

JAMKAZAM (HOPEFULLY) MADE SIMPLE

By Anne Tiffen Taylor, Phoenix, Arizona, retired lawyer, beginning fiddler, not an IT person and not affiliated with JamKazam or any other item, service, or product mentioned herein. This Guide was originally written to help my jamming friends so I would have more people to jam with. It consists entirely of information I have found in my research – not personal expertise. No promises or warranties of any kind are made or implied.

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Contents

I.	Introduction, Expectations, and How to Use This Guide.....	2
II.	Equipment.....	3
III.	Jamkazam App.....	5
IV.	In a Session.....	7
A.	Finding a Session.....	7
B.	Improving the App’s Performance in a Session.....	8
C.	Dealing With the Lack of Visual Cues.....	8
D.	Volume and Muting.....	9
E.	Available Metrics.....	10
F.	Sharing Lead Sheets.....	10
G.	Additional Musicians.....	10
H.	Tempo.....	11
V.	Reaching for the “Green Dot” Brass Ring.....	11
A.	Port Forwarding.....	12
1.	Tell JK What Ports to Use.....	12
2.	Assign a Static Internal IP Address to Your JK Computer.....	12
3.	Tell Your Router to Send Ports 12000 Through 12010 to the Static IP Address You Just Gave Your JK Computer.....	13
B.	“Manage.”.....	14
1.	Audio Settings > Audio Booster.....	14
2.	Audio Settings > Open ASIO Panel.....	15
3.	Audio Settings > Loopback Latency Testing.....	15
4.	Audio Settings > Configuration.....	15
5.	Audio Settings > Save All Settings.....	15
6.	Networking.....	15

C. Buffer Size and Sample Rate.	16
D. Power Plan.	17
E. Other Suggestions for Improving Performance.	19
F. Possible Need to Delete and Re-add Your Interface in JK.	20

I. **Introduction, Expectations, and How to Use This Guide.**

This JamKazam (sometimes, “JK”) Guide is limited to Windows 10; I do not know how the information here will differ for a Mac or a different version of Windows.

First, the obligatory “managing expectations” part:

- JamKazam is not as good as jamming live. It just isn’t. But, everyone I know who has tried it thinks it’s a whole lot better than the jamming we’ve been doing during this crazy time, which for most of us was none. People seem to feel (and I agree) that we’re getting back enough of the jam experience to make it fun, while we wait for the opportunity to get back together live.
- JamKazam is dodgy. Some days are simply better than others on JamKazam. Sometimes if you have a disappointing experience one day, just waiting until the next day might solve it.
- JK appears generally to work better at short distances (although I’ve jammed with folks from coast to coast, as well as abroad) and with fewer people (perhaps a max of 5 - 7, though a larger jam is known to work).
- I believe that the developers are working continuously on improvements, so whatever you find this week might be better next week and even better the next.

This Guide first discusses the equipment that you need (Section II) and installing and configuring JamKazam (Section III). If you’re not yet up and running, I recommend concentrating on Sections II and III for now, and do not worry about the remaining sections until a later time, and then only if needed.

Next, this Guide addresses what to expect in a session (Section IV), including some suggestions on quick fixes within a session to improve the app’s performance. Most of what’s in Section IV will eventually be clear as you join and participate in sessions on JamKazam, but this Guide will give you a head start and answer some questions.

Finally, this Guide addresses various steps that might increase performance and decrease latency (Section V). Section V is where to look if you’re already up and running with JamKazam and you want to try to turn as many of those dots “green” as you can. Three caveats about Section V:

- If you do decide to try some or all of the suggestions, try only one at a time so that you can evaluate the results.
- If you do decide to try some or all of the suggestions, make careful notes about exactly what you changed, including the starting value and the value you changed it to, and how you got to the part where you made the change. Consider making screen shots in addition to, or instead of, careful notes. Make sure you can retrace, and/or unwind, every step you take.
- Consider creating regular “restore points” as you work, so that you can restore a previous configuration of your computer if you run into problems.

Technical support has not been JK’s strong suit, which I assume is because they appear to be working feverishly on improvements. But, there is a Facebook group called “JamKazam Jammers” that is very helpful with advice and answering questions. Check that out. <https://www.facebook.com/groups/369491023208936/>

In addition to Facebook, JamKazam hosts a forum site: <https://forum.jamkazam.com/>

Finally, there are tons of YouTube videos that may be helpful, including this one with “Setup Tips:” <https://youtu.be/R0xKMsINU1M> I prefer written guides over video, which is why I wrote this.

