+SRA2DPDEL</b>	2.5.0+	<a href="#">Delete A2DP session</a>	270
<b>+SRA2DPMEDIACTRL</b>	2.5.0+	<a href="#">Control A2DP media stream</a>	271
<b>+SRA2DPSTATE</b>	2.5.x	<a href="#">Enable/disable BTC A2DP Profile</a>	272

## Command reference

Table 14-2: A2DP commands/notifications

Command	Description
<b>+SRA2DPAUDIOCFG (notification)</b> (F/W rev: 2.5.0+)	<p><b>A2DP media stream configuration (unsolicited notification)</b></p> <p>Notifies the local device of the A2DP media stream's audio configuration.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRA2DPAUDIOCFG: &lt;codec&gt;, &lt;sample_rate&gt;</b>            Purpose: Indicates the media stream's configuration details.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;codec&gt; (Media codec type used)</p> <ul style="list-style-type: none"> <li>0—SBC</li> </ul> <p>&lt;sample_rate&gt; (Audio sample rate, in Hz)</p> <ul style="list-style-type: none"> <li>Valid values: 16000, 32000, 44100, 48000</li> <li>Per A2DP specification, source role must support at least 44100 (44.1 kHz) and 48000 (48 kHz) rates.</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Audio stream uses SBC codec and 44.1 kHz sample rate:            +SRA2DPAUDIOCFG: 0, 44100</li> </ul>
<b>+SRA2DPAUDIOSTATE (notification)</b> (F/W rev: 2.5.0+)	<p><b>A2DP media stream state change (unsolicited notification)</b></p> <p>Notifies the local device when the remote device suspends, stops, or starts the A2DP audio stream.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRA2DPAUDIOSTATE: &lt;state&gt;</b>            Purpose: Indicates a change in the audio stream (stopped, started, suspended).</li> </ul> <p><b>Parameters:</b></p> <p>&lt;state&gt; (A2DP audio stream state)</p> <ul style="list-style-type: none"> <li>0—Audio stream suspended by remote device</li> <li>1—Audio stream stopped by remote device</li> <li>2—Audio stream started by remote device</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Audio stream suspended:            +SRA2DPAUDIOSTATE: 0</li> </ul>

Table 14-2: A2DP commands/notifications (Continued)

Command	Description
<b>+SRA2DPCFG</b> (F/W rev: 2.5.0+)	<p><b>Configure A2DP Session</b></p> <p>Configure an A2DP session that was previously enabled using +SRA2DPSTATE.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRA2DPCFG=&lt;remote_mac_address&gt;</b>              Response: +SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;              OK              or +CME ERROR: &lt;cme_error&gt;              or ERROR              Purpose: Set up an A2DP session.</li> <li>• Read: <b>AT+SRA2DPCFG?</b>              Response: +SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;              +SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;              ...              OK              Purpose: Display the current state of the A2DP sessions.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;remote_mac_addr&gt; (Remote device's MAC address)</p> <ul style="list-style-type: none"> <li>• ASCII string, hex format</li> <li>• e.g. "20:fa:bb:20:02:70"</li> </ul> <p>&lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;</p> <ul style="list-style-type: none"> <li>• Refer to <a href="#">+SRBTCFG (notification)</a> on page 135 for details</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Configure session:              AT+SRA2DPCFG=00:11:22:aa:bb:cc              +SRBTCFG: &lt;session_id&gt;, "0, 00:11:22:aa:bb:cc", A2DP              OK</li> <li>• Display current configuration:              AT+SRA2DPCFG?              +SRBTCFG: 1, 0, "20:fa:bb:00:01:79", A2DP              OK</li> </ul>

Table 14-2: A2DP commands/notifications (Continued)

Command	Description
<b>+SRA2DPCLOSE</b> (F/W rev: 2.5.0+)	<p><b>Disconnect from remote device (A2DP)</b>            Disconnect from a remote device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRA2DPCLOSE=&lt;session_id&gt;</b></li> <li>Response: OK</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>or ERROR</li> <li>Purpose: Disconnect from a connected A2DP &lt;session_id&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Previously configured A2DP session ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Disconnect from A2DP session 1:            AT+SRA2DPCLOSE=1            OK            +SRBTCFG: +SRBTCFG: 1, 0, "00:11:22:aa:bb:cc", A2DP</li> </ul>
<b>+SRA2DPCNX</b> (F/W rev: 2.5.0+)	<p><b>Connect via A2DP to Remote Device</b>            Connect to a remote device via an A2DP session that was previously configured using +SRA2DPCFG.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRA2DPCNX=&lt;session_id&gt;</b></li> <li>Response: OK</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>or ERROR</li> <li>Purpose: Connect to the configured A2DP &lt;session_id&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Previously configured A2DP session ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Connect to A2DP session 1:            AT+SRA2DPCNX=1            OK            +SRBTCFG: 1, 1, "00:11:22:aa:bb:cc", A2DP</li> </ul>

Table 14-2: A2DP commands/notifications (Continued)

Command	Description
<b>+SRA2DPCODEC</b> (F/W rev: 2.6.0+)	<p><b>Enable/disable Dev Kit audio codec</b></p> <p>Enable or disable use of the audio codec chip on the BX31 dev kit.</p> <hr/> <p><i>Note: Use this command with <a href="#">AT+SRBTCFILES</a> to enable A2DP and AVRCP profiles.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+SRA2DPCODEC=&lt;state&gt;</b>                Response:    OK                            or   +CME ERROR: &lt;cme_error&gt;                            or    ERROR                Purpose:     Connect to the configured A2DP &lt;session_id&gt;.</li> <li>• Read:         <b>AT+SRA2DPCODEC?</b>                Response:    +SRA2DPCODEC: &lt;state&gt;                            OK                Purpose:     Display the current state of the Dev Kit's audio codec.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;state&gt; (Dev Kit audio codec state)</p> <ul style="list-style-type: none"> <li>• 0—Disable (Default)</li> <li>• 1—Enable</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Enable the codec:                AT+SRA2DPCODEC=1                OK</li> <li>• Display the codec state:                AT+SRA2DPCODEC?                +SRA2DPCODEC: 1                OK</li> </ul>

Table 14-2: A2DP commands/notifications (Continued)

Command	Description
<b>+SRA2DPDEL</b> (F/W rev: 2.5.0+)	<p><b>Delete A2DP session</b></p> <p>Delete a disconnected A2DP session. (A connected session cannot be deleted.)</p> <hr/> <p><i>Note: Currently suspended A2DP media stream behavior, same as the Stop feature</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+SRA2DPDEL=&lt;session_id&gt;</b></li> <li>  Response:    OK</li> <li>                or +CME ERROR: &lt;cme_error&gt;</li> <li>                or ERROR</li> <li>  Purpose:      Delete a previously configured A2DP &lt;session_id&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Previously configured A2DP session ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Delete A2DP session 1:                AT+SRA2DPDEL=1                OK</li> </ul>

Table 14-2: A2DP commands/notifications (Continued)

Command	Description
<b>+SRA2DPMEDIACTRL</b> (F/W rev: 2.5.0+)	<p><b>Control A2DP media stream</b></p> <p>Start, stop, or suspend the media stream on an A2DP session.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRA2DPMEDIACTRL=&lt;session_id&gt;,&lt;control&gt;</b></li> <li>Response: OK</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>or ERROR</li> <li>Purpose: Start, stop, or suspend the media stream on A2DP &lt;session_id&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Previously configured A2DP session ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;control&gt; (A2DP media stream control operation)</p> <ul style="list-style-type: none"> <li>• 0—Start A2DP media stream</li> <li>• 1—Stop A2DP media stream</li> <li>• 2—Suspend A2DP media stream</li> </ul> <p>Note: Currently suspended the A2DP media stream behavior, same as the Stop feature.</p> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Stop media stream on A2DP session 1:              AT+SRA2DPMEDIACTRL=1              OK</li> </ul>

Table 14-2: A2DP commands/notifications (Continued)

Command	Description
<b>+SRA2DPSTATE</b> (F/W rev: 2.5.x)	<p><b>Enable/disable BTC A2DP Profile</b></p> <p>Enable or disable a BTC A2DP Profile.</p> <hr/> <p><i>Note: When disabling a profile that has A2DP sessions created but not running, the sessions are deleted.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:       <b>AT+SRA2DPSTATE=&lt;state&gt;[, &lt;codec&gt;]</b>              Response:    OK                          or   +CME ERROR: &lt;cme_error&gt;                          or    ERROR              Purpose:     Enable or disable the A2DP profile and, if enabling, indicate whether the codec is enabled or disabled.</li> <li>• Read:       <b>AT+SRA2DPSTATE?</b>              Response:    +SRA2DPSTATE: &lt;state&gt;,&lt;codec&gt;                          OK              Purpose:     Display the current state of the A2DP profile.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;state&gt; (A2DP profile state)</p> <ul style="list-style-type: none"> <li>• 0—(Default) A2DP profile disabled</li> <li>• 1—A2DP profile enabled</li> </ul> <p>&lt;codec&gt; (BX31 Dev Kit audio codec (TLV320aic3111) state)</p> <ul style="list-style-type: none"> <li>• 0—(Default) Disable</li> <li>• 1—Enable</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 3—EUL_AT_COMMAND_RESPONSE_ERROR_NOT_ALLOWED</li> <li>• 911—SESSION_RUNNING</li> <li>• 915—UNEXPECTED_PARAMETER</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• 917—PARAMETER_MISSING</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Enable the A2DP profile, and enable the codec:              AT+SRA2DPSTATE=1,1              OK</li> <li>• Display current configuration of A2DP profile:              AT+SRA2DPSTATE?              +SRA2DPSTATE: 1,1              OK</li> </ul>

## >> 15: AVRCP Commands

### Introduction

This chapter describes AVRCP interface-related commands.

