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WL-245N/H-S

High-Power Industrial WiFi 802.11AC/802.11n/802.11a



Version 1.1.0.1 Oct 15, 2017

User Manual

Your Feedback Please

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WL-245H-S User Manual

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Important Safety Information



WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.



ATTENTION: This manual is intended for qualified service personnel responsible for setting up and servicing these devices. The user must have previous experience with and a basic understanding of electrical terminology, configuration procedures, required equipment, and safety precautions. **Warning**: This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or Non-Hazardous Locations only. EXPLOSION HAZARD - Substitution of Any Components May Impair Suitability for Class I, Division II, Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous. Module must be powered by a Class 2 Power Source.



Warning: The RS-232 serial connector, Ethernet connector and I/O terminal block are not for use in Hazardous Locations; they are only for diagnostics and set-up only.



Warning: When Antenna is installed into ultimate enclosure, it must be threaded to appropriate port to ensure mechanical securement.

Important Notice:

Due to the nature of wireless communications, data transmission and reception can never be guaranteed. Data maybe delayed, corrupted (that is, it may have errors), or be totally lost. Significant delays or losses of data are rare when wireless devices such as Witlinc Technology Wireless products are used in a normal manner with a well-constructed network. Nevertheless, the WL-245H-S should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Witlinc Technology accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using Witlinc Technology products, or for failure of the (WL-245H-S) to transmit or receive such data.

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1.1 About WL-245H-S 802.11AC High-Power Industrial WiFi Module

WL-245H-S wireless communication module is specifically designed for industrial application, the maximum transmit power up to 1 W. It can be widely used in oil & gas, coal, mining, steel, water treatment, new energy and other industries. Field PLC, VFD, DCS and instrumentation can communicate to each other via this module

WL-245H-S wireless communication module is designed based on 802.11ac MIMO technology. Each module has 2 802.3 Ethernet ports, 1 WAN port, 1 LAN port. Systems with different IP segments can be connected via WL-245H-S module.

All interface and LEDs in the front and with the DIN-Rail in the back make the module well suited for the industry application. In order to protect against issues caused by ground loop, optical isolation was designed between the Ethernet port and Serial port.

Features:

- Wireless security policy compliant with centralized management (802.11i), controlling data priority through QoS (802.11e)
- Supports 802.11AC seamless roaming (802.11r), switching time is less than 50ms
- Supports country selection (802.11d)
- Supports Dynamic Frequency Selection (DFS) Space Time Block Coding (STBC)
- Wireless transmission distance 8 to 10 kM
- Wireless rate up to 1.3 Gbps (OFDM) multicast, 3x3 MIMO technology
- > Two 1000Mpbs Ethernet ports with routing capabilities
- Supports WiFi 802.11a/n/ac based on 5.150GHz-5.875Ghz
- Supports routing function, can set static routing table through web server
- > Powerful firewall features, port forwarding, NAT
- Supports simultaneous video surveillance and control system transmission
- -40°C to +70°C industrial outdoor environment, long-term stable operation
- Supports WiVPN

Specifications:

| Specifications | | | | | | | |
|---------------------------------------|---------|--|---------------|------------|------------|-------------|--------------|
| Wireless | | | | | | | |
| Wireless Standard | Support | s IEEE 802.11n, 8 | 02.11h, 802.1 | 1i,802. | 11a, 802.1 | 11g,802.11a | c (Legacy) |
| Channel data rate (802.11a/g/n/ac) | 1300,90 | 1300,900,300,150,54, 48, 36, 24, 18, 12, 9, 6 Mbps | | | | | |
| Frequency band | 5.15 | 50 GHz to 5.850 G | Hz | | 36 to | o 165 | |
| Transmission Power | 0-30 | 0 dBm (802.11ac) | adjustable | | | | |
| Receiver Sensitivity | | · · · · · | RX Spec | ifications | | | |
| Receiver Genativity | | DataRate | Sensitivity | | DataRate | Sensitivity | Tolerance |
| | | 6Mbps | -94dBm | | MCS 0 | -94dBm | ±2dB |
| | | 9Mbps | -94dBm | | MCS 1 | -94dBm | ±2dB |
| | | 12Mbps | -94dBm | | MCS 2 | -92dBm | ±2dB |
| | | 18Mbps | -92dBm | 5GHz | MCS 3 | -88dBm | ±2dB |
| | 802.11a | 24Mbps | -89dBm | 11n/ac | MCS 4 | -84dBm | ±2dB |
| | | 36Mbps | -86dBm | HT20 | MCS 5 | -81dBm | ±2dB |
| | | 48Mbps | -82dBm | | MCS 6 | -78dBm | ±2dB |
| | | 54Mbps | -80dBm | - | MCS 7 | -77dBm | ±2dB |
| | | | | - | MCS 8 | -/4dBm | ±2dB |
| | | MCE 0 | 02dBm | | MCS 9 | -/10BM | ±20B |
| | | MCS 1 | -930Bm | - | MCS 1 | -090Dm | ±2dB +2dB |
| | | MCS 2 | =90dBm | - | MCS 2 | -85dBm | +2dB |
| | | MCS 3 | -85dBm | - | MCS 3 | -81dBm | ±2dB |
| | 5GHz | MCS 4 | -82dBm | 5GHz | MCS 4 | -79dBm | ±2dB |
| | 11n/ac | MCS 5 | -78dBm | 11ac | MCS 5 | -75dBm | ±2dB |
| | H140 | MCS 6 | -77dBm | H180 | MCS 6 | -74dBm | ±2dB |
| | | MCS 7 | -75dBm | | MCS 7 | -72dBm | ±2dB |
| | | MCS 8 | -73dBm | | MCS 8 | -70dBm | ±2dB |
| | | MCS 9 | -71dBm | | MCS 9 | -68dBm | ±2dB |

| Transmit Power | | TX Specifications | | | | | | | | |
|---------------------|--|--|----------------------------|------------------------|-----------|----------|--------------|----------------------------|---------------------------|--------------|
| | | Data Rate | TX Power (per chain) | TX Power (3 chains) | Tolerance | | Data Rate | TX Power (per chain) | TX Power (3 chains) | Tolerance |
| | | 6Mbps | 27dBm | 32dBm | ±2dB | | MCS 0 | 27dBm | 32dBm | ±2dB |
| | | 9Mbps | 27dBm | 32dBm | ±2dB |] | MCS 1 | 26dBm | 31dBm | ±2dB |
| | | 12Mbp | 27dBm | 32dBm | ±2dB | | MCS 2 | 26dBm | 31dBm | ±2dB |
| | | 18Mbp | 27dBm | 32dBm | ±2dB | 5GHz | MCS 3 | 25dBm | 30dBm | ±2dB |
| | 802.11a | 24Mbp | 27dBm | 32dBm | ±2dB | 11n/ac | MCS 4 | 25dBm | 30dBm | ±2dB |
| | | 48Mbp | 25dBm | 30dBm | ±2dB | HT20 | MCS 6 | 24dBm | 29dBm | ±2dB |
| | | 54Mbp | 24dBm | 29dBm | ±2dB | 1 | MCS 7 | 23dBm | 28dBm | ±2dB |
| | | | | | |] | MCS 8 | 23dBm | 28dBm | ±2dB |
| | | | | | | | MCS 9 | 22dBm | 27dBm | ±2dB |
| | | MCS 0 | 27dBm | 32dBm | ±2dB | - | MCS 0 | 27dBm | 32dBm | ±2dB |
| | | MCS 1 | 26dBm | 310Bm | ±20B | | MCS 1 | 26dBm | 310BM | ±20B |
| | | MCS 3 | 25dBm | 30dBm | +2dB | | MCS 3 | 26dBm | 31dBm | +2dB |
| | 5GHz | MCS 4 | 25dBm | 30dBm | ±2dB | 5GHz | MCS 4 | 26dBm | 31dBm | ±2dB |
| | 11n/ac | MCS 5 | 25dBm | 30dBm | ±2dB | 11ac | MCS 5 | 25dBm | 30dBm | ±2dB |
| | 11140 | MCS 6 | 24dBm | 29dBm | ±2dB | 11100 | MCS 6 | 25dBm | 30dBm | ±2dB |
| | | MCS 7 | 23dBm | 28dBm | ±2dB | | MCS 7 | 24dBm | 29dBm | ±2dB |
| | | MCS 8 | 23dBm | 28dBm 27dBm | ±2dB | - | MCS 8 | 23dBm 22dBm | 28dBm | ±2dB +2dB |
| Sofoty | 64/ | 100 hi | | Virod Eq | | |) | LEGDIN | 270011 | -200 |
| Salety | WP | A & W | PA-PSK | &WPA2 | -PSK(W | i-Fi Pro |) otected | d Access) |) | |
| | MA | C ID fi | Iter | | | | | | | |
| Hardware Datasheet | T | | | | | | | | | |
| Weight | 1.2 | 1.2 lbs (543g) | | | | | | | | |
| Installation Method | Alu | Aluminum DIN rail | | | | | | | | |
| Ports | 2×F | 2xRJ45 (10/100/1000Mbps) ,3xSMA,1xDB9,1xRs485,2xDO | | | | | | | | |
| Temperature | Work: -40°C - 70°C / Storage: -40°C - 85°C | | | | | | | | | |
| Relative Humidity | 95% | 6 (wi | thout cor | ndensatio | on) | | | | | |
| Impact | IEC | 6006 | 8 2-6 (20 | g, 3-Axis | 5) | | | | | |
| Vibration | IEC 60068 2-27 (5g, 10Hz to 150Hz) | | | | | | | | | |
| Voltage | 9-3 | 6 VDC | ; | | | | | | | |
| Power | Wo | rk: 130 |)mA@24 | VDC | | | | | | |
| | Max | V. 250 | m A @ 24\ | | | | | | | |
| | ivia | x. 200 | IIA@24 | | | | | | | |
| | Ave | erage: | 160mA@ | 12VDC | | | | | | |
| Certification | CE | 、RoH | IS、FCC | | | | | | | |

