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## Using the firmware of the AT command set

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### Introduction

This document is a guide to the AT command set, a firmware application embedded in ST Bluetooth® module series: SPBT2532C2, SPBT2632C2A, SPBT2632C1A, and in ST evaluation tools STEVAL-SPBT2ATV2, STEVAL-SPBT2ATV3, STEVAL-SPBT3ATV3, STEVAL-SPBT4ATV3.

The AT command set is a user-friendly interface available in two options. The AT firmware implements a basic point-to-point cable replacement, while the AT2 firmware, in addition to the cable replacement, supports communication with smartphones.

The SPBT2532C2.AT module is equipped with the AT firmware implementing a serial cable replacement service using the Bluetooth® serial port profile, SPP.

The SPBT2532C2.AT2, SPBT2632C2A.AT2 and SPBT2632C1A.AT2 modules are equipped with the AT2 FW release, which offers SPP and IAP (iPOD accessory protocol) service, supporting communication with smartphones and Apple iOS Bluetooth®-enabled devices.

This document provides a detailed description of each command supported by the AT FW and AT2 FW interface. [Appendix A](#) contains the list of the system configuration variables of the AT command with each default value and range, both for AT and AT2 FW.

When it is not necessary to specify the FW version, “ATn” is used.

Each of the subsections in [Section 3: AT command list](#) gives the definition, syntax and responses of each command.

Error responses are also detailed in [Section 4](#) of this document.

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# 1 Definition and acronyms

The following table lists the acronyms used in this document.

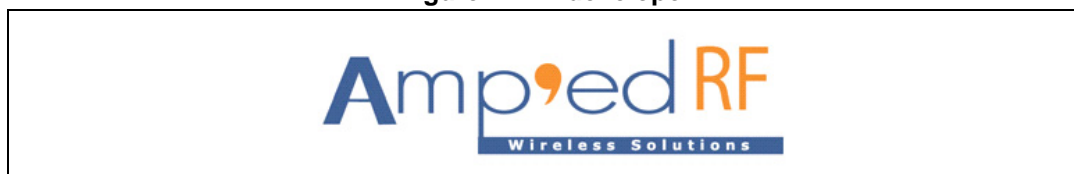
**Table 1. Definitions and acronyms**

Term	Description/meaning
ASCII	American standard code for information interchange, a standard describing encoding of characters; the use in this document is strictly US 7-bit
BD	Bluetooth device
DCD	Modem signal "data carrier detect"; indication from a modem that a connection has been made through, for example, a dialup connection
DTE	Data terminal entity, e.g., a computer
DTR	Modem signal "data terminal ready"; indication to a modem that the data terminal is ready for a connection
DUN	Dialup networking (profile)
GPIO	General purpose input-output
IAP	iPOD accessory protocol
LAN	Local area network
PIN	Personal identification number
SPP	Serial port profile
UART	Universal asynchronous receiver-transmitter

## 2 Overview

This chapter gives a basic overview of the AT and AT2 libraries which include a set of commands described in detail in [Section 3](#). [Appendix A](#) describes the two sets of configuration variables, relevant to AT and AT2 FW versions. The AT and AT2 FW are third party IPs developed by Amp'edRF.

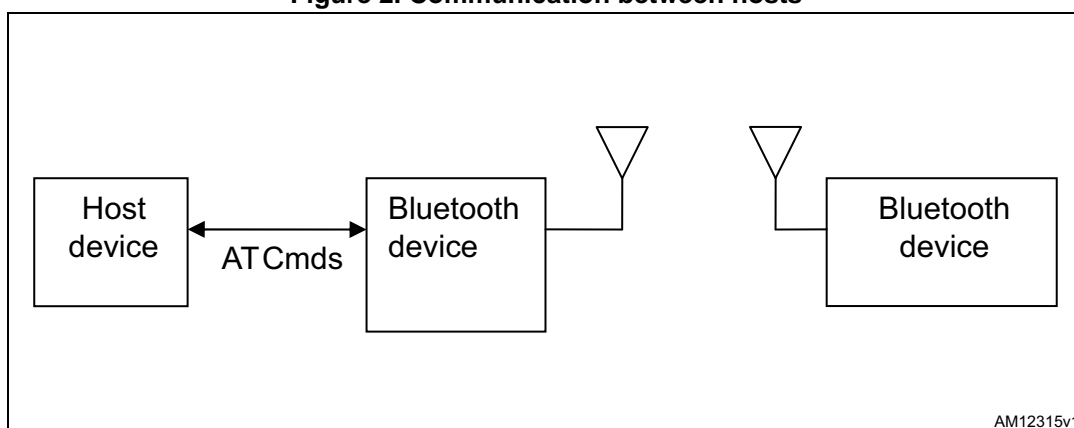
Figure 1. FW developer



### 2.1 AT command FW interface overview

The AT command FW is a cable replacement application that provides communication between Bluetooth-enabled devices. A serial port is used to communicate with a host device through an AT command interface as shown below.

Figure 2. Communication between hosts



The AT command FW provides the following basic features:

- AT2 FW supports point-to-point and multipoint connections, while AT FW supports only point-to-point connections.
- Serial port profile, SPP, is supported for both client and server applications.
- iPOD accessory protocol, IAP, is supported only by AT2 FW, enabling communication with Apple iOS Bluetooth-enabled devices.
- Command and bypass modes: it is possible to switch between command and bypass (data transmit/receive) modes during an active connection.
- Security: bonding and data encryption provides a secure link between two devices.
- Power conservation: use of the Sniff feature to minimize power consumption is supported only with AT2 FW.
- Variable baud rates: the serial port can be configured for the following baud rates: 1200, 2400, 4800, 9600, 19.2k, 38.4k, 57.6k, 115.2k (default), 230.4k, 460.8k, 921.6k



### 3 AT command list

This chapter details each of the AT commands including brief descriptions of behavior, syntax of the command, context of the command, and types of responses.

This AT command FW reference guide covers the commands listed in [Table 2](#).

The table compares the AT FW release to the new AT2 FW, pointing out additional features.

