



Well HaLow
There. *TeeHee.*

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The Basics

Hello, HaLow

Get ready to push your wireless range further than ever before with TeeHee HaLow! Whether you're brand new to wireless Ethernet bridges and camera control or you've L&D'd a few Slates in your career, this guide will brief you on the next era of open-source camera control at sub-1GHz frequencies. Hot diggity!

Prerequisites

TeeHee HaLow can fit into your workflow just about anywhere: You can use TeeHee HaLow as a self-contained system (with other TeeHee HaLow units) or connect to other HaLow hardware that supports AP/client connections. You can also keep your HaLow network isolated, or bridge your existing network and connections using TeeHee HaLow.

Because of the infinite configuration possibilities with the OpenWrt-based OS that runs TeeHee HaLow—and the limited time we have here together today—this guide will cover some of the most common out-of-the-box setups for use in the field. If you are an advanced user, don't let this guide limit your imagination: TeeHee HaLow has an entire GUI that you can easily access to make it work justtttttt right for you.

Unboxing

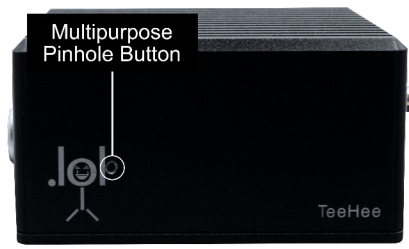
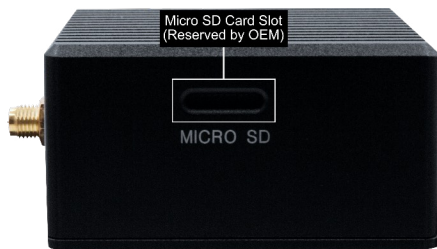
Package Contents

1x TeeHee HaLow

1x Antenna

0x Proprietary Fatuity

Hardware Overview



Power

| Pin | Description |
|------------------------|---------------|
| 1 (Closest to Red Dot) | GND |
| 2 | +DC (5.2-50V) |

Antenna

Ensure you have screwed on the included antenna until it no longer rotates. The antenna should be snug with no thread remaining visible on the unit once tightened. If the antenna is not mounted properly, you may encounter lackluster wireless performance; don't let that ruin your day, because we're just getting started!

Power & Boot Sequence

TeeHee HaLow will boot upon receiving power. The white PWR light will illuminate immediately to denote external power input. After about 30 seconds, the device will be fully powered up and able to establish network connections. The white PWR light will always remain a solid white when external power is present.

UPS Variant

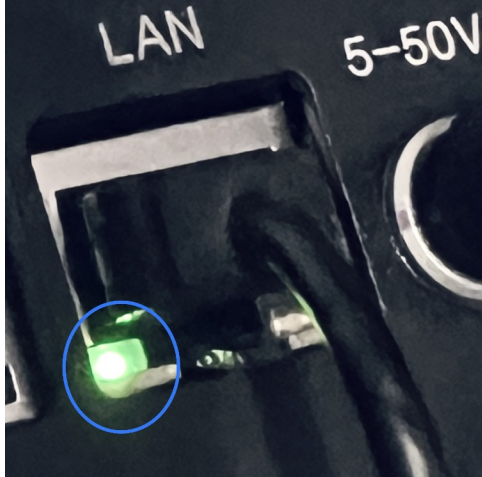
If you have TeeHee HaLow with Internal UPS (optional), it kicks in automatically when external power is removed. The UPS will trickle-charge in the background anytime external power is present, and takes about 10 minutes to fully charge while using TeeHee HaLow like normal. When the battery is fully charged and external power disappears, the UPS will provide TeeHee HaLow with approximately five minutes of uptime. During this UPS-powered interval, the white PWR light on TeeHee HaLow will not be illuminated, but the unit will nevertheless remain online until the internal battery is depleted. Just like a normal UPS, after the internal battery is depleted and external power is restored, TeeHee HaLow will reboot and the battery will begin to trickle charge in the background automatically.

RJ45 Connection

Physically connect TeeHee HaLow to an RJ45 port on the interface device of your choice, like a computer, tablet or smartphone.

1. If you're on a laptop or mobile device without an RJ45 port, you may utilize a dongle or other peripheral accessory that offers at least 10/100M Ethernet compatibility.
2. Plug the other end of your RJ45 cable into the *LAN* port on TeeHee HaLow.

The green rectangular light on TeeHee HaLow's *LAN* RJ45 port will illuminate to confirm your physical connection.



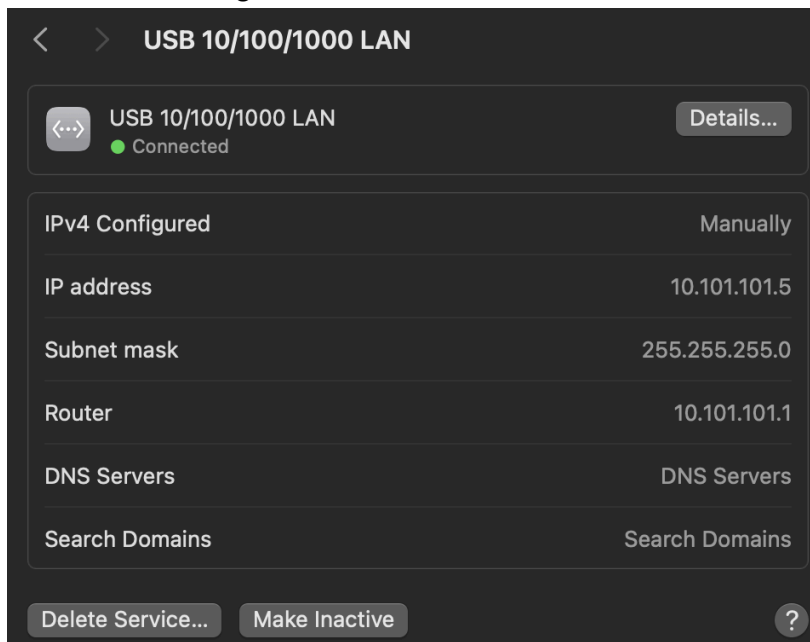
First Steps

Set Your Interface Device IP Address

1. With TeeHee HaLow connected to your interface device via the *LAN* port, open your device's network settings. On macOS, for example, this would be in System Settings.app, inside the *Network* pane.



2. Find the interface to which TeeHee HaLow is connected and match the following IP address settings:



Once your network settings match the above, the yellow rectangular status light on the *LAN* RJ45 port of TeeHee HaLow will begin blinking intermittently to denote successful data packet transfer.



Complete the Welcome Wizard

1. [Set Your Interface Device IP Address.](#)
2. Open your preferred web browser and navigate to *10.101.101.101*.

10.101.101.101

.lol English | 日本語

Welcome!

This wizard will guide you through the initial setup of this device.
You can exit now if you'd prefer to configure manually.

HaLow Configuration

Country

ⓘ The country determines the capabilities of your HaLow network. **Warning:** If you are currently using HaLow, modifying this value may cause you to lose access to this device. For details, see the [regulatory data table](#).

System Configuration

Hostname

ⓘ Hostname is used for many device id purposes, including DNS.

Password

ⓘ We recommend setting a password. This will protect both the web interface and ssh access.

Confirmation

Apply

3. Select your region.

Country

In the US and Canada, *US* is the optimal region choice. European customers: You will select *EU*—you will also need the European version of TeeHee HaLow as the wireless hardware is specific to Europe’s local HaLow frequencies.

👉 **Heads up!** Unlike 2.4GHz and 5GHz WiFi, precise HaLow frequencies are different based on your region. Legal ranges are typically dictated by your country’s government or other regional regulatory agency. Frequency reference lists according to country are available if you select *regulatory data table*, below the country dropdown in the *Welcome Wizard*.

HaLow Configuration

Country

ⓘ The country determines the capabilities of your HaLow network. Warning: If you are currently using HaLow, modifying this value may cause you to lose access to this device. For details, see [the regulatory data table](#).

