

Serial↔LAN / WLAN Converter

PBH-154 User Manual

Version 1.2



Sollae Systems Co., Ltd.

<http://www.ezTCP.com>



This symbol, found on your product or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of this product, please contact your local city office, household waste disposal service or the retail store where you purchased this product.

※ This equipment obtained certification by using 1.5M serial cable.

Contents

1	Overview	- 5 -
1.1	Overview	- 5 -
1.2	Features	- 5 -
1.3	Application Examples	- 6 -
1.3.1	Wired LAN	- 6 -
1.3.2	Wireless LAN.....	- 8 -
1.4	Components.....	- 9 -
1.5	Specification	- 10 -
1.5.1	Hardware	- 10 -
1.5.2	Software	- 10 -
1.6	Dimensions	- 11 -
1.7	Interface	- 12 -
1.7.1	Panel Layout.....	- 12 -
1.7.2	LED	- 13 -
1.7.3	USB Device Port for connection with a PC	- 13 -
1.7.4	Function Button (Func)	- 13 -
1.7.5	Supplying Power	- 14 -
1.7.6	USB Host Port for Connection with WLAN adapter	- 14 -
1.7.7	Serial interface	- 15 -
1.7.8	Ethernet interface	- 17 -
2	Operation Mode	- 18 -
2.1	Wired LAN Mode.....	- 18 -
2.2	Wireless LAN Mode.....	- 18 -
2.2.1	Infrastructure.....	- 19 -
2.2.2	Ad-hoc.....	- 20 -
2.2.3	Soft AP.....	- 21 -
2.2.4	Key terms.....	- 22 -
2.2.5	Authentication and Security	- 22 -
3	WEB configuration	- 23 -
3.1	Connecting to PBH-154.....	- 23 -
3.1.1	Setting by Wireless LAN	- 23 -
3.1.2	Setting by wired LAN	- 24 -
3.2	WEB Configuration.....	- 25 -
3.2.1	Procedures	- 25 -

3.2.2	Connecting to WEB server	- 25 -
3.2.3	WEB configuration page	- 26 -
3.3	Available settings	- 27 -
3.3.1	Default values	- 27 -
3.3.2	Network.....	- 28 -
3.3.3	Wireless LAN.....	- 29 -
3.3.4	Serial / Communication	- 31 -
3.4	System Information.....	- 32 -
3.4.1	MAC address.....	- 32 -
3.4.2	Firmware name	- 32 -
4	Communication Mode.....	- 33 -
4.1	Overview	- 33 -
4.2	TCP Server	- 33 -
4.2.1	Key parameters.....	- 33 -
4.2.2	Examples	- 34 -
4.3	TCP Client	- 35 -
4.3.1	Key parameters.....	- 35 -
4.3.2	Examples	- 35 -
5	System Management.....	- 36 -
5.1	Upgrading Firmware.....	- 36 -
5.1.1	Firmware	- 36 -
5.1.2	Processes	- 36 -
6	Additional Functions.....	- 37 -
6.1	Setting Password.....	- 37 -
6.2	Wireless LAN Authentication.....	- 38 -
6.2.1	Using WEP	- 38 -
6.2.2	Using WPA-PSK	- 39 -
6.2.3	Using WPA-Enterprise.....	- 39 -
6.2.4	Advanced Settings	- 41 -
6.3	Frame delimiter.....	- 42 -
6.4	Factory Reset.....	- 43 -
6.4.1	Factory reset procedure.....	- 43 -
7	Checklist in Trouble.....	- 44 -
7.1	Connection Problem over TCP/IP.....	- 44 -
7.2	Data Communication Problem on the Serial Port	- 45 -

8	Related Materials	- 46 -
8.1	Documents.....	- 46 -
9	Technical Support and Warranty	- 47 -
9.1	Technical Support.....	- 47 -
9.2	Warranty.....	- 47 -
9.2.1	Refund.....	- 47 -
9.2.2	Free Repair Services.....	- 47 -
9.2.3	Charged Repair Services.....	- 47 -
10	Precaution and Exemption from Liability	- 48 -
10.1	Precaution.....	- 48 -
10.2	Exemption from Liability.....	- 49 -
10.2.1	English version.....	- 49 -
10.2.2	French version.....	- 50 -
11	Revision History	- 52 -

1 Overview

1.1 Overview

PBH-154 is a serial to Ethernet/WLAN converter that enables your serial devices to carry robust networking capabilities. This serial to Ethernet/WLAN converter offers 4 serial ports interfaced with RS232/RS422/RS485 and a frame delimiter for packet fragmentation.

PBH-154 comes preloaded with Soft AP so it can simply be linked to any devices with WLAN by operating as an AP. It eases network construction with mobile devices such as smartphones, tablet PCs and laptops where an AP is unavailable.

Ensuring reliable operation with industrial temperature range of $-40^{\circ}\text{C}\sim+85^{\circ}\text{C}$, along with an overvoltage, reverse voltage and overcurrent protection circuit, makes this Serial to Ethernet/WLAN converter suitable for harsh industrial environments.

☞ To connect PBH-154 to wireless LAN, a USB wireless LAN adapter which uses a RT3070/RT5370 chipset of Ralink Corporation is required.

1.2 Features

- RS232/RS422/RS485 to Ethernet and Wireless LAN converter
- 4 X RS232/RS422/RS485 (D-SUB 9 pin Male, up to 230,400bps)
- Ethernet 10Base-T or 100Base-TX (Auto-Sensing)
- IEEE 802.11 b/g
- Infrastructure and Ad-hoc network
- Soft AP (setting and connection through a smartphone or laptop without an AP available)
- Security options (Password, WEP, WPA-PSK, WPA2-PSK)
- WPA Enterprise (EAP-TLS, EAP-TTLS, PEAP)
- 2 Communication modes (TCP Server, TCP Client)
- Web configuration