Table key:

- S: command is supported in this release
- NS: command is not supported in this release
- New: command is introduced with this release

**Table 2. AT command list summary**

Command	AT FW version V1.2 system configuration 1.2	AT2 FW version V1.3 system configuration 1.3	AT2 FW version V1.3 system configuration 1.5
Bond	S	S	S
BtcVersion	New	S	S
Build	S	S	S
Bypass	S	S	S
ChangeBaud	S	S	S
ChangeDefaultBaud	S	S	S
Config	S	S	S
Cptest	NS	New	S
DefaultLocalName	S	S	S
DeleteSmartCable	S	S	S
DisableBond	S	S	S
Discovery	S	S	S
EnableBond	S	S	S
EraseBondTable	S	S	S
ExitSniff	NS	S	S
GetBdAddress	New	S	S
GPIOConfig	S	S	S
GPIORead	S	S	S
GPIOWrite	S	S	S
HostEvent	S	S	S
IAPConnect	NS	New	S
IAPDisconnect	NS	New	S
LinkDisconnect	New	S	S

Table 2. AT command list summary (continued)

Command	AT FW version V1.2 system configuration 1.2	AT2 FW version V1.3 system configuration 1.3	AT2 FW version V1.3 system configuration 1.5
LocalName	S	S	S
PassKeyAccept	NS	NS	New
PortDisconnect	S	NS	NS
ReadClock	NS	NS	New
Reset	S	S	S
RoleSwitch	S	S	S
ShowDev	S	S	S
SmartCableSetup	S	S	S
Sniff	NS	S	S
SPPConnect	S	S	S
SPPDisconnect	S	S	S
StreamingSerial	S	S	S
UpdateInquiryScan	S	S	S
UpdatePageScan	S	S	S
Version	S	S	S

The following subsections describe each of these commands in detail, including a description of behavior, syntax (including possible parameter values), and types of responses.

Some responses will not be "immediate". Where applicable, these will be noted and will include an approximate delay before response.

For commands with optional parameters, all possible forms will be listed under the syntax subsection.

Error responses are described in [Section 4](#).

## 3.1 Bond

The Bond command is used to initiate bonding with a specified device. A personal identification number (PIN) is also required with this command.

### 3.1.1 Syntax

AT+AB Bond [BD Addr] [PIN]

Where [BD addr] is the BD Address of the remote device with which to bond and [PIN] is the PIN code to use (up to 16 characters).

### 3.1.2 Responses

If the request is successfully submitted, the response is:

```
AT-AB BondPending [Remote BD Addr]
```

If the operation is successful, the response is:

```
AT-AB BondOk
```

If the operation fails, the response is:

```
AT-AB BondFail
```

## 3.2 BtcVersion

The BtcVersion command is used to return the current ID of the Bluetooth controller chip.

### 3.2.1 Syntax

```
AT+AB BtcVersion
```

## 3.3 Build

The Build command is used to return the current build ID of the application firmware.

### 3.3.1 Syntax

```
AT+AB Build
```

### 3.3.2 Responses

If the operation is successful, the response is:

```
AT-AB ATn FW Build [date]
```

where [date] is the date code of the application firmware.

## 3.4 Bypass

The bypass command is used to return the ATn FW interface to the bypass mode, if a connection is still available. A possible use for this command is to change a setting after a connection has been made (such as the UART baud rate). If the ATn FW interface does not have a connection, it will respond as if the connection is down.

### 3.4.1 Syntax

```
AT+AB Bypass
```

### 3.4.2 Responses

If a connection is still available, the response is:

AT-AB -BypassMode-

If there is currently no connection, the response is:

AT-AB ConnectionDown

## 3.5 ChangeBaud

The host sends the ChangeBaud command in order to change the local UART speed to a new speed identified by the host. This setting will only remain in effect during the current session - until reset.

### 3.5.1 Syntax

AT+AB ChangeBaud [rate]

where [rate] is the new baud rate:

- 1200
- 2400
- 4800
- 9600
- 19,200
- 38,400
- 57,600
- 115,200
- 230,400
- 460,800
- 921,600

### 3.5.2 Responses

If the change is accepted, the response is:

AT-AB Baudrate Changed

The actual change will not occur until the response has been completely transmitted.

## 3.6 ChangeDefaultBaud

The host sends the ChangeDefaultBaud command in order to change the default UART speed to a new speed identified by the host. This command is used to override the default baud rate from the dynamic configuration script so that the device does not require reprogramming to update this setting. The new baud rate is updated permanently until the device is either re-programmed or another ChangeDefaultBaud command is issued. The baud rate specified in the command will not take effect until the device is reset. To change the baud rate of the current session, use the ChangeBaud command.

### 3.6.1 Syntax

`AT+AB ChangeDefaultBaud [rate]`

where [rate] is the new baud rate:

- 1200
- 2400
- 4800
- 9,600
- 19,200
- 38,400
- 57,600
- 115,200
  
- 230,400
- 460,800
- 921,600

### 3.6.2 Responses

If the change is accepted, the response is:

`AT-AB Baudrate Changed`

## 3.7 Config

The Config command is used to set a configuration variable.

### 3.7.1 Syntax

`AT+AB Config [variable name] = [variable value]`

The list of configuration variables is shown in [Appendix A](#).

## 3.8 Cptest

The Cptest command allows to verify the connection of the MFI chipset.

### 3.8.1 Syntax

`at+ab cptest`

### 3.8.2 Responses

If the coprocessor chipset is correctly connected, the output of the command gives infos (versions and ID) about the coprocessor. Example:

- CP Device Version: 0x03
- CP Firmware Version: 0x01
- CP Authentication protocol Major version: 0x02
- CP Authentication protocol Minor version: 0x00
- CP Device ID: 0x00000200

When the coprocessor is not connected or badly connected the output of the command is  
CP Data Fail or CP Address Fail.

## 3.9 DefaultLocalName

The DefaultLocalName command is used to set the name of the device to the name that is reported during device discoveries. By default, the ATn FW interface uses "Amp'ed UP!". Changing the name using this command will permanently change the local name, unlike the LocalName command, specified hereafter.

### 3.9.1 Syntax

```
AT+AB DefaultLocalName [name]
```

Where [name] is a string for the new local name, case sensitive (up to 20 characters). The space character is allowed; the name is assumed to be all text up to the end of the command.

