

Ehong Control Interface

(EHCI)

User Guide for EH-MB05

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1. Introduction

The Ehong Control Interface (EHCI) is a set of ASCII commands and indicators with which the user can control the Ehong's Bluetooth module via UART interface by a host (PC, MCU, etc.).

The commands are used to control the Bluetooth module sent by host. The indicators are output from the Bluetooth module to the host to indicate the status of the module.

In addition, there are some IO indicators available when the UART is used to transfer raw data (working in Bypass mode). As a complement of ASCII commands and indicators, the IO indicators are also a part of EHCI.

1.1. Default UART Configuration

The default configuration of UART is given below:

Baud rate: 115200
Data bits: 8
Stop bits: 1
Parity: None
Flow control: None

2. Command and Indicator Syntax

2.1. General Syntax

The general syntax of EHCI command is shown as below:

AT+CMD[=Para1][,Para2][,RawData][,...]<CR><LF>

The general syntax of EHCI indicator is shown as below:

IDC[=Para1][,Para2][,RawData][,...]<CR><LF>

Description of each field:

AT+ is the command line prefix.

CMD is the basic command. All of the commands are listed in section 3.

IDC is the basic indicator. All of the indicators are listed in section 4.

= is the separator between command/indicator and parameter. It's only needed if a parameter is presented.

Para1 is the first parameter. Not all of the commands have a parameter.

, is the separator between parameters. It's only needed if subsequent parameter is presented.

Para2 is the second parameter if available.

RawData is the raw data which will be sent by the command. Only parts of the commands have this field.

<CR><LF> is the terminator of the command line.

Notes: 1. If a parameter is mandatory, it will be surrounded by { }. If a parameter is optional, it will be surrounded by [].

2. <CR> means Carriage Return, and <LF> means Line-Feed.

3. All of the parameters are composed of ASCII characters while the **RawData** field can composed of any data contents.

2.2. Examples

Here is some examples show how to use the EHCI commands and indicators.

Ex. 2.1

➔ AT+FT=01,00,00,0A,01,0078<CR><LF> ← configure the module features.

⬅ OK<CR><LF> ← response from the module to indicate the command is adopted.

Notes:

1. For the examples in this document, the command sent to the Bluetooth module will be shown with "➔" at the beginning of the line, while the indicator output by Bluetooth module will be shown with "⬅" at the beginning of the line.

2. For the examples in this document, the comments will start with a "←" and be written in italic.

3. For the examples in this document, only the characters in grey background color are the real content of a command or indicator.

Ex. 2.2

➔ AT+CS=00189600ABCD<CR><LF> ← establish SPP connection with the device which address is 00:18:96:00:AB:CD.

⬅ SS=01,00189600ABCD<CR><LF> ← the Bluetooth module is now connecting to the specified device which address is 00:18:96:00:AB:CD.

⬅ CS=00,00189600ABCD<CR><LF> ← connecting result: success.

⬅ SS=02,00189600ABCD<CR><LF> ← the Bluetooth module is now connected to the specified device which address is 00:18:96:00:AB:CD.

3. Command List

All the available EHCI commands are listed and briefly described in the tables below. The detailed description of each command can be given.

EHCI Command List

Command	Short Description	Comments
General Commands		
PF	Query or configure the profiles of the module.	
AD	Query the Bluetooth address of the module.	
TP	Query or change the Tx Power of the module.	
CD	Query or configure the Class of Device of the module.	
FT	Query or configure the features of the module.	
MM	Query or configure Man-In-The-Middle protection feature.	
MT	Query or configure force to be master feature.	
SN	Query or configure the sniff mode.	
SP	Query or change the deep sleep mode.	
PN	Query or change the fixed pin code of the module.	
NM	Query or change the local friendly name of the module.	
BR	Query or change the UART baud rate.	
UI	Query or change the UART indicator output mode.	
MD	Query or change the state of discoverable mode.	
CP	Clear the paired Bluetooth device list.	
CK	Increase the Volume.	
CL	Decrease the Volume.	
LC	List connected devices	
FU	Make the module enter into DFU mode.	
VR	Query the Bluetooth version	
IO	Query or configure the IO capability of local device	
SPP Commands		
CS	Connect to the remote SPP device.	
DS	Disconnect with the remote SPP device.	
SS	Query the SPP state of each SPP instance.	
RFCOMM Commands (for Apple iOS devices)		
PT	Query or change the protocol name of iAP application.	
AH	Query the status of Apple authentication processor.	
CR	Connect to the remote RFCOMM device.	
DR	Disconnect with the remote RFCOMM device.	
RS	Query the RFCOMM state.	
A2DP Commands		
OD	Query or change the optional decoder used by A2DP.	
CM	Connect to the remote A2DP source device.	
DM	Disconnect with the remote A2DP source device.	
MS	Query the state of A2DP.	
AVRCP Commands		
VS	Query the AVRCP state.	
PL	Send a Play/Pause command to remote AVRCP device.	
ST	Send a Stop command to remote AVRCP device.	
NX	Send a Next command to remote AVRCP device.	
PR	Send a Previous command to remote AVRCP device.	

4. Indicator List

All the available EHCI indicators are listed and briefly described in the tables below.

