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Quantum Elite

HDCP-COMPLIANT SCALABLE VIDEOWALL PROCESSING SYSTEM

High Performance Multi-Graphic Processing for Large Scale Videowall Systems

- Scalable videowall processing for large videowalls with up to 28 displays or more
- High speed, dedicated video/graphic bus delivers real-time performance
- Supports 3G-SDI, HDMI, DVI, RGB analog, HD component, and standard video input signals
- HDMI, DVI, and RGB analog output options support many display types
- HDCP-compliant input/output options

Introduction

The Extron **Quantum® Elite** is a scalable, expandable videowall processor configurable to support a variety of input, output, and windowing capabilities. It features high performance video scaling technology capable of producing very high quality images. The Quantum Elite offers two card-cage versions that support various combinations of input and output cards for 3G-SDI, HDMI, DVI, RGB, HDTV, or video sources. Hundreds of additional DVI or RGB sources can be streamed over an IP network to the Quantum Elite using the Extron QGE 100 graphics capture encoder. Each HDMI or DVI-I dual output card supports up to 128 video/graphic source windows, and multiple Quantum Elite card cages can be cascaded to create very large display arrays. A dedicated, high-speed video/graphic bus maintains real-time performance even under heavy loading of inputs.

The Quantum Elite provides a high performance, highly reliable display processing solution. It is ideal for a wide range of applications, from public or commercial presentation systems, to mission critical, 24/7 monitoring environments.

The Quantum Elite maintains optimal full frame rate performance with a high speed 10 Gbps RAPT - Real-Time Asymmetric Packetized Transfer video/graphic bus that allows large numbers of inputs to be processed while preserving real-time control response and image performance. The scaling capability of the output cards allows up to 128 windows per output card, with no restrictions on window placement.

When used with HDCP-compatible displays, the HDMI input and output cards allow the display of HDCP-encrypted content on the videowall. A green window with an alert message will be displayed if HDCP-encrypted content is sent to a non-HDCP compliant display.

A variety of display scenarios can be pre-programmed or created on-the-fly using Quantum Elite Control Software, an intuitive control interface for setup and system operation. Many sources can be shown at small sizes, a few at large sizes, or many other combinations. All of this is complemented by high performance image scaling technology, which accurately preserves the original image quality at all window sizes.

System reliability is significantly enhanced through use of a ruggedized operating system. The Quantum Elite is available with removable flash storage or a removable hard disk drive, depending on the model.

The Quantum Elite is delivered as a factory-configured, modular system and is available in different frame options. The product can be sized to the needs of a current application and then expanded as requirements evolve.

These advantages make the Quantum Elite ideal for all types of surveillance, presentation, and visualization applications, whether traffic, security, military, or process control.

Features

Highly Scalable Input / Output Configuration

Card frame videowall processing system

The Quantum Elite is available as two card frames: the Quantum Elite 615, a 6U model with 15 available card slots, and the Quantum Elite 408, a 4U model with eight slots. Both versions allow for various combinations of input and output cards to match specific source and videowall configurations.

3G-SDI Inputs

The 3G-SDI input card accepts two serial digital video inputs with data rates from standard definition 480i and 576i to HDTV 1080p/60 Hz. It complies with SMPTE 259M, 292M, and 424M digital video standards, accommodating SDI, HD-SDI, and 3G-SDI signals.

Scalable, field-expandable systems

The Quantum Elite is highly scalable and can be expanded by adding input or output cards, or by cascading card frames together. This allows for system adaptability to fulfill future application needs. Quantum Elite system expansion is performed by Extron field staff.

Flexibility to support a variety of input and output configurations

The Quantum Elite can be configured with various combinations of inputs and outputs within the available card slots. Input cards include a 12-input card for composite or S-video sources, a two-input card for RGB graphics or HD component video, a two-input card for DVI-D sources, an HDCP-compliant two-input card for HDMI or DVI-D sources, and a two-input card for SDI, HD-SDI, or 3G-SDI sources.

Output cards include an HDCP-compliant HDMI/DVI two-output card and a DVI-I two-output card for DVI or analog RGB. Each output card supports two displays in the videowall.

HDCP-compliant system

HDCP-encrypted content can be displayed on HDCP-compatible displays when using Quantum Elite HDMI input and output cards.

HDCP Visual Confirmation

A green window with an alert message will be displayed if HDCP-encrypted content is sent to a non-HDCP compliant display.

Up to 128 video/graphic windows per dual output card

The Quantum Elite offers extensive windowing capabilities, with the ability to display up to 128 windows of video and graphics for each pair of displays in the videowall.

IP streaming of hundreds of RGB/DVI input signals

In addition to the input cards, hundreds of DVI or RGB graphics sources can be interfaced to the Quantum Elite over an IP network, using optional Extron QGE 100 Quantum Graphics Encoders.

Upload and display stored images

Image file types, including JPEG, GIF, PNG, and bitmaps, can be uploaded to the Quantum Elite and used as backgrounds behind the windows, or displayed as a source.

High speed, dedicated video/graphic bus delivers real-time performance

The Quantum Elite features a 10 Gbps Real-Time Asymmetric Packetized Transfer - RAPT video/graphic bus that allows for simultaneous processing of numerous, high resolution input signals while maintaining real-time operational performance as well as optimal image quality at full frame rates.

High Performance and Image Quality

Independent, on-board image processing

Each input or output card provides independent, on-board image processing for high quality upscaling and downscaling. This parallel image processing architecture eliminates use of shared control resources such as a dedicated bus or central processor, and enables rapid control for the user.

High quality image upscaling and downscaling

The Quantum Elite includes high performance image scaling technology offering both high quality upscaling and downscaling of video and high resolution RGB or HD video signals.

Supports digital and analog input signals up to 1920x1200

A wide range of standard definition, computer-video, and HD video sources can be accommodated by the Quantum Elite, up to 1920x1200 and HDTV 1080p/60 Hz.

Solid state flash storage

The Quantum Elite 615 model features CompactFlash-based data storage for the operating system and image files. This avoids the need for a hard disk drive and delivers continuous system operation and enhanced reliability. Write-protected flash storage eliminates the risk of virus retention, and allows for easy removal of data in secure environments.

Optimal reliability

The Quantum Elite delivers continuous 24/7 system reliability with redundant, hot-swappable power supplies and fans, and an optimized cooling system within the chassis. The RAPT video/graphic bus ensures continued display of content from connected video sources in the unlikely event of an operating system failure. The system returns to its previous operational state when rebooted.

Quantum Elite 615

Card Frames

The Quantum Elite is a factory-configured, modular system available in space-efficient 6U and 4U card frames. These house all image processing and input / output connectivity for supporting videowall systems with up to 28 displays or many more. It is configured at the factory to meet the needs of the customer, and can be expanded in the future as requirements evolve. For very large videowalls or applications requiring a large number of input sources, card frames can be cascaded together to increase input and output capacity. The Quantum Elite is designed to deliver continuous, 24/7 operational reliability in mission-critical environments.