### Command summary

The following table summarizes the commands described in this chapter.

**Table 15-1: AVRCP commands / notifications**

Command	F/W	Description	Page
+SRAVRPCCFG	2.5.0+	<a href="#">Configure AVRCP Session</a>	274
+SRAVRCPDEL	P1.0.0+	<a href="#">Delete AVRCP session</a>	275
+SRAVRCPMTD (notification)	P1.0.0+	<a href="#">Metadata information notification (unsolicited notification)</a>	275
+SRAVRCPPTCMD	P1.0.0+	<a href="#">Send AVRCP Passthrough Commands</a>	276
+SRAVRCPPTCMD (notification)	P1.0.0+	<a href="#">AVRCP Passthrough command callback event information (unsolicited notification)</a>	277
+SRAVRCPREQMTD	P1.0.0+	<a href="#">Request remote device metadata information</a>	278
+SRAVRCPRMTFEAT (notification)	P1.0.0+	<a href="#">AVRCP features supported by the remote device (unsolicited notification)</a>	279
+SRAVRCPSTATE	P1.0.0– 2.5.x	<a href="#">Enable/disable AVRCP Profile</a>	280

## Command reference

Table 15-2: AVRCP commands / notifications

Command	Description
<b>+SRAVRCPCFG</b> (F/W rev: 2.5.0+)	<p><b>Configure AVRCP Session</b></p> <p>Configure an AVRCP session that was previously enabled using <a href="#">+SRAVRCPSTATE</a>.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRAVRCPCFG=&lt;remote_mac_address&gt;</b>            Response: +SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;            OK            or +CME ERROR: &lt;cme_error&gt;            or ERROR            Purpose: Set up an AVRCP session.</li> <li>Read: <b>AT+SRAVRCPCFG?</b>            Response: +SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;            +SRBTCFG: &lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;            ...            OK            Purpose: Display the current state of the AVRCP sessions.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;remote_mac_addr&gt; (Remote device's MAC address)</p> <ul style="list-style-type: none"> <li>ASCII string, hex format</li> <li>e.g. "20:fa:bb:20:02:70"</li> </ul> <p>&lt;session_id&gt;, &lt;status&gt;, &lt;bt_addr&gt;, &lt;session_type&gt;</p> <ul style="list-style-type: none"> <li>Refer to <a href="#">+SRBTCFG (notification)</a> for details</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Configure session:            AT+SRA2DPCFG=00:11:22:aa:bb:cc            +SRBTCFG: &lt;session_id&gt;, 0, "00:11:22:aa:bb:cc", A2DP            OK</li> <li>Display current configuration:            AT+SRA2DPCFG?            +SRBTCFG: 1, 0, "20:fa:bb:00:01:79", A2DP            OK</li> </ul>

Table 15-2: AVRCP commands / notifications (Continued)

Command	Description
<b>+SRAVRCPDEL</b> (F/W rev: P1.0.0+)	<p><b>Delete AVRCP session</b></p> <p>Delete a disconnected AVRCP session.            Note: A connected session cannot be deleted.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+SRAVRCPDEL=&lt;session_id&gt;</b></li> <li>  Response:    OK</li> <li>                or +CME ERROR: &lt;cme_error&gt;</li> <li>                or ERROR</li> <li>  Purpose:      Delete a previously configured AVRCP &lt;session_id&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Previously configured AVRCP session ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Delete AVRCP session 1:                AT+SRAVRCPDEL=1                OK</li> </ul>
<b>+SRAVRCPMTD (notification)</b> (F/W rev: P1.0.0+)	<p><b>Metadata information notification (unsolicited notification)</b></p> <p>Notifies the local device that metadata information has been received.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRAVRCPMTD: &lt;metadata_id&gt;, &lt;info&gt;</b></li> <li>  Purpose:      Indicates metadata information has been received.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;metadata_id&gt; (Metadata type)</p> <ul style="list-style-type: none"> <li>• 0—Title of playing track</li> <li>• 1—Track artist</li> <li>• 2—Album name</li> <li>• 3—Track position on album</li> <li>• 4—Number of tracks on album</li> <li>• 5—Track genre</li> <li>• 6—Total album playing time in milliseconds</li> </ul> <p>&lt;info&gt; (Metadata content)</p> <ul style="list-style-type: none"> <li>• ASCII string</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Receive notification containing an album name:                +SRAVRCPMTD: 2, Hello</li> </ul>

**Table 15-2: AVRCP commands / notifications (Continued)**

Command	Description
<b>+SRAVRCPTCMD</b> (F/W rev: P1.0.0+)	<p><b>Send AVRCP Passthrough Commands</b></p> <p>Send passthrough commands to control an AVRCP media stream.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+SRAVRCPTCMD=&lt;session_id&gt;,&lt;cmd&gt;,&lt;key_state&gt;</b></li> <li>  Response:    OK</li> <li>                or +CME ERROR: &lt;cme_error&gt;</li> <li>                or ERROR</li> <li>  Purpose:      Send a single AVRCP passthrough command.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Previously configured AVRCP session ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;cmd&gt; (AVRCP passthrough command type)</p> <ul style="list-style-type: none"> <li>• 0—Play</li> <li>• 1—Stop</li> <li>• 2—Pause</li> <li>• 3—Forward</li> <li>• 4—Backward</li> <li>• 5—Rewind</li> <li>• 6—Fast forward</li> </ul> <p>&lt;key_state&gt; (Key state (position))</p> <ul style="list-style-type: none"> <li>• 0—Key pressed</li> <li>• 1—Key released</li> <li>• 2—Key pressed and released</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Send a 'play' command to session 3 indicating the key is pressed and released:              AT+SRAVRCPTCMD=3,0,2              OK</li> </ul>

Table 15-2: AVRCP commands / notifications (Continued)

Command	Description
<b>+SRAVRCPPTCMD (notification)</b> (F/W rev: P1.0.0+)	<p><b>AVRCP Passthrough command callback event information (unsolicited notification)</b></p> <p>Notifies the local device that callback event information for AVRCP media stream passthrough commands has been received.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Notification: <b>+SRAVRCPPTCMD: &lt;cmd&gt;,&lt;key_state&gt;</b></li> <li>• Purpose: Indicates the media stream's configuration details.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;cmd&gt; (AVRCP passthrough command type)</p> <ul style="list-style-type: none"> <li>• 0—Play</li> <li>• 1—Stop</li> <li>• 2—Pause</li> <li>• 3—Forward</li> <li>• 4—Backward</li> <li>• 5—Rewind</li> <li>• 6—Fast forward</li> </ul> <p>&lt;key_state&gt; (Key state (position))</p> <ul style="list-style-type: none"> <li>• 0—Key pressed</li> <li>• 1—Key released</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Receive notification that the stop key is pressed:                +SRAVRCPPTCMD: 1,0</li> </ul>

**Table 15-2: AVRCP commands / notifications (Continued)**

Command	Description
<b>+SRAVRCPREQMTD</b> (F/W rev: P1.0.0+)	<p><b>Request remote device metadata information</b>            Request metadata information from remote device.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRAVRCPREQMTD=&lt;session_id&gt;,&lt;metadata_id&gt;</b></li> <li>Response: OK</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>or ERROR</li> <li>Purpose: Request metadata information for the media stream on AVRCP &lt;session_id&gt;.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;session_id&gt; (Previously configured AVRCP session ID)</p> <ul style="list-style-type: none"> <li>• Decimal format</li> <li>• Unique integer value assigned to a specific session</li> <li>• Valid range: 1–64</li> </ul> <p>&lt;metadata_id&gt; (Metadata requested for AVRCP media stream)</p> <ul style="list-style-type: none"> <li>• 0—Title of the playing track</li> <li>• 1—Track artist</li> <li>• 2—Album name</li> <li>• 3—Track position on the album</li> <li>• 4—Number of tracks on the album</li> <li>• 5—Track genre</li> <li>• 6—Total album playing time in milliseconds</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Get the name of the album currently playing on session 1's AVRCP media stream:            AT+SRAVRCPREQMTD=1,2            OK            +SRAVRCPMTD: 1,hello</li> </ul>

Table 15-2: AVRCP commands / notifications (Continued)

Command	Description
<b>+SRAVRCPMTFEAT (notification)</b> (F/W rev: P1.0.0+)	<p><b>AVRCP features supported by the remote device (unsolicited notification)</b></p> <p>Notifies the local device of the remote device's supported features.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRAVRCPMTFEAT: &lt;features&gt;</b>              Purpose: Indicates the remote device's supported AVRCP features.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;features&gt; (Supported AVRCP features)</p> <ul style="list-style-type: none"> <li>Decimal value (sum of values of supported features):               <ul style="list-style-type: none"> <li>0x0001 (1)—Remote control target</li> <li>0x0002 (2)—Remote control controller</li> <li>0x0008 (8)—Remote control vendor-dependent commands</li> <li>0x0010 (16)—Use browsing channel</li> <li>0x0040 (64)—Remote control metadata transfer command/response</li> <li>0x0200 (512)—Remote control advanced control command/response</li> </ul> </li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Receive supported features notification (features include 0x40, 0x08, 0x02, 0x01):              +SRAVRCPMTFEAT: 75</li> </ul>

Table 15-2: AVRCP commands / notifications (Continued)