EHCI Indicator List

Indicator	Short Description	Comments
General Commands		
OK	Indicates a command was adopted by the module.	
ER	Indicates there is an error detected in the command sent by the host.	
AD	Bluetooth address of the module.	
TP	Tx Power of the module	
CD	Class of Device of the module.	
PF	Configuration of profiles of the module.	
FT	Features of the module.	
MM	States of Man-In-The-Middle protection.	
MT	Configuration of force to be master feature.	
SN	Configuration of sniff feature.	
SP	The deep sleep state.	
PN	Fixed pin code of the module.	
NM	Local friendly name of the module.	
BR	UART baud rate.	
UI	Configuration of UART indicator output.	
MD	Discoverable state.	
NC	Six digit number of numeric comparison.	
LC	List the connected devices	
SPP Commands		
SS	State of SPP channel.	
CS	Result of connect attempt to a remote SPP device.	
DT	Data packet received from remote SPP device.	
RFCOMM Commands (for Apple iOS devices)		
PT	Protocol name of iAP application.	
AH	Status of Apple authentication processor.	
RS	State of RFCOMM channel.	
CR	Result of connect attempt to a remote RFCOMM device.	
A2DP Commands		
OD	Configuration of optional decoder used by A2DP.	
MS	State of A2DP channel	
CM	Result of connect attempt to a remote A2DP source device.	
PL	Status of A2DP playing.	
DD	Decoder used by A2DP.	
SR	Simple rate of A2DP audio	
MR	Audio output route	
MV	Volume of A2DP music	
AVRCP Commands		
NP	Status of NowPlaying function	
VS	State of AVRCP.	
VC	Capabilities of AVRCP target device.	

5. Description of ASCII Commands

5.1. General Commands

5.1.1. PF—Query or configure the profiles

5.1.1.1. Description:

This command can query or configure the profiles of Bluetooth module. Once configured, the configuration will take effect immediately and until the next time the module is configured by this command. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost. If the new configuration is adopted by the Bluetooth module, the module will perform a reboot, the non-memorable settings will return to their default value. Therefore, it is recommended to send this command first if necessary. If the parameter is not presented, the Bluetooth module will report current profile configuration by the Indicator PF.

5.1.1.2. Syntax:

Synopsis:

AT+PF[=Spp][,Rfc][,A2dp][,Avrcp]<CR><LF>

5.1.1.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
Spp	Spp disable or enable. Value: 0 or 1 Default: 1	O	
Rfc	Rfc disable or enable. Value: 0 or 1 Default: 0	O	
A2dp	A2dp disable or enable. Value: 0 or 1 Default: 1	O	
Avrcp	Avrcp disable or enable. Value: 0 or 1 Default: 1	O	

Notes:

1. The default profile configuration may be different per software version.
2. The total instance of all profiles should no more than 7 according to Bluetooth Spec.

5.1.1.4. Examples:

Ex. 5.1. To query current profile configuration of Bluetooth module :

→ AT+PF<CR><LF> ← query current profile configuration.
 ← PF=01,00,01,01<CR><LF> ← report current profile configuration: SPP enable, Rfc disable, A2dp and avrcp enable.

Ex. 5.2. To configure the features of Bluetooth module :

→ AT+PF=00,00,01,01<CR><LF> ← configure the module profiles: SPP disable, Rfc disable, A2DP and AVRCP enable.
 ← OK<CR><LF> ← response from the module to indicate the command is adopted.

5.1.2. AD—Query the Bluetooth address

5.1.2.1. Description:

This command can query the Bluetooth address of local module. Once the Bluetooth module adopted this query request, it will report its Bluetooth address by the Indicator AD.

5.1.2.2. Syntax:

Synopsis:

AT+AD<CR><LF>

5.1.2.3. Examples:

Ex. 5.4. To query the Bluetooth address of local module:

→ AT+AD<CR><LF> ← query the Bluetooth address of local module.

← AD=00189600ABCD<CR><LF> ← report the Bluetooth address is 00:18:96:00:AB:CD.

← LA=00,00189680ABCD<CR><LF> ← report the BLE address is 00:18:96:80:AB:CD, the address type is public.
This is only available for MB09 module.

5.1.3. FT—Query or configure the features

5.1.3.1. Description:

This command can query or configure the features of Bluetooth module. Once configured, the configuration will take effect immediately and until the next time the module is configured by this command. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost. If the parameter is not presented, the Bluetooth module will report current feature configuration by the Indicator FT. If the user wants to configure the features, all of the parameters should be given together.

5.1.3.2. Syntax:

Synopsis:

AT+FT[=ATPowerOn,ACPaired,ATLinkLost,Interval]<CR><LF>

5.1.3.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
AT Power On	The attempt times of auto connect the last connected device after power on. Value: 00h—FFh 00: No auto connect attempt will be performed after power on. 01-FE: The attempt times of auto connect after power on. FF: The auto connect attempt will be performed permanently. Default: FF (Permanent)	O	
AC Paired	Auto connects after paired with a device. Value: 00 or 01 00: Disabled 01: Enabled Default: 00 (Disabled)	O	
AT Link Lost	The attempt times of reconnect after link lost. Value: 00h—FFh 00: No reconnect attempt will be performed after link lost. 01-FE: The attempt times of reconnect after link lost. FF: The reconnect attempt will be performed permanently. Default: FF (Permanent)	O	
Interval	The interval between each reconnect attempt after link lost. The unit is second. Value: 00h—FFh Default: 0A (10 seconds)	O	

5.1.3.4. Examples:

Ex. 5.9. To query current feature configuration of Bluetooth module:

➔ AT+FT<CR><LF> ← query current feature configuration.
 ⬅ FT=FF,00,FF,0A <CR><LF> ← report current feature configuration.
*The auto connection after power on has been enabled as permanent mode;
 The auto connect after paired has been disabled;
 The auto reconnect after link lost has been enabled as permanent mode;
 The interval of auto reconnect has been set to 10s.*

Ex. 5.10. To configure the features of Bluetooth module:

➔ AT+FT=14,00,00,0A<CR><LF> ← configure the module features:
*Set the attempt time of auto connect after power on as 20 times;
 Disable the auto connect after paired;
 No reconnect attempt will be performed after link lost;
 Set the interval of auto reconnect to 10s.
 Keep the discoverable mode and timeout as it was.*
 ⬅ OK<CR><LF> ← response from the module to indicate the command is adopted.

