Installation and Operation Manual
Videohub

Blackmagicdesign

Welcome

Welcome to Videohub!

We hope you share our dream for the television industry to become a truly creative industry by allowing anyone to have access to the highest quality video.

Previously high end television and post production required investment in millions of dollars of hardware, and professional SDI routing switchers have always been way too high in cost for most people to afford. HD-SDI is even worse and until now, only the largest post production and television facilities could afford HD-SDI routing. Videohub changes all that and even enables you to pipe 2K film around your studio just like video. We hope you get years of use from your Videohub and have lots of fun connecting everyone in your facility together!

This instruction manual should contain all the information you'll need to install your Videohub, although it's always a good idea to ask a technical assistant for help if you are not sure what IP addresses are, or if you don't know much about computer networks. Videohub is easy to install, however, there are a few slightly technical preferences you will need to set after you install it.

Please check our web site at www.blackmagic-design.com and click the support page to download the latest updates to this manual and Videohub software. Lastly, please register your Videohub when downloading software updates so we can keep you updated when new software is released. We are constantly working on new features and improvements, so we would love to hear from you!

Grant Petty

Grant Petty
CEO Blackmagic Design

Contents

Videohub Operation Manual

Blackmagicdesign

Welcome

How to read as little of this manual as possible

Most people only need to read one or two pages out of each section of this manual and there is no need to read every page. Here is what you'll learn in each section.

Planning

First, go to the "Planning your Videohub Installation" section for your model of Videohub or Videohub Smart Control. This section provides you with all the information you need to know before buying or installing a Videohub. You can plan how to set it up so there are no nasty surprises. For example it will tell you how much rack space will be required by your Videohub, how many power sockets it will need and which connection options are available for controlling your Videohub, e.g USB, Ethernet or RS-422.

Hardware Installation

Hardware Installation covers all aspects of Videohub hardware installation. If you've got a Universal Videohub, you'll need to read "Building a Universal Videohub" which details all the modules and how to install them. Next you'll need to connect your Videohub to a computer or network so you can control it. If your Videohub hardware has buttons, we suggest you read "Labelling Control Panels" so you make neat labels and avoid damaging the unit. There are also a few tips worth knowing when connecting lots of SDI cables to your Videohub or when connecting to video equipment which uses miniature SDI connectors.

Software Installation and Configuration

Now it's time to install and configure the software for Videohub. Jump to the "Software Installation" section and read the installation and configuration pages for your Videohub or your Videohub Smart Control.

Routing Video

Now that the hardware and software is set up, it's time to start routing video! If you've got a hardware control panel, just read the "Using Hardware Control Panels" section for your panel. If you're using software control panels, read the "Using Software Control Panels" section and choose between a menu-driven interface or a pushbutton interface which you can use with a touchscreen computer or iPad! The Videohub router control software can be installed on as many computers and iPads as you like and there is no extra cost.

Developers

There is even a chapter for developers which you don't need to read unless you are a developer who wants to integrate Videohub routers with third party control equipment and custom interfaces. The chapter also details the Blackmagic 2K format which includes the same 2K format used with Sony HDCAM SR decks.

Planning Your Videohub Installation

If you have just purchased a Videohub or are planning to buy one, this section covers what you need to know before installing a Videohub or Videohub Smart Control. Go directly to the planning pages for your model of Videohub or Videohub Smart Control for everything you need to know.

If your Videohub has previously been set up, you can jump straight to the Using Hardware and Software Control Panels sections of this manual.
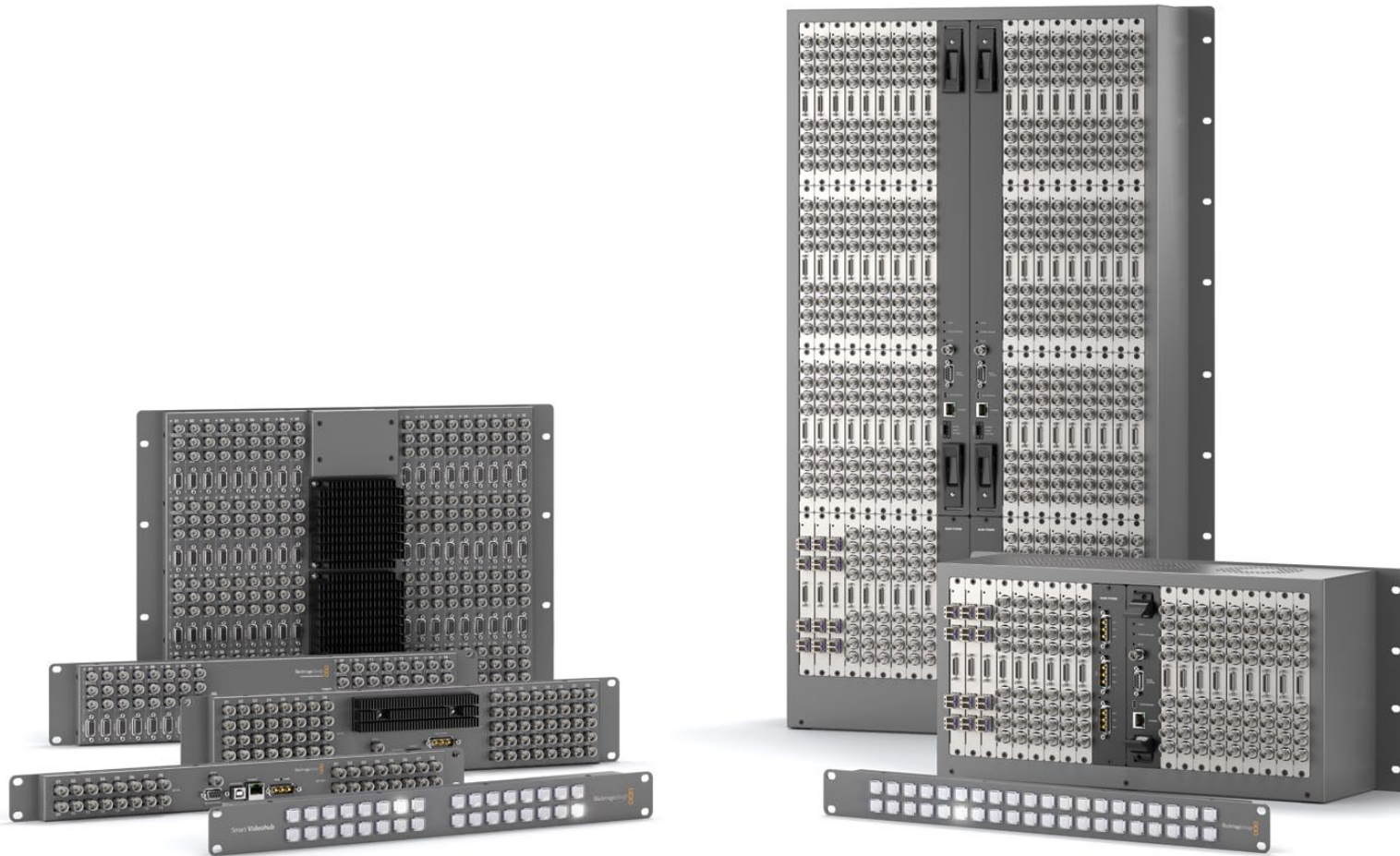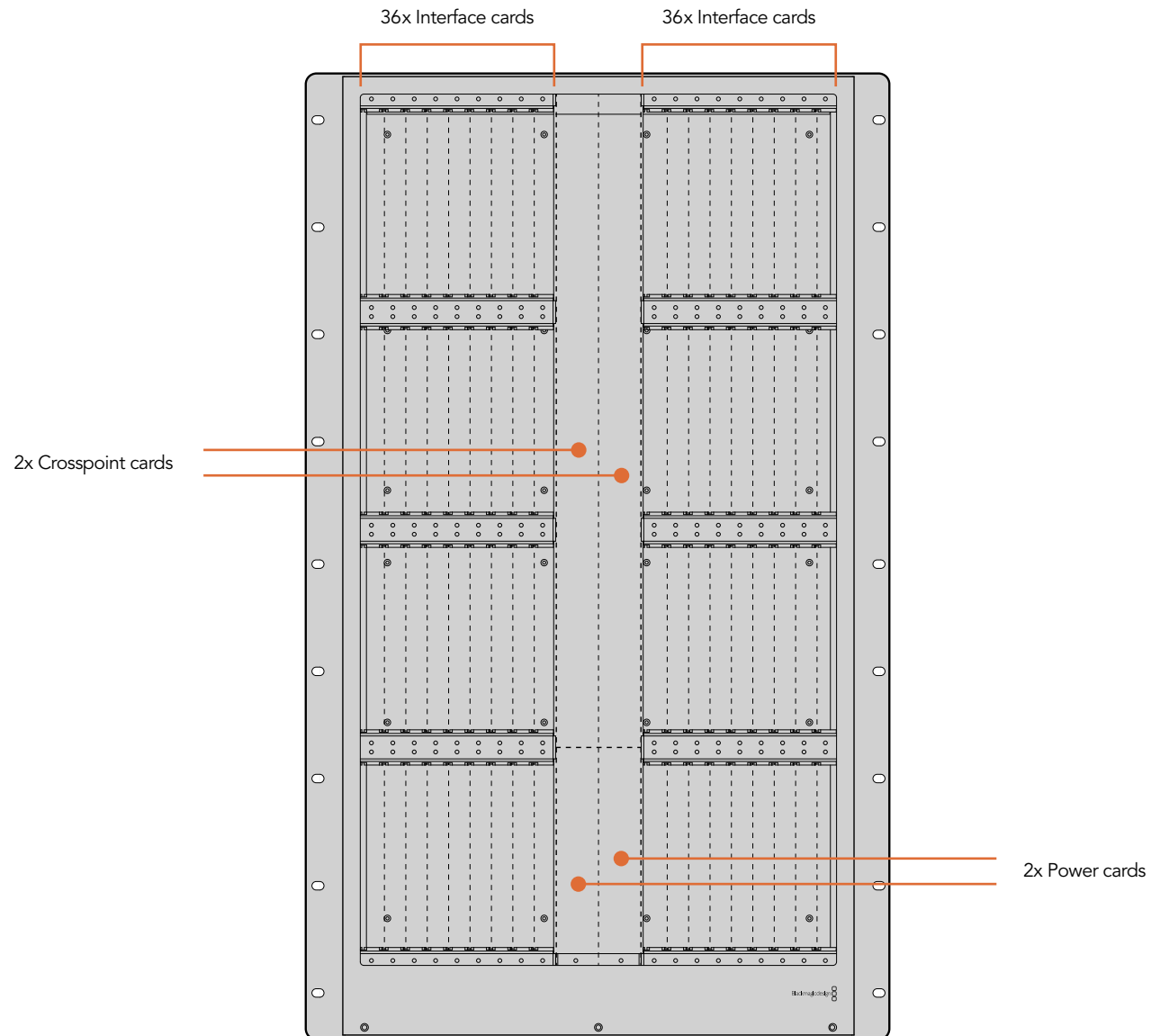
Planning Your Videohub Installation

Universal Videohub 288

36x Interface cards

36x Interface cards

2x Crosspoint cards

2x Power cards

Planning Your Videohub Installation

Universal Videohub Interface cards

Universal Videohub
Optical Interface

Universal Videohub
SDI Interface

Activity light

Output 1
Input 1

Output 2
Input 2

Universal Videohub Deck Control
Cable connector

Output 3
Input 3

Output 4
Input 4

Activity light

Output 1

Output 2

Output 3

Output 4

Universal Videohub Deck Control
Cable connector

Input 1

Input 2

Input 3

Input 4
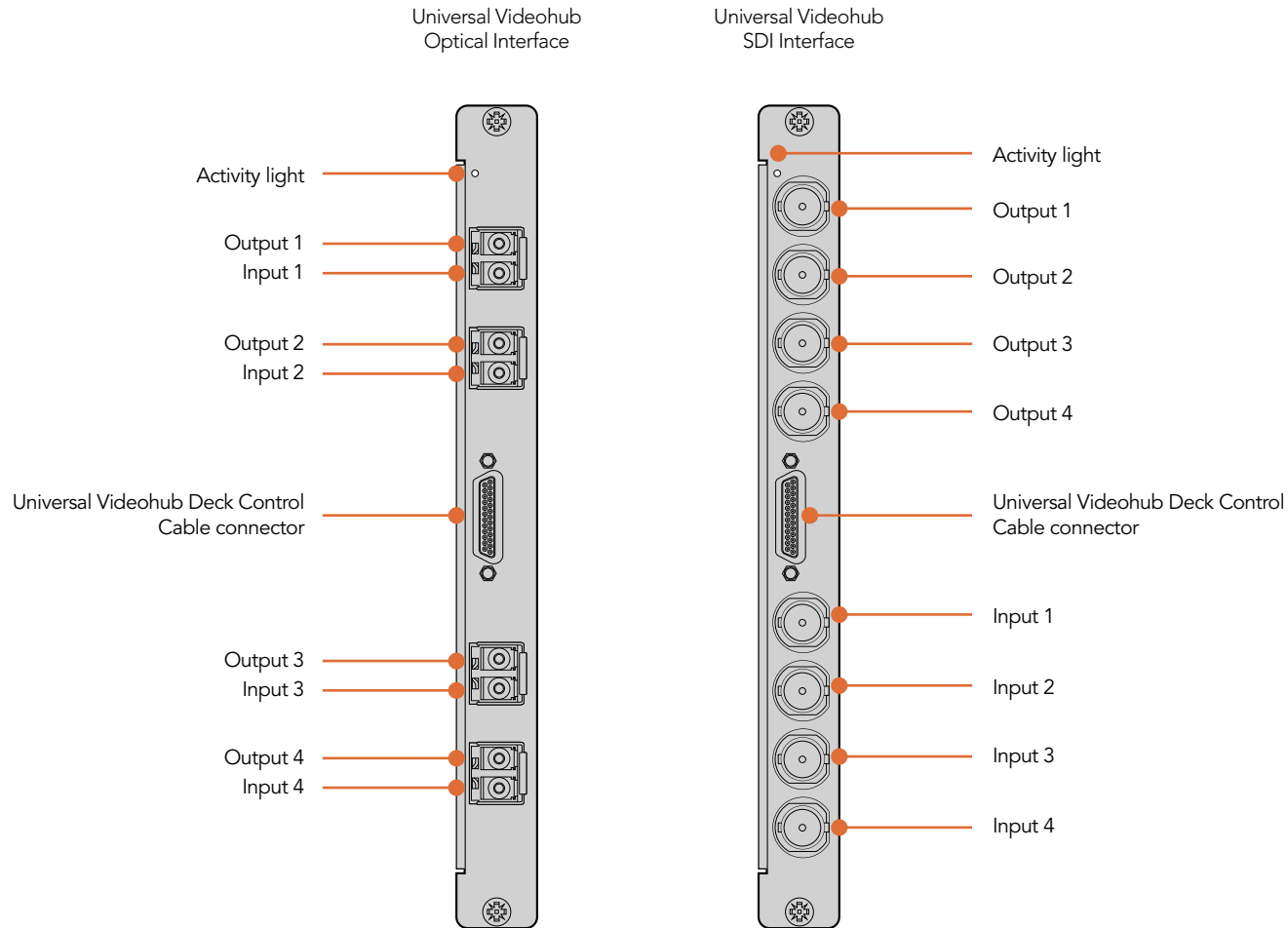
Planning Your Videohub Installation

Universal Videohub 288 Modules
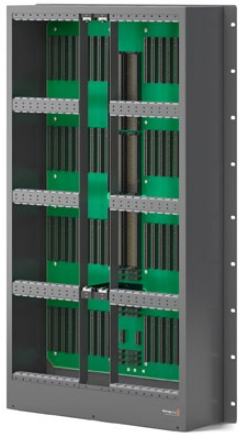
Universal Videohub 288

Universal Videohub 288 Crosspoint card

Universal Videohub 72 Crosspoint card
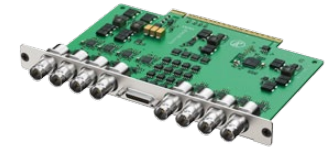
Universal Videohub SDI Interface card

Universal Videohub Optical
Interface card

Universal Videohub Deck Control Cable
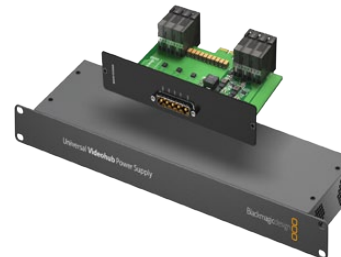
Universal Videohub Power Supply
includes a power card, 1 RU chassis
and connecting power cable

Universal Videohub 450W Power Card
can be connected to three 150W
power bricks

Planning your Universal Videohub 288 Installation

Universal Videohub 288 is a large, modular router which is perfect for very large facilities and broadcasters. It features a 72 card rack frame which can be filled with any combination of BNC SDI or optical fiber SDI interface cards. When fully populated with a Universal Videohub 288 Crosspoint card, two power cards, 72 interface cards and 72 deck control cables, Universal Videohub 288 provides 288 SDI inputs, 288 SDI outputs, 288 bidirectional RS-422 deck control ports, reference input, crosspoint processor, redundant power and powerful Videohub routing control software for Mac OS X and Windows.

All SDI connections support auto detection of SD, HD or 3 Gb/s SDI, and reclocking on all SDI outputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Universal Videohub 288.

Remote router control is performed via 10/100Base-T Ethernet or serial.

25 rack units of space should be reserved for the installation of the Universal Videohub 288 and two rack-mount power supply chassis as well as free space for heat dissipation. Only 23 RU is required if Universal Videohub 288 is mounted at the top of an open rack. Universal Videohub 288 is 18 RU high and 6 inches thick. You can rack-mount Universal Videohub 288 facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment. Due to the sheer number of cables that are likely to be attached to this Videohub, it would be preferable to mount Universal Videohub 288 in a dedicated rack. 2 RU of space should be left above Universal Videohub 288 for heat dissipation unless mounted at the top of an open rack where there is no obstruction to airflow above the Videohub. The remaining 5 RU allocation of space below Universal Videohub 288 is used by rack-mount power supplies.

Universal Videohub 288 ships as an empty rack frame, except for a removable fan tray and fans. All other hardware components, including SDI interface cards, deck control cables, crosspoint cards and power supplies must be purchased and installed separately. SDI interface cards can be purchased as your facility grows and need not be installed all at once. SDI interface cards are designed to be installed while Videohub is running and become active immediately. They do not require Videohub to be power cycled. You will need a number 01 and a number 02 size Pozidriv screwdriver to install the cards.

SDI interface cards feature 4 SDI inputs, 4 SDI outputs and a connector for a Universal Videohub Deck Control Cable. There are two models of SDI interface cards which can be used with Universal Videohub 288:

- Universal Videohub SDI Interface has BNC connectors for connecting SDI cables with BNC connectors.
- Universal Videohub Optical Interface has standard SFP transceiver modules with 1310 nm laser drivers and receivers. Each module includes an LC connector port to be used with single-mode optical fiber cables.

Universal Videohub Deck Control Cable has a single port at one end, for connection to both types of SDI interface cards, and four RS-422 deck control ports at the other end.

The Universal Videohub 288 Crosspoint card contains the crosspoint processor for switching routes between the SDI inputs and outputs, and changing deck control ports. Ethernet, USB and serial ports are located on the card for router control. A Reference input is located on the card for connection to a tri-level sync or blackburst genlock signal. An Alarm light will illuminate on the card if user intervention is required, e.g. if the Videohub is overheating due to inadequate cooling. Alarm notification is supplied by the GPI (general purpose interface) output to other devices. A Power Overload light will illuminate on the card if inadequate power is being supplied to the unit for the number of cards installed. You will need a number 01 size Pozidriv screwdriver to install the Universal Videohub 288 Crosspoint card.

Occasional firmware updates can be downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Universal Videohub 288. You will need to provide a USB 2.0 type A to mini B male cable.

Router Control Options

If router control is performed via Ethernet, the integrated "Videohub Server" is used and you need only provide an Ethernet cable to connect Universal Videohub 288 to your Ethernet network switch.

Third party router controllers can control Universal Videohub 288 via Ethernet, or as an RS-422 slave device, for router crosspoint switching. The Videohub Ethernet protocol, RS-422 protocol and RS-422 pinout diagram are documented in the Developer Information section of this manual.

Power Supply Options

External power supplies connect to Universal Videohub 288 via power cards. Only one power card is needed to power Universal Videohub 288 but two power cards should be installed if failover redundancy is required.

There are high and low power supply options for Universal Videohub 288. We strongly recommend the high power supply to ensure sufficient power with all card combinations. The high power supply is named the "Universal Videohub Power Supply". The low power supply may be considered due to its lower cost but is slightly underpowered and will not power a fully populated Universal Videohub 288 under all card combinations. The low power supply is a "Universal Videohub 450W Power Card" and requires three 150W "brick" power supplies which are sold separately.

Universal Videohub Power Supply

A Universal Videohub 288, which is fully populated and running at maximum power consumption, can be powered by a single "Universal Videohub Power Supply". The Universal Videohub Power Supply package includes a power card with a single connection to a 1 RU rack-mount chassis which contains the power supply. You will need to leave 3 RU of space in your equipment rack to install the Universal Videohub Power Supply chassis under the Universal Videohub 288, which includes 2 RU of clearance for removing the fan tray at the bottom of Universal Videohub 288. The Universal Videohub Power Supply chassis contains a universal (international) power supply for use in all countries and the connecting cable features thumb screw fasteners. You will need to provide a standard IEC cord, with a C13 connector, and a mains power socket.

A second Universal Videohub Power Supply can be connected to the Universal Videohub 288 to ensure continued operation should the first power supply fail. You will need to leave 5 RU of space in your equipment rack to install both Universal Videohub Power Supply chassis under the Universal Videohub 288, including 1 RU of clearance between each power supply for heat dissipation. When two Universal Videohub Power Supply chassis are connected, two IEC cords and two mains power sockets are required.

Universal Videohub 450W Power Card

While designed for the Universal Videohub 72, the lower cost Universal Videohub 450W Power Card can be used with three 150W "brick" power supplies to power a Universal Videohub 288. This power supply option is not capable of powering a fully populated Universal Videohub 288 running at maximum power consumption and should only be considered if attempting to minimize the cost of purchasing a Universal Videohub 288.

If you choose this option, please check the Power Overload light on the crosspoint card after installing any cards. If the Power Overload light illuminates, you will have to remove some cards to ensure that all installed cards are receiving power. If the Power Overload light continues to illuminate even after verifying that all three brick power supplies are working, you will need to discard your low power supply and upgrade to a Universal Videohub Power Supply.

A second Universal Videohub 450W Power Card with three power bricks can be connected to the Universal Videohub 288 to ensure continued operation should the first power card fail.
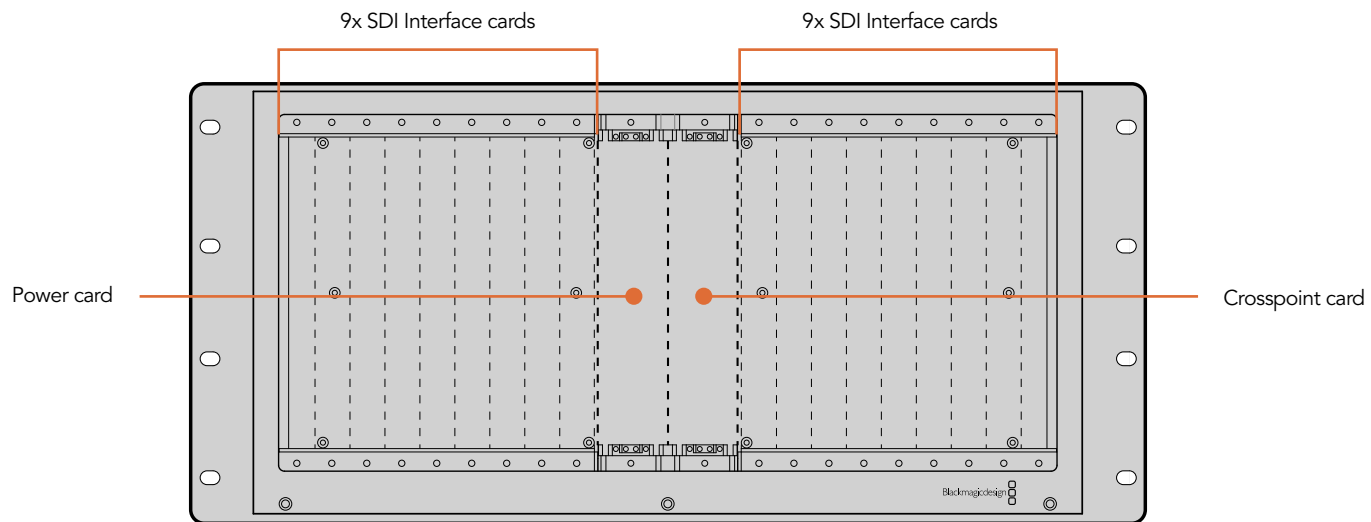
Planning Your Videohub Installation

Universal Videohub 72

9x SDI Interface cards

9x SDI Interface cards

Power card

Crosspoint card

Planning Your Videohub Installation

Universal Videohub Interface cards

Universal Videohub
Optical Interface

Universal Videohub
SDI Interface

Activity light

Output 1
Input 1

Output 2
Input 2

Universal Videohub Deck Control
Cable connector

Output 3
Input 3

Output 4
Input 4

Activity light

Output 1

Output 2

Output 3

Output 4

Universal Videohub Deck Control
Cable connector

Input 1

Input 2

Input 3

Input 4
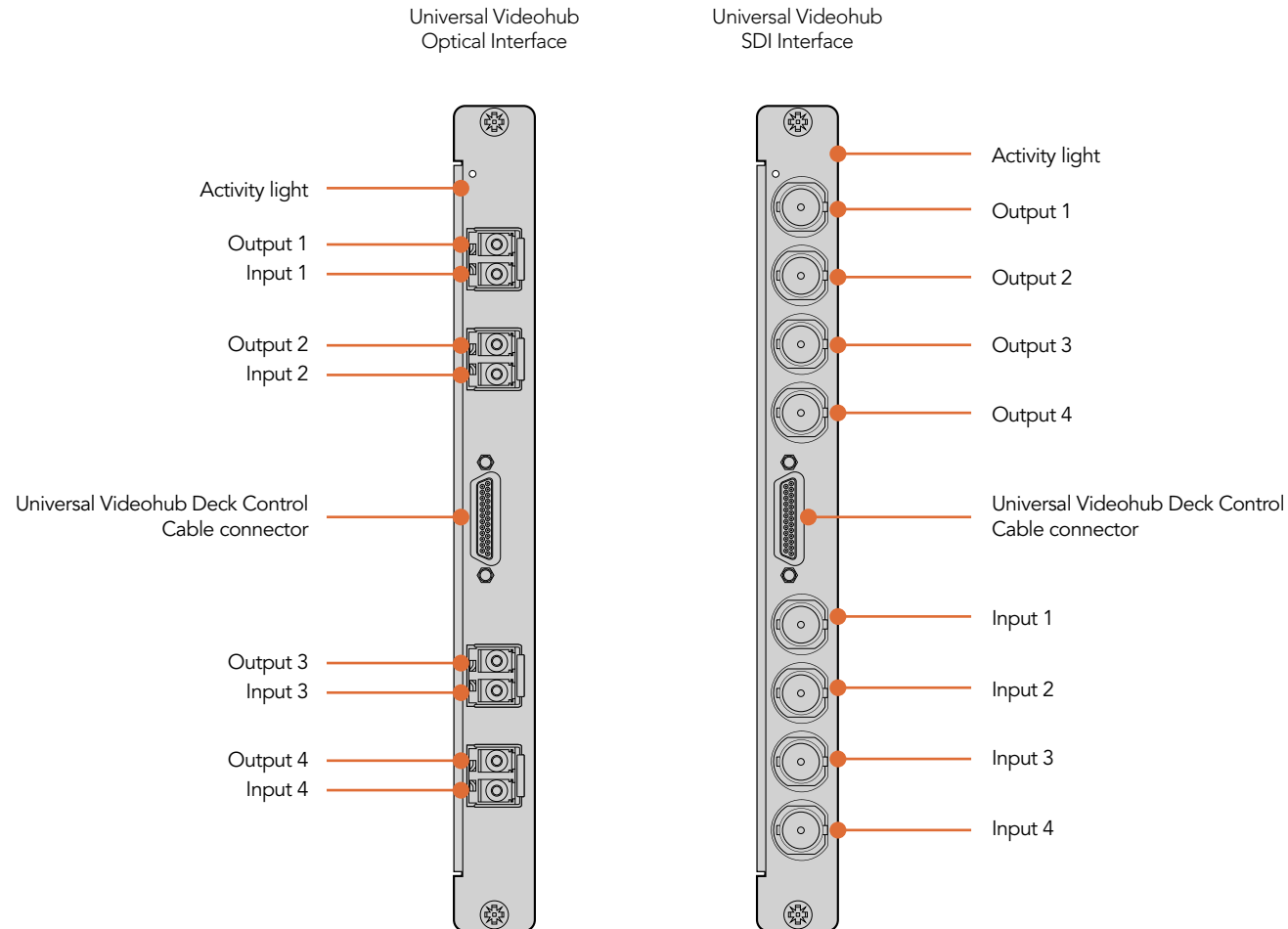
Universal Videohub 72 Modules

Universal Videohub 72 frame

Universal Videohub 72 Crosspoint card

Universal Videohub SDI Interface card

Universal Videohub Optical Interface card

Universal Videohub Deck Control Cable

Universal Videohub 450W Power Card can be connected to three 150W power bricks

Planning your Universal Videohub 72 Installation

Universal Videohub 72 is a medium-sized, modular router which is perfect for growing facilities. It features an 18 card rack frame which can be filled with any combination of BNC SDI or optical fiber SDI interface cards. When fully populated with a crosspoint card, a power card, 18 interface cards and 18 deck control cables, Universal Videohub 72 provides 72 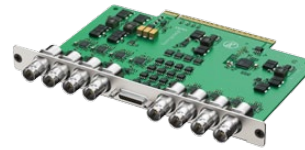SDI inputs, 72 SDI outputs, 72 bidirectional RS-422 deck control ports, reference input, redundant power supply options and powerful Videohub routing control software for Mac OS X and Windows.

