WIVC002xxx

WiFi serial I/O module

User Guide

Rev 1.02

Date: 2014/2/12

Notices

IMPORTANT NOTE:

This module is intended for OEM integrator. The OEM integrator is still responsible for the FCC compliance requirement of the end product which integrates this module.

20cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the FCC radiation exposure limits set forth for an population/uncontrolled environment can be satisfied.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of FCC rules. Operation

is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: 2ABAZ-WIVC002XXX ". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

ANTENNA USAGE:

Please use the antenna with Dipole Omni-directional type 2.4GHZ and 2.5dBi gain antenna. This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

Index

1. TCP/IP Network Basic

1-1 IP address (Internet protocol address)

Because TCP/IP networks are interconnected across the world, each computer on the Internet must have a unique address (called an *IP address*) to make sure that transmitted data reaches the correct destination.

The Internet Protocol (IP) uses a 32-bit address structure, consist of 4 bytes address (IPV4), and usually represented as for parts.

For example: 32 bits binary (11000000　10101000　00000000　00000001) written as 192.168.0.1 for easier to remember.

1-2 IP classes

the 32 bits of the address are subdivided into two parts. The network and hosts or stations.

There are five standard classes of IP addresses. Each address type begins with a unique bit pattern.
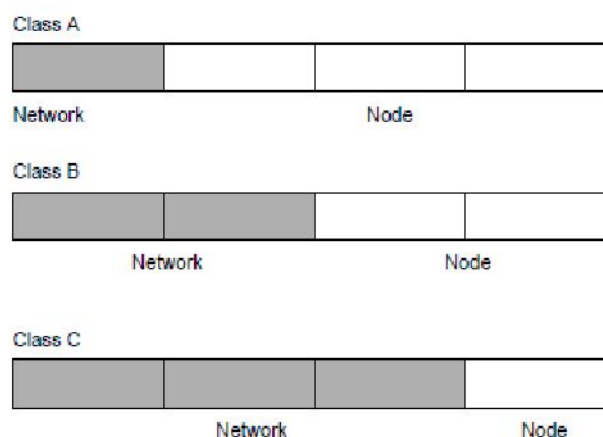
Class A: A n 8-bit network number and a 24-bit node number. Range: `1.x.x.x to 126.x.x.x`

Class B: A 16-bit network number and a 16-bit node number. Range: `128.1.x.x to 191.254.x.x`

Class C: A 24-bit network number and an 8-bit node number. Range: `192.0.1.x to 223.255.254.x`

Class D: Used for multicasts (messages sent to many hosts/group of). range: `224.0.0.0 to 239.255.255.255.`

Class E Class E addresses are for experimental use.

1-3 Netmask

 As last section describe, the size of network address and host address is implied by the class. This partitioning scheme can also be expressed by a netmask associated with the IP address. A netmask is a 32-bit quantity that, when logically combined (using an AND operator) with an IP address, yields the network address. For instance, the netmasks for Class A, B, and C addresses are 255.0.0.0, 255.255.0.0, and 255.255.255.0, respectively.

> e.g. 255.255.255.0 => 11111111.11111111.11111111.00000000 bit AND with
>   192.168.0.x   => 11000000.10101000.00000000.xxxxxxxx

1-4 Domain Name System (DNS) Server

Many of the resources on the Internet can be addressed by simple descriptive names such as "www.google.com " This addressing is very helpful at the application level, but the descriptive name must be translated to an IP address in order for a user to actually contact the resource. Translation service is

completed by DNS server.

1-5 DHCP server and DHCP client

When an IP-based local area network is installed, each computer must be configured with an IP address. If the computers need to access the Internet, they should also be configured with a gateway address and one or more DNS server addresses. As an alternative to manual configuration, Dynamic Host Configuration Protocol (DHCP) is a method by which each computer on the network can automatically obtain this configuration information. A device on the network may act as a DHCP server. The DHCP server stores a list or pool of IP addresses, along with other information (such as gateway and DNS addresses) that it may assign to the other devices on the network.

1-6 Server and Client

In networking application, base on different of role, usually classify into two kind of host, one is called Server, another is called Client. Usually Server standby on the net and waiting for Client to connect and Server may serve many clients. Like "WWW" Web Server.

1-7 TCP/UDP packet

There are two types of data packet, TCP and UDP. Their differents base on different transportation method, TCP packet trasmite data with confirmation and to do re-transmite data if source side didn't got destination's confirmation(ack). UDP packet just sent once, inspite of destination got packet or not. TCP for reliable data trasmittion. UDP is shorter delay and for some realtime data which don't care packet loss.

1-8 Unicast/Multicast/Broadcast packet transmittion

Base on transmission point, there are three type of packets.
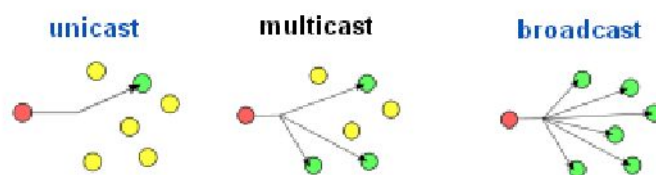Unicast:

Point to point transmission. IP format just point out destination IP
Multicast:

Point to multipoint and limited to a group. A multicast address is a single IP data packet set that represents a network host group. Multicast addresses range from 224.0.0.0 to 239.255.255.255
Broadcast:

Point to all same subnet hosts. Broadcast IP address represents as x.x.x.255

1-9 Ping network debug tool

For checking basic network health status. Ping tool send a test packet and wait reply.

2.WIVC002xxx module introduction

2-1 WIVC002xxx WiFi network

2-1-1 WIVC002 module is 802.11b/g WiF device, each module have own IP address.

