AW58100HTM

USER'S MANUAL

5.8 GHz Outdoor 100 Mbps
Wireless Ethernet Mesh Node

Industrial-grade, long-range wireless Ethernet systems

AvaLAN
WIRELESS

Thank you for your purchase of this member of the 5.8 GHz Outdoor 100 Mbps family of wireless Ethernet radios.

The AW58100HTM is a mesh node radio. It features dual omnidirectional antennas and may be used in sets to create a high speed, line-of-sight multipoint-to-multi-point network with 1 Watt EIRP and up to 100 Mbps RF data rate via the latest MIMO technology.

The AW58100HTM includes:

- (1) AW58100HTM Outdoor 100 Mbps Wireless Ethernet Mesh Node Radio
- (1) Heavy Duty Pole-mount Bracket
- (1) AW-POE18i Power Over Ethernet Injector with integrated 18 VDC Power Supply

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If you have any questions when configuring your AvaLAN system, the best place to get answers is to visit www.avalanwireless.com. You will also find the latest updates there. If more assistance is needed, send email to support@avalanwireless.com.

To speak to a live technician, please call technical support at the number below during normal business hours.

Quick Start Guide

We recommend connecting and powering up each AW58100M unit on the bench before deploying in the field, because it is much easier to troubleshoot problems and to adjust the configuration if necessary without having to climb poles to do it.

Step 1. Gather the parts: In addition to the AvaLAN radio and the accompanying AW-POE18i Power Over Ethernet Injector power supply, you will need at least two CAT5 cables and a PC with a LAN connection.

Step 2. Make the connections: Connect the devices as shown in the diagram. Plug the AW-POE18i power cord into a 120 VAC outlet to turn on the radio.

AW58100HTM
Mesh Node

Step 3. The default IP address of the radio is written on its product label. This address is 192.168.88.11 with a subnet mask of 255.0.0.0. You must configure your PC's wired LAN port to the same subnet and an IP address different from that of the radio. With this configuration in place, you should be able to use a web browser on your PC to log in to the radio's interface.

Step 4. Browse to the Access Point's interface: Enter http://192.168.88.11 into your web browser's address bar. If you are successful, you will see a login screen like that on the next page. If not, the browser will time out and you will need to double check the IP addresses and subnet masks.
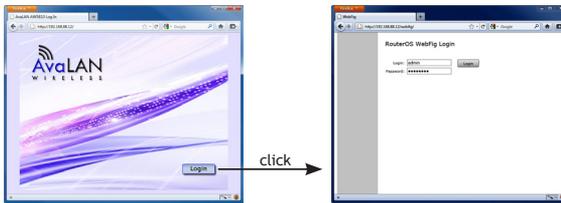
Step 5. Log In to the radio: The default login name is "admin" and the password is "password." If your login is successful, you should see the "Quick Set" page similar to this:
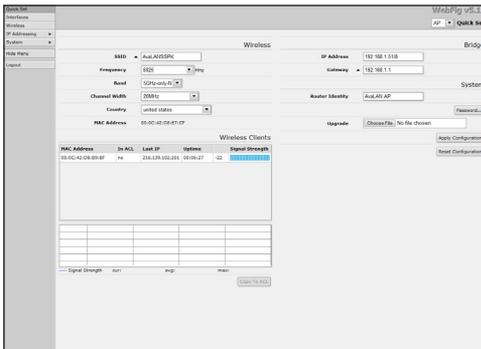
(You may need to scroll around in the page to see all the elements, particularly if you have a lower resolution monitor or are using Firefox as your browser.)

Step 6. To determine if your wireless mesh network is functioning correctly, you will need to give each AW58100HTM Mesh Node a unique IP address. There is a box near the upper right corner of the "Quick Set" page that displays the current value and allows you to change it. A special notation is used for this entry: Use /x at the end of the IP Address to specify the subnet mask: /8 for 255.0.0.0, /16 for 255.255.0.0, /24 for 255.255.255.0 and /32 for 255.255.255.255. Enter a new IP Address and subnet making sure you will be able to browse to the new address with your computer. Also, make sure that the new IP address is unique on your LAN subnet. Click the "Apply Configuration" button to make the change. Nothing appears to happen, but you have been disconnected and will need to browse to the new IP Address to login again.

