# Online playing FAQ

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Here are a few of the methods for doing music online, a brief survey:

## For arranged music

Record with click or guide tracks, assembling final tracks later. You can use a guide track on a phone and record in a higher quality device. The higher quality recordings can be sent to a producer for mixdown. (Be sure to "slate" each take properly!)

Paid (subscription) apps for this kind of work

**Acapella** - https://www.mixcord.co/pages/acapella (iOS only).

**Soundtrap** - https://www.soundtrap.com/ Basically an online version of Garageband.

**Audiomovers** https://audiomovers.com/wp/ establishes a 1 to 1 high quality connection with a DAW using a plug in. Sort of a present-day ISDN (for those who remember).

## For jamming - what we are here for!

Common traits of all these apps include: a client-server model, and UDP rather than TCP stream connection. The UDP (User Datagram Protocol) connection is faster than the normal TCP (Transmission Control Protocol) connection and requires port forwarding. UDP omits error correction for a faster stream. Buffer lengths are tweaked to get the best compromise between stability and latency.

Users can set up their own server or connect with an existing one. Creating your own server allows you to control who is in the jam, and enables you to create a server that is geographically closer to your other players. This can require a certain amount of comfort using a command line to talk to the computer, and connecting to your router to set up port forwarding.

### "Phrase jamming"

App establishes repeated phrase of an agreed-upon length, with metronome, and each player hears what was played on the previous "turn" of the repeated loop. Great for jam bands. Players vote on tempo and phrase length.

**NINJAM** (https://www.cockos.com/ninjam/) works with Reaper via a "ReaNINJAM" plugin. Brief demo at https://www.youtube.com/watch?v=1Q2EET7NyR4 - many more on YouTube. An archive of all sessions is at https://archive.org/details/ninjam. (NINJAM feeds to archive.org automatically.)

**Jammr** (https://jammr.net/) is a "bare bones" app for phrase jamming, based on NINJAM. Paid subscription is required to create private jams.

### Near real time (NRT) jamming

Creates a connection with the shortest latency possible (<30 ms target range). Good for geographically close players. Good resources here: https://25ms.org/technology/

**JackTrip -** https://ccrma.stanford.edu/software/jacktrip/ a very basic, but very fast and high quality two-way audio connection over the web between two players. Very lively open source community with lots of tutorials and many experiments in making multi-player sessions, etc. Must be run from a command line. Uses JACK (discussed below) to route audio to the web.

**SoundJack** –https://www.soundjack.eu/ is a Chrome browser-based (free, so far) implementation of JackTrip. SoundJack is not "Plug & play" but brings a lot of the controls out to the browser window. There is a good tutorial here https://www.youtube.com/watch?v=idIT53vLc0I.

**JamKazam** - https://www.jamkazam.com. A plug & play "wrapper" for NRT jamming, with social media and paid components.

**Jamulus** - **https://sourceforge.net/projects/llcon/files/Jamulus/3.5.11/ - our featured app today.**

## Setting up your audio

Simplest: use a physical mixer to feed combined signals to send one output to the computer and to handle your monitoring.

Your setup will generally require at least two mono or stereo inputs—for music and for a mic to talk about the music (unless you are a vocal soloist). (Many apps provide a "chat" window.)

Also, you may need two channels of output—to the internet, and to your own monitors. (Going directly from an interface to a streaming app will usually mean that you don't hear yourself, so if you are playing, *e.g.,* an electric piano or software instrument, you'll need to provide monitoring for yourself.)

On multi channel interfaces, use microphone to talk and another input for your instrument. Many interfaces like the Focusrite Scarlett come with a software mixer tailored to the interface which can be used to route signal to the internet.

Online software requires a virtual (within the computer) channel to listen to. (This applies to any online app like Zoom or Skype as well.)

