

NUAGE

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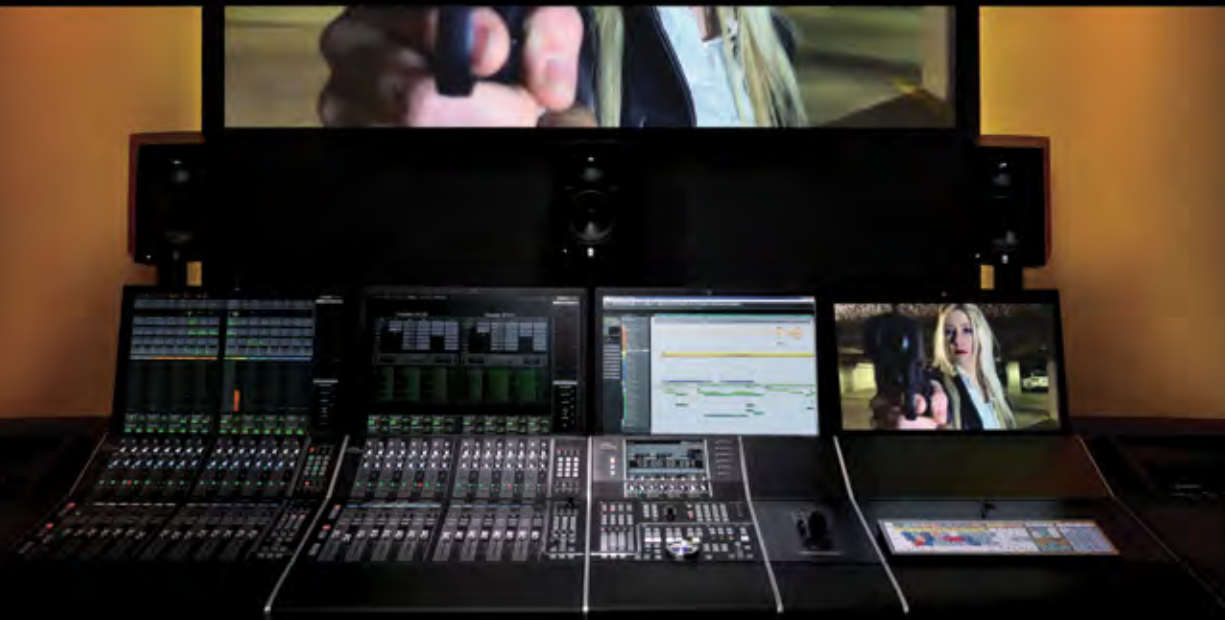
POST PRODUCTION AND MUSIC RECORDING WITH NUENDO AND CUBASE

by Ashley Shepherd



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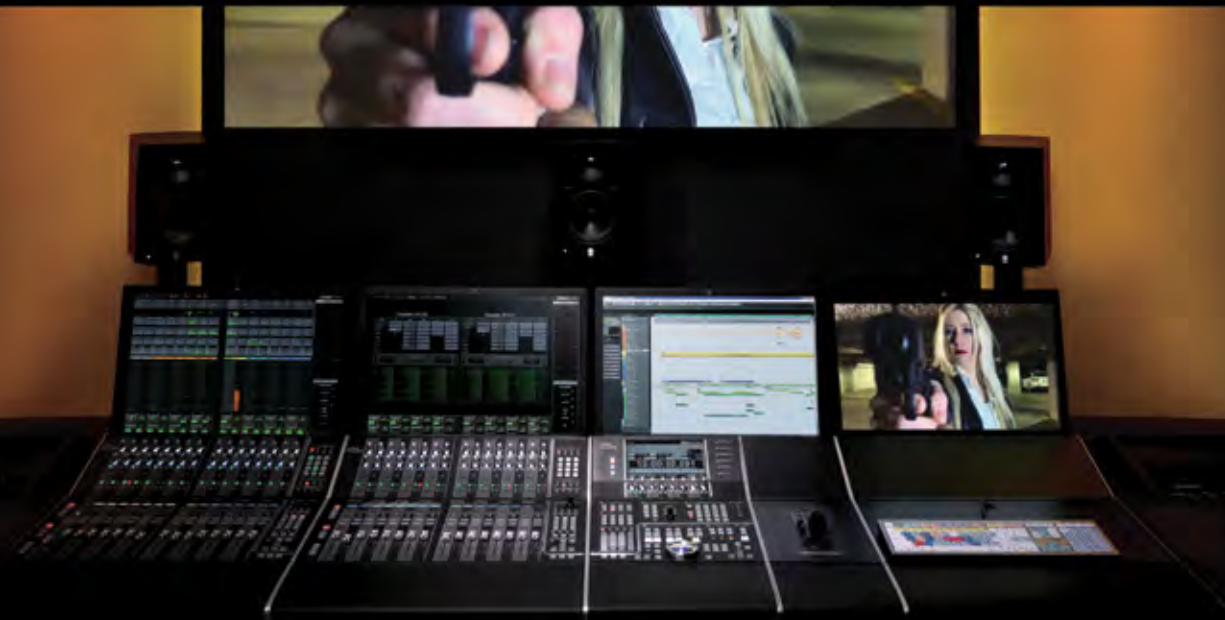
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Introduction



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Introduction

- ❖ The System
- ❖ Audio Hardware
- ❖ Dante (by Audinate)
- ❖ Yamaha Nuage
- ❖ The Course

Audio production has come a long way since its inception in the early 20th century. With the advent of digital audio recording and cheap computer processing, the possibilities have become virtually unlimited today. However, all of these possibilities can only be achieved through the interactions of the audio engineer and the sounds themselves. That's where the computer comes in. Now that we have digital audio workstations such as Nuendo and Cubase, the audio engineer is given all the tools necessary to manipulate sound in endless ways.

The interface between the sound itself and the audio engineer is made up of three parts: the DAW software, audio interfaces, and hardware controls. This composite interface is critical because it allows the creative decisions made by the engineer to be applied to sound in the digital medium. Mastering this interface is the skill set needed to be a successful audio production engineer today.

Nuage Courseware is designed to give you the skills necessary to apply your creative decisions in audio production using the software tools from Steinberg and audio hardware and tactile controllers from Yamaha. Yamaha Nuage Integrated Audio Production System is the most advanced hardware and software solution available today for audio post-production for video, sound for gaming, and music production.



Figure IN.1
Edison wax
cylinder phono-
graph c. 1899

The System

The Nuage system can be broken down into three areas: audio software, tactile control, and audio hardware (AD/DA conversion).

Audio Software

The DAW

At the core of audio software in any audio production system is the DAW (Digital Audio Workstation). For our purposes, this will consist of either Nuendo or Cubase software. The DAW software is the engine that allows editing, recording, and mixing of all the audio in any production. This is the single most complex piece of software you will use. However, there are other pieces of software that will be involved in the process.

Plug-ins

Plug-ins are modular pieces of software that work within the DAW software and process audio in various ways. Plug-ins can be from other software manufactures such as Universal Audio (UAD), Waves, or SoundToys. The great benefit of this is that you may use any tool necessary to achieve the sonic results you desire. Both Nuendo and Cubase come with built-in plug-ins such as the ModMachine delay shown in Figure 3, that are very effective and provide great results for most situations. However, the ability to choose a third-party plug-in adds flexibility to the system.



Figure IN.2 Nuendo and Cubase DAWs



Figure IN.3
ModMachine
delay plug-in

Video

When working with audio for video post-production or sound for gaming, it is necessary to synchronize audio and video. We have to be able to see the video in order to create appropriate sounds to go along with it.

Both Nuendo and Cubase provide a software video engine that allows for video files to be played in sync with audio. The video engine relies on the video capabilities of the host computer in which Nuendo or Cubase is installed. You will need to become familiar with various types of video files and formats in order to work with them inside Nuendo and Cubase.

Synchronization

It can be necessary to synchronize one DAW with another system either for video or more audio. There are various methods to do this, some using software only and others that require hardware devices such as Steinberg's SyncStation, shown in Figure 4, to interface with other systems outside the DAW.



Figure IN.4 Steinberg SyncStation

Tactile Control

In order to control all of the software, there needs to be some sort of physical interface between the human and the software. We have to use our hands, eyes, and of course our ears to control the software and then hear the results.

This is such a crucial aspect of the system because it is where the creative decisions are translated into actual commands to the software. Any delay, confusion, or misinterpretation of your intentions as a result of bad interface design will result in perhaps a less-than-perfect audio output.

In order to minimize these problems, great care has been taken to design the graphical user interface of the software, the tactile controllers for Nuage, and even the language of instructions given here and in the manuals.

Keyboard and Mouse

In its most basic form, tactile control is the combination of the keyboard and mouse of your computer such as the ones shown in Figure 5. With just a keyboard and a mouse you can control every aspect of the DAW, the plug-ins, and synchronized video. There are definite limitations to this basic tactile interface.

The first and foremost limitation is that you can only do one thing at a time with a mouse: point and click. Your hands, however, are capable of controlling several different things at once. And your brain, of course, can think about many different things at once. With the mouse, you can only click on one thing at a time.

The next limitation is the keyboard. An ASCII keyboard is designed primarily for typing words, not controlling DAW software. We have come up with solutions such as key commands and modifier keys to overcome this limitation, but the realities remain the same. The keyboard is designed for typing.

Finally, there are only buttons on the keyboard and the sliding action of the mouse. Our hands are capable of operating other types of mechanical devices such as knobs and faders.

There is a reason for having faders on a mixing console. Faders are very intuitive for adjusting the levels of audio signals. Also, knobs are the logical choice for adjusting everything from plug-in parameters to transport controls.

The mouse is capable of mimicking all of these types of mechanical devices, but only in a limited fashion. There comes a point where using dedicated hardware controls will seriously increase the efficiency and efficacy of your work.



Figure IN.5
Standard key-
board and
mouse

Control Surfaces

The idea behind a dedicated control surface is the creation of mechanical devices that are ideally suited for the purpose of controlling various parameters. The Nuage Master and Fader units shown in Figure 6 have been designed from the ground up to provide tactile controls for Nuendo and Cubase in a tightly integrated system.

When you operate the DAW software using one of these tactile controllers, there is no delay between your action and the result in the software. Furthermore, you may operate multiple parameters at the same time and get instant feedback and results from your actions. This helps promote the creative process, allowing you to conceive, execute, and evaluate creative decisions much more quickly than when using just a keyboard and mouse.

The Nuage controllers each have a constellation of faders, knobs, buttons, and the control wheel to give you access to every feature within the software. Bringing the features out of the key command and menu system and into your hands right in front of you has an amazing effect on the operator.



Fig IN.6 Nuage Master and Fader units

MIDI

MIDI (Musical Instrument Digital Interface) is a technical standard that describes a protocol, digital interface, and connectors, allowing a wide variety of electronic musical instruments, computers, and other related devices to connect and communicate with one another.

While MIDI is most commonly used to transmit musical information between devices, it has been harnessed to provide tactile control of DAW software. This allows hardware devices such as MIDI keyboards, pad controllers, and even portable devices such as smartphones and tablets to control DAW software.

Through the use of Generic MIDI and the Mackie Control protocols, access is gained to parameters such as channel volume, pan, aux sends, plug-ins, and other commands within Nuendo and Cubase.

Using these tools you could call up the Quantize function in Nuendo simply by pressing the low C note on a MIDI keyboard. You could create a remote control for your DAW by using an iPhone to operate the transport controls in Cubase using the Cubase iC app.

Multi-Touch Screens

Multi-touch screens are now becoming commonplace with the advent of Windows 8 and other operating systems such as iOS, shown in Figure 7 with the iPad. They can utilize multiple points within their GUI, thus controlling multiple parameters at once. As these systems become more developed, you will be able to take advantage of multi-touch within the DAW.



Fig IN.7 iPad running TouchOSC



Fig IN.8 Windows 8 Multi-Touch screen

The ability to touch and activate more than one item simultaneously within the GUI offers unprecedented utility from the screens. However, touching graphic elements on the screen is still very different from touching real knobs, faders, and buttons on a tactile control surface. The ability to feel your way across the control surface rather than searching with your eyes across the GUI delivers a much more immediate response. That being said, multi-touch screens offer a bright future for the graphical user interface.

Audio Hardware

The third element in the system is the audio hardware itself. It is where the audio signals are converted from analog into the digital medium and vice versa. This is the critical step in the quality of sound for any digital audio system.

While the other elements of the system are designed to help the operator interface with all the controls within the DAW, the audio interfaces allow your ears to interface with the sound directly. This is, after all, the end goal of audio production: to hear the sound that we imagine in our minds.

Studio AD/DA Converters

The Nuage system can use various audio interfaces, depending on the needs of the studio and the type of recording required. There are three studio audio interface configurations called the Nuage I/O's. Each unit has 16 inputs and 16 outputs:

- ❖ 16A (16 analog inputs and 16 analog outputs)
- ❖ 16D (16 AES/EBU digital inputs and 16 AES/EBU digital outputs)
- ❖ 8A8D (8 analog and 8 digital inputs and 8 analog and 8 digital outputs)
(Figure 9)



Fig IN.9 The Nuage IO 8A8D

Additional Yamaha Audio Interfaces

Other interfaces within the Yamaha product range can be used directly with Nuage. All of the R-series interfaces are controllable remotely from the Nuage hardware units, providing microphone preamps and AD and DA conversion all in one unit such as the Rio3224-D shown in Figure 10.



Fig IN.10
Rio3224-D
Stage Box

The RMio-64D shown in Figure 11 is designed to work with existing MADI interfaces (Multichannel Audio Digital Interface) for large-scale setups involving third-party equipment. It converts 64 channels at 44.1 or 48 kHz (32 channels at 96kHz and 16 channels at 192kHz) of audio on MADI to the Dante network protocol.



Fig IN.11 The RMio-64D MADI to Dante interface



Fig IN.12 AD8HR remote-controlled microphone preamp

The AD8HR shown in Figure 12 is a remote controlled, 8-channel studio microphone preamp that can be directly operated by the Nuage hardware.

Other Yamaha audio consoles, such as the QL and CL series, can interface with Nuage in more complex scenarios involving live sound, broadcast feeds, and multi-track recording all within one event, such as the Grammy Awards for example.

Dante (by Audinate)

All of these audio interfaces have one thing in common. They all use the Dante audio networking protocol to route signals between devices.

Dante is an audio networking protocol that utilizes Gigabit Ethernet to route up to 512 audio signals between various devices. The result is that you can use off-the-shelf networking hardware (with certain exceptions) to build a scalable audio network for use in the studio or in live applications. (See www.audinate.com.)

It also happens that the Nuage hardware controllers also use Gigabit Ethernet to communicate control signals between hardware units in the DAW software. This makes it extremely easy to set up an entire system using one Gigabit Ethernet switch and very little cabling to route a great number of audio channels and controller data all within one system.

Other Audio Interfaces

Both Nuendo and Cubase will operate with just about any audio interface available, including the audio on most laptop computers. This offers a great deal of flexibility when moving projects between studios, working at home or while traveling, or simply exchanging project data between various contributors.

Steinberg offers a complete line of audio interfaces suitable for Nuendo and Cubase. The only requirement is that the audio interface is ASIO compatible. In the Windows environment, this is a function of the driver software. In Mac OS X, if the audio interface is compatible with the Mac, then it will work with Nuendo and Cubase.

This opens up a world of possibilities for audio interfaces including devices from RME, Apogee, Focusrite, Universal Audio, and many more.



Fig IN.13 Third-party audio interface brands

Yamaha Nuage

Yamaha Nuage is the integration of all three parts of the system: software, control surfaces, and audio interfaces. The partnership between Steinberg and Yamaha has allowed for an incredibly tight integration of these three parts to make a whole that is greater than the sum. The workflow and output quality are the result of this integration and workflow improvements.



Fig IN.14 The complete Nuage system

The Course

This course will teach you how to produce audio for any type of multimedia using this system and its components in a fashion that affords greater creativity while also maintaining efficiency in achieving superior results. It will take you through the process of setting up a system, recording various types of projects, editing those projects into a final form and then mixing the projects in preparation for delivery in the final format.

We will use real-world examples including lab material prepared just for this course so that you will learn by doing. Of course there will be sections purely devoted to operating the software and understanding key functions, but those functions will then be used in real-world examples that put your skills to the test, and you'll finish with a final product that is tangible.

Hopefully you will find this experience rewarding and come out of it with a strong skill set that will allow you to pursue a career in audio production.

Prerequisites

This is not a basic audio course. There are some assumptions about basic audio knowledge that you'll need to succeed in this course.

Basic Audio Theory

It is assumed that you have fundamental knowledge in the following areas:

- ❖ fundamentals of sound waves, speed, and propagation
- ❖ anatomy of sound waves: amplitude, frequency, phase, polarity, etc.
- ❖ decibels: dB SPL, dB FS
- ❖ dynamic range: noise floor, operating level, headroom
- ❖ audio processing
- ❖ equalizers
- ❖ compressors
- ❖ time-based effects: delay, pitch change, reverb, etc.
- ❖ gain staging: mic level vs. line level vs. speaker level
- ❖ signal flow
- ❖ mixing, summing of signals, panning

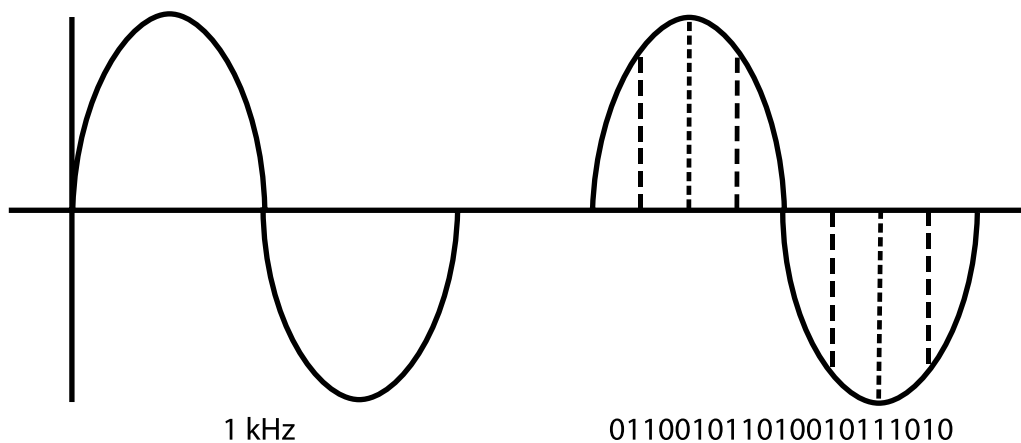


Fig IN.15 Analog versus digital

Basic Digital Audio Theory

In the area of digital audio, it is assumed that you have fundamental knowledge in the following areas:

- ❖ Nyquist theorem
- ❖ Bit depth and dynamic range
- ❖ Dithering
- ❖ 32-bit floating point vs. 24-bit fixed point audio
- ❖ Digital file formats: WAV, AIFF, MP3
- ❖ Digital level metering: peak vs RMS, K-system, LUFS

Basic Computer Knowledge

Is also required that you have a basic understanding of the computer system that you will be using for this course, whether Windows or Mac OS X operating system. You should have knowledge in the following areas:

- ❖ File system navigation: drives, paths, folders, etc.
- ❖ RAM vs HD (Hard Disk) storage
- ❖ File formats: .wav, .npr, .mpeg
- ❖ Digital video files, QuickTime
- ❖ Computer connectivity: PCIe, USB, FireWire, Thunderbolt, Ethernet, DVI, HDMI, VGA, etc.
- ❖ Software installation conventions
- ❖ Internet file downloads
- ❖ Basic Ethernet: 100baseT, Gigabit, switch, router, hub

Nuendo and Cubase

Nuendo and Cubase are very similar. The only differences that exist between the two are cosmetic differences in the GUI and additional functionality that's only found in Nuendo. Every feature in Cubase is also in Nuendo but not all features that are in Nuendo can be found in Cubase.

For example, the networking operation features found in Nuendo do not exist in Cubase. The ability to have more than one video track is a feature exclusive to Nuendo.

