streetsounds

Music for Your Main Street

StreetSounds Network Troubleshooting Guide

V2.0

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Contents

StreetSounds Network Troubleshooting Guide

This document is meant to help StreetSounds users with everyday basic troubleshooting of their networks.

StreetSounds Equipment Evolution

Over the years, AirNetix has developed three generations of StreetSounds equipment.

1. STS-70 – First generation of StreetSounds technology (2014 – 2017).

Master

Speakers

2. STS-170 - Second generation of StreetSounds technology (2018 – 1H2021).

Master

Speakers

3. STS-270 - Third generation of StreetSounds technology (2H2021- 2023+).

Master

Speakers

Mobile Master

In 2018 AirNetix introduced the "Mobile Master" which is a battery-powered transmitter that is capable of acting as the "Master Transmitter" of a smaller StreetSounds network. It too has a USB interface to allow the NMS to control the network. Its USB communications protocol is the same as the STS-70 and STS-170 (USB-HID, see below).
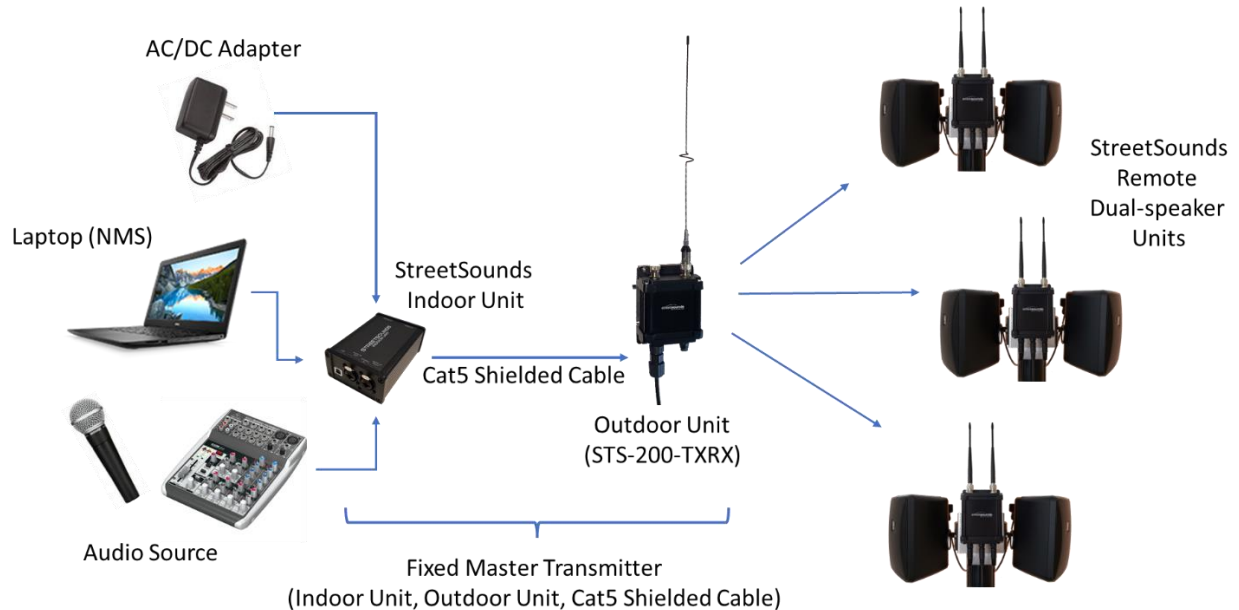
USB Communications Interface (IDU to ODU)

The StreetSounds Network Management System (NMS) facilitates extensive monitor and control capabilities in a StreetSounds network. The NMS can be used both for initial over-the-air configuration of each remote speaker, as well as for real-time monitoring of critical remote data such as received signal lever, "lost" (unanswered) polls, and audio drop-outs due to interference or signal obstructions.

The NMS application communicates from a Windows-based PC via a USB port on the PC to the "Indoor Unit" (IDU). The Indoor Unit then converts that standard USB signal to a proprietary signal carried over a Cat5 cable from the IDU to the ODU.

Over the years the USB interface between the Indoor Unit (IDU) and the Outdoor Unit (ODU) has transitioned from being a standard HID (Human Interface Device) to a more flexible RS-485 balanced driver format. The STS-70 and STS-170 Master Transmitter utilized a standard USB HID communications protocol with a USB line driver chip to enable the IDU to ODU link to be extended up to ~150'. However, the STS-270 generation of equipment uses a more robust RS-485 balanced line driver to enable an IDU to ODU distance of up to 1000'. This enables more flexibility in mounting locations of the ODU and IDU, and a more reliable IDU to ODU link.

The user must keep these differences in mind while attempting to troubleshoot a StreetSounds system.

