

DiGiGrid

IOS-XL USER GUIDE



Table of Contents

Introduction	4
1. Getting Started	5
1.1 System Requirements	5
1.2 Registration.....	5
1.3 Software Installation.....	6
1.4 Licenses	6
2. Hardware	7
3. Suggested Uses And Configurations	9
3.1 One Computer with a DiGiGrid IOS-XL	9
3.2 Adding More I/Os to Your System.....	10
3.3 Multiple Computers with a Single DiGiGrid IOS-XL.....	11
3.4 Advanced Network: Multiple Computers and Multiple I/Os.....	12
4. Software Setup And Controls.....	14
4.1 Device Firmware.....	17
4.1.1 Resetting the Unit.....	17
4.2 Identifying a Device from the SoundGrid Studio Device Rack.....	17
5. Control Panel	18
5.1 Controls Page	20
5.1.1 Top Bar.....	21

5.1.2 Analog Section.....	21
5.1.3 Digital Section.....	24
5.1.4 Clip Indication and Small Meters.....	25
5.2 Clock Page	26
6. IOS-XL Server	28
6.1 Applications of an IOS-XL Server	29
6.1.1 eMotion ST mixer	29
6.1.2 StudioRack.....	30
7. Moving Audio in a Soundgrid Network.....	31
7.1 Using an I/O Device with a DAW	32
7.2 Patching I/O to Driver and Driver to I/O	33
7.3 eMotion ST Mixer Patching	36
7.4 Device-to-Device Patching.....	37
7.5 Headphone Patching.....	38
8. Using the IOS-XL with Midi.....	39
9. Technical Specifications.....	40
9.1 Installation Notes.....	42

INTRODUCTION

Thank you for choosing the DiGiGrid IOS-XL interface for SoundGrid systems. In order to get the most out of your product, please take some time to read this manual. We also suggest that you become familiar with our support sites, www.digigrid.net and www.waves.com/support, where you will find an extensive answer base, the latest tech specs, detailed installation guides, software updates, and current information about licensing and registration.

About SoundGrid and DiGiGrid IOS-XL

SoundGrid is a scalable infrastructure that provides a variety of cost-effective, high-quality solutions for studio production. It can be configured in many ways, with many hardware possibilities, to provide a very flexible work environment. This framework is managed by the SoundGrid Studio Application, which configures the network, assigns and manages I/Os, controllers and servers, and patches audio throughout the system. Any user, anywhere on the SoundGrid network, has access to all available network I/O devices. Adding a SoundGrid DSP server enables processing, recording, and monitoring.

DiGiGrid IOS-XL is an audio interface for native DAWs and Waves SoundGrid applications that run on a SoundGrid network. It has eight mic/line inputs and 8 line outs, along with the standard digital ins and outs. Like all DiGiGrid I/O devices, it can be used by the local host or by a remote audio workstation anywhere on the SoundGrid network. Since all IOS-XL features (even the preamp settings) are controlled remotely from the host computer, the IOS-XL can be placed in the live room or in the studio.

The IOS-XL's internal DSP server moves plugin processing from the host CPU, greatly increasing the number of plugins that can be used simultaneously. It also enables recording while monitoring in incredibly low latency.

By combining a DSP server with an I/O, the IOS-XL offers an all-in-one solution to many audio production challenges.

1. GETTING STARTED

Aside from setting up your microphone preamps, there's not much you need to know to begin working with your IOS-XL.

1.1 System Requirements

- SoundGrid Studio runs on Mac and PC (consult [Waves website](#) for current OS and DAW compatibility).
- Compatible native DAW (Logic, Cubase, Nuendo, Ableton, Pro Tools Native, and many more). A list of SoundGrid-compatible hosts is available at [Waves website](#).
- IOS-XL / SoundGrid Studio software installed on the host computer.
- Cat 5e or Cat 6 Ethernet cables.

1.2 Registration

To download IOS-XL software you will need to register your device at www.digigrid.net or www.waves.com. You must know the serial number of your IOS-XL in order to register it, so sign up before you mount it in a rack. The serial number appears on a label on the bottom of the unit or on a sticker on the box.

Once you register you will receive two emails:

- A notification that you can now download the installer.
- Instructions about authorizing your license.

1.3 Software Installation

After you register your new IOS-XL, you can download the installer from the Download/Hardware Drivers section of the [Waves website](#). Since SoundGrid enables you to access an I/O device from any computer in the network, you will need to install the software on each computer in the network.

The IOS-XL installer consists of:

- The IOS-XL I/O hardware driver.
- The SoundGrid ASIO/Core Audio driver, which serves as a bridge between the DAW and the SoundGrid network.
- The SoundGrid Studio Application, which manages all SoundGrid network resources and assigns devices to computers.
- StudioRack, a software plugin rack, or chainer, that hosts up to eight plugins and can move their processing from the DAW to the SoundGrid server.
- eMotion ST, a software mixer that provides low-latency plugin processing and monitor mixing.

1.4 Licenses

DiGiGrid Native I/O devices do not require a license to operate in a SoundGrid network. However, certain advanced features, such as using StudioRack and eMotion ST for low-latency recording and monitoring, or offloading processing from the host CPU, require a server and a SoundGrid license. This license is included with the purchase of IOS-XL.

When you register your device, the relevant licenses are deposited in your Waves account. Use the Waves License Center application to activate your licenses and install them on your computer or on a USB flash drive.

2. HARDWARE

IOS-XL is a 2U rack-mounted device. Aside from headphone jacks, all connections are from the rear panel.

IOS-XL Front Panel

Front panel LEDs indicate status regarding essential device functions for each channel.



- ① Input clipping Red = clipping (level can be set through the control panel)
- ② Input signal present Green = signal present
- ③ 48v phantom power Orange = ON
- ④ Network status indicator
 - Blue: Device recognized by the SoundGrid network
 - Red: Device not recognized by the SoundGrid network
 - Yellow: Updating
 - White: Unit malfunction (e.g., firmware did not load properly, unit did not boot properly)
 - Cycling through colors: This LED is also used to identify the unit from the control panel.
- ⑤ Power switch/indicator
- ⑥ Two ¼-inch TRS headphone jacks with individual volume control knobs;
8–600 ohms; gain = OFF to +15 dB

IOS-XL Rear Panel



- 1 Mains input: 90–240 V AC 50/60 Hz
- 2 Built-in 1GB Ethernet switch, four ports
- 3 USB port for server service and upgrades (used for technical support)
- 4 Recovery/reset button
- 5 MIDI in and out (can be linked to Waves applications and to DAWs)

Digital and clock connections: software selected

- 6 Clock in and out (BNC connectors for external Word Clock)
- 7 S/PDIF in and out (RCA connectors)
- 8 AES in and out (XLR connectors)

Analog connections

- 9 8 mic/line inputs (combo XLR/TRS connectors)
- 10 8 line out ¼" TRS connectors
- 11 Alt line out (DB25 8 channel balanced connector) See connection diagram in IOS-XL specifications section.

3. SUGGESTED USES AND CONFIGURATIONS

There are many ways to use your DiGiGrid IOS-XL. Your existing (or future) equipment, how you work, and what you need to accomplish are factors to consider when incorporating an IOS-XL into your studio. Project studios with one or two DAWs can share I/O resources, with any of the computers involved capable of claiming the server. Studios with several rooms and many DAWs can stream audio between rooms, quickly swap out devices, and assign DSP processing. But no matter how simple or complex your setup is, connecting an IOS-XL involves only one cable, an Ethernet Cat 5e or Cat 6.

