

TNA-301 & TNA-302 Operating Manual

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This operating manual applies to the TNA-301 and TNA-302 product models.

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Note: Please be patient the first time you power on your device, as it may take more time than normal to boot up while the device flashes its internal modem firmware. Three blinking signal LEDs will indicate that this process is currently in progress, and should last about 30 seconds to 1 minute.

Product box contents*

Please consider recycling our eco-friendly product packaging.

Item	Qty
TNA-301 or TNA-302 60 GHz unit w/ attached mounting back plate	1
48V .5A PoE adapter and power cable	1
Quick start guide insert	1

* DC terminal screw block connectors are available upon request.

Meaning of device LEDs

Signal level LEDs

Signal LEDs are updated at a ~4 second interval.

Behavior	Meaning
All signal LEDs are off	The device is currently operating in AP mode, or the device is powered off.
The first LED is on & slowly blinking	The device is in station/PTP slave mode and currently scanning, or device is in PTP master mode waiting for the slave to connect.
All three LEDs are on & fast blinking	The device is currently updating its modem firmware. This only happens at boot after a firmware upgrade. Note: A normal upgrade should take less than 1 minute, but if the modem firmware is being recovered from an invalid state, this process could take up to 10 mins.
The first LED is on and not blinking	The device is in station (or PTP) mode and currently connected to a peer with low signal strength.
The first two LEDs are on, not blinking	The device is in station (or PTP) mode and currently connected to a peer with medium signal strength.
All three LEDs are on, not blinking	The device is in station mode (or PTP) and currently connected to a peer with high signal strength.

Ethernet port LEDs

2.5G ETH0: The link light will turn on when a link is established, and the power light will turn on once the device is supplied with power.

1G ETH1: The link light will turn on and blink when a link is established, and the PoE out light will turn on when PoE out is enabled in software.

Powering your device

Input Power

Important Notes

- The input power should be 48VDC and a minimum of .5A (24W) is recommended.
- -48VDC is **not** currently supported.
- Devices can **not** be powered by active PoE (802.3at, etc).

The TNA 301 and 302 devices can be powered two ways, either via:

1. The Power over Ethernet (PoE) port or via
2. The DC input terminal.

Both powering methods should not be used at the same time. The input power should be 48VDC in both cases and a minimum of .5A (24W) is recommended.

Although not recommended, a lower input voltage may be used. However, there are two main limitations when using a lower input voltage:

- The cable run should be as short as possible and the use of larger gauge cable such as CAT6+ is highly recommended. On longer cable runs, the voltage drop will be higher due to the higher current needed to meet the needs of the radio.
- The PoE out is current-limited to .5A. At 38VDC, there should be sufficient power for a second TNA radio depending on the length of your cable run.

Output Power

These TNA radios have the ability to send passive PoE out of the 1Gbps port to power another device using the input power provided to the TNA device. These settings can be found under the Network/Ethernet PoE Out section of the Web UI.

The output voltage is the same as the input voltage and supports a maximum of .5A of current (24W total).

Warning: when using the PoE out feature on the TNA radio, care should be taken to ensure there is adequate power supply to power both the TNA radio and the secondary device. The supplied PoE injector may not be adequate to power both devices and may result in unstable operation.

Warning: passive PoE out on the 1Gbps port can damage non-PoE devices. Do not connect non-PoE devices to the 1Gbps port when PoE out is enabled.

Device access for initial configuration

i You will need a modern web browser in order to access the device's Web UI to configure your device.

1. First, power on the device. You can do this by using the DC input terminal or by using the included PoE adapter. If using the PoE adapter, plug the power cable attached to the PoE adapter into the wall. Next, plug one side of an ethernet cable into the adapter's POE port, and the other into the device's 2.5G ETH0 PoE-in port.