As an introductory note, it’s all about latency. Latency refers to a short period of delay (usually measured in milliseconds) required for the conversion between analog and digital representations of the sound data. Computers can only process digital data, so the analog music data received must be converted to digital data, and, after processing of data, the processed data must be converted back to an analog signal before it can be output to speakers and played back. This conversion between analog and digital takes a short amount of time, which is known as latency. Latency in JamKazam comes from both the gear (“Interface Latency”) and the Internet connection (“Internet Latency”). JamKazam works best when latency of both types is minimized, and not at all if latency is too high.

II. Equipment.

The following equipment appears to be the bare minimum. Anyone who cannot meet all of the requirements in this Section II will probably not be able to use JamKazam at all.

- Computer with sufficient RAM. I do not know what the minimum RAM is. I have 8GB and it seems to work fine.
- Broadband Internet connection (not dial-up), and an Ethernet (hard-wired) connection to your computer. I have Cox, and I purchased an Ethernet to USB-C adapter (as my laptop doesn’t have an Ethernet port). JamKazam does not work properly on wi-fi.

- Sufficient download and upload speed. I have been told that the minimums for JamKazam are 100 megabytes per second (Mbps) download, and 10 Mbps upload. I am aware of people making JK work with slightly lower numbers. If you are materially lower than these numbers, try calling your ISP to make sure you are getting the speed you are paying for (it's been known to happen that there is a bad cable or similar, or for whatever reason your speed is less than it should be); and/or to see if a higher speed service is available and in your budget. You can test your speeds at one or more of the following sites:
 - Speedtest.net
 - Internethealthtest.org
 - Speed.cloudflare.com
 - Testmy.net/latency
 - DSLreports.com
- Router (most everyone has a router). I found that JamKazam worked only sporadically with my (rather ancient) Apple Airport Extreme even after port forwarding (discussed in Section V below), but when I upgraded to a Netgear Nighthawk x6 AC3200 R8000, which is a high-end gaming router, it worked well – and I didn't have to do the port forwarding described in Section V.A. Your mileage may vary, but if you are due for a router upgrade anyway, it might be wise to research which ones are known to work better with JamKazam before investing in one. If you weren't due for a router upgrade, try it with your existing router first (including the suggestions in Section V).
- Audio Interface. I bought the Presonus Audiobox 96. The Facebook “JamKazam Jammers” private Facebook group (mentioned and linked above) has an extensive list of audio interfaces that are known to work (of which this is one). I was told to get one with low latency, and also to get one with at least two inputs for versatility, and also make sure it has “phantom power” for a condenser mic. I do not know of anyone who is successfully using JamKazam without an audio interface. (Note that some articles you find, including a good article by Paul Maine, will refer to the interface as a “DAW.” I could be wrong, but I think that's improper – I think the DAW, or digital audio workstation, is the software that typically comes bundled with the interface, not the interface hardware itself. Generally, you don't need to use the software (the DAW) that came with your interface, except possibly for some tweaks discussed in Section V below.
- Microphone. I bought a Presonus condenser mic that came in a bundle with the audio interface.
- Headphones. You cannot use your computer speakers, or any other speakers, because what you hear will then feed back into your microphone and into your

session and create an echo. I believe Bluetooth slows down the app, so I would not plan on using Bluetooth headphones – use wired headphones.

Connect and test the equipment at this point to make sure it all works. Check “Sound” in “Control Panel” to make sure your interface is selected for playback and recording, and make sure the input “bars” move when you speak into your mic.

You will need to turn on “phantom power” (which may be labelled simply “48V”) on your interface IF you have a condenser mic. From what I understand, phantom power will damage other types of microphones, so check your owner’s manuals.

You may need to fiddle (see what I did there?) with the knobs on your interface to hear sound through the headphones.

III. Jamkazam App.

Download and install the app, set up an account, and send me a friend request. 😊

Adding “friends” on JamKazam makes it easier to create, and get into, sessions. When you create a session, if you want to specifically invite people, they must be on your “friends” list. When a friend starts a session, you should see it quickly when you’re looking for a session, and can usually just enter the session at will, rather than having to ask permission (depending on the jam organizer’s settings). You can also see which friends are on-line at any time and ask if they want to jam a bit. You can send messages to friends.

To add friends: Once you get into the main window, you’ll see a bunch of large red rectangles (including “Create a Session” and “Join a Session”). Move your eyes alllllll the way over to the right, where the red panels end and a teal color begins. There, there are several drop-down boxes stacked on top of one another, one of which is “friends,” and one of which is “chat,” which is important when you’re in a session, and one of which is “notifications.” At the very top of that area is a search bar for searching people’s names. Put a name in the search bar, and hit enter, and when you find the person, you can click “connect” to request them as a friend on JamKazam.

The “Notifications” drop-down box in that teal area to the right is where you can find, among other things, friend requests that have been sent to you that are awaiting acceptance. Note that, at present, JamKazam is not particularly effective at letting you know you have received a friend request. You should check your “Notifications” frequently, to make sure you are not missing requests, or messages, from friends.

