User Guide

Videowall Processors

Quantum Ultra Series

Videowall Processing Systems



Extron

68-2760-01 Rev. H
01 22

Safety Instructions

Safety Instructions • English

WARNING: This symbol, ⚠, when used on the product, is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

ATTENTION: This symbol, ⚠, when used on the product, is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

For information on safety guidelines, regulatory compliances, EMI/EMF compatibility, accessibility, and related topics, see the Extron Safety and Regulatory Compliance Guide, part number 68-290-01, on the Extron website, **www.extron.com**.

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Instrucciones de seguridad • Español

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Instructions de sécurité • Français

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ATTENTION : Ce pictogramme, ⚠, lorsqu'il est utilisé sur le produit, signale à l'utilisateur des instructions d'utilisation ou de maintenance importantes qui se trouvent dans la documentation fournie avec l'équipement.

Pour en savoir plus sur les règles de sécurité, la conformité à la réglementation, la compatibilité EMI/EMF, l'accessibilité, et autres sujets connexes, lisez les informations de sécurité et de conformité Extron, réf. 68-290-01, sur le site Extron, **www.extron.com**.

Istruzioni di sicurezza • Italiano

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ATTENTZIONE: Il simbolo, ⚠, se usato sul prodotto, serve ad avvertire l'utente della presenza di importanti istruzioni di funzionamento e manutenzione nella documentazione fornita con l'apparecchio.

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UWAGI: Ten symbol, ⚠, gdy używany na produkt, jest przeznaczony do ostrzegania użytkownika ważne operacyjne oraz instrukcje konserwacji (obsługi) w literaturze, wyposażone w sprzęt.

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Для получения информации о правилах техники безопасности, соблюдении нормативных требований, электромагнитной совместимости (ЭМП/ЭДС), возможности доступа и других вопросах см. руководство по безопасности и соблюдению нормативных требований Extron на сайте Extron: , **www.extron.com**, номер по каталогу - 68-290-01.

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注意: 产品上的这个标志意在提示用户，设备随附的用户手册中有重要的操作和维护(维修)说明。

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敬请访问 Extron 网站，**www.extron.com**，参见 Extron 安全规范指南，产品编号 68-290-01。

安全記事 • 繁體中文

警告: 若產品上使用此符號，是為了提醒使用者，產品機殼內存在未隔離的危險電壓，可能會導致觸電之風險。

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有關安全性指導方針、法規遵守、EMI/EMF 相容性、存取範圍和相關主題的詳細資訊，請瀏覽 Extron 網站:**www.extron.com**，然後參閱《Extron 安全性與法規遵守手冊》，準則編號 68-290-01。

安全上のご注意 • 日本語

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안전 지침 • 한국어

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. The Class A limits provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause interference. This interference must be corrected at the expense of the user.

ATTENTION:

- The Twisted Pair Extension technology works with unshielded twisted pair (UTP) or shielded twisted pair (STP) cables; **but to ensure FCC Class A and CE compliance, STP cables and STP Connectors are required**.
- La technologie extension paires torsadées fonctionne avec les câbles paires torsadées blindées (UTP) ou non blindées (STP). Afin de s'assurer de la compatibilité entre FCC Classe A et CE, les câbles STP et les connecteurs STP sont nécessaires.

NOTES:

- This unit was tested with shielded I/O cables on the peripheral devices. Shielded cables must be used to ensure compliance with FCC emissions limits.
- For more information on safety guidelines, regulatory compliances, EMI/EMF compatibility, accessibility, and related topics, see the **Extron Safety and Regulatory Compliance Guide** on the Extron website.

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ＶＣＣＩ－Ａ

Battery Notice

This product contains a battery. **Do not open the unit to replace the battery**. If the battery needs replacing, return the entire unit to Extron (for the correct address, see the Extron Warranty section on the last page of this guide).

CAUTION: Risk of explosion. Do not replace the battery with an incorrect type. Dispose of used batteries according to the instructions.

ATTENTION : Risque d'explosion. Ne pas remplacer la pile par le mauvais type de pile. Débarrassez-vous des piles usagées selon le mode d'emploi.

Conventions Used in this Guide

Notifications

The following notifications are used in this guide:

WARNING: Potential risk of severe injury or death.
AVERTISSEMENT : Risque potentiel de blessure grave ou de mort.

CAUTION: Risk of minor personal injury.
ATTENTION : Risque de blessure mineure.

ATTENTION:
- Risk of property damage.
- Risque de dommages matériels.

NOTE: A note draws attention to important information.

Software Commands

Commands are written in the fonts shown here:

```
^AR Merge Scene,,0p1 scene 1,1 ^B 51 ^W^C.0
[01] R 0004 00300 00400 00800 00600 [02] 35 [17] [03]
Esc X1 *X17* X20* X23* X21 CE←
```

NOTE: For commands and examples of computer or device responses used in this guide, the character "0" is the number zero and "O" is the capital letter "o."

Computer responses and directory paths that do not have variables are written in the font shown here:

```
Reply from 208.132.180.48: bytes=32 times=2ms TTL=32
C:\Program Files\Extron
```

Variables are written in slanted form as shown here:

```
ping xxx.xxx.xxx.xxx –t
SOH R Data STX Command ETB ETX
```

Selectable items, such as menu names, menu options, buttons, tabs, and field names are written in the font shown here:

From the **File** menu, select **New**.
Click the **OK** button.

Specifications Availability

Product specifications are available on the Extron website, **www.extron.com**.

Extron Glossary of Terms

A glossary of terms is available at **https://www.extron.com/technology/glossary.aspx**.

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Introduction

This section gives an overview of the Extron Quantum Ultra Series Videowall Processing Systems, describes their significant features, and provides sample application diagrams. The following topics are covered:

- **About this Guide**
- **About the Quantum Ultra Series Videowall Processors**
- **Features**
- **HyperLane Bus for Source Transfer**
- **Virtual Network Computing (VNC)**
- **Application Examples**

About this Guide

This guide discusses how to install, configure, and operate the Quantum Ultra Series, consisting of Quantum Ultra 610 and 305, the Quantum Ultra II 610 and 305, and the Quantum Ultra Connect 128 and 84 Videowall Processors. Throughout this guide, the following terms are used:

- "Quantum Ultra Series," and "processor" refer to all Quantum Ultra, Quantum Ultra II, and Quantum Ultra Connect models.
- "Quantum Ultra" refers to only the Quantum Ultra 610 and 305.
- "Quantum Ultra II" refers to only the Quantum Ultra II 610 and 305.
- "Quantum Ultra Connect" refers to only the Quantum Ultra Connect 128 or 84.

About the Quantum Ultra Series Videowall Processors

The Extron Quantum Ultra Series Videowall Processors are modular 4K video processors that support ultra-high resolutions up to 2560x1600 and 4096x2160 (4K) @ 60 Hz on inputs and outputs. They also provide customizable output resolutions, input and output image rotation, and mullion compensation for compatibility with most display technologies. USB, RS-232, and Ethernet interfaces provide direct connections for control systems.

Control methods for all models include Extron Videowall Configuration Software (VCS), which can be downloaded from the **Extron website** and provides a means of configuring videowall displays and saving window presets. Control is also available through Simple Instruction Set (SIS) commands and by using the Express Mobile Software (EMS) for Quantum Ultra and Ultra II on an iOS, Android, or Microsoft tablet device.

Quantum Ultra 610 and 305

The **Quantum Ultra 610** is a 6U, 10-slot card frame, while the **Quantum Ultra 305** is a 3U frame with 5 card slots. These models support multiple videowalls with mixed resolutions and screen orientations. They also support edge blend compensation, window border styles, and a variety of source types including picture, RSS, Text, Clock, and VNC. The optional IN SMD 100 input card decodes and displays multiple simultaneous MPEG2, Motion JPEG, and H.264 video streams at up to 60 frames per second. Each input card contains four HDMI or two LAN connectors. The output cards contain either four HDMI or four DTP connectors. Both chassis support any combination of input and output cards. Additional inputs and outputs can be added to a system with use of one or more additional chassis and expansion cards.

Quantum Ultra II 610 and 305

The Quantum Ultra II models have the same features as the Quantum Ultra 610 and 305, with the following additions:

- **HDMI 4K PLUS input and output cards** that support 4K @ 60 Hz resolution and refresh rates (the existing HDMI input and output cards continue to be supported as well)
- **500 Gbps Hyperlane video bus** (instead of the 400 Gbps Hyperlane bus of the other models)
- **IEC C20 power connectors** on the rear panel instead of the standard IEC connectors of the Quantum Ultra 610 (Quantum Ultra II 610 only)
- **1500 watt primary and redundant power supplies** with non-user replaceable internal fans (Quantum Ultra II 610 only)

Quantum Ultra Connect 128 and 84

The Quantum Ultra Connect 128 and 84 have fixed configurations. The Quantum Ultra Connect 128 has three HDMI input cards and two HDMI output cards, while the Quantum Ultra Connect 84 has two HDMI input cards and one HDMI output card. This card configuration is fixed and cannot be modified by the user. In addition, multiple chassis are not supported with these models.

Features

All Models

- **Extron Vector 4K scaling engine** — The Vector 4K scaling engine is specifically designed for critical-quality 4K imagery, with best-in-class image upscaling and downscaling.
- **Supports 4K on one, two, or four connections** — The Quantum Ultra Series provides management of 4K video as a single, dual, or quad-path signal, for flexibility when working with 4K sources, peripherals, and displays.
- **Direct control via RS-232, USB, and Ethernet** — Locally-stored configuration file allows direct connection between the control system and the Quantum Ultra Series.
- **Designed for 24/7, mission-critical environments** — The Quantum Ultra Series provides a high performance, high reliability display processing solution for monitoring valuable infrastructure and assets with maximum uptime.

- **Integrates into a diverse array of 4K environments such as lobbies, auditoriums, and simulations** — The Quantum Ultra Series is optimized for use with 4K displays, windowing large numbers of high-resolution sources across multiple displays with resolutions up to 3840x2160 or greater.
- **Full-featured control protocol** — Allows access to preset selection, window source selection, window size, position, and visibility, and many more presentation options.
- **Reliable connectivity for HDMI cables** — Extron LockIt® cable lacing brackets provide secure, reliable cable connections for Quantum HDMI inputs and outputs.
- **Powerful window management and source scaling capabilities** — Sources can be windowed, layered, and positioned anywhere on the video display, from 1/100 of the native source resolution to 1000 times the output resolution.
- **Supports portrait or landscape screen orientation**
- **Source rotation** — Source images can be rotated in 90-degree increments, providing flexible and creative presentation options for live content.
- **Mullion (bezel) compensation for flat-panel displays** — Adjustable compensation extends the displayed image "behind" screen bezels, accurately presenting sources which span multiple displays.
- **HDCP compliant** — Ensures display of content-protected media and interoperability with other HDCP-compliant devices.
- **Custom output resolutions** — Maximize compatibility with evolving display technology, non-standard displays, and LED systems.
- **JITC Certified** — Successfully completed interoperability and information assurance testing for use in government applications and other mission-critical environments.
- **Key Minder continuously verifies HDCP compliance for quick, reliable switching** — Key Minder authenticates and maintains continuous HDCP encryption between input and output devices to ensure quick and reliable switching in professional AV environments, while enabling simultaneous distribution of a single source signal to one or more displays.
- **SpeedSwitch Technology delivers virtually instantaneous switching speeds for HDCP-encrypted content**
- **User-selectable HDCP authorization** — Allows individual inputs to appear HDCP compliant or non-HDCP compliant to the connected source, which is beneficial if the source automatically encrypts all content when connected to an HDCP-compliant device. Protected material is not passed in non-HDCP mode.
- **HDCP Visual Confirmation** — When HDCP-encrypted content is transmitted to a non-HDCP compliant display, a green window with an alert message is sent to the display for immediate visual confirmation that protected content cannot be viewed on that display.
- **Picture controls for brightness and contrast, as well as horizontal and vertical sizing, positioning, and zoom**
- **Internal video test patterns for calibration and setup** — The Quantum Ultra Series offers several dynamically-generated video test patterns to facilitate proper system setup and calibration of display devices.
- **Digitally signed, secure firmware upgrades** — Firmware updates are digitally signed and transferred across an encrypted connection for secure system upgrade.
- **Event logging** — A system event log is maintained as a locally stored file with a user-definable maximum size.
- **Direct downloading of log files from the Quantum Ultra Series**

- **Password protected operating system** — Access to the The Quantum Ultra Series operating system is protected with a user-definable password.

  NOTE: The factory configured passwords for all accounts on this device have been set to the device serial number. In the event of an absolute system reset, the passwords convert to the default, which is `extron`.

- **Service maintenance alerts** — System administrators can be notified of fan or power supply failure or when recommended operating temperature is exceeded.
- **Power save mode** — Places the Quantum Ultra Series processor in a low-power state and turns off input and output cards to conserve energy when not in use.
- **Easy-to-use configuration and control software** — Videowall Configuration Software - VCS reduces configuration and preset programming time with a task-oriented, intuitive interface.
- **Integrates easily into a diverse array of 4K environments such as lobbies, auditoriums, and simulation environments** — The Quantum Ultra Series is optimized for use with 4K displays, windowing high-resolution sources across multiple displays with resolutions up to 3840x2160 or greater.
- **Advanced 4:4:4 signal processing** — 4:4:4 signal processing maintains color accuracy and fine picture detail.
- **Seamless transitions** — Seamless cut and fade through black transition effects are available when switching between presets, delivering fast, glitch-free, and professional-looking presentations for any application.
- **Solid-state storage** — Ensures long-term operation and fast boot times.
- **Write-protected operating system** — Prevents any permanent modification to the file system without administrator password verification and eliminates the possibility of viruses or unauthorized file updates from being retained across a power cycle.
- **Extron Everlast Power Supply** — Provides worldwide power compatibility, with high-demonstrated reliability and low power consumption for reduced operating cost.
- **Front panel LED indicates power supply status**
- **Auto Input Memory** — When activated, the unit automatically stores size, position, and picture settings based on the incoming signal. When the same signal is detected again, these image settings are automatically recalled from memory.
- **Custom output resolutions** — Optimizes compatibility with evolving display technology, non-standard displays, and LED systems.
- **Encrypted data connection between the Quantum Ultra Series processor and configuration PC** — SSL encryption provides a secure connection between the Quantum Ultra Series and the PC running the Extron Videowall Configuration Software.
- **Selectable HDMI to DVI Interface Format Correction** — Enables or disables InfoFrames and sets the correct color space for proper connection to HDMI and DVI displays.
- **Up to 64 video and graphic windows per output card** — The Quantum Ultra Series offers extensive windowing capabilities, with the ability to display up to 64 video, image, and clock windows from each output card.

Quantum Ultra and Ultra II 610 and 305

- **Scalable 4K @ 60 Hz videowall processing for display systems of any size** — Quantum Ultra and Ultra II support videowalls up to 36 screens in size from a single processor. Additional processors can be configured and operated as a single system to accommodate larger videowalls.
- **400 Gbps HyperLane video bus delivers real-time performance** — The Extron HyperLane video bus has a total throughput of 400 Gbps, accommodating the high-bandwidth demands of large videowalls displaying many simultaneous HD and 4K sources.
- **Modular architecture accommodates a variety of input and output arrangements** — The Quantum Ultra and Ultra II card frame can be populated with input and output cards selected to match source and display requirements for efficient system design.
- **Manage multiple videowalls with varying resolutions and screen arrangements from a single Quantum Ultra or Ultra II device** — Videowalls of varying output resolutions and orientation can all be supported with a single chassis.
- **Display locally stored images** — Image file types, including JPEG, PNG, and bitmaps can be uploaded to the Quantum Ultra or Ultra II for use as backgrounds or displayed as source windows.
- **Keying and Alpha channel support for image files** — User-definable level or color keying for image files allows transparent backgrounds for pictures, logos, and messages. Alpha channel and transparency are also supported.
- **6U, 10-slot Card Frame** — The 6U, 10-slot Quantum Ultra and Ultra II 610 card frames support any combination of input and output cards for I/O sizes from 36x4 to 4x36, or anything in-between.

  3U, 5-slot Card Frame — The 3U, 5-slot Quantum Ultra and Ultra II 305 card frames support any combination of input and output cards for I/O sizes from 16x4 to 4x16, or anything in-between.
- **Removable storage drives (Quantum Ultra and Ultra II 610)** — The Quantum Ultra and Ultra II 610 feature operating system and data storage drives that are easily removable to accommodate security management procedures.
- **Hot-swappable, dual-redundant power supplies (Quantum Ultra and Ultra II 610)** — The Quantum Ultra and Ultra II 610 feature hot swappable, dual-redundant power supplies with two AC power inputs as standard equipment for reliable operation and maximum up-time.
- **Indicator LEDs** — Front panel LEDs indicate fan and power supply status.
- **HDMI and DTP output cards support signals up to 4K @ 60 Hz** — The OUT4HDMI and OUT4DTP four-channel output cards deliver signals from 1024x768 to 2048x1080 and 1920x1200 at 60 Hz. Dual-channel mode supports two single-path 4K @ 30 Hz signals, while single-channel mode supports one dual-path or quad- path 4K @ 60 Hz signal.
- **Decodes and displays multiple streamed VNC sources** — The Quantum Ultra Series can display streamed content sourced from PCs running a Virtual Network Computing – VNC server application. Multiple VNC streams can be presented simultaneously on the videowall for collaborative desktop sharing from local or remote PCs.

- **User-definable window borders and text labels enhance presentation and simplify source identification** — Custom color borders with rounded corners, drop shadows, and transparency can be applied to any window type. A border can be set to flash to draw attention to the source window. Border titles and overlay text can be applied to a window and dynamically updated from the control system to indicate a change in the source's name, type, status, or classification level.
- **Output overlap for edge-blended applications** — Output overlap feature supports edge-blended applications by providing redundant image data for the projection system's blended regions.
- **Supports direct decoding of H.264 streams for presentation on the videowall (IN SMD 100 card)** — Eliminates the need for external decoders, reducing system cost and complexity.
- **Compatible with common industry streaming formats**, **including H.264, MPEG-2, MPEG-4, and Motion JPEG (IN SMD 100 card).**
- **Decodes a wide range of streamed resolutions up to 1080p/60 (IN SMD 100 card)** — Users can opt to decode more streams at lower resolutions or fewer streams at higher resolutions, allowing efficient use of network and processing bandwidth.
- **Supports the video sections of ONVIF Profile S (IN SMD 100 card)** — Compatible with a wide variety of H.264 encoders, IP cameras, media encoders, and other streaming devices that also support ONVIF Profile S.
- **Independently-configurable network connections (IN SMD 100 card)** — This allows decoding resources to be shared within the same subnet or split across multiple subnets, providing increased flexibility when designing complex streaming networks.
- **Transmits up to four outputs at distances up to 330 feet (100 meters) over a shielded CATx cable (OUT4DTP card)** — Reduces system complexity when output extension is required for driving videowall displays up to 330' (100 m) away from the Quantum Ultra Series processor.
- **Quantum Expansion IN and Quantum Expansion OUT cards** link multiple Quantum Ultra Series processors together to create a single large system.
- **Selectable DTP, XTP matrix, and HDBaseT output modes (OUT4DTP card)** — Allows selection of the type of twisted pair technology best suited for the application.
- **Power insertion enables remote powering of DTP receivers (OUT4DTP card)** — 12 V DC insertion at the OUT4DTP output card enables the DTP receivers to be powered over the twisted pair connections, eliminating the need for separate power supplies at the remote units. Requires one PS 124 per OUT4DTP card.
- **Bidirectional RS-232 and IR insertion for AV device control (OUT4DTP card)** — Bidirectional RS 232 control and IR signals can be transmitted alongside the video signal over DTP connections, allowing the remote device to be controlled without the need for additional cabling. Bidirectional control insertion eliminates the need for control system wiring to remote devices.
- **RS-232 insertion from the Ethernet control port (OUT4DTP card)** — System level device control to all remote locations via the Quantum Ultra control port, providing comprehensive control of endpoints and attached devices without needing additional equipment.

Quantum Ultra II 610 and 305 Only

- **500 Gbps HyperLane video bus delivers real-time performance for resolutions up to 8K** — Provides a total throughput of 500 Gbps, accommodating the high-bandwidth demands of large videowalls displaying many simultaneous 4K sources.
- **HDMI 4K PLUS cards support 4K/60 on each connection** — Offers management of 4K/60 video as a single signal for flexibility when working with 4K/60 sources, peripherals, and displays.
- **Supports multi-path 8K/60 signals** — The IN4HDMI 4K PLUS card supports 8K @ 60 Hz video as a four channel, multi-path signal. One 8K @ 60 Hz source is supported per card.
- **HDMI embedded audio switching** — Embedded audio can be switched between the Quantum IN4HDMI 4K PLUS input cards and Quantum OUT4HDMI 4K PLUS output cards for assignment to each canvas.
- **8K-ready design** ensures compatibility with existing as well as next generation input and output cards
- **HDCP 2.3 compliant**

Quantum Ultra Connect 128 and 84

- **Cost effective 4K/60 HDMI videowall processors for videowalls with up to eight screens**
- **400 Gbps HyperLane video bus delivers real-time performance** — The Extron HyperLane video bus has a total throughput of 400 Gbps, easily accommodating the high-bandwidth demands of large videowalls displaying many simultaneous HD and 4K sources.
- **3U, 5-slot card frame**
- **IN4HDMI input card supports signals up to 4K/60** — The IN4HDMI four-channel input card accepts four signals from 1024x768 to 2048x1080 and 1920x1200 at 60 Hz. Dual-channel mode supports two single-path 4K/30 signals, while single-channel mode supports one dual-path or quad-path 4K/60 signal. When used with HDCP-compliant displays, HDCP 1.4-encrypted sources can be displayed on the videowall.
- **OUT4HDMI output cards support signals up to 4K/60** — The OUT4HDMI four-channel output cards delivers signals from 1024x768 to 2048x1080 and 1920x1200 at 60 Hz. Dual-channel mode supports two single-path 4K/30 signals, while single-channel mode supports one dual-path or quad-path 4K/60 signal.
- **Up to 64 video and graphic windows per output card** — Quantum Ultra Connect offers extensive windowing capabilities, with the ability to display up to 64 video windows from each output card.

HyperLane Bus for Source Transfer

The HyperLane bus carries video source data between the input and output cards. It allows the passage of up to 400 Gbps (500 Gbps for the Quantum Ultra II models) of video information, which translates to a maximum of 96 native 1080p inputs at 60 Hz, or 24 4K sources at 60 Hz, all at 30 bits per pixel.

The HyperLane bus delivers data in real time. This means that it is able to display a source at its full temporal resolution, maintaining the same scan rate as the original source without dropping any fields or frames. The HyperLane bus remains operational if an operating system crash occurs, allowing crucial source content to be maintained on the target display.

The following table gives a breakdown of common resolutions and the number of sources at that native resolution that can be passed down a 500 Gbps HyperLane bus:

Width	Height	Frame Rate	Bandwidth (Gbps)	Number of Native Sources
1024	768	60	1.42	318
1280	720	60	1.66	272
1920	1080	60	3.73	120
1920	1200	60	4.15	108
1600	1200	60	3.46	130
2560	1600	60	7.37	61
3840	2160	30	7.46	60
4096	2160	30	7.96	56
3840	2160	60	14.93	30
4096	2160	60	15.93	28
4096	2400	60	17.69	25

NOTE: Bandwidth values do not include overhead data required for bus management. The bandwidth per signal is slightly higher.

Virtual Network Computing (VNC)

The Quantum Ultra Series can decode multiple VNC streams from servers loaded on remote desktops. The VNC streams can originate on the same network used for control or on a separate network and accessed using the second LAN port available on the Quantum Ultra Series.

Desktop resolutions up to 3840x2160 are supported, but the refresh speed of the desktop content depends on the amount of content moving or changing on the remote desktop. The size of the VNC window on the Quantum Ultra Series output and the number of VNC sources simultaneously displayed also influence the refresh rate of the content.

The following table shows expected frame rates of a 1920x1080 desktop at various sizes, quantity, and amount of content in motion:

VNC Desktop	Window Size	Number of Windows	Amount of Motion	Average Frame Rate (ftbs)	Network Usage (Mbps)
1920x1080	3840x2160	1	Full screen	4	18
	3840x2160	1	1/9 desktop	15	18
	1920x1080	1	Full screen	4	18
	1920x1080	1	1/9 desktop	20	22
	1920x1080	16	Full screen	1	100
	1920x1080	16	1/9 desktop	10	100
	960x540	64	1/9 desktop	1	120

Application Examples

The following application diagrams show examples of how the Quantum Ultra 610 and 305, Quantum Ultra II 610 and the Quantum Ultra Connect 128 can be connected.

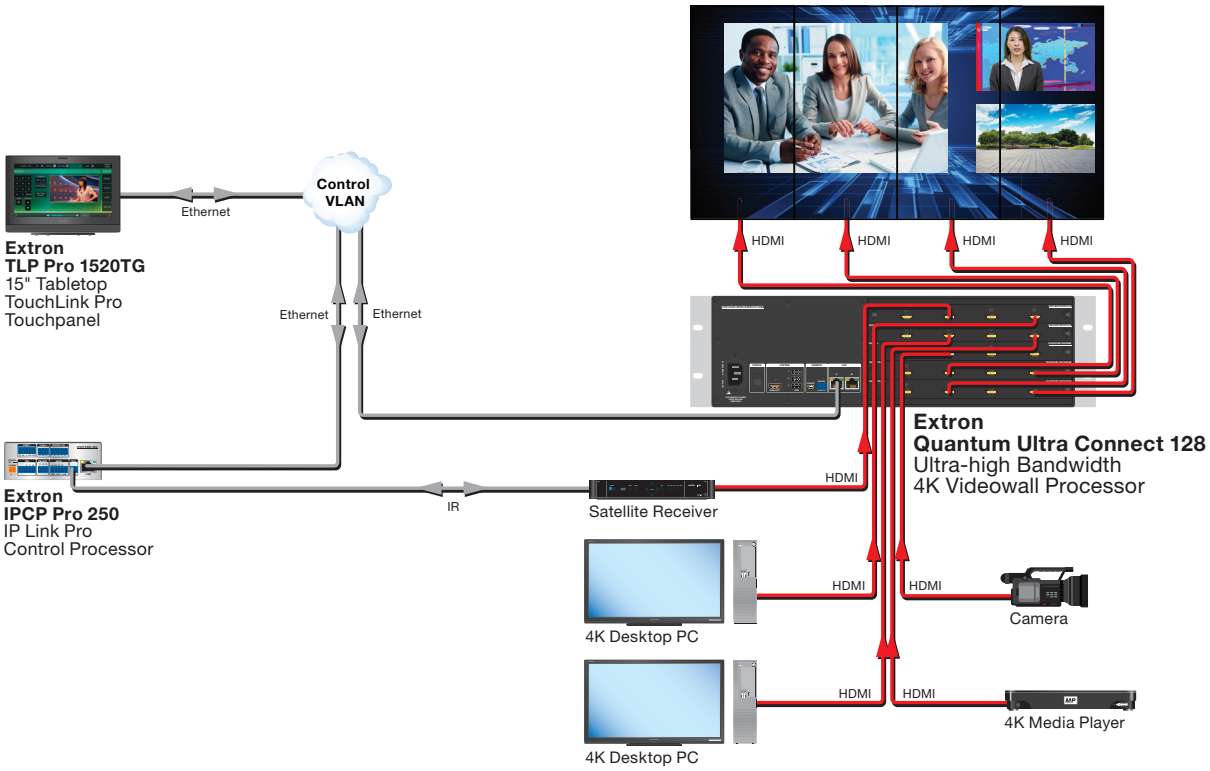


Figure 1. Quantum Ultra Connect 128 Application

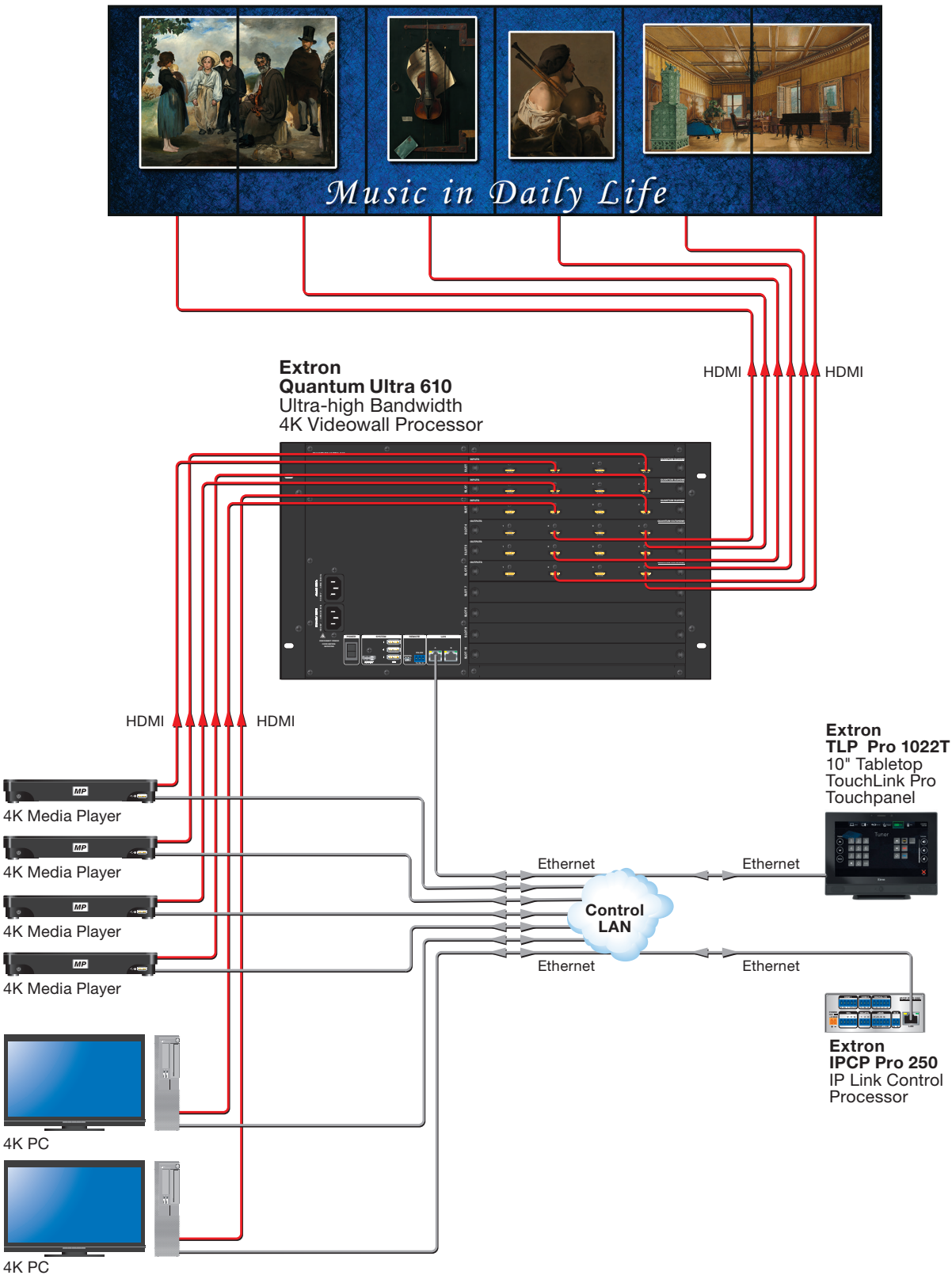


Figure 2. Connection Diagram for a Quantum Ultra 610, HDMI Only

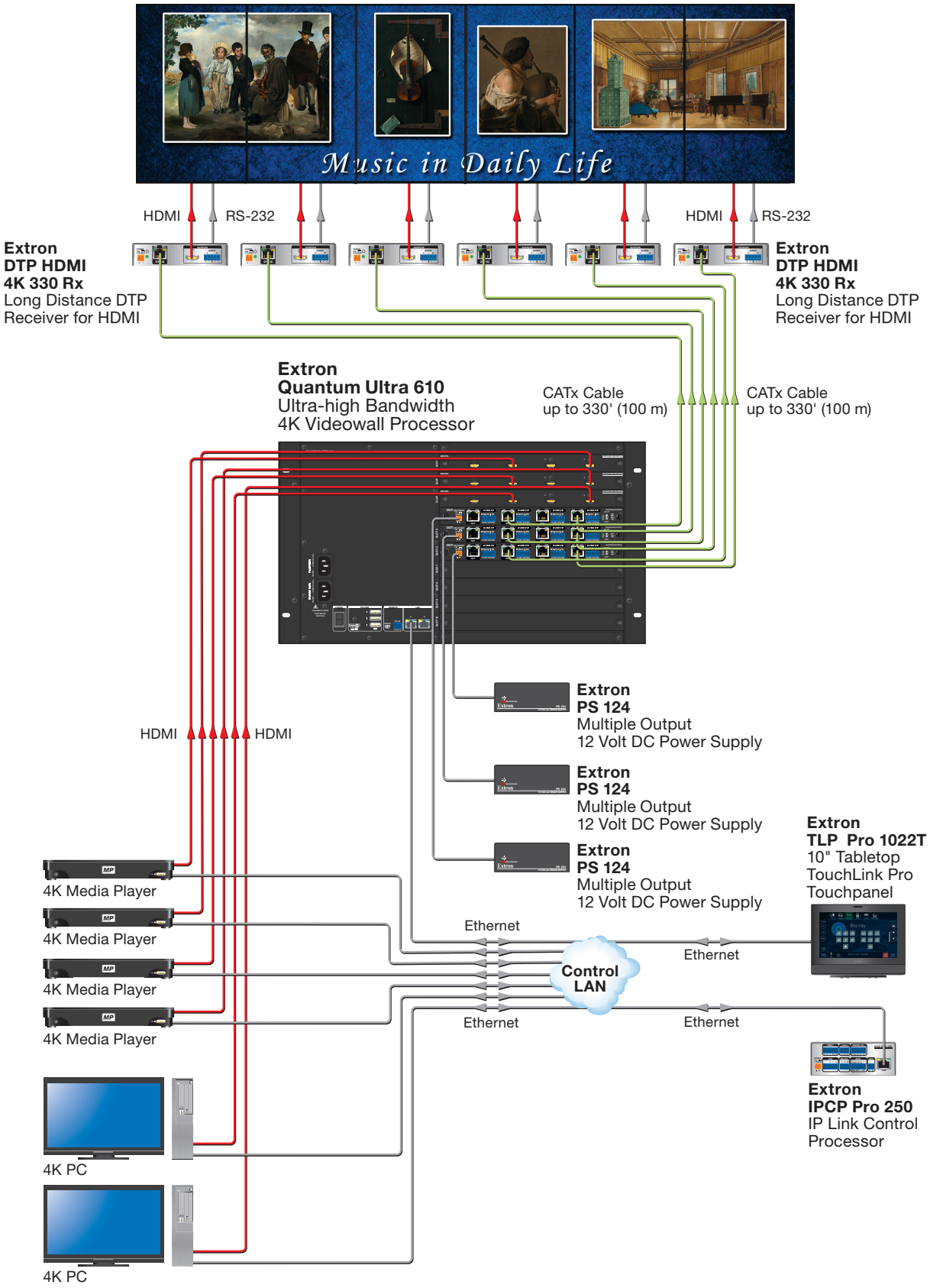


Figure 3. Quantum Ultra 610 Application Diagram with DTP Outputs

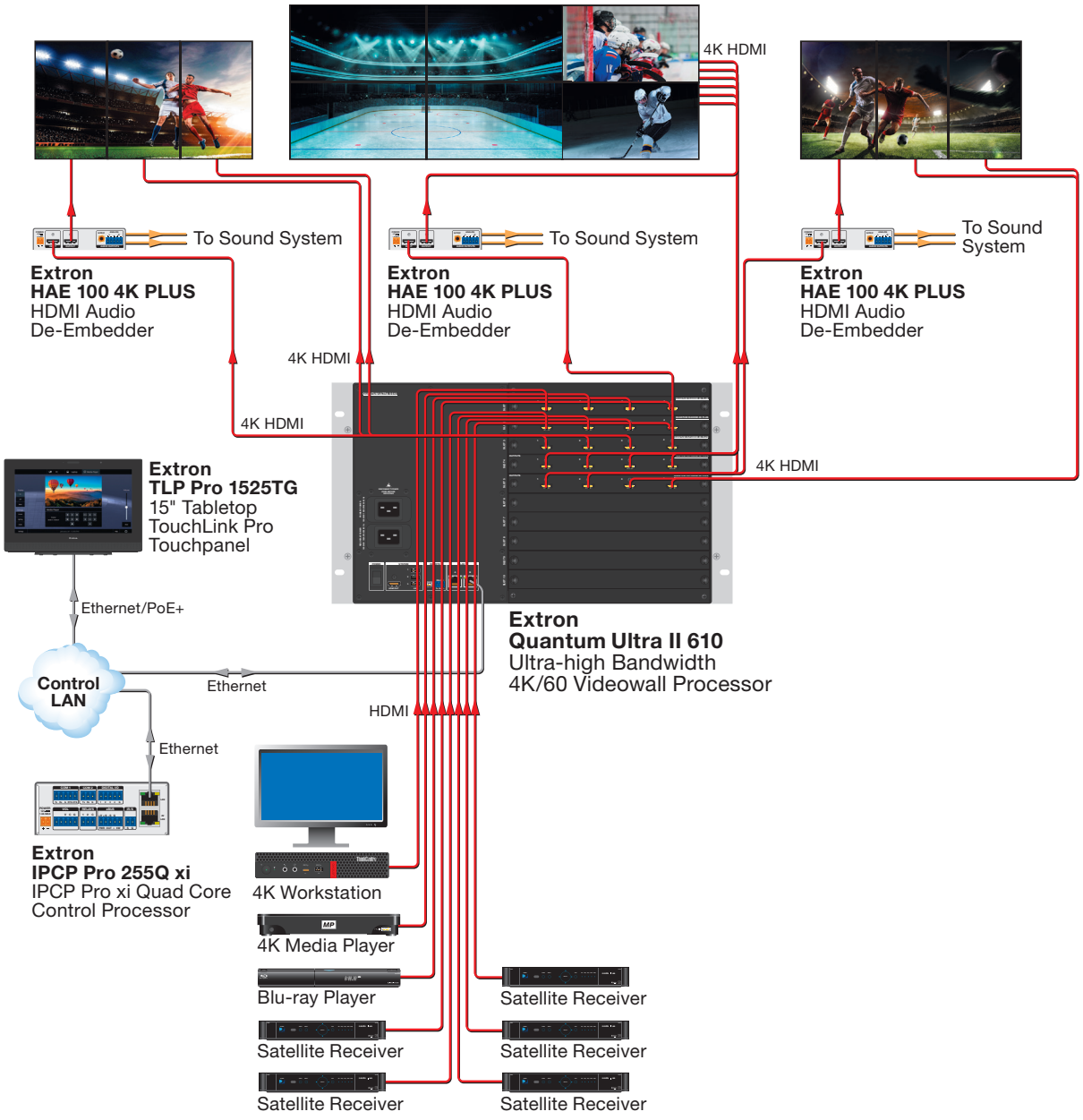


Figure 4. **Quantum Ultra II 610 Application Diagram with HD 4K PLUS Inputs and Outputs**

Installation and Configuration

This section provides the steps to install the Quantum Ultra Series processor. It also describes the rear panel components and provides instructions for cabling.

- **Installation Steps**
- **Front Panel Features**
- **Rear Panel Features**
- **Input and Output Cards**
- **Adjusting for Edge Blending and Mullion Compensation**
- **Connecting to a Network**
- **RS-232 Insertion - DTP Outputs Only**
- **Expansion Cards**

Installation Steps

The Quantum Ultra Series processor can be mounted in a 19-inch equipment rack or placed on furniture. To install and set up the processor for a videowall, follow the steps below (see **Application Examples** starting on page 9).

NOTE: To install a Quantum Ultra Series expansion system, see **Connecting the Expansion Cards** on page 48.

1. Disconnect power from the processor and all other equipment in the system.
2. If desired, rack mount the unit (see **Mounting the Quantum Ultra Series** on page 114).
3. Connect HDMI sources and LAN connections to the installed input cards.

   Connect HDMI displays, DTP or HDBaseT receivers, or an XTP matrix switcher to the connectors on the installed output cards as appropriate.
4. Secure each HDMI connector with a provided LockIt bracket (see **HDMI LockIt Cable Lacing Brackets** on page 19).

   NOTE: With an adapters DVI is available on any HDMI port.
5. Connect a control device or computer for remote control to:
   a. The rear panel RJ-45 LAN A or LAN B jack to enable configuration and control of the processor via Simple Instruction Set (SIS) commands (see **SIS Commands** starting on page 62) or VCS (LAN A recommended) (see the *VCS Help File*), or for streaming a VNC source (LAN B recommended).
   b. (Optional) The rear panel USB mini-B Config connector to enable control via VCS or SIS commands.
   c. (Optional) The rear panel 3-pole captive screw RS-232 connector to enable serial control via SIS commands.