3.1 One Computer with a DiGiGrid IOS-XL

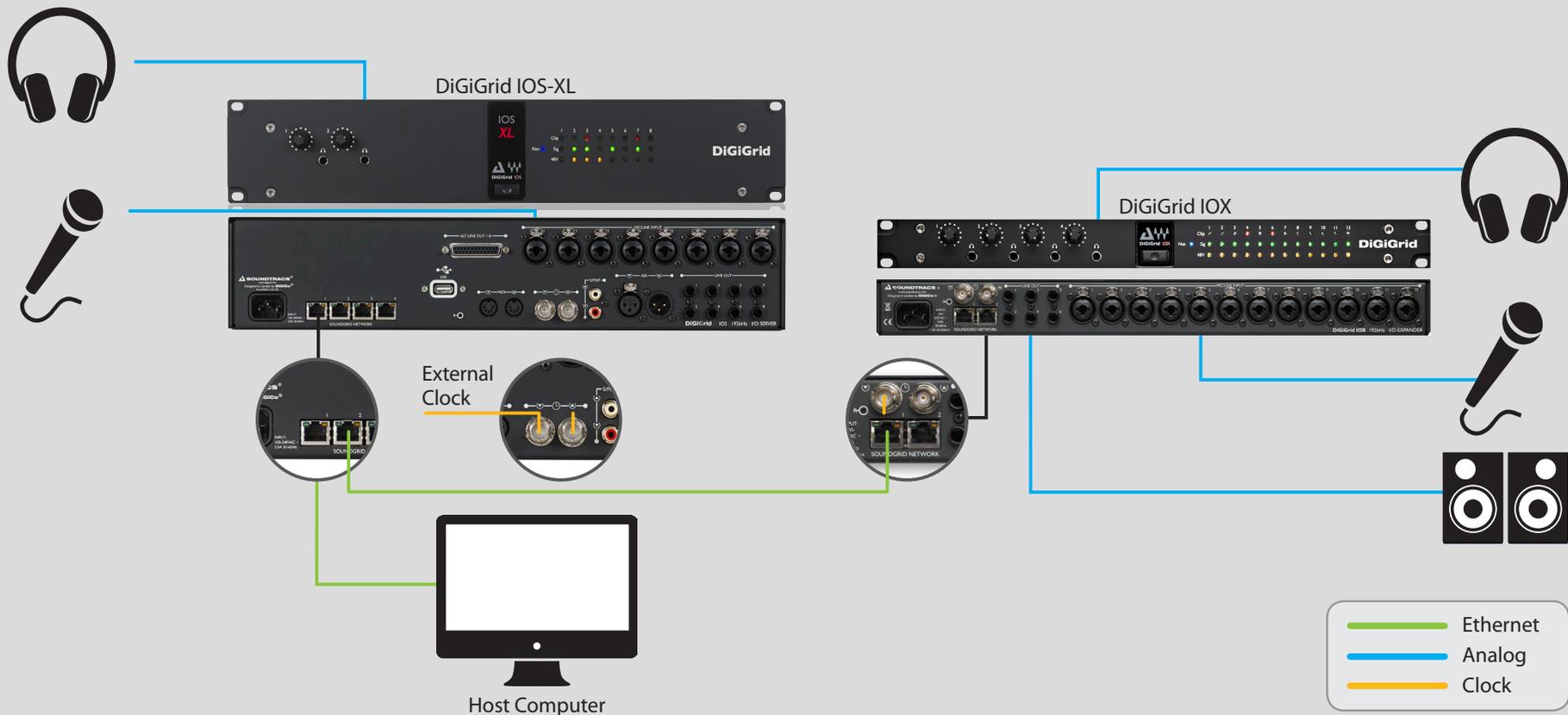
This is the most basic studio configuration. It includes a host computer with a native DAW and a single DiGiGrid IOS-XL that connects microphones, instruments, headphones, and monitors to the SoundGrid ASIO/Core Audio driver. This driver controls the network and all its devices. The built-in DSP server enables you to offload plugins processing from the DAW, greatly increasing the number of plugins you can use simultaneously. It also provides you with the eMotion ST mixer and Studio Rack plugin to create personalized monitor mixes with up to 72 inputs.



3.2 Adding More I/Os to Your System

Add a DiGiGrid IOX and you pick up another 12 mic inputs, 6 line outs, and 4 more individual headphone outputs. Connect the IOX to the built-in Ethernet switch on the rear of the IOS-XL. You can add up to eight SoundGrid I/O devices to a single host. Each of these can be accessed by any computer on the network.

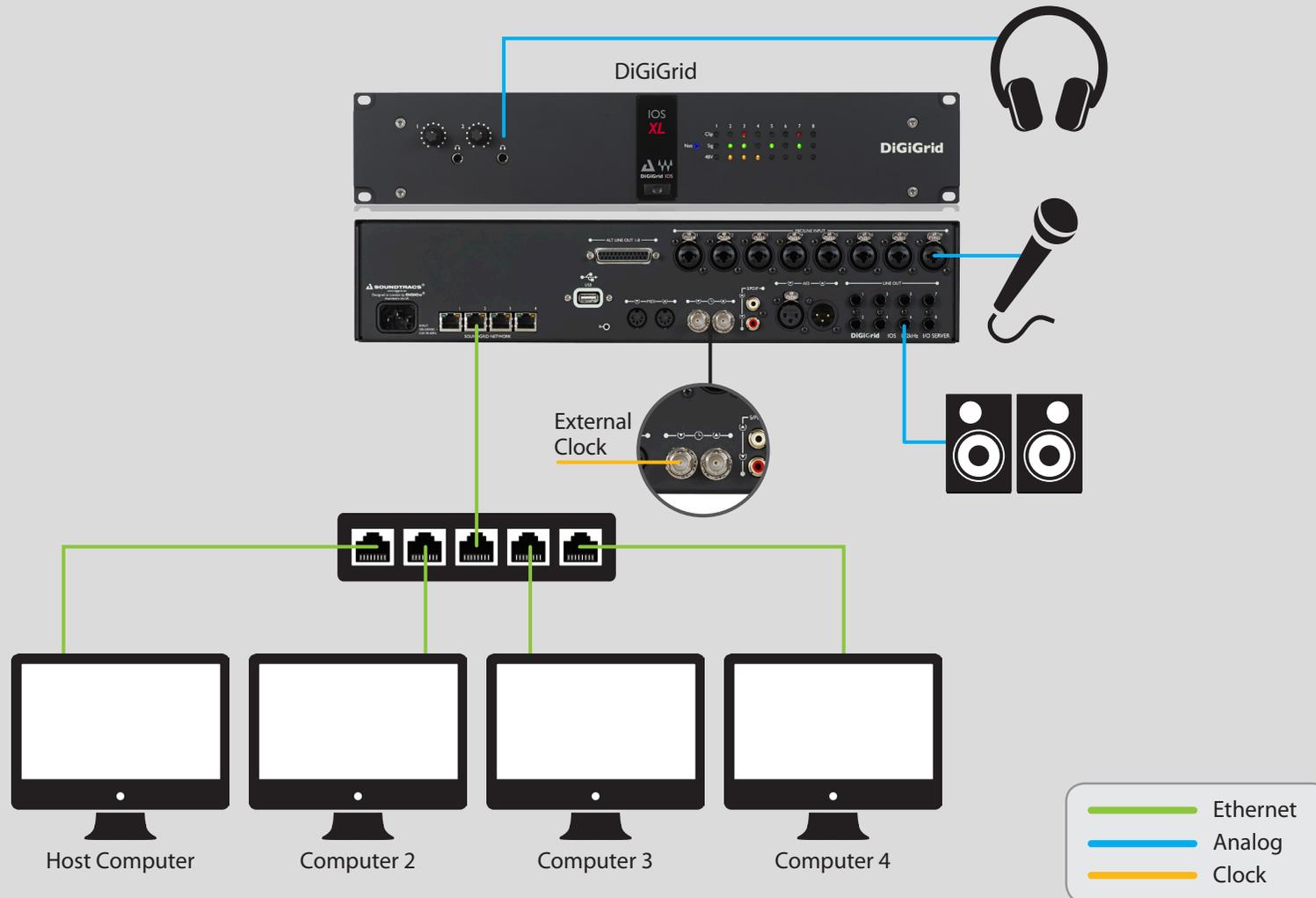
Audio and clock pass through the same Ethernet cable. This means of distributing clock is called “Sync over Ethernet” (SoE) and is used between all SoundGrid devices. To clock the entire network to an external clock source such as house sync, use Word Clock or Digital In as clock master for the IOS-XL. If the IOS-XL is the SoE master, then the entire network will be locked to this external source.