Step 7. Repeat the above steps for each Mesh Node in your network, giving them each a unique IP address. You may wish at the same time to perform the other Digital Configuration steps beginning on Page 5. Each radio must have a unique IP address with the other configuration parameters set alike.

Utilizing state of the art MIMO technology, the AW58100HTM achieves very high data rate through a combination of dual spacial streams and higher level OFDM modulation.

The default RF configuration provides a 20 MHz channel bandwidth with 5 selectable non-overlapping channels to choose from. When configured and mounted, the radios operate as a fully-connected peer-to-peer wireless network with automatic path routing and self-healing.

Physical Setup

1. The factory default digital configuration may be used, except that each radio must be given a unique IP address as described in the Quick Start Guide. You may want to perform the procedures in the next section before mounting the radios in their final locations. Particularly if data security is important, you will likely want to change passwords and encryption keys. If RF interference sources are present, you may want to change the channel frequency or bandwidth.

2. Mount each unit securely using the mounting brackets provided or other means as necessary.

3. The units have two omnidirectional antennas to provide dual RF streams for higher data rates. Each Mesh Node radio needs to be located with no more than a 1/2 mile line-of-sight path to whichever other Mesh Nodes it is intended to link with.

4. Power is provided to the units by means of their Ethernet cables, allowing the power supplies to be located at convenient locations. The included power-over-Ethernet injectors (POE) provide the means for adding DC power to unused wires in the cable (pins 4,5 negative and 7,8 positive). The POE RJ-45 socket nearest the power cord may be connected with an Ethernet cable into your network router or, at a remote site, your remote data source such as a camera. The female RJ-45 socket on the other end of the POE should be connected via your LAN cable to the AvaLAN radio. Then the power cord on the POE is plugged into a 120 VAC source. Each radio is provided with a cable clamping device that allows an RJ45 plug on the cable to pass through and can be tightened down around the cable to provide a weatherproof seal.

Digital Configuration

These five configuration elements must be set for each radio:

1. IP address/subnet mask
2. User password
3. SSID (Service Set Identifier)
4. Encryption pass phrase
5. Frequency Channel

For a set of Mesh Nodes in a network, the IP addresses must be different and all other configuration parameters must be the same. The following pages will give you step by step instructions for changing these configuration elements.

Connecting to the radio

1. Digital configuration is done by means of the radio's built in browser interface. The unit should be powered on and connected at least temporarily to a network containing a computer that can run a conventional web browser.

2. Using your web browser, connect to the radio as described in the Quick Start Guide found earlier in this manual.

3. The initial screen after a successful login is "Quick Set":

4. Each screen provides a menu on the left to navigate from section to section. The menu looks like this when sections are expanded:

In addition, many screens "drill down" when an area within the screen is clicked.

In the upper right of the screen is a label that tells you the version of the web interface. If the version number is not the same as shown below, you might want to visit www.avalanwireless.com to see if a newer version of this manual exists before proceeding further.

You are cautioned not to use the "back" button on your browser to attempt to move back to earlier screens. If you do, you will be logged out and will need to login again.

Changing The Configuration - Step by Step

Please remember that if you change the IP Address or User Password and forget their new values, you have locked yourself out of the browser interface. Recovery can be a time-consuming process and will require the help of AvaLAN Technical Support. If you are changing parameters over the RF link (we do not recommend this), be sure to make the remote changes first because the link will be broken if the SSIDs or Security Pass Phrases do not agree.

1. Setting the IP Address and subnet mask:

- On the Main Menu at the left side of the browser window, click "IP Addressing", then click "Set IP/subnet."

- The current IP Address is shown. Click it to bring up the page that allows you to change it.

- A special notation is used for this entry: Use /x at the end of the IP Address to specify the subnet mask: /8 for 255.0.0.0, /16 for 255.255.0.0, /24 for 255.255.255.0 and /32 for 255.255.255.255. Enter a new IP Address and sub-net making sure you will be able to browse to the new address with your computer. Also, make sure that the new IP address is unique on your LAN subnet.

- Click "Apply." Nothing appears to happen, but you have been disconnected and will need to browse to the new IP Address to login again. Note that the IP Address is also visible and may be changed on the "Quick Set" screen.