Command	Description
<b>+SRAVRCPSTATE</b> (F/W rev: P1.0.0–2.5.x)	<p><b>Enable/disable AVRCP Profile</b></p> <p><b>Deprecated:</b> Deprecated F/W rev. 2.6.0.            For F/W rev. 2.6.0+, use <a href="#">AT+SRBTCFILES</a> to enable AVRCP profiles.</p> <p>Enable or disable a BTC AVRCP Profile.</p> <hr/> <p><i>Note: When disabling a profile that has AVRCP sessions created but not running, the sessions are deleted.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:       <b>AT+SRAVRCPSTATE=&lt;state&gt;</b>            Response:    OK                          or   +CME ERROR: &lt;cme_error&gt;                          or    ERROR            Purpose:     Enable or disable the AVRCP profile.</li> <li>• Read:        <b>AT+SRAVRCPSTATE?</b>            Response:    +SRAVRCPSTATE: &lt;state&gt;                          OK            Purpose:     Display the current state of the A2DP profile.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;state&gt; (AVRCP profile state)</p> <ul style="list-style-type: none"> <li>• 0—(Default) AVRCP profile disabled</li> <li>• 1—AVRCP profile enabled</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 3—EUL_AT_COMMAND_RESPONSE_ERROR_NOT_ALLOWED</li> <li>• 911—SESSION_RUNNING</li> <li>• 915—UNEXPECTED_PARAMETER</li> <li>• 916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>• 917—PARAMETER_MISSING</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Enable the AVRCP profile:                AT+SRAVRCPSTATE=1                OK</li> <li>• Display current configuration of AVRCP profile:                AT+SRAVRCPSTATE?                +SRA2VRCSTATE: 1                OK</li> </ul>

# >> 16: HTTP Web Server Commands

## Introduction

This chapter describes HTTP web server-related commands.

## Command summary

The following table summarizes the commands described in this chapter.

**Table 16-1: HTTP Web Server commands / notifications**

Command	F/W	Description	Page
<b>+SRWSCHGWEB</b>	2.5.0+	<a href="#">Overwrite index.html web page</a>	282
<b>+SRWS_DATA (notification)</b>	2.5.0+	<a href="#">Data received for the host (unsolicited notification)</a>	284
<b>+SRWSFWDHTTP</b>	2.5.0+	<a href="#">Enable/disable forward HTTP requests to host</a>	285
<b>+SRWSSTATE</b>	2.6.0+	<a href="#">Enable/disable Web Server</a>	286

## Command reference

Table 16-2: HTTP Web Server commands

Command	Description
<b>+SRWSCHGWEB</b> (F/W rev: 2.5.0)	<p><b>Overwrite index.html web page</b></p> <p>Enter data mode to send and overwrite the BX310x web server's index.html web page.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRWSCHGWEB</b></li> <li>Response: Ready to send file &lt;file to send&gt; (<i>Send the new file</i>) +++ (<i>Exit data mode</i>) OK</li> <li>or +CME ERROR: &lt;cme_error&gt;</li> <li>or ERROR</li> </ul> <p>Purpose: Replace the index.html web page with the &lt;file to send&gt;.</p> <p><b>Parameters:</b></p> <p>&lt;file to send&gt; (New index.html file)</p> <ul style="list-style-type: none"> <li>Label and titles can be modified. However, main structure of page must be the same as the following example:</li> </ul> <pre> &lt;!DOCTYPE html&gt; &lt;head&gt;   &lt;meta name="viewport" content="width=device-width, initial-scale=1.0"&gt; &lt;/head&gt; &lt;body&gt;   &lt;h1&gt;Sierra Wireless&lt;/h1&gt;   &lt;h2&gt;Configuration page&lt;/h2&gt;   &lt;form action="/wifi" method="post"&gt;     &lt;div&gt;       &lt;label for="ssid"&gt;SSID:&lt;/label&gt;       &lt;br/&gt;       &lt;input type="text" id="ssid" name="ssid"&gt;     &lt;/div&gt;     &lt;div&gt;       &lt;label for="password"&gt;Password:&lt;/label&gt;       &lt;br/&gt;       &lt;input type="password" id="password" name="password"&gt;     &lt;/div&gt;     &lt;div class="button"&gt;       &lt;button type="submit"&gt;Connect&lt;/button&gt;     &lt;/div&gt;   &lt;/form&gt; &lt;/body&gt; &lt;/html&gt; </pre> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p>(Continued on next page)</p>

Table 16-2: HTTP Web Server commands (Continued)

Command	Description
<b>+SRWSCHGWEB</b> <b>(continued)</b> (F/W rev: 2.5.0)	<b>Overwrite index.html web page (continued)</b> <b>Example:</b> <ul style="list-style-type: none"><li>• Replace existing index.html with new file: AT+SRWSCHGWEB Ready to send file &lt;file to send&gt; +++ OK</li></ul>

Table 16-2: HTTP Web Server commands (Continued)

Command	Description
<b>+SRWS_DATA (notification)</b> (F/W rev: 2.5.0)	<p><b>Data received for the host (unsolicited notification)</b></p> <p>Notification providing data received for the host.</p> <p>The received data format depends on the state of the "Forward HTTP Request to Host" feature (managed using <a href="#">+SRWSFWDHTTP</a>). If the feature is enabled, then the notification's &lt;data&gt; contains the entire RAW HTTP request. If the feature is disabled, then the &lt;data&gt; contains the "data" parameter of the request's JSON content.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRWS_DATA: &lt;source_ip&gt;, &lt;data&gt;</b></li> </ul> <p>Purpose: Provides &lt;data&gt; received from a remote device that is connected to the BX module.</p> <p><b>Parameters:</b></p> <p>&lt;source_ip&gt; (IP address of the remote device)</p> <ul style="list-style-type: none"> <li>IPv4 format</li> <li>Default: 192.168.4.2</li> </ul> <p>&lt;data&gt; (Data to transfer to the host)</p> <ul style="list-style-type: none"> <li>If "Forward HTTP Request to Host" feature is enabled:           <ul style="list-style-type: none"> <li>&lt;data&gt; contains entire HTTP request, which is transferred directly to the host using the UART interface</li> </ul> </li> <li>If "Forward HTTP Request to Host" feature is disabled:           <ul style="list-style-type: none"> <li>&lt;data&gt; contains the "data" parameter of an HTTP request's JSON content.</li> </ul> </li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Notification received from external device at 192.168.4.25 while Forward HTTP Request to Host feature is enabled:            +SRWS_DATA: 192.168.4.25, GET /hello.htm HTTP/1.1 User-Agent: Mozilla/4.0 (compatible; MSIE5.01; Windows NT) Host: www.tutorialspoint.com Accept-Language: en-us Accept-Encoding: gzip, deflate Connection: Keep-Alive</li> <li>Notification received from external device at 192.168.4.25 while Forward HTTP Request to Host feature is disabled:            +SRWS_DATA: 192.168.4.25, hello</li> </ul> <p>Original request detail below; only "data" parameter is included in notification:</p> <p>Protocol: POST            URI: /bx31api            Request body in JSON format:</p> <pre>{   "information": {     "mode": 1,     "data": "hello"   } }</pre>

Table 16-2: HTTP Web Server commands (Continued)

Command	Description
<b>+SRWSFWDHTTP</b> (F/W rev: 2.5.0+)	<p><b>Enable/disable forward HTTP requests to host</b>            Enable or disable forwarding of HTTP requests to the host.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+SRWSFWDHTTP=&lt;state&gt;</b>                        Response:    OK                                or    +CME ERROR: &lt;cme_error&gt;                                or    ERROR                        Purpose:    Set up an A2DP session.</li> <li>• Read:        <b>AT+SRWSFWDHTTP?</b>                        Response:    +SRWSFWDHTTP: &lt;state&gt;                                OK                        Purpose:    Display the current state of HTTP request forwarding.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;state&gt; (HTTP request forwarding option state)</p> <ul style="list-style-type: none"> <li>• 0—Disable</li> <li>• 1—Enable</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Enable forwarding of HTTP requests to host:                AT+SRWSFWDHTTP=1                OK</li> <li>• Display current state of HTTP request forwarding option:                AT+SRWSFWDHTTP?                +SRWSFWDHTTP: 1                OK</li> </ul>

**Table 16-2: HTTP Web Server commands (Continued)**

Command	Description
<b>+SRWSSTATE</b> (F/W rev: 2.6.0+)	<p><b>Enable/disable Web Server</b>            Enable or disable the Web Server.</p> <hr/> <p><i>Note: The Web Server can be enabled only for Wi-Fi AP/STA or AP modes, and cannot be disabled while the server has active connections.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:       <b>AT+SRWSSTATE=&lt;state&gt;</b>                Response:  OK                          or +CME ERROR: &lt;cme_error&gt;                          or ERROR                Purpose:   Enable or disable the Web Server.</li> <li>• Read:        <b>AT+SRWSSTATE?</b>                Response:  +SRWSSTATE: &lt;state&gt;                          OK                Purpose:   Display the current state of the Web Server.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;state&gt; (Web Server state)</p> <ul style="list-style-type: none"> <li>• 0—Disable.                Note: The server cannot be disabled while it has active connections.</li> <li>• 1—Enable                Note: The server can be enabled only for Wi-Fi AP/STA or AP modes.</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Enable the web server:                AT+SRWSSTATE=1                OK</li> <li>• Display current state of web server:                AT+SRWSSTATE?                +SRWSSTATE: 1        <i>(Server is active.)</i>                OK</li> </ul>

# >> 17: Ethernet Commands

## Introduction

This chapter describes Ethernet interface-related commands.