Adding more SoundGrid-compatible I/Os, such as DiGiGrid IOC, does not impact server performance. You simply gain more I/O resources.

3.3 Multiple Computers with a Single DiGiGrid IOS-XL

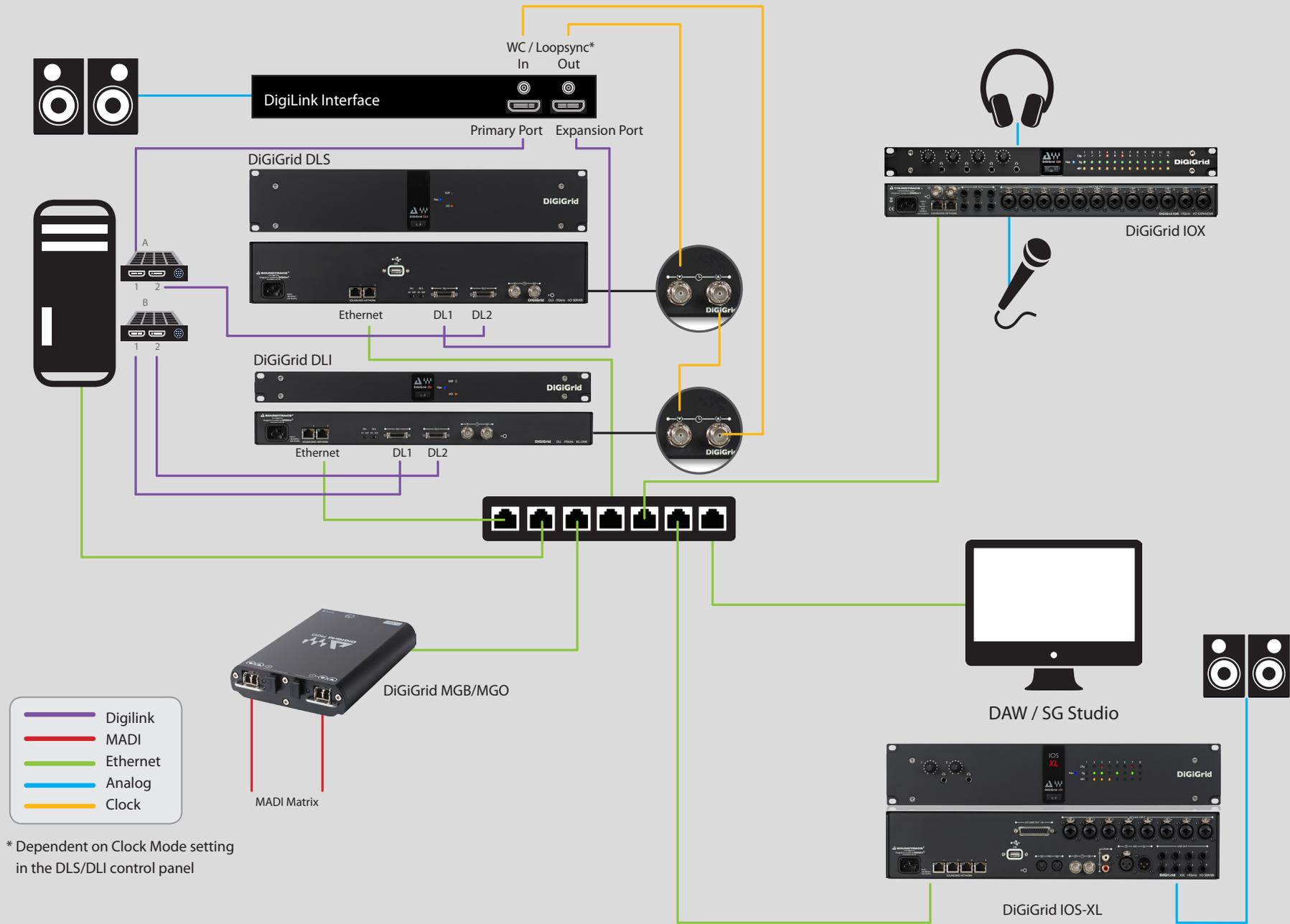
If you want to stream audio between several computers in order to combine multiple mixes or elements, connect several DAWs to one IOS-XL interface. Each DAW can send and receive an audio stream, and any computer can control the I/O. Any native DAW—or combination of different native DAWs—can be a part of this network, so each computer must have the IOS-XL software installed. Each of the additional computers is connected to the DiGiGrid IOS-XL's Ethernet switch via a single Cat 5e or Cat 6 Ethernet cable. Alternatively, you can use an approved external 1GB Ethernet switch.



3.4 Advanced Network: Multiple Computers and Multiple I/Os

This example shows how IOS-XL can be integrated into a complex studio network.

- A control/mix room equipped with a large Pro Tools HD/HDX system is connected to a SoundGrid network. Multiple DiGiGrid DLI units together supply 112 I/O channels to the HD system, with the DGS-XL providing a SoundGrid DSP server for plugin processing.
- Another DAW system with an IOS-XL can be used as a second control room system, an editing room DAW, or a recording station for the voiceover booth.
- A DiGiGrid IOX provides a live room or voiceover booth with 12 analog inputs and 4 separate headphone outs.
- A DiGiGrid MGB/MGO unit connects this network to a MADl source, for example a console or a MADl distribution system. Audio signals can be routed to the main or secondary system.



* Dependent on Clock Mode setting in the DLS/DLI control panel

4. SOFTWARE SETUP AND CONTROLS

A SoundGrid network is managed by the SoundGrid Studio Application. This application assigns and removes devices, oversees the network, patches between devices, and provides access to device control panels.

To maintain network effectiveness, the SoundGrid Studio Application always runs in the background. Bring SoundGrid Studio to the front by clicking on the SoundGrid icon in the Mac Top Bar or the Windows System Tray.



