Guide to Mumble + Zerotier

These are alternatives to both Discord and Hamachi

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Use this guide as a reference, should I not be there to help in person.

This guide has been updated as of 12/8/2021

Introduction

Various people in my Discord server started to notice that we were having lots of issues with things like, for example, latency, voice activity, and quality. This meant that people would start cutting in and out, they would “robot” (latency got really bad so it would “ultra compress” their voice), or just sound really quiet, loud, etc. This gave me an idea to look for some alternatives to Discord, except with a few requirements.

1) Must be low latency. Too many people on Discord have bad or “iffy” wifi. A low latency VoIP (Voice over IP, or internet) would mean that even people with bad wifi and hardware could join and have a perfectly fine experience.

2) Must have adjustable controls. Think of Discord’s individual volume button when you right click someone. Notice how it’s not in any measure of audio such as decibels? It’s in percentage. It also has a limit of 0% - 200%. This means if someone is very loud, you have a lot of control to make them quieter, but what if someone is quiet? Then you have essentially no control, other than whatever scaling Discord does. Decibel controls or something else would mean WORLDS of difference for people with different setups.

Sidenote, Discord’s system for volume control is *really* bad. Decibels *massively* increase the amount of volume every +10db. This means 20db is 10 times as loud as 10db. Give someone control over ±100db, and they now have complete control over local volume.

3) Must be good quality. No, I don’t mean it just sounds like any VoIP service, or that it just sounds “okay”. I mean it uses an audio system I *know* (Sorry Discord, but what in all hell is “legacy” and “experimental”?) and trust for stability, and is encrypted lest someone is “listening” (no I’m not paranoid but for the people that are, here you go). Mumble uses WASAPI which, if you use Reaper you know this, is a *very* good and stable audio system which works 100% (or really close to that) of the time. It also has Echo Cancellation and, best of all, control over *literally anything you need*. This means you can change compression, processing, transmission, etc. Sidenote, if you have absolutely no idea what I just said, don’t bother googling it, it probably doesn’t matter to you. Just ignore the last part and keep on reading.

4) Must be Open Source. If you do not know what open source is, lemme break it down for y'all. There are a few (important) different types of open source. The most important one is, FOSS. FOSS means "Free, open source software". Free in this case does *not* mean freemium. If something claims it is FOSS, this means it is free, and unless under *very* special circumstances, will stay that way. There is nothing to pay for, even if you wanted to. Open source itself means that the website GitHub is your friend. To put it in simple terms so that I don't have to type like 3 paragraphs, here is Mumble's source code. You can read and look at every single file in the program; meaning, NOTHING can and will be hidden. Should you have problems with the program, you can directly create an issue, and immediately send it to the developers to fix as fast as they can, with the help of the community.

Sidenote, if anything is certified FOSS, know that it has a community behind it that will most likely help under any circumstance. Also note that there is such a thing as a FOSS license. This means the user has less control over what they can do, other than looking at files.

So, now that I have shown the different prerequisites as to why I chose Mumble, it is time to show you how to set it up.

Setting up Mumble

Everything here is pretty straightforward. This guide is only a reference, so therefore I will only guide you through the challenging parts. I expect you to figure out the easy parts yourself.

First, Download and Install Mumble from here. I slightly recommend the snapshot purely because it has more features and the stability is the same, in my experience. It has pretty good wizards to walk you through setting it up. Please, please do not just press next and skip the wizards. The mumble team spent a decent amount of time making them self-explanatory and, for lack of a better word, idiot proof.

Sidenote, I **highly** recommend selecting your input and output devices and not using the default windows one. Windows loves to switch defaults whenever it wants, which still confuses me to this day.

You will come to a basic voice activation wizard where when you talk it will show a bar going through red, yellow, and green. For now just keep talking in sentences and make sure your quietest voice is picked up. For me a small snicker worked for quiet and a slight yell worked for loud.

Sidenote, make sure your voice is **NOT** too loud. We can make people infinitely louder, but if your mic is clipping Mumble can and most likely will just filter out your voice. Also it's annoying as hell.