Features

- Unmatched input bandwidth capability
- Dedicated 10 Gbps Real-Time Asymmetric Packetized Transfer - RAPT video/graphic bus provides optimized real-time image performance
- Accommodates input and output cards in any combination
- Dual high bandwidth, Gigabit Ethernet ports accept DVI or RGB graphics sources streamed from Extron QGE 100 Quantum Graphics Encoders
- Ethernet port for system control from a PC with Quantum Elite Control Software
- Integrates with external control systems from a PC with Quantum Elite Control Software
- USB port for image file upload or system upgrades
- Fast boot time, less than 90 seconds
- Maintains presentation of connected video sources in the unlikely event of an operating system failure
- Redundant, hot-swappable power supplies and fans
- Optimal cooling and thermal management system - no additional rack space required for ventilation

Quantum Elite 615

Quantum Elite 615

- Rack-mountable 6U, 15-slot card frame
- CompactFlash storage for the operating system is write-protected to prevent virus retention. It also offers enhanced reliability and quick system recovery in the unlikely event of an operating system failure.
- Second CompactFlash slot for storing image files
- Maximum input capacity[1]:
  - 3G-SDI, HDMI, DVI-D, or analog RGB or HD - up to 28 sources
  - Composite or S-video - up to 168 sources
- Maximum output capacity[2]:
  - HDMI or DVI-I - up to 28 outputs

Quantum Elite 408

- Rack-mountable 4U, eight-slot card frame
- Hard disk-based data storage
- Maximum input capacity[1]:
  - 3G-SDI, HDMI, DVI-D, or analog RGB or HD - up to 14 sources
  - Composite or S-video - up to 84 sources
- Maximum output capacity[2]:
  - HDMI or DVI-I - up to 14 outputs

[1] Based on I/O card configuration with one slot occupied by the output card.
[2] Based on I/O card configuration with one slot occupied by an input card.

Quantum Elite Cards

3G-SDI Input Card

- Accepts two SDI, HD-SDI, or 3G-SDI signals on two HD-BNC connectors - standard BNC adapters included
- Accepts data rates from 270 Mbps to 2.97 Gbps
- Compatible with SDI, HD-SDI, and 3G-SDI signals from standard definition 480i and 576i to HDTV 1080p/60 Hz
- Auto input source detection simplifies system programming to streamline integration of new sources into the Quantum Elite
- Motion adaptive deinterlacing delivers optimized image quality through advanced motion compensation
- Film mode cadence detection and processing ensures optimum image quality is retained for sources originating from film
- Automatic input cable equalization maintains signal integrity when long cable runs are required

HDMI Input Card

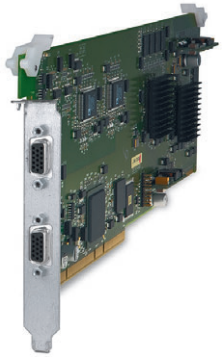
- Accepts two HDMI or DVI-D signals
- Compatible with resolutions up to 1920x1200 and HDTV 1080p/60 Hz
- HDCP-compliant when used with Quantum Elite HDMI output cards and HDCP-compliant displays
- Auto input source detection simplifies system programming to streamline integration of new sources into the Quantum Elite
- Native 4:4:4 color quantization
- High performance scaling technology optimizes real-time image processing capacity for the dedicated video/graphic bus
- High quality deinterlacing

DVI Input Card

- Accepts two DVI-D input signals
- Compatible with resolutions up to 1920x1200 and HDTV 1080p/60 Hz
- Auto input source detection simplifies system programming to streamline integration of new sources into the Quantum Elite
- Native 4:4:4 color quantization
- High performance scaling technology optimizes real-time image processing capacity for the dedicated video/graphic bus
- High quality deinterlacing

RGB / HD Component Video Input Card

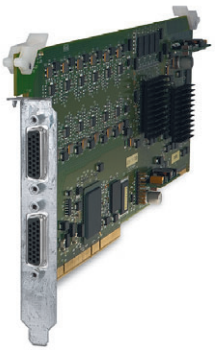
- Accepts two RGBHV, RGsB, and YPbPr input signals
- Compatible with resolutions up to 1920x1200 and HDTV 1080p/60 Hz, and supports custom resolutions
- Auto input source detection simplifies system programming to streamline integration of new sources into the Quantum Elite
- Native 4:4:4 RGB and 4:2:2 HD color quantization
- High quality motion adaptive 1080i deinterlacing
- High performance scaling technology optimizes real-time image processing capacity for the dedicated video/graphic bus



Quantum Elite Cards, Cont.

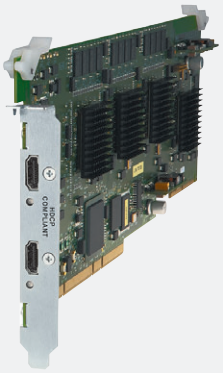
Video Input Card

- High density input configuration allows for up to 12 composite or S-video source connections
- Accepts NTSC, PAL, and SECAM standard definition video in any combination
- Accommodates any mix of composite or S-video sources
- Auto input source detection simplifies system programming to streamline integration of new sources into the Quantum Elite
- High performance scaling technology optimizes real-time image processing capacity for the dedicated video/graphic bus
- Native 4:2:2 color quantization
- High quality de-interlacing
- High quality composite video decoding
- Time base stabilitization and automatic gain control for adaptability to poor quality video sources



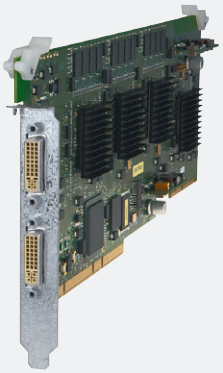
HDMI Output Card

- Two HDMI outputs deliver HDMI or DVI signals to drive two videowall displays
- HDCP-compliant when used with Quantum Elite HDMI input cards and HDCP-compliant displays
- High performance scaling technology with dedicated image processing for low and high resolution video optimizes images for the videowall displays
- Display up to 128 windows per output card
- Bezel compensation for flat-panel displays
- Output overlap for edge-blended applications
- Customize windows with captions, borders, and titles
- Output resolutions up to 1920x1200 and HDTV 1080p/60 Hz



DVI-I Output Card

- Two DVI-I outputs deliver DVI or analog RGB signals to drive two videowall displays
- High performance scaling technology with dedicated image processing for low and high resolution video optimizes images for the videowall displays
- Delivers consistent, high quality image performance regardless of input load
- Display up to 128 windows per output card
- Bezel compensation for flat-panel displays
- Output overlap for edge-blended applications
- Customize windows with captions, borders, and titles
- Output resolutions up to 1920x1200 and HDTV 1080p/60 Hz