### 3.9.2 Responses

If the operation is successful, the response is:

```
AT-AB LocalNameOk
```

## 3.10 DeleteSmartCable

The DeleteSmartCable command removes the current Smart Cable settings that were entered using the SmartCableSetup command, but not the setting from the dynamic configuration. The Smart Cable will then be deactivated for the remainder of this session. Upon reset, if a dynamic configuration for a Smart Cable exists, it will be activated. If there is no dynamic configuration Smart Cable setup, then this feature will remain deactivated.

### 3.10.1 Syntax

```
AT+AB DeleteSmartCable
```

### 3.10.2 Responses

If the operation is successful, the response is:

```
AT-AB DeleteSmartCableDone
```

## 3.11 DisableBond

The DisableBond command is used to deny new bonding with a device.

This command cannot be used while a connection is active.

### 3.11.1 Syntax

```
AT+AB DisableBond
```

### 3.11.2 Responses

If the operation is successful, the response is:

```
AT-AB BondDisabled
```

## 3.12 Discovery

The discovery command is used to initiate a device discovery. The command will return the number of responses of nearby devices and then the individual responses with BD address and name of device. The number of devices returned is limited to 10.

Inquiry is performed with an interval of 10.24 seconds.

The devices are reported in the same order as the original inquiry results.

### 3.12.1 Syntax

```
AT+AB Discovery [COD filters]
```

The discovery COD optional parameters are listed here below:

- miscellaneous
- computer
- phone
- lan
- peripheral
- imaging
- wearable
- toy
- health

### 3.12.2 Responses

When the discovery command has been accepted, the response is:

```
AT-AB InqPending
```

Once the initial inquiry is complete and discovery has been started, the response is:

```
AT-AB DiscoveryPending [num]
```

where [num] is the number of devices found, in decimal (up to 10 will be reported).

For each name request that is successful, the response uses the returned names in the following format.

```
AT-AB Device [BD addr] [name]
```

where [BD addr] is in hexadecimal with the most significant byte first. [name] is a string in double quotes " ".

For each unsuccessful name request, the corresponding name is replaced by "Unknown". The name request may not be successful if unable to make a connection for the request.

```
AT-AB Device [BD addr] "Unknown"
```

## 3.13 EnableBond

The EnableBond command is used to enable bonding with another device. The BD Address, PIN and timeout parameters are optional.

When no BD Address is specified, requests from all BD Addresses are allowed.

If a BD Address is specified, bonding requests from devices with BD Addresses other than the one specified will fail and the existing link key will be deleted for that device.

Optionally, a PIN code may be entered with this command. If no PIN code is specified, the default PIN code will be used.

Also, a timeout value, in seconds, may be entered after the PIN code. Bonding will be disabled automatically after the requested timeout. If no timeout is specified, bonding is enabled until reset or until the DisableBond command is used.

If this command is issued multiple times, only the last PIN and BD address are saved. Also, if this command is issued before the first timeout occurs, the subsequent command will extend the timeout. The timeout is always set to the specified time beyond the last received EnableBond.

### 3.13.1 Syntax

```
AT+AB EnableBond
```

```
AT+AB EnableBond [BD addr]
```

```
AT+AB EnableBond [BD addr] [PIN]
```

```
AT+AB EnableBond [BD addr] [PIN] [timeout]
```

Where [BD addr] is the BD Address of the remote device with which to bond, [PIN] is the PIN code to use (up to 16 characters), and [timeout] is the duration of the timeout in seconds (1 to 1000).

### 3.13.2 Responses

If the operation is successful, the response is:

```
AT-AB BondEnabled
```

If bonding has been initiated by a remote device, the notification is:

```
AT-AB BondPending [BD addr]
```

where [BD addr] is the BD address of the remote device that initiated the bonding.

If bonding has occurred, the notification is:

```
AT-AB BondOk [BD addr]
```

where [BD addr] is the BD address of the remote device with successful bonding.



If bonding was initiated by a remote device but failed, the notification is:

`AT+AB BondFail`

When the time limit for bonding has expired, the notification is:

`AT+AB BondDisabled`

## 3.14 EraseBondTable

The EraseBondTable command is used to erase all of the bonded device entries. Single devices cannot be erased with this command

### 3.14.1 Syntax

`AT+AB EraseBondTable`

### 3.14.2 Responses

If the operation is successful, the response is:

`AT+AB BondTableErased`

## 3.15 ExitSniff

The ExitSniff command is used by AT2 FW to switch a device from sniff mode to active mode.

### 3.15.1 Syntax

`AT+AB ExitSniff [BD address]`

Where [BD address] is the BD address of the device to be switched to active mode.

### 3.15.2 Responses

If the operation is successful, the response is:

`AT+AB ActiveMode`

## 3.16 GetBDAddress

The GetBDAddress command is used to read the local device's Bluetooth device address or MAC address.

### 3.16.1 Syntax

`AT+AB GetBDAddress`

### 3.16.2 Responses

If the operation is successful, the response is:

`AT+AB BD_ADDR = [BD address]`

## 3.17 GPIOConfig

The GPIOConfig command is used to configure a GPIO pin to input or output.

### 3.17.1 Syntax

```
AT+AB GPIOConfig [GPIO Pin] [Configuration]
```

where [GPIO Pin] is the pin number of the desired GPIO to configure. The GPIO numbering depends on the specific HW used.

[Configuration] is "i" or "I" for input and "o" or "O" for output.

### 3.17.2 Responses

If the operation is successful, the response is:

```
AT-AB GPIOConfigDone
```

## 3.18 GPIORead

The GPIORead command is used to read a GPIO pin. A GPIO may be read while configured as either an input or output.

### 3.18.1 Syntax

```
AT+AB GPIORead [GPIO Pin]
```

where [GPIO Pin] is the pin number of the desired GPIO to read. The GPIO numbering depends on the specific HW used.

### 3.18.2 Responses

If the operation is successful, the response is:

```
AT-AB GPIOReadDone [result]
```

Where [result] is either a 1 to indicate high, or 0 to indicate low.

## 3.19 GPIOWrite

The GPIOWrite command is used to set a GPIO pin to high or low. A GPIO may only be set when configured as an output.

### 3.19.1 Syntax

```
AT+AB GPIOWrite [GPIO Pin] [Setting]
```

where [GPIO Pin] is the pin number of the desired GPIO to read. The GPIO numbering depends on the specific HW used.

[Setting] is a 1 to set a pin to high and a 0 to set a pin to low.