802.11 AC Data Rate (Mbit/s)

| MCS | Spatial | Modulation | Data rate (in Mbit/s) | | | | | |
|-------|---------|------------|-----------------------|-----------|-----------|-----------|-----------------|-----------|
| index | Streams | type | 20 MHz | channels | 40 MHz (| channels | 80 MHz channels | |
| | | | 800 ns GI | 400 ns GI | 800 ns GI | 400 ns GI | 800 ns GI | 400 ns GI |
| 0 | 1 | BPSK | 6.5 | 7.2 | 13.5 | 15 | 29.3 | 32.5 |
| 1 | 1 | QPSK | 13 | 14.4 | 27 | 30 | 58.5 | 65 |
| 2 | 1 | QPSK | 19.5 | 21.7 | 40.5 | 45 | 87.8 | 97.5 |
| 3 | 1 | 16-QAM | 26 | 28.9 | 54 | 60 | 117 | 130 |
| 4 | 1 | 16-QAM | 39 | 43.3 | 81 | 90 | 175.5 | 195 |
| 5 | 1 | 64-QAM | 52 | 57.8 | 108 | 120 | 234 | 260 |
| 6 | 1 | 64-QAM | 58.5 | 65 | 121.5 | 135 | 263.3 | 292.5 |
| 7 | 1 | 64-QAM | 65 | 72.2 | 135 | 150 | 292.5 | 325 |
| 8 | 1 | 256-QAM | 78 | 86.7 | 162 | 180 | 351 | 390 |
| 9 | 1 | 256-QAM | N/A | N/A | 180 | 200 | 390 | 433.3 |
| 0 | 2 | BPSK | 13 | 14.4 | 27 | 30 | 58.5 | 65 |
| 1 | 2 | QPSK | 26 | 28.9 | 54 | 60 | 117 | 130 |
| 2 | 2 | QPSK | 39 | 43.3 | 81 | 90 | 175.5 | 195 |
| 3 | 2 | 16-QAM | 52 | 57.8 | 108 | 120 | 234 | 260 |
| 4 | 2 | 16-QAM | 78 | 86.7 | 162 | 180 | 351 | 390 |
| 5 | 2 | 64-QAM | 104 | 115.6 | 216 | 240 | 468 | 520 |
| 6 | 2 | 64-QAM | 117 | 130.3 | 243 | 270 | 526.5 | 585 |
| 7 | 2 | 64-QAM | 130 | 144.4 | 270 | 300 | 585 | 650 |
| 8 | 2 | 256-QAM | 156 | 173.3 | 324 | 360 | 702 | 780 |
| 9 | 2 | 256-QAM | N/A | N/A | 360 | 400 | 780 | 866.7 |
| 0 | 3 | BPSK | 19.5 | 21.7 | 40.5 | 45 | 87.8 | 97.5 |
| 1 | 3 | QPSK | 39 | 43.3 | 81 | 90 | 175.5 | 195 |

6

| 2 | 3 | QPSK | 58.5 | 65 | 121.5 | 135 | 263.3 | 292.5 |
|---|---|---------|-------|-------|-------|-----|-------|-------|
| 3 | 3 | 16-QAM | 78 | 86.7 | 162 | 180 | 351 | 390 |
| 4 | 3 | 16-QAM | 117 | 130 | 243 | 270 | 526.5 | 585 |
| 5 | 3 | 64-QAM | 156 | 173.3 | 324 | 360 | 702 | 780 |
| 6 | 3 | 64-QAM | 175.5 | 195 | 364.5 | 405 | N/A | N/A |
| 7 | 3 | 64-QAM | 195 | 216.7 | 405 | 450 | 877.5 | 975 |
| 8 | 3 | 256-QAM | 234 | 260 | 486 | 540 | 1053 | 1170 |
| 9 | 3 | 256-QAM | 260 | 288.9 | 540 | 600 | 1170 | 1300 |

1.2 Package Contents

The following components are included with the WL-245H-S, and are required for installation and configuration.



Important: Before beginning the installation, please verify that all of the following items are present

| Qty | Part No. | Part Name | PART DESCRIPTION |
|-----|-----------|-----------------------|--|
| | | | 802.11ac Industrial Wireless Router with |
| 1 | WL-245H-S | Industrial WiFi Modem | High Output Power (Max 30dB) |
| 1 | WL-2502-0 | 2.4GHz/5GHz Antenna | 2.4GHz/5GHz 2dBi Omni Antenna |
| 1 | WL-003T-A | 3-pin Power Plug | Mating connector used for attachment |
| | | | to customer's power supply |
| 1 | WL-010T-A | 6-pin IO Plug | Mating connector used for attachment |
| | | | to customer's IO Signal and Rs485 |

If any of these components are missing, please contact WitLinc Technology Support for replacement parts.

1.3 System Requirements

The following system requirements are the recommended minimum specifications to successfully install and run:

Software Requirement:

Operating system:

Microsoft Windows XP Professional with Service Pack 1 or 2 Microsoft Windows 7 Professional (32-or 64-bit) Microsoft Windows 8 Professional/Enterprise Microsoft Windows 10 Enterprise Microsoft Windows 2000 Professional with Service Pack 1, 2, or 3 Microsoft Windows Server 2003/2008/2012

Internet Explore

Internet Explorer 6.0 Internet Explorer 8.0 Google Chrome Mozilla Firefox

Hardware Requirement:

Ethernet hub with standard RJ45 Ethernet cable or Ethernet port with RJ45 crossover cable for direct connection to module

A Computer with RJ45 Ethernet port

128 Mbytes of RAM minimum, 256 Mbytes of RAM recommended

100 Mbytes of free hard disk space (or more based on application requirements) 256-color VGA graphics adapter, 800 x 600 minimum resolution (True Color 1024 x 768

1.4 Power Requirements

recommended)

The WL-245H-S accepts voltages between 9 and 30 VDC, with an average power draw of 9 watts or less. A detachable power connector comes with the radio, as shown below.

The connector terminals are labeled + (positive DC connection) GND (ground connection) - (negative DC connection).

The AC-to-DC power supply adapter may be used. DC power wires must be less than 2 meters in length to meet regulatory requirements.



Important: When wiring the power connector, be sure to observe the proper polarity markings on the power connector. Improper connector wiring can cause serious damage to the WL-430T-A which will not be covered under the Witlinc Technology Warranty.

2 Webpage Configuration

The configuration webpage is used to configure and manage the WL-245H-S. Since the webpage can be accessed remotely as well as local, the WL-245H-S can be configured from any location.