PC

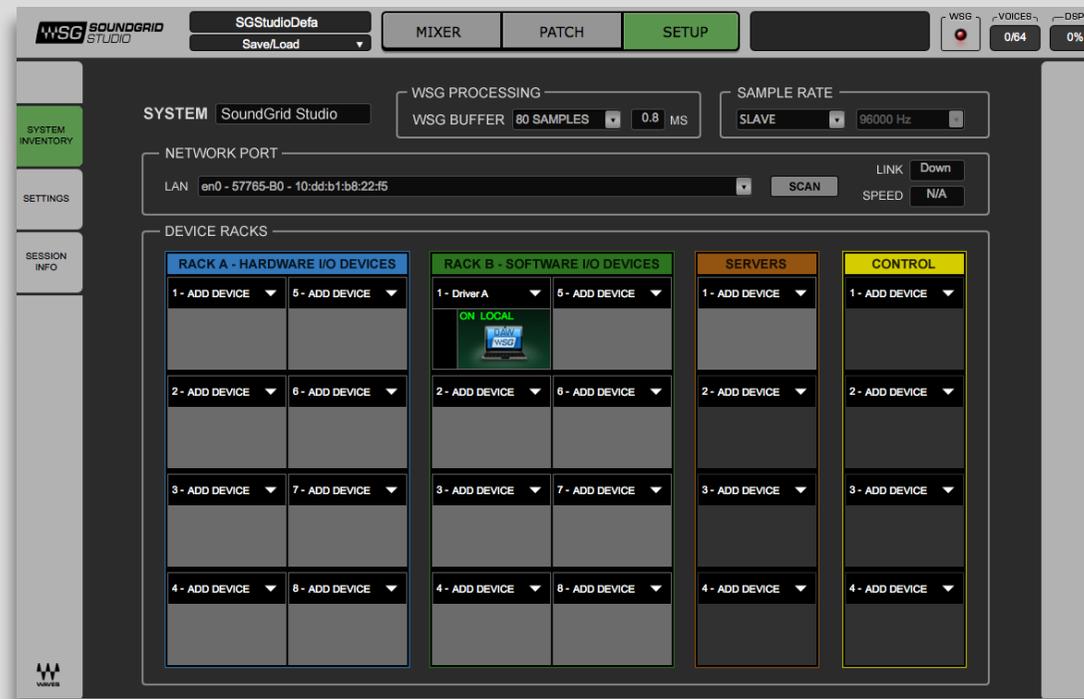


Mac

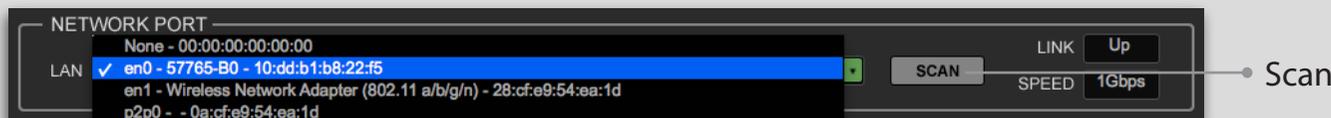
Mixer
Patch
Setup

Quit

When SoundGrid Studio opens you will see the System Inventory page, part of the Setup section.



The first time you launch SoundGrid Studio, the Wizard will open. It scans the network, inventories its assets, and then configures the devices. If the Wizard does not start automatically, click the SCAN button, which is next to the Network Port window.



Once it has scanned the system, the Wizard will offer to configure the SoundGrid network. A drop-down menu provides a list of configuration templates. Choose a template that best describes your hardware devices and production needs. You can save and load your own templates. Choose "NEXT" to start automatic configuration. This will take a few moments. Choose "CANCEL" to configure manually.

If the Wizard cannot locate the requested SoundGrid network devices, this means you may have chosen an incorrect network port on your computer. Check the physical connections, then click SCAN. When configuration is complete, close the window. If there's still a problem, you can use the System Inventory page to assign devices, control the network, and manage clock. To learn how to use this page, please refer to the SoundGrid Studio Application user guide.

SoundGrid Studio uses Ethernet to stream audio between devices on a SoundGrid network. Clock synchronization is also carried over Ethernet. This method of providing clock is called Sync over Ethernet (SoE). SoundGrid I/O devices can clock by other means as well, but SoE is by far the most common (and convenient) way to provide clock information to network devices.

In the SoundGrid Studio Setup page, you will see racks containing all of the devices assigned to your system: physical and virtual I/O devices, drivers, and servers. Each I/O rack slot displays the device's mode, clock status, and sample rate. In this example the IOS-XL is the SoundGrid network's clock master device, indicated by its blue color and the icon text: On, Master Clock, INT (48 kHz).



To add another SoundGrid device, click on the arrow in an empty rack slot. From the list of available devices, choose the one you want to add, in this case, a DiGiGrid MGB coaxial MADI interface. In this image the IOS-XL is grayed out, and therefore unavailable, since it is already claimed (in this case, by you).



The new device is visible in the rack slot. Unless changed by the user, it remains a clock slave and is colored green. Use the same menu to change the clock master assignment from one device to another or to remove the device from the rack slot.

4.1 Device Firmware

Firmware is a small program that runs on a device in order to control it. It enables IOS-XL to communicate correctly with SoundGrid Studio. An I/O that is using outdated or incompatible firmware will not work properly in a SoundGrid network until its firmware is updated. To see if your IOS-XL firmware is compatible with the version of SoundGrid Studio that you are currently running, go the System Inventory page and locate the device. Next to each device slot is a button labeled FW, whose color indicates firmware status.

Grey	Compatible firmware
Blue	Compatible firmware, but a newer version exists
Red	Firmware not compatible and must be updated in order to use



Click on the FW button to launch the firmware Updater. This will initiate a scan of the hardware and then offer options. Do not disconnect the device or turn off the computer until you see “Done.” After updating, turn the IOS-XL off and back on to reset the device.

4.1.1 Resetting the Unit

If an unsuccessful firmware update results in the IOS-XL no longer being recognized by MultiRack or SoundGrid Studio (the IOS-XL device is not showing in the inventory panel), you can use the Reset button to try to recover the unit.

The Reset button is on the IOS-XL rear panel.

- Turn off the unit.
- Press and hold the Reset button.
- Restart the unit while holding the button.
- Release the Reset button once the device has fully booted.

The unit is now in “force update” mode, and a new firmware update can be performed.

4.2 Identifying a Device from the SoundGrid Studio Device Rack

Just below the FW button is an **ID** button. Clicking on this button activates LEDs on the front panel of the hardware device. This serves the same function as the **Identify** button on the Control Panel Top Bar.

5. CONTROL PANEL

Access the IOS-XL Control Panel by clicking on the **Gear** symbol in the SoundGrid Studio Device Rack.



From the IOS-XL Control Panel you can manage:

- Clock settings: source, sample rate, type, clock status
- Microphone preamp controls: input gain, phantom on/off
- Output levels
- Sample rate conversion of digital inputs

In addition, there are input and output meters.

Top Bar

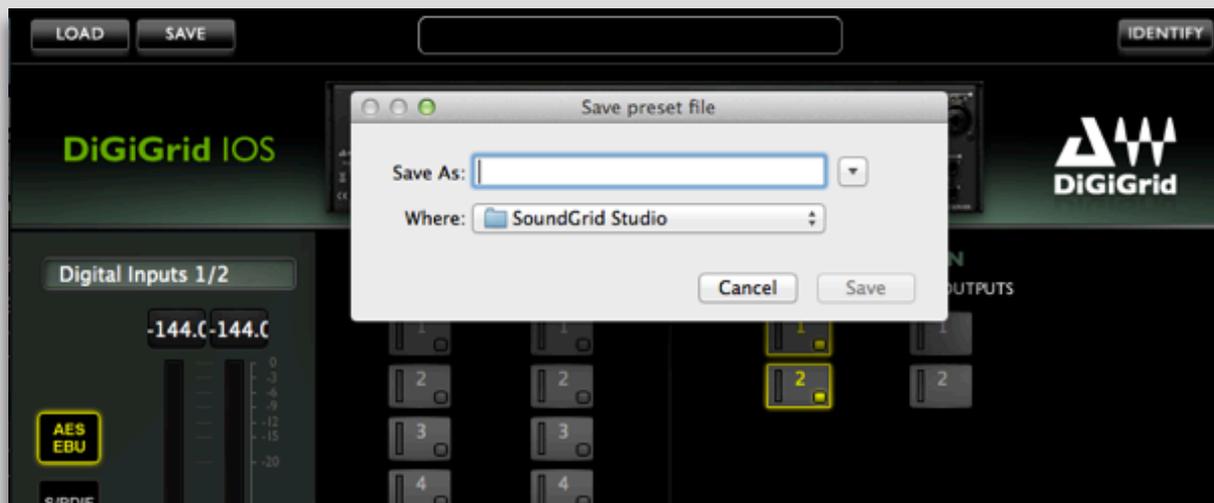
At the top of each Control Panel page is a banner used to load and save device presets and to identify device hardware.



Use the **Identify** button to determine which IOS-XL hardware device belongs to this Control Panel. Clicking the button causes the Network LED on the front panel of the IOS-XL to flash in a rather psychedelic manner.

You can save and load presets of device settings.

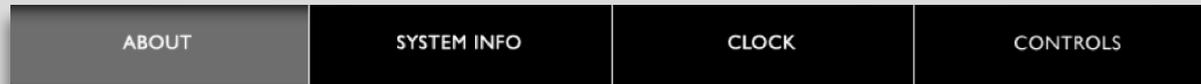
A saved preset includes all Clock and Control panels parameters. Use IOS-XL presets to use on future sessions or copy them to another computer to duplicate a configuration.



To save a preset, click the SAVE button and choose a name and path.

Loading a saved preset is equally obvious. Device presets are also saved as part of a SoundGrid Studio Application session. Refer to the SoundGrid Studio Application user guide for more information.