Computer Graphic Streaming

QGE 100

DVI/RGB Computer Screen Capture IP Encoder

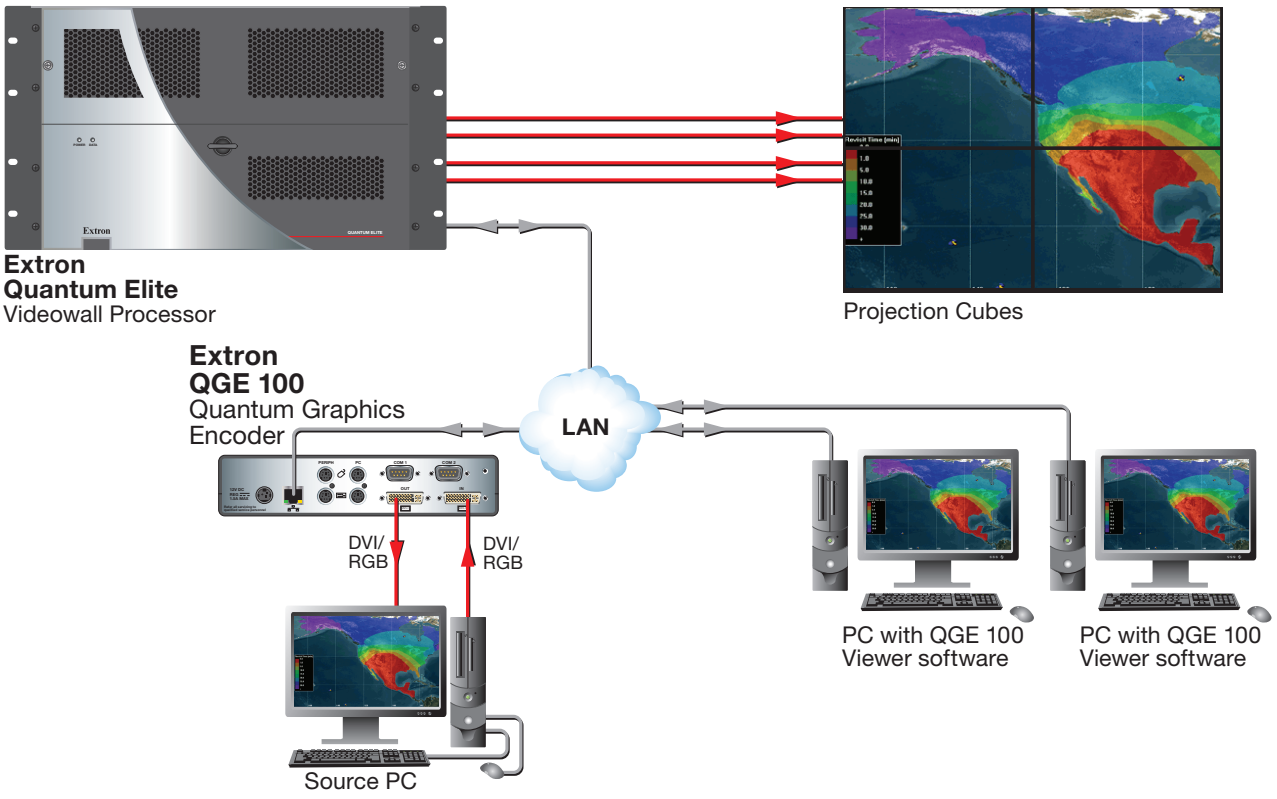
The Extron QGE 100 Quantum Graphics Encoder is used to stream RGB or DVI screen captures from PCs or other graphic sources to Quantum Elite videowall processors. It provides high scalability, allowing hundreds of sources such as maps, data screens, and other low-motion graphic input signals to be interfaced to Quantum Elite over an IP network. The QGE 100 applies high performance, lossless compression with 4:4:4, 24-bit color source reproduction while using low bandwidth streaming into a Quantum Elite processor or QGE 100 Viewer software.

Features

- Stream RGB or DVI computer-video screen captures to the Quantum Elite over an IP network
- Allows simple connection of a DVI or RGB source to an IP network
- Uses existing network or a dedicated media network with standard, routable IP packets
- Lossless compression with 4:4:4, 24-bit color source reproduction maintains image fidelity while minimizing network bandwidth
- Compatible with DVI input resolutions up to 1920x1200 and analog RGB input resolutions up to 1600x1200
- Auto-sensing and flexible signal acquisition circuitry simplifies installation for both standard and non-standard sources

* The Quantum Elite must be installed with at least one 12-channel video input card if QGE 100 units are used. The card provides the data bridge between the incoming IP stream and the RAPT video/graphic bus.

APPLICATION DIAGRAM



Control Software

Quantum Elite Control Software

Quantum Elite System Control and Configuration

The Quantum Elite Control Software is the application software and user interface for setting up, configuring, and managing the Quantum Elite videowall processing system. The user-friendly software is organized into a series of tasks, designed so that an integrator can easily navigate through them and quickly have a videowall system up and running, without complex setup procedures or programming. From there, videowall presentations can be created with the aid of a virtual canvas, with full control over the quantity, content, sizing, and placement of windows within the videowall display.

System Setup Tasks

Videowall system setup with the Quantum Elite Control Software is grouped into separate tasks that the integrator follows in sequence to set up and configure the videowall. First, network communication is established with the Quantum Elite unit. Then, the videowall display configuration is defined, and mullion or edge blend compensation applied, if necessary. Finally, the integrator configures the input sources to the system, including those connected to the input cards, RGB graphics sources streamed via QGE 100 units, and internally stored image files.

Virtual Canvas

With installation and configuration of the Quantum Elite inputs and outputs complete, the integrator or system operator can now begin designing presentations to be shown on the videowall. A large virtual canvas provides a visual on-screen layout of the videowall and its subdivisions. Windows may be added to the videowall by simply dragging and dropping them onto the canvas. Once dragged onto the canvas, they may be sized and positioned anywhere. The large area bordering the videowall serves as a “staging” area for windows to be added to, removed from, or prepared for placement on the videowall.

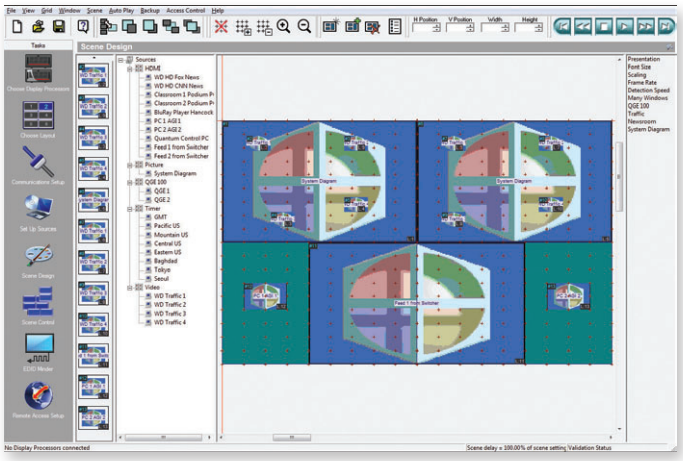
Changes to the multi-window layout can be viewed instantaneously on the videowall display. The software application lets the user customize the layout by selecting the source input for each window, sizing and positioning the windows, adding a caption label or color border to each window, and sizing, positioning, and zooming images within the windows. These configurations are saved as window presets for future recall.

User Operation

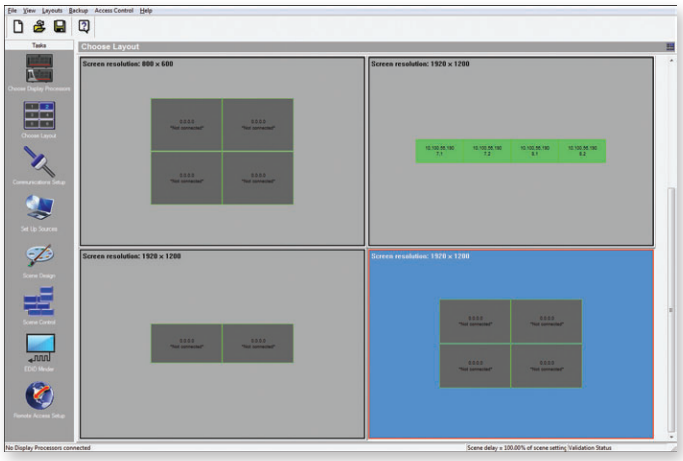
Once videowall window presets have been created, the Quantum Elite Control software can be used to create a simple user interface, so that the system operator can quickly and easily recall these presets. The software lets the integrator create this interface with clickable buttons for each preset. This interface is fully customizable, including button color, size, and position, as well as background color, text color, and the font. A bitmap image can also be assigned to a button or the background of the interface.