Key benefits of the web based configurator include:

- Login and configure devices parameters
- Connection Status
- Interface Configurations
- Wireless Configurations

2.1 Login Webpage Configuration

1. The default IP address of the WL-245H-S is 192.168.1.1. And DHCP Server is Enable, normally, your PC will be get an IP address which the modem assigned automatically. If your PC did not receive the IP address, please temporarily set the IP address of your PC to 192.168.1.xxx with a subnet of 255.255.255.0.

| Internet Protocol Version 4 (TCP/IPv4) F | Properties ? X | | | | | |
|---|---------------------|--|--|--|--|--|
| General | | | | | | |
| You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings. | | | | | | |
| Obtain an IP address automatically | / | | | | | |
| Output Use the following IP address: | | | | | | |
| IP address: | 192 . 168 . 1 . 100 | | | | | |
| Subnet mask: | 255 . 255 . 255 . 0 | | | | | |
| Default gateway: | · · · | | | | | |
| Obtain DNS server address automa | atically | | | | | |
| • Use the following DNS server addresses: | | | | | | |
| Preferred DNS server: | | | | | | |
| Alternate DNS server: | | | | | | |
| Validate settings upon exit | | | | | | |
| | OK Cancel | | | | | |

2. Open the Internet Explorer and enter the WL-245H-S default IP address of 192.168.1.1

| G Witlinc - Windows Internet Explorer | |
|---------------------------------------|-------------------------------|
| | 🔹 🗟 🔶 🗙 🔑 Bing |
| 🚖 Favorites 🛛 🚖 | |
| 🏉 Witlinc | 🟠 🔻 🔝 👻 🖃 🗰 👻 Page 👻 Safety 🕶 |

3. Once the WL-245H-S Login Webpage opens, enter the **USERNAME** and **PASSWORD** to login.

| Username witlinc Password ••••• | Username <mark>witlinc</mark> Password ••••• | Authorizat | rname and password. |
|------------------------------------|---|------------|---------------------|
| Password ••••• | Password | | u itline |
| | | Disername | ••••• |
| | | , assirera | |

The default Username is "witlinc", and the default Password is "admin".

4. After successful login, the main configuration webpage will be displayed.

| WitLinc® | | AUTO REFRESH ON |
|--|--|-----------------|
| Status System System | System Here you can configure the basic aspects of your device like its hostname or the timezone. | |
| Administration Time Synchronisation | System Properties | |
| Reboot | General Settings Logging | |
| Services | Local Time Fri Apr 21 06:03:42 2017 SYNC WITH BROWSER | |
| Network | Hostname Witlinc | |
| Logout | Timezone America/Vancouver • | |

2.2 Setup the WL-245H-S IP address

1. Scroll down your mouse to the *Network,Interface*, and choose *LAN*, then click *EDIT*.

| WitLinc [®] | | | AUTO REFRESH O |
|--|--|---|--------------------------|
| Status | WAN WANG LAN | | |
| System Network | Interfaces | | |
| Interfaces Wifi DHCP and DNS | Interface Overview | | |
| Hostnames | Network | Status | Actions |
| Static Routes Firewall Diagnostics | LAN S ⁽ (******) br-lan | Uptime: 0h 5m 17s MAC-Address: 00:02:2A:07:7F:48 RX: 11621 KB (1528 Pits.) TX: 284.04 KB (963 Pits.) IPv6: 192:693:08:48(4:1/60 | CONNECT STOP EDT DELETE |
| Serial | WAN eth0.2 | Uptime: 0h 0m 0s MAC-Address: 00:02:2A:07:7F:49 RX: 0.00 B (0 Pkts.) TX: 38.17 KB (123 Pkts.) | CONNECT STOP EDIT DELETE |
| <u>Logout</u> | WANG 21 eth0.2 | Uptime: 0h 0m 0s MAC-Address: 00:02:2A:07:7F:49 RX: 0.00 B (0 Pkts.) TX: 38.17 KB (123 Pkts.) | CONNECT STOP EDIT DELETE |
| Model Name: WL-245H-S Hostname: Witlinc Software Reversion: 01.18.05 | ADD NEW INTERFACE | | |
| | Global network opti | ons | S + ·, © . |

| WitLinc® | AUTO REFRESH ON |
|--|--|
| Status | |
| System | Interfaces - LAN |
| Network | On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and enter the names of several network interfaces separated by space. You can also use VIAN notation DURPEUE VIAND (e.g. etc. 1) |
| Interfaces | en e |
| DHCP and DNS | Common Configuration |
| Hostnames | General Setup Physical Settings Firewall Settings |
| Static Routes Firewall Diagnostics Serial | Status Uptime: 0h 6m 0s MAC-Address: 0002:2A:07:7F:48 PR: R1:13/14 KB (1689 Pk/s.) br-lan TX: 34:33 KB (1115 Pk/s.) I/Puef: Ide&s39b:8418:1/60 |
| | Protocol Static address |
| Logout | IPv4 address 192.168.1.1 |
| Model Name: WI -245H-S | IPv4 netmask 255.255.255.0 |
| Hostname: Witlinc Software Reversion: 01.18.05 | IPv4 gateway |
| | IPv4 broadcast |
| | Use custom DNS servers |

2. Enter the **IPv4 address**, **IPv4 netmask** and **IPv4 gateway** to be assigned to the WL-245H-S. You will not need to edit the **IPv4 broadcast** and **DNS server** of the parameters at this time.

3. Click Save & Apply. The module will automatically reboot.

4. Once the reboot is complete, the module's IP address will be changed to the address which you set.

5. Close your browser and open a new session. Enter the new IP address of the WL-245H-S to access the configuration webpage.

2.3 Setup WL-245H-S as WiFi-Master

2.3.1 Setup the WiFi Device Configuration

To get started let's go to the wifi configuration page. We can get to it by going to the "Network" menu on the top of the page and selecting the "Wifi" item.

| System | | |
|---------------|---|---------------------|
| Services | Wireless Overview | |
| Network | | |
| Interfaces | | |
| Wifi | 802.11AC wireless network adapter Channel: 157 (5.785 GHz) Bitrate: ? Mbit/s | SCAN ADD |
| DHCP and DNS | SSID: Witting Mode: Master | |
| Hostnames | 0% BSSID: 04:F0:21:29:D1:72 Encryption: None | DISABLE EDIT REMOVE |
| Static Routes | | |
| Diagnostics | | |

After click the Wifi item, the above picture will appear, You'll notice the buttons next to each of the networks. These buttons allow us to enable the network, edit the network's settings or remove the network. In our case, we're going to want to edit the network settings. Click the **"Edit"** button on the top-most on the page.

| WitLinc | AUTO REFRESH ON |
|--|--|
| Status | Device Configuration |
| System | General Setup Advanced Settings |
| Services | Status BSD: 04/51/2 SD: 12/2 Encryption: None BSD: 04/52/2 30/51/2 / Encryption: None 0% Channel: 157 (5/78 5/Hz) / Ta-Power: 23 dBm |
| Network | Birrate: co Birly iose: -93 dam Birrate: co Birly iose: -93 dam |
| Interfaces | Wireless network is enabled DISABLE |
| Wifi | Mode Channel Width |
| DHCP and DNS | Operating frequency AC • 161 (805 MHz) • 80 MHz • |
| Hostnames | Legacy |
| Static Routes | Transmit Power AC 9 mW) Transmit Power |
| Diagnostics | a dem- |
| Firewall | |
| QoS | |
| Serial | Interface Configuration |
| Logout | General Setup Wireless Security MAC-Filter |
| Logout | ESSID Witlinc |
| Model Name: WL-245H-S Hostname: Witlinc | Mode Access Point • |
| Software Reversion: 01.21.05 | • Network a las *** a a |

We're at the configuration page for our wifi network. From this page, you can control advanced settings for the wifi network. Feel free to scan through the settings, they're pretty interesting if you want to learn more about . Most importantly for our purposes, we can set up the security for our wifi network. Additionally at the top you'll see some tabs. Each tab contains the settings for one of the wifi networks on the router. In our case, the first one should be selected.

Now the device Configuration-General Setup will be selected.

Enable/disnable: Enable or Disable the Wireless network

Operating Frequency:

Mode: Selects the wireless protocol to use, 802.11AC or 802.11 N, the legacy is only for 802.11a.

802.11ac:IEEE 802.11ac is a wireless networking standard in the 802.11 family (which is marketed under the brand name Wi-Fi), developed in the IEEE Standards Association, providing high-throughput wireless local area networks (WLANs) on the 5 GHz band. Maximum net data rate from 54Mbit/s to 1300Mbit/s, wider RF bandwidth (up to 80 MHz)

Channel: Based on 5.0GHz - 5.875GHz

802.11n: IEEE 802.11n-2009, commonly shortened to 802.11n, is a wirelessnetworking standard that uses multiple antennas to increase data rates. Sometimes referred to as MIMO, which stands for "multiple input and multiple output", it is an amendment to the IEEE 802.11-2007 wireless-networking standard. Its purpose is to network throughput over the two previous improve standards-802.11a and 802.11g—with a significant increase in the maximum net data rate from 54 Mbit/s to 600 Mbit/s (slightly higher gross bit rate including for example errorcorrection codes, and slightly lower maximum throughput) with the use of four spatial streams at a channel width of 40 MHz. 802.11n standardized support for multiple-input multiple-output, frame aggregation, and security improvements, among other features. It can be used in the 2.4 GHz or 5 GHz frequency bands.WL-245H-S only support 5GHz Frequency bands.

