W2X Ring Scanner

BLE Communication Interface Protocol

HYCO
IoT Innovator

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Summary

The purpose of this agreement is to assist customers in the secondary development of W2X Ring Scanner of HYCO Technology, to realize various application functions to meet the functional requirements of each scene, to fully explore the product value, to improve operation efficiency, and to reduce burden.

This agreement is applicable to the communication and interaction between our W2X Ring Scanner and PC , mobile and PDA terminal applications.

Communication command interface of W2X products are same, which avoids the issue that customers need different interfaces for different application scenarios and multiple interfaces development needs.

Contents

I. Communication Protocol

1. Message data format

	Content	Data length	Value
1	Start	1Byte	0x40
2	Frame length	1Byte	
3	Transceiver	1Bytes	
4	Instruction	1Byte	
5	Data	1-250Bytes	
6	Check	1Byte	
7	Termination	1Byte	0x2A

2. Definition of message data format

"Start" Frame header 0x40

"Frame length" The length starts from the "Transceiver" field (including the "Transceiver" field) to the end of the "Data" field (including the "Data" field).

"Transceiver" Transceiver refers to whether the received data is to return confirmation information or new data information ('R' indicates that the confirmation information is received, and 'S' indicates that the received data is new data and needs to be processed.)

"Instruction" Encode for instructions to facilitate one-to-one correspondence in mutual communication.

"Data" Any data with a minimum of 1 byte and a maximum of 250 bytes.

"Check" The lower 8 bits of the sum of all the full bytes from the beginning of the "frame length" to the "data".

"Termination" The "termination" field of the non-fixed-length standard protocol is fixed to 1 byte: 0x2A。

Note: All data herein is expressed in hexadecimal, multi-byte data to little endian mode.

II. Instructions

No.	Instructions	Functions
1	0x01	Barcode transmission
2	0x04	Led control (simple)
3	0x05	Led control (advanced)
4	0x06	Bluetooth name setup
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10	0x10	Read barcode decoding priority
11	0x11	Set barcode decoding priority
12	0x12	Read barcode decoding parameters
13	0x13	Set barcode decoding parameters
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16	0x18	Controlling alert of after successful scanning
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19	0xC0	USB dongle PC connection control
20	0xE0	Device information
21	0xF0	System reset

III. Detailed Explanations

1. Barcode transmission (0x01)

Function: The device sends barcode data to the host, and the "data" in the packet is the barcode character.

Device --> Host   Send barcode in value "123456778"

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x0A	0x53	0x01	"12345678"	0x02	0x2A

2. Led control (simple) (0x04)

Function: to control led in designated colour

Parameter: color, dly

    color：(1 byte)

        00---close，01---red

        02---green，03---yellow

        04---blue，05---magenta

        06---cyan，07---white

    dly--duration time: ms (4 bytes)

        Light-on time (ms)

Device --> Host   Red light on for 100 milliseconds

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x07	0x53	0x04	0x01 0x64 0x00 0x00 0x00	0xC3	0x2A

3. Led control (Advanced) (0x05)

Function: Separate control of each LED on the device side.

Parameter: LEDn,n,dly,t_on,t_off；[...]

LEDn---name of the lights: (1 byte)

High 4 bits: fixed 1;

Low 4 bits: bit0--red, bit1--green, bit2--blue

0x11--red light

0x12--green light

0x14--blue light

n------flash times, (1 byte)

When n=0, turn off the corresponding light forcely, and ignore the subsequent dly, t_on and t_off parameters.

Dly----execution delay，mS(2 bytes)

The led control delay dly mS to start execution.

t_on---light on time, mS(2 bytes)

The length of time the light is on.

t_off--light off time, mS(2 bytes)

The length of time the light goes out.

Note: If there are multiple lights under the same control, the parameters can be combined. For example, when controlling white (RGB full on) light on for 0.3 seconds and off for 0.5 seconds, flashing 3 times, the parameters can be changed to: 0x17, 3, 0, 300, 500

Host --> Device   Sequentially lit red+green+blue for 100 milliseconds, repeated 2 times.