Sidenote, you can adjust the voice activation better in the settings so that it picks up less or more if needed. Note that if you talk and your voice is in the yellow, it will sound slightly incomprehensible because the yellow is like a preload rather than fully talking. Make sure your voice is in the green unless you aren't fully talking. Compressor microphones make this really easy and full setups almost make this useless to mess with.

Go to the settings tab (gear in the top bar), and find the noise suppression tab. Set it up so it uses both "Speex" and "RNNoise". After doing that, find the tab with echo cancellation and set it to "mixed channel".

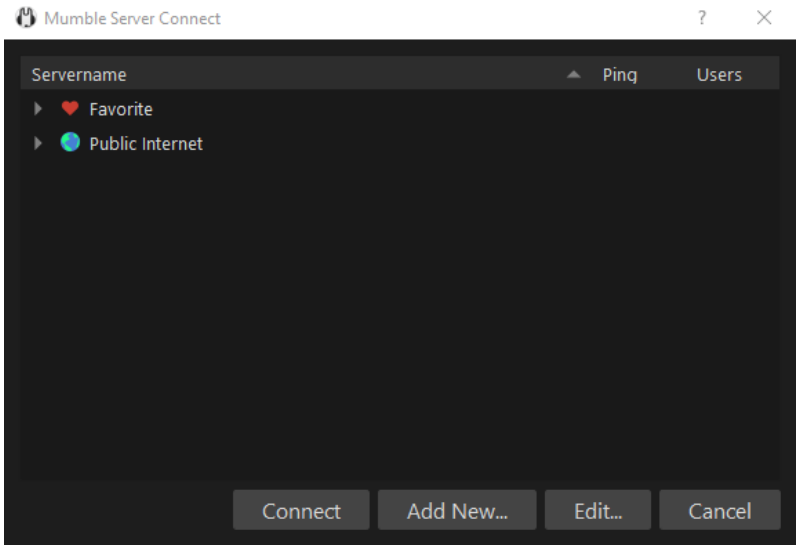
Setup your audio per packet (in the compression section) to 20 ms and then setup the quality to whatever until the numbers at the bottom of the section say ~70 kbit/s. This allows even the lowest bandwidth users in the Mumble Squad to hear without many problems.

Technically, Discord uses less bandwidth, but it wreaks havoc on your pc in turn.

You will at this point need to set up Zerotier so that it is possible to join the server. Please message me when you setup Zerotier as I need to give you a username to differentiate between people, and allow you access to a managed IP.