All SDI connections support auto detection of SD, HD or 3 Gb/s SDI, and reclocking on all SDI outputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Universal Videohub 72.

Remote router control is performed via 10/100Base-T Ethernet or serial.

9 rack units of space should be reserved for the installation of the Universal Videohub 72 including access space for the drop-down fan tray as well as free space for heat dissipation. Only 7 RU is required if Universal Videohub 72 is mounted at the top of an open rack. Universal Videohub 72 is 5 rack units high and 6 inches thick. You can rack-mount Universal Videohub 72 facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment. 2 RU of space should be left above Universal Videohub 72 for heat dissipation unless mounted at the top of an open rack where there is no obstruction to airflow above the Videohub.

Universal Videohub 72 ships as an empty rack frame, except for a removable fan tray and fans. All other hardware components, including SDI interface cards, deck control cables, crosspoint card and power supplies must be purchased and installed seperately. SDI interface cards can be purchased as your facility grows and need not be installed all at once. SDI interface cards are designed to be installed while Videohub is running and become active immediately. They do not require Videohub to be power cycled. You will need a number 01 and a number 02 size Pozidriv screwdriver to install the various cards.

SDI interface cards feature 4 SDI inputs, 4 SDI outputs and a connector for a Universal Videohub Deck Control Cable. There are two models of SDI interface cards which can be used with Universal Videohub 72:

- Universal Videohub SDI Interface has BNC connectors for connecting SDI cables with BNC connectors.
- Universal Videohub Optical Interface has standard SFP transceiver modules with 1310 nm laser drivers and receivers. Each module includes an LC connector port to be used with single-mode optical fiber cables.

Universal Videohub Deck Control Cable has a single port at one end, for connection to both types of SDI interface cards, and four RS-422 deck control ports at the other end.

The Universal Videohub 72 Crosspoint card contains the crosspoint processor for switching routes between the SDI inputs and outputs, and changing deck control ports. Ethernet, USB and serial ports are located on the card for router control. A Reference input is located on the card for connection to a tri-level sync or blackburst genlock signal. An Alarm light will illuminate on the card if user intervention is required, e.g. if the Videohub is overheating due to inadequate cooling. A Power Overload light will illuminate on the card if inadequate power is being supplied to the unit for the number of cards installed.

Occasional firmware updates can be downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Universal Videohub 72. You will need to provide a USB 2.0 type A to mini B male cable.

Router Control Options

If router control is performed via Ethernet, the integrated "Videohub Server" is used and you need only provide an Ethernet cable to connect Universal Videohub 72 to your Ethernet network switch.

Third party router controllers can control Universal Videohub 72 via Ethernet, or as an RS-422 slave device, for router crosspoint switching. The Videohub Ethernet protocol, RS-422 protocol and RS-422 pinout diagram are documented in the Developer Information section of this manual.

Power Supply Options

External power supplies connect to Universal Videohub 72 via a single power card. The Universal Videohub 450W Power Card provides connections for up to three 150W brick-style power supplies, which must be purchased separately.
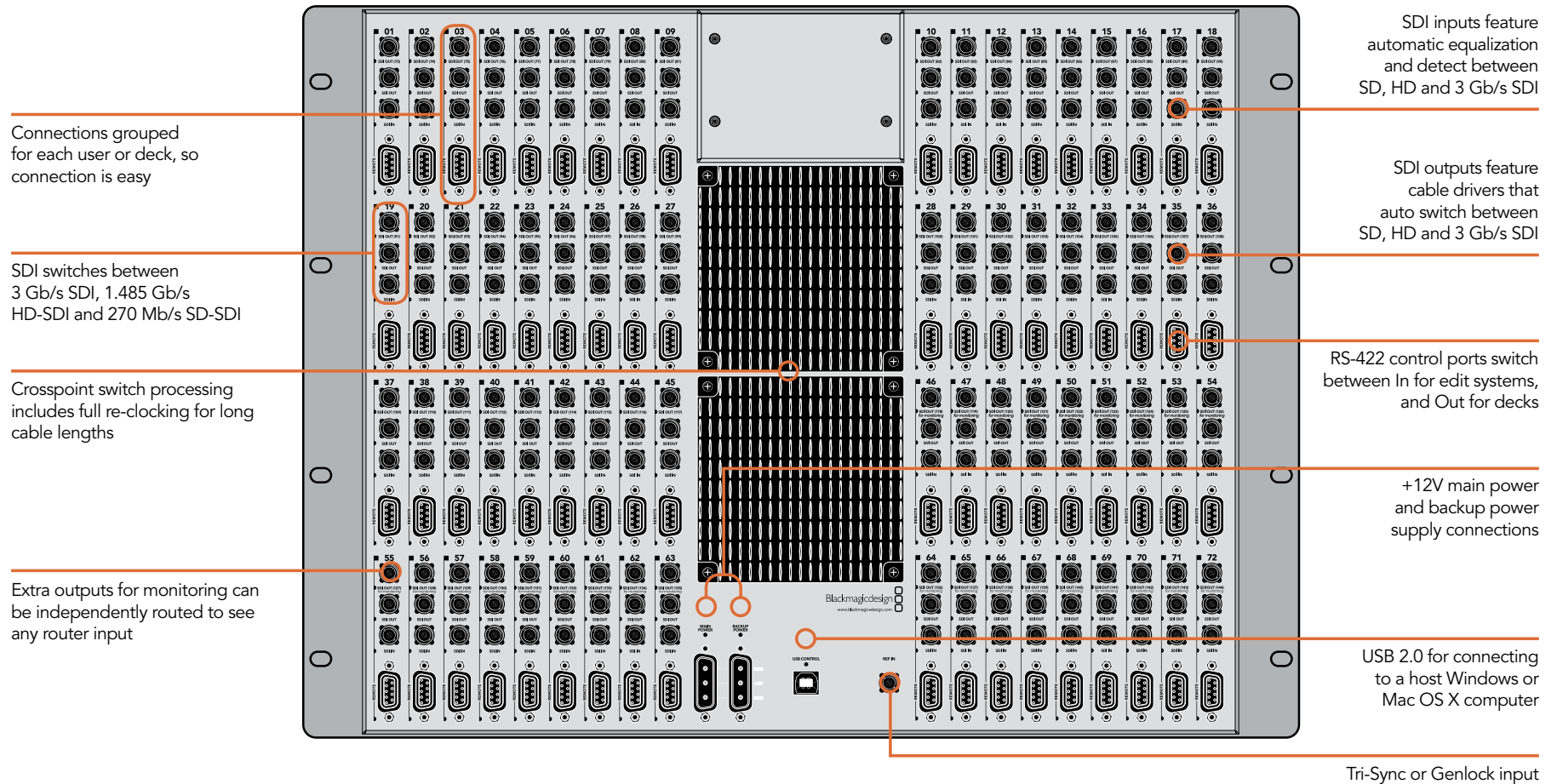
A Universal Videohub 72, which is fully populated and running at maximum power consumption, can be powered by two 150W "brick" power supplies. A third power supply can be connected to ensure continued operation should one power supply fail. The 150W power supplies are universal (international) power supplies for use in all countries and feature thumb screw fasteners. You will need to provide a standard IEC cord, with a C13 connector, for each power supply. When fully populated with three power supplies, three mains power sockets will be required.

If you have only partially populated your Universal Videohub 72 with cards, you might be able to power it with one 150W power supply and preferably use a second power supply for failover redundancy. If you choose this option, temporarily disconnect the second power supply and then check the Power Overload light on the crosspoint card after installing any cards. If the Power Overload light illuminates, you will have to add a 150W brick power supply or remove some cards to ensure that all cards are receiving power. Don't forget to reconnect the second power supply when you have finished checking the Power Overload light. For peace of mind, we recommend connecting and powering the three power supplies at all times to ensure sufficient power, and power redundancy, with all card combinations.
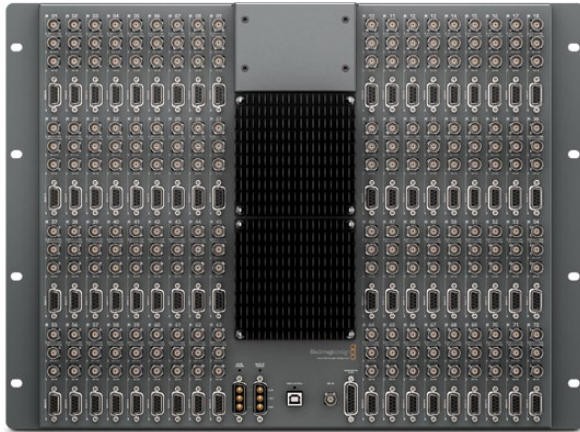
Universal Videohub 72 has a single slot for a power card. Accordingly the high power supply recommended for Universal Videohub 288 is ill-suited to Universal Videohub 72 as it does not provide power redundancy to Universal Videohub 72, is more expensive and requires an additional 1 RU of space below Universal Videohub 72.

Planning Your Videohub Installation

Broadcast Videohub

SDI inputs feature automatic equalization and detect between SD, HD and 3 Gb/s SDI

Connections grouped for each user or deck, so connection is easy

SDI outputs feature cable drivers that auto switch between SD, HD and 3 Gb/s SDI

SDI switches between 3 Gb/s SDI, 1.485 Gb/s HD-SDI and 270 Mb/s SD-SDI

RS-422 control ports switch between In for edit systems, and Out for decks

Crosspoint switch processing includes full re-clocking for long cable lengths

+12V main power and backup power supply connections

Extra outputs for monitoring can be independently routed to see any router input

USB 2.0 for connecting to a host Windows or Mac OS X computer

Tri-Sync or Genlock input

Planning your Broadcast Videohub Installation

Broadcast Videohub is perfect for large facilities. It features 72 SDI inputs, 144 SDI outputs, 72 bidirectional RS-422 deck control ports, reference input, redundant power supplies and powerful Videohub routing control software for Mac OS X and Windows.

All SDI connections support auto detection of SD, HD or 3 Gb/s SDI, and reclocking on all SDI inputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Broadcast Videohub.

Remote router control is performed via USB 2.0 and then shared over an IP network in much the same way as USB printer sharing. Prior to connecting any devices to Broadcast Videohub, you must nominate a computer to be the Videohub "Server" and to perform Videohub sharing via USB. You can use almost any computer for the Videohub Server, such as an editing workstation, and you don't need a dedicated or powerful computer for this task. However the Videohub Server computer must remain powered on at all times so that Videohub settings can be modified. If your Broadcast Videohub is too far away to connect via USB, or if you do decide to use a dedicated server computer, this could be a great use for an old Mac OS X or Windows computer which is no longer fast enough for other work. Alternatively you could use a very small computer, such as a netbook or Mac Mini, which can be hidden in an equipment rack along with your Broadcast Videohub. You will need to provide a standard USB 2.0 type A-B male cable to connect Broadcast Videohub to the server computer.

This same USB cable can be used for applying occasional firmware updates downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Videohub firmware update utility runs on the Videohub Server computer and uses the USB 2.0 connection to update Broadcast Videohub.

Third party router controllers can control Broadcast Videohub via Ethernet for router crosspoint switching. The Videohub Ethernet protocol is documented in the Developer Information section of this manual.

Broadcast Videohub is 8 rack units high and less than 3 inches deep, including power connector and cable. You will need to leave enough space in your equipment rack to install the Broadcast Videohub hardware. You can rack-mount Broadcast Videohub facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment.

The Broadcast Videohub requires one power supply but includes two, with thumb screw fasteners, to ensure continued operation should one fail. The included power supplies are universal power supplies for use in all countries. You will need to provide a standard IEC cord, with a C13 connector, for each power supply. We recommend connecting and powering the two power supplies at all times, which means two mains power sockets will be required. A third power socket will be required if you decide to use a dedicated server computer.

Studio Videohub

SDI outputs feature cable drivers that auto switch between SD, HD and 3 Gb/s SDI

SDI inputs feature automatic equalization and detect between SD, HD and 3 Gb/s SDI

Crosspoint switch processing includes full re-clocking for long cable lengths

Connections grouped for each user or deck, so connection is easy

Extra outputs for monitoring can be independently routed to see any router input
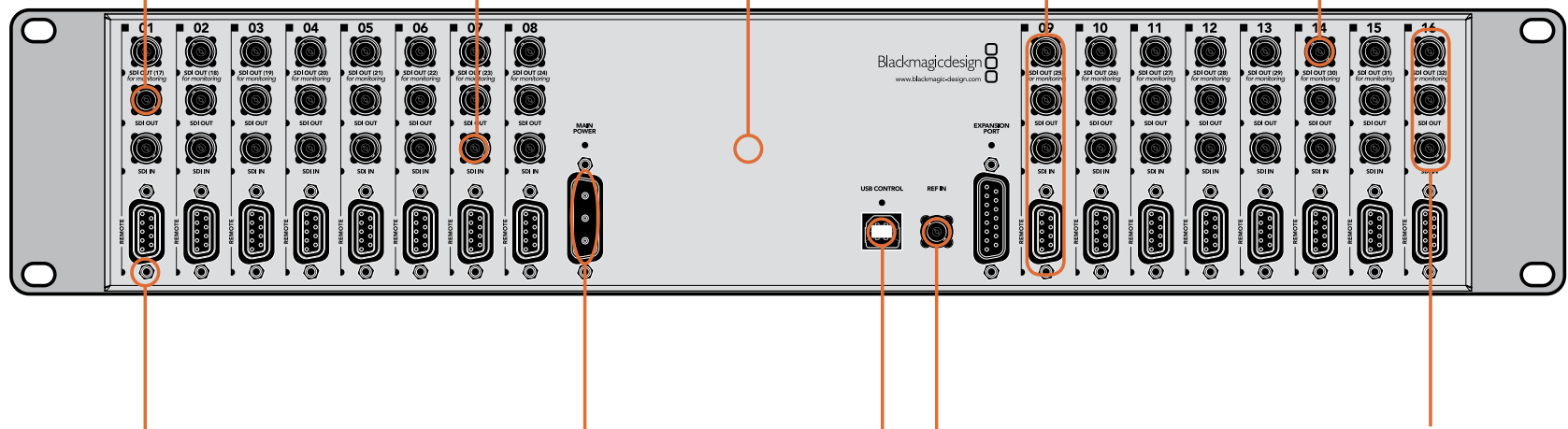
RS-422 control ports switch between in for edit systems, or Out for decks

+12V main power supply connection

USB 2.0 for connecting to a host Windows or Mac OS X computer

Tri-Sync or Genlock input

SDI switches between 3 Gb/s SDI, 1.485 Gb/s HD-SDI and 270 Mb/s SD-SDI

Planning your Studio Videohub Installation

Studio Videohub is perfect for smaller workgroups. It features 16 SDI inputs, 32 SDI outputs, 16 bidirectional RS-422 deck control ports, reference input, a universal power supply and powerful Videohub routing control software for Mac OS X and Windows.

All SDI connections support auto detection of SD, HD or 3 Gb/s SDI, and reclocking on all SDI inputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Studio Videohub.

Remote router control is performed via USB 2.0 and then shared over an IP network in much the same way as USB printer sharing. Prior to connecting any devices to Studio Videohub, you must nominate a computer to be the Videohub "Server" and to perform Videohub sharing via USB. You can use almost any computer for the Videohub Server, such as an editing workstation, and you don't need a dedicated or powerful computer for this task. However the Videohub Server computer must remain powered on at all times so that Videohub settings can be modified. If your Studio Videohub is too far away to connect via USB, or if you do decide to use a dedicated server computer, this could be a great use for an old Mac OS X or Windows computer which is no longer fast enough for other work. Alternatively you could use a very small computer, such as a netbook or Mac Mini, which can be hidden in an equipment rack along with your Studio Videohub. You will need to provide a standard USB 2.0 type A-B male cable to connect Studio Videohub to the server computer.

This same USB cable can be used for applying occasional firmware updates downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Videohub firmware update utility runs on the Videohub Server computer and uses the USB 2.0 connection to update Studio Videohub.

Third party router controllers can control Studio Videohub via Ethernet for router crosspoint switching. The Videohub Ethernet protocol is documented in the Developer Information section of this manual.
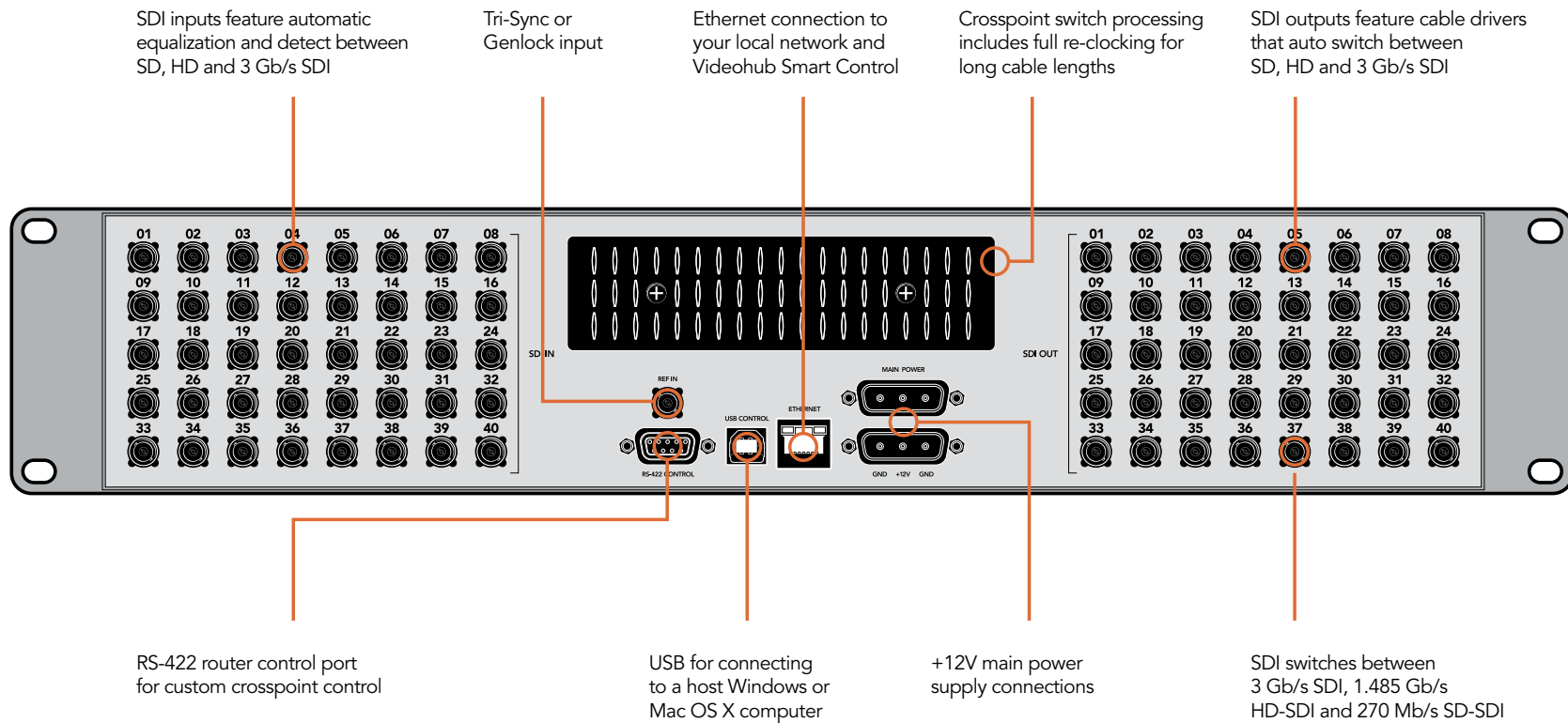
Studio Videohub is 2 rack units high and less than an inch thick. You will need to leave enough space in your equipment rack to install the Studio Videohub hardware. You can rack-mount Studio Videohub facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment. If you don't have a rack, then you can leave it in a safe place on the floor!

The Studio Videohub includes a universal power supply, with thumb screw fasteners, for use in all countries. You will need to provide a standard IEC cord, with a C13 connector, and a mains power socket. A second power socket will be required if you decide to use a dedicated server computer.

Compact Videohub

SDI inputs feature automatic
equalization and detect between
SD, HD and 3 Gb/s SDI

Tri-Sync or
Genlock input

Ethernet connection to
your local network and
Videohub Smart Control

Crosspoint switch processing
includes full re-clocking for
long cable lengths

SDI outputs feature cable drivers
that auto switch between
SD, HD and 3 Gb/s SDI

RS-422 router control port
for custom crosspoint control

USB for connecting
to a host Windows or
Mac OS X computer

+12V main power
supply connections

SDI switches between
3 Gb/s SDI, 1.485 Gb/s
HD-SDI and 270 Mb/s SD-SDI

Planning your Compact Videohub Installation

Compact Videohub is a small router and is perfect when you need a bigger router in a small size, such as in creative post facilities and broadcast trucks. It features 40 SDI inputs, 40 SDI outputs, reference input, redundant power supply connections and powerful Videohub routing control software for Mac OS X and Windows.

All SDI connections support auto detection of SD, HD or 3 Gb/s SDI, and reclocking on all SDI inputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Compact Videohub.

Remote router control is performed via 10/100Base-T Ethernet, serial or USB 2.0 and then shared over an IP network in much the same way as USB printer sharing.

If router control is performed via Ethernet, the integrated "Videohub Server" is used and you need only provide an Ethernet cable to connect Compact Videohub to your Ethernet network switch.

If router control is performed via USB 2.0, you must nominate a computer to be the "Videohub Server" and to perform Videohub sharing via USB. You can use almost any computer for the Videohub Server, such as an editing workstation, and you don't need a dedicated or powerful computer for this task. However the Videohub Server computer must remain powered on at all times so that Videohub settings can be modified. If your Compact Videohub is too far away to connect via USB, or if you do decide to use a dedicated server computer, this could be a great use for an old Mac OS X or Windows computer which is no longer fast enough for other work. Alternatively you could use a very small computer, such as a netbook or Mac Mini, which can be hidden in an equipment rack along with your Compact Videohub. You will need to provide a standard USB 2.0 type A-B male cable to connect Compact Videohub to the server computer.

Third party router controllers can control Compact Videohub via Ethernet, or as an RS-422 slave device, for router crosspoint switching. The Videohub Ethernet protocol, RS-422 protocol and RS-422 pinout diagram are documented in the Developer Information section of this manual.

Occasional firmware updates can be downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Compact Videohub. You will need to provide a standard USB 2.0 type A-B male cable.
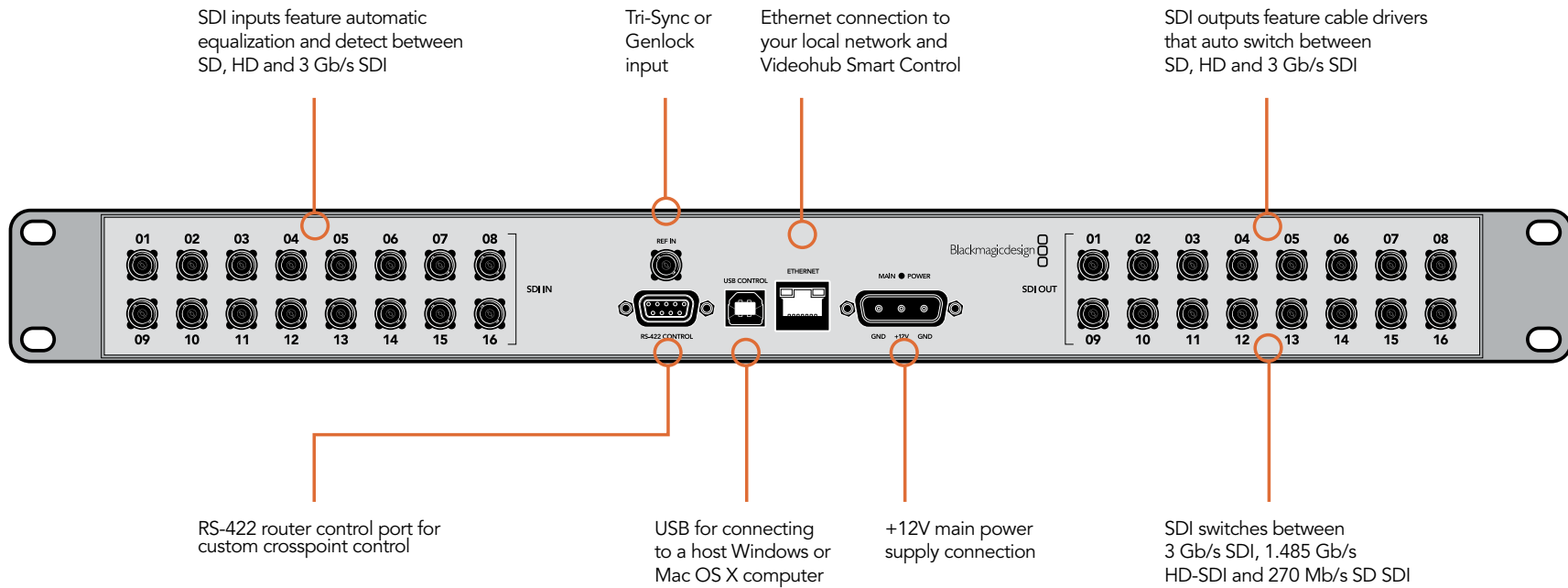
Compact Videohub is 2 rack units high and less than an inch thick. You will need to leave enough space in your equipment rack to install the Compact Videohub hardware. You can rack-mount Compact Videohub facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment. If you don't have a rack, then you can leave it in a safe place on the floor!