StreetSounds Network Diagram (STS-270)

StreetSounds Network Diagram (STS-170)

AC/DC Adapter

Laptop (NMS)

Indoor Unit

StreetSounds
Remote Units

Fixed Master
Transmitter

Audio Source
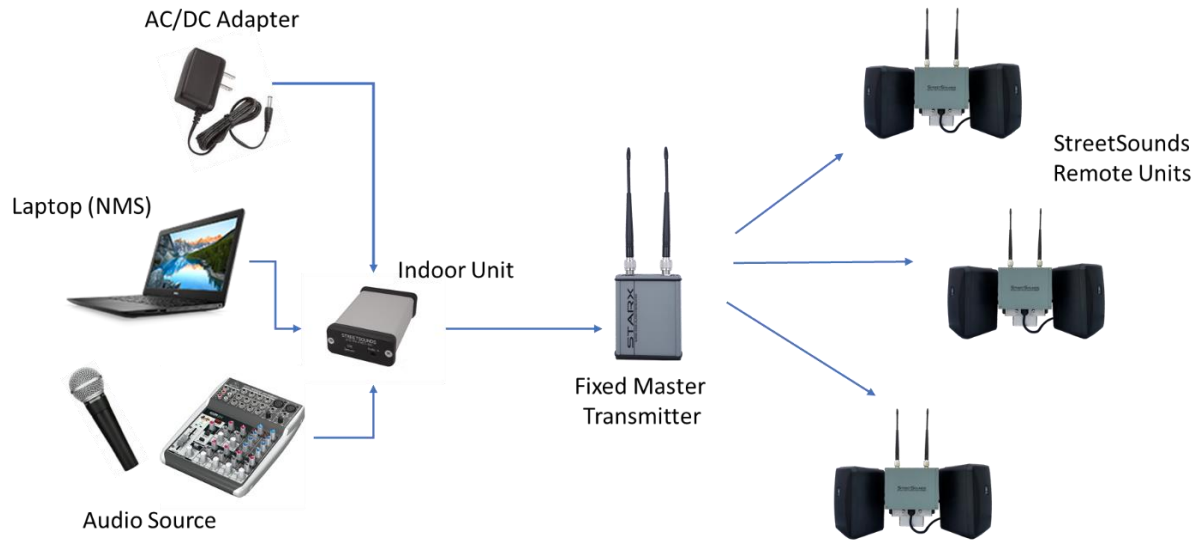
Indoor Unit Evolution

Below are IDUs for the various generations of StreetSounds equipment.

STS-70 Breakout Box (BOB).
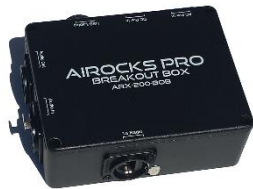
STS-170-IDU

(Note: "STS-270-IDU-**USB**" model includes a USB digital audio interface that appears in the Windows device manager as a "USB Audio DAC". Whereas the STS-270-IDU-DCX contains only analog audio inputs XLR & 1/8" TRS stereo jack).

Initial USB Communications Setup in NMS

After initial installation of the NMS you must select the appropriate USB communication protocol for the generation of hardware that you are using.

If using the STS-270 system, select the SST-200-TXRX (RS-485) button on the System Setup tab of the NMS screen as shown in below:
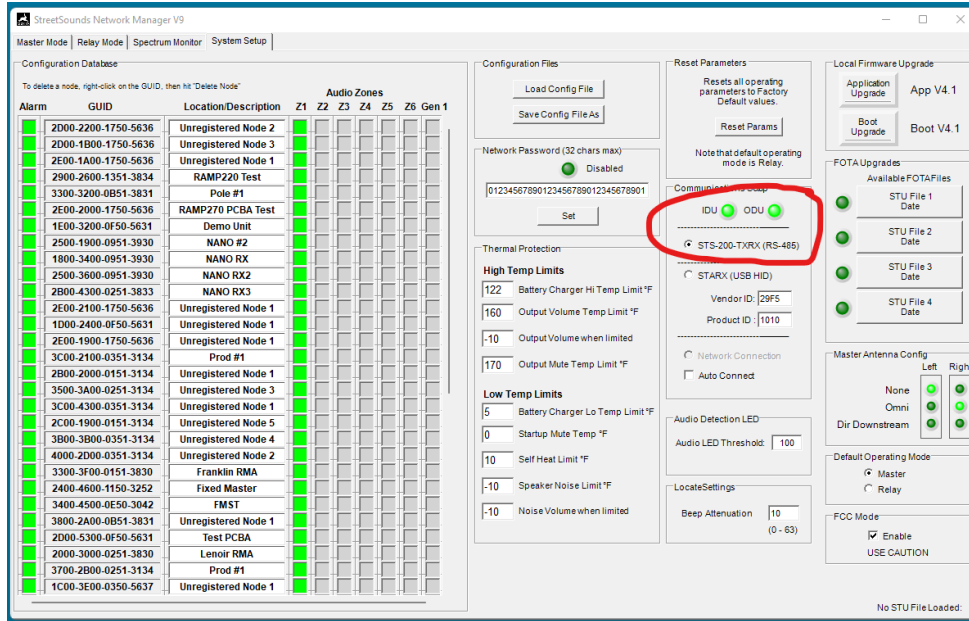
If the IDU is communicating with the ODU, both LEDs will be green as shown.