---

*Note: These commands apply only to Ethernet board variants (BX310x-ETH).*

---

## Command summary

The following table summarizes the commands described in this chapter.

**Table 17-1: Ethernet commands/notifications**

Command	F/W	Description	Page
<b>+SRETHCFG</b>	ETH-R1.0.0+	<a href="#">Configure (Enable/Disable) Ethernet interface mode</a>	288
<b>+SRETHDNSCFG</b>	2.6.0+	<a href="#">Configure Ethernet interface DNS IP Addresses</a>	289
<b>+SRETHIP (notification)</b>	ETH-R1.0.0+	<a href="#">Display Ethernet interface IP configuration (unsolicited notification)</a>	290
<b>+SRETHNETCFG</b>	ETH-R1.0.0+	<a href="#">Configure Ethernet interface DHCP/IP settings</a>	291
<b>+SRETHSTATUS</b>	ETH-R1.0.0+	<a href="#">Display Ethernet Interface Status and IP configuration</a>	292
<b>+SRETHSTATUS (notification)</b>	ETH-R1.0.0+	<a href="#">Ethernet Interface Status (notification)</a>	292

## Command reference

**Table 17-2: Ethernet commands / notifications**

Command	Description
<b>+SRETHCFG</b> (F/W rev: ETH-R1.0.0)	<p><b>Configure (Enable/Disable) Ethernet interface mode</b></p> <p>Enable or disable Ethernet interface mode.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>Ethernet can only be enabled if Wi-Fi STA feature is disabled (see +SRWCFG).</li> <li>Ethernet can only be enabled if BT feature is disabled (see +SRBTSYSTEM).</li> </ul> <p>NOTE: If Ethernet has been enabled and then disabled since the last reboot, Bluetooth cannot be enabled until the module reboots. (e.g. If +SRBTSYSTEM is used to enable Bluetooth, the change does not take effect until the module reboots.)</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRETHCFG=&lt;mode&gt;</b>            Response: OK                      or +CME ERROR: &lt;cme_error&gt;                      or ERROR            Purpose: Enable or disable Ethernet interface mode.</li> <li>Read: <b>AT+SRETHCFG?</b>            Response: +SRETHCFG: &lt;mode&gt;                      OK            Purpose: Display the current state of Ethernet interface mode.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;mode&gt; (Ethernet interface state)</p> <ul style="list-style-type: none"> <li>0—Disabled</li> <li>1—Enabled</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>915—UNEXPECTED_PARAMETER</li> <li>916—INVALID_PARAMETER</li> <li>917—PARAMETER_MISSING</li> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Enable the Ethernet interface:            AT+SRETHCFG=1            OK</li> <li>Display current state of Ethernet interface (disabled, in this example):            AT+SRETHCFG?            +SRETHCFG: 0            OK</li> </ul>

Table 17-2: Ethernet commands/notifications (Continued)

Command	Description
<b>+SRETHDNSCFG</b> (F/W rev: 2.6.0)	<p><b>Configure Ethernet interface DNS IP Addresses</b>            Configure the DNS IP addresses used for the Ethernet interface.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• Ethernet can only be enabled if Wi-Fi STA feature is disabled (see +SRWCFG).</li> <li>• Ethernet can only be enabled if BT feature is disabled (see +SRBTSYSTEM).            NOTE: If Ethernet has been enabled and then disabled since the last reboot, Bluetooth cannot be enabled until the module reboots. (e.g. If +SRBTSYSTEM is used to enable Bluetooth, the change does not take effect until the module reboots.)</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRETHDNSCFG=&lt;dns_main&gt;[,&lt;dns_backup&gt;[,&lt;dns_fallback&gt;]]</b>            Response: OK            or ERROR            Purpose: Configure the DNS IP address(es) used for the Ethernet interface.</li> <li>• Read: <b>AT+SRETHDNSCFG?</b>            Response: +SRETHDNSCFG: &lt;dns_main&gt;,&lt;dns_backup&gt;,&lt;dns_fallback&gt;            OK            Purpose: Display the DNS addresses currently used for the Ethernet interface.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;dns_main&gt; (IP address of main DNS server)</p> <ul style="list-style-type: none"> <li>• Used in static mode. (DHCP disabled)</li> <li>• IPv4 format</li> <li>• Default: 0.0.0.0</li> </ul> <p>&lt;dns_backup&gt; (IP address of backup DNS server when &lt;dns_main&gt; is not available)</p> <ul style="list-style-type: none"> <li>• Used in static mode. (DHCP disabled)</li> <li>• IPv4 format</li> <li>• Default: 0.0.0.0</li> </ul> <p>&lt;dns_fallback&gt; (IP address of DNS server for Wi-Fi STA or ETH mode when no DNS servers set up)</p> <ul style="list-style-type: none"> <li>• IPv4 format</li> <li>• Default: 0.0.0.0</li> <li>• Used in Wi-Fi STA or ETH mode. (DHCP enabled)</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Set all DNS server addresses for Ethernet interface:            AT+SRETHDNSCFG="10.10.10.1","10.10.10.2","10.10.10.1"            OK</li> <li>• Display DNS server addresses used for Ethernet interface:            AT+SRETHDNSCFG?            +SRETHDNSCFG: "10.10.10.1","10.10.10.2","10.10.10.1"            OK</li> </ul>

Table 17-2: Ethernet commands/notifications (Continued)

Command	Description
<b>+SRETHIP (notification)</b> (F/W rev: ETH-R1.0.0)	<p><b>Display Ethernet interface IP configuration (unsolicited notification)</b> Notifies the local device of the Ethernet interface IP configuration details.</p> <hr/> <p><i>Note: These details can be obtained automatically using DHCP, or manually configured. See <a href="#">+SRETHNETCFG</a> for details.</i></p> <hr/> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRETHIP: &lt;ip&gt;,&lt;netmask&gt;,&lt;gw&gt;</b> Purpose: Display the Ethernet interface details.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;ip&gt; (Interface IP address)</p> <ul style="list-style-type: none"> <li>IPv4 format</li> <li>Example: 123.57.3.8</li> </ul> <p>&lt;netmask&gt; (Interface netmask)</p> <ul style="list-style-type: none"> <li>IPv4 format</li> </ul> <p>&lt;gw&gt; (Interface gateway)</p> <ul style="list-style-type: none"> <li>IPv4 format</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Receive notification: +SRETHIP: "192.168.1.12","255.255.255.0","192.168.1.1"</li> </ul>

Table 17-2: Ethernet commands/notifications (Continued)

Command	Description
<b>+SRETHNETCFG</b> (F/W rev: ETH-R1.0.0)	<p><b>Configure Ethernet interface DHCP/IP settings</b>            Configure DHCP/IP settings for the Ethernet interface.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>Command is only available if Ethernet feature is enabled. See <a href="#">+SRETHCFG</a>.</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+SRETHNETCFG=&lt;dhcp&gt;[,&lt;ip&gt;[,&lt;netmask&gt;[,&lt;gw&gt;]]]</b>            Response: OK                      or +CME ERROR: &lt;cme_error&gt;                      or ERROR            Purpose: Configure specified DHCP/IP settings.</li> <li>Read: <b>AT+SRETHNETCFG?</b>            Response: +SRETHNETCFG: &lt;dhcp&gt;,&lt;ip&gt;,&lt;netmask&gt;,&lt;gw&gt;                      OK                      or ERROR            Purpose: Display the current DHCP/IP settings.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;dhcp&gt; (DHCP state)</p> <ul style="list-style-type: none"> <li>0—Disabled, static address used</li> <li>1—Enabled, remaining parameters ignored</li> </ul> <p>&lt;ip&gt; (Static IP address)</p> <ul style="list-style-type: none"> <li>IPv4 format</li> <li>Example: 123.57.3.8</li> </ul> <p>&lt;netmask&gt; (Static netmask)</p> <ul style="list-style-type: none"> <li>IPv4 format</li> </ul> <p>&lt;gw&gt; (Static gateway)</p> <ul style="list-style-type: none"> <li>IPv4 format</li> </ul> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>915—UNEXPECTED_PARAMETER</li> <li>916—EUL_AT_COMMAND_RESPONSE_ERROR_INVALID_PARAMETER</li> <li>917—PARAMETER_MISSING</li> <li>For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Configure settings:            AT+SRETHNETCFG=0,"192.168.1.12","255.255.255.0","192.168.1.1"            OK</li> <li>Display settings:            AT+SRETHNETCFG?            +SRETHNETCFG: 0,"192.168.1.12","255.255.255.0","192.168.1.1"            OK</li> </ul>