1.3 Application Examples

1.3.1 Wired LAN

- 1:1 Connection with a PC

● RS232/422/485
● LAN



Figure 1-1 1:1 connection with a PC

- Multiple serial ports

● RS232/422/485
● LAN

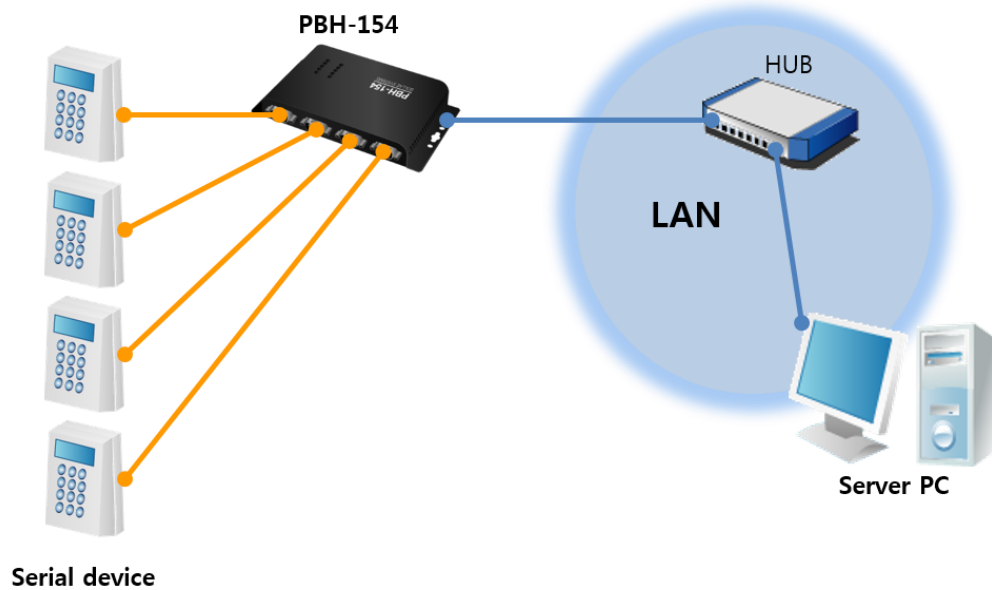


Figure 1-2 multiple serial ports

- Applied to LAN
- RS232/422/485
- LAN



Figure 1-3 applied to LAN

- Applied to the Internet with an IP Share Router

- RS232/422/485
- LAN

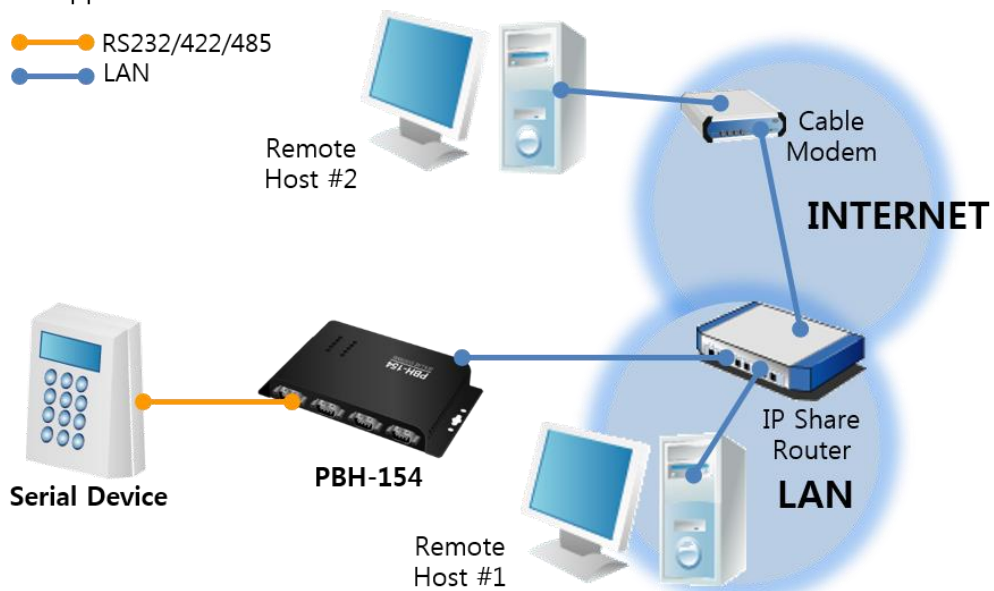


Figure 1-4 applied to the Internet with an IP share router

- Applied to a serial tunneling system

- RS232/422/485
- LAN

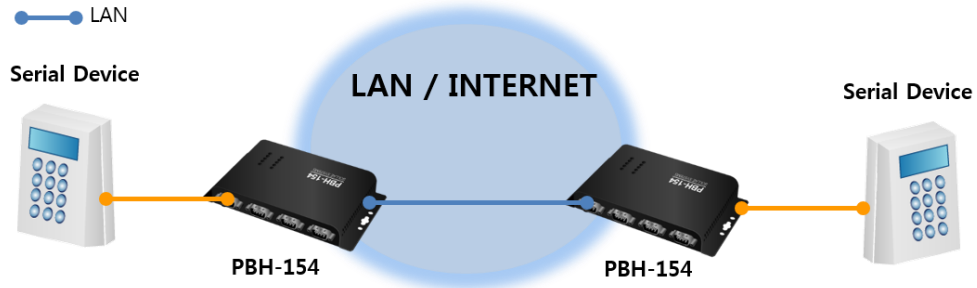


Figure 1-5 applied to a serial tunneling system

1.3.2 Wireless LAN

- 1:1 network with a PC

- RS232/422/485
- WLAN

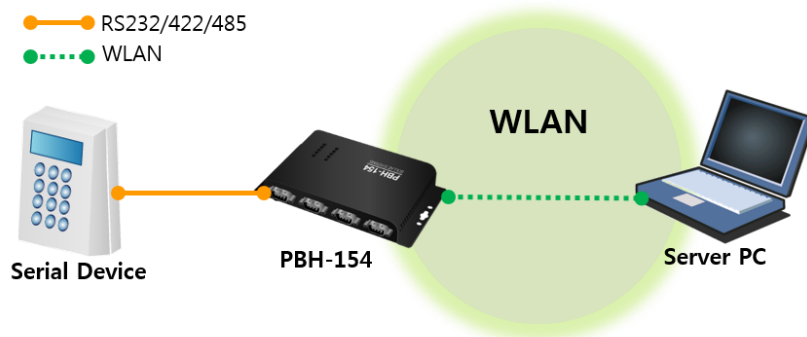


Figure 1-6 1:1 network with a PC

- 1:1 network with a PC through an AP

- RS232/422/485
- WLAN
- LAN

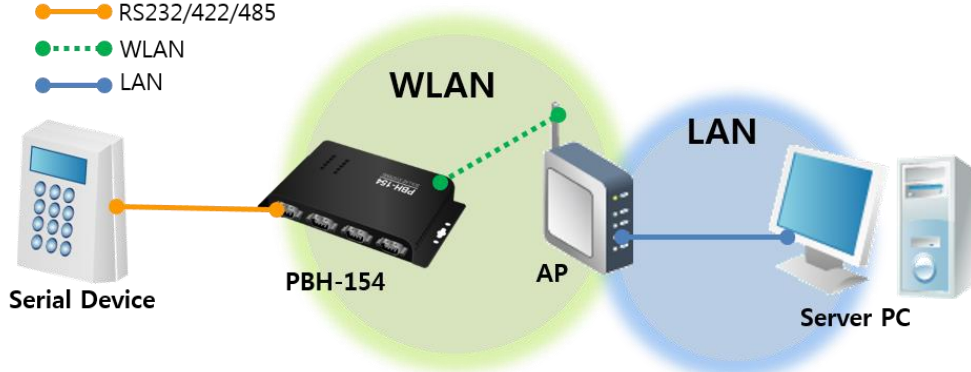


Figure 1-7 1:1 network with a PC through an AP

- Internet connection with a xDSL/cable modem

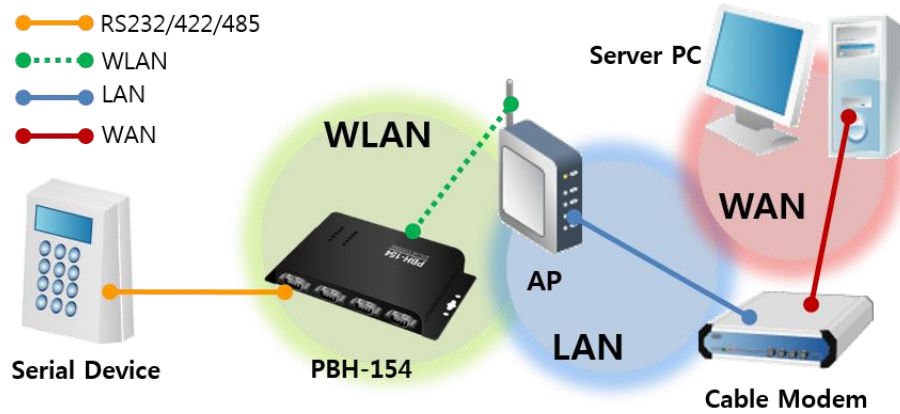


Figure 1-8 Internet connection with an xDSL/cable modem

1.4 Components

- PBH-154's body
- DVD, including utilities and documents (optional)
- USB WLAN adapter (optional)
- DC 5V power adapter (optional)
- RS232 cable (optional)
- Mounter (optional)

1.5 Specification

1.5.1 Hardware

Power	Input Voltage	DC 5V ($\pm 0.5V$) / USB
	Current	Typically 235mA (without a USB WLAN adapter)
Dimension		180mm x 90mm x 24mm
Weight		About 417g (without a USB WLAN adapter)
Interface	Serial	4 x RS232/422/485 COM1, COM4: 2,400bps ~ 230,400bps COM2, COM3: 1,200bps ~ 230,400bps
	Network	10 Base-T / 100 Base-TX Ethernet Auto MDI/MDIX (cable auto-sensing)
	USB	IEEE802.11b/g (Ralink RT3070/5370 chipset wireless adaptor required)
Temperature	Operating / Storage	-40 ~ 85°C (without a USB WLAN adapter)
Approval		KC, CE, FCC
RoHS		RoHS Compliant
Software		PHPoC Writer

Table 1-1 hardware specification

1.5.2 Software

Protocol	TCP, IP, DHCP, ARP, IEEE802.11b/g WEP, WPA-PSK, WPA-Enterprise(EAP-TLS/TTLS, PEAP)	
Communication mode	TCP Server	TCP Passive Connection
	TCP Client	TCP Active Connection

Table 1-2 software specification

1.7 Interface

1.7.1 Panel Layout

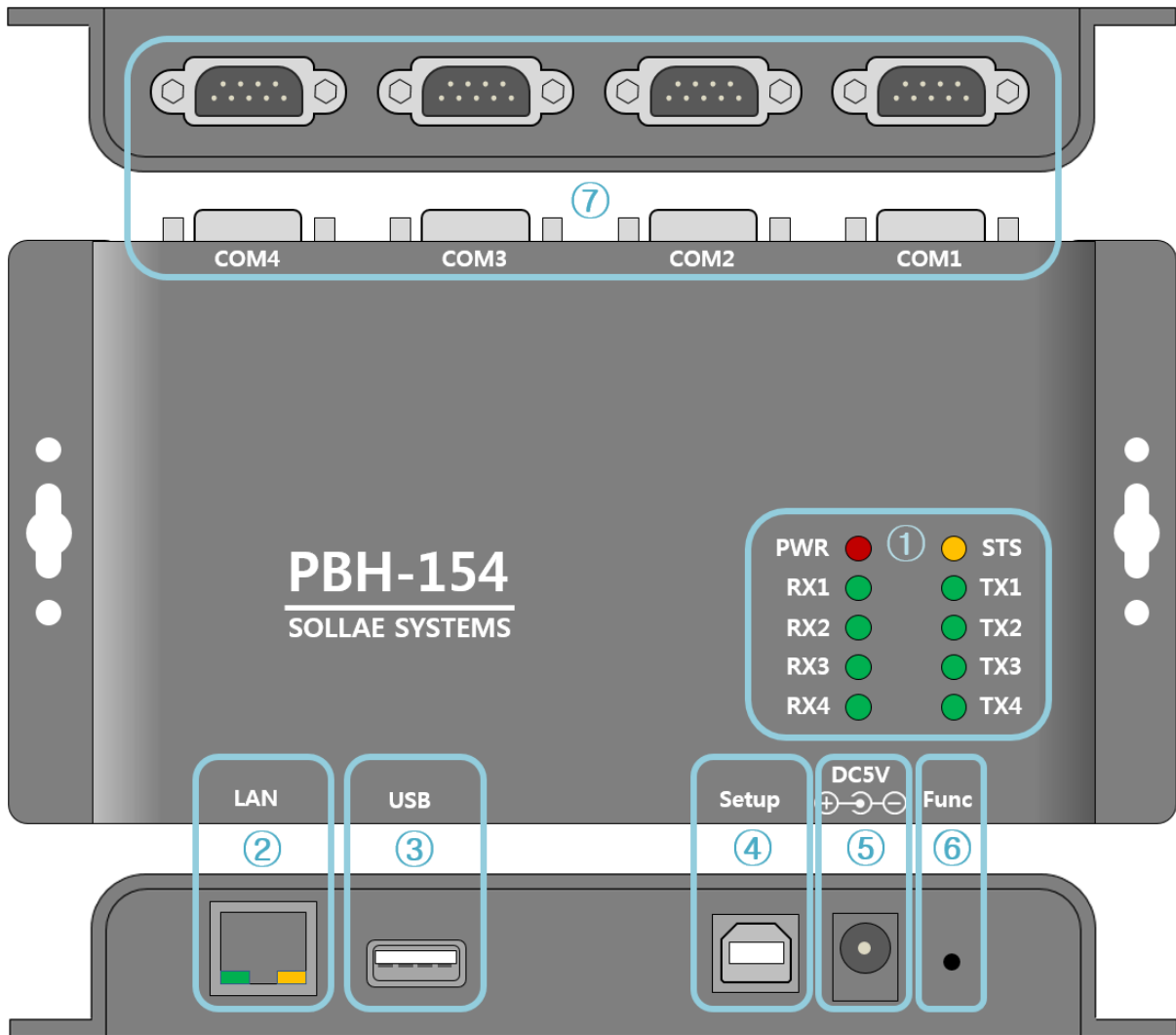


Figure 1-10 panel layout

- ① LED: PWR, STS, TX, RX
- ② Ethernet port: 10/100M
- ③ USB Host port: USB Wireless LAN adaptor connection
- ④ USB Device port (Setup): For connecting to PHPoC Writer
- ⑤ Power port (DC 5V)
- ⑥ Function port (Func)
- ⑦ Serial port: RS232 / RS422 / RS485

1.7.2 LED

LED	Name	Status	Action
Power	PWR	On	Supplying the power
Status	STS	Blinks	Initial mode
		On	Button setup mode
Serial TX	TX1 ~ TX4	Blinks	Sending data to serial port
		On	Connecting with TCP
Serial RX	RX1 ~ RX4	Blinks	Receiving data from serial port
		On	Connecting with TCP

Table 1-3 LED status on the top panel

☞ ***Please refer to the [Table 7-1 LED status according to symptoms] for LED pattern when there is a problem on PBH-154.***

1.7.3 USB Device Port for connection with a PC

USB device port is for connection with a PC. You can access to PBH-154 via PHPoC Writer after connecting a USB cable to this port. Moreover, you can supply DC 5V power to PBH-154 through this port.