### System resources for internal audio routing

#### *Mac*

*Blackhole, https://existential.audio/blackhole/*
*Source Nexus, https://source-elements.com/products/source-nexus*
*Soundflower (obsolete)*

#### *Windows:*

There is a good Reddit post on Windows virtual audio at
https://www.reddit.com/r/Twitch/comments/7w0i2b/routing_audio_from_applications_around_your_pc_a/

VB-Audio (https://vb-audio.com/); Virtual Audio Cable, & *Voicemeeter*, a software mixer using Virtual Audio Cable

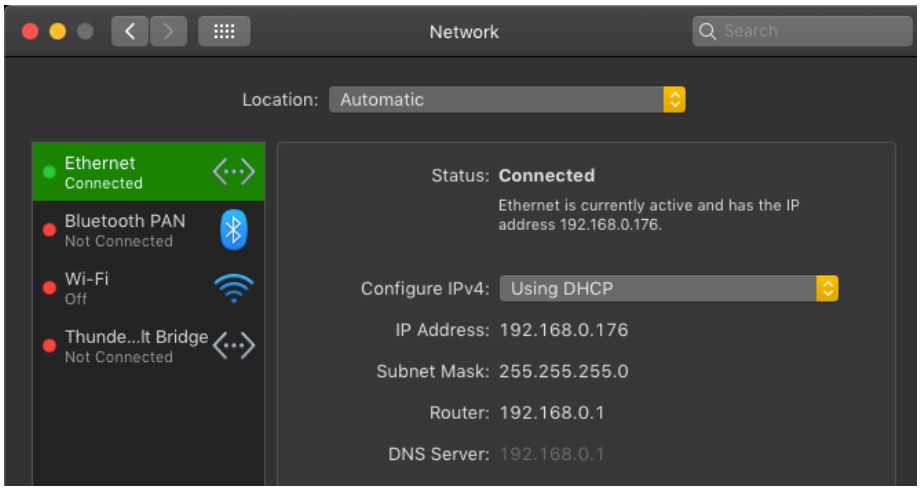
#### *Multi platform: JACK*

JACK is a virtual audio driver and router for Mac, Linux and Windows, and is often the virtual router of choice for Windows. It combines an audio driver with a routing tool, and works with JackTrip to route data to the internet.
https://ccrma.stanford.edu/docs/common/JACK.html, https://jackaudio.org,
https://jackaudio.org/faq/jack_on_windows.html

## Setting up your internet connection

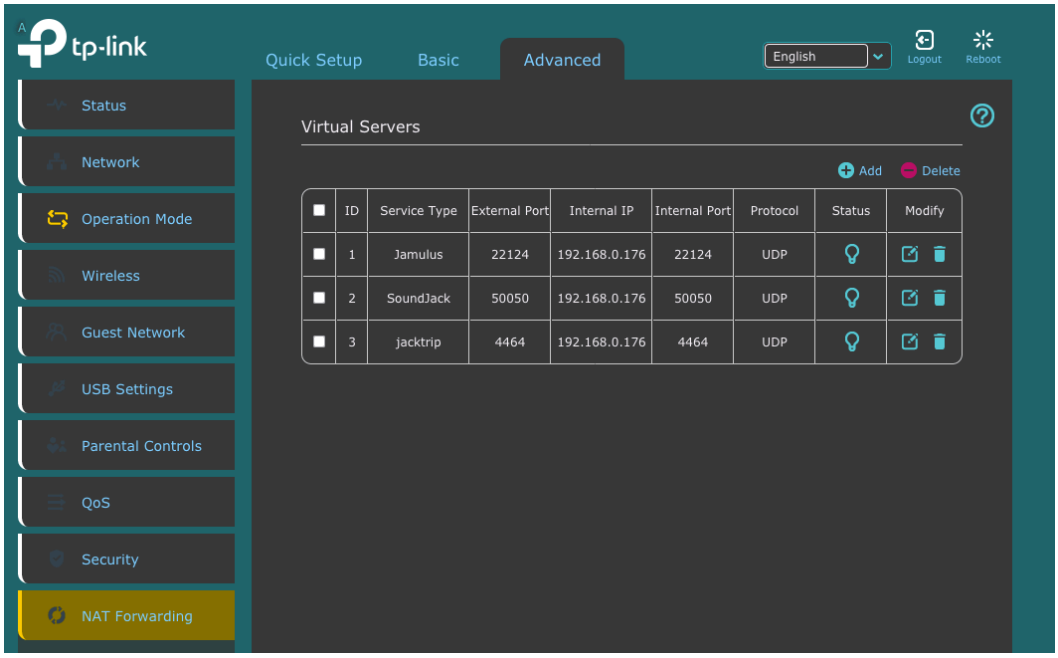
#### *Port forwarding*

Your computer has two IP addresses: an external ("public") one from the router to the "outside world," and an internal one that your router assigns to your individual computer. The **external** address can be obtained by typing, "**What is my ip address ipv4**" into any browser window.
The **internal** address shows up in Network preferences control panel (Mac panel shown):