6. Connect AC power to the IEC connectors of the Quantum Ultra Series primary and redundant (optional, 610 models only) power supplies.

   NOTE: Temperature controlled fans run at 100% as a failsafe if only one power supply is operational.

7. Power on the processor and all connected devices.
8. Download and install VCS on your computer (see **Videowall Configuration Software (VCS) Program** on page 81).
9. The default IP addresses of the Quantum Ultra Series chassis are:
   - **LAN A:** 192.168.254.254
   - **LAN B:** 192.168.1.254

   Set a new IP address for the processor using any of the following:
   - **VCS program** — The Videowall Configuration Software for the Quantum Ultra Series can be downloaded from the Extron website (see **Downloading VCS from the Website** on page 81). Run this program on a computer that is connected to the same network as the Quantum Ultra Series device to assign an IP address to the processor (see the *VCS Help File* for instructions).

     NOTE: A gateway IP address is required on the PC running VCS for the Quantum Ultra Series to be detected. The gateway IP address does not need to be valid or in the same subnet for the detection to work.

   - **Internal operating system** — The Quantum Ultra Series processor is a host device with an embedded Windows operating system. To interact with the operating system to change settings, attach peripheral USB devices, such as a keyboard, mouse, and flash drive, to System USB ports 1, 2, and 3 on the rear panel. Attach an HDMI monitor to the HDMI Out port beside the System ports to view the settings.
   - **SIS commands** — Using a host communication software program such as the Extron DataViewer on your computer, enter the appropriate SIS command to set an IP address or enable DHCP (see **IP Setup** on page 78).
10. Configure sources, displays, and presets for your videowall system using VCS (see the *VCS Help File*).

Front Panel Features

Quantum Ultra and Ultra II 305, Connect 128, and Connect 84

The Quantum Ultra Connect 128, Quantum Ultra Connect 84, and Quantum Ultra and Ultra II 305 (figure 5) front panels are identical except for the product name in the lower-right corner.



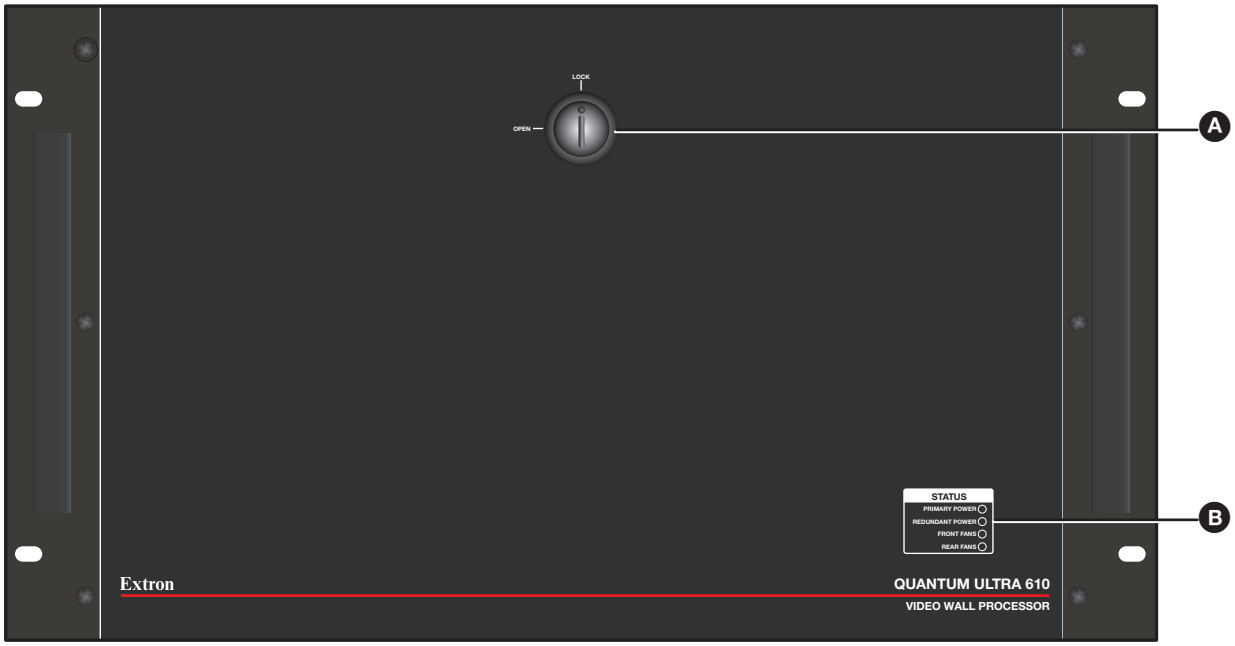
Figure 5. Quantum Ultra 305 and Ultra II 305 Front Panel

A Indicator LED — This tri-color LED lights to indicate the following:

- **Green, blinking** — The processor is booting.
- **Green, steady** — The unit is ready for operation.
- **Amber, steady** — The system is in power saving mode.
- **Red, steady** — A fan has failed.

Quantum Ultra and Ultra II 610 Front Panel Door

The front panel of the Quantum Ultra and Ultra II 610 has a door that opens to provide access to user-replaceable parts. This front panel door covers the power supplies, fans, and System Board Computer (SBC) assembly.



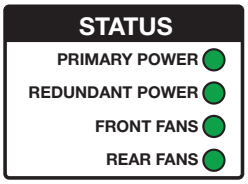
A Front panel lock **B Status LEDs**

Figure 6. Quantum Ultra and Ultra II 610 Front Panel Door

The Quantum Ultra and Ultra II 610 front panel door contains the following:

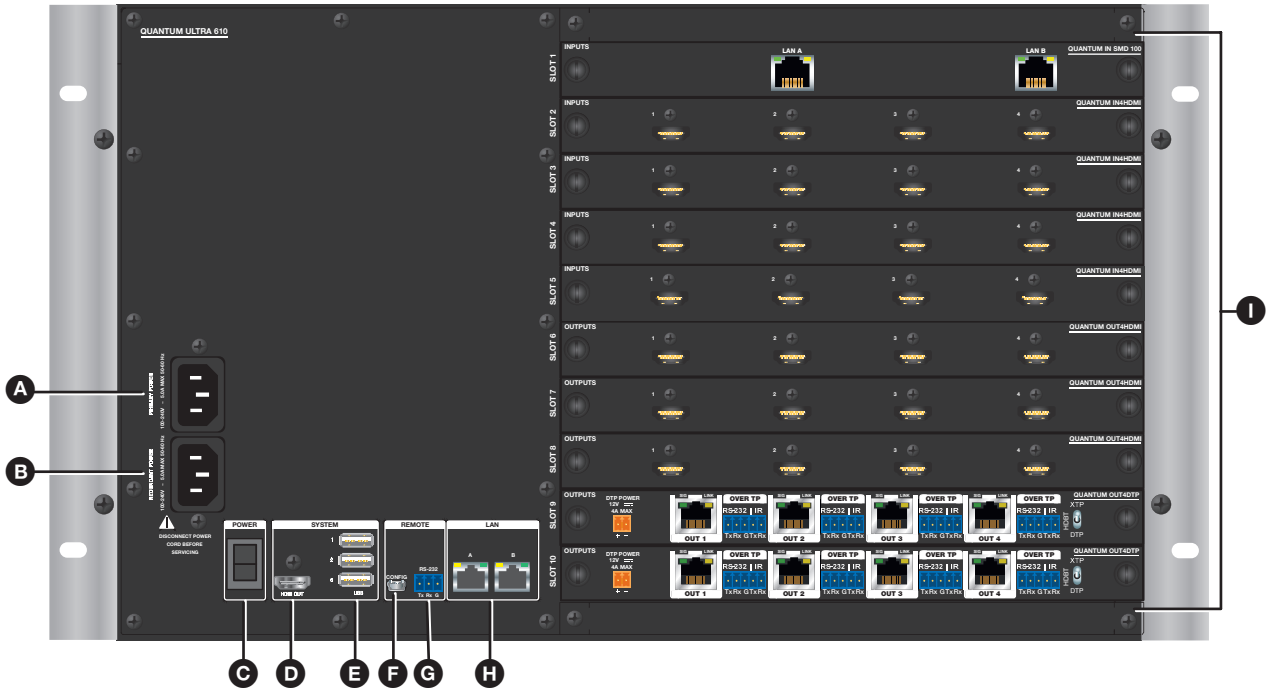
Ⓐ **Front panel lock** — This lock keeps the front panel door closed, protecting the user-replaceable parts (see **Accessing the Quantum Ultra and Ultra II 610 Front Panel** on page 1 to unlock the door).

Ⓑ **Status LEDs** — These LEDs indicate the condition of the power supplies, SBC, and fans. They light green while the fans and power supplies are functioning properly. If an item ceases to perform, its LED lights red, indicating the item needs to be replaced.



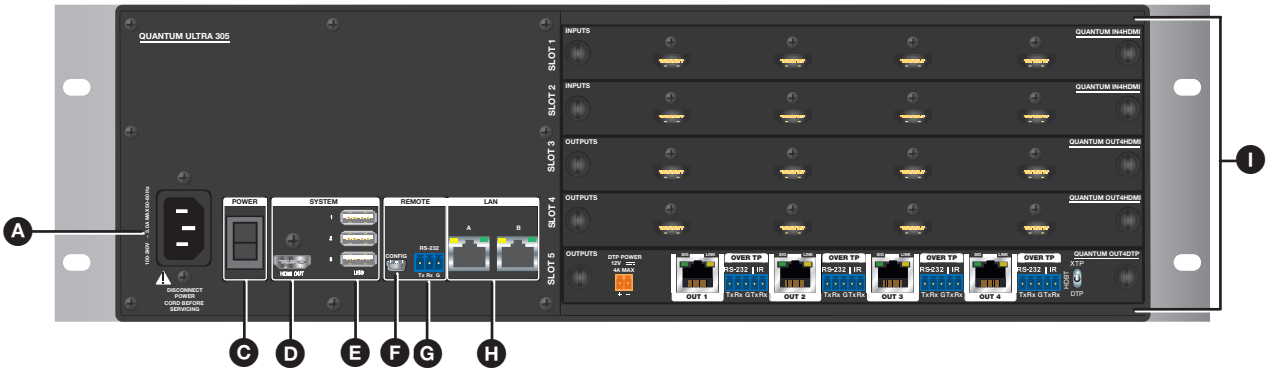
- **Primary Power** — Provides status for the primary (top) power supply.
- **Redundant Power** — Provides status for the redundant (bottom) power supply.
- **Front Fans** —
  - **Quantum Ultra** — Provides status for the power supply (front and largest) fan, which cools the two power supplies.
  - **Quantum Ultra II** — Provides status for the SBC fan.
- **Rear Fans** — Provides status for the six rear fans. If any of these fans fails, the LED lights red.

Rear Panel Features



Ⓐ **PRIMARY POWER connector**
Ⓑ **REDUNDANT POWER connector**
Ⓒ **POWER switch**
Ⓓ **HDMI OUT system output connector**
Ⓔ **USB system connectors**
Ⓕ **USB CONFIG control connector**
Ⓖ **RS-232 control connector**
Ⓗ **LAN connectors A and B**
Ⓘ **Input and output card slots**

Figure 7. Quantum Ultra and Ultra II 610 Rear Panel



A **PRIMARY AC power connector**
C **POWER switch**
D **HDMI OUT system output port**
E **USB system connectors**
F **USB CONFIG control connector**
G **RS-232 control connector**
H **LAN connectors A and B**
I **Input and output card slots**

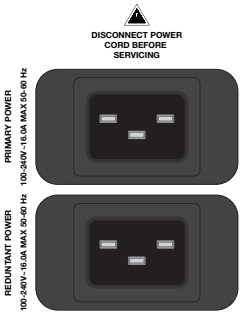
Figure 8. Quantum Ultra and Ultra II 305, Quantum Ultra Connect 128, and Quantum Ultra Connect 84 Rear Panel

A **PRIMARY POWER connector** — Connect AC power to this IEC connector for the primary power supply.

B **REDUNDANT POWER connector (Quantum Ultra and Ultra II 610 only)** — (Optional) Connect a second AC power source to this IEC connector for the secondary power supply to provide uninterrupted operation in the event of failure of the primary supply.

NOTES:

- The Quantum Ultra II 610 model has IEC C20 power connectors (shown at right), while the Quantum Ultra and Quantum Ultra II 305 models have standard US IEC connectors. The Quantum Ultra II 610 requires an IEC C19 power cord to connect AC power.
- Temperature controlled fans run at 100% as a failsafe if only one power supply is operational.



For Quantum Ultra II 610 only:

- **North America** — Connect the equipment to a 100-240 VAC, 50-60 Hz, 20 A protected power source using a power supply cord with a C19 coupler and either a NEMA 5-20 plug (125 V) or NEMA 6-20 plug (250 V).
- **Other regions** — Connect the equipment to a 200-240 VAC, 50-60 Hz power source using a power supply cord with a C19 coupler and a plug configuration of 7 A minimum.

C **POWER switch** — Press this momentary rocker switch to power the unit (both power supplies) off and on.

- If the unit is **off**, momentarily pressing this switch powers it on.
- If the unit is **on**, pressing and holding this switch for approximately 5 seconds powers it down.

NOTE: If you are logged into the Quantum Ultra Series device operating system, a momentary press of this switch powers off the device.

D **HDMI OUT system output connector** — (Optional) Connect an HDMI monitor to this female HDMI connector to view activity and interactions with the embedded operating system.

E **USB system connectors** — (Optional) Connect human interface devices (HID), such as a keyboard or mouse, or a flash drive to one or more of these three USB A connectors to interact with the embedded operating system.

F **USB CONFIG control connector** — Connect a computer to this USB connector to enable control of the Quantum Ultra Series device via SIS commands and VCS.

G **RS-232 control connector** — Connect a control system or computer to this 3-pole 3.5 mm captive screw connector to enable control of the Quantum Ultra Series device via SIS commands. RS-232 protocol for this port is 9600 baud, 1 stop bit, no parity, 8 data bits, and no flow control.

H **LAN connectors A and B** — Connect one or both of these RJ-45 Ethernet connectors to a network to access any of the following:

- A computer with VCS installed, to set up the videowall
- A control device such as an Extron IP Link Pro or IPCP Pro for AV control of the Quantum Ultra Series processor
- A network with Virtual Network Computing (VNC) servers to stream desktops to the Quantum Ultra Series processor
- Process SIS commands

NOTE: For expansion systems, the LAN A ports of all chassis in the system must be connected to the same network. If desired, LAN B ports of any of the chassis can be connected to a separate network for VNC or RSS sources.

I **Input and output card slots** — Each of these slots supports either an input card or an output card, depending on the configuration (at least one input and output card must be installed).

NOTE: The Quantum Ultra Connect 84 has two HDMI input cards and one HDMI output card, while the Connect 128 has three HDMI input and two HDMI output cards. These card configurations are fixed and cannot be modified by the user.

Input cards:

- **HDMI (IN4HDMI or IN4HDMI 4K PLUS)** — Each card has four HDMI connectors, so that up to four HDMI sources can be connected to it.
- **IN SMD 100** — Each card has two LAN connectors, each of which can be connected to a network to enable decoding and displaying of multiple streams (Quantum Ultra and Ultra II 610 and 305 only).
- **Expansion In** — Each card has three 12-fiber push-on (MPO) connectors to which another chassis in an expansion system can be connected via three MPO cables (Quantum Ultra 610 and 305 only).

Output cards:

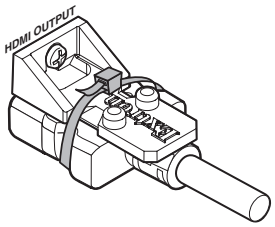
- **HDMI (IN4HDMI or IN4HDMI 4K PLUS)** — Each card has four HDMI connectors, so that up to four HDMI displays can be connected to it.
- **DTP (OUT4DTP)** — Each card has four DTP connectors to which up to four DTP receivers can be connected.
- **Expansion Out** — Each card has three 12-fiber push-on (MPO) connectors to which another chassis in an expansion system can be connected via three MPO cables (Quantum Ultra 610 and 305 only).

(For detailed information about these cards, see **Inputs** on page 21, **Outputs** on page 31, and **Expansion Cards** on page 46).

NOTE: The recommended cable type for the HDMI input and output connections is single link, high-speed, HDMI video cable with a maximum length of 25 feet (7.6 meters). Dual link signals are not supported. To connect DVI sources or displays to an HDMI connector, use a DVI-to-HDMI adapter.

HDMI LockIt Cable Lacing Brackets

Four Extron LockIt cable lacing brackets are provided with each HDMI card for the Quantum Ultra Series (additional ones can be ordered). These brackets enable you to secure HDMI input and output device cables to the HDMI connectors on the cards to prevent intermittent or complete signal loss due to a loose cable connection.



Top Mounted

Above each connector is a mounting screw, which you can use to attach the lacing bracket to the Quantum Ultra Series input and output cards (see the provided *LockIt HDMI Lacing Bracket Installation Guide* card for information on attaching the bracket).

Input and Output Cards

The Quantum Ultra and Ultra II 610 chassis contain 10 slots for input and output cards, while the Quantum Ultra 305, Quantum Ultra Connect 128, and Quantum Ultra Connect 84 each have five.

- **Quantum Ultra and Ultra II 610 and 305** — Each card contains either:
  - Four HDMI or HDMI 4K PLUS input connectors
  - Four HDMI or HDMI 4K PLUS output connectors
  - Four DTP RJ-45 output connectors
  - Two RJ-45 input connectors
- **Quantum Ultra Connect models** — These models are preconfigured as follows, and the card configuration cannot be altered by the user:
  - **Quantum Ultra Connect 128** — Three HDMI input cards and two HDMI output cards
  - **Quantum Ultra Connect 84** — Two HDMI input cards and one HDMI output card.

On the Quantum Ultra and Ultra II 610 and 305, multiple Quantum Ultra Series chassis can be added to the same project to create very large display arrays. You can remove, replace, and rearrange the cards in the chassis if desired (see **Replacing Input and Output Cards** on page 94 for the procedure). To order additional cards, contact your Extron representative.

NOTES:

- Maximum input capacity is based on an input-output card configuration with one slot occupied by an output card.
- Maximum output capacity is based on an input-output card configuration with one slot occupied by an input card.

Card Locations — Quantum Ultra and Ultra II 610 and 305

When the Quantum Ultra Series processor is assembled at the factory, the cards are installed according to the following rules:

- All the input cards are installed in slots **above** all the output cards in the chassis.
- Each card slot can contain either an input or an output card, depending on the configuration that was ordered (at least one input and one output card must be installed). However, because all the input cards must be installed together **above** the output cards in the chassis, slot 1 never contains an output card and slot 10 (610 models) or slot 5 (305 models) never contains an input card.
- All input cards of the same type (HDMI, HDMI 4K PLUS, IN SMD 100, or Expansion In) are installed together, as are all output cards of the same type (HDMI, HDMI 4K PLUS, DTP, or Expansion Out).

If installing cards yourself

Do not intersperse:

- Input cards with output cards
- **Input cards of different types** — HDMI input cards, HDMI 4K PLUS input cards, and IN SMD 100 cards with each other, or
- **Output cards of different types** — HDMI output cards, HDMI 4K PLUS output cards, and DTP cards

Install the cards in the chassis in the following order, top to bottom:

1. **Expansion IN** (not available on Quantum Ultra II)
2. **IN SMD 100**
3. **IN4HDMI**
4. **IN4HDMI 4K PLUS** (available on Quantum Ultra II models only)
5. **OUT4HDMI**
6. **OUT4DTP**
7. **OUT4HDMI 4K PLUS** (available on Quantum Ultra II models only)
8. **Expansion OUT** (not available on Quantum Ultra II)

NOTES:

- **Do not** leave empty slots between cards (input or output) in the chassis. This prevents the unit from functioning. Card slots that remain empty must be at the bottom of the card slots section.
- The expansion output and input cards have special rules for placement in card slots (see **Expansion card locations** on page 47 for more information on the location of these cards).

Inputs

The input cards available for the Quantum Ultra Series include:

- **HDMI (IN4HDMI)** — Each card contains four HDMI connectors.
- **HDMI 4K PLUS (IN4HDMI 4K PLUS)** — (Quantum Ultra II models only) Each card contains four HDMI connectors that support resolutions up to 4096x2160 @ 60 Hz. They also pass through audio signals that are embedded on the HDMI output.
- **IP (IN SMD 100)** — Each card contains two LAN connectors.

Source down-scaling

Each input card has an on-board scaler that can down-scale the video sources in size to 1/32 of the original size (horizontally, vertically, or both). Production of up to 16 instances of an input is supported, up to the total bandwidth of 18 Gbps (4K @ 60 Hz) or 144 Gbps (8 x 4K @ 60 Hz) for 4K PLUS cards.

Width	Height	Frame Rate	Bandwidth (Gbps)	Unique Instances on IN4HDMI and IN SMD 100 Cards	Unique Instances on IN4HDMI 4K PLUS card
480	270	60	0.233	16	16
640	360	60	0.415	16	16
960	540	60	0.933	16	16
1280	720	60	1.659	10	16
1920	1080	60	3.732	4	16
2560	1600	60	7.373	2	16
3840	2160	30	7.465	2	16
3840	2160	60	14.930	1	8

Should more instances be required for a preset layout, the scaler produces the required image sizes but reduces the frame rate as needed.

Downscaling examples

For simplicity, the example in the diagram in figure 9 assumes that each screen in the target display has the same resolution as the source.

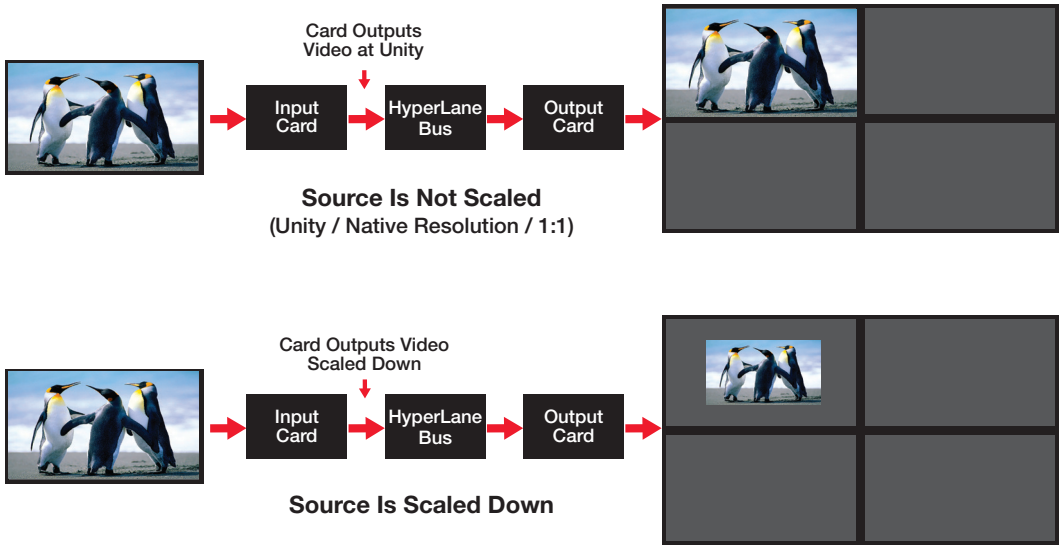


Figure 9. Example of a Source Displayed Full-Sized and Down-scaled

Up-scaling (magnification) is achieved by a scaler on the output card (see **Source up-scaling** on page 37).

Maximum instances of a source per input card — IN4HDMI and IN SMD 100

The following diagrams give examples of the maximum number of instances of a single source that can be provided by one input card, at different resolutions and refresh rates.

Example 1: Four 1080p inputs at 60 Hz applied to one input card

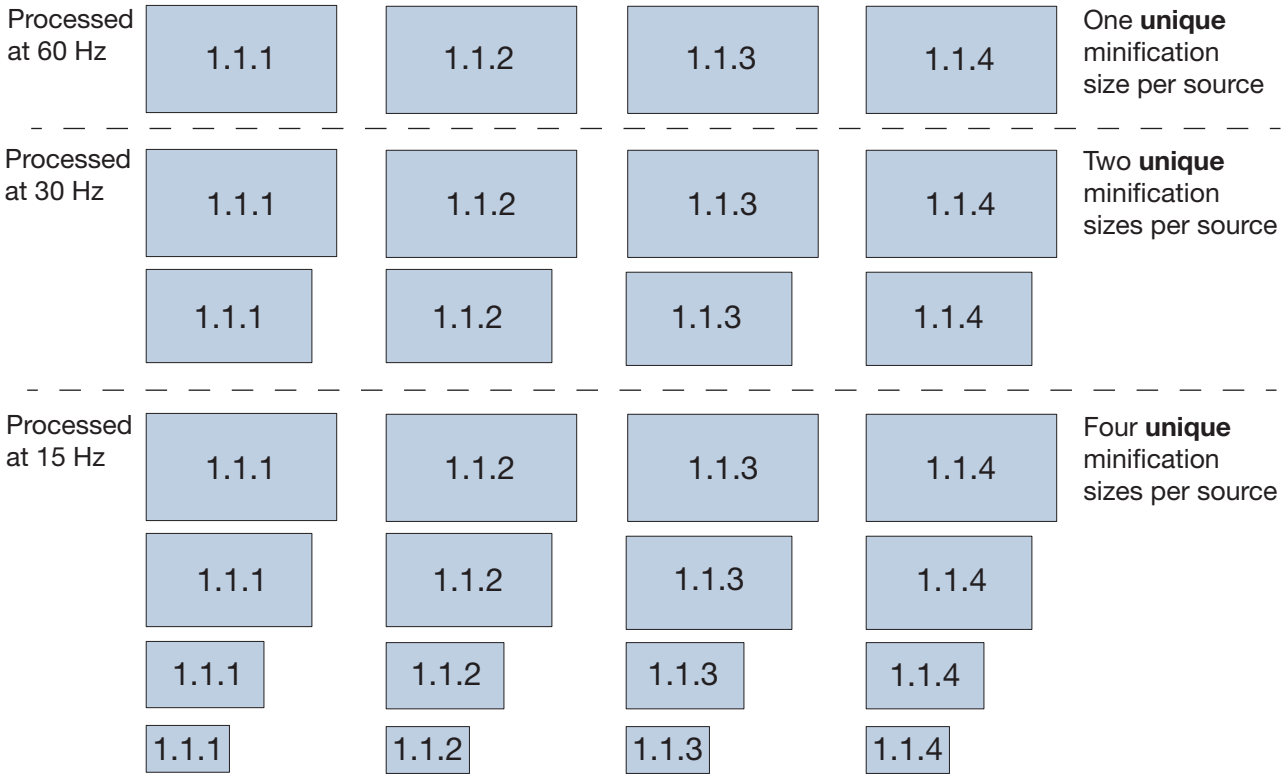


Figure 10. Example of Four Inputs at 1080p, 60 Hz, on One Input Card (IN4HDMI or IN SMD 100)

Example 2: One 1080p input at 60 Hz applied to one input card

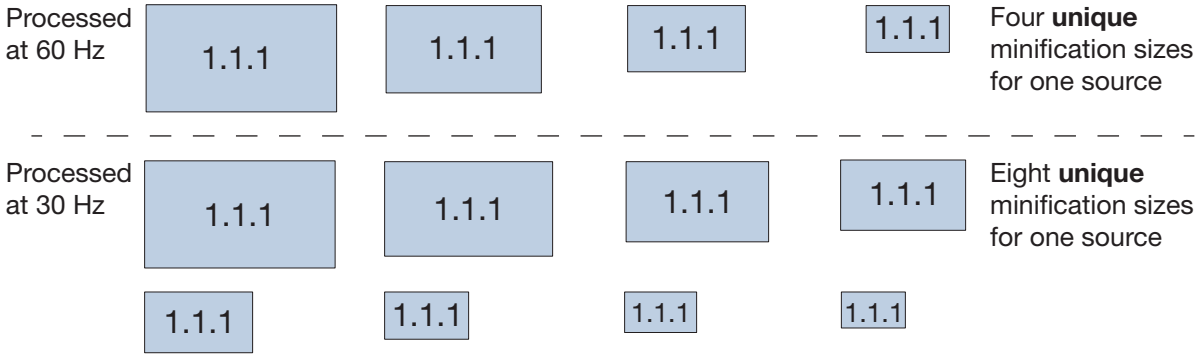


Figure 11. Example of One Input at 1080p, 60 Hz, on One Input Card

Example 3: Two 4K inputs at 30 Hz applied to one input card

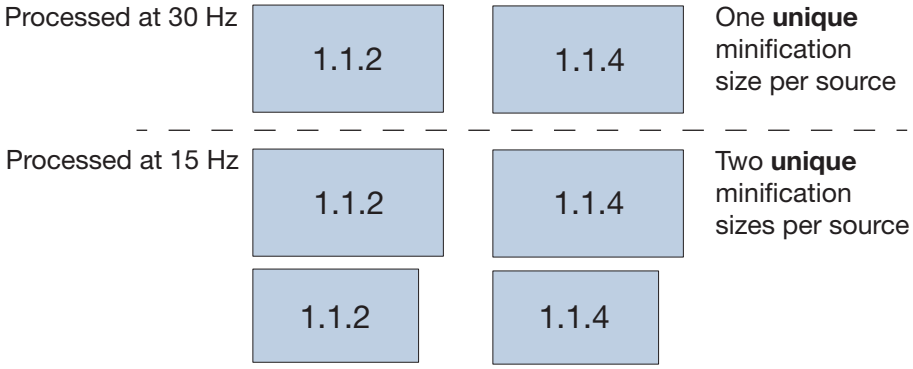


Figure 12. Example of Two Inputs at 4K, 30 Hz, on One Input Card

Example 4: One 4K input at 30 Hz applied to one input card

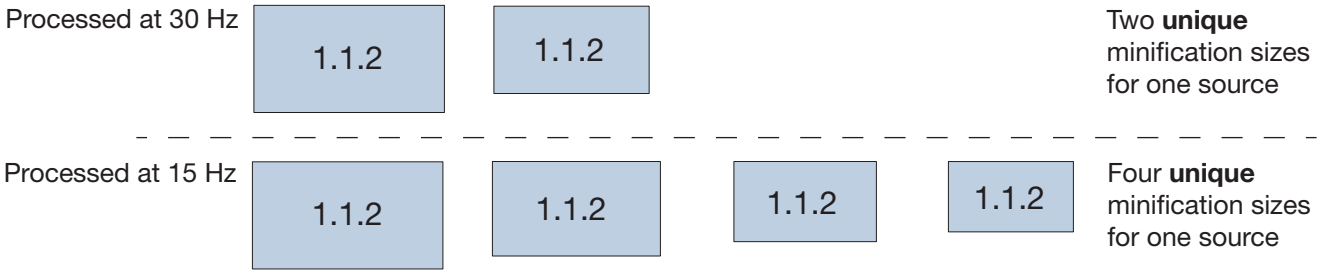


Figure 13. Example of One 4K Input at 4K, 30 Hz, on One Input Card

Example 5: One 4K input at 60 Hz, column or quad format, applied to one input card

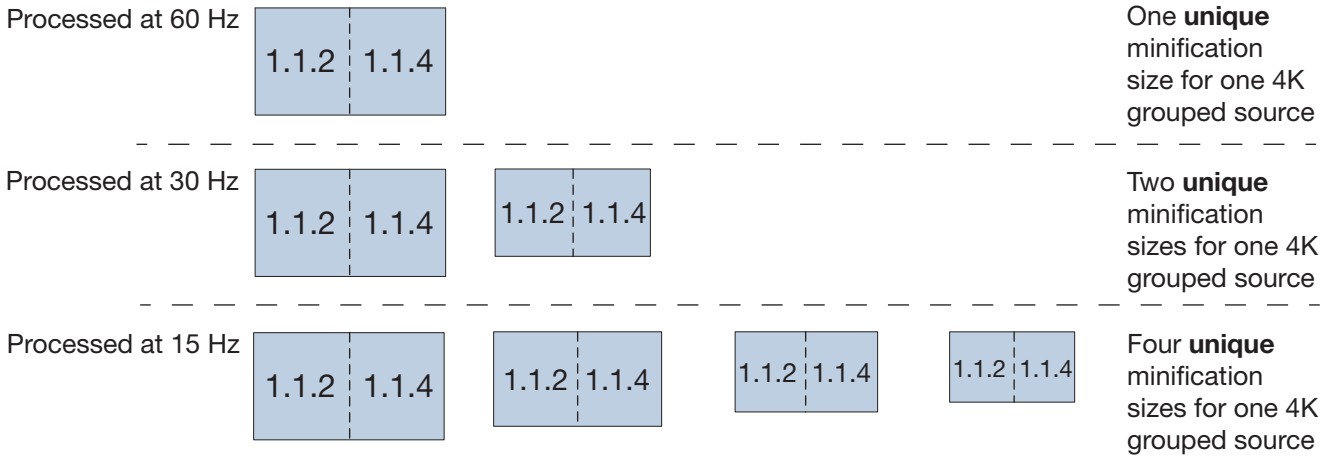


Figure 14. Example of One 4K Input, 60 Hz, Column or Quad Format, on One Input Card

Maximum instances of a source per input card — IN4HDMI 4K PLUS

The following examples show the maximum number of instances of a single source that can be provided by one HDMI 4K PLUS input card, at different resolutions and refresh rates.

Example 1: Four 4K inputs at 60 Hz applied to one input card

Processed at 60 Hz	2 **unique** minification size per source
Processed at 30 Hz	4 **unique** minification sizes per source
Processed at 15 Hz	8 **unique** minification sizes per source

Example 2: One 4K input at 60 Hz applied to one input card

Processed at 60 Hz	8 **unique** minification for one source
Processed at 30 Hz	16 **unique** minification for one source

HDMI inputs

The **HDMI input cards** have four female HDMI type A connectors, numbered 1 through 4 from left to right. Each HDMI input card can process up to four 2048x1200 signals at 60 Hz. On each input card, connectors 2 and 4 can be configured to support up to 300 MHz. This supports two 2560x1600 signals at 60 Hz or two 4096x2160 signals at 30 Hz.

The **HDMI 4K PLUS input cards** have the same number and type of connectors with the addition of support for resolutions of 4096x2160 @ 60 Hz on all four inputs, including audio, which can be embedded onto outputs on an OUT4HDMI 4K PLUS card. They are supported on Quantum Ultra II models only.



Figure 15. HDMI Input Card

NOTE: Figure 15 shows the standard HDMI input card. The HDMI 4K PLUS input card appears the same except for the card name, `IN4HDMI 4K PLUS`, in the upper-right corner of its front panel.

- **HDMI inputs 1 and 3** — These two inputs accept resolutions with pixel clocks of up to 165 MHz, providing support for resolutions of 2048x1200 and 1920x1200 at 60 Hz.
- **HDMI inputs 2 and 4** — These two inputs accept resolutions with pixel clocks of up to 300 MHz, providing support for resolutions of 4K at 30 Hz and 2560x1600 at 60 Hz.

  NOTE: If connector 2 on a card is configured to support 300 MHz signals, connector 1 on the same card is disabled. If connector 4 is configured to support 300 MHz signals, connector 3 is disabled.

- **HDMI 4K PLUS inputs 1 through 4** — All four inputs accept resolutions with pixel clocks of up to 600 MHz, providing support for 4096x2160 at 60 Hz.

These input cards are HDCP-compliant when used with HDCP-compliant displays. They provide down-scaling of sources as required, and full source auto-detection.

NOTE: The HDMI connectors also support DVI signals with appropriate HDMI to DVI cables or adapters.

HDCP authorization

HDCP authorization allows the unit to appear HDCP compliant or non-compliant to the connected source. This is useful if the source automatically encrypts all content when connected to an HDCP compliant device, if the displays in the system are not HDCP compliant, or if the source is being shared to capture devices that do not support HDCP. In a video system that should not transmit HDCP encrypted data, such as broadcast or streaming environments, HDCP authorization should be disabled at the input to ensure that the source content remains unencrypted when possible.

With HDCP authorization disabled, protected material is not passed. Each input can be set to enable or disable the support of HDCP signals. If HDCP authorization is disabled, the input does not negotiate with the source device and forces the source to transmit only unencrypted video.

Input rotation

Sources that have their content pre-rotated can be rotated within the Quantum Ultra Series processor to be displayed on standard, landscape formatted displays. This type of content traditionally would originate from desktops that have portrait formatted local displays, or custom graphics media that has portrait content rotated to fit into a standard resolution.

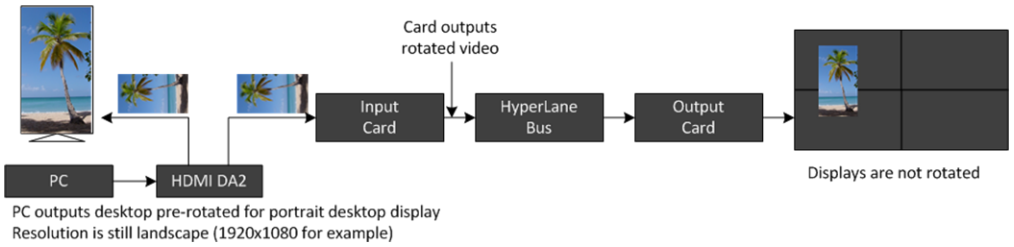


Figure 16. Input Rotation

The Quantum Ultra Series HDMI input card can support rotation of two 1920x1080 sources at 60 Hz or one 3840x2160 source at 30 Hz. Additional sources can be rotated, but the processing frame rate is reduced in half to remain within the available bandwidth of the card (see the following examples).

The HDMI 4K PLUS input cards can support rotation of four 4K sources at 60 Hz. Additional instances of the rotated sources can be produced, but at a lower frame rate.