1.7.4 Function Button (Func)

If this button is pressed, PBH-154 operates in Button setup mode. This mode is used for factory reset and setting parameters through Wireless LAN.

1.7.5 Supplying Power

PBH-154 provides the following two ports for supplying power. You can choose one of the two options.

- Power port

The Power port uses DC 5V and its specification is as follows:

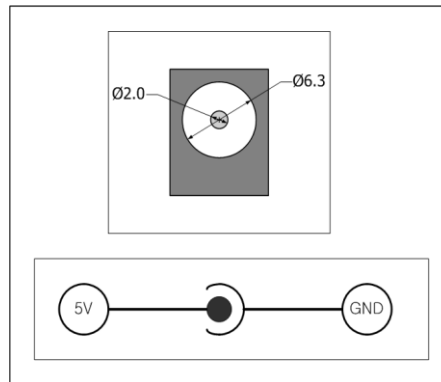


Figure 1-11 specification of power port

- USB device port (Setup Port)

You can supply DC 5V power through this port. Note that unstable operation may be occurred in case of supplying power via this port due to insufficient current.

1.7.6 USB Host Port for Connection with WLAN adapter

PBH-154 provides a USB host port for a USB WLAN adapter. You can connect PBH-154 to Wireless LAN by connecting the WLAN adapter to this port.

☞ **Caution: Only adapters using Ralink RT3070/5370 chipsets are available.**

☞ **Caution: WLAN cannot be used with Ethernet at the same time.**

1.7.7 Serial interface

PBH-154 provides four serial ports interfaced with D-SUB 9 pin male connectors and you can select the type among RS232, RS422 or RS485.

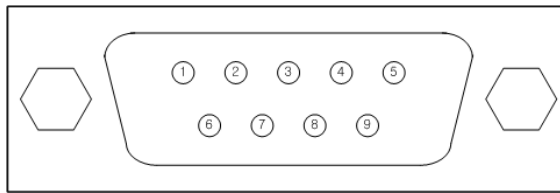


Figure 1-12 D-SUB 9 pin male connector

- Pin Assignment in RS232

Number	Name	Description	level	type	Etc.
1	DCD	Data Carrier Detect	RS232	IN	N/C
2	RXD	Receive Data	RS232	IN	required
3	TXD	Transmit Data	RS232	OUT	required
4	DTR	Data Terminal Ready (always output active signal)	RS232	OUT	optional
5	GND	Ground	Ground	-	required
6	DSR	Data Set Ready	RS232	IN	optional
7	RTS	Request To Send	RS232	OUT	optional
8	CTS	Clear To Send	RS232	IN	optional
9	RI	Ring Indicator	RS232	IN	N/C

Table 1-4 pin assignment in RS232

☞ ***N/C: Not Connected***

- Pin Assignment in RS422

Number	Name	Description	level	type	Etc.
9	TX +	Transmit Data +	RS422	OUT	required
1	TX -	Transmit Data -	RS422	OUT	required
4	RX +	Receive Data +	RS422	IN	required
3	RX -	Receive Data -	RS422	IN	required
5	GND	Ground	-	-	required

Table 1-5 pin assignment in RS422

- Pin Assignment in RS485

Number	Name	Description	level	type	Etc.
9	TRX +	Data +	RS485	IN/OUT	required
1	TRX -	Data -	RS485	IN/OUT	required
5	GND	Ground	-	-	required

Table 1-6 pin assignment in RS485

- Serial Port Specification

Parameter	Value
The number of port	4
Serial type	RS232 / RS422 / RS485
Baud rate	COM1, COM4 : 2,400 ~ 230,400 [bps] COM2, COM3 : 1,200 ~ 230,400 [bps]
Parity	NONE / EVEN / ODD / MARK / SPACE
Data bit	8 or 7 (7 data bit is only available on using Parity)
Stop bit	1 or 2
Flow control	NONE, RTS/CTS, Xon/Xoff

Table 1-7 serial port parameters

1.7.8 Ethernet interface

PBH-154 has an Ethernet port which supports 10/100M bit Ethernet. Both direct and cross over cable can be used because it automatically detects the type of cable.

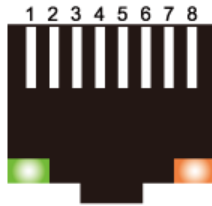


Figure 1-13 Ethernet connector interface (RJ45)

- Ethernet port interface (RJ45)

Number	Name	Direction
1	TX+	Output
2	TX-	Output
3	RX+	Input
4	-	-
5	-	-
6	RX-	Input
7	-	-
8	-	-

Table 1-8 RJ45 the Ethernet port interface

- LED indicator of RJ45

Color	LED status	Description
Green	On	Connected to network
	Off	Not connected to network
	Blink	Receiving or transmitting network data
Yellow	On	Connected to 100M Ethernet
	Off	Connected to 10M Ethernet

Table 1-9 LED indicator of RJ45

2 Operation Mode

2.1 Wired LAN Mode

PBH-154 operates in LAN mode when you connect a LAN cable. To use this mode, you are required to either remove a USB wireless LAN adapter or set WLAN disabled.



Figure 2-1 1:1 network with a PC

2.2 Wireless LAN Mode

If the USB WLAN adapter is connected, PBH-154 operates in WLAN mode.

PBH-154 supports IEEE802.11b/g. IEEE802.11 standard that is called Wi-Fi has three network topologies: Infrastructure, Ad-hoc and Soft AP mode.

For security, PBH-154 supports WEP, WPA-PSK and WPA-Enterprise (EAP-TLS/TTLS, PEAP).

☞ ***To connect PBH-154 to wireless LAN, a USB wireless LAN adapter which uses a RT3070/RT5370 chipset of Ralink Corporation is required.***

2.2.1 Infrastructure

In this mode, every wireless LAN station communicates through an Access Point (AP), which is able to interface with both Wireless LAN and Ethernet, so that all stations can be connected to Ethernet.

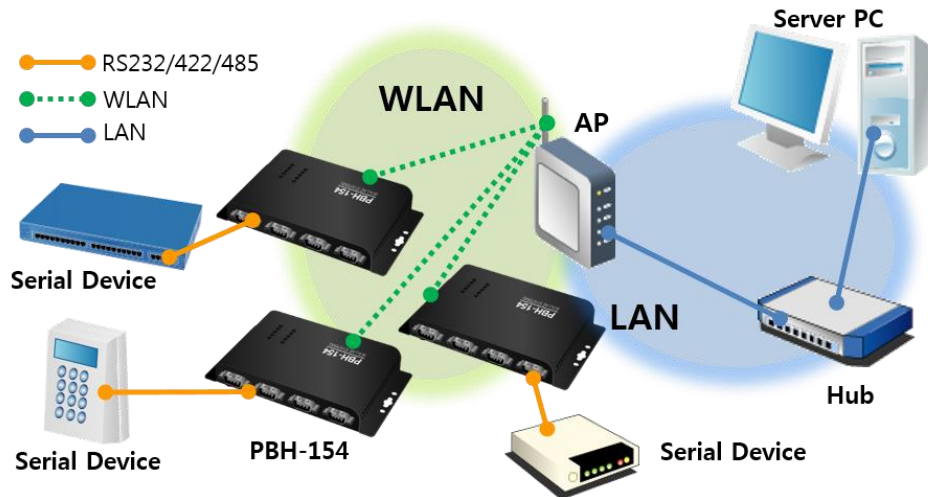


Figure 2-2 infrastructure mode

Wireless LAN

WLAN	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
WLAN topology	<input type="radio"/> Ad-hoc <input checked="" type="radio"/> Infrastructure <input type="radio"/> Soft AP
Channel	1 ▼
SSID	sollae
Shared Key (<input checked="" type="checkbox"/> hide key)
802.1x	None ▼

Figure 2-3 setting of Infrastructure

2.2.2 Ad-hoc

This is an easy way to set up network since wireless LAN stations communicate each other without an AP in this mode. It is suitable for a small scale network if wired LAN is not available. Usually, it is called peer-to-peer mode.

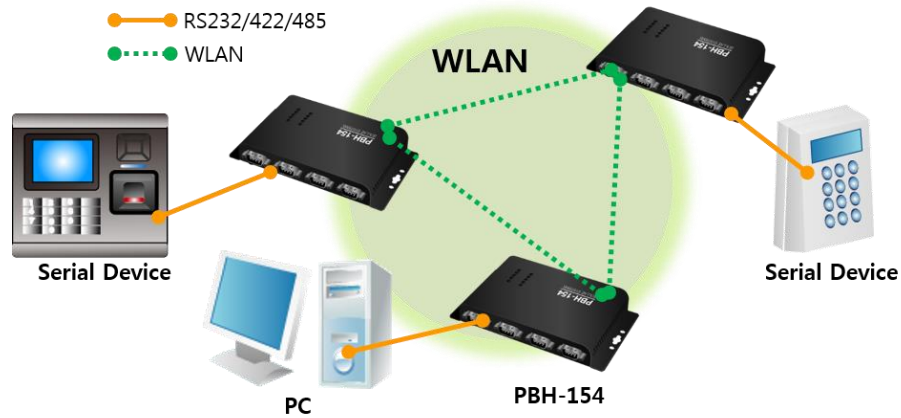


Figure 2-4 Ad-hoc mode

Wireless LAN

WLAN	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
WLAN topology	<input checked="" type="radio"/> Ad-hoc <input type="radio"/> Infrastructure <input type="radio"/> Soft AP
Channel	5 ▼
SSID	sollae
Shared Key (<input checked="" type="checkbox"/> hide key)
802.1x	None ▼

Figure 2-5 setting of Ad-hoc

2.2.3 Soft AP

Soft AP (Software embedded Access Point) is a mode that a wireless client can act as an AP through software embedded AP functions. Using this mode, the wireless client allow you to communicate with not only laptops and smartphones but also devices without Ad-hoc function.

