

STARX

Digital Wireless Audio Transceiver

User Guide

V2.3 June 2020



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Introduction

The STARX Digital Wireless Audio Transceiver is a digital wireless radio capable of sending and receiving very high quality audio over a wide area. It is typically used for commercial or professional audio distribution either in a business setting (i.e. background music, paging) or a mobile sound application (i.e. concerts, festivals). The STARX technology is a combination of functionality found in both the StreetSounds® (Music on Main Street) and AiRocks Pro (ARX-1900 mobile sound production) products from AirNetix. The STARX product line is compatible with both the StreetSounds® and AiRocks Pro products.

Features

- One-to-Many Transmission (up to 60 total remotes in a network).
- Fully weatherproof design.
- Permanent outdoor installations.
- Rugged aluminum enclosure.
- High transmit power for excellent RF coverage.
- Each radio can be configured as transmitter, receiver, or repeater.
- Very high-quality audio (20Hz to 17KHz).
- 2-Channel (stereo) audio transmission with line-level inputs and outputs.
- Ability to remotely mount Outdoor Unit (ODU) up to 150' away from Indoor Unit (IDU).
- Single shielded Cat5 cable interconnects IDU with ODU.
- Full remote monitor and control of all radios in network using powerful Network Management System (NMS).



Figure 1 STARX ODU

AC and DC Versions

The STARX transceiver is available in both an AC-powered (STARX-ODU-AC) and DC-powered (STARX-ODU-DC) version. The DC-powered version is typically used as the “Master” transmitter in a network, whereas the AC-powered unit is typically used as a “Repeater”. The functionality of both units is identical except for the power source and connectors. In a typical network the audio source is inserted into the Master and appears at the output of one or more “Receivers” or “Relay” units as a “line-level stereo” audio signal.

STARX-DC

The STARX DC transceiver consists of an Outdoor Unit (ODU), an Indoor Unit (IDU), and an interconnecting Cat5 shielded cable.

Outdoor Unit (STARX-ODU-DC)

The STARX-DC ODU (5"x4.25"x1.75") is housed in an aluminum enclosure and includes two 2dbi omnidirectional whip antennas with Type-N connectors. It has a single weatherproof shielded RJ45 connector which carries DC power (+12V) for the radio, audio (2 channels), and a USB signal for the NMS.



Figure 2 STARX ODU-DC bottom panel

Indoor Unit (STARX-IDU-DC)

The STARX Indoor Unit (IDU) is a small (3"x2"x1") "breakout box" which provides physical interfaces for:

- DC Power (+12VDC) from supplied AC/DC wall adapter.
- Audio Input or Output (stereo 3.5mm jack, 6' cable supplied)
- USB Type-C (cable supplied) for connecting to a laptop which runs the Network Management System application.



Figure 3 STARX IDU

ODU to IDU Interconnecting Cable

The STARX interconnect cable is used to connect the IDU to the ODU. The ODU is typically mounted outdoors (on the roof or exterior wall) so that it can achieve the best RF coverage. The interconnect cable runs from the ODU to an interior location where the IDU is located, along with the audio source/sink, and typically a laptop running the NMS.

This interconnect cable must be an outdoor-rated, high quality **SHIELDED** Cat5e and uses the wire pairs and shield as follows:

1. DC Power & Ground
2. Audio R&L Signals & Audio Ground
3. USB Signal & USB Ground

The maximum length and cable type is limited by the USB signal that the Network Management System uses to communicate from the laptop to the ODU via the IDU. The USB drivers in the IDU and ODU can communicate reliably up to ~150' when using a good quality SHIELDED Cat5e cable with the shield terminated at BOTH ends of the cable. If the Network Management System is NOT used (i.e. at the remote end of the link) only audio and DC power are present on this cable. In this case a shielded cable is NOT required, and the cable can be much longer if necessary (~250').

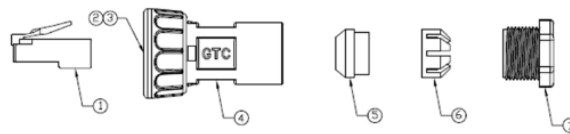
Also note that if the ODU is permanently mounted outdoors, the supplied weatherproof connector (GT125360-01) **MUST** be installed on the ODU-end of the cable to prevent moisture and corrosion of the RJ-45 connector. FAILURE TO INSTALL THIS CONNECTOR COVER WILL VOID THE WARRANTY.

