# WisNode-UART WIFI EVB Quick Start Guide

Shenzhen Rakwireless Technology Co., Ltd

www.rakwireless.com

info@rakwireless.com

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# 1. Product introduction

# 1.1 Overview

Arduino WisNode-UART WIFI EVB is based on the RAK473(476) module design of an Arduino-compatible development board, Can be plugged into the Arduino EVB, it also can be used as a base plate plug other Arduino series peripherals. This document will be through a detailed description make developers to quickly grasp RAK473(476) WiFi module. For example, through the PC(C) serial debugging assistant test module's AT command function, Establishment of Socket communications, Use the web or mobile phone APP to configure the module to the designated router and so on.

# **1.2 Evaluation Kit Introduction**

After buying the Evaluation Kit on Taobao, We will use the following items box send to you, As shown in Figure 1-1. Article in the box as shown in Figure 1-2: A WisNode-UART WIFI EVB, A Micro USB line. If you buy an external antenna EVB, there will be an antenna in the box.



Figure 1-1





Figure 1-2

# 1.3 Hardware Introduction

As the following Figure1-3, 1-4 shown is the Arduino WisNode-UART WIFI EVB hardware and hardware distribution.Because the RAK473 module and the RAK476 module are very similar in operation and procedure, Therefore, this document is mainly based on the case of RAK473 WiFi module. However, there are differences between the tow modules in the peripheral hardware circuit, So when you use this EVB you should pay attention to the hardware version switch. If you uses the RAK473 module, you should welded a  $0\Omega$  resistor at R3, As the Figure 1-3 show. If you uses the RAK473 module, you should welded a  $0\Omega$  resistor at R6. Besides, different modules need different external circuit. At the bottom of the EVB, you should welded  $0\Omega$  resistor follow the instructions. Use this EVB, Users only need a Micro USB line, one end connected to the EVB, one end connected to the computer, and pay attention to the use of serial jump cap jump mode.





Figure 1-3 Arduino WisNode-UART WIFI Top Diagram

Slots Usage:

- (1) When WisNode-UART WIFI EVB used independently or as a host: Using H1, H2, H3, H4;
- (2) When WisNode-UART WIFI EVB as a slave or plugged into other Arduino board: Using P4, P5, P6, P7

Serial Port connect methods:

- (2) When WisNode-UART WIFI EVB used independently or as a host: RXD connect to CTX, TXD connect to CRX;
- (2) When WisNode-UART WIFI EVB as a slave or plugged into other Arduino board: RXD connect to TX, TXD connect to RX;





Figure 1-4 Arduino WisNode-UART WIFI Bottom Diagram



图 1-5 Arduino WisNode-UART WIFI EVB Linking Methods



# 2. Use Introduction

# 2.1 STA Mode Test

● · / (	CommUart Assistant	4 ×
COM Settings PortNum COM3 BaudR 115200 DPaity NONE DataB 8 StopB 1 Close	Data receive Welcome to RAK473 Boot information	SAVAGE V4.0.9
Recv Options Receive to file Auto linefeed Show timestamp Receive as hex Pause receive Save Clear		
Send Options Data from file Auto checksum Auto clear input Send as hex Send cyclic	1.DCD • 2.RXD • 3.TXD • 4.DTR • 5.GND • 6.DSR • 7.RTS	● 8.CTS ◆ 9.RI ◆
Interval 1000 ms Load Clear	· ->	Send
💣 Ready!	Send: 0 Recv:	19 Reset

Serial debugging assistant interface diagram

# Use serial debugging assistant test:

(Serial baud rate: 115200, Check bit:NULL, Data bit: 8, Stop bit: 1, Flow control: Disable)

Welcome to RAK473	//Boot information
at+ascii=1	//Set AT command return to the ASCII dispaly
ОК	
at+psk=123456789	<pre>//Set routing password</pre>
ОК	
at+connect=rakwireless	//Connection route
ОК	
at+ipdhcp=0	//Obtain the dynamic IP address
ОК	
mac=9C:44:3D:00:06:59	
addr=192.168.31.103	



mask=255.255.255.0	
gw=192.168.31.1	
dns1=192.168.31.1	
dns2=0.0.0.0	
at+1tcp=25000	//Establish a tcp server
OK8	
at+recv_data=128,0,59231,192.168.31.180	//Receive tcp client connection event
at+recv_data=0,59231,192.168.31.180,12,hello rak473	//Receive data
at+recv_data=129,0,59231,192.168.31.180	//Receive tcp client disconnect event