2-1-2 WIVC002 can be either set as AP or Station(Infra.)

2-1-3 WIVC002 including DHCP server and DHCP client. Usually set DHCP server enable when run as AP mode(DHCP client disable), Set as DHCP client enable (when set as static IP then disable DHCP client) and DHCP server disable when run as WiFi station(Infra. mode)

2-1-4 WiFI Channel: 1~11CH (to set channel when run as AP mode, in Station node channel follow AP's channel)

2-1-5 Data Rate: 1Mbps~54Mbps.

2-1-6 Tx power: Max. 16.5dBm, can be auto or manual set,

2-1-7 Antenna: external U.FL connector.

2-2 WIVC002xxx I/O function

2-2-1 As WIFI to serial data conversion adapter. Run as Server mode or Client mode
       Default Server port number is 5000. IP address is 192.168.2.99

2-2-2 Serial data over WiFi can be set as TCP packet or UDP packet.

2-2-3 Support serial port data rate from 1200 BPS to 921000 BPS.

2-2-4 Command interface: UART 2 as interface, default baud rate 115200 N,8,1.
UART2 default is data mode, to switch to command please input "+++" and "enter" key.
And switch back to data mode type "exit".
Also you can use remote console as command interface via Telent console, default Username and password both are "admin". Command detail list as Appendix's description.

2-2-5 GPIO pin: Via command interface read I/O value or set I/O pin state.

2-2-6 5 pins PWM: Via command interface set 0-255 as pulse width, or read out value .
     It can be LED lighting or motors control.

2-2-7 Configuration the adapter provide following method.
      (1)UART2 serial port
      (2)Telnet
     (3) Web browser
     (4) PC AX2RW Utility.

2-2-8 I2C , SPI read and write functions.

2-3 WIV002xxx pin description

2-3-1 UART port

(1) UART0 and UART2

(2)UART0 as debug port, pin TXD0,RXD0, data rate 9600,N,8,1

(3)UART2 as data and command port. Data for communicate with remote data Server or data Client.
　　　Default data rate 115200,N,8,1 and can be change by user from 1200 to 921600 BPS.

(4)I/O logic level is 3.3V

2-3-2 PWM PWM0~4 5 pins

2-3-3 IO port

(1)I/O pin P10, P11(=P14), P12(P15), P13, P16 can be input or output.

　　　(P10 reserved for default setting)

　　　　　P17, P30,P31 can be input or output, only existing in module pin, but not connected to
　　　　　2.0mm conversion baord and demo board.

　　　　　Note: As input pin please set I/O Output as high(weak pull high)

(2)I/O out , Low: 0, pull low 4mAto GND, High(1) weak pull high 50KOhm to 3.3V,

WIVC002xxx Module outline
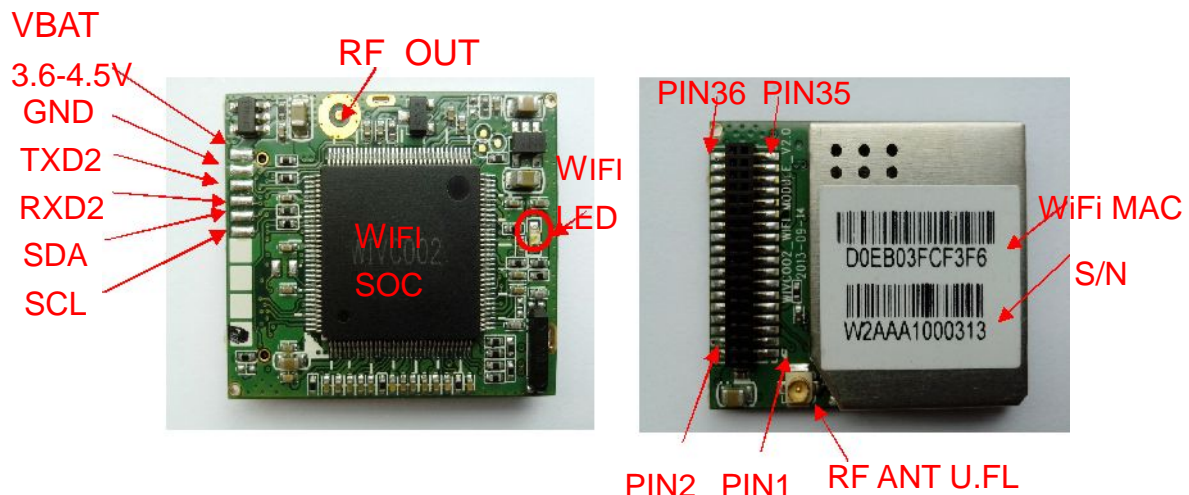
WIVC002xxx Module 1.0mm to 2.0mm conversion board