4. Do not change the default *Hostname* unless you have a specific reason to deviate.

Hostname

The default hostname is unique to each TeeHee HaLow unit: It contains a six character suffix derived from the unit’s MAC address.

5. Set your password for accessing the web GUI.

Password *

This step is optional, but recommended. You can use the asterisk button to the right of the field to reveal the password text as it’s entered. Confirm your password in the subsequent *Confirmation* field.

👉 **Heads up!** This password cannot be reset without resetting TeeHee HaLow to factory settings, so ensure you document your password for future reference.

6. Select *Apply* (at the bottom of the page).

You will be redirected to the *Wizard Config* page. Now that TeeHee HaLow knows what game you’re playing, it’s time to relay the rules.

The Essentials

In the simplest configuration, you will have one TeeHee HaLow connected to your interface device (e.g. computer) and another HaLow bridge on the remote device (e.g. camera body). In terms of hub-and-spoke network topology, the TeeHee HaLow AP (equivalent to a Ruckus R710) acts as the “hub” to which every other HaLow client device will connect (the “spokes”). You may eventually add more “spokes” to the single “hub,” depending on your needs. Hub-and-spoke topology is the most straightforward—and therefore default—configuration for TeeHee HaLow. If you’re an advanced user and have

a specific need for deploying HaLow mesh, please see [Appendix I: HaLow Mesh \(802.11s\)](#).

In hub-and-spoke topology, the primary interface device (like a laptop at the DIT cart, or a smartphone at the AC's focus station) is the ideal physical location for the AP unit to live as it communicates to every other HaLow device on your network. That way, if a particular client device powers down, the HaLow devices that remain online can still communicate with each other.

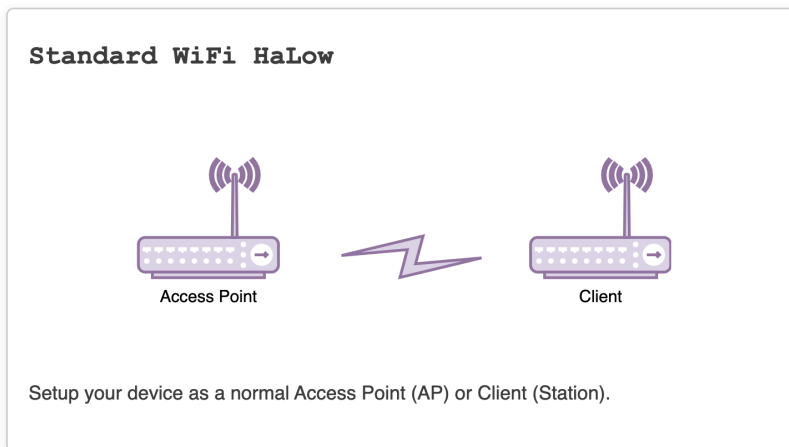
Configure TeeHee HaLow as an Access Point (AP)

1. If you haven't already, complete [First Steps](#).
2. From the main web GUI, navigate to *MORSE > Wizard Config* in the top menu bar.

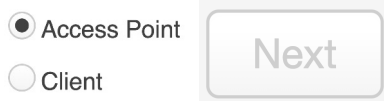


👉 Heads up! If you just completed the *Welcome Wizard*, you'll be redirected to this page automatically.

3. Select *Standard WiFi HaLow*.



4. Select *Access Point*, then *Next* (at the bottom of the page).



5. Set your *SSID* and *Passphrase*. This is just like any traditional WiFi network, and it will be the set of public credentials your network utilizes when new devices want to join.

SSID

Passphrase

6. If you've [set your region to US](#) and your locale doesn't stipulate legal frequency restrictions beyond the general guidelines of the 902-928MHz range, please match the following settings:

Bandwidth

Channel

These settings, while not required, are ideal for range and provide plenty of data throughput for camera control purposes.

👉 **Heads up!** You can always change these settings manually later, or even implement *Dynamic Channel Selection* if desired. This is just the setting for the initial configuration of your TeeHee HaLow AP.

👉 **Heads up!** European customers: You'll need to experiment to find your ideal channel. Due to legal and regional limitations, DOT LOL, INC. has not thoroughly tested frequencies below 900MHz in order to make an informed recommendation for an exact channel within the EU HaLow range.

7. For Upstream Network, select *None*, then *Next* (at the bottom of the page).

None

Ethernet

8. Click or tap *Apply* (at the bottom of the page).

9. On the *Wizard Complete* page, select *Leave wizard* (at the bottom of the page).

Wizard Complete

Click below to exit the wizard



Leave wizard

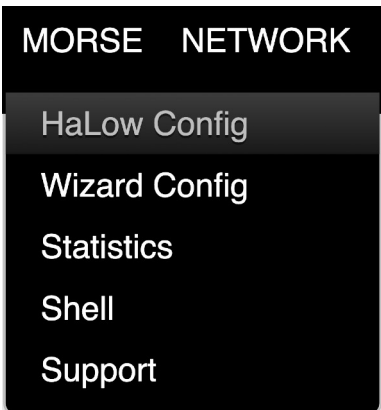
You will be redirected to the *STATUS > Overview* page. Here you can see things like your unit's current IP addresses and wireless connections.

Customize TeeHee HaLow AP: IP Settings

The *Wizard Config* sets a lot of the necessary settings automatically. The following steps will implement a static IP scheme and bridge HaLow and non-HaLow (i.e. wired) traffic.

👉 **Heads up!** If you don't have an existing network, you may follow along to the following steps verbatim. If you're attaching TeeHee HaLow to any sort of existing network—even just a wired switch—you should replace any IP addresses advised below with the IP scheme from the parent network. While this isn't required, it will help keep your IP address assignment organized and avoid any potential IP address conflicts.

1. If you haven't already, complete [First Steps](#).
2. From the main web GUI, navigate to *MORSE > HaLow Config* in the top menu bar.



3. Ensure *Access Point* is selected.

| | | | | |
|--------------|---------|--------|--------------|-----|
| Access Point | Station | Ad-Hoc | 802.11s Mesh | Off |
|--------------|---------|--------|--------------|-----|

- Under *Traffic Management*, toggle the *Bridge* switch to *On*.

Traffic Management

Bridge - On

 When enabled, the LAN and HaLow interfaces are joined to form a single network.

- Under *IP Settings*, set *IP Method* to *Static*.

IP Method

- Under *IP Settings*, match the following IP address scheme:

IP Address

Netmask

Gateway

- Click *Save* (at the bottom of the page).

- Within a minute, the page will automatically redirect you to the new IP address you've just set for GUI access. Log in, if necessary.

You've done the hard part! Now you just get to add all sorts of friends (er, uh, client bridges) to keep TeeHee HaLow company in the ever-lonely void of digital cyberspace. And who wouldn't want a few good friends to join in on the fun?

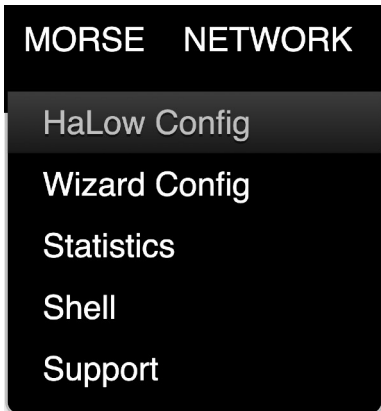
Configure TeeHee HaLow as a Client

Now that you have one TeeHee HaLow unit [configured as an AP](#), you can now attach your client(s). In the simplest topology, you may just have a single client, and that client unit would then live on, say, a cinema camera body. The good news: You can add as many clients as you would like, and the process is the same for each one.

Ultimately, this process is analogous to borrowing a friend's phone and entering your home WiFi password so they can connect to your network: After doing it once, the devices connect every time they're powered on and within range of one another.

- If you haven't already, complete [First Steps](#) on this additional TeeHee HaLow unit.
- Ensure the additional TeeHee HaLow unit that is already [configured as an AP](#) is turned on and nearby, with ample time (about 30 seconds) to fully boot. As a reminder, both the AP unit and the unit you're about to configure as a client should have their [antennas attached](#).

