BLE Command Reference Guide

Amp'ed RF Technology, Inc.

1. AT Commands

Note, all AT command except Escape, should terminate with a CRLF.

1.1. EnableDsm

The `EnableDsm` command is used to turn on Deep Sleep Mode for the current session.

Syntax

```
AT+AB EnableDsm
```

Responses

If the operation is successful, the response is:

```
AT-AB EnableDSMOk
```

1.2. EraseLeBondTable

The `EraseBondTable [bd address]` command is used to erase one device entry. The `EraseBondTable [NULL]` command is used to erase all device entries.

Syntax

```
AT+AB EraseLeBondTable [bd address/NULL]
```

Responses

```
AT-AB LeBondTableErased
```

1.3. Escape

The `Escape` command is used to switch from bypass mode, to command mode. When the Escape Sequence is received while a connection is still active and there is no data for 2 seconds, abSerial will respond (after those 2 seconds of no data) with the CommandMode reply.

Syntax

^#^$^% (there is no CRLF after this sequence)

Responses

If the operation is successful, the response is:

AT-AB -CommandMode-

1.4. FactoryInit

The `FactoryInit` command is used to restore the configuration values to the factory settings value.

Syntax

```
AT+AB FactoryInit
```

Responses

If the operation is successful, the response is:

```
AT-AB ResetPending
AT-AB -CommandMode-
AT-AB BDAddress [bd address]
```

1.5. GpioConfig

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

Syntax

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

Where `[GPIO Pin]` is the Pin number of the desired GPIO to configure. `[Configuration]` is “i” or “I” for input and “o” or “O” for output.

Responses

If the operation is successful, the response is:

```
AT-AB GPIOConfigDone
```

1.6. GpioRead

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

Syntax

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

Where `[GPIO Pin]` is the Pin number of the desired GPIO to read.

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.

1.7. GpioWrite

The `GPIOWrite` command is used to set a GPIO pin to high or low.

Syntax

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

Where `[GPIO Pin]` is the Pin number of the desired GPIO to read. `[Setting]` is a 1 to set a pin to high and a 0 to set a pin to low.

Responses

If the operation is successful, the response is:

```
AT-AB GPIOWriteDone
```

1.8. LeAdv

The `LeAdv` command is used to enable and disable LE advertising functionality.

Syntax

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

Responses

If the operation is successful, the response is:

```
AT-AB AdvOk
```

1.9. LeBypass

The `LeBypass` command is used to switch from data command mode, to bypass mode.

Syntax

```
AT+AB LeBypass
```

Responses

If the operation is successful, the response is:

```
AT-AB -BLE-BypassMode-
```

1.10. LeConnect

The `LeConnect` command is used to build a LE connection with a remote device. This command is valid in central mode (ProfileRole = c).

Syntax

```
AT+AB LeConnect [bd address] [pub/rand]
```

Where `[bd address]` is the remote device's BD Address.
`[pub/rand]` is the type of address, public or random.

Responses

If the operation is successful, the response is:

```
AT-AB -BLE-ConnectionUp [bd address]
```

(Note: Bypass mode is not automatically entered, use the LeBypass command)

1.11. LeDisconnect

The `LeDisconnect` command is used to disconnect from a remote LE device once connected.

Syntax

```
AT+AB LeDisconnect
```

Responses

If the operation is successful, the response is:

```
AT-AB -BLE-ConnectionDown
```

1.12. LeDiscovery

The `LeDiscovery` command is used to scans for remote devices.
This command is valid in central mode (ProfileRole = c).

Syntax

```
AT+AB LeDiscovery
```

Responses

If the operation is successful, the response is:

```
AT-AB LeScan pending
AT-AB 1 Device Found
AT-AB [bd address] [pub/rand] [name]
```

Where `[bd address]` is the remote device's address.
`[pub/rand]`is the type of address, public or random.
`[name]`is the remote device’s name.

1.13. LeReadByHandle

The `LeReadByHandle` command reads data from the remote device’s attribute handle.

Syntax

```
AT+AB LeReadByHandle [handle]
```

Where `[handle]` is the remote device attribute handle to read, in ascii hex, 2 bytes long, no formatting or spaces, 2 characters per byte.

Responses

If the operation is successful, the response is:

```
AT-AB LeReadRspDone [handle] [data]
```

Where `[handle]` is the remote device attribute handle read, in ascii hex, 2 bytes long, no formatting or spaces, 2 characters per byte.
And `[data]` is the set of ascii hex data to read, no formatting or spaces, 2 characters per byte.

1.14. LeReadByUuid

The `LeReadByUuid` command reads data from the remote device’s service matching the presented UUID.

Syntax

```
AT+AB LeReadByUuid [shdl] [ehdl] [uuid]
```

Where `[shdl]` is the remote device's service start handle to read, in ascii hex, 2 bytes long, no formatting or spaces, 2 characters per byte.
`[ehdl]` is the remote device's service end handle to read, in ascii hex, 2 bytes long, no formatting or spaces, 2 characters per byte.
`[uuid]` is the remote device's service `uuid` to read, in ascii hex, 2-16 bytes long, no formatting or spaces, 2 characters per byte.