You may get an error message as soon as you start the app, that your “network is changing packets port numbers which may prevent getting real-time UDP packet traffic from the Internet.” Sounds scary, eh? It’s not. We’ll come back to it in the “Port

Forwarding” section below. (It’s worth noting that I never got this error message after upgrading my router.)

Note: JamKazam has a website, JamKazam.com, where you will download the standalone app. If you sign into the website with your JK account, the screen looks a LOT like the app – but has (as far as I know) none of the functionality. Make sure you are working within the standalone JamKazam app, and not within the website. I do not know why their website mimics the appearance of the app without also having the same functionality.

So, from within the standalone app, first get JamKazam to recognize your audio gear, as follows.

Click your name in the upper right, and choose “audio gear.” Click “add new gear.” JamKazam will invite you to watch a video. I skipped it. If anyone watches it, and the information should be added to this guide, let me know! Click “next.”

The app will scan for and find your audio gear (which you may need to select from a drop-down box; I was advised to make sure you are using the specific driver for your interface (which may be an “ASIO” driver), and not a generic driver such as “WDM Windows”), and then test it for latency, I/O rate, and I/O variance. I failed one of these I/O tests, and was given the option to “turn down” the audio processing speed, so I changed it from “fast” to “moderate” and was able to proceed. Click “save.”

Next, configure voice chat – I selected the same mic that I’ll be using for music. For an acoustic instrument, you should do the same thing. “Next.”

At some point in this process is a drop-down box for specifying your instrument for each channel that you set up. This is important, because it is THIS instrument that will show to others when you’re in a jam. If you set your instrument to “banjo” in your profile, but don’t set the same instrument for the audio track channel, your instrument will show as “other” to people you’re jamming with. This may, of course, be an advantage, if you’re hoping to hide the fact that you’re a banjo player until the last possible moment.

Now the app will instruct you to turn off direct monitoring. You will need to figure out how your particular audio interface does that. On my Audiobox, the “Mixer” knob needs to be turned all the way to “playback” and away from “input.” This allows you to just hear your session once, instead of hearing an echo.

Now “play” the test sound file (you’ll see the button), and if it sounds good click “next” and then “close,” whereupon you will be invited to try a test session. I was unable to get a test session started from this button.

No matter – just set up a private session from the main (“home”) page, with a friend (I am happy to help any time), to see if by chance it will work right out of the box at this point. It often does, and it’s worth a try. You should definitely have a test session with a friend before joining any actual jam. A setup that is not quite right can crash an entire jam session for all of the participants (although it almost never happens any more). If your “test” partner can hear you speak and play your instrument, that’s half the battle. If you can hear them also, it’s working. If your test partner usually uses JK without a problem but can’t hear you, it’s probably something with your interface or microphone.

If you can’t hear your test partner, and/or if they are “greyed out” on the session panel, then we probably need to deal with those “packets” in the scary initial error message, by configuring port forwarding (Section V). From what I hear, the problem of people being greyed out is becoming more and more rare. What I’m finding now is that most of the folks who can’t get JamKazam going have not met the minimum requirements in Section I, above.

You can add a photo to your profile. Hover your mouse at upper right, select “profile” from the drop-down box, and then “change avatar” to upload a photo.

IV. In a Session.

Here are some helpful tips to find a session, and once you are in a session.

A. Finding a Session.

On the app’s home page, you can click “Create a Session” to create your own session. You can customize it with type of music, and by inviting only certain people or making it public – you will see the various options.

Important: in the same place (“Create Session”), below the options for creating a session, will be listed any current or upcoming jams to which you have been invited. This is the quickest way to join a session to which you have been invited. Finding this option under “Create Session” is, of course, completely counterintuitive, and may perhaps change in future versions. But it’s important to know for now.

If you’re wanting to see what sessions are available to just jump in and meet some people, use “Find Session.” This option will first open in the “For Me” subcategory, which will show you any ongoing sessions started by anyone on your friends list. JamKazam reports that the “For Me” subcategory refreshes automatically, but to be sure you might want to hit the “refresh” button (grey button just above all the “join” options). The next square, “Open Jams,” will list any ongoing jams that are available. JamKazam reports that this subcategory does not refresh automatically, so use the “refresh” button periodically. I

have found that if I leave JK open too long, the “refresh” button does not work, and it is necessary to close the app and come back in to find the current list of ongoing sessions.

B. Improving the App’s Performance in a Session.

If things don’t seem as smooth as you would like – too much latency, or too much static, or the sound quality isn’t as good as you’ve heard in other sessions, it frequently works to leave the session (the “leave” button is in the upper right of the main session window), and then come right back in.

If that doesn’t help, it almost always improves things to leave the session, shut down your computer, reboot your router, restart your computer, and then come back to the session. Frankly, I was doing this so often that I’ve started just doing it before I enter the session in the first place.