Width: Specifies the channel width in 802.11n and 802.11ac mode, HT20, HT40, HT80

HT80 only for 802.11ac

Channel: Specifies the wireless channel to use. "auto" defaults to the lowest available channel. Use specific channels, when channel is in "auto" mode. This option allows hostapd to select one of the provided channels when a channel should be automatically selected.



Transmit Power: Specifies the transmission power in dBm 0-30dBm (0-1000mw)

| Status Status Viele Viele Viele Viele Viele Status Viele Status Viele | | | | | |
|--|--|------------------------------------|---|----------------------------------|--|
| sterm i interfaces network is enabled interface interfaces i interface | tatus | Status | BSSID: 04:F0:21:32:29:28 Encryption: None | | |
| Wineless network is enabled DisABLE DeCP and DNS Virieless network is enabled Static Routes 11 dBm (12 mW) Disposition 11 dBm (12 mW) 13 dBm (19 mW) 10 dBm (25 mW) Firewall 11 dBm (25 mW) QoS Interface Configuration riral General Setup Wireless Security 20 dBm (19 mW) 2 dBm (19 mW) 10 dBm (25 mW) 10 dBm (25 mW) 10 dBm (25 mW) 10 dBm (25 mW) 10 dBm (25 mW) 11 dBm (19 mW) 10 dBm (25 mW) 12 dBm (19 mW) 10 dBm (25 mW) 14 dBm (25 mW) 10 dBm (25 mW) 14 dBm (26 mW) 10 dBm (26 mW) 14 dBm (27 mW) 20 dBm (19 mW) 14 dBm (27 mW) 20 dBm (19 mW) 14 dBm (27 mW) 20 dBm (19 mW) 14 dBm (27 mW) < | vstem | | Channel: 157 (5.785 GHz) Tx-Power: 23 dBm 0% Signal: 0 dBm Noise: -103 dBm | | |
| Will Wireless network is enabled DEKREE Will Interfaces Node Channel Width DPGP and DNS Operating frequency AC 157 (5785 MHz) + 80 MHz + DSGP and DNS Transmit Power 23 dBm (199 mW) • 11 dBm (12 mW) • 11 dBm (25 mW) • DSGP and DNS 11 dBm (25 mW) • • Dispositions 11 dBm (25 mW) • • Dispositions 14 dBm (26 mW) • • General Setup Wireless Security M2 dBm (198 mW) • 19 dBm (79 mW) • • • 19 dBm (79 mW) • • • • 19 dBm (79 mW) • • • • • 19 dBm (79 mW) 20 dBm (198 mW) • • • • • 19 dBm (79 mW) • 20 dBm (198 mW) • • • • • • • • • • • • • • < | etwork | | Bitrate: 0.0 Mbit/s Country: 05 | | |
| Mdl Operating frequency AC • 167 (5785 MHz) + 80 MHz + MB UPCP and DNS Transmit Power 23 dBm (199 mW) • Houtbarnes 11 dBm (12 mW) • • Static Koures 13 dBm (19 mW) • • Diagnostics 13 dBm (19 mW) • • Final 15 dBm (33 mW) • • General Setup Wireless Security MA 20 dBm (16 mW) • 20 dBm (10 mW) 12 dBm (25 mW) • • • gould General Setup Wireless Security MA 20 dBm (10 mW) • 20 dBm (100 mW) 21 dBm (25 mW) • • • • gould 20 dBm (19 mW) • • • • 20 dBm (19 mW) 21 dBm (25 mW) • • • • 20 dBm (19 mW) • • • • • • • • • • • • • • • • <t< td=""><td></td><td>Wireless network is enabled</td><td>DISABLE</td><td></td></t<> | | Wireless network is enabled | DISABLE | | |
| With an operating frequency AC • 157 (5785 MHz) • 80 MHz • DHCP and DNS. Transmit Power 288m (199 mW) • Static Routes 11 dBm (12 mN) • • Static Routes 13 dBm (19 mW) • • Diagnostics 14 dBm (25 mW) • • 16 dBm (31 mW) • • • 066 Interface Configuration 17 dBm (50 mW) • 17 dBm (50 mW) • • • 066 Interface Configuration • • • 17 dBm (50 mW) • • • • 066 • • • • • 067 • • • • • • 068 • • • • • • • 069 • • • • • • • • • • • • • • • • • <td>interfaces</td> <td></td> <td>Mode Channel Width</td> <td></td> | interfaces | | Mode Channel Width | | |
| Interface Configuration Transmit Power 23 dBm (199 mW) • Static Routes 11 dBm (12 mW) • Static Routes 13 dBm (19 mW) • Static Routes 14 dBm (25 mW) • Static Routes 16 dBm (31 mW) • Static Routes 20 dBm (100 mW) 20 dBm (100 mW) 20 dBm (100 mW) 20 dBm (100 mW) 20 dBm (100 mW) 20 dBm (100 mW) 20 dBm (100 mW) • 20 dBm (100 mW) | Mifi | Operating frequency | AC • 157 (5785 MHz) • 80 MHz • | | |
| Hostnames Transmit Power 35 bill (199 mW) I Static Routes 11 dBm (12 mW) 12 dBm (15 mW) Static Routes 13 dBm (19 mW) 12 dBm (15 mW) Japonstics 14 dBm (25 mW) 14 dBm (25 mW) Japonstics 14 dBm (25 mW) 14 dBm (25 mW) Japonstics 14 dBm (25 mW) 14 dBm (25 mW) Japonstics 14 dBm (25 mW) 14 dBm (25 mW) Japonstics 14 dBm (25 mW) 14 dBm (25 mW) Japonstics 14 dBm (25 mW) 14 dBm (25 mW) Japonstics 12 dBm (25 mW) 20 dBm (100 mW) Japonstics 14 dBm (25 mW) 20 dBm (100 mW) Japonstics 20 dBm (19 mW) 20 dBm (100 mW) Japonstics 20 dBm (19 mW) 20 dBm (100 mW) Japonstics 20 dBm (100 mW) 20 dBm (100 mW) Japonstics 20 dBm (100 mW) 20 dBm (100 mW) Japonstics 20 dBm (100 mW) 20 dBm (100 mW) Japonstics 20 dBm (100 mW) 20 dBm (100 mW) Japonstics 20 dBm (100 mW) 20 dBm (100 mW) <t< td=""><td>OHCP and DNS</td><td></td><td>00 - Em (400</td><td></td></t<> | OHCP and DNS | | 00 - Em (400 | | |
| itatic Routes 12 dBm (15 mV) * Apagnotics 13 dBm (19 mV) 14 dBm (25 mV) irenall 15 dBm (19 mV) 16 dBm (35 mV) iso 14 dBm (25 mV) 16 dBm (35 mV) ial General Setup Wireless Security 20 dBm (10 mV) 20 dBm (10 mV) 25 dBm (12 mV) 22 dBm (15 mV) 20 dBm (15 mV) 23 dBm (15 mV) 23 dBm (15 mV) 20 dBm (15 mV) 23 dBm (15 mV) 23 dBm (15 mV) 20 dBm (15 mV) 23 dBm (15 mV) 23 dBm (15 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) 24 dBm (25 mV) | lostnames | Transmit Power | 23 dBm (199 mW) • | | |
| Interface Configuration 13 dbm (19 mW) ide 14 dbm (25 mW) ide 16 dbm (31 mW) ide Interface Configuration ide General Setup Wireless Security MA idem (18 mW) 15 dbm (12 mW) idem (18 mW) 16 dbm (31 mW) idem (18 mW) 16 dbm (12 mW) idem (18 mW) 20 dbm (10 mW) 20 dbm (10 mW) | tatic Routes | | 12 dBm (15 mW) | | |
| If dBm (31 mW) If dBm (33 mW) Interface Configuration Interface Configuratinterface Configuration <th colsp<="" td=""><td>Nannostics</td><td></td><td>13 dBm (19 mW) 14 dBm (25 mW)</td><td></td></th> | <td>Nannostics</td> <td></td> <td>13 dBm (19 mW) 14 dBm (25 mW)</td> <td></td> | Nannostics | | 13 dBm (19 mW) 14 dBm (25 mW) | |
| internation 16 dbm (39 mW) biols Interface Configuration 17 dbm (60 mW) ial General Setup Wireless Security 19 dbm (79 mW) iout 2 dbm (12 mW) 2 dbm (12 mW) iout 2 dbm (12 mW) 2 dbm (12 mW) iout 2 dbm (12 mW) 2 dbm (12 mW) iout 2 dbm (12 mW) 2 dbm (12 mW) iout 2 dbm (12 mW) 2 dbm (12 mW) 2 dbm (13 mW) 2 dbm (13 mW) 2 dbm (15 mW) 2 dbm (13 mW) 2 dbm (13 mW) 2 dbm (15 mW) 2 dbm (15 mW) 2 dbm (15 mW) 2 dbm (15 mW) 2 dbm (15 mW) 2 dbm (15 mW) 2 dbm (15 mW) | in a second | | 15 dBm (31 mW) | | |
| Josh Interface Configuration 16 dam (83 mW) 19 dam (73 mW) 19 dam (73 mW) ial General Setup Wireless Security 20 dam (100 mW) 20 dam (120 mW) jout Security Wireless Security 24 dam (128 mW) 24 dam (128 mW) del Name: WL-245H-5 Vireless Security Made main (100 mW) 24 dam (128 mW) del Name: WL-245H-5 Vireless Security Made main (100 mW) 24 dam (128 mW) | a cylai | | 16 dBm (39 mW) 17 dBm (50 mW) | | |
| ial 19 dbm / 79 mW) General Setup Wireless Security 20 dbm (100 mW) 20 dbm (100 mW) 20 dbm (158 mW) 20 dbm (158 mW) 100Lf £550 23 dbm (159 mW) 64 Name: WL-245H-5 Mode 24 dbm (168 mW) | <u>jo</u> 5 | Interface Configuration | 18 dBm (63 mW) | | |
| General Setup Wireless Security MA 21 dBm (125 mW) 22 dBm (158 mW) 22 dBm (158 mW) 22 dBm (158 mW) 20ut 8530 Z dBm (198 mW) 24 dBm (251 mW) 24 dBm (251 mW) 24 dBm (251 mW) 24 dBm (251 mW) del Name: WL-245H-5 24 dBm (251 mW) 24 dBm (251 mW) | ial | | 19 dBm (79 mW) 20 dBm (100 mW) | | |
| iout ESID 2 3 dBm (198 mW) 24 dBm (258 mW) 24 dBm (251 mW) 24 dBm (251 mW) 26 dBm (358 mW) 26 dBm (350 mW) 26 dBm (350 mW) | | General Setup Wireless Security MA | 21 dBm (125 mW) | | |
| 10011 24 46 m (25 mW) 24 46 m (25 mW) 25 46 m (38 mW) 26 46 m (38 mW) 26 46 m (38 mW) 26 46 m (38 mW) 27 46 m (50 mW) 27 46 m (50 mW) | | ESSID | 22 dBm (158 mW) 23 dBm (100 mW) | | |
| Mode 25 dBm (316 mW) del Name: WL-245H-5 27 dBm (50 mW) | lout | | 24 dBm (251 mW) | | |
| del Name: WL-245H-5 27 dBm (500 mW) | | Mode | 26 dBm (316 mW) | | |
| | del Name: WL-245H-S | | 27 dBm (501 mW) | | |
| tname: Witline Network 28 dBm (630 mW) | tname: Witlinc | Network | 28 dBm (630 mW) | | |
| | | | 30 dBm (1000 mW) | | |