Control System Integration

The Quantum Elite can be remotely controlled via RS-232 serial control using the Extron TouchLink® or other control system to recall presets and provide additional system functions, such as changing the source input for a window or applying captions or border colors to windows.



The virtual canvas provides a visual on-screen layout of the videowall, where windows can easily be added, sized, and positioned.

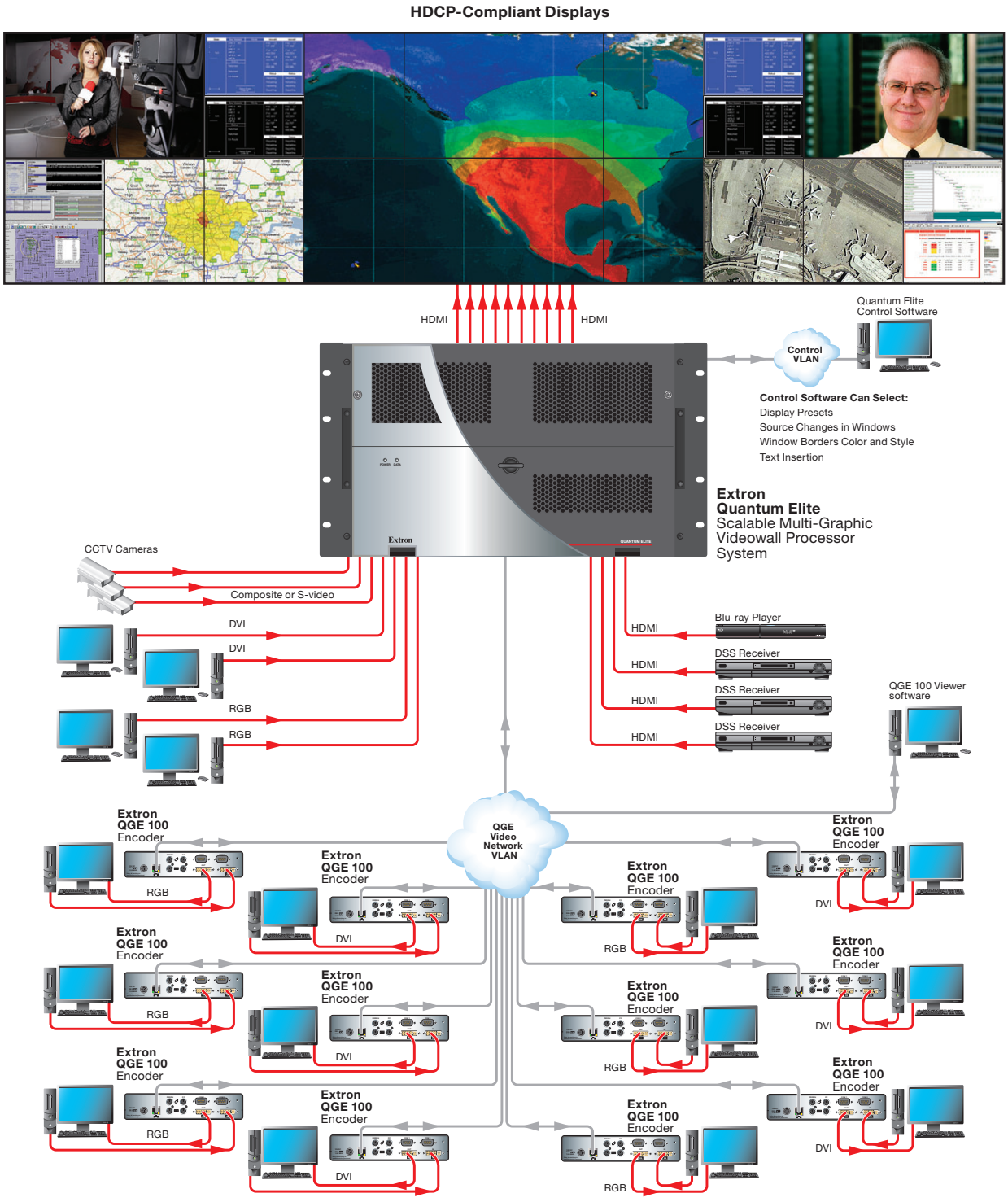


The control software is organized into a series of tasks shown on the left, designed so that the user can easily navigate through them to set up the videowall.

Applications

Command and Control Videowall System

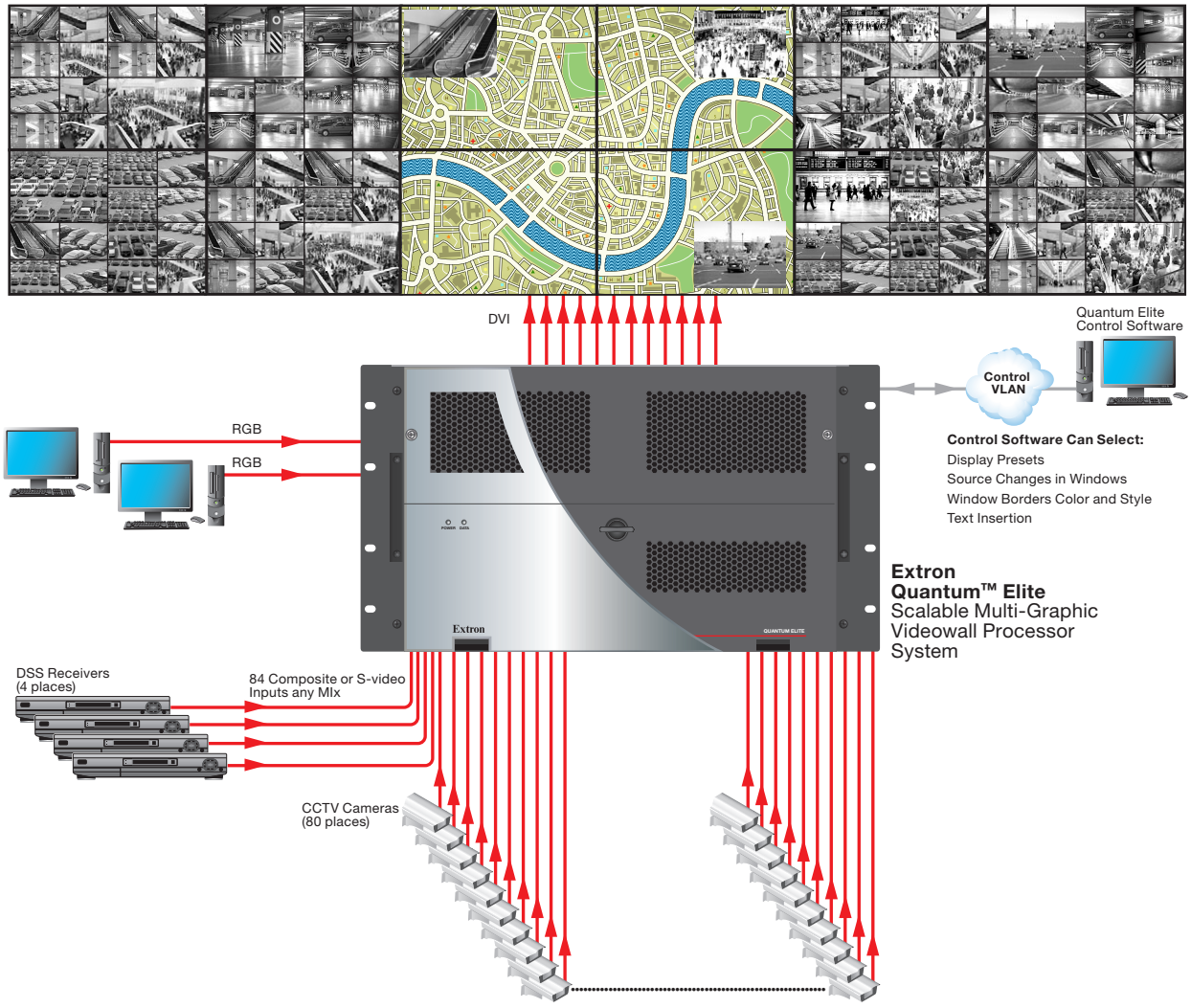
This videowall system application employs a 15-slot Quantum Elite 615 for processing 11 locally connected sources, plus 12 additional PC sources for maps and data screens streamed over the LAN via QGE 100 Quantum Graphics Encoders. A single video input card accommodates the three standard definition sources. Two HDMI input cards are used for the Blu-ray Disc player and digital satellite feeds. Two additional input cards are used for the DVI and analog RGB PC signals. Together with the five dual HDMI output cards for the 5x2 videowall, the Quantum Elite 615 still leaves five slots open for scalability to support future system expansion. In the future, the system can be expanded to support hundreds of additional PC data or graphics sources over the LAN using QGE 100 streaming encoders.