PBH-154 supports Soft AP function. While operating in this function, it has 192.168.0.1 as its IP address and assigns one of 192.168.X.X IP addresses to each client. (A simple DHCP server)

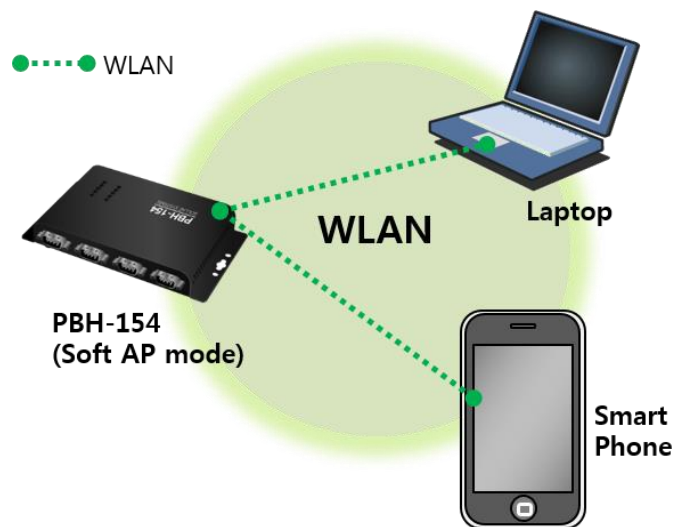


Figure 2-6 Soft AP mode

You can set Soft AP function manually on [Wireless LAN] section like the figure below.

Wireless LAN	
WLAN	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
WLAN topology	<input type="radio"/> Ad-hoc <input type="radio"/> Infrastructure <input checked="" type="radio"/> Soft AP
Channel	5 ▼
SSID	sollae
Shared Key (<input checked="" type="checkbox"/> hide key)
802.1x	None ▼

Figure 2-7 setting of Soft AP

2.2.4 Key terms

- SSID(Service Set Identifier)

It is a name to identify the particular wireless LAN. So every single station should have the same SSID to communicate in the network. In the case of infrastructure mode, you have to set the same SSID of an AP to PBH-154. Otherwise, it will not communicate at all. The maximum length of this parameter is 31 bytes and the default is "sollae".

- Channel

Wireless LAN stations communicate through the ISM (Industrial, Scientific, and Medical) band which has the range of frequencies around 2.4GHz. IEEE 802.11 specification divides this band into 14 channels in every 5MHz. If you install more than one wireless network in the same area, the channels should be set more than 4 channels apart to avoid interferences.

2.2.5 Authentication and Security

- Authentication

A wireless LAN station should get authentication from the AP in the infrastructure network. There are two methods for the authentication, Open System and Shared Key.

- WEP (Wired Equivalent Privacy)

The WEP is a security protocol for wireless LAN. You need to set 64 bit or 128 bit key. You can use both hexadecimal and ASCII code for this.

- WPA (Wi-Fi Protected Access)

WPA is a security standard for users of devices equipped with Wi-Fi wireless connection. It is expected to replace the original Wi-Fi security standard, Wired Equivalent Privacy (WEP), compensating the weakness of it. There are two modes about the user authentication in WPA security. One is Enterprise which has an authentication server and the other is PSK (Pre-Shared Key) which does not have any servers.

- WPA2

As final security of Wireless LAN, The Counter Mode with Cipher Block Changing Message Authentication Code Protocol (CCMP) was suggested for IEEE80211i (Wireless LAN standard) to replace the TKIP. CCMP uses Advanced Encryption Standard (AES) which is adopted by WPA2. WPA 2 has also both Enterprise and PSK mode.

3 WEB configuration

3.1 Connecting to PBH-154

3.1.1 Setting by Wireless LAN

Button setup mode allows you to set parameters through wireless LAN as follows:

- ① Connecting to a USB WLAN adapter.
- ② Supplying power.
- ③ Entering button setup mode.

Push the Function(Func.) button shortly. STS led will be ON.

- ④ Connecting to Wireless LAN using Soft AP.

Connect your laptop or smartphone to Wireless LAN (Wi-Fi) network using PBH-154's Soft AP function. The SSID is "phpoc_MAC Address's last 6 digit". (e.g. phpoc_000001)

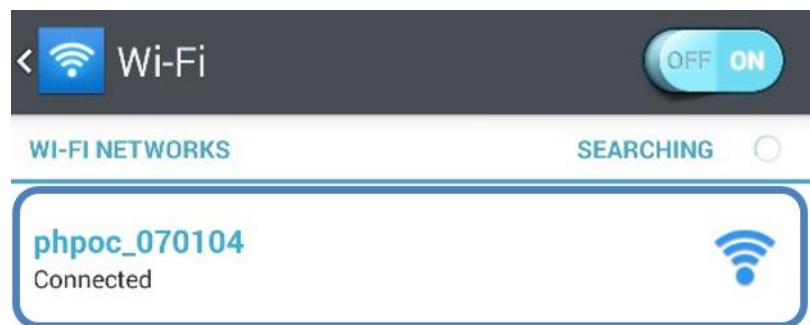


Figure 3-1 connecting Wireless LAN using Soft AP

- ⑤ Checking IP address.

After connection, PBH-154 has 192.168.0.1 as its IP address and assigns one of 192.168.X.X IP addresses to each client.

3.1.2 Setting by wired LAN

A WEB browser and LAN adaptor are required on your PC.

① LAN Connection

Connect PBH-154 to your PC via a LAN cable.

② USB Connection

Connect PBH-154 to your PC via a USB cable.

☞ **Device driver will be automatically installed when you connect PBH-154 to your PC. When automatic installation fails, download and install the driver on ST Micro's web site.**

☞ **STM32 USB Virtual Com Port Driver Download page:**

<http://www.st.com/web/catalog/tools/FM147/CL1794/SC961/SS1533/PF257938>

③ Finding assigned IP address

After connecting to PHPoC Writer, check the assigned IP address on Network information.

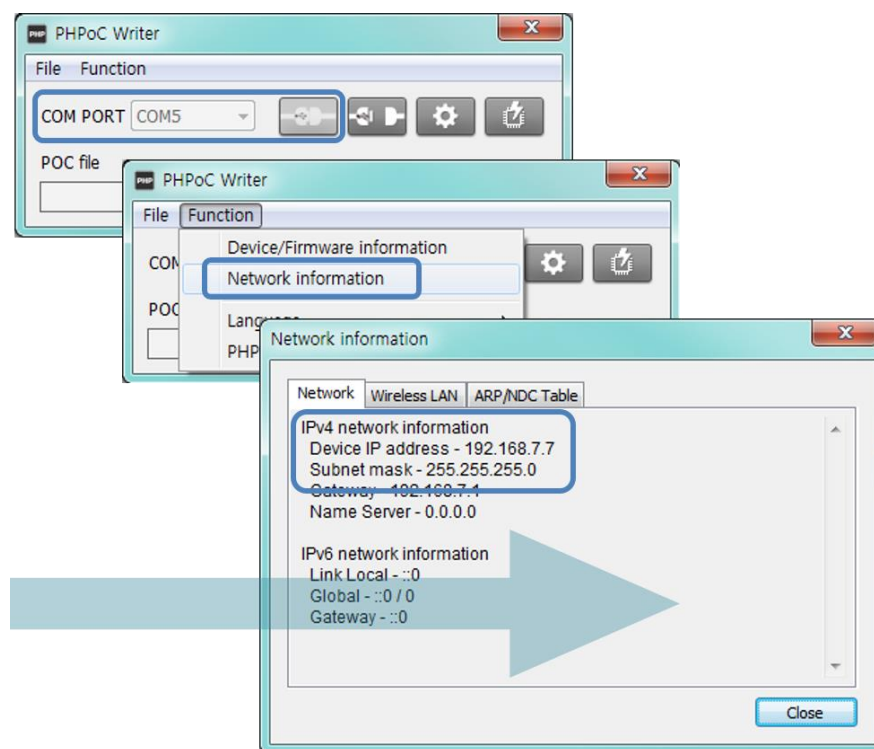


Figure 3-2 finding assigned IP address

3.2 WEB Configuration

3.2.1 Procedures

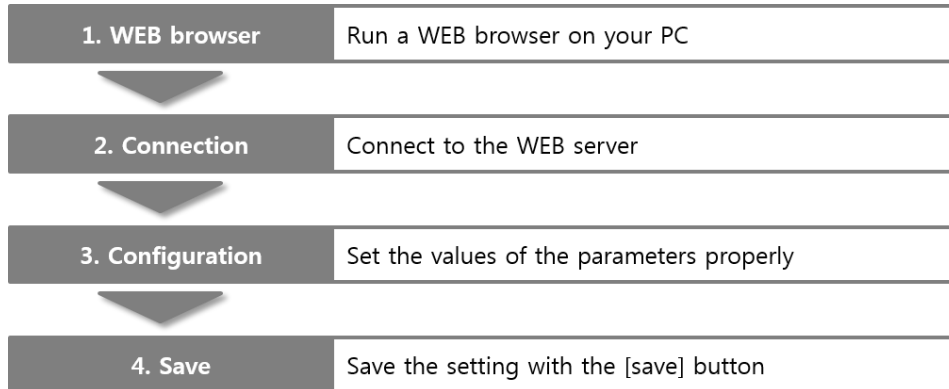


Figure 3-3 WEB configuration

3.2.2 Connecting to WEB server

Input the IP address of PBH-154 on the address bar. If you use button setup mode, please connect to 192.168.0.1.