### 3.19.2 Responses

If the operation is successful, the response is:

```
AT+AB GPIOWriteDone
```

## 3.20 HostEvent

The HostEvent command is used to enable/disable the host notification strings. This will override the default setting in the dynamic configuration only for the current session, until reset.

### 3.20.1 Syntax

```
AT+AB HostEvent [Enable/Disable]
```

Where [Enable/Disable] is an "e" or "E" character to enable this parameter and a "d" or "D" character to disable it.

### 3.20.2 Responses

If the feature is successfully enabled, the response is:

```
AT+AB HostEvent Enabled
```

If the feature is successfully disabled, there is no response because the events have been disabled.

## 3.21 IAPConnect

The IAPConnect command is used by AT2 FW to initiate a connection with the specified Apple iOS device. The remote BD address must be specified.

### 3.21.1 Syntax

```
AT+AB IAPConnect [BD Addr]
```

Where [BD Addr] is the iOS remote device's BD Address to page.

### 3.21.2 Responses

If the connection is successful, the response is:

```
AT+AB ConnectionUp [Remote BD Addr]
```

```
AT+AB -iAP-BypassMode-
```

If the connection cannot be completed, the response is:

```
AT+AB iAPConnectionClosed
```

## 3.22 IAPDisconnect

The IAPDisconnect command is used by AT2 FW to terminate a connection with the remote Apple iOS device.

### 3.22.1 Syntax

`AT+AB IAPDisconnect`

### 3.22.2 Responses

If the connection is successful, the response is

`AT-AB iAPConnectionClosed`

## 3.23 LinkDisconnect

The LinkDisconnect command is used to terminate a connection with the remote device's link handle.

### 3.23.1 Syntax

`AT+AB LinkDisconnect`

### 3.23.2 Responses

If the connection is successful, the response is

`AT-AB ConnectionDown`

## 3.24 LocalName

The LocalName command is used to set the name of the device to the name that is reported during device discoveries. By default, the ATn FW interface uses "Amped UP!". Changing the name using this command does not permanently change the local name.

### 3.24.1 Syntax

`AT+AB LocalName [name]`

Where [name] is a string for the new local name (up to 20 characters). The space character is allowed; the name is assumed to be all text up to the end of the command.

### 3.24.2 Responses

If the operation is successful, the response is:

`AT-AB LocalNameOk`

## 3.25 PassKeyAccept

This command is used to accept the MITM confirmation code, automatically generated during the bonding phase. After setting `var55 = true`, it is possible to use this command to complete the pairing automatically

### 3.25.1 Syntax

`AT+AB PassKeyAccept [y/n]`

Example for confirmation:

`AT+AB PassKeyAccept y`

Example for denying confirmation:

`AT+AB PassKeyAccept n`

### 3.25.2 Responses

If the operation is successful the module enters in bypass mode and it is automatically bonded or connected.

## 3.26 PortDisconnect

The PortDisconnect command is used to terminate a connection with the remote device port handle. it is supported by AT FW.

### 3.26.1 Syntax

`AT+AB PortDisconnect`

### 3.26.2 Responses

If the operation is successful, the response is:

`AT+AB ConnectionDown`

## 3.27 ReadClock

This command reads the piconet clock of the local or remote device

### 3.27.1 Syntax

`AT+AB ReadClock`

### 3.27.2 Responses

Local clock

### 3.27.3 Syntax

`AT+AB ReadClock [Remote Address]`

### 3.27.4 Responses

Remote device clock

## 3.28 Reset

The Reset command is used to reset the ATn FW interface. This is provided in the event that a host application wants to perform a software reset for error recovery. There is a response prior to reset in order to verify that the command was received by the ATn FW interface. A reset requires 1.6 seconds.

### 3.28.1 Syntax

```
AT+AB Reset
```

### 3.28.2 Responses

If the operation is successful, the response is:

```
AT-AB ResetPending
```

## 3.29 RoleSwitch

The RoleSwitch command is used to change a link from/to a Master or Slave role

### 3.29.1 Syntax

```
at+ab RoleSwitch [bd address] [role]
```

where

- [bd address] is the address of the remote device that will receive the role switch
- [role] is the new role of the local device: 0=Master, 1 =Slave

## 3.30 ShowDev

The ShowDev command is used to list the contents of the Bond Table.

### 3.30.1 Syntax

```
AT+AB ShowDev
```

### 3.30.2 Responses

This command returns the list of all the devices bonded, identified by their BD Address.

## 3.31 SmartCableSetup

The SmartCableSetup command is used to enable and configure a Smart Cable device. A device's BD Address is specified in order to automatically establish a connection, replacing the need for AT connection commands. This command will override the dynamic configuration of a Smart Cable device until the DeleteSmartCable command is issued; it is saved in non-volatile memory.

### 3.31.1 Syntax

```
AT+AB SmartCableSetup [BD address] [Attempts] [Interval]
```

Where [BD address] is the BD address of the remote device to page and attempt to connect. [Attempts] 0 - 999 is the number of pages that will be attempted to the specified device until a connection is successful. A value of 0 will not automatically page the remote device. A value of 1000 will perform unlimited pages until the connection is switched from command mode to bypass mode to exchange data.

[Interval] 1-1000 is the number of 100 ms intervals (0.1 sec to 100 sec) between page attempts. This interval is in addition to the amount of time required by the page attempt itself.

### 3.31.2 Responses

If the operation is successful, the response is:

```
AT-AB SmartCableConfigDone
```

## 3.32 Sniff

The Sniff command is used by AT2 FW to switch a device from active mode to sniff mode.

### 3.32.1 Syntax

```
AT+AB Sniff [BD address] [Sniff Interval]
```

Where [BD address] is the BD address of the device to be switched to active mode. [Sniff Interval] is given in slots from 66-10,000.

### 3.32.2 Responses

If the operation is successful, the response is:

```
AT-AB SniffMode
```

## 3.33 SPPConnect

The SPPConnect command is used to initiate a connection with the specified device. The remote BD address must be specified. The remote Service is optional. If not specified, the first registered SPP service will be used by default.

### 3.33.1 Syntax

```
AT+AB SPPConnect [BD Addr] [Service]
```

Where [BD Addr] is the remote device's BD Address to page. [Service] is the specific service on the remote device (optional).