- From the main web GUI, navigate to *MORSE > HaLow Config* in the top menu bar.



👉 **Heads up!** If you just completed the *Welcome Wizard*, you'll be redirected to the *Wizard Config* automatically. **Do not use the *Wizard Config* to add your client devices** as it does not offer the option to change the *IP Method*.

- Select *Station* from the top navigation bar.



👉 **Heads up!** If the navigation bar only has three options instead of five, toggle *Off* (on the right of the navigation bar) and the remaining options will appear. You will then be able to select *Station* as instructed above.

- Select *Save* (at the bottom of the page).



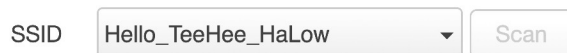
You may need to manually refresh the page.

- Scan* for available HaLow SSID's.



👉 **Heads up!** If your AP doesn't show up as expected, you may need to *Scan* again.

- If your TeeHee HaLow AP is the only HaLow AP in the area, the system will select it by default. If there are multiple HaLow AP's available from the dropdown, please choose the one to which you want to connect.



- Enter the passphrase for the selected AP's SSID.



- Under *Traffic Management*, toggle the *Bridge* switch to *On*.

Traffic Management

Bridge - On

 When enabled, the LAN and HaLow interfaces are joined to form a single network.

10. Under *IP Settings*, set *IP Method* to *Static*.

IP Method

11. Adopt the IP range you used to configure your AP unit, and manually assign an IP address to this client. This will allow you to easily access the TeeHee HaLow web GUI for changing settings in the field. If you don't have an external network, have no preference **and** are following this guide's recommendations, the following IP address scheme is recommended:

IP Address

Netmask

Gateway

10.101.101.102 is used instead of the next-in-sequence 10.101.101.101 because 10.101.101.101 is the default GUI address for TeeHee HaLow. For additional TeeHee HaLow clients, you can enter 10.101.101.103, 10.101.101.104 and so on, ensuring each additional client adopts a unique IP address within your subnet.

12. Select *Save* (at the bottom of the page).



13. Within a minute, the page will automatically redirect you to the new IP address you've just set for GUI access.
14. [Configure TeeHee HaLow as a Client](#) on any additional TeeHee HaLow units you would like to add to your network as clients.

You now have an AP and Client configured with an IP scheme that you've assigned manually. For each device on your new HaLow network—including the one you're using to access the web GUI or initiate changes to camera settings—you should manually adopt the same IP address scheme. Again, if you are following along verbatim to this guide, that means every device needs to receive a manual 10.101.101.XXX address, *and that address needs to be unique to that device*. Keeping a digital list of every device with its respective IP address is advisable for organizational purposes.

Why static IP addresses? For practical purposes in the field, static is superior to DHCP to avoid issues with lease times and keeping tabs on a myriad of client devices. While there is no "correct" or "official" method for IP assignment, this guide encourages users to follow the most reliable method whenever possible. The great thing is, since every

setting on TeeHee HaLow can be customized—and every person is different—if you are already aware of the settings you prefer, there’s nothing stopping you from using them! This guide is merely a template so that customers have a universal starting point if they don’t want to get into the weeds with networking, IP addresses and general network topologies.

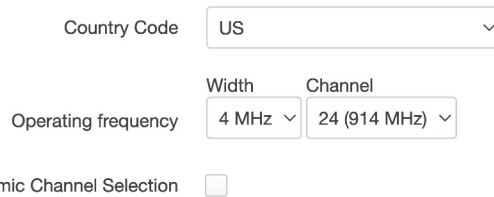
Maintenance

Change Wireless Settings

1. Physically attach TeeHee HaLow to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP address you’ve set for the web GUI, ensuring your device’s IP settings fall within the same subnet. (The default address is *10.101.101.101*.) Log in, if necessary.
2. Navigate to *NETWORK > Wireless*.
3. In the section labeled *Mode: Master*, select *Edit*.



4. Beneath *Device Configuration*, under the *General Setup* tab, you can change the *Country Code*, *Operating frequency (Width and Channel)* and *Dynamic Channel Selection* settings.

A screenshot of the 'Device Configuration' settings. It shows a 'Country Code' dropdown menu set to 'US'. Below it, 'Operating frequency' is set to '4 MHz' with a 'Width' dropdown and '24 (914 MHz)' with a 'Channel' dropdown. At the bottom, there is a 'Dynamic Channel Selection' checkbox which is currently unchecked.

5. Select *Save*.



6. Select *Save & Apply*.



After about 20 seconds, the page will refresh with live statistics.

Change the Web GUI Password

1. Physically attach TeeHee HaLow to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP address you’ve set for the web GUI, ensuring your device’s IP settings fall within the same subnet. (The default address is *10.101.101.101*.) Log in, if necessary.
2. Navigate to *SYSTEM > Administration*

Router Password

Changes the administrator password for accessing the device

Password

Confirmation

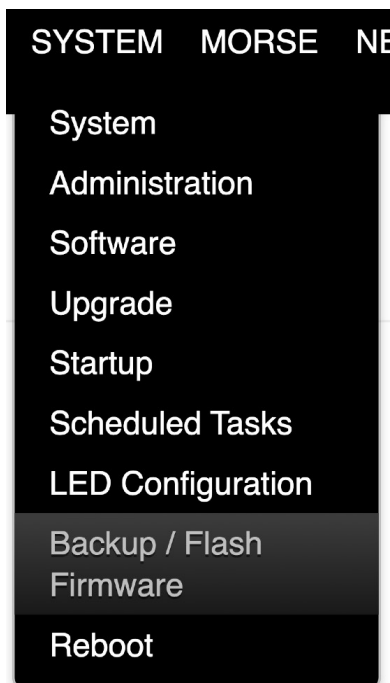
3. Enter your desired *Password* and replicate it in the *Confirmation* field.
4. Click *Save*.

Save

Create A Configuration Backup File

If you want to save the exact settings of an existing TeeHee HaLow—when you want to substitute another unit in its place, for example—you can export a configuration file.

1. Physically attach TeeHee HaLow to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP address you've set for the web GUI. (The default address is *10.101.101.101*.) Log in, if necessary.
2. From the main web GUI, navigate to *SYSTEM > Backup / Flash Firmware* in the top menu bar.



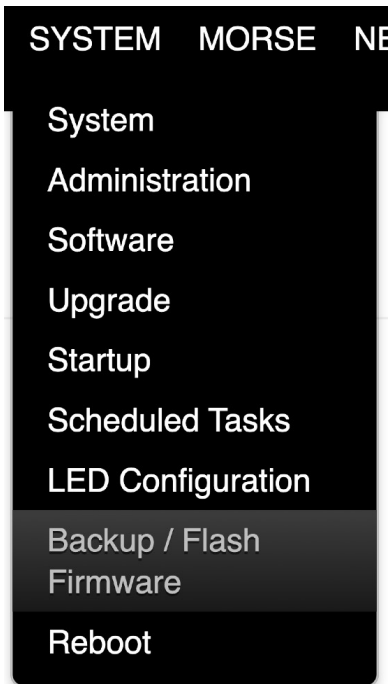
3. Under *Backup*, select *Generate archive* and save the file locally for future use.



 **Heads up!** Ensure the downloaded archive file ends in *.gz*. If it doesn't, you may need to use a different browser.

Upload A Configuration Backup File

1. Physically attach TeeHee HaLow to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP address you've set for the web GUI. (The default address is *10.101.101.101*.) Log in, if necessary.
2. From the main web GUI, navigate to *SYSTEM > Backup / Flash Firmware* in the top menu bar.