The audio engine and processing in Cubase are the same as in Nuendo. If you mix a project in Nuendo, you can open that project in Cubase and it will sound exactly the same so long as the same plug-ins are available on both systems. This makes it very easy to move projects back and forth between Nuendo and Cubase workstations.

For the purposes of this book and for the course, we will refer only to Nuendo throughout the text, except to note when the function under discussion is not available in Cubase. For all intents and purposes, the interface and functions are the same for both pieces of software except for those features available only in Nuendo.

A note about Nuendo and NEK (Nuendo Expansion Kit (optional)): Nuendo alone is missing some features designed primarily for music production (certain VSTi sound modules for example). In order to have those features available, the NEK package must be installed for Nuendo. Then Nuendo truly has all the features of Cubase. For this course we will also assume that the NEK package has been installed for Nuendo.

The Method

The method of teaching in this course is based around workflow. Instead of just explaining a bunch of features and functions of the software, we are going to go through the process of doing real work. This will show you how all the features and functions work together to achieve results. This course is as much about the creative process of audio production as it is about the details and specifics of the software and hardware.

Then there is the collaborative aspect of any multimedia production. When working on any type of project, whether film, video, gaming or music, you are working within a team of individuals. It is imperative that you understand how to interact with and share your work with others on the team.

The need for teamwork is most apparent when dealing with video. The video editor and the audio engineer have to work closely together to maintain proper synchronization between the visual image and the sound. This involves some technical steps when you exchange information between the video editing workstation and the audio workstation. Nuendo provides specific features that help this process run smoothly.

It is also necessary to be able to share audio material between workstations from different manufacturers. This requires an intermediate exchange format that allows both workstations to access the same project with certain limitations. Formats such as AAF and OMF are most commonly used for this purpose.

It is quite possible that you will have to work with somebody who is using a DAW that is not Nuendo or Cubase. For example, many audio engineers use Avid Pro Tools software and it is quite common to have to share material created in Pro Tools with Nuendo and vice versa. This course will take a close look at how to exchange projects between Nuendo and Pro Tools.

Lab Material

In order to learn how to produce audio you must work with real material. To that end, we will be working with lab materials created specifically for this course.

50/50 Film Production

These materials include a complete film production focused on sound design. The scenes include interior and exterior locations, dialogue, action sequences with firearms and cars, slow motion, and other surreal cinematics. Every aspect of film sound is represented in this production.

You will use all of the raw material from this production to create your own final mix for the project. This is the best way to learn how to do it. There is no substitute for the real thing.



Mathew Senatore

Fig IN.16 Scene from 50/50

Music Recording: Live Band

We will also cover techniques for music production. Although the primary focus of the course is audio production for video, we will have some music recording material for you to work with.

In addition, there will be music in the form of the score for *50/50*. Mixing music for cinema poses different challenges than mixing music alone. This will test your skills in both areas of music production.

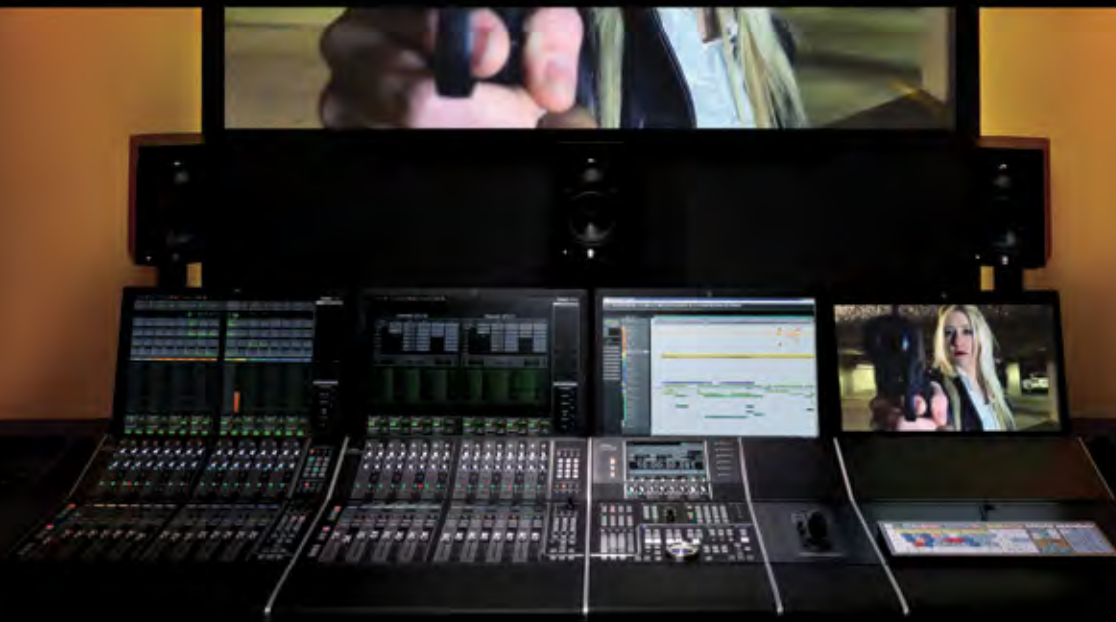


Fig IN.17
Drums in the studio

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PART I: SETTING UP



by Ashley Shepherd



In the first part of this course we will cover setting up a Nuendo system starting with the computer itself and all the hardware of a Nuage system. Then we will move into the configuration of Nuendo's features and preferences. We will also set up a laptop system that has virtually no hardware and that can be used with headphones as an alternative to the full Nuage system.

Nuendo is the centerpiece of your studio environment. We will take a close look at how to connect the Nuage system to all of the other gear in your studio from MIDI controllers and keyboards to microphone preamps and studio monitors.

Next, we will examine the file structure of a Nuendo Project and how Nuendo organizes the various files it creates and uses. This will help you keep all of the critical data safe, organized and backed up.

We will then take a tour of the Nuendo GUI, learning its basic layout and the various windows used in Nuendo. Then we will look at the extended layout with additional windows that delve deeper into the software.

Finally, we will cover techniques for navigating the channels and timeline of the project. The ability to move about freely and quickly in a Nuendo project is critical. This is what you need to learn first before we can move on to actually recording audio.

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PART I: SETTING UP

by Ashley Shepherd

Chapter 1 Planning



NUAGE

Planning

- ❖ Questions
- ❖ Computer Choices
- ❖ Audio Interface
- ❖ Speaker Systems and Monitoring
- ❖ Multiple Workstations

In order to properly set up your system, it is a good idea to sit down and plan everything ahead of time. Knowing what type of audio production you will be involved with, the hardware that's available to you, what type of monitoring situation you will be in, and other possible uses for the workstation are all necessary to properly set up a system.

Questions

First, consider a few questions about what type of audio production you intend to do. Of course Nuendo can be reconfigured later if your needs change, but it helps to outline your intended uses before moving ahead with installation and configuration.

- ❖ **Are you producing music or mostly sound design?** Nuendo has extra options specifically for music production contained in the NEK package that might not be necessary for sound design or dialog work alone.
- ❖ **How many speakers will you monitor through?** Will you primarily mix in 5.1 surround or in traditional stereo? It could be both. It is also possible to have multiple sets of monitor speakers, including headphones, all controlled by Nuendo.
- ❖ **What type of audio interface will you be using?** It could be as simple as the built-in audio of your laptop or a Dante Accelerator card with 128 ins and 128 outs!
- ❖ **Will you be recording MIDI from a keyboard controller?** This includes drum programming with a pad controller or drum triggers.
- ❖ **Will you be using some type of control surface?** This could be in the form of a simple MIDI controller, the Steinberg CC-121, an iPhone, or a complete Nuage controller system with three Fader units and one Master unit.
- ❖ **Will you be working to picture and require video playback?** Nuendo supports the use of Apple QuickTime video inside the program. This can be displayed onscreen or through special video playback hardware such as the Blackmagic Design video cards. External video playback systems may also be used with synchronization.

- ❖ **Will you be synchronizing with other audio and video systems?** You might need to lock to a house sync generator or even integrate Nuendo within a large dubbing theater with other DAWs, consoles, recorders, and video systems. This could require Steinberg's SyncStation to ensure sample-accurate synchronization.
- ❖ **Will you be using any DSP hardware to augment the computer's processing power?** UAD, TC PowerCore, and SSL Duende are just some examples of DSP processing hardware that increases the processing power of your system beyond the host CPU's capacity.
- ❖ **Will you be using an analog console or summing device for mix-down?** Many music mixers use some form of analog summing during mix-down, creating a hybrid mixing environment where the best of both analog and digital can be achieved.
- ❖ **Will you be using outboard gear for processing?** Vintage analog outboard gear never goes out of style. Plus, there are new digital outboard pieces such as the Bricasti and Cedar processors that offer the latest algorithms. Nuendo allows you to seamlessly integrate your existing compressors, EQs, and other analog and digital outboard gear into the Nuendo mixer.
- ❖ **Will you be collaborating with one or more other users on the same project?** Nuendo allows you to collaborate with other users on a single project using network connections between workstations.

Computer Choices

Once you have answers to these questions, you can determine what type of computer is most appropriate for your uses. For many, this choice may already be made, but if you have the opportunity to choose the computer you will use for Nuendo, factor your needs carefully into this decision.

Nuendo is a cross-platform application. It functions identically on both Windows and Mac OS X operating systems. So the choice of operating system is more of a personal preference or perhaps dictated by the hardware that is available.

Laptops

Obviously laptops are most appropriate for mobile work such as location recording or for those users who travel often and need a system that can travel with them. Modern laptops are very powerful and can do an amazing amount of work in a small package.

For example, I used an aging MacBook to record on location for an MTV reality show, capturing 16 channels at 48 kHz for two hours straight directly to the internal drive. This is not for the faint of heart, but I had no complications and I was even jam-synchronized to their time-of-day SMPTE timecode while running house sound out of the interface's mixer at the same time.

Editorial tasks such as dialog editing are easily handled by a laptop computer. Even large complex projects can be "off-lined" to a laptop for basic editing and then brought back to the main system for final mixing. Many EDM (Electronic Dance Music) productions are handled entirely within a laptop. They become more powerful every day.

PLUG-INS ACROSS SYSTEMS

If a project created on a system with special plug-ins is taken to a laptop (or other system) that does not have the same plug-ins or necessary DSP hardware, Nuendo will disable these plug-ins but still retain their settings so that when the project is opened on the original system, those plug-ins will load and operate just as they did before. This allows you to migrate projects across multiple systems without losing any valuable data or settings.

The primary limitation with laptops is the use of large-scale audio interfaces. While USB and Firewire offer a decent choice of I/O options for laptops, professional-level interfaces offering over 24 channels of I/O at high sample rates usually require PCIe cards to move that amount of data. With the advent of Thunderbolt-enabled interfaces, the same level of performance can be achieved on a laptop.

However, with Nuage and Dante, a laptop with Gigabit Ethernet can use the DVS (Dante Virtual Soundcard) to create 64 inputs and 64 outputs over one Cat 5e connection. This does require external Dante interfaces to be used.

The internal hard drives on most laptops are designed for energy conservation rather than streaming data performance. This trade-off suggests that for laptop recording, it is advisable to use an external hard drive with its own power supply and a drive that spins at least 7200 rpm. As the saying goes, “Your mileage may vary,” and internal drives are capable of some amount of recording if necessary.

Desktop Computers

Desktop computers offer a greater amount of processing power and disk capacity than laptops. For many users, a modern desktop is sufficient for just about all tasks in audio production. With modern processors having multiple cores and high-capacity SATA hard drives providing huge amounts of high-speed storage, the modern desktop computer has plenty of power to run Nuendo even in the most demanding situations, such as a feature film mix, which can contain hundreds of audio tracks.

High Performance Graphics Cards

Since so much of our audio work is now handled visually, the GUI (graphic user interface) of Nuendo can get quite large if desired. The dedicated graphics processors in desktop computers handle these needs better than their laptop counterparts. It is quite common to see two or more monitors (computer screens) being used to display all the GUI elements of Nuendo. This can really help speed up workflow as you do not need to search through a bunch of stacked up windows to find what you need.

A typical setup might have the project window (the basic multi-track edit screen in Nuendo) on one monitor, with the mixer and transport controls on another. For Nuage, each Fader unit requires its own dedicated 24-inch monitor to display the channel strip information above each hardware fader. On a full-sized system, you will have a minimum of four monitors (one for each Fader unit, plus another above the Master unit).

An additional monitor could be dedicated to video playback when working to picture. This can be connected to a large flat screen TV in the front of the studio or a projection system for even larger images.

We are now up to five monitors for one computer! Only a high-performance graphics card can handle these demands without putting undue strain on the host processor. Yamaha has recommended video cards that are tested with the system. These and other recommendations can be found at: http://www.yamahaproaudio.com/global/en/products/daw_systems/nuage/lineup.jsp.

Connectivity

Desktop computers offer more choices for connectivity to other devices, including PCIe cards, Thunderbolt, USB 3.0 and FireWire. Having more choices allows the use of the optimum connection for the activity you are doing most. For high-demand activities such as orchestral recording and film mixing, PCIe audio interfaces will offer better performance than USB 3.0 interfaces. Having the choice is easier with desktop computers.

Ever-Changing Technology

Computer technology changes every day, so the choices you have for computers will also change. When configuring a system, it is wise to keep up to date on the latest technology to ensure you take advantage of advances in computer systems.

Audio Interface

The two examples for audio interfaces that we will use in this course are the built-in audio of a standard laptop and a Dante network audio system used with Nuage. There are many other choices for audio interfaces between those two extremes. The best audio interface for your needs is determined by the type of recording you will be doing.

If you are recording many musicians simultaneously, a very high channel interface is the best choice. Conversely, if you will only record the voice with one microphone, a simple two-channel interface might be the best choice.

With Dante, you have greater flexibility regarding audio interfaces. For example, if you are recording large film scores, requiring many inputs for the orchestra, rhythm section, and additional soloists, you could use the Yamaha Rio3224-D as your Dante interface with 32 microphone preamps that you can control directly from the Nuage Fader units.

There are also 16 analog outputs that could be used to feed headphone amplifiers for the musicians. In the studio, you could have a Nuage I/O 16A for speaker monitoring in 5.1 surround plus other inputs such as the talkback microphone.

This entire system is connected by Gigabit Ethernet and Cat 5e cabling. With traditional systems, this complex setup would require a great deal of expensive cabling and hardware.



Figure 1.1
Yamaha
Rio3224-D

Speaker Systems and Monitoring

Nuendo and Cubase both feature a separate mixer designed to operate speaker and headphones systems in the studio called the Control Room Mixer. The Nuage Master and Fader units both utilize this feature. You must consider all of the various speaker systems and headphone systems you will be using in the studio. When using the Control Room features, each speaker channel will need its own audio output from your interface.

For example, if you are mixing 5.1 surround sound, you will need at least six output channels from your audio interface to feed the six speakers and a 5.1 speaker system. If you are using multiple surround sound speaker systems you will need additional audio outputs to feed those speaker channels.

Additionally, each headphone amplifier requires two channels to output channels from your audio interface. When you total it all up, quite a few output channels might be necessary for a complex studio monitoring system.

- ❖ 5.1 main speaker system = 6 channels
- ❖ 5.1 auxiliary speakers = 6 channels
- ❖ Stereo speakers = 2 channel
- ❖ Engineer headphone amplifier = 2 channels
- ❖ Studio headphone amplifier = 2 channels

In this example, we will need 18 output channels to configure the Control Room in Nuendo.

Multiple Workstations

Nuage can control more than one DAW. In fact, the hardware units can control three different workstations on separate computers. The first workstation must be either Nuendo or Cubase. The second and third workstations can be either Nuendo, Cubase, or Avid Pro Tools. Complex studio configurations with multiple workstations can easily be configured together to work with Nuage as one system, total integration.



Figure 1.2 Multiple Workstation Control of Nuendo, Cubase, and Pro Tools

These workstations must be connected over the same Gigabit Ethernet network as the Nuage hardware. The displays from each workstation can be routed to the monitors above each Nuage hardware unit and switched using a set of KVM switchers that are controlled by Nuage. Yamaha recommends the Gefen brand of KVM switchers that offer RS-232 control as shown in Figure 1.3.

The KVM switch will direct the mouse and keyboard to each workstation while also connecting the displays to the monitors above each Nuage hardware unit. Switching between workstations is as simple as pressing one button.



Figure 1.3 Gefen 4x1 DVI KVM DL

You will need one KVM switch to handle the main monitor, keyboard, and mouse plus one video switcher (Gefen 4x1 DVI DL) for each Fader unit in the Nuage system. These will be connected to the Nuage hardware units with RS-232 cabling in order for the switching to be controlled by Nuage.

Now that the planning has been done, it's time to install the hardware and software for the system and configure them to be ready for the first project.

NUAGE

COURSEWARE

PART I: SETTING UP

by Ashley Shepherd

Chapter 2

Hardware Installation



NUAGE

Hardware Installation

- ❖ The Workstation Computer
- ❖ Dante Accelerator
- ❖ Gigabit Ethernet Managed Switch
- ❖ Interface ID Setting
- ❖ Connect it All Together
- ❖ Dante Secondary Port
- ❖ KVM and Monitor Switching

Here is a list of hardware that needs to be installed for the example Nuage system:

- ❖ Workstation computer
- ❖ Dante accelerator card (PCIe)
- ❖ Nuage Master unit
- ❖ Nuage Fader unit
- ❖ Gigabit Ethernet managed switch
- ❖ Nuage I/O 16A
- ❖ Rio3224-D
- ❖ KVM and video switchers

The Workstation Computer

Depending on what type of computer you're using, its installation could be fairly complex or quite simple. For a Nuage system, the main piece of equipment that is necessary is the high-performance graphics card. Ensure that this graphics card is properly installed according to the manufacturer's instructions.

Additionally, you will need to have one 24-inch monitor for each of the Nuage hardware controllers. These should be connected and operational before proceeding.

Install Hard Drives

Depending on your system configuration, you may need to install internal hard drives for audio recording, video, and sample library storage. For laptop systems, these may be external drives. Here are some guidelines for hard drives:

- ❖ Use drives with speeds of 7200 rpm or greater.
- ❖ Have separate physical drives for audio recording, video files, sample libraries and backups.
- ❖ For most applications, the SATA interface is sufficient. For huge track counts (+250) and moderate track counts at higher sample rates (+100 @ 96kHz) it might be necessary to go to a RAID array for greater disk throughput.

- ❖ Use more drives with less space per drive rather than one larger drive. One terabyte per drive is a good size. Larger drives can exhibit performance issues once they get over 50% full depending on their physical platter and head design.
- ❖ Have duplicates of each drive for backups. Hard drives are cheap. Re-doing work due to a hard drive failure without a backup is much more expensive.
- ❖ Keep a spare unused drive around for emergencies.

DISK DOCKING STATION

With several internal hard drives and then duplicates for backups, the number of hard drives one needs to deal with grows every year. One item I have found extremely handy in dealing with so many hard drives is a disk docking station. These units (one shown below) usually have one or two slots in which you can insert a SATA hard drive. They can have USB 3.0, FireWire and/or eSATA interface connections on them to use with your computer. It is possible to “hot swap” drives in and out of the bays without shutting down your computer. This also eliminates the need to temporarily install hard drives in your computer just to see what’s on them. Your costs go down since you do not need to buy an external enclosure for each drive.

Some units can also accommodate the smaller 2.5” drives used in laptops such as the one shown in Figure 2.1. For backup drives, this is a very handy tool. When used with good backup software, these docking stations can make life much easier when dealing with many different hard drives. Using the eSATA interface, any hard drive in the docking station will perform just as well as an internal drive, allowing you to record audio directly to them.



Figure 2.1
Hard drive
caddy

BACK UP YOUR SYSTEM

This point in the installation is where you have the most stability with the hardware you have installed in your system. Creating a backup here ensures you have a stable system to revert to in case of problems in the future. Most system instability problems are due to the interaction between various plug-ins and Nuendo. If a serious system stability problem occurs that cannot be solved otherwise, revert to this system backup to regain stability. You may then add plug-ins one by one to see where the problem lies.