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x1A	0x53	0x05	0x11 0x02 0x00 0x00 0x64 0x00 0xF4 0x01(red) 0x12 0x02 0xC8 0x00 0x64 0x00 0xF4 0x01(green left) 0x14 0x02 0x90 0x01 0x64 0x00 0xF4 0x01(blue left)	0x13	0x2A

4. Bluetooth name setup (0x06)

Function: Set the Bluetooth name of the device on the host side (maximum 31 characters).

Host --> Device   Set the Bluetooth name of the device to "HYCO-R11"

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x0A	0x53	0x06	0x48 0x59 0x43 0x4F 0x2D 0x52 0x31 0x31	0x4C	0x2A

Note: When the sent data is 0x00, the device will restore the factory Bluetooth name. Executing this command will cause the current Bluetooth connection to be failed.

5. Barcode suffix setup (0x07)

Function: To set the suffix characters added when the device side sends barcodes [maximum 8 characters] at the host side.

Host --> Device   Set the suffix to "-001 carriage return and line feed".

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x08	0x53	0x07	0x2D 0x30 0x30 0x31 0x0D 0x0A	0x37	0x2A

Host --> Device   Cancel the suffix

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x02	0x53	0x07		0x5C	0x2A

6. Barcode prefix setup (0x08)

Function: To set the prefix characters added when the device side sends barcodes [maximum 8 characters] at the host side.

Host --> Device   Set the prefix to "01-"

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x05	0x53	0x08	0x30 0x31 0x2D	0xEE	0x2A

Host --> Device   Cancel the prefix

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x02	0x53	0x08		0x5E	0x2A

7. Power acquisition (0x0D)

Function: Response about the current power of the device: 0x05--0x00; when the voltage level is 0x00, it indicates that the power is low and the device cannot scan soon.

Host --> Device   Get the current power from the device

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x02	0x53	0x0D		0x62	0x2A

Device --> Host   Response about the current power: 2 bars

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x52	0x0D	0x02	0x64	0x2A

8. Scanning mode setup (0x0E)

Function: to set scanning mode in the device:

0----- Manual trigger scanning

1----- Triggered continuous scanning

2----- Automatic interval scanning

4----- Manually trigger single scanning

Host --> Device   Send a manual trigger scanning mode (0x00) setup command to the device.

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x0E	0x00	0x64	0x2A

9. Get detailed battery power information (0x0F)

Function: to get detailed battery power information [number of cells + ADC + voltage]:

Host --> Device   Send the command to the device to get the detailed information of power.

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x0F	0x00	0x65	0x2A

Device --> Host   Response about battery details by barcode transmission:

Battery power: "BAT: 5(0--5)   2586 4.166V"

10. Read barcode decoding priority (0x10)

Function: read current barcode decoding priority

No.	Barcode Type	No.	Barcode Type
0	EAN	1	UPC
2	CODE39	3	CODE128
4	CODE93	5	GS1
6	CODE25	7	CODE11
8	CODABAR	9	MSI

Host --> Device   Read decoding priority

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x02	0x53	0x10		0x65	0x2A

Device --> Host   The priority order of device response decoding is CODE128, CODE39, EAN, UPC, CODE93, GS1, CODE25, CODE11, CODABAR, MSI

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x0C	0x52	0x10	0x03 0x02 0x00 0x01 0x04 0x05 0x06 0x07 0x08 0x09	0x9B	0x2A

11. Set barcode decoding priority (0x11)

Host --> Device   Decoding priority order is CODE128, CODE39, EAN, others are arranged in order of number

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x05	0x53	0x11	0x03 0x02 0x00	0x6E	0x2A

12. Read barcode decoding parameters (0x12)

No.	Barcode Type	No.	Barcode Type	No.	Barcode Type
0	EAN8	1	EAN13	2	EAN128
3	UPCA	4	UPCE	5	CODE11
6	CODE39	7	CODE93	8	CODE128
9	GS1_DATABAR	10	GS1_LIMITED	11	GS1_EXPANDED
12	ITF25	13	INDUS25	14	IATA25
15	MATRIX25	16	CHINESE25	17	CODABAR
18	MSI				