2. Setting the User Password:

- On the Main Menu at the left side of the browser window, click "System", then click "Password."

- Enter the old password and the new password twice in the boxes indicated.
- Click the "Change" button.
- Log out and log back in to test.

3. Setting the SSID:

- On the Main Menu at the left side of the browser window, click "Wireless." Then click anywhere in the "Wireless_Radio" row to bring up the "Interface <Wireless_Radio>" page.

- The second line down in the content table shows the current SSID and provides a text box to change it. Change the SSID to a new value of your choice and click "OK" or "Apply."

- You will need to browse to the radio's IP Address and login again after the change.

4. Setting the Encryption Pass Phrase:
- On the same page as above for setting the SSID, a box is provided for entering the Encryption Key.

5. Setting the Access Point Frequency Channel and Bandwidth:

- On the Main Menu at the left side of the browser window, click "Quick Set." This returns you to the page presented after login.

- The default Frequency Channel is 5805 MHz. There are more choices available in the dropdown list than are legal or appropriate for this set of products. Do not change the "Band" dropdown box setting. Please choose from among the frequencies shown in the table on the last page of this manual. Make sure that you choose channels for mesh networks operating in proximity that do not overlap.

- The default Channel Width is 20 MHz, which provides the highest possible data rate. More range can be achieved at the expense of data rate by choosing a narrower Channel Width. Your choices are 5, 10 or 20 MHz.

- Change to the Frequency and Channel Width desired and click "OK" or "Apply."

Viewing Status Information

After configuring your AvaLAN radios and establishing links among them, you can use the browser interface to view status and troubleshooting Information. The initial "Quick Set" page will show whether the wireless link is operating and the current signal strength. For more comprehensive information, choose "Wireless" from the Main Menu at the left side of the window. The "Wireless" page leads to most of the useful status information. This page has two tabs, Interfaces and Associations.

		▲ Name	Type	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	Tx Drops	Rx Drops	Tx Erro
D	R	Wireless_Radio	Wireless(Atheros 11N	2290	73.8 kbps	17.4 kbps	9	8	0	0	0
	DR	wds1	WDS	2290	73.8 kbps	17.4 kbps	9	8	0	0	0

1. Interfaces Tab: This provides a list of the interface processes running in this radio. There should be one "Wireless_Radio" process and a WDS process running for each mesh node that is connected. (CAUTION! Do not click the little "D" buttons.) Clicking on the "Wireless_Radio" line brings up more information:

This page displays the current RF frequency, the SSID, current transmission rates, amount of data sent and received since last reboot, drops and errors. Also shown are graphs of megabits per second and packets per second during the last five minutes or so. The graphs are well labeled and auto-scale to fit the data. After viewing the status, you may leave the page by clicking "Cancel" or by using the Main Menu. (If you click "OK" or "Apply", the process will restart and briefly interrupt the data flow.

Back on the "Wireless" page, you can click on a WDS process line to see similar information about traffic with just that particular radio.

2. Associations Tab: This provides a list of radios that are connected, showing their MAC addresses, how long the connection has been up, seconds since last activity, Transmit and receive signal strength in dBm and the transmit and receive data rate in use.
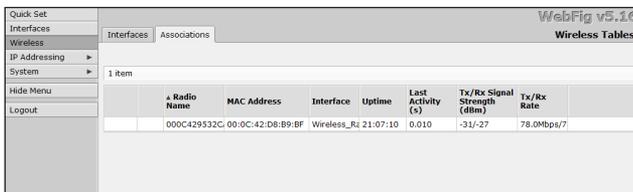
Clicking on the white text line brings up detailed status of the remote radio:

This screen is a very tall window with several interesting sections shown on the next page. The top "General" section shows information that may be useful if you contact AvaLAN Technical Support.

The "Signal" section shows transmit and receive signal strength overall and by individual MIMO channel.

The "Statistics" section shows the link transmit and receive rates.