Responses

If the operation is successful, the response is:

```
AT-AB LeReadRspDone [handle] [data]
```

Where `[handle]` is the remote device handle read, in ascii hex, 2 bytes long, no formatting or spaces, 2 characters per byte.
And `[data]` is the set of ascii hex data to read, no formatting or spaces, 2 characters per byte.

1.15. LeSimpleSvcSend

The `LeSimpleSvcSend` command sends data to the default characteristic in the configuration, Service UUID, using a length and hex data field.

Syntax

```
AT+AB LeSimpleSvcSend [len] [data]
```

Where `[len]` is the number of bytes in the `data` field below in ascii hex, 2 bytes long, no formatting or spaces, 2 characters per byte.
And `[data]` is the set of ascii hex data to send, no formatting or spaces, 2 characters per byte.

1.16. LeStartNtf

The `LeStartntf` command is used to open the Notify corresponding to the handle in the parameter.

Syntax

```
AT+AB LeStartNtf [handle]
```

Responses

```
AT+AB leWriteRspDone
```

1.17. LeStopNtf

The `LeStopNtf` command is used to close the Notify corresponding to the handle in the parameter.

Syntax

```
at+ab LeStopNtf [handle]
```

Responses

```
AT-AB leWriteRspDone
```

1.18. LeWrite

The `LeWrite` command writes data to the remote device's specified handle.

Syntax

```
AT+AB LeWrite [handle] [len] [data]
```

Where `[handle]` is the remote handle in ascii hex, 2 bytes long, no formatting or spaces, 2 characters per byte.
`[len]` is the number of bytes in the `data` field below in ascii hex, 2 bytes long, no formatting or spaces, 2 characters per byte.
And `[data]` is the set of ascii hex data to send, no formatting or spaces, 2 characters per byte.

Responses

If the operation is successful, the response is:

```
AT-AB LeWriteRspDone
```

1.19. Reset

The `Reset` command is used to reset the module interface.

Syntax

```
AT+AB Reset
```

Responses

If the operation is successful, the response is:

```
AT-AB ResetPending
```

1.20. ShowLeDev

The `ShowLeDev` command is used to display bonding table information.

Syntax

```
AT+AB ShowLeDev
```

Responses

```
1. [bd address] [rand/pub]
```

1.21. Lediscallsvc

The `lediscallsvc` command is used to display service information about the peer. It can only be used when establishing a connection

Syntax

```
at+ab lediscallsvc
```

Responses

```
at+ab lediscallsvc
AT-AB ServiceInfo sHdl:0001 eHdl:0005 uuid:1800
AT-AB AttCharInfo cHdl:0002 prop:02 vHdl:0003
AT-AB AttValeInfo hdl:0003 uuid:2a00
AT-AB AttCharInfo cHdl:0004 prop:02 vHdl:0005
AT-AB AttValeInfo hdl:0005 uuid:2a01
```

2. Mesh AT Commands

2.1 lemeshprovision

The `lemeshprovision` command is used to enable mesh networking.

Syntax

```
at+ab lemeshprovision
```

Responses

```
at+ab lemeshprovision
AT-AB LeMeshProvPending
AT-AB -CommandMode-
AT-AB BDAddress [bd address]
```

2.2 lemeshshowprovision

The `lemeshshowprovision` command is used to display detailed networking information.

Syntax

```
at+ab lemeshshowprovision
```

2.3 lemeshremoveprovision

The `at+ab lemeshremoveprovision` command is used to remove from mesh networks

Syntax

```
at+ab lemeshremoveprovision
```

Responses

```
at+ab lemeshremoveprovision
AT-AB LeMeshRemoveProvPending
AT-AB -CommandMode-
AT-AB BDAddress [bd address]
```

2.4 lemeshsend

The `leMeshSend` command is used to send data to the mesh network

Syntax

```
at+ab leMeshSend [len][data]
```

Where `[len]` is a 2 byte ascii hex length value, range: 0001-0172 (370 bytes)
And `[data]` is an ascii hex sequence of data. Each two characters represent one byte of data.

Example

```
at+ab leMeshSend 0005 3132333435
```

Response

```
AT-AB LeMeshSent
```

2.5 lemeshSubsAddr add

The lemeshSubsAddr add command is used to add subaddr.

Syntax

```
at+ab lemeshSubsAddr add CXXX
```

Responses

```
at+ab lemeshSubsAddr add C004
AT-AB LeMeshSubAddrAddOk
```

2.6 lemeshSubsAddr del

The lemeshSubsAddr del command is used to delete subaddr.

Syntax

```
at+ab lemeshSubsAddr del CXXX
```

Responses

```
at+ab lemeshSubsAddr del C004
AT-AB LeMeshSubAddrDelOk
```

2.7 lemeshSubsAddr lst

The lemeshSubsAddr lst command is used to list subaddr.