Function: Set the decoding parameters of each code type on the device side

Parameter: code type number, reserving 5 bytes, minimum length identification, maximum length identification, and decoding control mark;

No.	Parameter	Explanation	Parameter Length
1	Code type number	See the last table	1 byte
2	Reservation		1 byte
3	Minimum length identification	0: no limits	1 byte
4	Maximum length identification	0: no limits	1 byte
5	Decoding control mark	Bit0---decoding on/off Bit1---check on/off Bit2---FULL ASCII switch on/off Bit3---decode and complement on/off Bit8---check code output on/off Bit9---Lead code output on/off **Note: The other bits must be 0.** When all the above bits are 1, the function is turned on, and when they are 0, the function is turned off.	4 bytes

Host --> Device   Read decoding parameter of CODE128

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x12	0x08	0x70	0x2A

Device --> Host   The device responds to the decoding parameters of CODE128: decoding on, decoding minimum length 2,and decoding maximum length 50

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x0A	0x52	0x12	0x08 0x00 0x02 0x32 0x01 0x00 0x00 0x00	0xAB	0x2A

Host --> Device   Read decoding parameter of EAN13

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x12	0x01	0x69	0x2A

Device --> Host   The device responds to the decoding parameters of EAN13: decoding on, decode minimum length 13, decode maximum length 13, complement decoding on, check output on, and preamble output on

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x0A	0x52	0x12	0x01 0x00 0x0D 0x0D 0x09 0x03 0x00 0x00	0x95	0x2A

13. Set barcode decoding parameters (0x13)

Function: set barcode decoding parameters [same parameter as command 0x12]

Host --> Device   Set the decoding parameters of CODE128: decoding on, decoding minimum length 2, decoding maximum length 50

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x0A	0x53	0x13	0x08 0x00 0x02 0x32 0x01 0x00 0x00 0x00	0xAD	0x2A

Host --> Device   Set the decoding parameters of CODE39: decoding on, decode minimum length 2, decode maximum length 50, FULL ASCII conversion on, and check code output on

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x0A	0x53	0x13	0x06 0x00 0x02 0x32 0x05 0x01 0x00 0x00	0xB0	0x2A

14. Vibration control instructions (0x16)

Function: Control the vibrator to act according to instructions

Parameter: loopCnt，executeDly，timeOn，timeOff

Parameter	Explanation	Size	Unit	Remarks
loopCnt	Loop execution times	2 bytes	time	Not more than 100, when it is 0xFFFF, it is unlimited loop
executeDly	Delay in execution time	2 bytes	ms	Not more than 10000, that is, 10 seconds
timeOn	Vibration	2 bytes	ms	Not more than 5000, that is, 5 seconds
timeOff	Vibration stop	2 bytes	ms	Not more than 5000, that is, 5 seconds

Host --> Device   Repeat 150ms vibration and 100ms stop for 3 times

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x0A	0x53	0x16	0x03, 0x00,//(3 cycles) 0x00, 0x00,//(immediate execution) 0x96, 0x00,//(150ms vibration) 0x64, 0x00,//(100ms stop)	0x70	0x2A

15. Bluetooth disconnection alarm (0x17)

Function: Bluetooth disconnection alarm on/off

Parameter: enable

Parameter	Explanation	Size	Unit	Remarks
enable	Alert on/off	1 byte		1— alert on; 0— alert off

Host --> Device   Bluetooth disconnection alarm on

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x17	0x01	0x6E	0x2A

Host --> Device   Bluetooth disconnection alarm off

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x17	0x00	0x6D	0x2A

Note: After turning on the "Bluetooth disconnect alarm" function, when the Bluetooth is disconnected, the blue light flashes and the scanner vibrates, and this state continues. There are two ways to turn on or off the function: ①Use the communication command, ②Scan the barcode for the specified setting. After the Bluetooth connected, the alarm terminates.