Everyone in the session should hit the “resync” button (the furthest button right on the row of grey buttons at the top of the main session window) from time to time. It never hurts, and it almost always helps. It recently came to my attention that, in the “Manage” menu (extreme upper left of the screen), under “Audio Settings” and then “Configuration,” is a setting to automatically re-sync periodically. I have not experimented with this yet, but I can’t see how it can hurt, and it might help.

Every once in a while the problems in a session can only be solved by scrapping the session and starting a brand new one. This does not happen very often.

Section V discusses additional steps to improve performance, some of which you can do within a session and some of which you cannot.

C. Dealing With the Lack of Visual Cues.

JamKazam offers a video option, but it is not recommended to use video except for a quick hello or to show something quickly to the others. Video adds too much latency to use all the time. If you press the “video” button (in the row of grey buttons), you will suddenly appear on screen for all your jamming buddies to see and say hello to, so it would be a good idea to be sure you are wearing clothing.

Since video is not recommended, you will be jamming solely with aural cues. What we’ve been doing to distribute breaks is have the song leader firmly and loudly speak the name into the microphone. It helps to say the name twice, just in case an interference makes the person miss their name; and if people have similar names (Anne and Van, for example), it helps to add the person’s instrument as well (“Anne fiddle” and “Van guitar”). Many people go in order down the list of participants shown on the JamKazam session page. However, fiddle requires me to be farther away from my computer, and I can’t see the small print on the JK session page, so I bought a white board desktop easel on Amazon

and I write down everyone's name and check them off as I call them for breaks. You will find what works best for you, to keep track of who has taken a break on your song.

Verbal cues seem to help: "singing now;" "final chorus;" "I've got it" to acknowledge a break; "last line tag;" and similar can help things go more smoothly.

Because aural cues are all we have, it is important to speak (and sing) from as close to the microphone as possible. Otherwise you may be difficult to hear.

The "chat" window (in the teal part to the right of the session screen) can be used to send messages to session participants during the session (and it's also where uploaded lead sheets will appear – see Section IV.F on that). It is a good idea to leave the "chat" expanded during a session, rather than the other options ("friends" or "notifications"), so that you can see if someone sends a chat to the group (or to you individually). But, as noted above, do check notifications occasionally.

D. Volume and Muting.

Next to each participant's name is a familiar "volume" or "sound" icon – this controls the volume that you hear. You should send your own volume slider down close to zero, so you can hear the others. Then, fiddle with the volume sliders for each participant in your session to get the volume(s) and mix you want. When you change a volume slider, you are only affecting what you hear, not what others hear.

There is also a grey button called "Volume" in the row of grey buttons, that controls the overall volume of what you're hearing. This can be helpful too.

There is also a "master mix" for the entire session, controlled by one person, which can change the mix that everyone hears. I'm not as familiar with this as I would like to be and will elaborate in a future version. What I've found is that whoever enters the session first controls the master mix, but the control person can be changed in the "Settings" grey button (left-most button on the row of grey buttons) (it can even be set so that anyone can control the master mixer). The control person uses the "Mixer" button on the row of grey buttons to change the mix. This can be useful for example if, for whatever reason, one participant is too soft and the volume sliders aren't sufficient to bring that person up.

There is also a mute function connected to the volume sliders, so that you can mute participants. This is very easy to click by accident. If you have used JK successfully and suddenly can't hear someone, or they can't hear you, someone may be accidentally muted, so check that. (It's also possible the person you can't hear stepped away from the computer for a moment – that happens sometimes.) You can mute yourself, for example if your dog is singing off-key (address this with the dog at the earliest possible opportunity), or if your parrot is expressing loud disapproval of the goings-on (don't even try to remonstrate with a parrot).

E. Available Metrics.

If you hover over the “dot” (whether red, yellow, or green) near your name in a session, you will see values for your various performance metrics including latency and jitter. These values, and the color of your dot, will change throughout the session.

If you hover over the “dot” by someone else’s name in your session, you will see a much larger array of data including a “total latency” that you can only see between yourself and another person. I’m not sure why you see more data for other people than yourself; I assume it’s because the data represent peer-to-peer metrics, and you obviously can’t evaluate peer-to-peer metrics for only one person. In any event, we’ve been telling each other what data we see for them and sometimes even sending each other screen shots so we can isolate suspected problems and work on them.

It seems like it would be desirable for as many dots as possible to be green, or at a minimum yellow. But, I’ve found that red dots are not the kiss of death – usually things still proceed pretty well even when the dots are turning red. The dots, and the metrics, will change constantly. Nonetheless, green dots is the goal, as discussed further in Section V.

