TrellisWare Technologies

TW-1760 Wi-Fi Adapter User Guide

Version 1.0

Terms of Use

WARNING – THE INFORMATION IN THIS DOCUMENT IS PROPRIETARY TO TRELLISWARE TECHNOLOGIES, INC. ("TrellisWare"). ONLY AUTHORIZED EMPLOYEES OF END USER'S ORGANIZATION PURCHASING THE PRODUCT(S) REFERENCED HEREIN FROM TRELLISWARE OR ITS APPROVED CUSTOMERS, DISTRIBUTORS AND/OR PARTNERS ARE AUTHORIZED TO VIEW THE INFORMATION IN THIS DOCUMENT. The terms
"You" and "your" refer to any user of this document or the product to which it applies (the "Product").

Your access and use of the information contained in this document are subject to these Terms of Use ("Terms") in addition to any licenses or terms contained in the information packet that shipped with the Product, which are also incorporated herein by reference. TrellisWare reserves the right to update these Terms at any time without notice. The most current version of the Terms can be reviewed by clicking on the hypertext link for this document located on TrellisWare's support website at www.TrellisWare.com/support/. Violations of these Terms may result in the immediate loss of the holder's privilege to retain and use this document and the Products and may subject the violator to civil and/or criminal penalties. If you are unable to locate the licenses or terms shipped with the Product, or for other requests for this document, submit written requests to TrellisWare Technologies, Inc., 10641 Scripps Summit Court, Suite 100, San Diego, California 92131 United States of America.

INTELLECTUAL PROPERTY - The Products and information disclosed in this document, including all designs, images, and related materials, are the property of TrellisWare and/or its licensors. TrellisWare and/or its licensors, as appropriate, reserve all patent, copyright and other intellectual property and proprietary rights to this document, and any unauthorized use or reproduction, modification or distribution of these materials is strictly prohibited. The content provided in this document, including its design, text, graphics and the selection and arrangement thereof are protected by copyright. Nothing in this document grants you any rights in or to the intellectual property or proprietary rights of TrellisWare or any third party.

EXPORT- This document is subject to the Export Administration Regulations of the United States Department of Commerce. Any export or re-export of this document without TrellisWare's prior written consent is prohibited.

This document contains information within the purview of the Export Administration Regulations (EAR), 15 CFR §730 et seq., and may not be released to any end-user located in, or nationals of any country which is under an embargo of the U.S. government pursuant to embargo provisions in Part 746, or any successor regulations or supplement.

TRADEMARK NOTICE - TrellisWare Technologies, TrellisWare, trellisware.com, CUB, WildCat, WildCat II, Ocelot, CheetahNet, CheetahNet Mini, Ghost, Shadow, Shadow HPR, Spirit, and related words and logos are trademarks or service marks ("Marks") and/or trade names of TrellisWareTechnologies, Inc. or other companies referred to in this document. Nothing in this document shall be construed as granting, either expressed or implied, a license or other right to use any Marks or trade names of TrellisWare or the respective owners. Any unauthorized use of the Marks or trade names of TrellisWare or of third parties is strictly prohibited. For further information or requests to use TrellisWare trademarks, please submit your request in writing to TrellisWare Technologies,10641 Scripps Summit Court, Suite 100, San Diego, California 92131 United States of America.

DISCLAIMER - This document may contain references to information, hardware, software, products or services that belong to or are controlled by a third party. TrellisWare does not control, is not responsible for any such information, items or services nor does reference imply endorsement.