# 2.2 AP Mode Test

# Use serial debugging assistant test:

(Serial baud rate: 115200, Check bit:NULL, Data bit: 8, Stop bit: 1, Flow control: Disable)

```
Welcome to RAK473
                                                          //Boot information
at+ascii=1
                                                          //Set AT command return to the ASCII dispaly
ок
at+psk=123456789
                                                          //Set AP psk
ок
at+ap=RAK473_AP
                                                          //Establish AP
OK
at+ipstatic=192.168.9.5,255.255.255.255.0,192.168.9.1,192.168.9.1,0 //Set static IP address
ок
at+ipdhcp=1
                                                          //Open dhcp server
ок
at+1tcp=25000
                                                          //Establish tcp server
OK8
at+recv data=connect
                                                          //Receive STA connect event
at+recv_data=128,0,47466,192.168.9.2
                                                          //Receive tcp client connect event
at+recv_data=0,47466,192.168.9.2,12,hello rak473
                                                          //Receive data
at+recv_data=129,0,47466,192.168.9.2
                                                          //Receive tcp client disconnect event
at+recv_data=disconnect
                                                          //Receive STA disconnect event
```

Detailed list of AT commands please refer to RAK473(476) UART software programming manual.



# 2.3 Creating AP and Establish TCP\_SEVER

This part gives an example process of AT command, set the module to AP mode, and establish TCP Sever, PC(C) connects to the module AP, and create TCP Client to communicate with the module.

TCP&UDP-Debug
Operate(O) View(V) Windows(W) Help(H) Language
🗄 🚰 CreateConnn 🔕 CreateServer   🐰 StartServer 🛞 🕢   🕱 Connect 🕱   👒 🗟 DisconnAll   💥 DeleteConn 🎇   🔟 📚 💂
CreateConn CreateServer StartServer DisconnAll DeleteConn R 20 7  Connect DisconnAll DisconnAll R DeleteConn R 20 7  Connect DisconnAll R 20 7  Conne

TCP/UDP test tool interface diagram

Frequency band: 2.4GHZ

Information channel: channel 1

AP Name: rak\_ap

AP password: rakwireless

Encryption mode: WAP2-PSK-CCMP

Module IP address: 192.168.9.4

Country code: CN





# AT command flow is as follows:

Starting-up returns

57 65 6C 63 6F 6D 65 20 74 6F 20 52 41 4B 34 37 33 0D 0A

Set channel

Send: at+channel=1\r\n Return: 4F 4B 0D 0A

### Set AP psk

Send: at+psk=rakwireless\r\n

Return: 4F 4B 0D 0A

Set module to connect the wireless of rak\_ap

Send: at+ap=rak\_ap\r\n return: 4F 4B 0D 0A

Set module static IP is 192.168.9.4

Send: at+ipstatic=192.168.9.4,255.255.255.0,192.168.9.1,0,0\r\n Return: 4F 4B 0D 0A

Setting the module to automatically set the DHCP SEVER parameter

Send: at+ipdhcp=1\r\n Return: 4F 4B 0D 0A

Module create a TCP Server with local port of 25000 Send: at+ltcp=25000\r\n Return: 4F 4B 08 0D 0A

When PC connected the module's ap, module return: 61 74 2B 72 65 63 76 5F 64 61 74 61 3D 82 0D 0A

Use PC create a TCP Client ,IP address is 192.168.9.4, target port is 25000 and connect to the TCP Server created by WiFi module, module return:

61 74 2B 72 65 63 76 5F 64 61 74 61 3D 80 00 18 CA 02 09 A8 C0 0D 0A



TCP Client send a string of "abcd" to TCP Sever, module return:

61 74 2B 72 65 63 76 5F 64 61 74 61 3D 00 18 CA 02 09 A8 C0 04 00 61 62 63 64 0D 0A

TCP Sever send a string of "ABCD" to TCP Client

Send: at+send\_data=0,49729,192.168.9.2,4,ABCD\r\n

Return: 4F 4B 0D 0A

COMSettings	COM port data receive
PortNum COM12 BaudR 115200 DPaity NONE DataB 8 StopB 1 Close Recv Options Receive to file Show timestamp	57 65 6C 63 6F 6D 65 20 74 6F 20 52 41 4B 34 37 33 0D 0A at+channel=1 4F 4B 0D 0A at+psk=rakwireless 4F 4B 0D 0A at+ap=rak_ap 4F 4B 0D 0A at+ipstatic=192.168.9.4,255.255.0,192.168.9.1,0,0 4F 4B 0D 0A at+ipdhcp=1 4F 4B 0D 0A at+ltcp=25000 4F 4B 08 0D 0A
✓ Receive as hex ✓ Receive pause Save Clear	61 74 2B 72 65 63 76 5F 64 61 74 61 3D 82 0D 0A 61 74 2B 72 65 63 76 5F 64 61 74 61 3D 80 00 C2 D2 02 09 A8 C0 0D 0A 61 74 2B 72 65 63 76 5F 64 61 74 61 3D 00 18 CA 02 09 A8 C0
Send Options Data from file Auto checksum Auto clear input Send as hex Send cyclic Interval 100 ms	04 00 61 62 63 64 0D 0A at+send_data=0,0,0,4,ABCD 4F 4B 0D 0A
Load Clear	Send
🖝 COMSettings	Send: 273 Recv: 182 Reset

Properties <b>4</b> ×	192.168.9.4:25000
E Client Mode ↓ 192.168.9.4:25000 E Server Mode	DestIF:     Send     AtuoSend Eve     100     ns     Stop       DestFort:     25000     Send Hex     Send File     Send Baceived     Clear Option     BroadOption       LocalFort     4001     Type     Type     Type     Type     Type     Type     Type     Type     Type     Send Hex     Send File     Send Baceived     Clear Option     BroadOption       BoostDart     StateSend     Send     Send     Send     Send     Send     Send       Eve     D     s     Seve (In Time)     ABCIDABCD     ABCIDABCD     Send     Send



# 2.4 Module connected to Router (STA) and Establish TCP Client

This part gives a sample process of AT command, connect the module with the router with SSID of RAK, PSK of rakwireless, then establish TCP sever. PC (C) establishes TCP Client and connects to the module terminal TCP SEVER to transmit data.



Frequency band: 2.4GHZ

AP name: rak\_sta

AP password: rakwireless

Encryption mode: WPA2-PSK

IP address of WiFi Moudle (B): DHCP acquiring

 $RAK_2.4GHz$ 

AT command flow is as follows:

Boot information

57 65 6C 63 6F 6D 65 20 74 6F 20 52 41 4B 34 37 33 0D 0A

Scan wireless network with SSID of rak\_sta in all channels

Send: at+scan=0,rak\_sta $r\n$ 

Return: 4F 4B 01 0D 0A

Set wireless password is rakwireless

Send:  $at+psk=rakwireless\r\n$ 

Return: 4F 4B 0D 0A

Module connects the wireless network with SSID of rak\_sta

Send:  $at+connect=rak\_sta\r\n$ 

Return: 4F 4B 0D 0A



Open module DHCP Client, obtain module IP address

Send:  $at+ipdhcp=0\r\n$ 

Return: 4F 4B 9C 44 3D 00 06 52 7F 01 A8 C0 00 FF FF FF 01 01 A8 C0 01 01 A8 C0 00 00 00 00 0D 0A

PC terminal use TCP/UDP tool to establish TCP Sever with local port of 9000, and start up the server. The module terminal establishes TCP Client, and then connects to the TCP Sever of PC terminal

Send: at+tcp=192.168.1.106,9000,25000,0\r\n

Return: 4F 4B 00 0D 0A

TCP Sever of PC terminal sends a string of "abcd" to TCP Client, the module returns

61 74 2B 72 65 63 76 5F 64 61 74 61 3D 00 28 23 6B 01 A8 C0 04 00 61 62 63 64 0D 0A

TCP Client of module terminal sends TCP Sever of PC terminal a string of "ABCD"