5.1.4. MM—Query or configure Man-In-The-Middle protection feature

5.1.4.1. Description:

This command can query or configure the Man-In-The-Middle protection feature of Bluetooth module. Once configured, the configuration will take effect immediately and until the next time the module is configured by this command. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost.

If the parameter is not presented, the Bluetooth module will report current configuration by the Indicator MM.

5.1.4.2. Syntax:

Synopsis:

AT+MM[=State]<CR><LF>

5.1.4.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
State	The new state of Man-In-The-Middle protection. Value: 00h or 02h 00: Deactivated 01: Activated 02: Activated and auto confirm the numeric comparison. Default: 02 (Activated and auto confirm)	O	The default value may be different per software version.

Notes:

1. A man-in-the-middle (MITM) attack occurs when a user wants to connect two devices but instead of connecting directly with each other they unknowingly connect to a third (attacking) device that plays the role of the device they are attempting to pair with. The third device then relays information between the two devices giving the illusion that they are directly connected. The attacking device may even eavesdrop on communication between the two devices (known as active eavesdropping) and is able to insert and modify information on the connection. In this type of attack, all of the information exchanged between the two devices are compromised and the attacker may inject commands and information into each of the devices thus potentially damaging the function of the devices. Devices falling victim to the attack are capable of communicating only when the attacker is present. If the attacker is not active or out range, the two victim devices will not be able to communicate directly with each other and the user will notice it.

To prevent MITM attacks, Secure Simple Pairing offers two user assisted numeric methods: numerical comparison or passkey entry. If Secure Simple Pairing would use 16 decimal digit numbers, then the usability would be the same as

using legacy pairing with 16 decimal digit PIN. The chance for a MITM to succeed inserting its own link keys in this case is a 1 in $10^{16} = 253$ pairing instances, which is an unnecessarily low probability.

Secure Simple Pairing protects the user from MITM attacks with a goal of offering a 1 in 1,000,000 chance that a MITM could mount a successful attack. The strength of the MITM protections was selected to minimize the user impact by using a six digit number for numerical comparison and Passkey entry. This level of MITM protection was selected since, in most cases, users can be alerted to the potential presence of a MITM attacker when the connection process fails as a result of a failed MITM attack. While most users feel that provided that they have not compromised their passkey, a 4-digit key is sufficient for authentication (i.e. bank card PIN codes), the use of six digits allows Secure Simple Pairing to be FIPS compliant and this was deemed to have little perceivable usability impact.

If the Man-In-The-Middle protection feature is activated, the module may output the number for numeric comparison by indicator NC or a passkey request by indicator PK. About the command NC and PK, please refer to section 5.1.24 and 5.1.25.

2. If the Man-In-The-Middle protection feature is activated, the IO capability can only be configured to “**Display Yes/No**” or “**Keyboard Only**”. About the IO capability, please refer to section 5.1.7 .

3. When connect with some Android device by the SPP profile, it is required to active the Man-In-The-Middle protection.

5.1.4.4. Examples:

Ex. 5.11. To query current Man-In-The-Middle protection state of the Bluetooth module:

➔ AT+MM<CR><LF> ← query the current Man-In-The-Middle protection state.
 ⬅ MM=00<CR><LF> ← report the Man-In-The-Middle protection is deactivated currently.

Ex. 5.12. To active Man-In-The-Middle protection feature:

➔ AT+MM=01<CR><LF> ← active Man-In-The-Middle protection feature.
 ⬅ OK<CR><LF> ← response from the module to indicate the command is adopted.

Ex. 5.13. To active Man-In-The-Middle protection feature, and let the module confirm the numeric comparison automatically:

➔ AT+MM=02<CR><LF> ← active Man-In-The-Middle protection feature and auto confirm the numeric comparison.
 Thus, no NC indicator will be output by the module.
 ⬅ OK<CR><LF> ← response from the module to indicate the command is adopted.

5.1.5. NM—Query or change the local friendly name

5.1.5.1. Description:

This command can query or change the local friendly name of Bluetooth module. Once changed, the new friendly name will take effect at next time the remote device get local name and until the next time the friendly name is changed by this command. It means the Bluetooth module will remember the friendly name, and even if the Bluetooth module has been powered off, the friendly name will not be lost.

If the parameter is not presented, the Bluetooth module will report current friendly name by the Indicator NM.

5.1.5.2. Syntax:

Synopsis:

AT+NM[=Name]<CR><LF>

5.1.5.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
Name	The new local friendly name of the Bluetooth module. Length: 1—30 characters Default: Per software version.	O	

5.1.5.4. Examples:

Ex. 5.26. To query current local friendly name of Bluetooth module:

AT+NM<CR><LF> query current local friendly name.

NM=EH-MB05<CR><LF> *report current local friendly name, it's "EH-MB05".*

Ex. 5.27. To change the local friendly name of Bluetooth module:

➔ AT+NM=MY_BT_DEVICE<CR><LF> *← change the local friendly name to "MY_BT_DEVICE"*

← OK<CR><LF> *← response from the module to indicate the command is adopted.*

Notes:

For MB05 module, the module will append "_L" at the end of given name as the BLE device name. That means, in the above example, the BLE device name will be changed to "MY_BT_DEVICE_L".