1.0mm 36 pins
Header

U.FL
connector

SMA
RF connector

PIN 1

WIVC002
module

1.0mm to
2.0mm conversion board
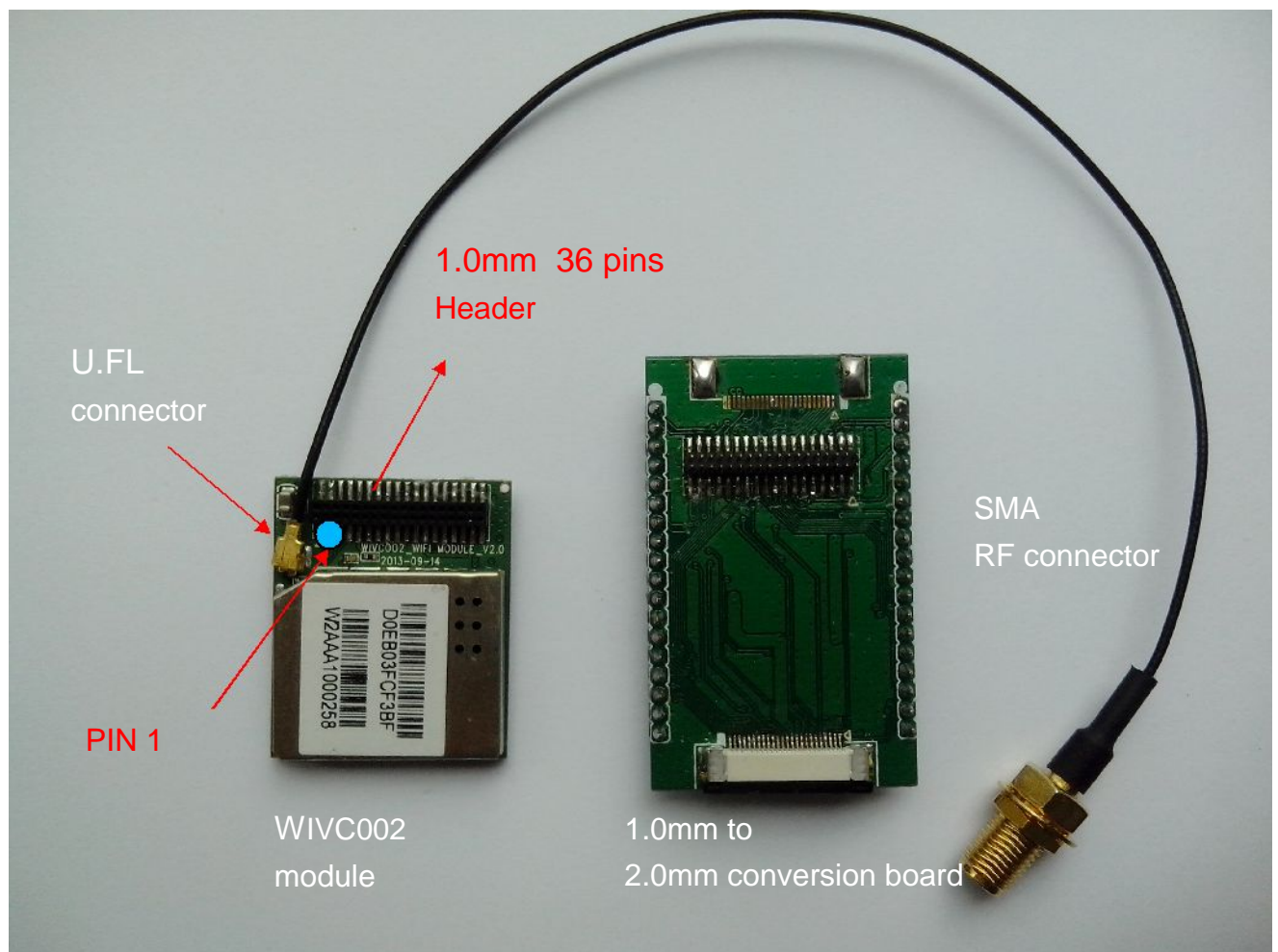
Note：RF connector please use U.FL or IPEX, RF cable impedance 50 Ohm，Frequency 2.4GHZ.

2-4 Module 36 pins and Demo board pinout mapping

36 PINS CONNECTOR

Fun.3	Fun.2	Functions	GPIO	Pin Name	2.0mm	pin #	Pin #	2.0mm	Pin Name	GPIO	Functions	Fun.2	Fun.3
		Power output		3.3V	11	1	2	12	GND		Power		
		Power input		VBAT		3	4	18	GND		Power		
		Power enable		3.3_EN		5	6	6	SS1		SPI		
		UART0		RXD0	36	7	8	35	TXD0		UART0		
		I2C		SCL	33	9	10	34	SDA		I2C		
		SPI		SS0	7	11	12	8	SCLK		SPI		
		SPI		MISO	10	13	14	9	MOSI		SPI		
		I2S	P10	MCLK	31_IO8	15	16	27_IO4	BCLK	P11+P14	I2S		
		I2S	P12+P15	LR	26_IO3	17	18	28_IO5	DT	P13	I2S		
		I2S	P16	DR	25_IO2	19	20	19	/BURN		/Download		XDATA4
		RTC power		VRTC		21	22	21	CTS2/PCLK/CS4	P32	UART2	VDP	
PWM	VDP	UART2	P33	DSR2/CS5/PWM0A	16	23	24	15	CS6/PWM0B	P34		VDP	PWM
PWM	VDP	UART2	P35	DCD2/CS7/PWM1A	14	25	26	13	RTS2/CS8/PWM1B	P36	UART2	VDP	PWM
	INT0	/Wake Up		WKUP	3	27	28	4	INT		INT1		
		UART2	P26	RXD2	1	29	30	2	TXD2	P27	UART2		
	VDP	RS485	P30	DE2/CS2		31	32		RE2_N/CS3	P31	RS485	VDP	
PWM	VDP	UART2	P37	DTR2/CS9/PWM2	20	33	34		RSIO_N			VDP	
	VDP		P17	HREF		35	36	21	PLCK_CS	P23		VDP	

Demo board 36 PINS 2.54mm CONNECTOR

| GPIO	Demo board Pin Name	2.0mm/2.54mm	pin #	Pin #	2.0mm/2.54mm	Demo board Pin Name	GPIO
	RXD2	1	29	7	36	RXD0	
	TXD2	2	30	8	35	TXD0	
	WAKEUP	3	27	10	34	SDA	I2C
	INT	4	28	9	33	SCL	I2C
SPI	SS1	5	6		32	WLED	
SPI	SS2	6		15	31	IO8	P10
SPI	SS0	7	11		30	IO7	
SPI	SCK	8	12		29	IO6	
SPI	MOSI	9	14	18	28	IO5	P13
SPI	MISO	10	13	16	27	IO4	P14,P11
	3V3	11	1	15	26	IO3	P15,P12
	GND	12	2,4	19	25	IO2	P16
P36	PWM1B	13	26	2,4	24	GND	
P35	PWM1A	14	25		23	IO0	
P34	PWM0B	15	24		22	IO1	
P33	PWM0A	16	23	36	21	PCLK	P23
	VRF_PA	17		33	20	PWM2	P37
	GND	18	2,4	20	19	XDATA4	

Note: P10 pull low 5 seconds to reset system to default setting.

