

TNA-303X Operating Manual

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This operating manual applies to the TNA-303X product model.

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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. The fast-blinking signal LED will indicate that this process is currently in progress, and should last about 30 seconds to 1 minute.

Product box contents*

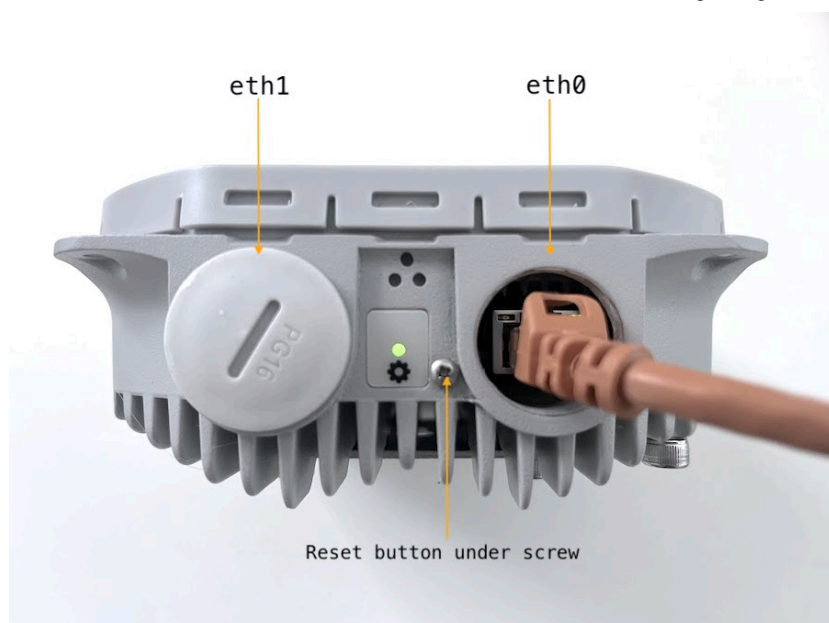
Please consider recycling our eco-friendly product packaging.

Note: Antenna kits (and corresponding mounts) are shipped separately.

Item	Qty
TNA-303X base model	1
RJ45 plug	1
Quick start guide insert	1

Device I/O

The reset button is located under the screw, shown in the image below:



Meaning of device LEDs

Signal level LED

The single signal LED is updated at a ~4 second interval.

Behavior	Meaning
LED is off	The device is currently operating in AP mode, the device is powered off, or the radio modem is not detected.
LED is blinking slowly	The device is in station or PTP mode and is currently scanning.
LED is blinking with a medium speed	The device is in station or PTP mode and is connected with a low signal.
LED is blinking with a fast blink speed	Case 1: If the unit is just booting up, the device is flashing the internal modem firmware. Case 2: If the unit is fully booted, then the device is in station or PTP mode and connected to an AP with a medium signal strength.
LED is on & solid	The device is in station or PTP mode and connected to an AP with excellent signal strength.

Ethernet port LEDs

2.5G ETH0 (PoE-In): 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 (optional PoE-Out): 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 0.5A (24W) is recommended.
- TNA-303X devices **do** support active PoE (802.3at, etc),

The TNA-303X can be powered via 38-57V Active PoE-In into the **ETH0** port.

Output Power

The TNA-303X has the ability to send passive PoE out of the 1Gbps port to power another device using the input power provided to the TNA-303X. 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 0.5A of current (24W total).

 **Warning:** when using the PoE out feature on the TNA-303X, care should be taken to ensure there is adequate power supply to power both the TNA-303X 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

 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.

3. Log in to your device's local web UI in your web browser at the DHCP-assigned IP, or the fallback 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.
5. Select an antenna kit (if using one) under the Wireless settings to ensure proper operation.

Making a link

By default, the TNA-303X is configured to operate in station mode with the SSID **tachyon-ptmp**, and configured to use the encryption key value of 'passphrase'.

This means once you power up a TNA-303X with-in range of a factory-reset TNA-301, 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.

Other notes:

1. You can see the status of the link between the AP (or PTP master) and client (or PTP slave) on the dashboard page of the Web UI, as well as perform a speedtest across the link.
2. There is an aiming tool located under the Tools menu of the Web UI which will report RSSI much faster than the dashboard does. This is useful to optimize the signal once a station is connected.
3. The amount of aiming required to make a link will depend on the antenna kit attached to your TNA-303X. You can download the STEP file for a 3D printable physical aiming tool **here** (<https://tachyon-networks.freshdesk.com/support/solutions/articles/67000728119-tna-303x-aiming-tool-step-file>), which attaches to the antenna kit.
4. If you're using an antenna kit in station or PTP modes, you may want to lock the radio to the boresight beam in order to keep the radio from beamforming and jumping to a different beam. You can enable this under the wireless settings.

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-303X 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.

The TNA-303X (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.
8. If you're using any antenna kits.

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.