If you are using the STS-70 or STS-170 hardware, select the button labelled STARX (USB-HID) as shown below:
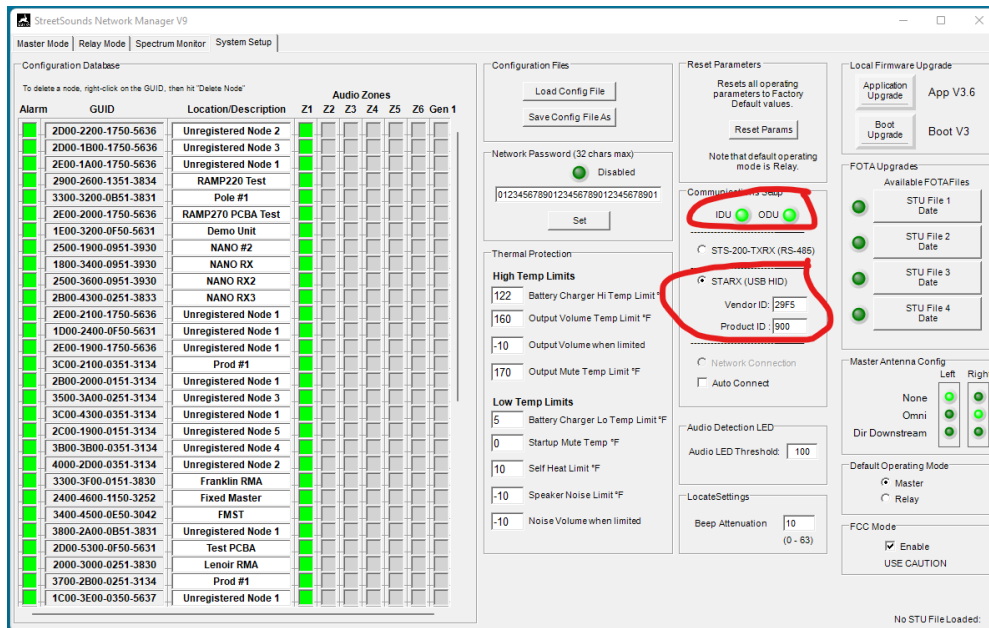
Definitions

The following definitions (and abbreviations) are important to understand the troubleshooting procedures.

1. Fixed Master (**FMST**). This refers to your Fixed Master Transmitter (if you are using one). The FMST consists of the following pieces:
2. Outdoor Unit (**ODU**). This is the "radio on the roof" and is the main RF transmitter for your network. If it is not working, your speakers will not have anything to receive, and will not play music.
3. Indoor Unit (IDU). This is the "indoor" piece of the FMST. It takes audio from your "audio source" and sends it to the ODU, which in turn sends it to the speakers.
4. Cat5 Cable. This is the cable that connects the IDU to the ODU and is generally 150' long. It is a special "outdoor rated" cable that carries the proprietary signals and power from the IDU to the ODU. It is **NOT** a "network" or "ethernet" compatible cable and should never be connected to your company's ethernet network.
5. Mobile Master (**MMST**). The Mobile Master is a battery powered, "mobile" transmitter which can either be used as the main transmitter for the StreetSounds network, or it can be used as the transmitter for a "special outdoor event".
6. Network Management System (**NMS**). The NMS is a Windows-based software application that is used to initially configure a StreetSounds network, as well as to monitor and debug the network after initial installation. The NMS is free to download from the AirNetix website.
7. StreetSounds network "Applications" or "Modes". A StreetSounds network typically operates in one of two "Modes":
    a. "Day-to-day Background Music" mode. In this mode you are simply streaming audio from a subscription source (i.e. Cloudcover Music) to your speakers over the StreetSounds network. A laptop computer is typically used to stream the music from your audio subscription provider and send it to the StreetSounds network via the audio input on the IDU.
    b. "Special Outdoor Event" mode. This mode is used when you want to "originate" your source audio from a different outdoor location, other than from your FMST location. The transmitter for this mode is typically a MMST. In most cases the FMST is reconfigured to operate as a "repeater" that accepts the transmit signal from the MMST, and re-transmits (relays, repeats) the signal out to the speakers that were previously configured to listen to the FMST.
8. "Speaker" or "Pole-Mounted Dual-Speaker Unit". The official name of this unit is STS-270-205J. It is also referred to as a "speaker" in much of this document. This assembly consists of the RAMP, Pole Mount, and two JBL weatherized speakers.
9. Radio/Amplifier (**RAMP**). The black box in the middle of the pole mounted assembly that contains the wireless Radio and internal Audio Amplifier.
10. Mount or Pole Mount. The three-piece pole mounting attachment for the RAMP and JBL Control 25 speakers.
11. JBL Speakers. The two JBL Control 25 speakers and their associated weather protected speaker grills, speaker wires, and rear-panel covers.