Maximum instances of a rotated source per input card — IN4HDMI and IN SMD 100

Example 1: Four rotated 1080p inputs at 60 Hz applied to one input card

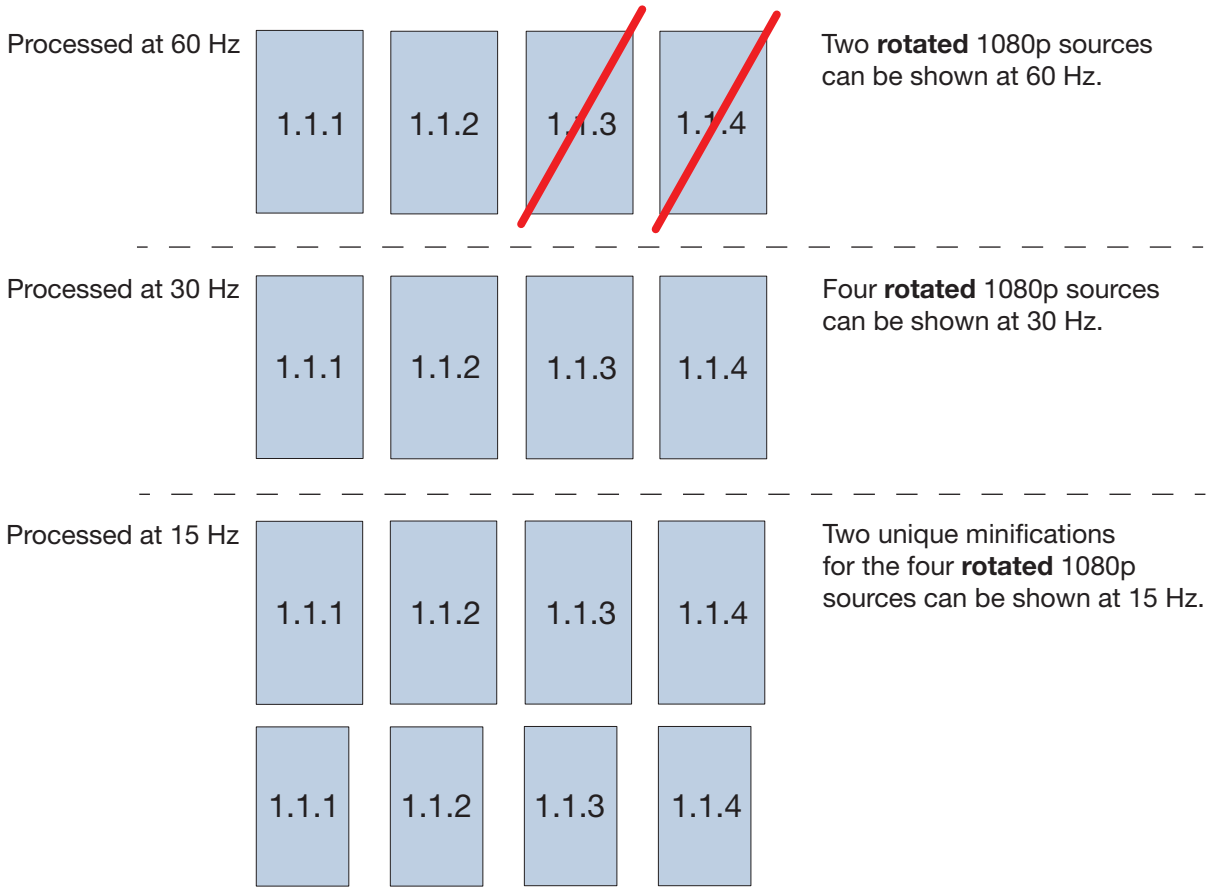


Figure 17. Example of Four Rotated 1080p Inputs, 60 Hz, on One Input Card

Example 2: One rotated 1080p input at 60 Hz applied to one input card

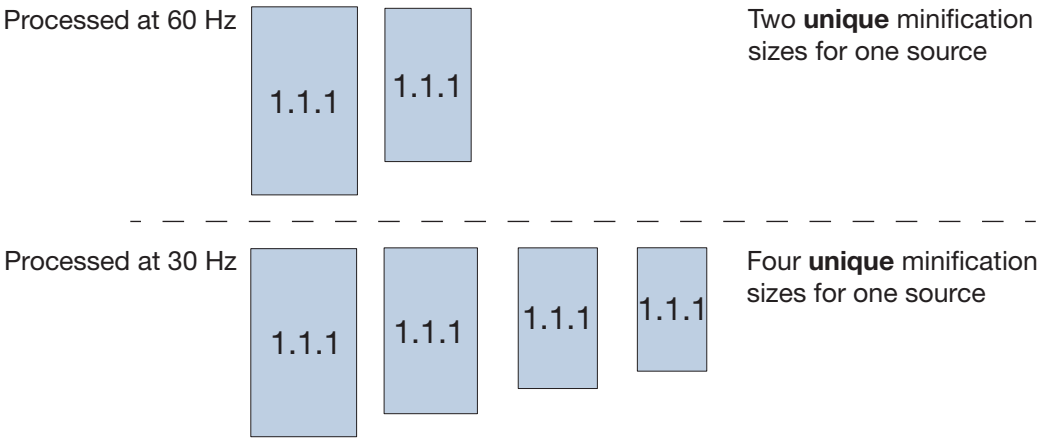


Figure 18. Example of One Rotated 1080p Input, 60 Hz, on One Input Card

Example 3: Two rotated 4K inputs at 30 Hz applied to one input card

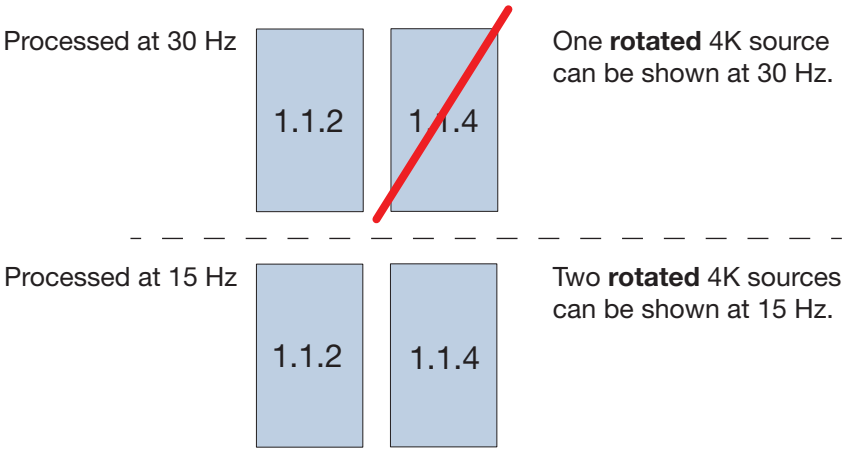


Figure 19. Example of Two Rotated 4K Inputs, 60 Hz, on One Input Card

Example 4: One rotated 4K input at 30 Hz applied to one input card

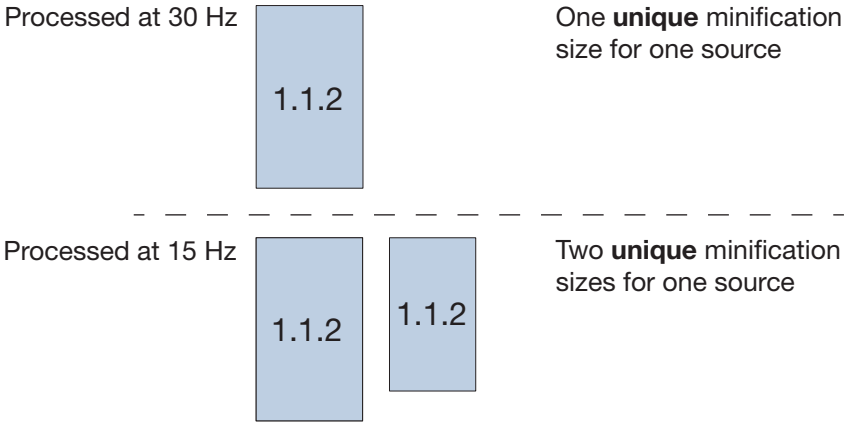


Figure 20. Example of One Rotated 4K Input, 30 Hz, on One Input Card

Maximum instances of a rotated source per input card — IN4HDMI 4K PLUS

The following examples show the maximum number of instances of a single source that can be provided by one HDMI 4K PLUS input card, at different resolutions and refresh rates.

Example 1: Four rotated 4K inputs at 60 Hz applied to one input card

Processed at 60 Hz	4 rotated 4K sources can be shown at 60 Hz.
Processed at 30 Hz	2 unique minifications for the 4 rotated 4K sources can be shown at 30 Hz.

Example 2: One rotated 4K input at 60 Hz applied to one input card

Processed at 60 Hz	4 **unique** minification sizes for one source
Processed at 30 Hz	8 **unique** minification sizes for one source

EDID management

The Quantum Ultra EDID Minder manages the EDID for the HDMI inputs. By default, input EDID is set to 1080p @ 60 Hz. In addition, EDID can be manually assigned to the sources via VCS. By maintaining continuous EDID communication with all sources, EDID Minder ensures that all sources power up properly and maintain their video outputs, whether or not they are actively displayed on Quantum Ultra outputs.

Each input on the HDMI input cards has the option to set the EDID to be provided to the connected source device. The preferred resolution found in custom EDID files is parsed and the resolution and refresh rate are displayed in VCS.

NOTE: On HDMI inputs 2 and 4, EDIDs for resolutions with pixel clocks above 165 MHz are available only if "Up to 300 MHz" pixel clock support has been enabled on HDMI inputs 2 and 4 of the IN4HDMI card.

The IN4HDMI 4K PLUS card supports EDIDs up to 600 MHz on all four HDMI inputs (see the *VCS Help File* for information on setting the resolution support).

You can set the EDID for each of the inputs in your Quantum Ultra chassis using VCS. The software lets you view the current EDID that has been set for each input. If no project file has been saved on the Quantum Ultra, the default EDID setting of 1080p @ 60 Hz is applied (see the *VCS Help File*, provided with the software, for details on selecting and monitoring EDID).

IP inputs — Quantum Ultra and Ultra II 610 and 305 Only

The IN SMD 100 cards each contain two identical RJ-45 connectors (LAN A and LAN B). Connect these ports to a network to enable decoding and displaying of multiple video streams. You can select, add, and configure these streams using VCS (see the *VCS Help File* for instructions).

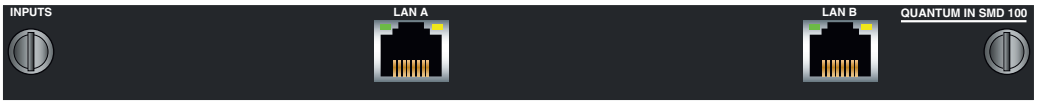


Figure 21. IN SMD 100 Card

Each IN SMD 100 card can decode a predetermined number of streams per LAN port, depending on the resolutions and refresh rates of the streams (streams of different resolutions can be mixed on one card).

NOTE: Both LAN ports must be connected to the network in order to support the maximum stream count.

Each card can process the following number of streams:

- 4 x 1080p @ 60 Hz (2 per port)
- 8 x 1080p @ 30 Hz (4 per port)
- 8 x 720p @ 60 Hz (4 per port)
- 14 x 720p @ 30 Hz (7 per port)
- 32 x 270p (480x270) @ 30 Hz (16 per port)

Installing more IN SMD 100 cards in the chassis increases the total number of streams that can simultaneously be decoded. Hundreds of IP stream definitions can be viewed simultaneously on an output, depending on the number of IN SMD 100 cards installed.

Ethernet port configuration

Each of the two Ethernet connectors can be configured individually to either reside on the same subnet or support video streams from two different subnets. The capabilities of the card are split between the two connectors so that only 2 1080p @ 60 Hz streams or 14 SD streams can be decoded per subnet group if the Ethernet ports are configured to be on different subnets.

NOTE: Only unicast streams, or multicast streams addressed using ONVIF, SAP, RTSP, or HTTP, are supported when using multiple subnets.

The network settings of each port can be configured via VCS (see the *VCS Help File* for instructions). The following settings are available:

Ethernet port settings:

- IP Address
- Gateway IP Address
- Subnet Mask
- DHCP mode
- DNS Sever Address

The default network setting for the two ports is DHCP enabled, which allows quick connectivity to an existing IP video system.

Streaming methods

The IN SMD 100 input card supports the following streaming methods provided by the Extron SME 100, Extron SMP 351, and 3rd party encoders:

- **UDP-TS** (Push) — Single program MPEG-2 Transport stream (SPTS), multicast only.
- **RTP** (Push) — Native (elementary video streams), multicast only. Single program MPEG-2 Transport stream (SPTS) (RTP-TS), multicast only.
- **RTP/RTSP unicast or multicast** (Pull) — RTP and RTSP interleaved over a UDP connection.
- **Unicast RTP over RTSP (RTP and RTSP interleaved over TCP)** (Pull) — Used for on-demand video in which RTP is interleaved with RTSP over a TCP connection to navigate fire walls that block UDP.
- **Unicast RTP over RTSP over HTTP (RTP and RTSP interleaved over TCP on port 80)** (Pull) — Used where RTP is interleaved with RTSP over HTTP, to navigate fire walls that allow HTTP (ports 80 or 8080 are open).

Streaming container format

The IN SMD 100 card supports the MPEG2 Transport stream (including .ts, .m2ts, and .m2t file extensions) container format.

File formats

- MPEG2 TS MPEG-2 part 1 (or ISO/IEC 13818-1 or ITU-T Rec. H.222.0)
- MP4 (including mp4 and m4v file extensions, not case sensitive)

Video codecs

- MPEG4 part 2 SP (<10 Mbps)
- MPEG4 part 2 ASP (<10 Mbps)
- MPEG4 part 10 (AVC) H.264 BP, MP, HiP up to level 4.2 (<62.5 Mbps, 1 sec)
- JPEG over RTP

Protocols

The IN SMD 100 supports the following network protocols, depending on the source and network properties.

Application layer protocols:

- **HTTP and HTTPS** (Hypertext Transfer Protocol and Hypertext Transfer Protocol Secure – RFC 2068) — Used for serving internal web pages to clients and for server control.
- **RTP** (Real-time Transport Protocol – RFC 3550) — Adds the ability to obey embedded timestamps to maintain synchronization among multiple streams.
- **RTP/AVP** (Real-time Protocol/Audio Video Profile – RFC 2250, 2435, 6184) — Describes the payload type being transmitted via RTP.
- **RTCP** (RTP Control Protocol – RFC 3550) — Required for RTP and useful or necessary for determining network status, performance, and troubleshooting.
- **RTSP** (Real-time Streaming Protocol – RFC 2326) — Over TCP and UDP as defined in *RFC 2326, April, 1988*.
- **SAP** (Session Announcement Protocol – RFC 2974) — Allows decoders to discover and list streams (sessions) available on the local network. Specifically, displays a list of currently active and compatible multicast streams on the web interface browser page, allowing a user to select and load, and begin decoding and displaying, any of those streams without requiring any further information.
- **SDP** (Session Description Protocol – RFC 4145 and 4566) — Allows RTSP initialization of the Quantum Ultra IP card using a locally stored SDP file to function as a browser helper application. In practice, the IP card may use the DESCRIBE method to initialize RTSP. Also used to encapsulate the data for SAP.

Transport layer protocols:

- **UDP** (User Datagram Protocol) — For multicast and possible control and monitoring feature support
- **TCP** (Transport Control Protocol) — For RTSP and HTTP support

Internet layer protocols:

- **ICMP** (Internet Control Message Protocol) — Required to support ping echo requests and replies
- **IGMP** (Internet Group Management Protocol) — Required for IP multicast stream support

Protocol combinations supported from Extron SME 100 and future Extron streaming products:

- **UDP-TS** — Single program MPEG-2 transport stream (SPTS) unicast or multicast
- **Unicast RTP** — Native (elementary audio and video streams). Single program MPEG-2 transport stream (SPTS, RTP-TS)
- **Multicast RTP over UDP** — Native (elementary audio and video streams). Single program MPEG-2 transport stream (SPTS, RTP-TS).
- **Unicast RTP over RTSP** (RTP and RTSP interleaved over TCP) — Used for on-demand video where RTP is interleaved with RTSP over a TCP connection to navigate fire walls that block UDP.
- **Unicast RTP over RTSP over HTTP** (RTP and RTSP interleaved over TCP on port 80) — Used where RTP is interleaved with RTSP over HTTP and is used to navigate fire walls that allow HTTP (ports 80 or 8080 are open).

Outputs

The Quantum Ultra Series HDMI, HDMI 4K PLUS, and DTP output cards integrate all inputs to be displayed in a layout that you define using the control software (see the *VCS Help File* for information on using the program to set up displays). They also provide up-scaling of sources.

HDMI outputs

- **HDMI output cards** — These cards provide the final output to a display device. They have four female HDMI A connectors, numbered 1 through 4 from left to right. Connect up to four HDMI or DVI (with an appropriate adapter) displays to these cards.

  Each OUT4HDMI output card can process up to four 2048x1200 signals at 60 Hz. On each output card, connectors 2 and 4 can be configured to support up to 300 MHz. This supports two 2560x1600 signals at 60 Hz or two 4096x2160 signals at 30 Hz.

  NOTE: If connector 2 on a card is configured to support 300 MHz signals, connector 1 on the same card is disabled. If connector 4 is configured to support 300 MHz signals, connector 3 is disabled.



Figure 22. HDMI Output Card

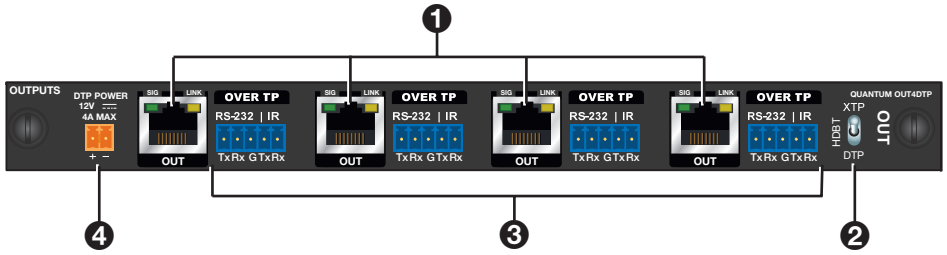
NOTE: Figure 22 shows the standard HDMI output card. The HDMI 4K PLUS output card appears the same except for the card name, `OUT4HDMI 4K PLUS`, in the upper-right corner of its front panel.

- **HDMI 4K PLUS output cards** — (Quantum Ultra II models only) Like the standard HDMI output cards, these cards have four female HDMI A connectors, numbered 1 through 4 from left to right, to which up to four HDMI or DVI (with an appropriate adapter) displays can be connected.

  Unlike the standard HDMI cards, all four outputs on these cards can generate resolutions with pixel clocks of up to 600 MHz, providing support for resolutions of 4096x2160 at 60 Hz. Audio from sources connected to IN4HDMI 4K PLUS cards can be embedded onto the HDMI outputs of these cards. No connector disabling is required to support any resolution.

DTP outputs — Quantum Ultra and Ultra II 610 and 305 only

The DTP cards have four twisted pair outputs on RJ-45 connectors. They also contain an RS-232/IR control connector for each output, a TP mode switch, and a power connector providing power over DTP for the four outputs.



1 DTP output connectors
2 TP mode switch
3 OVER TP control connectors
4 DTP POWER connector

Figure 23. DTP Output Card

❶ **DTP output connectors** — Connect STP cables between these connectors (labeled OUT) and up to four compatible Extron DTP receivers, XTP matrix switcher inputs, or third-party HDBaseT-enabled sink devices.

❷ **TP mode switch** — This three-position switch enables you to select between the following twisted pair output modes:

- **DTP mode** — Passes video signals, and allows bidirectional RS-232 and IR control between the DTP output card and DTP receivers via the OVER TP control connectors (see **figure 23**, ❸ on the previous page).

  Remote power over DTP is available via the 2-pole DTP POWER connector (❹).
- **XTP mode** — Passes video signals, and allows bidirectional RS-232 and IR control between the DTP output card and XTP matrix switcher inputs via the OVER TP control connectors (❸). Remote power is not supported.
- **HDBT mode** — Passes video signals, and allows bidirectional RS-232 and IR control between the DTP output card and HDBT sink devices via the OVER TP control connectors (❸). Remote power is not supported.

❸ **OVER TP control connectors** — Each DTP output connector has an RS-232 and IR control connector associated with it. Connect serial RS-232 signals, modulated IR signals, or both, to these 3.5 mm, 5-pole captive screw connectors (the ground pin is shared) to insert bidirectional RS-232 and IR communications (including SIS commands) into the signal passing through the associated DTP outputs.

Wiring the serial and IR ports:

Figure 24 shows how to wire the OVER TP RS-232 and IR connectors. For these connectors, the Ground (G) pin is shared by both signal types and both signal types can be active at the same time.

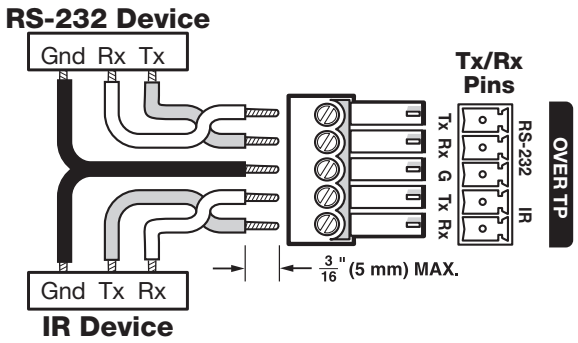


Figure 24. Wiring the RS-232 and IR Connectors

NOTE: The length of the exposed wires is important. The ideal length is 3/16 inch (5 mm).

❹ **DTP POWER connector** — Connect a 12 V, 4 A power supply (such as the Extron PS 124) to this 2-pole captive screw connector to provide power to receivers connected to any or all of the DTP output connectors on the card. The connected receivers must be classified as Powerable Endpoints (PEP).

Output resolutions

- **HDMI and DTP outputs 1 and 3** — These two outputs generate resolutions with pixel clocks up to 165 MHz, which supports resolutions of 2048x1200 and 1920x1200 at 60 Hz.
- **HDMI and DTP outputs 2 and 4** — These two outputs generate resolutions with pixel clocks up to 300 MHz, which provides support for 4K at 30 Hz and 2560x1600 at 60 Hz.

  A possible configuration might consist of a single channel greater than 165 MHz plus two channels that are less than 165 MHz, as shown in figure 25. In this example, output 2 is configured to support up to 4K at 30 Hz, and outputs 3 and 4 are configured to support up to 1920x1200 at 60 Hz.



Figure 25. Output Channel Configuration Example

- **HDMI 4K PLUS outputs 1 through 4** — These four outputs generate resolutions with pixel clocks up to 600 MHz, which provides support for 4K at 60 Hz.

Output resolution table

The following table shows all the output resolutions and refresh rates supported on Quantum Ultra Series, and which connectors on the output cards support each resolution.

Resolution	23.98 Hz	24 Hz	25 Hz	29.97 Hz	30 Hz	50 Hz	59.94 Hz	60 Hz
1024x768								X
1280x768								X
1280x800								X
1280x1024								X
1360x768								X
1366x768								X
1440x900								X
1400x1050								X
1680x1050								X
1600x1200								X
1920x1200								X
720p			X	X	X	X	X	X
1080p*	X	X	X	X	X	X	X	**X***
2048x1080	X	X	X	X	X	X	X	X
2048x1200								X
2048x1536**								X
2560x1080**								X
2560x1440**								X
2560x1600**								X
3840x2160**	X	X	X	X	X	X†		X†
3840x2400**					X			X†
4096x2160**	X	X	X	X	X	X†		X†
3840x2160 C	X	X	X	X	X	X	X	X
4096x2160 C	X	X	X	X	X	X	X	X
3840x2160 Q	X	X	X	X	X	X	X	X
3840x2400 Q								X
4096x2160 Q	X	X	X	X	X	X	X	X
4096x2400 Q								X
Custom rate 1-10								

***Default resolution and refresh rate**

****Not supported on OUT4HDMI and OUT4DTP card connectors 1 and 3**

† Supported on OUT4HDMI 4K PLUS card only

NOTE:

- **C** refers to a column-formatted 4K/UHD signal comprised of two output channels to address a full 4K raster (for example, two channels of 1920x2160 = full 3840x2160 raster).
- **Q** refers to a quad-formatted 4K/UHD signal comprised of four output channels to address the full 4K raster (for example, four channels of 1920x1080 = full 3840x2160 raster).

Custom output resolutions

Using the VCS program, you can add custom output resolutions based on EDID that have either been captured from the connected sink device on an output or uploaded (see the *VCS Help File* for information on managing EDID).

NOTES: The following notes apply only to the OUT4HDMI and DTP output cards, not the OUT4HDMI 4K PLUS card.

- If the EDID pixel clock is greater than 165 MHz, you are not able to assign the resolution to output connectors 1 and 3 (see the *VCS Help File* for instructions on managing EDID).
- If the custom resolution does not work, the pixel clock may need to be adjusted in order to be supported by the HyperLane bus. **Contact an Extron representative for assistance.**

Output grouping and canvases

The VCS program provides screen workspaces called *canvases* (or output groups) on which to design the videowall.

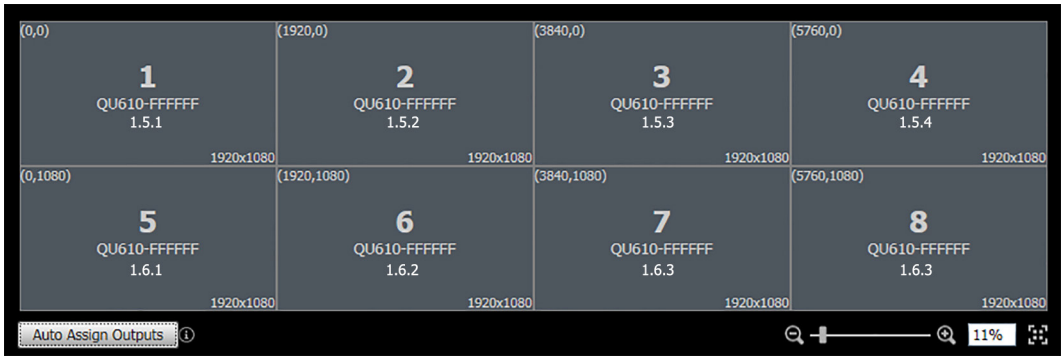


Figure 26. Canvas Example

A canvas contains a grid diagram in which each cell shows the following information about a display on the videowall:



Figure 27. Canvas Cell Contents Example

- Location coordinates of the display on the wall in pixels (see figure 27, ❶)
- Display number (displays are numbered horizontally on the canvas, ❷).
- Name of the Quantum Ultra Series device to which the display is connected (❸). Displays on a videowall can be connected to different processors.
- Number of the output card slot on the chassis, followed by the output connector number to which the display is connected (❹).
- Output resolution (❺)

In the canvas example in **figure 26** and **figure 27** on the previous page, display 1 is located at `x=00` and y=`00` (upper-left corner) on the videowall, the Quantum Ultra is named `QU610-FFFFFF`, the display is connected to the output card in slot 5, output connector 1 (`1.5.1`), and the wall output resolution is `1920x1080` (1080p).

The following properties can be configured for a canvas:

- Output resolution
- Output rotation
- Edge blending or mullion settings
- HDCP notification
- Digital output format

A canvas can support up to 128 window presets (see the *VCS Help File*, included with VCS, to set up these presets).

Multiple canvases (Quantum Ultra and Ultra II 610 and 305 Only)

For a Quantum Ultra or Ultra II 610 or 305, the videowall project can contain up to 10 canvases. Each canvas can contain connectors on any output board on any chassis, and multiple canvases can be defined on a single output card.

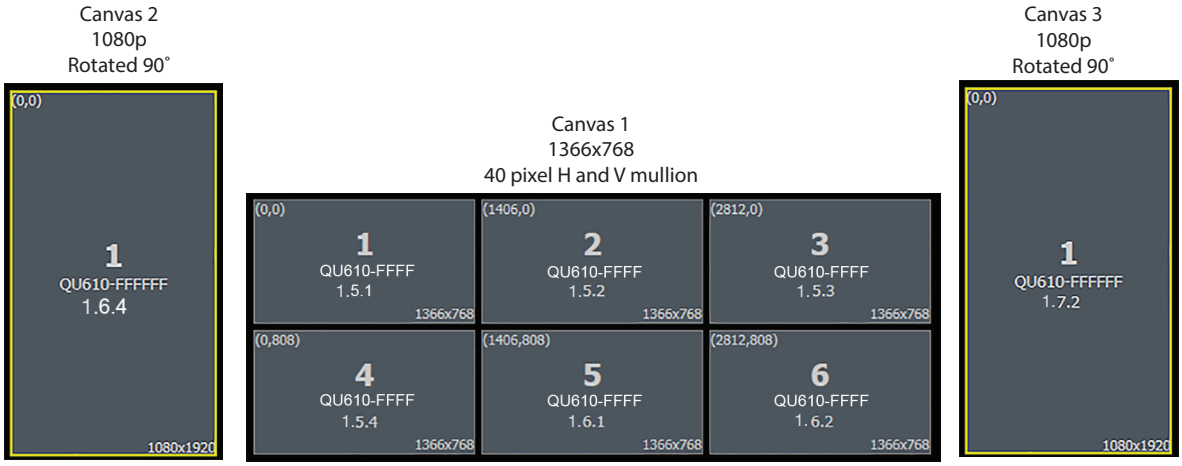


Figure 28. Videowall with Multiple Canvases

In the HDMI example in figure 28, the layout utilizes three HDMI output cards (see the diagram in figure 29).



Figure 29. Two Output Cards Used in one Canvas

A maximum of 10 canvases can be defined for each Quantum Ultra Series chassis, with each canvas able to support up to 128 window presets associated with it. All canvases (output groups) must be operating at refresh rates that are factors of each other to be properly supported by the HyperLane bus (for example, 60 Hz and 30 Hz or 50 Hz and 25 Hz).

Output format

Each output group (canvas) defined in VCS can be formatted as HDMI, DVI, or Auto. When set to **`Auto`** (the default), the output format is applied based on the EDID of the display (see the *VCS Help File* for instructions on configuring and grouping the displays).

The format selections for a canvas have the following results:

- **HDMI** — With this selection, the AVI info-frame packet and a blank audio payload are included.
- **DVI** — This selection does not include the info-frame packet or blank audio.
- **Auto** — With this selection, an HDMI sink device format is determined by the detection of a valid CEA extension header in the second block of EDID data.

HDCP mode

Using VCS, you can select the HDCP mode, which specifies whether the Quantum Ultra Series processor encrypts source content. The processor can be set to always encrypt HDMI data, to never encrypt (**`Off`** option), or to not encrypt after attempting unsuccessfully to exchange keys with the target display for 1 minute (see the *VCS Help File* for instructions on using this option).

Source up-scaling

The on-board scaler on the output card provides up-scaling of live video sources. Independent horizontal and vertical scaling is possible up to 32 times the native (outgoing) resolution. For example, a source of 1920 x 1080 pixels can be scaled up to approximately 61,440 x 34,560 pixels.

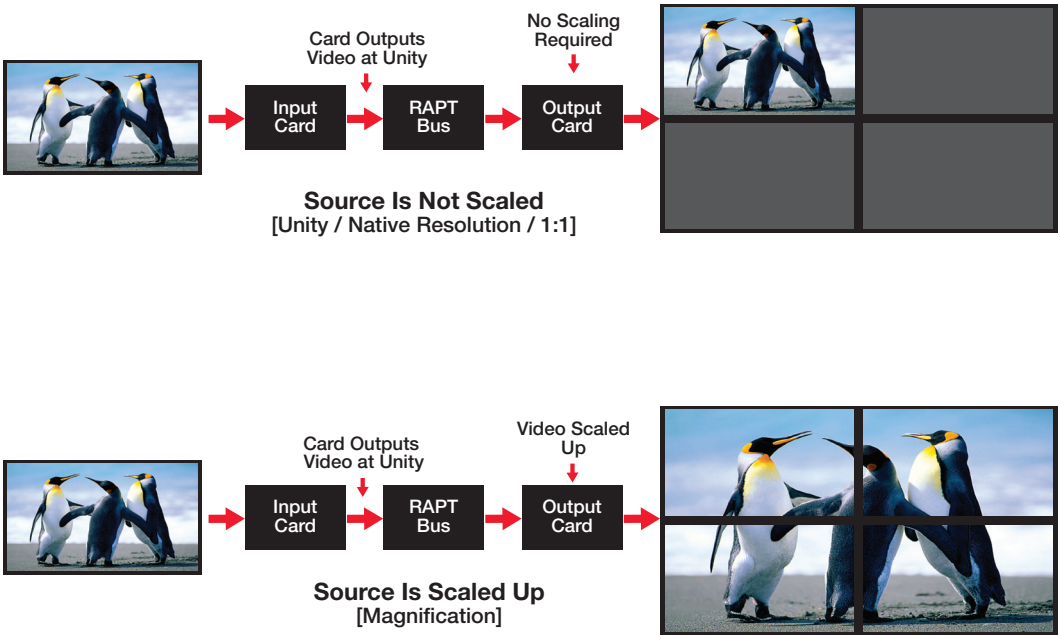


Figure 30. Example of a Source Displayed Full-sized and Up-scaled

NOTE: Static image files are rendered at the appropriate size by the graphics processor (GPU). This ensures maximum image sharpness.

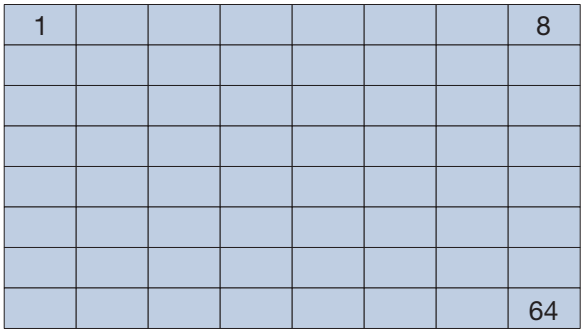
Down-scaling of live video sources is performed by a scaler on the input cards (see **Source down-scaling** on page 21 for further details).

Maximum windows per output card

This section discusses the maximum number of source windows that each output card can support, at different resolutions and refresh rates. A total of 64 windows are supported per output card.

Example 1: All source windows on one output channel

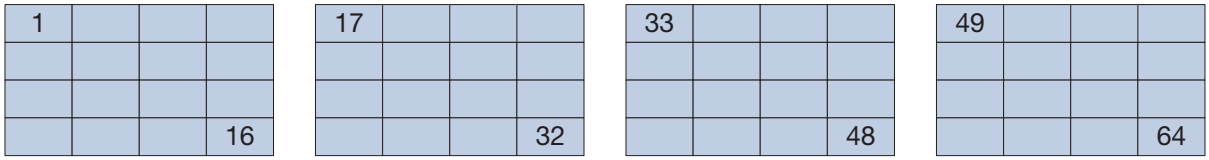
In this example, 64 windows have been assigned to output channel (connector) 1.1. No additional windows are available for output channels 1.1.2, 1.1.3, and 1.1.4. (Additional windows can be assigned to other cards.)



Output Channel 1.1.1

Figure 31. Example of All Available Windows Assigned to One Output Channel

Example 2: All Source Windows distributed evenly among all four output channels



Output Channel 1.1.1
Windows 1 through 16

Output Channel 1.1.2
Windows 17 through 32

Output Channel 1.1.3
Windows 33 through 48

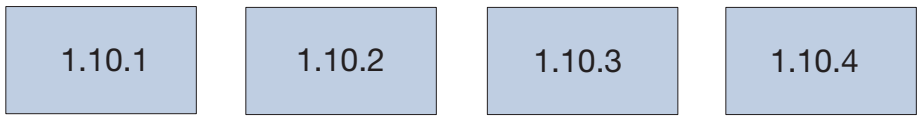
Output Channel 1.1.4
Windows 49 through 64

Figure 32. Example of All Available Windows Distributed Evenly Among the Four Output Channels.

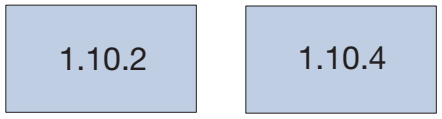
Maximum output signals for each OUT4HDMI and OUT4DTP card

The following examples show the number of output signals that are supported on each output card, depending on resolution, refresh rate, and format (standard, column, or quad).

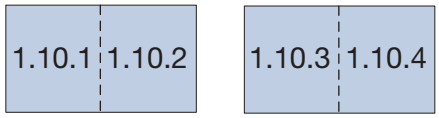
Example 1: Four 1080p outputs at 60 Hz



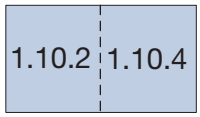
Example 2: Two 4K outputs at 30 Hz (channels 1 and 3 disabled)



Example 3: Two 4K column outputs at 30 Hz



Example 4: One 4K column output at 60 Hz (channels 1 and 3 disabled)



Example 5: One 4K quad output at 60 Hz

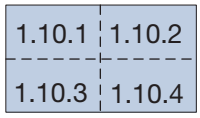


Figure 33. Maximum Number of Output Signals Per Output Card at Different Resolutions and Refresh Rates

Maximum output signals for each OUT4HDMI 4K PLUS card

The following example shows the number of output signals that are supported on each HDMI 4K PLUS output card.

Example 1: Four HDMI 4K PLUS outputs at 60 Hz

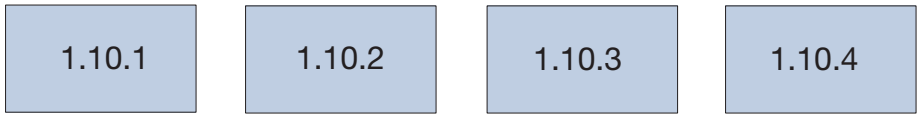


Figure 34. Maximum Number of HDMI 4K PLUS Output Signals Per Output Card

Output Rotation

If the displays in the videowall are installed in a portrait orientation, the output signal from the processor can be rotated to support the rotated displays. In contrast to input rotation, which rotates the source content within a window, output rotation affects the entire output signal, which includes all sources, window text, images, and HDCP messaging.

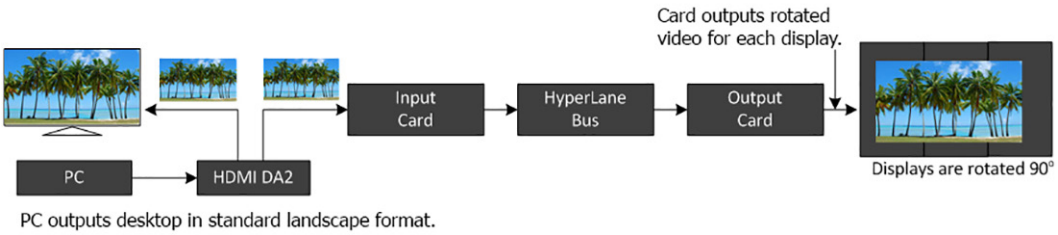


Figure 35. Output Rotation

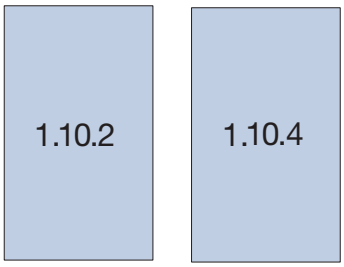
The Quantum Ultra Series standard HDMI output cards can support rotation of two 1920x1080 outputs at 60 Hz or one 3840x2160 output at 30 Hz. When rotation is enabled, only outputs 2 and 4 are addressable if the resolution pixel clock is less than 165 MHz and only output 4 is addressable if the output resolution is greater than 165 MHz (see the following examples).

The HDMI 4K PLUS output cards can support rotation of all four outputs.

Maximum rotated output signals for each OUT4HDMI and OUT4DTP output card

The following example shows the number of rotated output signals that are supported on each standard HDMI output card at different resolutions and refresh rates.

Example 1: Two rotated 1080p outputs at 60 Hz (connectors 1 and 3 disabled)



Example 2: One rotated 4K output at 30 Hz (connectors 1, 2, and 3 disabled)

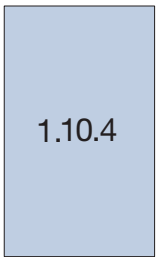


Figure 36. Maximum Number of Rotated Output Signals Per Output Card at Different Resolutions and Refresh Rates

NOTES:

- Column and quad outputs cannot be rotated.
- The HDMI 4K PLUS output cards support rotation of all four outputs at 4096x2160 at 60 Hz.

Adjusting for Edge Blending and Mullion Compensation

When setting up the videowall, you can select test patterns via VCS that help you define the following adjustments:

- **Edge blending compensation (Quantum Ultra and Ultra II 610 and 305 only)** — In certain situations it may be desirable to create an overlap of video between adjacent displays. This overlap melds the two images from two separate outputs into a single image and prevents a visible separation line between the two images. Use VCS to set or adjust the amount of horizontal and vertical overlap of the videowall displays.

  Each output canvas maintains its unique edge blend compensation settings with discrete values for the horizontal and vertical edges. The settings are applicable to all edges within the canvas.

- **Mullion compensation** — Mullion is the area of frame border that exists around each display. When designing the videowall, you must take this area into account so that, when an image is spread across two or more displays, the image flow is not distorted. The VCS enables you to adjust the space around each display to compensate for the mullion (see **figure 37** on the next page for an example).

See the *VCS Help File* for instructions on adjusting to compensate for mullion and edge blending.

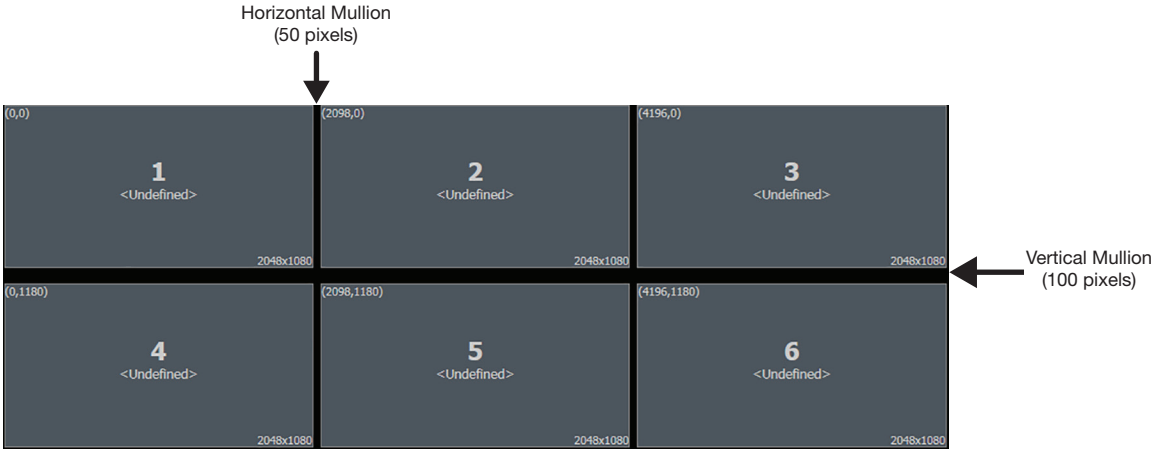


Figure 37. Example of Mullion Compensation Settings on a Canvas

NOTE: For information about replacing input and output cards, see **Replacing Input and Output Cards** starting on page 94.

