NeoLAB Convergence Inc.
15th floor, Mario Tower
Guro-Dong 222-12
Guro-Gu
Seoul, S. Korea
E-Mail: contact@neolab.net
Web: www.neosmartpen.com

Preliminary

14. April. 2015

NWP-F1xx Bluetooth SPP
Version: 1.01

Revision History

Date	Comment	Author
2014.07.08	Revised to new format	Jason H.
2014.07.10	Modified : Valid ID Req. 0x0b	JYL
2014.07.21	Added: Pen Up/Don CMD 0x16	JYL
2014.08.21	Added: 0x09, 0x0A: Duration of Auto power-off 0x28, 0x29: color setting 0x2A, 0x2B: Auto power-on 0x2C, 0x2D: Pressure sensor Adj. 0x2E, 0x2F: Beep setting Modified: 0x26, 0x27	JYL
2014.08.27	Added: File deletion 0x4A, 0x4B	JYL
2014.09.16	Added: password 0x0D~0x10	JYL
2014.09.14	Revised: BT Connection flow	JYL

1. List of Command

1.1. Pen Status & Setting(0X0x)

CMD	CMD Type	Direction	Description	Compatibility
0x01	Pen Power Status	PEN→APP	Notify Pen is ready	All
0x02	Pen power Status	APP→PEN	Acknowledge for “Pen Ready”	All
0x03	PEN RTC Setting	APP→PEN		All
0x04	PEN RTC Setting	PEN→APP		All
0x05	Hovering Mode Setting	APP→PEN		All
0x06	Hovering Mode Setting	PEN→APP		All
0x07	Pen Calibration	APP→PEN		All
0x08	Pen Calibration	PEN→APP		All
0x09	Auto Power Off Timer	APP→PEN		F110
0x0A	Auto Power Off Timer	PEN→APP		F110
0x0B	Valid ID	APP→PEN		F110
0x0C	Valid ID	PEN→APP		F110
0x0D	Password Request	PEN→APP		F110
0x0E	Password Request	APP→PEN		F110
0x0F	Password Change	APP→PEN		F110
0x10	Password Change	PEN→APP		F110

1.2. Stroke Data Transmission(0X1x)

CMD	CMD Type	Direction	Description	Compatibility
0x11	Stroke Data transmission	PEN→APP		All
0x12				All
0x13	Pen Up	PEN→APP	Sending pen up status	All
0x14	Pen Up Acknowledge	APP→PEN	Response to pen up status	All
0x15	Data Transmission for ID Change(2)	PEN→APP		All
0x16	Transmission (pen up/down)	PEN→APP	Transmit the status of pen up/down	F110

1.3. Pen Status Information Request & Settings (0X2x, 0X3x)

CMD	CMD Type	Direction	Description	Compatibility
0x21	Pen Information	APP→PEN	Request information for battery, memory,.	Ack 0x25 for F110
0x22	Pen Information	PEN→APP	Acknowledge for pen information	
0x23				
0x24				

0x25	PEN Status 2	PEN→APP		F110
0x26	PEN Status	APP→PEN		F110
0x27	PEN Status	PEN→APP		F110
0x28	LCD color setting	APP→PEN	Request color value to be displayed on Pen's LED	F110
0x29	LCD color setting	PEN→APP	Acknowledge for LCD color setting	F110
0x2A	Auto Power On	APP→PEN	Requesting Auto power on.	F110
0x2B	Auto Power On	PEN→APP	Acknowledge for Auto Power On	F110
0x2C	Force Sensor Sensitivity	APP→PEN	Requesting force sensor sensitivity configuration	F110
0x2D	Force Sensor Sensitivity	PEN→APP	Acknowledge	F110
0x2E	Beep On/Off	APP→PEN	Requesting Beep On/Off	F110
0x2F	Beep On/Off	PEN→APP	Acknowledge	F110