Documenting Your Network

In order to facilitate troubleshooting, it is imperative to keep an accurate graphical map of the layout of your network showing the locations of the fixed master and each remote speaker (by name/number) and repeater in the network.
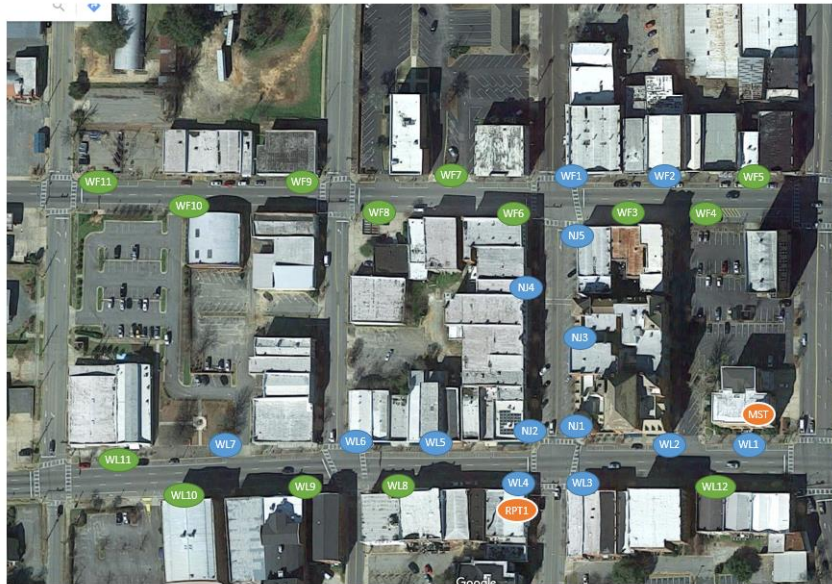
It is also advisable to keep a record of which transmit channels are being used by the FMST and any repeaters in the network, as well as which speakers are set in manual channel select mode to receive those channels.

StreetSounds Network			
Node Name	Location	TX Chan	RX Chan
Master 1	Welcome Center	2/7	
WL1	West Lamar #1	1/6	2/7
WL2	West Lamar #2	x	3/8
WL3	West Lamar #3	x	3/8
WL4	West Lamar #4	3/8	1/6
WL5	West Lamar #5	4/9	3/8
WL6	West Lamar #6	x	4/9
WL7	West Lamar #7	x	3/8
NJ1	N. Jackson #1	x	3/8
NJ2	N. Jackson #2	x	3/8
NJ3	N. Jackson #3	x	3/8
NJ4	N. Jackson #4	x	3/8
NJ5	N. Jackson #5	x	3/8
WF1	W. Forsyth #1	5/10	3/8
WF2	W. Forsyth #2	x	5/10

Interference Issues

Local radio interference can cause audio dropouts and control issues for the StreetSounds network. In many cases some level of interference can be tolerated due to the redundancy and diversity of the radio design. However, there can be locations where interference cannot be overcome by radio placement, antennas, and/or repeaters. On larger networks we require that measurements be made prior to full deployment so that the level of local interference can be understood ahead of time, and a "Go/No Go" decision can be made on the potential effects of the interference.

Common sources of interference in the 900 MHz spectrum include:

1. Smart Meters
    a. Many state, county, and city utility departments utilize wireless automatic meter reading equipment that operates in the 900 MHz band. Since the StreetSounds system also operates at 900 MHz, this meter reading equipment can cause interference. Some of these meters are "one-way" communication from the meter to the Base Station. Others are "two-way" and can be temporarily turned off in order to "time share" the frequency band. If your city utilizes wireless meter reading equipment within your desired area of coverage for the StreetSounds equipment, it is imperative that you speak to your utility department about this potential issue.
2. Banks
    a. Some banks use motion detectors and access controls that operate in the 900 MHz spectrum. In some cases this can cause interference if the StreetSounds speakers are placed near a bank. You may need to either avoid placing a StreetSounds speaker unit near a bank, or be prepared to move it so another location if you find that the interference is excessive in the chosen location.
3. Automotive Traffic
    a. Engine noise from cars and trucks can cause sporadic interference. This type of interference generally cannot be avoided, so the user should expect occasional random interference on a heavily travelled street. Most of the time this type of interference does not cause audible dropouts.