3 WIVC002xxx Evaluation Kit

3-1 Evaluation Kit contents

1. WIVC002xxx Module
2. 1.0mm to 2.0mm header pin conversion board
3. WIVC Demo board
4. Experiment bread board
5. Wires and pin header.
6. Experiment LED: R, G, B and white color LED.
7. USB to UART adapter, with 5V DC Jack, USB PL2303 device driver can be found in CD .
8. CD content: Document, PC Utility and Demo sample code

3-2 Demo board
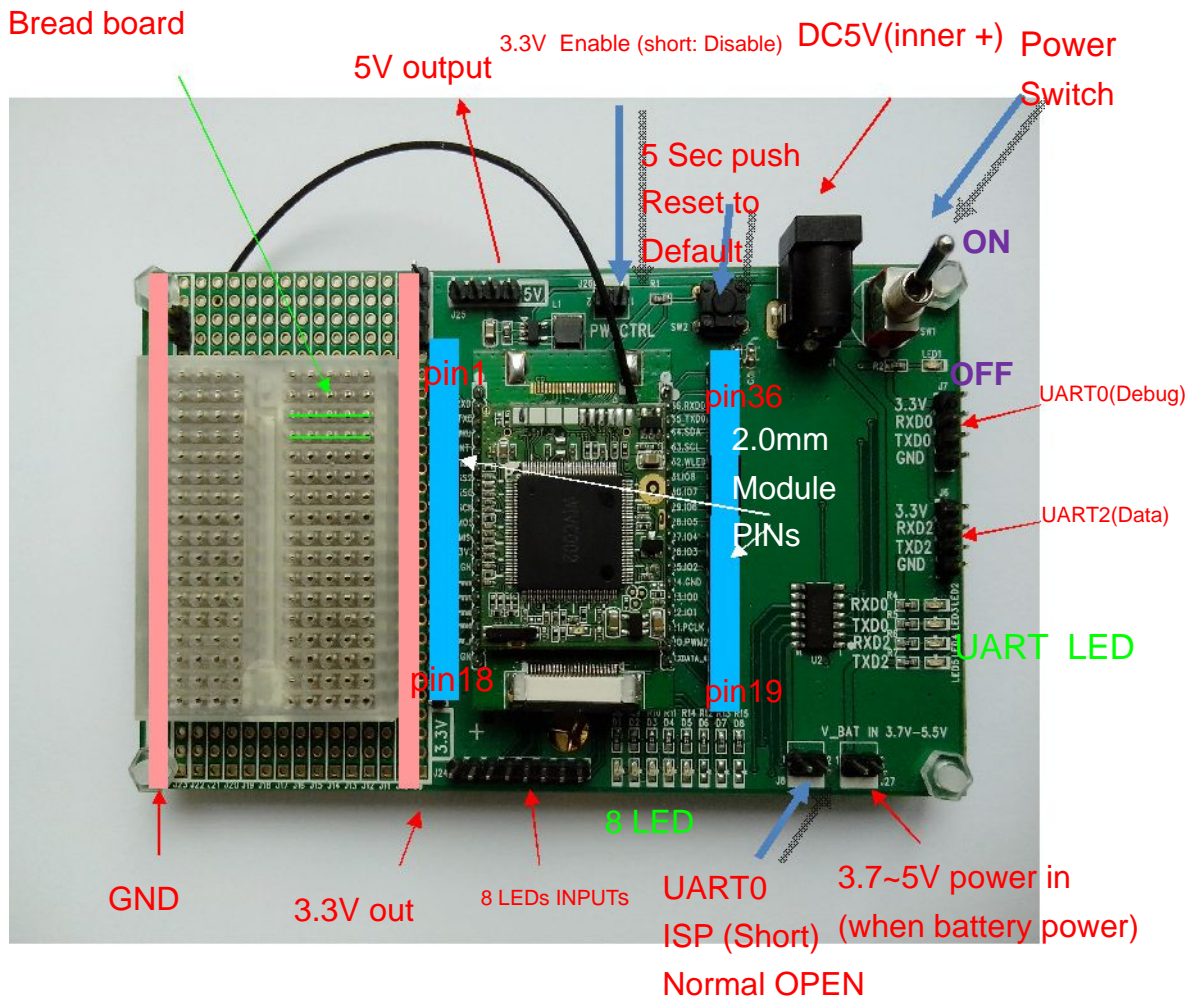
4.WIVC002xxx operation setup

4-1 Netwotk Architecture setup(WIVC002xx command list as Appendix I)

1. WIFI network type(nt), command <nt>. AP mode "set nt 1" or Infra. Mode "set nt 0"

2. As Server or Client, command <mode>, Server " set mode 0", Client "set mode 1"

3. Packet type TCP/UDP, comamnd <connectype>, TCP "set connectype 0", UDP "set connectype 1"

Frequency used network architecture as Appendix II.