There are four pages on the IOS-XL Control Panel:



The **About** and **System Info** pages provide information about the unit, such as MAC address, SoE master MAC Address, firmware version, and more. The **Clock** and **Controls** pages are used to set up and manage the IOS-XL.

5.1 Controls Page

This is where you configure the inputs and outputs of the IOS-XL. Mic preamps, line inputs and outputs, digital I/O, level control and metering: all of the things you'd expect from a top-end I/O.



The Controls page is divided into four sections:

- 1 Top Bar
- 2 Analog section
- 3 Digital section
- 4 Focus section:
Analog and Digital input and output levels are controlled from here.

5.1.1 Top Bar

The Top Bar of the Controls page includes an illustration of the IOS-XL rear panel. When an input or output is selected in the main section of the page, the corresponding connector is highlighted.



5.1.2 Analog Section

There are 8 mic preamp and line inputs and 8 line outputs. Select a channel and it will appear in the Focus section.



Analog Input Controls

Use the Focus section to set preamp levels and turn the 48v phantom on and off. The long meters range from -80 dBFS to 0 dBFS

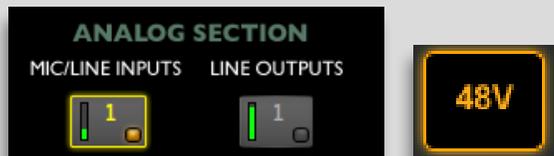
Mic knob gain range: 0 dB to +52.5 dB in 7.5-dB steps

Line knob gain range: 0 dB to +52.5 dB in 7.5-dB steps

Fine knob digital gain range: 0 dB to +7 dB

A clip indicator holds for two seconds or for as long as clipping persists. Peak hold persists until reset by clicking on the indicator.

An orange light on a channel button indicates that phantom power for that channel is active.



You can also control preamp functions from SoundGrid applications such as the eMotion ST mixer.



Control	Function
48v Phantom	On/Off
Preamp Gain Input	Controls analog gain in an attached I/O device that includes a controllable preamp.
Input Polarity	Mono channels have one polarity reverse button. Stereo channels have two. Buttons are latching and are colored green when engaged.
Digital Input Trim	Controls input level from digital sources. Separate controls for L/R when input is stereo.

This allows you to control preamps “on the fly,” without leaving your monitor mixer. eMotion ST also provides a digital trim for incoming digital signals. Refer to the eMotion ST user guide to learn how to integrate the IOS-XL with the eMotion ST mixer.

Analog Output Controls



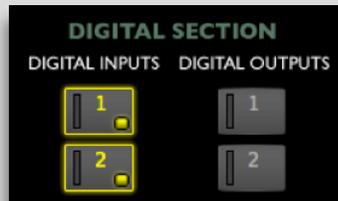
In addition to meters and clip and peak indicators—which are identical to the input controls—there is a Headroom switch that provides a -10 dB pad.



Presence of the -10 dB pad on an analog output is indicated by a blue light.

5.1.3 Digital Section

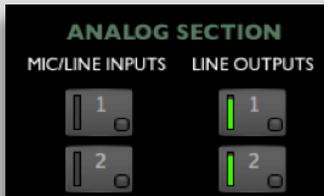
Digital inputs and outputs are selected in pairs. Two buttons in the Focus section are used to switch digital input and clock between AES/EBU and S/PDIF. This choice is reflected in the Top Bar illustration.



Use the SRC button to enable input sample rate conversion. When SRC is selected, IOS-XL will convert incoming digital stream to the sample rate of the clock that the device is locked to. A yellow light on a channel button indicates that sample rate conversion is active for that channel.

5.1.4 Clip Indication and Small Meters

Clip Indication Threshold sets where the clipping is indicated on the meter in the Focus section. This allows you to monitor levels in the way you find most comfortable. The threshold can be set to 0 dB, -1 dB, -2 dB, or -3 dB. This setting is global, not channel-specific. When Clip Indication Threshold is set, this behavior affects level indication for all channels, input and output.



Additionally, each channel button—analogue or digital, input or output—has a small level meter that indicates signal and provides a rough idea of level. A red light on the channel button indicates clipping.

5.2 Clock Page

Use the Clock page to set the clock source and sample rate for the device and to assess clock status. Clock controls are on the left side of the page; status indicators are on the right.



1 SOURCE sets the clock source

Internal	The interface itself provides the clock.
External WC	Clock is provided by an external device via the IOS-XL Word Clock Input connector
Sync over Ethernet	Word clock is transmitted between SoundGrid devices using Ethernet
Digital	IOS-XL clocks to an incoming digital stream.

- 2 **SAMPLE RATE** sets the sample rate when Clock Source is set to Internal. Range: 44.1 / 48 / 88.2 / 96 kHz.

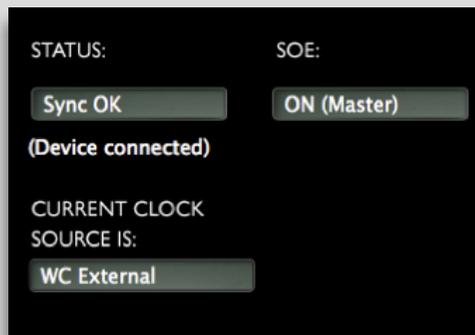


When Clock Source is set to Internal, you can use the Sample Rate menu to control the clock of the IOS-XL device. If the IOS-XL is the network (SoE) clock master, as determined in the Device Racks of SoundGrid Studio, then this setting determines the sample rate of the SoundGrid network.

If Clock Source is set to an external clock source, you cannot change the sample rate. The Sample Rate menu is grayed out and inoperative.

3 **Clock Status indicators**

Three windows on the right side of the Clock control panel help you to quickly assess the network status of the IOS-XL.



STATUS	Reports the presence or absence of sync between the IOS-XL and the SoundGrid network.
CURRENT CLOCK SOURCE	Displays the current sync method. This may differ from the choice made in the Source menu.
SOE	Indicates whether this IOS-XL is the master or a slave in the SoundGrid network. This mirrors the status information in the SoundGrid Studio Device Rack

When the IOS-XL is a slave in the SoundGrid network, you will likely sync it to the SoundGrid network clock (via SoE).

Even when IOS-XL is an SoE slave, you can lock it to an external clock source. For example, if another SoundGrid I/O device is the SoE master and is locked to a word clock device, you may choose to receive clock from the external device over word clock rather than via network SoE.

In the event that the selected clock source fails, IOS-XL has a series of clock fallback layers, in this order: WC, SoE, AES/EBU, S/PDIF, Internal. If an IOS-XL is clocked to WC and this external source fails, it will first try to clock to SoE. If that not successful, it will try AES/EBU, and so forth. If an IOS-XL is clocking to S/PDIF, it can fall back only to Internal, since S/PDIF is the last external fallback clock source.

6. IOS-XL SERVER

When you connect the IOS-XL to the host computer and run the Wizard, the internal server is assigned a port and configured for the host. Normally that's all you need to do. The IOS-XL server appears in the SoundGrid Studio Server rack, and the IOS-XL I/O is seen in the Hardware I/O rack.



IOS-XL is a combination of a server and an I/O, but these components operate more-or-less independently of each other. This enables you to assign your local I/O to another computer while keeping the server on your own host, or to use a server from elsewhere on the network.



To assign, free, or rename a server, click on the arrow to reveal the list of available servers, select a server from the list, and remove or assign the server.

A server cannot be shared by multiple SoundGrid host applications such as SoundGrid Studio or MultiRack. Within a SoundGrid network, only one computer can utilize a server's processing power for StudioRack and the eMotion ST mixer. Once assigned to a computer, a server remains unavailable to all other computers until released by the user. For further details, refer to the SoundGrid Studio Application manual.

6.1 Applications of an IOS-XL Server

The IOS-XL server gives you access to advanced features for mixing processing, and monitoring.