### 3.33.2 Responses

If the connection is successful, the response is:

```
AT+AB ConnectionUp [Remote BD Addr]
```

```
AT+AB -BypassMode-
```

If the connection cannot be completed, the response is:

```
AT+AB SPPConnectionClosed
```

## 3.34 SPPDisconnect

The SPPDisconnect command is used to terminate a connection with the remote device.

### 3.34.1 Syntax

```
AT+AB SPPDisconnect
```

### 3.34.2 Responses

If the connection is successful, the response is

```
AT+AB SPPConnectionClosed
```

## 3.35 StreamingSerial

### 3.35.1 Syntax

```
AT+AB StreamingSerial [Enable/Disable]
```

Where [Enable/Disable] is an "e" or "E" character to enable this parameter and a "d" or "D" character to disable it. Streaming Serial will disable the RTS/CTS hardware flow control and discard non-transmitted data when enabled. RTS/CTS flow control is enabled when Streaming Serial is disabled.

### 3.35.2 Query

An alternative syntax may be used to query the current StreamingSerial feature status. This syntax is not supported by other commands.

```
AT+AB StreamingSerial
```

### 3.35.3 Responses

If the feature is successfully applied or queried, the response is:

```
AT+AB StreamingSerial [Enabled/Disabled]
```

## 3.36 UpdateInquiryScan

The UpdateInquiryScan command is used to modify the Inquiry scan parameters: mode, duration, and interval.



### 3.36.1 Syntax

AT+AB UpdateInquiryScan [mode] [duration] [interval]

where [mode] is the discoverable mode:

- 0: non-discoverable
- 1: limited discoverability - not supported
- 2: discoverable

[duration] is the scan length in slots; 18 to 4096. The default duration is 18 slots.

[interval] is the period between scans in slots; 18 to 4096. The default interval is 2048 slots

### 3.36.2 Responses

If the command is successful, the response is:

AT-AB InquiryScanUpdateDone

## 3.37 UpdatePageScan

The UpdatePageScan command is used to modify the Page scan parameters: mode, duration, and interval.

### 3.37.1 Syntax

AT+AB UpdatePageScan [mode] [duration] [interval]

where [mode] is the connectable mode:

- 0: non-connectable
- 1: connectable

[duration] is the scan length in slots; 18 to 4096. The default duration is 18 slots.

[interval] is the period between scans in slots; 18 to 4096. The default interval is 2048 slots

### 3.37.2 Responses

If the command is successful, the response is:

AT-AB PageScanUpdateDone

## 3.38 Version

The version command is used to return the current version of the ATn FW interface.

### 3.38.1 Syntax

AT+AB Version

### 3.38.2 Responses

If the operation is successful, the response is:

AT-AB ATn FWVer [x.y]

where [x.y] is the current version of the ATn FW interface.

## 4 Error responses

This chapter details the error responses that occur under specific circumstances.

There are seven error responses that can occur beyond error responses specific to a particular command (e.g., Discovery). They are:

- ErrConnect
- ErrExecute
- ErrFormat
- ErrInvalidParam
- ErrNumParam
- ErrUnknownCmd
- ErrInProgress

The following subsections detail the different error responses. These error responses replace the original error response

AT+AB ErrorCommand

### 4.1 ErrConnect

The ErrConnect error response will be sent if ATn FW has a valid connection established and the command cannot be executed while connected (even in the command mode). Examples of commands that produce this error response are given in the following table.

**Table 3. Example commands that generate <ErrConnect>**

Example	Reason
AT+AB Discovery	Performing a device discovery while a connection already exists.
AT+AB SPPConnect 00043e000000	Establishing a connection to a device while a connection exists with another.

### 4.2 ErrExecute

The ErrExecute error response will be sent if the command cannot complete for any reason. Examples of commands that produce this error response are given in the following table.

**Table 4. Example commands that generate ErrExecute**

Example	Reason
AT+AB Sniff	Execution of sniff while the device is not connected

### 4.3 ErrFormat

The ErrFormat error response will be sent if ATn FW receives a command (text terminated by a carriage return or line feed) that does not match the expected format starting with "AT+AB".

Examples of commands that produce this error response are given in the following table.

**Table 5. Example commands that generate <ErrFormat>**

Example	Reason
AT-AB discovery	A valid command name that does not start with the right prefix.
SPPConnect 00043e000000	A command that does not start with "AT+AB".
abcdef	A command that does not start with "AT+AB".

### 4.4 ErrInvalidParam

The ErrInvalidParam error response will be sent if the parameters for the requested command are not correct. The parameter(s) will be echoed back to the user starting from the parameter that was rejected.

Examples of commands that produce this error response are given in the following table.

**Table 6. Example commands that generate <ErrInvalidParam>**

Example	Response	Reason
AT+AB SPPConnect 8136	AT-AB ErrInvalidParam 8136	Numeric parameter not specified with required number of digits (BD address must always be 12 hex characters).
AT+AB SPPConnect 00043e008136 GOEP	AT-AB ErrInvalidParam goep	Unrecognized (or unsupported) symbolic parameter used.
AT+AB ChangeBaud 1600	AT-AB ErrInvalidParam 1600	Numeric parameter is out of range (specified baud rate is not supported by command).
AT+AB EnableBond 00043e000000 12345678901234567	AT-AB ErrInvalidParam 12345678901234567	String parameter (PIN) has too many characters.

### 4.5 ErrNumParam

The ErrNumParam error response will be sent if there are too few parameters for the requested command. A command sent with too many parameters does not generate an error; instead, the extra parameters are ignored.

*Note:* Some commands will accept a variable number of parameters.

Examples of commands that produce this error response are given in the following table.

Table 7. Example commands that generate &lt;ErrNumParam&gt;

Example	Reason
AT+AB Sniff	The minimum number of parameters was not specified.

## 4.6 ErrUnknownCmd

The ErrUnknownCmd error response will be sent if the requested command is not recognized. The unrecognized command will be echoed back to the host. Any parameters given will be ignored.

AT-AB ErrUnknownCmd [unrecognized command]

An accepted command always starts with the command identifier:

AT+AB

## 4.7 ErrInProgress

ErrInProgress is sent in response to the Discovery command being issued when the previous one is still in progress.