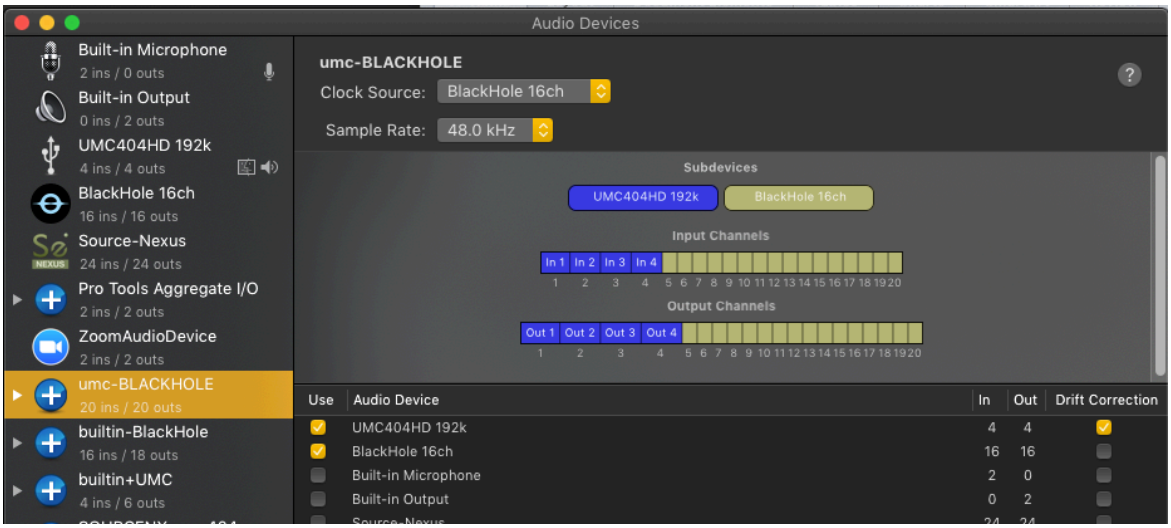
(On Windows, open a command window and type “IPCONFIG” to get the internal IP and router address.) **NOTE** that I’m using DHCP rather than manual addressing.

Connect to your router by entering the router address (see picture above) into a browser window, look for Advanced setup, and find “NAT Forwarding” or other port forwarding page. Set up the correct port number for Jamulus with your internal IP address as shown. (All of these apps will tell you the port number associated with each in their literature.) My router config page looks like this:




## Using Jamulus on a Mac

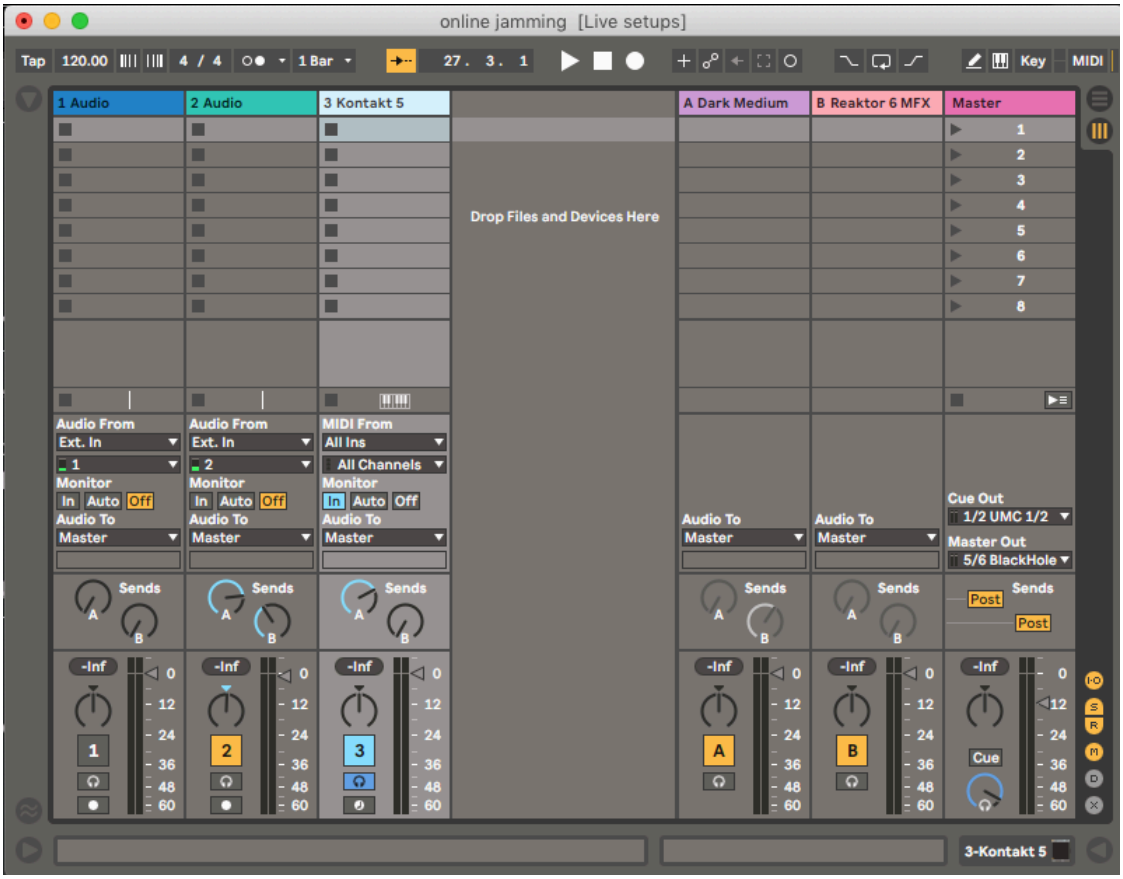
### 1. Audio setup: Use Macintosh Audio MIDI setup to create aggregate devices.




“Clock source” should be set to the designated virtual stream for best results.

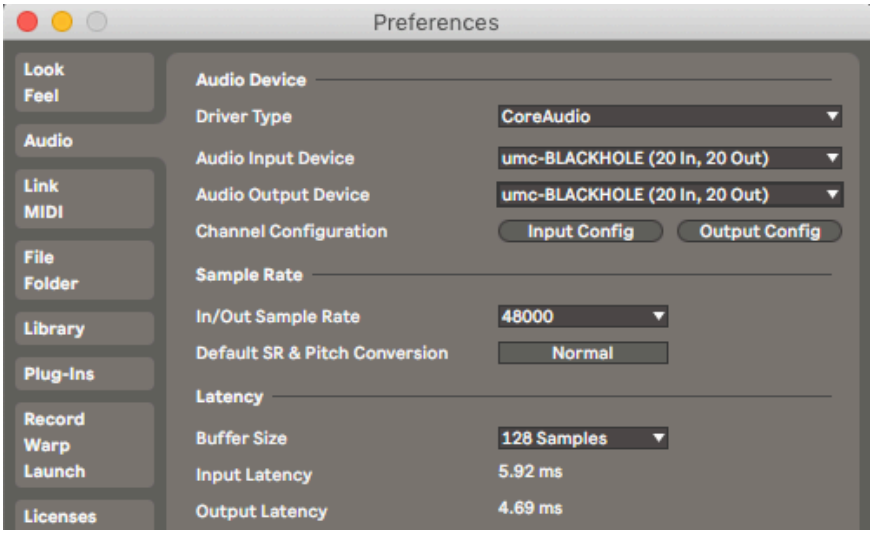
Make note of the Sample Rate. (Other apps may require setting the sample rate manually in all app windows – Jamulus picks up the sample rate automatically.)

## 2. Create a mix session in your computer (in Ableton LIVE in this example):

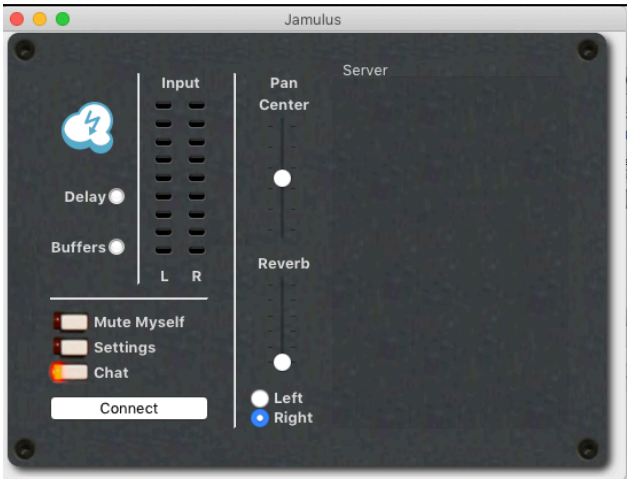



Using a “cue” channel for self monitoring here.