Applications

Security and Surveillance Videowall System

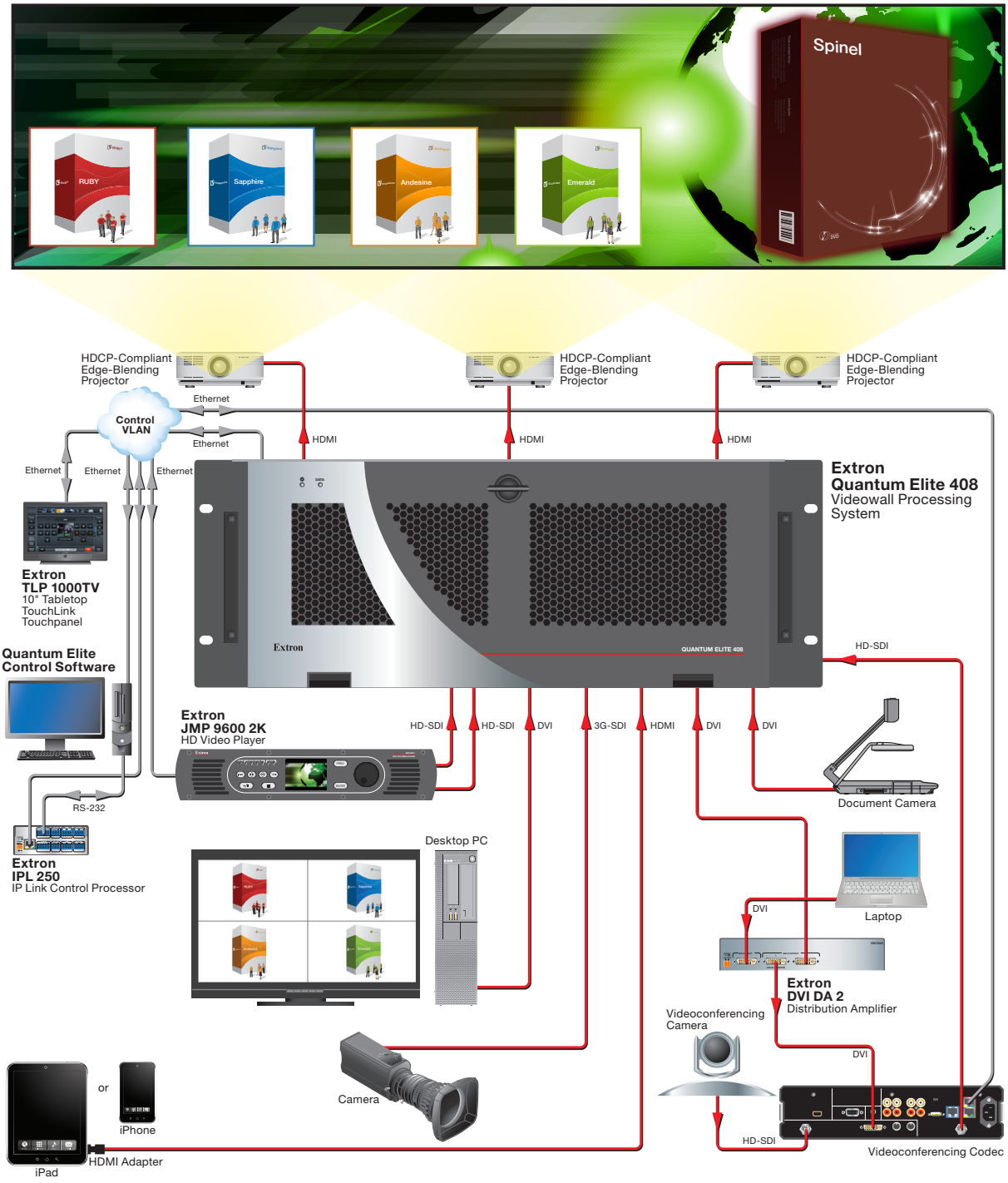
In this application, input sources include 80 standard definition CCTV cameras for surveillance, four satellite TV receivers, and two PCs. The standard definition sources are connected to seven 12-channel video input cards. An additional input card is used for the PCs. The Quantum Elite 615 provides the capacity to accommodate all 86 input sources, together with the 6x2 videowall that requires six dual DVI-I output cards, all in just a 6U rack space unit. The high speed video/graphic bus easily supports all 86 inputs simultaneously while maintaining real-time performance, and the windowing capability allows all of them to be displayed on the videowall in separate windows. A dedicated PC with the Quantum Elite Control Software is used for system configuration and operation.



Applications

Executive Conference Room

This application utilizes a Quantum Elite 408 card frame with three HDCP-compliant edge-blended projectors to create a seamless display for a large executive conference room. Two HDMI output cards provide three overlapped signals to the projectors, which blend the overlap regions to create one seamless image. Two 3G-SDI input cards accept signals from a videoconferencing system, a camera providing live product shots, and an Extron JMP 9600 2K HD player that provides two channels of HD-SDI content to present corporate videos and wide, animated backgrounds. Two DVI input cards accommodate a desktop PC, a laptop computer, and a document camera to support live presentations. An HDMI input card accepts signals from mobile devices with an HDMI adapter for additional content. Any combination of sources can be presented simultaneously, and freely positioned anywhere on the display. An Extron TLP 1000TV TouchLink® Touchpanel and IPL 250 IP Link® Control Processor provide simple control for recalling display presets or managing content playback.