16. Controlling alert of after successful scanning (0x18)

Function: alert after successful scanning on/off

Parameter: enable

Parameter	Explanation	Size	Unit	Remarks
enable	Alert after successful scanning on/off	1 byte		1— device alert on; 0— device alert off

Host --> Device   Device alert on

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x18	0x01	0x6F	0x2A

Host --> Device   Device alert off

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x18	0x00	0x6E	0x2A

Note: device alert will be on after Bluetooth disconnection if the setup is not saved.

17. Dialog box command (0x30)

Function: The host asks the ring scanner to enter the dialog state.

Parameter: enter, timeOut

Parameter	Explanation	Size	Unit	Remarks
enter	Enter/exit dialog box state	1 byte		1— Enter dialog box state; 0— Exit dialog box state
timeOut	Length of timeout	4bytes	ms	1. If there is no operation of the scanner when the specified time arrives [the barcode is not scanned, and the right button is not touched], the "cancel" message will be automatically sent 2. When it is 0, then no timeout limit.

Host --> Device   Enter the dialog box state, 5 seconds timeout [0x00001388=5000]

Start	Frame length	Transceiver	Instruction	Data	Check	Termi nation
0x40	0x07	0x53	0x30	0x01, //(enter) 0x88,0x13,0x00,0x00, //(5000ms)	0x26	0x2A

Host --> Device   Enter dialog box state with no timeout

Start	Frame length	Transceiver	Instruction	Data	Check	Termi nation
0x40	0x07	0x53	0x30	0x01, //(enter) 0x00,0x00,0x00,0x00, //(0—no timeout limits)	0x8B	0x2A

Host --> Device   Exit dialog box state

Start	Frame length	Transceiver	Instruction	Data	Check	Termi nation
0x40	0x07	0x53	0x30	0x00, //(enter) 0x88,0x13,0x00,0x00, //(could be any value)	0x25	0x2A

Note: After the scanner enters the dialog box state, ①the function of the touch key on the right is "confirm", which is effective when you touch and release it; ②vibrate twice; ③continuously flashing red light. Touch the left key to scan the barcode, touch the right key, when the dialog box timeout, or receive an instruction to close the dialog, exit the dialog box state and the prompting terminated.

18. Dialog box command response (0x31)

Function: dialog box command response: "confirm"/"cancel"　　　Parameter: confirm

Parameter	Explanation	Size	Unit	Remarks
confirm	Reply "confirm" or "cancel"	1 byte		1— confirm message in the dialog; 0— cancel message in the dialog

Device --> Host　　"Confirm" message [When the ring scanner is in the dialog box status, and touch the right key to send a "Confirm" message].

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x31	0x01	0x88	0x2A

Device --> Host　　"Cancel" message [When the dialog box times out or after scanning other barcodes, the Lord of the Rings will send a "Cancel" message].

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x31	0x00	0x87	0x2A

19. USB Dongle connection mode control(0xC0)

Function: to control the interface mode of USB Dongle.

　　　　0x00----- HID mode on

　　　　0x01----- Keep the USB serial port mode

Host --> Device　　USB Dongle in HID mode

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0xC0	0x00	0x16	0x2A

Host --> Device　　USB Dongle keeps USB serial port mode

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0xC0	0x01	0x17	0x2A

20. Device information (0xE0)

Function: to get device information of the scanner.

Host --> Device　　Get the device information from the scanner

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0xE0	0x00	0x36	0x2A

Device --> Host　　Response about the device information through barcode transmission:

Device info:

Serial Number: "SN: 0080618",

Software Version: "VER: W16 1.001.004 Aug 13 2016 11:52:33 16973825",

BLE Version: "BT:　BLE 1.01.02 Nov 16 2015 15:26:59",

Battery Power: "BAT: 5(0--5)　2586 4.166V",

Tel Number: "TEL: 4006-308-608",

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21. Reset System (0xF0)

Function: reset system and restart the ring scanner.