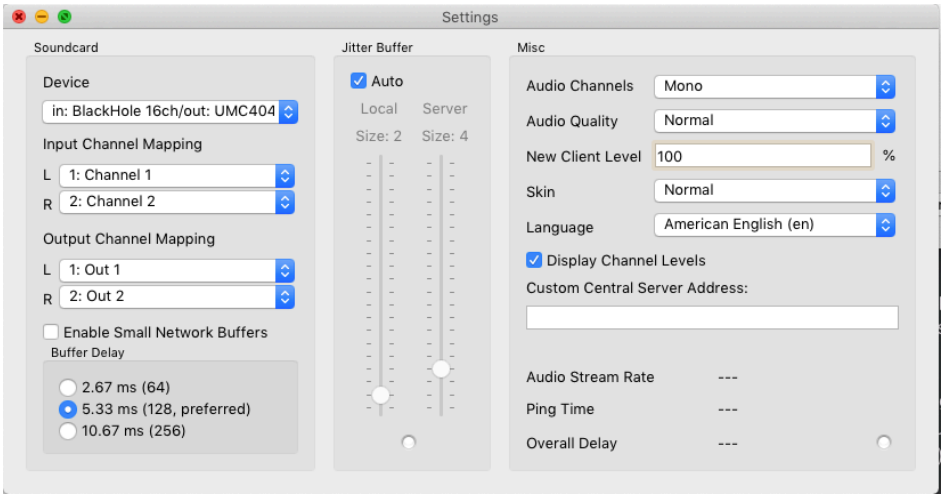
The LIVE audio settings should look like this:



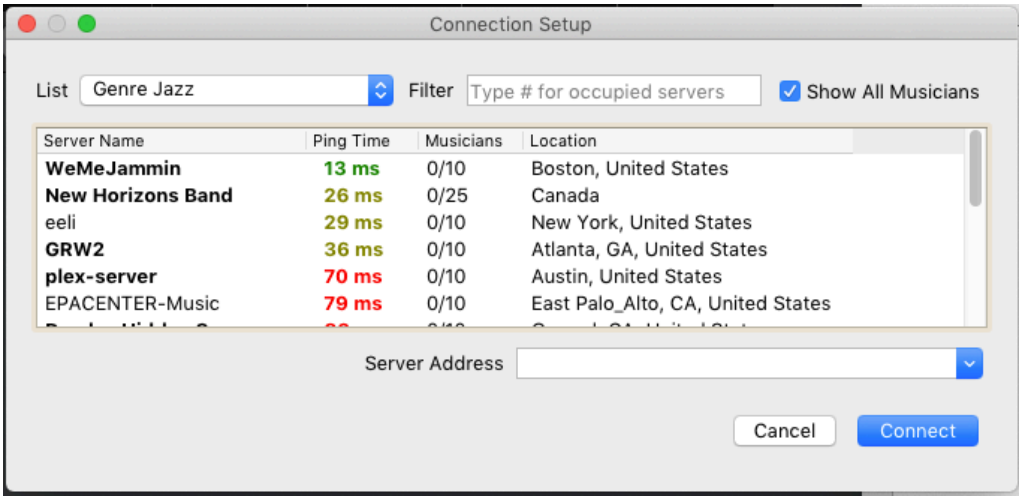
### 3. Start Jamulus.