Figure 3-4 mobile web browser (Wireless LAN)

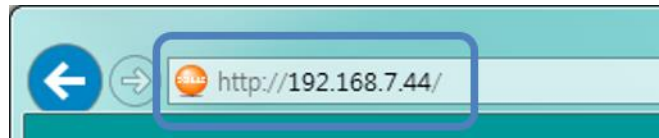


Figure 3-5 a PC web browser (Wired LAN)

3.2.3 WEB configuration page

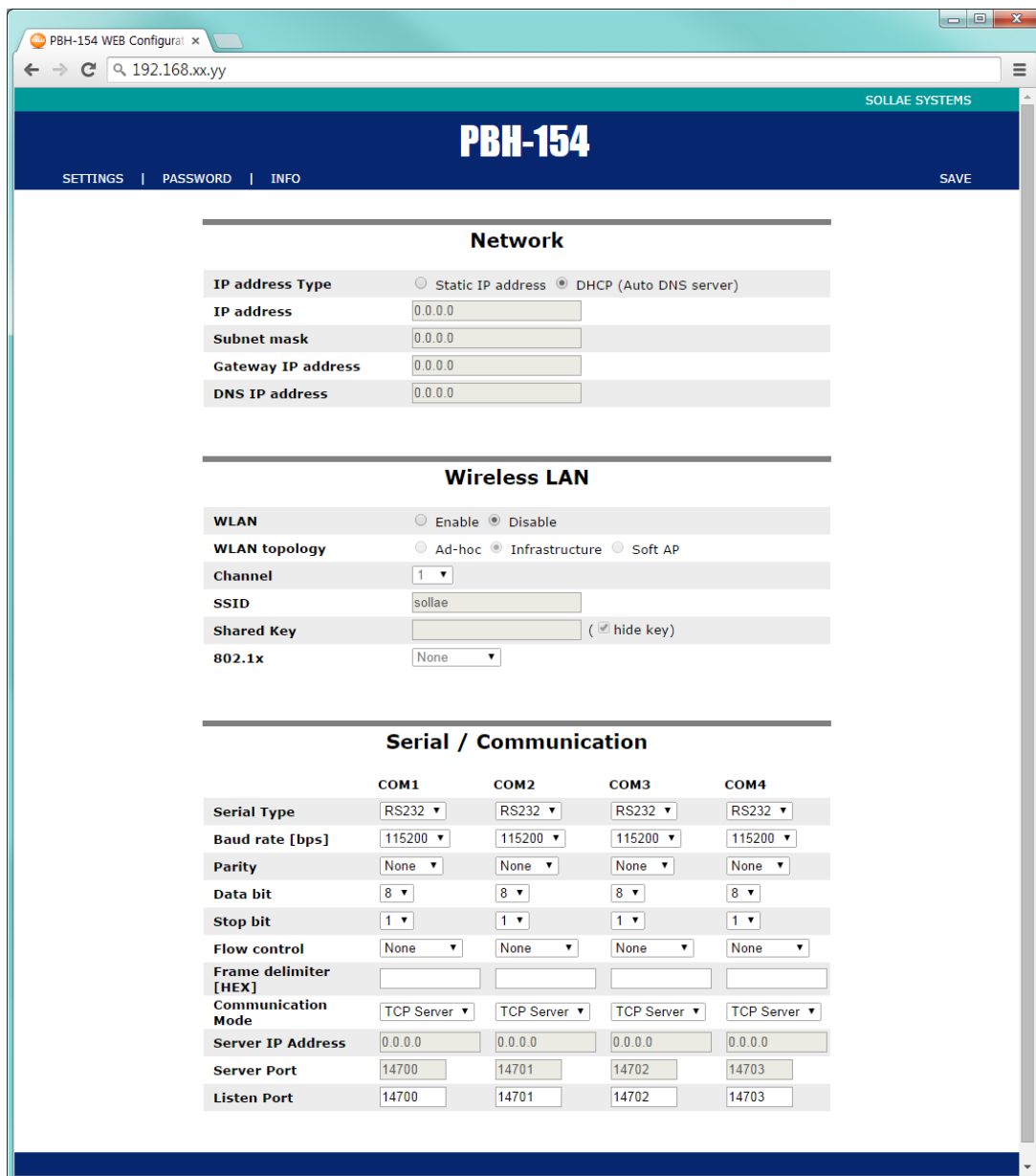


Figure 3-6 WEB configuration page

3.3 Available settings

3.3.1 Default values

Name		Default values
Network	Local IP Address	DHCP (Assigned IP address check required)
Wireless LAN	WLAN	Disable
	Topology	Infrastructure
	SSID	sollae
	Security	None
Serial / Communication (COM1~4)	Serial Type	RS232
	Baud Rate	115,200bps
	Parity	NONE
	Data Bits	8
	Stop Bit	1
	Flow Control	NONE
	Communication mode	TCP Server
	Local Port	COM1: 14700 COM2: 14701 COM3: 14702 COM4: 14703

Table 3-1 default values of major parameters

3.3.2 Network

Network	
IP address Type	<input checked="" type="radio"/> Static IP address <input type="radio"/> DHCP (Auto DNS server)
IP address	<input type="text" value="192.168.0.100"/>
Subnet mask	<input type="text" value="255.255.255.0"/>
Gateway IP address	<input type="text" value="192.168.0.1"/>
DNS IP address	<input type="text" value="0.0.0.0"/>

Figure 3-7 Network parameter

- IP address type

You can choose either Static IP address or Dynamic IP (DHCP) address to assign PBH-154's IP address.
- IP address

This is a text box to set a static IP address of PBH-154. If you want to use DHCP, IP address will be assigned automatically.
- Subnet mask

When you select Static IP address option, a Subnet mask should be set in this text box.
- Gateway IP address

When you select Static IP address option, a Gateway IP address of user's network should be set in this box. Gateway is needed to connect with other networks. If it is not correct, Internet or inter network communication will not be possible.
- DNS IP address

When you select Static IP address option, a DNS IP address of user's network should be set in this box.

3.3.3 Wireless LAN

Wireless LAN

WLAN	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
WLAN topology	<input type="radio"/> Ad-hoc <input checked="" type="radio"/> Infrastructure <input type="radio"/> Soft AP
Channel	1 <input type="button" value="v"/>
SSID	<input style="border: 1px solid gray;" type="text" value="sollae"/> <input type="button" value="x"/>
Shared Key	<input style="width: 100%;" type="password" value="••••••••"/> (<input checked="" type="checkbox"/> hide key)
802.1x	None <input type="button" value="v"/>

Figure 3-8 wireless LAN parameter

- **WLAN**
You can choose whether to use the WLAN.
- **WLAN topology**
You can choose one among these mode: Infrastructure, Ad-hoc and soft AP mode. In the Infrastructure mode, PBH-154 and wireless LAN devices communicate with each other through an AP(Access point). Ad-hoc and Soft AP mode do not need an AP. These modes only need wireless devices.
- **Channel**
In the case of Ad-hoc and Soft AP mode, you can select a channel which is used to form a wireless link. If you have to set two or more networks in the same place, we recommend you to give space more than 4 channels between each of the networks. This helps to avoid the interference.
- **SSID(Service Set Identifier)**
SSID is for identification of wireless networks. SSID of PBH-154 should match with AP's SSID, because wireless devices need the same SSID for communication. The default value is "sollae".

- Shared Key

The authentication can be divided to two big parts. One is Open-System and the other is Shared-Key. The first one consists 2 frames: request and response. Because there is no checking process, the shared key is not needed in this mode. The second one uses shared key for the authentication.

WLAN Authentication supported by PBH-154 and usable authentication for each topology are as follows.

Type	Description	Infrastructure	Ad-hoc	Soft-AP
None	No security set	O	O	O
WEP	64, 128 bit key	O	O	O
WPA-PSK	8~63 bytes key	O	X	X
WPA2-PSK	8~63 bytes key	O	X	X

Table 3-2 WLAN Authentication

3.3.4 Serial / Communication

Serial / Communication				
	COM1	COM2	COM3	COM4
Serial Type	RS232 ▾	RS232 ▾	RS232 ▾	RS232 ▾
Baud rate [bps]	115200 ▾	115200 ▾	115200 ▾	115200 ▾
Parity	None ▾	None ▾	None ▾	None ▾
Data bit	8 ▾	8 ▾	8 ▾	8 ▾
Stop bit	1 ▾	1 ▾	1 ▾	1 ▾
Flow control	None ▾	None ▾	None ▾	None ▾
Frame delimiter [HEX]	0d	0a	0d	0a
Communication Mode	TCP Server ▾	TCP Server ▾	TCP Server ▾	TCP Server ▾
Server IP Address	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0
Server Port	14700	14701	14702	14703
Listen Port	14700	14701	14702	14703

Figure 3-9 serial/communication parameter

- Serial type

You can select a type of serial communications in this combo box. PBH-154 has RS232, RS422 (Full duplex) and RS485 (Half duplex) interface.

- Baud rate

Select a baud rate for serial data communication. The unit is bit/sec.

- Parity

You can make a decision whether you use the parity bit or not with this option. There are five different options below.

Type	Description
None	Disable parity bit
Even	Add a parity bit to make number of 1 to be even number
Odd	Add a parity bit to make number of 1 to be odd number
Mark	Add a parity bit of 1
Space	Add a parity bit of 0

Table 3-3 options of parity

- Data bit

Choose the length of data bits. The options are 7 and 8 bits. Its default value is 8 and 7 data bit is only available on using Parity.

- Stop bit

Choose the length of stop bit. The options are 1 and 2 bit(s). Its default value is 1.

- Flow control

Select a method of flow control. The options are None, RTS/CTS and Xon/Xoff.

Type	Description
None	Disable flow control
RTS/CTS	Using RTS/CTS pins for flow control (hardware)
Xon/Xoff	Xon/Xoff flow control (software)

Table 3-4 options of flow control

- Frame delimiter [HEX]

This box is for setting a frame delimiter. Using this function, you can control the network packets by specific characters. Character must be the hexadecimal. Max length is 4 bytes.