1.4. **Data Transmission (0X4x)**

CMD	CMD Type	Direction	Description	Compatibility
0x41	File Information	PEN→APP	File information to be sent	
0x42	File Information	APP→PEN	Acknowledge	
0x43	File data Transmission	PEN→APP	Send File data to App	
0x44	File data Transmission	APP→PEN	Acknowledge	
0x45	Request List of stored data ID	APP→PEN	Request the Data list stored in the pen	F110
0x46	Request List of stored data ID	PEN→APP	Acknowledge	F110
0x47	File Transmission	APP→PEN	Request list data by note ID	F110
0x48	File Transmission	PEN→APP	Acknowledge	F110
0x49	File Size	PEN→APP	Send the size of requested file	F110
0x4A	File Deletion	APP→PEN	Delete by the unit of Section/Owner/ID	F110
0x4B	File Deletion	PEN→APP	Acknowledge	

1.5. **Upgrade (0X5x)**

CMD	CMD Type	Direction	Description	Compatibility
0x51	PEN FW upgrade	APP→PEN	PEN FW upgrade	
0x52	PEN FW binary	PEN→APP	Request Firmware binary	
0x53	PEN FW binary	APP→PEN	Send Requested binary	
0x54	PEN status	PEN→APP	PEN FW transmission status	

1.6. **0x0E ~ 0xFF : F/W reserved**

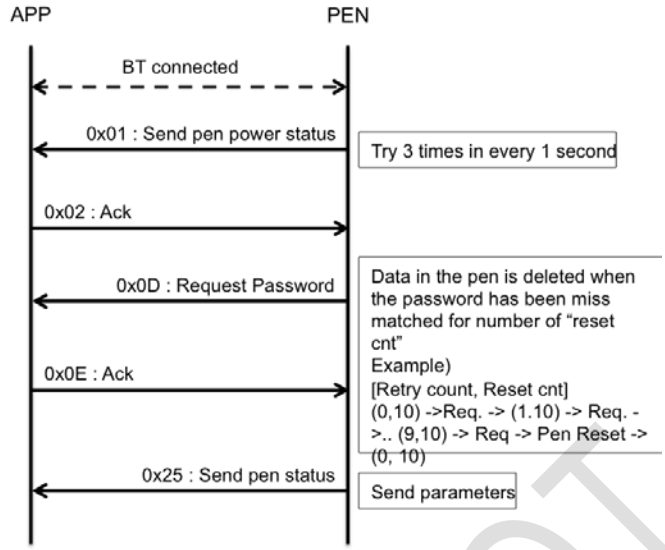
2. Structure of Packet Header

←---------- Header area– data excluded (5 bytes) ----------→				
STX (1 byte)	CMD (1 byte)	Data Length (2 bytes)	Data (Variable Length)	ETX (1 byte)
0xC0	0x00 ~ 0xFF	0 ~ 0xFFFF		0xC1

3. Commands

3.1. Pen Status & Setting(0X0x)

3.1.1. BT connection sequence chart



3.1.2. Command

① **CMD : 0x01** / PEN→APP / PEN power ON/OFF status

Name	Time	Status	Force Max	SW VER
Data Type	unsigned long long	unsigned char	unsigned char	unsigned char[]
Size (Byte)	8	1	1	5
Description	millisecond tick from Jan. 01. 1970	OFF : 0x00 ON : 0x01 Sleep : 0x02 Wake : 0x03	0~255	Text String

② **CMD : 0x2** / APP→PEN / PEN power ON/OFF status acknowledge

Name	Time	Status
Format	unsigned long long	unsigned char
Size (Byte)	8	1
Description	millisecond tick from Jan. 01. 1970	normal : 0x00 abnormal : 0x01

③ **CMD : 0x03** / APP→PEN / PEN RTC setting

Name	Time	Offset
Format	unsigned long long	signed long
Size (Byte)	8	4
Description	millisecond tick from Jan. 01. 1970	GMT offset(millisecond) of Device's Time zone Example) Seoul(KST) : 9 hours(time difference) * 3600 (seconds) * 1000(ms). Apply DST(Daylight Saving Time) for certain region

④ **CMD : 0x04** / PEN→APP / PEN RTC Setting

Name	Error
Format	unsigned char
Size (Byte)	1
Description	success : 0x00 Failure : 0x01