**Table 17-2: Ethernet commands/notifications (Continued)**

Command	Description
<b>+SRETHSTATUS</b> (F/W rev: ETH-R1.0.0)	<p><b>Display Ethernet Interface Status and IP configuration</b></p> <p>Display the Ethernet interface status and IP configuration details.</p> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>Command is only available if Ethernet feature is enabled. See <a href="#">+SRETHCFG</a>.</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Read: <b>AT+SRETHSTATUS?</b></li> <li>Response: <b>+SRETHSTATUS: &lt;status&gt;</b>  <b>+SRETHIP: &lt;ip&gt;,&lt;netmask&gt;,&lt;gw&gt;</b>  <b>OK</b></li> <li>or <b>ERROR</b></li> <li>Purpose: Display Ethernet interface status and IP configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;status&gt; (Ethernet interface status)</p> <ul style="list-style-type: none"> <li>0—Not connected</li> <li>1—Connected</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Ethernet interface is connected:  <b>AT+SRETHSTATUS?</b>  <b>+SRETHSTATUS: 1</b>  <b>+SRETHIP: &lt;ip&gt;,&lt;netmask&gt;,&lt;gw&gt;</b> <i>(Note: Received only if &lt;status=1&gt;.)</i>  <b>OK</b></li> </ul>
<b>+SRETHSTATUS</b> <b>(notification)</b>	<p><b>Ethernet Interface Status (notification)</b></p> <p>Notifies the local device of the current status of the Ethernet interface. May be received in response to <a href="#">+SRETHSTATUS?</a> or as an unsolicited notification when the interface goes up or down.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+SRETHSTATUS: &lt;status&gt;</b></li> <li>Purpose: Indicate current status of Ethernet interface.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;status&gt; (Ethernet interface status)</p> <ul style="list-style-type: none"> <li>0—Not connected</li> <li>1—Connected</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Solicited notification:  <b>AT+SRETHSTATUS?</b>  <b>+SRETHSTATUS: 1</b>  <b>+SRETHIP: &lt;ip&gt;,&lt;netmask&gt;,&lt;gw&gt;</b> <i>(Note: Received only if &lt;status=1&gt;.)</i>  <b>OK</b></li> <li>Unsolicited notification when interface goes down:  <b>+SRETHSTATUS: 0</b></li> <li>Unsolicited notification when interface comes up:  <b>+SRETHSTATUS: 1</b></li> </ul>

## >> 18: Power Management Commands

### Introduction

This chapter describes power management-related commands.

### Command summary

The following table summarizes the commands described in this chapter.

**Table 18-1: Power Management commands**

Command	F/W	Description	Page
<b>+SRPSCFG</b>	2.5.0+	<a href="#">Power Saving Configuration</a>	294
<b>+SRPSMODE</b>	2.5.0+	<a href="#">Select Power Saving Mode</a>	295

## Command reference

Table 18-2: Power Management commands

Command	Description
<b>+SRPSCFG</b> (F/W rev: 2.5.0+)	<p><b>Power Saving Configuration</b>            Configure Power Saving.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+SRPSCFG=&lt;wakeup_mode&gt;,&lt;option_1&gt;[,&lt;option_2&gt;]</b>              Response: OK              or ERROR              Purpose: Configure Power Saving to use a RTC GPIO or timer as a wake-up source. (&lt;option_2&gt; is not used if the wake-up source is a timer.)</li> <li>• Read: <b>AT+SRPSCFG?</b>              Response: +SRPSCFG: &lt;wakeup_mode&gt;,&lt;option_1&gt;[,&lt;option_2&gt;]              OK              Purpose: Display the current wake-up source. (&lt;option_2&gt; does not appear if the source is a timer.)</li> </ul> <p><b>Parameters:</b></p> <p>&lt;wakeup_mode&gt; (Power Saving wake-up mode)</p> <ul style="list-style-type: none"> <li>• 0—RTC GPIO</li> <li>• 1—Timer</li> </ul> <p>&lt;option_1&gt;</p> <ul style="list-style-type: none"> <li>• For &lt;wakeup_mode = 0&gt;:             <ul style="list-style-type: none"> <li>• GPIO number used as the wake-up source</li> <li>• Valid GPIOs: 0, 2, 4, 12–15, 25–27, 32–39</li> </ul> </li> <li>• For &lt;wakeup_mode = 1&gt;:             <ul style="list-style-type: none"> <li>• Timer used as wake-up source</li> <li>• Time before wake-up, in seconds</li> </ul> </li> </ul> <p>&lt;option_2&gt;</p> <ul style="list-style-type: none"> <li>• Used only for &lt;wakeup_mode = 0&gt;</li> <li>• Input level that will trigger wake-up:             <ul style="list-style-type: none"> <li>• 0—Low</li> <li>• 1—High</li> </ul> </li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Configure GPIO 32 as wake-up source, trigger on low input level              AT+SRPSCFG=0,32,1              OK</li> <li>• Configure timer as wake-up source, wake-up after 90 seconds              AT+SRPSCFG=1,90              OK</li> <li>• Display current Power Saving wake-up source (GPIO)              AT+SRPSCFG?              +SRPSCFG: 0, 32, 1              OK</li> <li>• Display current Power Saving wake-up source (Timer)              AT+SRPSCFG?              +SRPSCFG: 1, 90              OK</li> </ul>

Table 18-2: Power Management commands (Continued)

Command	Description
<b>+SRPSMODE</b> (F/W rev: 2.5.0+)	<p><b>Select Power Saving Mode</b></p> <p>Put the device into Power Saving mode (light sleep or deep sleep).</p> <p>Sleep characteristics:</p> <ul style="list-style-type: none"> <li>• Light sleep               <ul style="list-style-type: none"> <li>• Digital peripherals, most RAM, and CPUs are clock-gated.</li> <li>• Supply voltage is reduced.</li> <li>• RTC peripherals and RTC memories (slow and fast) are powered off.</li> <li>• Internal state of peripherals and CPUs is preserved.</li> <li>• On exit from light sleep, peripherals and CPUs resume operation using preserved internal state.</li> </ul> </li> <li>• Deep sleep               <ul style="list-style-type: none"> <li>• CPUs, most RAM, and all digital peripherals that are clocked from APB_CLK are powered off.</li> <li>• RTC peripherals and RTC memories (slow and fast) are powered off.</li> <li>• On exit from deep sleep, the device resets and initializes to its default state.</li> </ul> </li> </ul> <hr/> <p><i>Note: In both light sleep and deep sleep modes, wireless peripherals are powered down.</i></p> <hr/> <p><b>Requirements:</b></p> <ul style="list-style-type: none"> <li>• Power Saving Configuration (<a href="#">+SRPSCFG</a>) must be done before using this command.</li> </ul> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+SRPSMODE=&lt;sleep_mode&gt;</b></li> <li>  Response:    OK</li> <li>                or    ERROR</li> <li>  Purpose:     Put the device immediately into light sleep or deep sleep Power Saving mode.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;sleep_mode&gt; (Sleep mode to enter)</p> <ul style="list-style-type: none"> <li>• 0—Start light sleep mode</li> <li>• 1—Start deep sleep mode</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Enter deep sleep mode:               <pre>AT+SRPSMODE=1 OK</pre> </li> </ul>

## >> 19: PWM Commands

### Introduction

This chapter describes PWM (Pulse Width Modulation)-related commands.

### Command summary

The following table summarizes the commands described in this chapter.

Table 19-1: PWM commands

Command	F/W	Description	Page
+KPWM	2.5.0+	<a href="#">PWM Control</a>	297

## Command reference

Table 19-2: PWM commands

Command	Description
<b>+KPWM</b> (F/W rev: 2.5.0+)	<p><b>PWM Control</b></p> <p>Configure the frequency and duty cycle of a PWM output.</p> <p>Note: According to the limitation of frequency divider, the duty cycle must be a period integer multiple. For example, generating a frequency of 200 kHz must be equal to 1M/actual frequency (200 KHz) = 5. Therefore, the duty cycle can only generate 0%, 20%, 40%, 60%, 80%, or 100%.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KPWM=&lt;output&gt;,&lt;operation&gt;[,&lt;period&gt;][,&lt;dutycycle&gt;]]]</b>            Response: OK            or ERROR            Purpose: Configure PWM or PWM2.)</li> <li>Read: <b>AT+KPWM?</b>            Response: +KPWM: &lt;output=1&gt;,&lt;operation&gt;,&lt;period&gt;,&lt;dutycycle&gt;            +KPWM: &lt;output=2&gt;,&lt;operation&gt;,&lt;period&gt;,&lt;dutycycle&gt;            OK            Purpose: Display PWM1 and PWM2 configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;output&gt; (PWM to configure)</p> <ul style="list-style-type: none"> <li>1—PWM1, multiplexed with GPIO(5)</li> <li>2—PWM2, multiplexed with GPIO(27)</li> </ul> <p>&lt;operation&gt;</p> <ul style="list-style-type: none"> <li>0—(Default) Turn off</li> <li>1—Turn on</li> </ul> <p>&lt;period&gt; (Cycle time, in ms)</p> <ul style="list-style-type: none"> <li>Valid range: 2–40000</li> <li>Default: 1000</li> <li>Frequency = 1 MHz / &lt;period&gt;            For example:           <ul style="list-style-type: none"> <li>Frequency of PWM signal with 2 ms period is 1 MHz / 2 = 500 kHz</li> <li>Frequency of PWM signal with 40000 ms period is 1 MHz / 40000 = 25 Hz</li> </ul> </li> </ul> <p>&lt;dutycycle&gt; (Percentage on/off ratio)</p> <ul style="list-style-type: none"> <li>Valid range: 0–100</li> <li>Default: 50</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Configure PWM1 (Turn on, 1000ms period, 40% on)            AT+KPWM=1,1,1000,40            OK</li> <li>Display current PWM1 and PWM2 configuration:            AT+KPWM?            +KPWM: 1,0,1000,50            +KPWM: 2,0,1000,50            OK</li> </ul>

## >> 20: ADC Commands

### Introduction

This chapter describes ADC interface-related commands.

### Command summary

The following table summarizes the commands described in this chapter.