6.1.1 eMotion ST mixer

The eMotion ST is the mixer element of the SoundGrid Studio System. It lets you run SoundGrid plugins with low latency for monitoring while recording. The eMotion ST mixer enables you to create personalized monitor mixes, with plugin processing done pre-, post-, or in parallel with your DAW. eMotion ST combines 8 channel inputs with up to 64 StudioRack plugins. Each input or StudioRack channel can be sent to aux tracks or a main mix.

You can set up and control the IOS-XL preamp from eMotion ST, so you never have to leave the mixer to adjust microphones.



For further information, refer to the eMotion ST user guide.

6.1.2 StudioRack

StudioRack is a plugin chainer for any DAW. It hosts up to eight plugins, controls them, assigns them to external controllers, and manages them—with their presets—all in a way that makes it easy to move from one DAW session to another and from one DAW platform to another. It enables users to create racks of processors with limitless parameters and flexible signal flows, which are easily inserted into any track of the session.



When part of a SoundGrid network with a DSP server (such as DiGiGrid IOS-XL), StudioRack can shift plugin processing away from the local CPU and direct it to the SoundGrid DSP server. StudioRack works in conjunction with the eMotion ST mixer to create numerous personalized monitor mixes that use the same plugins heard in the mix—all with virtually no latency.

For more information, please refer to the StudioRack user manual.

7. MOVING AUDIO IN A SOUNDGRID NETWORK

You've configured the network and set up the IOS-XL preamps. One last thing to do: Integrate your hosts into the SoundGrid network so that you can send audio to and from devices—and listen to it. In order to do this, the audio must be patched from one point to another.

Audio must be patched because SoundGrid is a scalable and very flexible network—you can connect any combination of items: a device channel, the eMotion ST mixer, or another driver (that is, another computer), or a mix of these. Plus you can change your configuration at any time.

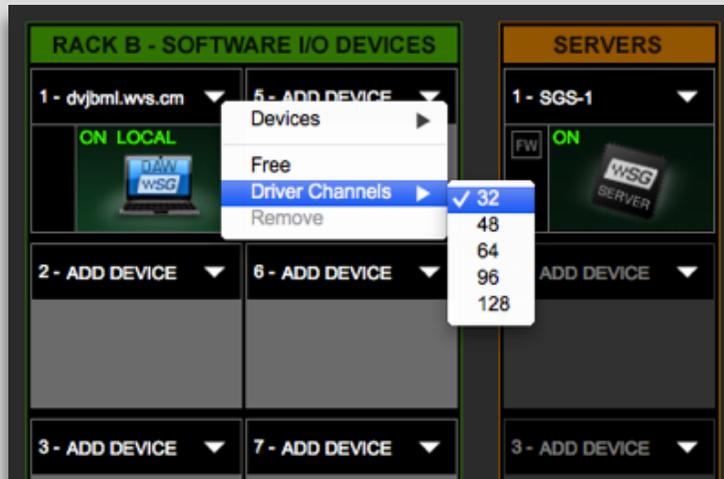
Most of the time you don't need to think about patching. When you first set up a SoundGrid network or change its physical inventory, the Wizard automatically sets up your devices and establishes the patches. Still, you should know how to patch between devices, drivers, and applications. Then you can take advantage of the flexibility of a SoundGrid network.

There are three types of SoundGrid Patch page connections:

- Patch I/Os to drivers in order to connect with a DAW. The driver “speaks the same language” as the OS or DAW, so it serves as the intermediary between the I/O and the DAW.
- Patch directly to the eMotion ST. This application “speaks the same language” as the IOS-XL, so this connection bypasses the SoundGrid driver altogether.
- Patch two or more devices to each other to split signals to several hosts. This serves the purpose of a multi-connector or tie line.

7.1 Using an I/O Device with a DAW

When using a DAW on a SoundGrid network, the SoundGrid ASIO/Core Audio driver serves as a bridge between IOS-XL and the DAW. It enables the I/O to communicate with the DAW, and it provides patch points for connections. Using the driver and routing audio through it involves two steps: patch between the I/O and the driver; then select the correct driver in your DAW as the playback engine.



Selecting the Number Of Channels

When you configure your host application, you can allocate between 32 and 128 driver channels. This is done in Rack B of the Setup page. The number of channels you select here is reflected in the Patch page: fewer allocated channels means fewer channels visible.

Pick a number that only slightly exceeds the maximum total number of driver channels you will be using. There's no harm in selecting all 128 channels, but it may make the Patch page unwieldy.

7.2 Patching I/O to Driver and Driver to I/O

When streaming audio to and from an IOS-XL and a DAW, you must assign IOS-XL inputs and outputs to the SoundGrid ASIO/Core Audio driver. (Alternatively, you may choose to monitor through the eMotion ST mixer. We'll cover that option later in this section.)

In the SoundGrid Studio Patch page, select the Device-to-Device tab. All device and driver channels are shown along both the horizontal and vertical axes. To make a standard “ascending patch” connection, draw the cursor in a diagonal line as shown below. To create a customized patch, click on individual cells. There are many ways to patch devices, but normally IOS-XL inputs are patched to the ASIO/Core Audio inputs for recording. For playback, the patches are opposite, unless you choose to patch to the eMotion ST mixer for monitor mixing.

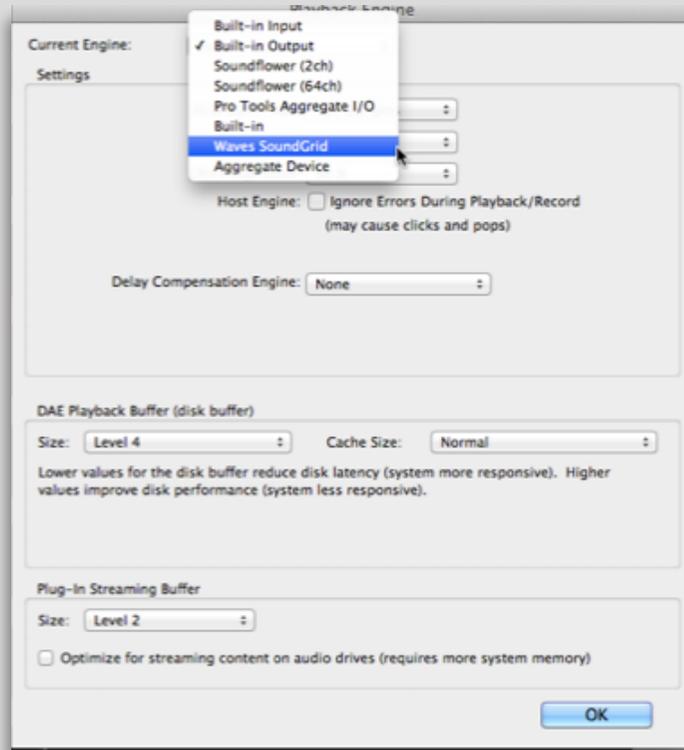
Once again, if you set up your system using the Wizard, you will not need to do any of this.

The screenshot shows the SoundGrid Studio Patch page with the 'DEVICE TO DEVICE' tab selected. The interface includes a top bar with 'Channel 1', 'Save/Load', 'MIXER', 'PATCH', and 'SETUP' buttons, along with 'WSG', 'VOICES 0/64', and 'DSP 4%' indicators. The main area is a grid for patching devices. The 'FROM' axis (vertical) lists 'IOS-1' (AN Mic 1-8, DG AES L/R) and 'davejbmlion.waves.com' (DG Core 1-9). The 'TO' axis (horizontal) lists 'Line' (1-8), 'Phones' (1L, 1R, 2L, 2R), 'AES' (L, R), and 'Core Audio' (1-17). A diagonal line of blue checkmarks indicates a standard ascending patch from IOS-1 inputs to Core Audio outputs.