Send: at+send\_data=0,9000,192.168.1.106,4,ABCD\r\n

Return: 4F 4B 0D 0A

COMSettings	COM port data receive
PortNum COM12 -	57 65 6C 63 6F 6D 65 20 74 6F 20 52 41 4B 34 37 33 0D 0A
BaudB 115200 -	at+scan=0, rak_sta
	4F 4B 01 0D 0A
DPaity INUNE	at+psk=rakwireless
DataB 8 🗾	4F 4B OD OA
StopB 1	at+connect=rak_sta
	4F 4B OD OA
🔴 Close	attipdhcp=U
	4F 4B 9C 44 3D 00 06 52 7F 01 A8 C0 00 FF FF FF 01 01 A8 C0
Recv Options	attar=182 168 1 107 8000 25000 0
🔽 Receive to file	4F 4B 00 0D 0A
🔽 Show timestamp	61 74 28 72 65 63 76 5F 64 61 74 61 3D 00 28 23 6B 01 48 CO
🔽 Receive as hex	04 00 61 62 63 64 0D 0A
TReceive pause	at+send_data=0,0,0,4,ABCD
	4F 4B OD OA
Save Clear	
Send Options	
🔽 Data from file	
Auto checksum	
Auto clear input	
Send as hex	
Send cyclic	
Te turnul 100 e e	
THIGLART 100 WZ	at+send_data=0,0,0,4,ABCD
Load Clear	Jeila
👉 COMSettings	Send : 418 Recv : 281 Reset



# <mark>深圳市瑞科慧联科技有限公司</mark> Shenzhen Rakwireless Technology Co., Ltd WISNODE-UART WIFI EVB QUICK START GUIDE

Operate( <u>O</u> ) View( <u>V</u> ) Window	s( <u>W</u> ) Help( <u>H</u> ) Language ×
🗄 🚰 CreateConnn 🔇 CreateServe	🐉 StartServer 😤 😡   😒 Connect 🕱   🛬 DisconnAll   💥 DeleteConn 🎇   🔟   🥫 💂
Properties <b>P</b> ×	▲ Þ ×
- ☐ Client Mode Server Mode Client Mode	DestIP:       Send TAtuoSend Eve 100 ms Send Stop         192.168.1.127       Send Hex Send File Send Received Clear Option BroadOption         DestFort:       25000         V LocalPort       abcd         3000       Type ICP *         AtuoConn       s         Eve 0       ms         Count       Sered Time)         Rec       StopShow Clear Save Option ShowHex         Count       Save (In Time)         ABCD       ABCD
۰ III ا	Sand Sanad (P.C). 0 Paraina Sanad (P.C). 0
	senu speeu(b/s): v Receive speed(b/s): v



# 2.5 Network Configuration

This part mainly introduces several network configurations of RAK473, RAK473 mainly includes three kinds of network configuration modes, that is, AP, WPS and Easyconfig.

# 2.5.1 AP Network Configuration

This section introduces how to use the web page to configure the module to the specified. router under the

AP mode.

Boot information

57 65 6C 63 6F 6D 65 20 74 6F 20 52 41 4B 34 37 33 0D 0A

Start web configuration, the module will establish ap according to the internally stored web parameters, ap name defaults to RAK473 WEB XXXXXX (XXXXXX is module MAC address after six bits).

Send: at+start\_web $r\n$ 

Return: 4F 4B 0D 0A



PC terminal connects module ap to open web page, input 192.168.7.1 to go to the webpage, then enter the user name "admin" and password "admin" to go into the web page.



Z <del>∃</del> RAK LO	GIN 的服务器 192.168.7.1 要求用户名和密码。
浩:此服务器 )基本认证)。	要求以不安全的方式发送您的用户名和密码(没有安全连接
	admin
	●●●●● 同 记住我的凭据

In the network configuration page:

- 1, Slect the Wlan Mode of STA mode
- 2, Click on "Search" to search ap hot spots around the module, and

choose one of the ap for the module connection

- 3, Select AUTO as channel selection mode
- 4, If ap is encrypted, then fill in password of ap
- 5, Select the DHCP Mode of DHCP
- 6, Click "Save", and jump to the next page