**Table 20-1: ADC commands / notifications**

Command	F/W	Description	Page
<b>+KADC</b>	2.5.0+	<a href="#">Read ADC</a>	299
<b>+KADCCFG</b>	2.5.0+	<a href="#">Configure ADC</a>	301
<b>+KADCMODE</b>	2.5.0+	<a href="#">Set ADC precision (bit width)</a>	303

## Command reference

Table 20-2: ADC commands / notifications

Command	Description
<b>+KADC</b> (F/W rev: 2.5.0+)	<p><b>Read ADC</b></p> <p>Read the value of a specific ADC.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+KADC=&lt;id&gt;[,&lt;timing&gt;]</b></li> <li>  Response:    <b>+KADC &lt;read_value&gt;,&lt;id&gt;,&lt;timing&gt;</b></li> <li>                  OK</li> <li>                  or    <b>ERROR</b></li> <li>  Purpose:      Read the current value from the specified ADC.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;id&gt; (ADC identifier)</p> <ul style="list-style-type: none"> <li>• 4—ADC0, multiplexed with GPIO(34). Provided for compatibility with HL6/8.</li> <li>• 7—ADC1, multiplexed with GPIO(35). Provided for compatibility with HL6/8.</li> <li>• 8—ADC2, multiplexed with GPIO(38)</li> <li>• 9—ADC3, multiplexed with GPIO(39)</li> <li>• 10—ADC4, multiplexed with GPIO(32)</li> <li>• 11—ADC5, multiplexed with GPIO(33)</li> </ul> <p>&lt;timing&gt; (Timing constraint)</p> <ul style="list-style-type: none"> <li>• 3—No constraint. Provided for compatibility with HL6/8.</li> </ul> <p>&lt;read_value&gt; (ADC value)</p> <ul style="list-style-type: none"> <li>• Value read from ADC</li> <li>• Max value—Unit/attenuation/bitwidth-dependent:           <ul style="list-style-type: none"> <li>• For +KADCCFG &lt;units = 0&gt; (Raw):               <ul style="list-style-type: none"> <li>• For +KADCMODE &lt;bit_width = 9 bits&gt;—Value range: 0–511</li> <li>• For +KADCMODE &lt;bit_width = 10 bits&gt;—Value range: 0–1023</li> <li>• For +KADCMODE &lt;bit_width = 11 bits&gt;—Value range: 0–2047</li> <li>• For +KADCMODE &lt;bit_width = 12 bits&gt;—Value range: 0–4095</li> </ul> </li> <li>• For +KADCCFG &lt;units = 1&gt; (millivolts):               <ul style="list-style-type: none"> <li>• For +KADCCFG &lt;attenuation 0 (0 dB)&gt;—Max value ~1100</li> <li>• For +KADCCFG &lt;attenuation 1 (2.5 dB)&gt;—Max value ~1400</li> <li>• For +KADCCFG &lt;attenuation 2 (6 dB)&gt;—Max value ~1900</li> <li>• For +KADCCFG &lt;attenuation 3 (11 dB)&gt;—Max value ~3200</li> </ul> </li> <li>• For +KADCCFG &lt;units = 2&gt; (microvolts):               <ul style="list-style-type: none"> <li>• For +KADCCFG &lt;attenuation 0 (0 dB)&gt;—Max value ~1100000</li> <li>• For +KADCCFG &lt;attenuation 1 (2.5 dB)&gt;—Max value ~1400000</li> <li>• For +KADCCFG &lt;attenuation 2 (6 dB)&gt;—Max value ~1900000</li> <li>• For +KADCCFG &lt;attenuation 3 (11 dB)&gt;—Max value ~3200000</li> </ul> </li> </ul> </li> </ul> <p>(Continued on next page)</p>

**Table 20-2: ADC commands / notifications (Continued)**

Command	Description
<b>+KADC (continued)</b> (F/W rev: 2.5.0+)	<b>Read ADC (continued)</b> <b>Example:</b> <ul style="list-style-type: none"><li>• Read value of ADC0: AT+KADC=4 +KADC 75000,4,3 OK</li><li>• Read value of ADC0 with &lt;timing=3&gt; (Identical behavior as not including &lt;timing&gt;): AT+KADC=4,3 +KADC 75000,4,3 OK</li></ul>

Table 20-2: ADC commands / notifications (Continued)

Command	Description
<b>+KADCCFG</b> (F/W rev: 2.5.0+)	<p><b>Configure ADC</b></p> <p>Enable/disable or configure a specific ADC.</p> <p>To show the current configuration of a specific ADC, specify only the &lt;id&gt; (do not include any other parameters).</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KADCCFG=&lt;id&gt;[,&lt;enable&gt;][,&lt;attenuation&gt;][,&lt;units&gt;]]</b></li> <li>Response: <b>+KADCCFG &lt;id&gt;,&lt;enable&gt;,&lt;attenuation&gt;,&lt;units&gt;,&lt;bit_width&gt;</b> OK</li> <li>or <b>ERROR</b></li> <li>Purpose: Enable, disable, or configure the specified ADC.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;id&gt; (ADC identifier)</p> <ul style="list-style-type: none"> <li>• 4—ADC0, multiplexed with GPIO(34). Provided for compatibility with HL6/8.</li> <li>• 7—ADC1, multiplexed with GPIO(35). Provided for compatibility with HL6/8.</li> <li>• 8—ADC2, multiplexed with GPIO(38)</li> <li>• 9—ADC3, multiplexed with GPIO(39)</li> <li>• 10—ADC4, multiplexed with GPIO(32)</li> <li>• 11—ADC5, multiplexed with GPIO(33)</li> </ul> <p>&lt;enable&gt; (ADC state)</p> <ul style="list-style-type: none"> <li>• 0—(Default) Disable. Configures GPIO pin to digital input.</li> <li>• 1—Enable. Configures GPIO pin to analog input for ADC reading.</li> </ul> <p>&lt;attenuation&gt; (ADC attenuation, mapped to dB)</p> <ul style="list-style-type: none"> <li>• 0—(Default) 0 dB</li> <li>• 1—2.5 dB</li> <li>• 2—6 dB</li> <li>• 3—11 dB</li> </ul> <p>&lt;units&gt; (Units to report ADC readings)</p> <ul style="list-style-type: none"> <li>• 0—Raw. Direct ADC reading.</li> <li>• 1—mv (millivolts). ADC reading converted to millivolts.</li> <li>• 2—(Default) <math>\mu</math>v (microvolts). ADC reading in millivolts multiplied by 1000 (no additional accuracy). Provided for compatibility with HL6/8.</li> </ul> <p>&lt;bit_width&gt; (ADC measurement precision, in bits)</p> <ul style="list-style-type: none"> <li>• Integer value</li> <li>• Valid range: 9–12</li> <li>• Default—10 bits</li> </ul> <p>(Continued on next page)</p>

Table 20-2: ADC commands / notifications (Continued)

Command	Description
<b>+KADCCFG</b> <b>(continued)</b> (F/W rev: 2.5.0+)	<b>Configure ADC (continued)</b> <b>Examples:</b> <ul style="list-style-type: none"> <li>• Configure ADC0 with various settings:               <ul style="list-style-type: none"> <li>AT+KADCCFG=4 <i>(Configure ADC0 to default settings)</i>                    +KADCCFG 4,0,0,2,10                    OK</li> <li>AT+KADCCFG=4,1 <i>(Enable ADC0)</i>                    +KADCCFG 4,1,0,2,10                    OK</li> <li>AT+KADCCFG=4,1,1 <i>(Change attenuation to 1 dB)</i>                    +KADCCFG 4,1,1,2,10                    OK</li> <li>AT+KADCCFG=4,1,1,1 <i>(Change units to millivolts)</i>                    +KADCCFG 4,1,1,1,10                    OK</li> <li>AT+KADCCFG=4,,3 <i>(Change attenuation to 3 dB)</i>                    +KADCCFG 4,1,3,2,10                    OK</li> <li>AT+KADCCFG=4,,,0 <i>(Change units to raw data)</i>                    +KADCCFG 4,1,3,0,10                    OK</li> <li>AT+KADCMODE=9 <i>(Set ADC resolution (bit width) to 9 bits)</i>                    OK</li> <li>AT+KADCCFG=4 <i>(Show curent ADC configuration)</i>                    +KADCCFG 4,1,3,0,9                    OK</li> </ul> </li> </ul>

Table 20-2: ADC commands / notifications (Continued)

Command	Description
<b>+KADCMODE</b> (F/W rev: 2.5.0+)	<p><b>Set ADC precision (bit width)</b>            Set the precision (bit width) of all ADCs.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+KADCMODE=&lt;bit_width&gt;</b></li> <li>  Response:    OK</li> <li>                or    ERROR</li> <li>  Purpose:      Set the ADC precision.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bit_width&gt; (ADC measurement precision, in bits)</p> <ul style="list-style-type: none"> <li>• Integer value</li> <li>• Valid range: 9–12</li> <li>• Default—10 bits</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Set ADC precision to 9 bits:                <b>AT+KADCMODE=9</b>                <b>OK</b></li> </ul>

## >> 21: ICMP Commands

### Introduction

This chapter describes ICMP interface-related commands.

### Command summary

The following table summarizes the commands described in this chapter.

