ROUTING SWITCHERS
CONCERTO, APEX PLUS, TRINIX NXT

BUSINESS CASE
• The Grass Valley® routing switcher portfolio supports a wide range of signal formats, data-rates, and input/output size choices.
• Whether used for News, Live or Playout, all Grass Valley routing switchers address today’s as well as tomorrow’s business challenges in respect to flexibility, efficiency, and usability.
• With their unsurpassed density, long lasting reliability, and life cycle compatibility, all Grass Valley routing switchers feature true platform architectures either with single or multiformat support.
• Concerto™, Apex, and Trinix® routing switchers have a global proven record that enable a very secure and high return of investment.
• The common use of superior direct native control interfaces ensures fast, reliable, and deterministic control.
• Concerto addresses routing switcher requirements for broadcast infrastructures which need to support multiple signal types and formats.
• Apex addresses routing switcher requirements for large scale broadcast infrastructures which need to support different digital audio formats and sampling rates.
• Trinix addresses routing switcher requirements for large scale broadcast infrastructures, which need to support different digital video formats and data-rates.

KEY FEATURES

CONCERTO
• 3 chassis choices 4, 7, or 8 rack units
• Unique 1 board architecture
• Linear expandable up to 256x256 (audio)
• Built-in or external control options
• XPT native control interface
• Multiple signal type and format support

APEX PLUS
• Unique 11 rack unit input & output chassis
• Patented redundant DRR processing
• FPGA-based architecture
• Linear expandable up to 4096x4096 (mono)
• Natively supports all audio sampling rates
• Clean switch of Dolby E
• XPT native control interface

TRINIX NXT
• 6 chassis choices—symmetric and asymmetric
• Unique CleanFlow™ architecture
• Unique EvenFlow architecture
• Passive expansion up to 2048x2048 (3G)
• Natively supports all SDI data rates
• XPT native direct control interface
• Built-in web server-based monitoring and diagnostics
The Concerto routing switcher is ideal for everything from mobile units to broadcast or post-production facilities—as well as telco or cable head ends.

Combining multi-format video and audio support with a scalable, efficient, and highly reliable design, the Grass Valley Concerto routing switcher is an ideal choice for everything from mobile trucks and OB vans to broadcast or post-production facilities. Its optional 48 VDC power supply also makes it a perfect fit in telco or cable head-end facilities.

The Concerto supports mixed-signal formats, including analog audio and video, as well as SD and 3G/HD/SD digital video, AES/EBU digital audio, time code, and RS-422 data for machine control—all within a single chassis. It offers a variety of rear panel connectors. It even supports the routing of digital audio and analog audio on the same level.

The Concerto routing switcher scales to 128x128 configurations and support three chassis: a 7 RU chassis that can handle up to 4 levels of 32x32, one level of 128x128, or any combination in between; a 4 RU chassis that supports either two levels of 32x32 or one level of 64x64; and an 8 RU chassis that that supports all signal types up to 128x128 and can be used for hosting up to four Maestro master-control engines. All Concerto boards are compatible with any of these chassis. Optional time division multiplexing (TDM) backbone supports audio routing configurations up to 256x256 using the two 7 or 8 RU chassis.

Unlike most routing switchers that require dedicated input, output, and crosspoint boards for new configurations and expansion, it takes just one board to add 32x32 crosspoints of video, audio, and/or data—in any combination—to an existing Concerto chassis. It takes only four boards to configure up to a 128x128 matrix.

For high reliability, the Concerto routing switcher features low power consumption, a minimal component count, and a design that maximizes cooling. For easy serviceability, its active components are front-removable and hot swappable for safe, on-air maintenance.

The Concerto is supported by all Grass Valley control solutions and can be equipped with Maestro master control engines. It also supports the Grass Valley NetCentral™ status and monitoring application.

### Multi-Format Flexibility by Design

The Concerto routing switcher supports multiple mixed signal types in the same chassis, including analog audio and video; SD and 3G/HD/SD digital video; AES/EBU digital audio; time code; and RS-422 data for machine control.

The slots in the Concerto chassis are not format sensitive and you can easily remove and reconfigure its rear panels. This design makes the system easy to expand or modify. It also provides tremendous flexibility when laying out a multi-format system. It’s just as easy, for example, for the 7 RU chassis to house a 128x128 serial digital video level as two 64x64 levels for serial digital video and AES/EBU audio respectively, or as four 32x32 levels each handling its own format.