3. Under *Restore*, select *Upload archive....*



4. In the popup, select *Browse....*



5. Navigate to your local backup file. This file must end in *.gz*.

6. Select *Upload*.

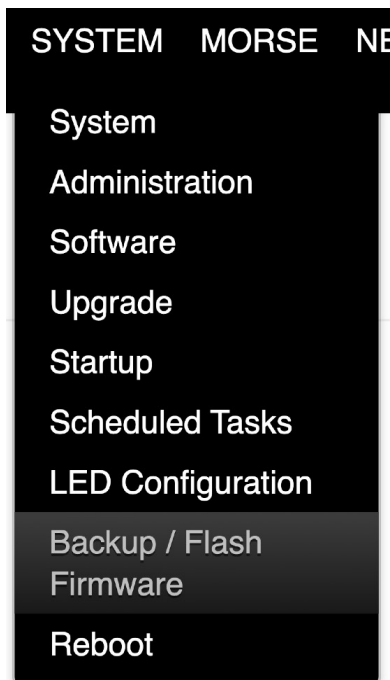


7. Wait 30-60 seconds for the backup to upload and save to TeeHee HaLow. The wait time may vary depending on the exact size of the backup file.

👉 **Heads up!** Custom files (certificates, scripts) may remain on the system. To prevent this, [Reset \(via Software\)](#) before you [Upload A Configuration Backup File](#).

Update Firmware

1. Physically attach TeeHee HaLow to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP address you've set for the web GUI, ensuring your device's IP settings fall within the same subnet. (The default address is *10.101.101.101*.) Log in, if necessary.
2. [Create A Configuration Backup File](#) just in case.
3. From the main web GUI, navigate to *SYSTEM > Backup / Flash Firmware* in the top menu bar.



4. Under *Flash new firmware image*, select *Flash image...*

Flash image...

5. In the popup, select *Browse...*

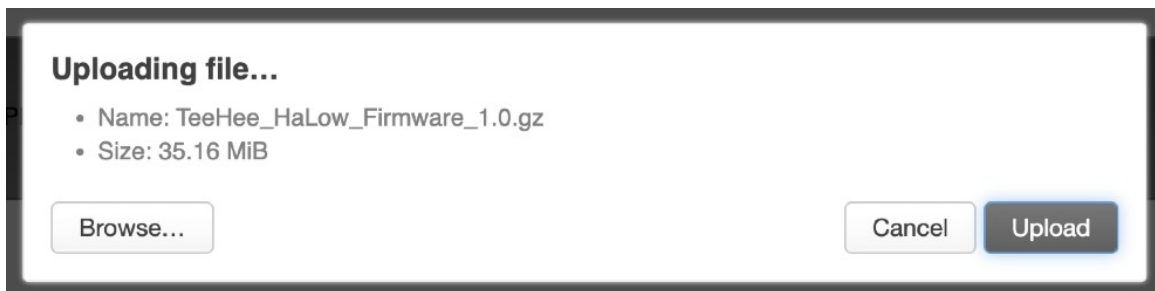


Uploading file...

Please select the file to upload.

Browse... Cancel Upload

6. Navigate to your local firmware file. This file must end in *.gz*.
7. Select *Upload*.

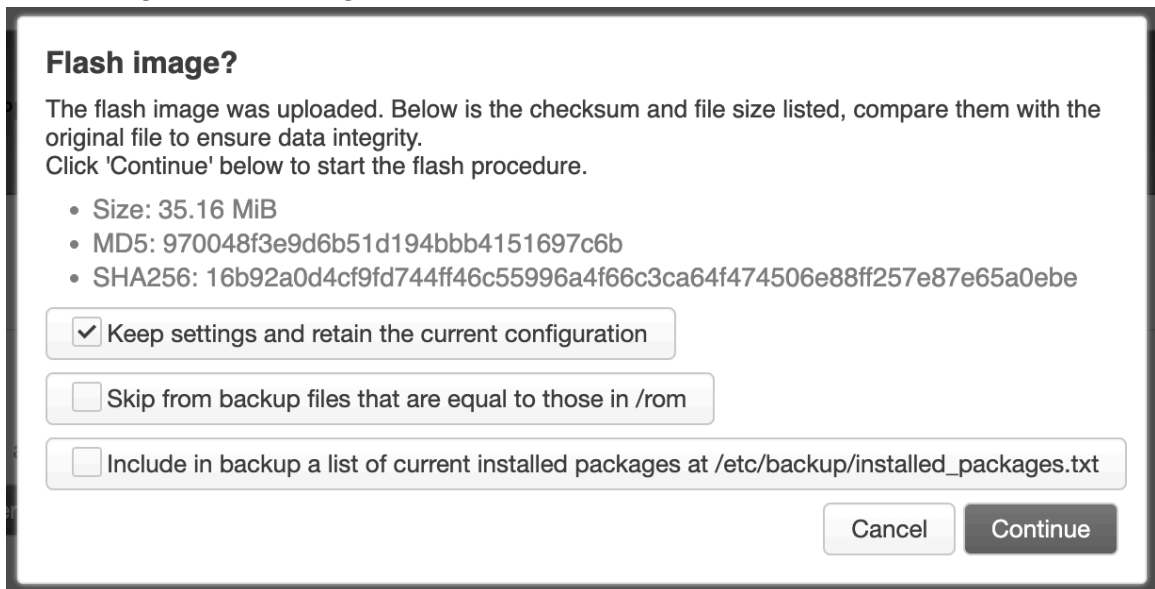


Uploading file...

- Name: TeeHee_HaLow_Firmware_1.0.gz
- Size: 35.16 MiB

Browse... Cancel Upload

8. Once the upload completes, please select your preferences. If you're not performing a reset during the firmware update, ensure the first option is checked.



Flash image?

The flash image was uploaded. Below is the checksum and file size listed, compare them with the original file to ensure data integrity. Click 'Continue' below to start the flash procedure.

- Size: 35.16 MiB
- MD5: 970048f3e9d6b51d194bbb4151697c6b
- SHA256: 16b92a0d4cf9fd744ff46c55996a4f66c3ca64f474506e88ff257e87e65a0ebe

Keep settings and retain the current configuration

Skip from backup files that are equal to those in /rom

Include in backup a list of current installed packages at /etc/backup/installed_packages.txt

Cancel Continue

9. Wait a few minutes for firmware to install. The wait time may vary depending on the exact size of the firmware file.

Flashing...

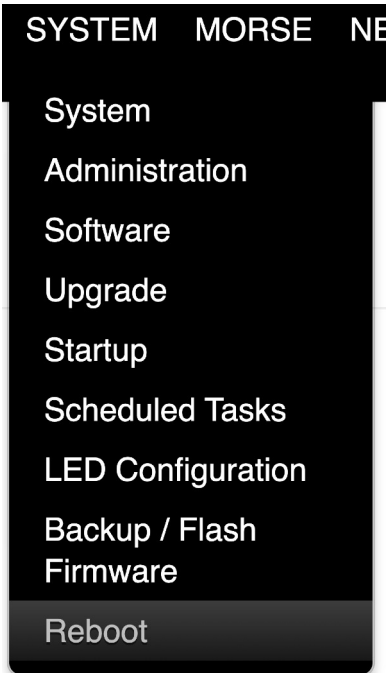
The system is flashing now.
DO NOT POWER OFF THE DEVICE!

○ Wait a few minutes before you try to reconnect. It might be necessary to renew the address of your computer to reach the device again, depending on your settings.

10. If you chose to retain your settings during Step 8, you will still be able to access TeeHee HaLow at the previous IP address you assigned. If not, the web GUI IP address will revert to its default of *10.101.101.101*.

Reboot (via Software)

1. Physically attach TeeHee HaLow to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP address you've set for the web GUI, ensuring your device's IP settings fall within the same subnet. (The default address is *10.101.101.101*.) Log in, if necessary.
2. From the main web GUI, navigate to *SYSTEM > Reboot* in the top menu bar.



3. Wait about 30 seconds for TeeHee HaLow to reboot.

Rebooting...

○ Waiting for device...