F. Sharing Lead Sheets.

You can upload lead sheets to a session, for use by other participants. Use “file” in the grey buttons, and make sure your lead sheet is an image file or a PDF (not a Word file). Click the yellow dropdown box at the bottom of the window that opens when you click “file,” and use the middle option to upload a lead sheet from your computer. It will then appear in the “chat” window for the session – when clicked, it will open in a browser.

G. Additional Musicians.

Once in a session, you can invite additional musicians to the session with the option “invite musicians,” appearing below the heading “Other Live Tracks.” I believe that anyone can invite musicians to an ongoing session, not just the person who created the session.

Depending on how the session was set up, you may see notifications that “So-and-so has requested to join your session.” These notifications appear at the bottom of the screen and they are too small to see easily and they are there for about half a second. But, you can always get back to them by clicking the “Notifications” drop-down box in the teal section at the right of the session page. So, check “Notifications” periodically during a session, if you are interested in allowing additional musicians to join or if you just want to see who asked to join. I’m not sure how well this particular feature works, though – I’ve known of times when a musician was approved to enter a session but still couldn’t enter.

It's also possible that by the time you approve the request, the person has stopped watching for approval and moved on. This feature of JK needs work.

H. Tempo.

It seems inevitable that many songs will slow down during the course of the song, because of latency. People trying to adjust to the timing they are hearing will slow down to match a beat that is coming in a bit late, and the cumulative effect of this slows everything down. There is not much to be done about this but learn to work with it. I know that some JamKazamers think the song leader should try to forge ahead with his or her chosen tempo even when the beat lags behind, and other JamKazamers think it's better that everyone do their best to stay with the beat even if the song slows down. This debate may yet rage for a while.

V. Reaching for the “Green Dot” Brass Ring.

This Section discusses all of the suggestions I've found in my research, for reducing latency and increasing the number of green dots or (at worst) yellow dots over red dots. Some of this is stuff I have tried, and some of it is not. I believe that most, if not all, of the suggestions for reducing latency will degrade sound quality, so the trick is to find the right balance through trial and error.

I believe JamKazamers have something of an obligation to do whatever they can to bring their latency as low as possible. The success of any given session depends on the overall latency, which in turn depends on how efficient each participant has been in reducing their latency.

Note that, although I've seen suggestions that 40ms total latency is an upper limit as a practical matter, I've had many enjoyable jams with higher total latency than that. Also latency changes constantly within a session.

Because it is important, I will repeat the three caveats from the beginning of this Guide, for this Section V:

- If you do decide to try some or all of the suggestions, try only one at a time so that you can evaluate the results.
- If you do decide to try some or all of the suggestions, make careful notes about exactly what you changed, including the starting value and the value you changed it to, and how you got to the part where you made the change. Consider making screen shots in addition to, or instead of, careful notes. Make sure you can retrace, and/or unwind, every step you take.
- Consider creating regular “restore points” as you work, so that you can restore a previous configuration of your computer if you run into problems.

A. **Port Forwarding.**

You will see reference in many places to “port forwarding.” This is the process of instructing your router to send the JamKazam ports directly to your JamKazam computer so the app doesn’t waste latency scanning for available ports.

It’s worth noting that my Netgear Nighthawk router did not seem to need this – I did these steps very recently, and they did not cause any noticeable improvement in performance. So port forwarding may not be necessary. I believe that the reason it doesn’t seem necessary on my router is that my router also has a “Dynamic QoS [Quality of Service]” option, that reportedly does the same thing on an automatic basis (it directs traffic to the place of highest demand). So if your router offers “Dynamic QoS,” or similar, try that first.

Here’s how to do port forwarding, if it seems that it might help. It’s actually very easy.

Port forwarding involves three steps, the first of which takes place in JamKazam and the second and third of which take place in the configuration utility for your router: (1) telling JamKazam what ports it should use; (2) telling your router to assign a static internal IP address to your computer (which is distinct from a static external IP address, which business Internet consumers may have but residential ones don’t need); (3) telling your router to send the JamKazam specific ports to the IP address that you just assigned to your JK computer. These steps will be covered, in order:

1. **Tell JK What Ports to Use.**

In JamKazam, click “manage” in the upper left, “preferences,” check “always use the same set of UDP ports” and fill in 12000 as the first port. “Save.”

2. **Assign a Static Internal IP Address to Your JK Computer.**

Most or all routers for consumers / residential assign “dynamic” IP addresses to the devices on your system – IP addresses that will change from time to time (referred to as DHCP). In order to forward the JamKazam ports (the ones you just told JK to use), we need to tell the router that this one particular computer (where you’ll run JamKazam) should only have one fixed IP address, which does not change.