AT+AB Discovery [unrecognized command]

Examples of commands that produce this error response are given in the following table:

Table 8. Example commands that generate &lt;ErrInProgress&gt;

Example	Reason
AT+AB Discovery	Trying to issue the Discovery command when the previous one has not completed.

## 5 Other responses

The following subsections describe types of responses that occur under specific circumstances, not necessarily as a result of a specific command. They are:

- Reset
- Escape sequence

### 5.1 Reset

Upon either a hardware reset or software reset (such as the Reset command), ATn FW will respond as follows after the reset is complete:

```
AT-AB -CommandMode-
```

```
AT-AB BDAddress [BD addr]
```

Because the BD address of the local device is reported during this response, the response is different than a response to the Escape Sequence.

### 5.2 Escape sequence

If the escape sequence, "`^#^$^%`", is received and no connection is active, ATn FW will immediately respond with:

```
AT-AB -CommandMode-
```

When the escape sequence is received while a connection is still active and there is no data for 2 seconds, ATn FW will respond (after those 2 seconds of no data) with the same string. ATn FW will now be in command mode.

### 5.3 Remote escape sequence

The remote escape sequence, supported by AT2 FW, allows a remote device to enter in a mode where it can be controlled and configured by a BT link using a local host and Bluetooth device.

To enable Remote Control the configuration variable `RmtEscapeSequence` must be set to true.

The Remote escape sequence is "`@#@$@%`" and it must be sent by the local host in a single complete packet over the BT link with no CR or LF in the sequence.

When received, the remote device will respond locally with:

```
AT-AB RemoteMode.
```

*Note: If sent digit by digit it will not be recognized by the system.*

## Appendix A FW configuration variables

The system configuration settings for each firmware version are given in the tables that follow .

In order to set a configuration variable, enter "at+ab config xxxx = yyyy", where "xxxx" is the variable name and "yyyy" is the value to set. A variable name could also be specified as "varzz", where zz is the sequence number of the variable.

*Note:* All changes require a reset to take effect.

### A.1 AT FW version 1.2

**Table 9. AT version 1.2 system configuration settings – version 1.2**

Variable	Name	Default	Description
Var01	BuildVersion	xxxxxxx	Date code software was built.
Var03	BD_ADDR	00043e260e73	Bluetooth device address (Read-only).
Var04	DeviceName	Amp'ed Up!	Code used for secure connection. Up to 20 characters are allowed (case sensitive).
Var05	StreamingSerial	True	When true, hardware RTS/CTS flow control is disabled and data not able to be transmitted over the link will be discarded. When False, RST/CTS flow control is enabled.
Var06	PIN	1234	Code used for pairing. Up to 16 characters are allowed (case sensitive).
Var07	UartBaudrate	115200	Main UART baudrate: 1200 to 921,600 baud.
Var08	UartParity	None	Main UART parity.
Var09	UartDataBits	8	Main UART data bits per character.
Var10	UartStopBits	1	Main UART number of stop bits.
Var11	UartTimeout	44	Timeout used to determine the end of a message in units of bit times: from 8 to 128 are allowed.
Var12	AutoSniff	False	This enables the sniff feature when the link is inactive automatically.
Var13	AutoSniffTimeout	5	The inactivity timeout in seconds used for AutoSniff above.
Var14	AutoSniffInterval	1000	Sniff Slot interval applied AutoSniff.
Var15	HostDeepSleepEnable	False	Enables deep sleep mode.
Var16	GPIO_HostKeepAwake	None	GPIO register used to prevent the module from entering deep sleep mode. A setting of none means that this function is disabled.
Var17	GPIO_HostWakeup	None	GPIO register used to wake up the module after it enters deep sleep mode. A setting of none means that this function is disabled.

Table 9. AT version 1.2 system configuration settings – version 1.2 (continued)

Variable	Name	Default	Description
Var18	UseSmallPackets	False	If true, only DM1, DH1, DM3, DH3 packets are allowed on a link. EDR is disabled.
Var19	EnableAFH	True	Enable/disable the adaptive frequency hopping mode.
Var20	EnablePowerControl	False	Enable/disable the bluetooth dynamic power control feature.
Var21	HostFlowControl	0	Reserved for future usage.
Var22	ATReply	AT-AB	Sets the AT command reply prefix. All events that are displayed are prefixed by this character string (case sensitive).
Var23	QoS_Latency	20	Sets the quality of service latency from 3 to 20 Slots. A slot size is 625 microseconds.
Var24	CpuMHz	32	Sets the module's CPU speed: 2, 4, 8, 12, 16, 20, 24, 28, 32, 36 and 64 MHz are allowed. (Note: CPUMHz: 40 to 63 are not supported.)
Var25	HciBaudrate	921600	Baud rate of the HCI interface to the Bluetooth controller: 230,400; 460,800; 921,600; and 2,000,000 baud are allowed.
Var26	SPIEnable	False	Enables the SPI interface to external pins.
Var27	SPIMode	Slave	Mode of the SPI.
Var28	I2CEnable	False	Enables the I <sup>2</sup> C interface to external pins. (Note: not supported)
Var29	COD	000000	Bluetooth Class of Device.
Var30	LinkSecurity	False	
Var31	HostEvents	True	All host events are sent when true.
Var32	BondingAllowed	True	Automatically allows bonding by default when true.
Var33	PageScan	True	Enables Page scan when true, or halts Page scan when false.
Var34	InquiryScan	True	Enables Inquiry scan when true, or halts Inquiry scan when false.
Var35	MPMode	0	0 = point-to-point, 1 = multipoint using packet protocol, 2 = broadcast.
Var36	UseExtLPO	False	True when a 32.768 kHz low power oscillator is present, and false if not present.
Var37	HSE_MHz	13	MHz rating of the main crystal oscillator (read-only)
Var38	EnableEncryption	False	Set to true to enable the Bluetooth link encryption

Table 9. AT version 1.2 system configuration settings – version 1.2 (continued)

Variable	Name	Default	Description
Var39	DefaultSecurity	1	Default security mode should be 1 for no security or 4 for authentication required. Modes 2 and 3 are used for legacy compatibility.
Var40	DefaultAuthentication	4	Establishes which level of SSP authentication is enabled. Possible values are 4 - SSP Just works or 5 - SSP pairing modes with MITM protection.