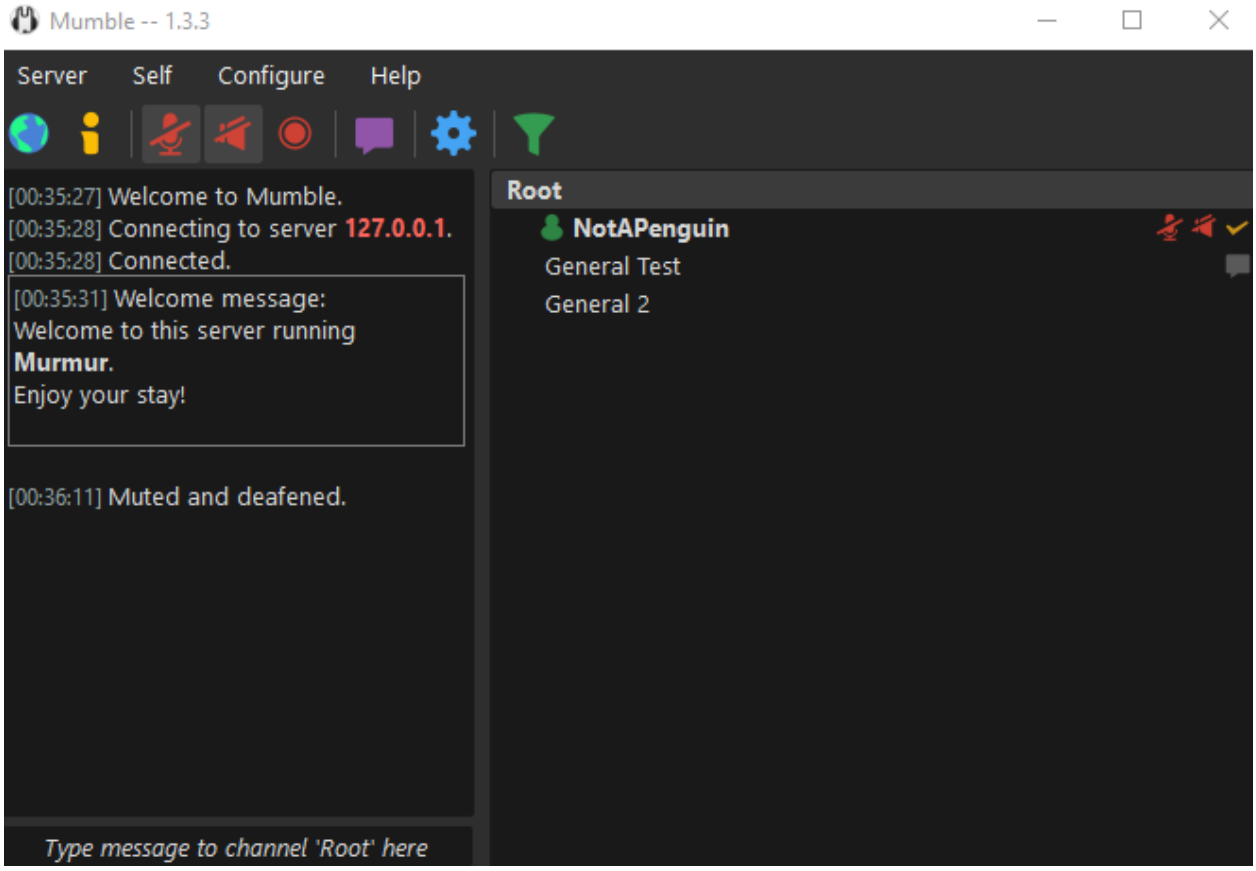
Setup Zerotier before doing this

After setting up Zerotier, go back to Mumble and click the Server button. From there, click the Connect button. A window like this will pop up:



Then, click the Add New button. In the Address section, put the IP Address (10.244.1.1) into it. Put your Username into the section, and give the server a label if you want. You should see a

window like this after you connect:



Sidenote, you will see a window about a password, type in 11. You will then see a window about a certificate, just press accept or yes (whatever the button is).

Connect to a “Voice Channel” by just double clicking on it. Please do not stay in the Root channel. If you wish to share your screen or something else, use Discord to share the screen, but mute on Discord and keep Mumble unmuted. That allows us to share screens without using Discord’s audio system. I have set up a Discord server for exactly this purpose.

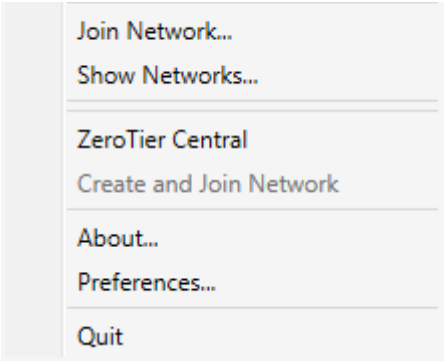
Setting up Zerotier

Q: What is Zerotier and why do I need it?
A: It is the exact same thing as Hamachi, except without any cost, much higher limit, and no annoying GUI (graphical user interface) to keep open. Also it's open source.

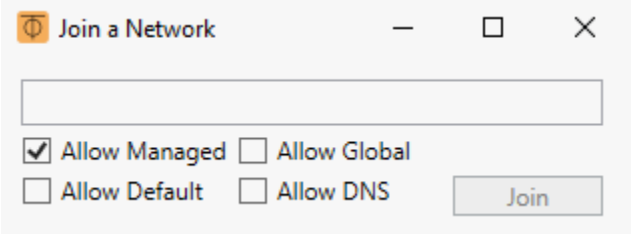
Q: How hard is Zerotier to set up?
A: For a new network, a little hard. For just a user, it's extremely easy. Zerotier now has a GUI (that you can close) to make it even easier to use.