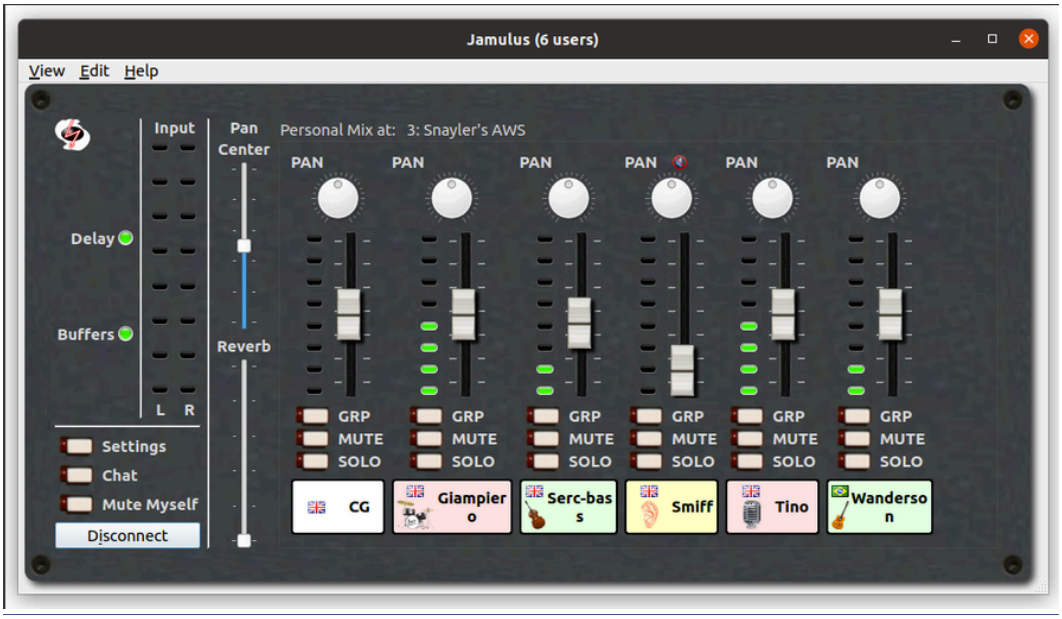

The Jamulus settings window looks like this:




You can change the buffer delay setting to avoid distortion and glitching. Higher setting is more stable, lower setting means less latency.Check the Connections window to see the available public servers:



A connected session will look something like this:

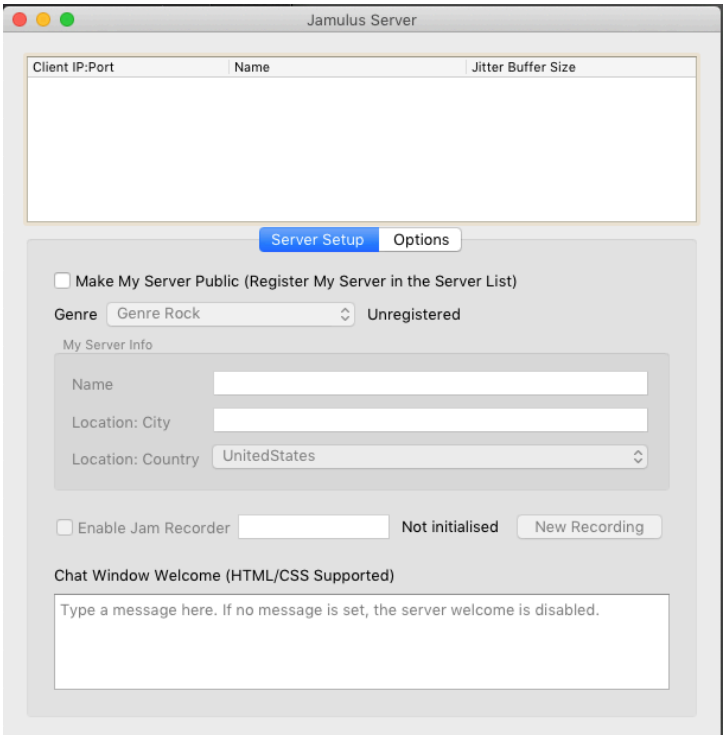



At this point, you should hear the other players and be ableo to play. There is also a “Chat” window for meta-musical conversation.

Pro tip (UNVERIFIED): when connected to a public server, you may be able to create a “sub group” by pressing “Solo” on the channels of players you want to play with, and asking them to do the same.

## 4. Creating a private Jamulus server (unverified)

Start the separate “**Jamulus server**” app on your computer.




From this it appears that you only need to send your fellow players your **public** IP address (see above) and they would enter that address into their “Connect” dialog box (see above).

To make your server public, just check the “Make My Server Public” and add the server info. You need a faster IP connection for this. You may also be able to record jams locally (I have not tried this.)