Connecting to a Network

The Quantum Ultra Series provides an Ethernet network connection over UTP that is separate from the network port dedicated for control. In secure installations, it is often preferable to isolate the AV control network and separate it from the standard house network. This provides access to the rich media content that the Quantum Ultra chassis supports. You can access VNC sessions on your network using one LAN port, and the AV control IP connection is not required to also be on your data network. Connect a computer running VCS to the rear panel Ethernet (10/100/1000Base-T) LAN A or LAN B port to let you control the Quantum Ultra and to set up videowall applications via the computer.

You must use VCS to set up the Quantum Ultra Series chassis. However, you can use SIS to reset the IP address of LAN port A from the default (192.168.254.254) without interacting directly with the embedded operating system interface. LAN port B is not accessible via SIS but can be configured via VCS or the embedded operating system. After the system is configured with the desired wall layout and window presets, the Quantum Ultra can be controlled directly by a control system via Ethernet or RS-232.

The network port on the computer or the network hub, router, or LAN must be able to support a 100Base-T connection. When the Quantum Ultra Series processor is delivered, it is set with the following default addresses and values:

- **Default IP addresses:**
  LAN A: 192.168.254.254
  LAN B: 192.168.1.254
- **Default subnet mask:** 255.255.255.0
- **Default gateway:** 0.0.0.0

To change these addresses, use the Videowall Configuration Software (see the *VCS Help File*), the `Control Panel` (see **Starting the Control Panel** on page 49) or (for LAN port A only) SIS commands (see **IP Setup** on page 78).

NOTE: To enable communications between the computer and the processor, the Quantum Ultra Series processor IP address and subnet mask must be compatible as follows:

- The subnet mask must be the same for all devices.
- The IP addresses must be different, but on the same subnet.

RS-232 Insertion — DTP Outputs Only

NOTE: This feature is not available on the Quantum Ultra Connect models.

The twisted pair output ports on the DTP output card allow you to insert RS-232 control signals onto the same cable that carries video to extend them to the OVER TP port on a connected endpoint.

Signals from a control device pass into each OVER TP port on a DTP card, are embedded with the TP signal, and are sent to individual TP receiver endpoints for control of remote sink devices.

The control signals can be inserted two ways:

- **Ethernet to RS-232 insertion** — A control signal applied to the Quantum Ultra LAN A port can be routed to any OVER TP port (see "Ethernet to RS-232 Insertion").

  The RS-232 insertion port number is entered as the Telnet port number when you establish communication with the insertion port. The port numbers are automatically assigned to the DTP outputs and are numbered sequentially, starting with 2001.
- **Captive screw insertion** — A control signal applied to an RS-232 captive screw port is tied directly to the associated TP port. You must physically connect a cable attached to the captive screw connector where a control signal is to be inserted (see **Captive Screw Signal Insertion** on page 44).

Ethernet to RS-232 Insertion

Figure 38 on page 44 shows a connection example of an Ethernet to RS-232 insertion, in which an Extron IPCP Pro control processor provides control of a display via the Quantum Ultra. Configure this type of insertion as follows:

1. Connect a TP cable from the control processor to LAN port A, directly or via a network.
2. If necessary, enable the port for Ethernet, using VCS (see **Selecting the Insertion Method and RS-232 Protocol** on page 45).
3. If necessary to match the device to be controlled, use VCS to configure the port RS-232 protocol (baud rate, parity, data bits, and stop bits).
4. Connect the TP cable to the endpoint as usual.
5. Connect a serial cable from the endpoint to the device to be controlled.

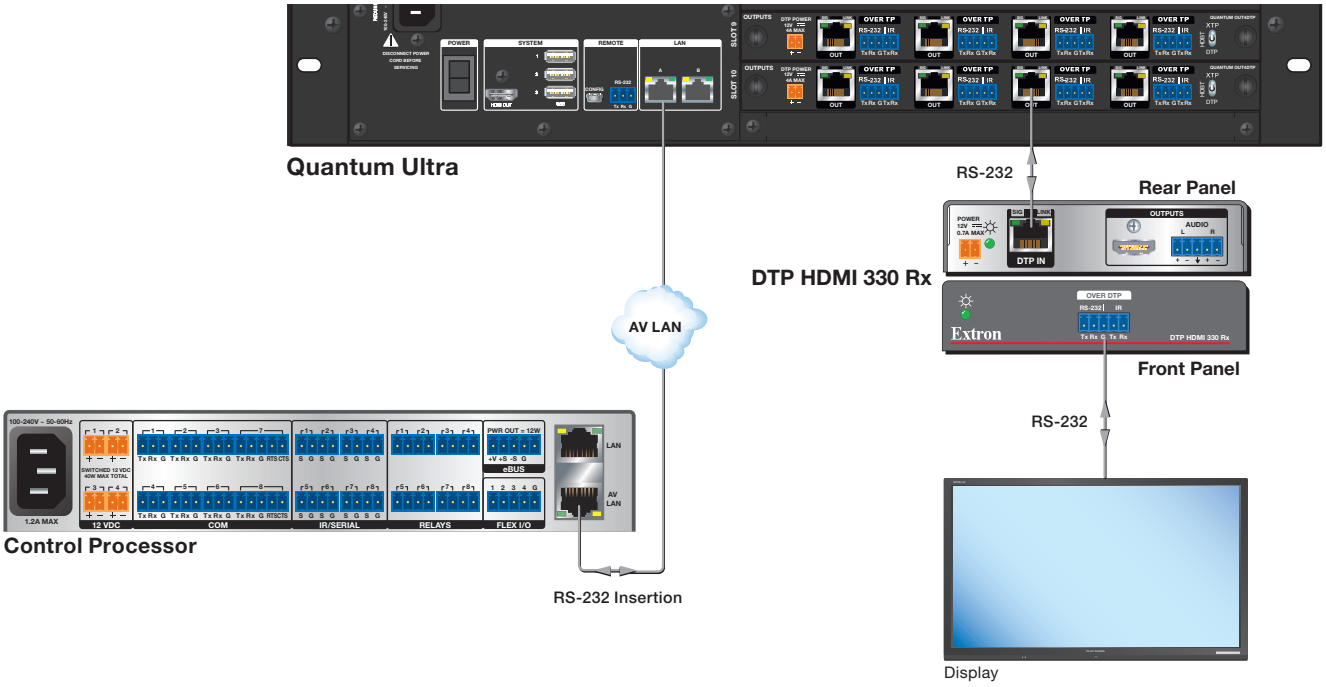


Figure 38. Typical Ethernet to RS-232 Insertion to an Output Endpoint

Captive Screw Signal Insertion

Figure 39 on page 45 shows a connection example of a typical captive screw insertion, in which an Extron IPCP Pro control processor provides control of a display via the Quantum Ultra. Configure this type of insertion as follows:

1. Connect a serial cable from a control processor to the 3-pole Over TP RS-232 captive screw port on the Quantum Ultra rear panel.
2. If necessary, enable the port for captive screw insertion (see **Selecting the Insertion Method and RS-232 Protocol** on page 45). The RS-232 control signal is inserted directly onto the TP port of the same number.
3. Connect a serial cable from the RS-232 and ground pins of the OVER TP connector on the endpoint to the display to be controlled, or connect an IR emitter to the IR and ground pins for IR control of the display.

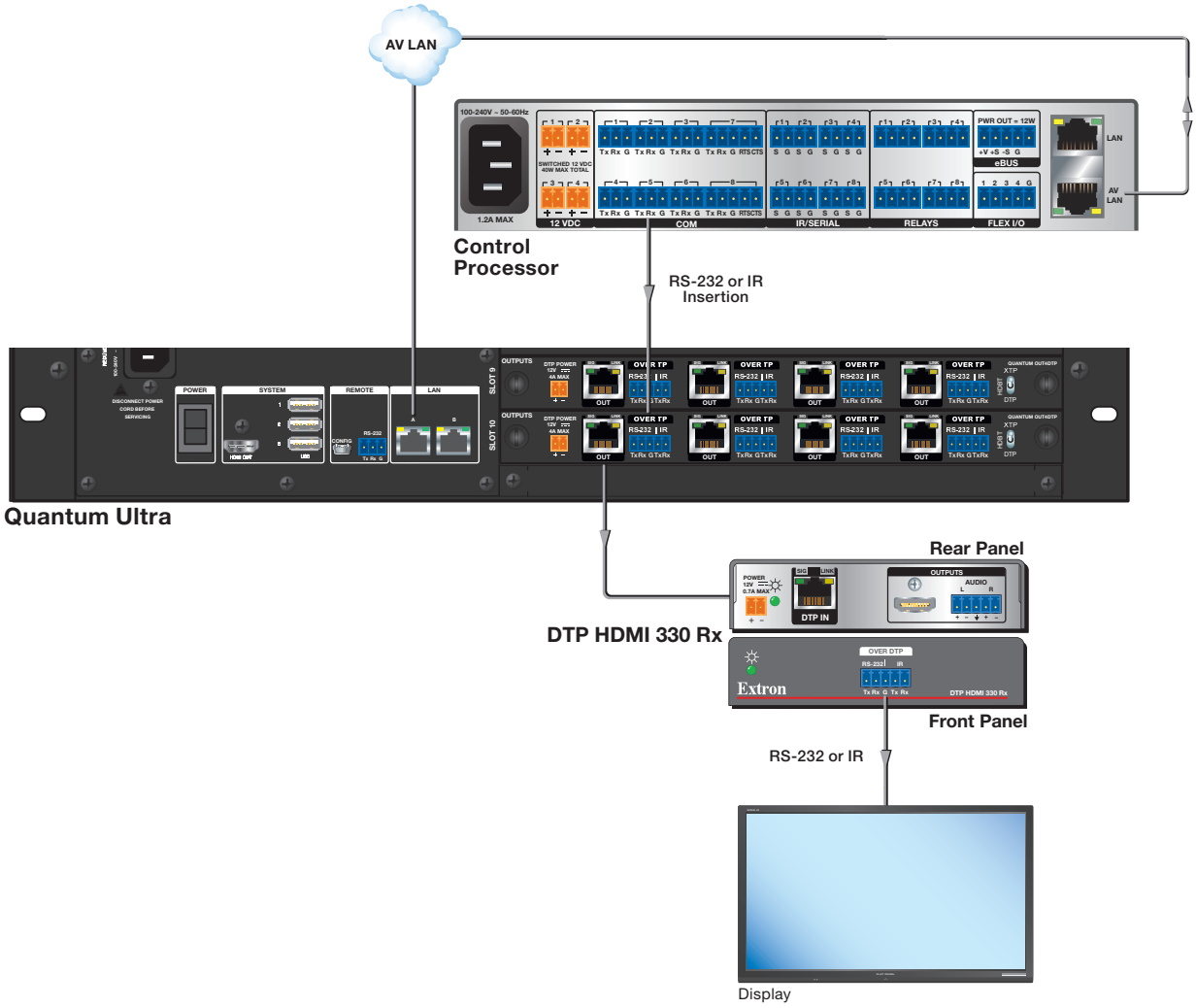


Figure 39. Typical Captive Screw Insertion to an Output Endpoint

Selecting the Insertion Method and RS-232 Protocol

To configure the method of RS-232 insertion to send across the TP connection, use VCS to select Ethernet insertion or captive screw insertion (default) for the port.

If you select Ethernet insertion, you must also select the RS-232 protocol (baud rate, data bits, stop bits, and parity bits) for the port (see the *VCS Help File* for detailed configuration instructions).

NOTE: The insert connections, whether inserted via Ethernet or captive screw connectors, can support up to a 115,200 baud rate.

Expansion Cards

Quantum Ultra Expansion IN (input) and Expansion OUT (output) cards link multiple Quantum Ultra 610 or 305 videowall processors together to simplify the design, integration, and operation of large videowalls.

NOTE: Expansion cards are not supported on Quantum Ultra II.

To link processors, an output card is installed in one processor and an input card is installed in another. Three fiber optic cables link the two cards. This extends the high-speed HyperLane bus between the processors to create a common, shared bus, making each input source available to all video outputs. Once configured, the processors operate as a single system without the need for front end switching or distribution amplifiers. Up to five chassis can be linked using four pairs of expansion cards.

System Size	Maximum Inputs and Outputs
1 processor	40
2 processors	72
3 processors	104
4 processors	136
5 processors	168

All chassis in an expansion system are connected to the same network via their LAN A ports. The first (primary) chassis in the signal chain is always a Quantum Ultra 610 and controls the other (secondary) chassis in the chain. The **last** unit in the chain can be either a Quantum Ultra 305 or 610 (expansion cards are not supported by the Quantum Ultra Connect models).



Figure 40. Expansion In Card

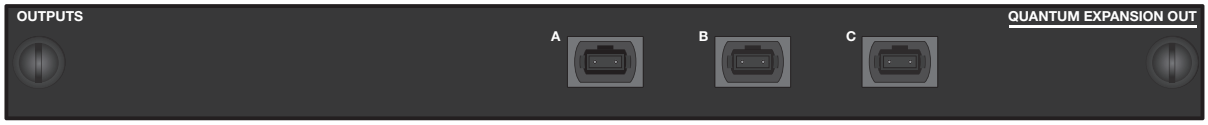


Figure 41. Expansion Out Card

Each input and output expansion card contains three MPO connectors, labeled A, B, and C. The chassis in the system are linked to each other through these connectors. Two lengths of MPO M-M cables are available: 1 meter (3.3 feet) and 10 meters (32.8 feet). Three cables of either length are needed for each pair of output-input expansion cards to be connected together.

Expansion Card Locations

In the expansion units, cards are factory-installed in the chassis in the order listed below:

On the primary chassis:

- **Non-expansion input and output cards** are installed as described under **Card Locations - Quantum Ultra and Ultra II 610 and 305** on page 20 (see figure 42, ❶).



Figure 42. Locations of Expansion Cards on the Primary Chassis

- **The Expansion OUT card** is installed in the last slot (slot 10) of the primary chassis to enable connection to the secondary chassis (❷).

On the secondary chassis:

- **The Expansion IN card** is installed in the first slot (slot 1) to accept the connection from the Expansion OUT card in the previous chassis (see figure 43, ❶).



Figure 43. Locations of Expansion Cards on Secondary Chassis

- **Additional non-expansion input or output cards** are installed following the installation order started in the previous chassis.

In the example in figure 43, non-expansion input cards (❷) are installed below the Expansion IN card. Non-expansion output cards (❸) follow the input cards. The Expansion OUT card (❹) is in the last slot.

NOTES:

- The last chassis in the chain does not contain an Expansion OUT card.
- So long as the expansion cards do not interrupt an otherwise normal flow of card locations, any expansion system should be valid.

Connecting the Expansion Cards

1. Connect three MPO cables between **Expansion OUT card** connectors A, B, and C of the **primary** chassis and **Expansion IN card** connectors A, B, and C of the **first secondary** chassis in the chain. Always connect output A to input A, output B to input B, and output C to input C (see figure 44).
2. Connect the three expansion outputs of each subsequent secondary chassis to the expansion inputs of the next chassis until all the desired chassis (up to five) are connected).

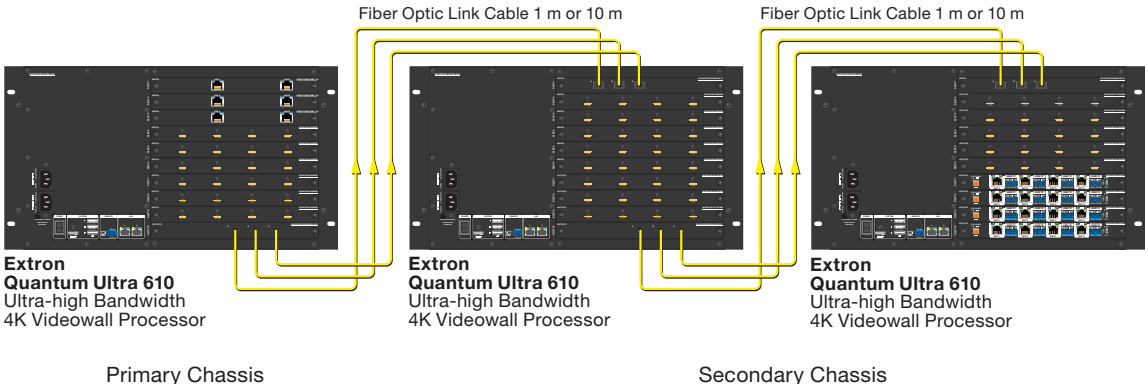


Figure 44. Expansion Card Connection

3. Connect the LAN A port (see **figure 7** and **figure 8**, Ⓗ on page 14) of each chassis in the chain to the **same** network.
4. If desired, connect the LAN B port of all of the chassis to a different network for VNC or RSS sources.
5. Use VCS to configure the videowall for the multi-chassis system (see the *VCS Help File* for more information).

Operation

The Quantum Ultra Series processor is a host device with an embedded operating system. The Control Panel is a program that resides on the Quantum Ultra Series operating system and enables you to perform various setup and maintenance tasks, such as setting the processor IP address, resetting the device, or updating the firmware.

This section discusses the functions accessed via the Control Panel:

- **Starting the Control Panel**
- **Buttons on the Control Panel**
- **Loading Image Files**
- **Updating the Password**
- **Updating Firmware**
- **Modifying Network Settings from the Control Panel**
- **Resetting the Device from the Control Panel**
- **Service Mode**
- **Disabling and Enabling Write Protection**
- **Shutting Down the Device**

Starting the Control Panel

To access the Quantum Ultra Series Control Panel:

1. Connect a USB keyboard and mouse to the USB system connectors on the rear panel (see figure 45). You can also connect a USB flash drive to a USB system connector to load and manage picture files or upload new firmware.

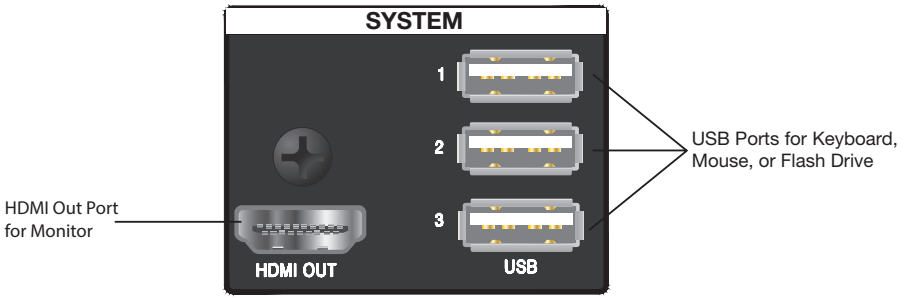


Figure 45. System Ports for Keyboard, Mouse, and Monitor

2. Connect a monitor to the HDMI Out system connector on the rear panel. A login window opens with the user name displayed (by default, this name is `admin`).
3. Enter the password where indicated on the login window (by default, the password is `extron`).

NOTE: The factory configured passwords for all accounts on this device have been set to the device serial number. In the event of an absolute system reset, the passwords convert to the default, which is `extron`.

The Quantum Ultra Control Panel main window opens on the monitor, in front of a background image of the Quantum Ultra device. From this window, you can access all common tasks.

NOTE: If the Control Panel window is closed, press <**Ctrl + F2**> to reopen it.

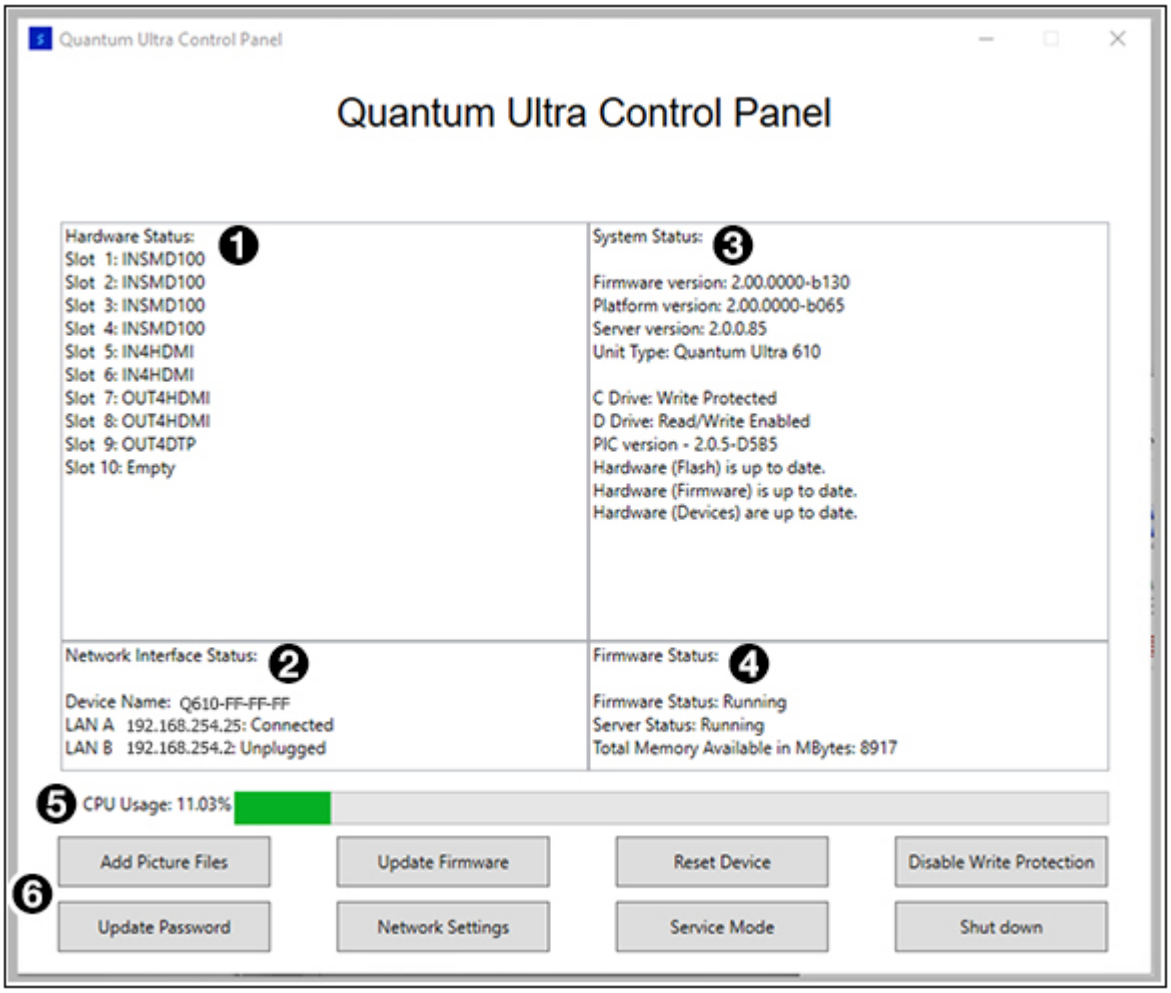


Figure 46. The Quantum Ultra Control Panel Main Window

4. The Quantum Ultra Control Panel window contains eight buttons that let you access the setup and management tasks for the Quantum Ultra (see figure 46, ❻). Click one of these buttons to proceed to the desired task (see **Buttons on the Control Panel** on page 51).

   The Control Panel window also contains the following status panels that enable you to observe status and activity of each major component (figure 46):

   ❶ Hardware Status

   ❷ Network Interface Status

   ❸ System Status

   ❹ Firmware Status

   ❺ CPU Usage progress bar

Buttons on the Control Panel

The following buttons give you access to set up and manage the Quantum Ultra via the Control Panel (see figure 47).

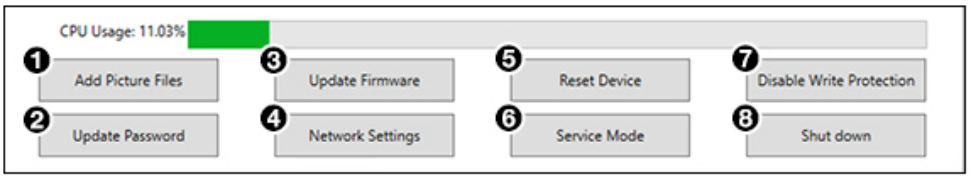


Figure 47. Buttons on the Control Panel

NOTE: Most of these tasks cause the unit to restart to complete them. For certain actions, the unit may restart twice: once to disable write protection, and a second time to finish applying the settings.

- **Add Picture Files (❶)** — Enables you to load image files (.bmp, .png, .tif, or .jpg) to the Quantum Ultra `D:` drive (see "Loading Image Files — Quantum Ultra 610 and 305"). These pictures are then available to display on the videowall (see the *VCS Help File* to add images to the videowall project).

  NOTE: This function is not available on the Quantum Ultra Connect models.

- **Update Password (❷)** — Enables you to update the hardware password to access the Quantum Ultra Control Panel (see **Updating the Password** on page 53).
- **Update Firmware (❸)** — Provides options to install new firmware or roll back to a previous version (see **Updating Firmware** on page 54).
- **Network Settings (❹)** — Displays the `Network Settings` window, from which you can view or modify the IP addresses of the LAN A and LAN B ports (see **Modifying Network Settings from the Control Panel** on page 58).
- **Reset Device (❺)**— Enables you to reset the Quantum Ultra to different levels of the default state (see **Resetting the Device from the Control Panel** on page 59).
- **Service Mode (❻)** — Provides access to the file system and a shortcut to the operating system control panel, where you can update the date and time (see **Service Mode** on page 60).
- **Disable Write Protection (❼)** — Enables you to make changes on the C: drive if desired (see **Disabling and Enabling Write Protection** on page 61).
- **Shut down (❽)** — Performs an orderly shutdown of the Quantum Ultra system (see **Shutting Down the Device** on page 61).

Loading Image Files

You can upload image files from an external USB drive to the Quantum Ultra Series processor to be displayed as sources in windows and incorporated into presets. You can also upload image files using VCS (see the *VCS Help File* for instructions).

The Quantum Ultra Series processor supports .bmp, .jpg, .tif, and .png image file types.

To upload image files to the Quantum Ultra Series hard drive:

1. Connect the external USB drive containing the images to one of the rear panel System USB ports.
2. On the `Quantum Ultra Control Panel` window, click **`Add Picture Files`**.

3. In the directory window that opens, navigate to the USB flash drive containing the pictures. In the example below, that drive is `E:`. Yours may be a different drive.

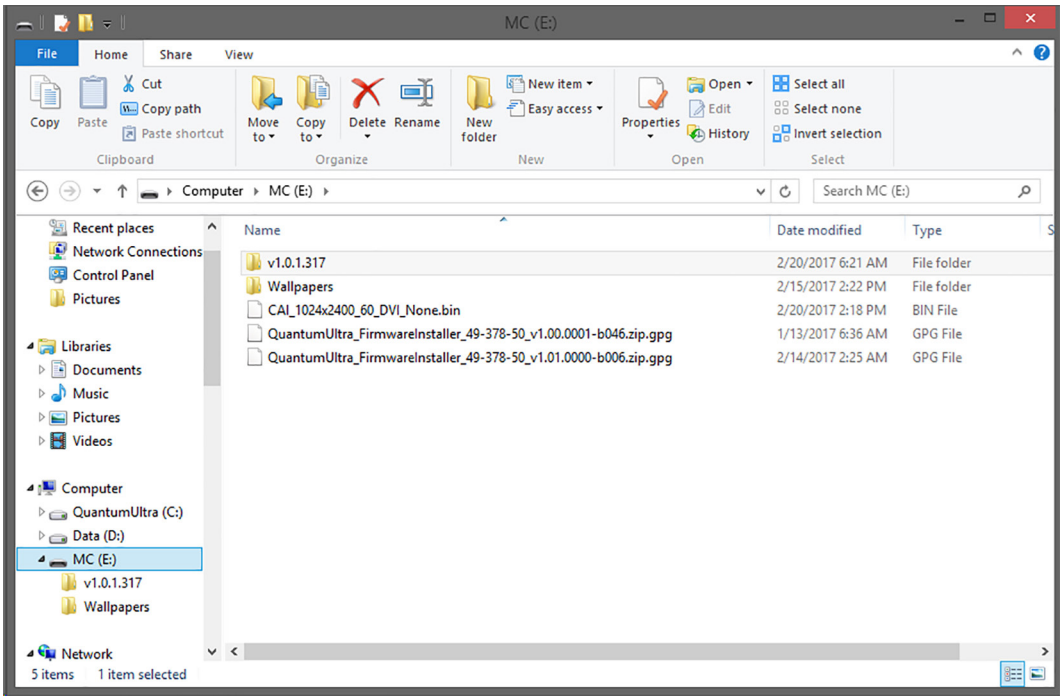


Figure 48. USB Flash Drive Containing Picture Files

4. On the USB drive, locate the image files to be loaded to the Quantum Ultra Series device and drag or copy them to the `Pictures` folder on the unit `D: Data` drive.

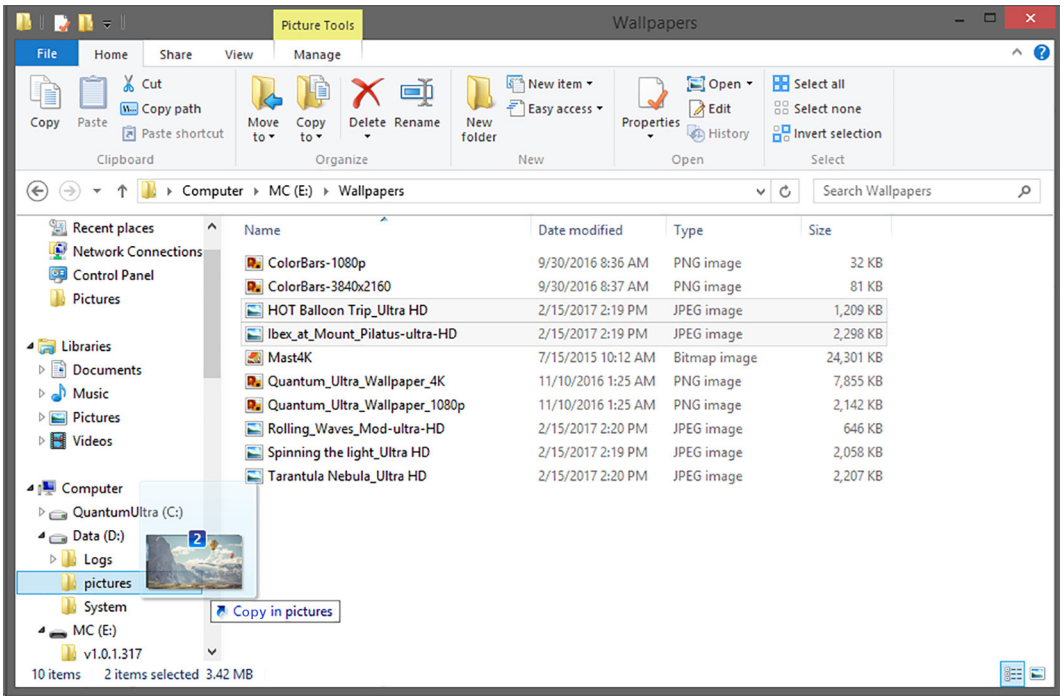


Figure 49. Copying Two Picture Files to the Quantum Ultra Series Device Data Drive

The files can now be accessed via VCS for use in configuration (see the *VCS Help File* for more information).

Updating the Password

To change the password to access the operating system:

1. Click the **Update Password** button on the Control Panel window (see **figure 47**, ❷ on page 51). The unit may restart to disable write protection before proceeding with the next step.
2. On the Change Password window, enter in the appropriate fields:
   - The current password (the default password is extron)
   - The new password
   - The new password again to confirm it

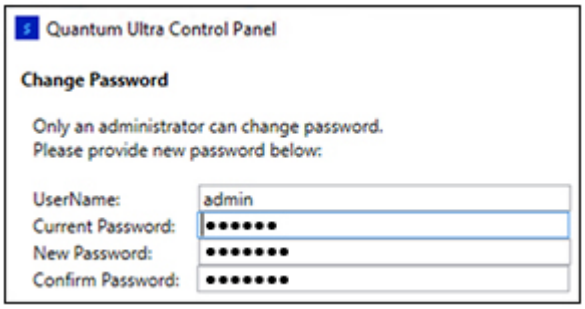


Figure 50. Change Password Fields

3. Click the **Enter** button at the bottom of the Change Password window. The following prompt opens, informing you that the unit will reboot and enable write protection for the new password to take effect.

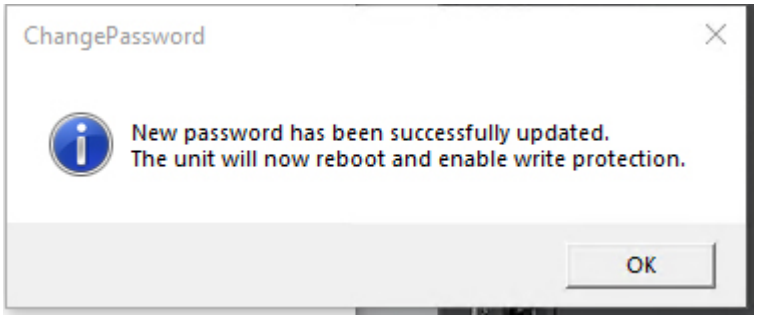


Figure 51. Password Reboot Prompt

4. Click **OK** to reboot.

Updating Firmware

If it becomes necessary to update the firmware on your Quantum Ultra Series processor, you can obtain new firmware at **www.extron.com** and upload it to the unit.

Downloading a Firmware File

1. On the Extron website, hover the mouse pointer over the **Download** tab (see figure 52, ❶), then click the **Firmware** link (❷) in the Downloads column.

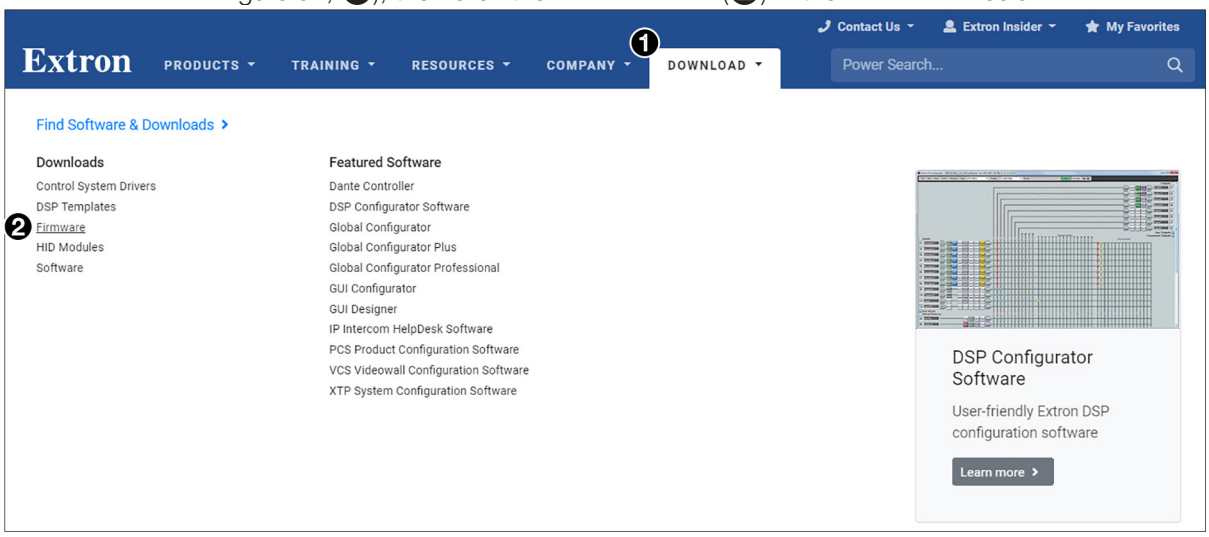


Figure 52. Downloading Firmware

2. On the Download Center screen, click the **Q** link (see figure 53, ❶).
3. Scroll to locate the Quantum Ultra firmware and click the **Download** link at the far right (❷).

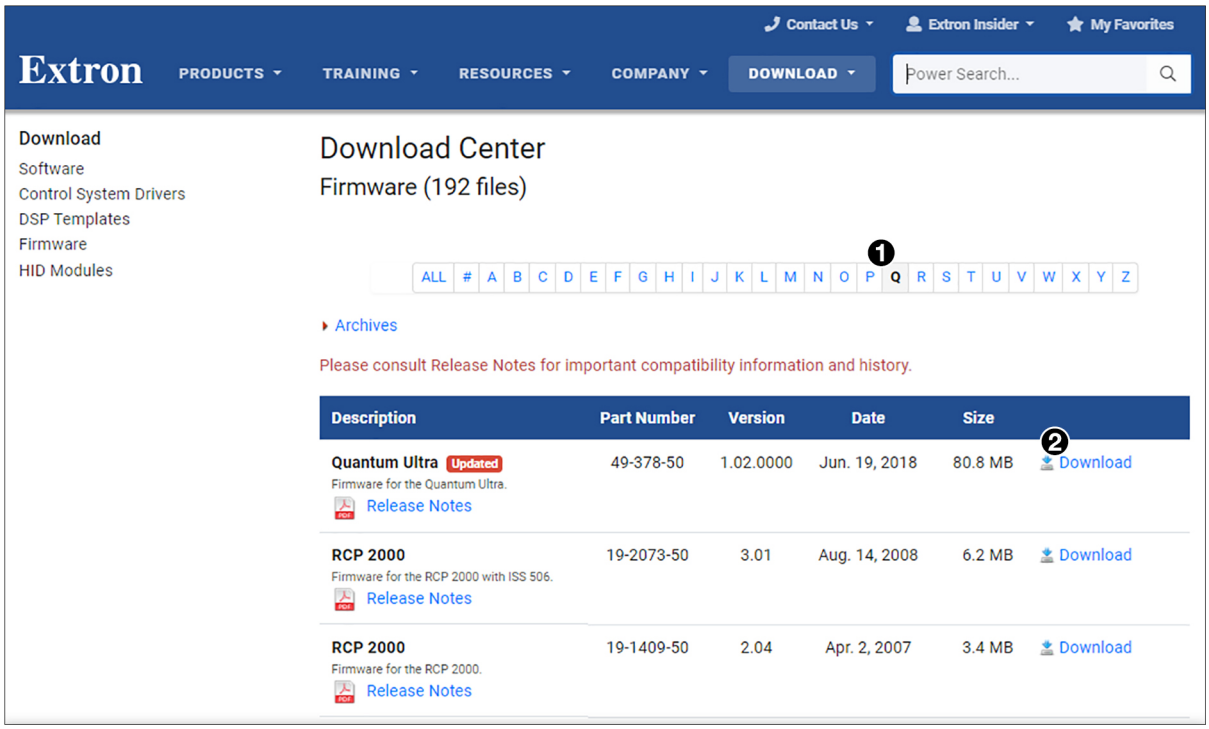


Figure 53. Download Center Page for Firmware

4. On the login page that appears next, fill in the required information to log into the **www.extron.com** website (if you need an Extron Insider ID number, see your Extron representative).
5. Follow the instructions on the rest of the download screens to save the executable firmware file to your computer. Note the folder to which the file was saved.
6. Locate the downloaded executable file on your computer and open it.

> **NOTE:** When downloaded from the Extron website, by default the firmware is placed in a folder at:
> `C:\Program Files (x86)\Extron\Firmware\Quantum Ultra`.

7. Follow the instructions on the `Installation Wizard` screens to install the new firmware on your computer. A Release Notes file, providing information on what has changed in the new firmware version, and a set of instructions for updating the firmware are also loaded.

Uploading a Firmware File

To upload a new firmware file to the Quantum Ultra:

1. Copy the new, unpacked firmware file to a USB flash drive or to a CD for use in a secure location.
2. Plug the flash drive into one of the System USB ports on the rear panel (see figure 54).

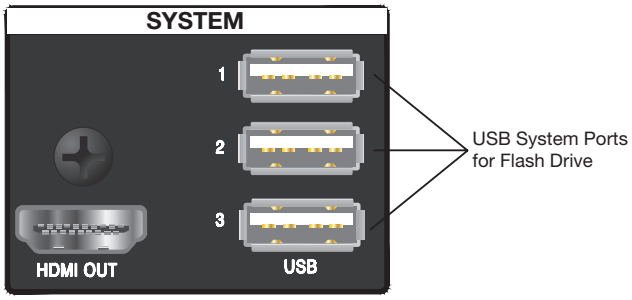


Figure 54. USB System Ports on the Rear Panel

> **NOTE:** A portable CD, DVD, or Blu-Ray drive can be used, but cannot be powered by the USB connection to the Quantum Ultra.

3. On the `Control Panel` window, click the **`Service Mode`** button (see **figure 47**, ❻ on page 51).
4. Copy the firmware file from the USB drive to the root directory of the `D:` drive.
5. On the `Control Panel` window, click the **`Update Firmware`** button (❸).