⑤ **CMD : 0x05** / APP→PEN / Hovering mode setting[To be implemented]

Name	Status
Format	unsigned char
Size (Byte)	1
Description	OFF : 0x00 ON : 0x01

⑥ **CMD : 0x06** / PEN→APP / Ack for Hovering mode [To be implemented]

Name	Error
Format	unsigned char
Size (Byte)	1
Description	success : 0x00 Failure : 0x01

⑦ **CMD : 0x07** / APP→PEN / PEN Calibration Request[To be implemented]

Name	None
Format	-
Size (Byte)	0
Description	

⑧ **CMD : 0x08** / PEN→APP / Ack. for PEN Calibration completion[To be implemented]

Name	Dummy1	Dummy2	Dummy3	Dummy4
Data Type	unsigned char	unsigned char	unsigned char	unsigned char
Size (Byte)	1	1	1	1
Description	0x00	0x00	0x00	0x00

- @Data field is reserved for future use

⑨ **CMD : 0x09** / APP→PEN / Req. Auto power off time setting

Name	Minute
Format	unsigned short
Size (Byte)	2
Description	Unit: min (1 ~)

⑩ **CMD : 0x0a** / PEN→APP / Ack. Auto power off time setting

Name	Error
Format	unsigned char
Size (Byte)	1
Description	success : 0x01 Failure : 0x00

⑪ **CMD : 0x0b** / APP→PEN / Req. Valid ID

Name	Type	Count	Param[0]	Param[1]	...	Param[9]
Data Type	unsigned char	unsigned char	unsigned long			unsigned long
Size (Byte)	1	1	4			4
Description	1: note id 2: section owner id 3: all	Number of ID to be requested.(Max = 10) If type = 1, Number of Note ID If type = 2, Number of Section owner ID.	If type = 1, the owner section ID related to Note ID list is placed in Param 0. If type = 2, The first owner section ID is placed in Param 0	Owner Section ID If type = 1, first Note ID If type = 2, second Owner Section ID		

- @ send Owner ID and list of note ID included in Owner.
- @ The size is fixed to 46 byte

⑫ **CMD: 0x0c** / PEN→APP / ack. for valid ID req.

Name	Status
Format	unsigned char
Size (Byte)	1
Description	Failure : 0x00 success : 0x01

⑬ **CMD: 0x0d** / PEN→APP / Req for password

Name	Retry Count	Reset Count
Format	unsigned char	unsigned char
Size (Byte)	1	1
Description	Start from 0(zero)	Pen data will be deleted, when retry count reaches to reset count

⑭ **CMD: 0x0e** / APP→PEN / Ack. for password

Name	Password
Format	unsigned char []
Size (Byte)	16
Description	-

⑮ **CMD: 0x0f** / APP→PEN / Req. for changing password

Name	Previous password	New Password
Format	unsigned char []	unsigned char []
Size (Byte)	16	16
Description		-

16 CMD: 0x10 / PEN→APP / Ack. for changing password

Name	state
Format	unsigned char
Size (Byte)	1
Description	0x00: success 0x01: password mismatch 0x02: invalid password format.

3.2. Stroke data transmission(0X1x)

3.2.1. Command

① **CMD : 0x11** / PEN→APP / Stroke data

Name	Time	X	Y	Float X	Float Y	Force
Data Type	unsigned char	unsigned short	unsigned short	unsigned char	unsigned char	unsigned char
Size (Byte)	1	2	2	1	1	1
Description	time difference from previous dot	X	Y	X in precision coordinate	Y in precision coordinate	Force Sensor Value

② **CMD : 0x12** empty

③ **CMD : 0x13** / PEN→APP / Pen Up

Name	Time	Status
Data Type	unsinged long long	unsigned char
Size (Byte)	8	1
Description	millisecond tick from Jan. 01. 1970	0x00 : Writing Start (Down) 0x01 : Writing Finish (Up)

④ **CMD : 0x14** / APP→PEN / Ack. for pen up [To be implemented]