The Compact Videohub includes one power supply with thumb screw fasteners. A second power supply can be purchased to ensure continued operation should one fail. The power supplies are universal power supplies for use in all countries. You will need to provide a standard IEC cord, with a C13 connector, for each power supply. We recommend connecting and powering the two power supplies at all times, which means two mains power sockets will be required. A third power socket will be required if you decide to use a dedicated server computer.

Micro Videohub

SDI inputs feature automatic equalization and detect between SD, HD and 3 Gb/s SDI

Tri-Sync or Genlock input

Ethernet connection to your local network and Videohub Smart Control

SDI outputs feature cable drivers that auto switch between SD, HD and 3 Gb/s SDI

RS-422 router control port for custom crosspoint control

USB for connecting to a host Windows or Mac OS X computer

+12V main power supply connection

SDI switches between 3 Gb/s SDI, 1.485 Gb/s HD-SDI and 270 Mb/s SD SDI

Planning your Micro Videohub Installation

Micro Videohub is a tiny router and is perfect for locations where minimal space is available, such as outside broadcast trucks. It features 16 SDI inputs, 16 SDI outputs, reference input, a universal power supply and powerful Videohub routing control software for Mac OS X and Windows.

All SDI connections support auto detection of SD, HD or 3 Gb/s SDI, and reclocking on all SDI inputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Micro Videohub.

Remote router control is performed via 10/100Base-T Ethernet, serial or USB 2.0 and then shared over an IP network in much the same way as USB printer sharing.

If router control is performed via Ethernet, the integrated "Videohub Server" is used and you need only provide an Ethernet cable to connect Micro Videohub to your Ethernet network switch.

If router control is performed via USB 2.0, you must nominate a computer to be the "Videohub Server" and to perform Videohub sharing via USB. You can use almost any computer for the Videohub Server, such as an editing workstation, and you don't need a dedicated or powerful computer for this task. However the Videohub Server computer must remain powered on at all times so that Videohub settings can be modified. If your Micro Videohub is too far away to connect via USB, or if you do decide to use a dedicated server computer, this could be a great use for an old Mac OS X or Windows computer which is no longer fast enough for other work. Alternatively you could use a very small computer, such as a netbook or Mac Mini, which can be hidden in an equipment rack along with your Micro Videohub. You will need to provide a standard USB 2.0 type A-B male cable to connect Micro Videohub to the server computer.

Third party router controllers can control Micro Videohub via Ethernet, or as an RS-422 slave device, for router crosspoint switching. The Videohub Ethernet protocol, RS-422 protocol and RS-422 pinout diagram are documented in the Developer Information section of this manual.
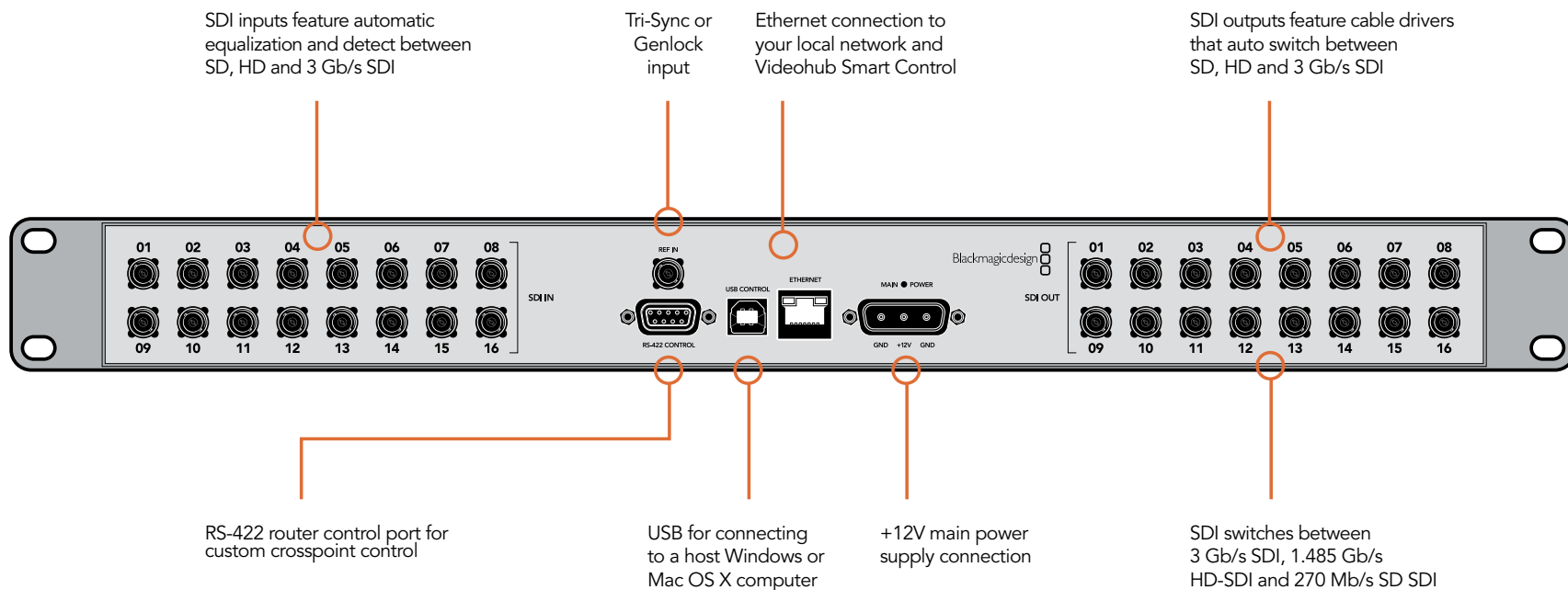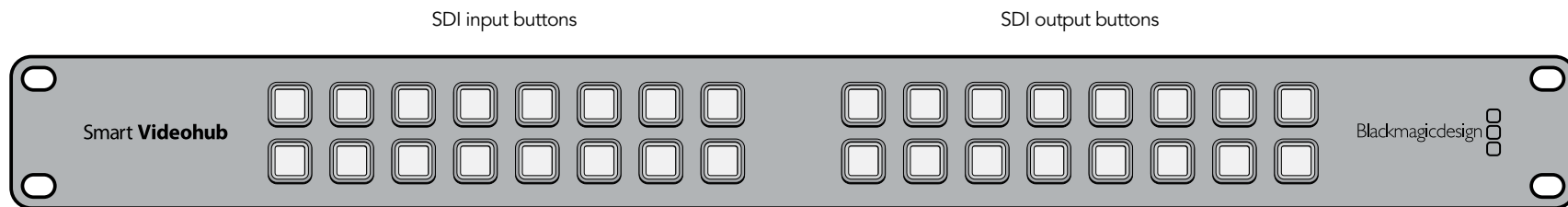
Occasional firmware updates can be downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Micro Videohub. You will need to provide a standard USB 2.0 type A-B male cable.

Micro Videohub is 1 rack unit high and less than an inch thick. You will need to leave enough space in your equipment rack to install the Micro Videohub hardware. You can rack-mount Micro Videohub facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment. If you don't have a rack, then you can leave it in a safe place on the floor!

The Micro Videohub includes a universal power supply, with thumb screw fasteners, for use in all countries. You will need to provide a standard IEC cord, with a C13 connector, and a mains power socket. A second power socket will be required if you decide to use a dedicated server computer.

Smart Videohub

SDI input buttons   SDI output buttons

SDI inputs feature automatic
equalization and detect between
SD, HD and 3 Gb/s SDI

Tri-Sync or
Genlock
input

Ethernet connection to
your local network and
Videohub Smart Control

SDI outputs feature cable drivers
that auto switch between
SD, HD and 3 Gb/s SDI

RS-422 router control port for
custom crosspoint control

USB for connecting
to a host Windows or
Mac OS X computer

+12V main power
supply connection

SDI switches between
3 Gb/s SDI, 1.485 Gb/s
HD-SDI and 270 Mb/s SD SDI

Planning your Smart Videohub Installation

Smart Videohub is a tiny router, with a built-in control panel for changing routes, and is perfect for locations where minimal space is available such as outside broadcast trucks. It features 32 pushbuttons for local router control without needing a computer, 16 SDI inputs, 16 SDI outputs, reference input, a universal power supply and powerful Videohub routing control software for Mac OS X and Windows.

All SDI connections support auto detection of SD, HD or 3 Gb/s SDI, and reclocking on all SDI inputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Smart Videohub.

Local router control is easy and intuitive using the built-in 32 pushbutton control panel, and requires no configuration and no computer. The front panel can be removed to allow insertion of labels under the buttons. All buttons can be variably backlit to ensure the labels can be easily read, even in dark rooms.

Remote router control can also be performed via 10/100Base-T Ethernet, serial or USB 2.0 and then shared over an IP network in much the same way as USB printer sharing.

If router control is performed via Ethernet, the integrated "Videohub Server" is used and you need only provide an Ethernet cable to connect Smart Videohub to your Ethernet network switch.

If remote router control is performed via USB 2.0, you must nominate a computer to be the "Videohub Server" and to perform Videohub sharing via USB. You can use almost any computer for the Videohub Server, such as an editing workstation, and you don't need a dedicated or powerful computer for this task. However the Videohub Server computer must remain powered on at all times so that Videohub settings can be modified. If your Smart Videohub is too far away to connect via USB, or if you do decide to use a dedicated server computer, this could be a great use for an old Mac OS X or Windows computer which is no longer fast enough for other work. Alternatively you could use a very small computer, such as a netbook or Mac Mini, which can be hidden in an equipment rack along with your Smart Videohub. You will need to provide a standard USB 2.0 type A-B male cable to connect Smart Videohub to the server computer.

Third party router controllers can control Smart Videohub via Ethernet, or as an RS-422 slave device, for router crosspoint switching. The Videohub Ethernet protocol, RS-422 protocol and RS-422 pinout diagram are documented in the Developer Information section of this manual.
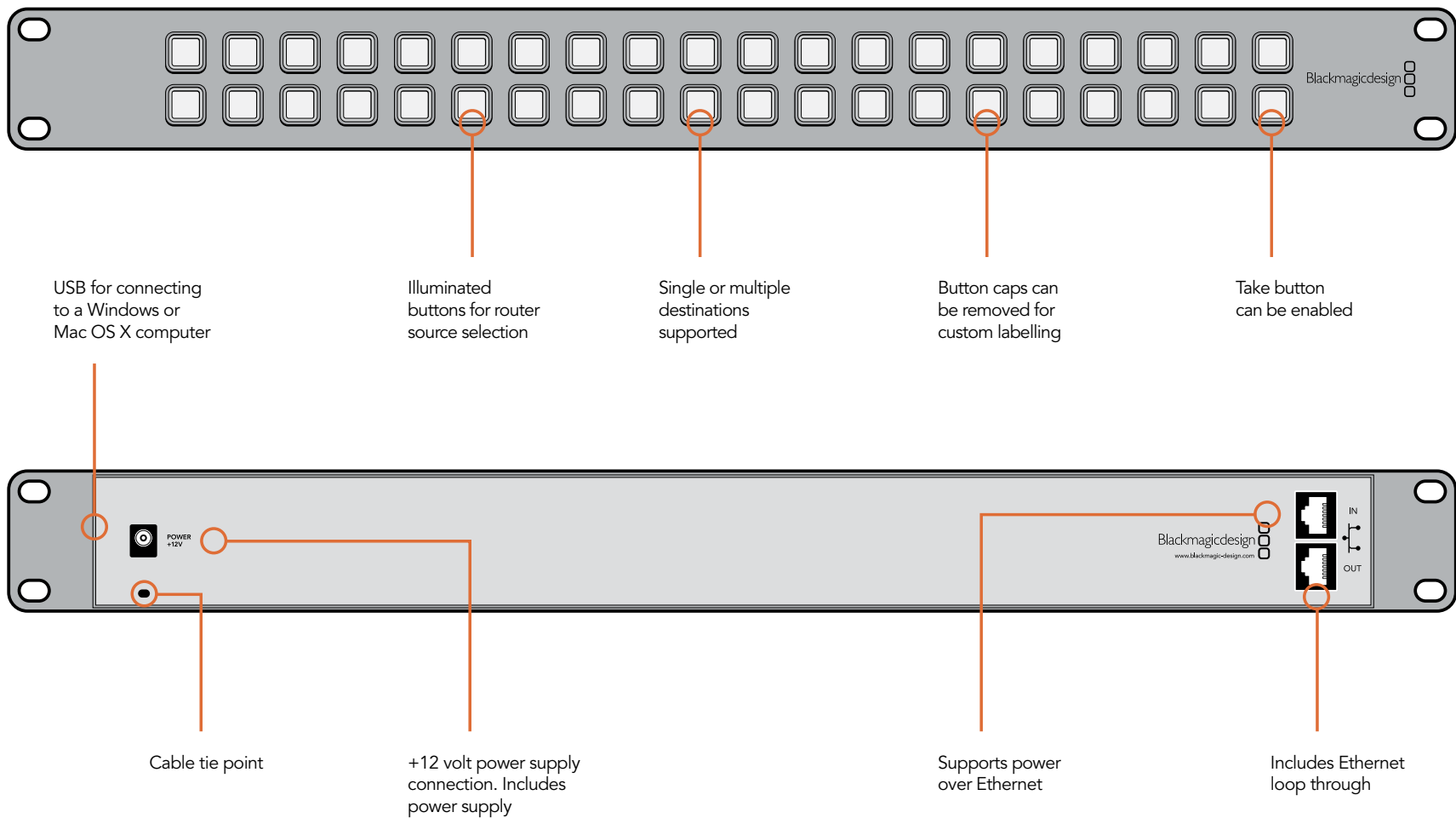
Occasional firmware updates can be downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Smart Videohub. You will need to provide a standard USB 2.0 type A-B male cable.

Smart Videohub is 1 rack unit high and just over an inch thick. You will need to leave enough space in your equipment rack to install the Smart Videohub hardware. You can rack-mount Smart Videohub at the front or at the rear of the rack to leave space for other equipment. If you don't have a rack, then you can leave it in a safe place on the floor!

The Smart Videohub includes a universal power supply, with thumb screw fasteners, for use in all countries. You will need to provide a standard IEC cord, with a C13 connector, and a mains power socket. A second power socket will be required if you decide to use a dedicated server computer.

Videohub Smart Control

USB for connecting
to a Windows or
Mac OS X computer

Illuminated
buttons for router
source selection

Single or multiple
destinations
supported

Button caps can
be removed for
custom labelling

Take button
can be enabled

Cable tie point

+12 volt power supply
connection. Includes
power supply

Supports power
over Ethernet

Includes Ethernet
loop through

Planning your Videohub Smart Control Installation

Videohub Smart Control is a rack-mountable control panel, with 40 backlit pushbuttons and Ethernet connectivity, which works with all models of Videohub. It can be configured to work with one or many SDI destination devices, using the included software utility for Mac OS X and Windows. Once configured for your SDI equipment and Videohub router, Videohub Smart Control no longer requires a computer and can immediately change SDI routes as desired.

The front panel of Videohub Smart Control can be removed to allow insertion of labels under the buttons. All 40 pushbuttons can be variably backlit to ensure the labels can be easily read, even in dark rooms.

When configured for a single SDI destination, such as a monitor or deck, the pushbuttons can instantly switch between 40 different SDI sources on the same Videohub router. When configured for multiple SDI destinations, destination buttons become gold colored, source buttons become white, and the lower right button can be configured as a take button and illuminates red. The Blackmagic Videohub Smart Control configuration utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Videohub Smart Control. You will need to provide a USB 2.0 type A to mini B male cable.

This same USB cable can be used for applying occasional firmware updates downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Blackmagic Videohub Smart Control utility is used to apply firmware updates, on Mac OS X and Windows computers, and uses a USB 2.0 connection to Videohub Smart Control.

Videohub Smart Control connects to any Videohub via 10/100Base-T Ethernet networking and also includes a loop through Ethernet port for connecting to additional control panels, Videohub routers or other network devices. You will need to provide a standard RJ45 Ethernet network cable to connect Videohub Smart Control to your Ethernet network switch.

Videohub Smart Control features power over Ethernet meaning no external power supply is required if used with a power over Ethernet switch. If your Ethernet switch does not provide power over Ethernet, use the included universal power supply with international power socket adapters for all countries. To stop power from being accidentally disconnected, a cable tie point is included just below the power socket to lock down the power connection. You will need to provide a mains power socket for the universal power supply.

Videohub Smart Control is 1 rack unit high and less than an inch thick. You will need to leave enough space in your equipment rack to install the Videohub Smart Control hardware. You can rack-mount Videohub Smart Control at the front or at the rear of the rack to leave space for other equipment. When configured for a single SDI destination, install Videohub Smart Control immediately under an SDI deck or monitor you wish to control. If you don't have a rack, then you can leave it in a safe place on the floor!

If your Videohub has previously been set up, you can jump straight to the Router Control section of this manual.

If you've just bought a Universal Videohub, you'll need to read the "Building a Universal Videohub" pages for your specific model of Universal Videohub.

Every Videohub needs to be networked so it can be controlled by computers and pushbutton control panels. If your Videohub features an Ethernet port, go to the section Networking Videohub with Ethernet. Otherwise go to Networking Videohub with USB.

If you have a Videohub Smart Control, you will need to connect it via Ethernet to control a Videohub. There is also an inconspicuous USB port used for configuring Videohub Smart Control. Please see the connection instructions for Networking Videohub Smart Control with Ethernet and Connecting Videohub Smart Control via USB.

If you want to label the buttons on a Smart Videohub or Videohub Smart Control, please read Labelling Control Panels to help create neat labels and avoid damaging the keyboard membrane when opening the chassis.

We've also provided some tips on connecting SDI cables.

Building a Universal Videohub 288

Universal Videohubs contain electrostatic sensitive devices. It is essential to discharge yourself of static electricity before handling any of these devices, just as you would when installing devices into a computer. We recommend the use of an antistatic wrist strap when handling any of these devices.

Universal Videohub 288

Universal Videohub 288 ships as an empty rack frame except for a fan tray containing three hot-swappable fans. 25 rack units of space should be reserved for the installation of the Universal Videohub 288 and two rack-mount power supply chassis. 2 RU of this reserved space should be left above Universal Videohub 288 for heat dissipation unless mounted at the top of an open rack where there is no obstruction to airflow above the Videohub. Only 23 RU is required if Universal Videohub 288 is mounted at the top of an open rack. Due to the sheer number of cables that are likely to be attached to this Videohub, it would be preferable to mount Universal Videohub 288 in a dedicated rack.

As part of the space reservation in your equipment rack, 5 RU should be allocated to install both Universal Videohub Power Supply chassis under the Universal Videohub 288. This 5 RU allowance includes 1 RU of clearance between each power supply chassis for heat dissipation and also 2 RU of clearance under the base of the Videohub to allow the fan tray to be removed and the fans replaced. Please refer to the Troubleshooting section of this manual for instructions on "Replacing a fan in Universal Videohub".

Universal Videohub 288 should be securely mounted in a rack before populating it with any additional hardware as it will quickly become very heavy. The substantial combined weight of many connected SDI cables means that it is a good idea to connect cables to the lower cards first and then progressively insert the upper interface cards and connect SDI cables as required. Cables should be supported by the rack and not just left hanging from the Videohub. While true of any video router, it is particularly important to support cables on big video routers so as not to stress the interface connectors. Cable support can be provided by using cable harnesses and tying each harness to the rack frame.

It is essential that unpopulated card slots be covered with the blanking plates which are supplied with the Universal Videohub. Failure to cover all slots may lead to Universal Videohub overheating.

Universal Videohub 288 Crosspoint

Once the Universal Videohub 288 has been mounted in a rack, it needs to be fitted with a crosspoint card. The crosspoint card is the "brains" of any Universal Videohub and performs video route switching. A second Universal Videohub 288 Crosspoint card can be installed for future redundancy. Universal Videohub 288 Crosspoint cards are hot-swappable and are designed to be installed and removed while the Universal Videohub is running. However replacing the card is like a brain transplant and all video routes and port labels will be removed with the old card.
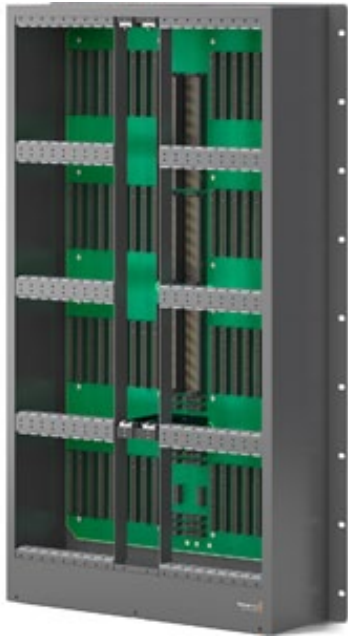
An empty Universal Videohub 288 frame

Universal Videohub 288 Crosspoint card

To install the Universal Videohub 288 Crosspoint card, hold the card in a vertical orientation by its two levers. The BNC, Ethernet and other ports should be towards the bottom end of the card. Gently insert the unit into its slot and ensure the top and bottom edges of the card follow the black guides. Now firmly push both levers flat to fully engage the multi-pin connectors with the motherboard. Mating pins ensure that the card precisely engages with the motherboard without damaging the multi-pin connectors. Use a number 01 size Pozidriv screwdriver to secure the two levers on the crosspoint card.

Should you ever need to remove a Universal Videohub 288 Crosspoint card, remove the two screws and then pull open the two levers. Once the levers have been fully opened, gently extract the card along its guides.

If you wish to install a second Universal Videohub 288 Crosspoint card, use a number 02 size Pozidriv screwdriver to remove the blanking plate from the right crosspoint card slot.

Universal Videohub 72 Crosspoint

A single Universal Videohub 72 Crosspoint card can be installed in the left crosspoint card slot of a Universal Videohub 288. The Universal Videohub 72 Crosspoint card is limited to supporting 18 interface cards and does not support crosspoint redundancy. This card should only be considered if attempting to minimize the initial cost of purchasing a Universal Videohub 288. When using a Universal Videohub 72 Crosspoint card, only the bottom row of 18 interface cards can be used. A Universal Videohub 288 Crosspoint card must be used if you want to install more than 18 interface cards.

The short length of the Universal Videohub 72 Crosspoint card, compared with the Universal Videohub 288 Crosspoint card, requires the installation of an additional supporting bridge in the center of the Universal Videohub 288. When upgrading to a Universal Videohub 288 Crosspoint card at a later time, the additional supporting bridge must be removed.

The additional supporting bridge, short blanking plate and associated screws are available as a seperate package from your Videohub dealer. Torx T8, Torx T10, number 01 and number 02 size Pozidriv screwdrivers are required to install the additional supporting bridge and the Universal Videohub 72 Crosspoint card.

Step 1: Ensure power is switched off and disconnected from Universal Videohub 288.

Step 2: Use a number 02 size Pozidriv screwdriver to remove the blanking plate from the right crosspoint card slot.

Step 3: Use a number 02 size Pozidriv screwdriver to remove the blanking plates from the interface card slots for SDI ports 73-216.

Step 4: Maneuver the supporting bridge through the crosspoint card slots and rest it flat on the motherboard while taking great care to avoid damaging the multi-pin connectors on the motherboard.

Universal Videohub 72 Crosspoint card
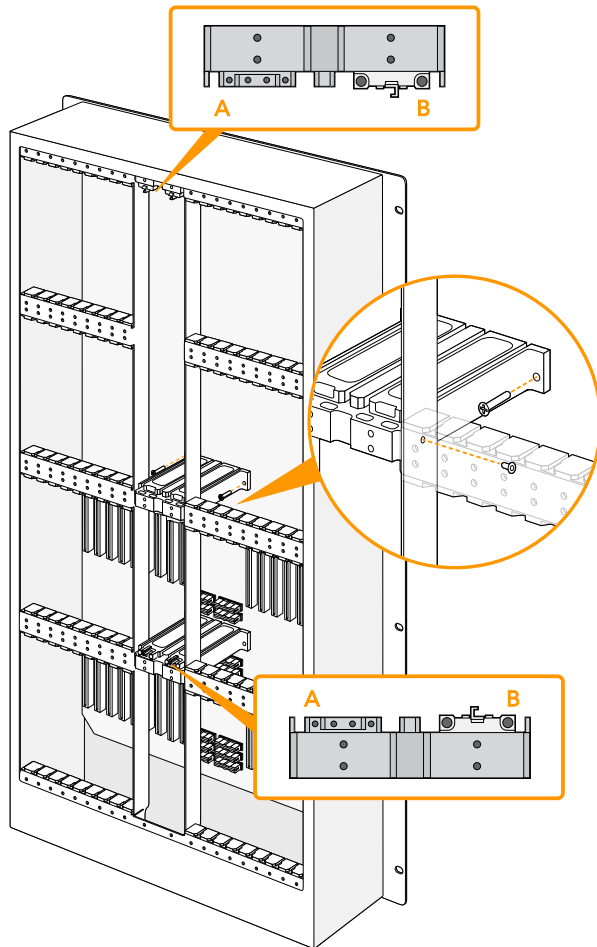
Step 5: Stand the supporting bridge so the holes in its left and right feet are positioned over the corresponding mounting holes on the motherboard standoffs.

Step 6: Secure the left and right feet of the supporting bridge with the number 02 size Pozidriv screws.

Step 7: Secure the left and right legs of the supporting bridge with the two Torx T10 screws as shown in the accompanying illustration. These screws are installed horizontally.

Step 8: Use a Torx T8 screwdriver to remove the silver catches from the two supporting bridges at the top and bottom of the left crosspoint slot. In the accompanying illustration, the letter "A" indicates the location on the left side of the supporting bridges where the silver catches have been removed. When upgrading to a Universal Videohub 288 Crosspoint card at a later time, you will need to reinstate the silver catches so make sure you keep them in a safe place. The silver catches shown at "B" should not be removed. They will be required if installing a Universal Videohub 288 Crosspoint card in the right crosspoint card slot in the future.

Step 9: To install the Universal Videohub 72 Crosspoint card, hold the card in a vertical orientation by its two levers. The BNC, Ethernet and other ports should be towards the bottom end of the card. Gently insert the unit into its slot, below the additional supporting bridge, and ensure the top and bottom edges of the card follow the black guides. Now firmly push both levers flat to fully engage the multi-pin connectors with the motherboard. Mating pins ensure that the card precisely engages with the motherboard without damaging the multi-pin connectors. Use a number 01 size Pozidriv screwdriver to secure the screws on the two levers of the crosspoint card.

Should you ever need to remove a Universal Videohub 72 Crosspoint card, remove the two screws and then pull open the two levers. Once the levers have been fully opened, gently extract the card along its guides.

Step 10: The short length of the Universal Videohub 72 Crosspoint card means that a short blanking plate should also be installed to cover the rest of the long crosspoint slot. The short blanking plate can be secured with a number 02 size Pozidriv screwdriver.

Step 11: Use a number 02 size Pozidriv screwdriver to reinstate the blanking plate for the right crosspoint card slot.