5.1.6. BR—Query or change the UART baud rate

5.1.6.1. Description:

This command can query or change the UART baud rate of Bluetooth module. Once changed, the new baud rate will take effect immediately and until the next time the baud rate is changed by this command. It means the Bluetooth module will remember the baud rate, and even if the Bluetooth module has been powered off, the baud rate will not be lost.

If the parameter is not presented, the Bluetooth module will report current baud rate by the Indicator BR.

5.1.6.2. Syntax:

Synopsis:

AT+BR[=BaudRate]<CR><LF>

5.1.6.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
BaudRate	The new baud rate of the Bluetooth module. Value: 01h—15h 00: 1200 01: 1800 02: 2400 03: 4800 04: 7200 05: 9600 06: 14400 07: 19200 08: 38400 09: 56000 0A: 57600 0B: 115200 0C: 128000 0D: 230400 0E: 256000 F: 460800 10: 921600 11: 1382400 12: 1843200 13: 2764800 14: 3686400	O	

Default: 06 (9600)

Warning:

Please do NOT try to change to a new baud rate if you don't have a host which can work in that baud rate, for there is no other way to restore it except for UART port.

5.1.6.4. Examples:

Ex. 5.30. To query the baud rate of Bluetooth module:

➔ AT+BR<CR><LF> *← query the baud rate.*

← BR=06<CR><LF> *← report the baud rate, it's 9600.*

Ex. 5.31. To change the baud rate of Bluetooth module:

➔ AT+BR=0C<CR><LF> *← change the baud rate to 115200.*

← OK<CR><LF> *← response from the module to indicate the command is adopted.*

Notes:

The response will be sent in current baud rate.

5.1.7. VR—Query the Bluetooth version

5.1.7.1. Description:

This command can query the Bluetooth address of local module. Once the Bluetooth module adopted this query request, it will report its Bluetooth address by the Indicator VR.

5.1.7.2. Syntax:

Synopsis:

AT+VR<CR><LF>

.

5.1.7.3. Examples:

Ex. 5.4. To query the Bluetooth address of local module:

➔ AT+VR<CR><LF> ← *query the Bluetooth version.*
 ⬅ EH_MB05_C000_V1.1.0<CR><LF> ← *report the Bluetooth version is EH_MB05_C000_V1.1.0.*

5.1.8. UI—Query or configure the UART indicator output mode

5.1.8.1. Description:

This command can query or configure (disable or enable) the UART indicator output mode of Bluetooth module. Once configured, the configuration will take effect immediately and until the next time the module is configured by this command. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost.

If the parameter is not presented, the Bluetooth module will report current configuration by the Indicator UI.

5.1.8.2. Syntax:

Synopsis:

AT+UI[=State]<CR><LF>

5.1.8.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
State	The new state of UART indicator output mode Value: 00h or 01h 00: Disabled 01: Enabled	O	

Default: 01 (Enabled)

5.1.8.4. Examples:

Ex. 5.35. To query current UART indicator output mode of the Bluetooth module:

➔ AT+UI<CR><LF> ← *query current UART indicator output mode.*
 ⬅ UI=01<CR><LF> ← *report the UART indicator output is enabled currently.*

Notes:

If the UART indicator output is disabled currently, the report will not be output.

Ex. 5.36. To disable the UART indicator output:

→ AT+UI=00<CR><LF> ← *disable the UART indicator output*
 ← *no response output because the UART indicator output has been disabled*

Ex. 5.37. To enable the UART indicator output:

→ AT+UI=01<CR><LF> ← *enable the UART indicator output*
 ← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.9. IQ—Inquiry the Bluetooth device

5.1.9.1. Description:

This command makes the Bluetooth module to inquiry the Bluetooth device in its visible range.

5.1.9.2. Syntax:

Synopsis:

AT+IQ<CR><LF>

5.1.9.3. Examples:

Ex. 5.44. To inquire the Bluetooth device:

→ AT+IQ<CR><LF> ← inquire the Bluetooth device.
 ← AP=01<CR><LF> ← indicate the Bluetooth module is now inquiring.
 ← IR=03<CR><LF> ← indicate there are 3 Bluetooth devices found.
 ← AP=00<CR><LF> ← indicate Bluetooth module is now in idle.
 ← FD=02,00189600000C,FFC6,BT_DEV_3<CR><LF> ← indicate the 3rd found device's address, the RSSI is -58dBm, the device name is BT_DEV_3.
 ← FD=01,00189600000B,FFC7<CR><LF> ← indicate the 2nd found device's address, the RSSI is -57dBm, the device name is not gotten.
 ← FD=00,00189600000D,FFC8,BT_DEV_1<CR><LF> ← indicate the 1st found device's address, the RSSI is -56dBm, the device name is BT_DEV_1.

5.1.10. MD—Make the Bluetooth module discoverable

5.1.10.1. Description:

This command can query or change the Bluetooth module's discoverable status. Only when the Bluetooth module is discoverable, it can be found by other Bluetooth device.

If the parameter is not presented, the Bluetooth module will report current discover status by the Indicator MD.