THIS DOCUMENT, INCLUDING ALL DOCUMENTATION INCORPORATED BY REFERENCE HEREIN, IS PROVIDED "AS IS" AND TRELLISWARE AND/OR ITS RESPECTIVE SUPPLIERS MAKE NO REPRESENTATIONS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, OF ANY KIND ABOUT THE ACCURACY, COMPLETION, FITNESS FOR A PARTICULAR PURPOSE, OR SUITABILITY OF THE INFORMATION CONTAINED IN THIS DOCUMENT. TRELLISWARE ASSUMES NO RESPONSIBILITY FOR ANY TECHNICAL OR OTHER INACCURACIES, OMMISSIONS, GENERALIZATIONS, OR TYPOGRAPHICAL ERRORS CONTAINED IN THIS DOCUMENT AND RELATED GRAPHICS. CHANGES ARE PERIODICALLY ADDED TO THE INFORMATION HEREIN, HOWEVER, TRELLISWARE MAKES NO COMMITMENT TO PROVIDE ANY SUCH CHANGES IN A TIMELY MANNER OR AT ALL.
TRELLISWARE AND/OR ITS RESPECTIVE SUPPLIERS RESERVE THE RIGHT TO MAKE IMPROVEMENTS AND/OR CHANGES IN THE PRODUCT(S) AND/OR THIS DOCUMENT AT ANY TIME. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, TRELLISWARE SHALL NOT BE LIABLE FOR ANY TYPE OF DAMAGES RELATED TO THIS DOCUMENTATION OR ITS USE, EVEN IF TRELLISWARE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

The terms of use of any TrellisWare Product or software are set out in a separate license or other agreement. NOTHING IN THIS DISCLAIMER IS INTENDED TO SUPERSEDE ANY EXPRESS WRITTEN AGREEMENTS OR WARRANTIES PROVIDED BY TRELLISWARE FOR TRELLISWARE PRODUCTS.

Windows®, Windows Media®, Windows XP® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. Mozilla® and Firefox® are registered trademarks of Mozilla Foundation. Google Earth™ is a trademark of Google Inc. Bonjour®, QuickTime®, and MAC OS X® are trademarks of Apple Inc., registered in the U.S. and other countries. VLC® is the registered trademark of VideoLAN. GeoServer® is the registered trademark owned by Raytheon Company. Peltor™ is the trademark of 3M Company. All other trademarks are the property of their respective owners.

TrellisWare Technologies,10641 Scripps Summit Court, Suite 100
San Diego, CA 92131
Phone 858-432-4851

---

2 | TW-1760 Wi-Fi Adapter User Guide

Contents

Support Center

Answers to commonly asked questions can be found at TrellisWare's Support Center:

https://support.trellisware.com

Access technical notes, documentation, and information about training and software updates.

Contact support@trellisware.com or visit us on the web.

Overview

The TW-1760 Wi-Fi Adapter acts as a Wi-Fi access point, creating a network to support data transfers between a radio in a TSM network and various Wi-Fi devices. This document discusses how to configure a Wi-Fi Adapter and introduces best practices for maximizing your adapter performance.
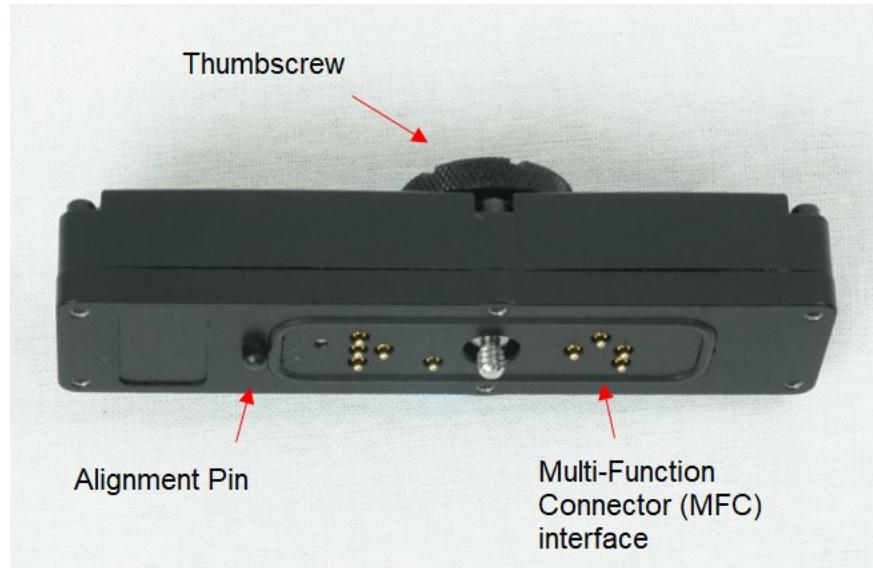
Relevant Products