- Communication mode

Select a communication mode of PBH-154. The options are a Server and a Client.

- Server IP address

This box is for setting an IP address of server which is going to be connected with PBH-154. This could be set under a client mode.

- Server port

When PBH-154 is in Client mode, the server's local port which is listening should be configured at this box.

- Listen port

This item is a port number which will wait to listen in case of a server mode.

3.4 System Information

3.4.1 MAC address

MAC address is a unique hardware address. It begins with 00:30:F9.

3.4.2 Firmware name

Firmware file name(*.poc) of PBH-154.

4 Communication Mode

4.1 Overview

There are two types of connection to communicate with a remote host.

Mode	Description	Connection
TCP Server	Wait connection request from TCP clients.	Passive
TCP Client	Send connection request to a TCP server.	Active

Table 4-1 comparison of communication mode

4.2 TCP Server

In this mode, PBH-154 listens to receive a TCP connection request from remote hosts. After receiving the request, and the connection is established, PBH-154 converts the raw data from the serial port to TCP/IP data and sends it to the network and vice versa.

4.2.1 Key parameters

- Local Port

This is a server's port number which is used in TCP connection.

4.2.2 Examples

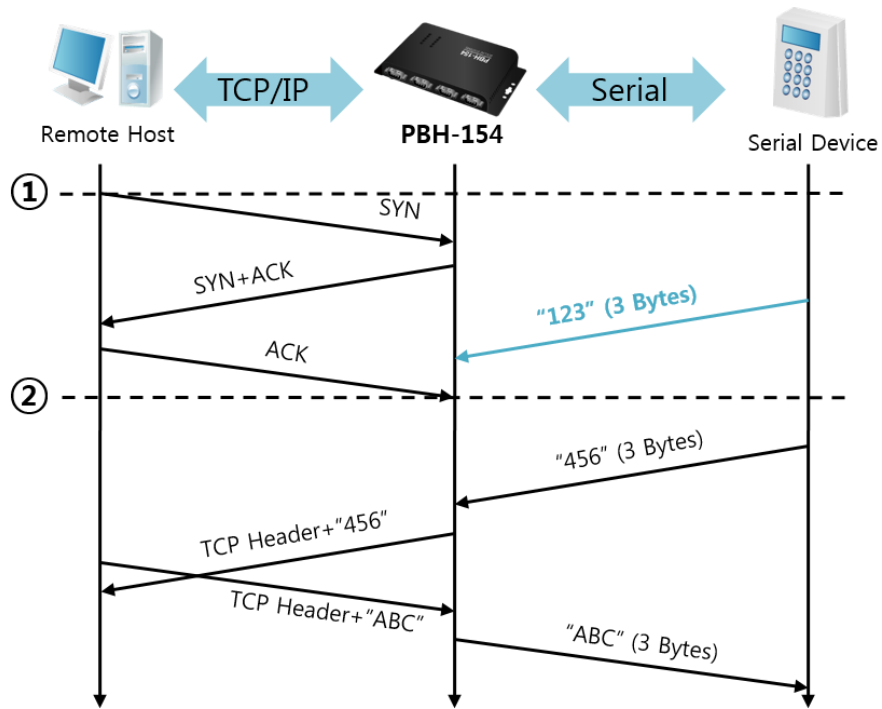


Figure 4-1 time chart

Time	States
~	PBH-154 listens to connection requests
①	Remote host sends a connection request (SYN) segment
~	Processes of the connection
②	The connection is established
~	Data communication is implemented on both sides

Table 4-2 states of each point

Notice the blue arrow above that the data "123" from the serial port has been sent before establishing a connection. In this case, the data cannot be sent or received.

4.3 TCP Client

In this mode, PBH-154 sends request segments to a TCP server with information of [Server IP Address] and [Server Port]. Once a host is listening, the connection will be established. After then, PBH-154 converts the raw data from the serial port to TCP/IP data, and sends them to the network and vice versa.

4.3.1 Key parameters

- Server IP Address

[Server IP Address] is an address of TCP server.

- Server Port

[Server Port] is a port number of TCP server.

4.3.2 Examples

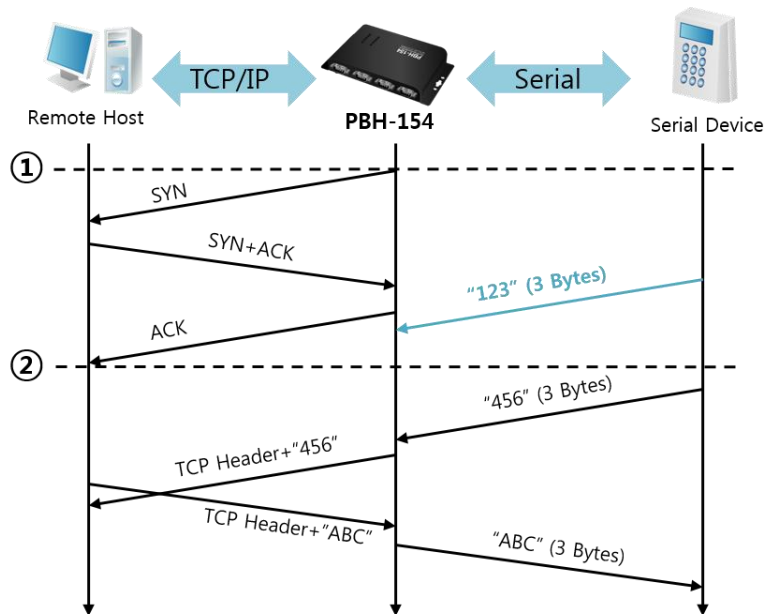


Figure 4-2 time chart

Time	States
①	PBH-154 sends a connection request segment right after it boots up.
~	processes of TCP connection
②	The connection is established.
~	data communication on both sides

Table 4-3 states of each point

Notice the blue arrow above that the data "123" from the serial port has been sent before establishing a connection. In this case, the data cannot be sent or received.

5 System Management

5.1 Upgrading Firmware

5.1.1 Firmware

Firmware is a type of software to operate PBH-154. If there are in need of adding functions or fixing bugs, the firmware can be modified and released. For this reason, we recommend using the latest version of the firmware.

5.1.2 Processes

- Downloading the latest firmware
Download the latest firmware file uploaded at our website.
- Connecting the USB port
Connect setup port of PBH-154 to local PC via USB cable.
- Run PHPoC Writer program for sending the Firmware file
Run the program on PHPoC Writer.
- Checking firmware file and Sending

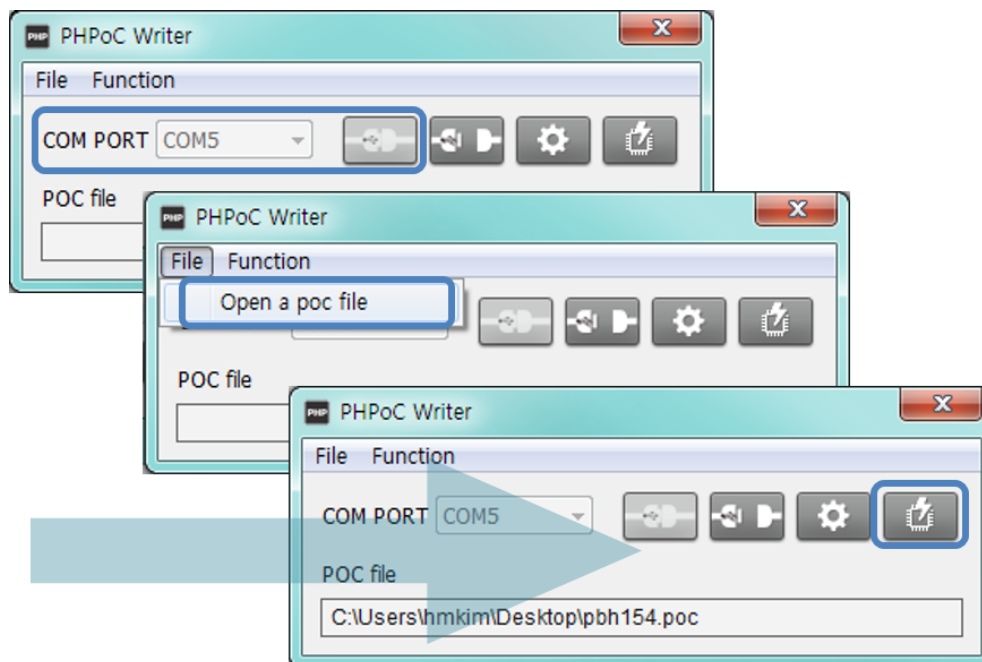



Figure 5-1 sending firmware file

- ① Select firmware file.
- ② Click () button, and send firmware file.

6 Additional Functions

6.1 Setting Password

A password can be used to protect PBH-154 from changing environmental parameters by non-qualified hosts. The maximum length is 8 bytes of alphabet or number.

The screenshot shows the PBH-154 web interface. At the top, there is a dark blue header with the text "PBH-154" in white. Below the header, there are two menu items: "PASSWORD" and "INFO". The main content area is titled "Password Settings" and contains three input fields: "Password", "New Password", and "Confirm Password". The "New Password" field has a note "(4~8 digit)" next to it.

Figure 6-1 password setting

If a password for PBH-154 is set, the following window will be shown.