Dante Accelerator

In order to achieve the highest audio performance from the Dante network you will need to install the Dante accelerator PCIe card into the workstation computer as shown in Figure 2.2. Once installed, you'll have access to 128 inputs and 128 outputs from the workstation to the Dante audio network.

1. Physically install the card in an available PCIe slot in the workstation. For both Windows and Mac Pro workstations, install the card into a slot that is a x4 lane or faster slot. For a Mac Pro, the Dante Accelerator must be installed in Slot 2 (right above the one for the graphic card).
2. Install the driver for the card by following the instructions from the software package.



Figure 2.2
AIC-128 Dante Accelerator PCIe card being inserted

Gigabit Ethernet Managed Switch

Dante will run over 100 base T Ethernet networks but it is preferred always to run Dante in a gigabit Ethernet environment. Any gigabit switch will work, but for larger systems, such as a big Nuage system, an “enterprise level” or “managed switch” is preferred.

Managed switches provide QoS (Quality of Service) features. There is a key setting that is part of the QoS features that will improve the performance of Dante. DSCP(DiffServ Code Point) should be set on the switch. It can be referred to as the “trust mode” of QoS or port priority.

Most managed switches are programmed by using a web interface from a computer connected to the switch. Follow the instructions for your gigabit switch in order to configure the DSCP parameters for QoS.



Figure 2.3
Linksys managed switch

Interface ID Setting

Each interface in the Dante network needs to be uniquely identified. This is achieved through the use of ID settings. On the back of each Dante interface there’s a rotary switch used to set this ID, as shown in Figure 2.4. You should set the ID numbers such that the first interface with the lowest ID number is the first interface you want to see listed in the Dante controller.

For our example there are two interfaces, the Rio3224-D and the Nuage I/O 16A. Since I want to see the Nuage I/O first, I will set its ID to 1 and then set the Rio interface to number 2. Only the interface boxes have ID numbers. The rest of the system is self-identifying.

You can have up to eight interfaces in a single Nuage workgroup for a total of 128 channels.



Figure 2.4
Rotary switch
for device ID

Connect it All Together

Now it's time to connect all the devices together. This is the simplest part. Everything is connected to the Ethernet switch. The Nuage Master and Fader units have Ethernet ports on the rear panel. The audio interfaces each have an Ethernet port. Connect each of these ports to the gigabit switch such as the one in Figure 2.5.



Figure 2.5
Connecting the
Nuage system
to a Gigabit
Switch

However, the workstation computer requires two connections to the gigabit switch, one from the Dante accelerator card and the second from the normal network connection on the computer. The second connection is what allows the control surfaces to communicate with Nuendo.

Dante Secondary Port

Each Dante device in the Nuage system has two Ethernet ports: Primary and Secondary. The primary port can be used by itself as described in the previous section. The secondary port can be used in one of two ways: in a daisy chain system or as a redundant backup system. Both configurations are best suited for live situations. They will be briefly discussed here.

Daisy Chain

Yamaha consoles and stage interfaces support a daisy chain mode. No Ethernet switch is required for this configuration and it is most useful where cable runs prevent reaching each device from a central location.

This mode uses the secondary port to carry Dante signals to the next connected device in the chain. The last device will only have the primary port connected, as shown in Figure 2.6. The network is set up automatically but each device in the chain must be set to daisy chain mode.

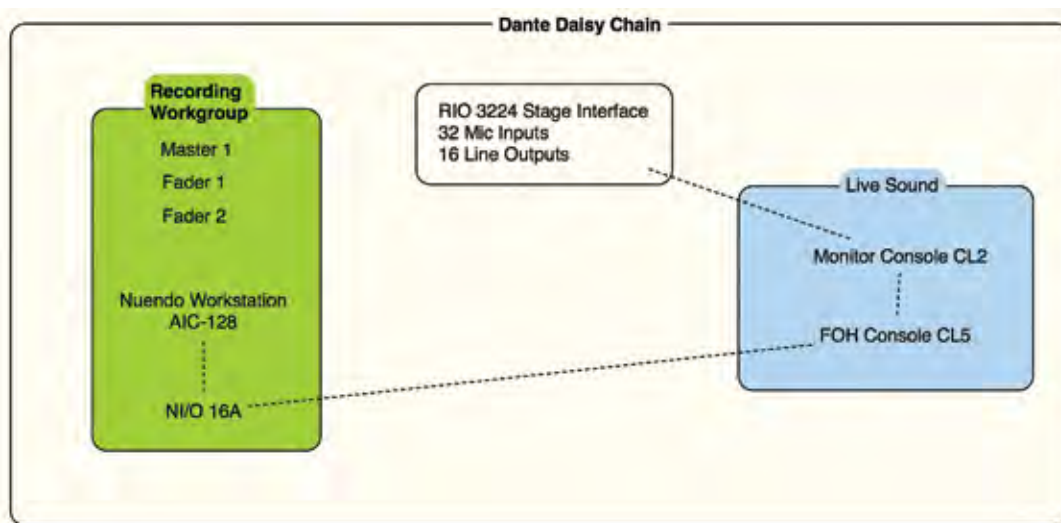


Figure 2.6
Dante daisy chain mode

AIC-128 SECONDARY PORT

Note that the secondary port on the AIC-128 cannot be used to daisy chain devices. It must be the last device in the chain.

The Nuage I/O's have DIP switches on the rear panel to switch the secondary ports between redundant and daisy chain, as seen in Figure 2.4. For normal operation using a network switch, leave this set to redundant.

Dante Redundant Network

It is possible to set up a secondary Dante network for fail-safe operation. In case of a cable or network switch failure, the secondary network will take over instantly so that no audio samples are lost. Figure 2.7 shows how a secondary network could be set up for Nuage in a live event situation.

The two Dante networks should not be connected directly. The switches need to operate completely independent of each other to ensure fail safe operation.

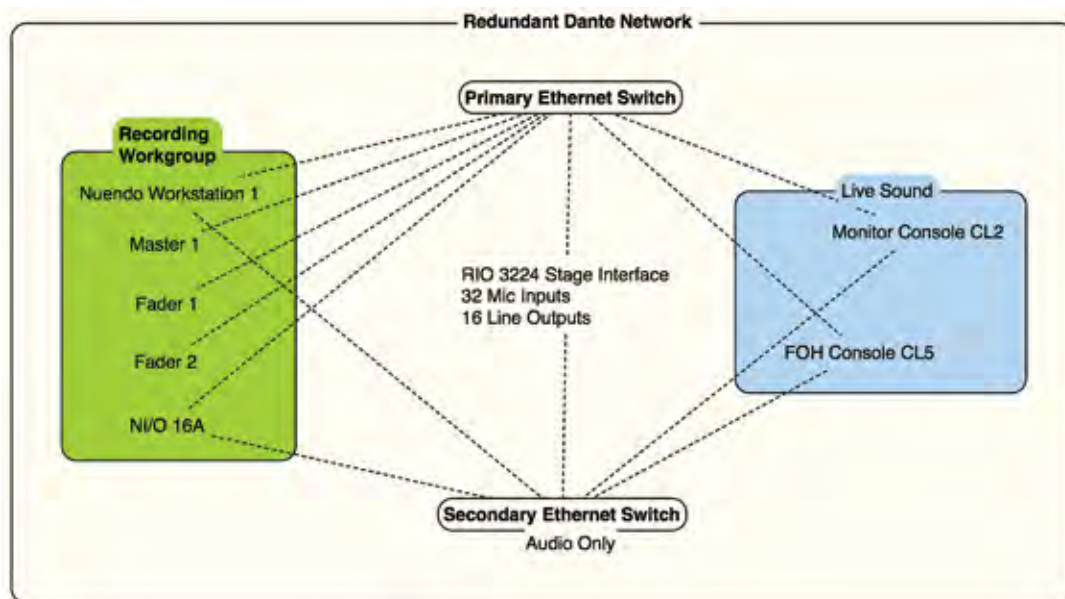


Figure 2.7
Dante redundant secondary network configuration

KVM and Monitor Switching

If you are going to use Nuage with multiple workstations, you will need to connect each workstation to the KVM and video switchers. Then the KVM and video switchers are connected to the displays above each hardware unit along with the keyboard and mouse.

Each switcher is also connected to the Nuage hardware units by a RS-232 serial cable, allowing the Nuage hardware to control the switching. Figure 2.8 shows a diagram of how this is set up.

Video Connections

- ❖ Connect the main workstation's first display output to the first input of the KVM switch.
- ❖ Connect the first display output of the secondary workstation to the second input of the KVM switch.
- ❖ The video output of the KVM switch is then connected to the main display positioned above the Nuage Master unit.
- ❖ Connect the second display output of the main workstation to the first input of the video switcher.
- ❖ Connect the second display output of the secondary workstation to the second input of the video switcher.
- ❖ Connect the output of the video switcher to the secondary display positioned above the Nuage Fader unit.

Now when both switchers change from the main workstation to the secondary, the displays will show the secondary workstation screens.

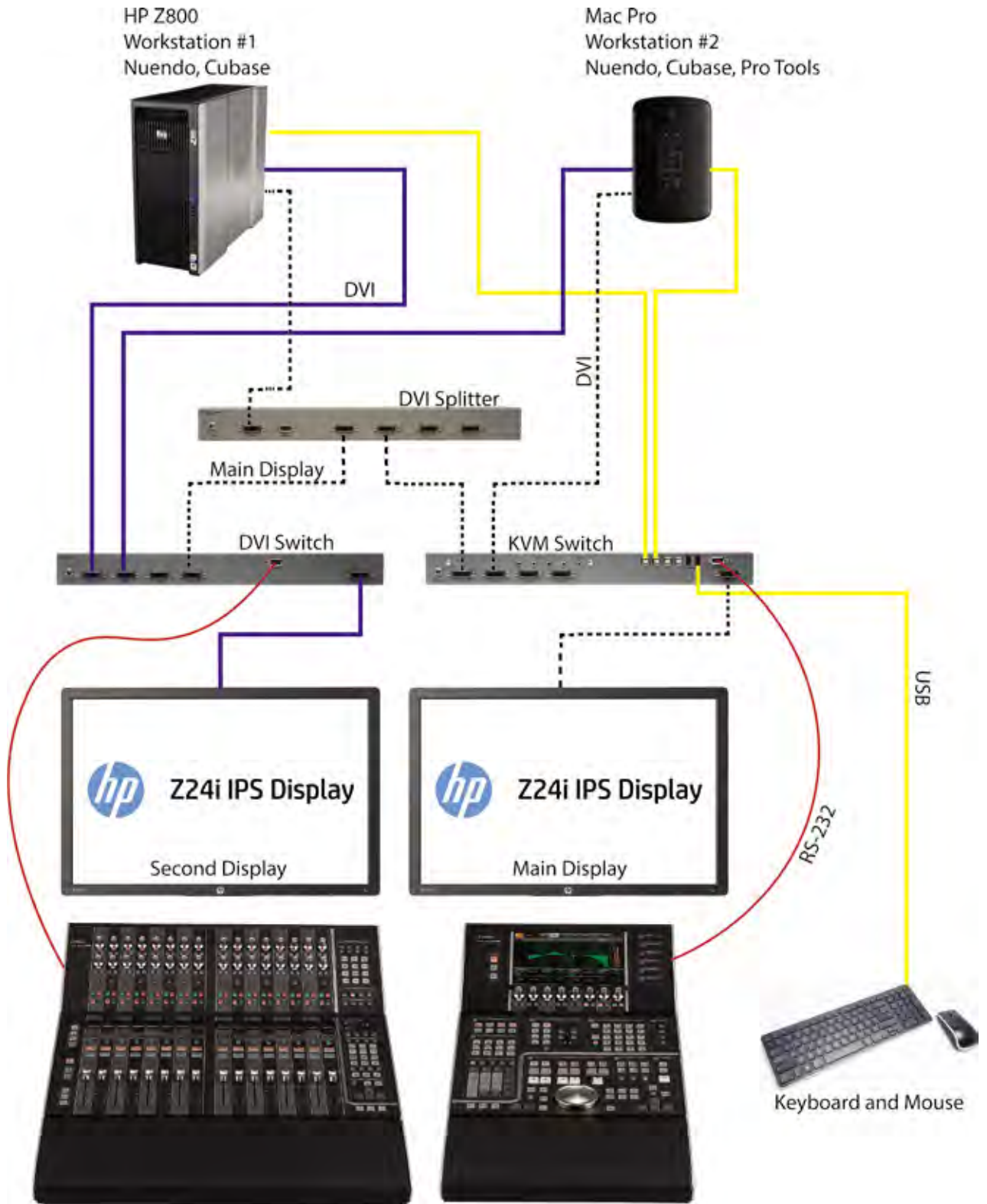


Figure 2.8 KVM and monitor switching diagram

USB Connections

- ❖ Connect the keyboard and mouse to the USB outputs of the KVM switcher.
- ❖ Connect the first USB input of the KVM to a USB port on the main workstation.
- ❖ Connect the second USB input of the KVM to a USB port on the secondary workstation.

Now when the KVM is switched to the secondary workstation, the keyboard and mouse will be directed to that computer.

RS-232 Connections

Using DB9 cabling, connect the RS-232 output of the Nuage Master unit to the RS-232 input of the KVM switch. Also connect the RS-232 output of the Nuage fader unit to the RS-232 input of the video switcher. This allows the Nuage hardware units to operate the KVM and video switchers, making workstation switching happen with the touch of a button.

Video Splitter

The use of a video splitter facilitates the display of the main screen (the one for the Master unit) on any other display monitor in the Nuage system. By splitting the main display signal and routing it to other inputs of the video switcher, the secondary display can also show the main screen. The permutations of these configurations are specific to the needs of each facility.

The Nuage Workgroup Manager is designed to manage how the KVM and video switchers are controlled. This depends on the specific configuration. For the purposes here, this will be limited to a primary and secondary workstation.

Now that all the connections have been made, its time to install and configure the software.

NUAGE

COURSEWARE

PART I: SETTING UP

by Ashley Shepherd

Chapter 3

Software Installation



NUAGE

Software Installation

- ❖ Install Nuendo (or Cubase)
- ❖ Install Tools for Nuage
- ❖ Dante Network
- ❖ Install Dante Virtual Soundcard (DVS)
- ❖ After Configuration
- ❖ Yamaha Nuage Installation Guides

The Nuage system requires several pieces of software in order to run:

- ❖ Nuendo (or Cubase) 6 or later
- ❖ Tools for Nuage (The Workgroup Manager and drivers)
- ❖ Dante Controller (for administering the Dante network)
- ❖ Dante PCIe accelerator driver (installed with the hardware)
- ❖ Apple QuickTime (for video playback)
- ❖ Dante Virtual Soundcard (for laptops and other computers on the Dante network)

Beyond that, there may be third-party plug-ins that have to be installed, virtual instruments (VSTi), DSP accelerators, MIDI interfaces, or other hardware drivers. Save these for later, after the system is up and running.

Install Nuendo (or Cubase)

To install Nuendo, simply follow the instructions that come with the installer package or DVDs. If you are installing the student version of either Nuendo or Cubase, the process is still the same. You may also need a USB-eLicensor to operate the software once installed. Please follow the instructions that came with your installer package.

32-bit and 64-bit Versions of Nuendo

You may have the choice of installing the 32-bit or 64-bit version of Nuendo. There are only some situations where the 32-bit version is necessary. The operating system, drivers, and plug-ins all need to be 64-bit in order to work together. With a new system and up-to-date software, there should be no need to work in 32-bit.



Figure 3.1 Nuendo 7 Installer Package

The 64-bit version of Nuendo is capable of addressing much more memory than the 32-bit version. This is very helpful to those who use large VSTi sample libraries. Many sample-based VSTi's pre-load portions of their sample data into memory for faster access. This eats up memory. Having 64-bit access to memory solves this problem by giving you access to a much larger amount of memory (RAM).

Also, users in the feature film post-production world can have projects in excess of 400 tracks. Add to that external control surface usage and a pile of editing and you can chew through memory fast. This type of use will also benefit from the 64-bit version of Nuendo.

32-BIT OR 64-BIT?

Understand that the 64-bit version of Nuendo does not sound or operate any differently than the 32-bit version. The only difference is in how much computer memory the application can access. The audio engine uses a 32-bit floating-point audio signal format that should not be confused with 32-bit memory addressing from Windows XP and older versions of OS X (pre-Snow Leopard).

This is also true for other audio hardware and third party plug-ins being used in conjunction with 64-bit Nuendo. The plug-ins and drivers for audio interfaces, PCI cards, and DSP accelerators must also be 64-bit even if the audio they process is 32-bit floating-point.

NEK (Nuendo Expansion Kit)

Nuendo's NEK package installs additional items that are primarily designed for music production. They include additional VSTi's, music notation features, and added MIDI features. While these are intended for music production, they may also find use in a sound design role. For example, the Padshop VSTi is very well suited to creating background ambiences using granular synthesis.

In order to have access to these advanced music production tools, you must install Nuendo and the NEK package separately. Please follow the included instructions with the install package.

Install Tools for Nuage

Tools for Nuage is the software package that installs the Workgroup Manager and drivers for the Nuage control surfaces. Follow the instructions with the latest version of the installer package. It can be found at: http://www.yamahaproaudio.com/global/en/products/daw_systems/nuage/downloads.jsp

There are three tools in the installer:

- ❖ Workgroup Manager (required on primary workstation)
- ❖ Nuage Extension (required on all workstations)
- ❖ PT Bridge (required on workstations using Nuage with Pro Tools)

Nuage Extension and PT Bridge

Each workstation requires either the Nuage Extension or the PT Bridge in order to be part of the Nuage system. The PT Bridge only needs to be installed on computers that are running Pro Tools that you wish to control using Nuage. Nuage can control up to three workstations at once. For example, the main workstation would have Nuendo installed along with the Workgroup Manager and Nuage Extension. A second workstation could have Cubase installed along with the Nuage Extension. A third workstation could have Pro Tools installed along with the PT Bridge. Once each workstation has been configured, all three can be controlled from the Nuage hardware units.

Audio Routing

The hardware control of Nuage is independent of the audio routing. If you are working with multiple workstations, audio routing must be correct in order to hear each workstation in the Control Room of the main Nuendo workstation.

Once the Tools for Nuage package is installed, you should have a new icon in the system tray (Windows) or in the menu bar of OS X as shown in Figure 3.2. This is how you can access the Workgroup Manager.

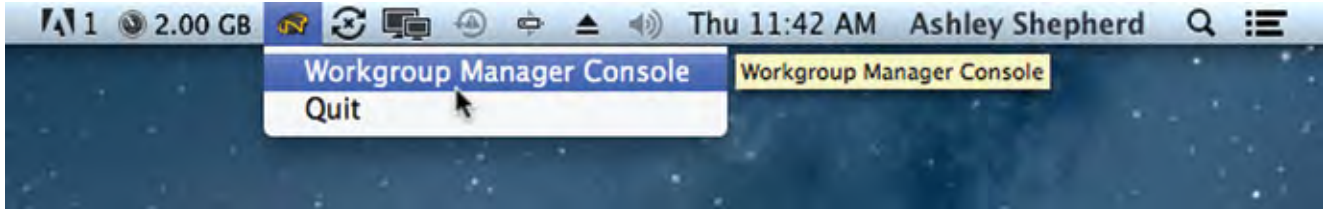


Figure 3.2 Nuage Workgroup Manager icon

Dante Network

The Dante network requires installation of devices, controller software and, optionally, the Dante Virtual Soundcard in computers that have no sound card.

Install Dante Controller

The Dante Controller allows you to configure the Dante network, including clock settings, audio patching, and the naming of devices and pathways in the system. The latest version can be found at: www.audinate.com.

This piece of software can be installed on any computer connected to the same network as the Dante devices. You can control the Dante network from any computer, including one that does not play any audio role in the system. Normally, the Dante Controller would be installed on the main workstation computer for convenience.

Yamaha AIC128-D PCIe Card

The AIC128-D PCIe card is a high-performance, low-latency Dante sound card for the workstation, providing 128 channels in and 128 channels out to the computer. Install the appropriate driver for the operating system of the main workstation (Windows or OS X).