6. On the **Firmware Options** screen, click **Upgrade or Roll back firmware** (see figure 55, ❶).

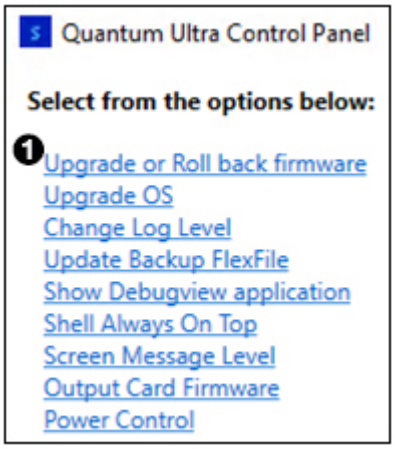


Figure 55. Selecting Upgrade or Roll Back Firmware

7. On the next screen, click the **Browse** button and locate the new firmware file.
8. Double-click on the firmware file or select it and click **Open**. The Quantum Ultra firmware file must have a .gpg extension.

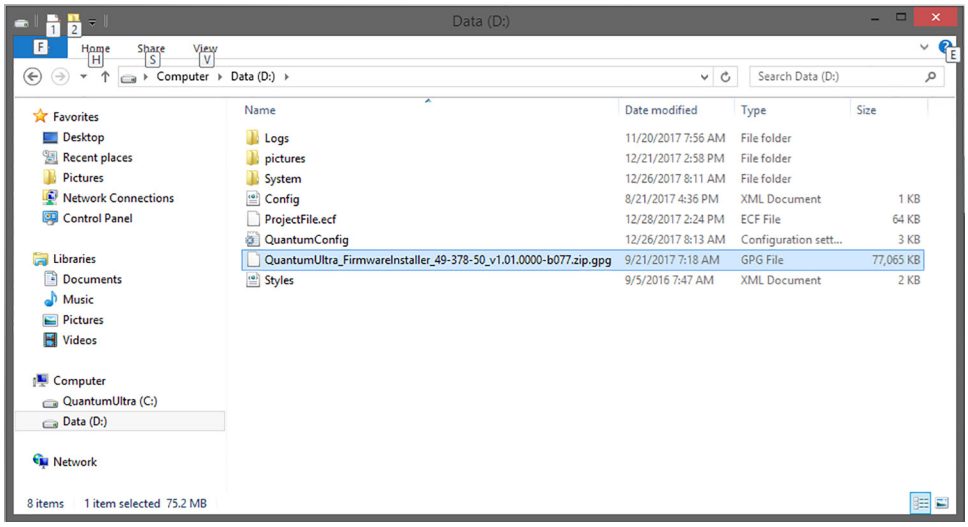


Figure 56. Selecting the Firmware File on the D: Drive

9. On the `Firmware update` screen, click **`Install`** (see figure 57, ❶). The unit may restart to disable write protection before proceeding with the next step.

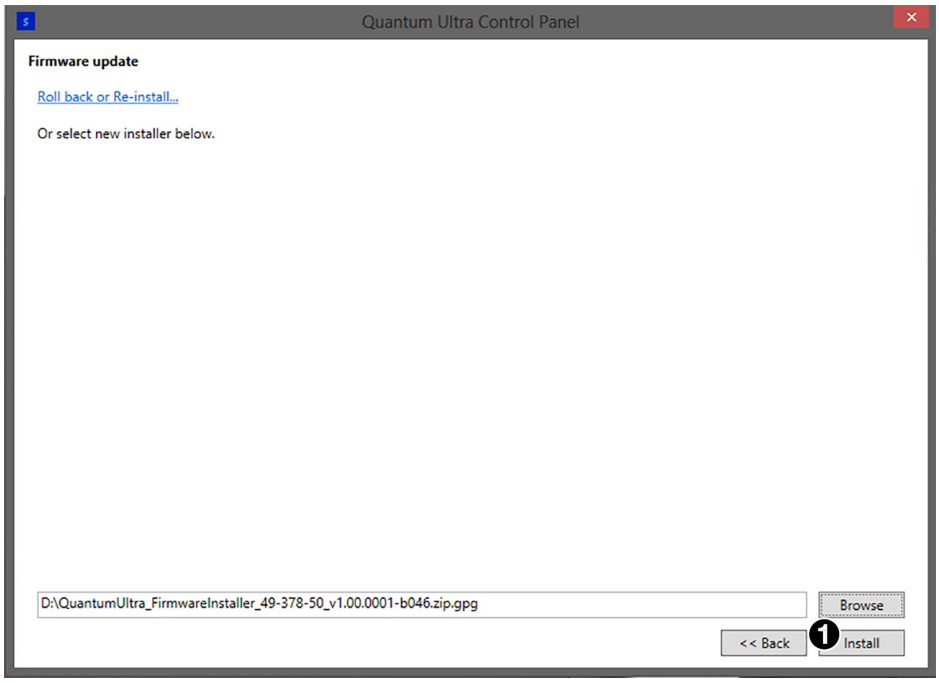


Figure 57. Click Install on the Firmware Update Screen

10. On the confirmation prompt that appears, click **`OK`** to proceed with the firmware installation.

    The `Quantum Ultra Control Panel` screen displays progress messages in the upper-left corner (see figure 58, ❶), while a progress bar (❷) at the bottom of the screen lets you know approximately how much time remains for the installation.



Figure 58. Installation Progress Screen

When the installation is completed, `Success!` appears in the upper-left corner of the screen.

A prompt appears, telling you to restart the Quantum Ultra.

11. Click **OK**.

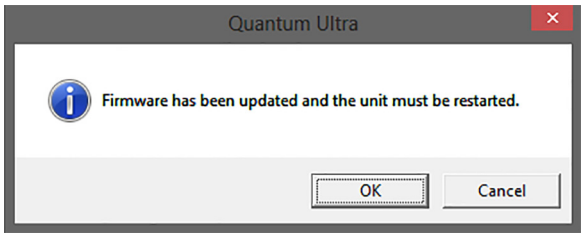


Figure 59. Restart Prompt after Firmware Update

ATTENTION:

- Wait until the opening screen appears before performing any other operations.
- Attendez jusqu'à ce que l'écran d'accueil apparaisse avant d'effectuer une quelconque opération.

Modifying Network Settings from the Control Panel

To change the IP addresses of the LAN A and LAN B ports:

1. On the `Control Panel` window, click the **`Network Settings`** button (see **figure 47**, ❹ on page 51. The `Network Settings` window opens.

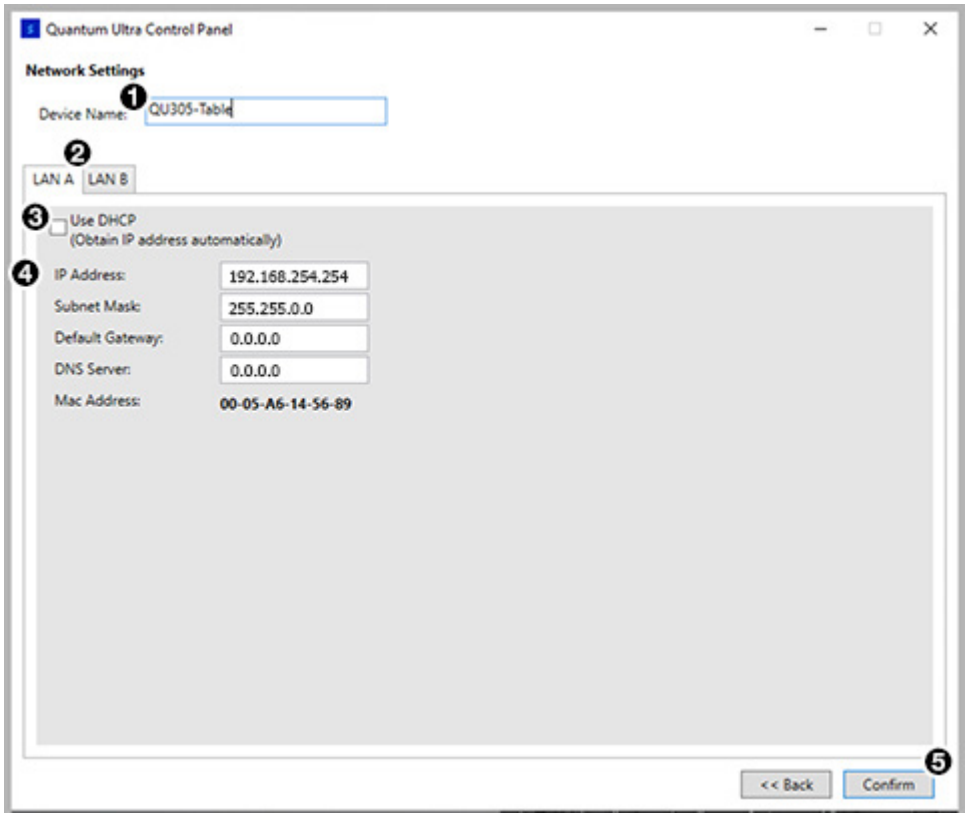


Figure 60. Network Settings for LAN A Port

2. If desired, enter a name of 1 to 15 characters for your Quantum Ultra Series processor in the **Device Name** field (see **figure 60**, ❶ on the previous page). Only letters, numbers, and the hyphen (**-**) can be used in this name.

   NOTES:
   - The device name must start with a letter.
   - All letters in the **Device Name** field are displayed in uppercase. By default the device name is **QU610-** followed by the last three hex pairs of MAC address.

3. Select the tab for the LAN port to configure (**LAN A** or **LAN B**) (❷).
4. Select the **Use DHCP** checkbox (❸) to automatically assign all IP addresses, **or**

   Enter the addresses in the **IP Address**, **Subnet Mask**, **Default Gateway**, and **DNS Server** fields (❹).

   NOTE: The Media Access Code (MAC) address cannot be changed.

5. If desired, select the tab for the other LAN port and repeat step 4.
6. When finished, click **Confirm** (❺). A message window opens, notifying you that the unit will restart in 5 seconds.
7. Click **OK** on the prompt to close it. The unit restarts, applying your new settings.

Resetting the Device from the Control Panel

To reset the Quantum Ultra unit (see figure 61):

1. Click the **Reset Device** button on the **Control Panel** (see **figure 47**, ❺ on page 51).

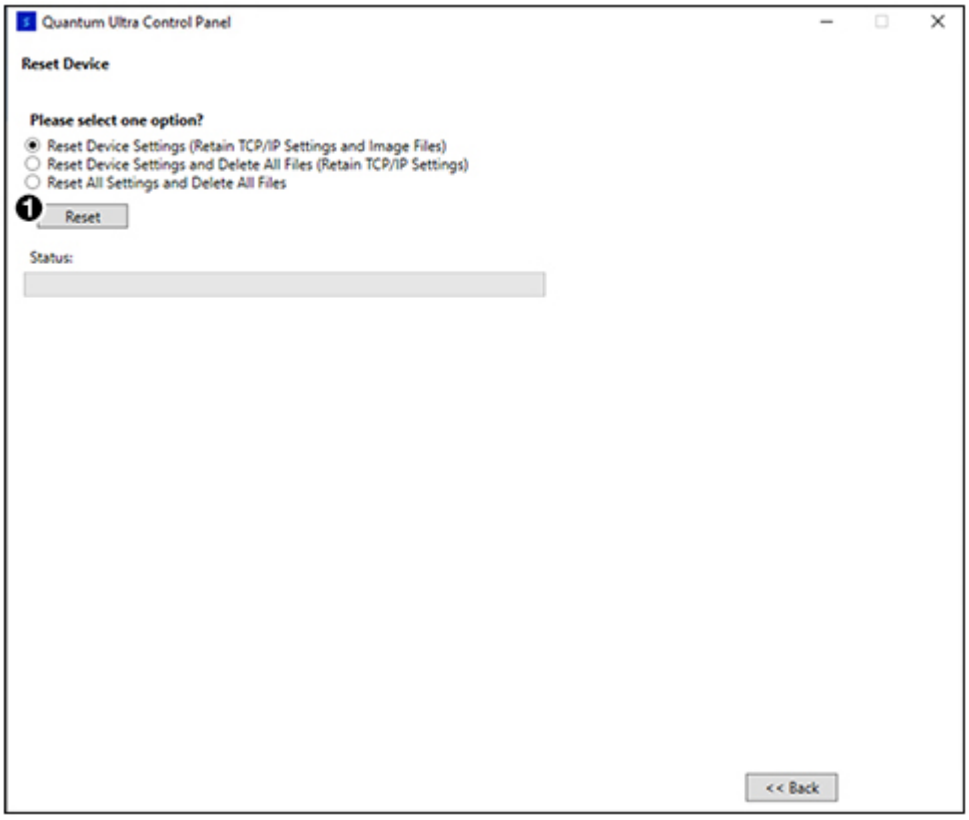


Figure 61. Reset Device Window

2. On the **Reset Device** window, select the radio button for the type of reset desired:
   - **Reset Device Settings (Retain TCP/IP Settings and Image Files)** — Resets the Quantum Ultra to its factory default settings while keeping the IP addresses and other settings that have been entered, plus any image files that have been uploaded. This is the default.
   - **Reset Device Settings and Delete All Files (Retain TCP/IP Settings)** — Resets the unit to factory defaults and keeps IP address information. All uploaded image files are deleted and the default image files are restored. This is the "absolute system reset."
   - **Reset All Settings and Delete All Files** — Resets the unit to factory defaults. All user-uploaded image files are deleted, IP settings are reset to default, and the default image files are restored.

     NOTE: The factory configured passwords for all accounts on this device have been set to the device serial number. In the event of an absolute system reset, the passwords convert to the default, which is **extron**.
3. Click the **Reset** button (see **figure 61**, ❶ on the previous page). The following prompt appears:

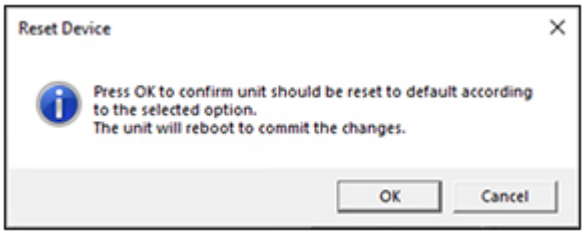


Figure 62. Reset Confirmation Prompt

4. Click **OK**. The unit reboots and resets.

Service Mode

In service mode, you can access the Quantum Ultra Series **C:** and **D:** drives as well as the operating system Control Panel. To enter service mode:

1. On the Quantum Ultra **Control Panel** main window, click **Service Mode** (see **figure 47**, ❻ on page 51). A prompt window opens with the following message:

   Write protection is enabled and changes will not be saved after device is rebooted or power cycled.

   The device must restart to allow changes to be made.

   Do you want to restart now to make changes or view settings only?
2. To enter service mode and change settings, click the **Restart** button on the prompt to reboot the unit and disable write protection, **or**

   Click **View Only** to view the current settings without making any changes to them. The unit displays the settings, but does **not** disable write protection.
3. Follow the directions on any subsequent screens.

Disabling and Enabling Write Protection

Should you want to make changes to items on the **C:** drive, you must disable write protection as follows:

1. On the **Control Panel**, click the **Disable Write Protection** button (see **figure 47**, ❼ on page 51). The following restart prompt appears:

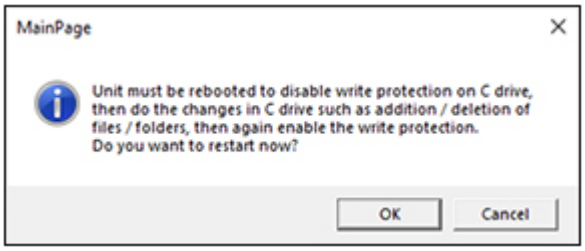


Figure 63. Restart Prompt for Disabling Write Protection

2. Click **OK**. The unit reboots. The button turns red, and its text changes to **Enable Write Protection**.



Figure 64. Write Protection Disabled

To enable write protection:

1. Click the red **Enable Write Protection** button. The following prompt appears:

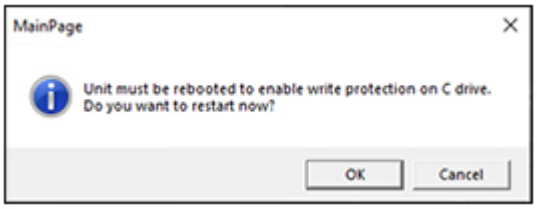


Figure 65. Restart Prompt for Enabling Write Protection

2. Click **OK**. The unit reboots and Write Protection is enabled.

Shutting Down the Device

If required, use one of the following methods to shut down the Quantum Ultra Series device:

- When a keyboard, mouse, and monitor are attached, the processor can be shut down via the **Control Panel**.
- If logged into the Quantum Ultra Series operating system, momentarily press the rear panel power switch.
- Press and hold the rear panel power switch for 5 seconds (see **figure 7** and **figure 8**, Ⓒ on pages 16 and 17).

To perform an optional orderly shutdown:

1. Click **Shut down**. A confirmation prompt appears.
2. Click **OK** on the prompt window. The unit shuts down.

Remote Configuration and Control

This section describes the methods by which the Quantum Ultra Series can be configured and controlled remotely: the Extron Simple Instruction Set (SIS) commands and the Videowall Configuration Software (VCS). It describes the available SIS commands and how to enter them, as well as providing instructions for obtaining and accessing VCS. Topics include:

- **SIS Commands**
- **Command and Response Table for SIS Commands**
- **Videowall Configuration Software (VCS) Program**

SIS Commands

You can use SIS commands to configure and control the processor via a host computer or other device (such as a control system) attached to the rear panel Remote RS-232 connector, LAN A or B port, or USB Config connector. Enter commands using a host communication application such as the Extron DataViewer, available at **www.extron.com** (see the *DataViewer Help* file to use this program). The RS-232 port uses a protocol of 9600 baud, 8 data bits, 1 stop bit, no parity, and no flow control.

SIS commands consist of one or more characters per field. No special characters are required to begin or end a command sequence. When the processor determines that a command is valid, it executes the command and sends a response to the host device. All responses from the Quantum Ultra to the host end with a carriage return and a line feed (CR/LF = ↵), indicating the end of the response character string (one or more characters).

Copyright Information

The Quantum Ultra Series device sends the following copyright message at initial power-up:

↵ (c) Copyright 20*nn*, Extron, Quantum Ultra *nnn* [or Quantum Ultra II *nnn*, Quantum Ultra Connect 84, or Quantum Ultra Connect 128], V*n.nn*, 60-*nnnn-nn*↵
Www, *DD Mmm* 20*nn hh:mm:ss*↵

(V*n.nn* is the firmware version and 60-*nnnn-nn* is the part number. On the next line, *Www* is the day of the week, *DD* is the day of the month, *Mmm* is the month name, 20*nn* is the year, *hh* is the hour, *mm* is the number of minutes, and *ss* is the number of seconds.)

Processor-initiated Messages

When a local event such as a software selection or adjustment takes place, the Quantum Ultra Series processor responds by sending a message to the host. No response is required from the host.

Examples of messages initiated by the processor are:

`1 Rpr` X3 `*` X25 ↵	Window preset X25 for canvas X3 recalled.
`FAILED: Power Supply 1` ↵	Sent if the primary power supply fails.
`FAILED: Power Supply 2` ↵	Sent if the redundant power supply fails (Quantum Ultra and Quantum Ultra II 610 only).
`FAILED: Fan 1` ↵	Sent if the fan for the CPU or power supply fails.
`FAILED: Fan 2` ↵	Sent if the fan for the input or output cards fails (Quantum Ultra and Quantum Ultra II 610 only).
`FAILED: Temperature` ↵	Sent when an overheating event occurs for the internal ambient temperature.
`FAILED: Temperature 1` ↵	Sent when an overheating event occurs for the SBC controller.
`FAILED: Temperature 2` ↵	Sent when an overheating event occurs for the I/O cards.
`Reconfig` X1 ↵	Signal change detected on input X1 .

Error Codes

When the Quantum Ultra Series processor receives a valid command, it executes the command and sends a response to the host device. If the unit is unable to execute the command, it returns an error response followed by a carriage return and line feed to the host.

`E01` — Invalid input number
`E10` — Invalid command
`E11` — Invalid preset number
`E13` — Invalid parameter
`E14` — Invalid command for this configuration
`E17` — Invalid command for signal type
`E22` — Busy
`E24` — Privilege violation
`E25` — Device not present
`E26` — Maximum number of connections exceeded
`E28` — Bad file name or file not found

Using the Command and Response Table

The **Command and Response Table for SIS Commands** on page 68 lists the commands that the Quantum Ultra Series processor recognizes as valid, the responses that are returned to the host, a description of the command function or the results of executing the command, and some examples of the command syntax in ASCII.

NOTE: Unless otherwise stated, upper- and lowercase text can be used interchangeably in the commands.

| ASCII to HEX Conversion Table | | |

X6 = Model name —
Quantum Ultra 610
Quantum Ultra 305
Quantum Ultra II 610
Quantum Ultra II 305
Quantum Ultra Connect 84
Quantum Ultra Connect 128

X7 = Part number of the product
Quantum Ultra 610 – 60-1571-01 or 60-1990-01
Quantum Ultra 305 – 60-1734-01 or 60-1989-01
Quantum Ultra II 610 – 60-1900-01
Quantum Ultra II 305 – 60-1899-01
Quantum Ultra Connect 84 – 60-1898-01 or 60-1898-11
Quantum Ultra Connect 128 – 60-1898-02 or 60-1898-12

X10 = On or off (enable or disable)
0 = Off or disable
1 = On or enable

X12 = Internal temperature in degrees Celsius
Response is two digits with a leading zero.

X13 = Horizontal and vertical frequencies
Response format is three digits with leading zeros and one decimal place (Example: 075.3).

X14 = Name or text label (for inputs and window presets) — Up to 32 characters
Invalid characters: \ / : * ? , > |

NOTES:

- Inputs saved without a name are assigned the default name Input *nnnn*, based on the source number assigned by the firmware.
- Window presets saved without a name are assigned the default name Window Preset *nnn*.

X16 = Horizontal and vertical position (Limits depend on input or output resolutions.)
Response is six digits with a leading + or - and padded with zeros (example: -000175).

X17 = Horizontal and vertical size (Limits depend on input or output resolutions.)
Response is six digits, padded with zeros (example: 000175).

X22 = Test pattern — 0 through 13
Response is two digits padded with a zero.

0 = Off (default)	7 = White Field
1 = Crop	8 = Checkerboard
2 = Alternating Pixels	9 = 4x4 Crosshatch
3 = Alternating Lines	10 = Fine Crosshatch
4 = Color Bars	11 = Diagonal Hatch
5 = Grayscale	12 = Edge Blend (Quantum Ultra 610 and 305 only)
6 = Ramp	13 = Display ID

X25 = Window preset number — 1 through 128
Response is three digits padded with zeros.

X26 = Input preset number — 1 through 128
Response is three digits padded with zeros.

X42 = Window mute
0 = Off (unmute) (default)
1 = On (mute window)

X44 = Input HDCP status
0 = No video detected
1 = Video detected without HDCP
2 = Video detected with HDCP

X45 = Output HDCP status
0 = No active sink device detected (unplugged)
1 = Sink detected, output not encrypted
2 = Sink detected, output encrypted with HDCP (plugged and encrypted)

X61 = Video signal status
0 = Video signal not detected
1 = Video signal detected

X75 = Window border style — 000 through 127
000 = No border
Response is three digits padded with zeros.

X78 = Window priority position — 1 through 999
1 = In front
Response is three digits padded with zeros.

X80 = Input resolution — Horizontal and vertical dimensions. Example: 1280x720

X81 = Source text string — 1-64 characters. Invalid characters are " ' \ ` |.

NOTE: The text string must be transmitted using UTF-8 encoding.

X82 = RGB color value for text string or text background — 0 - 255

X83 = Text size in points — 8 through 251

X84 = Input resolution support
0 = Up to 165 MHz
1 = Up to 300 MHz

X85 = Chassis position in expansion system
1 = First chassis
2 = Second chassis
3 = Third chassis
4 = Fourth chassis
5 = Fifth chassis

IP setup symbol definitions

X111 = Firmware version number (listed to two decimal places)

X112 = Unit name — Text string of up to 15 characters: A-Z, 0-9, and hyphen or minus sign (-).
- No blank or space characters are permitted.
- No distinction is made between upper- and lowercase.
- The first character must be an alpha character (A-Z, a-z).
- The last character **cannot** be a minus sign or hyphen.

X113 = IP address (*nnn.nnn.nnn.nnn*)
Leading zeros in the octets are optional in setting values, suppressed in returned values.

X114 = Gateway IP address (*nnn.nnn.nnn.nnn*)
Leading zeros in the octets are optional in setting values, suppressed in returned values.

X118 = Hardware (MAC) address (00-05-A6-*xx-xx-xx*)

X119 = Subnet mask (*nnn.nnn.nnn.nnn*)
Leading zeros in the octets are optional in setting values, suppressed in returned values.

X122 = Verbose mode
0 = None (default for LAN connection)
1 = Verbose mode (default for RS-232 and USB connection)
2 = Tagged response for queries
3 = Verbose mode and tagged response for queries

NOTES:

- In **verbose response** mode, the Quantum Ultra Series device returns unsolicited responses for value and setting changes that may result from a signal change, or a setting adjustment made via another interface.

  Example: The processor can send out a notice of a change in some setting without receiving a query via a PC or a control system. That change could have resulted from an internal process or a selection made via the VCS program. This is a verbose (wordy) relationship between the controller and a connected device.

- If **tagged responses** are enabled, all "view" commands return the command string plus the data, the same as in responses for setting a value. For example:
  Command: Esc P X3 * X5 WNDW ←
  Response: Wndw P X5 * X3 * X78 ↵ (tagged) **or** X78 ↵ (untagged)

X127 = Date and time
Set date and time format — MM/DD/YY-HH:MM:SS
Example: 08/17/21-13:51:30

View date and time format — *Www* {*day of the week*}*,DD • Mmm • YYYY • HH:MM:SS*.
Example: Tue, 17 Aug 2021 13:53:58

X133 = Password
- Length is 1-128 characters.
- All human-readable characters permitted except / \ | * and space characters.
- The password cannot be a single space.
- Passwords are case-sensitive.
- A user password cannot be assigned if no administrative password exists. An E14 error code is returned.
- If the admin password is cleared, the user password is cleared as well.

NOTE: The factory configured passwords for all accounts on this device have been set to the device serial number. In the event of an absolute system reset, the passwords convert to the default, which is extron.

X141 = Reading password. Response is four asterisks (****) if a password exists, empty if none exists.

X149 = Default name — Combination of model name and last three hexadecimal character pairs of the unit MAC address (Example: QU610-00-02-3D)

X176 = Network Interface
1 = LAN A
2 = LAN B

X177 = Prefix (subnet mask bits). Subnet 255.255.255.0 is represented as a prefix value by /24. The default response for the Esc CISG command (on IPv4) is /24.

Command and Response Table for SIS Commands

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
Input Switching and Configuration			
Input Selection			
Select input	X3 * X5 * X1 !	Grp X3 • Win X5 • In X1 ↵	Select input X1 for window X5 on canvas X3.
View current input	X3 * X5 !	X1 ↵ *In verbose modes 2 and 3:* Grp X3 • Win X5 • In X1 ↵	View currently selected input X1 in window X5 on canvas X3.

KEY:

X1 = Input number: 0 through 9999 (assigned by the VCS program). Response is four digits with leading zeros.
0 = Window without source.
1-999 = Physical video connections on all chassis in the system.
1000-9999 = VNC, image, text, and clock sources defined in the system

X3 = Canvas number: 1 through 10. Response is two digits with leading zero.
0 = All canvases (for window mute and preset recall only)

X5 = Window number: 1 through 999. Response is three digits with leading zeros.
0 = All windows (for window mute only)

Input Name

NOTE: To clear an input name, enter a single space for X14. This resets the input name to the default.

Write name	Esc X1 , X14 NI ←	Nmi X1 , X14 ↵	Set name X14 for input X1.

NOTE: Each input name must be unique. If you enter a name that already exists, the system returns an E13 error response.

View name	Esc X1 NI ←	X14 ↵ *In verbose modes 2 and 3:* Nmi X1 , X14 ↵	

Input Resolution Support

NOTES:

- If 300 MHz support is enabled for an input, the adjacent input is disabled. For example, if an HDMI 2.4 input is set to 300 MHz, the HDMI 2.3 input is disabled.
- These commands are supported for HDMI *n*.2 and *n*.4 inputs only.

Set resolution support for an input	Esc X1 * X84 ITYP ←	Ityp X1 * X84 ↵	Set input X1 to support up to X84 resolution.
View supported resolution	Esc X1 ITYP ←	X84 ↵	Set input X1 to support up to 165 MHz resolution.

KEY:

X1 = Input number: 0 through 9999 (assigned by the VCS program). Response is four digits with leading zeros.
0 = Window without source.
1-999 = Physical video connections on all chassis in the system.
1000-9999 = VNC, image, text, and clock sources defined in the system

X14 = Name or text label (for inputs) — Up to 32 characters. Invalid characters: \ / : * ? , > |.

X84 = Input resolution support: 0 = Up to 165 MHz, 1 = Up to 300 MHz

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
Input Switching and Configuration (continued)			
Text Source Configuration			
Set text string	Esc T X1 * X81 TEXT ←	Text T X1 * X81 ↵	Set the text string to X81 for text source X1.
NOTE: The text string must be transmitted using UTF-8 encoding.			
View current text string	Esc T X1 TEXT ←	X81 ↵ *In verbose modes 2 and 3:* Text T X1 * X81 ↵	View text string X81 for text source X1.
Set text color values	Esc C X1 * X82 * X82 * X82 TEXT ←	Text C X1 * X82 * X82 * X82 ↵	Define the R, G, and B values for custom text color X82 for input X1.
Example:	EscC1003*51*102*153TEXT ←		The source text color of input 1003 has the following RGB values: red = 51, green = 102, blue = 153
View text color values	Esc C X1 TEXT ←	X82 * X82 * X82 ↵ *In verbose modes 2 and 3:* Text C X1 * X82 * X82 * X82 ↵	View the RGB text color values X82 for input X1.
Set text background color values	Esc K X1 * X82 * X82 * X82 TEXT ←	Text K X1 * X82 * X82 * X82 ↵	Define the R, G, and B values for custom text background color X82 for input X1.
View text background color values	Esc K X1 TEXT ←	X82 * X82 * X82 ↵ *In verbose modes 2 and 3:* Text K X1 * X82 * X82 * X82 ↵	View the RGB text background color values X82 for input X1.

KEY:

X1 = Input number: 0 through 9999 (assigned by the VCS program). Response is four digits with leading zeros.
1-999 = Physical video connections on all chassis in the system.
1000-9999 = VNC, image, text, and clock sources defined in the system

X81 = Source text string — 1-64 characters. Invalid characters: " ' \ ` |.

NOTE: The text string must be transmitted using UTF-8 encoding.

X82 = RGB color value for source text string or text background — 0-255, in the format {*red * green * blue*}: First X82 value = red, second value = green, third value = blue.

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
Input Switching and Configuration (continued)			
Text Source Configuration (continued)			
Enable or disable text background transparency	Esc Y X1*X10 TEXT ←	Text Y X1* X10↵	Enable or disable text background transparency for input X1.
View text background transparency	Esc S X1 TEXT ←	Text Y X1*X10↵	View the text background transparency state for input X1.
Set text size	Esc S X1*X83TEXT ←	Text S X1*X83↵	Set the source window text size for input X1 to X83.
View text size	Esc S X1 TEXT ←	X83↵	
Picture Adjustments			
Window Mute			
Mute window	X3*X5*1B	Vmt X3*X5*1↵	Mute window X5 on canvas X3.
Unmute window	X3*X5*0B	Vmt X3*X5*0↵	Unmute window X5 on canvas X3.
View mute status	X3*X5 B	X42↵ *In verbose modes 2 and 3:* Vmt X3*X5*X42↵	View mute status X42 of window X5 on canvas X3.
Window Priority			
Send to back	Esc P X3*X5*0 WNDW←	Wndw P X3*X5*0↵	Place window X5 behind all other windows on canvas X3.
Send backward	Esc P X3*X5*1 WNDW←	Wndw P X3*X5*1↵	Move window X5 back one layer on canvas X3.
Bring forward	Esc P X3*X5*2 WNDW ←	Wndw P X3*X5*2↵	Move window X5 forward one layer on canvas X3.
Bring to front	Esc P X3*X5*3 WNDW←	Wndw P X3*X5*3↵	Place window X5 in front of all other windows on canvas X3.
View window priority	Esc P X3*X5 WNDW←	X78↵ *In verbose modes 2 and 3:* Wndw P X3*X5*X78↵	View the priority (X78) of window X5 on canvas X3.

KEY:

X1 = Input number: 0 through 9999 (assigned by the VCS program). Response is four digits with leading zeros.
1-999 = Physical video connections on all chassis in the system.
1000-9999 = VNC, image, text, and clock sources defined in the system

X3 = Canvas number: 1 through 10. Response is two digits with leading zero.
0 = All canvases (for window mute and preset recall only)

X5 = Window number: 1 through 999. Response is three digits with leading zeros.
0 = All windows (for window mute only).

X10 = Enable or disable text background transparency: 0 = Off or disable, 1 = On or enable

X42 = Window mute: 0 = Unmute (default), 1 = Mute window.

X78 = Window priority position — 001 through 999. Response is three digits padded with zeros. 001 = Front.

X83 = Text size in points — 8 through 251

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
Picture Adjustments (continued)			
Window Add and Delete			
Create window	Esc C X3 * X5 , X16 * X16 * X17 * X17WNDW ←	WndwC X3 * X5 , X16 * X16 * X17 * X17 ↵	Create window X5 on canvas X3.
Delete window	Esc X X3 * X5 WNDW ←	WndwX X3 * X5 ↵	Delete window X5 from canvas X3.
Horizontal Shift (Window)			
Specific value	Esc W X3 * X5 * X16 HCTR ←	Hctr W X3 * X5 * X16 ↵	Shift the horizontal center of window X5 on canvas X3 horizontally to X16.
Increment value	Esc W X3 * X5 +HCTR ←	Hctr W X3 * X5 * X16 ↵	Shift the horizontal center of window X5 on canvas X3 one pixel to the right.
Decrement value	Esc W X3 * X5 -HCTR ←	Hctr W X3 * X5 * X16 ↵	Shift the horizontal center of window X5 on canvas X3 one pixel to the left.
View window shift	Esc W X3 * X5 HCTR ←	X16 ↵ *In verbose modes 2 and 3:* Hctr W X3 * X5 * X16 ↵	View horizontal center position X16 of window X5 on canvas X3.
Vertical Shift (Window)			
Specific value	Esc W X3 * X5 * X16 VCTR ←	Vctr W X3 * X5 * X16 ↵	Shift the vertical center of window X5 on canvas X3 vertically to X16.
Increment value	Esc W X3 * X5 +VCTR ←	Vctr W X3 * X5 * X16 ↵	Shift the vertical center of window X5 on canvas X3 down by one line.
Decrement value	Esc W X3 * X5 -VCTR ←	Vctr W X3 * X5 * X16 ↵	Shift the vertical center of window X5 on canvas X3 up by one line.
View window shift	Esc W X3 * X5 VCTR ←	X16 ↵ *In verbose modes 2 and 3:* Vctr W X3 * X5 * X16 ↵	View vertical center position X16 of window X5 on canvas X3.

KEY:

- X3 = Canvas number: 1 through 10. Response is two digits with leading zero.
  0 = All canvases (for window mute and preset recall only)
- X5 = Window number: 1 through 999. Response is three digits with leading zeros.
  0 = All windows (for window mute only)
- X16 = Horizontal and vertical position (Limits depend on input or output resolutions.) Response is six digits with leading + or -, padded with zeros.
- X17 = Horizontal and vertical size (Limits depend on input or output resolutions.) Response is six digits, padded with zeros.

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
Picture Adjustments (continued)			
Horizontal Size (Window)			
Specific value	Esc W X3 * X5 * X17 HSIZ ←	Hsiz W X3 * X5 * X17 ↵	Set the horizontal size (width) of window X5 on canvas X3 to X17.
Increase horizontal size	Esc W X3 * X5 +HSIZ ←	Hsiz W X3 * X5 * X17 ↵	Widen window X5 on canvas X3 by one pixel.
Decrease horizontal size	Esc W X3 * X5 -HSIZ←	Hsiz W X3 * X5 * X17 ↵	Narrow window X5 on canvas X3 by one pixel.
View horizontal size	Esc W X3 * X5 HSIZ ←	X17 ↵ *In verbose modes 2 and 3:* Hsiz W X3 * X5 * X17 ↵	View horizontal size X17 of window X5 on canvas X3.
Vertical Size (Window)			
Specific value	Esc W X3 * X5 * X17 VSIZ ←	Vsiz W X3 * X5 * X17 ↵	Set the vertical size (height) of window X5, canvas X3 to X17.
Increase vertical size	Esc W X3 * X5 +VSIZ ←	Vsiz W X3 * X5 * X17 ↵	Increase the vertical size of window X5 on canvas X3 by one line.
Decrease vertical size	Esc W X3 * X5 -VSIZ ←	Vsiz W X3 * X5 * X17 ↵	Decrease the vertical size of window X5 on canvas X3 by one line.
View	Esc W X3 * X5 VSIZ ←	X17 ↵ *In verbose modes 2 and 3:* Vsiz W X3 * X5 * X17 ↵	View vertical size X17 of window X5 on canvas X3.
Compound Window Position and Size			
Specific value	Esc X3 * X5 , X16 * X16 * X17 * X17 XWIN ←	Xwin X3 * X5 , X16 * X16 * X17 * X17 ↵	Set the horizontal and vertical position (X16) and horizontal and vertical size (X17) for window X5 on canvas X3.
View position and size	Esc X3 * X5 XWIN ←	X16 * X16 * X17 * X17 ↵ *In verbose modes 2 and 3:* Xwin X3 * X5, X16 * X16 * X17 * X17 ↵	View the horizontal and vertical positions and sizes of window X5 on the canvas X3.

KEY:

- X3 = Canvas number: 1 through 10. Response is two digits with leading zero.
  0 = All canvases (for window mute and preset recall only)
- X5 = Window number: 1 through 999. Response is three digits with leading zeros.
  0 = All windows (for window mute only)
- X16 = Horizontal and vertical position. (Limits depend on input or output resolutions.)
  Response is six digits with leading + or -, padded with zeros.
- X17 = Horizontal and vertical size. (Limits depend on input or output resolutions.)
  Response is six digits, padded with zeros.

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
Presets			
NOTE: The final character of the `Recall Preset` command is a period, while the final character of the `Save Preset` command is a comma.			
Window Presets			
Recall preset	`1 * X3 * X25 .`	`1 Rpr X3 * X25 ↵`	Recall window preset X25 to canvas X3 without audio tie recall.
Recall preset to all canvases	`1 * 0 * X25 .`	`1 Rpr 0 * X25 ↵`	Recall window preset X25 to all canvases without audio ties recall.
Recall preset with audio to a canvas	`3*X3*X25.`	`3 RprX3*X25`	Recall window preset X25 to canvas X3 including audio tie.
Recall preset with audio to all canvases	`3*0*X25.`	`3 Rpr0*X25`	Recall window preset X25 to all canvases including audio ties.
Save preset	`1 * X3 * X25 ,`	`1 Spr X3 * X25 ↵`	Save window preset X25 for canvas X3 including audio tie.
Delete preset	`Esc X 1*X3*X25 PRST←`	`Prst X 1* X3 * X25 ↵`	Clear window preset X25 and set its name to `[unassigned]`.

View last recalled preset	`Esc L 1*X3 PRST←`	`X25 ↵`
		In verbose modes 2 and 3:
		`PrstL 1 * X3*X25↵`
			View the last recalled preset (X25) for canvas X3.

Set window preset name	`Esc1*X3*X25,X14 PNAM←`	`Pnam1*X3*X25,X14↵`	Assign name X14 to window preset X25 on canvas X3.

View window preset name	`Esc1*X3*X25 PNAM←`	`X14↵`
		In verbose modes 2 and 3:
		`Pnam1*X3*X25,X14↵`
			View name X14 of preset X25 on canvas X3.

Input Presets			
Recall preset	`2 * X3 * X5 * X26 .`	`2 Rpr X3 * X5 * X26 ↵`	Recall input preset X26 to canvas X3, window X5.
Save preset	`2 * X3 * X5 * X26 ,`	`2 Spr X3 * X5 * X26 ↵`	Save input preset X26 for canvas X3, window X5.
Delete preset	`Esc X 2*X26 PRST ←`	`Prst X 2* X26 ↵`	Clear input preset X26 and set its name to `[unassigned]`.