Below is a summary of these requirements.



ODU to IDU Interconnect Cable		
Network Management System	Max Length	Cable Type
NMS Active (using USB signal)	150'	Cat5e SHIELDED cable
No NMS (not using USB signal)	250'	Cat5 shielded or un-shielded

Note: If ODU is permanently mounted outdoors, the weatherproof connector must be used on the ODU-end of the cable. See below.



GT12536-01 Weatherproof Connector

STARX-AC

The STARX-ODU-AC (AC powered) is normally used as a “repeater”. It is identical in functionality and performance to the STARX-ODU-DC (+12V DC powered) except that it includes an internal AC adapter for power. This allows the STARX-ODU-AC to be mounted on a streetlight pole or some other location where it is not convenient or practical to run a CAT5 cable to an indoor location for the IDU. In this application the received signal from an upstream unit is simply “repeated” to the next downstream unit. No audio is terminated at this location.



Figure 4 STARX ODU AC

The STARX-ODU-AC includes a ~6’ AC power cable with a standard 3-prong plug. It also includes the same RJ-45 weatherproof connector as the STARX-ODU-DC. However this connector is only used for factory calibration and debugging and not normally used when the AC cord is attached.

ARX-1900 AiRocks Pro

The third member of the STARX Transceiver family is the ARX-1900 “AiRocks Pro”. It is typically used in temporary setups for wireless audio distribution by pro-audio mobile sound production companies in festivals, parades, and concerts. The ARX-1900 is similar in functionality, and compatible with the other STARX family members. The main difference in the ARX-1900 is the audio input/output connectors. In addition, the ARX-1900 is NOT designed for permanent outdoor installations.



Figure 5 ARX-1900 AiRocks Pro

The ARX-1900 includes Left and Right XLR balanced audio input/output connectors. When used as a the main Master transmitter, audio is inserted into these connectors. At all other locations in the network, audio is sent out of these connectors to powered speakers. The ARX-1900 also includes an EtherCon RJ45 interface for inserting DC power and/or inserting/receiving unbalanced stereo audio. The optional STARX BOB-PRO, pro-audio breakout box (see next section) can be connected to this port.

The ARX-1900 is compatible with all of the mounts shown in the STARX ODU Mounting Options section.

Optional Breakout Box (BOB-PRO)

The STARX family includes an optional “Breakout Box” with professional audio and AC power interfaces. The BOB-Pro would be used instead of the STARX-DC-IDU in an installation. The BOB-Pro is normally used in conjunction with the ARX-1900 AiRocks Pro transceiver for mobile sound production applications, but it is electrically and mechanically compatible with the STARX-DC transceiver.

The BOB-Pro is powered by 110 VAC via a heavy-duty power cable terminated with a Neutrik PowerCon connector. This provides a rugged connection for the rigors of a festival or other outdoor event. The BOB-Pro includes transformer-isolated balanced XLR audio input/outputs and a USB interface for a Network Management System PC for network control and monitoring.



Figure 6 STARX BOB-PRO

The photo below shows the BOB-Pro connected to an ARX-1900 using a shielded CAT6 cable terminated with Neutrik EtherCon connectors on both ends. Since the STARX transceiver does not have an EtherCon connector, one EtherCon housing would need to be removed at the transceiver end to enable this type

of cable to be used. An suitable alternative is a standard shielded CAT5 cable with standard RJ-45 connectors on both ends.



Figure 7 BOB-PRO shown with ARX-1900, optional Neutrik EtherCon cable and optional Neutrik PowerCon AC power cable.



Figure 8 ARX-1900 with Dual 5db Omni Antennas



Figure 7 ARX-1900 on Flashpoint 13' Air Cushioned Heavy Duty Light Stand

STARX Applications

The STARX products can be “mixed and matched” within a network. For example, a STARX-ODU-DC could be used as a permanently mounted Master transmitter communicating with StreetSounds remote speaker units, STARX-ODU-AC repeaters, and ARX-1900 remotes feeding powered speakers in a temporary setup. All of the remote units in the network could be managed by a single Network Management System running on a PC.

The diagram below shows the STARX-DC being used as a Master transmitter to several remote STARX-DC units feeding powered speakers. The STARX-DC can feed up to 12 remote units if the Network Management System (NMS) is used. The number of remotes is unlimited if the NMS is not required.