Recommended Configuration: → High Throughput: Mode: 801.11ac Transmit Power: 30dBm Width:HT80 Channel:149 → Long-Range > 2km Mode:802.11n Transmit Power: 30dBm Width:HT20 Channel:36

2.3.2 Setup the WiFi interface Configuration

Finished the Deive Configuration-General Setup, Scroll down the configuration webpage you can see the **interface Configuration**, let us set up the **General Setup** first, From this page, you can setup the ESSID, Wireless mode and Network area;

| WitLinc® | | AUTO REFRESH |
|--|-----------------------------------|--|
| Status | | |
| System | Interface Configuration | |
| Vetwork | General Setup Wireless Security M | JAC-Filter |
| Wifi | ESSID | WitLinc |
| DHCP and DNS | Mode | Access Point • |
| Hostnames Static Routes Firewall Diagnostics Serial | Network | Access Point Client Ad-Hoc 802.11s Pseudo Ad-Hoc (ahdemo) Monitor Access Point (WDS) Client (WDS) Client (WDS) |
| .ogout | | € Choose the network(s) you want to attach to this wireless interface or fill out the <i>create</i> field to define a new network. |
| Model Name: WL-245H-S Hostname: Witlinc Software Reversion: 01.18.05 | Hide <u>ESSID</u> | |
| | WMM Mode | 8 |

ESSID: extended service sets (ESS) are logical units of one or more basic service sets on the same logical network segment, In IEEE 802.11 wireless local area networking standards, a service set is a group of wireless network devices that are operating with the same networking parameters. There is formally no such thing as an 'ESSID' in 802.11 standards. In 802.11 standard documents, the logical network (ESS or independent-BSS) service set identifier is simply abbreviated 'SSID', irrespective of whether an SSID identifies an infrastructure-BSS's ESS, or the peer-to-peer network of an independent-BSS. Unlike basic service set identifiers, SSIDs are usually customizable. These SSIDs can be zero to 32 octets (32 bytes) long, and are, for convenience, usually in a natural language, such as English. (i.e Witlinc)

<u>Notice: To associate with a WiFi wireless network, a station must know the</u> <u>network's SSID, and every client must set the same ESSID like the master Access</u> <u>Point(AP).</u>

Mode: if the module is a master station in the wireless network, this item need to be set to Access Point or Access Point(WDS).

Network: Specifies the network interface to attach the wireless to. if the module is a master station, we need to bridge the wireless network to the LAN of the device.

Hide ESSID: if this check box is selected, the other wireless module can not scan the wireless network name of the master station. Turns off SSID broadcasting can improve the security of the WLAN.

WMM Mode: Enables WMM (802.11e) support. Required for 802.11n support.

2.3.3 Setup the WiFi Wireless Security

Let's set our wifi password now. The wifi password settings are in **"Wireless Security"** in the **"Interface Configuration"** section about halfway down the page. Click "Wireless Security".

Next you should see a drop down box titled **"Encryption"**. We want to select **"WPA2-PSK"** in the drop down box.

| VitLinc® | | | UNSAVED CHANGES: 1 AUTO REFRE |
|--|---|---|-------------------------------|
| itus | | BSSID: 04:10:21:32:29:28 Encryption: None Channel: 157 (5:785 GHz) Tx-Power: 23 dBm 0% Signal: 0 dBm Noise: -103 dBm Bitrate: 0.0 Mbit/s Country: US | |
| stem | Wireless network is enabled | DISABLE | |
| work | Operating frequency | Mode Channel Width AC • 157 (5785 MHz) • 80 MHz • | |
| | Transmit Power | 23 dBm (199 mW) 🔹 | |
| Hostnames | | Ø dBm | |
| | | | |
| itatic Routes | | | |
| Static Routes Diagnostics Firewall | Interface Configuration | | 7 |
| Static Routes Diagnostics Firewall QoS | Interface Configuration General Setup Wireless Security MA | AC-Filter |] |
| Static Routes Diagnostics Firewall QoS Prial | Interface Configuration General Setup Wireless Security MJ Encryption | AC-Filter No Encryption • |] |
| Static Routes Diagnostics Firewall QoS erial | Interface Configuration General Setup Wireless Security MJ Encryption | AC-Filter No Encryption WEP Open System WEP Shared Key WPA-PSK | |

Once you select **"WPA2-PSK"**, two new form fields will pop up: **"cipher"** and **"key"**. We don't need to do anything with **"cipher"** so we'll leave that as **"auto"**. The field we really care about **"key"**. **"Key"** is the technical name for the password you'll use when connecting to your wifi network. We'll set that next.

| WitLinc® | | AUTO REFRESH |
|--|--|--|
| | WITERESS TREWORK IS DISADIED | |
| tatus | Mode Channel Width | |
| /stem | Operating frequency AC • 161 (5805 MHz) • 80 MHz • | |
| etwork | Transmit Power 23 dBm (199 mW) | |
| Interfaces | Ø dBm | |
| Wifi | | |
| DHCP and DNS | | |
| Hostnames | Interface Configuration | |
| Static Routes | Interface configuration | |
| Firewall | General Setup Wireless Security MAC-Filter | |
| Diagnostics | Encryption WPA2-PSK | |
| erial | ar to other | |
| | Cipher auto | |
| ogout | Key | |
| | | |
| lodel Name: WL-245H-S ostname: Witlinc oftware Reversion: 01 18 05 | | |
| Software Reversion: 01.18.05 | BACK TO OVERVIEW | SAVE & APPLY SAVE RES |
| | Copyright @2016-2017 WitLinc Technology Inc. E-mail: support@witlinc.com | n Tel: +1 778-300-9900 Fax: +1 778-300 |