Quantum Connect

Quantum Connect

HDCP-Compliant Videowall Processing System

The Extron Quantum® Connect is a videowall processor that delivers the same high quality video scaling, windowing capability, and real-time performance as the Quantum Elite, at a lower price point. It is ideal for small to medium-sized videowalls with two to 14 screens in installations with permanent AV system configurations.

The Quantum Connect is populated at the factory with any combination of HDMI and DVI-I output cards and input cards for 3G-SDI, HDMI, DVI, RGB, HDTV, or video sources. The dual output card supports up to 128 video/graphic windows and the high-speed, dedicated RAPT video bus maintains real-time performance even under heavy loading of inputs. The Quantum Connect can accommodate up to 84 video inputs or 14 multi-rate SDI, HDMI, or RGB/DVI inputs, depending on the input and output card configuration.

Like the Quantum Elite, the Quantum Connect allows the display of HDCP-encrypted content on the videowall when HDMI input and output cards are used with HDCP-compatible displays. A green window with an alert message will be displayed if HDCP-encrypted content is sent to a non-HDCP compliant display.

Feature	Quantum Connect	Quantum Elite
10 Gbps RAPT video/graphic bus	✓	✓
High performance video scaling and windowing	✓	✓
SDI, HD-SDI, and 3G-SDI input support	✓	✓
HDCP-compliant input/output options	✓	✓
Bezel compensation for flat-panel displays	✓	✓
4U, eight-slot card frame	✓	✓
6U, 15-slot card frame		✓
Output overlap for edge-blended applications		✓
Incorporate streamed RGB graphic sources		✓
Upgradeable for future system expansion		✓
Cascade card frames for large videowalls		✓
Display window borders, title and overlay text		✓
Display locally stored images		✓

Quantum Connect 408

A variety of display scenarios can be pre-programmed or created on-the-fly using Quantum Connect Control Software, an intuitive control interface for setup and system operation. Many sources can be shown at small sizes, a few at large sizes, or many other combinations. All of this is complemented by high performance image scaling technology, which accurately preserves the original image quality at all window sizes.

The Quantum Connect is packaged into permanent configurations when shipped from the factory. Applications requiring greater scalability and the flexibility to expand over time should use the Quantum Elite processor.

NOTE: The Quantum Connect is shipped with a fixed I/O configuration, specified at time of ordering.

Features

- Delivers the same real-time performance and windowing capability of the Quantum Elite at a lower price point
- Scalable videowall processing for mid-sized videowalls with up to 14 displays
- Supports 3G-SDI, HDMI, DVI, RGB analog, and standard video input signals
- HDMI, DVI, and RGB analog output options support many display types
- High quality image upscaling and downscaling
- Card frame videowall processing system available with eight slots
- High speed, dedicated video/graphic bus delivers real-time performance
- Up to 128 video/graphic windows per dual output card
- Bezel compensation for flat-panel displays
- Easy-to-use configuration and control software

Extron VideoWall Support

Extron Videowall Commissioning

Extron Videowall Commissioning is a proactive, on-site service that ensures your Quantum® Elite, Quantum Connect, or WindoWall® processing system meets your customer's specifications for performance. An Extron Systems Design Engineer - SDE will provide personalized assistance, from conception to completion, to help you deliver a system that fully meets the expectations of your customer.

Extron Videowall Commissioning Includes:

- **Pre-installation design review services** – Extron SDEs are available to assist you throughout the design process. We will review your final system design diagram, prior to commissioning, to verify that it will provide optimal videowall performance.
- **Window layout optimization** – Using your wiring schematic and window layout drawings, we will create a project file that includes all aspects of the system including videowall parameters, I/O routing, and window layout presets. Once on-site, the Extron SDE will verify the presets, configure source parameters, and deliver to you a completed project file.
- **On-site processor and source optimization** – When on-site, the Extron SDE will optimize all Quantum or WindoWall processors, including signal timing, clock and phase settings, size and position adjustments, video adjustments such as color, tint, contrast, and brightness settings, as well as other general image parameters.
- **Validation of processor control** – After processor and source optimization is complete, the Extron SDE will verify that window layout presets are being recalled correctly, and that the processor is correctly responding to any commands it receives from an external control system, if present.
- **Basic Quantum or WindoWall control software training for the system operator** – After correct processor control is verified, the Extron SDE will provide training on the control software's user interface, as well as how to perform system adjustments and design window layouts.

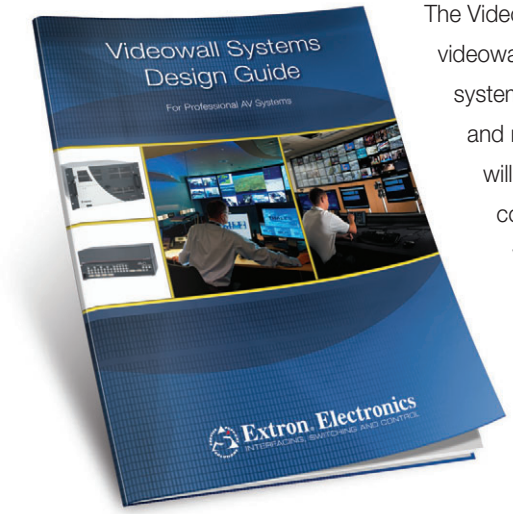
Pre- and Post-Commissioning Checklists

A site preparedness form will be provided to you before the arrival of an Extron SDE, to guide you through the pre-commissioning requirements. Upon completion of the commissioning, you will be issued a site acceptance form to facilitate signoff of the Extron Videowall Commissioning service.

Developing a Commissioning Plan

Extron will assist you in developing a commissioning plan for the installation. Please contact your local Extron sales representative or sales office to discuss your commissioning plan and schedule.

VIDEOWALL SYSTEMS DESIGN GUIDE

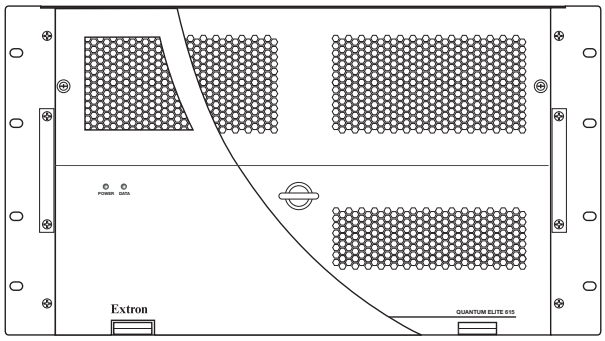


The Videowall Systems Design Guide is an invaluable reference to AV professionals who specify videowalls. Basic videowall concepts such as operating environments, processor features, and system control are discussed, as well as more complex topics such as room design, legibility and readability, and production tips for unique videowall applications. Experienced designers will find useful technical references and visual illustrations that will aid in communicating or comprehending technical topics that can be unique to videowall systems. Several real-world design examples show how the sources, videowall processor, displays, and control system all come together to create a powerful visual tool for boardrooms, simulation environments, traffic management centers, and more.