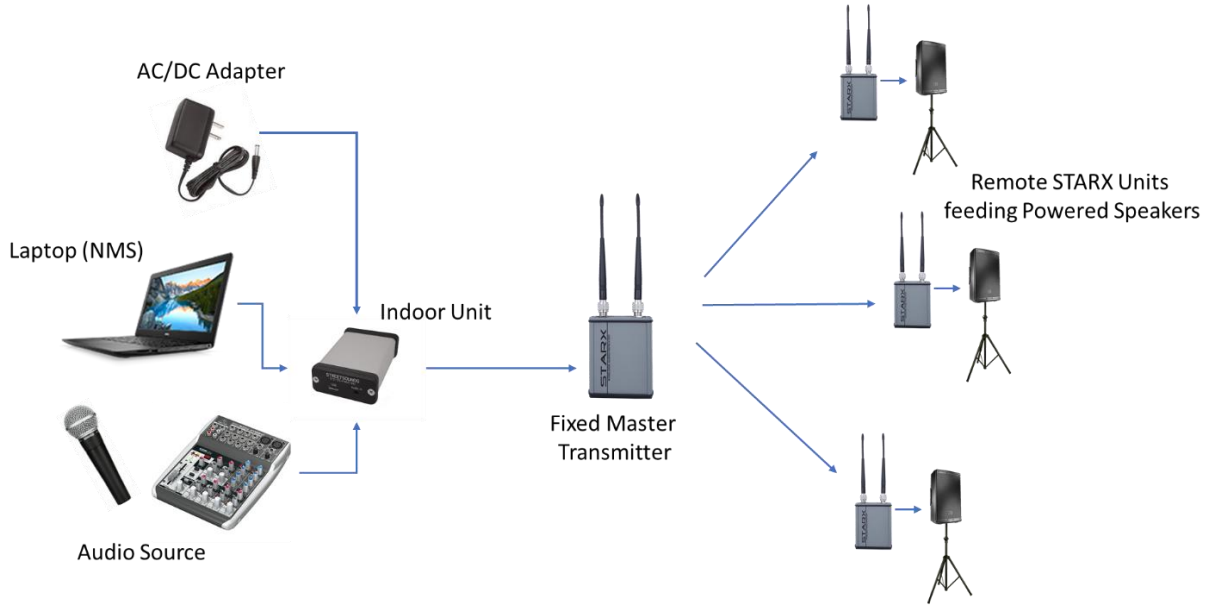


Figure 8 STARX in an Audio Distribution Application

The next diagram shows the STARX-DC used as a Fixed Master transmitter in a StreetSounds network.