With careful network design and antenna selection and orientation, the StreetSounds network can operate acceptably even in the presence of significant local interference.

NMS Issues

It is important to be able to distinguish between NMS-related issues and StreetSounds equipment issues.

The NMS is a Windows-based software application that is compatible with Windows 10 and 11. It will not run on a Mac. The application can be downloaded for free from the StreetSounds website at http://streetsoundswireless.com/files/StreetSounds_NMS_V9.zip.

The NMS communicates with the IDU over a USB cable/connection. The communication relies on USB drivers from FTDI, which are commonly used for USB to serial devices. Generally, these drivers are already pre-installed when Windows is installed. However, if the drivers are not installed, you must manually install them. They can be downloaded from the StreetSounds website if necessary (http://streetsoundswireless.com/files/CDM212364_Setup.zip).

NMS USB Communications Issues

It is mandatory that the NMS be able to communicate to the network via the USB interface of the IDU. If this communication link is not working, you will see one of the following indications.

Setting Up the USB Connection to the IDU

You must make sure that the NMS is properly configured to talk to the IDU over the USB Connection between the laptop and the IDU. This is done by selecting the "STS-200-TXRX (RS-485) button on the System Setup tab of the NMS screen (see below). Once this button is selected, both LEDs should turn green. If the LEDs do not turn green, check that the IDU has power, and that the USB cable is connected to the IDU and laptop. If the LEDs do not turn green, exit the NMS application and restart it. Bot LEDs must be green in order for the NMS application to work properly.

Music for Your Main Street
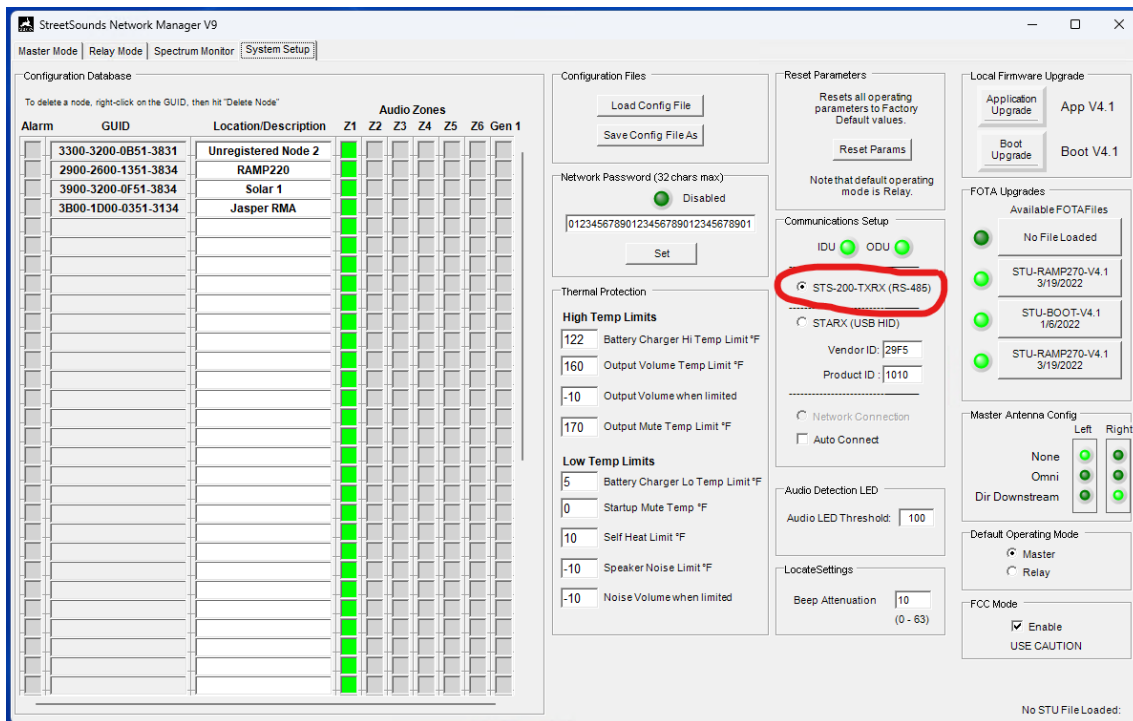
Flashing IDU and ODU LEDs

