

# WF288 Mesh Gateway Application Note

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## WF288 Mesh Gateway Application Note

#### 1. Overview

WF288 MG is an enclosed gateway product for Wi-Fi Mesh network. This product implements the gateway functionality of a Wi-Fi mesh network and serves as a WAN bridge.

## 2. Product Introduction

#### 2.1. Layout:



- Power: When powered on, this indicator light will light up.
- Link: When the system is fully started, this indicator light will light up.
- State: Indicates Wi-Fi Mesh network connection status.



- Reset: Reset button.
- Power: Power input.
- LAN: Ethernet socket.

#### 2.2. Key Features:

- Supports IPV6
- 802.11 a/b/g/n, dual band
- Mesh networking with WF88
- Supports Mesh Gateway
- WPA3 security enabled
- DC5V/1A Input



## 3. Cable Connections

A USB to Type-C data cable provides the voltage input connection. Insert the Type-C connector of the data cable into the Type-C power interface of WF288 MG, and the other end into the DC5V/1A adapter. The "Power" indicator light of WF288 MG is on. Insert the Ethernet cable into the LAN interface of WF288 MG, and the other end into devices such as switches or routers. The yellow and green indicator lights on the Ethernet socket of WF288 MG indicate the network status.

## 4. Parameter Setup

#### 4.1. COM Port

Plug the USB to Type-C data cable into the computer's USB interface. The Ethernet cable does not need to be plugged in. In the Windows operating system, under Control Panel -> Administrative Tools -> Computer Management -> Device Manager -> Ports (COM and LPT), find the "Silicon Labs CP210x USB to UART Bridge (COMx) " device.

4.2. Run "WF88-ConfigureToolPro-Vx.x.x.exe" configuration tool software, as shown below:

🕅 WF88-ConfigureTool-V1.4.0			×
Serial Port Setting			
Set Ver ↓ Update	,	👖 Clos	e
Vonnect Serial Port			



#### 4.3. Port Setup

click the "Serial Port" button, and a serial port settings dialog box will pop up, as shown below:



MF88-ConfigureTool-V1.4.0						
Setu Po Be St Pe Fic	ings COM5 d rate 115200 a bits 8 bits 1 ty None y control None					
Serial Port Setting Open Status	OK	Cancel				-
Connect Serial Port	MQTT Set 📃 💆 Telnet S	et 🚯 Reset	✓ Ping	∛ GetVer	↓ Update	I Close

#### Serial port settings dialog box

In the serial port settings dialog box, Select the corresponding COMx port from the Port dropdown list box, where the COMx port number is consistent with the serial port number recognized in the Device Manager above. Then, click the "OK" button.



## 4.4. Connect

In the main window, click the "Connect" button to open the serial port.

WF88-ConfigureTool-V1.4.0		
root -sh: root: not found [root@Ingenic-g1_1:~]#		
Carial Dark Setting	Devenuelas Catilina	
Onen Status -> COM5     OM5     Omen Status		
Disconnect     Serial Port	Set Ver Upda	te 👖 Close

Open the serial port



## 4.5. Mesh Settings

Click the "Mesh Set" button to open the Mesh Set dialog box:

WF88-ConfigureTool-V	1.4.0	
<pre>;dhcp = 1 indicates th an AP or router or se ;dhcp = 0 indicates th n "[ipv4]" and "[ipv6] dhcp = 0</pre>	hat the mesh terminal(mesh station or mesh gate) obtains an IP address(IPV4 or IPV6) from erver.The AP or router or server responsible for assigning IP addresses ne hat the user needs to manually assign an IP address. Here, the corresponding parameters i ]" need to be filled in according to the values set in "ipver" below.	a i
;ipver = 1 is using I ;ipver = 2 is using I ;ipver = 3 is using I	PV4. Fill in the corresponding parameters in "[ipv4]" below.          Mesh Set       Image: Constraint of the set	
ipver = 3	Node Type: Gate  LoadModule: none	
[ipv4] ;IP address of IPV4 o v4ipaddr = 192.168.1.	Mesh Name: mymesh	
;IP subnet mask for I v4netmask = 255.255.2	Password: 12345678	
;IP gateway for IPV4, v4gateway = 192.168.1	Band: 2.4G Country: India Channel: 1	
[ipv6] ;The IP address of th	DHCP:	
v6ipaddr = fd00:6868: ;IP gateway for IPV6, v6gateway = fd00:6868	IPV4         IPV6           Address:         192 . 168 . 1 . 250           Address:         fd00:6868:6868::250	
[loadmodule] ;tcpmqtt = mqtt, MQTT	Netmask: 255 . 255 . 255 . 0 Subnet Prefix: 64	
;tcpmqtt = tcp, ICP ;tcpmqtt = none, Neit tcpmgtt = none	Gateway: 192 . 168 . 1 . 1 Gateway: fd00:6868:6868::1	
[root@Ingenic-g1_1:~] da15906f3333503e839a7		
[root@Ingenic-g1_1:~]	Save 👖 Qiose	
Serial Port Setting	Parameter Setting	
Open Status ->COM5	Receive Status     Mach Sat    MOTT Sat    Tainat Sat	to 🚺 🗖 Close
✓ Disconnect	Serial Port	

Mesh Set dialog box

For WF288 MG typical settings are:

- Node Type: must select "Gate",
- LoadModule: must select "none"
- DHCP: optional, does not need to be selected

Other parameters should be filled in according to the actual situation. In general, in a physical Wi-Fi Mesh network, only one WF288 MG device is needed as the Gate. "Mesh Name", "Password", "Band", "Country", "Channel", "IP Version" must be the same for all station and gateway nodes in the same network. The IP address cannot be duplicated, but it must be set to the same network segment.



After completion, click the "Save" button to save the settings. The "Successfully saved" dialog box will pop

#### up, as shown below:

WF88-ConfigureTool-V1.4.0	
> ;ipver = 2 is using IPV6. Fill in the corresponding parameters in "[ipv6]" bel	
ow. > ;ipver = 3 is using IPV4 and IPV6. Fill in the corresponding parameters in "[i pv4]" and "[ipv6]" below. > ipver = 3	
> [1pv4] > 1P address of IPV4 Mesh Set > v4_ipaddr = 192.168.	
> J1P subnet mask for > v4netmask = 255.255 Node Type: Gate  LoadModule: NONE	
erver. Mesh Name: Mymesh > v4gateway = 192.168	
<pre>&gt; [ipv6] Password: 12345678</pre>	
> v6ipaddr = fd00:686 Band: 2.4G ▼ WF88-Configure ⊠ ▼ Channel: 1 ▼ ) > j1P gateway for IPV	
erver. DHCP: 🗖 I: Successfully saved. 🔻	
> [loadmodule]	
> ;tcpmqtt = tcp, TC > ;tcpmqtt = none, Ne d and run.	
> tcpmqtt = none > EOF Froot@Lugepic=g1 1:~1	
[root@Ingenic-g1_1:~]	
ig/meshconfig.ini [root@Ingenic-g1_1:~]	
Serial Port Setting Parameter Setting	
	date <u>I</u> Close

In the "Successfully saved" dialog box, click "OK" button, complete parameter settings.

Note: In the main window, click the "Reset" button to restart WF288 MG for the settings to take effect.

## 5. Update Firmware

In WF288 MG firmware versions later than V1.3.0\_20231028, the kernel version of Linux is

"3.10.14\_\_isvp\_swan\_1.0 (gcc version 4.7.2 (Ingenic r2.3.3 2016.12) ) #58 PREEMPT Wed Oct 25

11:24:14 CST 2023", and the firmware update of the application partition is supported.

Using a network cable to connect the WF288 MG to the computer used to update the firmware. The cable can be connected directly or through a switch.