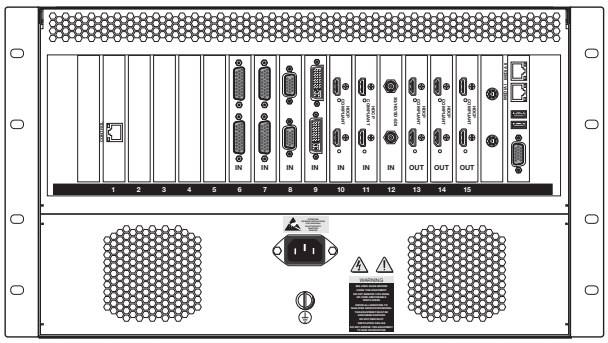
Download or order a hard copy of the Videowall Systems Design Guide by visiting www.extron.com/vwsdg.

Panel Drawings

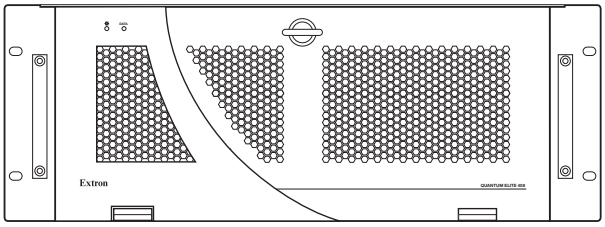
QUANTUM ELITE CARD FRAMES



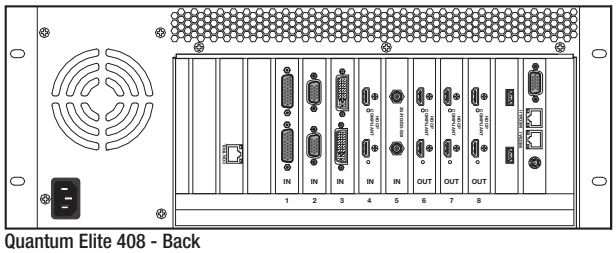
Quantum Elite 615 - Front



Quantum Elite 615 - Back

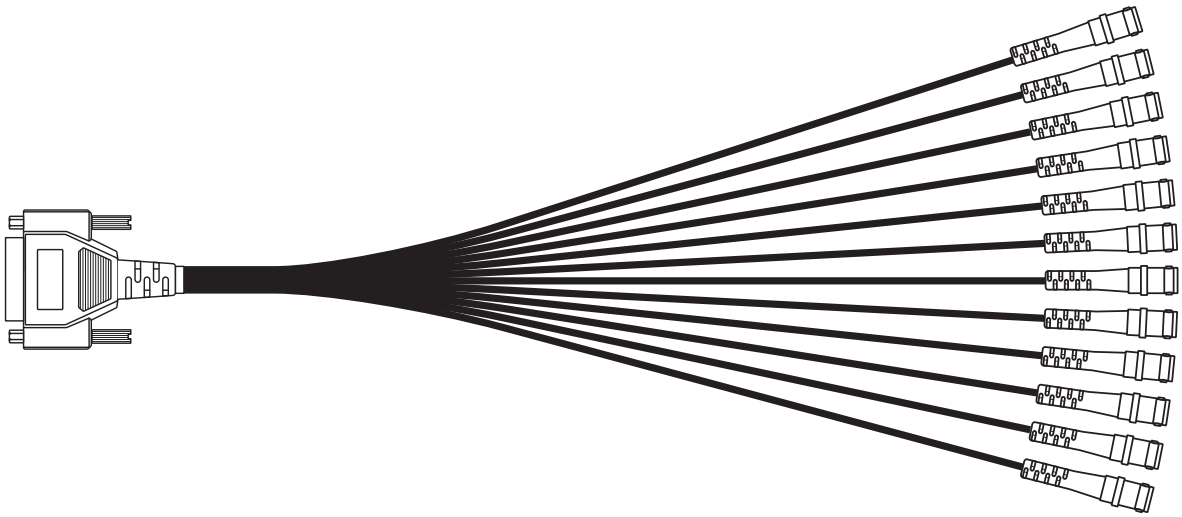


Quantum Elite 408 - Front

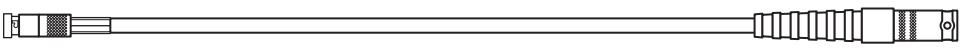


Quantum Elite 408 - Back

STANDARD VIDEO BREAKOUT CABLE



SDI ADAPTER CABLE



Specifications

NOTE: The Quantum Elite 615 has 15 slots for factory-installed input or output cards, and the Quantum Elite 408 has 8. Each slot can accommodate up to 12 S-video or composite video inputs, 2 analog RGB or component video inputs, 2 DVI inputs, 2 HDMI inputs, 2 3G/HD/SD-SDI inputs, 2 RGB or DVI outputs, or 2 HDMI outputs.

VIDEO INPUT — COMPOSITE AND S-VIDEO — QEC I12VID

Number/signal type	12 S-video, composite video
Connectors	2 female 26-pin HD (included adapter allows input on 24 female BNC connectors)
Impedance	75 ohms
Horizontal frequency	15 kHz
Vertical frequency	50 Hz, 59.94 Hz

VIDEO PROCESSING — QEC I12VID

Digital sampling	8 bits per color; 13.5 MHz standard
Colors	16.78 million

SYNC — QEC I12VID

Standards	NTSC 3.58, NTSC 4.43, PAL, SECAM

VIDEO INPUT — QEC I2RGB

Number/signal type	2 analog VGA-WUXGA RGBHV, RGsB, HDTV, component video
Connectors	2 female 15-pin HD
Impedance	75 ohms
Horizontal frequency	15 kHz to 100 kHz
Vertical frequency	50 Hz to 75 Hz
Resolution range	640x480 to 1920x1200, NTSC, PAL, 480p, 576p, 720p, 1080i, 1080p

VIDEO PROCESSING — QEC I2RGB

Digital sampling	24 bit, 8 bits per color; 205 MHz standard (RGB, component video)
Colors	16.78 million

SYNC — QEC I2RGB

Input type	RGBHV, RGsB, bi-level or tri-level component video
Impedance	2.2k ohms for H and V
Polarity	Positive or negative

VIDEO INPUT — QEC I2DVI

Number/signal type	2 digital VGA-WUXGA RGB single link DVI
Connectors	2 female DVI-I (analog signals are not supported)
Horizontal frequency	31 kHz to 100 kHz
Vertical frequency	50 Hz to 85 Hz
Resolution range	640x480 to 1920x1200, 480p, 576p, 720p, 1080i, or 1080p
Formats	RGB digital video
Standards	DVI 1.0

VIDEO PROCESSING — QEC I2DVI

Maximum data rate	4.95 Gbps (1.65 Gbps per color)
Digital sampling	24 bit, 8 bits per color; 165 MHz standard (RGB)
Colors	16.78 million

VIDEO INPUT — QEC I2HDMI

NOTE: *Appropriate HDMI to DVI cables or adapters are required for DVI signal input/output.