Name	Time
Data Type	unsigned long long
Size (Byte)	8
Description	

⑤ **CMD : 0x15** / PEN→APP / Send data for ID Change(2)

Name	Section Owner ID	Note ID	Page ID
Data Type	unsigned long	unsigned long	unsigned long
Size (Byte)	4	4	4
Description	section id: upper 1byte owner id: lower 3 bytes	Note	Page

- @ 0x14 is replaced by 0x15 on FW version 1.05.0011 or later

⑥ **CMD:0x16** / PEN→APP / Pen Up/Down

Name	Time	Status	Pen Color
Data Type	unsinged long long	unsigned char	unsigned long
Size (Byte)	8	1	4
Description	millisecond tick from Jan. 01. 1970	0x00 : Writing Start (Down) 0x01 : Writing Finish (Up)	Type (upper 1byte) 1: Pen Tip Color (lower 3 bytes) 23-16 bit : R 15-8 bit : G 7-0 bit : B

- @

3.3. Request PEN status information(0X2x)

3.3.1. Command

① **CMD : 0x21** / APP→PEN / Req. for PEN status information

Name	None
Data Type	
Size (Byte)	0
Description	

② **CMD : 0x22** / PEN→APP / Ack. for PEN status information (only for F100E)

Name	Time	Battery	Storage Total	Storage Used
Data Type	unsigned long long	unsigned char	unsigned short	unsigned short
Size (Byte)	8	1	2	2
Description	millisecond tick from Jan. 01. 1970(UTC)	0~100(%)	Mbyte	Mbyte

③ **CMD : 0x23** empty

④ **CMD : 0x24** empty

⑤ **CMD : 0x25** / PEN→APP / PEN ack. for status transmission 2

Name	Protocol Version	Status	Time Zone	Time Tick	Force Max	Battery
Data Type	unsigned char	unsigned char	signed long	unsigned long long	unsigned char	unsigned char
Size (Byte)	1	1	4	8	1	1
Description	protocol version	PEN status	GMT offset(millisecond) of Device's Time zone Example) Seoul(KST) : 9 hours(time difference) * 3600 (seconds) * 1000(ms). Apply DST(Daylight Saving Time) for certain region	millisecond tick from Jan. 01. 1970	Range of Force Sensor 0~255	Battery steps F110 : 0~5

Used Memory	Pen Tip color	Auto Power Mode	Acceleration Mode	Hover Mode	Beep	Auto Power Off Time	Pen pressure	Reserved
unsigned char	unsigned long	unsigned char	unsigned char	unsigned char	unsigned char	unsigned short	unsigned short	unsigned char[]
1	4	1	1	1	1	2	2	11
%	RGB assignment For LCD 23-16 bit : R 15-8 bit : G 7-0 bit : B	1: On 2: Off	1: On 2: Off	1 : On 2 : Off	1 : On 2 : Off	Unit: min (Minute)	Pen pressure level: 0~4	Reserved

- @ DATA area has to always maintain 40 bytes.
- @ Acceleration Mode: NWP-F110 has a 3 axis accelerometer for future use.

⑥ **CMD : 0x26** / APP→PEN / PEN status setting

Name	Time Zone	Time Tick	External set Color	Auto Power On	Acceleration Mode	Hover Mode	Beep	Auto Power Off Time	Pen Pressure	Reserved
Data Type	singed long	unsigned long long	Unsigned long	Unsigned char	unsigned char	unsigned char	unsigned char	unsigned short	unsigned short	unsigned char[]
Size (Byte)	4	8	4	1	1	1	1	2	2	16
Description	GMT offset(millisecond) of Device's Time zone Example) Seoul(KST) : 9 hours(time difference) * 3600 (seconds) * 1000(ms). Apply DST(Daylight Saving Time) for certain region 0xFFFFFFFF : ignore	millisecond tick from Jan. 01. 1970 0 : ignore	Type (upper 1byte) 1: Pen Tip Color (lower 3 bytes) 23-16 bit : R 15-8 bit : G 7-0 bit : B 7-0 bit : B 0 : 무시	0: ignore 1: On 2: Off	0: ignore 1: On 2: Off	0: ignore 1: On 2: Off	0: ignore 1: On 2: Off	0 : ignore Unit : minute Range: 1~	0xFFFF : Ignore Level : 0~4 Do not process out of range value	Reserved

- @ DATA area has to always maintain 40 bytes.