The Wi-Fi adapter is compatible with the following TrellisWare radios:

- TW-900/950 TSM Shadow
- TW-135 TSM High-power Shadow

Basic Setup

Required Equipment:

1. PC with an 802.11b/g-capable Wi-Fi interface
2. TW-1760 Wi-Fi adapter
3. Compatible TrellisWare radio

The steps to set up the TW-1760:

1. Attach the Wi-Fi adapter to the radio.
2. Connect to the radio Wi-Fi Access Point.
   Configure the Wi-Fi settings on the radio.

Wi-Fi Network Configuration

Before getting started, you must complete the pre-configuration steps for loading certificates and setting up your workstation. Please refer to **TN-0040 – Computer Pre-Configuration** for details.

Step 1: Attach the Wi-Fi adapter to the radio

1. Attach the Wi-Fi adapter to the multi-functional side connector on the radio. The alignment pin is positioned towards the top of the radio.
2. Use the thumbscrew to secure the dongle to the radio.
3. Turn the radio on (it automatically recognizes the attached adapter).
4. Once the radio has completed initialization, the Wi-Fi adapter will be operational.

Step 2: Connect to the Wi-Fi Access Point

1. From the PC wireless network connection screen, locate the radio Access Point, identified as the radio serial number.
2. When prompted for a password, enter the default: *trellisware.*
3. The PC will complete the connection to the Access Point.

Step 3: Open the TrellisWare Network Controller web application to configure the radio

1. Identify the radio being used:

    a. By serial number - located on the back or side of the radio

    b. (TW-950/TW-135 radios ONLY) By IP address - displayed in the Networking Status display on the front panel

---
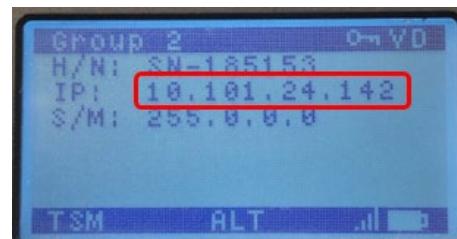
2. Enter 10.1.0.2 **OR** sn-xxxx.local (where 'xxxx' is the radio serial number) **OR** the IP address of the radio in the web browser address bar on the PC.
3. Access the TrellisWare Network Controller (TNC) web applications page. Click the **Devices** tab in the left panel and select the ⚙ **Remote Control** icon.
4. On the right side of the page, a configuration menu should populate. Scroll down and select the **Wi-Fi** drop-down, enter your desired SSID, password, Channel, Broadcast setting, and click **Save.**

5. The radio will save the changes made in the window. If you changed the password, you may have to re-join the network using the new Wi-Fi password you configured.