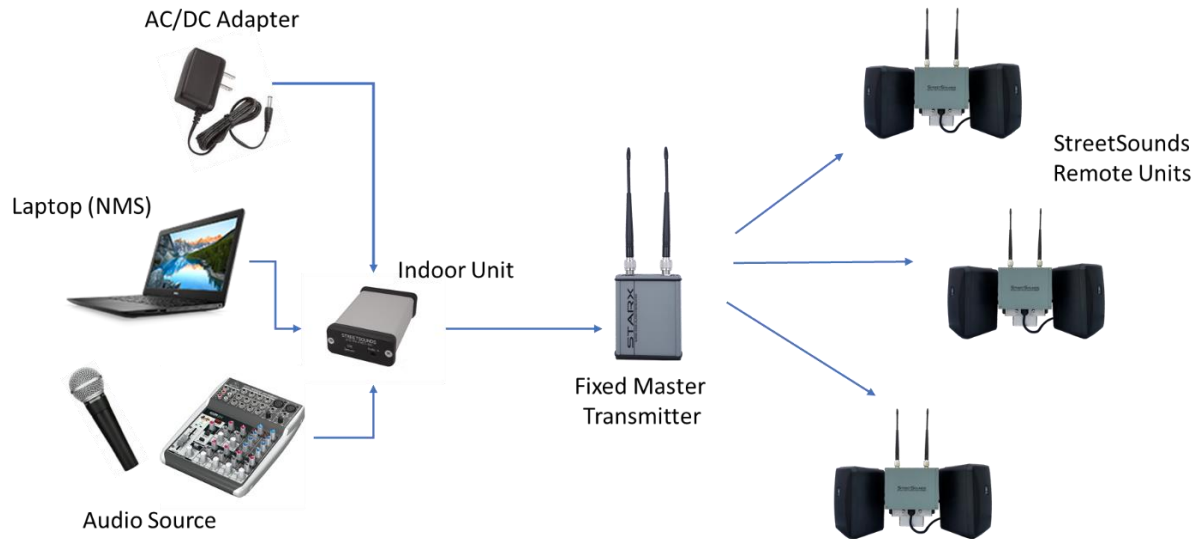


Figure 9 STARX-DC as a Fixed Master in a StreetSounds Network

STARX-ODU-DC Application

The architecture of the STARX product line is highly flexible. The hardware and firmware in all STARX DC units are identical. Therefore, the STARX ODU/IDU can be used as either the “Master Transmitter”, a “Repeater”, or as a “Remote Receive Only” unit. The interconnections vary for each configuration.

When configured as a Master transmitter, line-level stereo audio is sent INTO into the IDU via a 1/8” stereo jack. When configured as a remote Receive unit, line-level stereo audio is comes OUT of the same 1/8” stereo audio jack on the IDU, or on a simple Y-cable that is supplied with the STARX Kits. In a typical network the Master can talk to one or more remotes directly or via a “repeater”.

STARX-DC Master Transmitter Configuration.

The STARX-DC master transmitter configuration typically uses an IDU as the indoor interconnect and breakout device. This configuration is as follows:



Figure 10- Typical STARX Master Configuration.

The diagram above shows the STARX ODU connected to the IDU via a short blue Cat5 cable. Note that this short cable represents the ODU-IDU Interconnect cable as described earlier. This cable can be up to 150' long for this type of configuration. The AC adapter, audio, and USB cables are supplied with the STARX-IDU-DC Kit.

STARX Remote Receive Configuration.

The STARX Remote Receive configuration does not typically use the IDU since there is no need for a USB NMS connection at a remote receiver. AirNetix supplies a Y-cable for this application that provides an interface for the un-balanced stereo audio output (3.5mm stereo jack), and input for the AC/DC adapter (+12V) which powers the radio over the interconnect cable. This configuration is shown below:



Figure 11 - STARX Remote Receive Configuration

Note that the short blue cable in the figure above represents the ODU-IDU Interconnect cable which can be much longer (~250') in this configuration (no USB). See the ODU-IDU Interconnect requirements above.

STARX ODU Mount Options

Three different mounting options are available for the STARX transceiver:

- Combo Mount – acts as an antenna mount + STARX pole/wall mount for permanent installs.
- L-Mount – least expensive pole/wall mount. Normally used for permanent installs.
- Quick Mount – more expensive. Used for temporary setups (i.e. ARX-1900 outdoor festivals)

STARX Combo Mount (Antenna Extender + Wall/Pole Mount)



Dual 5dbi Omni Antenna Kit with Combination Antenna Extender-Radio Mount acts both as an antenna extender and a radio mount. It provides a simple mounting surface for either pole or wall mounting, as well as an extender for the antennas. This kit can be used at both the Master transmitter location and/or a repeater location..



STARX Combo Mount Assembly Instructions

Place the combo bracket over the two Type N antenna connectors on the radio. **DO NOT REMOVE THE EXISTING NUTS AND LOCK WASHERS ON THE RADIO CONNECTORS.** The kit comes with two additional nuts and lock washer for attaching the MNT-ANTEX-COMBO. Place one nut and lock washer on each of the antenna connectors. Tighten securely.



Insert the two Type N bulkhead connectors in the outer holes at either end of the antenna extender arm. Secure with the supplied nuts and lock washers.



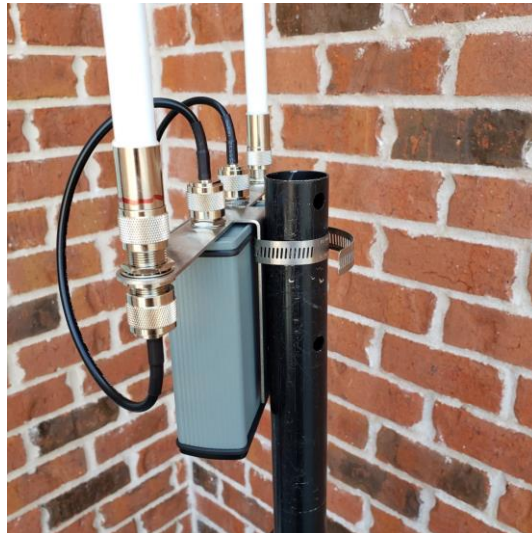
Attach the two RF cables between the radio antenna connector and the bulkhead connectors on each side of the extender.