Step 12: Reinstate the blanking plates for the interface card slots for SDI ports 73-216. Interface cards must only be installed in the the bottom row, for SDI ports 1-72, when a Universal Videohub 72 Crosspoint card is used.
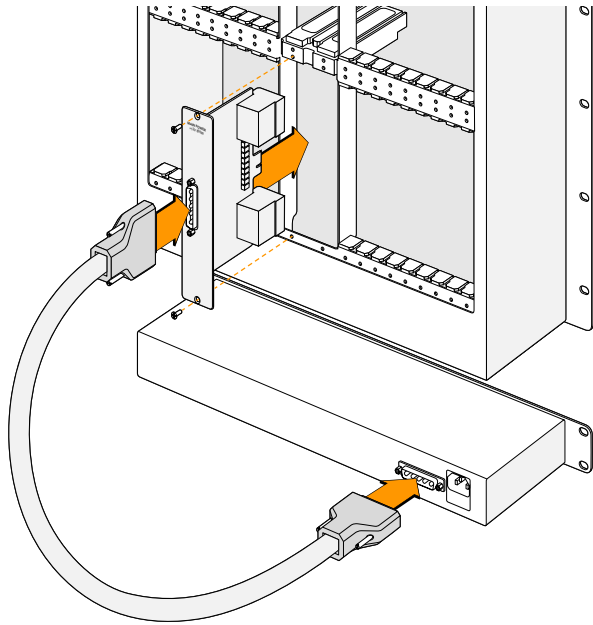
The Universal Videohub Power Supply consists of a power card, which is inserted in to the Universal Videohub 288, and then connected to a 1 RU chassis located under the Universal Videohub 288.

Universal Videohub Power Supply

The Universal Videohub Power Supply package is recommended for the Universal Videohub 288 and consists of a power card, a power cable and a 1 RU chassis containing the power supply. The Universal Videohub 288 has provision for two Universal Videohub Power Supplies. The second Universal Videohub Power Supply can be installed under the first power supply for failover redundancy. You will need to provide a standard IEC cord with a C13 connector for each power supply.

Installing a Universal Videohub Power Supply

If you are installing power supplies in a new Universal Videohub 288, it is important to ensure that no power is connected until the power supplies are fully installed and ready to be powered on. Accordingly please carry out the installation procedure in the following order:

Step 1. Ensure that any new power supplies are disconnected from any electrical source.

Step 2. Orient the power card so that the "MAIN POWER" label appears at the top of the card and then insert the power card into either of the two power card slots. Use a number 02 size Pozidriv screwdriver to secure the power card with its two screws. If you have a second power card to install, install it now in to the spare power card slot.

Step 3. Mount the 1 RU chassis underneath the Universal Videohub leaving 2 RU of clearance between the Videohub and power supply chassis so you can access the drop-down fan tray if needed. If you have a second power supply to install, install it below the first power supply leaving 1 RU of clearance between the two power supplies for heat dissipation.

Step 4. Connect the included power cable between the power connectors on one power card and one power supply. Tighten the thumb screws on both power connectors. Repeat this step if you have a second power card and second power supply. It does not matter which power card connects to which power supply.

Step 5. Connect an IEC cord from each power supply to the wall socket and turn on the power.

Installing a second Power Supply while Universal Videohub is running

If you wish to install a redundant or replacement power supply, while Universal Videohub 288 is still running from a power supply, it is important to ensure that no power is connected to the redundant power supply until it is fully installed and ready to be powered on. Accordingly please carry out the installation procedure in the following order:

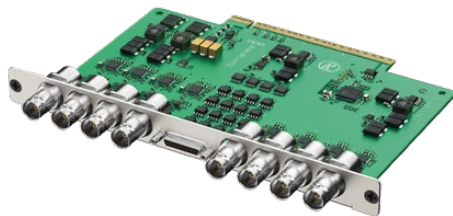**Step 1.** Ensure that the new power supply is disconnected from any electrical source.

Step 2. Orient the new power card so that the "MAIN POWER" label appears at the top of the card and then insert the power card into the spare power card slot. Use a number 02 size Pozidriv screwdriver to secure the power card with its two screws.
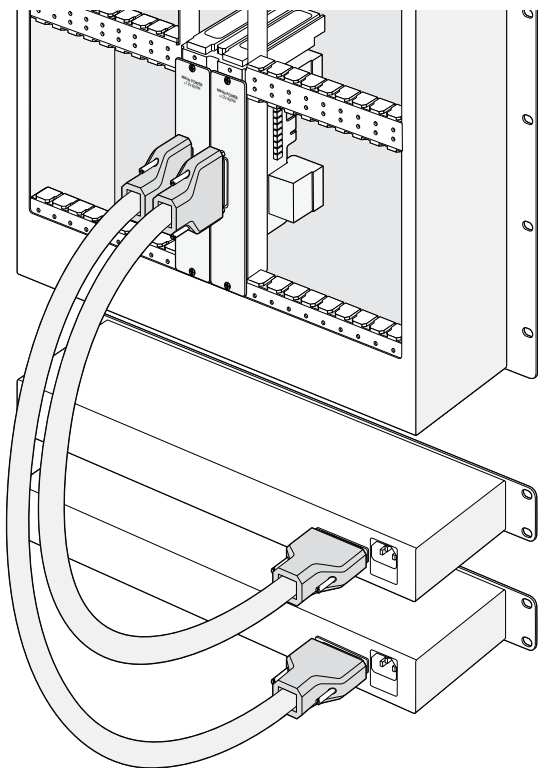
Two Universal Videohub Power Supplies can be installed for power redundancy with the Universal Videohub 288

Universal Videohub 450W Power Card

Step 3. If you are installing a redundant power supply for the first time, install the 1 RU chassis below the first power supply leaving 1 RU of clearance between the two power supplies for heat dissipation.

If you are installing a replacement power supply, install the replacement 1 RU chassis where the faulty unit was previously located.

Step 4. Connect the new power cable between the power connectors on the new power card and the new power supply. Tighten the thumb screws on both power connectors.

Step 5. Connect an IEC cord from the new power supply to the wall socket and turn on the power.

Removing a Power Supply while Universal Videohub is running

If you need to remove a faulty power supply, while Universal Videohub 288 is continuing to run from another power supply, it is important to ensure that no power is connected to the faulty power supply while you remove it. Accordingly please carry out the removal procedure in the following order:

Step 1. Switch off the power to the faulty power supply and unplug its IEC cord.

Step 2. Disconnect the power cable between the power card and the power supply of the faulty unit.

Step 3. Remove the faulty 1 RU chassis and associated power card. Ensure all components from the faulty unit are placed somewhere where they will not be confused with a new replacement unit.

Universal Videohub 450W Power Card

The Universal Videohub 450W Power Card features three power connectors which need to be connected to a set of three 150W power supply "bricks" for 450W of power. This power card is not capable of powering a fully populated Universal Videohub 288 running at maximum power consumption and should only be considered if attempting to minimize the cost of purchasing a Universal Videohub 288.

A second Universal Videohub 450W Power Card and another set of three brick power supplies can be installed for failover redundancy.

Orient the power card so that the "MAIN POWER" label appears at the top of the card and then insert the power card into its slot in the motherboard. Use a number 02 size Pozidriv screwdriver to secure the power card with its two screws.

If you need to remove or replace a power card while Universal Videohub 288 is still running from another power card, power off and disconnect all connected power supplies before removing the power card.

Universal Videohub 150W Power Supply

The Universal Videohub 150W Power Supply is a "brick" style power supply which connects to a Universal Videohub 450W Power Card. You will need to connect 3 power supplies for each Universal Videohub 450W Power Card you install in a Universal Videohub 288. You will need to provide a standard IEC cord with a C13 connector for each power supply.

Adding a Universal Videohub 150W Power Supply

It is important to ensure that no power is connected until the power supplies are fully installed and ready to be powered on. Accordingly please carry out the installation procedure in the following order:

Step 1. Ensure that any new brick power supplies are disconnected from any electrical source.

Step 2. Connect each new power supply to the Universal Videohub 450W Power Card.

Step 3. Tighten the thumb screws on all power connectors.

Step 4. Connect an IEC cord from each new power supply to the wall socket and turn on the power.

If you need to remove or replace a power brick while Universal Videohub 288 is still running from a second power card and set of power supplies, power off the brick while being careful to avoid switching off power to the remaining power supplies. Unplug the IEC cord and then unscrew and disconnect the power supply from the Universal Videohub 450W Power Card.

Universal Videohub SDI Interface

Universal Videohub Optical Interface

Universal Videohub Deck Control Cable

Universal Videohub SDI Interface

The Universal Videohub SDI Interface card provides 4 SDI inputs and 4 SDI outputs using traditional BNC SDI connectors. It includes an identification LED and also a breakout cable port for the Universal Videohub Deck Control Cable.

Hold the card in a vertical orientation with the identification LED at the top of the card. The identification LED looks like a pin hole near the top-left of the top connector. Gently but firmly insert the card so that it follows its guides and plugs in to the PCI slot in the motherboard. Use a number 02 size Pozidriv screwdriver to secure the interface card to the Universal Videohub frame.

Universal Videohub Optical Interface

The Universal Videohub Optical Interface card provides 4 SDI inputs and 4 SDI outputs using single mode, optical fiber, LC connectors. It includes an identification LED and also a breakout cable port for the Universal Videohub Deck Control Cable.

Hold the card in a vertical orientation with the identification LED at the top of the card. The identification LED looks like a pin hole near the top-left of the top connector. Gently but firmly insert the card so that it follows its guides and plugs in to the PCI slot in the motherboard. Use a number 02 size Pozidriv screwdriver to secure the interface card to the Universal Videohub frame.

Universal Videohub Deck Control Cable

The Universal Videohub Deck Control Cable connects to any Universal Videohub SDI Interface or Universal Videohub Optical Interface card to add four independent deck control ports. Simply connect the cable to the corresponding port on the interface card and then tighten the two thumbscrews.

An empty Universal Videohub 72 frame

Universal Videohub 72 Crosspoint card

Building a Universal Videohub 72

Universal Videohubs contain electrostatic sensitive devices. It is essential to discharge yourself of static electricity before handling any of these devices, just as you would when installing devices in to a computer. We recommend the use of an antistatic wrist strap when handling any of these devices.

Universal Videohub 72

Universal Videohub 72 ships as an empty rack frame except for a fan tray containing three hot-swappable fans. 9 rack units of space should be reserved for the installation of the Universal Videohub 72. 2 RU of this reserved space should be left above Universal Videohub 72 for heat dissipation unless mounted at the top of an open rack where there is no obstruction to airflow above the Videohub. Only 7 RU is required if Universal Videohub 72 is mounted at the top of an open rack. The space reserved for Universal Videohub 72 includes 2 RU of clearance under the base of the Videohub to allow the fan tray to be removed and the fans replaced. Please refer to the Troubleshooting section of this manual for instructions on "Replacing a fan in Universal Videohub".

Universal Videohub 72 customers will need to purchase and install a single Universal Videohub 450W Power Card and external "brick" power supplies. Up to three brick power supplies can be connected to the power card.

Universal Videohub 72 should be securely mounted in a rack before populating it with any additional hardware as it will quickly become heavy.

It is essential that unpopulated card slots be covered with the blanking plates which are supplied with the Universal Videohub. Failure to cover all slots may lead to Universal Videohub overheating.

Universal Videohub 72 Crosspoint

Once the Universal Videohub 72 has been mounted in a rack, it needs to be fitted with a crosspoint card. The crosspoint card is the "brains" of any Universal Videohub and performs video route switching.

To install the Universal Videohub 72 Crosspoint card, hold the card in a vertical orientation by its two levers. The BNC, Ethernet and other ports should be towards the bottom end of the card. Gently insert the unit into its slot and ensure the top and bottom edges of the card follow the black guides. Now firmly push both levers flat to fully engage the multi-pin connectors with the motherboard. Mating pins ensure that the card precisely engages with the motherboard without damaging the multi-pin connectors. Use a number 01 size Pozidriv screwdriver to secure the screws on the two levers of the crosspoint card.

Should you ever need to remove a Universal Videohub 72 Crosspoint card, remove the two screws and then pull open the two levers. Once the levers have been fully opened, gently extract the card along its guides.

The Universal Videohub 72 Crosspoint card is hot-swappable and is designed to be installed and removed while the Universal Videohub 72 is running. However replacing the card is like a brain transplant and all video routes and port labels will be removed with the old card.

Universal Videohub 450W Power Card

The Universal Videohub 450W Power Card features three power connectors which can be connected to 150W power supply "bricks" for up to 450W of power. This power card is suitable for powering a fully populated Universal Videohub 72 with two power supplies connected. A third connected power supply provides failover redundancy should one power supply fail.

Orient the power card so that the "MAIN POWER" label appears at the top of the card and then insert the power card into its slot in the motherboard. Use a number 02 size Pozidriv screwdriver to secure the power card with its two screws.

If you need to remove or replace the power card, power off and disconnect all connected power supplies before removing the power card.

Universal Videohub 150W Power Supply

The Universal Videohub 150W Power Supply is a "brick" style power supply which connects to the Universal Videohub 450W Power Card. Please review the "Power supply options" in the earlier "Universal Videohub 72 pre-installation overview and planning" section to determine how many power supplies you will need. You will need to provide a standard IEC cord with a C13 connector for each power supply.

It is important to ensure that no power is connected until the power supplies are fully installed and ready to be powered on. Accordingly please carry out the installation procedure in the following order:

Step 1. Ensure that any new brick power supplies are disconnected from any electrical source.

Step 2. Connect each new power supply to a spare power connector on the Universal Videohub 450W Power Card.

Step 3. Tighten the thumb screws on all power connectors.

Step 4. Connect an IEC cord from each new power supply to the wall socket and turn on the power.

If you need to remove or replace a power brick while Universal Videohub 72 is still running, power off the brick while being careful to avoid switching off power to the remaining power supplies. Unplug the IEC cord and then unscrew and disconnect the power supply from the Universal Videohub 450W Power Card.

Universal Videohub 450W Power Card

Universal Videohub SDI Interface

Universal Videohub Optical Interface

Universal Videohub Deck Control Cable

Universal Videohub SDI Interface

The Universal Videohub SDI Interface card provides 4 SDI inputs and 4 SDI outputs using traditional BNC SDI connectors. It includes an identification LED and also a breakout cable port for the Universal Videohub Deck Control Cable.

Hold the card in a vertical orientation with the identification LED at the top of the card. The identification LED looks like a pin hole near the top-left of the top connector. Gently but firmly insert the card so that it follows its guides and plugs in to the PCI slot in the motherboard. Use a number 02 size Pozidriv screwdriver to secure the interface card to the Universal Videohub frame.

Universal Videohub Optical Interface

The Universal Videohub Optical Interface card provides 4 SDI inputs and 4 SDI outputs using single mode, optical fiber, LC connectors. It includes an identification LED and also a breakout cable port for the Universal Videohub Deck Control Cable.

Hold the card in a vertical orientation with the identification LED at the top of the card. The identification LED looks like a pin hole near the top-left of the top connector. Gently but firmly insert the card so that it follows its guides and plugs in to the PCI slot in the motherboard. Use a number 02 size Pozidriv screwdriver to secure the interface card to the Universal Videohub frame.

Universal Videohub Deck Control Cable

The Universal Videohub Deck Control Cable connects to any Universal Videohub SDI Interface or Universal Videohub Optical Interface card to add four independent deck control ports. Simply connect the cable to the corresponding port on the interface card and then tighten the two thumbscrews.

Networking Videohub with Ethernet

Many Videohub models have an Ethernet port and can connect directly to your Ethernet network switch and then to any computer on your local area IP based network. The integrated "Videohub Server" is used when router control is performed via Ethernet. This contrasts to the USB connection method which requires a separate computer to act as the Videohub Server.

You will need to carry out the following steps to connect Videohub to the local area IP based network.

Step 1. Securely connect and power on all of the power supplies included with your Videohub.

Step 2. Connect the Videohub router to the network switch with a standard RJ45 Ethernet cable.

Network Switch

Ethernet

Videohub connected via Ethernet networking

Client Computers
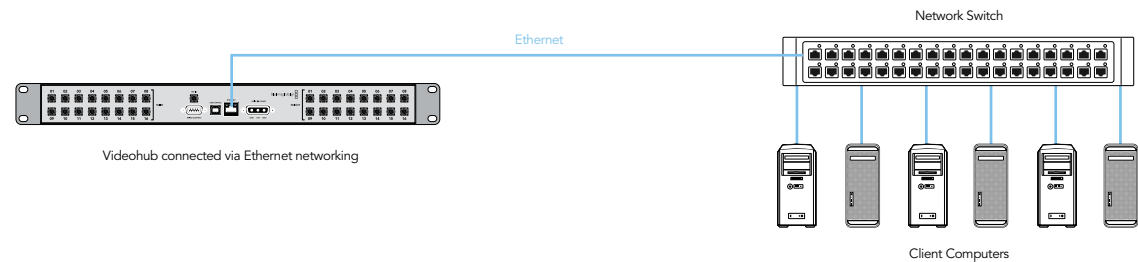
Networking Videohub with USB

All Videohubs, except Universal Videohubs, can connect to any computer on your local area IP based network via USB 2.0. One "server" computer on your network connects to Videohub via the plug and play USB connection, and shares the Videohub with other computers and iPads on your network in a similar way to USB printer sharing.

You can use almost any computer for the Videohub Server, such as an editing workstation, and you don't need a dedicated or powerful computer for this task. If your Videohub is too far away to connect via USB, or if you do decide to use a dedicated server computer, this could be a great use for an old Mac OS X or Windows computer which is no longer fast enough for other work. Alternatively you could use a very small computer, such as a netbook or Mac Mini, which can be hidden in an equipment rack along with your Videohub.

The "Videohub Server" can be any computer running Apple Mac OS X, Windows XP or Windows 7 and any number of Mac OS X and Windows "clients" can connect to the "server" via USB. You will need to carry out the following steps to connect Videohub to the local area IP based network.

Step 1. Securely connect and power on all of the power supplies included with your Videohub.

Step 2. Connect the Videohub router to the Videohub Server computer with a standard USB 2.0 type A-B male cable.

Step 3. Connect the Videohub Server computer to your network switch. We strongly recommend connecting the Videohub Server computer with reliable Ethernet cables in preference to wireless networking. Wireless networking may be affected by interference from appliances and other wireless devices. Wireless interference is a common problem in equipment racks containing electronic equipment.

Network Switch

Ethernet

Videohub Server Computer

Videohub connected via USB

Client Computers
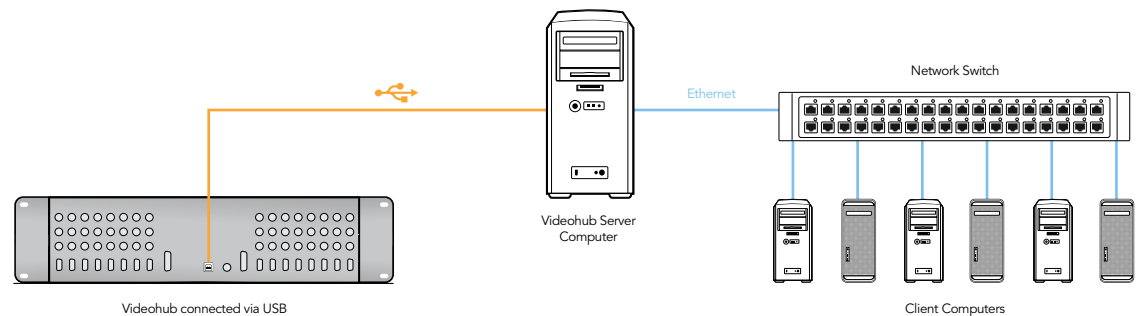
Networking Videohub Smart Control with Ethernet

Videohub Smart Control connects to any Videohub via standard Ethernet networking and can be powered over Ethernet or with an external power supply. Videohub Smart Control has two 10/100Base-T Ethernet ports. The In port usually connects directly to the Ethernet network switch and then to any Videohub router on your local area IP based network. Alternatively the In port can connect directly to any Ethernet-equipped Videohub using a standard Ethernet cable and without the need for a network switch. The Out port provides a loop through Ethernet connection to additional control panels, Videohub router or other network devices. The loop through Ethernet connection is useful if you want to add Videohub Smart Control to your network without having to run an additional cable back to the network switch.

You will need to carry out the following steps to connect Videohub Smart Control to the local area IP based network.

Step 1. Videohub Smart Control features power over Ethernet meaning no external power supply is required if used with a power over Ethernet switch. You can skip this step if your network switch provides power over Ethernet. Otherwise connect the included power supply to Videohub Smart Control. No problem will be caused by connecting the power supply and power over Ethernet at the same time.

When power is first connected to Videohub Smart Control, a self-diagnostic test will be conducted and all of the buttons will flash their test lights in the following order: red, green, blue and white.

Step 2. Use the network In port on Videohub Smart Control to connect to your network switch, or directly to an Ethernet-equipped Videohub, with a standard RJ45 Ethernet cable.

Step 3. You might also wish to connect another network device to the network Out port on Videohub Smart Control, such as a Videohub router, another Videohub Smart Control or other network devices such as a computer or VoIP phone. The Out port does not provide power over Ethernet and any network device connected to this port will require its own power supply.

In most facilities, Videohub is usually shared via an Ethernet network switch so it can be controlled by computers on the network as well as by Videohub Smart Control. See "Connection method 1".

Connection method 1. Connecting to an Ethernet-equipped Videohub via a network switch.

Videohubs without a built-in Ethernet port can be connected as shown in "Connection method 2".

Videohub Smart Control connected via Ethernet networking

Network Switch

Ethernet

Videohub Server computer   Videohub connected via USB
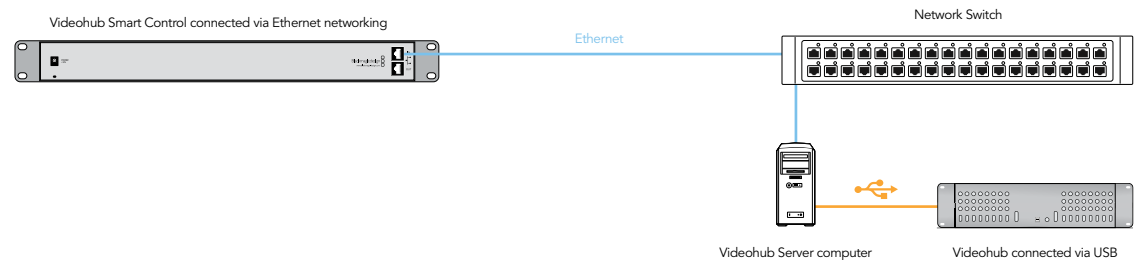
Connection method 2. Connecting to a USB-attached Videohub via a network switch.

You might wish to connect your Videohub Smart Control directly to an Ethernet-equipped Videohub if:

- you need to set up very fast
- you don't have any requirement to share Videohub on the network so it can be controlled by computers on the network
- you don't have much space, such as in an OB van
- you have a limited power budget, such as in an OB van

A regular Ethernet cable can be used between Videohub Smart Control and the Videohub. There here is no need to use a special crossover cable. See "Connection method 3".

Videohub Smart Control connected via Ethernet networking

Ethernet

Videohub connected via Ethernet

Connection method 3. Connecting directly to an Ethernet-equipped Videohub.

POWER
+12V
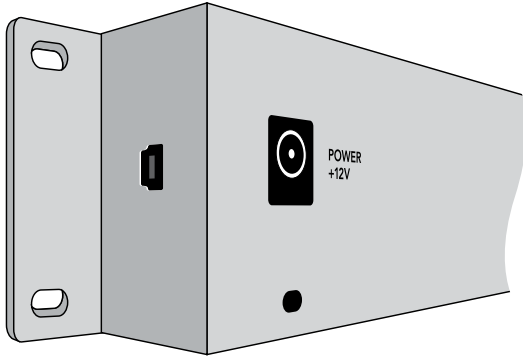
Side view of Videohub Smart Control showing the mini-B type USB port

Connecting Videohub Smart Control via USB

A USB 2.0 connection, to a computer, is used to configure the network and button settings of Videohub Smart Control.

When viewed from the rear of the unit, the mini-B type USB port can be found on the small, left panel of the chassis, just in front of the rack-mounting holes.

The USB port will become inaccessible once Videohub Smart Control has been installed in a rack. Therefore most people will usually configure Videohub Smart Control via USB, and then remove the USB cable, before installing the unit in a rack.

If you are likely to reconfigure Videohub Smart Control periodically, then it may be more convenient to permanently connect a USB cable to the unit before installing Videohub Smart Control in a rack. This will enable Videohub Smart Control to connect to a computer via USB without needing to remove the unit from the rack.
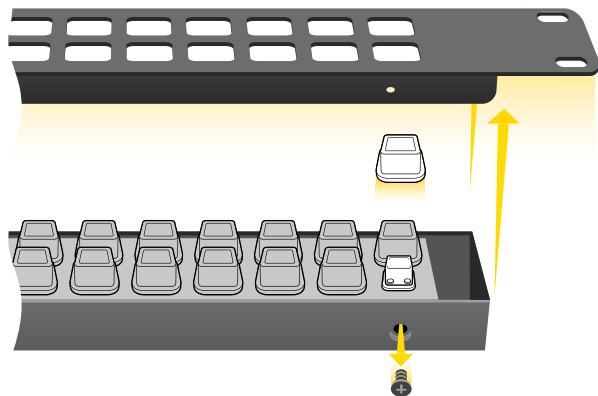
Steps 3-5. Remove the 4 screws, lift off the face plate and then the button caps

Step 7. Lightly press the four corners of the square label into the rounded corners of the clear cap

Labelling Control Panels

Videohub Smart Control and Smart Videohub have removable face plates which provide access to the buttons for labelling.

Included with the software installer is a Smart Labels folder containing both PDF and Adobe Illustrator template files. You can print and use either of these files for labelling the buttons. The Illustrator file contains text boxes so you can add your text labels before printing them out. If you don't have Adobe Illustrator, you can just print out the PDF file and write on the labels. Then cut out the square labels so they are ready to be inserted in to the buttons.

To remove the face plate:

Step 1.   Power off the unit and disconnect all cables.

Step 2.   Remove the unit from the rack and lay it flat with the buttons facing upwards and the Ethernet ports face-downwards on the table.

Step 3.   Using a No. 2 Phillip's head screwdriver, remove the 4 screws found on each of the top and bottom sides of the faceplate.

Step 4.   Now lift the face plate off the rest of the unit.

Step 5.   The button caps can be easily lifted off with your fingers. Remove the clear cap from a button that you wish to label, while taking care to avoid lifting the silicon button membrane.

Step 6.   Loosely place the printed label into the upturned clear cap.

Step 7.   Use a pointy device, such as the tip of a screwdriver, to lightly press the four corners of the square paper label into the four, rounded corners of the clear cap. Avoid using a pen for the pointy device as it is likely to mark your labels.

Step 8.   Reinstate the clear cap containing the printed label. As the clear cap is pressed down on to its silicon button, the paper label will be pushed forward, and neatly held flat against the window of the clear cap. Repeat for as many buttons as you wish to label.

Step 9.   Lower the face plate back into position, making sure the Blackmagic Design logo is the correct way up.

Step 10.   Replace the eight screws.

Tips for Connecting SDI cables

The weight of copper-based SDI cables quickly adds up so it is advisable to use your rack to support the cables so that the full cable weight does not place undue stress on the BNC ports of your Videohub. This is particularly important with larger models of Videohub due to the weight of many SDI cables. Cable support can be provided by using cable harnessses and tying each harness to the rack frame.

It is also good practice to attach cables to the lowest BNC and optical fiber connectors first and then work upwards. This will avoid having to push lots of cables out of the way as you attach more cables in the future.