5.1.10.2. Syntax:

Synopsis:

AT+MD[=Status]<CR><LF>

5.1.10.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
Status	The new status of discoverable. Value: 00h or 01h 00: Not discoverable 01: Discoverable Default: 00 (Not	O	

discoverable)

5.1.10.4. Examples:

Ex. 5.45. To query the current discoverable status of the Bluetooth module:

➔ AT+MD<CR><LF> ← *query the current discoverable status.*
← MD=00<CR><LF> ← *report the Bluetooth module is not discoverable currently.*

Ex. 5.46. To make Bluetooth module discoverable:

➔ AT+MD=01<CR><LF> ← *make Bluetooth module discoverable.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.11. CP—Clear the paired Bluetooth device list

5.1.11.1. Description:

This command can clear the paired device list stored in the Bluetooth module. If there is some Bluetooth device is connected with the Bluetooth module, it will perform a disconnection before clear the paired device list.

5.1.11.2. Syntax:

Synopsis:

AT+CP<CR><LF>

5.1.11.3. Examples:

Ex. 5.54. To clear the paired device list:

➔ AT+CP<CR><LF> ← *clear the paired device list.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.12. CK—Increase the Volume

5.1.12.1. Description:

This command is used to increase the volume of HFP voice or A2DP music by 1 step.

Only the volume of currently output will be increased, that means if it is in a phone call, the volume of HFP voice will be increased while the volume of A2DP music will not be affected. Otherwise, if it is playing A2DP music, the volume of A2DP music will be increased while the volume of HFP voice will not be affected.

5.1.12.2. Syntax:

Synopsis:

AT+CK<CR><LF>

5.1.12.3. Examples:

Ex. 5.67. To increase the volume:

➔ AT+CK<CR><LF> ← *increase the volume.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.13. CL—Decrease the Volume

5.1.13.1. Description:

This command is used to decrease the volume of HFP voice or A2DP music by 1 step.

Only the volume of currently output will be decreased, that means if it is in a phone call, the volume of HFP voice will be decreased while the volume of A2DP music will not be affected. Otherwise, if it is playing A2DP music, the volume of

A2DP music will be decreased while the volume of HFP voice will not be affected.

5.1.13.2. Syntax:

Synopsis:

AT+CL<CR><LF>

5.1.13.3. Examples:

Ex. 5.68. To increase the volume:

→ AT+CL<CR><LF> ← decrease the volume.
 ← OK<CR><LF> ← response from the module to indicate the command is adopted.

5.1.14. LC—List connected devices

5.1.14.1. Description:

This command is used to list the connected devices.

5.1.14.2. Syntax:

Synopsis:

AT+LC<CR><LF>

5.1.14.3. Examples:

Ex. 5.69. To list the connected devices:

AT+LC<CR><LF> list the connected devices.
 LC=03,00123456ABCD <CR><LF> report the device which name is unknown is connected with SPP profile, the device address is 00:12:34:56:AB:CD.
 LC=04,00123456CDEF, iPhone<CR><LF> report the device "iPhone" is connected with RFCOMM profile(for data transmission), the device address is 00:12:34:56:CD:EF.
 LC=04,00123456CDEF, iPhone<CR><LF> report the device "iPhone" is connected with HFP profile, the device address is 00:12:34:56:CD:EF.
 LC=05,00123456CDEF, iPhone<CR><LF> report the device "iPhone" is connected with A2DP profile, the device address is 00:12:34:56:CD:EF.
 LC=06,00123456CDEF, iPhone<CR><LF> report the device "iPhone" is connected with AVRCP profile, the device address is 00:12:34:56:CD:EF.

5.2. SPP Commands

5.2.1. CS—Connect to the remote SPP device

5.2.1.1. Description:

This command will make the Bluetooth module to connect to the remote Bluetooth SPP device. If the Bluetooth address parameter is not presented, the Bluetooth module will attempt to connect to the last connected SPP device.

5.2.1.2. Syntax:

Synopsis:

AT+CS[=BdAddr][,NameId]<CR><LF>

5.2.1.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
-----------	-------------	-----------------------	----------

BdAddr	The Bluetooth address of the Bluetooth SPP device to connect.	O	
Name Id	The name ID of this connection. Once connected, the host can use the name ID to identify the source or destination. Value: 40h—4xh (x is the maximum SPP instance count, refer to 5.1.1)	O	This is only available when both of the two sides are Ehong's software.

Notes:

1. If either local or remote device has already established a SPP connection with some other device use the same Name ID, the remote device will disconnect with local device immediately.
2. Once the connection with a specified Name ID has been successfully established, the Bluetooth module will remember the Name ID and use this Name ID to auto connect after power on and auto reconnect after link lost(if these features are enabled).

5.2.1.4. Examples:

Ex. 5.77. To connect to the last connected SPP device:

```

→ AT+CS<CR><LF>          ← connect to the last connected device with the SPP profile.
← SS=01,00189600ABCD<CR><LF> ← the Bluetooth module is now connecting to the last connected device which
address is 00:18:96:00:AB:CD.
← CS=00,00189600ABCD<CR><LF> ← connecting result: success.
← SS=02,00189600ABCD<CR><LF> ← the Bluetooth module is now connected to the last connected device.

```

Ex. 5.78. To connect to the specified device with the SPP profile:

```

→ AT+CS=00189600000A<CR><LF> ← connect to the specified device 00:18:96:00:00:0A with the SPP profile.
← SS=01,00189600000A<CR><LF> ← the Bluetooth module is now connecting to the specified SPP device which
address is 00:18:96:00:00:0A.
← CS=00,00189600000A<CR><LF> ← connecting result: success.
← SS=02,00189600000A<CR><LF> ← the Bluetooth module is now connected to the specified SPP device.