4-2 Network setting tips:

1. When DHCP allocate IP, DHCP server usually reside in AP or router. One LAN only have one DHCP server otherwise IP network will mess, WIVC002 including DHCP server and DHCP client, so

   => When WIVC002 set as AP, please turn DHCP server enable, DHCP client disable
   Setting: "set dhcpclient 0", "set dhcpsrvenable 1"

   => When WIVC002 set as Station, please tuen D HCP serverdisable, DHCP client enable
   Setting: "set dhcpclient 1", "set dhcpsrvenable 0"

2. Serve usually wait for other for connect，normally set set as static IP

3. When set static IP , IP to IP need setup as same domain..

   For instence：If PC is IP 192.168.1.10, netmask 255.255.255.0 , module IP is 192.168.2.99

   can't work. PC IP need set as 192.168.2.x then network same domain as module IP's domain.
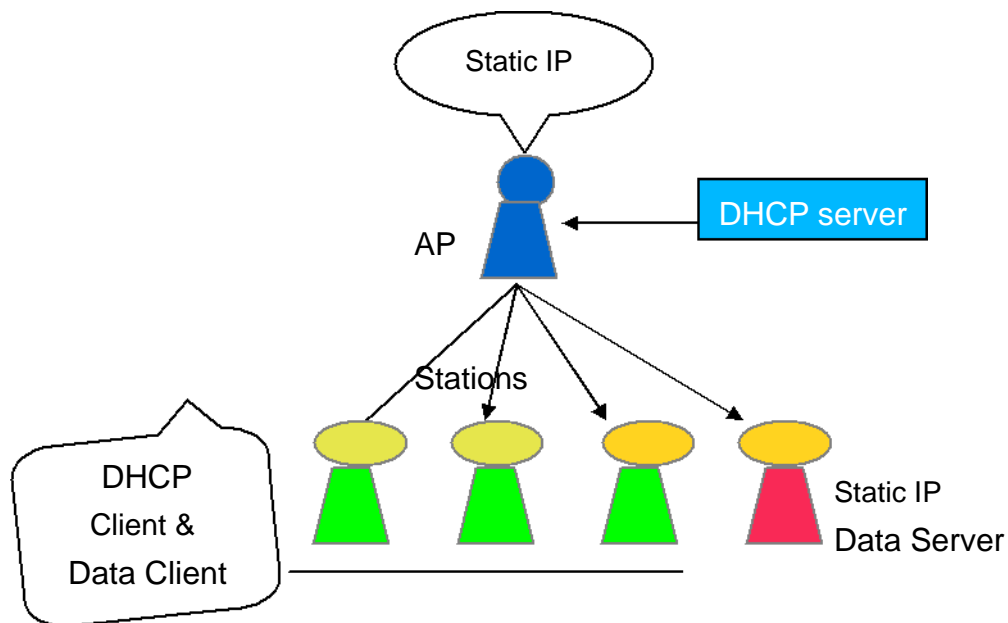
4-3 Setup example

4-3-1 Network architecture

Use WIVC002first architecture, Module as AP and data Server, waiting for others connect and connect with TCP packet.

Operating architecture
ARCH 1 (TCP)
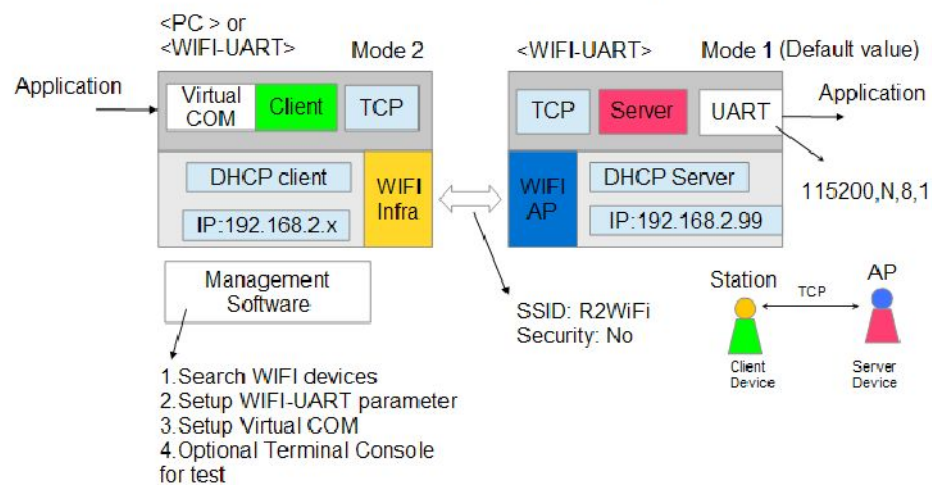
5 Android phone demo sample APP