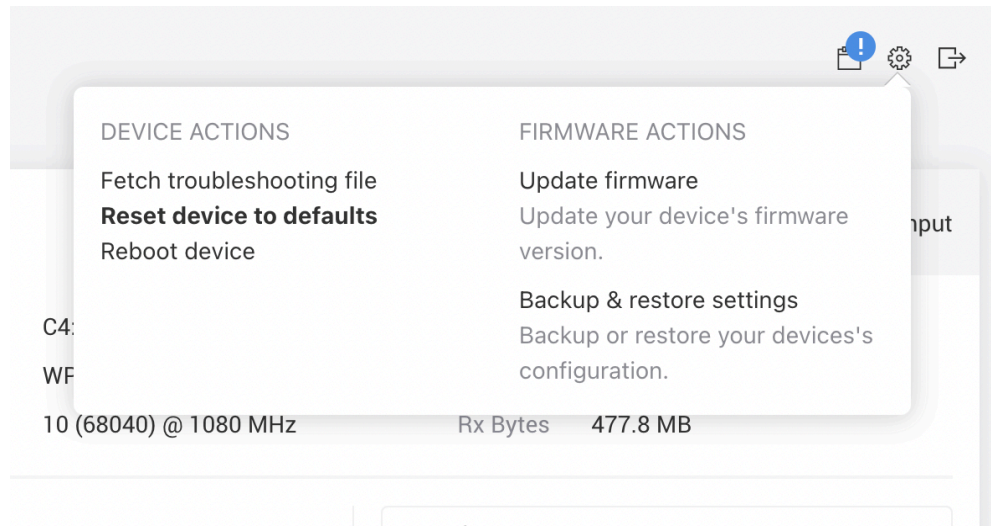
Why doesn't the speedtest cause a spike in traffic on the throughput graph?

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.

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-303x 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.

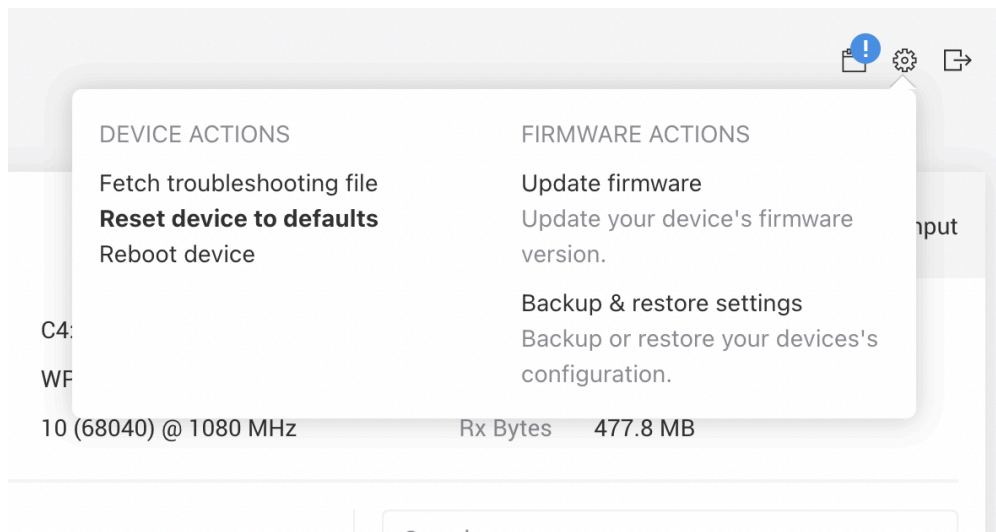
Resetting your device

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:



Attaching an AK-100 kit

Place the AK-100 antenna kit dome on the front of the TNA-303X and attach it using 4 of the screws supplied with the antenna kit.

The mounting bracket is be attached to the back of the TNA-303X using the rest of the screws supplied with the antenna kit, like shown in the image below:



FCC Statement

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

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with minimum distance 160cm between the radiator & your body.

ISED Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
 - (2) This device must accept any interference, including interference that may cause undesired operation of the device.
- Cet appareil contient des émetteurs/récepteurs sans licence qui sont conformes aux RSS sans licence d'Innovation, Sciences et Développement économique Canada. L'exploitation est soumise aux deux conditions suivantes:
- (1) Cet appareil ne doit pas causer d'interférences.
 - (2) Cet appareil doit accepter toute interférence, y compris les interférences qui pourraient causer un fonctionnement indésirable de l'appareil.

ISED Radiation Exposure Statement:

This equipment complies with ISED RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with minimum distance 160cm between the radiator & your body. Cet appareil est conforme aux limites d'exposition de rayonnement RF ISED établies pour un environnement non contrôlé. Cet émetteur ne doit pas être co-implanté ou fonctionner en conjonction avec toute autre antenne ou transmetteur. Cet équipement doit être installé et utilisé avec une distance minimale de 160cm entre le radiateur et votre corps.

This radio transmitter [IC:11468A-TNA303] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

The maximum antenna gain is 40dBi, Antenna type: Array+Parabolic antenna.

Cet émetteur radio [IC:11468A-TNA303] a été approuvé par innovation, science et développement économique Canada pour fonctionner avec les types d'antennes énumérés ci-dessous et pour afficher le gain maximal admissible. Le gain du type d'antenne non inclus dans cette liste est supérieur au gain maximal de l'un des types énumérés et ne doit pas être utilisé avec cet équipement. Le gain maximal d'antenne est de 40dBi, Type d'antenne: tableau+parabolique d'antenne.

Legal Information:

This device may be operated in all member states of the EU. Observe national and local regulations where the device is used.

				
AT	BE	CY	CZ	DK
EE	FI	FR	DE	EL
HU	IE	IT	LV	LT
LU	MT	NL	PL	PT
SK	SI	ES	SE	BG
RO	HR			

List of antenna kits

EUT Combination		Antenna Type	input impedance (Ohm)	Antenna Gain	Frequency Range
Basic Model		Array Antenna	Unknown	16.2dBi	56-71 GHz
Basic Model +	Kit:TNA-AK-100	Array+Parabolic Antenna	Unknown	33dBi	56-71 GHz
	Kit:TNA-AK-150		known	37dBi	56-71 GHz
	Kit:TNA-AK-300		Unknown	40dBi	56-71 GHz
	Kit:TNA-AK-S-45		Unknown	27dBi	56-71 GHz
	Kit:TNA-AK-S-90		Unknown	27dBi	56-71 GHz