Under "USB Connection" on the Master Map tab of the NMS (see below), when both LEDs are RED (IDU and ODU) it means the computer cannot communicate with the IDU, and hence the ODU and the entire StreetSounds network.
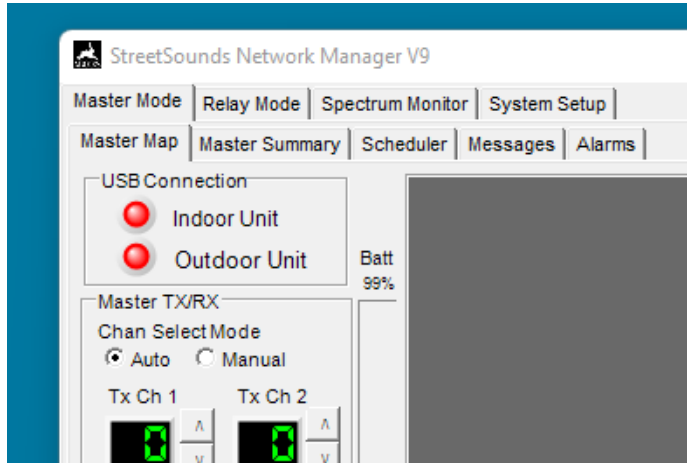
Flashing ODU LED

Under "USB Connection", one LED is green (IDU), the other (ODU) is red. This means that the NMS can communicate with the IDU, but IDU is unable to communicate with the ODU. This could be due to either a bad Cat5 cable, an intermittent (loose) RJ45 connection of the Cat5 cable at either the indoor end, or the outdoor end of the cable. Or it could be due to a corroded RJ45 connector at the ODU and of the cable if the weather protection cover has not been installed or improperly installed. Or it could mean that the ODU has failed.
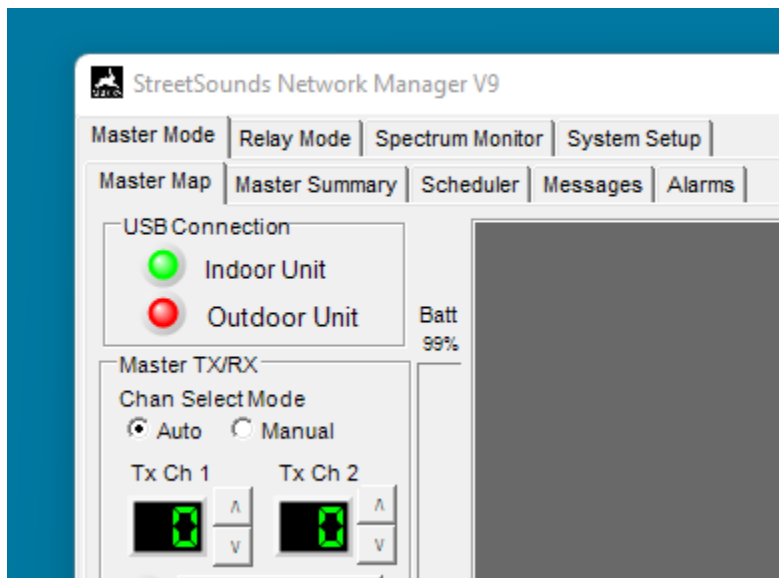
Testing for a Bad Cat5 Cable

One way to eliminate the possibility of a bad cable is to bring the ODU indoors and connect it with a known-good, short Cat5 cable to the IDU. If the short cable allows the IDU to communicate with the ODU, you should replace the original Cat5 cable with a comparable outdoor-rated Cat5 cable.

Normal Operation

When both LEDs are green (see below), the NMS and laptop are communicating via the IDU to the ODU and hence to the network/speakers. This is the normal operation of the NMS/IDU/ODU.
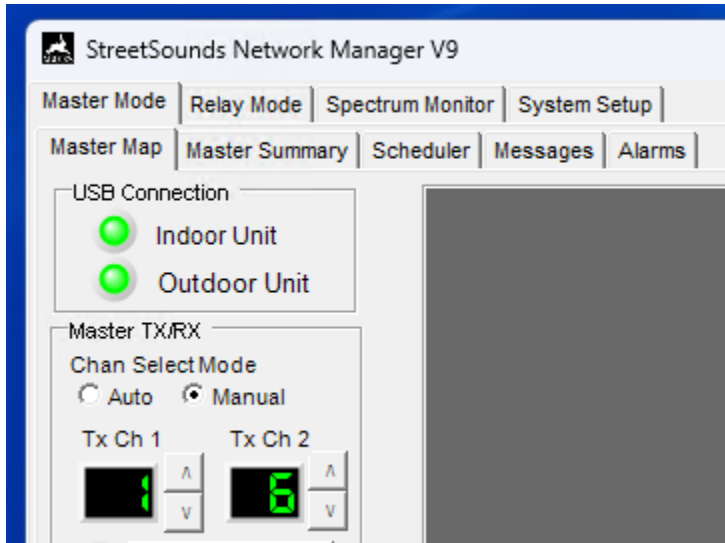
No Speakers Show Up on NMS Screen

This is a common issue that can be caused by one or more of the following:

1. The NMS is not able to communicate with the IDU or ODU (see above).
2. The Fixed Master is transmitting on the wrong channel(s).
3. The remote speakers have lost power.
4. The Fixed Master antenna setting is incorrect.
5. The Fixed Master ODU has failed.
6. One or more of the Repeaters in the network has failed or has no power.