Syntax

```
at+ab lemeshSubsAddr lst
```

Responses

```
at+ab lemeshSubsAddr lst
AT-AB LeMeshSubsAddr 0xc002
```

```
AT-AB LeMeshSubsAddr 0xc004
AT-AB LeMeshSubsAddr 0xc005
```

2.8 lemeshShowPublicParam

The lemeshShowPublicParam command is used to show publicparam.

Syntax

```
at+ab lemeshShowPublicParam
```

Responses

```
at+ab lemeshShowPublicParam
Pubilcation Address: cXXX
App Key Local Index: XX
Ttl                : XX
```

2.9 lemeshSendToNode

The leMeshSendToNode command is used to send data to unique address or group ID

Syntax

```
at+ab LeMeshSendToNode [node][len][data]
```

Where [node] is a 2 byte ascii hex node address, range: 0001-BFFF
[len] is a 2 byte ascii hex length value, range: 0001-0172 (370 bytes)
[data] is an ascii hex sequence of data. Each two characters represent one byte of data.

Example

```
at+ab leMeshSendToNode 0002 0005 3132333435
```

Responses

```
AT-AB LeMeshSent
```

3. General Functions

3.1. Transmit and exchange data with IoS device.

In bypass mode, all characters are transmitted over the BLE data link. Received data is output on the main UART. Use Bypass and Escape commands to enter and exit bypass mode.

3.2. Low power mode.

Use the configuration parameter SleepEnable (see below), to turn on the low power mode.

3.3. Support IoS device’s APP “Smart Find Me”.

4. Configuration Commands

The section describes the system configuration variables of with their defaults and ranges. These values are stored in the non-volatile memory of the module.

4.1. Set/update

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 may also be specified as "varzz". Where zz is the sequence number of the variable.

4.2. Inquiry

An inquiry may be made using:

```
at+ab config xxxx
```

Where “xxxx” is the variable name. The reply will be the current setting.

4.3. Configuration Parameters

Name	Default	Description
BuildVersion	XXXXXX	Date code of the firmware (read only).
BD_ADDR	000102030405	Bluetooth device address (read only).
DeviceName	Amp'ed Up!	Code used for secure connection. Up to 20 characters are allowed (case sensitive).
StreamControl	true	Enabled does not use RTS/CTS flow control, disabled uses flow control.
PIN	123456	Code used for pairing.
UartBaudrate	115200	Main UART baudrate: 1200 to 921,600 baud.
UartParity	none	Enable/disable parity on the main UART.
UartDataBits	8	Main UART data bits per character.
UartStopBits	1	Main UART number of stop bits.
SleepEnable	false	Enables deep sleep mode. True: DSM mode after power on False: Active mode after power on
GPIO_KeepAwake	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. Gpio is connected to a high level forces a wake up, low level will allow deep sleep.
EnableEncryption	false	Enables Bluetooth link encryption.
HostEvents	true	All host events are sent when set.
ProfileRole	P	Profile Role. P=peripheral, C=central role. all,supports running both Central and Peripheral modes simultaneously
AdvIntMin	256	Min advertising interval, 0.625 ms units: 20 ms to 10240 ms.
AdvIntMax	512	Max advertising interval, 0.625 ms units: 20 ms to 10240 ms
ScanInt	32	Scan Interval, 0.625 ms units: 2.5 ms to 10240 ms.
ScanWindow	18	Scan Window, 0.625 ms units: 2.5 ms to 10240 ms.
ConnectIntMin	912	Min connection interval, 1.25 ms units: 7.5 ms to 4000 ms.
ConnectIntMax	1000	Max connection interval, 1.25 ms units: 7.5 ms to 4000 ms.
SlaveLatency	0	The number of consecutive connection events that the slave device is not required to listen for the master. Range: 0 ~ 499.
SupervisorTimeout	2000	Used by the Controller to monitor link loss. Range: 10 ~ 3200.
Appearance	0x0000	Contains a 16-bit number that can be mapped to an icon or string that describes the physical representation of the device during the device discovery procedure.
TxPower	0	Default RF transmission power. Range: -19 ~ 7 dbm
ConnectMode	Bypass	0 = Bypass, 1 = Command
manufacturerName	Amp'ed Up	
ModelNumber	BLE60	

SerialNumber	5.2	
HWRevision	1.0.0	
FWRevision	1.0.0	
SWRevision	1.0.0	
SystemID	000000FEFFBE7C08	
IEEECertification	010200000000	
PnPID	03040000000000	

5. Modem Mode Service

Using the BLE60 module as a simple data modem is possible using the default service and characteristics.

During discovery, the following Service and Characteristics are visible:

Service UUID : 26cc3fc0-6241-f5b4-5347-63a3097f6764
Characteristic 1 UUID: 26cc3fc1-6241-f5b4-5347-63a3097f6764

- NOTIFY. Used to send data from the module.

Characteristic 2 UUID: 26cc3fc2-6241-f5b4-5347-63a3097f6764

- WRITE. Used to receive data from remote devices.