WebFig v5.16
AP Client <00:0C:42:D8:B9:BF>

Close   Ping

	General
Radio Name	000C429532CA
MAC Address	00:0C:42:D8:B9:BF
Interface	Wireless_Radio
Uptime	21:07:41
RouterOS Version	5.16
Last IP	216.139.102.201

	Signal
Last Activity	0.010 s
Tx/Rx Signal Strength	-20/-32 dBm
Tx/Rx Signal Strength Ch0	-20/-32 dBm
Tx/Rx Signal Strength Ch1	-58/-43 dBm
Signal To Noise	85 dB

Rate	Last Measured
6Mbps	00:00:00.01
9Mbps	20:42:48.78
12Mbps	21:06:31.74
18Mbps	21:06:12.61
24Mbps	21:05:53.84
54Mbps	00:00:04.58
HT20-3	21:05:31.23
HT20-4	00:00:00.08
HT20-5	00:00:00.01
HT20-6	00:02:16.58
HT20-7	00:00:03.52

	Nstreme
Framing Mode	none
Framing Limit	
Framing Current Size	
Nstreme	☐

	Statistics
Tx/Rx Rate	78.0Mbps/78.0Mbps
Tx/Rx Packets	92 906/74 752
Tx/Rx Bytes	113.3 MiB/12.7 MiB

Advanced Diagnostic Tools

You may want to contact AvaLAN Technical Support for more guidance before using the additional tools described in this section.

The radio's browser interface unlocks some additional features if you login as an advanced user instead of the standard user described earlier in this manual. From the browser initial login page, if you enter a user name of "adv_user" with a password of "passw0rd" (a zero replacing the "o"), you will see and be able to do anything the standard user (user name "admin") can do, plus some additional tasks. Obviously, you can change the password for "adv_user" and may want to do so for security purposes.

When you log in as the advanced user, the navigation menu looks like this. There are three new tabs:

Quick Set
System ►
Files
Tools ►
Hide Menu
Hide Passwords
WinBox
Logout
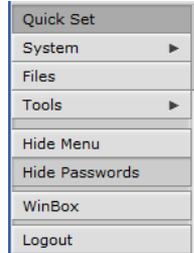
- Files - Lists the files associated with the web interface of the radio. This information may be useful when contacting AvaLAN Technical Support. You are cautioned not to delete or alter these files without instructions from AvaLAN Technical Support. (It is very easy to render your radio inoperative by doing so.)

- Tools - Four different diagnostic tools are provided here to facilitate troubleshooting and performance optimization.

- WinBox - Downloads a simple finder utility that can be used on Windows-compatible PCs to locate AW58100 family products on your LAN.

Tools:

1. Bandwidth Test: This is a tool that will generate a high volume of traffic for a particular radio link and produce a graph of the data rate achieved. The test can only be performed from one radio to another over the wireless link, so enter the IP address of the remote radio you wish to exchange data with. You can also specify the protocol, tcp or udp, and the packet size and data direction.

2. Flood Ping: This tool can be used to generate a continuous string of ping commands to any IP address the radio can see on its subnet. Ping uses ICMP (Internet Control Message Protocol) to request a packet from the target device, waits for a return and then immediately sends another request. You can specify the IP address to ping, the packet count, packet size in bytes and the timeout in milliseconds.

3. IP Scan: The radio will scan a range of addresses (by default, its entire subnet) and report back the MAC address and other information about each device it finds.

#	Address	MAC Address	Time (ms)	DNS	SNMP	Netbios
0	192.168.1.1	00:18:E7:F2:7C:CA	3			
1	192.168.1.3	00:1E:58:32:C6:8E	2			
2	192.168.1.142		1			
3	192.168.1.25	00:1D:BA:95:84:13	2			
4	192.168.1.11	00:21:74:00:06:99	4			
5	192.168.1.12	00:21:74:02:44:87	1			
6	192.168.1.13	00:21:74:02:63:13	7			
7	192.168.1.14	00:21:74:00:03:40	7			
8	192.168.1.15	00:21:74:00:14:29	19			
9	192.168.1.16	00:21:74:02:23:26	21			
10	192.168.1.17	00:21:74:02:44:83	16			
11	192.168.1.141	C0:C1:C0:4B:57:E7	0			
12	192.168.1.21	00:21:74:03:48:87	3			
13	192.168.1.189	00:16:36:7D:18:45	2			
14	192.168.1.95	00:1D:73:5B:A9:DE	2			
15	192.168.1.130	00:0C:42:D8:F5:D7	2			
16	192.168.1.134	00:09:6B:8F:8C:99	0			
17	192.168.1.137	00:24:1D:27:41:AA	2			
18	192.168.1.147	00:23:18:94:6B:86	2			