All Videohub models feature regular-sized BNC ports which make it easy to connect to other SDI equipment using regular SDI cables.

If you're connecting Videohub to SDI equipment which has miniature SDI connectors, such as DIN 1.0/2.3, we recommend using SDI cables which are terminated with a miniature connector at one end and a regular BNC at the other. Alternatively an adapter cable can be connected to a regular SDI cable but this could prevent you from running long cables due to some loss of signal quality.

It's easy to connect and disconnect SDI cables to and from your Videohub. However as you attach more SDI cables, you might find it tricky to fit your fingers between the BNC connectors. You can use an inexpensive BNC Removal Tool, from third party vendors, to help make this task easy even when your Videohub has many cables connected.
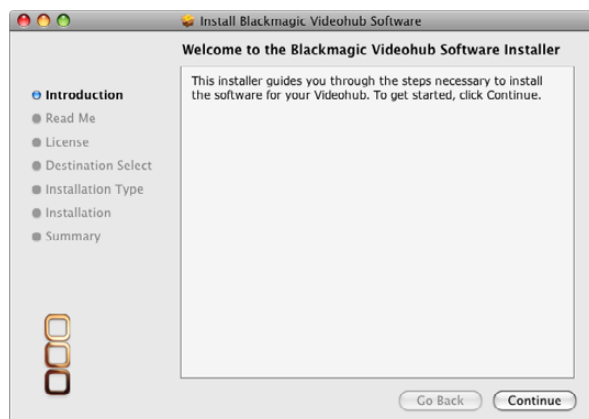
Mac OS X installation: Follow install prompts.
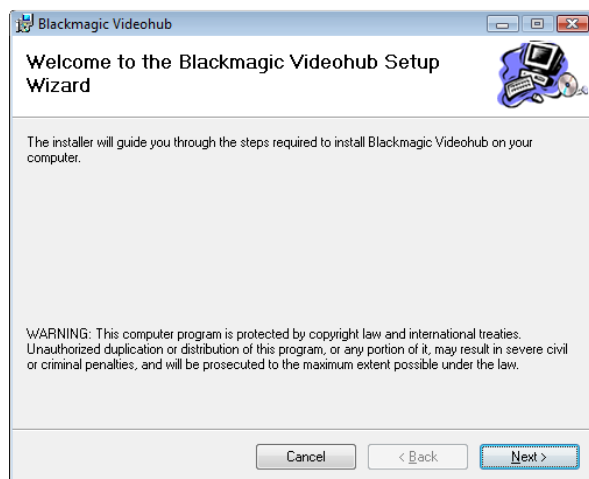
Windows installation: Follow install prompts.

Installing the Videohub Software

Videohub software runs on the latest Leopard and Snow Leopard versions of Mac OS X. On the Windows platform, Videohub software runs on both 32 and 64-bit versions of Windows XP and Windows 7 with the latest service packs installed. Testing on previous versions of these operating systems is not conducted and so it is always best to keep up to date with the latest versions of Mac OS X and Windows.

The Videohub software should be installed on any Mac or PC client or server computers from which you want to control the Videohub.

You will need administrator privileges to install the software on Mac OS X and Windows computers.

While the CD supplied with some models of Videohub contains the software installer, we recommend you visit www.blackmagic-design.com to ensure you have the latest version.

Locate the installer file and double-click it. This will be on the supplied CD or, if downloaded from the Blackmagic website, in your downloads folder.

Mac OS X™ machines will automatically install the required drivers without user interaction.

If running Windows XP or Windows 7, a dialog will appear saying, "Found new hardware" and the Hardware Wizard will start. If prompted to search the Windows Update Website, select, "No, not at this time" and click "Next".

Select "Install the Software Automatically" and the system will find the Videohub drivers for you.

A "This software has not passed logo certification" or "The publisher could not be verified" warning may reappear during this process. Choose to "Continue Anyway" or "Run".

Once this is complete and the Videohub is connected and powered on, you are ready to configure the device for your facility.

Configuring the Videohub Software

When launching the Videohub application for the first time after installing the software, the "Welcome to Videohub" window will appear. Choose your preferred interface to Videohub.

If you are a system administrator, or are configuring a Videohub Server computer, choose the third option "Main Router Control" so you can see every option and every connection in your facility.

If configuring the Videohub software on a client computer, choose "Simple Router Control" if screen space is limited, or "Personal Router Control" to see all your video routing connections simultaneously. Alternatively choose a Pushbutton view if you need to switch connections rapidly and frequently or if a touchscreen computer is being used. You will soon find the best Videohub view to use by trying the Router Control and Pushbutton views.

You can click on the view which you prefer or press the shortcut key combinations shown in the "Welcome to Videohub" window. You can easily change the Videohub view later by pressing the shortcut keys or by choosing the preferred Videohub view from the View menu in Mac OS X and Windows.
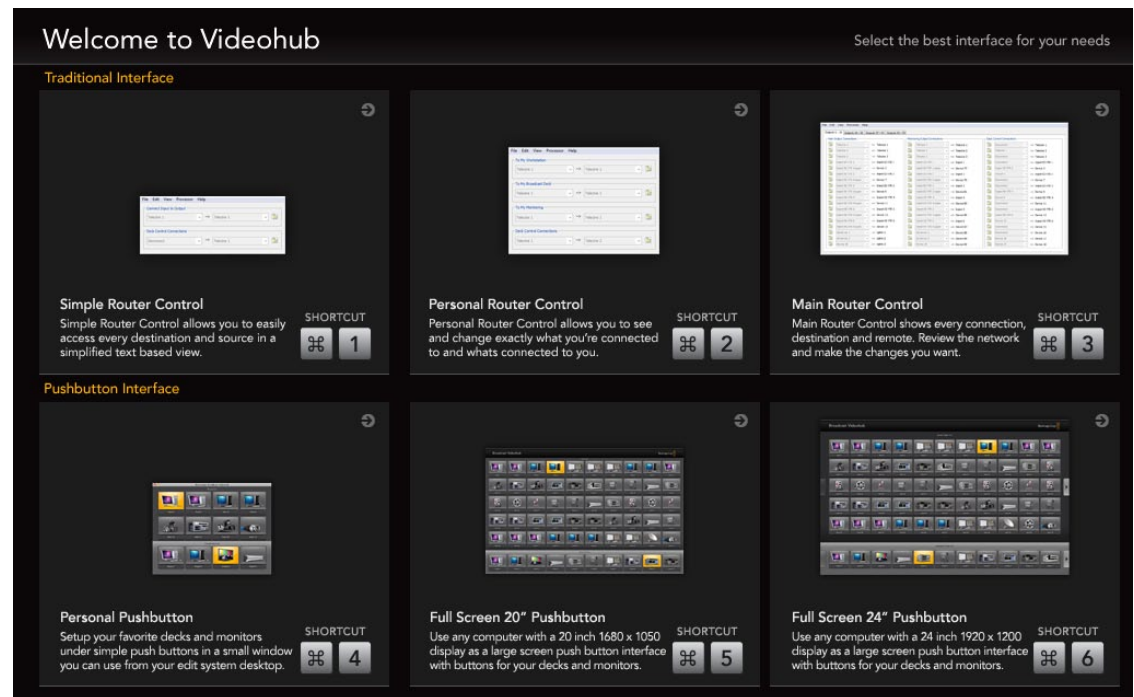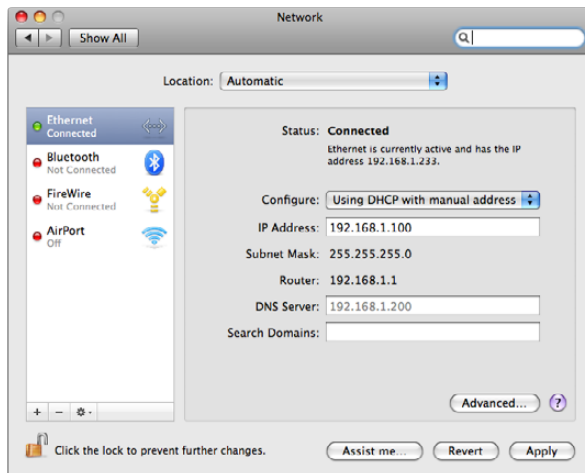
Network PrefPane in Mac OS X 10.6 set to "Using DHCP with manual address" to provide a static IP address.
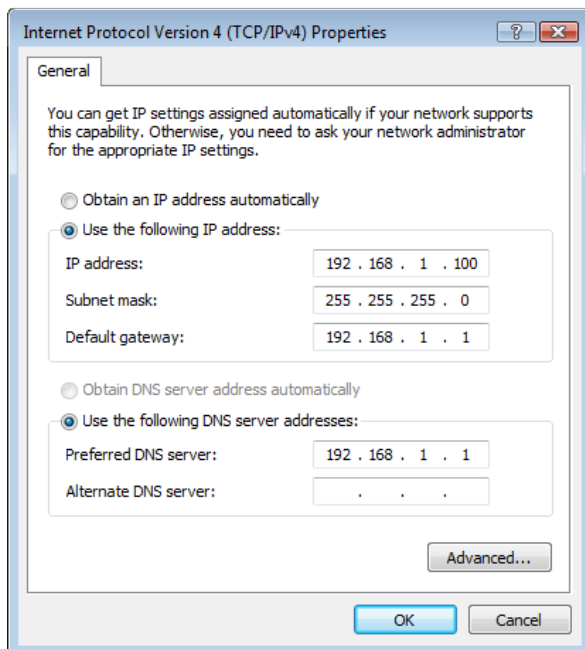
Network control panel in Windows 7 set to "Use the following IP address" to provide a static IP address.

All Videohub preferences are configured through the Videohub control software, regardless of whether performed on a Videohub Server computer or on a client computer. The Videohub preferences can be found under the Edit Menu in the Windows™ software or under the Blackmagic Videohub menu in Mac OS X™.

The preferences are split in to two sections, Videohub Server Preferences and Customize Labels. There is also a Take Confirmation option for use with any Pushbutton view.

Videohub Server Computer Settings

The Videohub Server will need a static IP address so that the other Videohub clients on the network can always find it. Please discuss this with your network administrator who will probably want to configure this for you. Avoid using DHCP on the Videohub Server computer as this will potentially cause the IP address of the server to change and the Videohub clients will lose communication with it. DHCP can be used on any other computers and iPads on the network which are running the Videohub software as a client.

When using a Videohub Server computer, you should make a note of its static IP address as you will need to enter this address in to the Videohub Server Preferences on each of the client computers which are running Videohub software.

On Mac OS X, go to `System Preferences> Network` and look at the IP address in the configuration information for your Ethernet or Airport network. Ensure the network configuration is set to either Using DHCP with manual address or Manually.

On Windows XP, go to `Start menu> Control Panel> Network Connections`. Right-click on your LAN connection, which is usually Ethernet or Wireless Network Connection, and choose Properties. Select Internet Protocol (TCP/IP) and click the Properties button. Ensure Use the following IP address has been chosen.

On Windows 7, go to `Start menu> Control Panel>Network and Sharing Center`. Next to your connection, click Local Area Connection for Windows 7. Click on Properties. Select Internet Protocol Version 4 (TCP/IPv4). Click on Properties. Ensure Use the following IP address has been chosen.

The "Videohub Server" connection settings are used to specify the address of the Videohub Server. This can be accessed through the "Connection Settings" window in Mac OS X and Windows. If you are configuring these settings on a Videohub Server computer, enable the option to "Use Locally Connected Videohub". This will automatically enable the correct network settings, on the server computer, based on the Network control panel.
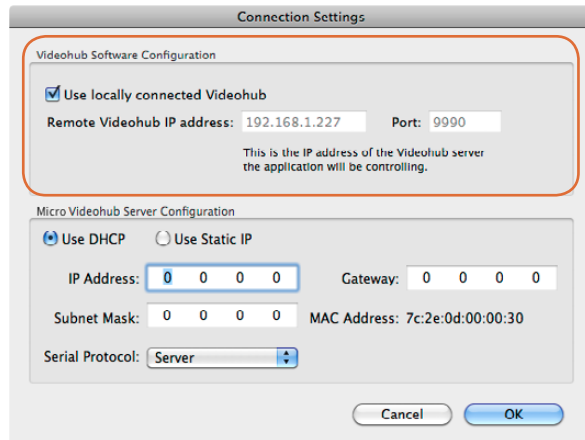
Select the "Use locally connected Videohub" checkbox on a Videohub Server computer.
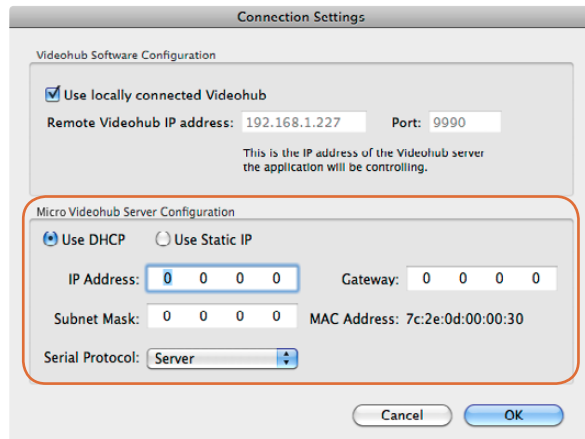
The Videohub Server Configuration options will only become active when an Ethernet-equipped Videohub is connected via USB.

When the Videohub Client is first started, the "Remote Videohub IP address" field will be set to "localhost". All clients will need to specify the address of the server before they can connect and control the Videohub. Ask your network administrator for this information and then enter the IP address in to this field, e.g. 192.168.1.52.

Once each client computer and iPad has the address of the server, the software interface will become active and it will be able to control the Videohub.

Integrated Videohub Server Settings

Some Videohub models feature an Ethernet port and contain an integrated Videohub Server so that a Videohub Server computer is not required for most tasks. To set the IP address on these Videohub models, connect the Videohub to your computer via USB, launch the Videohub software and then open the Connection Settings as before. The Videohub Server Configuration settings will become active. Videohub should usually be given a static IP address but please check with your system administrator before setting this option.

The MAC Address option is included because some system administrators may wish to control which devices can access the network for security reasons.

The DHCP option is included for system administrators who assign a specific IP address to a device via DHCP.

If controlling Videohub via RS-422, set the "Serial Protocol" switch to:

- "Server" if the Videohub is to be controlled from an automation system or third party router control system.
- "Client" if the Videohub is to act as a client of a connected control panel and to listen and respond to the control panel button presses.

Customize Labels - Router Input, Output and Monitoring

The Customize Labels preferences are used to specify the labels assigned to each port. These labels are saved on the Videohub server and will be seen by all clients. This is where you enter labels for each device you connect to the video ports on the Videohub.

For example, you might have a Digital Betacam™ deck connected to 'Input 21' and 'Output 21' of the Videohub. In this case you could change the label to Sony Digibeta or even Doug's Deck. It really doesn't matter what you label the inputs and outputs, but remember that everyone on your network running the Videohub software can see the labels. This is because label changes are system wide and are reflected on all clients.

If you're working in non-Roman character set languages such as Japanese, Chinese, Korean or Middle Eastern languages, then you can enter double byte unicode labels. This is supported on both Mac™ and Windows™ based computers.

Windows

Customize Labels

Mac OS X

Customize Labels

Customize Labels - Router Deck Control

If your Videohub features RS-422 deck control ports, Customize Labels is also used to specify the labels assigned to each RS-422 serial port. You can label these ports in a similar way to the video ports.

Videohub will automatically change serial port directions. You can connect any deck or workstation, whether they are acting as slave or master, to any port on the Videohub.

When two RS-422 ports are routed to each other, Videohub will automatically change the direction of the serial port communication, determining which are the slave and master devices. Videohub will detect any change in the master and slave devices and will automatically change the direction of RS-422 control as required.

This is very useful in situations where you're running deck to deck editing. The deck with which you're editing and setting in and out points, becomes a master controller which controls another slave deck. In this example, the deck with which you set the in and out points becomes a controller device. That's because this deck is now controlling another deck. Deck to deck editing is not as popular as it once was but with Videohub it's still easy.

Windows

Customize Labels

Mac OS X

Customize Labels

The "Take Confirmation" feature can be used in any Pushbutton view.

Take Confirmation

When using a Pushbutton view to change video routes, you may wish to enable the "Take Confirmation" feature to help prevent unintentional changes to video routes.

Touchscreen computers are perfect for use with Videohub's Pushbutton views but it is easy to accidentally touch a button and cause an unintentional video route change. To help avoid this potential problem, enable the "Take Confirmation" feature by selecting it from the "Edit" Menu in Windows™ or under the "Blackmagic Videohub" menu in Mac OS X™. The "Take Confirmation" feature must be set on each client computer individually. You might choose to enable it on a touchscreen computer but leave it disabled on non-touchscreen computers.

Once you have enabled the "Take Confirmation" feature, any attempt to change a video route using a Pushbutton view will cause the "Take Confirmation" dialog box to appear. Select the red "Take" button to confirm and perform the change or "Cancel" to leave the route unchanged.

Mac OS X installation: Drag the Blackmagic Videohub Smart Control utility to the Applications folder
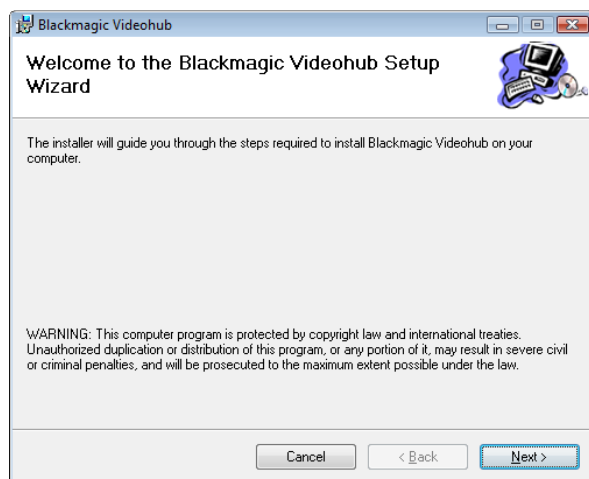
Windows installation: Follow install prompts.

Installing the Videohub Smart Control Software

The Blackmagic Videohub Smart Control software runs on the latest Leopard and Snow Leopard versions of Mac OS X. On the Windows platform, Videohub software runs on both 32 and 64-bit versions of Windows XP and Windows 7 with the latest service packs installed. Testing on previous versions of these operating systems is not conducted and so it is always best to keep up to date with the latest versions of Mac OS X and Windows.

The Blackmagic Videohub Smart Control software only needs to be installed on one computer running Mac OS X or Windows.

While the CD supplied with some models of Videohub contains the software installer, we recommend you visit www.blackmagic-design.com to ensure you have the latest version.

On Mac OS X, open the supplied CD, or downloaded disk image, and drag the Blackmagic Videohub Smart Control utility to your Applications folder.

The Videohub software installer for Windows also installs the Blackmagic Videohub Smart Control utility and there is nothing more you need to install. If you have not already installed the latest version of the Videohub software for Windows, you will need to conduct the following steps.

Locate the installer file and double-click it. This will be on the supplied CD or, if downloaded from the Blackmagic website, in your downloads folder. A dialog will appear saying, "Found new hardware" and the Hardware Wizard will start. If prompted to search the Windows Update Website, select, "No, not at this time" and click "Next".

Select "Install the Software Automatically" and the system will find the Videohub Smart Control drivers for you.

A "This software has not passed logo certification" or "The publisher could not be verified" warning may reappear during this process. Choose to "Continue Anyway" or "Run".

Once this is complete and Videohub Smart Control is connected and powered on, you are ready to configure the device for your facility.

Blackmagic Videohub Smart Control application icon

Configuring the Videohub Smart Control Software

When power is first connected to Videohub Smart Control, a self-test will be conducted and all the buttons will display their test lights in the following sequence: red, green, blue and white.

If the Blackmagic Videohub Smart Control software is not running or linked to the hardware via USB, the top left button will indicate the status of the Videohub Smart Control unit using the following diagnostic display:

Pink flashing light - unit is attempting to acquire an IP address. The button should quickly become red if the unit is set to use a static IP address, or if the unit successfully acquires an IP address from the DHCP server. If the button took several minutes before turning red, the unit has failed to acquire an IP address and has eventually provided itself with a self-assigned AutoIP address in the 169.254.xxx. xxx format. Unless you wish to use an AutoIP address, disconnect and firmly reconnect the network cables to ensure they are properly connected, check for faulty network cables and make sure the DHCP server has spare IP addresses available. Then unplug and reconnect all power sources from Videohub Smart Control so it will request a new IP address from the DHCP server. The button should quickly become red.

Red flashing light - unit has acquired an IP address and is attempting to connect to the Videohub Server. Make sure the Videohub Server is powered on and connected via Ethernet.

Yellow flashing light - unit has connected to a Videohub Server computer but the Videohub Server is running an incompatible software or firmware version. Update Videohub with the latest version of Videohub software and firmware and then power cycle Videohub Smart Control.

No flashing light - unit has successfully connected to the Videohub Server and is ready to control the Videohub if solid white, or solid white and gold, lights can be seen.

To configure Videohub Smart Control, connect the unit via USB and launch Blackmagic Videohub Smart Control. Review the information in the following sections of this chapter named "Network Settings" and "Button Settings". After you have finished configuring the unit, the USB cable can be removed.

If the Blackmagic Videohub Smart Control software is running, and linked to the hardware via USB, all of the buttons will illuminate with the same colors and intensity as chosen in the software interface. While the software is running and connected via USB, the top left button will not indicate the status of the unit.

After configuring the network and button settings in the Blackmagic Videohub Smart Control utility, quit the software or unplug its USB connection. If the top left button begins to flash, refer to the diagnostic light information above. Otherwise, you can immediately test the buttons as you program them and verify the SDI routes are valid.
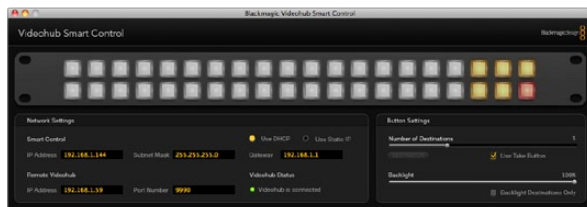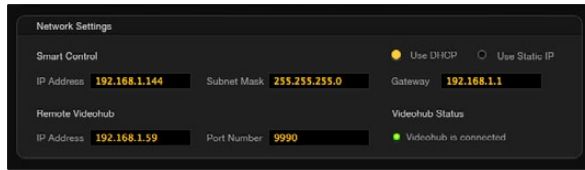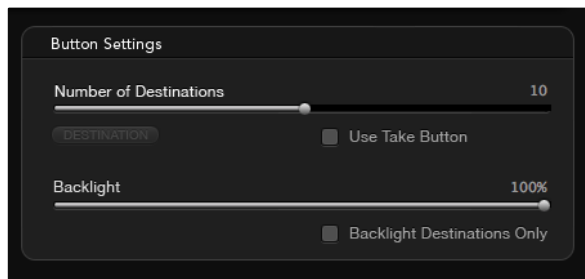

If the Blackmagic Videohub Smart Control software is running, and linked to the hardware via USB, all of the buttons will illuminate with the same colors and intensity as chosen in the software interface

Blackmagic Videohub Smart Control network settings

Blackmagic Videohub Smart Control button settings

Click on the desired Source or Destination button
to configure the button.

Network Settings

Each Videohub Smart Control unit requires an IP address in order to communicate with a Videohub via the IP-based network.

When configuring Videohub Smart Control via USB, you can choose DHCP or Static IP. DHCP automatically obtains all the network settings for your Videohub Smart Control and is the easier choice.

If you decide to use a static IP address, please ask your system administrator for a spare IP address to avoid creating an IP conflict on your network. You will then need to complete the IP address, subnet mask and gateway details for your Videohub Smart Control hardware. A static IP address must be used if directly connecting Videohub Smart Control to an Ethernet-equipped Videohub without using a network switch.

You will also need to complete the IP details for the Remote Videohub which you wish to control with your Videohub Smart Control. The remote Videohub is the Videohub Server and could refer to a Videohub Server computer or an integrated Videohub Server.

Button Settings: Number of Destinations

Videohub Smart Control can be configured as a Cut-Bus controller or as an XY controller.

When configured as a Cut-Bus controller, every button represents an SDI source and there is only one destination. Use this configuration when dedicating a Videohub Smart Control unit to a single destination device, such as an SDI monitor or deck. All of the buttons will become white to indicate that they are all source buttons. Simply slide the "Number of Destinations" slider all the way to the left so the number of destinations becomes "1". The "Destination" button below the slider will become active. Click on the active "Destination" button and enter the number of the Videohub output port, to which the destination device is connected, in to the "Router SDI Out A" field. If your destination device is receiving dual-link HD-SDI or dual-stream 3D, you will also need to enter an output port number in to the "Router SDI Out B" field. There is also a "Router Remote" field if your Videohub is also routing RS-422 deck control to the destination device. Click "OK" to confirm the Destination settings.

When configured as an XY controller, Videohub Smart Control can be configured to work with up to 20 destinations. The source buttons will illuminate white and the destination buttons will illuminate gold-colored. Use this configuration if you don't intend to dedicate a Videohub Smart Control unit to each destination device. Simply slide the "Number of Destinations" slider to the right so the number of destinations increases to the desired number. The "Destination" button below the slider will become grayed out and inactive. You can now configure the destination buttons by clicking on each gold button in the software interface. Enter the number of the Videohub output port, to which the destination device is connected, in to the "Router SDI Out A" field. If your destination device is receiving dual-link HD-SDI or dual-stream 3D, you will also need to enter an output port number in to the "Router SDI Out B" field. There is also a "Router Remote" field if your Videohub is also routing RS-422 deck control to the destination device. Click "OK" to confirm the destination settings.
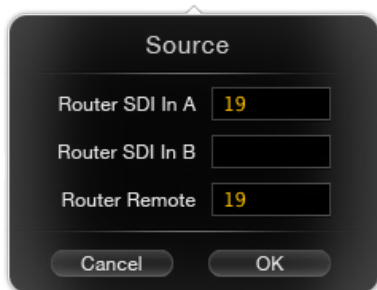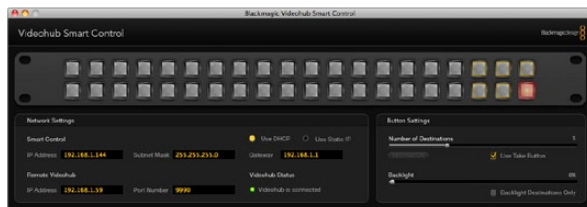
Enter the number of the Videohub port to which the SDI device is connected.
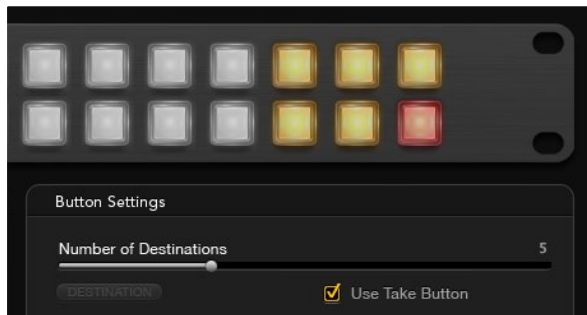
The Take button illuminates red in the lower right corner

This picture shows the backlight set to the dimmest setting

Source buttons are configured in much the same way as destination buttons by clicking on each white button in the software interface. Enter the number of the Videohub input port, to which the source device is connected, in to the "Router SDI In A" field. If your destination device is receiving dual-link HD-SDI or dual-stream 3D, you will also need to enter an input port number in to the "Router SDI In B" field. There is also a "Router Remote" field if your Videohub is also routing RS-422 deck control from the source device. Click "OK" to confirm the source settings.