Install Dante Virtual Soundcard (DVS)

For laptop users who plan to work within the Dante network, you will need to install Dante Virtual Soundcard driver. This allows for 64 inputs and 64 outputs from the laptop's Gigabit Ethernet connection. The Virtual Soundcard acts like another audio interface in the system. It will be available as another ASIO driver for Nuendo. Visit www.audinate.com to get the DVS driver software.

When not connected to the Dante network, you will be able to switch back to the built-in audio of the laptop to work using headphones or other speakers. You can quickly switch to the Dante Virtual Soundcard when connected back to the Dante network in order to hear your workstation in the Nuage system.

DANTE AND PRO TOOLS

Dante Virtual Soundcard is compatible with Pro Tools (non-HD). If you are running a workstation with Pro Tools and the PT Bridge in Nuage, you can use the Dante network to route audio signals from Pro Tools into the main Nuendo workstation via the Control Room or to audio tracks within the Nuendo Project. For Pro Tools HD, you must connect the Avid interfaces to the Nuage I/O in order to monitor the Pro Tools system in Nuage.

Now you are ready to configure the Nuage system. There might be other pieces of software such as third-party plug-ins and additional drivers that you desire but it is recommended that you first configure the whole system and ensure that everything is working properly at this stage before adding more software. This is a perfect time to back up the entire system.

After Configuration

Once Nuage has been initially configured, you can continue to add plug-ins and other hardware drivers to the system as your needs require. Before doing this you should back up the system. This ensures that if there is a problem with any additional driver, you can always revert back to this stage.

Install Hardware Drivers

Install all the hardware devices that you will use in your system. This includes MIDI interfaces, video cards, USB keyboards/controllers, DSP accelerators (UAD, Waves SoundGrid, etc.) This step includes installing drivers for video cards, especially HD video cards used for dedicated video playback such as a Blackmagic Design DeckLink.

INSTALL MOTHERBOARD DRIVERS FIRST

For Windows users, the latest motherboard drivers should be installed first, as these affect the basic performance of the computer and need to be in place before installing any other drivers.

Install Third Party Plug-ins

Now you should install any third-party plug-ins you know to be stable and that you plan to use often. Refrain from installing any demos or unknown plug-ins at this stage so that you can establish a very stable system to start out with. Once you have confirmed that the system is stable and created a backup, then you can experiment with demos of new plug-ins and ones by lesser-known creators.

Back up your system yet again.

DATA SECURITY

The creation of these incremental system backups is useful when the computer is being used only for audio work. If you revert to a previously backed up system image, all other data will be lost. If you have email, photos or any other data on your system drive, they will be removed if you revert to a previous backup disk image.

It is advisable to keep all other files on a separate drive so that the system drive can be wiped without any critical loss of data. In a professional environment, down time due to technical issues costs money and that is why the DAW computer should really be a dedicated system that does not perform any other duties.

Yamaha Nuage Installation Guides

Yamaha provides additional installation guides online at:

http://www.yamahaproaudio.com/global/en/products/daw_systems/nuage/downloads.jsp

Look at the bottom of the page for the installation guides. These guides have up-to-date information on the latest versions of drivers and installation packages. Refer to them for more details.

NUAGE

COURSEWARE

PART I: SETTING UP

by Ashley Shepherd

Chapter 4

Software Configuration



NUAGE

Software Configuration

- ❖ eLicenser Control Center (eLCC)
- ❖ Nuendo First Launch
- ❖ Nuendo Basic Configuration
- ❖ VST Connections
- ❖ MIDI Connections

Since the Nuage system uses several pieces of software working together, each piece requires basic settings in order to operate. Let's begin configuring the pieces of software to work together properly.

eLicenser Control Center (eLCC)

The first thing to do is to ensure that we have the proper license for Nuendo. The eLicenser Control Center or eLCC application was installed during the Nuendo installation process. Open it now. Nuendo and Cubase both use a USB dongle to authorize the program. The eLicenser Control Center application manages the licenses that are contained in the dongle.

Synchronization and Maintenance

The first thing that pops up is the online synchronization and maintenance window. Click to perform maintenance tasks as this will update eLCC with all the latest information about license codes and usage periods for your license. If you haven't done so already, insert the license dongle into an available USB port on the workstation computer. It will be detected by eLCC and the available licenses will be displayed.

Add License Code

From the Actions menu, choose Enter Activation Code and enter your 16-character activation code that came with the installation package. Once you enter this code, eLCC will activate the license on your dongle. Now you will be able to open Nuendo.

Validate Usage Periods

If you are using a time-limited license, you will need to validate the usage period before the license will work. Choose this option from the Actions menu. Once the usage period has been verified, you can then start the usage period to begin using your license.

If you have any other licenses that operate with the eLicenser dongle, you may enter them now to have them ready.

Nuendo First Launch

When you launch Nuendo for the first time you will see the splash screen go through the list of plug-ins and other components including the Nuage extension.

You might be asked what audio driver to use. Choose the Dante Accelerator card. On a laptop, there might not be any choice at all and this pop-up will be skipped. That's all you need to do for now.



Figure 4.1
Nuendo 7
Launch screen

Nuage Workgroup Manager Configuration

Now that you've launched Nuendo, it's possible to configure your Nuage Workgroup.

From the system tray or menu bar, open the Nuage Workgroup Manager Console. The interface consists of an upper window (Workgroup) and a lower window (Device/DAW List), a few menu items and two arrow buttons in the middle. The upper window should be empty at this point. This is where you will build your workgroup.

The lower window should be populated with all the devices in the network that are available as elements of a Nuage workgroup. In our example, there should be the following:

- ❖ Nuage Fader
- ❖ Nuage Master
- ❖ Nuendo DAW
- ❖ Nuage I/O 16A

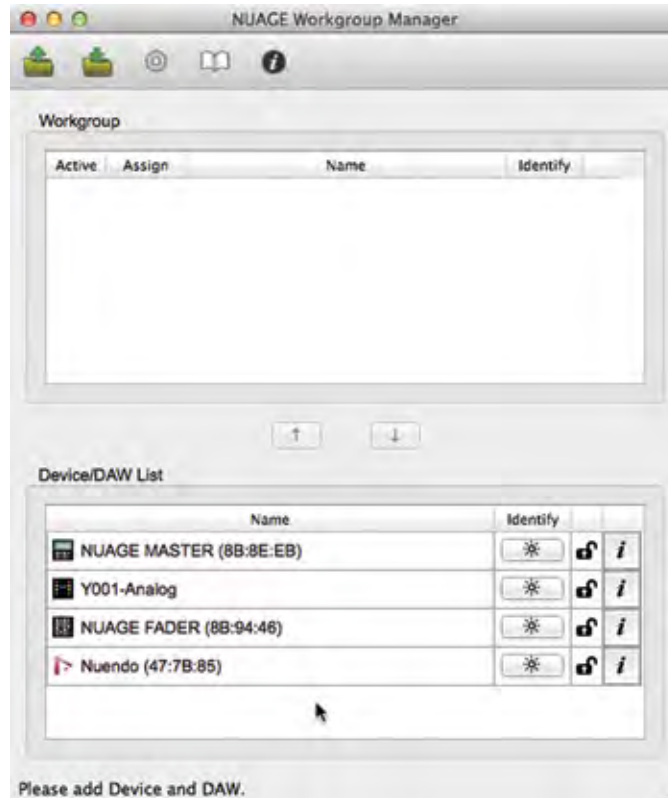


Figure 4.2
The Nuage
Workgroup
Manager

There can be many Nuage-compatible hardware devices and DAWs on the same physical Ethernet network. It's possible to have multiple Nuage workgroups also contained on that same physical Ethernet network. The Workgroup Manager console allows you to choose just the devices you need for your Nuage system and add them to your workgroup.

Other users in the network can create additional workgroups that will not interfere with yours. Any multi-room studio facility will find this capability valuable, allowing studios to share equipment, such as audio interfaces and even DAW workstations, between multiple rooms without physically moving the equipment itself.

Identifying Components

The Workgroup Manager Console can identify components in the system by flashing lights on the hardware units. Simply press the Identify button for the corresponding component to initiate flashing lights.

When there is more than one audio interface or fader unit, unique identification is necessary. Fader units, DAWs and audio interfaces are listed in a specific order within Nuage. This is necessary for their channel order to be presented to you in the proper sequence in Nuendo.

Add Components to the Workgroup

In order to add a component to the workgroup, select it in the Device/DAW List and then press the up arrow. Now the component will appear in the workgroup window. Continue adding components until your workgroup is complete.

ADD FADER UNITS IN ORDER

Fader units need to be added in the order that they are placed physically in the studio from left to right. This ensures that the channel layout from Nuendo will be displayed properly from left to right across all the fader units in your workgroup. The first fader unit added to the workgroup should be the leftmost unit physically.

Once your workgroup is complete, you may save the configuration using the Save folder icon in the upper left. You can also load a preset configuration in the same manner.

Firmware Updates

From time to time it may be necessary to update the firmware of devices in your workgroup. The Fader units, Master unit, and audio interfaces all have updatable firmware.

Pressing the 'i' button for any device will open the properties window shown in Figure 4.3. The properties window will display the name, version number, and MAC address for the selected device.

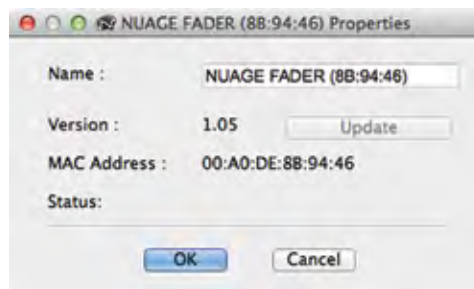


Figure 4.3
Nuage Fader
unit Properties

In order to update the firmware, press Update. You will then be prompted to find the firmware file for this device. Once it is located, you can execute the firmware update process. During the update, ensure that power is not interrupted for either the workstation or the device itself! This can cause permanent damage to the device.

Naming Devices

While you have the properties window open, you may create a custom name for that device so it is more easily identifiable within your network. Simply alter the name in the name field and press OK to rename the device.

Audio Interface Calibration

When you open the properties window for an audio interface, you will be presented with more options. These include analog level calibrations for all inputs and outputs. This will allow you to precisely calibrate the analog levels of your interface to the electrical requirements of your other studio equipment.

External Word Clock Sources

The audio interfaces are capable of utilizing external word clock source from the BNC connector on the rear. By default, the work clock source is set to Dante. You may choose BNC in from the pull-down menu to switch to an external work clock.

Workgroups Sharing a Single Dante Network

Understand that the workgroup and Dante networks are separate but related systems. Several devices may be together on the Dante audio network, but in separate Nuage workgroups as seen in Figure 4.4. This could be the case in a multi-room facility with shared Nuage devices.

Any audio interface on the Dante network must use the same master clock setting. For example, if two studios are sharing audio interfaces on the same Dante network, they must also run at the same sampling frequency, 44.1, 48, etc. If they need to be independent, then the Ethernet networks must be separated physically or logically by VLAN.

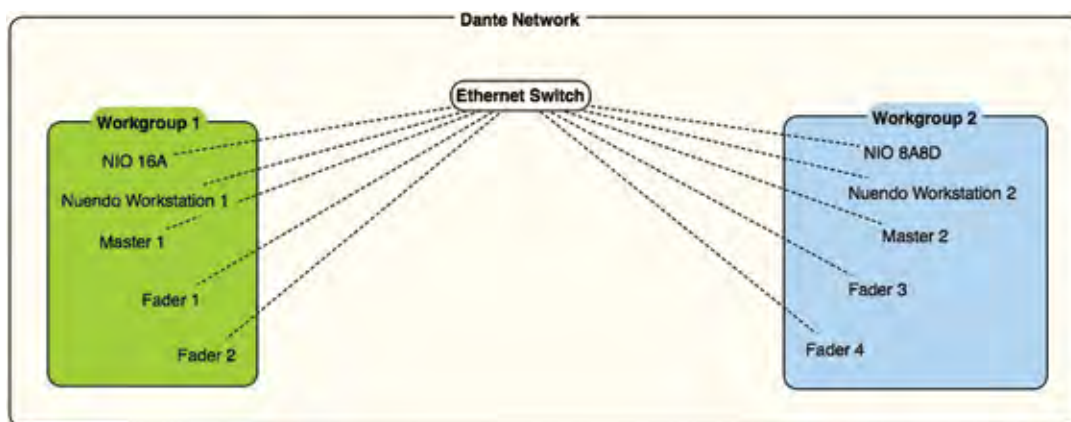


Figure 4.4

Two workgroups sharing a single Dante network

If they can use the same master clock setting, then it is easy to share devices between workgroups. The A studio could be using the first audio interface and the B studio could be using the second. They could even split channels of the same audio interface between them as Dante allows for single channel routings.

A good example of this would be in a live event scenario where Dante devices are being shared between the FOH and monitor consoles while Nuage is recording the event and creating broadcast feeds as shown in Figure 4.5. The stage audio interfaces must be shared by the consoles and Nuage. This is possible even if the audio interfaces are not part of the Nuage workgroup.

One thing to note here is that equipment that is on the same Dante audio network as the Nuage system will not necessarily be able to be part of a Nuage workgroup. In this example, the Rio3224-D will be used as an audio source for Nuage but will not be part of the Nuage workgroup.

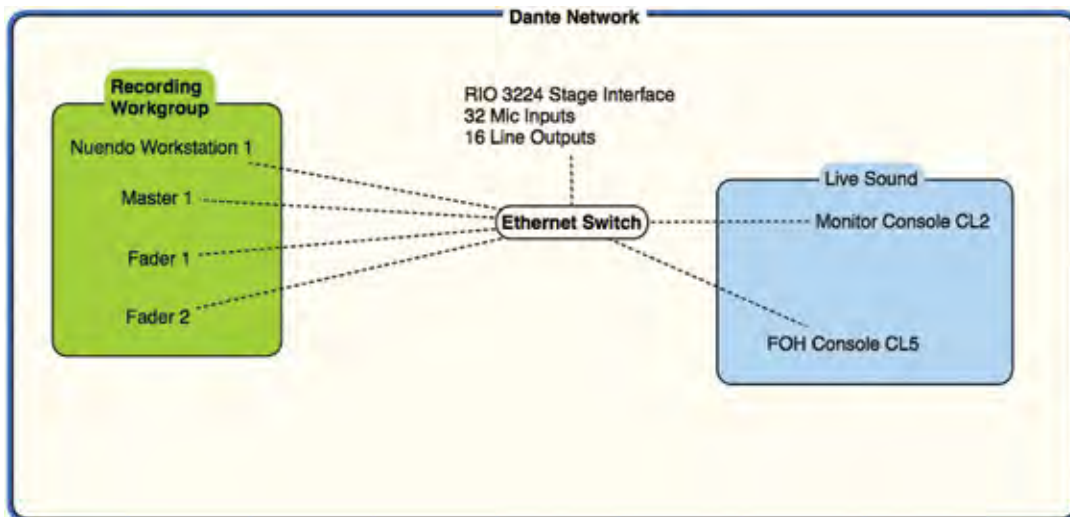


Figure 4.5
Live Event network diagram

Dante Network Configuration

This leads us to the Dante network configuration. The Dante Controller is the piece of software that allows you to change all the routings and clock settings for all the devices in your Dante network. When you first launch the Dante Controller, all of the Dante enabled devices in the Ethernet network (or VLAN) will be discovered and listed in the network view.

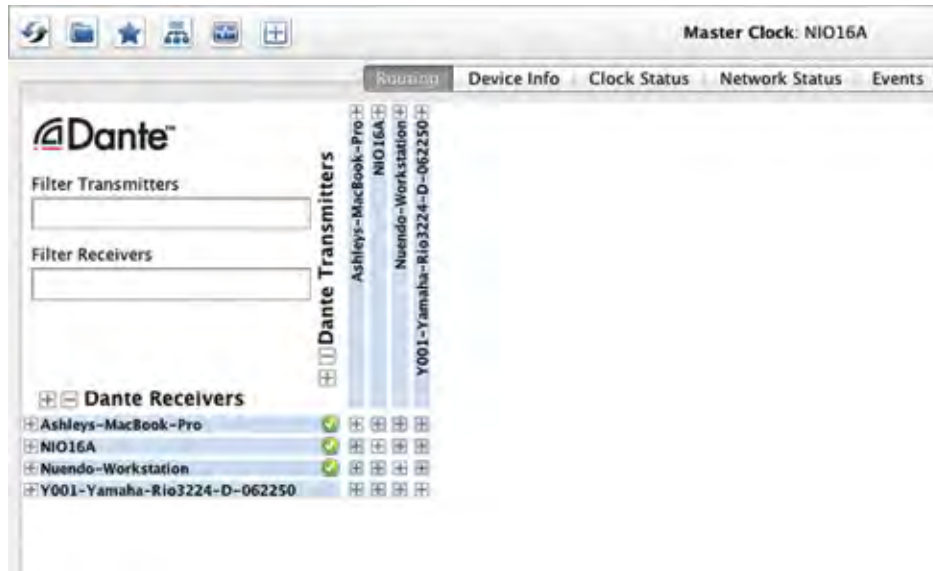


Figure 4.6
Dante
Controller
Routing View

By default, you are shown the routing tab shown in Figure 4.6. Here you will be able to see all of the audio connections between various devices and alter, delete, or add them as necessary. In this example, I have a Nuendo workstation, Nuage I/O 16A interface, Rio3224-D, and my laptop with the Dante Virtual Soundcard driver.

Along the top row you see the Dante transmitters. These can be considered audio outputs from each device. Along the left column, you see Dante receivers, which can be considered audio inputs to the various devices. In order to view the individual connections, open one of the tabs by clicking a plus (+) sign. Doing so will reveal the individual connections for that device.

In Figure 4.7 you can see the transmitter tab for the Nuendo workstation has been opened up along with the receiver tab for the Nuage I/O 16A. The Nuendo workstation transmitters will eventually be connected to the first eight receivers of the I/O. These connections will be used to feed audio to the speaker systems in the studio. But first, before we connect any audio channels, we need to ensure that the audio clock settings are correct.

Dante Clocking

It's imperative in any digital audio system to have one clock source that determines the speed at which samples of audio are played and recorded. This is commonly referred to as the word clock. In Dante, the word clock is transmitted over the same Ethernet connections as audio signals.

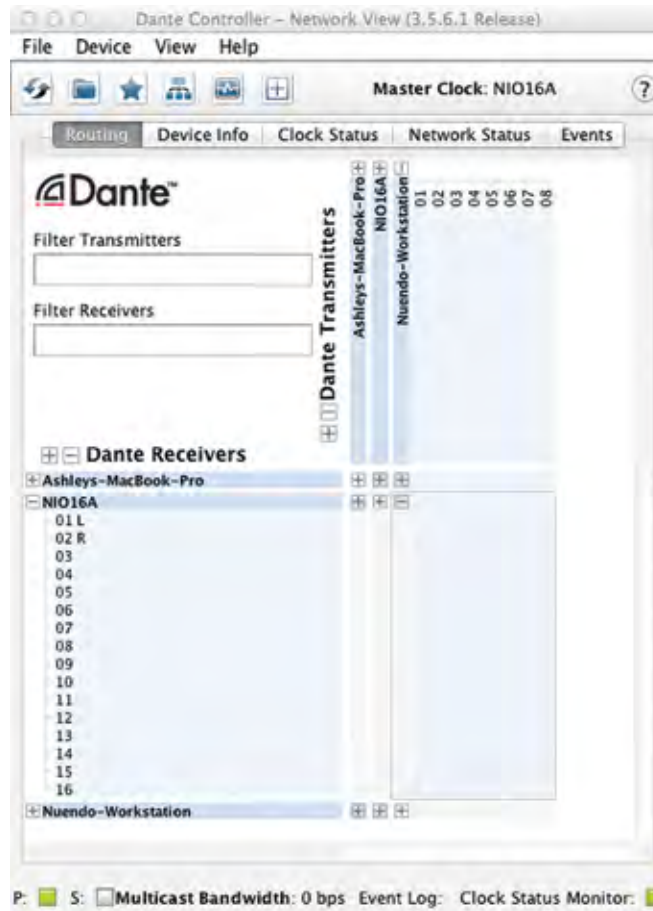


Figure 4.7
Dante with the Nuendo Workstation and NIO opened up

This makes it very convenient when connecting multiple devices together. There’s no need for additional cabling in order to ensure proper clock. You must, however, choose a device to be the master clock source for the entire Dante system. This is done in the Dante Controller software under the clock status tab.

