

Serial Mobile Slim protocol definition UART

Communication

(Rev 1.12)

UART communication

UART characteristics:

- 1 start bit, 8 bits data and 1 stop bit.
- Parity none.
- Flow control: none.
- Baud rate:
 1. BT - 115200 bps.
 2. iOS via cable – 57600 bps.

Terms:

Device – Hand writing capture device with UART capability.

Host – Device with UART capability e.g. SSP Blue Tooth module or PC.

Blue Tooth Profile:

SPP.

iOS.

The communication between the device and the host is divided to two modes:

3. The host sends special command to the device (e.g. memory status, upload note etc.) and the device reply an answer.
4. Device Send XY coordinate when writing with the pen (XY coordinate is being sent around 60 times in a second)
Device massages.

Notes:

1. To avoid receiving XY coordinates while command has been sent to the device, it need to send the device the mode command mode or XY coordinate mode the mode select command describe below.

Mode Select Command:

Host → Device:*

Wake Up (1 Byte)
0xFF

Device → Host:*

Dev Ready (1 Byte)
0xFC

Host → Device:

Mode select command (1 Byte)	Mode (1 Byte)
0xA0	Data

Data: 0x00 – XY coordinate mode.
0x01 – Command mode.

Device → HOST:

Length of Data and CRC-8 (1 Byte)	Mode select command (1 Byte)	Mode selected (1 Byte)	Checksum (1 Byte)
0x03	0xA0		

Mode selected: the current mode.

Checksum: calculate on delete note res. and error message (2 bytes).

* - not required in iOS profile.

1. Host special command.

Commands list:

- Memory Status – Number of notes and size of all note requests.
- Note information – Size of specific note and if that note was uploaded before request.
- Upload note – upload specific note.
- Delete notes – delete all notes.
- Version – Request from device PID and version.
- Device ID – Request from device unique ID.

Note: After sending wake up byte the host should wait for Dev Ready byte from the device before sending commands.

Undefined command device response:

In case of receiving undefined command the device will send the following packet:

Device → Host:

Length of Data and CheckSum (1 Byte)	Received Byte (1 Byte)	Undefined command (1 Byte)	CheckSum (1 Byte)
0x03		0xFD	

Memory Status:

Host → Device:*

Wake Up (1 Byte)
0xFF

Device → Host:*

Dev Ready (1 Byte)
0xFC

Host → Device:

Memory Status Command (1 Byte)
0xB5

Device → HOST:

Length of Data and CRC-8 (1 Byte)	Number of all notes (2 Bytes)		Size of all notes (4 Bytes)				Checksum (1 Byte)
0x07	LSB	MSB	LSB			MSB	

Checksum: calculate on number of all notes number and size of all notes (6 bytes).

Checksum calculation: XOR (exclusive or) operation on the bytes for example number of all notes = 50 => 0x00 0x32 and size of all notes = 490 => 0xEA 0x01 0x00 0x00 the checksum should be => 0x00 xor 0x32 xor 0xEA xor 0x01 xor 0x00 xor 0x00 = 0xD9

* - not required in iOS profile.

Note information:

Host → Device:*

Wake Up (1 Byte)
0xFF

Device → Host: *

Dev Ready (1 Byte)
0xFC

Host → Device:

Note information command (1 Byte)	Note Number (2 Byte)	
0xB6	LSB	MSB

Device → Host:

Length of Data and CheckSum (1 Byte)	Size of note (4 Bytes)				Was uploaded (1 Byte)	CheckSum (1 Byte)
0x06	LSB			MSB		

Was uploaded: if the note was uploaded before = 0x01 otherwise = 0x00.

CheckSum: calculate on size of note and was uploaded (5 bytes).

Note Number: first note = 1, second note = 2 etc.

* - not required in iOS profile.

Upload Note:

Upload Sequence:

1. Request start of upload note

Host → Device:*

Wake Up (1 Byte)
0xFF

Device → Host:*

Dev Ready (1 Byte)
0xFC

Host → Device:

Upload Note command (1 Byte)	Note Number (2 Byte)
0xB7	LSB MSB

2. Device sends the note data.

Device → Host:

Length of Data and CheckSum (1 Byte)	Note Data (N Bytes)	CheckSum (1 Byte)
N + 1		

N – Number of byte in the note data field up to 62 bytes.

CheckSum: calculate on note data (N bytes).

Note Number: first note = 1, second note = 2 etc.

For note data description see appendix A.

3. Host sends an upload error message.

Host → Device

Report ID (1 Byte)	Upload Error Message (1 Byte)
0xB8	

Upload Error Message Table:

Error	Value	Description
ERROR_SUCCESS	0x00	The data was receive correctly, send the next data (of the selected note)
ERROR_RECEIVE	0x02	The data not receive correctly; send again the last data that send in stage 2.
ERROR_ABORT	0x03	Abort upload

The device will send the last data or the next data (until all the note data will send) or abort upload sequence according to the received upload error message that describe above.

* - not required in iOS profile.

Delete Notes:

Host → Device:*

Wake Up (1 Byte)
0xFF

Device → Host:*

Dev Ready (1 Byte)
0xFC

Host → Device:

Delete Notes Command (1 Byte)
0xB0

Device → Host:

Length of Data and CheckSum (1 Byte)	Delete Notes Res. (1 Byte)	Delete Error Message (1 Byte)	CheckSum (1 Byte)
0x03	0xB0		

Delete Error Message: see error message table below.

CheckSum: calculate on delete note res. and error message (2 bytes).