Reboot (via Hardware)

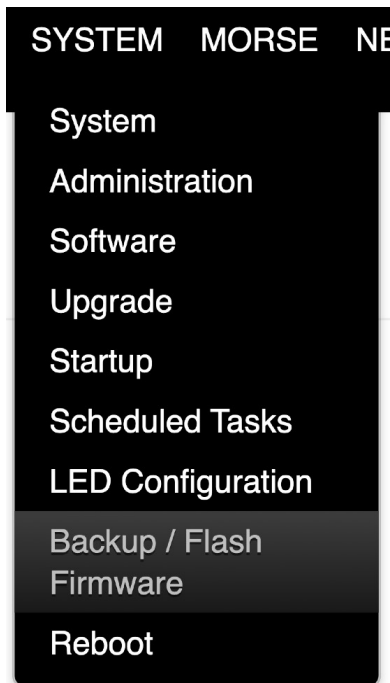
1. Insert a SIM card ejector or similar tool to trigger the multipurpose pinhole button, located [adjacent to the DOT LOL logo](#) on the TeeHee HaLow chassis.

2. Though subtle, you will be able to feel the momentary push button's physical feedback. Hold the button down for exactly 10 seconds, then release.
3. If an RJ45 cable with an active connection is currently inserted, monitor the port's integrated status lights: They will go dark, indicating a successful power cycle. After about 30 seconds, the device will come back online.

👉 **Heads up!** The white PWR light on the TeeHee HaLow chassis will remain lit during this process. This is expected behavior.

Reset (via Software)

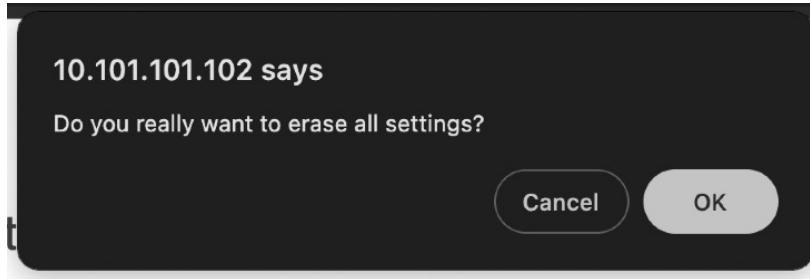
1. Physically attach TeeHee HaLow to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP address you've set for the web GUI, ensuring your device's IP settings fall within the same subnet. (The default address is *10.101.101.101*.) Log in, if necessary.
2. From the main web GUI, navigate to *SYSTEM > Backup / Flash Firmware* in the top menu bar.



3. Under *Reset Defaults*, select *Perform reset*.



4. Confirm your intent in the browser popup.



👉 **Heads up!** The white PWR light on the TeeHee HaLow chassis will remain lit during this process. This is expected behavior.

5. After about 40 seconds, the device will come back online at the default IP address of *10.101.101.101*.

Reset (via Hardware)

1. Connect an active RJ45 cable to the *LAN* port on TeeHee HaLow.
2. Insert a SIM card ejector or similar tool to trigger the multipurpose pinhole button, located [adjacent to the DOT LOL logo](#) on the TeeHee HaLow chassis.
3. Though subtle, you will be able to feel the momentary push button's physical feedback. Hold the button down for up to 25 seconds, or until the *LAN* port's green and yellow status lights turn off, whichever comes first.
4. After about 40 seconds, the device will come back online at the default IP address of *10.101.101.101*.

👉 **Heads up!** The white PWR light on the TeeHee HaLow chassis will remain lit during this process. This is expected behavior.

Appendix I: HaLow Mesh (802.11s)

TeeHee HaLow supports mesh on HaLow frequencies. While not the default configuration, this option is available for advanced users who have multiple TeeHee HaLow units placed throughout an environment and wish to extend the range beyond simple hub-and-spoke topology. Please note that mesh replaces any other wireless configuration on TeeHee HaLow, including the previously delineated methods in this guide for AP and client connections; therefore, your entire TeeHee HaLow network will need to be configured for mesh from the get-go—it's not simply an option you can enable after-the-fact.

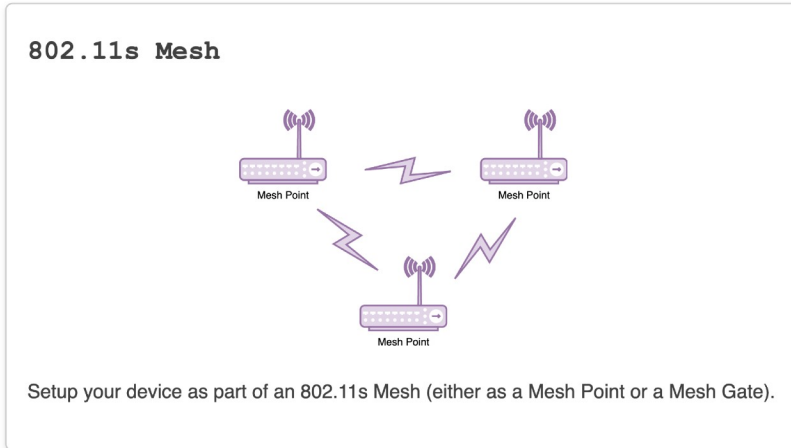
🗨️ **Heads up!** The following HaLow mesh instructions presume that you are not working within the confines of a pre-existing network—wireless or otherwise. If you are trying to integrate into a pre-existing network infrastructure, you will likely need to deviate from the written guidance herein in order to adapt to subordinate IP addresses and/or hardware you have already deployed.

Configure TeeHee HaLow as a Mesh Access Point (AP)

1. Physically attach TeeHee HaLow to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP address you've set for the web GUI, ensuring your device's IP settings fall within the same subnet. (The default address is *10.101.101.101*.) Log in, if necessary.
2. If TeeHee HaLow was previously configured as a normal AP or client, [Reset \(via Software\)](#).
3. Complete [First Steps](#).
4. From the main web GUI, navigate to *MORSE > Wizard Config* in the top menu bar.



5. Select *802.11s Mesh*.



6. Select *Mesh Gate*, then *Next* (at the bottom of the page).

Mesh Point

Mesh Gate (Mesh Point with collocated network)

Next

7. Set your *Mesh ID* and *Mesh Passphrase*. These are similar to an SSID and passphrase combo: They will be the credentials for your mesh network when new mesh points need to join.

Mesh ID

Mesh Passphrase

8. If you've [set your region to US](#) and your locale doesn't stipulate legal restrictions beyond the general guidelines of the 902-928MHz range, please match the following settings:

Bandwidth

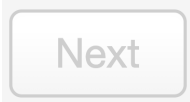
Channel

These settings, while not required, are ideal for range and provide plenty of data throughput for camera control purposes.

👉 Heads up! You can always change these settings manually later, or even implement *Dynamic Channel Selection* if desired. This is just the setting for the initial configuration of your mesh AP.

European customers: You'll need to experiment to find your ideal channel. Due to legal and regional limitations, DOT LOL, INC. has not thoroughly tested frequencies below 900MHz in order to make an informed recommendation for an exact channel within the EU HaLow range.

9. Select *Next* (at the bottom of the page).



10. Select *None*, then *Next* (at the bottom of the page).

None

Ethernet



11. Toggle *Enable Access Point* to be enabled

Enable Access Point



12. Set your *SSID* and *Passphrase*. This is just like any traditional WiFi network, and it will be the set of public credentials your network utilizes when new devices want to join.

SSID

Hello_TeeHee_HaLow

Passphrase

.....

*

13. Select *Next* (at the bottom of the page).



14. Select *Apply* (at the bottom of the page).



15. On the *Wizard Complete* page, select *Leave wizard* (at the bottom of the page).

Wizard Complete

Click below to exit the wizard

A screenshot of a web interface showing a 'Leave wizard' button circled in blue.

You will be redirected to the *STATUS > Overview* page. Here you can see things like your unit's IP addresses and wireless connections.

Configure TeeHee HaLow as a Mesh Client

Now that you have one TeeHee HaLow [configured as a Mesh AP](#), you can now attach your mesh client(s). In the simplest mesh topology, you may just have a single mesh client, and that mesh client unit would then live on, say, a cinema camera body. The good news: You can add as many mesh clients as you would like, and the process is the same for each one.

TeeHee HaLow mesh clients can be attached to downstream devices like normal bridged clients or planted standalone at stationary locations to expand your network's wireless perimeter. The following mesh client configuration process functions for both use cases. Just remember that, if your mesh points are mounted to devices like cameras and they get powered down temporarily, the total quantity of your mesh points will be reduced.