The clock status tab shown in Figure 4.8 displays information relating to clock sources, primary and secondary networks, preferred devices, and external clocks. To begin with, there are several status indicators that should be green if the system is working correctly.

In the lower left corner, there are two indicators for the primary and secondary networks. Dante can have two independent physical networks for redundancy. If the primary network should fail, the secondary will take over at the next sample to prevent any interruption of the audio. This fail-safe is a must for live events where audio interruptions are unacceptable. In our example, there is only one network.

For each device in the system, there is a sync indicator to show that it is receiving proper clock. Then the clock source is shown, which in most cases should be Dante. Sometimes



Figure 4.8
Clock Status
Tab

devices may need to use an external word clock source to integrate with other systems. If this is the case, the device using external work clock should be the Master in the Dante network. That way, all clocks in the system are following the external clock.

The Primary Status shows which unit is the Master and which units are the Slaves. If you are using the Secondary network, similar status indications will be shown.

The Preferred Master checkbox should be the device most central to your system's functioning. In other words, the Master clock device should be a unit that is never disconnected from the system and has a primary function, such as the main AD/DA converter you are using. In this example, the Nuage I/O 16A is the Preferred Master.

In a live event situation, a Rio stage interface or FOH console might make the ideal master unit. For studio applications, the primary AD/DA should be the preferred master. Once a master has been set, ensure that all devices are running at the same sample rate in order to make audio connections between them.

Changing Sample Rates

In order to change sample rates for the Dante network, all devices must be set to the new sample rate. This can be done using the Device Info tab in Dante Controller shown in Figure 4.9.

Double-click on the line of the primary clock device to open the Device View. Here you will find more specific information for that particular device, including configuration settings in the Device Config tab shown in Figure 4.10. Click the Device Config tab.

In the second block, you can alter the sample rate for this device. Choose the new sample rate from the drop down menu to change the setting for that device. You will get the warning dialog that the connection will be interrupted. This must be repeated for each device in the

Dante network. If a device is set to run at a different sample rate than the others, connections to that device will not work.

For more in-depth information on clocking in Dante, refer to Audinate’s support documents. There is a great deal of information available on this subject.

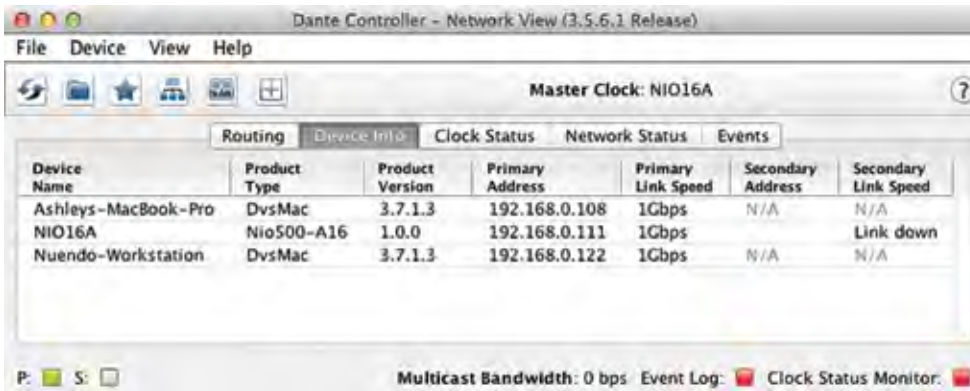


Figure 4.9
Device Info Tab

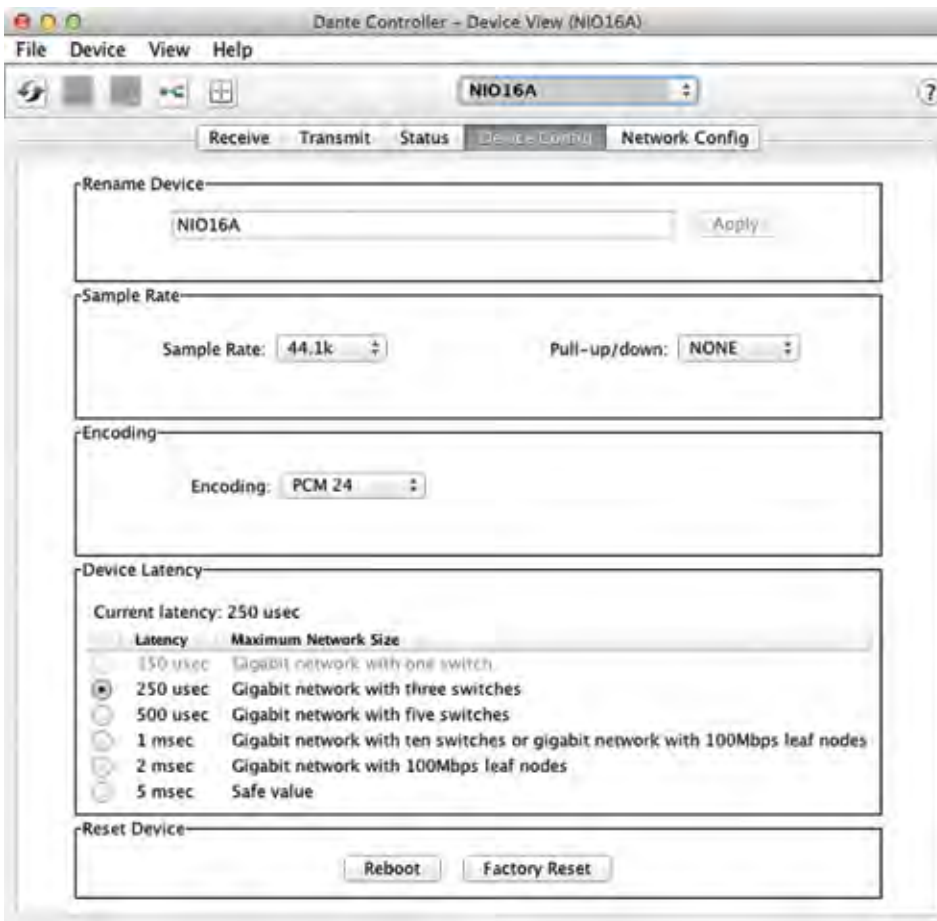


Figure 4.10
Device Config
Tab for Nuage
I/O 16A

Channel Routing (Subscriptions)

Dante uses the term *subscription* to indicate channel routing. Basically, when a receiver is subscribed to a transmitter, it will receive all the audio that comes from that transmitter. In the routing tab, you can make these connections, or subscriptions, simply by clicking in the box where the transmitter column meets the receive row. Icons will appear indicating the progress of connection until the green check is present, telling you the audio connection is working.

You can make these connections one-by-one in any fashion you choose. It is also possible to connect more than one receiver to the same transmitter (multiple subscribers). For example,

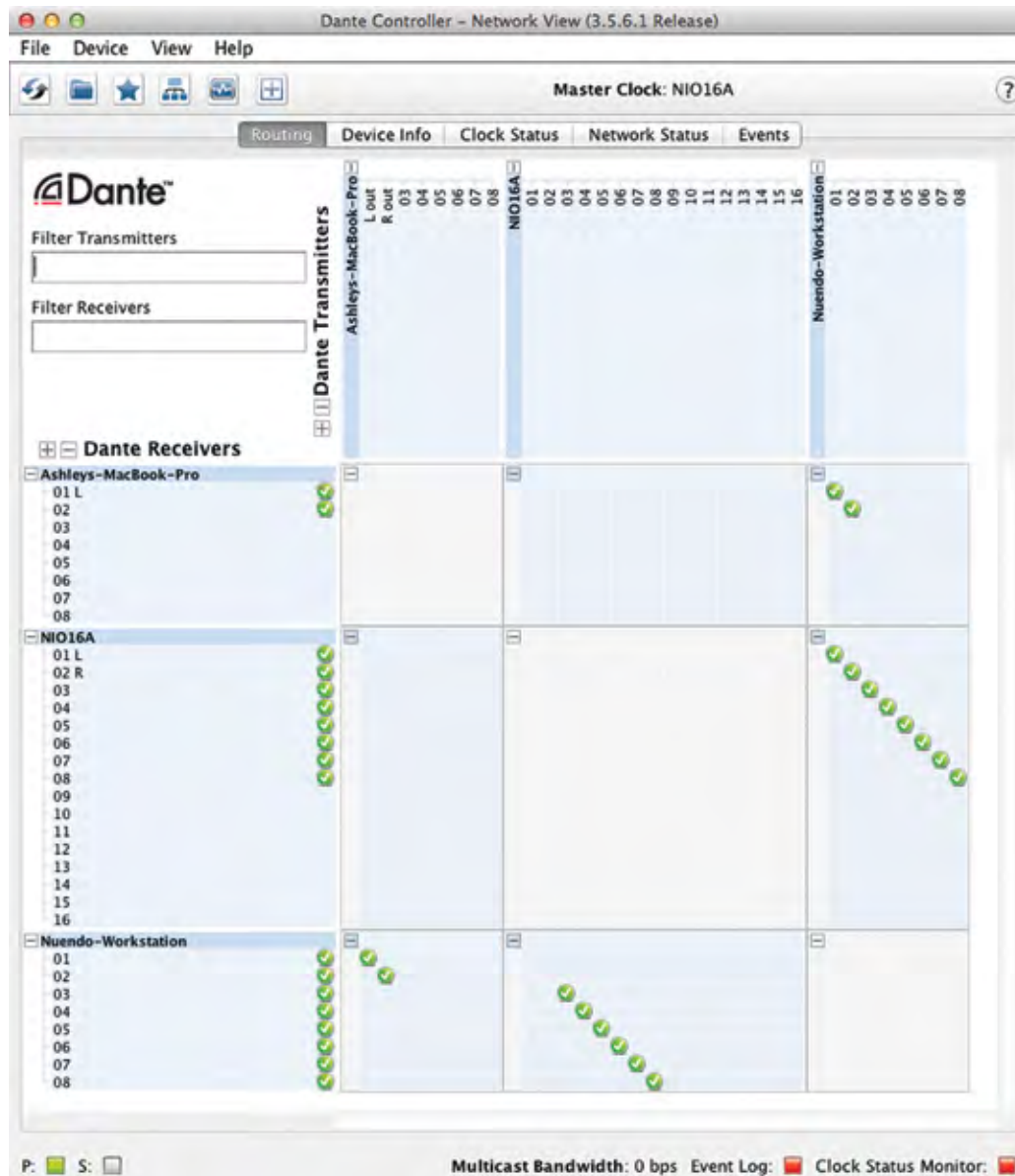


Figure 4.11
Audio routing
in Dante

the first channel on the Rio stage box could be routed to multiple destinations such as the FOH console, monitor console, and a Nuendo workstation for recording.

This system offers a great deal of flexibility. You can create a complex network of audio connections that would be very expensive and difficult to do with analog systems; think “patch-bay on steroids.”

Multiple Routings at Once

With large channel counts and multiple interfaces, assigning channels one-by-one can get tedious. There is one shortcut to routing many channels at once. When you hover the mouse over the [-] indicator at the intersection of two devices, the diagonal row of possible connections will highlight. By holding down the Control key and clicking on the [-], all possible channels will be routed at once as shown in Figure 4.12.

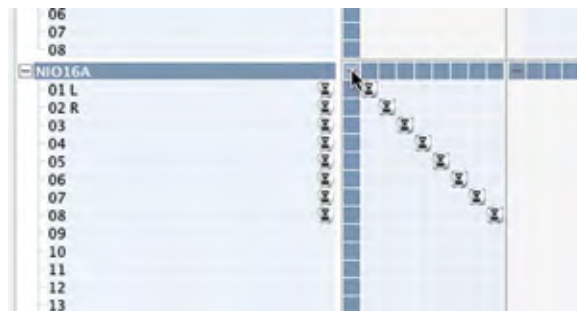


Figure 4.12
Diagonal routing of multiple channels at once

Studio Planning

Now is a good time to consider the configuration of your studio. How many input channels will you use? How many speakers, headphones and other outputs will you need? What about a talkback microphone? Is there a second audio workstation in the studio? We will get into the details when configuring Nuendo, but channel routing in Dante is all part of that same process.

For our example, the following is a list of inputs and outputs to the system:

Inputs

- ❖ Talkback microphone
- ❖ 4-channel microphone preamp
- ❖ iPod input
- ❖ Laptop workstation input, stereo (over Dante)

Outputs

- ❖ 5.1 Surround speaker system
- ❖ Stereo nearfield speakers
- ❖ 1 headphone cue (for talent in the studio)
- ❖ Control room headphone output

For now, we are going to connect the first sixteen outputs (transmitters) from the Nuendo workstation to the sixteen inputs (receivers) of the Nuage I/O 16A as shown in Figure 4.13 in order to connect the two speaker systems to Nuendo's Control Room. Then we will connect the sixteen transmitters from the Nuage I/O 16A to the first sixteen receivers of the Nuendo workstation.



Figure 4.13
Routing 16 workstation outputs to the NI/O 16A

Nuendo Basic Configuration

When you launch Nuendo for the first time, you will see the progress as Nuendo goes through any third-party plug-ins, registering them to the system. When that process is completed, you will see the Steinberg Hub shown in Figure 4.14. You may choose to open any recently opened projects, create a new project, or open another saved project. This dialog is optional and can be disabled in Preferences>General, found under the Nuendo menu in OS X or under the File menu in Windows.



Figure 4.14 Steinberg Hub

For now, cancel this dialog. It is not necessary for a project to be open in Nuendo for the application to be running. You can still configure the software in this state. When Nuendo is running without a project loaded, there will not be much to see on the screen except the transport controls and the menus above.

VST Audio System

The first and most important setting is the ASIO driver for the VST Audio System. This determines which audio interface connected to your system Nuendo will use. To access the VST Audio System settings choose **Devices>Device Setup>VST Audio System**.

The top menu allows you to choose the ASIO driver for the audio interface you wish to use with Nuendo. Nuendo can use just about any audio hardware driver, even the built-in audio devices for laptops if needed for offline editing or mobile use. However, for best performance in Nuage, we will use the Dante Accelerator PCIe card as shown in Figure 4.15.

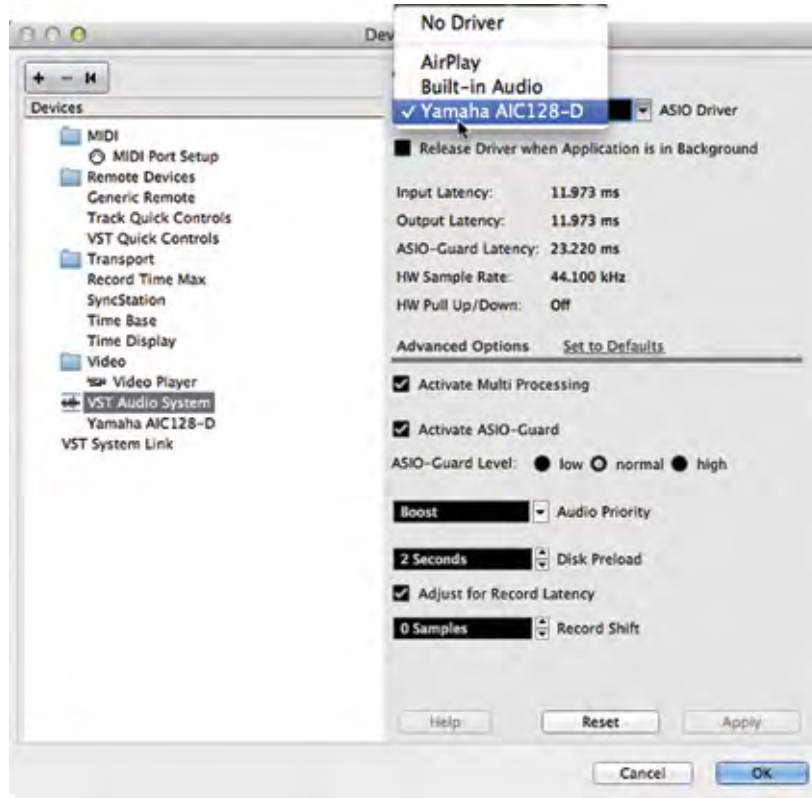


Figure 4.15
VST Audio
System Settings
selecting the
Yamaha
AIC128-D ASIO
Driver

Release Driver in Background

This option makes Nuendo release control over the ASIO driver when the application is not active (hidden or minimized). If you tend to switch between several applications that use the audio driver (Final Cut Pro and Nuendo for example) as a part of your workflow, you can check this box. Understand that this could potentially make the system unstable if the other applications do not handle the ASIO driver well. Constant switching between various applications using the same ASIO driver may cause the audio card to switch sample rates and other settings resulting in clicks and pops in the audio outputs. Use this setting only if you absolutely need this in your workflow.

Advanced Options

These options affect how the system interacts with the ASIO driver. The default settings should work in most cases. If you experience problems with audio playback, changes may be made here to help. Refer to the manual for specific information.

ASIO-Guard

ASIO-Guard is a function to provide better performance when using lower buffer settings for the audio driver. When the buffer is set to 512 or less samples, ASIO-Guard will improve the performance of the system, allowing more plug-ins and instruments to be used without drop-outs, click, or pops. The default setting (normal) should be sufficient for most purposes.

ASIO Driver Settings

In Device Setup>VST Audio Settings, there will be an option right below this that contains all the specific ASIO driver settings for your particular audio device (in this case the Dante Accelerator seen in Figure 4.16). These vary by manufacturer and device but for the most part, contain controls for clocking and direct monitoring options. To access more specific controls for each device such as buffer settings, press the Control Panel button found at the top.

Remember, for Dante all clock settings must be made from Dante Controller. Changing the sample rate from within Nuendo will not work. It must be changed for every device in the Dante network.

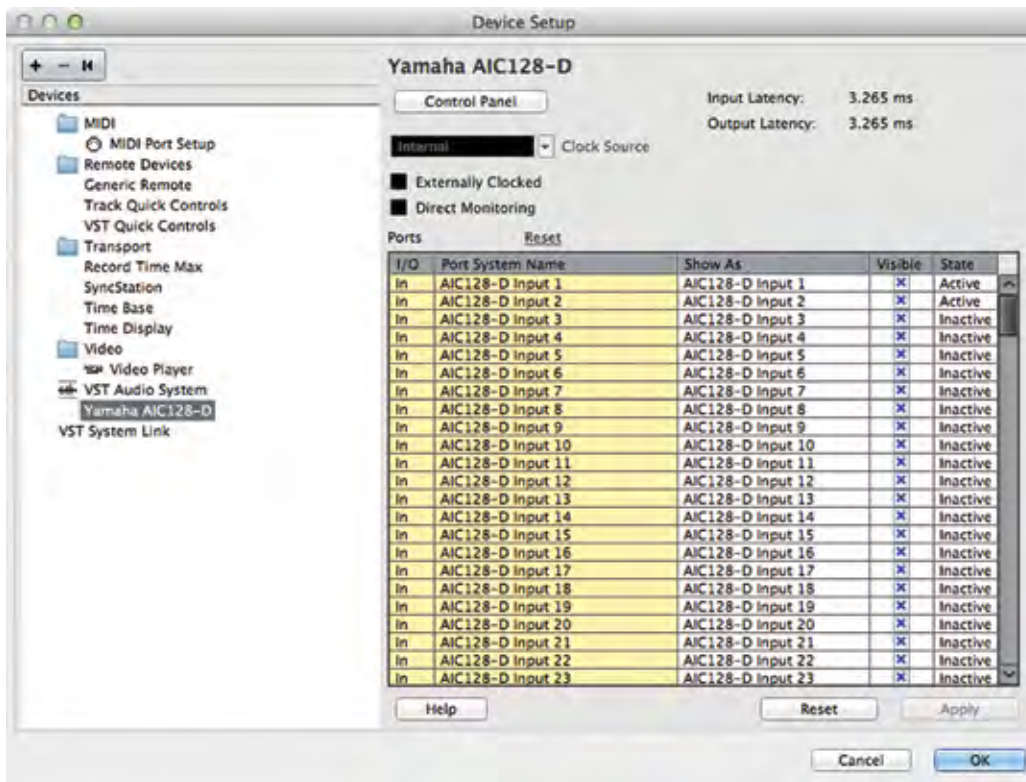


Figure 4.16
ASIO Device
Settings for the
Dante
Accelerator

ASIO Port Naming

In the lower portion of this dialog, each input and output of your audio device will be listed in the table. Here you can rename each port to more effective names and also make inputs and output active or not. The Port System Name is the name the device gives to the operating system. This cannot be changed. However, Nuendo allows you to create a new name that will be shown inside the application. This name can be more appropriate for your studio setup than the system name, making it easier to set up input and output connections later.