2. Connect your laptop's ethernet cable into either the data port of the PoE adapter (2.5G) or the ETH1 (1G) port on the device, in order to give your laptop or device connectivity. By default, DHCP client is enabled on the main management network bridge of the device. If your device cannot obtain an IP from an upstream DHCP server, it will fall back to 192.168.1.1, unless otherwise configured. If your device is running v1.12.0 firmwares or later, the device will be accessible on the additional "alternative local IP" of 169.254.1.1.
3. Log in to your device's local web UI in your web browser at the DHCP-assigned IP/fallback IP or the "alternative local IP" previously mentioned, using the default credentials of root/admin. **Please change the default user credentials after you login for the first time.**
4. Go to the configuration settings tab via the main nav menu on the left in order to configure your device. Please refer to the **full web UI manual** (<https://tachyon-networks.freshdesk.com/support/solutions/articles/67000659775-tna-30x-web-ui-manual-v1-10-3->) for details about each setting, or continue reading below about how to make a link.

Making a link

By default, the TNA-301 is configured to operate in AP mode with the SSID tachyon-ptmp, and the TNA-302 is configured to operate in station mode with the same SSID. Both are configured to use the encryption key value of 'passphrase'.

This means once you power up the devices within range of each other, they should link up without any additional configuration (default channel is 5), and immediately start passing traffic.

For minimal setup, it is recommended to change the SSID to a unique identifier and to set a unique encryption key. **In order for the devices to link together, the SSID, channel width, and encryption type/key must all match.**

To do to this, login to the Web UI, navigate to the wireless->60 GHz radio settings, and input the new settings on both devices (and subsequent client radios). Click save to apply the changes. If the channel width or operation mode has been changed, it will require the device to reboot to take effect.

Lightly aim the two devices and they should connect up and pass traffic immediately. In close range such as lab setups, it may be difficult to reach full performance due to the strength of the signal and high-power reflections caused by walls and other objects.

You can see the status of the links between the AP and client on the dashboard page of the Web UI.

How to select channel parameters

Please use the **link calculator** (<https://tachyon-networks.com/calc.html>) and corresponding guide to determine the optimal target distance and channel(s) to use for your installation. Also keep in mind that the 60 GHz frequency requires LOS and is affected by **rain fade** (<https://tachyon-networks.freshdesk.com/support/solutions/articles/67000668977-how-is-the-60ghz-spectrum-affected-by-rain->) as well as **significant oxygen absorption** (<https://tachyon-networks.freshdesk.com/support/solutions/articles/67000452947-how-is-the-60ghz-spectrum-affected-by-oxygen->) in the lower frequencies.

You can read more about **half channel support** (<https://tachyon-networks.freshdesk.com/support/solutions/articles/67000710571-does-the-tna-30x-support-half-channels->) here.

Troubleshooting your link

Please take the following steps to troubleshoot any wireless links that have sub-optimal performance:

1. Check to see if the devices are running the latest firmware. The latest firmware can be found **here** (<https://tachyon-networks.freshdesk.com/support/solutions/articles/67000710575-tna-30x-firmware-releases>).
2. Check to see if the devices are within the coverage areas of each other and have line of sight to each other.
3. Check to see if the link parameters in use are capable to create a link as estimated by the **link calculator** (<https://tachyon-networks.com/calc.html>).
4. If the devices are connected but the connection quality is poor, it could be due to a destructive reflection on the path. To solve this, try moving your TNA station up or down, or left/right in small increments. Up/down movements are generally more helpful in these cases assuming the reflection is from the ground plane (e.g. the ground, nearby rooftops in the path, etc.). Changing the channel may also resolve this issue since different frequencies will have different channel characteristics.

All TNA radios (as well as most other PTMP devices operating in the 60GHz band) use a single carrier PHY for transmitting data. Single carrier PHYs are more susceptible to destructive reflections than some other methods such as OFDM.

I'm still having trouble with my link, what do I do next?

