



Axia Livewire Channel Numbering

A fast guide to IP address and Channel Number planning

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Introduction

An Axia node is an I/O device that provides an audio gateway into to the IP world of audio routing. Whether it's an Analog node, AES/EBU node, Microphone node or a PowerStation console engine, incoming audio is converted to 48Khz - 24bit audio data which is then delivered to a multicast group. A unique Multicast address is created for each stream based on the Livewire Channel Number that is entered into the Sources page of a node or PowerStation. This document will explain how Multicast addresses are generated and how to calculate them, how to design a logical plan for device IP addresses, and a corresponding plan for Channel Numbers.

How Livewire Numbering Works

A Livewire network utilizes Multicast IP addresses for incoming audio streams (called Sources), in the range between 239.192.0.1 and 239.192.127.255. Each time the last octet of the multicast IP address is filled, the address numbers "roll over", incrementing the 3rd octet group by one, and starting to fill the 4th group again, starting with "0".

This sounds harder to comprehend than it really is. Here's an example: if the Channel Number "1" is entered for a Livewire audio stream, the multicast address will equal 239.192.0.1 (this is the address that the 48KHz-24bit stream goes occupies in the Livewire network).

- If the number 100 is entered, the multicast address will equal 239.192.0.100
- If the number 256 is entered, the multicast address will equal 239.192.1.0
- If the number 1101 is entered, the multicast address will equal 239.192.4.77
- And so on.

Typically, you do not need to concern yourself with these Multicast address numbers. All you need to know is the number that is entered into the Channel field. As long as each channel field is given a unique number, you will not have duplicate multicast streams.

So the question that arises is: how does one best maintain the system to insure that no device will create a duplication of Multicast data?

Planning logical IP Addresses

In the days of analog facilities, a well-built plant would have each cable numbered. The number of cables was astronomical. Recommended best practice of the time was to create a “wire book.” This book contained a list of each wire, its number, and what was connected to each end of the wire. The amount of information could be very extensive, depending on how complicated the wire job was.

The same practice could be applied to documenting the Axia Livewire domain, and the end result would be, again, a massive book that one would need to refer to any time they wished to make a change or find something. I personally believe this is a poor practice; better options are available when working with Livewire.

Each device connected to the network requires an IP address. Depending on the Class of network, the amount of available network devices can vary. For simplicity, I will discuss a class-C network. A plain-vanilla Class-C provides 254 unique addresses; usually plenty. If we imagine a facility with 6 physical studios, we can divide the available quantity of unique addresses into 6 or more groups. There is also plenty of room to divide them into logical, easy to remember groups.

For example,

- Studio 1 is given IP addresses X.Y.Z.110 - X.Y.Z.119
- Studio 2 is given IP addresses X.Y.Z.120 - 129
- Studio 3 is given ip addresses X.Y.Z.130 - 139

You can see that the last octet of the IP address will define its location. 110-119 = Studio 1 and 160-169 = Studio 6. This equates to 10 devices per studio. You can see that providing a unique IP address to every device in your network is fairly easy when following this method.

Planning logical Channel Numbers

Next, we need to address Livewire Channel numbers. Remember, each Livewire audio source needs to be given a unique “identifier” (Livewire Channel Number). Livewire Channel Numbers can be anything from the number 1 to the number 32767. So how should one organize this? With the methods of “wire books” or by use of a logical numbering method? I’ve shown how one might design an easy IP address numbering plan — so why can’t we play off that same design for channel numbering?



Example:

STUDIO 1

- St1_Analog-Node = X.Y.Z.111
- Input.1 = 11101
- Input.2 = 11102
- Input.3 = 11103
- ...
- Input.8 = 11108

As you can see, the first three numbers of the Channel have a relation to the last octet of the IP address of the device. If we consider the possibility that we would never introduce two devices with the same IP address, we could conclude that no Livewire Channel numbers would be the same.

- Device A (X.Y.Z.121) Ch#12101-12108
- Device B (X.Y.Z.122) Ch#12201-12208

Conclusion

Random numbering of Sources provides almost no protection against duplicate Multicast data streams.

Creating a flat, sequential numbering plan leads to the need of a “wire book” and the perpetual need to reference to that book to determine which numbers have been used and which haven’t.

Creating a logical number plan, which references Channels to previously established device IP Address numbers can virtually eliminate the possibility of duplicate numbers, and also leads to a better-organized system that can easily be maintained.

Questions? Feel free to ask Axia Support, by phone at +1-216-241-7225, or by email at Support@AxiaAudio.com.