5-1 Application circuits connection for demo

Power Enable

Vcc in

2.4GHz Antenna

Pin5

3V3_EN

Pin3

BAT

3.6 - 4.5V

3.3V

U.FL connector

WIVC002RS3 module

PWM0 — Red LED

PWM1 — Green LED

PWM2 — Blue LED

PWM3 — White LED

Pin2&4 GND

P11
P12
P13
P16

8 LED input
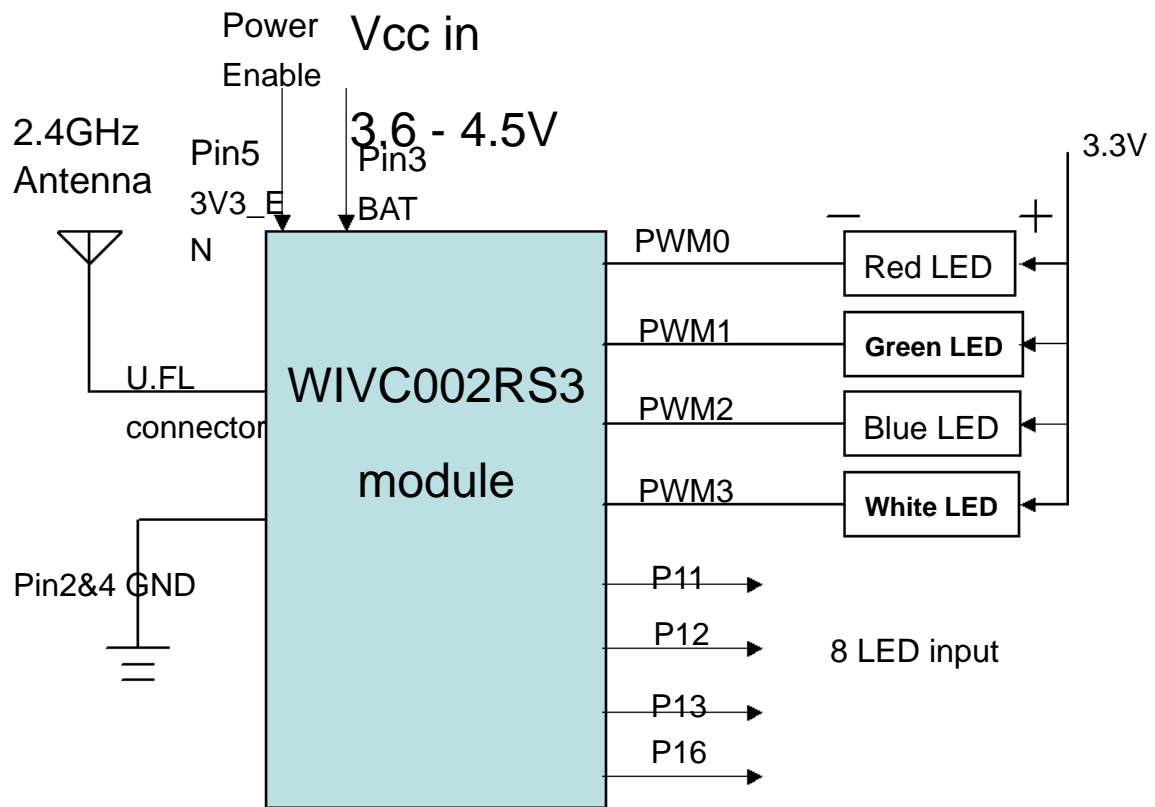
5-2 Smart phone UI

The operation describe as following picture

IO input

PWM channel

IO output

PWM value

TELNET connect to
192.168.2.99
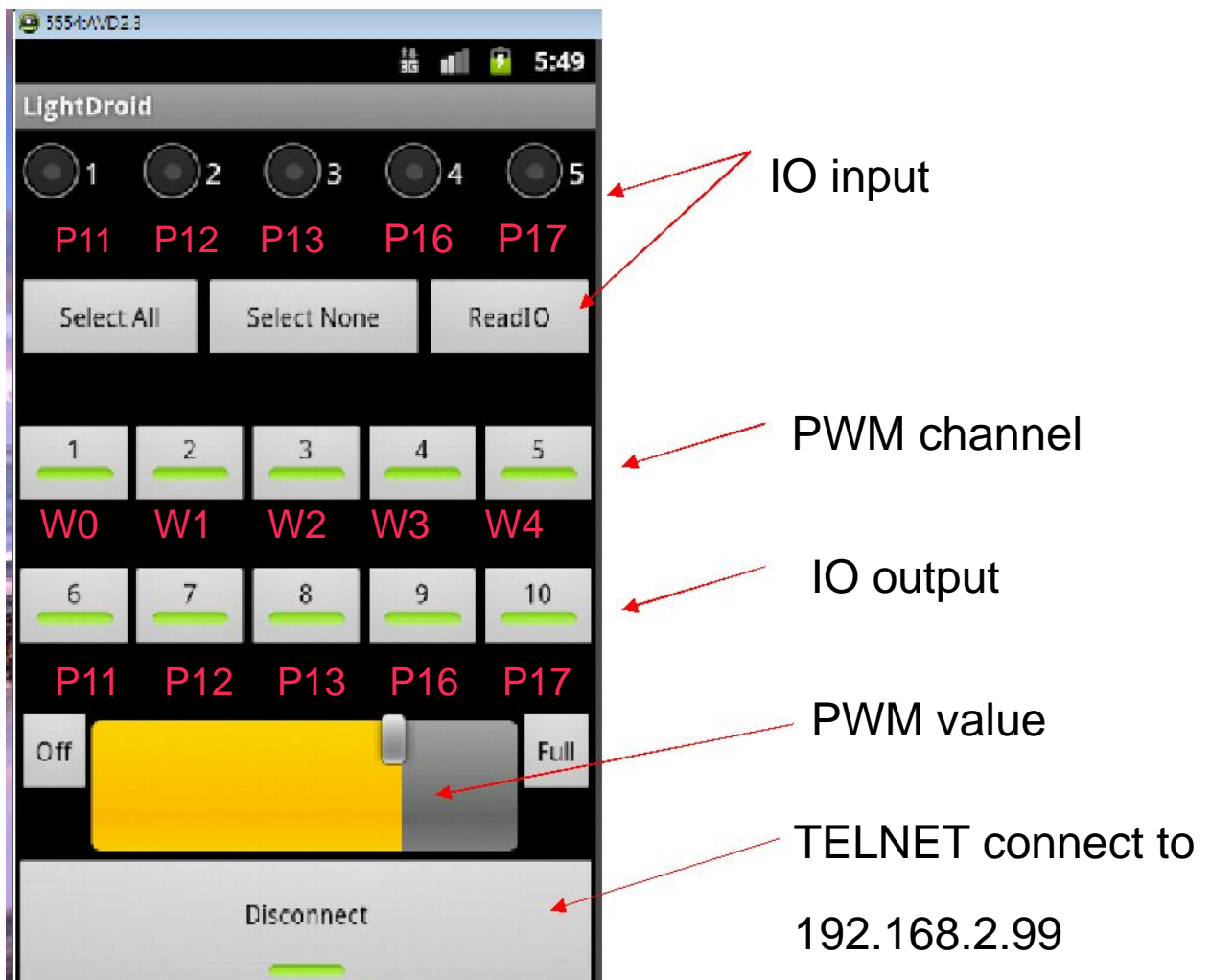
Appendix 1. WIVC002xxx command list