By clicking in the “Shown As” field, you can enter a name for that input or output that will be seen whenever that port is being used by a VST channel in Nuendo. Take the time now to name each input and output of your device to something that will make sense later when configuring VST channels.

CHANNEL NAMING LAYERS

There are several layers of names for various audio channels as they make their way into Nuendo. These layers can be confusing if not handled properly from the very start. Depending on the type of interface you are using, there can be as many as four naming layers involved from the hardware unit all the way to VST channels in the mixer.

For Nuage, there is also the Dante system, adding a fifth layer. Here’s how the naming layers break down:

1. Physical Inputs: Nuage I/O 16A
2. Dante PCIe card channels
3. Port System names: Dante 01
4. “Shown As” names: Analog Input 1-16
5. VST Input names: Preamp 1, Preamp 2, etc.

Just getting from one physical input all the way into the program is a bit confusing at first. These abstraction layers do make things easier in the long run by being very versatile and allowing you to name things logically in the program. It takes few minutes to set up, but it is worth the time.

Buffer Settings

Every audio interface uses a data buffer as part of its operation. This buffer gathers sound data (samples) and when it is full, this data is passed on to its destination. This happens in both directions, sound coming in and sound going out of the interface. The size of this buffer is usually measured in samples. The larger the number, the more samples are collected before the buffer passes this data on. The buffering process causes a delay in the audio signal, commonly referred to as “latency.”

The buffer setting is critical to the performance of the audio interface and for the DAW as a whole. Larger buffer settings ease the load on the host processor in part because data is being handed over less often. With lower buffer settings, data is being handed off quickly, requiring more work by the processor. Therein lies the trade-off:

- ❖ **High buffer settings** = More processing power available, but more overall delay in the system.
- ❖ **Low buffer settings** = Less overall delay or latency but much higher processing loads.

The result is that you might need to change your buffer setting depending on what activity you are performing. If you are recording musicians live but not using very many plug-ins, the lowest buffer setting possible will yield the least delay, allowing the performers to hear themselves correctly.

If you are editing or mixing only, the buffer can be set very high, giving you more processing power for plug-ins, without adversely affecting your workflow. There might be some slight delay between the time you press “play” and when you hear the first sound, but unless this is extreme, it should not affect normal editing or mixing.

Listed below are the standard buffer settings available to most professional interfaces. The delay value is the buffer setting times two, one buffer for each direction through the interface. There could be additional delay depending on the device but these numbers give you the general idea of how buffer settings generate latency. The values listed below apply to the standard 44.1kHz and 48kHz sample rates. Higher sample rates will have smaller latency delays.

- ❖ **32 samples** = 1.4ms. This is not very discernible and the ideal for recording.
- ❖ **64 samples** = 3ms. This is still very good for recording and only moderately noticeable.

- ❖ **128 samples** = 6ms. This is still suitable for recording but the delay is noticeable.
- ❖ **256 samples** = 12ms. The delay is noticeable but can still be used for recording of non-rhythmic sounds.
- ❖ **512 samples** = 23ms. This delay is very noticeable and unusable for recording. Processing power is increased dramatically.
- ❖ **1024 samples** = 56ms. Editing a mixing.
- ❖ **2048 samples** = 93ms. Editing and mixing with many plug-ins.

Buffer settings are accessed via the control panel for the audio interface. By pressing the control panel button in the VST Audio System dialog, you will open the corresponding control panel for the selected interface shown in Figure 4.17.



Figure 4.17

Dante
Accelerator
Control Panel
Buffer setting

VST Connections

Open the VST Connections window from the Devices menu (F4). This is where all of the audio connections will be made into and out of Nuendo shown in Figure 4.18. This window maps your audio interface's physical inputs and outputs to Nuendo's virtual inputs and outputs. There are many possibilities here including simple inputs and outputs of Nuendo's mixer but also more complex routings such as external FX inserts, external MIDI instruments, control room monitoring, and headphone channels.

Using a large multi-channel audio interface, many intricate connections can be made. Presets can be made that can be called up in any project. Flexibility in routing, and the quickness with which routing changes can be implemented, are powerful aspects of Nuendo. You can switch from a 5.1 film mixing workstation directly to a multi-track band recording setup in a matter of moments.

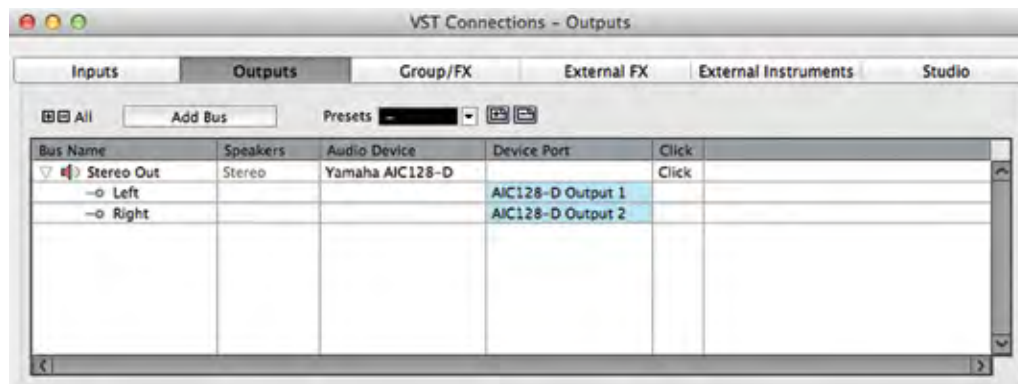


Figure 4.18
VST
Connections
window

VST Inputs

The VST Inputs tab contains the current list of inputs available to Nuendo. By default, a stereo input is created. Understand that this is a virtual layer between your audio interface and the Nuendo application. There can be many inputs created here, more than your interface has or less than the available inputs. The idea is that you only create the number and type of inputs you need for a specific project. There's no need for 56 inputs if you are only recording a voice-over.

Inputs have several attributes:

- ❖ **Channel width** – Each input can have its own channel width starting with mono and continuing with stereo, 5.1, and on up to 13.1 Auro surround.
- ❖ **Sharing of physical inputs** – Inputs can share physical interface inputs as much as you desire. For example, a mono input can use the first channel on your interface while a 5.1 input can use that same interface channel (1) plus 5 more (2-6) to make up a single 5.1 source.
- ❖ **Child buses** - Multi-channel inputs automatically generate mono “child” buses. Each channel of a multi-channel input is available as a mono input within Nuendo. You may also create multi-channel child buses of surround buses. For example, you can create a stereo child bus for a 5.1 surround bus out of the front left and right channels.
- ❖ **“Not Connected”** - Input buses can be set as “Not Connected.” This can happen when a project from a larger system is opened on a system that does not have the physical inputs available to match all the VST Inputs. These input buses can remain in the project and when it is reopened in the larger system, they will connect back to their physical inputs on that system.

Go through your studio and figure out what will be connected to the inputs of your audio interface. This is a highly customizable part of Nuendo and will be different for each studio and setup. In my studio, I name the inputs by the microphone preamp that is normally connected to that input as shown in Figure 4.19. This helps me keep track of what preamp was used on a particular track. If you are using a patch bay, this layout can change every session. You can change the labels of each input used in a project so it will be saved with the project file, preserving your routing information.

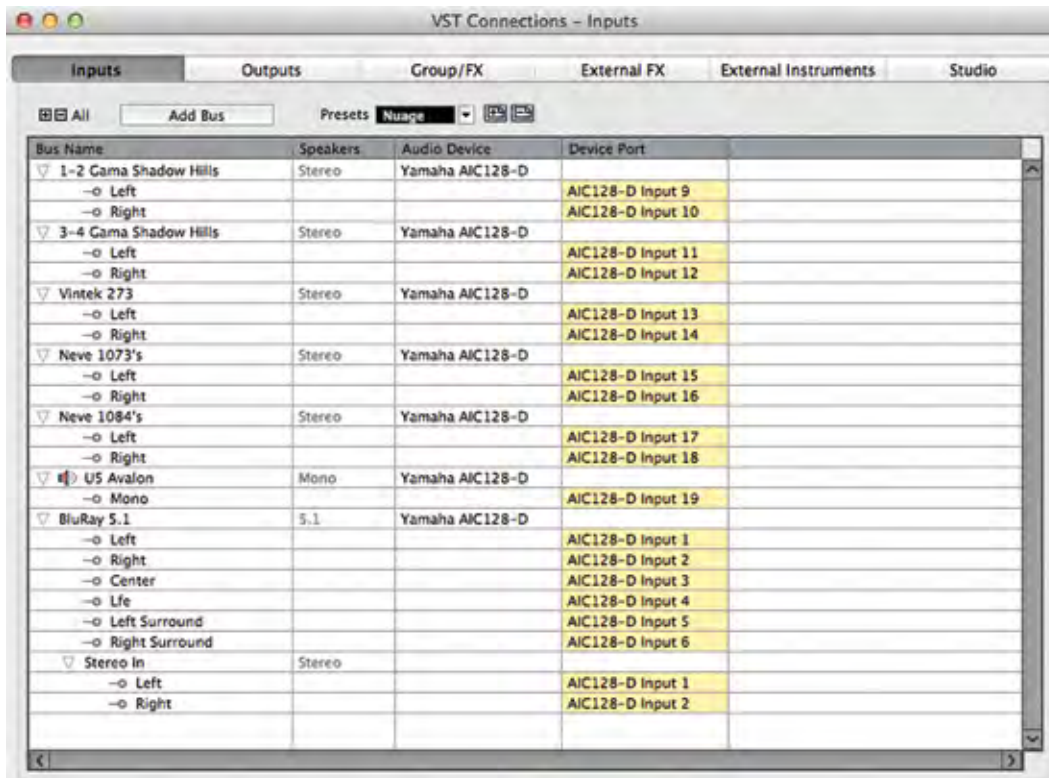


Figure 4.19
Various input buses

In order to create a VST Input, follow these steps:

1. Press the Add Bus button at the top of the window. The Add Input Bus dialog opens shown in Figure 4.20.
2. From the configuration pull-down menu, choose the channel width and format.

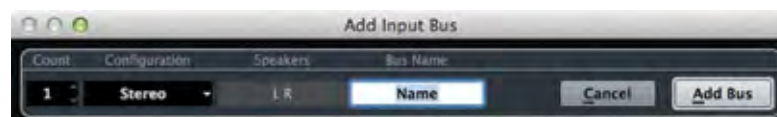


Figure 4.20
The Add Input Bus dialog

3. If you wish to create more than one of the same type of bus, increment the count.
4. Device ports will automatically be assigned to each channel of the bus, usually incrementing up from the last used port. You may change these assignments by clicking on the device port name and choosing another port from the pull-down menu seen in Figure 4.21.
5. Name the input bus, entering it in the Bus Name field. If you are creating more than one bus, a number will be added to create unique names.
6. Continue adding buses until all the inputs you will use have been setup.

ASSIGNING DEVICE PORTS TO MULTIPLE VST CONNECTIONS

You can assign device ports to multiple VST connections at once. To do this, hold shift while selecting multiple connections. Then click and hold Shift while selecting the first device port. Device ports will be assigned incrementally for all selected connections.

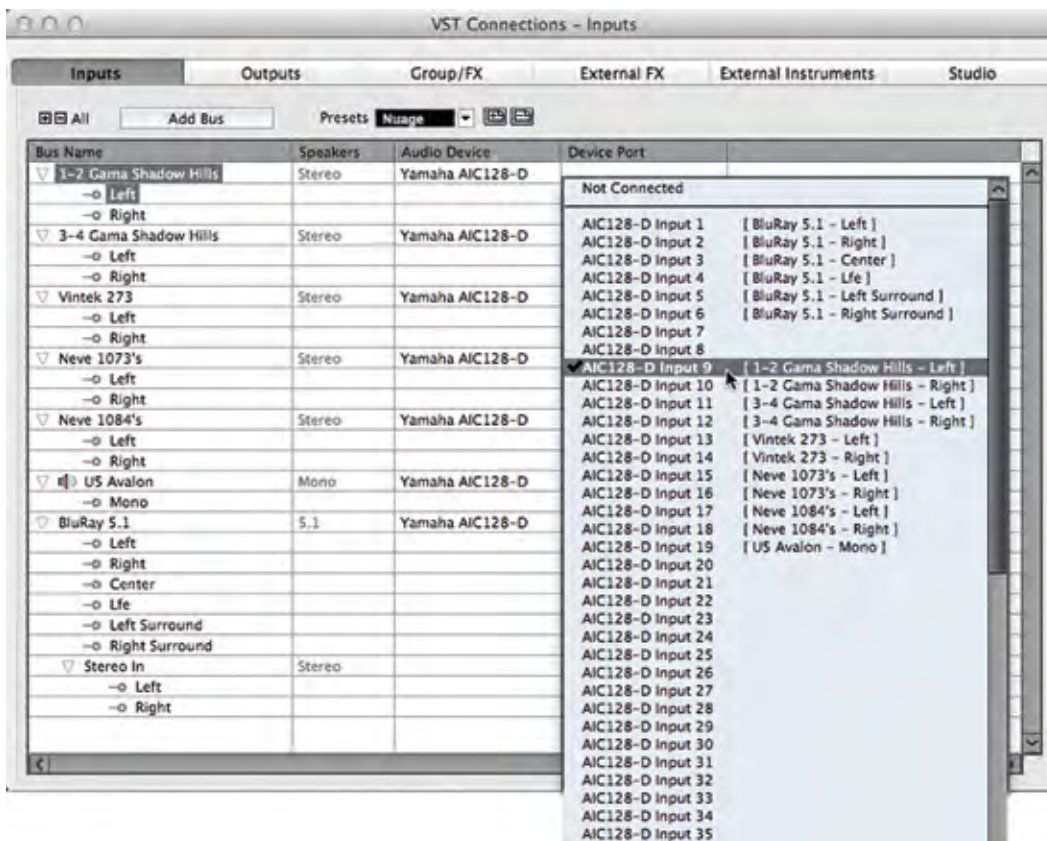


Figure 4.21
Device port assignment pull-down menu

Once a set of inputs has been created and labeled, you can save this as a preset using the preset tools at the top of the window. Creating a preset named “default” will force Nuendo to use that preset when creating a new project as seen in Figure 4.22.

UPDATING PRESETS

By adding a preset and typing in the exact name of an existing preset, you can modify or update that preset with the current settings. This is true for all presets in VST Connections. Having a good set of presets that covers the basic ways you work everyday can save valuable time setting up projects in Nuendo.

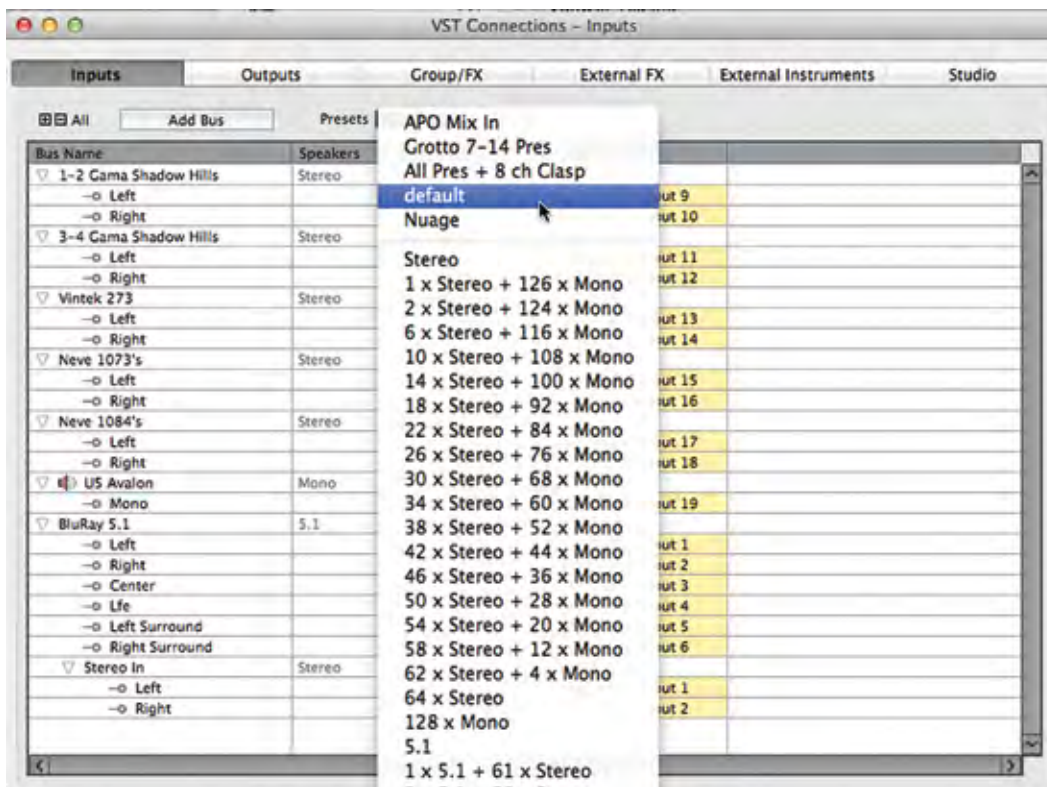


Figure 4.22
VST Input
Presets

VST Outputs

The VST Outputs tab functions in many of the same ways as the inputs tab. You can create output buses in the same fashion, assigning various device ports to the channels in each buss. You can name each bus and save the entire list of output buses as a preset.

For simple stereo projects, only one stereo output bus might be needed. If you use an external analog mixing desk, individual mono output buses can be used to feed each channel of a mixer. For a film dubbing project, multiple surround output buses may be needed to act as stem outputs.

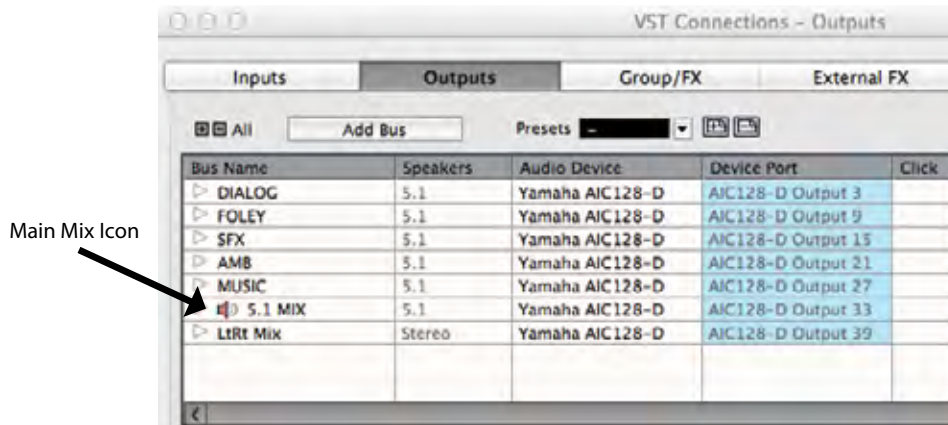


Figure 4.23
Film Dub Preset with Main Mix set to '5.1 MIX'

Each one of these possible scenarios can be saved as a preset and called up whenever it is needed. The presets menu comes populated with various configurations to start. You can modify these to meet your needs and save them as new presets.