👉 **Heads up!** You can still [Configure TeeHee HaLow as a Client](#) and attach it to your mesh's normal SSID if for some reason you don't want your clients to be additional mesh points.

Ultimately, this process is analogous to borrowing a friend's phone and entering your home WiFi password so they can connect to your network: After doing it once, the devices connect every time they're powered on and within range of one another.

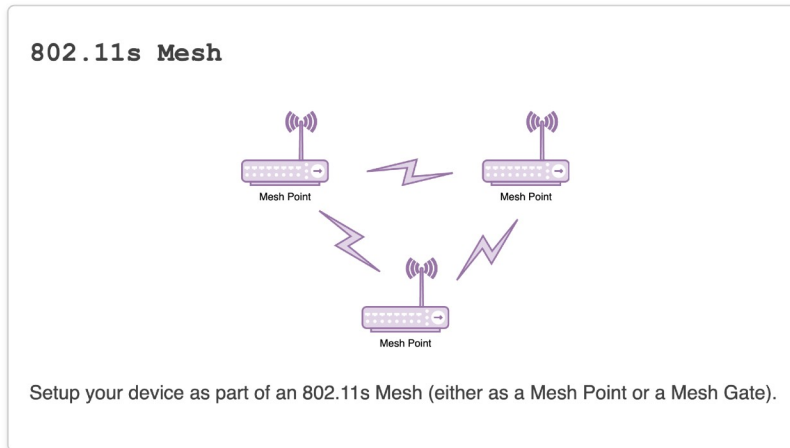
1. Physically attach TeeHee HaLow to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP

address you've set for the web GUI, ensuring your device's IP settings fall within the same subnet. (The default address is *10.101.101.101*.) Log in, if necessary.

2. If TeeHee HaLow was previously configured as a normal AP or client, [Reset \(via Software\)](#).
3. Complete [First Steps](#).
4. Ensure the additional TeeHee HaLow unit that is already configured as a mesh AP is turned on and nearby, with ample time (about 30 seconds) to fully boot. As a reminder, both the mesh AP unit and the unit you're about to configure as a mesh client should have their [antennas attached](#).
5. From the main web GUI, navigate to *MORSE > Wizard Config* in the top menu bar.



6. Select *802.11s Mesh*.



7. Select *Mesh Point*, then *Next* (at the bottom of the page).

Mesh Point

Mesh Gate (Mesh Point with collocated network)

Next

8. Enter the requested information, which you previously chose in Step 11 and Step 12 of [Configure TeeHee HaLow as a Mesh Access Point \(AP\)](#), then select *Next* (at the bottom of the page).

Mesh ID

Mesh Passphrase

Bandwidth

Channel

9. Select *Bridge*, then *Next* (at the bottom of the page).

None

Bridge

Extender

10. Select *Apply* (at the bottom of the page).

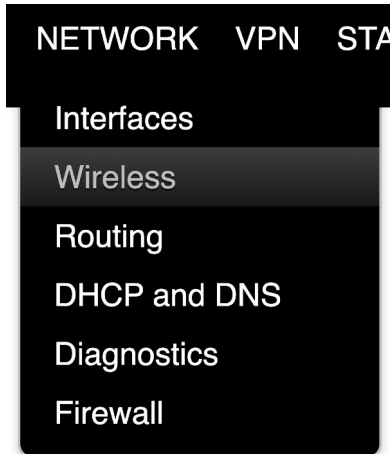
In the interim, you will no longer have a wired connection to this mesh point. Therefore, the GUI page will not refresh. This TeeHee HaLow unit will, however, now be wirelessly connected to your mesh AP, as intended.

As long as there is a contiguous wireless connection thread that leads back to the HaLow mesh AP, all attached mesh clients will, in typical mesh fashion, hop onto the “closest” (ideal RSSI value) mesh point automatically and dynamically anytime the HaLow network is online. Of course, the mesh AP must always be online as the central controller since this is not a *self-healing* mesh network, but mesh points can come and go as they please. Mesh points act as bridges for downstream clients just like the [normal client configuration](#).

Enable Mesh Point Bridging

This process will allow all components of your mesh network to “see” each other. This will simultaneously allow access to any downstream devices connected to TeeHee HaLow mesh points.

1. Physically attach the TeeHee HaLow unit that is already [configured as a mesh AP](#) to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP address you’ve set for the web GUI, ensuring your device’s IP settings fall within the same subnet. (The default address is *10.101.101.101*.) Log in, if necessary.
2. From the main web GUI, navigate to *NETWORK > Wireless* in the top menu bar.



3. In the section labeled *Mode: Mesh Point*, select *Edit*.



4. Beneath *Interface Configuration*, under the *General Setup* tab, change the *Network* dropdown to match the following:



5. Select *Save*.



6. In the section labeled *Mode: Master*, select *Edit*.



7. Beneath *Interface Configuration*, under the *General Setup* tab, change the *Network* dropdown to match the following:



8. Select **Save**.



9. Select **Save & Apply**.

Wireless Overview

| | | |
|-------------|-----------------------------------------------------------------------------------------|---------------------|
| radio0 | Morse Micro HaLow WiFi 802.11ah Channel: 24 (914.0 MHz) Bitrate: 1.5 Mbit/s | Restart Scan Add |
| -18/-80 dBm | Mesh ID: MeshID Mode: Mesh Point Interface has 3 pending changes | Disable Edit Remove |
| disabled | SSID: ? Mode: Client Wireless is disabled | Enable Edit Remove |
| ---/-80 dBm | SSID: MeshSSID Mode: Master Interface has 1 pending changes | Disable Edit Remove |

Associated Stations

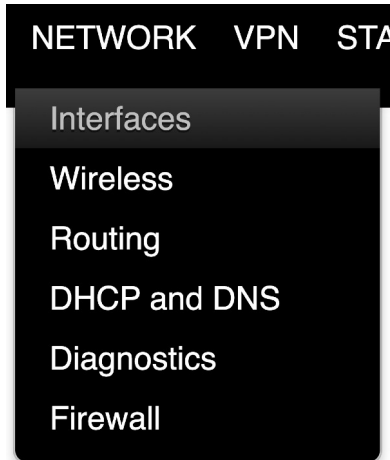
| Network | MAC address | Host | Signal / Noise | RX Rate / TX Rate |
|-----------------------------|-------------------|------|----------------|----------------------------------------------------------------|
| Mesh Point "MeshID" (mesh0) | 0C:BF:74:8A:79:98 | ? | -18/-80 dBm | 2.8 Mbit/s, 4 MHz, MCS 1 1.6 Mbit/s, 4 MHz, MCS 0, Short GI |

Save & Apply Save

After about 20 seconds, the page will refresh with live statistics.

Configure the DHCP Subnet

1. Physically attach the TeeHee HaLow unit that is already [configured as a mesh AP](#) to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP address you've set for the web GUI, ensuring your device's IP settings fall within the same subnet. (The default address is *10.101.101.101*.) Log in, if necessary.
2. From the main web GUI, navigate to *NETWORK > Interfaces* in the top menu bar.



3. Beside the *ahwlan* interface, select *Edit*.



4. Set the IPv4 address to *10.101.101.2*, then select *Save*.



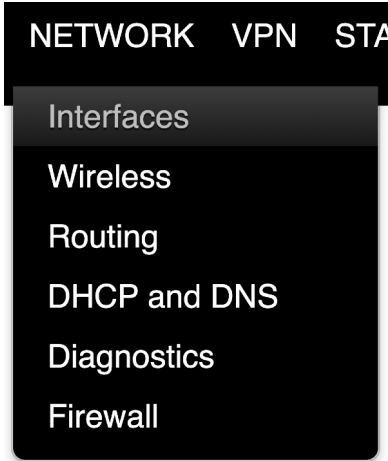
5. Select *Save & Apply*.



6. Wait for the changes to apply. Once the page automatically refreshes, on both the mesh AP and mesh client, [Reboot \(via Hardware\)](#).