Below is the finished radio assembly.



The radio assembly can be attached to a 2 ½" pole using the supplied hose clamp. Larger hose clamps can be used for larger diameter poles. There are also holes to allow for wall-mounting.



Attach the two 5dbi white antennas to the two outer bulkhead connectors.

CAUTION

TIGHTEN THE ANTENNA BY HOLDING THE METAL PORTION OF THE CONNECTOR AT THE BASE OF THE ANTENNA. DO NOT TWIST THE WHITE PART OF THE ANTENNA TO TIGHTEN. THIS WILL BREAK THE WEATHER SEAL AND WILL RUIN THE ANTENNA.



STARX L-Mount

The STARX ODU can be used with an optional “L-Mount” shown below.



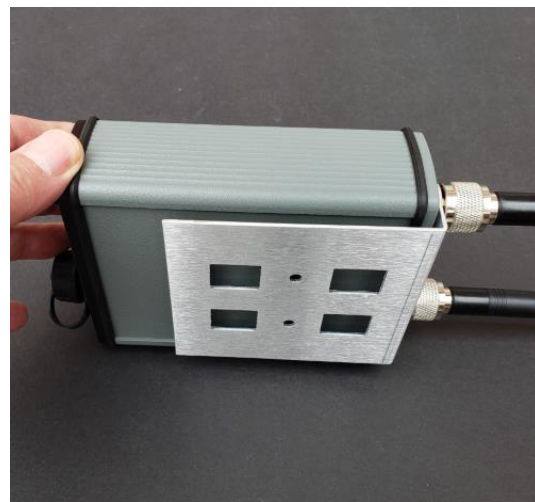
Figure 12 STARX L-Mount Kit

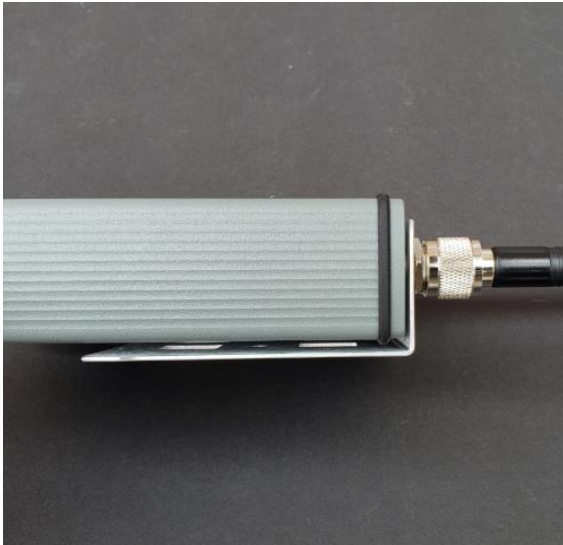
The STARX L-Mount is a simple bolt-on mount that allows the STARX Transceiver to be mounted to a pole, wall, or temporary mounting clamp such as the Manfrotto Super Clamp (or Impact Super Clamp).

To attach the L-Mount to the STARX enclosure simply feed the two antenna connectors through the holes as shown. Place a lock washer over each connector, then screw on the hex nuts. DO NOT remove the pre-installed nut and washer on the STARX enclosure.



Once the L-Mount is secured to the STARX enclosure, attach antennas to each connector. Make sure the antennas are screwed on tightly. This can be done by hand. It is not necessary to tighten the antennas with a wrench.





The STARX enclosure can now be attached to wall or a variety of poles, such as a small speaker pole (using a 2" – 3" hose clamp), a larger street light pole (using a 4" to 6" diameter hose clamp), or by using a quick disconnect clamp such as the (customer-provided) Manfrotto Super Clamp or Impact Super Clamp. Using one of these clamps will require two M5 bolts (supplied by customer).



Figure 13 - STARX L-Mount shown with customer-provided Manfrotto SuperClamp

STARX Quick Mount (Clip-On Mount)

The STARX Quick Mount is designed for easy setup and tear down for temporary events (festivals, parades, meetings) in mobile sound production applications. The clip-on clamps hold the STARX transceiver firmly in place on a pole using either hose clamps or a (customer supplied) Manfrotto Super Clamp.