**Table 21-1: ICMP commands / notifications**

Command	F/W	Description	Page
<b>+KPING</b>	2.6.0+	<a href="#">Ping an IP Address</a>	305
<b>+KPING (notification)</b>	2.6.0+	<a href="#">Ping result received (unsolicited notification)</a>	306
<b>+KPINGSTAT (notification)</b>	2.6.0+	<a href="#">Ping statistics received (unsolicited notification)</a>	306
<b>+KPINGSTOP</b>	2.6.0+	<a href="#">Stop the active ping process</a>	307

## Command reference

Table 21-2: ICMP commands / notifications

Command	Description
<b>+KPING</b> (F/W rev: 2.6.0+)	<p><b>Ping an IP Address</b></p> <p>Send pings to an IP address. Individual ping responses are returned by <b>+KPING (notification)</b> notifications, and a summary response is returned after the process finishes via a <b>+KPINGSTAT (notification)</b> notification.</p> <p>Only one +KPING request (ping process) can be active at a time. To start a new ping process, wait until the current process finishes or use AT+KPINGSTOP to stop it.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Write: <b>AT+KPING=&lt;addr&gt;[,&lt;count&gt;][,&lt;timeout&gt;][,&lt;interval&gt;]]]</b></li> <li>Response: OK or ERROR</li> <li>Purpose: Send ping(s) to the IP address (&lt;addr&gt;).</li> </ul> <p><b>Parameters:</b></p> <p>&lt;addr&gt; (IP address that pings are sent to)</p> <ul style="list-style-type: none"> <li>IPv4 format</li> <li>e.g. 192.168.1.58</li> </ul> <p>&lt;count&gt; (Number of pings to send)</p> <ul style="list-style-type: none"> <li>Valid range: 1–2147483647</li> <li>Default: 3 (Used if parameter is not entered)</li> </ul> <p>&lt;timeout&gt; (Time to wait for a response (<b>+KPING (notification)</b>), in ms)</p> <ul style="list-style-type: none"> <li>Valid range: 1–2147483647</li> <li>Default: 1000 (Used if parameter is not entered)</li> </ul> <p>&lt;interval&gt; (Time between receiving response and sending next ping, in ms)</p> <ul style="list-style-type: none"> <li>Valid range: 1–2147483647</li> <li>Default: 1000 (Used if parameter is not entered)</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Send pings using default parameter values:            AT+KPING=192.168.1.58            OK            +KPING: 60,19                   (60 byte response packet received after 19 ms)            +KPING: 0,1000                (No packet received, timeout after 1000 ms)            +KPING: 60,8                   (60 byte response packet received after 8 ms)            +KPINGSTAT: 3,2,1,1027,8,19</li> </ul>

Table 21-2: ICMP commands/notifications (Continued)

Command	Description
<b>+KPING (notification)</b> (F/W rev: 2.6.0+)	<p><b>Ping result received (unsolicited notification)</b></p> <p>Notifies local device that a ping result was received for the ping process that was started using <b>+KPING</b>.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+KPING: &lt;bytes&gt;,&lt;time&gt;</b>            Purpose: Ping result indicating ping failure, or including the response packet size and round-trip time.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;bytes&gt; (Received packet size, in bytes)</p> <ul style="list-style-type: none"> <li>0—No packet received (ping timed out)</li> <li>&gt;0—Packet size</li> </ul> <p>&lt;time&gt; (Round-trip ping message/response time, in ms)</p> <ul style="list-style-type: none"> <li>Decimal value</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>Devices connecting and disconnecting:           <ul style="list-style-type: none"> <li>+KPING: 60,19                   <i>(60 byte response packet received after 19 ms)</i></li> <li>+KPING: 0,1000                 <i>(No packet received, timeout after 1000 ms)</i></li> <li>+KPING: 60,8                    <i>(60 byte response packet received after 8 ms)</i></li> </ul> </li> </ul>
<b>+KPINGSTAT (notification)</b> (F/W rev: 2.6.0+)	<p><b>Ping statistics received (unsolicited notification)</b></p> <p>Notification containing summary of ping process results, received after the ping process completes or is prematurely stopped using <b>+KPINGSTOP</b>.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>Notification: <b>+KPINGSTAT: &lt;sent&gt;,&lt;received&gt;,&lt;lost&gt;,&lt;time&gt;,&lt;min_time&gt;,&lt;max_time&gt;</b>            Purpose: Statistics for the just-completed ping process.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;sent&gt; (Number of ping requests (packets) sent)</p> <ul style="list-style-type: none"> <li>Valid range: 1–2147483647</li> </ul> <p>&lt;received&gt; (Number of ping responses (packets) received)</p> <ul style="list-style-type: none"> <li>Valid range: 1–2147483647</li> </ul> <p>&lt;lost&gt; (Number of ping requests (packets) lost)</p> <ul style="list-style-type: none"> <li>Valid range: 1–2147483647</li> </ul> <p>&lt;min_time&gt; (Shortest round-trip time reported by <b>+KPING (notification)</b> notifications, in ms)</p> <ul style="list-style-type: none"> <li>Valid range: 1–2147483647</li> </ul> <p>&lt;max_time&gt; (Longest round-trip time reported by <b>+KPING (notification)</b> notifications, in ms)</p> <ul style="list-style-type: none"> <li>Valid range: 1–2147483647</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>ping Statistics received:           <ul style="list-style-type: none"> <li>+KPINGSTAT: 3,2,1,1027,8,19     <i>(3 pings, 2 received, 1 lost, 1027 ms total, minimum round trip 8 ms, longest round trip 19 ms.)</i></li> </ul> </li> </ul>

Table 21-2: ICMP commands/notifications (Continued)

Command	Description
<b>+KPINGSTOP</b> (F/W rev: 2.6.0+)	<p><b>Stop the active ping process</b></p> <p>Stop the active ping process (started with <a href="#">AT+KPING</a>) at the end of the next interval (as specified in the ping request).            (Note: A <a href="#">+KPINGSTAT (notification)</a> will be received after stopping the process.)</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write: <b>AT+KPINGSTOP</b></li> <li>Response: OK</li> <li style="padding-left: 20px;">or +CME ERROR: &lt;cme_error&gt;</li> <li>Purpose: Send ping(s) to the IP address (&lt;addr&gt;).</li> </ul> <p><b>Parameters:</b></p> <p>&lt;cme_error&gt; (CME error code)</p> <ul style="list-style-type: none"> <li>• 3—ERROR_NOT_ALLOWED</li> <li>• For a full list of codes, see <a href="#">Table A-1, CME Error Codes</a>, on page 314.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>• Stop current ping process:              AT+KPINGSTOP              OK</li> </ul>

## >> 22: I2S Master Commands

### Introduction

This chapter describes I2S interface-related commands.

### Command summary

The following table summarizes the commands described in this chapter.

**Table 22-1: I2S Master commands / notifications**

Command	F/W	Description	Page
<b>+KI2SCFG</b>	2.7.1+	<a href="#">Configure I2S Master Tx parameters</a>	309
	2.6.2+	<a href="#">Configure I2S Master Tx parameters</a>	311
	2.6.0+	<a href="#">Configure I2S Master Tx parameters</a>	312

## Command reference

Table 22-2: I2S Master commands / notifications

Command	Description
<b>+KI2SCFG</b> (F/W rev: 2.7.1+)	<p><b>Configure I2S Master Tx parameters</b></p> <p>Configure the I2S (master mode) interface.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:           <b>AT+KI2SCFG=&lt;port_number&gt;, &lt;enable&gt; [&lt;communication_format&gt;, &lt;channel_format&gt;, &lt;mclk_enable&gt;,&lt;bck&gt;, &lt;ws&gt;, &lt;data_out&gt;, &lt;data_in&gt;]</b>                  Response:    OK                                or    ERROR                  Purpose:     Configure the I2S interface with specified parameters or default values.</li> <li>• Read:           <b>AT+KI2SCFG?</b>                  Response:    +KI2SCFG: &lt;port_number&gt;,&lt;enable=0&gt;                                or    +KI2SCFG: &lt;port_number&gt;,&lt;enable=1&gt;,&lt;communication_format&gt;,&lt;channel_format&gt;,&lt;bck&gt;,&lt;ws&gt;,&lt;data_out&gt;,&lt;data_in&gt;                                ...                                OK                  Purpose:     Display the I2S interface's current configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;port_number&gt; (I2S port number to be configured)</p> <ul style="list-style-type: none"> <li>• 0—I2S port number 0</li> </ul> <p>&lt;enable&gt; (Port state)</p> <ul style="list-style-type: none"> <li>• 0—Disable (Default)</li> <li>• 1—Enable</li> </ul> <p>&lt;communication_format&gt; (Communication protocol and format used by the I2S peripheral)</p> <ul style="list-style-type: none"> <li>• 0—I2S and MSB format (Default)</li> <li>• 1—I2S and LSB format</li> <li>• 2—PCM and Short format</li> <li>• 3—PCM and Long format</li> </ul> <p>&lt;channel_format&gt; (Channels used by the I2S peripheral)</p> <ul style="list-style-type: none"> <li>• 0—Right and Left (Default)</li> <li>• 1—All right channel</li> <li>• 2—All left channel</li> <li>• 3—Only right channel</li> <li>• 4—Only left channel</li> </ul> <p>(Continued on next page)</p>

Table 22-2: I2S Master commands / notifications (Continued)