```

Ex. 5.79. To connect to the specified SPP device with the Name ID 13:

```

→ AT+CS=00189600000A,43<CR><LF> ← connect to the specified device 00:18:96:00:00:0A with the Name ID 43.
← SS=01,00189600000A,43<CR><LF> ← the Bluetooth module is now connecting to the specified SPP device which
address is 00:18:96:00:00:0A,use Name ID 43.
← CS=00,00189600000A<CR><LF> ← connecting result: success.
← SS=02,00189600000A,43<CR><LF> ← the Bluetooth module is now connected to the specified SPP device,
the Name ID is 43.

```

5.2.2. SS—Query the state of each SPP channel

5.2.1.1. Description:

This command is used to query the state of each SPP channel.

5.2.2.2. Syntax:

Synopsis:

```
AT+SS<CR><LF>
```

5.2.2.3. Examples:

Ex. 5.82. To query the state of each SPP channel:

```

AT+SS<CR><LF>          query the state of each SPP channel.
SS=01,00189600ABCD<CR><LF> the SPP channel 0 of Bluetooth module is now connecting to the remote
device which address is 00:18:96:00:AB:CD.
SS=12,00189601ABCD<CR><LF> the SPP channel 1 of Bluetooth module is now connected with the remote
device which address is 00:18:96:01:AB:CD.
SS=22,00189603ABCD,43<CR><LF> the SPP channel 2 of Bluetooth module is now connected with the remote
device which address is 00:18:96:02:AB:CD, the name ID is 43.

```

SS=30<CR><LF> *the SPP channel 3 of Bluetooth module is now connectable*
SS=40<CR><LF> *the SPP channel 4 of Bluetooth module is now connectable*
SS=50<CR><LF> *the SPP channel 5 of Bluetooth module is now connectable*

5.2.3. DS—Disconnect with the remote SPP device

5.2.3.1. Description:

This command will make Bluetooth module to disconnect with the remote Bluetooth SPP device. If the Bluetooth address parameter is not presented, the Bluetooth module will disconnect with all of the connected SPP devices.

5.2.3.2. Syntax:

Synopsis:

AT+DS[=BdAddr]<CR><LF>

5.2.3.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
BdAddr	The Bluetooth address of the Bluetooth SPP device to disconnect.	O	

5.2.3.4. Examples:

Ex. 5.80. To disconnect with all of the connected SPP devices:

→ AT+DS<CR><LF> ← *disconnect with all of the connected SPP devices.*
← SS=00<CR><LF> ← *the SPP channel 0 of Bluetooth module is now disconnected and is connectable.*
← SS=10<CR><LF> ← *the SPP channel 1 of Bluetooth module is now disconnected and is connectable.*
← SS=30<CR><LF> ← *the SPP channel 3 of Bluetooth module is now disconnected and is connectable.*

Ex. 5.81. To disconnect to the specified device:

→ AT+DS=00189600000A<CR><LF> ← *disconnect with the specified device 00:18:96:00:00:0A.*
← SS=00<CR><LF> ← *the SPP channel 0 of Bluetooth module is now disconnected and is connectable.*

5.3. RFCOMM Commands (for Apple iOS devices)

The RFCOMM commands are mainly used to connect and communicate with an iOS device, such as iPod, iPhone and iPad.

5.3.1. PT—Query or change the protocol name of MFi application

5.3.1.1. Description:

This command can query or change the protocol name of MFi application. Once changed, the new protocol name will take effect at next time the Bluetooth module connect with an iOS device and until the next time the protocol name is changed by this command. It means the Bluetooth module will remember the protocol name, and even if the Bluetooth module has been

powered off, the friendly name will not be lost.

If the parameter is not presented, the Bluetooth module will report current protocol name by the Indicator PT.

5.3.1.2. Syntax:

Synopsis:

AT+PT [=ProtocolName]<CR><LF>

5.3.1.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
-----------	-------------	-----------------------	----------

Protocol Name	The new protocol name of MFi application. Length: 1—30 characters Default: Per software version.	O
---------------	--	---

Notes:

The protocol name string will be compared (without considering case) to strings presented by applications on the iOS device. The recommended format of protocol name is revise-DNS string (e.g. "com.Ehong.protocol").

5.3.1.4. Examples:

Ex. 5.109. To query current protocol name of iAP application:

→ AT+PT<CR><LF> ← query current protocol name.

← PT=com.eh.bt.iap <CR><LF> ← report current protocol name, it's "com.eh.bt.iap".

Ex. 5.110. To change the protocol name of iAP application:

→ AT+PT=com.Ehong.protocol <CR><LF> ← change the local friendly name to "com.Ehong.protocol".

← OK<CR><LF> ← response from the module to indicate the command is adopted.

5.3.2. AH—Query the status of Apple authentication processor

5.3.2.1. Description:

This command is used to query the status of Apple authentication processor.

5.3.2.2. Syntax:

Synopsis:

AT+AH<CR><LF>

5.3.2.3. Examples:

Ex. 5.111. To query the status of Apple authentication processor:

AT+AH<CR><LF> query the status of Apple authentication processor.

AH=01<CR><LF> Report the Apple authentication processor works normally.

5.3.3. CR—Connect to the remote RFCOMM device

5.3.3.1. Description:

This command will make the Bluetooth module to connect to the remote Bluetooth RFCOMM device. If the Bluetooth address parameter is not presented, the Bluetooth module will attempt to connect to the last connected RFCOMM device.

5.3.3.2. Syntax:

Synopsis:

AT+CR[=BdAddr]<CR><LF>

5.3.3.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
BdAddr	The Bluetooth address of the Bluetooth RFCOMM device to connect.	O	

5.3.3.4. Examples:

Ex. 5.112. To connect to the last connected RFCOMM device:

AT+CR<CR><LF> connect to the last connected RFCOMM device.