Delete Error Message Table:

Error	Value	Description
ERROR_SUCCESS	0x00	Success to delete notes.
ERROR_FAIL	0x01	Fail to delete notes.

* - not required in iOS profile.

Version:

Host → Device:*

Wake Up (1 Byte)
0xFF

Device → Host:*

Dev Ready (1 Byte)
0xFC

Host → Device:

Version Command (1 Byte)
0x95

Device → Host:

Length of Data and CheckSum (1 Byte)	Version Information (11 Byte)	CheckSum (1 Byte)
0x0C		

Version information:

Byte 0: 0x80.

Byte 1: 0xA9.

Byte 2: Product ID.

Byte 3: firmware version high.

Byte 4: firmware version low.

Byte 5: firmware version high.

Byte 6: firmware version low.

Byte 7: PAD version high.

Byte 8: PAD version low.

Byte 9: 0x0E.

Byte 10: MODE: raw = 0x00, XY = 0x01, Tablet = 0x02 and
Mobile = 0x03.

CheckSum: calculate on version information (11 bytes).

* - not required in iOS profile.

Device ID:

Host → Device:*

Wake Up (1 Byte)
0xFF

Device → Host:*

Dev Ready (1 Byte)
0xFC

Host → Device:

Device ID command (2 Bytes)	
0x80	0xD3

Device → Host:

Length of Data and CheckSum (1 Byte)	Device ID (14 Bytes)	CheckSum (1 Byte)
0x0F		

Device ID:

Byte 0 : 0x81.

Byte 1 : 0xD3.

Byte 2 - 13: Device unique ID (12 bytes).

CheckSum: calculate on version information (14 bytes).

* - not required in iOS profile.

2. Device XY coordinate

XY coordinate when writing with the pen

Data Packets:

PEN-DATA packet (XY coordinates):

PEN-DATA packets (XY mode).

Device → Host

Byte #	Byte Name	7	6	5	4	3	2	1	0
0	Status	1	0	0	0	0	0	Battery state	
1	Color	1	0	0	0	Hov	0	Sw1	Tip
2	X low	x	x	x	x	x	x	x	x
3	X high	x	x	x	x	x	x	x	x
4	Y low	x	x	x	x	x	x	x	x
5	Y high	x	x	x	x	x	x	x	x

Battery state:

0x00 no state report

0x01 battery low report

0x02 battery good report

PEN-UP packet:

PEN-UP packets (XY mode).

Device → Host

Byte #	Byte Name	7	6	5	4	3	2	1	0
0	Status	1	0	0	0	0	0	Battery state	
1	Color	1	0	0	0	0	0	0	0
2	X low	0	0	0	0	0	0	0	0
3	X high	0	0	0	0	0	0	0	0
4	Y low	0	0	0	0	0	0	0	0
5	Y high	0	0	0	0	0	0	0	0

Battery state (as in DATA packet above):

0x00 no state report

0x01 battery low report

0x02 battery good report

Device Messages.

Device sends messages to host.

Device → Host:

Length of Data and CheckSum (1 Byte)	Message Header (1 Byte)	Message (1 Byte)	Parameter (1 Byte)	CheckSum (1 Byte)
0x04	0x90			

Message: 0x91 – Device uploads abort.
 0x92 – Memory full.
 0x93 – User switch pressed.
 0x94 – Device uploads Request.

Parameter: Device uploads abort – 0x00.
 Memory full – 0x00.
 User switch pressed – switch number.
 Device uploads Request – 0x00.

User switch parameter:
 0x01 – Next Note pressed.
 0x02 – User SW pressed (Pen/Mouse mode).

Appendix A: Memory management.

The device saves notes in flash memory.

Each note contain note header and data (XY coordinates, Pen up)

Note structure description:

Note header: 14 Bytes.

Byte number	Byte description	7	6	5	4	3	2	1	0
1	Pointer to next note address	Low							
2									
3		High							
4	Flags	Note open	Note closed	Note closed (software)	1	Note Side Left	Note Side Right	Note Upload	Pen Bat
5	Note number								
6	Total note number								
7	Time Stamp	Low							
8									
9									
10		High							
11	Protocol ID								
12	Reserved								
13	Reserved								
14	Reserved								

Note open:

0 – There is XY coordinates in this note.

1 – Empty note.

Note closed:

0 – The note closed by user or software.

1 – Note not closed.

Note closed (software):

0 – Note not closed by user.

1 – else.

Note Side Left: (NOT USED)

0 – Left.

1 – N.C.

Note Side Right: (NOT USED)

0 – Right.

1 – N.C.

Note Upload:

0 – Note already uploaded.

1 – else.

Pen Bat: (NOT USED)

0 – Pen battery low voltage.

1 – Pen battery normal voltage.

Time Stamp: Number of minute (from 1/1/08).

Protocol ID: 0x01.

Data:

XY coordinates: 4 Bytes

Byte number	Byte description	7	6	5	4	3	2	1	0
1	X coordinate	Low							
2		High							
3	Y coordinate	Low							
4		High							

Pen up: 4 Bytes

Byte number	Byte description	7	6	5	4	3	2	1	0
1	Pen up	0	0	0	0	0	0	0	0
2		0	0	0	0	0	0	0	0
3		0	0	0	0	0	0	0	0
4		1	0	0	0	0	0	0	0

Memory data structure example:

Note 1 header	XY	XY	XY	XY	Pen up	XY	XY
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XY	Pen up	Note 2 header	XY	Pen up	Note N header		
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Remark:

1. The last note will be empty note and the pointer for next note = 0xFFFFFFFF