Output Child Buses

In complex surround sound mixing, there is a need to have specific types of child buses available for each surround bus. To create specific child buses for an output bus right click (Win) or control+click (Mac) on an output bus's name and choose an option from the Add Child Bus menu shown in Figure 4.24. All possible formats for that size output bus will be displayed for you to choose from.

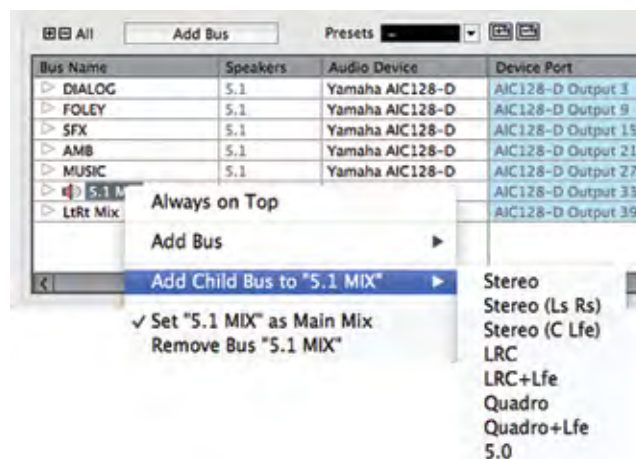


Figure 4.24
Add Child Bus menu

“Main Mix” Designation

If you will notice in Figure 4.23, there is a speaker icon next to the 5.1 MIX output bus. This icon indicates that this bus is the Main Mix. The Main Mix designation has to do with monitoring through Nuendo’s Control Room features, covered later in this chapter. Since Nuendo can have multiple output buses, one of these must be designated the Main Mix for monitoring purposes through the Control Room mixer.

In order to set any output bus as the Main Mix, right click (Win) or control+click (Mac) on the name of the bus to access the contextual menu shown in Figure 4.25. Check the “Set as Main Mix” option and notice the speaker icon next to the bus name.

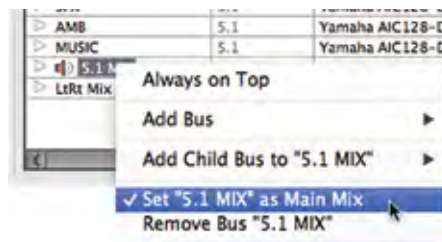


Figure 4.25

Set as Main Mix option

Output Bus Not Connected

It is possible and common to have output buses not connected to any device port directly. Instead of monitoring the output buses directly, Nuendo can route these signals through the Control Room mixer, which is connected to the device ports for monitoring. Using the Control Room features, you can monitor various points in the mixer’s signal chain through dedicated monitor outputs. Final mixdown files can still be created from any output bus whether it is connected to a device port or not.

It might feel counter-intuitive, but output busses that are “not connected” still generate audio. The audio can be written to a disk file, routed to the Control Room mixer, or even routed to another VST output using an aux send.

WHEN TO CONNECT VST OUTPUT BUSES

VST Output buses should only be connected to device ports when the signals need to be fed into an external console, recorded by an external device, routed to a broadcast feed or if the Control Room is not active for monitoring.

Click Option

The last column in the output bus tab is the click option. The internal click generator in Nuendo can be routed in multiple ways, one of which is by checking the click option for any output. This routing is separate from the Control Room where you can also route the click to various outputs. The Control Room does not have to be active for the click option in Output buses to function.

You may only activate click on the entire output bus, not child buses or single channels within the bus.

Group/FX

The Group/FX tab does not pertain to actual inputs or outputs from Nuendo. Rather it deals with internal mixer routing options within the Nuendo project. This will be discussed in great detail in Part IV: Mixing. Group and FX channels that are a part of the active project will be displayed here. It is also possible to create new group and FX channels in this tab and save presets of multiple group and FX channels.

External FX

The External FX tab allows the creation of outputs and inputs that can be routed to external processing devices such as compressors, equalizers, and reverb units that you wish to use inside Nuendo's mixer. Once created, these external FX can be inserted just like plug-ins on any audio channel in the mixer.

Audio will pass out of the assigned outputs to your external device and then return through the assigned inputs back into Nuendo's mixer. You can mix plug-ins with external FX on the same channel if you wish. In this way, all of your favorite analog equipment can be used inside the digital mixer just like any other plug-in processing.

If the external device is MIDI controllable, a MIDI device can be associated with the External FX so that when it is inserted, its MIDI device panel will open just like a plug-in GUI. This allows you to remote control the device and save the parameters within the Nuendo project for later recall.

To create an External FX, follow these steps:

1. Press the Add External FX button. The Add External FX dialog will open shown in Figure 4.26.
2. Click in the name field and enter the name of the device.
3. Choose the send channel configuration. How many inputs does the device have?
4. Choose the return configuration. This may be different than the send. For example, many reverb units have a mono input but a stereo output. There is no need to waste device ports on unused channels.
5. If the device is MIDI controllable, and you have created a MIDI device for it in Nuendo, you can attach that to the External FX by pressing the Associate MIDI Device button and choosing the appropriate MIDI device.
6. Click OK and the device will appear in the list.
7. Assign device ports to the inputs and outputs that will be connected to the external device.

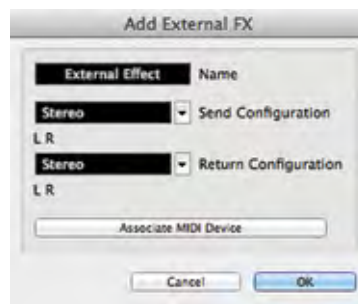


Figure 4.26
Add External
Effect dialog

If this is an external FX that you plan on using often, add it as a Favorite so that it may be recalled in other projects easily. This is similar to the presets in the Inputs and Outputs tabs. To add an External FX as a favorite, right click (Win) or control+click (Mac) on its name and choose Add to Favorites from the menu. Now this device will be available from the Favorites button in any active project.

External Instruments

External Instruments allow you to use MIDI keyboards and other external MIDI devices such as an Akai MPC workstation in Nuendo as if they were a part of the program, similar to a VSTi virtual instrument. Much like External FX, External Instruments have a MIDI device associated with them but only have audio inputs as a part of their configuration. Each external instrument can have multiple mono and stereo inputs associated with it. In order to create an external instrument, follow these steps:

1. In the External Instruments tab, press the Add External Instrument button. The Add External Instrument dialog will open as shown in Figure 4.27.
2. Click in the name field and enter the name of the new instrument.
3. Choose the amount of mono and stereo inputs the instrument will have in Nuendo.
4. If you have created a MIDI device for this instrument, press the Associate MIDI Device button and add it to the instrument.



Figure 4.27
Add External
Instrument
dialog

The newly created instrument can be added to a project just like any other VSTi. You will be able to create MIDI tracks for this instrument and automatically have that routed to the device and have the resulting sounds come into the project mixer.

Device Port Sharing

Some VST connections can share device ports with others. For example, you could create a stereo Input bus that uses device ports 1 and 2. You could then create another mono Input bus that also uses device port 1, and so on. This can be useful for naming various inputs or having alternate input bus names for the same device ports. The same is true of Output buses. Just be sure to be aware of any VST connections that share device ports as this can be a source of confusion.

External FX and External Instruments, however, cannot share either input or output device ports with any other VST connection. If you have device ports used by an External FX or Instrument and you wish to use it for something else, you must either remove the external device from the VST Connections or set their device ports to “Not Connected” in order to make that port available.

Device ports that have been assigned to exclusive VST connections are denoted in the device port list in red and cannot be shared. If you select this port for another VST connection, it will break the current connection. A dialog box will open shown in Figure 4.28, indicating that the selected port is already in use. You can continue and break the previous connection or cancel the operation.

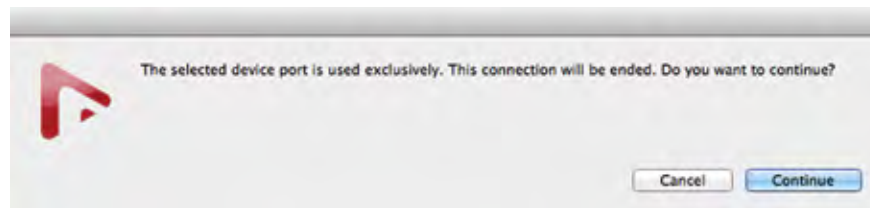


Figure 4.28
Device Port
sharing
warning

Control Room and the Studio Tab

The features of Nuendo’s Control Room Mixer are valuable for day-to-day use in a real studio environment. The ability to listen to external sources, route headphones and talkback signals to various cue outputs, and manipulate speaker configurations and calibrations adds a great deal of functionality all within the software.

Think of Control Room as a secondary mixer, with its own set of inputs and outputs, that controls monitor sources, external inputs, the talkback along with speakers and headphones in the studio. Signals, such as Nuendo’s project mixer outputs, external sources (DVD, iPod etc.), talkback microphones and cue sends, are processed by the Control Room mixer and routed to the speaker and headphone systems.

The Control Room is scalable in its configuration. You can use as many or as few of its features as you need. Just like the other tabs in VST Connections, you add only the channels you need and nothing more. To enable the Control Room, go to the Studio tab in VST Connections and enable the power button for Control Room, as seen in Figure 4.29.

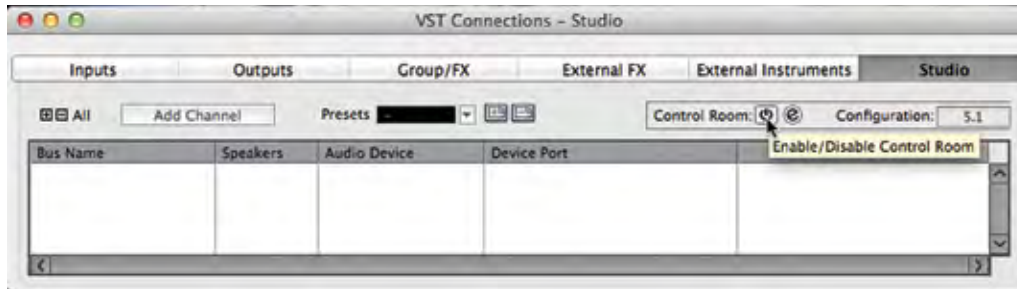


Figure 4.29
Studio Tab in VST Connections, enable Control Room

Control Room Overview

Initially, the Control Room Mixer will contain one Monitor output channel. A Monitor output channel is designed to be connected directly to a speaker system. You must have at least one Monitor channel for Control Room to operate.

Open the Control Room Overview from the Devices menu as shown in Figure 4.30. This window visually represents all of the Control Room channels and their current configuration. Highlighted items are active while grayed out items are not active but are available to add.

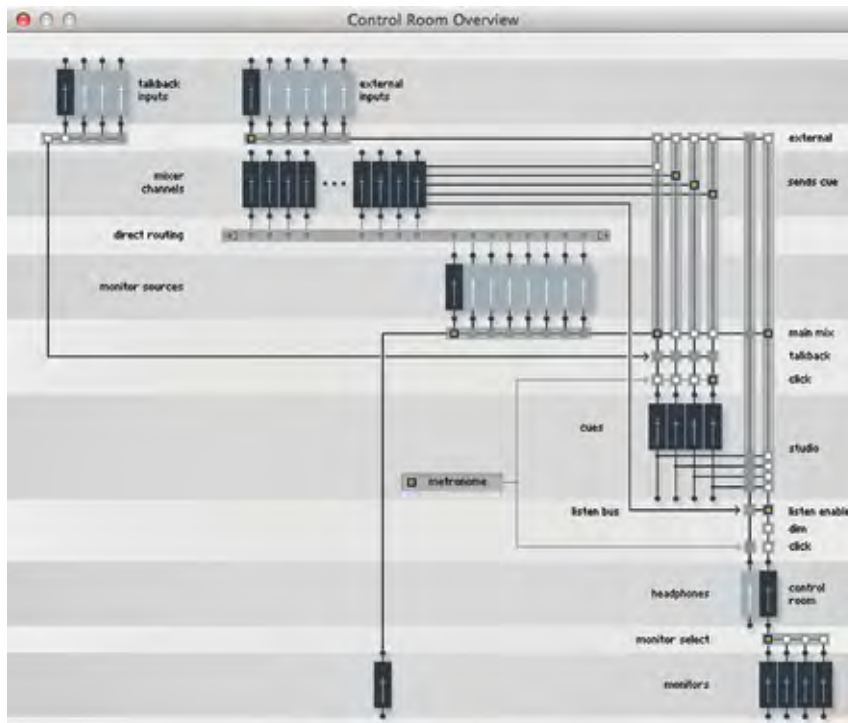


Figure 4.30
Control Room Overview

Control Room Channels

The following is a list of all the possible Control Room channels you can create.

Monitor	A monitor channel is connected to a set of speakers. Consider them speaker channels. All formats from mono to 8.1 channel surround and more are supported. Up to four (4) monitor channels may be created. They can share outputs if necessary and do not need to be the same channel configuration.
Headphones	One (1) dedicated stereo headphone channel is available. This should not be confused with the Studio channels that are designed to feed headphones or monitors for musicians and performers in the studio while recording. This headphone channel is primarily designed for the engineer to monitor sounds in the control room, including the Listen bus.
Cues	The Cue channels are for performers to hear themselves and the rest of the mix during recording. There are four (4) stereo Cue channels available. They can be connected directly to headphone amplifiers, multi-channel headphone systems such as the Aviom or even a set of speakers in the recording studio.
Meter Channel	This output should be connected to an external metering device such as a Dorrrough meter. It cannot be removed from the setup and has its own channel configuration.
External Inputs	External Input channels allow you to listen to other sources outside Nuendo. This is handy for listening to CD and DVD players or perhaps a smartphone. There are eight (8) External Inputs available in formats up to nine channels wide (8.1 Cine).
Talkback	Four (4) talkback channels can be created, which allows the engineer and producers to communicate with performers in the studio and provides useful functionality such as dimming the main speakers when the talkback is on and auto-off during recording.

Monitor Sources Monitor Sources are signals created by the Nuendo Project. The VST Output designated the Main Mix is the default monitor source. You can create additional sources from any VST Input, Group channel or other VST Output in the currently active project mixer. You can define up to eight (8) monitor sources in a project. These choices are saved with the Project file and change with each active project.

You can add various channels to the Control Room by using the Add Channel button found in the Studio tab. Choose the type of channel you wish to add and a dialog will open up that allows you to name the channel and choose a channel configuration.

Once you have added all your desired channels, you can assign device ports to each one just like other VST connections. This is where things can get a bit confusing as many VST connections can share device ports.

For example, if you have a VST Output from the project connected to device ports 1 and 2 and a Control Room Monitor also connected to device ports 1 and 2, then those signals can both go to the device ports at the same time. This can cause overloads in the output converter and improper signal levels. If possible, have all VST Outputs “Not Connected” when using Control Room to prevent accidental level increases.

Main Mix Control Room Configuration

The Control Room has an overall channel width configuration (stereo, 5.1, etc.). This is determined by the channel configuration of the Main Mix of the active project. The current configuration is displayed at the top right of the Studio tab in VST Connections. The example below shows a well-populated Control Room preset for film dubbing. Notice the configuration of the Control Room matches that of the Monitor Source “5.1 Main Mix” as shown in Figure 4.31.

Device Port Sharing in Control Room

All channels in the Control Room, with the exception of Monitors, use exclusive device ports. This means that once you assign a particular device port to a Control Room channel, it will not be available to any other VST connection.

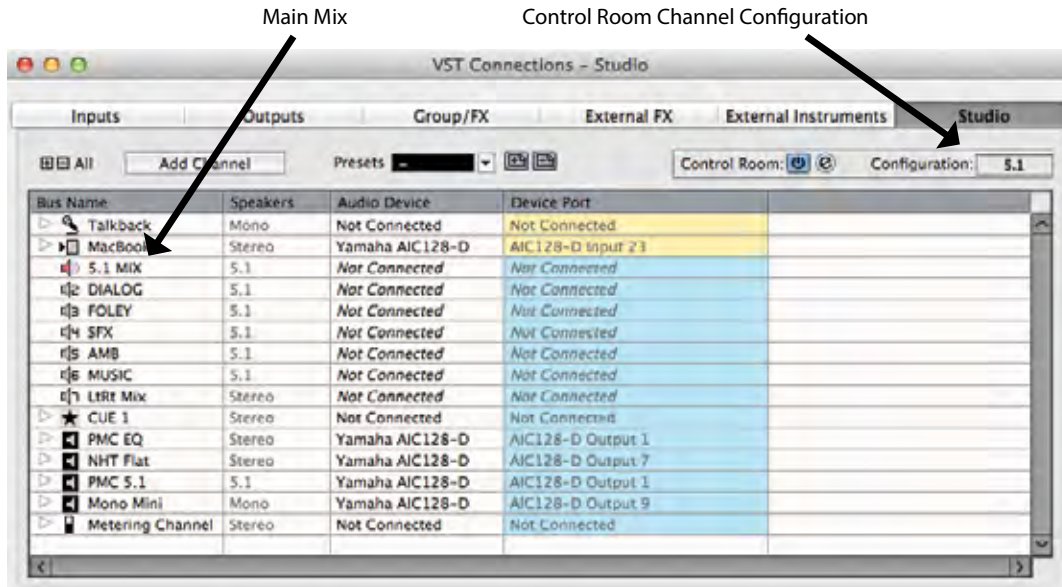


Figure 4.31
Control Room
configured for
film mixing

For Monitor channels, there is a preference to choose whether or not they use exclusive device ports. This helps avoid the issue of the Main Mix and Monitor outputs sharing device ports and causing signal overloads and improper monitoring. Preferences>VST>Control Room>Exclusive Device Port for Monitor Channels.

On the other hand, it can be helpful for surround speaker systems to share device ports between Monitor Channels so that you can create a stereo monitor pair from the main left and right speakers in a surround setup. This makes it possible to change from a surround system to a stereo playback system using the same speakers. This is similar to the child bus concept for VST Outputs.

To create a stereo Monitor using shared device ports from a surround speaker system, follow these steps:

- ❖ Create a 5.1 Monitor channel and assign it to device ports that are connected to the corresponding speakers.
- ❖ Create a stereo Monitor channel and assign it to the same device ports as the main left and right speakers of the surround Monitor channel.

You can now switch easily from surround - to stereo monitoring using the same speaker system. Operation of the Control Room Mixer is covered in the next section.

BE CAREFUL WITH VST OUTPUT ROUTING

Trouble can arise if you inadvertently assign a VST Output bus (especially the Main Mix) to the same device ports as a Monitor channel. This results in both signals being combined on the shared device port. If the Main Mix bus is assigned to the same device ports at the current Monitor channel, a doubling in volume of the sound will be heard at the output of the audio interface potentially causing harm to speaker systems and your hearing. Also, none of this clipping will be visible in Nuendo's meters since it is taking place at the audio interface and not inside Nuendo.

To avoid this possibility, go to Preferences>VST>Control Room and check the option for "Exclusive Device Ports for Monitor Channels."

CREATING CONTROL ROOM SETUP PRESETS

Create a preset for your Control Room Setup in the Studio tab. This makes all of the complex settings in Control Room recallable. You might create two presets, a simple setup for stereo music recording with more studio channels and then a more complex surround setup for film mixing. Control Room channels take up system resources so only use the channels that you need. Flexibility is the idea here.

Control Room Mixer

The Control Room Mixer allows you to adjust every channel you have created in the Studio tab of VST Connections. It expands or contracts depending on the type and number of Studio channels you have made. Just like the project mixer, portions of the GUI can be hidden from view to save space if not being used.

The Control Room Mixer can be viewed in several locations: in its own window, at the right side of the Project Mixer and at the right side of the Nuage screen above each fader unit. Its appearance is the same in all three locations. There are two main views of the Control Room accessed from two tabs at the top.

- ❖ Control Room: This view has controls for all Control Room channels.
- ❖ Meter: This view displays the Control Room Main Meter.