Please collect the troubleshooting files for both sides of the link you're trying to make, and send them to us at **support@tachyon-networks.com**, along with any other relevant info you might have about your install such as:

1. A detailed description of your issue
2. Link distance
3. Your rain region and expected RSSI of the link, based on results from the link calculator
4. Wireless speed test results (assuming a link can be made)
5. How you are powering the devices
6. What other accessories (cameras, other radios, etc) are connected to the device, and how they're powered.
7. Relevant environmental details, such as how far off the ground the AP and STA(s) are installed, if there are any metal structures nearby, large bodies of water, etc.

You can find the link to download a device's troubleshooting file from the menu located under the gear/settings icon in the web UI, in the upper right corner (see below screenshot under the "Updating firmware" section).

Quick Setup FAQs

Why does the MCS rates of my link seem lower than it should be given a solid RSSI?

You will need to run traffic over your link in order the data rates to modulate to the higher values.

Why doesn't the speedtest cause a spike in traffic on the throughput graph?

The speedtest only sends a very quick burst of packets, so won't have that much of an impact on the overall throughput graph results.

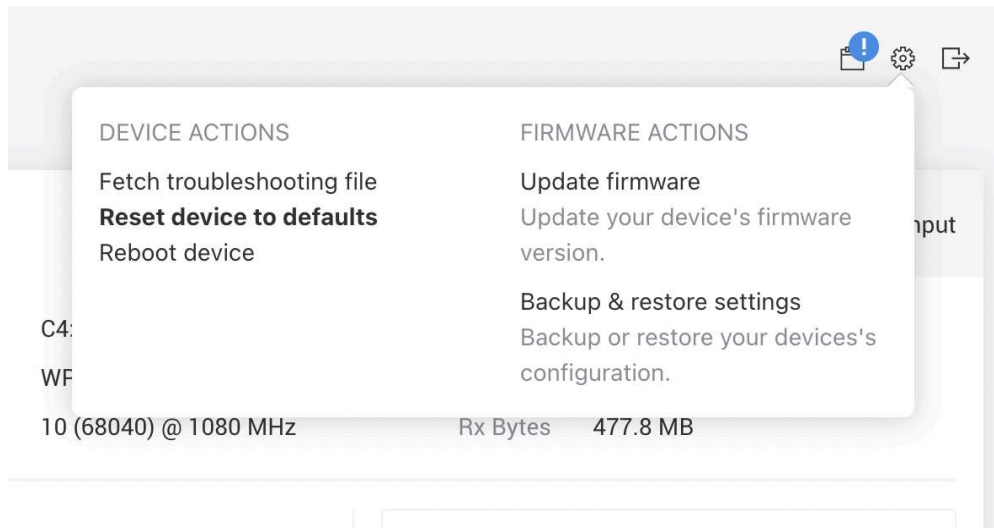
What does tx/rx sector mean?

You can read more about how to interpret **tx and rx sector numbers here.** (<https://tachyon-networks.freshdesk.com/en/support/solutions/articles/67000717208-what-do-the-tna-30x-tx-rx-sector-numbers-mean->). We will also be adding visualizations to the web UI in the future.

Updating firmware

Firmware can be updated in two ways:

1. **Via the web UI:** Download the latest firmware from our support site, and upload it via the web UI:



2. **Via the RESTful API:** You can script firmware upgrades via the API. Reference the **Tachyon Networks RESTful API** (<https://tachyon-networks.freshdesk.com/support/solutions/articles/67000659777-tna-30x-restful-api>) specs article for more information.

All TNA-300 series devices have two bootbanks. In the event that a firmware upgrade fails (power flicker, etc) and the device cannot boot up, it will revert back to the firmware flashed on the previous bootbank.