First, locate and write down your computer’s MAC (i.e., physical) address. (This is different from an Apple Macintosh computer – MAC address is a unique, permanent physical “address” that all Internet-connected devices have, consisting of 12 alpha-numeric digits in 6 pairs. The pairs may be separated by a colon or by a dash – there is no difference.) Open Control Panel; select “Network and Sharing;” select “change adapter

settings;” right-click on the Ethernet connection for your JK computer; select “status;” and select “details.” The entry for “physical address” is the MAC address of that computer.

Second, open the configuration utility for your router. Some routers will have a standalone app that you can download from the manufacturer’s website; other routers will have a web-based configuration, where you enter an IP address into the URL bar in your browser. Google “how do I configure my _____ router,” filling in the blank with the brand and model of your router, to get instructions on finding your router utility.

I’ve seen a suggestion to make sure your router is in DHCP mode – if it is in “bridge” mode, then IP addresses are being controlled by another router behind this one, perhaps a modem/router combo that your Internet cable comes into. I have not heard of this being an issue for anyone, so if you can’t determine this don’t worry about it for now.

Locate the “DHCP Range,” which is the range of IP addresses that your router uses. Raise the lowest one by about 20 (just to make sure that the static IP address you’ll be assigning your computer is not in use). My lowest was 10.0.1.2, and I changed it to 10.0.1.20. Save the change.

Next, find “DHCP reservations,” to “reserve” one IP address for the JK computer. On my router I clicked a “+” button to add a reservation. This is where you will need the MAC address that you found earlier – the router will have an option (perhaps in a dropdown box) to assign IP address “by MAC address.” Choose that, and enter the MAC address for the JK computer that you wrote down earlier.

Then, enter (for that MAC address) an IP address that is within the range you removed from the DHCP in the above step. (This is so that your router won’t assign this fixed IP address to another device in its DHCP process. If 2 devices are using the same IP address neither one can access the Internet.) I entered 10.0.1.10. Then “save” and/or “apply” your settings.

Now your JK computer has a fixed internal IP address of 10.0.1.10 (or whatever you chose). You can confirm this as follows: open Control Panel; select “Network and Sharing;” select “change adapter settings;” right-click on the Ethernet connection; select “status;” and select “details.” (Same thing we did above, to get the MAC address.) The “IPv4 address” shown should match the static IP address that you assigned in this step.

3. Tell Your Router to Send Ports 12000 Through 12010 to the Static IP Address You Just Gave Your JK Computer.

Somewhere in your configuration utility should be a “port mapping” or “port forwarding” option. In my router, it was under an “advanced” tab.

You may, again, have to click a “+” button to add a forwarding. You want to enter 12000 – 12010. (Recall that this is the range of port numbers we already told JamKazam to use exclusively.) Enter this range for both the “public” and “private” ports (or click the option to use the same range for both).

I’ve seen conflicting information on what “service” to use, but TCP/UDP combined seems to work.

You may be able to enter a description (e.g. “JamKazam”).

Then fill in your JK’s static internal IP address, that we set in step 2, for the “private IP address.”

Make sure that you save, and/or “apply,” your changes.

B. “Manage.”

The “Manage” function in the very upper left of the JamKazam app has a number of options, most of which I have not yet explored, that may help with latency. This Section V.B will discuss the ones that seem most useful.

1. Audio Settings > Audio Booster.

Audio Settings > Audio Booster brings up a window that offers options for Frame Size, Maximum Outgoing Bit Rate, and Network Packet Rate.

“Frame Size” can only be changed within a session, but the change is “sticky” (i.e., if you change it in a session, the change will stay for future sessions until it’s changed again). (You can create a solo session to look at, and/or change, this number.) Reducing the frame size down to 1 ms if possible (if it does not degrade sound quality too much) seems to improve performance – and I’ve been told that it’s best if everyone in a session is on the same frame size. I’ve been told that the “experimental” settings are for Mac computers, but they seem to work fine on my PC.

For “Maximum Outgoing Bit Rate,” the lower the bitrate, the lower the latency (at the expense of sound quality). The default value is 320, but lowering it to 128 can reduce latency and jitter. You can also try 256 if the sound quality deteriorates too much. I have seen it said that all participants should have the same maximum outgoing bit rate.

For Network Packet Rate, I have read that the lower this is, the lower the latency. I have also seen a suggestion that 100 should be set as the maximum, but I have not explored this.

I have not yet experimented with the “gain” sliders on Manage > Audio Settings > Audio Booster.

2. Audio Settings > Open ASIO Panel.

There is an option in Audio Settings called “Open ASIO panel,” which I assume is supposed to open a control panel for your interface driver, where you could change options not otherwise controlled in “Manage” (options discussed in Section V.C, below). However, for me, when I click this option I get a message that my audio device has to be “activated,” even though it is already activated. I was told that starting the DAW, or the control panel for your interface if it is separate, before going into JamKazam may solve this, but that did not work for me. It does not matter; you can, and may have to, use the DAW and/or software control panel that came with your audio interface to change the additional settings (see Section V.C below).