## A.2 AT2 FW version 1.3

Table 10. AT2 version 1.3 - system configuration settings – version 1.4

Variable	Name	Default	Description
Var01	BuildVersion	xxxxxxx IDPS	Date code software was built.
Var03	BD_ADDR	00043e212345	Bluetooth device address (read-only).
Var04	DeviceName	Amp'ed Up!	Code used for secure connection. Up to 20 characters are allowed (case sensitive).
Var05	StreamingSerial	True	When true, hardware RTS/CTS flow control is disabled and data not able to be transmitted over the link will be discarded. When false, RST/CTS flow control is enabled.
Var06	PIN	1234	Code used for pairing. Up to 16 characters are allowed (case sensitive).
Var07	UartBaudrate	115200	Main UART baud rate: 1200 to 921,600 baud.
Var08	UartParity	None	Main UART parity.
Var09	UartDataBits	8	Main UART data bits per character.
Var10	UartStopBits	1	Main UART number of stop bits.
Var11	UartTimeout	16	Timeout used to determine the end of a message in units of bit times: from 8 to 128 are allowed.
Var12	AutoSniff	False	This enables the sniff feature when the link is inactive automatically.
Var13	AutoSniffTimeout	5	The inactivity timeout in seconds used for AutoSniff above.
Var14	AutoSniffInterval	1000	Sniff Slot interval applied AutoSniff.
Var15	HostShallowSleepEnable	True	Enables shallow sleep mode.
Var16	HostDeepSleepEnable	False	Enables deep sleep mode.
Var17	GPIO_HostKeepAwake	None	GPIO register used to prevent the module from entering deep sleep mode. A setting of none means that this function is disabled.



Table 10. AT2 version 1.3 - system configuration settings – version 1.4 (continued)

Variable	Name	Default	Description
Var18	GPIO_HostWakeup	None	GPIO register used to wake up the module after it enters deep sleep mode. A setting of none means that this function is disabled.
Var19	UseSmallPackets	False	If true, only DM1, DH1, DM3, DH3 packets are allowed on a link. EDR is disabled.
Var20	EnableAFH	True	Enable/Disable the Adaptive Frequency Hopping mode.
Var21	EnablePowerControl	True	Enable/Disable the Bluetooth Dynamic power control feature.
Var22	HostFlowControl	0	Reserved for future usage.
Var23	ATReply	AT-AB	Sets the AT command reply prefix. All events that are displayed are prefixed by this character string (case sensitive).
Var24	QoS_Latency	20	Sets the Quality of Service Latency from 3 to 20 slots. A slot size is 625 microseconds.
Var25	CpuMHz	32	Sets the module's CPU speed: 2, 4, 8, 12, 16, 20, 24, 28, 32, 36 and 64 MHz are allowed. (Note: CPUMHz: 40 to 63 are not supported.)
Var26	HciBaudrate	921600	Baud rate of the HCI interface to the Bluetooth controller: 230,400; 460,800; 921,600; and 2,000,000 baud are allowed.
Var27	SPIEnable	False	Enables the SPI interface to external pins.
Var28	SPIMode	Slave	Mode of the SPI.
Var29	I2CEnable	False	Enables the I <sup>2</sup> C interface to external pins. (Note: not supported)
Var30	COD	240404	Bluetooth Class of Device.
Var32	HostEvents	True	All host events are sent when true.
Var33	BondingAllowed	True	Automatically allow bonding by default when true.
Var34	PageScan	True	Enables page scan when true, or halts page scan when false.
Var35	InquiryScan	True	Enables inquiry scan when true, or halts inquiry scan when false.
Var36	MPMode	0	0 = point-to-point, 1 = multipoint using packet protocol, 2 = broadcast.
Var37	UseExtLPO	False	True when a 32.768 kHz low power oscillator is present, and false if not present.
Var38	HSE_MHz	13	MHz rating of the main crystal oscillator (Read-only)
Var39	EnableEncryption	True	Set to true to enable the Bluetooth link encryption

**Table 10. AT2 version 1.3 - system configuration settings – version 1.4 (continued)**

Variable	Name	Default	Description
Var40	DefaultSecurity	4	Default security mode should be 1 for no security or 4 for authentication required. Modes 2 and 3 are used for legacy compatibility.
Var41	DefaultAuthentication	5	Establishes which level of SSP authentication is enabled. Possible values are 4 - SSP Just works or 5 - SSP pairing modes with MITM protection.
Var42	EnableIAP	True	Enables IAP mode to support iOS devices.
Var43	AllowSniff	False	Enables sniff mode.
Var44	iAPAppID	A1B2C3D4E5	This variable identifies the iOS application ID.
Var45	iAPPProtocolStrMain	com.****.Demo	This variable defines the main connecting string for the iOS application.
Var46	iAPPProtocolStrAlt	com.****.Protocol Alt	This variable defines the alternative connecting string for the iOS application.
Var47	CPI2CMode	3	Apple CP chip I <sup>2</sup> C address mode 2 or 3.
Var48	SPP128UUID	True	This variable enables the 128-bit UUID for the Android devices.
Var51	RmtEscapeSequence	False	Set to true to enable Remote Control Mode.

**Table 11. AT2 FW version 1.3 system configuration settings - version 1.5**

Variable	Name	Default	Description
Var01	BuildVersion	121016A IDPS	Data code software was build (read only)
Var03	BD_ADDR	00043e212345	Bluetooth device address (read-only).
Var04	DeviceName	Amp'ed Up!	Code used for secure connection. Up to 20 characters are allowed (case sensitive).
Var05	StreamingSerial	True	When true, hardware RTS/CTS flow control is disabled and data not able to be transmitted over the link will be discarded. When false, RST/CTS flow control is enabled.
Var06	PIN	1234	Code used for pairing. Up to 16 characters are allowed (case sensitive).
Var07	UartBaudrate	115200	Main UART baud rate: 1200 to 921,600 baud.
Var08	UartParity	None	Main UART parity. None/Even/Odd
Var09	UartDataBits	8	Main UART data bits per character. With Even/Odd parity, this must be 9 data bits, to include 1 bit of parity.
Var10	UartStopBits	1	Main UART number of stop bits. 1 or 2
Var11	UartTimeout	16	Timeout used to determine the end of a message in units of bit times: from 8 to 128 are allowed.