RS=01,00189600ABCD<CR><LF> the Bluetooth module is now connecting to the last connected RFCOMM device which address is 00:18:96:00:AB:CD.
 ⬅ CR=00,00189600ABCD<CR><LF> ⬅ connecting result: success.
 ⬅ RS=02,00189600ABCD<CR><LF> ⬅ the Bluetooth module is now connected to the last connected RFCOMM device.

Ex. 5.113. To connect to the specified RFCOMM device:

➔ AT+CR=00189600000A<CR><LF> ⬅ connect to the specified RFCOMM device: 00:18:96:00:00:0A.
 ⬅ RS=01,00189600000A<CR><LF> ⬅ the Bluetooth module is now connecting to the specified RFCOMM device which address is 00:18:96:00:00:0A.
 ⬅ CR=00,00189600000A<CR><LF> ⬅ connecting result: success.
 ⬅ RS=02,00189600000A<CR><LF> ⬅ the Bluetooth module is now connected to the specified RFCOMM device.

5.3.4. DR—Disconnect with the remote RFCOMM device

5.4.5.1. Description:

This command will make Bluetooth module to disconnect with the remote Bluetooth RFCOMM device. If the Bluetooth address parameter is not presented, the Bluetooth module will disconnect with all of the connected RFCOMM devices.

5.3.4.2. Syntax:

Synopsis:

AT+DR[=BdAddr]<CR><LF>

5.3.4.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
BdAddr	The Bluetooth address of the Bluetooth RFCOMM device to disconnect.	O	

5.3.4.4. Examples:

Ex. 5.114. To disconnect with all of the connected RFCOMM device:

➔ AT+DR<CR><LF> ⬅ disconnect with all of the connected RFCOMM device.
 ⬅ RS=00<CR><LF> ⬅ the RFCOMM channel of Bluetooth module is now disconnected and is connectable.

Ex. 5.115. To disconnect to the specified RFCOMM device:

➔ AT+DR=00189600000A<CR><LF> ⬅ disconnect with the specified RFCOMM device: 00:18:96:00:00:0A.
 ⬅ RS=00<CR><LF> ⬅ the RFCOMM channel of Bluetooth module is now disconnected and is connectable.

5.3.5. RS—Query the state of RFCOMM channel

5.3.5.1. Description:

This command is used to query the state of RFCOMM channel.

5.3.5.2. Syntax:

Synopsis:

AT+RS<CR><LF>

5.3.5.3. Examples:

Ex. 5.116. To query the state of RFCOMM channel:

AT+RS<CR><LF> *query the state of RFCOMM channel.*

RS=01,00189600ABCD<CR><LF> *the RFCOMM channel of Bluetooth module is now connecting to the remote RFCOMM device which address is 00:18:96:00:AB:CD.*

5.4. A2DP Commands

The A2DP commands are only available for MB05, MB06 and MB09 module.

5.4.1. OD—Query or change the optional decoder used by A2DP

5.4.1.1. Description:

This command can query or change the configuration of optional decoder used by A2DP. Once configured, the configuration will take effect at the next boot and until the next time the module is configured by this command. Therefore, a manually reboot is needed to make the new configuration take effect and the Bluetooth module will remember the configuration, and

even if the Bluetooth module has been powered off, the configuration will not be lost.

If the parameter is not presented, the Bluetooth module will report current profile configuration by the Indicator OD.

5.4.1.2. Syntax:

Synopsis:

AT+OD[=Mp3,Aac,FastStream,AptX,AptXLL]<CR><LF>

5.4.1.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
Mp3	The new status of MP3 decoder. Value: 00h or 01h 00h: Disabled 01h: Enabled Default: Disabled	O	
Aac	The new status of AAC decoder. Value: 00h or 01h 00h: Disabled 01h: Enabled Default: Disabled	O	
FastStream	The new status of Fast Stream decoder. Value: 00h or 01h 00h: Disabled 01h: Enabled Default: Disable	O	
AptX	The new status of Apt-X decoder. Value: 00h or 01h 00h: Disabled 01h: Enabled Default: Disabled	O	
AptXLL	The new status of Apt-X LL decoder. Value: 00h or 01h 00h: Disabled 01h: Enabled Default: Disabled	O	

Notes:

Even if the module has implemented the function of optional decoder, it is illegal to use it and/or may not work in your product without the corresponding license from its owner. It is the customer's responsibility to get the license from the

owner of the decoder.

5.4.1.4. Examples:

Ex. 5.157. To query current configuration of optional decoder:

➔ AT+OD<CR><LF> ← query current configuration of optional decoder.
 ⬅ OD=00,00,00,00,00,00<CR><LF> ← report current configuration of optional decoder: all optional decoder is disabled

Ex. 5.158. To change the configuration of optional decoder:

➔ AT+OD=00,01,00,01,00,00<CR><LF> ← change the configuration of optional decoder: enable the AAC and Apt-X decoder.
 ⬅ OK<CR><LF> ← response from the module to indicate the command is adopted.

5.4.2. CM—Connect to the remote A2DP source device

5.4.2.1. Description:

This command will make the Bluetooth module to connect to the remote Bluetooth A2DP source device (generally, it's a mobile phone, tablet or laptop, etc.). If the Bluetooth address parameter is not presented, the Bluetooth module will attempt to connect to the last connected A2DP source device.