The NMS is not able to communicate with the IDU or ODU

If the NMS is not able to communicate with the IDU or ODU, the Master Map screen will not show any remote speakers. Please refer to the previous section for troubleshooting steps.

The Fixed Master is transmitting on the wrong channel(s).

If the FMST was initially configured to transmit on (i.e.) channels 1/6 and all remote speakers are set to receive channels 1/6 from the FMST, and someone changes the FMST transmit channel setting to something other than 1/6, all of the remote speaker icons will disappear from the Master Map screen. It is highly recommended that you keep a record of which channels are used by the FMST and any repeaters in the network.

The remote speakers have lost power.

The remote speakers must be powered for them to show up on the NMS Master Map screen. Sometimes the GFI breakers can trip due to moisture intrusion.

The Fixed Master antenna setting is incorrect.

If the FMST was originally configured to transmit on the right-hand antenna port, and someone changes that antenna port to the left-hand port, the transmitted signal may not reach the remote speakers due to the attenuation of the signal being sent through the wrong antenna port.

The Fixed Master ODU has failed.

In the rare case that there is a failure of the ODU due to a lightning strike or extreme power surge, all of the speaker icons will disappear from the Mast Map screen. Please see the previous section on troubleshooting the ODU communications issues.

One or more of the Repeaters in the network has failed or has no power.

If the network was originally configured to rely on a "repeater" to send the signal from the FMST to other speakers in the network, and that repeater fails, all speakers, including the repeater and all of its "downstream" speakers (and repeaters) will disappear from the Master Map screen.

Speakers Keep Dropping off the Master Map Screen

Usually, this is normal behavior. Speakers can drop off the Master Map screen for various reasons such as a transient burst of interference in the area near the speaker caused by (i.e.) automotive ignition noise or some other temporary cause. Dropping off the NMS screen does not necessarily mean that the speaker is dropping audio. In fact, in most cases the speaker does not produce an audio dropout. The

best way to judge whether the speaker is experiencing a serious audio dropout problem is to stand under the speaker and listen to the audio.

However, if the speaker drops off and does not eventually return, this can indicate that speaker has lost power for failed. But it can take larger networks many seconds to reacquire a dropped remote speaker, depending on how many speakers are in the network, and how many speakers are attempting to reconnect to the Fixed Master, and how many repeaters the remote speakers must traverse in order to reach the Fixed Master.

A speaker that continuously drops off the NMS screen may indeed be experiencing serious interference issues. If the interference is consistent and severe, the speaker will typically have consistent audio dropouts. In this case, you may have to move the speaker to a different location, or try to improve its received signal from the FMST by adding a directional antenna, either on the speaker itself, or on the FMST if one does not already exist there.

Speaker Issues

Below are common issues with the pole-mounted speakers

No sound coming from both speakers.

Check for power. This is by far the most common issue with "no sound". If the pole has no power, the speaker will not show up on the Mast Map screen.

If you unplug the speaker from the outlet, then plug it back in, the three LEDs on the bottom of the RAMP will flash several times, indicating that the unit is working properly. If the LEDs do not flash, and you have verified that the outlet does indeed have power, the RAMP has probably failed.

No Sound Coming from One Speaker

Recheck the speaker wire connection to make sure it is not damaged or loose. Swap the left and right speaker wires and note whether the issue follows the speaker or audio output from the RAMP.

Check the NMS audio input to make sure it is receiving both Left and Right audio from its source (the laptop). If the audio input is only supplying one channel of audio, this will be heard from all speakers in the network, unless the audio output of a Speaker unit is set to "Left + Right Mix" (see below), in which case audio will come out of both speakers.