Once you've come up with a password, type it into the the **"key"** box. If you want to make sure you've typed the password correctly, press the green cycle icon next to the password box. Once you do so, you should be able to see the password you've typed.

| Chatture | Wileless network is enabled | | | |
|--|--|--|------------|--|
| System | Operating frequency | Mode Channel Width AC ▼ 157 (5785 MHz) ▼ 80 MHz ▼ | | |
| Network | Transmit Power | 23 dBm (199 mW) | • | |
| Interfaces | | Ø dBm | | |
| Wifi | | | | |
| | | | | |
| DHCP and DNS | | | | |
| DHCP and DNS Hostnames | Interface Configuration | | | |
| DHCP and DNS Hostnames Static Routes | Interface Configuration | | | |
| DHCP and DNS Hostnames Static Routes Diagnostics | Interface Configuration General Setup Wireless Security M. | AC-Filter | | |
| DHCP and DNS Hostnames Static Routes Diagnostics Firowall | Interface Configuration General Setup Wireless Security M. Encryption | AC-Filter WPA2-PSK | | |
| DHCP and DNS Hostnames Static Routes Diagnoslics Firewall QoS | Interface Configuration General Setup Wireless Security M. Encryption | AC-Filter WPA2-PSK | • | |
| DHCP and DNS Hostnames Static Routes Diagnostics Finewall QoS Serial | Interface Configuration General Satup Wireless Security M. Encryption Cipher | AC-Filter WPA2-PSK auto | <u> </u> | |
| DHCP and DNS Hotmannes Static Routes Diagnostics Friewall QoS Serial | Interface Configuration General Setup Wireless Security M. Encryption Cipher Key | AC-Filter WPA2-PSK auto 123456789 | • • | |
| DHCP and DNS Hotmannes Static Rouree Diagnostics Firewall QoS Serial | Interface Configuration General Setup Wireless Security M. Encryption Cipher Key | AC-Filter WPA2-PSK auto 123456789 | • • | |
| DHCP and DNS Hostnames Static Routes Disgnostics Filcovall QoS Sierial | Interface Configuration General Setup Wireless Security M. Encryption Cipher Key | AC-Filter WPA2-P5K auto 123456789 | • • | |

Now that we've set our password, let's press the **"Save & Apply"** button to finalize the changes on the module. You should be brought back to the top of the page. A set of notifications will update you on the changes being saved and tell you when the changes are done.

After about 15 seconds, the Wifi status should no longer say disabled. Additionally, it should provide additional information about the wifi network. This information includes:

- Network name (SSID)
- The current connection quality for clients. If none are connected, it's normal for this to say 0%.
- Encryption method
- Wifi channel
- Transfer speed. If no clients are connected, this will say 0.0. That's normal!

If you only have one wireless network on your module, you're done setting up networks. You'll know this because near the top of the page, you'll only have one tab for wifi networks. If you have more wireless networks, then you should go to each of them in turn and set them up using the same process. You can do that by clicking on the tab for each of the wireless networks as shown in the screenshot below.

For ease of use, we highly recommend using the same password for every network on your router. There's no real harm in this unless you have a set up that is quite different from the one described in this walkthrough.

Your wifi network is set up! You can connect to the wifi network "WitLinc" with the proper key. You should have access to the wireless network. If you don't normally connect with a network cable to the device you've been using to set up your module, feel free to unplug that.

2.3.4 Setup the WiFi Wireless Security

MAC Filter: Specifies the mac filter policy, disable to disable the filter, allow to treat it as whitelist or deny to treat it as blacklist.

Mac list: List of MAC addresses (divided by spaces) to put into the mac filter.

2.4 Setup WL-245H-S as WiFi-Client

1. Change the IP Addess of the device according to the section 2.2, IP Address must be changed into the same segment of the master module.(i.e WiFi-Master IP Address:192.168.1.1 WiFi-Client IP Address:192.168.1.2)

Login to the Configuration Webpage by the new IP address, let's go to the "Network" menu on the top of the page and selecting the "Wifi" item.

| WitLinc® | | | | | | | AUTO REFRESH |
|---|-------------------------|--|--------------------------|----------------------|-----------------|----------------------|---------------------|
| Status System Services | Wireless Ov | erview | | | | | |
| Network Interfaces Wifi DHCP and DNS Hostnames | 802:11AC Channel: 15 | wireless network adapter 7 (5.785 GHz) Bitrate: ? Mbit/s linc Mode: Master IF0.21:29:D1:72 Encryption: None | | | | DISABLE | SCAN ADD |
| Static Routes Diagnostics Firewall QoS | Associated | Stations | | | | | |
| Serial | SSID | MAC-Address | IPv4-Address | Signal | Noise | RX Rate | TX Rate |
| Logout | | | No informatio | n available | | | |
| Model Name: WL-245H-S Hostname: Witlinc Software Reversion; | | Copyright @201 | 6-2017 WitLinc Technolog | gy Inc. E-mail: supp | ort@witlinc.com | n Tel: +1 778-300-99 | 000 Fax: +1 778-300 |

 Click on the "SCAN" button, Wait for a few moments, A WiFi List will appear, let select the network name of the WiFi-Master module, and then click "JOIN NETWORK" add to the WiFi network. If there is no list of WiFi Network, please click on the "REPEAT SCAN" and scan again.

| WitLinc® | | |
|----------|---|--------------|
| Status | | |
| System | Join Network: Wireless Scan | |
| Services | | |
| Network | ✓ SYZ-5G | JOIN NETWORK |
| Serial | 65% Channel: 157 Mode: Master BSSID: 88:25:93:D6:25:D5 Encryption: mixed WPA/WPA2 - PSK | |

3. After you click the **"JOIN NETWORK"** button we can set the parameter of the Wifi network's password and the Firewall zone. You must set the password same as the master module. Also you should be able to see the password you have typed by press the green cycle icon next to the password box.

| WitLinc [®] | |
|--|--|
| Status System | Join Network: Settings |
| Network | |
| Serial | Replace wireless configuration 🗷 © An additional network will be created if you leave this unchecked. |
| Logout | WPA passphrase |
| Model Name: WL-245H-S Hostname: Witlinc Software Reversion: 01.11.06 | Wane of the new network wwan Image: The allowed characters are: A=2, a=2, 0=9 and |
| | Create / Assign firewall-zone 💿 Ian: 🔚 👷 🙊 |
| | wan: 4G: |
| | unspecified -cr- create: |
| | • Choose the firewall zone you want to assign to this interface. Select <i>unspecified</i> to remove the interface from the associated zone or fill out the <i>create</i> field to define a new zone and attach the interface to it. |

 Next, the "Name of the new network" will be set up to WWAN automatically. At the same time we need to change the "Create/assign firewall zone" From "WAN" to "LAN". Then Click "SUBMIT" to go to NEXT.

| WitLinc® | UNSAVED CHANGES: 13 AUTO REFRESH |
|--|--|
| Status | radio0: Client "SYZ-5G" radio1: Master "OpenWrt" |
| System Network Interfaces | Wireless Network: Client "SYZ-5G" (radio0.network1) The Device Configuration section covers physical settings of the radio hardware such as channel, transmit power or antenna selection which are shared |
| Wifi DHCP and DNS | among all defined wireless networks (if the radio hardware is multi-SSID capable). Per network settings like encryption or operation mode are grouped in the Interface Configuration. |
| Hostnames Static Routes | Device Configuration General Setup Advanced Settings |
| Firewall QoS Serial | Status Mode: Client SSID: SYZ-5G BSSID: 882593:306:25:05 Encryption: None Channel: 157 (375 564) Tx-Power: 0 dBm °M Signal: 0 dBm Noise: 0 dBm Bitrate: 0 Mbits/ E Country: US |
| | Wireless network is enabled DISABLE |
| Logout | Mode Channel Width Operating frequency AC ▼ 157 (5785 MHz) ▼ 80 MHz) ▼ |
| Model Name: WL-245H-S Hostname: Witlinc Software Reversion: 01.11.06 | Transmit Power 23 dBm (199 mW) ▼ ● dBm |

5. Setup the Device Configuration same as the Master Module, Include "Operation Frequency" and e "Transmit Power" these two parameters.