Host --> Device   Get device information from the scanner.

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0xF0	0x00	0x46	0x2A

22. Specified packet settings/reading instructions of long barcodes (0x3A)

Function: setting/reading long barcode special   packet

Parameter: flag

Parameter	Note	Size	Unit	Remark
Flag	To enable setting/reading long barcode special packet	1 byte		1— Open long barcode special packet; 0— Close long barcode special packet; Else- Enable reading long barcode special packet;

Host --> Device, open long barcode special packet

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x3A	0x01	0x6F	0x2A

Host --> Device, close long barcode special packet

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x3A	0x00	0x6E	0x2A

Host --> Device, read long barcode special packet

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x3A	0x02	0x70	0x2A

Device --> Host, enabling status feedback of long barcode packet

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x52	0x3A	0x01	0x6E	0x2A

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x52	0x3A	0x00	0x6D	0x2A

Note: After each successful Bluetooth connection, the host should send this command to the device;

23. Barcode additional information settings/reading instructions (0x3B)

Function: setting/reading barcode additional information

Parameter: flag

Parameter	Note	Size	Unit	Remark
Flag	Enabling setting/reading barcode additional information	1 byte		1— Open long barcode additional information; 0— Close long barcode additional information; Else- Enable reading barcode additional information;

Host --> Device, open long barcode additional information

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x3B	0x01	0x6F	0x2A

Host --> Device, close long barcode additional information

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x3B	0x00	0x6E	0x2A

Host --> Device, reading long barcode additional information

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x53	0x3B	0x02	0x70	0x2A

Device --> Host, enabling status feedback of barcode additional information

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x52	0x3B	0x01	0x6E	0x2A

Start	Frame length	Transceiver	Instruction	Data	Check	Termination
0x40	0x03	0x52	0x3B	0x00	0x6D	0x2A

Note: **After each successful Bluetooth connection, the host should send this command to the device;**

Each time after enabling the sending of barcode additional information, the 0x41 long barcode packet is

automatically enabled; and the sending is only under the long barcode packet format【command 0x01】;

Long barcode special packet

1. Message data format

Message data format as follows

	Field content	Data length	Value
1	Start	1Byte	0x41
2	Frame length	2Byte	
3	Transceiver	1Bytes	
4	Instruction	1Byte	
5	Data	1-2000Bytes	
6	Check	1Byte	
7	Termination	1Byte	0x2B

2. Definition of format in this protocol

"Start"　　　　　　Frame header. 0x41

"Frame length" The length starts from the "Transceiver" field (including the "Transceiver" field) to the end of the "Data" field (including the "Data" field).

"Transceiver"　　　It refers to whether the received data is to return confirmation information or new data information ('R' indicates that the confirmation information is received, and 'S' indicates that the received data is new data and needs to be processed).

"Instruction"　　　Encode for instructions to facilitate one-to-one correspondence in mutual communication.

"Data"　　　　　　Any data with a minimum of 1 byte and a maximum of 2000 bytes.

"Check"　　　　　The lower 8 bits of the sum of all the full bytes from the beginning of the "frame length" to the "data".

"Termination"　　The "termination" field of the non-fixed-length standard protocol is fixed to 1 byte. 0x2B

Note: All data herein is expressed in hexadecimal, multi-byte data to little endian mode.

No.	Instructions	Functions
1	0x01	Barcode transmission

Barcode data sending (0x01)

Function: the device send barcode data to the host, and the 'data' in the packet is the barcode characters

Device --> Host, sending a 266-byte barcode

Start	Frame length	Transceiver	Instruction	Data	Check	Termi nation
0x41	0x0A 0x01	0x53	0x01	xxx	0x02	0x2B

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Add other information when sending a barcode: barcode type, total time (ms) from lasering to reading, current frame reading time (ms);

Sending with 0x01 command. Add one 0x00 after barcode data, and 3 more information:

1. Barcode type---4 bytes; little endian data
2. Reading time---4 bytes; little endian data
3. Decoding time---4 bytes; little endian data
4. ...

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