5.4.2.2. Syntax:

Synopsis:

AT+CM[=BdAddr]<CR><LF>

5.4.2.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
BdAddr	The Bluetooth address of the Bluetooth A2DP source device to connect.	O	

5.4.2.4. Examples:

Ex. 5.159. To connect to the last connected A2DP source device:

➔ AT+CM<CR><LF> ← connect to the last connected A2DP source device.
 ⬅ MS=01,00189600ABCD<CR><LF> ← the Bluetooth module is now connecting to the last connected A2DP source device which address is 00:18:96:00:AB:CD.
 ⬅ CM=00,00189600ABCD<CR><LF> ← connecting result: success.
 ⬅ MS=02,00189600ABCD<CR><LF> ← the Bluetooth module is now connected to the last connected A2DP source device.

Ex. 5.160. To connect to the specified A2DP source device:

➔ AT+CM=00189600000A<CR><LF> ← connect to the specified A2DP source device: 00:18:96:00:00:0A.
 ⬅ MS=01,00189600000A<CR><LF> ← the Bluetooth module is now connecting to the specified A2DP source device which address is 00:18:96:00:00:0A.
 ⬅ CM=00,00189600000A<CR><LF> ← connecting result: success.
 ⬅ MS=02,00189600000A<CR><LF> ← the Bluetooth module is now connected to the specified A2DP source device.

5.4.3. DM—Disconnect with the remote A2DP source device

5.4.3.1. Description:

This command will make Bluetooth module to disconnect with the remote Bluetooth A2DP source device. If the Bluetooth address parameter is not presented, the Bluetooth module will disconnect with all of the connected A2DP source devices.

5.4.3.2. Syntax:

Synopsis:

AT+DM[=BdAddr]<CR><LF>

5.4.3.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
BdAddr	The Bluetooth address of the Bluetooth A2DP source device to disconnect.	O	

5.4.3.4. Examples:

Ex. 5.161. To disconnect with all of the connected A2DP source devices:

➔ AT+DM<CR><LF> ← *disconnect with all of the connected A2DP source devices.*
⬅ MS=00<CR><LF> ← *the A2DP channel 0 of Bluetooth module is now disconnected and is connectable.*

Ex. 5.162. To disconnect to the specified A2DP source device:

➔ AT+DM=00189600000A<CR><LF> ← *disconnect with the specified A2DP source device: 00:18:96:00:00:0A.*
⬅ MS=00<CR><LF> ← *the A2DP channel 0 of Bluetooth module is now disconnected and is connectable.*

5.4.4. MS—Query the state of A2DP

5.4.4.1. Description:

This command is used to query the state of A2DP.

5.4.4.2. Syntax:

Synopsis:

AT+MS<CR><LF>

5.4.4.3. Examples:

Ex. 5.163. To query the state of A2DP:

➔ AT+MS<CR><LF> ← *query the state of A2DP.*
⬅ MS=01,00189600ABCD<CR><LF> ← *the A2DP channel 0 of Bluetooth module is now connecting to the remote A2DP source device which address is 00:18:96:00:AB:CD.*
⬅ MS=10<CR><LF> ← *the A2DP channel 1 of Bluetooth module is now connectable.*

5.5. AVRCP Commands

The AVRCP commands are only available for MB05, MB06 and MB09 module.

5.5.1. VS—Query the state of AVRCP

5.5.1.1. Description:

This command is used to query the state of AVRCP.

5.5.1.2. Syntax:

Synopsis:

AT+VS<CR><LF>

5.5.1.3. Examples:

Ex. 5.175. To query the state of AVRCP:

➔ AT+VS<CR><LF> ← query the state of AVRCP.

↩ VS=02,00189600ABCD<CR><LF> ← the AVRCP channel 0 of Bluetooth module is now connecting to the remote AVRCP target device which address is 00:18:96:00:AB:CD.

5.5.2. PL—Play or Pause

5.5.2.1. Description:

This command is used to send a *Play* or *Pause* command to the connected/active AVRCP target device.

5.5.2.2. Syntax:

Synopsis:

AT+PL<CR><LF>

5.5.2.3. Examples:

Ex. 5.176. To send a *Play* or *Pause* command to the connected/active AVRCP target device:

➔ AT+PL<CR><LF> ← send a *Play* or *Pause* command.

↩ OK<CR><LF> ← response from the module to indicate the command is adopted.

5.5.3. ST—Stop play

5.5.3.1. Description:

This command is used to send a *Stop* command to the connected/active AVRCP target device.

5.5.3.2. Syntax:

Synopsis:

AT+ST<CR><LF>

5.5.3.3. Examples:

Ex. 5.177. To send a *Stop* command to the connected/active AVRCP target device:

➔ AT+ST<CR><LF> ← send a *Stop* command.

↩ OK<CR><LF> ← response from the module to indicate the command is adopted.

5.5.4. NX—Next

5.5.4.1. Description:

This command is used to send a *Next* command to the connected/active AVRCP target device.

5.5.4.2. Syntax: \

Synopsis:

AT+NX<CR><LF>

5.5.4.3. Examples:

Ex. 5.68. To send a *Next* command to the connected/active AVRCP target device:

➔ AT+NX<CR><LF> ← *send a Next command.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.5.5. PR—Previous

5.5.5.1. Description:

This command is used to send a *Previous* command to the connected/active AVRCP target device.

5.5.5.2. Syntax:

Synopsis:

AT+PR<CR><LF>

.

5.5.5.3. Examples:

Ex. 5.69. To send a *Previous* command to the connected/active AVRCP target device:

➔ AT+PR<CR><LF> ← *send a Previous command.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*