| itatus | General Setup | Wireless Security | | |
|--|-----------------|-------------------|--|--|
| ystem | | ESSID | SYZ-5G | |
| etwork | | Mode | Client | v |
| Interfaces | | BSSID | 88:25:93:D6:25:D5 | |
| DHCP and DNS | | Network | 🔲 lan: 💯 🧐 | |
| Hostnames Static Routes | | | 🔲 wan: 💯 | |
| Diagnostics | | | 🗹 wwan: 🚊 | |
| Firewall QoS | | | create: | |
| erial | | | Choose the network(s) you want to attach t new network. | to this wireless interface or fill out the <i>create</i> field to define a |
| ogout | | | | |
| odel Name: WL-245H-S ostname: Witlinc | BACK TO OVERVIE | w | | SAVE & APPLY SAVE RESET |

- 6. The above picture is the WiFi Interface Configuration webpage, after you set up to the Device Configuration; let us select to the "Interface Configuration"-"General Setup", "ESSID" is the Network Name which you should Join in. the "BSSID" is the MAC address of the master module. We need to change the "Mode" into Client or Client(WDS).
- 7. let's press the **"Save & Apply"** button to finalize the changes on the module. All the parameter configured completely, and the module will reboot, After the module reboot, the WiFi parameter will be effective.

| WiFi | Description |
|------------|--|
| Mode | Configure the WiFi operating frequency |
| SSID | Assign a network name (SSID) of up to 32 characters. The Module uses this name in all network references. All devices in a network must have the same SSID. |
| Channel | Select a channel and frequency range for the network or accept the default value. Network channels allow radios to avoid sharing a frequency with other networks in the same location. The channel list indicates the channel number as well as the Frequency. |
| Encryption | Encryption scrambles data so that only intended viewers can decipher and understand it. Although "none" is an available encryption type, Witlinc Technology strongly recommends encrypting all data sent and received from every radio on your network, to help prevent your data from being intercepted and decoded. |
| | WPA-PSK: Preshare key mode To use WPA-PSK encryption on packets sent between the modules, select WPA-PSK in the Encryption field. Next, in the key phrase field, enter a pass phrase of between eight and 63 normal keyboard characters. |
| | This phrase automatically generates an encryption key of 128 hexadecimal characters. The default pass phrase is "password" (lower case, no quotes). |

L

| | WPA2-PSK: based on IEEE 802.11i Use WPA-PSK encryption on packets send between the modules, select WPA-PSK in the Encryption field. |
|-----|--|
| key | You must enter the password in this field, after set the encryption mode. |



2.5 Setup the WiVPN Function

i

1. While in client site, WiVPN actively makes connection to the server side, if passed the server authentication, a VPN connection would be established. Below are steps to make connection to a WiVPN server:

- 1. Before config WiVPN client, you need to get 3 files from WiVPN server administrator: ca.crt, clientX.crt and clientX.key
- 2. And ask WiVPN server administrator for parameters about server address, server port and cipher.
- 3. Through web management interface: *Services*->*WiVPN*, you can see sample instances as show below.

| WitLinc® | | | | | | | |
|------------------|--|----------------------|-----------|------------|------|----------|------|
| Status System | WiVPN | | | | | | |
| Dynamic DNS | WiVPN instances | | | | | | |
| WIVPN | Below is a list of configured WiVPN inst | ances and their curr | ent state | | | | |
| Network | | Enabled | Started | Start/Stop | Port | Protocol | |
| Logout | sample_client | | no | START | 443 | udp | EDIT |

4. Click "EDIT" button corresponded to "sample_client". And type in WiVPN server address (IP or FQDN) and server port (there must have space between server address and server port). As show below.

| Overview » Instance "sample clien | t" | | |
|------------------------------------|--|----------|--|
| Switch to advanced configuration » | | | |
| | | | |
| | | | |
| verb | 3 | • | |
| | 🛿 Set output verbosity | | |
| port | 443 | | |
| | O TCP/UDP port # for both local and remote | | |
| tun_ipv6 | ■ ❷ Make tun device IPv6 capable | | |
| nobind | | | |
| comp_lzo | yes | • | |
| | @ Use fast LZO compression | | |
| proto | udp | • | |
| | 🛿 Use protocol | | |
| client | 8 | | |
| | O Configure client mode | | |
| client_to_client | Allow client-to-client traffic | | |
| | 123 58 2 65 443 | <u>†</u> | |
| remote | | | |

5. Click "*Switch to advanced configuration* >>" as show below.

| WitLinc® | | UNSAVED CHANGES: 3 |
|-------------------------|---|--------------------|
| Status System | Overview » Instance "sample_client" | |
| Services Dynamic DNS | Switch to advanced configuration | |
| Wivpn Network | | |
| | verb 3 • Ø Set output verbosity | |
| Logout | . 443 | |

6. Click "*Cryptography*" as show below.

| WitLinc® | UNSAVED CHANGES | 3 |
|--|---|---|
| Status System Services Dynamic DNS W/VPN | Overview » Instance "sample_client" <u> a Switch to basic configuration</u> Configuration category: Service <u>Networking</u> <u>VPM</u> Crystography | |
| Network Logout | Service | |

7. Type in cipher, upload ca.crt to ca field, upload clientX.crt to cert field and upload clientX.key to key field. As show below the cipher is "AES-256-CBC".

| Configuration category: Service | <u>Networking</u> | <u>VPN</u> | Cryptography |
|---------------------------------|-------------------|------------|--------------|
|---------------------------------|-------------------|------------|--------------|

| cipher | AES-256-CBC |
|----------------------|---|
| | C Encryption cipher for packets |
| no_replay | Ø Disable replay protection |
| mute_replay_warnings | Ø Silence the output of replay warnings |
| no_iv | Ø Disable cipher initialisation vector |
| tls_server | Enable TLS and assume server role |
| tls_client | Enable TLS and assume client role |
| ca | Uploaded File (1.77 KB) 🔗 |
| | O Certificate authority |
| cert | Uploaded File (5.37 KB) 🔗 |
| | O Local certificate |
| key | Uploaded File (1.66 KB) 🖉 |
| | Cocal private key |
| single_session | Allow only one session |

If no corresponded fields exist, scroll down the page and select field from "Additional Field", click "ADD" button to add the field. As show below.

| | | mute_r | eplay_warnings | ₩ ♥ Silence the output of replay warnings |
|----------------------------|-------------------------------------|--------|----------------|---|
| | | | no_iv | Disable cipher initialisation vector |
| | | | tls_server | Enable TLS and assume server role |
| sec aut | ret h | | tls_client | Enable TLS and assume client role |
| key eng | size jine | | cert | Uploaded File (5.37 KB) 🛛 😂 |
| rep | lay_window lay_persist | | | ❷ Local certificate |
| ca | | | key | Uploaded File (1.66 KB) 🛛 🥰 |
| pkc key tis_ tis_ | s12 _method cipher timeout | | single_session | Local private key Allow only one session |
| ren | eg_pytes eg_pkts eg_sec | | tls_exit | Exit on TLS negotiation failure |
| han tran tis_ | id_window | | auth_nocache | Opn't cacheaskpass orauth-user-pass passwords |
| A | dditional Field V | ADD | | |
| | | | | |

SAVE & APPLY SAVE RESE

SAVE & APPL

8. Check all your configurations are correct and uploaded the 3 files to corresponded fields, click "SAVE" button as show below.

| | , |
|------------------------|--|
| cert | Uploaded File (5.37 KB) 🛛 🛃 |
| | O Local certificate |
| key | Uploaded File (1.66 KB) 🛛 🛃 |
| | ♥ Local private key |
| single_session | Allow only one session |
| tls_exit | Exit on TLS negotiation failure |
| auth_nocache | □ ❷ Don't cacheaskpass orauth-user-pass passwords |
| Additional Field V ADD | |
| | \sim |

 Through web management interface: Services->WiVPN, check "Enabled" checkbox, and click "SAVE" button. As show below.

| /iV/PN instances | | | | | | |
|---------------------------------------|-----------------------------|----------|------------|------|----------|-------------|
| elow is a list of configured WiVPN in | stances and their currer | it state | | | | |
| | Enabled | Started | Start/Stop | Port | Protocol | |
| sample_client | | no | START | 443 | udp | EDIT DELETE |
| Client config | uration for an ethernet bri | dae VPN | | | | |

10. Wait a while, you can see the client started, now the VPN connection is established. By clicking "*STOP*" button you can stop WiVPN client. As show below.

| /iVPN | | | | | | | |
|--|------------------------|--------------|------------|------|----------|-------------------|------|
| WiVPN instances | | | | | | | |
| Below is a list of configured WiVPN in | stances and their cu | rrent state | | | | | |
| | Enabled | Started | Start/Stop | Port | Protocol | | |
| sample_client | | yes (12707) | STOP | 443 | udp | EDIT DELETE | |
| Client config | uration for an etherne | bridge VPN ▼ | ADD | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | SAVE & APPLY SAVE | RESE |

3. Hardware Installation

Power Supplies installation Antenna Installation IO Terminal Installation Rs232 Installation Rs485 Installation LED indicators



3.1 Power Supplies installation

The WL-245H-S accepts voltages between 9 - 30 VDC, two step complete the power supply wiring.