RelayMonitor

Network ID
2
Node Description/Location
Unregistered Node 2
GUID: 3300-3200-0B51-3831   Model: RAMP270   App FW Ver: V4.1
Boot FW Ver: V4.1

Internal Temperature
93.2
Degrees F

Poll List

Locate   Reset Params   Register Node

TX/RX Channel Select Mode: Auto   Manual   Active   DMT Enable

Transmit
TX Ch 1   **3**
TX Ch 2   **8**
TX Power   **20**

TX Enable   OFF
TX Diversity   OFF

Audio
Output Gain   **-10**
Audio Avg   0.0%
Delay (mSec)   **0**
Non-cumulative

20db
15db
10db
5db
0db
-5db

500
400
300
200
100
0

PA Gain   -15
Set

Audio Output
2 Ch Stereo
Left + Right Mix
Left Only
Right Only
IAMP Enabled

Receive
RxCh1   **2**   RxCh2   **7**

Manual Re-scan

Uplink Node ID   **1**

Uplink Control Channel   **2**

Packet Error Rate %   **0.0**

Left   Right
0   0
-20   -20
-40   -40
-60   -60
-80   -80

-99   **-50**
RSSI (dBm)

TX/RX Antenna Config
None
Omni
Dir Downstream
Dir Upstream

RSSI MONITOR
— Left
— Right
0dbm
-20dbm
-40dbm
-60dbm
-80dbm
-100dbm
RSSI

PER   BatterySummary   Battery Detail   Settings   Logging

PACKET ERROR RATE
— PER
— TX Div
2.0%
1.5%
1.0%
0.5%
0.0%
PER

Alarm 300

Select Firmware File   Program Firmware

CW
PRBS

18

Fixed Master Issues

LEDs on NMS Master Map Screen Flashing Red

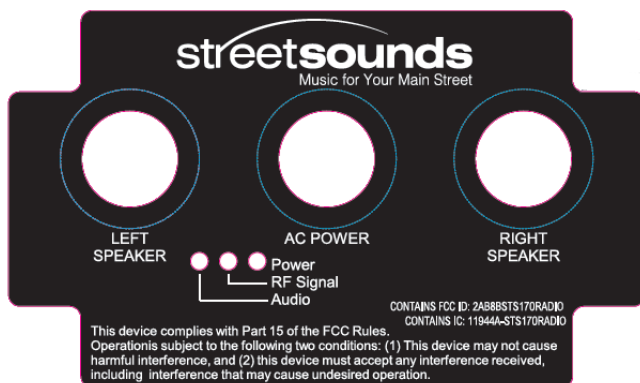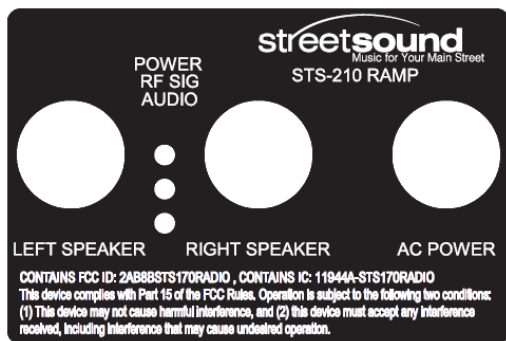Please see NMS section "Flashing IDU and ODU LEDs" above.
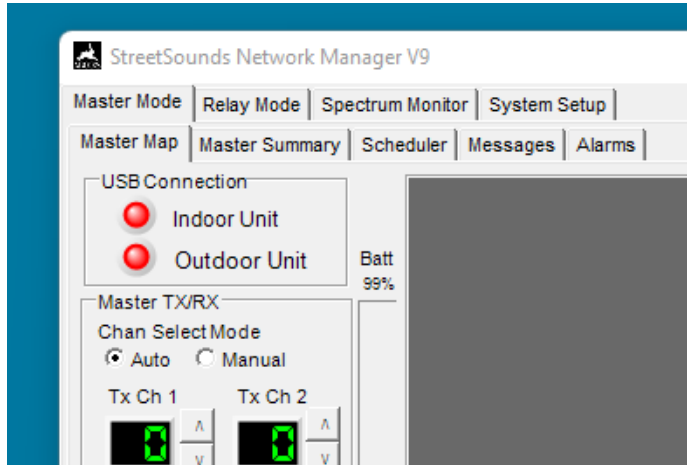
LED Indicator Definitions

Below are the definitions of the LED on/off patterns of the StreetSounds Transceivers and RAMPs

StreetSounds LED Indicator Functionality			
LED	Solid Green	Flashing Green	Off (dark)
Power	Power is present. Unit is operating properly	Intermittent power	No power, or unit failure
RF Signal	Unit is receiving transmit signal from upstream unit. NMS is communicating with this unit	Unit is receiving transmit signal from upstream unit. NMS is NOT communicating with this unit.	Unit is NOT receiving a signal from upstream unit.
Audio	Audio is being received from upstream unit and is being sent to output of this unit.	Audio is being received from upstream unit and is being sent to output of this unit.	No audio is being received from upstram unit.

STS-270-RAMP

STS-220-RAMP

STS-200-TXRX (ODU)