Table 11. AT2 FW version 1.3 system configuration settings - version 1.5 (continued)

Variable	Name	Default	Description
Var12	AutoSniff	False	This enables the sniff feature when the link is inactive automatically.
Var13	AutoSniffTimeout	5	The inactivity timeout in seconds used for AutoSniff above.
Var14	AutoSniffInterval	1000	Sniff Slot interval applied AutoSniff: from 200 to 10,000 are allowed. 0.625 ms per slot.
Var15	HostShallowSleepEnable	True	Enables shallow sleep mode.
Var16	HostDeepSleepEnable	False	Enables deep sleep mode
Var17	GPIO_HostKeepAwake	None	GPIO register used to prevent the module from entering deep sleep mode. A setting of none means that this function is disabled. Typically GPIO 3 & 5 support this feature.
Var18	GPIO_HostWakeup	None	GPIO register used to wake up the module after it enters deep sleep mode. A setting of none means that this function is disabled. Typically GPIO 3 & 5 support this feature.
Var19	UseSmallPackets	False	If true, only DM1, DH1, DM3, DH3 packets are allowed on a link. EDR is disabled.
Var20	EnableAFH	True	Enable/Disable the Adaptive Frequency Hopping mode.
Var21	EnablePowerControl	True	Enable/Disable the Bluetooth Dynamic power control feature. Not supported
Var22	HostFlowControl	0	Reserved for future usage.
Var23	ATReply	AT-AB	Sets the AT command reply prefix. All events that are displayed are prefixed by this character string (case sensitive).
Var24	QoS_Latency	20	Sets the Quality of Service Latency from 3 to 40 slots. A slot period is 625 microseconds
Var25	CpuMHz	32	Sets the module's CPU speed: 2, 4, 8, 12, 16, 20, 24, 28, 32, 36 and 64 MHz are allowed. (Note: CPUMHz: 40 to 63 are not supported.)
Var26	HciBaudrate	921600	Baud rate of the HCI interface to the Bluetooth controller: 115,200; 230,400; 460,800; 921,600; and 2,000,000 baud are allowed.
Var27	SPIEnable	False	Enables the SPI interface to external pins.
Var28	SPIMode	Slave	Mode of the SPI.
Var29	I2CEnable	False	Enables the I2C interface to external pins. (Note: not supported)
Var30	COD	240404	Bluetooth Class of Device.
Var32	HostEvents	True	All host events are sent when true.
Var33	BondingAllowed	True	Automatically allow bonding by default when true

Table 11. AT2 FW version 1.3 system configuration settings - version 1.5 (continued)

Variable	Name	Default	Description
Var34	PageScan	True	Enables page scan when true, or halts page scan when false.
Var35	InquiryScan	True	Enables inquiry scan when true, or halts inquiry scan when false.
Var36	MPMode	0	0 = point-to-point, 1 = multipoint using packet protocol, 2 = broadcast.
Var37	UseExtLPO	False	True when a 32.768 kHz low power oscillator is present, and false if not present.
Var38	not assigned		
Var39	EnableEncryption	True	Set to true to enable the Bluetooth link encryption.
Var40	DefaultSecurity	4	Default security mode should be 1 for no security or 4 for Authentication required. Modes 2 and 3 are used for legacy compatibility and not supported anymore.
Var41	DefaultAuthentication	5	Establishes which level of SSP authentication is enabled. Possible values are 4 - SSP Just works or 5 - SSP pairing modes with MITM protection by asking for a confirmation message during pairing.
Var42	EnableIAP	True	Enables IAP mode to support iOS devices.
Var43	AllowSniff	False	Enables sniff mode. Must be False when no 32.768KHz LPO is present
Var44	iAPAppID	A123CDFG445	Apple MFI application ID. Up to 10 characters are allowed. See Apple MFI documentation for further details
Var45	iAPPProtocolStrMain	com.****.Demo	Main connecting string for an Apple MFI Application. Up to 25 characters are allowed. See Apple MFI documentation for further details.
Var46	iAPPProtocolStrAlt	com.****.Protocol Alt	Alternative connecting string for the Apple MFI Application. Up to 25 characters are allowed. See Apple MFI documentation for further details.
Var47	CPI2CMode	3	Apple CP Chip I2C address mode 2 or 3. Apple CP v2.0C should default to 3. See Apple CP documentation for further details.
Var48	SPP128UUID	True	This variable enables the 128-bit UUID for the SPP profile.
Var51	RmtEscapeSequence	False	Remote escape sequence enabled: @#@\$@%
Var53	CreditMax	5	Number of buffers available for incoming data packets.
Var54	PageScanInterlaced	False	Enables the Bluetooth interlaced scan mode.

Table 11. AT2 FW version 1.3 system configuration settings - version 1.5 (continued)

Variable	Name	Default	Description
Var55	MITMEvent	False	Sends pairing passkey to the main UART. User must input: at+ab passkeyaccept, in order to complete pairing.
Var56	AltCPGPIO	False	Alternate Apple CP pins (GPIO 5 = SDA and GPIO 6 = SCL) are used when true, instead of RTS/CTS control lines.
Var57	AccName	Amped-Test	Apple accessory name field. Up to 20 characters are allowed. See Apple MFI documentation for further details.
Var58	AccManufacturer	Amped RF	Apple accessory manufacturer field. Up to 20 characters are allowed. See Apple MFI documentation for further details.
Var59	AccModelNumber	Test-Model	Apple accessory model number field. Up to 20 characters are allowed. See Apple MFI documentation for further details.
Var60	AccSerialNumber	Amp'ed Up	Apple accessory serial number field. Up to 20 characters are allowed. See Apple MFI documentation for further details.

## Revision history

**Table 12. Document revision history**

Date	Revision	Changes
08-Jun-2012	1	Initial release.
23-Jul-2012	2	<ul style="list-style-type: none"><li>– Modified: <a href="#">Introduction</a></li><li>– Added in <a href="#">Table 2</a>: cptest and role switch</li><li>– Added in <a href="#">Table 9</a>: Var40 and 41</li><li>– Added: <a href="#">Section 3.2</a>, <a href="#">3.8.1</a>, <a href="#">3.8.2</a>, <a href="#">3.29</a>, <a href="#">3.29.1</a></li><li>– Added in <a href="#">Table 10</a>: Var51</li></ul>
11-Nov-2013	3	Added <a href="#">Table 11</a>

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