Button Settings: Take Button

When the "Use Take Button" is enabled, the lower right button becomes red-colored. Use this configuration if you wish to be able to select a change of route and then confirm the change by pressing the red "Take" button.

The "Take" button can be used with both Cut-Bus and XY controller configurations and takes the place of a destination button.

Button Settings: Backlight

Adjust the backlight slider to vary the brightness of the backlit buttons as desired.

Enable the "Backlight Destinations Only" button if you wish to disable the backlighting of the white source buttons.

Load/Save Settings

If you intend to use your Videohub Smart Control as a Cut-Bus controller, and dedicate a number of Videohub Smart Control units to single destination devices in your facility, it can be convenient to save the settings from an already configured unit and then load those settings in to the other units. After loading the pre-configured settings in to the other units, you need only update the destination device for each of the other units. Load/Save settings can also be used with XY controller configurations. You can load and save settings by choosing "Load Settings" or "Save Settings" from the File menu.

Download the Videohub app to your iPad

Videohub settings on iPad

Installing the Videohub app on an Apple iPad

The Videohub app for iPad must be downloaded using your iTunes Store account.

As with all iPad apps, there are two ways to download and install the software. Detailed instructions are provided in the iTunes Help and also in the iPad User Guide but a quick guide is also provided here:

Step 1. Launch the iTunes application on your Mac OS X or Windows computer and then click on iTunes Store. Click the App Store button in the navigation bar near the top of the window. Click in the Search Store field at the top-right of the window and enter Videohub. Select the Videohub app to be taken to its info screen. Click on the Free App button to download the app to the iTunes library on your computer. Finally, use iTunes to sync applications to your iPad.

Step 2. Tap the App Store icon. Tap the search field at the top of the screen and enter Videohub. Select the Videohub app to be taken to its info screen. Click on the Free App button and then tap Install App.

Configuring the Videohub app on an iPad

After installing the Videohub app on to your iPad, tap on Settings and then choose Videohub under the list of Apps. Enter the IP address of your Videohub Server in the Videohub IP Address field. The Videohub Server could refer to a Videohub Server computer or an integrated Videohub Server.

Front panel

Rear panel

Every pushbutton on the front panel of Smart Videohub has a matching SDI input or output on the rear panel.

Using Smart Videohub's Control Panel

Smart Videohub features a built-in, 32 pushbutton control panel on the front panel of the router. Routing changes can be made without needing a computer as there is a pushbutton for each SDI input and output on Smart Videohub. Remote router control can also be used with Smart Videohub.

The rear panel of Smart Videohub has 16 SDI inputs on the left, and 16 SDI outputs on the right. The built-in pushbutton control panel on the front, has a corresponding layout with 16 sources on the left and 16 destinations on the right. Every pushbutton on the front panel has a matching SDI input or output on the rear panel.

When power is connected to Smart Videohub, the top-left destination button will illuminate white along with its corresponding source button.

- To change routes, select a destination button and it will illuminate white along with its corresponding source button. Now press the desired video source button to connect a new source to the destination. The video source will immediately be connected and viewable on the destination device, such as an SDI monitor. The new source button will illuminate white, and the previous source button will darken. To change another route, select another destination button and then select a new source button.
- The pushbuttons on Smart Videohub directly control the integrated Videohub Server and override any existing routes, including destinations locked with Videohub software.

The illuminated Smart Videohub pushbuttons display the last route made with the Smart Videohub control panel. They do not mimic the buttons on other Videohub software or hardware control panels. No matter what routing changes have been made by a remote Videohub user, the Smart Videohub pushbuttons will continue to illuminate the last route made with the Smart Videohub control panel.

However if a remote Videohub user changes the source for the currently selected destination, the illuminated source pushbutton will automatically change on the Smart Videohub control panel.

Videohub Smart Control configured as a Cut-Bus controller and with a Take button

Videohub Smart Control configured as an XY controller and with a Take button

Using Videohub Smart Control

After configuring the Videohub Smart Control hardware with the Blackmagic Videohub Smart Control software utility, there is nothing more to do other than change video routes as desired.

If Videohub Smart Control has been configured as a Cut-Bus controller, the destination device has already been chosen and you only need to choose a video source.

- Select one of the white, video source buttons. The video source will immediately be connected and viewable on the destination device, such as an SDI monitor. The selected source button will be brightly illuminated compared with the other source buttons making it obvious which source has been chosen.
- If the Take button has been enabled, the current source button will remain lit and both the new source button and the Take button will begin to flash. The change of route will not take place until you confirm by pressing the Take button. If you accidentally pushed the wrong source button, simply press the desired source button before pressing the Take button.

If Videohub Smart Control has been configured as an XY controller, destination buttons appear gold-colored and source buttons illuminate white. When working with multiple destinations, always select a destination button before selecting a source button.

- To change routes, start by selecting a gold destination button and it will illuminate brightly compared with the other destination buttons. If a video source has previously been connected to this destination, it's button will be brightly illuminated white. Now press the desired video source button to connect a new source to the destination. The video source will immediately be connected and viewable on the destination device, such as an SDI monitor. The new source button will brightly illuminate white, and the brightness of the previous source button will reduce to normal. To change another route, select another destination button and then select a new source button.
- If the Take button has been enabled, the current source button will remain lit and both the new source button and the Take button will begin to flash. The change of route will not take place until you confirm by pressing the Take button. If you accidentally pushed the wrong source button, simply press the desired source button before pressing the Take button.
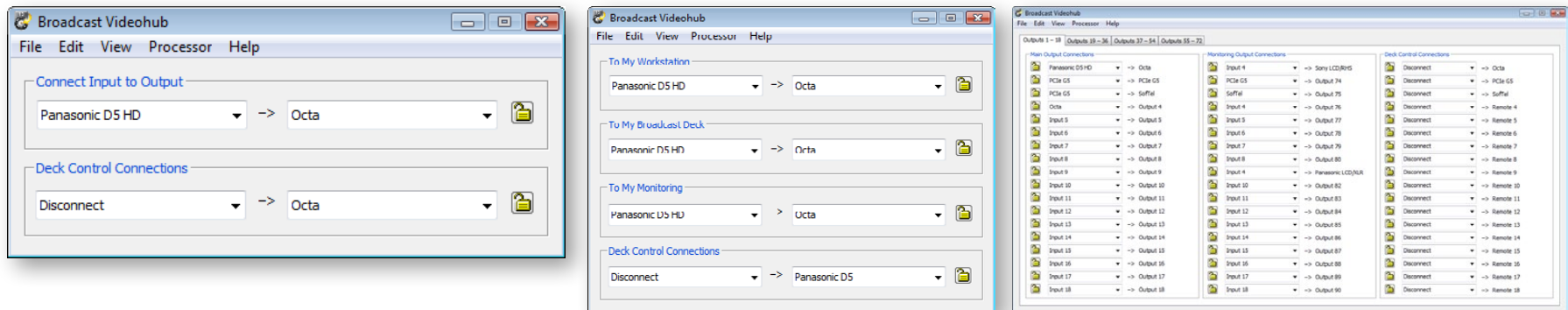
Router Control Views

To control Videohub, you should install the Videohub software on each computer.

The first time a client is started on a machine its interface will appear disabled and it must be configured with the Videohub Server IP address. The interface will also be disabled whenever a Videohub is physically disconnected from its Videohub Server computer.

Choose between Personal, Simple or Main Router Control depending upon how many connections you want to see.

Windows

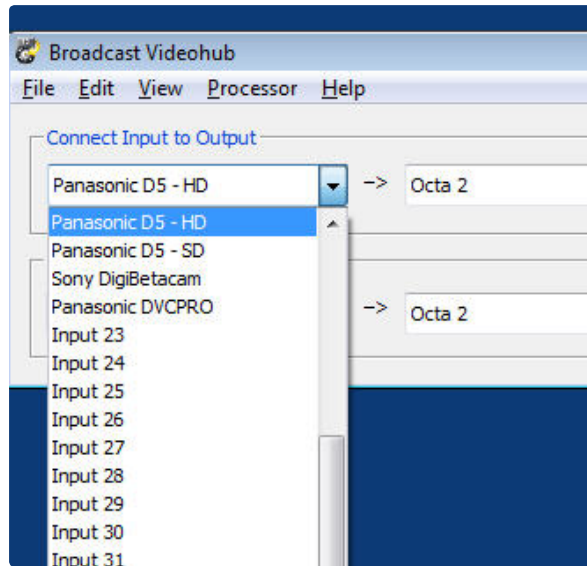You can view your Videohub using Personal, Simple or Main Router Control

Mac OS X

You can view your Videohub using Personal, Simple or Main Router Control

The Main Router Control is split into three distinct areas –

1. **To Destination**

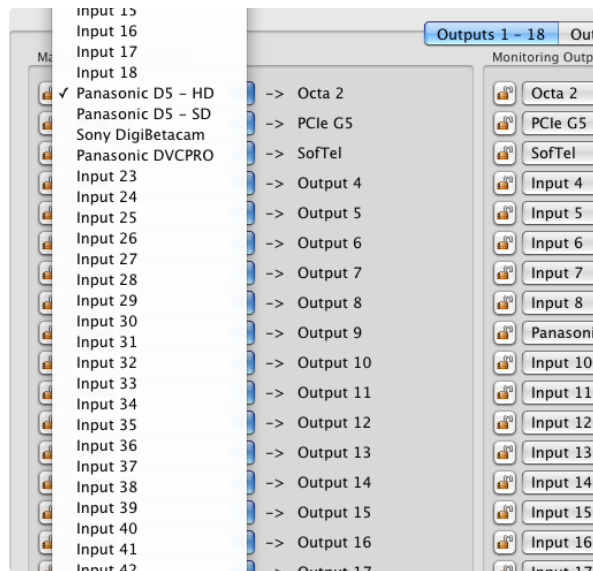   Controls routing for the Destination SDI outputs;

2. **To Monitoring**

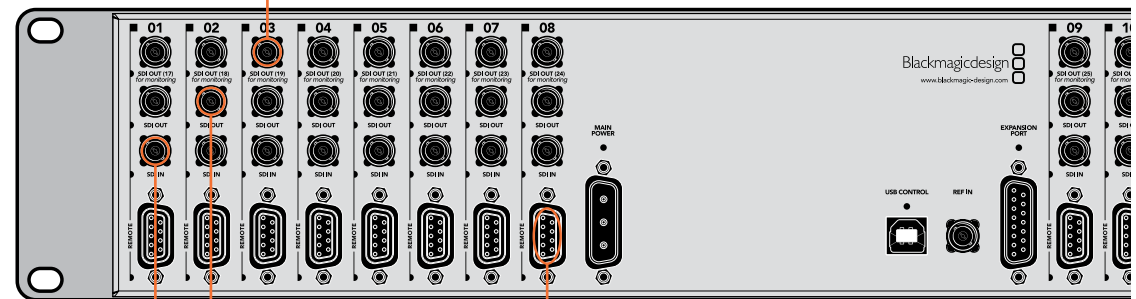   Controls routing for the Monitor SDI outputs;

3. **Deck Control Connections**

   Controls routing for the RS-422 serial ports.

Connect a video input to a video output by selecting the menu of any destination outputs or monitoring outputs.

Monitoring
SDI outputs

Source
SDI input

Destination
SDI output

Deck Control Connections
RS-422 serial ports

Blackmagic Videohub supports one-to-many routes. This means that any video input, such as a HD deck, can be sent to one or more monitoring outputs. On the Studio Videohub, one input could be sent to as many as 16 monitoring outputs. On the Broadcast Videohub, one input could be sent to as many as 72 outputs, while on the Universal Videohub 288, one input could be sent to as many as 288 outputs!
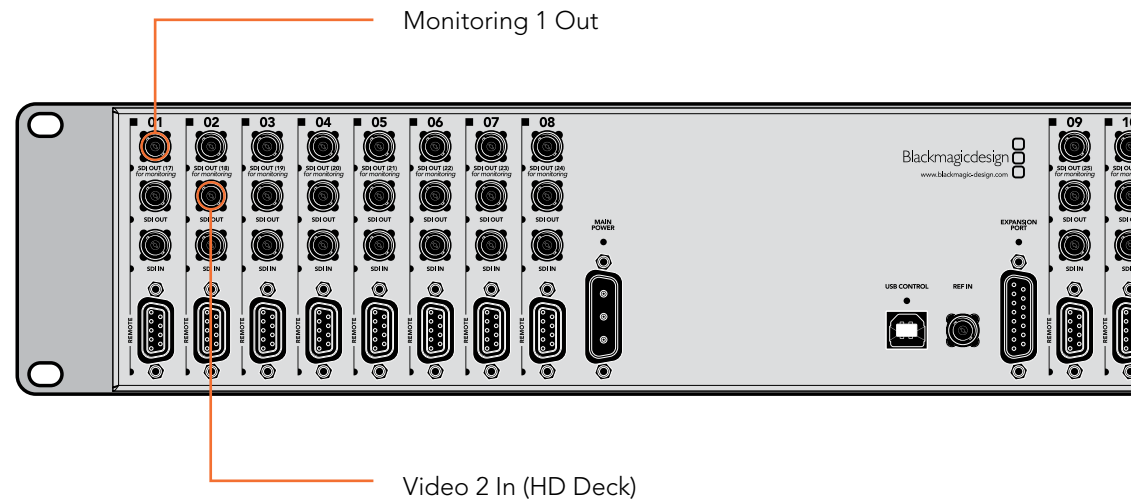
Monitoring 1 Out

Video 2 In (HD Deck)

RS-422 deck control can be routed on some Videohub models that feature RS-422 remote ports.

The RS-422 port on the deck can be routed to another RS-422 port on the Videohub, for example when connecting a deck to an NLE workstation. Unlike the video, RS-422 control is point to point, so when you connect two devices together, one will disable so it cannot be accidentally connected to another port. To change the control port connection, just change the connection to another port. Or you can choose to Disconnect the RS-422 port completely.

Changing an RS-422 deck control route will affect other ports involved in the routing - if Port 1 and 2 are connected together, and you connect Port 3 to Port 2, Port 1 will become disconnected.

RS-422 Serial Port 2

RS-422 Serial Port 1
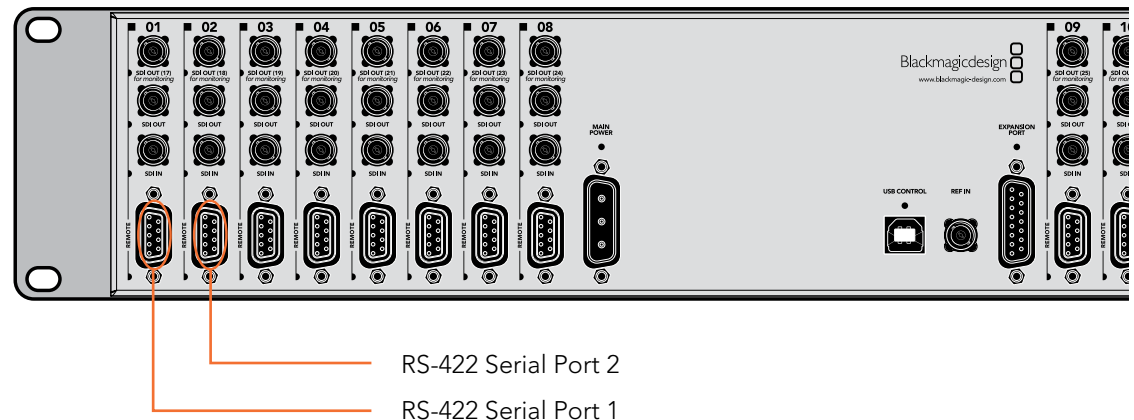
Windows

Locked

Mac OS X
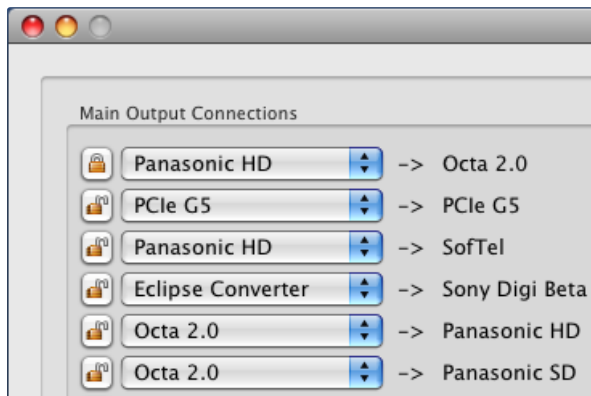
Locked

Locking and Unlocking Routes

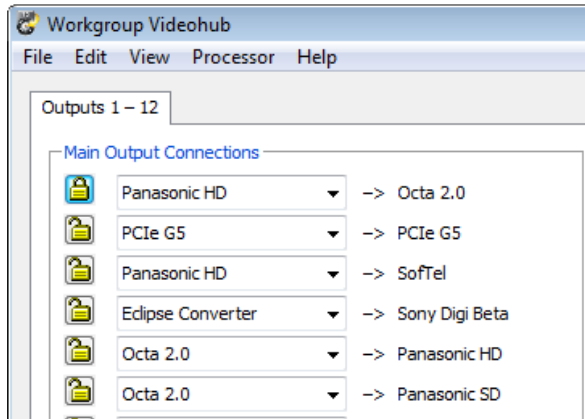Often you may not want other people in your facility to change the route of a signal you are working with. This is important when outputting a master to tape, and you don't want anyone changing the input of the deck from your setting.

Videohub supports locking to prevent people on other workstations from changing your routes.

To lock an output, simply click the unlocked icon next to the port's drop-down list. The icon will change to a locked image and other people are now unable to make changes that impact your port.

After you have locked a port the interface of other clients will change so the port becomes grayed out. If ports on your interface appear grayed out it simply means that another user has locked the port.

If you have locked a port it will become unlocked as soon as you change its route. You may then relock the port if you wish to prevent further changes by other users.

The Videohub control software running on a Videohub Server computer can unlock any locked output. If you wish to over-ride someone else's lock setting, simply make the change on the Videohub Server computer. This is nice if someone is controlling the Videohub from their notebook, and they leave the office, with a destination locked!

Locking serial ports can have far-reaching effects as any new serial route involving your port will be disallowed for other users. For example, if Serial Port 1 is connected to Serial Port 2 and you lock Serial Port 2, no other users can establish a route to Serial Port 2, even though you locked Serial Port 1.

Pushbutton views provide an intuitive, icon-driven representation of the Videohub connections

Pushbutton views

The Main Router Control view is the best place for a system administrator to configure and label all the connections on any Videohub. However most users do not need or want to see all connections all of the time. They may just want to see the connections which they use most of the time. Simple Router Control and Personal Router Control views are helpful because they reduce the number of visible connections to a single set of connections for immediate needs.

If a user frequently needs to switch between multiple sources and destinations, without the extra effort of using popup menus to change connections, then Pushbutton views are the natural choice. Pushbutton views provide the fastest and most intuitive way to view and switch between multiple sources and destinations without needing to see all Videohub connections at once.

Pushbutton views are easy to use because they operate on a single video output at a time. Selecting a destination (output) pushbutton shows which source (input) is connected to it by illuminating the source pushbutton. To change the video source, simply click on a different source pushbutton. It is that easy!

Pushbutton views are designed to be simple and intuitive and only provide basic configuration options compared with Router Control views. Accordingly it is advisable to have a system administrator use Main Router Control view to complete all labeling and configuration, of SDI connectors and RS-422 ports on the Videohub Server, before operators start using Pushbutton views.

Pushbutton views are not appropriate for system administrators, as they do not show all of the information that a system administrator would require.

Pushbutton views are not appropriate for users who need to view more than one video route at a time, e.g. all of the video destinations connected to a single video source.

Pushbutton views are not appropriate for users who need to determine the direction of RS-422 control for a particular video device. However once RS-422 is configured in a Router Control view, Pushbutton views can be used to route a video source to a video destination including RS-422 device control.

Pushbutton View at a Glance

Title Bar shows which type of Videohub you are using

Simple and easy to understand icons

Arrow buttons allow you to move through your Source screens

This button is reserved by Videohub for when a destination is connected to a source which does not appear in the sources panel.

Arrow buttons allow you to move through your Destination screens

Highlighted icon denotes paired connections

The number of dots below the Sources and Destinations panels show the number of screens you have, and indicates which screen you're viewing.

Arrow buttons and dots make it easy to move through screens of Sources and Destinations when more than one screen is used. Multiple screens are available in Full Screen 24" Pushbutton view but not in smaller views.

The View menu in Videohub

There are several Pushbutton views available for displays of different resolutions:

- **Full Screen 24" Pushbutton** - requires a 1920 x 1200, or 1920 x 1080 widescreen display such as a typical 24" computer display or a large high definition display. This view can display up to 55 sources and 11 destinations in a single screen, or any number of sources and destinations by using the left and right arrow buttons to move through screens.

- **Full Screen 20" Pushbutton** - requires a 1680 x 1050 widescreen display, such as a typical 20" computer display. This view can display up to 50 sources and 10 destinations.

- **Personal Pushbutton** - By contrast to the Full Screen views, Personal Pushbutton view provides a window containing space for up to 8 sources and 4 destinations. It is perfect for personal use and smaller displays, especially on laptop computers. It requires an 800 x 600 or higher resolution display.

Full Screen Pushbutton views are designed to dominate displays so that no menu bar, system tray or dock are visible. Full Screen Pushbutton views are perfect when used on displays which match a supported resolution but will look poor on any other display. The Personal Pushbutton view is designed to work on any display with an 800 x 600 or higher resolution.

Pushbutton views and Router Control views can be chosen from the "Welcome to Videohub" startup screen, from the View menu or by using a keyboard shortcut. Keyboard shortcuts can be used if the View menu is not visible and are very similar on Mac and Windows platforms.

Mac OS X keyboard shortcuts	Windows keyboard shortcuts	Videohub View
Cmd 1	Ctrl 1	Simple Router Control
Cmd 2	Ctrl 2	Personal Router Control
Cmd 3	Ctrl 3	Main Router Control
Cmd 4	Ctrl 4	Full Screen 24" Pushbutton
Cmd 5	Ctrl 5	Full Screen 20" Pushbutton
Cmd 6	Ctrl 6	Personal Pushbutton

After installing Videohub software, launch the Blackmagic Videohub application and choose a Pushbutton view, to match the size of your computer display. This page of the Videohub manual shows the Full Screen 24" Pushbutton view being used with a Broadcast Videohub. All pushbuttons initially show the generic icon of a BNC connector which you can then replace from a selection of icons.

Each Pushbutton view is divided in to an upper panel of buttons representing video sources, and a lower panel of buttons representing video destinations.

If the Input, Output and Remote connections have not yet been labeled in Main Router Control view, then the source pushbuttons will appear as Input 1 to Input 55 and the destination pushbuttons will appear as Output 1 to Output 11. These inputs and outputs correspond to the connector numbers on the Videohub. If the Input, Output and Remote connections have already been labeled in Main Router Control view, their names will appear under each of the respective pushbuttons in place of the connector numbers.

Pushbutton views reduce the number of visible connections to only those that you want to see, in contrast to Main Router Control view which displays all connections simultaneously.

On smaller Videohubs, you may find that there are many more source pushbuttons, in a Full Screen Pushbutton view, than there are SDI input connectors on the Videohub itself. For example when using Studio Videohub with the Full Screen 24" Pushbutton view, the Sources panel will show Input 1 to Input 16 repeated several times until the pushbuttons fill the Sources panel.
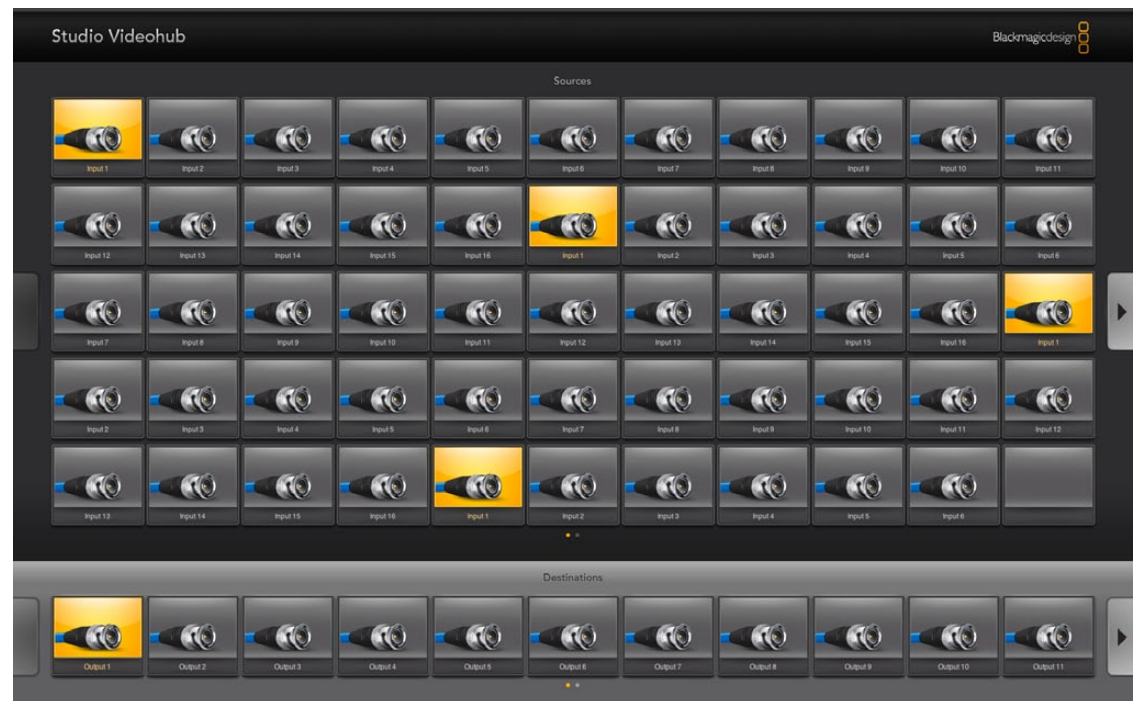
The i icon is revealed when the mouse is moved to the top-right corner of any unlocked Videohub pushbutton.
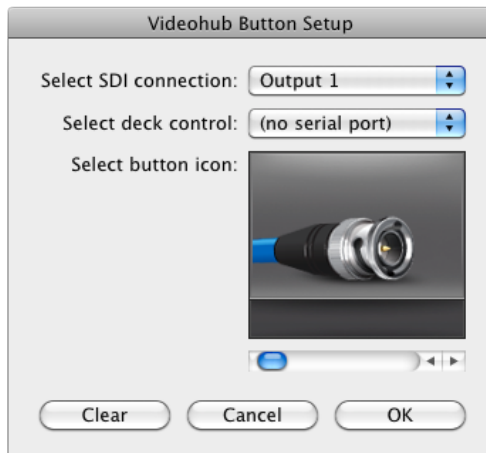
Clicking on the i icon reveals the Videohub Button Setup window.

Configuring Pushbuttons is easy. Move the mouse to the top-right corner of any Videohub pushbutton to reveal an i icon. Clicking the i icon will open the Videohub Button Setup window which allows one to set the SDI input or output connection, RS-422 deck control and the icon for the pushbutton. The Clear button will delete all settings for the pushbutton and the icon will be replaced with black. In most cases, deck control is grouped with the associated SDI connections and so an SDI connection named Input 1 would usually be associated with the corresponding Remote 1.

The bottom-right source button, in each Pushbutton view, is reserved by the Videohub application itself and cannot be configured. If a destination pushbutton is connected to a source which does not appear in the sources panel, the source will automatically appear in the bottom-right pushbutton of the sources panel.