Step 3 (OPTIONAL): Configure Wi-Fi settings on TMT (TrellisWare Management Tool)
1. Using either the Wi-Fi adapter or an Ethernet adapter (such as the TrellisWare TW-1710), establish a network connection between the radio and PC.
2. Launch the TrellisWare Management Tool desktop application.
3. On the left panel, select **Device Config**.
4. Your radio should populate in the device list if successfully connected. Check the empty box to ensure you are configuring the preferred device.
5. On the right side of the screen, select the **Network** drop-down menu and scroll down to **Wi-Fi Configuration** settings.
6. You can make changes to the SSID, Passphrase, select a Wi-Fi channel, and switch Broadcast SSID on/off.
7. After making the desired changes, click the blue **Apply** button in the bottom right corner. The radio stores the Wi-Fi configuration information and automatically reboots.
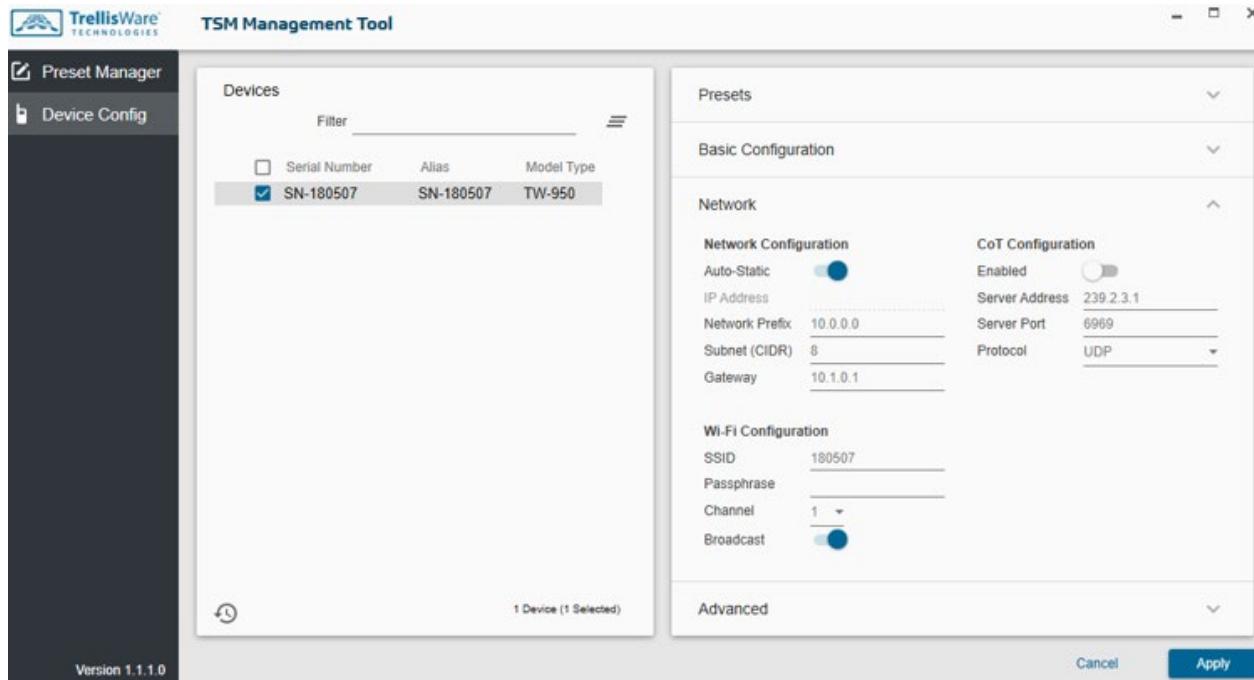
Wi-Fi Adapter Best Practices

Wi-Fi Signal Strength and Range

The Wi-Fi dongle antenna radiates from the plastic window of the outer housing. Maintaining a clear path between a Wi-Fi Dongle antenna and the client provides the best connection. Signal strength can vary depending on obstructions, such as walls, bodies, metal, etc. The maximum range of the Wi-Fi Dongle is around 250 feet in line-of-sight conditions.

Wi-Fi Channel Interference Mitigation

The Wi-Fi dongle configuration sets the access point mode and channel setting to Channel 1 within the 802.11g framework. Many wireless devices, including routers, keyboards, mice, etc., default to Channel 6 from the manufacturers. Potential interference issues may be experienced if operating the Wi-Fi dongle in close proximity to these devices that communicate on a separate network using Channel 6. If available, configure your other wireless devices to operate on a different 802.11g channel. Channels 1 and 11 provide ideal non-overlapping operation with Channel 6. The diagram below shows the channel center frequency and their channel bandwidths.