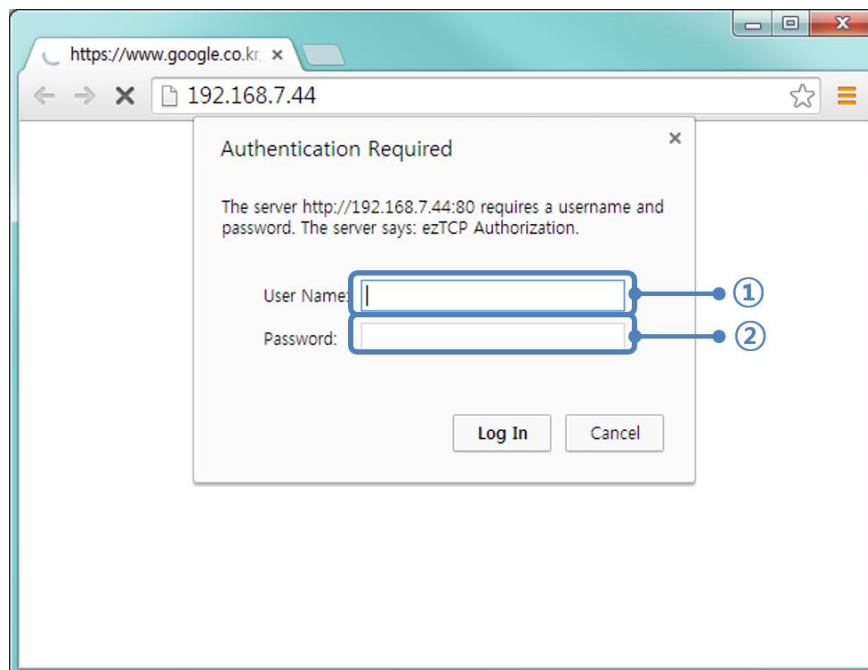


Figure 6-2 authentication with a password

- ① User Name: It is not required. Leave blank or put a random name.
- ② Password: It should be the same as a password that was set through the web.

6.2 Wireless LAN Authentication

6.2.1 Using WEP

- Usable WLAN topology
Ad-hoc, Infrastructure and Soft AP
- AP settings
Set parameters such as authentication mode (open / shared) and key length (64 / 128) on your AP. If you do not know how to set the parameters, refer to its manual or ask the manufacturer.
- PBH-154 settings
Input WEP Key, which is set on the AP, in [Shared Key] text box of [Wireless LAN] section.

Wireless LAN

WLAN Enable Disable

WLAN topology Ad-hoc Infrastructure Soft AP

Channel 8 ▾

SSID sollae

Shared Key ●●●● hide key

802.1x None ▾

Figure 6-3 shared key settings

Type		Digit	Example
WEP64 (64bits)	ASCII	5	abcde
WEP128 (128bits)	ASCII	13	0123456789abc

Table 6-1 WEP key settings

6.2.2 Using WPA-PSK

- Usable WLAN topology

Infrastructure

- AP settings

Set WPA-PSK or WPA2-PSK and related parameters on your AP. If you do not know how to set AP's parameters, refer to your AP manual or ask its manufacturer.

- PBH-154 settings

Input WPA-PSK Key, which is set on the AP, in [Shared Key] text box of [Wireless LAN] section. (See the Figure 6-3 shared key settings)

☞ ***The length of Key for WPA-PSK should be 8 ~ 63 characters.***


6.2.3 Using WPA-Enterprise

- Configuration of the Access Point

Set WPA-Enterprise for authentication and radius server to communicate. If you do not know how to set AP's parameters, refer to your AP manual or ask its manufacturer.

☞ ***PBH-154 supports EAP-TLS / TTLS and PEAP.***

- Configuration of the product

Click configuration button () and select WLAN tab. select one of authentication protocols on 802.1X item in the Security Settings.

Protocol	required configurations
EAP-TLS	ID of radius server account, client certificate
EAP-TTLS	ID and passphrase of radius server account
PEAP	ID and passphrase of radius server account

Table 6-2 802.1X item

- How to use EAP-TLS

In the case of EAP-TLS, a certificate is needed to save by PHPoC Writer.

The procedures are as follows:

- ① Configure the ID of radius server account
- ② Click [Certificate] button

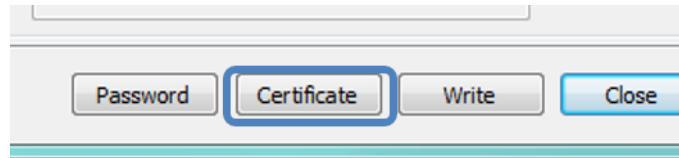


Figure 6-4 certificate button

- ③ Save the client certificate made by radius server

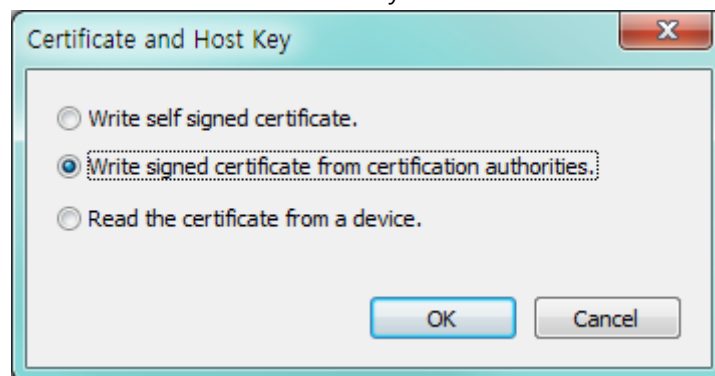


Figure 6-5 saving client certification

- ④ Input password for the certificate
- ⑤ Check the information of the certificate

6.2.4 Advanced Settings

You can configure advanced settings for WLAN. We recommend using the default values if you do not have any problem with it.

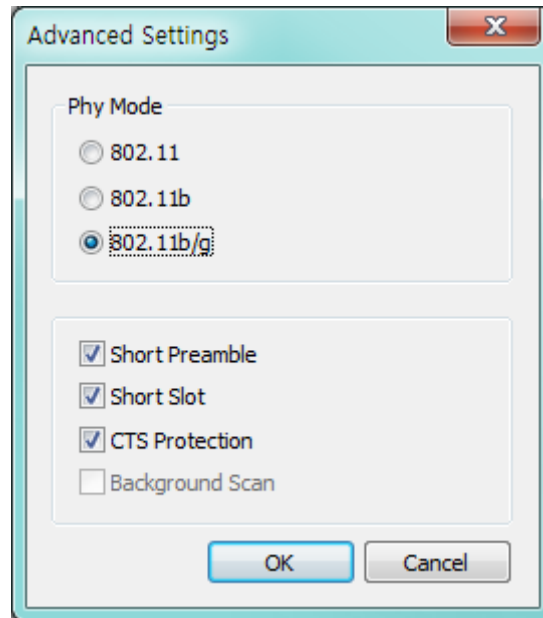


Figure 6-6 advanced Settings

- PHY Mode

You have three options for PHY mode: [802.11], [802.11b] and [802.11b/g].

- Short Preamble

Under a good condition of WLAN environment, you can expect a slight improvement of performance by enabling this option. Otherwise, it is better to disable this option.

- Short Slot

Using this option, you can expect some improvement in WLAN performances. If you are in bad condition of WLAN environment, it is better to disable this option.

- CTS Protection

Using this option, you can expect some improvement in WLAN performances under WLAN environment in both 802.11b and 802.11g devices.

6.3 Frame delimiter

Frame delimiter is a value that is used when PBH-154 separates TCP segments before sending them to network. Because TCP is a reliable stream transport service, in fact, it is not important how the segments are divided. However, some application needs the separation. By using this function, you can separate TCP segments based on frames of serial data protocol.

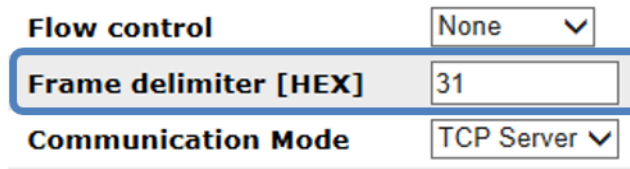


Figure 6-7 configuration frame delimiter parameter

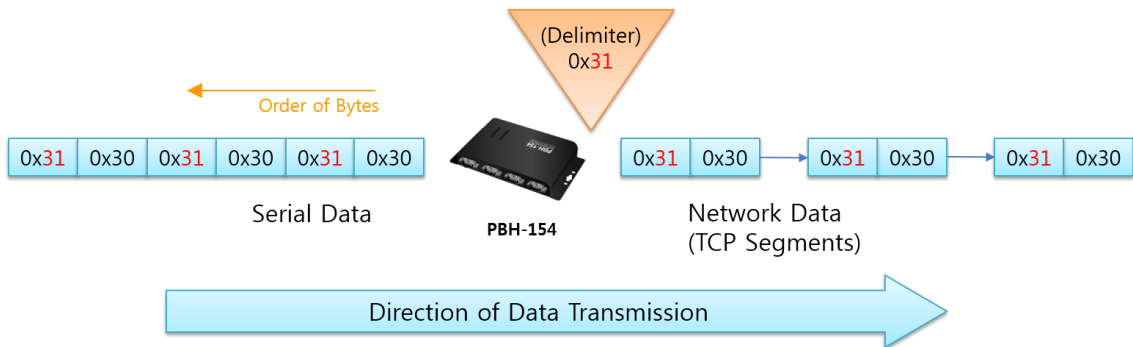


Figure 6-8 example of delimiter

6.4 Factory Reset

It is a function to physically initialize all the setting.

6.4.1 Factory reset procedure

Step	Procedure	Status of PBH-154	Status of STS LED
1	Press the Function button shortly (less than 1sec.)	Enter to button setup mode	On
2	Keep pressing the Function button over 5 seconds.	Ready to reset	Blinks rapidly
3	Check STS LED after 5 seconds.	Reset enabled	Off
4	After the step 3, release the function button within 2 seconds	Progressing initialization	On
5	Rebooting automatically	Initial state	Off

Table 6-3 factory reset procedure

- ☞ ***If you keep pressing the function button over 2 seconds after the step 3, product state will return to the step 2.***
- ☞ ***Soft AP function will be activated in the button setup mode. Thus, STS LED can be blink if a wireless LAN client is linked.***

7 Checklist in Trouble

When you have problem with PBH-154, make sure all the followings first.

7.1 Connection Problem over TCP/IP

- Connection with the network

Check if PBH-154 is successfully connected in network.