1. Connect the 24VDC cable to the power terminal, Please be careful don't connect the positive to the negative terminal.



- 2. Insert the Power Terminal into the module, then tighten the screws.
- 3.2 Antenna installation

The module designed of 3 antenna ports, 3×3 MIMO Antena, Each module must have 3 antennas connected to antenna port on the WL-245H-S, without the antenna the module will not connect to the network.

1. Small WiFi antennas with a reverse polarity SMA connector can be mounted directly on the radio. Screw the antenna onto the antenna port connector until it is snug. The frequency range must between 5.125GHz – 5.875GHz.



Important: Antennas selected should not exceed a maximum gain of 5 dBi under standard installation configuration. In more complex installations, it is imperative that the installer follow maximum dBi gain guidelines in accordance with the radio communications regulations of the Federal CommunicaCommission (FCC), Industry Canada, or your country's regulatory body (if used outside the Canada).

3.3 IO terminal installation

There are two digital input/output and one analog terminals on the module. We can monitor the IO signal by the Serial port. Also the IO signal can be controlled by the serial port.

| DO-2 | Digital Output Signal No.2 terminal | | |
|---------|-------------------------------------|--|--|
| DO-1 | Digital Output Signal No.1 terminal | | |
| СОМ | Digital Output ground terminal | | |
| | | | |
| GND | RS485 Ground terminal | | |
| Rs485 + | Rs485 positive terminal | | |
| Rs485 - | Rs485 Negative terminal | | |

3.4 Rs232 Serial port installation

The use of hardware handshaking (control and monitoring of signal lines) depends on the requirements of the networked device. If no hardware handshaking will be used, the cable to connect to the port is as shown below:





With the package there are two serial cable, one cable is RJ45 to DB9 Female connector, and another is the serial Null-Modem cable.

RS-232: Modem Connection (Hardware Handshaking Required)

This type of connection is required between the module and a modem or other communication device.



The "Use CTS Line" parameter for the port configuration should be set to 'Y' for most modem applications.

RS-232: Null Modem Connection (Hardware Handshaking)

This type of connection is used when the device connected to the module requires hardware handshaking (control and monitoring of modem signal lines).



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3.5 Rs485 Serial port installation

The RS-485 interface requires a single two or three wire cable. The Common connection is optional, depending on the RS-485 network devices used. The cable required for this interface is shown below:

| D0-2 D0-1 00M | | |
|---------------------|----------|--|
| GND RS485- | R\$485 - | |
| R5485+ | | TX- / RX- |
| | RS485 + | 1/ |

IO Terminal

Note: Terminating resistors are generally not required on the RS-485 network, unless you are experiencing communication problems that can be attributed to signal echoes or reflections. In these cases, installing a 120-ohm terminating resistor between pins Rs485+ and Rs485- on the module connector end of the RS-485 line may improve communication quality.

RS-485 and RS-422 Tip

If communication in the RS-422 or RS-485 mode does not work at first, despite all attempts, try switching termination polarities. Some manufacturers interpret + and -, or A and B, polarities differently.

3.6 LED indicators

| LED | Color | Status | Description | |
|--------------------|-------|-----------|---|--|
| Signal Strength | Green | Steady | Signal Quality of the wireless received from the WiFi-master module | |
| | | Unlighted | Signal is bad | |
| Lan | Green | Steady | Lan Communication Failed | |
| | Green | Flashing | Lan Communication is successful | |
| | | Unlighted | No Ethernet Cable has been detected | |
| WAN | Green | Steady | WAN port Communication Failed | |
| | Green | Flashing | WAN port Communication is ok | |
| | | Unlighted | No Ethernet Cable has been detected | |
| WiFi | Green | Steady | WiFi Function is enable | |
| | | Unlighted | WiFi Function is disable | |
| 4G | Green | Steady | No Used | |
| | | | | |
| PWR | Green | Steady | Power supply is normal | |
| SYS | Green | Steady | System has err occurs | |

4. Support, Service & Warranty

4.1 Contacting Technical Support

WitLinc Technology, Inc. is committed to providing the most efficient and effective support possible. Before calling, please gather the following information to assist in expediting this process:

- 1 Product Version Number
- 2 System architecture

3 Network details

If the issue is hardware related, we will also need information regarding: **1** Module configuration

2 Module operation and any unusual behavior

3 Configuration/Debug status information

4 LED patterns

5 Details about the serial, Ethernet or other interfaced to the module.

Note: For technical support calls within the United States, an emergency after-hours answering system allows 24-hour/7-days-a-week pager access to one of our qualified Technical and/or Application Support Engineers. Detailed contact information for all our worldwide locations is available on the following page.

| Internet | Web Site: www.witlinc.com/ E-mail address: support@witlinc.com |
|----------|---|
| Tel | +1 778-300-9900 |
| Fax | +1 778-3009080 |

4.2 Warranty Information

For complete details regarding WitLinc Technology's TERMS & CONDITIONS OF SALE, WARRANTY, SUPPORT, SERVICE AND RETURN MATERIAL AUTHORIZATION INSTRUCTIONS please see the documents on the Product DVD or go to www.witlinc.com

APPENDIX

♦ IEEE 802.11AC

IEEE 802.11ac is a wireless networking standard in the 802. 11 family (which is marketed under the brand name Wi-Fi), developed in the IEEE Standards Association, providing high-throughput wireless local area networks (WLANs) on the 5 GHz band. The standard was developed from 2008 (PAR approved 2008-09-26) through 2013 and published in December 2013 (ANSI approved 2013-12-11).

The specification has multi-station throughput of at least 1 gigabit per second and single-link throughput of at least 500 megabits per second (500 Mbit/s). This is accomplished by extending the air-interface concepts embraced by 802. 11n: wider RF bandwidth (up to 160 MHz), more MIMO spatial streams (up to eight), downlink multi-user MIMO (up to four clients), and high-density modulation (up to 256-QAM).

The first 802.11ac products from 2013 are referred to as Wave 1, and the newer higher bandwidth products introduced in 2016 are referred to as Wave 2.

New technologies introduced with 802.11ac include the following:

- Extended channel binding
- Optional 160 MHz and mandatory 80 MHz channel bandwidth for stations; cf. 40 MHz maximum in 802.11n.
- More MIMO spatial streams
- Support for up to eight spatial streams (vs. four in 802.11n)
- Downlink multi-user MIMO (MU-MIMO, allows up to four simultaneous downlink MU-MIMO clients)
- Multiple STAs, each with one or more antennas, transmit or receive independent data streams simultaneously.
- Space-division multiple access (SDMA): streams not separated by frequency, but instead resolved spatially, analogous to 11n-style MIMO.
- Downlink MU-MIMO (one transmitting device, multiple receiving devices) included as an optional mode.
- Modulation
- 256-QAM, rate 3/4 and 5/6, added as optional modes (vs. 64-QAM, rate 5/6 maximum in 802.11n).
- Some vendors offer a non-standard 1024-QAM mode, providing 25% higher data rate compared to 256-QAM
- Other elements/features
- Beamforming with standardized sounding and feedback for compatibility between vendors (non-standard in 802.11n made it hard for beamforming to work effectively between different vendor products)
- MAC modifications (mostly to support above changes)

- Coexistence mechanisms for 20, 40, 80, and 160 MHz channels, 11ac and 11a/n devices
- Adds four new fields to the PPDU header identifying the frame as a very high throughput (VHT) frame as opposed to 802.11n's high throughput (HT) or earlier. The first three fields in the header are readable by legacy devices to allow coexistence

Example configurations[edit]

All rates assume 256-QAM, rate 5/6:

| Scenario | Typical client form factor | PHY link rate | Aggregate capacity (speed) |
|---|-------------------------------|---------------|----------------------------------|
| One-antenna AP one-antenna STA 80 MHz | Handheld | 433 Mbit/s | 433 Mbit/s |
| Two-antenna AP two-antenna STA 80 MHz | Tablet, laptop | 867 Mbit/s | 867 Mbit/s |
| Three-antenna AP three-antenna STA 80 MHz | Laptop, PC | 1.27 Gbit/s | 1.27 Gbit/s |