So, onto setting it up. Download and Install Zerotier here. There shouldn't be any kind of wizard or anything to set it up so just install it.

Zerotier will be in the system tray. Just right click it and you will see something like this:

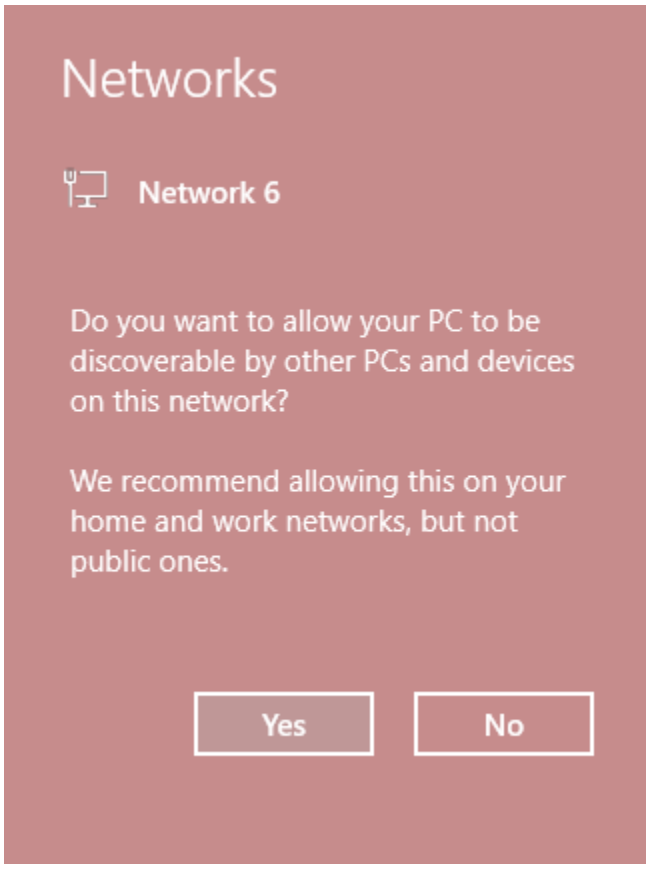


Click the Join Network button, and a window like this will pop up:



Copy paste this (9f77fc393e3f074f) into the box and press join.

A box like this will pop up on the right side of your screen. Click Yes.



You will now be connected to the Zerotier server.

Sidenote, Zerotier can also be used to allow us to host Lan servers on Minecraft without the use of an actual server, which also allows us to only render the world locally, instead of server wide. Meaning we can have every single person in the Zerotier server connect to one Minecraft world, and not have any impact on the performance.

Sidenote, Zerotier can also also be used to share files over the internet through Samba and a NAS Setup.

Disclaimer

It has come to my attention that there is a chance that Zerotier may be affecting your latency in certain games, such as Rocket League. There is no solution to this other than just turning off Zerotier. There may be a way to make it not affect your network, but I have either not figured it out or it is out of my personal skill level. I have very limited knowledge on programming and being that everything currently works, I do not want to change any settings, in fear of messing everything up. At the moment, the combination of Mumble and Zerotier is allowing us to use a low latency VoIP service that normally would be used with port forwarding, when I cannot port forward. My family and the ISP have a contract that does not allow port forwarding, so this is a massive deal that Zerotier even allows this, especially all for free. Please do not complain about this because this is the only way I can do this for free and being that I do not have a job, it massively helps.

Edit (7/3/2021): I found that the problem was getting sent too many packets through zerotier while your main wifi (ethernet does not have this problem) has either a slow connection or it drops too many packets. Do a packet loss test and set up your Jitter Buffer in the Audio Output tab.