3. Audio Settings > Loopback Latency Testing.

This is a subject I’ve seen discussed, but do not understand yet. My project for the next version of this Guide will be to figure out loopback. If anyone understands the concept, please help me learn and understand it!

4. Audio Settings > Configuration.

This option has a number of settings I have not explored and know nothing about. I noticed that it includes “Periodic AutoResync,” which I would guess is advantageous.

5. Audio Settings > Save All Settings.

I do not know what this option does, other than what its name implies.

6. Networking.

One option under “Manage” that appears to be relatively new is “Networking,” which then gives three methods for the app to process data: Prefer JamKazam Network Path; Prefer Peer to Peer Path; and Prefer Adaptive Path Selection. I believe “Peer to Peer” is the default. I have not yet explored these.

Because they are new (I think), there is not much information out there yet. I’ve seen speculation that Peer to Peer might be better where there is lower total latency (20 ms or lower); and JamKazam might be better if the total latency is over 20 ms. I’ve also seen it suggested that all participants should be using the same network preference under this option, but that doesn’t seem logical to me. I’ve also seen it suggested that switching the network preference could act in the same manner as “jiggling the handle,” and getting things in better shape during a session. I have not explored any of these ideas.

Note that Manage > Networking > Packet Rate Configuration brings up the same window of options that “Audio Booster” brings up. I see no difference.

C. Buffer Size and Sample Rate.

Buffer size, also called “block size,” is the delay (measured in “samples”) between input and output. Lower buffer sizes can produce lower latency.

“Sample rate” (sometimes called “sampling frequency”) refers to the number of samples of audio carried per second, measured in Hz (cycles per second) or kHz. For reference, CD quality sample rate is 44.1 kHz, and DVD quality sample rate is 48 kHz. Higher sample rates can produce lower latency.

These two values work together. As I understand it, buffer size is the numerator, and sample rate is the denominator, in a fraction that represents your gear latency (buffer size / sample rate). For example:

- If your buffer size is 256 samples, and your sample rate is 44,100 times per second, then your latency will be $256/44,100$ seconds, which is 0.0058 seconds or 5.8ms.
- If you double the sample rate in this example to 96KHz, you will get $256/96,000 = 2.7$ ms latency. Basically – the buffer fills up twice as fast.
- If you leave the sample rate at 44.1 kHz, but halve the buffer size to 128, you will get latency of 2.9ms.

In either case (doubling the sample rate, or halving the buffer size) there is a greater strain on resources. Thus, because buffer size and sample rate affect CPU load, these two values may be limited by the available power of your computer (see Section V.D below for changes to your computer’s power plan).

Buffer size and sample rate, as near as I can tell, must be set with the DAW (digital audio workstation – the software that came with your interface) and/or any control panel software (which may be simpler than the DAW) that came with your interface – not in JamKazam. If there is a way to change these values within JamKazam, either I am not aware of it or it does not work for my particular setup. (It’s possible that the ASIO control panel command that does not work for me, see above, may allow changes to these values within JamKazam.)

Also, for what it is worth, my DAW apparently allows me to change only the buffer (block) size; but the simpler software “control panel” that came with my interface (theoretically) allows me to change both buffer size and sample size. But, that said, it turns out that changes to both values did not remain effective. The values revert to default in my DAW for my interface – even though, weirdly, the changes caused my interface latency to become even higher! The way I changed those values and fixed the interface latency, for my setup, was to change to the correct Power Plan (see Section V.D, below) and then follow the procedure in Section V.F below to delete, and re-add, my interface in

JamKazam. I have seen suggestions that the mysterious “loopback” concept can help with difficulty changing buffer size and sample rate – more on that in the next version!

I have read that reducing the frame size in Manage > Audio Settings > Audio Booster also automatically reduces the buffer size – specifically, that 1ms of frame size results in a buffer size of 48, and 2ms of frame size results in a buffer size of 96, but I have not confirmed this. This comment may have been specific to a particular setup and/or a particular interface.

D. Power Plan.

JamKazam says it works best with the “High Performance” power plan (Control Panel > Power Options). In fact, I got a message reminding me of this fact every time I started JamKazam, until I fixed it. (I believe that Ultimate Performance is even better, but for simplicity will just refer to “High Performance” in this Section V.D. If the Ultimate Performance Plan is available, either right away or through the below steps, use it instead of “High Performance.”)

Some computers (I think just laptops), like mine, will not have a “High Performance” power plan option (even after clicking “See more power plans”). If you open a Command Prompt, type “powercfg / list” (without the quotation marks), and hit “Enter,” you will see what power plans are available on your machine. If High Performance isn’t listed there, you might be able to add it with the below steps. If it is listed there, make sure you are using it and that the “Minimum Processor State” is set to 100 %. (I’ve seen someone suggest 75%, but I don’t know why we would not select 100 %.)