Each view has two panes accessed from tabs at the bottom. The Meter modes will be discussed later. The Control Room panes are:

- ❖ Mixer: This pane offers controls for normal use.
- ❖ Setup: This pane offers access to more parameters, including inserts.

Each section in the Control Room mixer has separate controls that are only visible when that section has been expanded. Clicking on the section name will expand the available controls. These sections appear in both the Mixer and Setup panes.

Mixer Pane

Clicking on the Mixer tab at bottom puts the interface in its standard operating mode for everyday use: the Mixer pane.

External Inputs Section

Starting at the top, if you have more than one External Input defined, then the External pane will be shown. The only control in this pane is a pop-up menu that lets you choose which external input signal to use as shown in Figure 4.32.

Cues Section

Next, the Cue 1 pane has been expanded.

The source for each Cue can be either the Mix source, External or the Cue buss (1-4) from Nuendo's project mixer.

Channels Section (Speaker channels)

The next section is called Channels shown in Figure 4.34 and has to do with the various speaker channels in a surround system. Here, you can solo individual speaker channels and route the rear speakers to the front, among other things.

MIXCONVERT ACCESS

If you double-click in the black area between the speaker channels, you will open up the MixConvert settings for the current down mix. Here you can make adjustments to the downmix to suit your needs.



Figure 4.32
External input pane with popup input select



Figure 4.33
Cue 1 Control Room detail

Talkback controls
Click controls

Cue output level
Output meter



Figure 4.34
Channels section of the Control Room Mixer

Downmix Presets Section

When working in surround sound, it is helpful to be able to preview your mix in stereo. This requires a “downmix” of signals from 5.1 channels to two. Nuendo provides a downmixing process called MixConvert that does this automatically as needed. This pane allows you to switch between various downmixing presets. This is the same as checking your mix in mono for music mixing, just with more channels. There are four downmix presets available as shown in Figure 4.35.



Figure 4.35
Downmix
Preset Pane and
corresponding
MixConvert
settings

Monitors Section

The Monitors section allows you to switch between various speaker systems in your Control Room setup. There are four possible Monitors designated A, B, C and D. Beneath the selector is a meter that shows the actual output level for the current volume setting.

Phones Section

If you have a Phones channel defined, it will be beneath the Monitors section. By default, the source select, level (green knob) and click enable control are always visible. If you expand the section, level and pan controls for the click and Listen bus are displayed in Figure 4.37. The Listen bus is for soloing in AFL/PFL mode, discussed later.

Main Section

At the bottom is the Main control room section, with the large, red level control used for the overall level of your monitors.



Figure 4.36 Monitors Section with output level metering



Figure 4.37 Control Room Phones section



Figure 4.38 Control Room Main section

Here is a condensed collection of controls you would use most often.

- ❖ **Input Selector:** Main monitor source, external input and cue sends from the project mixer.
- ❖ **Control Room Level:** The actual output level sent to your monitor speakers (red knob).
- ❖ **Dim:** reduces the CR level by a preset amount so you can quickly lower the volume.
- ❖ **Reference Level:** A user-defined volume setting for calibrated mixing environments, mostly film and broadcast mixing.
- ❖ **Click Enable:** This routes the built-in click sound to the selected speakers.
- ❖ **Monitor Select:** Quickly choose from up to four speaker systems.
- ❖ **Downmix Preset:** Toggle between four downmix presets.
- ❖ **Talkback:** Activate the primary talkback input.
- ❖ **Talkback 2:** Up to four talkback inputs can be added, each of which will have a separate enable button.

- ❖ **Talk Off:** Deactivates all talkback inputs at once.
- ❖ **Click Mix:** Pan and volume for the click
- ❖ **Listen Bus:** Switch between AFL and PFL solos, enable Listen bus output, Listen bus level.
- ❖ **Talk Dim:** Reduces the CR output level by this amount when the Talkback is turned on.
- ❖ **Listen Dim:** Reduces the CR output level by this amount when one or more channels are routed to the Listen bus.

Setup Pane

There are some additional controls and options for each Control Room section visible when you enter the Setup pane by clicking the Setup tab at the bottom. Once again, you must click on each section to expose all of the options.

Talkback Setup

When you enter the setup view, the Talkback setup section becomes visible. There are eight insert slots available for plug-ins. For example, you could insert a compressor on the Talkback channel to ensure that everyone can be heard over the talkback microphone as shown in Figure 4.39.

Beneath the inserts are a level meter and input gain adjustments for fine tuning the talkback signal.

External Setup

Each External input has six available inserts, a phase/polarity switch, and an input gain setting as shown in Figure 4.40. Selecting a different External input will access its individual settings.

Cue Setup

Each Cue channel has eight available inserts.

Monitors Setup

Each Monitor channel has eight inserts, phase, and input gain as seen in Figure 4.41. The setup controls correspond to the currently selected Monitor. Switching Monitors in the Main section will change the inserts seen in the Monitor setup.



Figure 4.39 Talkback setup with a compressor inserted



Figure 4.40 External Input setup switching

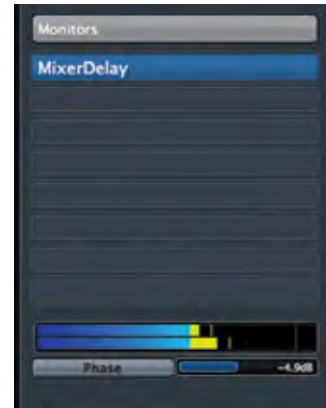


Figure 4.41 Monitors Setup with IK Room insert

The Monitor inserts could be used for room correction equalization. Certain speaker systems can require corrective EQ to flatten the room response. There are various third party plug-ins designed to do this by measuring the response with a calibrated microphone and applying a corrective EQ curve with a plug-in.

The insert slots of the Monitor in Control Room are the ideal locations for this type of processing. That way, the corrective EQ is only applied to the signal feeding your monitors and not to the mix itself. When you switch to another set of speakers in Control Room, the inserts are unique so this corrective EQ will only be applied to the one set of speakers where it is required.

Another option would be to insert a bass management plug-in for use in a small surround sound system with a shared subwoofer. It should be noted, however, that the Nuage I/O interfaces have built-in bass management functions available that do not use any CPU processing power.

In most other DAWs, this type of processing must be inserted on the mix bus itself and needs to be bypassed in order to output a proper final mix. Since the Control Room Mixer is a totally independent mixer from the Project mixer, there is no need to bypass its processing during export.

Phones Setup

The Phones channel has eight inserts.

Main Setup

The Main channel also has eight inserts. The first six inserts are positioned before the Control Room Level while seven and eight are after the level control. The pre-fader inserts could be used for metering plug-ins or spectral analyzers as seen in Figure 4.42 while the post-fader inserts could be used for a protective limiter set to prevent overdriving a speaker system.



Figure 4.42 Main setup with Span inserted showing the spectrum analyzer

The Listen Bus (AFL/PFL solo)

Typically, most DAWs use a form of solo known as Solo-in-Place (SIP). It works simply by muting all other channels in the mixer that are not in solo, leaving that channel by itself. However, this interrupts all of those signals from continuing on to the mix bus, aux sends, and other routing, which may or may not be a good thing. For example, soloing a channel to check a problem during a live broadcast would interrupt the entire mix and that is just not acceptable. This is where the Listen Bus can be helpful.

Traditional analog consoles have another form of solo that uses a dedicated bus to route solo signals to the monitors without affecting the mix of all channels together. A channel placed in solo has its signal routed to this dedicated bus and the monitors are switched to the solo bus as the source. Now you will hear this one signal by itself in the speakers but the complete mix continues uninterrupted. This signal could be taken either before the channel fader (PFL) or after the channel fader (AFL).

This functionality was needed in the DAW environment. The Listen Bus is Nuendo's answer to the need for AFL/PFL solos with some added functionality only a digital system can provide. Listen-enabled channels are routed directly to the Control Room either AFL or PFL. What's different is that the whole mix can be added to this solo bus to keep soloed sound in perspective with the overall mix while still bringing it forward for closer examination. Imagine soloing a channel and just having the whole mix dim down 6 dB under the soloed channel?

The real world application of this is that you can solo any channel in the mixer and have it be prominent in the monitors while still hearing the entire mix at a certain level below that, thus bringing that sound "forward" but not completely out of perspective with the other parts of the mix. This helps when making equalization choices and other adjustments that relate better to the mix as a whole. No more EQing in a vacuum. Plus the Listen Bus is separate from any mix bus, allowing you to solo channels without interrupting the mix in a live or broadcast situation.

SOLOING REVERB RETURNS

One application of the Listen Bus is soloing reverb and other effects returns. Using Solo-in-Place to solo the reverb return ends up muting all the tracks feeding that reverb bus so you won't hear anything. Using the Listen Bus, you can solo up just the reverb sound by itself, which is very handy for making EQ adjustments that help the reverb fit in the mix better.

Control Room with Nuage Hardware

One main advantage that the Nuage Master unit provides is access to all the Control Room functions with dedicated hardware controls. Adjusting Control Room level and speaker selection are two of the most common tasks performed by audio engineers. Providing hardware access to these common functions improves workflow and ergonomics.

The Control Room level is placed in the center of the Master Unit shown in Figure 4.43, with a clear numeric readout of the level in dB. To the left, the Monitors can be switched along with the downmix preset. At right are the Monitor Sources and External inputs. The four Cues are to the very right. They can be quickly enabled or muted.



Figure 4.43
Master Unit
Control Room
sections

Headphones Channel

Pressing the Phones button switches the controls to the Headphones channel. You can choose any Monitor Source or External Input to monitor on the Headphone channel while the main monitors listen to another source.

A headphone icon will appear in the numeric volume display to indicate the Headphone Channel is selected. Changes made to the Control Room or Monitor Source sections now affect the Headphones channel only. For example, the Headphones could be listening to an external input while the Main Monitors could be listening to the mix from the project mixer.

Control Room Touchscreen

The rest of the Control Room functions are found on the touchscreen when the blue Control Room section button is lit as seen in Figure 4.44. The Main page has controls for the Phones and Control Room channels including click track level and pan, solo mode (SIP, AFL, PFL), and meters.

The Speaker Control page allows you to switch between the four Monitors and control the downmix preset that is applied. For surround Monitors, you can use the graphic representation to solo individual speaker channels such as the center channel as seen in Figure 4.45.



Figure 4.44
Main touch-screen page



Figure 4.45
Speaker Control page

The Inserts page gives you access to all the insert slots available for all the Control Room channels. Press the channel along the top row and the insert slots for that channel are displayed on the screen as seen in Figure 4.46. You can add and edit plugins right there on the touchscreen.



Figure 4.46
Control Room
Inserts page set
to Main
channel

MIDI Connections

MIDI connections are handled in much the same way as audio connections in Nuendo. You can manage the input and output ports and then configure various MIDI devices that use these ports similar to VST Connections and audio device ports.

MIDI Port Setup

MIDI connections are accessed from the MIDI Port Setup found under the Devices menu. Similar to the VST Connections window, all the available MIDI ports are listed here. You can rename them by clicking in the “Show As” field and typing in a new name.

Unless you have an extensive vintage MIDI keyboard collection, most MIDI setups are relatively simple. In this system, besides the virtual Nuage MIDI ports, there are only two other devices having a total of three MIDI inputs and two MIDI outputs shown in Figure 4.47.



Figure 4.47 MIDI Port Setup

Here's a description of each MIDI port in the example system shown in Figure 4.47. Every Nuage system will always have the four Nuage MIDI ports:

- ❖ **Axiom 61:** This M-Audio MIDI controller has 61 keys plus 8 drum pads and a variety of knobs and sliders for use as MIDI controllers. The Axiom uses a USB interface to connect to the computer directly so no MIDI interface is needed. The two MIDI inputs are for the keyboard itself and the second for its own MIDI-In jack that can be used to accept incoming MIDI from another external device. The output port goes directly to the MIDI-Out jack as the controller itself has nothing to control with MIDI. It does not generate any sounds.
- ❖ **Nuage MIDI 1-4:** These ports are created by the Nuage Workgroup and are used for Pro Tools workstation control.
- ❖ **Network MIDI:** It is possible in OS X to create a network MIDI port for use between multiple workstations on the same network. Synchronization of two workstations using MTC over this MIDI connection is a common purpose for Network MIDI ports.

rtpMIDI

For Windows workstations, rtpMIDI is a free driver for creating compatible network MIDI ports for Windows operating systems. These network ports can connect to Apple computers and other devices such as iPads, Android tablets, and more. Visit: <http://www.tobias-erichsen.de/software/rtpmidi.html>

If there are MIDI ports that you do not intend to use, you can hide them by unchecking the port in the Visible column. Making a port invisible will also disconnect it from anything in Nuendo.

'All MIDI Inputs' Option

The checkbox for *In 'All MIDI Inputs'* determines if that port is included in this special MIDI input option for recording. If a MIDI track uses 'All Inputs' as its input source, MIDI data from these selected inputs will be merged and recorded together onto the MIDI track. In the MIDI Port Setup above, note that the Nuage ports are not selected to be part of 'All MIDI Inputs' as the data from those ports would not be recorded on a MIDI track.

This can be useful, for example, when using more than one MIDI controller to program drums. A normal keyboard could be used for most of the drums while a separate MIDI triggering device could be used for foot-operated triggers for the kick drum and hi-hat performance. The 'All MIDI Inputs' will merge the data from both controllers onto the MIDI drum track.

BE CAREFUL WITH CONTROL SURFACE CONNECTIONS

It is best not to include ports connected to MIDI control surfaces (such as HUI, Nuage, Euphonix, etc.) that you are using to adjust the mixer or plug-in settings, as that data could get recorded on a MIDI track along with the relevant keyboard controller data you intend to record. Uncheck the 'All MIDI Inputs' boxes for these devices to avoid this problem as shown in Figure 4.47.

MIDI Device Manager

Once you have your MIDI ports set up, you can create MIDI devices for each external MIDI module you have connected. These devices can be associated with External FX or External Instruments for MIDI control over these external devices. MIDI devices can be anything from keyboards and external processors to digital consoles and MIDI control surfaces. Once

created, these devices are used in Nuendo to connect MIDI tracks and controls to and from the device.

For example, I often use a vintage Line 6 Echo Pro rack mount delay unit for mixing. It is MIDI capable, and every parameter of the unit can be controlled by MIDI from Nuendo. Also, I am able to store settings from the unit as system exclusive data in a Nuendo project for later recall.

For every external device connected via MIDI to Nuendo, you should create a MIDI device that represents it. Follow these steps to create a new MIDI device in the MIDI device manager.

1. Open the MIDI Device Manager from the Devices menu (Fig 4.48).
2. Press the Install Device button and the Create MIDI Device dialog will open showing you a list of common brand name devices to choose from (Fig 4.49).
3. If your device is listed, select it and click OK as this will load a pre-configured device of that kind.
4. If the device is not listed, select "Define New..." and the Create New MIDI Device dialog will open (Fig 4.50).
5. Click in the name field and enter the name of the device.
6. Click on all available MIDI channels in the Identical Channels box that the device will use.
7. Click OK to create the device. Its Device window will open showing the available MIDI channels (Fig 4.51).
8. Back in the MIDI Device Manager, you will see the new device listed. Click on it and you will see the MIDI output pull-down menu. Choose the MIDI port that is connected to the new device (Fig 4.52).



Figure 4.48
Empty MIDI
Device
Manager

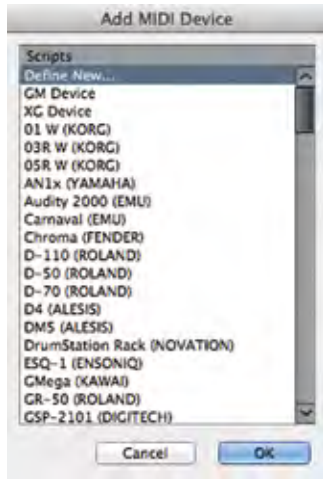


Figure 4.49
Create MIDI Device dialog



Figure 4.50
Create New MIDI Device dialog

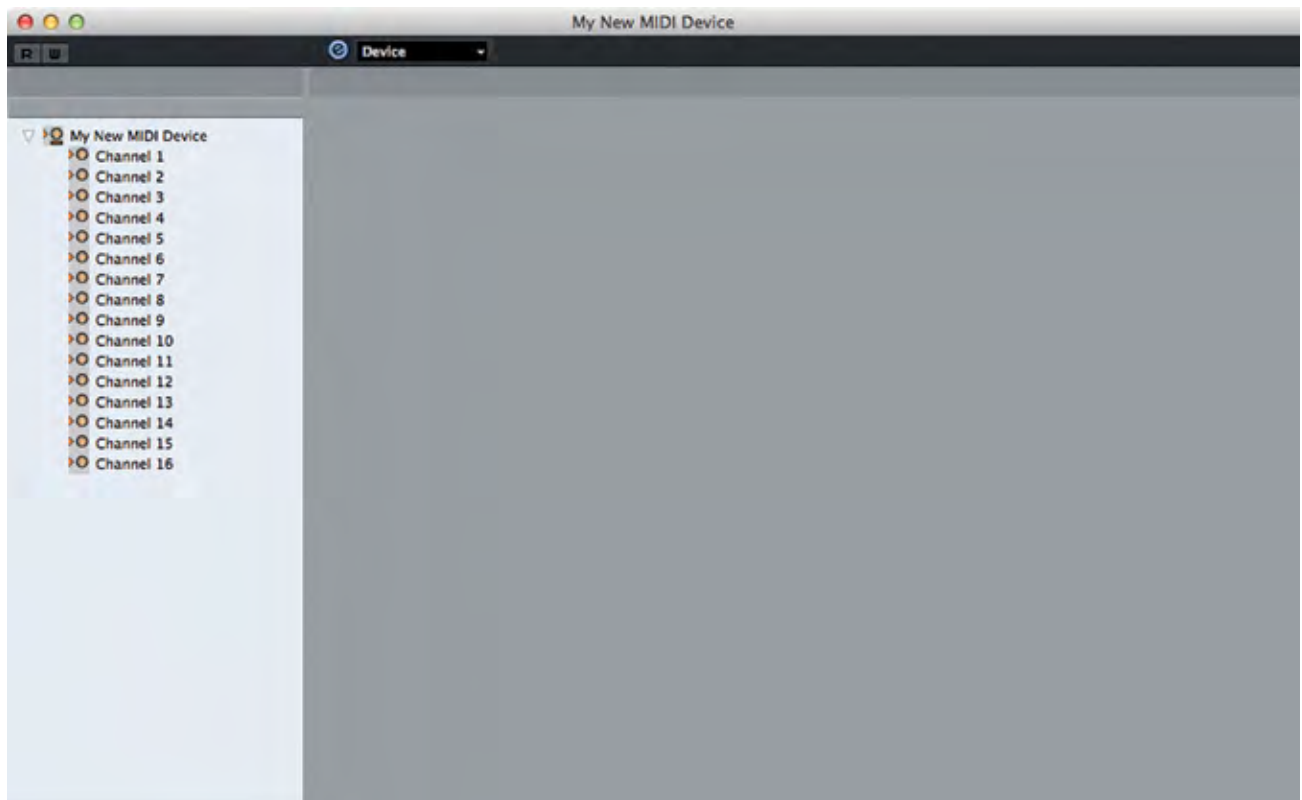


Figure 4.51 Basic 16 channel MIDI Device



Figure 4.52
MIDI Port Selection

Your MIDI device is now set up and ready to be used. Take a look at a fully configured MIDI device utilizing various “device panels” that allow complete MIDI control of the device from inside Nuendo (Fig 4.53).

This example gives you an idea of what is possible. Creating this amount of detail in a MIDI device is a complicated process that is outside the scope of this material. Understand that you can create custom “device panels” for MIDI devices that allow direct access to various parameters of your choice. If you wish to explore the creation of MIDI device panels, refer to Steinberg’s documentation on MIDI Devices contained in a separate PDF file with your install data. The creation of basic MIDI devices allows you to connect those devices to MIDI tracks easily by name as opposed to MIDI port.



Figure 4.53
Fully configured MIDI device for the TC Finalizer