FROM	TO	Analog								Digital		Digital																					
		Line								Phones		AES		Core Audio																			
		1	2	3	4	5	6	7	8	1L	1R	2L	2R	L	R	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
BANK A - SLOT 1	IOS-1 AN Mic 1															✓																	
	IOS-1 AN Mic 2																✓																
	IOS-1 AN Mic 3																	✓															
	IOS-1 AN Mic 4																		✓														
	IOS-1 AN Mic 5																			✓													
	IOS-1 AN Mic 6																				✓												
	IOS-1 AN Mic 7																					✓											
	IOS-1 AN Mic 8																						✓										
	IOS-1 DG AES L																							✓									
IOS-1 DG AES R																									✓								
davejbmlion.waves.com	davejbmlion.waves.com DG Core 1	✓																															
	davejbmlion.waves.com DG Core 2		✓																														
	davejbmlion.waves.com DG Core 3			✓																													
	davejbmlion.waves.com DG Core 4				✓																												
	davejbmlion.waves.com DG Core 5					✓																											
	davejbmlion.waves.com DG Core 6						✓																										
	davejbmlion.waves.com DG Core 7							✓																									
	davejbmlion.waves.com DG Core 8								✓																								
	davejbmlion.waves.com DG Core 9									✓																							

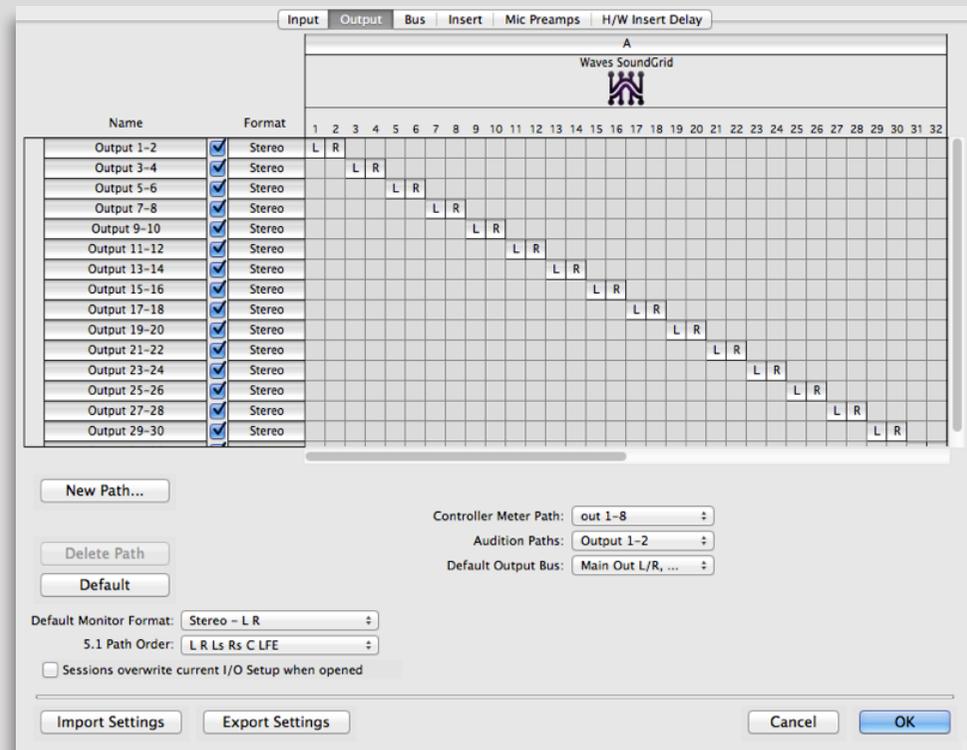
Selecting the Driver in the DAW

When a DAW is part of a SoundGrid network, the SoundGrid ASIO/Core Audio driver must be its playback engine. Choose **Waves SoundGrid** from among your playback engine options.



DAW I/O Setup

When you look at the I/O setup page of your DAW, what you see are driver channels, not the channels of the I/Os themselves. What these channels are ultimately connected to is determined in the Patch page of the SoundGrid Studio Application.



Note the relationship between the SoundGrid Studio Patch page and the DAW I/O Setup page.

The image shows two side-by-side screenshots from the Waves SoundGrid software interface.

The left screenshot is the "PATCH" page. It features a "DEVICE TO DEVICE" patching grid. The grid has columns for "Line" (1-8) and "Core Audio" (L, R) for both "Analog" and "Digital" paths. The rows represent the "FROM" device (IOS-1 or davejbmlion.waves.com) and the "TO" device (Line 1-8 or Core L/R). Blue checkmarks in the grid indicate active connections: IOS-1 Line 1-8 to Driver Line 1-8, and IOS-1 Core L/R to Driver Core L/R. A blue arrow on the left points from the driver to the device, indicating signal flow.

The right screenshot is the "DAW I/O Setup" page. It shows a table of 10 driver channels (Input 1-10) and their connections to 32 DAW input channels. The connections are as follows:

Driver Channel	Format	DAW Input 1	DAW Input 2	DAW Input 3	DAW Input 4	DAW Input 5	DAW Input 6	DAW Input 7	DAW Input 8	DAW Input 9	DAW Input 10
Input 1	Mono	M									
Input 2	Mono		M								
Input 3	Mono			M							
Input 4	Mono				M						
Input 5	Mono					M					
Input 6	Mono						M				
Input 7	Mono							M			
Input 8	Mono								M		
Input 9	Mono									M	
Input 10	Mono										M

Below the table are buttons for "New Path...", "New Sub-Path", "Delete Path", and "Default". At the bottom, there is a "5.1 Path Order" dropdown set to "L R Ls Rs C LFE" and a checkbox for "Sessions overwrite current I/O Setup when opened".

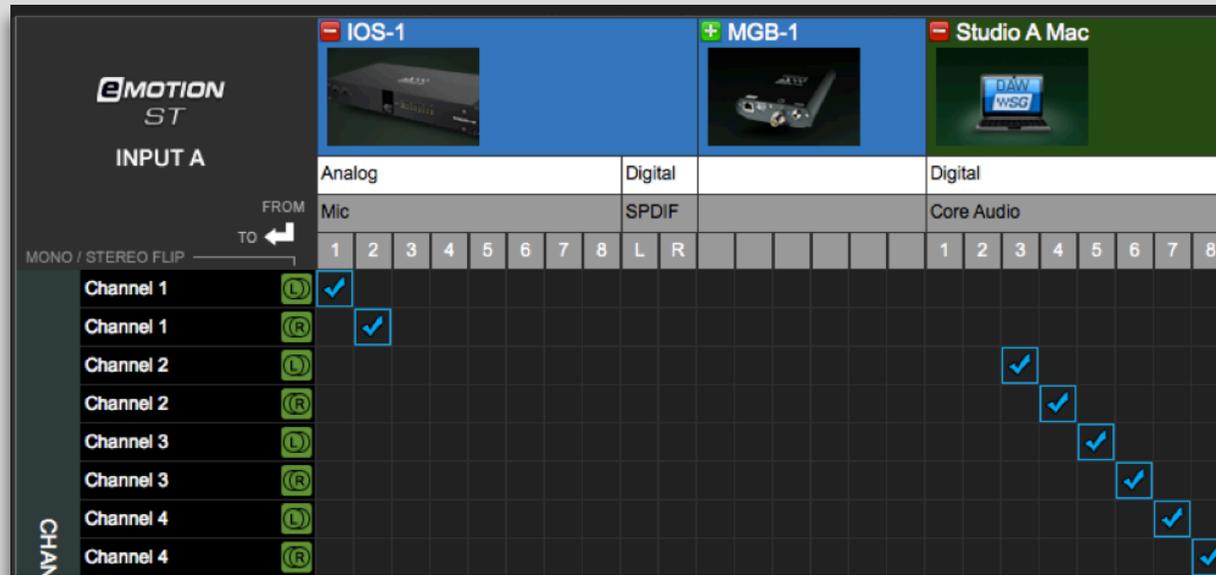
In the Patch page (left), IOS-XL analog channels 1–8 are patched to driver channels 1–8, and IOS-XL AES L and R are patched to driver channels 9 and 10. The arrow on the upper left of the Patch indicates that signal flows from the IOS-XL to the driver.