Command	Description
<b>+KI2SCFG (continued)</b> (F/W rev: 2.7.1+)	<p><b>Configure I2S Master Tx parameters (continued)</b></p> <p>Configure the I2S (master mode) interface.</p> <p>&lt;clk_enable&gt; (A numeric parameter which specifies the option of the enable/disable of the MCLK output)</p> <ul style="list-style-type: none"> <li>Note: MCLK output does not support the BX310x-ETH chip, the MCLK output(GPIO0) wave only supports 11.2 Mhz.</li> <li>Default: Disable output             <ul style="list-style-type: none"> <li>0—Disable output</li> <li>1—Enable output</li> </ul> </li> </ul> <p>&lt;bck&gt; (GPIO number used for I2S Bit clock line)</p> <ul style="list-style-type: none"> <li>Must be a valid GPIO number</li> <li>Default:             <ul style="list-style-type: none"> <li>BC310x—26 (GPIO 26)</li> <li>BC310x-ETH—12 (GPIO 12)</li> </ul> </li> </ul> <p>&lt;ws&gt; (GPIO number used for I2S Word clock line)</p> <ul style="list-style-type: none"> <li>Must be a valid GPIO number</li> <li>Default:             <ul style="list-style-type: none"> <li>BC310x—18 (GPIO 18)</li> <li>BC310x-ETH—14 (GPIO 14)</li> </ul> </li> </ul> <p>&lt;data_out&gt; (GPIO number used for I2S data output line)</p> <ul style="list-style-type: none"> <li>Must be a valid GPIO number</li> <li>Default: 32 (GPIO 32)</li> </ul> <p>&lt;data_IN&gt; (GPIO number used for I2S data input line)</p> <ul style="list-style-type: none"> <li>Must be a valid GPIO number</li> <li>Default: 33 (GPIO 33)</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Set I2S configuration:            AT+KI2SCFG=0,1,0,0,0,26,18,32,33            OK</li> <li>Read current I2S configuration (Two ports, both disabled):            AT+KI2SCFG?            AT+KI2SCFG:=0,0            AT+KI2SCFG:=0,0            OK</li> <li>Read current I2S configuration (Two ports, one enabled and one disabled):            AT+KI2SCFG?            AT+KI2SCFG: 0,1,0,0,0,26,18,32,33            AT+KI2SCFG: 1,0            OK</li> </ul>

Table 22-2: I2S Master commands / notifications (Continued)

Command	Description
<b>+KI2SCFG</b> (F/W rev: 2.6.2+)	<p><b>Configure I2S Master Tx parameters</b></p> <p>Configure the I2S (master mode) interface.</p> <p>&lt;bck&gt; (GPIO number used for I2S Bit clock line)</p> <ul style="list-style-type: none"> <li>• Must be a valid GPIO number</li> <li>• Default:           <ul style="list-style-type: none"> <li>• BC310x—26 (GPIO 26)</li> <li>• BC310x-ETH—12 (GPIO 12)</li> </ul> </li> </ul> <p>&lt;ws&gt; (GPIO number used for I2S Word clock line)</p> <ul style="list-style-type: none"> <li>• Must be a valid GPIO number</li> <li>• Default:           <ul style="list-style-type: none"> <li>• BC310x—18 (GPIO 18)</li> <li>• BC310x-ETH—14 (GPIO 14)</li> </ul> </li> </ul> <p>&lt;data_out&gt; (GPIO number used for I2S data output line)</p> <ul style="list-style-type: none"> <li>• Must be a valid GPIO number</li> <li>• Default: 32 (GPIO 32)</li> </ul> <p>&lt;data_IN&gt; (GPIO number used for I2S data input line)</p> <ul style="list-style-type: none"> <li>• Must be a valid GPIO number</li> <li>• Default: 33 (GPIO 33)</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Set I2S configuration:           <pre>AT+KI2SCFG=0,1,0,0,0,0,26,18,32,33 OK</pre> </li> <li>• Read current I2S configuration (Two ports, both disabled):           <pre>AT+KI2SCFG? AT+KI2SCFG:=0,0 AT+KI2SCFG:=0,0 OK</pre> </li> <li>• Read current I2S configuration (Two ports, one enabled and one disabled):           <pre>AT+KI2SCFG? AT+KI2SCFG: 0,1,0,0,0,0,26,18,32,33 AT+KI2SCFG: 1,0 OK</pre> </li> </ul>

**Table 22-2: I2S Master commands / notifications (Continued)**

Command	Description
<b>+KI2SCFG</b> (F/W rev: 2.6.0+)	<p><b>Configure I2S Master Tx parameters</b>            Configure the I2S (master mode) interface.</p> <p><b>Usage:</b></p> <ul style="list-style-type: none"> <li>• Write:        <b>AT+KI2SCFG=&lt;port_number&gt;, &lt;enable&gt; [&lt;communication_format&gt;, &lt;channel_format&gt;, &lt;bck&gt;, &lt;ws&gt;, &lt;data_out&gt;, &lt;data_in&gt;]</b>                Response:    OK                            or    ERROR                Purpose:     Configure the I2S interface with specified parameters or default values.</li> <li>• Read:        <b>AT+KI2SCFG?</b>                Response:    +KI2SCFG: &lt;port_number&gt;, &lt;enable=0&gt;                            or    +KI2SCFG: &lt;port_number&gt;, &lt;enable=1&gt;, &lt;communication_format&gt;, &lt;channel_format&gt;, &lt;bck&gt;, &lt;ws&gt;, &lt;data_out&gt;, &lt;data_in&gt;                            ...                            OK                Purpose:     Display the I2S interface's current configuration.</li> </ul> <p><b>Parameters:</b></p> <p>&lt;port_number&gt; (I2S port number to be configured)</p> <ul style="list-style-type: none"> <li>• 0—I2S port number 0</li> </ul> <p>&lt;enable&gt; (Port state)</p> <ul style="list-style-type: none"> <li>• 0—Disable (Default)</li> <li>• 1—Enable</li> </ul> <p>&lt;communication_format&gt; (Communication protocol and format used by the I2S peripheral)</p> <ul style="list-style-type: none"> <li>• 0—I2S and MSB format (Default)</li> <li>• 1—I2S and LSB format</li> <li>• 2—PCM and Short format</li> <li>• 3—PCM and Long format</li> </ul> <p>&lt;channel_format&gt; (Channels used by the I2S peripheral)</p> <ul style="list-style-type: none"> <li>• 0—Right and Left (Default)</li> <li>• 1—All right channel</li> <li>• 2—All left channel</li> <li>• 3—Only right channel</li> <li>• 4—Only left channel</li> </ul> <p>&lt;bck&gt; (GPIO number used for I2S Bit clock line)</p> <ul style="list-style-type: none"> <li>• Must be a valid GPIO number</li> <li>• Default:               <ul style="list-style-type: none"> <li>• BC310x—26 (GPIO 26)</li> <li>• BC310x-ETH—12 (GPIO 12)</li> </ul> </li> </ul> <p>&lt;ws&gt; (GPIO number used for I2S Word clock line)</p> <ul style="list-style-type: none"> <li>• Must be a valid GPIO number</li> <li>• Default:               <ul style="list-style-type: none"> <li>• BC310x—18 (GPIO 18)</li> <li>• BC310x-ETH—14 (GPIO 14)</li> </ul> </li> </ul> <p>(Continued on next page)</p>

Table 22-2: I2S Master commands / notifications (Continued)

Command	Description
<b>+KI2SCFG (continued)</b> (F/W rev: 2.6.0+)	<p><b>Configure I2S Master Tx parameters (continued)</b></p> <p>Configure the I2S (master mode) interface.</p> <p>&lt;data_out&gt; (GPIO number used for I2S data output line)</p> <ul style="list-style-type: none"> <li>• Must be a valid GPIO number</li> <li>• Default: 32 (GPIO 32)</li> </ul> <p>&lt;data_IN&gt; (GPIO number used for I2S data input line)</p> <ul style="list-style-type: none"> <li>• Must be a valid GPIO number</li> <li>• Default: 33 (GPIO 33)</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Set I2S configuration:              AT+KI2SCFG=0,1,0,0,26,18,32,33              OK</li> <li>• Read current I2S configuration (Two ports, both disabled):              AT+KI2SCFG?              AT+KI2SCFG:=0,0              AT+KI2SCFG:=0,0              OK</li> <li>• Read current I2S configuration (Two ports, one enabled and one disabled):              AT+KI2SCFG?              AT+KI2SCFG: 0,1,0,0,26,18,32,33              AT+KI2SCFG: 1,0              OK</li> </ul>

## >> A: CME Error Codes

Table A-1: CME Error Codes

Code	Definition
3	ERROR_NOT_ALLOWED
902	NO_MORE_SOCKETS
903	MEMORY_PROBLEM
904	DNS_ERROR
905	TCP_DISCONNECTION_BY_THE_SERVER
906	TCP_UDP_CONNECTION_ERROR
907	GENERIC
908	FAILED_TO_ACCEPT_CLIENT_REQUESTS
909	SENT_DATA_INCOHERENT
910	BAD_SESSION_ID
911	SESSION_RUNNING
912	NO_MORE_SESSIONS
913	SOCKET_TIMEOUT
914	CONTROL_SOCKET_TIMEOUT
915	UNEXPECTED_PARAMETER
916	INVALID_PARAMETER
917	PARAMETER_MISSING
918	FEATURE_NOT_SUPPORTED
919	FEATURE_NOT_AVAILABLE
920	PROTOCOL_NOT_SUPPORTED
921	INVALID_BEARER_CONNECTION_STATE
922	INVALID_SESSION_STATE
923	INVALID_TERMINAL_PORT_DATA_MODE
924	SESSION_BUSY
925	HTTP_HEADER_MISSING_COLON
926	HTTP_HEADER_MISSING_CRLF
927	HTTP_HEADER_NAME_EMPTY
928	HTTP_HEADER_VALUE_EMPTY
929	INVALID_INPUT_DATA_FORMAT
930	INVALID_INPUT_DATA_CONTENT

**Table A-1: CME Error Codes (Continued)**

<b>Code</b>	<b>Definition</b>
931	INVALID_PARAMETER_LENGTH
932	INVALID_PARAMETER_FORMAT
933	SESSION_EXISTS