KEY:

X1 = Input number: `0` through `9999` (assigned by the VCS program). Response is four digits with leading zeros.
`1-999` = Physical video connections on all chassis in the system.
`1000-9999` = VNC, image, text, and clock sources defined in the system

X3 = Canvas number: `1` through `10`. Response is two digits with leading zero.
`0` = All canvases (for window mute and preset recall only)

X5 = Window number: `1` through `999`. Response is three digits with leading zeros.
`0` = All windows (for window mute only)

X14 = Name or text label for window presets — Up to 32 characters. Invalid characters: `\ / : * ? , > |`

X25 = Window preset number — `1` through `128`. Response is three digits padded with zeros.

X26 = Input preset number: `1` through `128`. Response is three digits padded with zeros.

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
Window Border Styles			
Set border style	Esc B X3 * X5 * X75 WNDW ←		
		Wndw B X3 * X5 * X75 ↵	Set the border style to X75.
View border style	Esc B X3 * X5 WNDW←	X75 ↵ *In verbose modes 2 and 3:* Wndw B * X3 * X5 * X75↵	View current border style X75 on window X5 on canvas X3.
Audio			
Select audio source	X3*X1$	GrpX3•InX1•Aud↵	Select audio from input X1 for canvas X3.
View selected audio source	X3$	X1↵	View selected audio source X1 for canvas X3.
Advanced Configuration			
Test Patterns			
Set pattern	Esc X3 * X22 TEST ←	Test X3 * X22 ↵	Select test pattern X22 for canvas X3.
View test pattern	Esc X3 TEST ←	X22↵	View the current test pattern X22 on canvas X3.
HDCP Status			
Query HDCP status of an input	Esc I X1 HDCP ←	X44 ↵ *In verbose modes 2 and 3:* Hdcp I X1 * X44 ↵	View HDCP status X44 of input X1.
Query HDCP status of all inputs	Esc I HDCP ←	X44 X44 ... X44↵ *In verbose modes 2 and 3:* Hdcp I $X44_1$ $X44_2$ ... $X44_n$↵	View HDCP status X44 of all inputs.
Video Signal Presence			
View video signal presence	Esc 0 LS ←	X61 X61 ... X61↵ *In verbose modes 2 and 3:* In00 • $X61_1$ $X61_2$ ... $X61_n$↵	View video signal presence X61 on all inputs.

KEY:

X1 = Input number: 0 through 9999 (assigned by the VCS program). Response is four digits with leading zeros.
0 = Window without source.
1-999 = Physical video connections on all chassis in the system.
1000-9999 = VNC, image, text, and clock sources defined in the system

X3 = Canvas number: 1 through 10. Response is two digits with leading zero.
0 = All canvases (for window mute and preset recall only).

X22 = Test pattern: 0 through 13. Response format is two digits, with a leading zero (see **Test pattern symbol definitions** on page 65 for a list of available test pattern).

X44 = Input HDCP status: 0 = No video detected, 1 = Video detected without HDCP, 2 = Video detected with HDCP.

X61 = Video signal status: 0 = Video signal not detected, 1 = Video signal detected.

X62 = Power save status: 0 = off (full power mode, default), 1 = power save on.

X75 = Window border style number: 000 through 127. 000 = No border.

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
Advanced Configuration, continued			
Power Save			
Power save off	Esc 0 PSAV ←	Psav 0 ↵	The Quantum Ultra runs in full power mode (default).
Power save on	Esc 1 PSAV ←	Psav 1 ↵	The unit enters low power state that can be exited only via the Power Save Off command or a power cycle.
View power save status	Esc PSAV ←	X62 ↵ *In verbose modes 2 and 3:* Psav X62 ↵	View current power save status X62.
NOTE: When power save is disabled, the Quantum Ultra reboots, and network connections must be re-established.			
KEY: X62 = Power save status: 0 = off (full power mode, default), 1 = power save on.			
Resets			
Reboot system and save network settings	Esc 1 BOOT ←	Boot 1↵	Reboot the system and retain the network settings.
Reboot system and discard network settings	Esc 3 BOOT ←	Boot 3↵	Reboot the system and discard the network setting changes.
System reset (soft reset)	Esc ZXXX ←	Zpx↵	Reset all device settings to factory defaults. The project file is deleted and the unit is rebooted to commit and clear video outputs. IP configuration and picture files remain untouched.
Absolute system reset but retain IP settings.	Esc ZY ←	Zpy↵	Set all device settings to factory defaults except the IP address, subnet mask, gateway address, DHCP, and port mapping. The project file is deleted, the picture folder is reset to default images, and the unit is rebooted to commit and clear video outputs. The IP configuration remains untouched.
Absolute system reset	Esc ZQQQ ←	Zpq↵	Set all device settings plus DHCP and the IP address to factory defaults. The project file is deleted, the picture folder is reset to default images, the IP configuration is reset to default, and the unit is rebooted to commit and clear video outputs. This command also removes the initial factory-configured serial number password, and resets it to extron.

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
Information Requests			
General information	X3 * X5 * I	Grp X3•Win X5•In X1•Typ X4•Blk X42•Res X80•Vrt X13↵ (Responses are the same in verbose modes 2 and 3.)	View canvas (output group), window, input selection, source type, mute status, input resolution, and vertical frequency.
Query model name	1I	X6 ↵ *In verbose modes 2 and 3:* Inf01 * X6 ↵	View Quantum Ultra model name X6.
Query firmware version	Q	*n.nn* ↵ *In verbose modes 2 and 3:* Ver01 * *n.nn* ↵	View firmware version to the second decimal place.
Query firmware build version	*Q	*n.nn.nnnn-bnnn*↵ *In verbose modes 2 and 3:* Bld *n.nn.nnnn-bnnn* ↵	View the full firmware version.
Query part number	N	X7 ↵ *In verbose modes 2 and 3:* Pno X7 ↵	View the Quantum Ultra part number.
View internal temperature	Esc 20STAT ←	X12 ↵ *In verbose modes 2 and 3:* 20Stat • X12 ↵	View unit internal temperature X12 in degrees Celsius.
View SBC temperature	Esc 21STAT ←	X12 ↵ *In verbose modes 2 and 3:* 21Stat • X12 ↵	View temperature X12 of the internal controller (SBC) in degrees Celsius.
View I/O card temperature	Esc 22STAT ←	X12 ↵ *In verbose modes 2 and 3:* 22Stat • X12 ↵	View temperature X12 of the hottest input or output card.

KEY:

X1 = Input number: 0 through 9999 (assigned by the VCS program). Response is four digits with leading zeros.
0 = Window without source.
1-999 = Physical video connections on all chassis in the system.
1000-9999 = VNC, image, text, and clock sources defined in the system

X3 = Canvas number: 1 through 10. Response is two digits with leading zero.
0 = All canvases (for window mute and preset recall only)

X4 = Source format: 0 = No signal present, 1 = HDMI, 4 = H.264/MJPEG, 5 = VNC, 6 = Clock, 7 = Image file (.bmp, .jpg, .tif, or .png)

X5 = Window number: 1 through 999. Response is three digits with leading zeros.
0 = All windows (for window mute only)

X6 = Quantum Ultra 610, Quantum Ultra 305, Quantum Ultra II 610, Quantum Ultra II 305, Quantum Ultra Connect 128, or Quantum Ultra Connect 84

X7 = **Quantum Ultra 610** = 60-1571-01 or 60-1990-01 **Quantum Ultra 305** = 60-1734-01 or 60-1989-01
Quantum Ultra II 610 = 60-1900-01 **Quantum Ultra II 305** = 60-1899-01
Quantum Ultra Connect 84 = 60-1898-01 or 60-1898-11
Quantum Ultra Connect 128 = 60-1898-02 or 60-1898-12

X12 = Internal temperature in degrees Celsius.

X13 = Vertical frequency: Response format is three digits with leading zeros and one decimal place.

X42 = Window mute: 0 = Off (unmute) (default), 1 = On (mute window)

X80 = Input resolution: Horizontal and vertical dimensions.

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
Information Requests (continued)			
Query HDCP status of an output	Esc O X2 HDCP ←	X45 ↵ *In verbose modes 2 and 3:* HdcpO X2 * X45 ↵	View HDCP status X45 of output X2.
Query HDCP status of all outputs	Esc OHDCP ←	X45[1] X45[2] X45[3] ... X45[n] ↵ *In verbose modes 2 and 3:* HdcpO X45[1] X45[2] X45[3]...X45[n] ↵	View HDCP status X45 of all outputs from 1 through *n*.
Query hardware status	S	X10 • X10 • X10 • X10 • X12 • X12 • X12 ↵	View the status of the following hardware elements in the order shown below: <*primary psu*>, <*redundant psu*>, <*front fan*>, <*rear fan*>, <*ambient temp*>, <*sbc temp*>, <*card temp*>
Example:	S	Sts1 1 1 1 26 45 54	Status, verbose modes 2 and 3: Primary power supply: 1 (on) Redundant power supply: 1 (on) Front fan: 1 (on) Rear fans: 1 (on) Ambient temperature: 26 °C SBC temperature: 45 °C I/O card temperature: 54 °C
Query hardware status of chassis in an expansion system	X85S	X85*X10•X10•X10•X10•X12•X12•X12 ↵ *In verbose modes 2 and 3:* StsX85*X10•X10•X10•X10•X12•X12•X12 ↵	View the status of the hardware elements of chassis X85 in an expansion system.
Query LinkLicenses	Esc LELIC ← ↵↵	Express Mobile Software Connection, 79-2576-01 ↵↵ *In verbose modes 2 and 3:* ElicL•Express Mobile Software Connection, 79-2576-01	Display the name of the LinkLicense installed.

NOTE: If no license is installed, the response is ↵↵ (two carriage returns with line feeds).

KEY:

X2 = Output number: 1011 through 8994 (physical video connections on all chassis in the system) Response is four digits with leading zeros. Example: 2994 = device 2, card 99, connector 4

X10 = Hardware element status: 1 = On, 0 = Off.

X12 = Internal temperature in degrees Celsius. Response is two digits with a leading zero.

X45 = Output HDCP status
0 = No active sink device detected (unplugged)
1 = Sink detected, output not encrypted
2 = Sink detected, output encrypted with HDCP (plugged and encrypted)

X85 = Chassis order number in an expansion system:
1 = Chassis 1, 2 = Chassis 2, 3 = Chassis 3, 4 = Chassis 4, 5 = Chassis 5

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
IP Setup			
NOTES: • Unless noted, all commands apply to LAN A. • After adjusting **any** IP setting, enter the network reboot command Esc 1BOOT ← for the command to take effect.			
Set unit name[24]	Esc X112 CN ←	Ipn • X112 ↵	Specify a name for the unit.
NOTES: • Up to 15 characters are permitted. No blank or space characters are allowed. Names are **not** case sensitive. • The **first** character must be an **alpha** character (A-Z, a-z). The **last** character **cannot** be a **hyphen**.			
View unit name	EscCN←	X112↵ *In verbose modes 2 and 3:* Ipn • X112 ↵	View the name of the unit.
View hardware (MAC) address for LAN A	Esc1CH←	X118 ↵ *In verbose modes 2 and 3:* Iph 1 * X118 ↵	View unit media access code (MAC) address X118 for the LAN A port.
View hardware (MAC) address for LAN B	Esc2CH←	X118↵ *In verbose modes 2 and 3:* Iph 2 * X118↵	View unit media access code (MAC) address X118 for the LAN B port.
Set date and time	Esc X27CT←	Ipt • X127 ↵	Set local date and time X27.
View date and time	EscCT←	X127↵	View local date and time X27.
Verbose Mode			
Set verbose mode	Esc X122 CV ←	Vrb X122 ↵	Set the verbose mode.
View verbose mode	Esc CV ←	X122 ↵ *In verbose modes 2 and 3:* Vrb X122 ↵	View current verbose mode X122.
DHCP			
NOTE: After adjusting IP settings by the CI, CS, or CG commands, you must enter the network reboot command Esc 1BOOT ← for the command to take effect. This is not required if you use the CISG command.			
Set DHCP to On[24]	Esc 1DH ←	Idh 1 ↵	Enable Dynamic Host Configuration Protocol (DHCP) to enable automatic assigning of IP addresses.
Set DHCP to Off[24]	Esc 0DH ←	Idh 0 ↵	Disable DHCP automatic IP address assignment.
View DHCP mode	Esc DH ←	X10 ↵ *In verbose modes 2 and 3:* Idh X10 ↵	View the DHCP status: On or Off (default).
NOTE: Attempting to set the IP address, subnet mask, or gateway address while DHCP is on results in an E14 error.			

KEY:

X10 = DHCP status: 1 = On, 0 = Off (default).

X112 = Unit name: Text string of up to 15 characters: A-Z, 0-9, and hyphen (-).

X118 = Hardware (MAC) address (00-05-A6-*xx-xx-xx*)

X122 = Verbose mode: 0 = None (default for Telnet), 1 = Verbose mode on (default for RS-232 and USB), 2 = Verbose mode off, tagged responses enabled for queries, 3 = Verbose mode and tagged responses for queries enabled (see the **Verbose mode symbol definitions** on page 67).

X127 = Set date and time format: MM/DD/YY-HH:MM:SS Example: 08/17/21-13:51:30
View date and time format: *Www* {*day of the week*}*,DD • Mmm • YYYY • HH:MM:SS*.
Example: Tue, 17 Aug 2021 13:53:58

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
IP Setup (continued)			
IP Addresses			
Set IP address [24]	Esc X113 CI←	Ipi • X113 ↵	Set IP address X113 for the unit.
View IP address[24]	Esc CI←	X113 ↵	View unit IP address X113.
Set subnet mask[24]	Esc X119 CS←	Ips • X119 ↵	Set subnet mask X119 for the unit.
View subnet mask[24]	Esc CS ←	X119 ↵	View the unit subnet mask X119.
Set gateway IP address[24]	Esc X114 CG←	Ipg • X114 ↵	Set gateway IP address X114 for the unit.
View gateway IP address	Esc CG←	X114 ↵ *In verbose modes 2 and 3:* Ipg • X114 ↵	View unit gateway IP address X114.
Set LAN IP address[24]	Esc X176*X113 CISG ←	Cisg • X176*X113 / X177*X114 ↵	Set IP address to X113 for LAN X176. The response includes subnet mask prefix / X177 and gateway address X114.
Set LAN IP address and subnet mask[24]	Esc X176*X113 / X177 CISG ←	Cisg • X176*X113 / X177*X114 ↵	Set IP address to X113 for LAN X176 and subnet mask prefix / X177. The response also includes current gateway address X114.
Set LAN IP address, subnet mask, and gateway address[24]	Esc X176*X113 /X177*X114 CISG ←	Cisg • X176*X113 / X177*X114 ↵	Set IP address to X113 for LAN X176, subnet mask prefix /X177, and gateway address X114.
View all addresses	Esc X176 CISG ←	X113 / X177*X114 ↵ *In verbose modes 2 and 3:* Cisg • X176 * X113 / X177*X114 ↵	View IP address X113, subnet mask prefix X177, and gateway address X114 at one time.

KEY:

X113 = IP address (*nnn.nnn.nnn.nnn*). Leading zeros in each of the four octets are optional in setting values and are suppressed in returned values.

X114 = Gateway address (*nnn.nnn.nnn.nnn*). Leading zeros in each of the four octets are optional in setting values and are suppressed in returned values.

X119 = Subnet mask (*nnn.nnn.nnn.nnn*)
Leading zeros in each of the four octets are optional in setting values, and are suppressed in returned values

X176 = Network interface: 1 = LAN A port, 2 = LAN B port

X177 = Prefix representing subnet mask bits (subnet mask value in CISG commands). Default = /24, which represents the default subnet mask, 255.255.255.0.

Command	ASCII Command (Host to Processor)	Response (Processor to Host)	Additional Description
Passwords			
NOTE: The factory configured passwords for all accounts on this device have been set to the device serial number. In the event of an absolute system reset, the passwords convert to the default, which is `extron`.			
Set project administrator password[24]	Esc X133 CA ←	Ipa • **** ↵	Set password X133 for the unit. Passwords are case-sensitive.
Clear project administrator password[24]	Esc • CA ←	Ipa • ↵	Remove the administrator password from the unit. The user password is also removed.
View project administrator password[24]	Esc CA ←	**** ↵ *In verbose modes 2 and 3:* Ipa **** ↵	The actual password is not displayed. Four asterisks are returned instead. If there is no password, **** is omitted from the response.
Set project user password[14, 24]	Esc X133 CU ←	Ipu • **** ↵	Set user password X133 for the unit. Passwords are case-sensitive.
NOTE: A user password cannot be set unless an administrator password has been assigned.			
Clear project user password[24]	Esc • CU ←	Ipu • ↵	Remove the user password from the unit.
View project user password[24]	Esc CU ←	**** ↵ *In verbose modes 2 and 3:* Ipu • **** ↵	The actual password cannot be viewed. Four asterisks are returned instead. If there is no password, **** is omitted from the response.

KEY:

X133 = Administrator or user password, 128 characters maximum. / \ | * and space characters are **not** allowed. Passwords are case-sensitive.

Videowall Configuration Software (VCS) Program

The Extron VCS program is a PC-based program for the Quantum Ultra Series that provides a convenient way to configure the videowall. System configuration is broken down into logical tasks, including output and wall configuration, source setup, preset design, and EDID Minder. Online and offline editing allows creation and configuration of systems with or without a Quantum Ultra Series device connected.

Window presets are created by dragging and dropping sources onto a virtual representation of the videowall. Offline configuration allows for videowall configuration files to be created when the Quantum Ultra Series processor is temporarily unavailable.

Downloading VCS from the Website

To use the Videowall Configuration Software, download the latest version of the program from the Extron web page and install it on the PC that will be connected to the Quantum Ultra Series device, as described in the following sections. You can also download updates to VCS as they become available. To access the software:

1. On the Extron website, hover the mouse pointer over the **Download** tab (see figure 67, ❶), then move the pointer to the **Software** link (❷) in the Downloads column and click it.

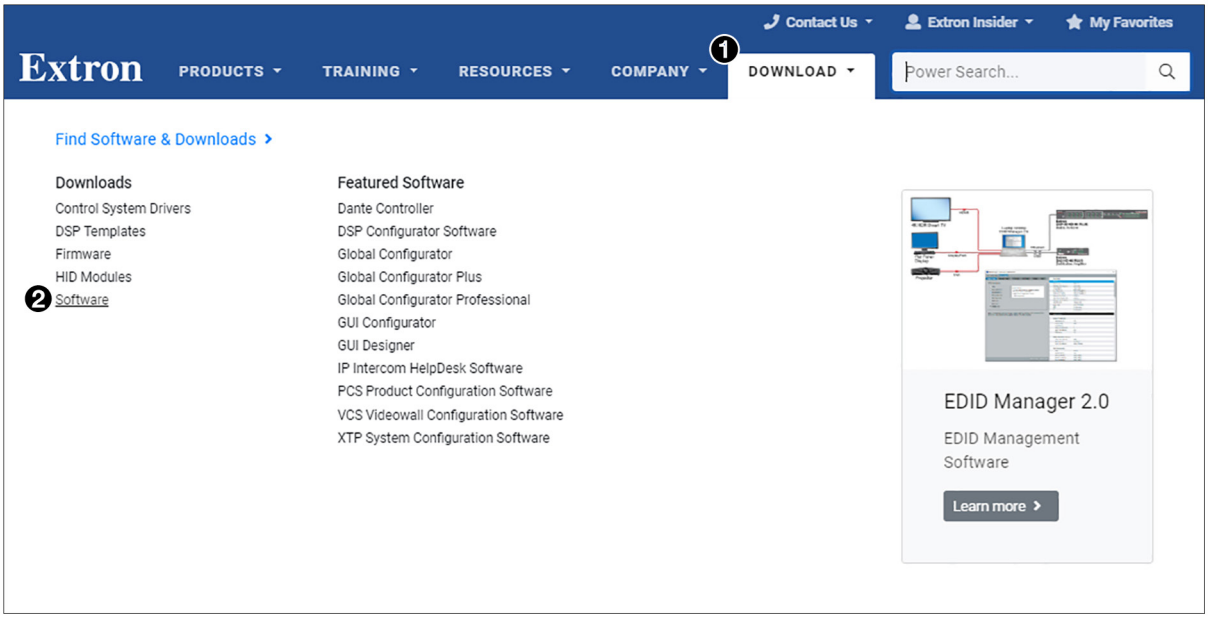


Figure 67. Software Link on the Download Page

2. On the `Download Center` screen, click the **`V`** link (see figure 68, ❶).

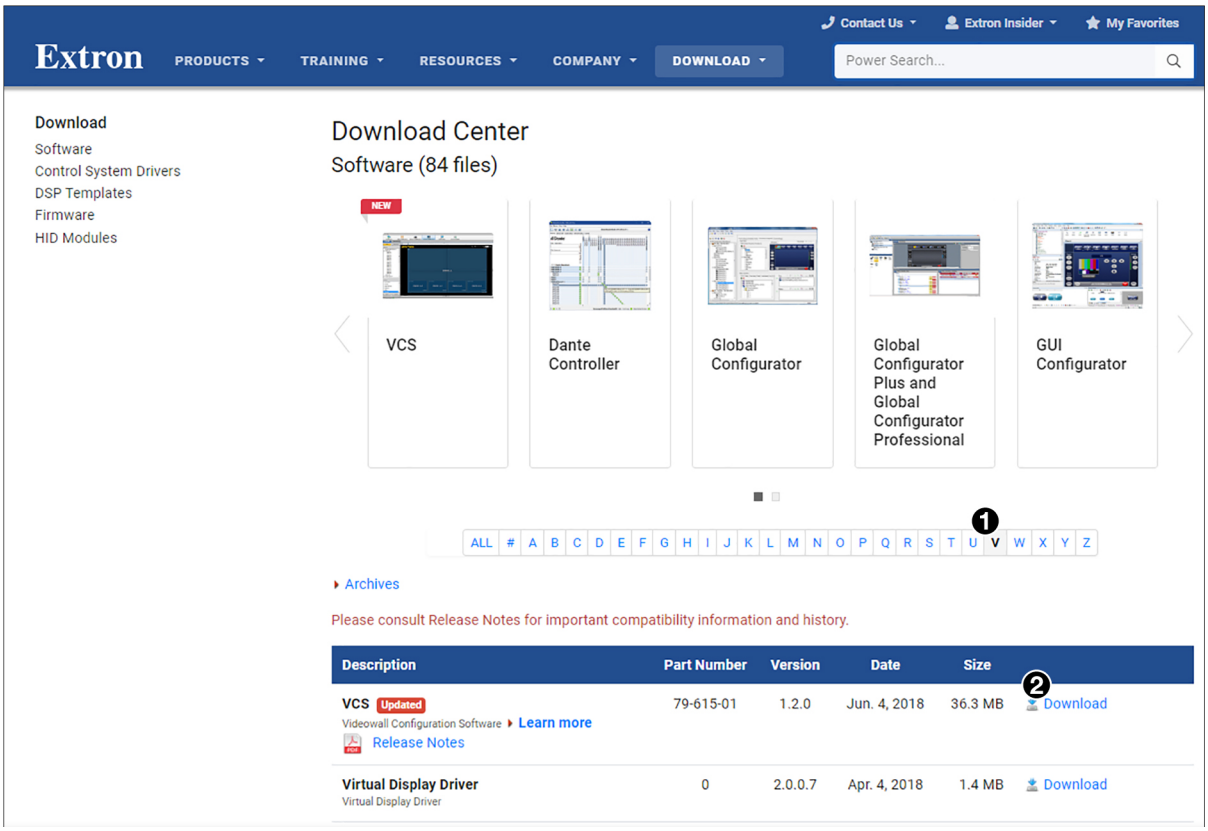


Figure 68. VCS Links on Download Center Page

3. Locate `VCS` on the list of available software programs and click the **`Download`** link (❷) to the right of the name.
4. On the login page that appears next, fill in the required information to log into the **www.extron.com** website (if you need an ID number, see your Extron representative).
5. Follow the instructions on the subsequent screens to complete the software program installation. By default, the installation places the program files at: `C:\Program Files (x86)\Extron\Extron VCS`.

   If there is not already an Extron folder in your Program Files x86 folder, the installation program creates it as well.

Starting the Configuration Program

To start using the VCS program:

1. Open VCS on your PC either by double-clicking the **VCS** icon (shown at right) if one was placed on your desktop during installation, or by clicking **Start** > **All Programs** > **Extron Electronics**> **Videowall Configuration Software**. (This opening process may vary with the operating system.) The **Start** screen opens, displaying the **Connect to Device** window, **Discover** tab (see figure 70).

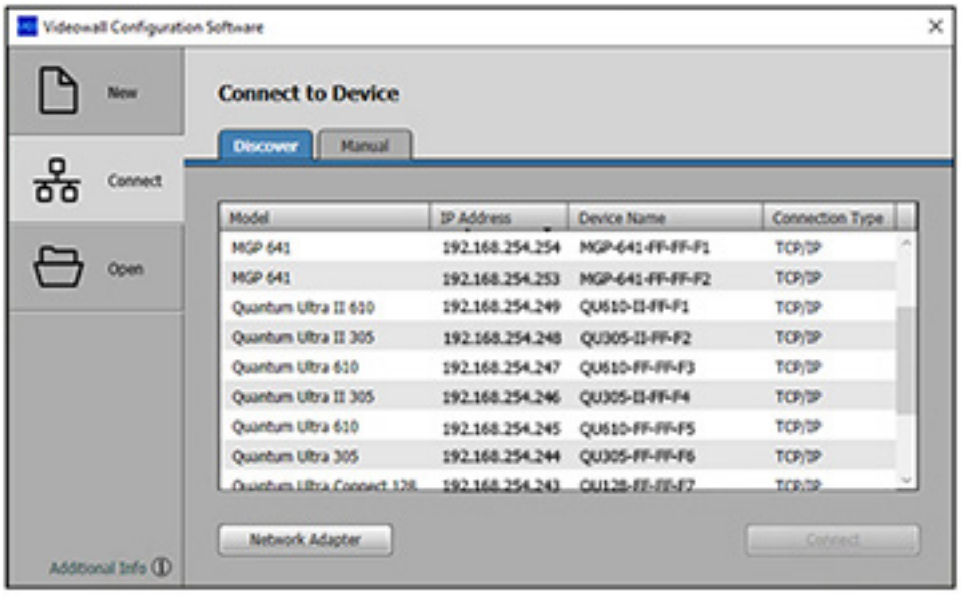


Figure 69. Connect to Device Screen

2. Select the **New** side tab (see figure 70, ❶) to open the **Create New Project** screen.

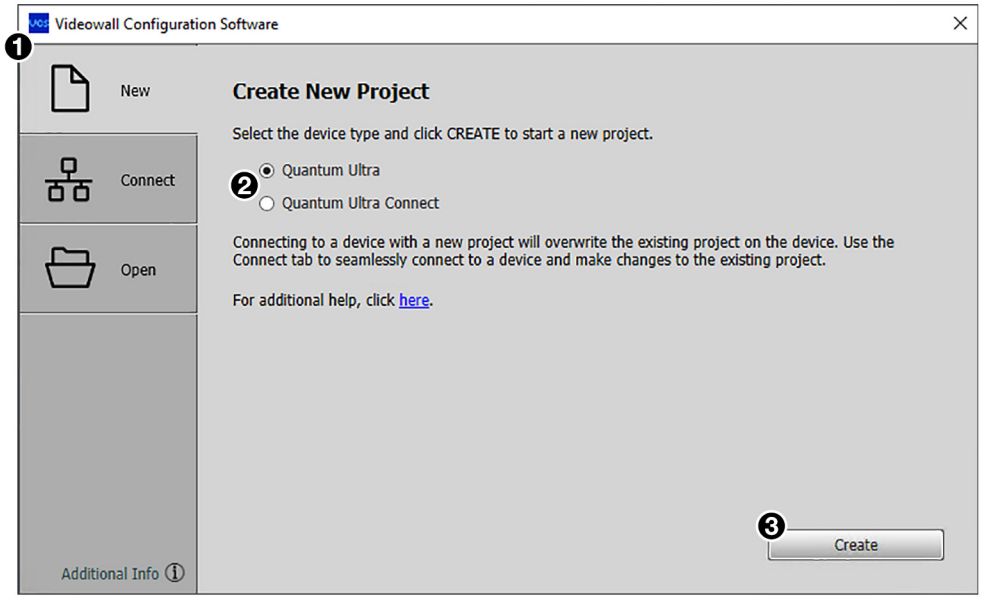


Figure 70. VCS New Project Screen

3. Select the radio button for your Quantum Ultra Series device (**Quantum Ultra** or **Quantum Ultra Connect**, ❷).

NOTE: You cannot proceed without selecting a device type.

4. Click the **Create** button (see **figure 70**, ❸ on the previous page). VCS searches for devices that are connected to the network and are the type of device selected in step 3. The **Connection** screen displays a list of detected Quantum Ultra Series devices (see figure 71 ❶).

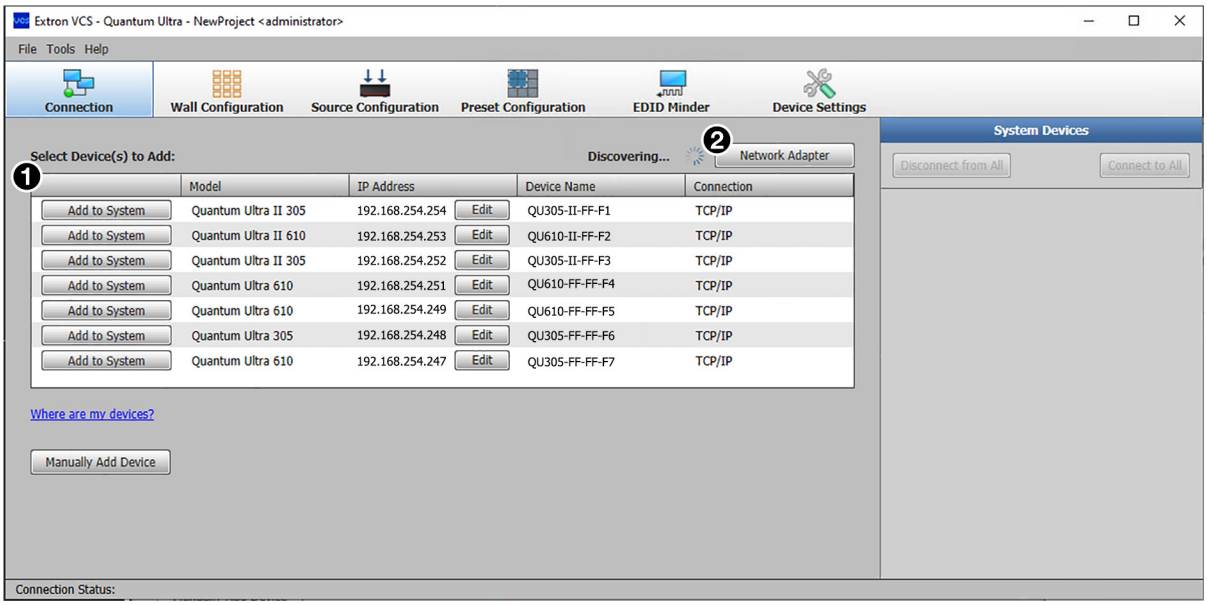


Figure 71. Connection Screen

NOTE: Only devices of the selected type (Quantum Ultra or Quantum Ultra Connect) are displayed in the **Select Device(s)** to Add panel (see step 6 to change what is displayed).

5. If no devices appear in the panel, confirm that VCS is using the intended network connection. If not, select a different network adapter as follows:

   a. Click the **Network Adapter** button (❷).

   b. On the **Network Adapter** screen, select the desired network adapter to use to connect to the Quantum Ultra Series device chassis.

      If no network adapters appear on the screen, select the **Show All Network Adapters** checkbox (see figure 72, ❶).

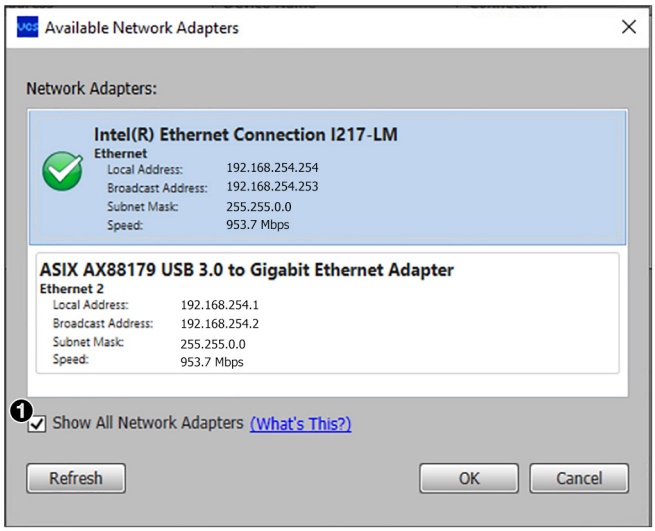


Figure 72. Network Adapter Screen

   c. Click **OK** to confirm your selection. The **Network Adapter** screen closes.

6. On the **Connection** screen, locate your device on the list and click the **Add to System** button at the left of the device name (see figure 73, ❶). Connection information is displayed in the **System Devices** panel (❷).

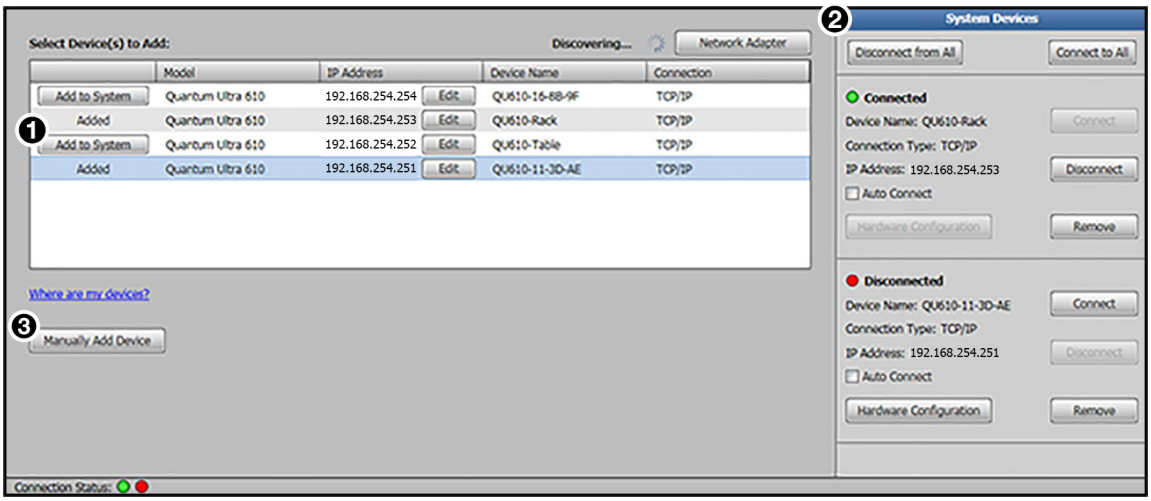


Figure 73. Adding Devices to the System

If you do not see your device in the Select Device(s) to Add panel:

a. Click **Manually Add Device** (see figure 73, ❸). The Manually Add Device window opens.

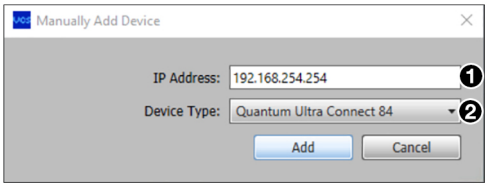


Figure 74. Manually Add Device Window

b. In the **IP Address** field, enter the address of the Quantum Ultra Series device to be connected (see figure 74, ❶).

c. If necessary, select the Quantum Ultra Series device type from the **Device Type** drop-down menu (❷).

d. Click **Add**. The connection information for the device is displayed in the **System Devices** panel (see figure 73, ❷).

NOTE: A unit added this way is **not** shown in the **Select Devices to Add** panel.

7. Edit IP address settings for your device as needed.

a. In the **Select Device(s) to Add** panel, click the **Edit** button (see figure 75, ❶).

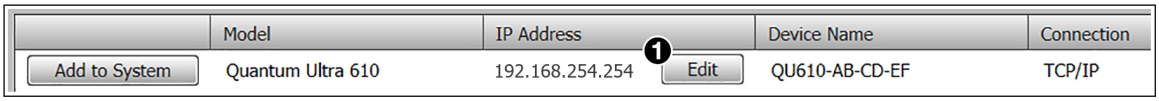


Figure 75. Editing a Device IP Address

b. The **Communication Settings** dialog box opens. In this window, enter a new IP address and edit other IP settings as desired.

To enable Dynamic Host Configuration Protocol (DHCP), select the **DHCP** checkbox (see **figure 76**, ❶ on the next page). When this box is selected, an available IP address is assigned automatically to the unit when it is connected to a supporting network. All other IP settings fields become read-only.

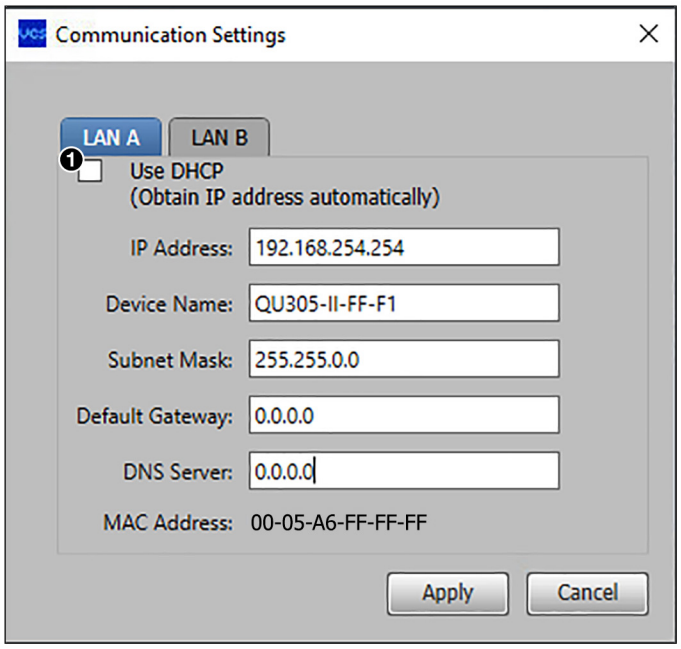


Figure 76. Communication Settings Screen

If you added this device manually, click the **Device Settings** button (shown at right) on the taskbar. On the Device Details screen, click the **Communication Settings** button (see figure 77, ❶) to display the Communication Settings dialog box.



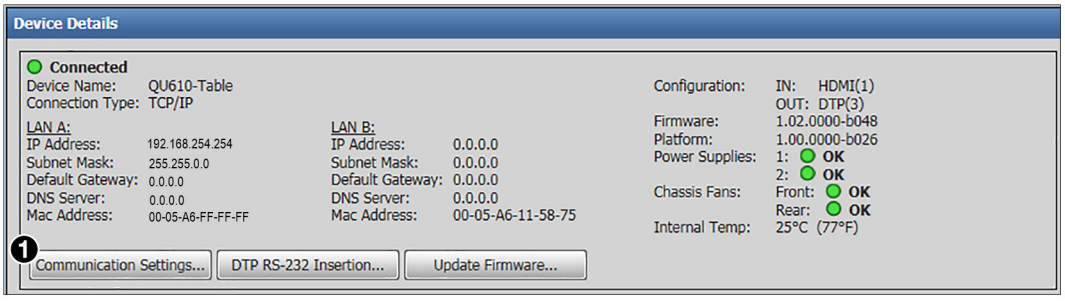


Figure 77. Device Details Screen

For detailed instructions on using VCS to configure the videowall, see the *VCS Help File*.

Starting the VCS Program with Expansion Cards

There are some differences in the procedure for starting a VCS project for a system containing expansion cards. To set up an expansion project:

1. On the `Start` screen, select the **`Quantum Ultra 305/610`** radio button.

   NOTE: Expansion cards are not supported on the Quantum Ultra II models.

2. On the `New Project` screen, each listed device with expansion cards is preceded by a **`Configure Expansion`** button (in place of the **`Add to System`** button, see figure 78, ❶). Click the **`Configure Expansion`** button for any one of the expansion devices. (Figure 78 shows an expansion system with two chassis. There can be up to five chassis in an expansion system.)