Execution command:

(1)Usage: helpcommand help, another help <sethelp>

(2)Usage: quit   logout command. Telent logout please use <exit>

(3)Usage: reboot   software system reboot

(4)Usage: passwd   change password

Old Password:

New Password:

Re-enter New Password:

(5)Usage: print <message>   When Telent output message to UART2 data port

(6)Usage: username <user name> change login in user name

(7)Usage: ipconfig   show current IP address. For instence:

RS3>ipconfig

Current IP: 192.168.2.99

Current IP Mask: 255.255.255.0

Current Gateway: 192.168.2.1

Ok

RS3>

(8)Usage: saveconfig   save current setting to Flash Memory, it will be load into memory on next boot.

(9)Usage: software-reset reset to default factory setting.

(10)Usage: emconfig Show Alarm email setting. For instence:

RS3>emconfig

Current e-mail server address: e-mail.com.tw

Current e-mail from address: ds@e-mail.com.tw

Current e-mail To1 address: to1@e-mail.com.tw

Current e-mail To2 address: to2@e-mail.com.tw

Current e-mail To3 address: to3@e-mail.com.tw

Ok

RS3>

(11) Usage: connstatus   display data link connection status, for example:

RS3>connstatus

Connect Status: Idle

TCP Tx Flag: 1

Ok

RS3>

Usage: ping xxx.xxx.xxx.xxx Ping tool to test network status

Usage: sisrvy [ssid]

Usage: jbss <ID in sitesurvey table>

Usage: wificonfig

Usage: ezconfig

Usage: station

Usage: exit

Usage: sethelp

RS3>

Set and Get commands

RS3>sethelp

Usage: set ip <ip addr>

Usage: set mask <netmask>

Usage: set gateway <ip addr>

Usage: set dns <ip addr>

Usage: set serialport <baud rate> <data bits> <parity> <stop bits> <flow ctrl>

    <baud rate>: 0: 921600   5: 9600

           1: 115200   6: 4800

             2: 57600   7: 2400

           3: 38400   8: 1200

           4: 19200

    <data bits>: 0: 5   2: 7

           1: 6   3: 8

    <parity>:   0: Odd   2: None

           1: Even

    <stop bits>: 0: 1   1: 1.5   2: 2

    <flow ctrl>: 0: Xon/Xoff   2: None

           1: Hardware

Usage: set mode <mode>

    <mode>: 0: SERVER   1: CLIENT

Usage: set srvport <port>

Usage: set dstport <port>

Usage: set dhcpclient <status>

      <status>: 0: disable   1: enable

Usage: set connectype <protocol>

    <protocol>: 0: TCP   1: UDP

Usage: set transmitimer <time>

      <time>: time in ms

Usage: set accessip <index> <ip addr>

    <index>:   index of accessible IP

    <ip addr>: accessible IP address

Usage: set accip <mode>

    <mode>: 0: disable   1: enable

Usage: set ems <e-mail server domain name>

Usage: set emf <e-mail address>

Usage: set emt1 <e-mail address>

Usage: set emt2 <e-mail address>

Usage: set emt3 <e-mail address>

Usage: set aw <cold start> <authentication fail> <ip changed> <password changed>

    <cold start>:   0: Disable   1: Enable

    <authentication fail>:   0: Disable   1: Enable

    <ip changed>:   0: Disable   1: Enable

    <password changed>:   0: Disable   1: Enable

Usage: set rs485 <mode>

    <mode>:   0: Sleep   2: Double Twisted Pair FD (Slave)

    <mode>:   1: Single Twisted Pair HD   3: Double Twisted Pair FD (Master)