The TW-1760 operates in the 2.4GHz frequency band. TrellisWare radios can also operate in this frequency range. For best performance, TrellisWare recommends using TSM operating frequencies outside of the Wi-Fi band (2400 MHz – 2485 MHz) when the Wi-Fi adapter is employed.
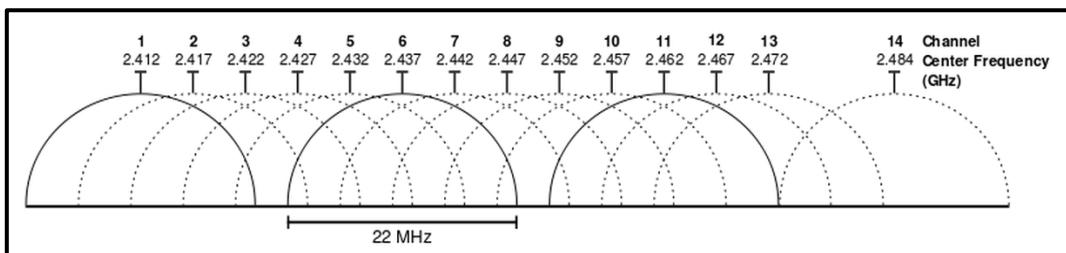
Wi-Fi Data Throughput

In addition to signal strength and channel contention limitations, there are additional factors that reduce achievable data rates from theoretical maximums which are advertised. The advertised rates do not account for protocol overhead that Wi-Fi connections must exchange for security and reliability, nor do they account for any high-layer protocol (e.g. TCP/IP) overhead.

Lastly, these theoretical rates compute combined upstream and downstream traffic; since Wi-Fi is half-duplex, the rate in one direction is reduced to accommodate traffic in the reverse direction. Thus, while the advertised rate for 802.11g is 54 Mbps, a robust channel operating at max capacity will deliver approximately 20 Mbps of application data in one direction.

Technical Specifications

Size	3.65" L x 0.90" W x 0.88" H in (92.7 x 11.9 x 22.4 mm)
Weight	1.7 oz (48 g)
Operating Temperature	-22 to +185 °F (-30 to +85 °C)
Ingress Protection	IP68
Wi-Fi Standards	IEEE 802.11b/g
Wi-Fi Data Rate	Up to 54 Mbps
Operating Frequency	2400 – 2473 MHz
Security	WPA2
Power Consumption	1.0 W max

Regulatory Information

TrellisWare Technologies
Model: TW-1760
Contains FCC ID: 2A6X2-1760
Contains IC: 28565-1760
CAN ICES-3 (B)/NMB-3(B)

Federal Communication Commission Interference Statement

<u>FCC</u>
Suppliers Declaration of Conformity
47 CFR § 2.1077 Compliance Information
Unique Identifier: TW-1760
Responsible Party – U.S. Contact Information
Name: TrellisWare Technologies Inc.
Address: 10641 Scripps Summit Court, Suite 100, San Diego, CA 92131
Website: www.trellisware.com

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. 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.

FCC Caution
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

Radiation exposure statement

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

Innovation, Science and Economic Development Canada Statement

This device complies with Innovation, Science and Economic Development Canada 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.

Cet appareil est conforme aux règles d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes:
1. le dispositif ne doit pas produire de brouillage préjudiciable, et
2. ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation exposure statement
This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment.

Déclaration d'exposition aux radiations
Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé.

Caution
(i) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;

(ii) the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall comply with the e.i.r.p. limit; and

(iii) the maximum antenna gain permitted for devices in the band 5725-5825 MHz shall comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate.

(iv) Users should also be advised that high-power radars are allocated as primary users (i.e., priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

Avertissement

(i) les dispositifs fonctionnant dans la bande 5 150-5 250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;

(ii) le gain maximal d'antenne permis pour les dispositifs utilisant les bandes 5 250-5 350 MHz et 5 470-5 725 MHz doit se conformer à la limite de p.i.r.e.;

(iii) le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5 725-5 825 MHz) doit se conformer à la limite de p.i.r.e. spécifiée pour l'exploitation point à point et non point à point, selon le cas.

(iv) De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5 250-5 350 MHz et 5 650-5 850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.