⑦ **CMD : 0x27** / PEN→APP / PEN status setting

Name	Error Code
Data Type	unsigned char
Size (Byte)	1
Description	success : 0x00 Failure : 0x01

⑧ **CMD : 0x28** / APP→PEN / color setting

Name	External set Color
Data Type	Unsigned long
Size (Byte)	4
Description	Type (upper 1byte) 1: Pen Tip Color (lower 3 bytes) 23-16 bit : R 15-8 bit : G 7-0 bit : B 7-0 bit : B

⑨ **CMD : 0x29** / PEN→APP / Ack. for color setting

Name	Error Code
Data Type	unsigned char
Size (Byte)	1
Description	success : 0x01 Failure : 0x00

⑩ **CMD : 0x2A** / APP→PEN / Req. for Auto Power On

Name	Auto Power On/Off
Data Type	Unsigned char
Size (Byte)	1
Description	1: On 0: Off

⑪ **CMD : 0x2B** / PEN→APP / Ack. for Auto Power On

Name	Error Code
Data Type	unsigned char
Size (Byte)	1
Description	success : 0x01 Failure : 0x00

⑫ **CMD : 0x2C** / APP→PEN / Req. for force sensor sensitivity

Name	Acceleration Mode
Data Type	unsigned short
Size (Byte)	2
Description	Level : 0~4

⑬ **CMD : 0x2D** / PEN→APP / Ack. for force sensor sensitivity

Name	Error Code
Data Type	unsigned char
Size (Byte)	1
Description	success : 0x01 Failure : 0x00

⑭ **CMD : 0x2E** / APP→PEN / Req. for Beep setting

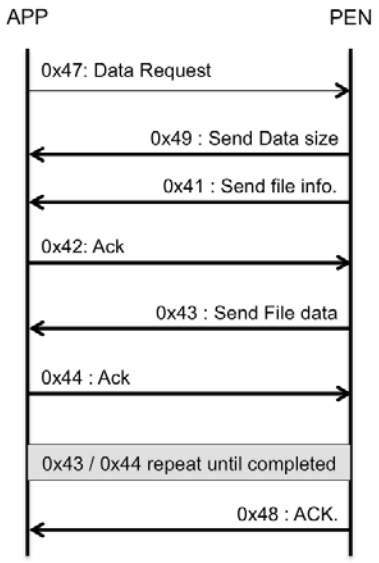
Name	Beep
Data Type	unsigned char
Size (Byte)	1
Description	1: On 0: Off

⑮ **CMD : 0x2F** / PEN→APP / Ack. for Beep

Name	Error Code
Data Type	unsigned char
Size (Byte)	1
Description	success : 0x01 Failure : 0x00

3.4. Data transmission (0X4x)

3.4.1. Message sequence chart



3.4.2. Command

① **CMD : 0x41** / PEN→APP / Trasmit file information

Name	File Name	File Size	Packet Count	Packet Size
Data Type	unsigned char[]	unsigned long	unsigned short	unsigned short
Size (Byte)	128	4	2	2
Description	string (include path) ex: E:\Data\27\302\16\0.zip	(unit: byte)	0 ~	1 ~ 4096 (unit: byte)

- @FILE NAME : include path, '\' means root of the pen
- @FILE SIZE : the size to be sent
- @PACKET COUNT : when FILE SIZE is 4096 byte and PACKET SIZE is 1024bytes, PACKET COUNT is 4.
- @ In the case that the file extension is zip, complete the whole file before parse the information.

