Axia IP-Audio Driver Use With Ethernet Adapters

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This bulletin details the known approved Ethernet adapters for use with the Axia IP-Audio Driver and also the method of modifying the Network Interface Card settings for self-certification of a non-qualified NIC. The Axia IP-Audio Driver requires a reliable network interface card (NIC). If Ethernet receive errors and dropped packets are experienced, this will result in audio discontinuities and unwanted anomalies.   If possible, please use a network card listed in recommended table below. If using a "recommended NIC is not practical, there are instructions to help you step through the process of "tuning" a non-qualified NIC for use with Livewire. Please note that the majority of newer NIC adapters have the capabilities necessary for use with Livewire but may require some comprehensive modifications to the driver settings in order to operate correctly on a Livewire network. Avoiding older Ethernet cards and controllers will help avoid common and known performance issues. Many of these older or blacklisted NIC adapters exhibit performance issues due to the consistent high-speed traffic of a Livewire network.   Some Ethernet controllers supporting Gigabit Ethernet are less expensive than network cards using 10/100 chips. Gigabit Ethernet cards are more flexible and can be used with 10/100 networks. It is also important to check quality of your other networking equipment such as Ethernet switches and cables. Switches must be a member of the qualified family of Axia/Livewire switches, found at http://www.AxiaAudio.com/switches.   These switches must also be programmed according to the specifications, found in the configuration guides found at http://www.AxiaAudio.com/manuals. Proper configuration of an approved switch is imperative to the correct operations of a NIC card and the IP-Audio Driver for use with a Livewire network.

Currently Recommended Network Interface Cards

3Com 3C905CX-TX-M	PWLA8391GTBLK (PCI)
Intel PRO/1000 with 82541	Realtek RTL8169/8110 Family
Linksys LNE100M	SMC1244TX-1 w/ Realtek RTL8139

## Currently Non-Qualified Network Interface Cards

3Com 3C905C
Intel PRO/100 M -- Chip GD82559
Intel PRO/100 M -- Chip GD82551QM

** This list will be kept current based on reports from customers and internal testing of NIC cards. If you have feedback on a particular card, please report it to us via email at support@AxiaAudio.com
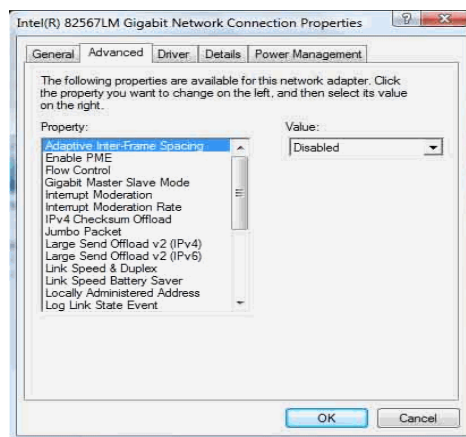
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Qualifying Your Own NIC Card For Use With Livewire