Ensure that the IP address of WF288 MG and the IP address of the computer are in the same network segment. It can be tested through ping, as shown below:



🕅 WF88-ConfigureTool-V1.4.0			8
;ipver = 1 is using IPV4. Fill in the corresponding parameters in "[ipv4]" below. ;ipver = 2 is using IPV6. Fill in the corresponding parameters in "[ipv6]" below. ;ipver = 3 is using IPV4 and IPV6. Fill in the corresponding parameters in "[ipv4]" and "[ipv6]" below. ipver = 3			
<pre>[ipv4] ;IP address of IPV4 of the mesh terminal. v4ipaddr = 192.168.1.252 ;IP subnet mask for IPV4. v4netmask = 255.255.0 ;IP gateway for IPV4,where the gateway is the address of the AP or router or server. v4gateway = 192.168.1.1</pre>			
[ipv6] ;The IP address of the IPV6 of the mesh_terminal_including the subnet prefix v6ipaddr = fd00:6868:6868::252/64 vFing Test v6gateway for IPV6,where the gateway v6gateway = 2001:250:1800:1::1			
<pre>[loadmodule] ;tcpmqtt = mqtt, MQTT is loaded and run ;tcpmqtt = top, TCP client/server app; tcpmqtt = none, Neither MQTT nor TCP of tcpmqtt = none. [root@Ingenic-g1_1:~]# md5sum /system/of fle60681be9d33d5e2818d86c636e72 /system [root@Ingenic-g1_1:~]# cd [root@Ingenic-g1_1:~]# [root@Ingenic-g1_1:~]# ping 192.168.1.80 PING 192.168.1.80: seq=0 ttl=128 time=0.862 ms</pre>			
64 bytes from 192.168.1.80: seq=1 ttl=128 time=0.598 ms 64 bytes from 192.168.1.80: seq=2 ttl=128 time=0.578 ms			
Serial Port Setting			
Image: Content of the section of t	ite	👖 Cla	ose

Ping dialog box

Click the "Update" button, and the "Update App" dialog box will pop up, as shown below:



🕂 WF88-ConfigureTool-V1.4.0			×
;For IPV6, the settings are similar to:ServerIP = 2001:250:1800:1::188 ;For IPV4, the settings are similar to:ServerIP = 192.168.137.188 ServerIP = 2001:250:1800:1::188			
;Set the port number for listening to the IP address(ServerIP parameters above) of the remote server. RemotePortNum = 10000			
;Set local listening protocol type, and client can connect to the "LocalPortNum" through this protocol. ;ListenProtocol = TCP6-LISTEN, Use TCP6 protocol for local port listening ListenProtocol = TCP6-LISTEN			
;Set the port for local listening, and client can connect to the local port through "ListenProtocol" protocol.			
LocalPortNum = 20000 🕅 Update App			
[root@Ingenic-g1_1:~]# md5s 731094ded5023028aDb8d2b6b79 ServerIP address: [root@Ingenic-g1_1:~]# nets netstat: showing only proce			
cd [root@Ingenic-g1_1:~]# OpenFile [root@Ingenic-g1_1:~]# ping PING 192.168.1.80 (192.168.			
64 bytes from 192.168.1.80: 64 bytes from 192.168.1.80: 64 bytes from 192.168.1.80: 64 bytes from 192.168.1.80:			
64 bytes from 192.168.1.80: 64 bytes from 192.168.1.80: seq=5 ttl=128 time=0.478 ms			
192.168.1.80 ping statistics 6 packets transmitted, 6 packets received, 0% packet loss round-trip min/avg/max = 0.377/0.550/0.974 ms [root@Ingenic-g1_1:~]#			
Parameter Setting			
✓ Open Status       ✓ Receive Status         ✓ Disconnect       ④ Serial Port	•	👖 Clos	se

Update App dialog box

Click on the "Server IP address" dropdown list box and select the IP address of the computer that successfully tested communication, as shown below:



🕅 WF88-ConfigureTool-V1.4.0		
64 bytes from 192.168.1.80: seq=48 ttl=128 time=0.510 ms 64 bytes from 192.168.1.80: seq=48 ttl=128 time=0.482 ms		
104 bytes from 192.160.1.00; seq=49 tt=120 time=0.495 ms 164 bytes from 192.168.1.80; seq=50 tt]=128 time=0.485 ms		
64 bytes from 192.168.1.80: seq=51 ttl=128 time=0.609 ms		
64 bytes from 192.168.1.80: seq=52 ttl=128 time=0.451 ms		
64 bytes from 192.168.1.80; seq=53 ttl=128 time=0.455 ms		
04 bytes from 192.160.1.00; seq=04 ttl=120 time=0.900 ms 64 bytes from 192.168 1 80: seq=55 ttl=128 time=0.450 ms		
64 bytes from 192.168.1.80: seq 56 tl=128 time=0.526 ms		
64 bytes from 192.168.1.80: seq=57 ttl=128 time=0.588 ms		
64 bytes from 192.168.1.80: seq=58 ttl=128 time=0.354 ms		
64 bytes from 192.168.1.80: seq=59 ttl=128 time=0.549 ms		
64 bytes from 192.168.1.80:		
64 bytes from 192.168.1.80: 💘 Update App 🛛 🛛 🔀		
64 bytes from 192.168.1.80:		
64 bytes from 192.168.1.80; Server IP address: 192.168.1.80		
64 bytes from 192.100.1.00.		
192.168.1.80 ping stati: OperFile		
66 packets transmitted, 66 ; Open me		
round-trip min/avg/max = 0.		
[rootwingenic_g1_1: ]# hets		
netstat: showing only proce		
netstat: showing only proces		
netstat: showing only proces		
netstat: slowing only procession with own your ID		
netstat, showing only processes with your user ID		
netstat: showing only processes with your user ID		
netstat: showing only processes with your user ID		
netstat: showing only processes with your user ID		
Parameter Setting		
Open Status -> COM5     OR Receive Status	_	
S Mesh Set 🚯 MQTT Set 🖳 Telnet Set 🚺 Reset 🖌 🖌 Ping 💡 Get Ver 📘 🕇 Upda	ite 🧾	Close
Serial Port		

Select Server IP address

Click the "OpenFile" button to open the file selection dialog box and select the firmware with the ".amped" extension that needs to be upgraded, as shown below:



🕅 WF88-ConfigureTool-V1.4.0		• 🔀
192.168.1.80 ping statistics 66 packets transmitted, 66 packets received, 0% packet loss round-trip min/avg/max = 0.312/0.466/0.908 ms [root@Ingenic-g1_1:~]# netstat: showing only processes with your user ID netstat: showing only processes with your user ID		
netstat: showing only proce VUpdate App		
netstat: showing only proce: Server/Paddress: 192.168.1.80		
netstat: showing only proce: OpenFile E:\WF88#58#system\1.5.0-20231222.amped netstat: showing only proce:		
netstat: showing only proce netstat: showing only proce netstat: showing only proce		
netstat: showing only proce netstat: showing only proce netstat: showing only proce		
netstat: showing only processes with your user ID		
netstat: showing only processes with your user ID		
netstat: showing only processes with your user ID		
netstat: showing only processes with your user ID		
Serial Port Setting Parameter Setting		
Open Status -> COM5      Receive Status		
Serial Port	·	Close

#### Firmware selection

Click the "Update" button in the Update App dialog box to start downloading the firmware, as shown below:



🕅 WF88-ConfigureTool-V1.4.0	
192.168.1.80 ping statistics 66 packets transmitted, 66 packets received, 0% packet loss round-trip min/avg/max = 0.312/0.466/0.908 ms [root@Ingenic-g_l:~]# netstat: showing only processes with your user ID netstat: showing only processes with your user ID	
netstat: showing only process with your user in netstat: showing only process With your user in metstat: showing only process Update App	
netstat: showing only proce: netstat: showing only proce: Server IP address: 192.168.1.80	
netstat: showing only proce- netstat: showing only proce-	
netstat: showing only proces netstat: showing only proces netstat: showing only proces netstat: showing only proces	
netstat: showing only processes with your user ID netstat: showing only processes with your user ID	
netstat: showing only processes with your user ID netstat: showing only processes with your user ID	
netstat: showing only processes with your user ID	
Serial Port Setting Parameter Setting	
Open Status -> COM5     Receive Status	
Serial Port	Close