Now look at the DAW I/O. The 10 driver channels appear at the top, and are patched to DAW input channels 1–10.

You may find it convenient to rename the channel path names in your DAW to reflect what is patched to the driver channel in the SoundGrid Studio Patch page. This will simplify setting up sessions when you have multiple devices or customized patching.

7.3 eMotion ST Mixer Patching

The eMotion ST mixer enables you to create studio monitor mixes as well as personalized headphone mixes. Patch to and from the mixer using the eMotion ST input and output tabs on the left side of the interface. The green buttons indicate whether a channel is mono, left side of a stereo pair, or right side of a stereo pair. Toggle between these states by double-clicking on the button.



To learn more about patching between devices or to and from the eMotion ST mixer, please refer to the SoundGrid Studio Application user guide.

A few things to remember about the Patch page:

- All available devices and driver channels will appear in the patch. The number of channels depends on devices and connections.
- Patch direction is indicated by an arrow on the left side of the patch.
- Establish a patch by clicking on a cell, or by dragging across several cells. Remove a patch by clicking on it again.
- An output can patch to two inputs. An input can accept only one source.

Use the tabs at left to choose among the patch options.

7.4 Device-to-Device Patching

Choose this view to patch devices and drivers to each other. All device and driver channels are shown along both the horizontal and vertical axes. There are many ways to patch devices, but normally IOS-XL inputs are patched to the ASIO/Core Audio inputs for recording. For playback the patches are opposite, unless you choose to patch to the eMotion ST mixer for monitor mixing. For further details, refer to the SoundGrid Studio Application user guide.

DEVICE TO DEVICE

FROM TO

IOS-1

				Analog								Analog				Digital	
				Line								Phones				SPDIF	
				1	2	3	4	5	6	7	8	1L	1R	2L	2R	L	R
BANK A - SLOT 2	MGB-1	DG	MADI	58	✓												
	MGB-1	DG	MADI	59		✓											
	MGB-1	DG	MADI	60			✓										
	MGB-1	DG	MADI	61				✓									
	MGB-1	DG	MADI	62					✓								
	MGB-1	DG	MADI	63						✓							
	MGB-1	DG	MADI	64							✓						
	MGB-1	DG	MADI	65								✓					
	MGB-1	DG	MADI	66									✓				
	MGB-1	DG	MADI	67										✓			

7.5 Headphone Patching

IOS-XL has two independently adjustable headphone jacks. These appear on the Patch page after the 8 I/O channels. Adjust headphone levels on the IOS-XL front panel.

The screenshot shows the E-Motion ST software interface with the following components:

- Device:** IOS-1 (Analog Line)
- Destination:** Studio A Mac (Digital Core Audio)
- Grid Columns:** Analog Line (1-8), Analog Phones (1L, 1R, 2L, 2R), Digital SPDIF (L, R), Digital Core Audio (1-10).
- Grid Rows:** Channel 8, FX 1, FX 2, Mix 1, Mix 2, Mix 3, Mix 4, Mix 5.
- Connections (Checkmarks):**
 - Mix 3 to 2R
 - Mix 4 to 1R
 - Mix 4 to 2R

8. USING THE IOS-XL WITH MIDI

An external MIDI controller can be connected to an IOS-XL. The IOS-XL software installer includes two MIDI drivers. One driver controls the device’s MIDI ports; the other is for StudioRack (this is explained in greater detail in the StudioRack manual).



To activate MIDI ports, open the SoundGrid Studio Application. Go to I/O Rack A and locate the IOS-XL that you want to assign. From the drop-down menu, choose “Assign to SoundGrid MIDI Driver.”



In the host, select the port for MIDI in and out, “Waves SoundGrid Device I/O.”

9. TECHNICAL SPECIFICATIONS

General

- 2U rack-mounted (standard 19" rack-mount wide, 2U high, 380-mm deep excluding connectors)
- Supported sample rates: 44.1, 48, 88.2 and 96 kHz (176.4 and 192 kHz will be supported in the future)
- 8 channel mic/line inputs (on XLR/TRS combo)
- 8 channel line outputs (on TRS or 25pin D-con)
- 2 channel AES/EBU or SPDIF (switchable), SRC optional.
- Word Clock I/O
- Clock synchronization via Word Clock input, AES/EBU, SPDIF, SoundGrid (SoE), Internal
- MIDI I/O
- 4 SoundGrid ports (RJ45s)
- USB port (emergency port to boot server support function)
- Reset switch
- 2 headphone outputs with analog level knobs; range: Off to +15 dB
- Settings for different broadcast level formats via jumpers on all analog I/Os
- Internal SoundGrid DSP server (Intel® i7)

Analog Inputs specifications`

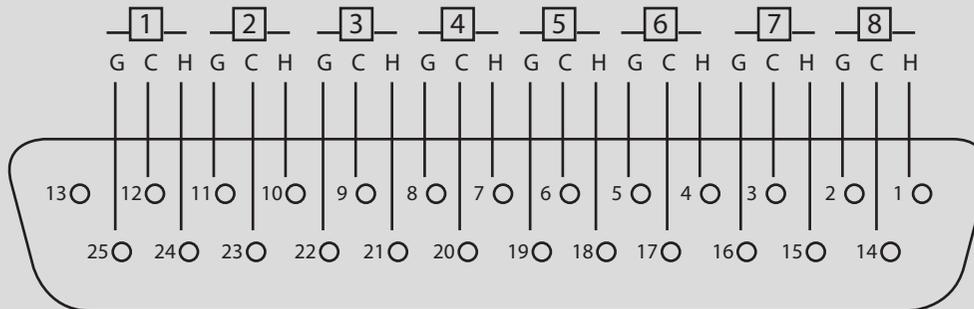
- Input Impedance:
Mic: 2K5 / Line: 8K0
- Gain Range:
Mic: 0 dB to +52.5 dB in 7.5-dB steps / Line: 0 dB to +52.5 dB in 7.5-dB steps
- Maximum Input Level:
Mic: +26 dBu / Line: +36 dBu
- Mic Equivalent Input Noise: > -126 dB (150 Ohm source, gain +60 dB)
- Harmonic Distortion: Typically < 0.01% @ unity gain, 10-dB input @ 1 kHz
- Frequency Response: +/-0.5 dB (20 Hz to 20 kHz)
- Channel Separation: Better than 90 dB (40 Hz to 15 kHz)

Analog Outputs specifications

- Maximum Output Level: +22 dBu
- Residual Output Noise: <90 dB (20 Hz to 20 kHz)
- Frequency Response: +/-0.5 dB (20 Hz to 20 kHz)
- Output Impedance: 50 Ohms
- Channel Separation: Better than 90 dB (40 Hz to 15 kHz)
- Harmonic Distortion: Typically < 0.01% @ +10-dB Output @ 1 kHz

IOS-XL Analog Connectors

DB25 8-channel balanced connector AES59-2012



G=Ground C=Cold H=Hot

XLR connectors

Phase	Termination Point
Positive (+)	Pin 2
Negative (-)	Pin 3
Signal Ground	Pin 1
Chassis Ground	Case

1/4" TRS connectors

Phase	Termination Point
Positive (+)	Tip
Negative (-)	Ring
Signal Ground	Sleeve

9.1 Installation Notes

The IOS-XL unit must be earthed to the mains earth (ground) and installed according to the safety instructions included with the unit. The unit is powered from an IEC inlet on the rear. This must be connected to an earthed mains outlet using a cable that complies with local approvals and regulations.

Approvals cover use in ambient air temperature of up to 35°C. Operation in higher temperatures should be avoided. A 1U space should be left above and below the unit to prevent heat transfer from adjacent equipment, if this generates heat above 35°C.

At least 75 mm (3 inches) should be allowed to the sides of the unit to allow ventilation. At least 75 mm (3 inches) of free air should be left at both the front and the rear side of the rack to allow heat dissipation. Under no circumstances should the fan (where fitted) or ventilation outlets be blocked or restricted.