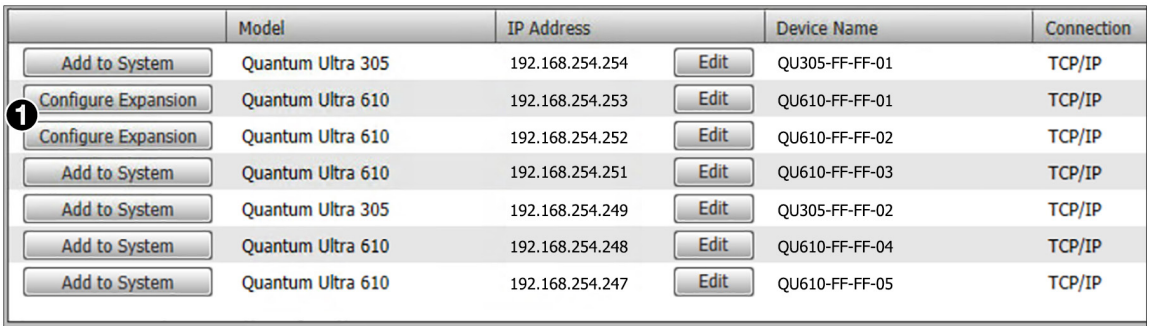


Figure 78. Connection Screen for an Expansion System

3. The `Confirm Expansion System` window opens, showing the IP addresses of all Quantum Ultra devices with expansion cards, listed in their order in the chain, with the primary device at the top. If all the information on this screen is correct, click the **`Confirm`** button at the bottom of the screen.

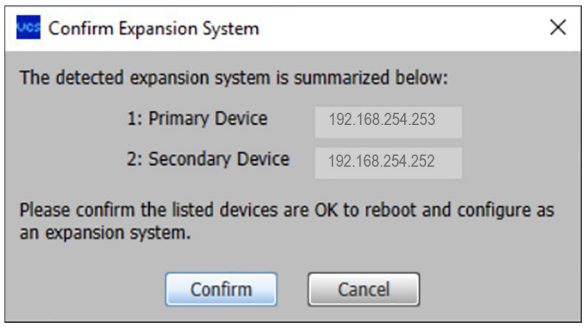


Figure 79. Confirm Expansion System Prompt

NOTE: If the IP address of a connected device in the chain is not found, this window indicates which device is missing. Click **`Cancel`** to return to the `New Project` connection screen.

A prompt window appears, indicating that the initial configuration is complete and that the system will reboot.

4. Click **`OK`** on the prompt to close it. The reboot starts automatically and takes a few minutes to complete.

5. When the connection screen is displayed, the device list contains one item, the primary chassis, representing the expansion system. **Quantum Ultra Expansion** is displayed in the **Model** column (see figure 80, ❶). The information in the rest of the columns (**IP Address**, **Device Name**, and **Connection** columns) applies to the primary device in the chain.

   Click the **Add to System** button in front of the **Quantum Ultra Expansion** line (❷) to add the expansion chain to the **System Devices** panel.

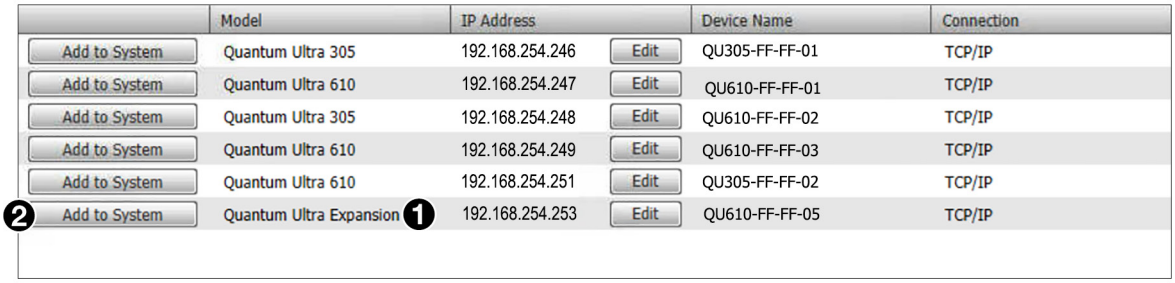


Figure 80. Quantum Ultra Expansion Chain in the Device Discovery Panel

Only information on the primary device is displayed in the **System Devices** panel. However, an **Expansion Device Details** button appears below the device in the panel. Click this button to display a drop-down list of the IP addresses of all the chassis in the chain (see figure 81, ❶).

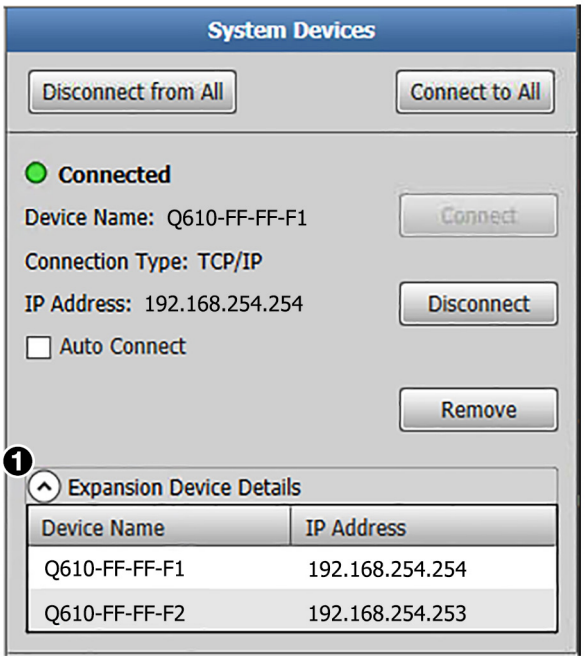


Figure 81. Expansion Details List in the System Devices Panel

6. Configure the videowall (see the *VCS Help File*).

Adding expansion devices manually

If the desired expansion device does not appear on the `NewProject` discovery screen, add the expansion system manually as follows:

1. On the `NewProject` connection screen, click the **`Manually Add Device`** button (see **figure 73**, ❸ on page 85.
2. On the `Manually Add Device` window, click the **`Manually Configure Expansion`** button (see figure 82, ❶). Ignore the other fields.

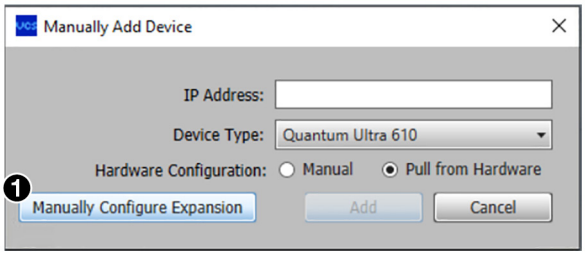


Figure 82. Manually Add Device Window

3. On the `Manually Configure Expansion` screen, enter the IP addresses of the devices in the expansion. Be sure to enter the addresses in the order the devices are connected in the chain, with the primary device address in the top (first) field (see figure 83, ❶).

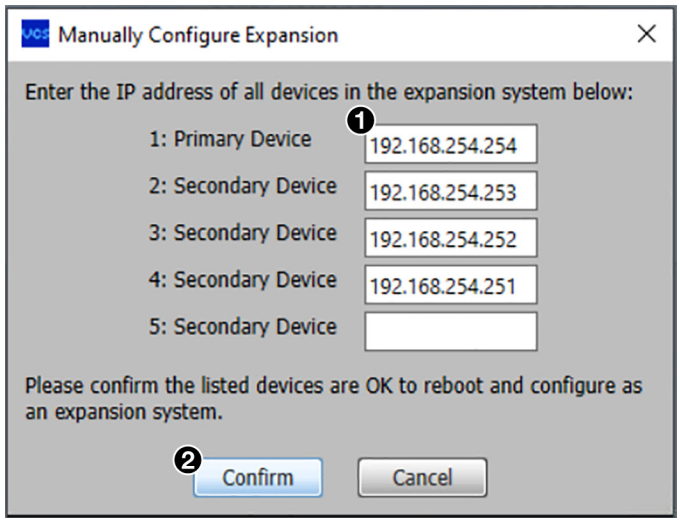


Figure 83. Manually Configure Expansion Screen

4. Click **`Confirm`** (❷). The system restarts, then after approximately 2 minutes displays the expansion system as a single item on the device list with the model name `Quantum Ultra Expansion` (see **figure 80**, ❶ on page 87).
5. Go to **step 4** of the "Starting the VCS Program with Expansion Cards" procedure on the previous page, and complete the procedure as described.

NOTE: If the Quantum Ultra Expansion line does not appear on the connection screen, add the primary device manually (see **If you do not see your device in the Select Device(s) to Add panel** on page 85).

Reconfiguring an expansion system

To redo the configuration or repurpose the chassis into different systems:

1. Connect to the expansion system.
2. From the `Tools` menu, select **`Reset Devices`**.
3. In the `Reset Devices` window, select **`Reset Device Settings and Delete All Files (Retains TCP/IP Settings)`** (the second radio button).
4. Click **`Reset`**. The system reboots. After approximately 2 minutes, the expansion devices appear listed separately in the device discovery panel, as shown in **figure 78** on page 87.

Maintenance

The Quantum Ultra 610 has several parts that you can replace, should they fail, wear out, or no longer meet your requirement. On the Quantum Ultra 305, only the input and output cards can be replaced. The Quantum Ultra Connect models have no user-replaceable parts, therefore, these maintenance procedures do not apply to them.

This section provides instructions for replacing these parts, which you can order from your Extron representative or by going to **www.extron.com**. All these replacements are performed from the front panel.

The following topics are discussed in this section:

- **Front Panel - Quantum Ultra and Ultra II 610**
- **Replacing Input and Output Cards**
- **Replacing a Power Supply - Quantum Ultra and Ultra II 610**
- **Replacing the Power Supply Front Fan - Quantum Ultra 610 Only**
- **Replacing a Disk Drive - Quantum Ultra and Ultra II 610**
- **Replacing the System Board Computer (SBC) Assembly - Quantum Ultra and Ultra II**

Front Panel — Quantum Ultra and Ultra II 610

Accessing the Quantum Ultra and Ultra II 610 Front Panel

To access the Quantum Ultra and Ultra II 610 front panel, open the front panel door as follows:

1. Insert a coin, such as a penny, in the slot on the front panel lock and rotate it one quarter turn counterclockwise, until the dot above the slot faces `Open`.

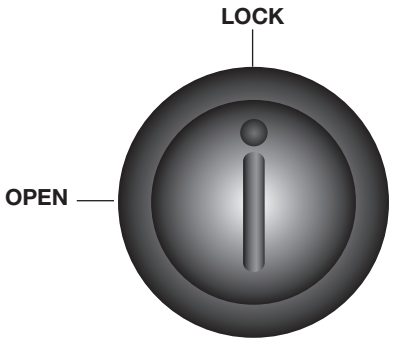


Figure 84. Front Panel Door Lock

2. Pull the front door all the way down (see figure 85).

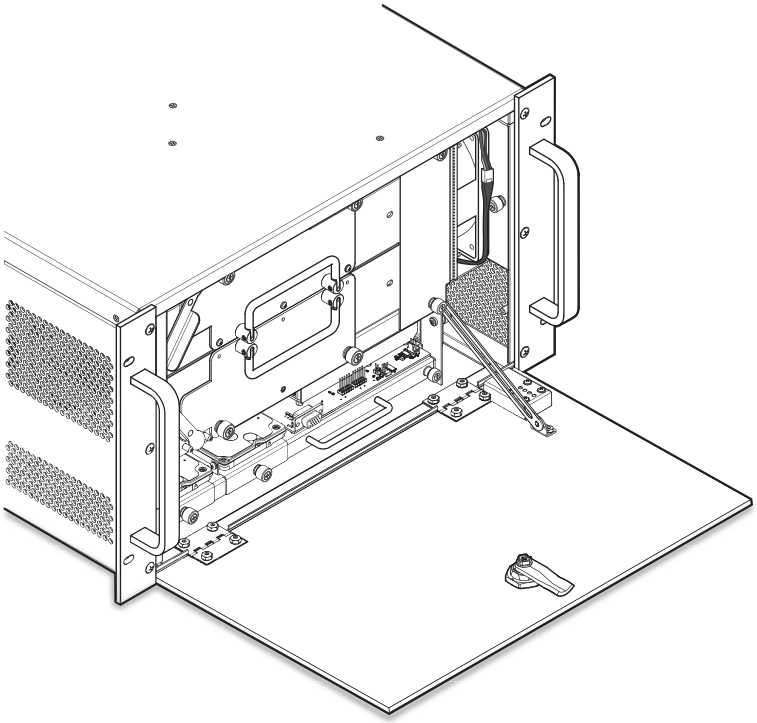


Figure 85. Front Panel Door Open

3. When finished with maintenance tasks, lift up the front panel door until it is in place.
4. Holding the door closed, use a coin to rotate the lock clockwise until it is in a vertical position.

The power supplies and fans can be removed and replaced while the system is powered on. To replace the SBC and drives, the system must be powered off.

The items that may need to be replaced at some time during the lifetime of the Quantum Ultra 610 are accessed via the front panel. Most of these items are held in place by thumbscrews.

ATTENTION:

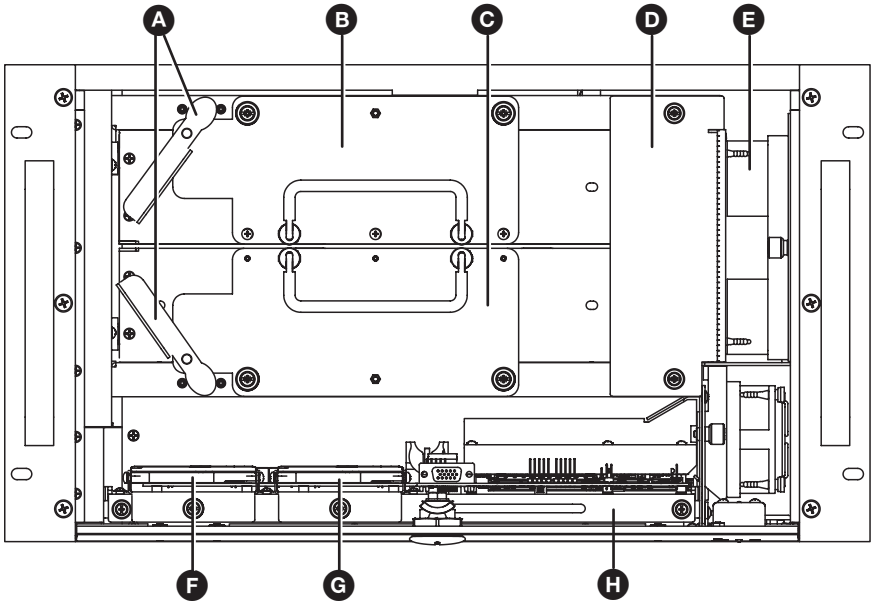
- Thumbscrews should be tightened with a screwdriver after both initial installation and subsequent access to the panel.
- Les vis doivent être serrées avec un tournevis après la première installation et l'accès postérieur au panneau.

NOTE: The thumbscrews cannot be removed completely.

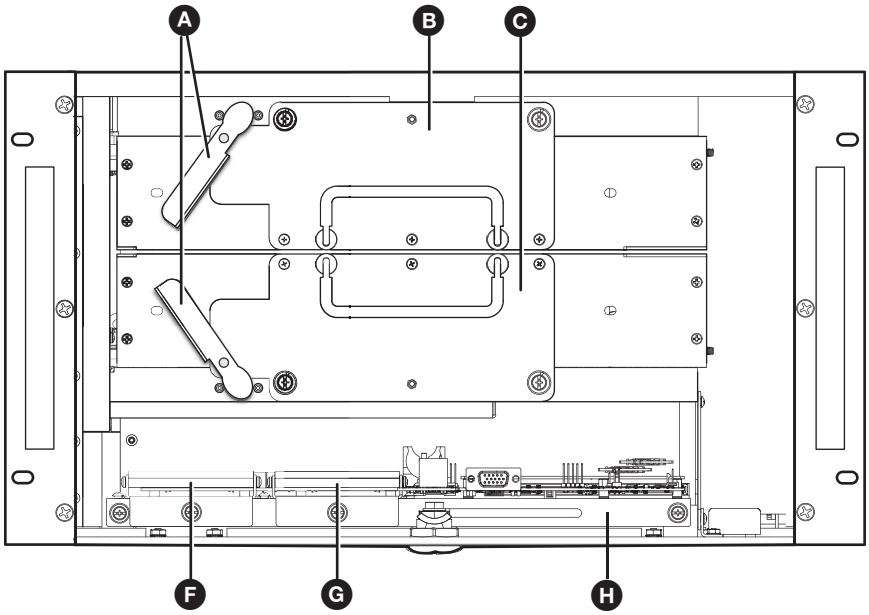
Front Panel Contents

Figure 86 shows the front panels of a Quantum Ultra 610 and a Quantum Ultra II 610.

Quantum Ultra 610



Quantum Ultra II 610



- **A** Power supply levers
- **B** Primary power supply
- **C** Redundant power supply
- **D** Protective cover panel (Quantum Ultra 610 only)
- **E** Power supply (front) fan (Quantum Ultra 610 only)
- **F** C: drive
- **G** D: drive
- **H** System Board Computer (SBC)

Figure 86. Front Panels (Behind the Door)

Ⓐ **Power supply levers** — Rotate these latches to release the power supplies for removal, or to assist in installing the power supply completely onto the connector (see **Replacing a Power Supply - Quantum Ultra 610** starting on page 96).

Ⓑ **Primary power supply** — Main power supply that provides power to the processor. This power supply can be replaced if necessary without powering off the system (hot-swappable) (see **Replacing the Primary Power Supply** on page 96).

Ⓒ **Redundant power supply** — A secondary or backup power supply that can continue to power the Quantum Ultra 610 if the primary supply fails. This power supply can also be replaced without powering off the system (see **Replacing the Redundant Power Supply** on page 101).

Ⓓ **Protective cover panel** (Quantum Ultra 610 only) — This panel protects the front fan and guides air into the power supplies. You must remove this panel in order to replace the power supplies or the front fan.

Ⓔ **Power supply (front) fan** (Quantum Ultra 610 only) — Cools the power supplies. This fan can be replaced without powering off the system (see **Replacing the Power Supply Front Fan - Quantum Ultra 610** on page 102).

> **NOTE:** On the Quantum Ultra II 610, this fan is located inside the power supply casing and is not is not user-replaceable.

Ⓕ **C: drive** — This write-protected drive contains the embedded operating system and the Quantum Ultra Series firmware.

Ⓖ **D: drive** — This drive can be used to store user files such as pictures and system configuration data.

Ⓗ **System Board Computer (SBC)** — This assembly contains the two hard drives (`C:` and `D:`) and the SBC, which runs the Quantum Ultra Series firmware.

Replacing Input and Output Cards

When you place an order for a Quantum Ultra Series processor, you specify how many input and output cards are loaded when the product is shipped. However, if your application changes, you may want to purchase additional cards from Extron and replace one or more of the original cards.

For example, you might start out with three input cards and three output cards, then decide you want five output cards and only two input cards. You would need to order two more output cards, and remove one input card.

When designing your configuration, keep in mind the following restrictions:

- There must be at least one input and one output card installed.
- All the input cards must be installed in card slots **above** the output cards. Do not intersperse input cards with output cards (see **Card Locations — Quantum Ultra and Ultra II 610 and 305** on page 20).

To replace an input or output card:

1. Power off the Quantum Ultra Series processor.

> **ATTENTION:**
>
> - The input and output cards are **NOT** hot-swappable and cannot be replaced while the unit is operating. Always power off the processor before inserting or removing a card.
> - Les cartes d'entrée et de sortie **NE** sont **PAS** interchangeables à chaud et ne peuvent être changées lors du fonctionnement de l'unité. Veillez à toujours mettre hors tension le processeur avant de retirer une carte.

2. On the processor rear panel, loosen the two thumbscrews at the right and left edges of the card to be removed (see **figure 88** on page 96 for the locations).
3. Slide the card out of the chassis.
4. Inside the card slot are guides on both sides to ensure the replacement card is aligned correctly. Slide the new card into the slot with its side edges in the card guides. Press the card firmly into place, so that its outside edge is flush with the rear panel of the chassis.

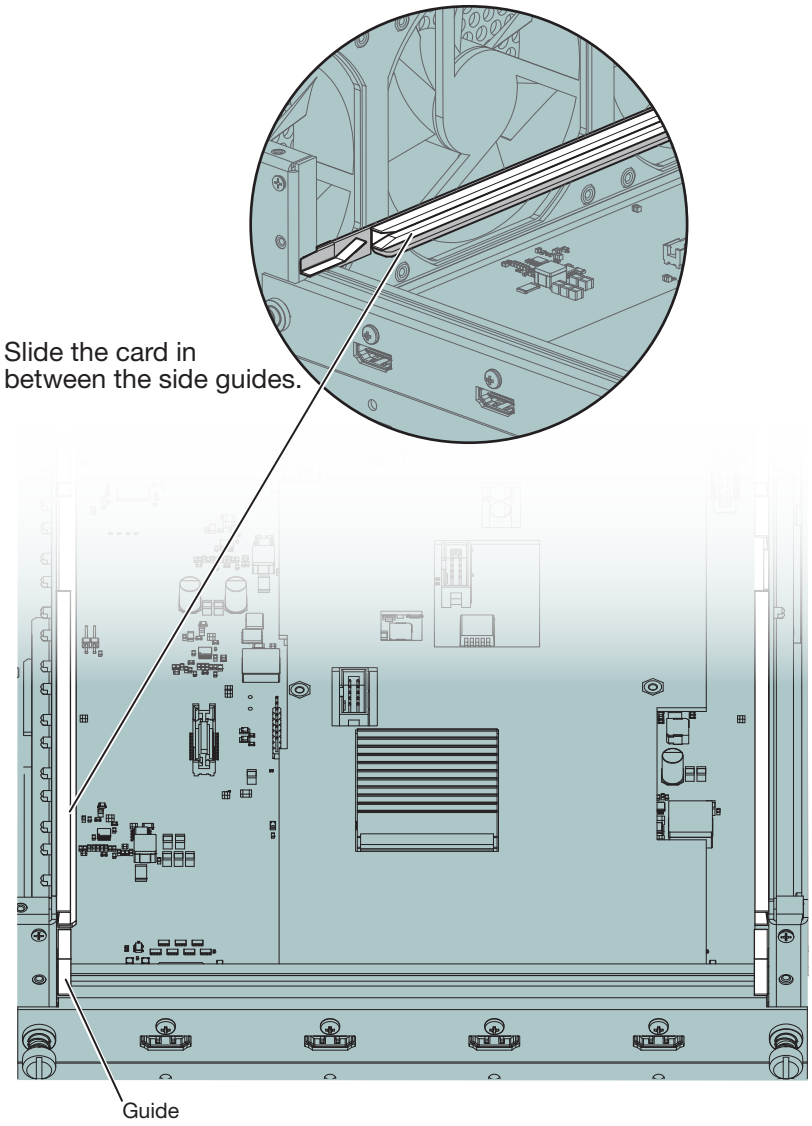


Figure 87. Input or Output Card Guides

NOTE: The card is not completely in place until you hear or feel it snap into the connector at the end of the card. If you do not feel it snap into position, press on it more firmly until you do.

5. Use a screwdriver to tighten each thumbscrew on the card by pressing inward on the screw head while rotating the screw clockwise until it is tight.

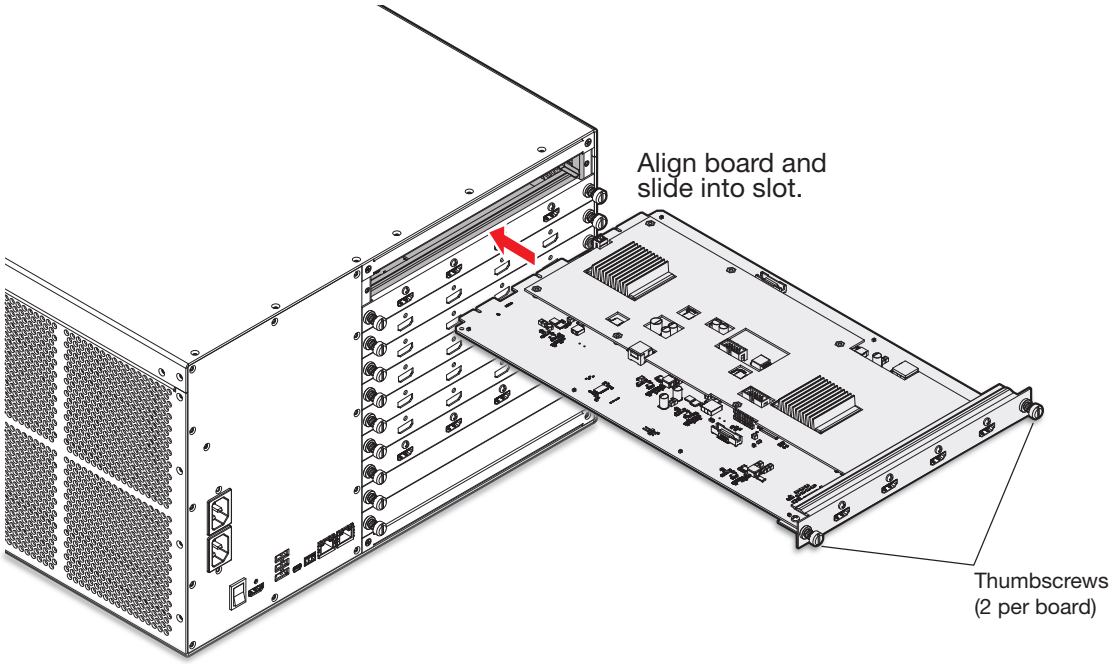


Figure 88. Installing a New Input or Output Card

6. When finished removing and installing cards, power the unit on.

Replacing a Power Supply — Quantum Ultra and Ultra II 610

The Quantum Ultra and Ultra II 610 each have a primary and a redundant power supply unit (PSU) to ensure continued, uninterrupted operation if a power supply should fail. However, if a power supply does fail, you should replace it at your earliest convenience. The power supplies are hot-swappable, that is, one can be replaced while the unit is operating and the other power supply is supplying power.

Replacing the Primary Power Supply

This section describes the procedure for replacing the primary power supply. If the redundant power supply needs to be replaced, some additional steps are required (see **Replacing the Redundant Power Supply** on page 101).

To remove and replace a power supply:

1. Using a screwdriver, loosen the two thumbscrews on the power supply and on the protective cover panel (Quantum Ultra 610 only, see figure 89, ❶.

ATTENTION:

- Thumbscrews should be tightened with a screwdriver after both initial installation and subsequent access to the panel.
- Les vis doivent être serrées avec un tournevis après la première installation et l'accès postérieur au panneau.

NOTE: The thumbscrews cannot be removed completely from the plates.

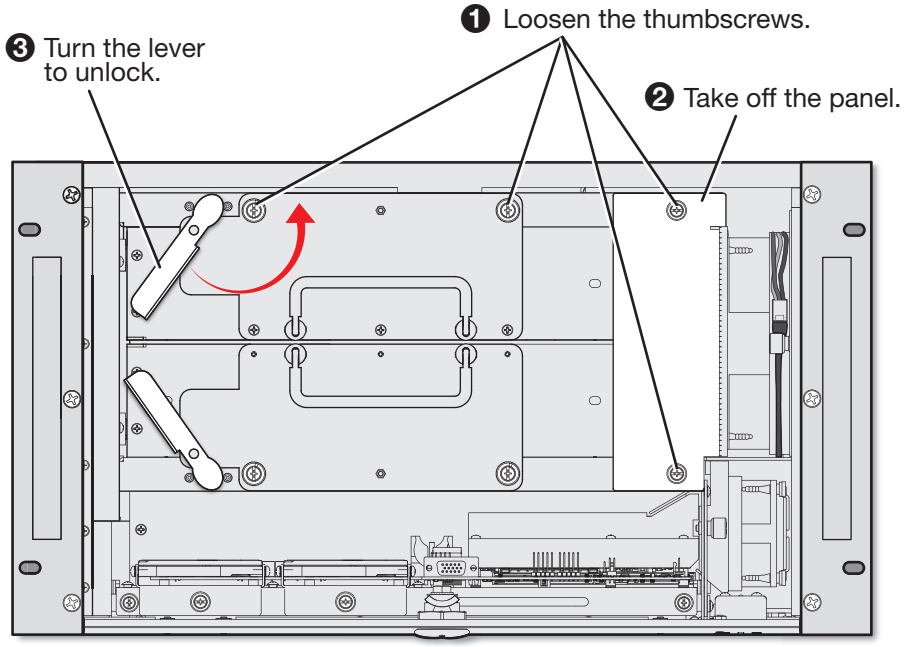


Figure 89. Unfastening the Power Supply — Quantum Ultra 610

2. **Quantum Ultra 610 only:** Remove the cover panel (❷).

NOTE: Because the Quantum Ultra II 610 does not have fans outside of the power supply casings, it does not have a protective cover panel that needs to be removed.

3. Rotate the lever to the right (❸) until it is in a horizontal position, parallel to the top and bottom of the unit.

4. As you rotate the lever, the power supply slides toward the right. Continue sliding the power supply to the right as far as possible (see figure 90, below, and **figure 91** on the next page, ❶).

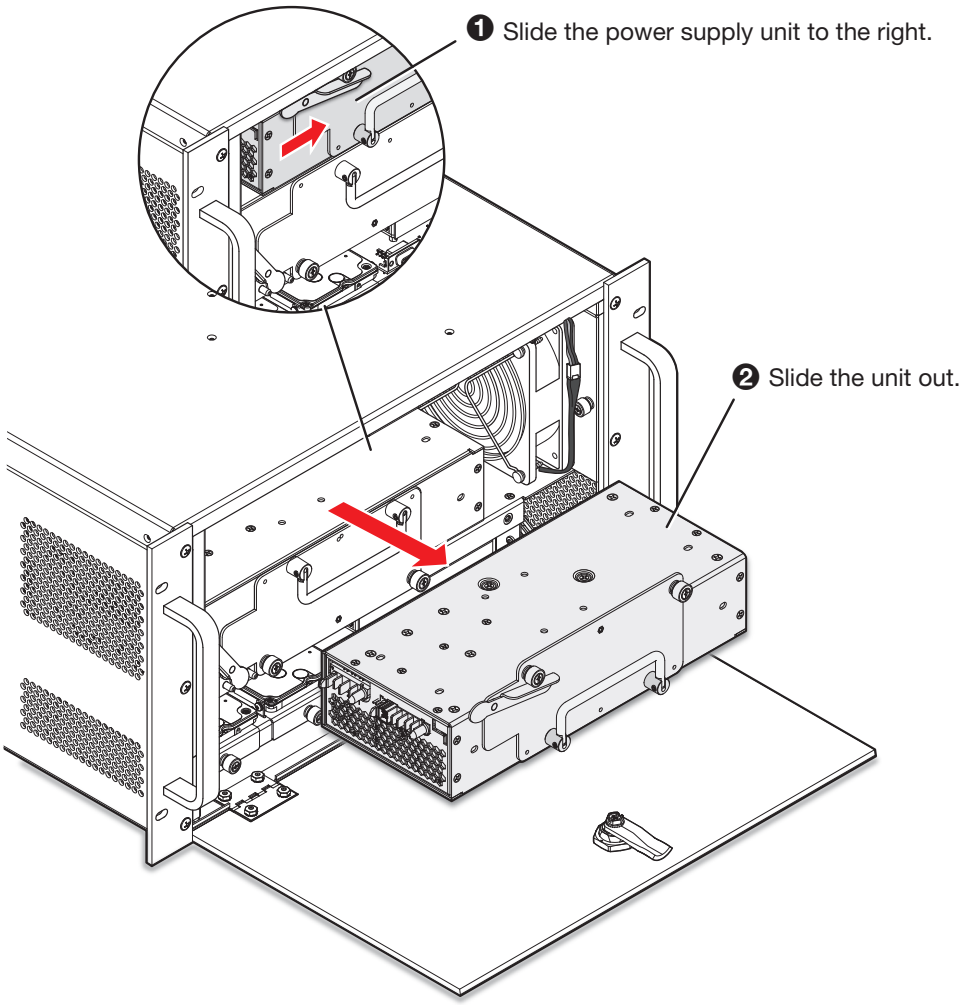


Figure 90. Rotating the Latch and Sliding the Power Supply to the Right and Out (Quantum Ultra 610)

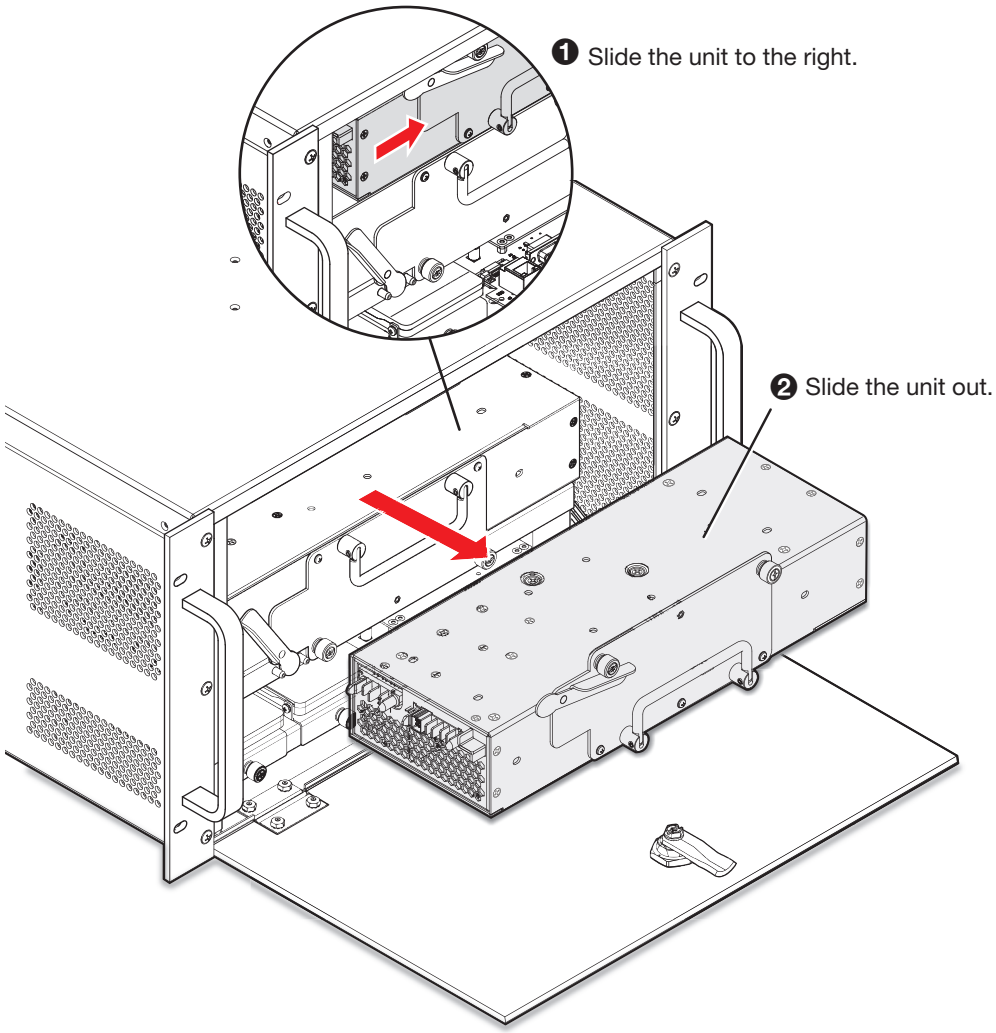


Figure 91. Sliding the Power Supply Out (Quantum Ultra II 610)

5. Lift the power supply up slightly and slide it toward you, out of the chassis (see **figure 90** on the previous page and figure 91, above, ❷).
6. Slide the new power supply into the empty slot vacated by the old power supply, until its back panel is flat against the back wall of the power supply compartment.

NOTE: There are two keyhole slots in the back wall and one on the front surface of the power supply compartment. The power supply has three protruding pegs (see figure 92, ❶).

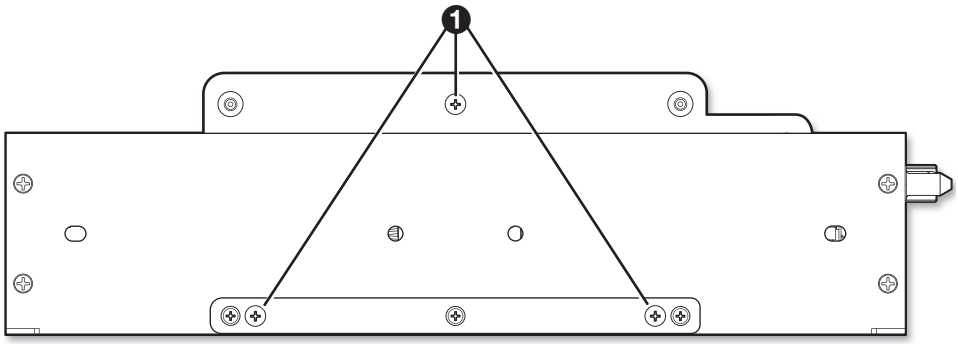
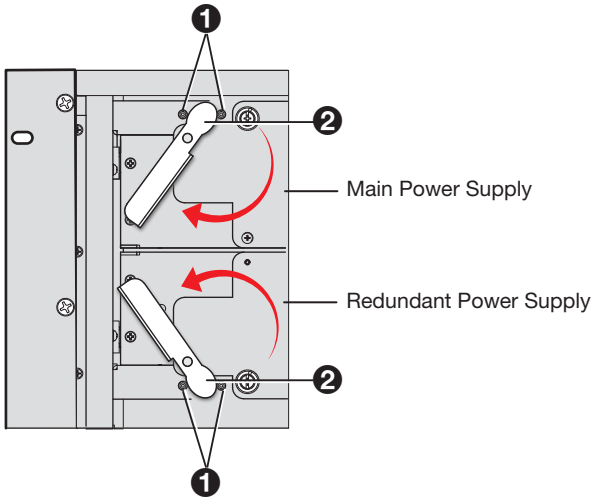


Figure 92. Pegs on the Back of the Power Supply

These pegs must be in the slots on the back wall and front surface of the power supply compartment when you slide the power supply all the way in. Otherwise, the power supply does not lie flat against the back of the compartment, the levers cannot lock the PSU in place, and the supply does not function.

If the power supply is in place, its front panel is flush with the front panel of the other power supply. If the new power supply is not even with the other one, slide the new one out again and lift it up slightly as you slide it in again, until it touches the back of the compartment.

7. When the power supply is in position, slide it to the left as far as you can without forcing it.
8. Ensure that the round end of the locking lever on the power supply (see figure 93, ❷) is positioned between the two pegs (❶), located on the chassis adjacent to the power supply, then rotate the lever clockwise until the power supply is locked in place.



Slide the round end of the lever (❷) between the two pegs (❶) when installing a power supply.

Figure 93. Positioning the Lever between the Two Pegs on the Chassis

9. Use a screwdriver to tighten the two thumbscrews on the power supply as follows:
   a. Grasp the screw firmly and press it inward.
   b. Continue to press inward as you turn the screw to the right, until it is securely in place.
10. Reattach the protective cover panel (Quantum Ultra 610 only, see **figure 89**, ❷ on page 96).

Replacing the Redundant Power Supply

Replacing the redundant (bottom) power supply requires some additional steps to be performed within the procedure described in the previous section. The primary and redundant power supplies are essentially the same unit, but they are configured slightly differently in order to fit into their slots in the chassis.

The replacement power supply kit is shipped with the power supply configured to replace the top (primary) PSU. If the lower (redundant) power supply fails instead, you must replace the front and back metal plates of the new PSU with those of the failed redundant power supply.

1. Perform **steps 1 through 5** of the primary power supply replacement procedure, starting on page 96, to remove the redundant power supply from the chassis.
2. Remove the front plate (containing the latch, handle, and thumbscrews) from the failed redundant power supply by unfastening the three round-headed Philips screws at the top of the plate (see figure 94). Retain the front plate and screws to attach to the replacement power supply in step 5.

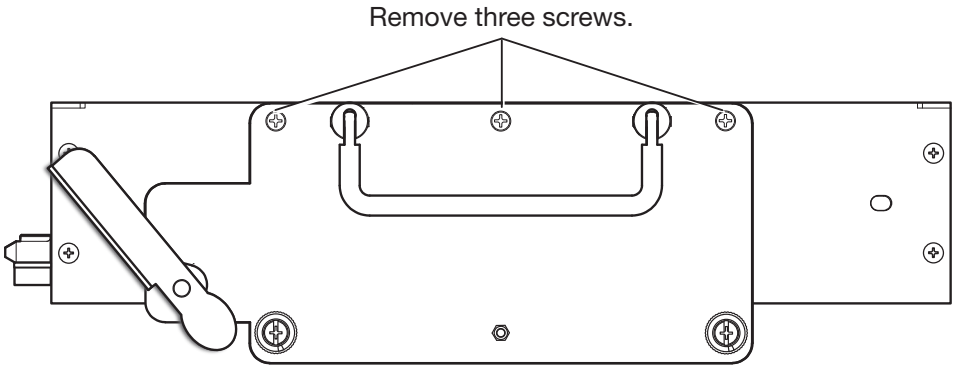


Figure 94. Removing the Plate from the Failed Redundant Power Supply Front Panel

3. Remove the metal strip from the back of the failed redundant power supply by unfastening the three flat-headed screws (see figure 95). Retain the back plate and screws to reattach the strip in step 6.