The Pushbutton view on this page shows a Studio Videohub with button icons configured to represent SDI video devices. The black buttons have been cleared.

The smaller Pushbutton views show the top-left portion of the largest Pushbutton view to ensure that button layouts will not change when switched between Pushbutton views. Users who regularly switch between Full Screen and Personal Pushbutton views should group the most commonly used video sources in the top left of the Full Screen Pushbutton view so they will be visible in Personal Pushbutton view. The most commonly used destinations should be located in the first few destination buttons on the left side of the Pushbutton view.

The Personal Pushbutton view shows only those pushbuttons which appear in the top-left portion of the largest Pushbutton view.

When using a Full Screen Pushbutton view, you may choose to show multiple instances of a source or destination pushbutton. The example pictured on this page shows a Studio Videohub with all of its inputs configured in the first rows of the Pushbutton view. Some of the same inputs have been duplicated and then grouped together, with devices of the same type, enabling them to be quickly located, e.g. a camera group, a deck group, etc. Destinations can also be duplicated if desired.

If a destination pushbutton is routed from a source, which appears multiple times in the Sources panel, selecting the destination pushbutton will illuminate all instances of the source pushbutton, regardless of how deck control has been configured for each source pushbutton. Similarly if multiple instances of an output pushbutton appear in the Destinations panel, they will illuminate together when any one has been selected.

Full Screen 24" Pushbutton view showing an example of duplication and grouping of inputs. Two, illuminated instances of Input 1 can be seen in this example. Grouping of inputs can enable quick identification and location of video sources of the same type, e.g. all available cameras.

Using Software Control Panels

This destination is unlocked and is available to any Videohub user on the network. The associated video source will be illuminated in the Sources panel and can be changed by pressing another source pushbutton.

In order to see which video source has been routed to a video destination, such as a video monitor, press the video monitor button in the destinations panel to make the button illuminate. Simultaneously the associated video source button will illuminate in the sources panel, making it immediately obvious which video source is connected to the video monitor, e.g. a tape deck.

In order to change the video source from a tape deck to a video camera, press a camera pushbutton in the sources panel to immediately illuminate the camera pushbutton and route video to the video monitor. The tape deck button will no longer be illuminated and will be disconnected from the video monitor.

When configuring pushbuttons, only select a deck control connection for those devices which have RS-422 deck control. For example, it makes no sense to assign a deck control connection to a video monitor, camera or satellite-receiving dish.

While all icons are available to any pushbutton, it usually doesn't make such sense to choose the icon of a video monitor or transmitter for a source pushbutton unless the source device happens to have a loop-through output. Similarly it would not usually make sense to assign the icon of a camera or satellite-receiving dish to a destination pushbutton.

Locally locked destinations are represented by a yellow padlock icon. Locking a destination prevents other Videohub users from using the same video output device or from disconnecting the RS-422 deck control.

Remotely locked destinations are represented by a gray padlock icon. Outputs locked by another Videohub user can only be unlocked from the remote user's computer or iPad, or from the Videohub Server computer.

Locking and Unlocking Routes

Locking a destination will avoid accidentally changing the video source which is routed to that destination. To lock a route between an input and an output, double-click the destination pushbutton. A yellow padlock icon will appear in the top-left corner of the destination pushbutton and will prevent anyone else from using the destination device until it is unlocked from your computer. Double-click the destination pushbutton again to unlock. Locking a destination still leaves the associated video source available for routing to multiple destinations simultaneously.

Locking a route between an input and an output also locks the RS-422 deck control connection between the two devices to avoid other users accidentally seizing the deck control belonging to the video source. The RS-422 connection between the video source and video destination will remain locked until the destination pushbutton is unlocked.

A gray padlock icon will appear on any destination pushbuttons which other users have locked. The video destination devices will not be available to you until the destination pushbuttons have been unlocked from the other users' computers and iPads.

If you encounter a gray padlock icon, and do not know who locked the video device, you can request your system administrator to unlock the route for you. The Videohub Server computer has administrative control over all connections and your system administrator can unlock any connection from the Videohub Server computer. When a route is unlocked, the yellow or gray padlock icon will instantly disappear from the Pushbutton views on all Videohub clients. The locked padlock icon will change to an unlocked icon in the Router Control views on all Videohub client computers.

Touchscreen Computers

The Pushbutton views are designed to be easy to use and look beautiful on a large, touchscreen display. Dedicating a touchscreen computer to the Videohub Pushbutton interface makes it incredibly easy for users to switch connections between multiple SDI devices without having to see every connected device all of the time. Using a touchscreen computer, in conjunction with Videohub Pushbutton views, provides the fastest way to switch connections which is perfect for a master control room. Touchscreen desktop and touchscreen laptop computers can be used. It is a good idea to check the resolution of your touchscreen display before deciding upon which Pushbutton view to use.

The Pushbutton interface to Videohub was introduced at the NAB 2009 trade show and displayed on HP TouchSmart IQ800 computers. This computer model had a 25″ display and a resolution of 1920 x 1200 which was perfect for Full Screen Pushbutton view. Many other brands and models of touchscreen computers and displays exist and you just need to choose one that provides a resolution matching one of the Pushbutton views.

Touchscreens are perfect for rapidly selecting and routing inputs and outputs but they are cumbersome for configuring pushbuttons. The width of a human fingertip is much wider than a mouse pointer and is less accurate when tapping on menu options and small icons. For this reason, we recommend configuration of Videohub pushbuttons be performed with a mouse. Once the Videohub pushbuttons have been configured, it will be easy to use a finger to select and route, inputs and outputs, by tapping on Videohub pushbuttons.

When a computer mouse is moved to the top-right corner of any Videohub pushbutton, an i icon appears and clicking the icon opens the Videohub Button Setup window. By contrast, a touchscreen cannot detect a hovering finger and so the i icon will not be revealed. Tapping a finger in the top-right corner of any Videohub pushbutton will open the Videohub Button Setup window on a touchscreen even though the i icon will not have been revealed.

When a computer mouse is moved to the top of a Full Screen Pushbutton view, the Videohub menu bar will be revealed. When the mouse is moved away from the menu bar, the menu bar will hide again. As with the i icon, a touchscreen cannot detect a finger hovering towards the top of the display and so the Videohub menu bar will not be revealed automatically. Tapping a finger anywhere above the top row of source pushbuttons will reveal the Videohub menu bar on a touchscreen. To hide the Videohub menu bar, simply tap again in the same area.

Touchscreens work a little differently to a computer mouse but provide the fastest and easiest way to work with the Videohub Pushbutton interface and so are highly recommended. When using a touchscreen computer, we recommend enabling the Take Confirmation option to help avoid unintentional changes to video routes.

Apple iPad

The Videohub Pushbutton controller interface looks stunning on the high resolution Apple iPad display. Aside from looking great, it also provides the convenience of portable router control anywhere in your facility or even over the Internet via a wireless or cellular connection! If you are already familiar with the Videohub Pushbutton interface on a computer, then there is almost nothing new you need to learn and you'll only notice slight differences between computer mouse control and touchscreen control on the iPad.

Up to 40 sources and 8 destinations can be displayed in a single Videohub Pushbutton screen on the iPad. Even more sources and destinations can be displayed by flicking the iPad left or right, or tapping to the left or right of the row of dots, to move through multiple Pushbutton screens.

The initial Pushbutton interface

Upon launching the Videohub app on your iPad for the first time, all pushbuttons initially show the generic icon of a BNC connector which you can then replace from a selection of icons. If the Input, Output and Remote connections have not yet been labeled from a Mac or Windows computer using Main Router Control view, then the source pushbuttons will appear as Input 1 to Input 40 and the destination pushbuttons will appear as Output 1 to Output 8. These inputs and outputs correspond to the connector numbers on the Videohub. If the Input, Output and Remote connections have already been labeled in Main Router Control view on a computer, their names will appear under each of the respective pushbuttons in place of the connector numbers.

On smaller Videohubs, you may find that there are many more source pushbuttons than there are SDI input connectors on the Videohub itself. For example when using Micro Videohub, the Sources panel will show Input 1 to Input 16 repeated several times until the pushbuttons fill the Sources panel.

The Videohub Button Setup window allows one to set the SDI input or output connection, RS-422 deck control and the icon for the pushbutton

In order to see which video source has been routed to a video destination, tap a destination button and the associated video source button will immediately illuminate

Configuring Videohub Pushbuttons on the iPad

Configuring Videohub Pushbuttons on the iPad is easy. Press and hold any Videohub pushbutton to open the Videohub Button Setup window which allows one to set the SDI input or output connection, RS-422 deck control and the icon for the pushbutton. The Clear button will delete all settings for the pushbutton and the icon will be replaced with black. In most cases, deck control is grouped with the associated SDI connections and so an SDI connection named Input 1 would usually be associated with the corresponding Remote 1.

The bottom-right source button is reserved by the Videohub app itself and cannot be configured. If a destination pushbutton is connected to a source which does not appear in the sources panel, the source will automatically appear in the bottom-right pushbutton of the sources panel.

When configuring pushbuttons, only select a deck control connection for those devices which have RS-422 deck control. For example, it makes no sense to assign a deck control connection to a video monitor, camera or satellite-receiving dish.

While all icons are available to any pushbutton, it usually doesn't make such sense to choose the icon of a video monitor or transmitter for a source pushbutton unless the source device happens to have a loop-through output. Similarly it would not usually make sense to assign the icon of a camera or satellite-receiving dish to a destination pushbutton.

You may choose to show multiple instances of a source or destination pushbutton within the one Pushbutton screen or on multiple Pushbutton screens.

If a destination pushbutton is routed from a source, which appears multiple times in the Sources panel, selecting the destination pushbutton will illuminate all instances of the source pushbutton, regardless of how deck control has been configured for each source pushbutton. Similarly if multiple instances of an output pushbutton appear in the Destinations panel, they will illuminate together when any one has been selected.

Viewing and Changing routes

In order to see which video source has been routed to a video destination, such as tape deck, tap the tape deck button in the destinations panel to make the button illuminate. Simultaneously the associated video source button will illuminate in the sources panel, making it immediately obvious which video source is connected to the tape deck, e.g. an NLE workstation.

In order to change the video source from an NLE workstation to a video camera, tap a camera pushbutton in the sources panel to immediately illuminate the camera pushbutton and route video to the tape deck. The NLE workstation button will no longer be illuminated and will be disconnected from the tape deck.

A yellow padlock icon will appear in the top-left corner of the destination pushbutton and will prevent anyone else from using the destination device until it is unlocked from your iPad. A gray padlock icon will appear on any destination pushbuttons which other users have locked.

Locking and Unlocking Routes

Locking a destination will avoid accidentally changing the video source which is routed to that destination. To lock a route between an input and an output, double-tap the destination pushbutton. A yellow padlock icon will appear in the top-left corner of the destination pushbutton and will prevent anyone else from using the destination device until it is unlocked from your iPad. Double-tap the destination pushbutton again to unlock. Locking a destination still leaves the associated video source available for routing to multiple destinations simultaneously.

Locking a route between an input and an output also locks the RS-422 deck control connection between the two devices to avoid other users accidentally seizing the deck control belonging to the video source. The RS-422 connection between the video source and video destination will remain locked until the destination pushbutton is unlocked.

A gray padlock icon will appear on any destination pushbuttons which other users have locked. The video destination devices will not be available to you until the destination pushbuttons have been unlocked from the other users' computers and iPads.

If you encounter a gray padlock icon, and do not know who locked the video device, you can request your system administrator unlock the route for you. The Videohub Server computer has administrative control over all connections and your system administrator can unlock any connection from the Videohub Server computer. When a route is unlocked, the yellow or gray padlock icon will instantly disappear.
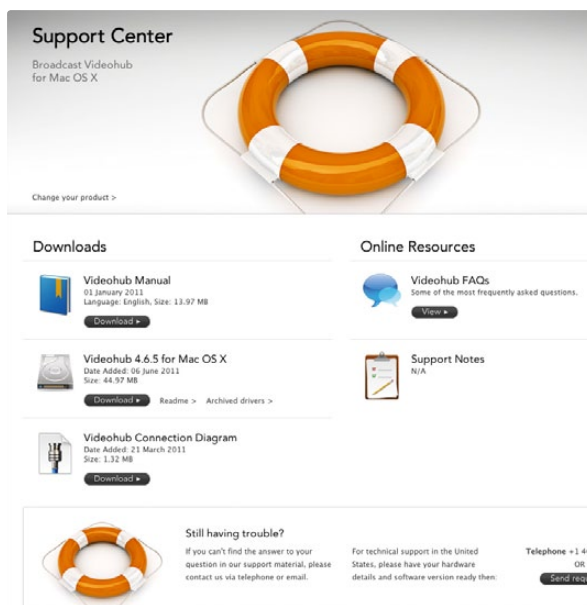
The client software interface is always disabled.

This could be for several reasons –

The client is not connected to the Videohub server.

In this case, check the following Question entitled "The client software cannot connect to the Videohub server".

If this is not the cause, then the Videohub might not be physically connected to a host server computer. In this case, try the following:

If your Videohub connects to a Videohub Server computer via USB, the client interface is always disabled when the Videohub is not connected via USB. Ensure there is a USB connection between the Videohub and the Videohub Server computer.

When the USB connection is running the light next to the USB connector on the Videohub will blink intermittently indicating the USB is communicating correctly.

If this does not solve the problem, then the Videohub might not have been detected by the Videohub Server computer. Try the following:

Step 1. Ensure the drivers have been installed on the server by running the installer.

Step 2. Disconnect and reconnect the Videohub's USB connection, on reconnect it should be detected by the server – allow any uninstalled drivers to be installed.

Step 3. Uninstall the Videohub software on the Videohub Server computer and repeat the installation.

How do I unlock a destination which someone else has locked?

Videohub deliberately prevents you from unlocking a destination, which someone else has locked, so that you don't accidentally seize their connection during a critical job.

If you encounter a locked destination, and do not know who locked the video device, you can request your system administrator to unlock the route for you. The Videohub Server computer has administrative control over all connections and your system administrator can unlock any connection from the Videohub Server computer.

If you have networked your Videohub via Ethernet, you will need to temporarily connect a Mac OS X or Windows computer via USB, and use the Videohub software on that computer to override and unlock the destination. Simultaneous connections via RS-422, USB and Ethernet are supported.

The pushbuttons on Smart Videohub directly control the integrated Videohub Server and provide the quickest method to override any existing routes, including destinations locked with Videohub client software. Smart Videohub supports simultaneous connections via RS-422, USB and Ethernet.

The client software cannot connect to the Videohub server.

In this case, check:

Step 1. Is the Videohub and/or Videohub Server computer turned on?

Step 2. Ensure the IP address of the Videohub Server is correctly specified in your preferences on each client computer and iPad on your network.

Step 3. Check that you have network connectivity to the Videohub Server.

Step 4. Ensure the Videohub Server does not have TCP port 9990 blocked by a firewall. This port is automatically opened by the installer if possible. It may have inadvertently been closed by server software updates or user intervention.

Step 5. Is the server service running on the Windows server computer? Check:

- Double-click on Administrative Tools in the Control Panel
- Double-click on Services
- Ensure the word Started appears under the Status column for the Blackmagic Videohub Daemon service. If it does not, click on the service and select Start the service.

Replacing a fan in Universal Videohub

The Universal Videohub 72 and Universal Videohub 288 each contain three fans which can be replaced if a pre-installed fan stops working or becomes noisy. The Videohub will continue to work even if a fan stops running. However a working fan will help to extend the life of the Videohub for many years and we recommend the fan be replaced if it should ever stop running. Replacement fans can be purchased through Blackmagic Design authorized resellers. You will need a number 01 size Phillips head screwdriver to replace the fans.
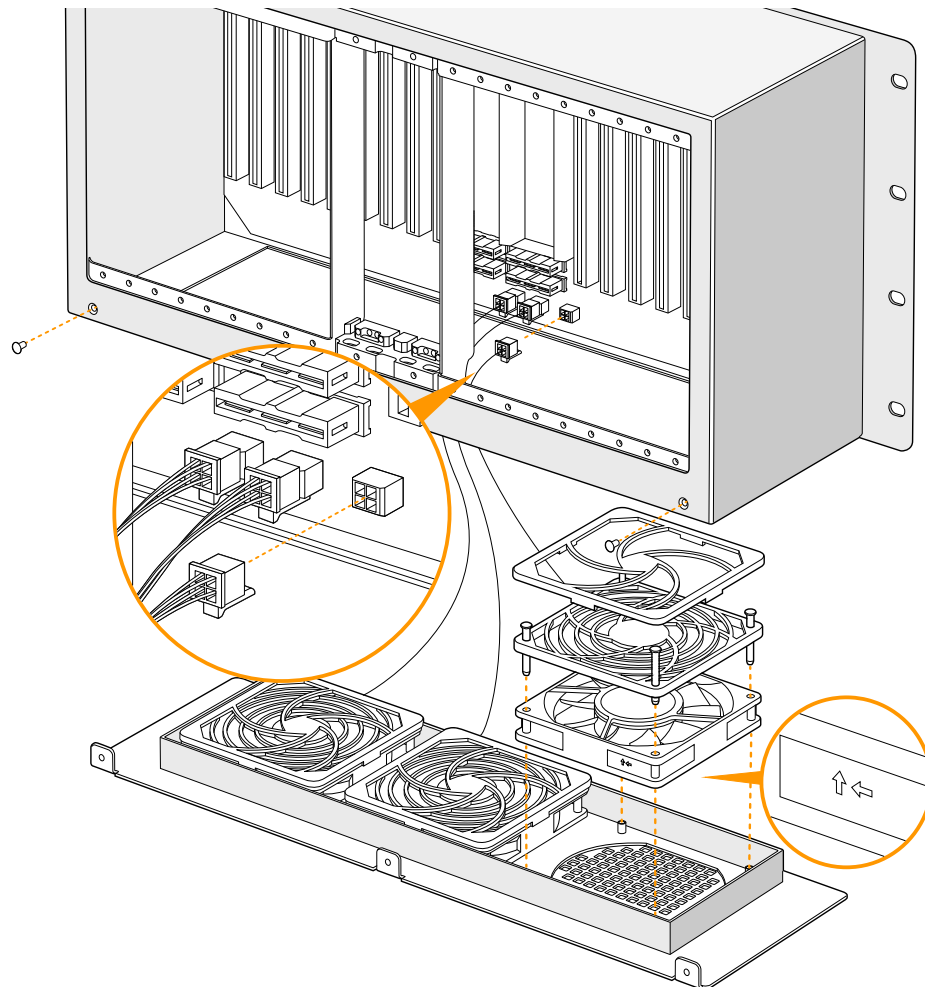
Each fan is designed to be replaced without needing to switch off power to the Videohub. The fan tray is located at the base of the unit. Remove the left and right screws from the fan tray using a number 01 Phillips head screwdriver. While supporting the tray with a thumb, remove the center screw. Having removed all three screws, slowly allow the fan tray to swing open until you see the black, plastic dust-filter on top of each fan. Gently pull the tray towards you while continuing to swing it down until you feel the rear of the tray detach from the Universal Videohub chassis. Note which fan is faulty. You will see the colored power cables connecting to each fan. Each fan power cable connects to the Videohub motherboard with a plastic connector. While supporting the fan tray with one hand, unplug the plastic power connectors of all three fans with the other hand. The fan tray can now be fully removed.

Place the fan tray on a flat surface and unclip the top of the dust-filter housing using the four clips. Remove the top of the housing and the filter. Four screws will be revealed. Remove the four screws around the faulty fan. Then remove the base of the dust-filter housing and also the faulty fan. Replace the fan with a spare unit and then reinstate the base of the dust-filter housing. Secure the housing and fan with the four screws and ensure the heads of the screws recess in to the dust-filter housing. If the screws fail to recess, flip over the housing and try again. Place the dust filter over the base of the housing and then snap on the top of the dust-filter housing.

Position the fan tray underneath the base of the Universal Videohub chassis and connect all three fan power cables to the motherboard. All three fans should immediately start running. Gently dock the rear of the fan tray with the Universal Videohub chassis. Swing up the front of the fan tray and simultaneously push the tray towards the Videohub motherboard until the rear of the fan tray slides in to place and the front swings shut. Reinstall the three screws.

Replacing the fan in Broadcast Videohub or Enterprise Videohub

The Broadcast Videohub and Enterprise Videohub packages include a spare fan in case the pre-installed fan stops working or becomes noisy. The Videohub will continue to work even if the fan stops running. However a working fan will help to extend the life of the Videohub for many years and we recommend the fan be replaced if it should ever stop running.

The fan is designed to be replaced without needing to switch off power to the Videohub. Remove the four screws on the fan cover and lift up the cover gently. You will see the colored power cables connecting to a plug on the Videohub. Gently remove the plastic plug from the Videohub. Remove the two screws which attach the faulty fan to the fan cover. Replace the faulty fan with the spare fan by following this process in reverse. The spare fan should immediately start running.
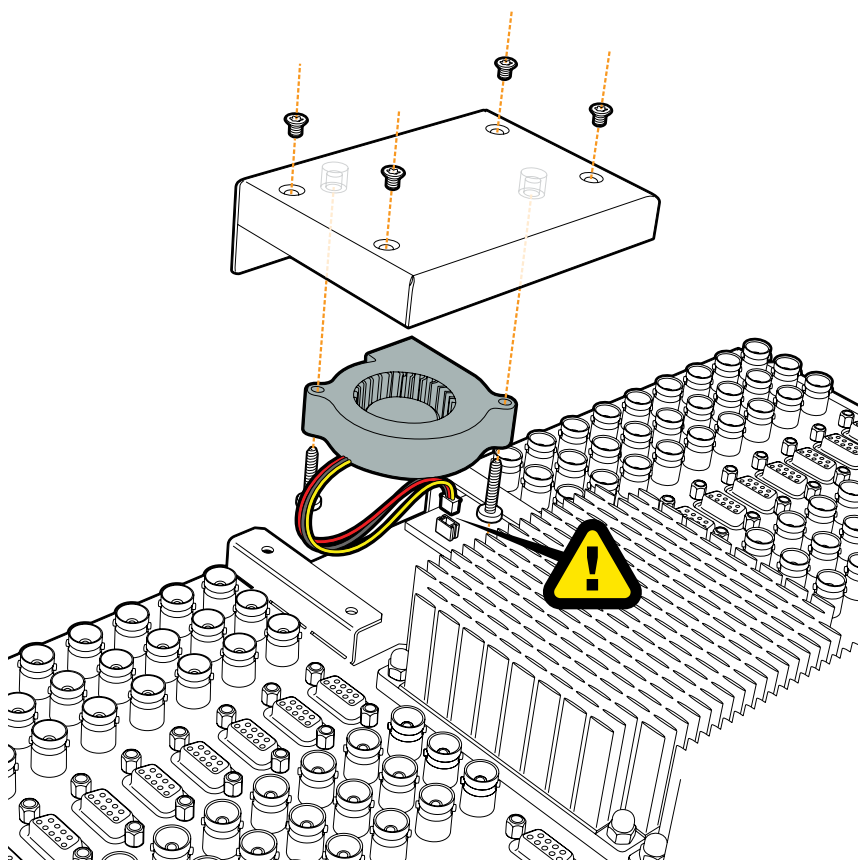
There are four steps to getting help.

Step 1. Check out the Blackmagic Design web site www.blackmagic-design.com and click on the Support page for the latest support information.

Step 2. Call your dealer.

Your dealer will have the latest technical updates from Blackmagic Design and should be able to give you immediate assistance. We also recommend you check out the support options your dealer offers as they can arrange various support plans based on your workflow requirements.
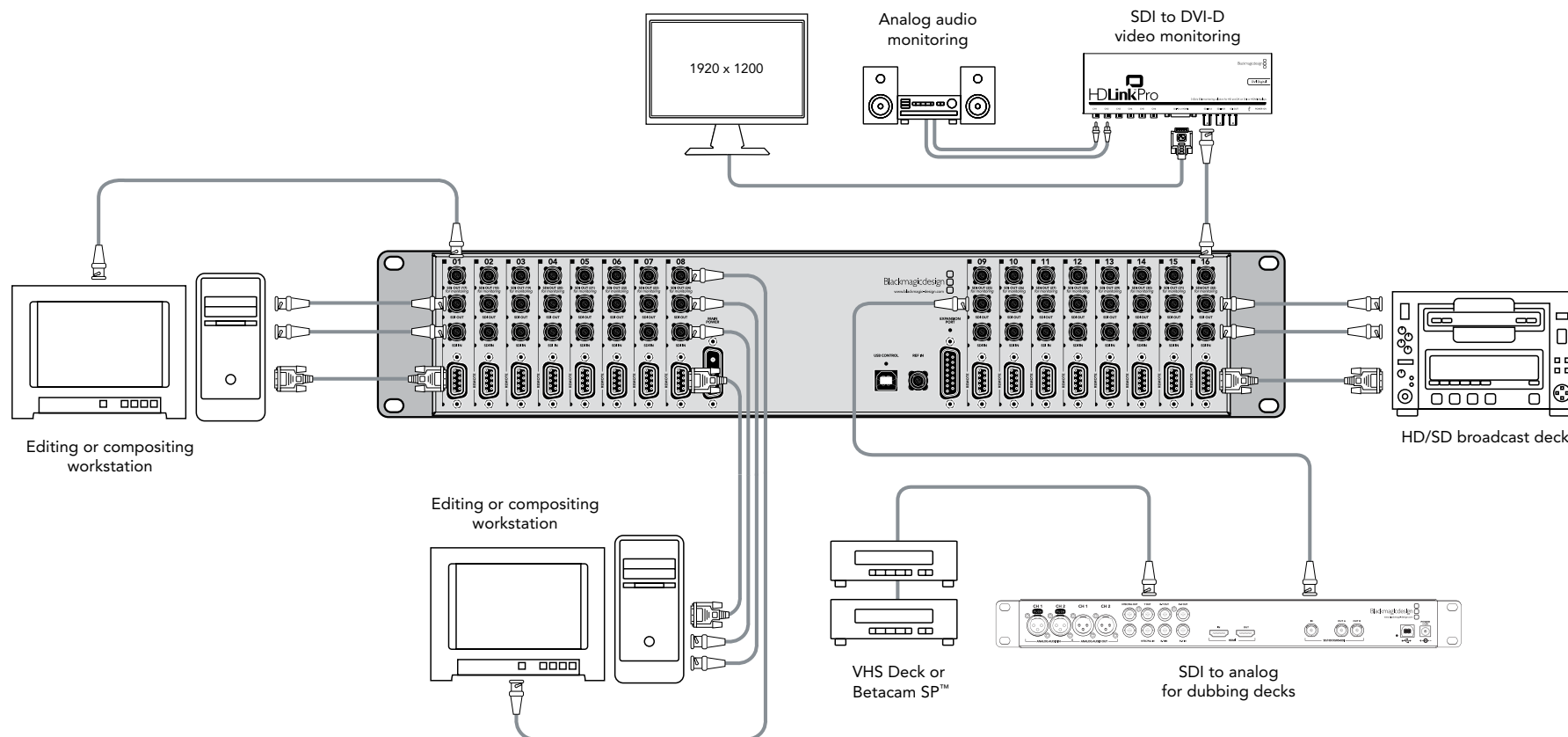
Step 3. The next option is to email us with your questions using the web form at

www.blackmagic-design.com/support/contact

Step 4. Phone a Blackmagic Design support office. Check our web site for current support phone numbers in your area. www.blackmagic-design.com/company.

Please provide us with as much information as possible regarding your technical problem and system specifications so that we may try to respond to your problem as quickly as possible.