Figure 14 STARX Quick-Mount (Note: customer-provided Manfrotto SuperClamp)

Installing the STARX-DC-ODU For StreetSounds Applications

The ODU should be mounted on the roof of a building overlooking the main coverage area of the radios. We recommend using a “non-penetrating” roof mount, such as the satellite dish mount EZ-NP-60-200 from Solid Signal (~\$90, below left). It is important that the antennas be mounted as high as possible so that they are not obstructed by any solid objects on the roof. It is also important that the mount be located as close to the front edge of the roof as possible so that the downward look angle to the remote units is as clear as possible. The “line of sight” does not need to be completely clear of obstacles, but the clearer the line of sight, the better the signal at the receivers.

An alternative mounting option is to use a Ubiquiti “J-Mount” (Ubiquiti UB-AM ~\$20) as shown below right.

NOTE that the Cat5 cable must be run to an interior location where it will terminate into the IDU, which serves as a connection for the audio, DC power, and USB controls. The USB will then be plugged into your laptop which runs the Network Management System (NMS).



Figure 2 Non-penetrating roof mount (EZ-NP-60-200)



Figure 3 Ubiquiti “J-Mount” (Ubiquiti UB-AM)

Connecting the Indoor Unit



The Indoor Unit (IDU) will be connected to the Cat5 cable from the roof at an interior location in the building. There are four connections to the IDU:

1. Cat5/RJ45 cable to the ODU on the roof.
2. DC power from the AC/DC adapter provided with the kit.
3. Audio feed to the network. This generally comes from the earphone output of the Laptop.
4. USB cable connects to the laptop for Network Management System control and monitoring.

Laptop for Network Management.

You will need to provide a laptop that is dedicated to the StreetSounds network. It must be a Windows PC running either Windows 7 or Windows 10. The Network Management System will not run on a Mac. There are no special hardware requirements for the PC, so a mid-range or used laptop should work fine. Below are desired specs for the laptop:

Windows 7 or 10

6GB RAM

Intel i5 or better processor.

Minimum screen resolution of 1366 x 768

(Note: Dell offers refurbished PC's with these capabilities for \$400 - \$450).

The NMS can either be a permanent part of the network or may only be used for initial configuration. However, the NMS provides a valuable tool in remotely troubleshooting the network. It also allows AirNetix to assist with any network debugging required. We highly recommend that it be a permanent part of your network installation, otherwise we will be very limited in the assistance we can provide.

Enabling Remote Access to the Laptop

We recommend that you create a unique Gmail account for your STARX network (i.e. yourcitystreetsounds@gmail.com). Create a password that you can share with AirNetix and any others who may need access to the laptop remotely. When creating the account, you will be asked to create a PIN. We generally use 515151 so it is easy to remember.



Once the Gmail account has been created, download and install the Chrome browser (if not already installed). Log into the newly created account on the Chrome browser, then download and install Chrome Remote Desktop (remotedesktop.google.com). You can do this by entering "remotedesktop.google.com" in the browser address bar. You should then click on the "Remote Access" tab at the top of the screen. This will lead you through the installation of the "host" application that allows remote access by authorized users. Finally, you must "Enable remote connections" to enable remote access. After doing this, you can test the connection from any other computer by logging into the new Gmail account and typing "remotedesktop.google.com" in the address bar. The remote laptop should show up as a green icon in the "Remote Devices" section of the screen.

THIS IS A VERY IMPORTANT FIRST STEP IN THE INSTALLATION PROCESS AND MUST BE DONE BEFORE WE CAN ASSIT WITH THE CONFIGURATION OF THE NETWORK. If you need help with this, AirNetix can walk you through the process.

FCC Statements

Class B Devices:

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.

RF Exposure and Safety Information

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance **30cm** between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Access to the internal module is reasonably restricted by the host packaging. ***The end-user has no manual instructions to remove or install the module.*** Questions or concerns regarding product safety should be referred to AirNetix, LLC, 2218 Edgartown Lane SE, Smyrna, GA 30080.

Modular Radio

This host device contains a modular radio with FCC ID: 2AB8BSTS170RADIO and IC: 1944A-ST5170RADIO

Industry Canada Specific Statements:

This device complies with Industry Canada license-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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de

brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This radio transmitter **11944A-ST5170RADIO** has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio **11944A-ST5170RADIO** a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maxi mal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

- 2 dBi dipole
- 14 dbi Yagi
- 8 dbi Patch
- 8 dbi Omni directional antenna

This device complies with Industry Canada license-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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisat eur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage es t susceptible d'en compromettre le fonctionnement.