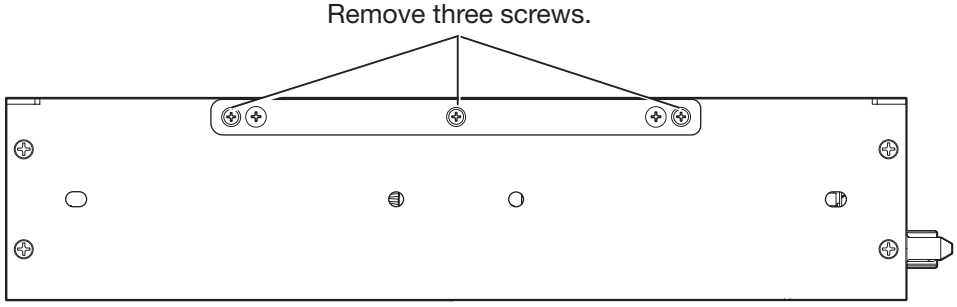


Figure 95. Removing the Metal Strip from the Failed Power Supply Back Panel

4. Remove the front and rear panels from the **replacement** power supply by unfastening the three screws on the front and back panels. (These panels and screws are no longer needed.)
5. Attach the front plate that was removed from the failed redundant power supply in step 2 to the three holes on the back panel of the replacement power supply. Use the three round-headed screws that also were removed in step 2.
6. Attach the metal strip from the failed power supply to the three holes on the front of the replacement power supply, using the three flat-headed screws removed in step 3.
7. Perform **steps 6 through 10** of the primary power supply replacement procedure, beginning on page 92.

Replacing the Power Supply Front Fan — Quantum Ultra 610 Only

The largest (front) fan cools the power supplies on the Quantum Ultra 610 (the fans of the Quantum Ultra II 610 power supplies are within the power supply casings and are not user-replaceable).

If a Quantum Ultra 610 power supply fan fails, you can order a new one from **www.extron.com** and replace it as described in this section. This fan is hot-swappable, that is, it can be replaced while the Quantum Ultra 610 is operating, without the need to power down the unit.

ATTENTION:

- When a fan fails, replace it immediately. **Do not** run the unit for a long period without a fan.
- Lorsqu'un ventilateur cesse de fonctionner, remplacez-le immédiatement. **Ne** prolongez **Pas** le fonctionnement de l'unité sans ventilateur.

1. Use a screwdriver to loosen the two thumbscrews on the cover panel and remove the panel (see figure 96).

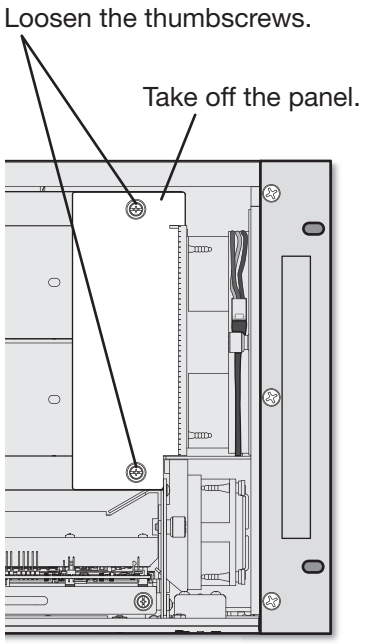


Figure 96. Removing the Cover Panel

2. Use a screwdriver to loosen the thumbscrew that holds the fan to the chassis (see **figure 97**, ❶ on the next page. The thumbscrews cannot be removed completely.

ATTENTION:

- Thumbscrews should be tightened with a screwdriver after both initial installation and subsequent access to the panel.
- Les vis doivent être serrées avec un tournevis après la première installation et l'accès postérieur au panneau.

3. Disconnect the small fan cables (❷).

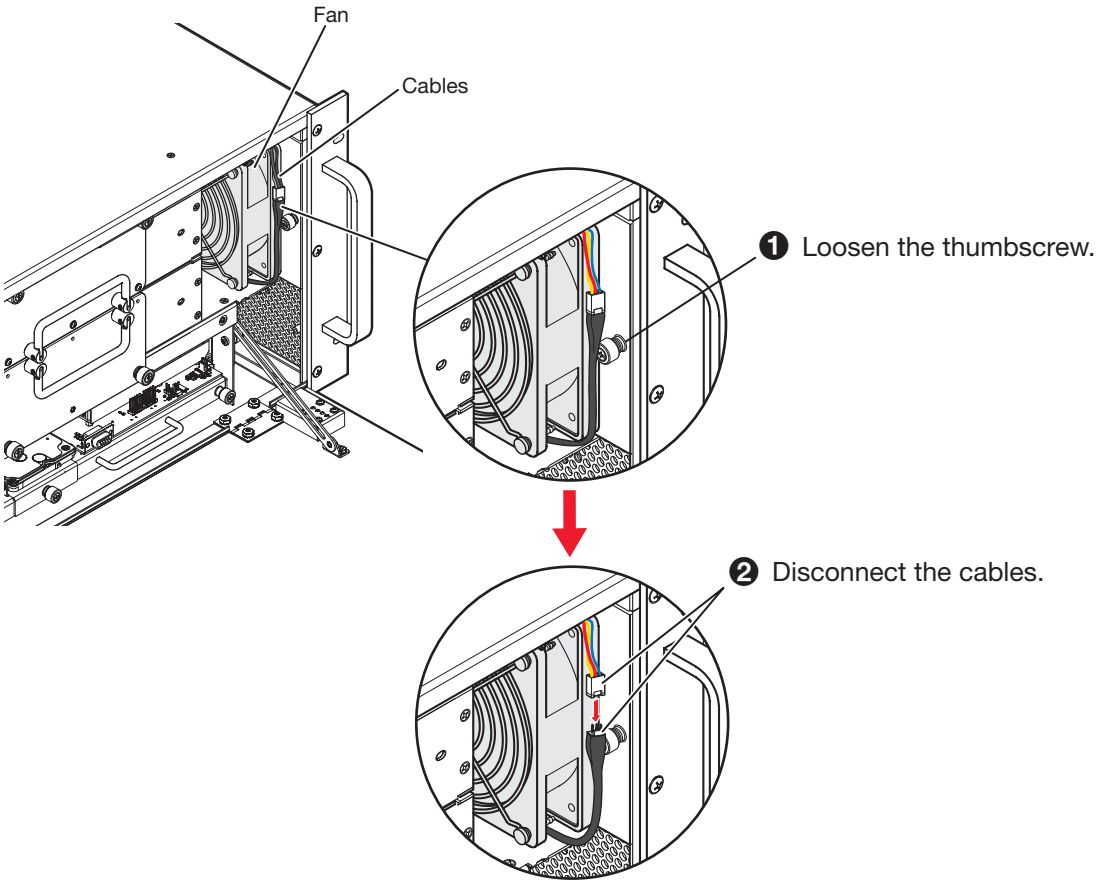


Figure 97. Detaching the Front Fan

4. Slide the fan out.

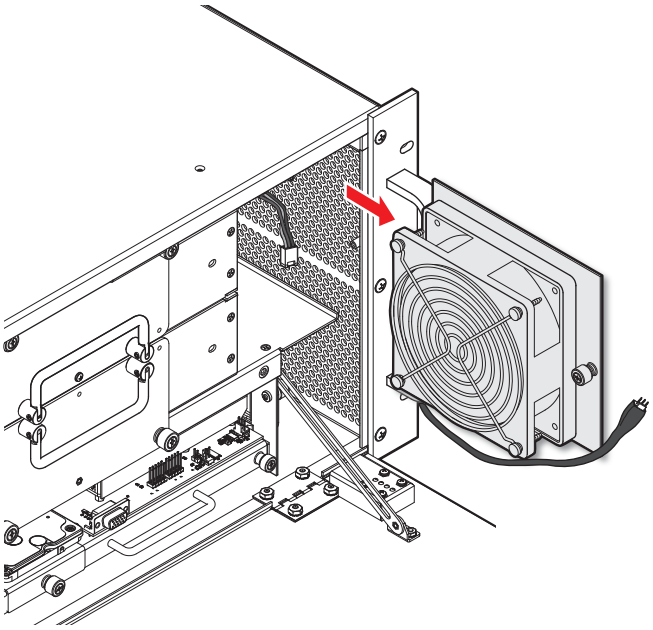


Figure 98. Sliding the Front Fan Out of the Chassis

5. The replacement fan has two tabs on the back (see figure 99). These tabs fit into two slots in the back of the fan compartment of the chassis (see figure 100).

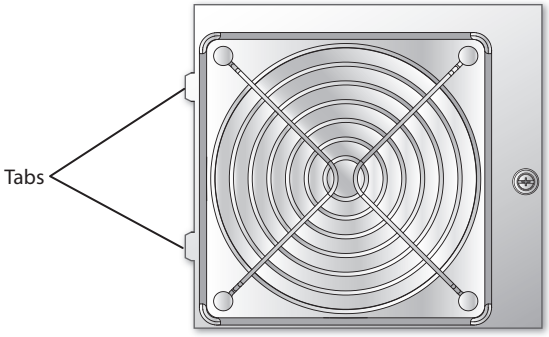


Figure 99. Tabs on the Front Fan

Align the new fan with the right wall of the chassis, the tabs facing toward the back and the thumbscrew and cables facing outward, toward you.

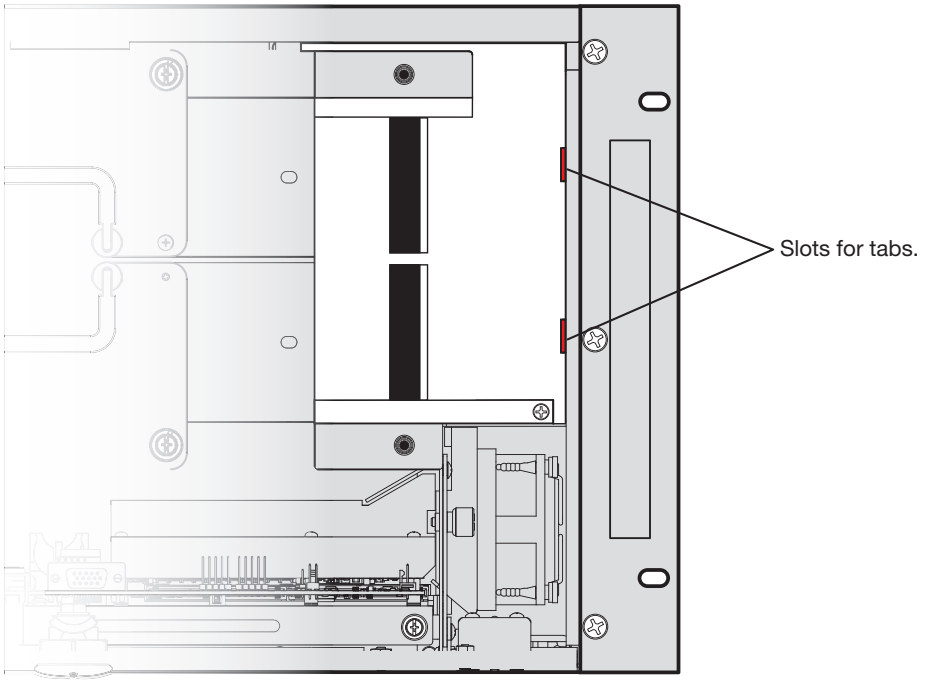


Figure 100. Slots for Tabs in the Back of the Fan Compartment

6. Slide the fan straight back into the chassis until the tabs are inserted into the slots (see figure 101, ❶). Ensure that the ends of both cables are not trapped behind or under the fan and are accessible from the front.

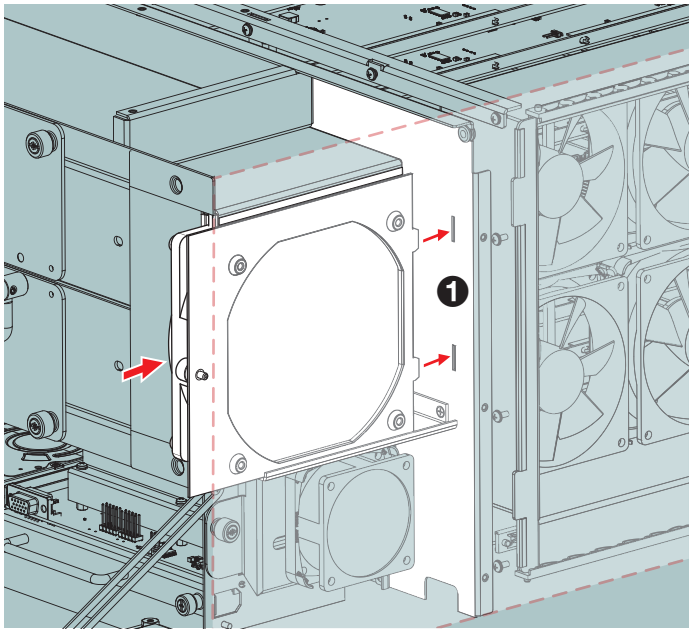


Figure 101. Inserting the Replacement Fan

7. When the fan unit is in place, use a screwdriver to tighten the thumbscrew.
8. Connect the two fan cables.

Replacing a Disk Drive — Quantum Ultra and Ultra II 610

The Quantum Ultra has two solid state hard disk drives:

- **Drive C** — Contains the internal operating system and hardware drivers (see figure 102, ❶).
- **Drive D** — Contains system configuration data. This drive can also store local source content, such as image files (❷).

One or both of these drives can be removed and replaced if they should fail during operation.

NOTE: The System Board Computer (SBC) assembly contains the two disk drives and the system computer. This entire assembly can be removed and replaced if necessary. However, it is **not** necessary to remove the entire SBC in order to replace only the disk drives.

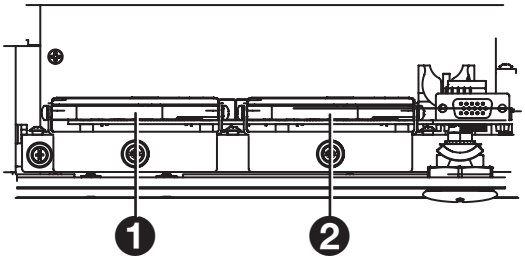


Figure 102. Disk Drives C and D

ATTENTION:

- These drives are **NOT** hot-swappable and cannot be replaced while the unit is operating. Always power off the Quantum Ultra before removing a drive.
- Ces disques **NE** sont **PAS** interchangeables à chaud et il est impossible de les changer durant le fonctionnement de l'unité. Mettez toujours hors tension le Quantum Ultra avant de retirer un disque.

To replace a disk drive:

NOTE: Before replacing a disk drive, confirm you have copies of the following files related to your Quantum Ultra system:

- Project file currently loaded on the device
- Picture files currently loaded on the device
- Commissioning Report

Use VCS to connect to the unit and obtain the project file and commissioning report. Picture files can be downloaded from the D drive of the unit using the System HDMI and USB connections.

1. Shut down the unit and disconnect the power.

2. Use a screwdriver to loosen the thumbscrew on the drive (see figure 103, ❶) by rotating it to the left.

NOTE: The thumbscrews cannot be removed completely.

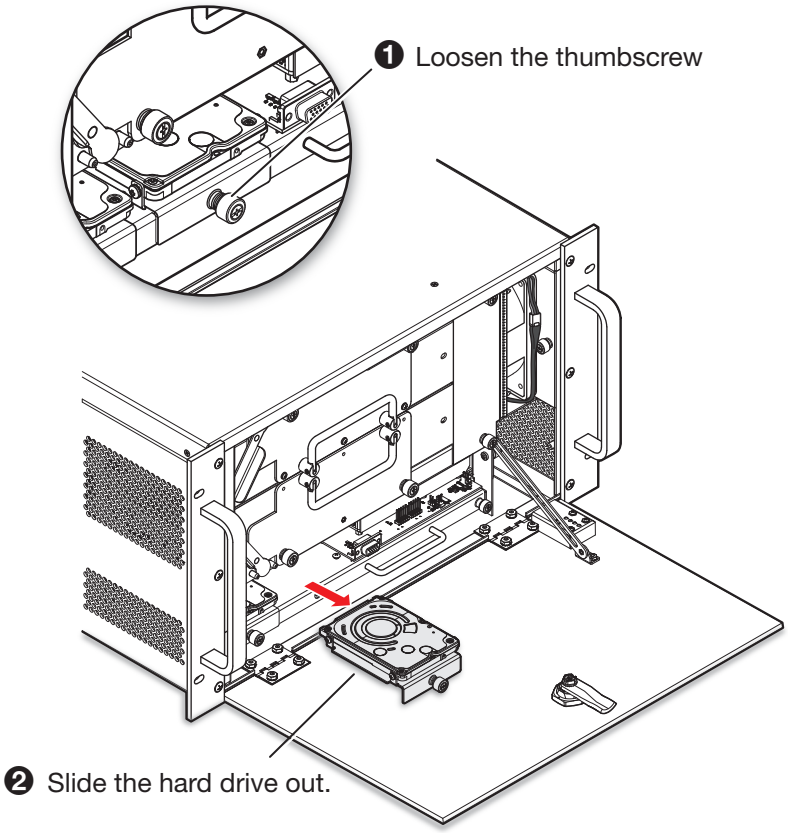


Figure 103. Removing the Disk Drive

ATTENTION:

- Thumbscrews should be tightened with a screwdriver after both initial installation and subsequent access to the panel.
- Les vis doivent être serrées avec un tournevis après la première installation et l'accès postérieur au panneau.

3. Grasp the thumbscrew firmly and pull the drive straight toward you until it is free (see **figure 103**, ❷).

4. Insert the replacement drive so that the right and left edges pass under the inside edges of the three screws on the right and left sides of the drive (see figure 104, ❶).

NOTE: The second and third pairs of screws are not visible. However, if you press the drive straight back after it passes under the first pair of screws, without letting its front edge rise up, it passes under the remaining screws as well.

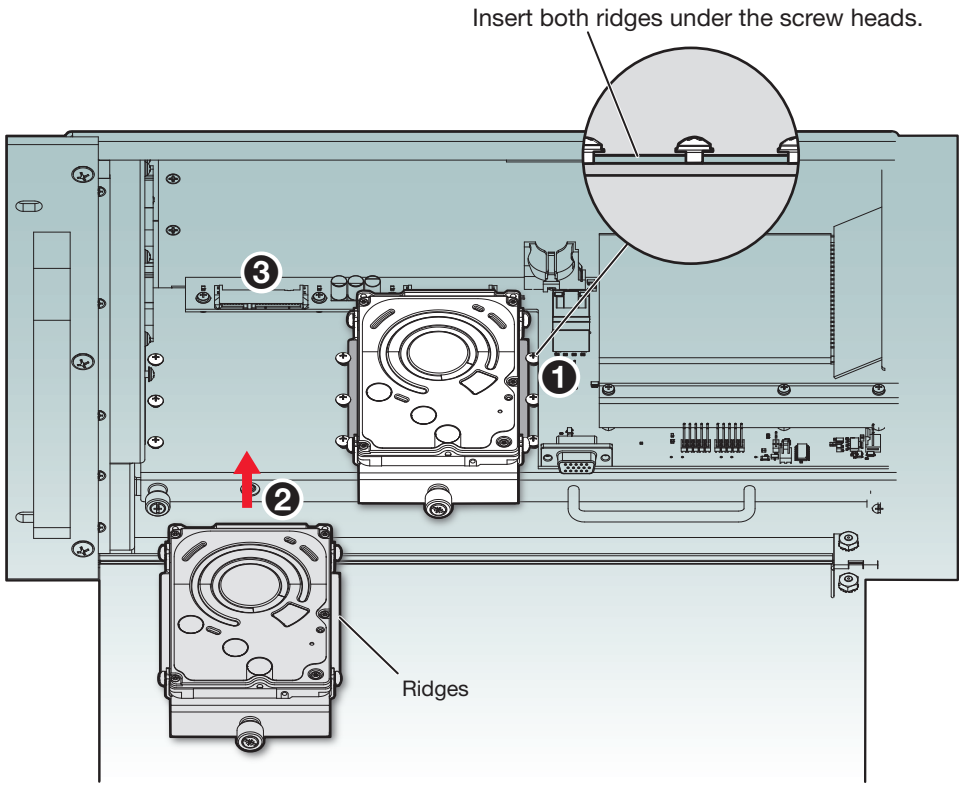


Figure 104. Inserting the Hard Drives

5. Continue pressing the drive into its space until it stops. The pins on the back edge of the drive (❷) insert into the receptacles on the board at the back of the compartment (❸).
6. Use a screwdriver to tighten the thumbscrew and secure the drive in place.
7. Power the system back on. New firmware is automatically installed before you are able to proceed.
8. After the firmware is successfully loaded, reset the Quantum Ultra 610 using the Control Panel. Select the **`Reset All Settings and Delete All Files`** option on the `Reset Device` screen (see **Resetting the Device from the Control Panel** on page 59).
9. Set the IP address of the Quantum Ultra 610 device. Use the Control Panel (see **Modifying Network Settings from the Control Panel** on page 58), VCS (see the Quantum Ultra VCS Help File), or SIS (see **Set IP address** on page 79).
10. Use the latest project file to connect to the device via VCS and confirm the system is operational.

Replacing the System Board Computer (SBC) Assembly — Quantum Ultra 610 and Ultra II 610

The System Board Computer assembly contains the system computer and the two hard disk drives. This entire assembly can be removed and replaced if necessary.

ATTENTION:

- The SBC assembly is **not** hot-swappable and cannot be replaced while the unit is operating. Always power off the unit before removing the SBC assembly.
- L'ensemble de composants SBC **n'est pas** interchangeable à chaud et il est impossible de le changer durant le fonctionnement de l'unité. Mettez toujours hors tension le Quantum Ultra avant de retirer l'ensemble SBC.

Removing the SBC Assembly

1. Shut down the unit and disconnect the power.
2. Remove the two hard drives from the SBC assembly and set them aside. They are used with the new assembly (see **Replacing a Disk Drive - Quantum Ultra and Ultra II 610** on page 106).

NOTE: It is not necessary to replace the disk drives whenever you replace the SBC. If either or both drives are functioning adequately, remove them first, then reinstall them after installing the new SBC.

3. Unplug the lower fan cable from the 3-pin connector at the right front corner of the SBC assembly (see figure 105).

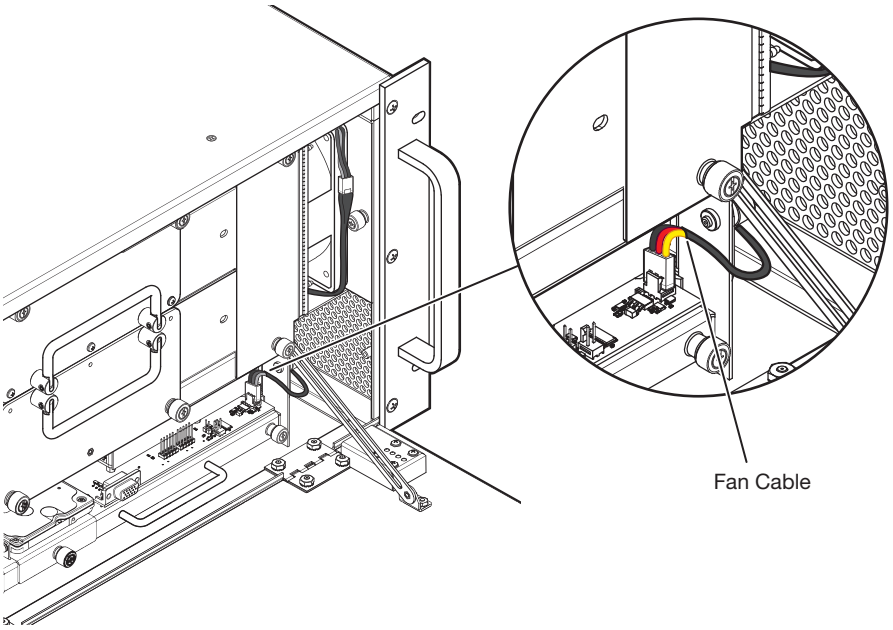


Figure 105. Unplugging the Fan Cable

4. Use a screwdriver to loosen the thumbscrews at the right and left edges of the assembly (see figure 106, ❶). The thumbscrews cannot be removed completely.

ATTENTION:

- Thumbscrews should be tightened with a screwdriver after both initial installation and subsequent access to the panel.
- Les vis doivent être serrées avec un tournevis après la première installation et l'accès postérieur au panneau.

5. Pull the handle on the SBC (❷) toward you until the assembly is free of the chassis.

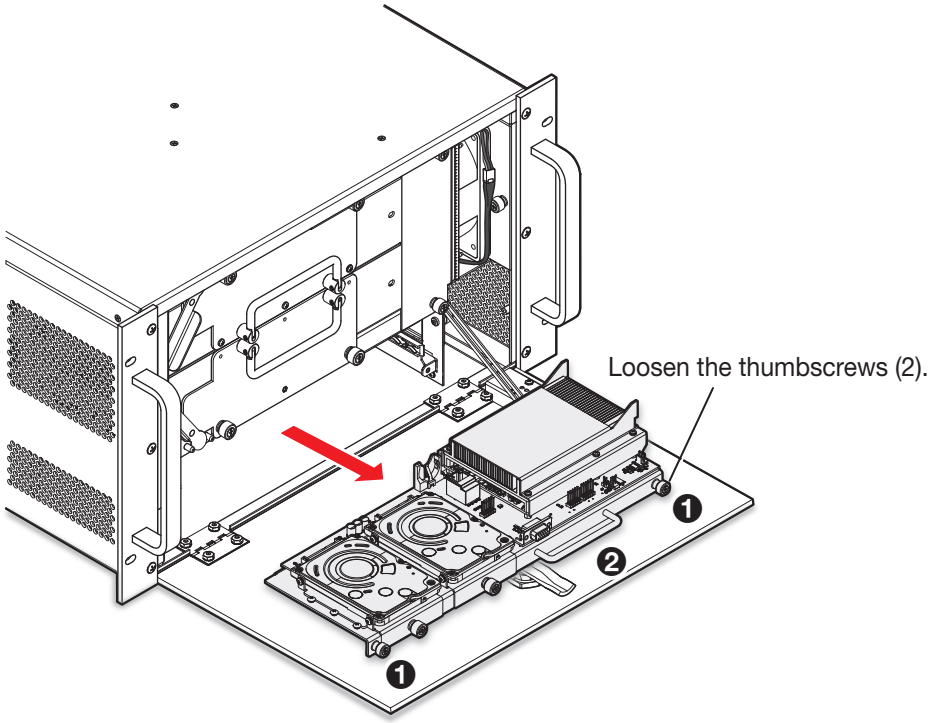


Figure 106. Removing the SBC Assembly

Installing a New SBC Assembly

To install a new SBC assembly:

1. Align the edges of the new assembly with the tracks inside the chassis on the right and left sides.

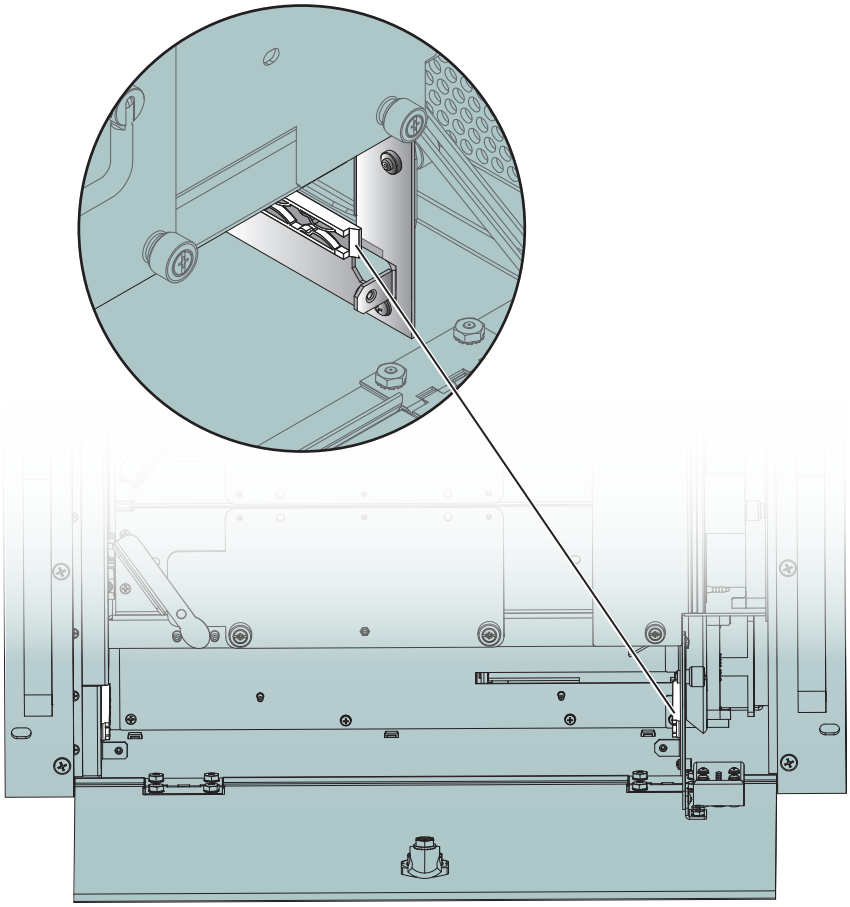


Figure 107. Tracks to Insert the SBC Assembly

2. Slide the assembly into the chassis and press it firmly into place, so that the pins on the back of the SBC board are plugged into their receptacles on the chassis.

> **NOTE:** The SBC assembly is not completely in place until you hear or feel it snap. If you do not feel it snap into position, press on it more firmly until you do.

3. Use a screwdriver to tighten the right and left thumbscrews on the SBC assembly.
4. Attach the lower fan cable to the 3-pin connector in the right front corner of the SBC (see **figure 105** on page 109 for the location).
5. Reinstall the hard drives on the SBC assembly (see **Replacing a Disk Drive — Quantum Ultra and Ultra II 610** on page 106).
6. Power the system back on.

Reference

This section contains information on cleaning and mounting the Quantum Ultra. The following topics are discussed:

- **Best Practices for Cleaning Your Extron Products**
- **Mounting the Quantum Ultra Series**

Best Practices for Cleaning Your Extron Products

Depending on the device, application, and location, there may be times when it becomes necessary to clean your Extron product. Frequently touched devices, such as touchscreens and button panels, require regular cleaning to ensure their surfaces remain sanitary. Plastic surfaces and cosmetic finishes can be damaged by long term exposure to chemicals. Therefore, Extron recommends the following guidelines when cleaning our products.



All Extron products can be safely cleaned with:

- 70% concentration or higher Isopropyl Alcohol
- Disinfectant cleaners that:
  - Are non-ammonium based (for example, contains no ammonium chloride).
  - Contain 2% or less sodium hypochlorite (for example, 2% bleach, 98% water).

Regardless of the device, it is important to follow these general guidelines when cleaning:

1. If possible, unplug the device.
2. Spray the cleaner on a lint-free cloth until the cloth is damp.
3. Do not spray the cleaner directly onto the product.
4. Gently clean the product surface using the cloth.

Your health and safety are an Extron priority. Keeping devices clean, especially those in high-traffic environments and high-use applications, is a crucial step in minimizing the spread of infections. Please contact Extron if you have any questions about the guidelines outlined in this section or if you have a question about cleaning a specific Extron product.

Cleaning Fiber Optic Connectors and Cables

To obtain optimum optical performance, ensure the fiber optic cables and connectors are properly cleaned. Both the fiber and connector ends should be cleaned immediately before connecting.

WARNING:

ADVERTISSEMENT :

- Always handle, use, and dispose of chemicals in accordance with the safety instructions of the manufacturer. Some chemicals may be toxic if swallowed.
- Toujours manipuler, utiliser, et jeter les produits chimiques conformément aux consignes de sécurité du fabricant. Certains produits chimiques peuvent être toxiques en cas d'ingestion.

- Ensure that no optical signal is present in the fiber during cleaning. Always be certain the cable is disconnected at both ends and the equipment is off prior to cleaning.
- Assurez-vous que aucun signal optique n'est présent dans la fibre lors du nettoyage. Il est important de veiller à ce que le câble soit toujours déconnecté aux deux extrémités et que l'équipement soit hors tension avant le nettoyage.

Connectors

1. Moisten a lint-free wipe with alcohol (damp, but not saturated), or use a pre-moistened wipe.
2. Wipe the ferrule end-face in a twisting and wiping motion.
3. Repeat twice, using a clean area of the dampened wipe each time.
4. Repeat wiping action using a dry lint-free wipe.
5. Inspect the end-face under magnification (100x minimum) to ensure debris and contaminants are removed.

Cables

1. Moisten the end of a lint-free swab with alcohol.
2. Remove excess alcohol from the swab with a dry, clean wipe.
3. Insert the swab into either end of the cable.
4. Clean, using a scrubbing motion.
5. Remove the swab using a rotating motion.
6. Using clean, compressed air, blow out the cable until dry.

WARNING:

ADVERTISSEMENT :

- Always wear eye protection when using compressed air.
- Veillez à toujours porter des lunettes de protection lorsque vous utilisez de l'air comprimé.

- Never inspect or look into the end of terminated fibers while the cables are connected to equipment as invisible laser radiation may damage eye tissue.
- Ne jamais inspecter ni regarder le bout des fibres raccordées lorsque les câbles sont connectés aux équipements car le rayonnement laser invisible peut entraîner des lésions oculaires.

Mounting the Quantum Ultra Series

The Quantum Ultra Series processor can be placed on a tabletop or mounted in a rack (recommended).

CAUTION: The Quantum Ultra 610 and Ultra II 610 chassis is very heavy. When it is fully populated with input and output cards, its weight can be up to 87 lbs (39.5 kg).

It is strongly recommended that you seek assistance with lifting or moving the unit.

ATTENTION : Le processeur Quantum Ultra est très lourd. Lorsqu'il est entièrement équipé de cartes d'entrée et de sortie, son poids peut être jusque 39.5 kg (87 lbs).

Il est fortement recommandé que vous soyez assisté lorsque vous soulevez ou que vous déplacez l'unité.

UL Guidelines for Rack Mounting

The following Underwriters Laboratories (UL) guidelines pertain to the installation of the Quantum Ultra Series processor into a rack:

- **Elevated operating ambient temperature** — If the equipment is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consider installing the equipment in an environment compatible with the maximum ambient temperature (TMA) of 95 ºF (35 ºC).
- **Reduced air flow** — Install the equipment in the rack so that the amount of air flow required for safe operation of the equipment is not compromised.
- **Mechanical loading** — Mount the equipment in the rack so that uneven mechanical loading does not create a hazardous condition.
- **Circuit overloading** — When connecting the equipment to the supply circuit, consider the connection of the equipment to the supply circuit and the effect that circuit overloading might have on overcurrent protection and supply wiring. Consider equipment nameplate ratings when addressing this concern.
- **Reliable earthing (grounding)** — Maintain reliable grounding of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (such as the use of power strips).

Consignes UL pour le Montage en Rack

Les consignes UL (« Underwriters Laboratories ») suivantes concernent l'installation en rack d'un boîtier Quantum Ultra :

ATTENTION :

- **Température ambiante élevée** — En cas d'installation de l'équipement dans un rack fermé ou composé de plusieurs unités, la température du rack peut être supérieure à la température ambiante. Par conséquent, il est préférable d'installer l'équipement dans un environnement qui respecte la température ambiante maximale (Tma) spécifiée par Extron.
- **Réduction du flux d'air** — Si l'équipement est installé dans un rack, veillez à ce que le flux d'air nécessaire pour un fonctionnement sécurisé de l'équipement soit respecté.
- **Charge mécanique** — Installez l'équipement en rack de manière à éviter toute situation dangereuse causée par le déséquilibre de la charge mécanique.
- **Surcharge électrique** — Lorsque vous connectez l'équipement au circuit d'alimentation, observez la connexion de l'équipement et étudiez les effets possibles d'une surcharge du circuit sur les protections contre les surintensités et les conducteurs d'alimentation. Consultez à cet égard les indications de la plaque d'identification de l'équipement.
- **Mise à la terre** — Assurez-vous que l'équipement est correctement mis à la terre. Accordez une attention particulière aux connexions électriques autres que les connexions directes au circuit de dérivation (ex. : les multiprises).

Rack Mounting Requirements

In addition to the UL guidelines (see **UL Guidelines for Rack Mounting** on the previous page), observe the following when mounting the processor:

Support

Always use additional support at the sides or rear of the Quantum Ultra unit, attached to both the front and rear rack posts. Ensure that the shelf or other mounting accessories can support the full weight of the unit.

ATTENTION:

- **Do not** rely on the processor mounting flanges to support the full weight of the unit. These must be used only to secure the unit within the rack.
- Veuillez **ne pas** utiliser les brides de montage du processeur pour le support du poids total de l'unité. Celles-ci doivent être utilisées uniquement pour fixer l'unité dans le rack.

- **Do not** stand other units directly on top of the processor when it is rack mounted because this can overload the mountings.
- N'installez pas d'autres produits directement au-dessus du processeur lorsque celui-ci est monté en rack : cela risquerait de surcharger les éléments de montage.

Ventilation

Ensure that sufficient airflow is provided to satisfy the ventilation requirements of **all** items of equipment installed in the rack.

A ventilation gap of at least 4 inches (10 cm) must be left between the side panel vents of the Quantum Ultra and adjacent surfaces or equipment.

Rack Mounting Procedure

The Quantum Ultra Series processors are housed in rack-mountable metal enclosures with mounting flanges for standard 19-inch racks.

Mount the unit as follows (see **figure 108** on the next page for an example):

1. Insert the unit into the rack, aligning the holes in the mounting flanges with those in the rack.
2. Secure the processor to the rack using the supplied bolts.

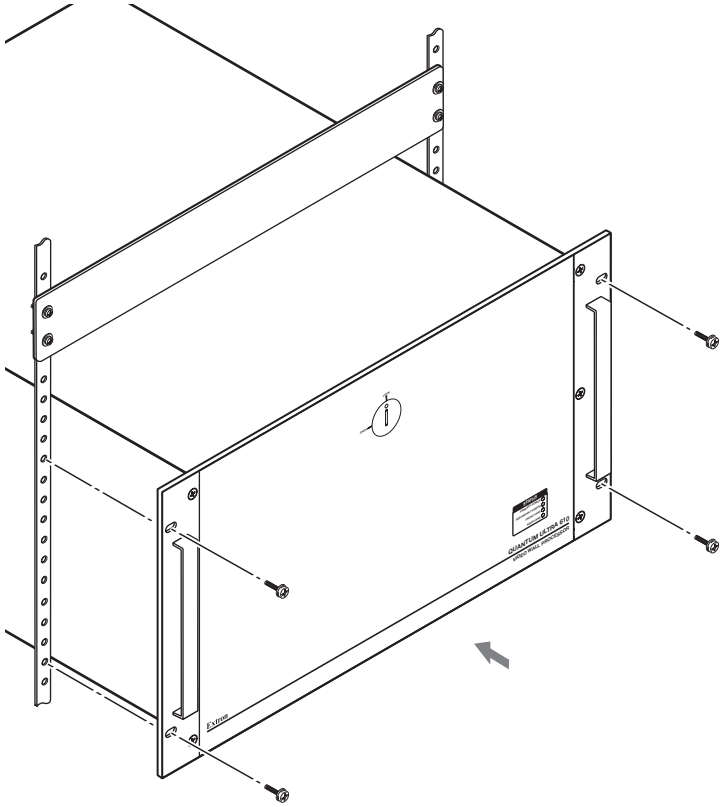


Figure 108. Rack Mounting the Quantum Ultra or Ultra II 610

ATTENTION:

- Because of the weight of the Quantum Ultra Series processor, you must provide additional support for the unit from the back.
- Compte tenu du poids du processeur Quantum Ultra Series, vous devez fournir plus de capacités de support à l'arrière de l'unité.

Extron Warranty

Extron warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:
Extron
1230 South Lewis Street
Anaheim, CA 92805
U.S.A.

Asia:
Extron Asia Pte Ltd
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Japan:
Extron Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Middle East:
Extron Middle East
Dubai Airport Free Zone
F13, PO Box 293666
United Arab Emirates, Dubai

Africa:
Extron South Africa
3rd Floor, South Tower
160 Jan Smuts Avenue
Rosebank 2196, South Africa

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or if modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA:	714.491.1500 or 800.633.9876	**Asia**:	65.6383.4400
Europe:	31.33.453.4040 or 800.3987.6673	**Japan**:	81.3.3511.7655
Africa:	27.11.447.6162	**Middle East**:	971.4.299.1800

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.