Number/signal type	2 single link HDMI (or DVI*)
Connectors	2 female HDMI type A (analog signals are not supported)
Signal type	Single link HDMI (or DVI*)
Digital video	RGB digital video (DVI and HDMI standards) or Y, Cr, Cb digital component video (HDMI standard)
EDID and DDC	Supports Extended Display Identification Data (EDID) and Display Data Channel (DDC) data using DVI and HDMI standards. Factory or custom EDID tables are user selectable.
HDCP	Compliant with High-bandwidth Digital Content Protection (HDCP) using DVI and HDMI standards
Horizontal frequency	31 kHz to 100 kHz
Vertical frequency	24 Hz to 85 Hz
Resolution range	640x480 to 1920x1200, 480p, 576p, 720p, 1080i, or 1080p
Standards	DVI 1.0, HDMI, HDCP
Equalization	Automatic

VIDEO PROCESSING — QEC I2HDMI

Maximum data rate	4.95 Gbps (1.65 Gbps per color)
Digital sampling	24 bit, 8 bits per color; 165 MHz standard
Colors	16.78 million

VIDEO INPUT — QEC I2SDI

Number/signal type	2 3G/HD/SD-SDI
Connectors	2 female HD-BNC
Data rates	270 Mbps to 2.97 Gbps
Horizontal frequency	15 kHz to 100 kHz
Vertical frequency	23.98 Hz to 60 Hz
Resolution range	480i, 576i, 720p, 1080i, or 1080p
Formats	YCbCr digital component video
Standards	SMPTE 259M-C, SMPTE 292M, SMPTE 424M

VIDEO PROCESSING — QEC I2SDI

Maximum data rate	2.97 Gbps
Digital sampling	24 bit, 8 bits per color
Colors	16.78 million

VIDEO INPUT — QGE 100 (REMOTE HARDWARE)

Number/signal type	1 analog VGA-UXGA or digital VGA-WUXGA RGBHV, RGBS, RGsB, single link DVI 1 analog or digital loop-through
Connectors	2 female DVI-I
Impedance	75 ohms
Horizontal frequency	31 kHz to 100 kHz
Vertical frequency	50 Hz to 85 Hz
Resolution range	640x480 to 1920x1200* *1920x1200 is accepted for DVI single link, reduced blanking only
Formats	RGB, digital video
Standards	DVI 1.0

VIDEO PROCESSING — QGE 100 (REMOTE HARDWARE)

Maximum data rate	4.95 Gbps (1.65 Gbps per color)
Digital sampling	24 bit, 8 bits per color, 165 MHz standard
Colors	16.78 million

SYNC — QGE 100 (REMOTE HARDWARE)

Input type	RGBHV, RGBS, RGsB
Polarity	Positive or negative

VIDEO PROCESSING — QEC O2

Maximum data rate	4.95 Gbps (1.65 Gbps per color)
Digital sampling	24 bit, 8 bits per color, 165 MHz standard
Colors	16.78 million

Specifications

VIDEO OUTPUT — QEC O2

Number/signal type	2 scaled RGBHV or single link DVI
Connectors	2 female DVI-I (analog and digital signals are both active)
Impedance	75 ohms
Vertical frequencies	50 Hz, 60 Hz
Scaled resolution	640x480[1,2], 800x600[1,2], 848x480[1,2], 1024x768[1,2], 1152x870[1,2], 1280x768[1,2], 1280x1024[1,2], 1360x768[1,2], 1366x768[1,2], 1440x900[1,2], 1400x1050[1,2], 1408x1050[1,2], 1600x1200[1,2], 1680x1050[1,2], 1920x1200[1,2] HDTV: 720p[1,2], 1080p[1,2] [1] = at 50 Hz, [2] = at 60 Hz
Standards	DVI 1.0

SYNC — QEC O2

Output type	RGBHV
Polarity	Positive or negative

VIDEO PROCESSING — QEC O2HDMI

Maximum data rate	4.95 Gbps (1.65 Gbps per color)
Digital sampling	24 bit, 8 bits per color, 165 MHz standard
Colors	16.78 million

VIDEO OUTPUT — QEC O2HDMI

Number/signal type	2 scaled single link HDMI (HDCP compliant)
Connectors	2 female HDMI type A
Vertical frequency	50 Hz, 60 Hz
Scaled resolutions	640x480[1,2], 800x600[1,2], 848x480[1,2], 1024x768[1,2], 1152x870[1,2], 1280x768[1,2], 1280x800[1,2], 1280x1024[1,2], 1360x768[1,2], 1366x768[1,2], 1440x900[1,2], 1400x1050[1,2], 1408x1050[1,2], 1600x1200[1,2], 1680x1050[1,2], 1920x1200[1,2] HDTV: 720p[1,2], 1080p[1,2] [1] = at 50 Hz, [2] = at 60 Hz
Standards	DVI 1.0, HDMI, HDCP

CONTROL/REMOTE — PROCESSOR/DECODER/SCALER

Ethernet ports	1 female RJ-45 connector for control, networked 2 female RJ-45 for media transfer (QGE 100 sources)
Ethernet data rate	Control port: 10/100Base-T, half/full duplex with autodetect
Quantum Elite 615	Media I and II ports: 10/100/1000Base-T, half/full duplex with autodetect
Quantum Elite 408	Media I: 10/100Base-T, half/full duplex with autodetect Media II: 10/100/1000Base-T, half/full duplex with autodetect
Storage	
Quantum Elite 615	C drive: 512 MB, solid state drive D drive: 256 MB, solid state drive
Quantum Elite 408	80 GB (1 IDE drive partitioned for C and D drives)
Program control	Extron Quantum Elite control/configuration software for Windows®

NOTE: The operating system is hard-coded into the Quantum Elite and Windows updates are not required. The C drive, which contains the operating system, is write protected to prevent unauthorized access.

CONTROL/REMOTE — SETUP AND TROUBLESHOOTING

Number/signal type	
Quantum Elite 615	1 analog VGA-UXGA RGBHV local monitor 2 USB 1 PS/2 mouse 1 PS/2 keyboard
Quantum Elite 408	1 analog VGA-UXGA RGBHV local monitor 2 USB 1 PS/2 mouse and keyboard

GENERAL

Power supply	
Quantum Elite 615	Internal Input: (2*) 100-240 VAC, 50-60 Hz power supplies *A redundant power supply is standard.
Quantum Elite 408	Internal Input: (1) 100-240 VAC, 50-60 Hz power supply
Power consumption	300-500 watts (varies with configuration)
Thermal dissipation	300-1350 BTU/hr (varies with configuration)
Mounting	
Rack mount	Yes
Enclosure dimensions (per unit)	
Quantum Elite 615	10.5" H x 17.1" W x 19.3" D (6U high, full rack wide) (26.7 cm H x 43.3 cm W x 49.0 cm D) (Depth excludes connectors and handles. Width excludes built-in rack ears.)
Quantum Elite 408	7.0" H x 17.1" W x 19.3" D (4U high, full rack wide) (17.8 cm H x 43.3 cm W x 49.0 cm D) (Depth excludes connectors and handles. Width excludes built-in rack ears.)
Regulatory compliance	
Safety	CE, c-UL, UL, Korea KC Mark
EMI/EMC	CE, FCC Class A
Environmental	Complies with the appropriate requirements of RoHS, WEEE.
Warranty	3 years parts and labor

NOTE: All nominal levels are at ±10%.

Model	Version Description
Quantum Elite 615	6U/15 Slot Card Frame
Quantum Elite 408	4U/8 Slot Card Frame
QEC O2	Two Output DVI/RGBHV Card
QEC O2HDMI	Two Output HDMI Card
QEC I12VID	12 Input Video/S-Video Card
QEC I2RGB	Two Input Analog RGB/YUV Card
QEC I2DVI	Two Input DVI Card
QEC I2HDMI	Two Input HDMI Card
QEC I2SDI	Two Input 3G-SDI Card
QGE 100	Quantum Graphics Encoder
S³ Videowall Commissioning	Product Commissioning Services

For complete specifications, please go to www.extron.com
Specifications are subject to change without notice.

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