Assign A Static IP Address to the Mesh AP

1. Physically attach the TeeHee HaLow unit that is already [configured as a mesh AP](#) to your computer or mobile device with an RJ45 cable connected to the LAN port. With your browser of choice, navigate to the IP address you've set for the web GUI, ensuring your device's IP settings fall within the same subnet. (The default address is *10.101.101.101*.) Log in, if necessary.
2. From the main web GUI, navigate to *NETWORK > Interfaces* in the top menu bar.



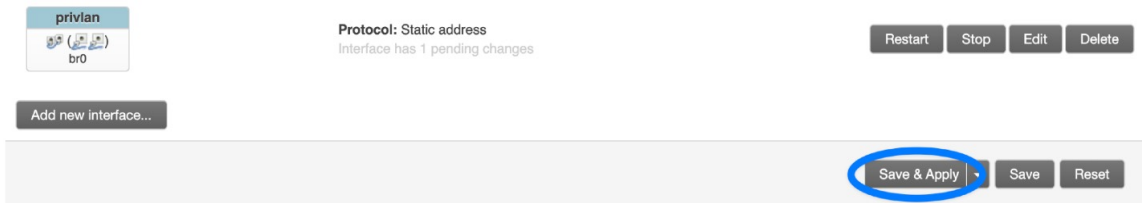
3. Beside the *privlan* interface, select *Edit*.



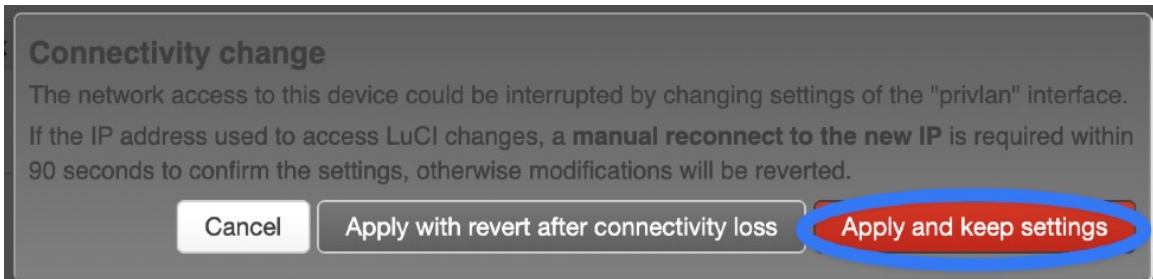
4. Set the *IPv4 address* to *10.101.101.100*, then select *Save*.



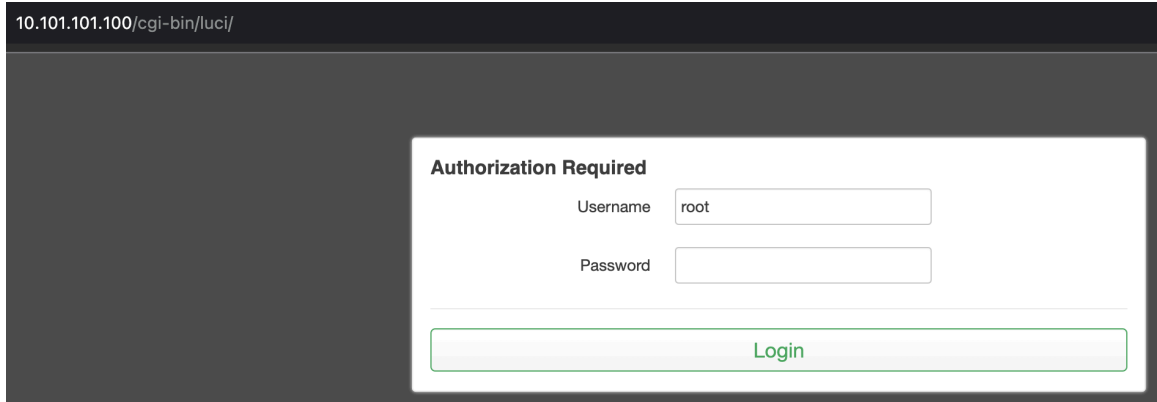
5. Select *Save & Apply*.



6. Select *Apply and keep settings*. Wait 10-15 seconds.



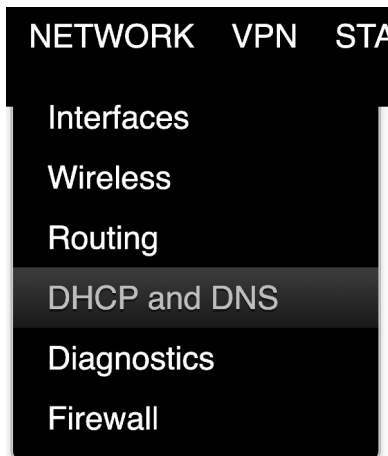
7. To return to the web GUI, manually enter *10.101.101.100* into your URL bar. Log in, if necessary.



Assign A Static Lease to a Mesh Client

Unlike a traditional TeeHee HaLow AP and client relationship, an 802.11s mesh AP with one or more mesh clients attached utilizes an internal DHCP server to assign IP addresses to any attached mesh points. In order to emulate static addresses, we are going to employ static *leases* for each mesh point, which are ultimately controlled by the mesh AP. While this is not required, it is best practice to lock down any dynamic variables for easier troubleshooting in the field.

1. Physically attach the TeeHee HaLow unit that is already [configured as a mesh AP](#) to your computer or mobile device with an RJ45 cable connected to the *LAN* port. With your browser of choice, navigate to the IP address you've set for the web GUI, ensuring your device's IP settings fall within the same subnet. (The default address is *10.101.101.101*. If you've been following along for mesh configuration thus far, the address will now be *10.101.101.100*.) Log in, if necessary.
2. From the main web GUI, navigate to *NETWORK > DHCP and DNS* in the top menu bar.



3. Navigate to the *Static Leases* tab.

DHCP and DNS

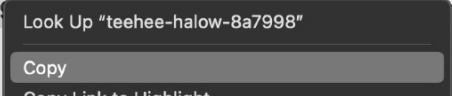
Dnsmasq is a lightweight [DHCP](#) server and [DNS](#) forwarder.

General Settings Advanced Settings **Static Leases** Resolv and Hosts Files Hostnames IP Sets Relay SRV MX CNAME PXE/TFTP Settings

4. Ensure your TeeHee HaLow mesh client is online: Under *Active DHCP Leases*, copy the TeeHee HaLow mesh client's *Hostname*, which by default will read *teehee-halow-XXXXXX*. You don't need to copy the text within the parentheses (which is hidden behind the contextual menu in the below screenshot).

Active DHCP Leases

| Hostname | IPv4 address |
|---------------------|---------------|
| teehee-halow-8a7998 | 192.168.1.172 |



5. Under *Active DHCP Leases*, take note of the TeeHee HaLow mesh client's *MAC address*.

Active DHCP Leases

| Hostname | IPv4 address | MAC address | Lease time remaining |
|---------------------|---------------|-------------------|----------------------|
| teehee-halow-8a7998 | 192.168.1.171 | 3E:02:59:8A:79:99 | 11h 11m 50s |

6. Back under *Static Leases*, select *Add*.

DHCP and DNS

Dnsmasq is a lightweight [DHCP](#) server and [DNS](#) forwarder.

General Settings Advanced Settings **Static Leases** Resolv and Hosts Files Hostnames IP Sets Relay SRV MX CNAME PXE/TFTP Settings

Static leases are used to assign fixed IP addresses and symbolic hostnames to DHCP clients. They are also required for non-dynamic interface configurations where only hosts with a corresponding lease are served.

Use the *Add* Button to add a new lease entry. The *MAC address* identifies the host, the *IPv4 address* specifies the fixed address to use, and the *Hostname* is assigned as a symbolic name to the requesting host. The optional *Lease time* can be used to set non-standard host-specific lease time, e.g. 12h, 3d or infinite.