If it’s not obvious from the Power Plan features shown on your screen what your Minimum Processor State is set at, follow these steps from within “Power and Sleep Settings:”

- Additional Power Settings;
- “Change Plan Settings;”
- Edit Plan Settings;
- “Advanced Power Settings,”
- Which opens a window called “Power Options,” which should include Processor Power Management. Set Minimum Processor State to 100 %.

If you don’t have the High Performance Power Plan on your laptop, you could try left-clicking (not right) the battery icon in your laptop taskbar, and moving the slider all the way to the right (“Best Performance”). This did not decrease my gear latency number, but it did seem to decrease overall latency in my next session. It’s not the same as the High Performance power plan, but it could help a little.

Here are the suggestions I've seen to add the High Performance Plan if it's not on your machine, and the one involving the Registry entry worked for me and was very easy. Review the caveats at the beginning of this Section V before trying any of these (especially the caveat about *creating a restore point* before doing any of this).

1. Press Windows + R keys to open the Run dialog box. Type "powercfg.cpl" (without the quotation marks) and hit enter. This might put the High Performance plan back into your available power plans. It did not work for me.
2. Open a Command Prompt, and copy and paste the command below for the missing power plan you want to restore into the command prompt, and press Enter.

(Power saver)

```
powercfg -duplicatescheme a1841308-3541-4fab-bc81-  
f71556f20b4a
```

(Balanced)

```
powercfg -duplicatescheme 381b4222-f694-41f0-9685-  
ff5bb260df2e
```

(High Performance)

```
powercfg -duplicatescheme 8c5e7fda-e8bf-4a96-9a85-  
a6e23a8c635c
```

(Ultimate Performance - [Windows 10 build 17101](#) and later)

```
powercfg -duplicatescheme e9a42b02-d5df-448d-aa00-  
03f14749eb61
```

This step did not work for me.

3. Type regedit to open Registry Editor.
Go to:
"HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Power"
Double click on "CsEnabled"
Change Value data from "1" to "0"
Click OK.

This worked for me and was very easy.

4. I have also seen a suggestion for downloading a zip file containing the missing power plan(s), but fortunately I didn't need to do this, and therefore don't have much information on it.

Note that, if you do manage to install and select the High Performance Power Plan, your laptop may revert to "Balanced" at times, especially if you take it off power and use it on battery only. Check from time to time to make sure you're still in the High Performance Power Plan.

Also note: weirdly, installing and selecting the High Performance Power Plan did not change my latency data in JK at all! But ... deleting and re-configuring the interface in JamKazam did. I guess it was necessary to force either my interface, or JK, to recognize that my laptop now has the high power option. With these fixes (High Performance Power Plan and deleting, and re-adding, my interface in JK), suddenly my interface latency went from 13.9 to 4.4. See Section V.F about deleting the interface in JK.

E. Other Suggestions for Improving Performance.

As noted above, rebooting both the JK computer and the router can improve performance in a session. I often just reboot them before even trying to get into JamKazam.

I have read that turning off wi-fi may improve performance. I assume that, even though we're using an Ethernet connection, other device use in the house can put a strain on resources and affect performance. I have not tried this suggestion yet, but I'm going to. Note that if you use a web-based configuration utility to manage your router, and you turn off wi-fi, you will have to use the Ethernet-connected computer to get back into the configuration utility. There may also be a button on your router to turn off wi-fi.

I have read that turning off Bluetooth on the JK computer may improve performance, again I assume because it reduces the load on the system. I have not tried this yet.

It seems logical that if turning off wi-fi and Bluetooth can help, then also shutting down unnecessary apps on your JK computer might also improve performance. Certainly, you should turn off all active apps on your computer. I accidentally left Outlook running in one session and noticed improvement in my Internet latency when I noticed that and closed it out. I believe that turning off background apps, for example with an app like "EndItAll," may also help. I have not tried this yet, but I plan to.

Make sure you are using the best driver for your gear. On a Windows machine, this will usually be (as mentioned above) an "ASIO" driver. It should be the driver that came with (or as a download for) your specific interface, but I know of at least one person who had to search out and use an older driver for a Focusrite interface, to get better performance.

I have read that the volume control knobs on your interface (or “gain”) should be as high as they can be set without causing clipping.

F. Possible Need to Delete and Re-add Your Interface in JK.

As noted above, the change I made to my Power Plan did not improve my latency at all until I went into JK, went into my “Audio Gear,” deleted my interface, clicked “Add new gear,” and added it back in. Suddenly the buffer size was down to 16 – a change I could not make directly; with the sample rate still at 48, and this is when my interface latency dropped to 4.4.

Happy jammin’! See you on JamKazam!