			1 2 21
Net Config	Network parameters	ettings:network SSID encryption	and IP
Advance		d lan	
-W Update	Wlan Mode :	I SIA mode	
	SSID	RAK_2. 4GHz	Search
	Which Channel	3 AUTO	
	Encryption Mode	Encrypt	
	PSK	4 <b></b> show	
	DHCP Mode	5 DHCP	
	IP Addr	192. 168. 7. 1	
	NetMask	255, 255, 255, 0	
	Gateway	192. 168. 7. 1	
	DNSsever1	0. 0. 0. 0	
	DNSsever1	0. 0. 0. 0	
		(	5 Save

# 7, Save the Settings

# 8,Starting automatical net-connecting,The module is

# connected to the designated router

Send: at+auto\_connect\r\n

Return: 4F 4B 9C 44 3D 00 06 52 7F 01 A8 C0 00 FF FF FF 01 01 A8 C0 01 01 A8

C0 00 00 00 00 0D 0A 45 52 52 4F 52 FF 0D 0A

COMSettings	COM port data receive
PortNum COM12 💌	57 65 6C 63 6F 6D 65 20 74 6F 20 52 41 4B 34 37 33 0D 0A
BaudR 115200 -	at+auto_connect 4F 4B 9C 44 3D 00 06 52 7F 01 48 C0 00 FF FF FF 01 01 48 C0 01 01
DPaitu NONE -	A8 C0 00 00 00 00 0D 0A 45 52 52 4F 52 FF 0D 0A
DateD 8	
StopB	
🧕 Close	
Recv Options	
🔲 Receive to file	
🔲 Show timestamp	
🔽 Receive as hex	
🔽 Receive pause	
Save Clear	
Send Options	
🔲 Data from file	
🦳 Auto checksum	
🦳 Auto clear input	
Send as hex	
Send cyclic	
Interval 100 ms	at+auto_connect
Load Clear	- Send
🚰 COMSettings	Send: 496 Recv: 414 Reset





In the "advanced management" page, the login account and password can be modified.

RUK	Low Power \	Nifi For IOT	中文 English
Net Config Advance FW Update	Modify login username a	nd password	
	New Password Again Password	admin	
	Module Manage		Save
	Complete configuration operat	tion and inform to the host	Finish

In the "advanced management" page, the login account and password can be modified.

RUK	Low Power Wifi For IOT
Net Config Advance	Upgrade the latest firmware,Please Seriously
FW Update	Current firmware version:1.0.0.17-2.9.4 [ 浏览]
	Start



# 2.5.2 Easyconfig Configuration

This section introduces how to use mobile APP to one-key configure the module to the specified router. And please download RAK47X Config Tool APP from http://www.rakwireless.com.

Step1: The mobile phone connects to the network that module will be connected to. Open RAK47X Config Tool APP, Ssid automatic filling, input Psk:



Step2: Reset wifi module, Send at+easy\_config\r\n, make the module get into configuration status, and "link" indicator light faster flicker:

test - 超级终端 文件(F) 编辑(E) 查看(V) 呼叫(C) イ  〇 協 (20) (20) (20) (20) (20) (20) (20) (20)	传送(T) 帮助(H)
Welcome to RAK476 at+ascii=1 OK at+easy_config OK mac=9C:44:3D:00:06:10 addr=192.168.3.7 mask=255.255.255.0	Open ascii display Send AT command Configure successfu
gw=192.168.3.1 dns1=192.168.3.1 dns2=192.168.3.1	



Step3: Click Connect, start configure:

1.Let phone connect to a network.				
2.Input the password of the network.				
3.Click	C'default' key to let device be in			
4.Click	Connect" to start configure the			
device	e to the network.			
5.If co	nfiged success,it will return the			
MAC	of the device,or return timeout.			
Ssid:	hlink			
Ssid:	hlink			

Step4: If configure successful, APP will return module's mac address:

🚵 🖬 🧐 🖞 🖞 " 🔞 🞓 🔛 🖬 10% 🛙 21:21					
SimpleConfig					
<ol> <li>Let phone connect to a network.</li> <li>Input the password of the network.</li> <li>Click "default" key to let device be in simpleconfig mode.</li> <li>Click "Connect" to start configure the Configured Device</li> </ol>					
9c:44:3d:00:06:10					
ОК					
Psk: 1234567890					
Connect					



# 3. Modification Records

Edition	Author	Date	Modification content
V1.0	Wenyong.tang	2017/01/06	Creating document