Updating the firmware

The WF88-ConfigureTool will download and update firmware, as shown below:



🕅 WF88-ConfigureTool-V1.4.0	
netstat: showing only processes with your user ID netstat: showing only processes with your user ID cd [root@Ingenic-g1_1:~]# cat /system/etc/config/version	
WF86:HardWare:WF86_VIPU-VIPI, SoftWare:VI.3.U-20231026 U-Boot SPL:2013.07-00014-g7e49a2567-dirtv (Abr 25 2022 - 16:06:41)	
U-Boot:2013.07 (May 15 2023	
Linux:version 3.10.14_isvp Vopate App	) #58 PREEMP
1 Wed OCT 25 11:24:14 CST 2	ver: 409 bui
Id: 82, api: 1060, cap: 0x0	ver. 109, par
acc1340 driver version-Hard	
wpa_supplicant:v2.10 OpenFile E\WF88#58#systemV1.5.0-20231222 amoed	
<pre>[root@Ingenic-g1_1:~]# cd [root@Ingenic-g1_1:~]# kill. [root@Ingenic-g1_1:~]# kill. killall: socat: no process : [root@Ingenic-g1_1:~]# killall -9 wpa_supplicant [root@Ingenic-g1_1:~]# killall -9 wpa_supplicant [root@Ingenic-g1_1:~]# cd [root@Ingenic-g1_1:~]# tftp -g -1 /tmp/WF88#59#systemV1.5.0-20231222.amped.new - V#F80#F67#systemV1 5.0.20231222.amped.new -</pre>	
r Wr86#58#39stemv1.5.U-2U231222.amped 192.165.1.80 WF88#58#cvstemv1.5.U 75%  ************************************	
Serial Port Setting Parameter Setting	
Open Status -> COM5      Receive Status     Mach Set    MOTT Set    Report    Proceed     Proceed     Proceed     Proceed     Proceed	tVor
Serial Port	

Download the firmware

Finally, complete the firmware update, the device will automatically restart, as shown below:



🕅 WF88-ConfigureTool-V1.4.0		
DDRC_REMAP4 0x0f0e0100 DDRC_REMAP5 0x13121110 DDRC_AUTOSR_EN 0x00000000 sdram init finished SDRAM init ok board_init_r image entry point: 0x80100000		
U-Boot 2013.07 (May 15 2023 - 11:13:58)		
Board: ISVP (Ingenic XBurst T31 SoC) DRAM: 64 MiB Ten of DNU woold for U Boot		
Reserving 444k for U-Boot a 🏆 Update App		
Reserving 32784k for malloc Reserving 32 Bytes for Boar Server (Paddress: 192.168. WF88-ConfigureTool		
Reserving 128k for boot par Stack Pointer at: 81f6bf48 OnenFile ExwEgg#Egg Successfully updated.		
Now running in RAM - U-Boot Control C.AW 000000		
the manufacturer c8 SF: Detected GD25Q128		
*** Warning - bad CRC, using		
In: serial		
out: serial Err: serial		
Net: ====>phy 0:0x243-0xc54 found SPEED:0, DUPLEX:0		
$J_24775-9161$		
□ Serial Port Setting □ □ Parameter Setting		
Open Status ->COM5     Receive Status		
✓ Disconnect     Serial Port         ✓ Disconnect     ④ Serial Port	.e	Close

Successfully updated

# 6. Ordering Information

Part Name	Description
WF288-MG	Wi-Fi mesh gateway
WF288-LB	Wi-Fi and BLE gateway