Usage: set dsthn <Host name/IP>

Usage: tftpsrv <type> <ip addr>

    <type>: 0: Bldr   1: MCPU   2: WCPU

Usage: set filename <type> <file name>

    <type>: 0: Bldr   1: MCPU   2: WCPU

Usage: set dbgmsg <mode>

    <mode>: 0: Disable   1: Enable

Usage: set bmcast <bcast> <mcast>

    <bcast>: 0: Off   1: On

    <mcast>: 0: Off   1: On

Usage: set ssid <Maximum 31 characters>

Usage: set nt <0 = Infra mode, 1 = Simple-AP mode>

Usage: set ch <channel index>

   <channel index>

   0: Auto 1: 1 2: 2 3: 3 4: 4 5: 5 6: 6

   7: 7 8: 8 9: 9 10: 10 11: 11

Usage: set wepklen <0:64 bits, 1:128 bits>

Usage: set w64k <index = 0 ~ 3> <HEX Byte 0> <HEX Byte 1> ... <HEX Byte 4>

Usage: set w128k <index = 0 ~ 3> <HEX Byte 0> <HEX Byte 1> ... <HEX Byte 12>

Usage: set wki <WEP key index = 0 ~ 3>

Usage: set wp <WPA Passphrase, 8 ~ 63 characters>

Usage: set et <Encryption Type>

    <Encryption Type> 0: No Security   3: TKIP

              1: WEP64   4: AES

                  2: WEP128   5: Auto

Usage: set pmb <0 = Long preamble, 1 = Auto>

Usage: set rts <RTS threshold, 0 ~ 2432>

Usage: set tpl <Power level>

    <Power level> 0: 100%   3: 12.5%

             1: 50%   4: 6.25%

             2: 25%

Usage: set dr <Data rate>

    <Data rate> 0: Auto   7: 12Mbps

             1: 1Mbps   8: 18Mbps

             2: 2Mbps   9: 24Mbps

             3: 5.5Mbps   10: 36Mbps

             4: 6Mbps   11: 48Mbps

             5: 9Mbps   12: 54Mbps

                6: 11Mbps

Usage: set apc <Auto power control>

    <Auto power control> 0: Disable   1: Enable

Usage: set bi <Beacon interval(ms)>

    <Beacon interval(ms)> 20 ~ 1000

Usage: set pft <Protection frame type>

    <Protection frame type>: 0: RTS   1: Self-CTS

Usage: set keyauto <key string>

Usage: set dhcpsrv <start addr> <end addr> <netmask> <gateway> <lease>
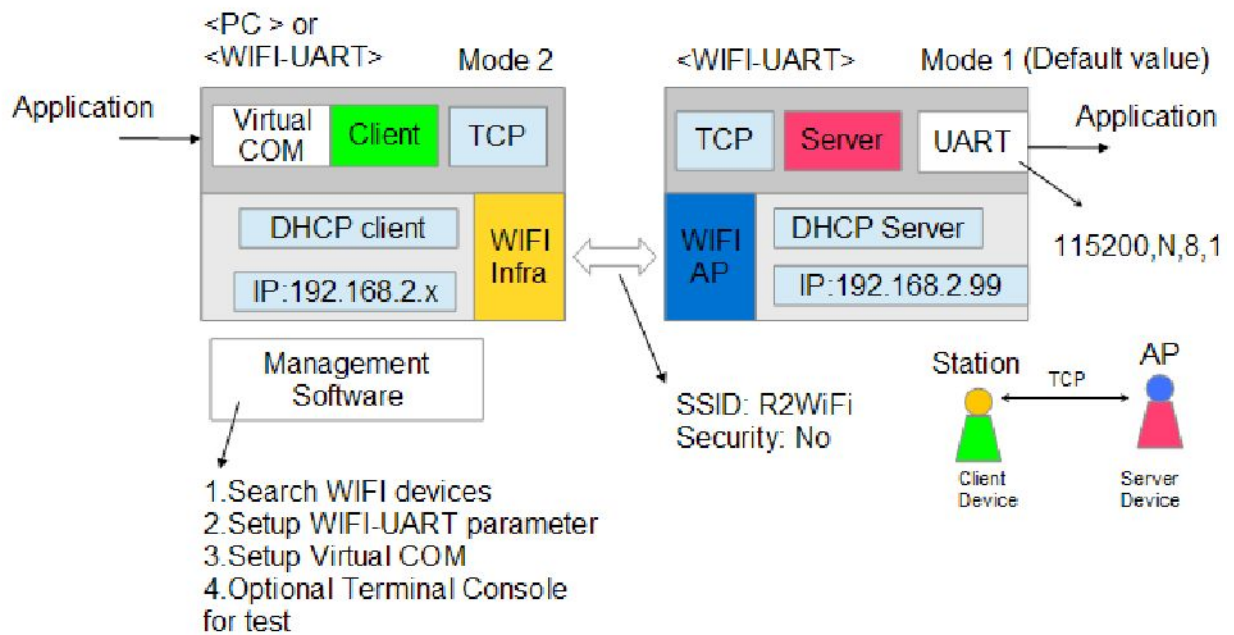
Usage: set dhcpsrvenable <status>

    <status>: 0: disable   1: enable

Usage: pwm <channel 0-4> <on/off: 0/1>

Usage: set io <port_pin: pxx> <state: 0/1>

Appendix 2. Frequency used Module Network Architecture

Operating architecture
ARCH 1 (TCP)

<PC > or
<WIFI-UART>   Mode 2

Application

| Virtual COM | Client | TCP |

| DHCP client | WIFI Infra |
| IP:192.168.2.x | |

Management Software

1. Search WIFI devices
2. Setup WIFI-UART parameter
3. Setup Virtual COM
4. Optional Terminal Console for test

<WIFI-UART>   Mode 1 (Default value)

Application

| TCP | Server | UART |

| WIFI AP | DHCP Server |
| | IP:192.168.2.99 |

115200,N,8,1

SSID: R2WiFi
Security: No

Station   TCP   AP

Client Device   Server Device

ARCH 2 (TCP)

<PC > or
<WIFI-UART>   Mode 3   Mode 4   <WIFI-UART>

Application →

Virtual COM	Server	TCP
DHCP Client		WIFI Infra
IP:192.168.0.B		

PC Management Software

TCP	Client	UART
WIFI Infra		DHCP client
		IP:192.168.0.A

→ Application

WIFI AP

DHCP Server

IP:192.168.0.1

ARCH 3 (UDP)

<PC > or
<WIFI-UART>   Mode 6   Mode 5   <WIFI-UART>

Application →

Virtual COM	Client	UDP
DHCP client		WIFI Infra
IP:192.168.2.4		

PC Management Software

UDP	Server	UART
WIFI AP		DHCP Server
		IP:192.168.2.99

→ Application

ARCH 4 (UDP)

ARCH 5 (UDP_MULTICAST)