There are many different manufactures and several different drivers for each NIC card so qualifying your own for use with Livewire can be a tedious process. First, we will start with a NIC that has come with a machine you purchased and you would like to check for correct operations with Livewire. Once the IP-Audio Driver has been loaded on the machine, licensed correctly, it is connected to a qualified Livewire switch (as noted above), and the switch is properly configured per our configuration documentation (also noted above), then you will navigate to the statistics page of the IP-Audio Driver through the Control Panel configuration page, as seen below:
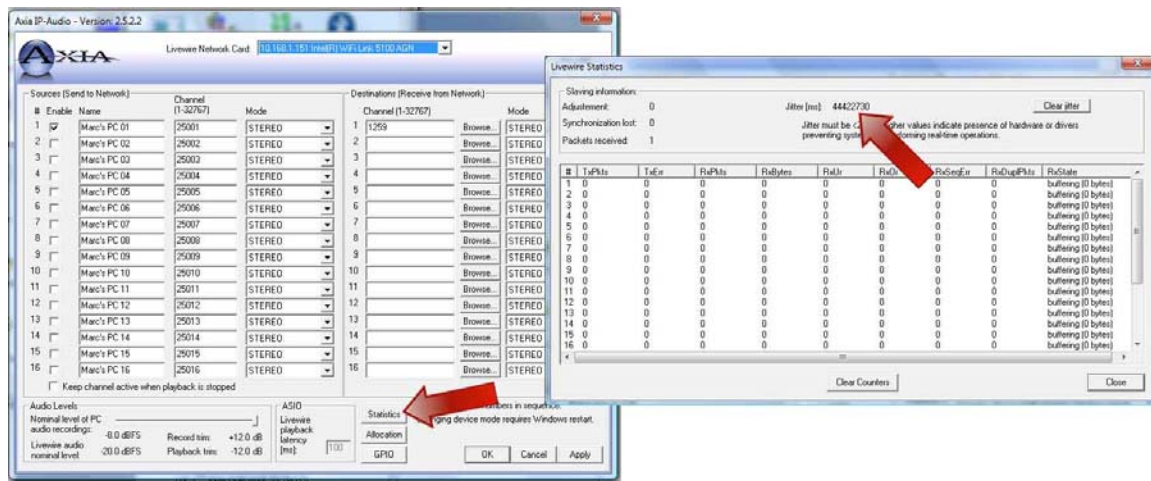
On this page, you will see a jitter amount measured in milliseconds. Jitter is the variation in the time between packets arriving/departing which is something that obviously needs to be minimized in a Livewire audio network. Jitter can be caused by network congestion, timing drift, route changes, or hardware/software compatibility issues within the machine. Any jitter amount greater than 30ms is unacceptable within a Livewire system and is the first indication that there is a problem. If your machine keeps the jitter level below this threshold, then proceed to testing the automation system or playback program. Monitor this jitter level during the execution of all the machine's software programs (IE: virus detection s/w, software firewall, automation audio transfer, etc). Monitor the jitter amount during anything that would be considered "normal" operations of the machine. Also check the error count in the table below the jitter level. Ideally you would like to see no errors but adding a machine into a network or making a change elsewhere on the network can result in a limited number of errors. As long as you do not see exponential growth in the errors in this table and the jitter value remains below the 30ms threshold, this NIC card should be good for use with Livewire. Once tested, please report this as a known working NIC card so it can be shared with other Livewire users. Email us at support@AxiaAudio.com with the details of your NIC and driver.

If you find yourself with a jitter level greater than 30ms, then we need to embark on a process of "tuning your NIC" for use with Livewire. Please note that not all NIC cards are able to be successfully "tuned" for use with Livewire. The procedures noted below are suggestions and will vary by card, software, and specific hardware. The tuning procedure will involve settings in the NIC card driver itself. Start by disabling most everything in the NIC driver. The goal is to "dumb down" the NIC so it simply sends and receives data without any logic or advanced control. Your specific card will have different options depending on the model NIC and the drivers used, as seen here:

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Settings such as flow control, checksum, jumbo packet control, transmit and receive buffers, specific priorities, and wait for link should all be disabled. Setting the link speed to: Full/100Mbps Duplex is a good idea as well. We have seen some NIC cards throw errors when the Wake On settings were enabled too - this was very interesting because the unit or the NIC was never idle during testing because an automation system was constantly sending audio. There is not an exact science when it comes to certifying your own NIC card so it will require some trial and error.

Many times, video card driver can cause some issues with Livewire being successfully interfaced to a machine. A USB dongle for an automation system has been found to cause problems because of the "check" process to be sure the USB dongle was still attached caused heavy CPU

utilization resulting in high packet loss and jitter. The possibilities can be great as far as what causes the problem, a latency tool from THESYCON has been found to be most helpful in the diagnostics of this nature. You can download the application here: http://www.thesycon.de/dpclat/dpclat.exe and once installed, you can try executing different programs to see which is causing latency (or jitter) in the machine enough to create errors for the IP-Audio Driver. Anything in the red or above 2000μs can cause troubles with jitter. Again, this program is great for self diagnostics on which software or hardware interface could be causing the problems.

It is also imperative to be sure any Destinations or Sources recorded from the network within the IP-Audio Driver are Standard Stereo Streams. The different between Standard Stereo and Livestreams are the size and speed of the packets. Livestreams use small and fast packets, while Standard Streams have bigger and slower packets. Livestreams require dedicated hardware and achieve the required very low delay for microphone-to-headphone paths. PCs are not able to handle these small packets flying by so quickly, therefore they use the Standard Streams. Off-the-shelf PC hardware with a special operating system and software optimized for real time audio are able to handle the fast streams. We use this approach for our studio mixing, processing engine, and dedicated Node hardware. Be sure that all recorded streams are set to Standard Stereo, as seen below:

These are the fine tuning methods for using NIC cards with Livewire. Please update us via email at support@AxiaAudio.com if you find any cards that can be placed on our approved list.

If you have any further questions, please contact Axia Support by email at support@AxiaAudio.com, call our main office at +1 (216) 241-7225, or our 24/7 support hotline at +1 (216) 622-0247

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