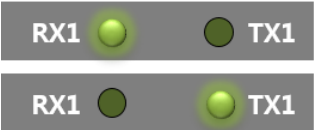
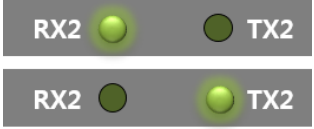
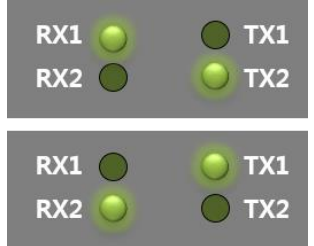
Symptoms	LED status
Not connecting a LAN cable or a USB WLAN adapter	<p>RX1 and TX1 LED are blink alternately</p> 
Not connecting to the WLAN	<p>RX2 and TX2 LED are blink alternately</p> 
Without obtaining an IP address by DHCP	<p>TX1, RX2 and RX1, TX2 are blink alternately</p> 

Table 7-1 LED status according to symptoms

- Checking parameters related with TCP/IP

When PBH-154 has a private IP address, an IP address of a PC and PBH-154 need to be on the same network. Check if the IP address and local port number are correct. In the case of a fixed IP address, related items such as subnet mask, gateway IP address and DNS IP address should be configured.

TCP Server side	TCP Client side
Local IP Address, Local Port, Subnet Mask, Gateway IP Address, DNS IP Address and etc.	Local IP Address, Server's IP Address, Server's Port, Subnet Mask, Gateway IP Address, DNS IP Address, and etc.

Table 7-2 major parameters related with TCP/IP

- PING Test

Confirm the connection over the network by PING test. If PBH-154 does not send any reply from the request, check the network environment.

- Network Firewall

In the case of networks with strong security, the access may be denied by their firewall. Under this circumstance, consult the network administrator to release ports you want to use. (Ex: TCP 14700, TCP 80)

- Communication Mode

To make TCP connection, both a server and client must exist. If there are only servers or clients, TCP connection cannot be established.

7.2 Data Communication Problem on the Serial Port

- Connection of Pins

Check if each connection of pins is right. Refer to the chapter 1.7.7 Serial interface to find out the pin assignment. In the case of using a cable, you should choose the right type of cable for the device.

☞ You must connect the Ground pin to your device when using RS422 or RS485 as well as RS232.

- Setting parameters

Check if all the serial port parameters such as Baud Rate, Data bit, Stop bit and Parity are properly set.

☞ Please contact us if you have any questions about above steps or our products.

8 Related Materials

8.1 Documents

You can find each document on our web site or included DVD in your package.

- Datasheet
- CE certificate
- Declaration of RoHS Compliance

9 Technical Support and Warranty

9.1 Technical Support

If you have any question regarding operation of the product, visit Customer Support FAQ corner and the message board on Sollae Systems' web site or send us an email at the following address:

- E-mail: support@eztcp.com
- Website Address for Customer Support: <http://www.eztcp.com/en/support/>

9.2 Warranty

9.2.1 Refund

Upon the customer's request to refund the product within two weeks after purchase, Sollae Systems will refund the product.

9.2.2 Free Repair Services

For product failures occurring within 2 years after purchase, Sollae Systems provides free repair services or exchange the product. However, if the product failure is due to user's fault, repair service fees will be charged or the product will be replaced at user's expense.

9.2.3 Charged Repair Services

For product failures occurring after the warranty period (2 years) or resulting from user's fault, repair service fees will be charged and the product will be replaced at user's expense.

10 Precaution and Exemption from Liability

10.1 Precaution

- Sollae Systems is not responsible for product failures occurring due to user's alteration of the product.
- Specifications of the product are subject to change without prior notice for performance improvement.
- Sollae Systems does not guarantee successful operation of the product if the product was used under conditions deviating from the product specifications.
- Reverse engineering of firmware and applications provided by Sollae Systems is prohibited.
- Use of firmware and applications provided by Sollae Systems for purposes other than those for which they were designed is prohibited.
- Do not use the product in an extremely cold or hot place or in a place where vibration is severe.
- Do not use the product in an environment in which humidity is high or a lot of oil exists.
- Do not use the product where there is caustic or combustible gas.
- Sollae Systems does not guarantee normal operation of the product under the conditions a lot of noise exists.
- Do not use the product for a purpose that requires exceptional quality and reliability relating to user's injuries or accidents – aerospace, aviation, health care, nuclear power, transportation, and safety purposes.
- Sollae Systems is not responsible for any accident or damage occurring while using the product.

10.2 Exemption from Liability

10.2.1 English version

In no event shall Sollae Systems Co., Ltd. and its distributors be liable for any damages whatsoever (including, without limitation, damages for loss of profit, operating cost for commercial interruption, loss of information, or any other financial loss) from the use or inability to use the PBH-154 even if Sollae Systems Co., Ltd. or its distributors have been informed of such damages.

The PBH-154 is not designed and not authorized for use in military applications, in nuclear applications, in airport applications or for use in applications involving explosives, or in medical applications, or for use in security alarm, or for use in a fire alarm, or in applications involving elevators, or in embedded applications in vehicles such as but not limited to cars, planes, trucks, boats, aircraft, helicopters, etc..

In the same way, the PBH-154 is not designed, or intended, or authorized to test, develop, or be built into applications where failure could create a dangerous situation that may result in financial losses, damage to property, personal injury, or the death of people or animals. If you use the PBH-154 voluntarily or involuntarily for such unauthorized applications, you agree to subtract Sollae Systems Co., Ltd. and its distributors from all liability for any claim for compensation.

Sollae Systems Co., Ltd. and its distributors entire liability and your exclusive remedy shall be Sollae Systems Co., Ltd. and its distributors option for the return of the price paid for, or repair, or replacement of the PBH-154.

Sollae Systems Co., Ltd. and its distributors disclaim all other warranties, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose, with respect to the PBH-154 including accompanying written material, hardware and firmware.

10.2.2 French version

- Documentation

La documentation du boîtier PBH-154 est conçue avec la plus grande attention. Tous les efforts ont été mis en œuvre pour éviter les anomalies. Toutefois, nous ne pouvons garantir que cette documentation soit à 100% exempt de toute erreur. Les informations présentes dans cette documentation sont données à titre indicatif. Les caractéristiques techniques peuvent changer à tout moment sans aucun préavis dans le but d'améliorer la qualité et les possibilités des produits.

- Copyright et appellations commerciales

Toutes les marques, les procédés, les références et les appellations commerciales des produits cités dans la documentation appartiennent à leur propriétaire et Fabricant respectif.

- Conditions d'utilisations et limite de responsabilité

En aucun cas Sollae Systems Co., Ltd. ou un de ses distributeurs ne pourra être tenu responsable de dommages quels qu'ils soient (intégrant, mais sans limitation, les dommages pour perte de bénéfice commercial, interruption d'exploitation commerciale, perte d'informations et de données à caractère commercial ou de toute autre perte financière) provenant de l'utilisation ou de l'incapacité à pouvoir utiliser le boîtier PBH-154, même si Sollae Systems Co., Ltd. ou un de ses distributeurs a été informé de la possibilité de tels dommages.

Le boîtier PBH-154 est exclusivement prévu pour un usage en intérieur, dans un environnement sec et non poussiéreux. Le boîtier PBH-154 n'est pas prévu, ni autorisé pour être utilisé en extérieur, ni de façon embarquée dans des engins mobiles de quelque nature que ce soit (voiture, camion, train, avion, etc...), ni en milieu explosif, ni dans des enceintes nucléaires, ni dans des ascenseurs, ni dans des aéroports, ni dans des enceintes hospitaliers, ni pour des applications à caractère médical, ni dans des dispositifs de détection et d'alerte anti-intrusion, ni dans des dispositifs de détection et d'alerte anti-incendie, ni dans des dispositifs d'alarme GTC, ni pour des applications militaires.

De même, le boîtier PBH-154 n'est pas conçu, ni destiné, ni autorisé pour expérimenter, développer ou être intégré au sein d'applications dans lesquelles une défaillance de celui-ci pourrait créer une situation dangereuse pouvant entraîner des pertes financières, des dégâts matériel, des blessures corporelles ou la mort de personnes ou d'animaux. Si vous

utilisez le boîtier PBH-154 volontairement ou involontairement pour de telles applications non autorisées, vous vous engagez à soustraire Sollae Systems Co., Ltd. et ses distributeurs de toute responsabilité et de toute demande de dédommagement.

En cas de litige, l'entière responsabilité de Sollae Systems Co., Ltd. et de ses distributeurs vis-à-vis de votre recours durant la période de garantie se limitera exclusivement selon le choix de Sollae Systems Co., Ltd. et de ses distributeurs au remboursement de votre produit ou de sa réparation ou de son échange. Sollae Systems Co., Ltd. et ses distributeurs démentent toutes autres garanties, exprimées ou implicites.

Tous les boîtiers PBH-154 sont testés avant expédition. Toute utilisation en dehors des spécifications et limites indiquées dans cette documentation ainsi que les court-circuit, les chocs, les utilisations non autorisées, pourront affecter la fiabilité, créer des dysfonctionnements et/ou la destruction du boîtier PBH-154 sans que la responsabilité de Sollae Systems Co., Ltd. et de ses distributeurs ne puissent être mise en cause, ni que le boîtier PBH-154 puisse être échangé au titre de la garantie.

- Rappel sur l'évacuation des équipements électroniques usagés

Le symbole de la poubelle barré présent sur le boîtier PBH-154 indique que vous ne pouvez pas vous débarrasser de ce dernier de la même façon que vos déchets courants. Au contraire, vous êtes responsable de l'évacuation du boîtier PBH-154 lorsqu'il arrive en fin de vie (ou qu'il est hors d'usage) et à cet effet, vous êtes tenu de le remettre à un point de collecte agréé pour le recyclage des équipements électriques et électroniques usagés. Le tri, l'évacuation et le recyclage séparés de vos équipements usagés permettent de préserver les ressources naturelles et de s'assurer que ces équipements sont recyclés dans le respect de la santé humaine et de l'environnement. Pour plus d'informations sur les lieux de collecte des équipements électroniques usagés, contacter votre mairie ou votre service local de traitement des déchets.

11 Revision History

Date	Version	Description	Author
2014.08.27	1.0	○ Initial release	Amy Kim
2014.09.25	1.1	○ Modified typos and updated serial specification	Amy Kim
2015.05.20	1.2	○ Modified exemption from liability French version	Amy Kim