4. Ping: This tool is like the normal Internet ping command and is less disruptive of network traffic than Flood Ping. A request is sent and the time needed for a reply is measured. After an interval, the process is repeated. By default, continuous ping requests are send until you click "Stop." Or you can specify a count, much like the ping command used in the Windows or Unix command line.
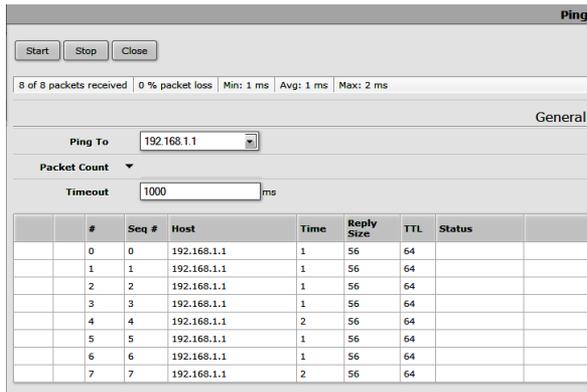
6. WinBox: Clicking this tab will cause your browser to download a utility for installation on your PC (Windows win32 compatibility only). It may be possible to run it on Linux or MAC OSX by using a Windows emulator such as Wine. By clicking the discovery button labeled "...", any AvaLAN AW58100 family products on your LAN will be reported. (You may also see other devices as well if they respond to the CDP protocol used by the utility.) The popup window will show the IP address of each radio and will facilitate logging in if you have lost or forgotten these addresses. This utility has some powerful features that can totally disrupt the functioning of your product. You are not encouraged to experiment or you may need to rely upon AvaLAN Technical Support to restore proper functionality.
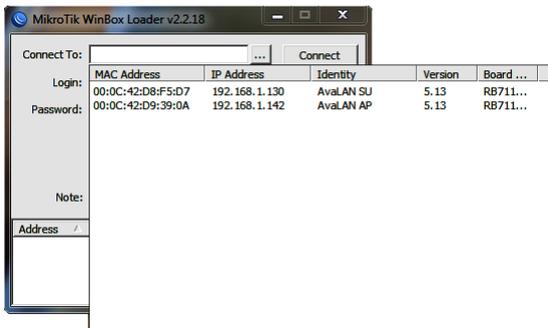
Frequency Channels

Frequency Band	Frequency MHz	Non-overlapping 20 MHz Bandwidth	Non-overlapping 10 MHz Bandwidth	Non-overlapping 5 MHz Bandwidth
802.11a Upper Band (FCC specifies for Outdoor use)	5730			OK
	5735		OK	OK
	5740			OK
	5745	OK	OK	OK
	5750			OK
	5755		OK	OK
	5760			OK
	5765	OK	OK	OK
	5770			OK
	5775		OK	OK
	5780			OK
	5785	OK	OK	OK
	5790			OK
	5795		OK	OK
	5800			OK
	5805	OK - Default	OK	OK
	5810			OK
	5815		OK	OK
ISM Band	5820			OK
	5825	OK	OK	OK
	5830			OK
	5835		OK	OK
	5845			OK

Limited Warranty

This product is warranted to the original purchaser for normal use for a period of 360 days from the date of purchase. If a defect covered under this warranty occurs, AvaLAN will repair or replace the defective part, at its option, at no cost. This warranty does not cover defects resulting from misuse or modification of the product.

Compliance Statement (Part 15.19)
This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.
Warning (Part 15.21)
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
RF Exposure (OET Bulletin 65)
To comply with FCC RF exposure requirements for mobile transmitting devices, this transmitter should only be used or installed at locations where there is at least 20cm separation distance between the antenna and all persons.
Information to the User - Part 15.105 (b)
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
--Reorient or relocate the receiving antenna.
--Increase the separation between the equipment and receiver.
--Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
--Consult the dealer or an experienced radio/TV technician for help.