② **CMD : 0x42** / APP→PEN / Ack. file info. transmission

Name	Result
Data Type	unsigned short
Size (Byte)	2
Description	0x01 : success 0x00 : Failure

③ **CMD : 0x43** / PEN→APP / File data transmission

Name	Index	Check Sum	Data
Data Type	unsigned short	unsigned char	unsigned char[]
Size (Byte)	2	1	N
Description	0~		

④ **CMD : 0x44** / APP→PEN / Ack for File data transmission

Name	Result
Data Type	unsigned short
Size (Byte)	2
Description	index

⑤ **CMD : 0x45** / APP→PEN / Req. for the list of stored data ID

Name	Reserve
Data Type	unsigned char
Size (Byte)	1
Description	0x00

⑥ **CMD : 0x46** / PEN→APP / Ack for the list of stored data ID

Name	Status	Owner ID	Note Count	Note ID [0]	...	Note ID [9]
Data Type	unsigned char	unsigned long	unsigned char	unsigned long		unsigned long
Size (Byte)	1	4	1	4		4
Description	0x01 : last packet	section id upper 1 byte owner id lower 3 bytes	Number of note id	note id		

- @ transmit Owner ID and Note Id included in the Owner ID

⑦ **CMD : 0x47** / APP→PEN / Rqe. For file transmission

Name	Section Owner ID	Note Count	Note ID [0]	...	Note ID [9]
Data Type	unsigned long	unsigned char	unsigned long		unsigned long
Size (Byte)	4	1	4		4
Description	section id upper 1 byte owner id lower 3 bytes	number of note id	note id		

- @ transmit Owner ID and Note Id included in the Owner ID

⑧ **CMD : 0x48** / PEN→APP / ack for file request

Name	Status
Data Type	unsigned char
Size (Byte)	1
Description	0x00 : Transmission Failure 0x01 : Transmission completed (No files to transmit)

⑨ **CMD : 0x49** / PEN→APP / transmit size of file list

Name	File Count	File Size
Data Type	unsigned long	unsigned long
Size (Byte)	4	4
Description	number of the requested files which correspond to ID list	size of the requested files which correspond to ID list

⑩ **CMD : 0x4A** / APP→PEN / req. file deletion

Name	Section Owner ID	Note ID
Data Type	unsigned long	unsigned long long
Size (Byte)	4	8
Description	section id upper 1bytes owner id lower 3bytes	Don't Use

① **CMD : 0x4B** / PEN→APP / Ack. for file deletion

Name	Status
Data Type	unsigned char
Size (Byte)	1
Description	0x01 : success 0x00 : Failure

5.1. F/W upgrade(0X5x)

5.1.1. Command

① **CMD : 0x51** / APP→PEN / PEN FW upgrade

Name	File Name	File Size	Packet Count	Packet Size
Data Type	unsigned char[]	unsigned long	unsigned short	unsigned short
Size (Byte)	128	4	2	2
Description	string (including path) ex: \SYSTEM\test.bin	(unit: byte)	0 ~	1 ~ 4096 (unit: byte)

- @FILE NAME : include path, '\' means root of the pen
- @FILE SIZE : the size to be sent
- @PACKET COUNT : when FILE SIZE is 4096 byte and PACKET SIZE is 1024bytes, PACKET COUNT is 4.

② **CMD : 0x52** / PEN→APP / Req. for PEN FW binary

Name	Index
Data Type	unsigned short
Size (Byte)	2
Description	index

- @
  The index requested from the pen may not be in order, but app should transmit the requested binary index to the pen

③ **CMD : 0x53** / APP→PEN / ack. PEN FW binary

Name	Index	Check Sum	Data
Data Type	unsigned short	unsigned char	unsigned char[]
Size (Byte)	2	1	N
Description	0 ~		

- @ DATA: transmit the data correspond to the index request by [CMD 0x52]
- the size to be transmitted is defined in Packet size at [CMD 0x51]

④ **CMD : 0x54** / PEN→APP / PEN FW transmission status

Name	Status
Data Type	unsigned char
Size (Byte)	1
Description	0x00 : binary transmission Failure 0x01 : binary transmission success 0x02 : binary transmitting 0x03 : insufficient memory 0x04 : Fail to store packet