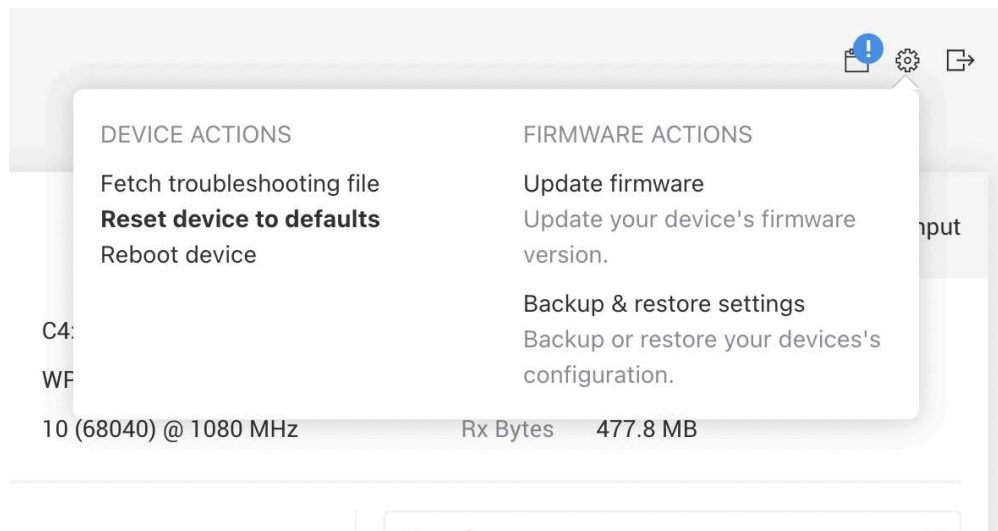
Resetting your device

You can reset your device to factory defaults 2 ways:

1. **Reset button:** Find a paperclip, or something similar, and use it to press and hold the physical reset button on the device for 20 seconds or more. This will not have any affect if the reset button is disabled in software.

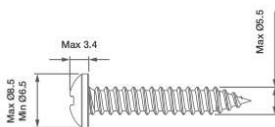
Important: Make sure that the unit is fully booted up (~5 mins) before attempting to reset the device via the reset button.

2. **Via the web UI:** Once you're logged in, click the gear icon in the upper right corner, as shown below, and you'll see the reset option:

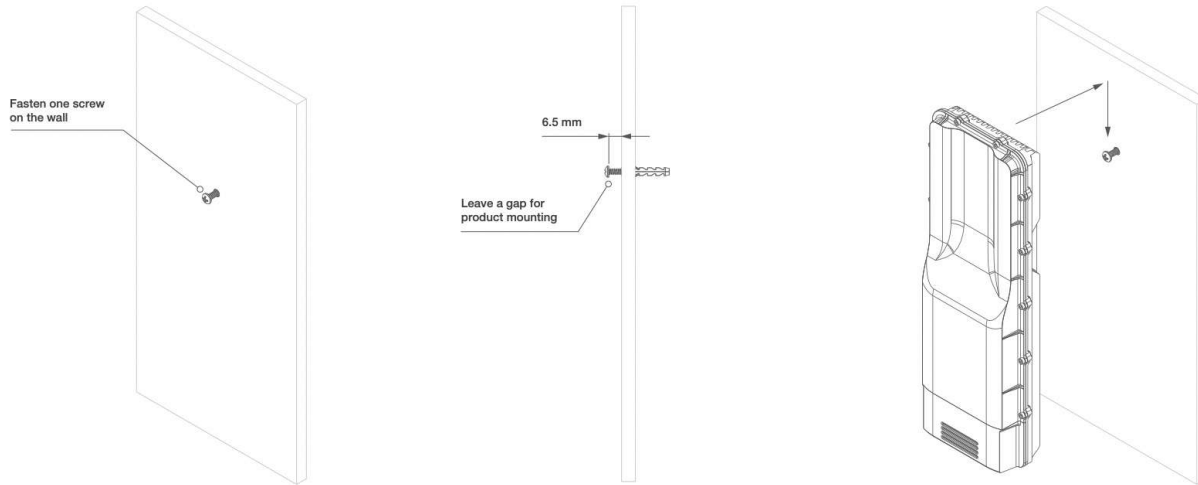


Mounting your device

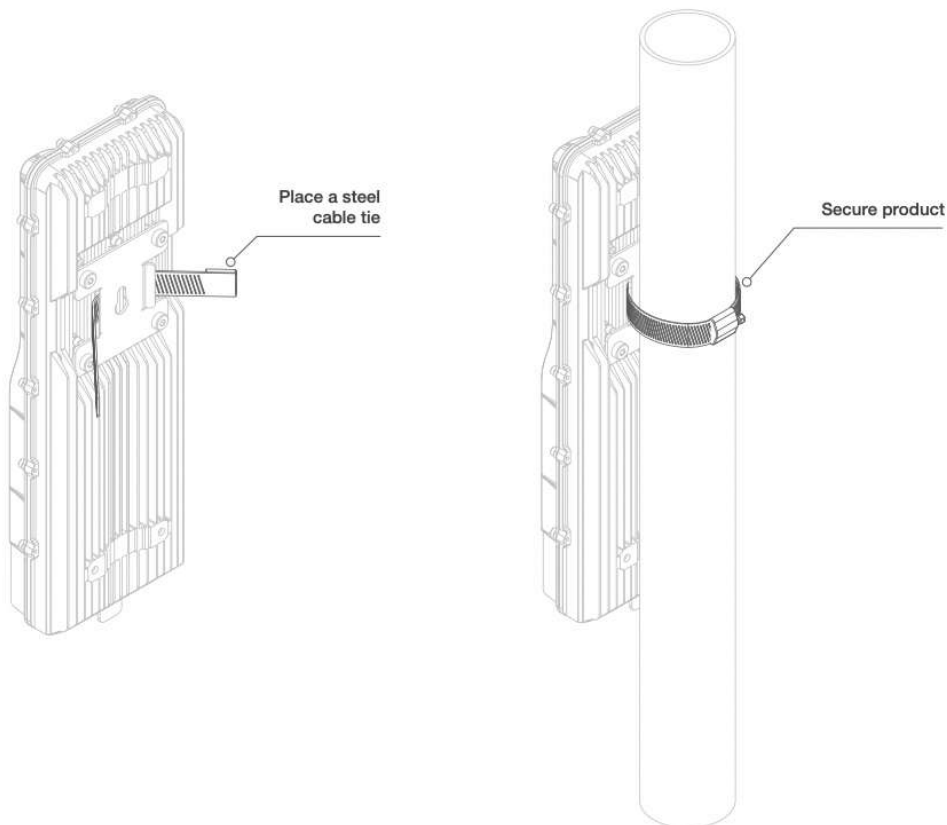
Screw specification (mm):



Wall mounting instructions



Pole mounting instructions



FCC/IC Warning

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

Note: 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.

ISED Warning

NOTICE: This radio is intended for use in occupational/controlled conditions where users have full knowledge of their exposure and can exercise control over their exposure to meet the occupational limits in FCC/ISED and International standards. This radio device is not authorized for general population consumer use.

RF Exposure Requirements:

To control your exposure and ensure compliance with the occupational/controlled environmental exposure limits, always adhere to the following procedures.

Guidelines:

User awareness instructions should accompany device when transferred to other users. Do not use this device if the operational requirements described herein are not met.

Operating Instructions:

Keep the radio unit at least 2.5 cm away from the face. Keeping the radio at the proper distance is important as RF exposure decreases with distance from the antenna. The antenna should be kept away from the face and eyes.

Use of non-approved antennas, batteries, and accessories causes the radio to exceed the FCC/ISED RF exposure guidelines.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Innovation, Science and Economic Development Canada licence-exempt RSS standard (s). Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Tout changement ou modification non expressément approuvé par la partie responsable de la conformité pourrait annuler l'autorité de l'utilisateur à faire fonctionner l'équipement.

Cet appareil est conforme aux normes RSS exemptes de licence d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes : (1) cet appareil ne doit pas causer d'interférences, et (2) cet appareil doit accepter toute interférence, y compris les interférences pouvant entraîner un fonctionnement indésirable de l'appareil.