Videohub Workflows

This example shows Studio Videohub connecting to other SDI equipment including an SDI deck, CRT and DVI monitors and video capture cards. All Videohubs connect in exactly the same way. Analog equipment, such as a Betacam SP deck, can be connected to Videohub via a bidirectional SDI-to-analog converter, such as Broadcast Converter or any Multibridge.

Analog audio monitoring

SDI to DVI-D video monitoring

1920 x 1200

Editing or compositing workstation

Editing or compositing workstation

HD/SD broadcast deck

VHS Deck or Betacam SP™

SDI to analog for dubbing decks

Videohub and Sync

Current models of Videohub include a REF IN port so it will remain in sync with any other genlocked equipment in your facility. This example shows Broadcast Videohub connected to a Mini Converter Sync Generator which supports both SD blackburst and HD tri-level sync. The Sync Generator is also connected to the reference inputs on a deck, monitor and video capture device in this picture.

CRT MONITOR

Blackmagic Design™
MULTIBRIDGE PRO

Blackmagic Design™
SYNC GENERATOR

Mini Converter
Sync Generator

DECK
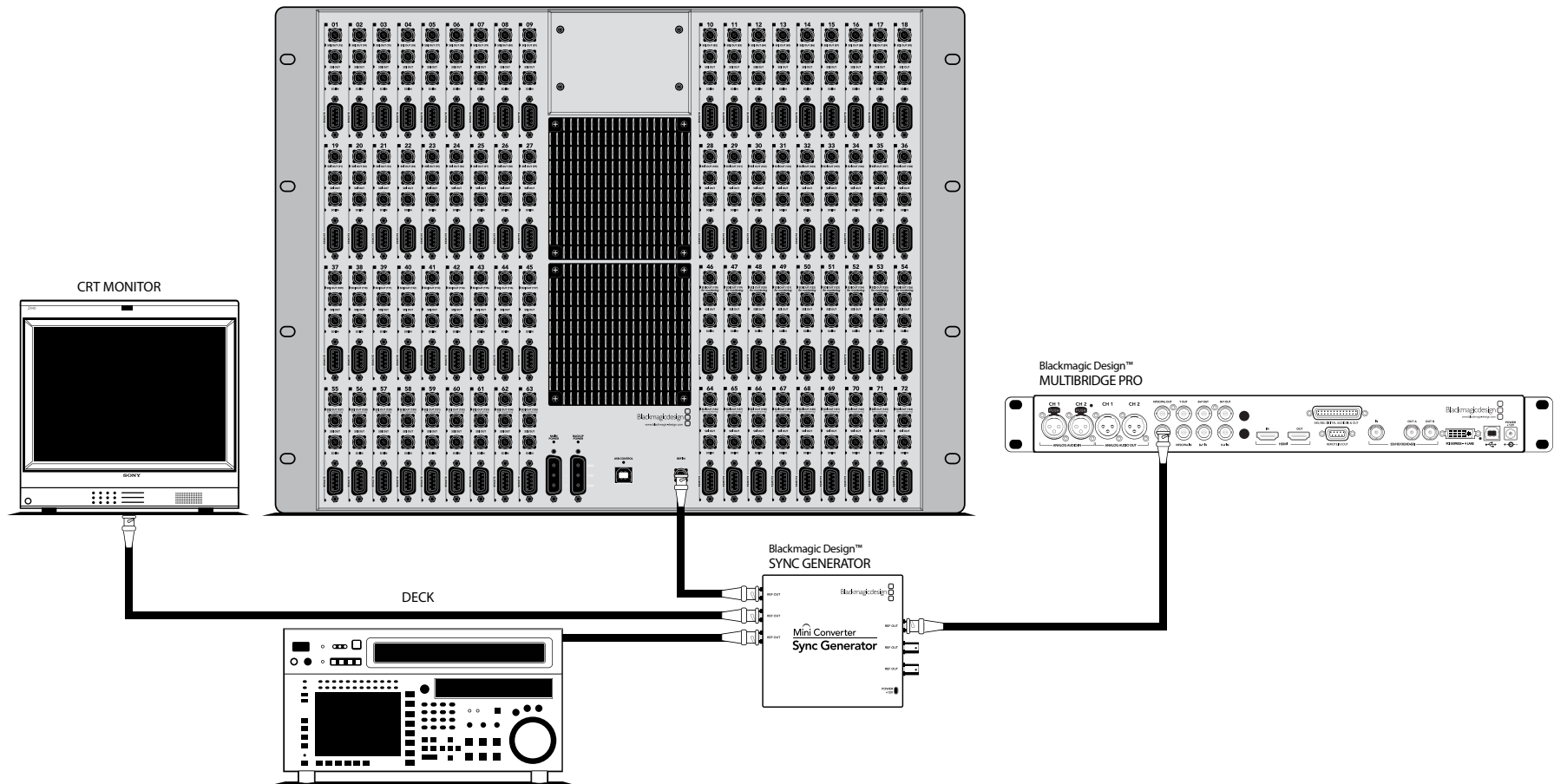
Blackmagic 2K Format – Overview

The latest Blackmagic Design products use the new 3 Gb/s SDI video, which allows twice the data rate of traditional HD-SDI video. We thought it would be a really nice idea to add 2K film support, via this new 3 Gb/s SDI technology, so we could simplify feature film workflows. With the popularity of Blackmagic Design editing systems worldwide, now thousands of people can benefit from a feature film workflow revolution.

This information includes everything product developers need to know for building native 2K SDI equipment. Of course, all Blackmagic products can be updated, so if the television industry adopts an alternative SDI-based film standard, we can add support for that too!

Frame Structure

- Transmitted at 23.98, 24 or 25 frames per second as a Progressive Segmented Frame.
- Active video is 2048 pixels wide by 1556 lines deep.
- Total lines per frame : 1650
- Active words per line are 1535. One word consists of a 10-bit sample for each of the four data streams, i.e. a total of 40 bits. See the diagram named Blackmagic 2K Format - Data Stream Format.
- Total active lines : 1556
- Total words per line : 1875 for 23.98/24Hz and 1800 for 25Hz.
- Fields per frame : 2, 825 lines each
- Active lines located on lines 16-793 (field 1) and 841-1618 (field 2).

Transport Structure

- Based on SMPTE 372M Dual Link mapping and SMPTE 425M-B support for mapping SMPTE 372M into a single 3 Gb/s link.
- Timing reference signals, line number and line CRC insertion is the same as above.
- Optional ancillary data is inserted into both virtual interfaces.
- At present, only audio data is included: as per standard HD audio insertion (SMPTE S299M) the audio data packets are carried on data stream two and audio control packets are carried on data stream one.
- During active video, 10-bit Red, Green and Blue data is sent in the following sequence:

> **Data stream 1:** Green_1, Green_2, Green_3, Green_5...Green_2047
>
> **Data stream 2:** Blue_1, Blue_2, Green_4, Blue_5...Green_2048.
>
> **Data stream 3:** Red_1, Blue_3, Blue_4, Red_5...Blue_2048.
>
> **Data stream 4:** Red_2, Red_3, Red_4, Red_6...Red_2048.

The diagram, Vertical Timing Reference, shows the vertical timing details with line numbers and Field, Vertical and Horizontal bits for the Timing Reference Signal codes.

The diagram, Data Stream Format, shows the data stream formats around the optional ancillary data section of the horizontal line. Note that each active pixel takes up three samples.

Blackmagic 2K Format – Vertical Timing Reference

	FIELD 1					ACTIVE					
F	1	0	0	0	0	0	0	0	0	0	0
V	1	1	1	1	1	0	0	0	0	1	1
LINE #	1650	1	2	…	14	15	16	…	792	793	…	825

	FIELD 2					ACTIVE					
F	0	1	1	1	1	1	1	1	1	1	1
V	1	1	1	1	1	0	0	0	0	1	1
LINE #	825	826	827	…	839	840	841	…	1617	1618	…	1650

Blackmagic 2K Format – Data Stream Format

							EAV(3FFh)	EAV(000h)	EAV(000h)	EAV(XYZh)	LN0	LN1	CRC0	CRC1	ANC/AUDIO DATA			SAV(3FFh)	SAV(000h)	SAV(000h)	SAV(XYZh)				
DATA STREAM 1	G2041	G2042	G2043	G2045	G2046	G2047	EAV(3FFh)	EAV(000h)	EAV(000h)	EAV(XYZh)	LN0	LN1	CRC0	CRC1	ANC/AUDIO DATA			SAV(3FFh)	SAV(000h)	SAV(000h)	SAV(XYZh)	G1	G2	G3	G5
DATA STREAM 2	B2041	B2042	G2044	B2045	B2046	G2048	EAV(3FFh)	EAV(000h)	EAV(000h)	EAV(XYZh)	LN0	LN1	CRC0	CRC1	ANC/AUDIO DATA			SAV(3FFh)	SAV(000h)	SAV(000h)	SAV(XYZh)	B1	B2	G4	B5
DATA STREAM 3	R2041	B2043	B2044	R2045	B2047	B2048	EAV(3FFh)	EAV(000h)	EAV(000h)	EAV(XYZh)	LN0	LN1	CRC0	CRC1	040	...	040	SAV(3FFh)	SAV(000h)	SAV(000h)	SAV(XYZh)	R1	B3	B4	R5
DATA STREAM 4	R2042	R2043	R2044	R2046	R2047	R2048	EAV(3FFh)	EAV(000h)	EAV(000h)	EAV(XYZh)	LN0	LN1	CRC0	CRC1	200	...	200	SAV(3FFh)	SAV(000h)	SAV(000h)	SAV(XYZh)	R2	R3	R4	R6
WORD# 23.98/24 PsF	1870	1871	1872	1873	1874	1875	1	2	3	4	5	6	7	8	9	...	335	336	337	338	339	340	341	342	343
WORD# 25 PsF	1795	1796	1797	1798	1799	1800	1	2	3	4	5	6	7	8	9	...	260	261	262	263	264	265	266	267	268

Blackmagic Videohub Ethernet Protocol v2.2

Summary

The Blackmagic Videohub Ethernet Protocol is a text based protocol that is accessed by connecting to TCP port 9990 on a Videohub Server. Integrated Videohub Servers and Videohub Server computers are supported by the protocol.

The Videohub Server sends information in blocks which each have an identifying header in all-caps, followed by a full-colon. A block spans multiple lines and is terminated by a blank line. Each line in the protocol is terminated by a newline character.

Upon connection, the Videohub Server sends a complete dump of the state of the device. After the initial status dump, status updates are sent every time the Videohub status changes.

To be resilient to future protocol changes, clients should ignore blocks they do not recognize, up to the trailing blank line. Within existing blocks, clients should ignore lines they do not recognize.

Protocol Preamble

The first block sent by the Videohub Server is always the protocol preamble:

```
PROTOCOL PREAMBLE:↵
Version: 2.2 ↵
↵
```

The version field indicates the protocol version. When the protocol is changed in a compatible way, the minor version number will be updated. If incompatible changes are made, the major version number will be updated.

Device Information

The next block contains general information about the connected Videohub device. If a device is connected, the Videohub Server will report the attributes of the Videohub:

```
VIDEOHUB DEVICE:↵
Device present: true↵
Model name: Blackmagic Smart Videohub↵
Video inputs: 16↵
Video processing units: 0↵
Video outputs: 16↵
Video monitoring outputs: 0↵
Serial ports: 0↵
↵
```

This example is for the Smart Videohub which is a 16x16 router.

Legend	
↵	carriage return
…	and so on

Version 2.2 of the Blackmagic Videohub Ethernet Protocol was released with Videohub 4.7 software.

Developer Information

If the Videohub Server has no device connected, the block will simply be:

```
VIDEOHUB DEVICE:↵
Device present: false↵
↵
```

If a device is present, but has an incompatible firmware, the status reported will be:

```
VIDEOHUB DEVICE:↵
Device present: needs_update↵
↵
```

In the last two situations, no further information will be sent, unless the situation is rectified.

If the Videohub Server detects a new Videohub attached, it will resend all blocks except the protocol preamble to indicate the device has changed, and allow the client to update its cache of server state.

Initial Status Dump

The next four blocks enumerate the labels assigned to the input, output, monitoring and serial ports.

Videohubs which do not have monitoring or serial ports do not send the corresponding blocks.

```
INPUT LABELS:↵
0 VTR 1↵
1 VTR 2↵
…
↵
OUTPUT LABELS:↵
0 Output feed 1↵
1 Output feed 2↵
…
↵
MONITORING OUTPUT LABELS:↵
0 Monitor feed 1↵
1 Monitor feed 2↵
…
↵
SERIAL PORT LABELS:↵
0 Deck 1↵
1 Deck 2↵
↵
```

Ports are always numbered starting at zero in the protocol.

The next three blocks describe the routing of the output, monitoring and serial ports.

```
VIDEO OUTPUT ROUTING:↵
0 5↵
1 3↵

…
↵
VIDEO MONITORING OUTPUT ROUTING:↵
0 7↵
1 8↵

…
↵
SERIAL PORT ROUTING:↵
0 12↵
1 11↵

…
↵
```

Videohubs with processing units (only the Workgroup Videohub) send an extra routing block:

```
PROCESSING UNIT ROUTING:↵
0 5↵
1 3↵

…
↵
```

Videohubs with frame buffers (only the Workgroup Videohub) send two extra blocks:

```
FRAME LABELS:↵
0 Frame one↵
1 Frame two↵

…
↵
FRAME BUFFER ROUTING:↵
0 7↵
1 8↵

…
↵
```

The next three blocks describe the locking status of the output, monitoring and serial ports. Each port has a lock status of "O" for ports which are owned by the current client (ie locked from the same IP address), "L" for ports which are locked from a different client, or "U" for unlocked. Note that Videohubs which do not have monitoring ports or serial ports do not send the corresponding blocks.

```
VIDEO OUTPUT LOCKS:↵
0 U↵
1 U↵
…
↵
MONITORING OUTPUT LOCKS:↵
0 U↵
1 U↵
…
↵
SERIAL PORT LOCKS:↵
0 U↵
1 U↵
…
↵
```

Videohubs with processing units (only the Workgroup Videohub) send an extra lock block:

```
PROCESSING UNIT LOCKS:↵
0 U↵
1 U↵
…
↵
```

Videohubs with frame buffers (only the Workgroup Videohub) send an extra lock block:

```
FRAME BUFFER LOCKS:↵
0 U↵
1 U↵
…
↵
```

Videohubs with pluggable cards (only Universal Videohubs) send three more blocks which describe the hardware status of the ports. Missing video or serial ports have a status of "None"; input and output video ports will be "BNC" or "Optical" if they are present; serial ports will be "RS422" if they are present.

```
VIDEO INPUT STATUS:↵
0 BNC↵
1 BNC↵
…
↵
VIDEO OUTPUT STATUS:↵
0 BNC↵
1 BNC↵
…
↵
SERIAL PORT STATUS:↵
0 RS422↵
1 RS422↵
…
↵
```

Status Updates

When any route, label, or lock is changed on the Videohub Server by any client, the Videohub Server resends the applicable status block, containing only the items which have changed. For example, if serial port 6 has been unlocked, the following block will be sent:

```
SERIAL PORT LOCKS:↵
5 U↵
↵
```

If multiple items are changed, multiple items may be present in the update:

```
OUTPUT LABELS:↵
7 New output 8 label↵
10 New output 11 label↵
↵
```

If a card is plugged into or removed from the Universal Videohub, it will send hardware status blocks for the video inputs, video outputs, and serial ports on that card.

Requesting Changes

To update a label, lock or route, the client should send a block of the same form the Videohub Server sends when its status changes. For example, to change the route of output port 8 to input port 3, the client should send the following block:

```
VIDEO OUTPUT ROUTING:↵
7 2↵
↵
```

The block must be terminated by a blank line. On receipt of a blank line, the Videohub Server will either acknowledge the request by responding:

```
ACK↵
↵
```

or indicate that the response was not understood or able to be actioned by responding:

```
NAK↵
↵
```

After a positive response, the client should expect to see a status update from the Videohub Server showing the status change. This is likely to be the same as the command that was sent, but if other changes were made simultaneously by other clients, there may be more updates in the block, or more blocks. Simultaneous updates could cancel each other out, leading to a response that is different to that expected.

In the absence of simultaneous updates, the dialog expected for a simple label change is as follows:

```
OUTPUT LABELS:↵
6 new output label seven↵
↵
ACK↵
↵
OUTPUT LABELS:↵
6 new output label seven↵
↵
```

The asynchronous nature of the responses means that a client should never rely on the desired update actually occurring and must simply watch for status updates from the Videohub Server and use only these to update its local representation of the server state.

To lock a port, send an update to the port with the character "O" indicating that you wish to lock the port for example:

```
SERIAL PORT LOCKS:↵
7 O↵
↵
ACK↵
↵
SERIAL PORT LOCKS:↵
7 O↵
↵
```

Hardware status blocks can only be sent by the Videohub Server. If a client sends hardware status blocks, they will be ignored.

Requesting a Status Dump

The client may request that the Videohub Server resend the complete state of any status block by sending the header of the block, followed by a blank line. In the following example, the client requests the Videohub Server resend the output routing:

```
OUTPUT LABELS:↵
↵
ACK↵
↵
OUTPUT LABELS:↵
0 output label 1↵
1 output label 2↵
2 output label 3↵
…
↵
```
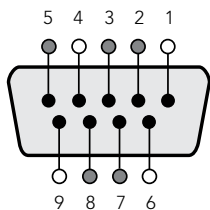
Checking the Connection

While the connection to the Videohub Server is established, a client may send a special no-operation command to check that the Videohub Server is still responding:

```
PING:↵
↵
```

If the Videohub Server is responding, it will respond with an ACK message as for any other recognized command.

5 4 3 2 1

9 8 7 6

Videohub RS-422 Router Control

Pin	Function
1	Ground
2	Tx- (Data sent by router)
3	Rx+ (Data received by router)
4	Ground
5	NC (No connect)
6	Ground
7	Tx+ (Data sent by router)
8	Rx- (Data received by router)
9	Ground

Videohub RS-422 Router Control pin connections.

Videohub RS-422 Protocol

General

The RS-422 protocol can be used to control many Videohub models as RS-422 slave devices, for router crosspoint switching. This feature is available on any Videohub model which has an "RS-422 Control" port.

In "server" mode, these Videohub models implement the router (server) side of the Leitch Serial Pass-Through Protocol as specified in section 4 of Leitch document SPR-MAN revision D. In "client" mode, the Videohub implements the controller (client) side of the Leitch terminal protocol.

This document describes the commands and parameters in the protocol that are relevant and supported by Videohub. Other commands and parameters specified in the Leitch protocol are accepted but ignored.

The RS-422 serial port is configured as 9600 N81.

The protocol is line-oriented, with a maximum length of 250 characters per command. Each command from the client should be terminated with a carriage-return (\r). Each response from the server will be terminated with a carriage-return and line-feed (\r\n).

Sources, destinations and levels are always specified in base-16, numbered from zero. Levels are always between 0 and 15 ("F") . Videohubs only have one valid level - level zero.

On connecting to the serial port, the client should send a carriage-return. The Videohub Server will respond with a > character prompt, which is not followed by a carriage-return or line-feed. Receiving the prompt indicates that a connection has been established. The same prompt will be issued after each command received by the Videohub Server.

In the following documentation, commands in orange and values in blue must be typed literally, including any spaces. In the following example of an immediate command using destination port 7 and source port 3, @ X:0/destination,source would be entered as: @ X:0/6,2

Notifications

Once connected, if status reporting is enabled, the client will receive a notification message when a route changes on the Videohub Server. The notifications take one of two forms:

`S:0`destination,source   Routing change
This message indicates that the specified source port is now routed to the specified destination.

`V:0`destination,source   Preset routing notification

This message indicates that the current preset includes a route from the specified source to the specified destination.

Global Commands

All pass-through commands are preceded by an @ symbol and a space.

The following client commands are supported:

`@ !`   disable status reporting
            Status reporting is disabled by default.

`@ ?`   enable status reporting
            Status reporting is enabled.

`@ Z:`   reset routing table

Routing is reset so that the first source is routed to all destinations.

Immediate Commands

`@ X:0/destination,source`   change route

`@ X:0/destination,source/destination-2,source-2`…   change multiple routes
            The specified source ports are routed to the specified destinations.
            Any routing changes will trigger `S:` notifications

`@ X?0destination`   request individual route status
            The source routed to a the specified destination will be returned as an `S:` notification.

`@ S?0`   request all ports route status
            Each source & destination port pair will be returned as `S:` notifications

Salvo Commands

@ `P:0`/`destination,source`   queue route change

@ `P:0`/`destination,source`/`destination-2,source-2`…   queue multiple route changes
> The specified routing changes are added to the current salvo for later execution.

@ `P?0`/`destination`   request individual port status in salvo
> If a routing change for the specified destination port is queued, the route will be returned as a `V:` notification.

@ `V?0`   request all ports status in salvo
> Each queued routing change in the salvo is reported as a `V:` notification.

@ `B:C`   clear salvo

@ `B:R`   clear salvo
> Any queued changes are discarded and the salvo is reset.

@ `B:E`   execute salvo
> Any queued changes are executed and each routing change will be returned as an `S:` notification.

Universal Videohub 288 SDI Connection Chart

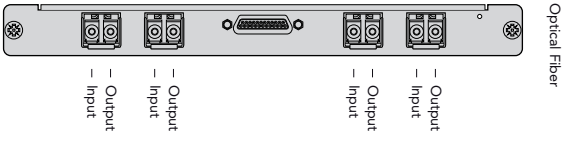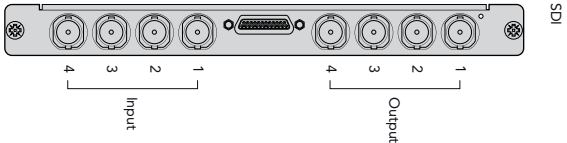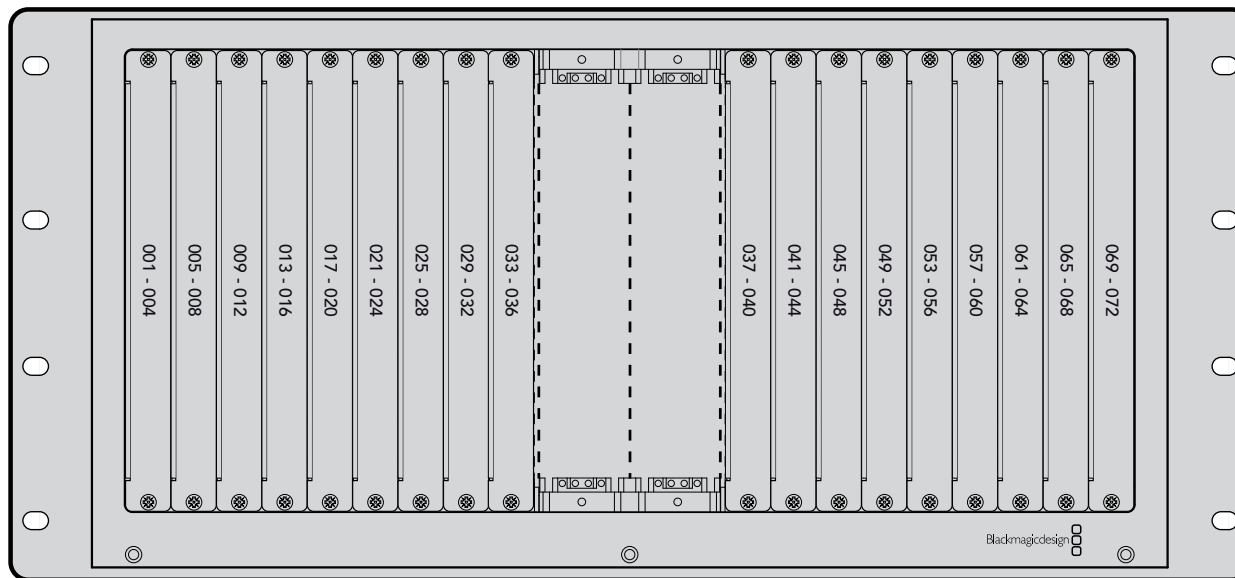|			
001 - 004	073 - 076	145 - 148	217 - 220
005 - 008	077 - 080	149 - 152	221 - 224
009 - 012	081 - 084	153 - 156	225 - 228
013 - 016	085 - 088	157 - 160	229 - 232
017 - 020	089 - 092	161 - 164	233 - 236
021 - 024	093 - 096	165 - 168	237 - 240
025 - 028	097 - 100	169 - 172	241 - 244
029 - 032	101 - 104	173 - 176	245 - 248
033 - 036	105 - 108	177 - 180	249 - 252
037 - 040	109 - 112	181 - 184	253 - 256
041 - 044	113 - 116	185 - 188	257 - 260
045 - 048	117 - 120	189 - 192	261 - 264
049 - 052	121 - 124	193 - 196	265 - 268
053 - 056	125 - 128	197 - 200	269 - 272
057 - 060	129 - 132	201 - 204	273 - 276
061 - 064	133 - 136	205 - 208	277 - 280
065 - 068	137 - 140	209 - 212	281 - 284
069 - 072	141 - 144	213 - 216	285 - 288

Blackmagicdesign

Universal Videohub Interface Cards

Optical Fiber

4 — Output — Input
3 — Output — Input
2 — Output — Input
1 — Output — Input

SDI

Input: 4 3 2 1
Output: 4 3 2 1

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Universal Videohub 72

001 - 004
005 - 008
009 - 012
013 - 016
017 - 020
021 - 024
025 - 028
029 - 032
033 - 036
037 - 040
041 - 044
045 - 048
049 - 052
053 - 056
057 - 060
061 - 064
065 - 068
069 - 072

Universal Videohub Interface Cards

Optical Fiber

SDI

1 — Output
   — Input

2 — Output
   — Input

3 — Output
   — Input

4 — Output
   — Input

1
2   Output
3
4

1
2   Input
3
4

Universal Videohub 72 SDI Connection Chart

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Limited Warranty

Blackmagic Design warrants that Videohub routers will be free from defects in materials and workmanship for a period of 36 months from the date of purchase excluding connectors, cables, cooling fans, fiber optic modules, fuses, keyboards and batteries which will be free from defects in materials and workmanship for a period of 12 months from the date of purchase. Blackmagic Design warrants that Videohub Smart Control will be free from defects in materials and workmanship for a period of 12 months from the date of purchase. If a product proves to be defective during this warranty period, Blackmagic Design, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, you the Customer, must notify Blackmagic Design of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. The Customer shall be responsible for packaging and shipping the defective product to a designated service center nominated by Blackmagic Design, with shipping charges pre paid. Customer shall be responsible for paying all shipping changes, insurance, duties, taxes, and any other charges for products returned to us for any reason.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Blackmagic Design shall not be obligated to furnish service under this warranty: a) to repair damage resulting from attempts by personal other than Blackmagic Design representatives to install, repair or service the product, b) to repair damage resulting from improper use or connection to incompatible equipment, c) to repair any damage or malfunction caused by the use of non Blackmagic Design parts or supplies, or d) to service a product that has been modified or integrated with other products when the effect of such a modification or integration increases the time or difficulty of servicing the product. THIS WARRANTY IS GIVEN BY BLACKMAGIC DESIGN IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. BLACKMAGIC DESIGN AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. BLACKMAGIC DESIGN'S RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE WHOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER BLACKMAGIC DESIGN OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES. BLACKMAGIC DESIGN IS NOT LIABLE FOR ANY ILLEGAL USE OF EQUIPMENT BY CUSTOMER. BLACKMAGIC IS NOT LIABLE FOR ANY DAMAGES RESULTING FROM USE OF THIS PRODUCT. USER OPERATES THIS PRODUCT AT OWN RISK.