The tag construct filters which host directives are used; more than one tag can be provided, in this case the request must match all of them. Tagged directives are used in preference to untagged ones. Note that one of mac, duid or hostname still needs to be specified (can be a wildcard).

| Hostname | MAC address(es) | IPv4 address | Lease time | DUID | IPv6-Suffix (hex) | Tag | Match Tag |
|----------|-----------------|--------------|------------|------|-------------------|-----|-----------|
|----------|-----------------|--------------|------------|------|-------------------|-----|-----------|

This section contains no values yet



7. Enter the *Hostname* you copied in Step 4.

Hostname

8. From the *MAC address(es)* dropdown, select the *MAC address* you observed in Step 5.

MAC address(es)

IPv4 address

Lease time

- From the *IPv4 address* dropdown, enter *10.101.101.102* in the – *custom* – field and hit return to ensure it captures the input value. For additional mesh points, you can enter 10.101.101.103, 10.101.101.104 and so on, ensuring each additional mesh point adopts a unique IP address within your subnet.

IPv4 address

Lease time

DUID

v6-Suffix (hex)

The IPv6 interface identifier (address suffix)

- From the *Lease time* dropdown, select *infinite (lease does not expire)*.

Lease time

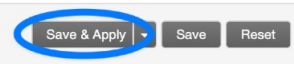
DUID

v6-Suffix (hex)

- Select *Save*.



- Scroll down to the bottom of the page and select *Save & Apply*.



13. Wait for the changes to apply. Once the page automatically refreshes, on both the mesh AP and mesh client, [Reboot \(via Hardware\)](#).

You can now use an app like [LanScan](#) to verify everything is hunky-dory. You may still see a remnant scan of the original DHCP mesh point address, but with the new static lease you just assigned, the mesh point will now receive the address you entered in Step 9. Eventually the remnant scan will disappear.

| IPv4 address | IPv6 Local | IPv6 Global | MAC address | Hostname | Ping |
|----------------|--------------------|-------------|-------------------|----------------------|------|
| 10.101.101.5 | ...c:220:1385:be01 | | 00:e0:4c:68:19:48 | LMA0 | ● |
| 10.101.101.100 | ...6 In-App! **4b | | 62:eb:27:f2:1b:4b | teehee-ha'low-f21b4a | ● |
| 10.101.101.102 | | | 3e:02:59:8a:79:99 | teehee-ha'low-8a7998 | ● |
| 10.101.101.172 | ...e Details Pane) | | 3e:02:59:8a:79:99 | | ● |

Appendix II: TeeHee HaLow Configuration Files

For those who want to jump start their journey with TeeHee HaLow, these saved configuration files can save you some effort. These were created according to the respective configuration processes delineated in this guide. Once uploaded, you can either use the baked-in IP schemes or manually alter the IP schemes to fit your individual needs.

👉 **Heads up!** These configuration files are built around the *Region* setting of *US*. If you are in another locale, please set the appropriate *Region* before use. To adjust these preferences, [Change Wireless Settings](#).

AP-Client

[AP](#)

IP: 10.101.101.100
GUI password: sampetrov.lol
SSID: Hello_TeeHee_HaLow
SSID password: sampetrov.lol

[Client](#)

IP: 10.101.101.102
GUI password: sampetrov.lol

Mesh AP-Client

[Mesh AP](#)

IP: 10.101.101.100
GUI password: sampetrov.lol
SSID: MeshSSID
SSID password: sampetrov.lol
Mesh ID: MeshID
Mesh ID password: sampetrov.lol

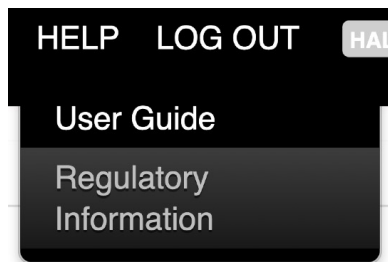
[Mesh Client](#)

IP: 10.101.101.102
GUI password: sampetrov.lol

Appendix III: TeeHee HaLow FAQ

How do I know which HaLow frequencies I can use in my country?

From the main web GUI, navigate to *HELP > Regulatory Information* in the top menu bar.



You can select your *Country* from the dropdown menu to view the HaLow frequencies allocated in your region.

Country

What should I do if the wireless range of TeeHee HaLow seems to underperform when compared to the advertised distance?

Ensure all HaLow device antennas are attached properly. You may also try to [Change Wireless Settings](#).

If your *Country Code* is set to *US*, check your *Width* setting and ensure it's set to 4MHz. If changing the *Width* doesn't resolve the issue, you can try to toggle *Dynamic Channel Selection* or change to a different *Channel* manually, as there could be a local conflict at the exact frequency you're inhabiting.

If these do not resolve the issue, you may just be subject to general environmental interference within the sub-1GHz spectrum in your specific area. This may be an ambiguous factor unless you are able to deploy a spectrum analyzer at HaLow frequencies to actually determine your RF environment.

Why does TeeHee HaLow have vestigial design attributes?

TeeHee HaLow, based around the NanoPi R2S Plus, utilizes the original TeeHee chassis, which was designed around the NanoPi R5C. Therefore, the AUX antenna hole is now capped with a screw, the Micro SD card slot is now utilized to run the OS and the extra status lights are now integrated into the RJ45 ports at the OS level for troubleshooting purposes.

Where's the Reset Button on TeeHee HaLow?

There's only one button on TeeHee HaLow. The button can be used to [Reboot \(via Hardware\)](#) or [Reset \(via Hardware\)](#).

Is it normal for TeeHee HaLow to get warm?

Yes. The silent, fanless design dissipates heat from the chassis and may feel warm to the touch. Using the integrated threaded mounting points is recommended to avoid any adhesive coming undone during histrionic handheld camera movements.

What if I can't find TeeHee HaLow on my network?

On macOS, you can try to find TeeHee HaLow using [LanScan](#). If that doesn't work, you may need to [Reset \(via Hardware\)](#), at which point the default IP address of `10.101.101.101` will be reinstated for the TeeHee HaLow web GUI. You can then revisit [First Steps](#).

How do I utilize the battery inside TeeHee HaLow with Internal UPS?

If you own TeeHee HaLow with Internal UPS, there are no additional steps to take advantage of the integrated supplemental power system. You can verify whether or not your TeeHee HaLow unit contains a battery by unplugging external power to see if the unit continues to retain network connections once external power is removed. TeeHee HaLow with Internal UPS will simply stay online after power is disconnected—for up to five minutes, if the internal battery is fully charged. Like a standard UPS, the system is entirely automatic: TeeHee HaLow runs off of external power input when external power is present, and the battery kicks in whenever external power is lost. The internal battery takes about 10 minutes to fully charge in the background during normal use of TeeHee HaLow.

How do I turn off TeeHee HaLow?

If you do not have TeeHee HaLow with Internal UPS, the unit simply turns on and off when you attach and disconnect external power.

If you have TeeHee HaLow with Internal UPS, you may need to wait up to 30 minutes for the unit to deplete its battery and fully shut down. In most cases the battery depletes in 10-15 minutes.

How do I contact support?

Support is available via email: support@sampetrov.lol.

Appendix IV: Limited Warranty

DOT LOL, INC. warrants that this product will be free from defects in materials and workmanship for a period of one year from the date of purchase. If a product proves to be defective during this warranty period, DOT LOL, INC., at its option, will either repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, you, the Customer, must notify DOT LOL, INC. of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. The Customer shall be responsible for packaging and shipping the defective product to DOT LOL, INC., with shipping charges prepaid. DOT LOL, INC. shall pay for the return of the product to the Customer if the shipment is to a location within the country in which DOT LOL, INC. is located. Customer shall be responsible for paying all shipping charges, insurance, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. DOT LOL, INC. shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than those employed by DOT LOL, INC. to install, repair or service the product, b) to repair damage resulting from improper use or connection to incompatible equipment, c) to repair any damage or malfunction caused by the use of non-DOT LOL, INC. supplied parts or supplies, or d) to service a product that has been modified or integrated with other products when the effect of such a modification or integration increases the time or difficulty of servicing the product.

THIS WARRANTY IS GIVEN BY DOT LOL, INC. IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. DOT LOL, INC. AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE RESPONSIBILITY OF DOT LOL, INC. TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE WHOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER DOT LOL, INC. OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.