As one would expect from a true multi-format solution, the Concerto routing switcher provides two independent internal sync reference inputs for video; this approach eliminates the need for multiple chassis in multi-standard facilities. For example, PAL or NTSC sync can be assigned to individual, user-selectable outputs.

The unique I/O architecture of the routing switcher makes it the perfect tool for bridging analog and digital environments; one frame accommodates analog and digital video and audio signals simultaneously.
As an added bonus, the analog audio boards of the Concerto include built-in A/D and D/A converters for routing signals between analog and digital environments. For facilities transitioning from analog to digital, this capability is significant because it simplifies wiring and eliminates the need for additional audio-conversion equipment.

**Linear Scalability Makes for Easy Upgrades**

The Concerto routing switcher features a linearly scalable design to make future growth easy and cost-effective. Unlike most systems that require dedicated input, output, and crosspoint boards for expansion, it takes only a single board to change a 32x32 router to a 64x64 configuration and only four boards to configure a full 128x128 routing switcher. Concerto offers separate rear-panel modules with no active components that can be installed and pre-wired in preparation for future expansion. Choose the amount of expansion needed and only pay for that amount.

What’s more, the Concerto routing switcher supports expansion to 256x256 configurations for analog and digital audio via optional TDM expansion boards. This straightforward, industry-standard technique simplifies cabling between frames and eliminates the need for secondary switches and distribution amplifiers. Using just four coaxial cables per TDM connection, expand all sources, destinations, and secondary switches and distribution amplifiers. Using just four coaxial cables per TDM connection, expand all sources, destinations, and secondary switches and distribution amplifiers. This straightforward, industry-standard technique simplifies cabling between frames and eliminates the need for secondary switches and distribution amplifiers.

**Ensuring High Reliability**

Designed for low power consumption, the Concerto routing switcher minimizes its use of components to help ensure high reliability and availability. A basic 32x32 level, for example, requires only a board and a rear panel. What’s more, its built-in, multi-fan, forced-air cooling ensures optimal performance and reliability without requiring external fan units.

To further maximize uptime, configure Concerto routing switcher with complete control and power redundancy for mission-critical applications—or with a single controller and power supply for less demanding applications.

The Concerto chassis also features alarm relay outputs to alert facility management and engineering personnel of system anomalies.

** Ensuring High Serviceability**

The Concerto routing switcher also offers maximum serviceability. Its passive rear panel permits hot swapping of all boards from the front of the chassis—even power supplies and fans. This approach keeps the routing switcher online during upgrades and to avoid going behind the equipment rack to perform any service-oriented tasks.

All Concerto video and audio boards have monitor outputs for quality assurance and signal-integrity analysis equipment. The routing switcher also supports the Grass Valley NetCentral Simple Network Management Protocol (SNMP)-based application for remote monitoring.

**Full Control System Support**

The Concerto routing switcher is supported by all Grass Valley control solutions, including the Encore™, Jupiter™, Prelude™, and Series 7000.

**Serial Digital Video Module (SMPTE 259M & EBU Tech 3267)**

Use the SD video board in either re-clock or bypass mode. The re-clocked bit rates include 143 Mb/s, 177 Mb/s, 270 Mb/s, and 360 Mb/s. It also accommodates multi-sync reference selection on each output.

**3 Gb/s High Definition Video Module (SMPTE 424M) (3G/HD/SD)**

The 3G video board of the routing switcher will seamlessly handle the 3 Gb/s signals used for the highest quality HD (1080p) and multiplexed 3D signals. The 3G video board also fully supports all SD and HD bitrates, and bypass switches all non-standard bit rates from 10 Mb/s to 3 Gb/s.

**Analog Video Board**

The analog video board features terminating differential inputs and outputs, DC restore capability, and wideband signal performance for switching computer graphic signals.

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**Flexible Design and Linear Scalability**

[Diagram of Concerto routing switcher]

The unique I/O architecture of the Concerto routing switcher makes it easy to mix analog and digital formats in the same chassis. Input, output and crosspoint functions are on a single board for easy system expansion.

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CONCERTO MULTI- & MIXED-FORMAT ROUTING SWITCHER

Digital Audio Board
The router’s digital audio board not only complies with AES and EBU standards, it includes more advanced features such as synchronous AES/EBU switching (for signals sampled at 48 kHz), attributes control (as described in the stereo analog audio section), and silent switching to eliminate pops and clicks that can be introduced by signal-level differences. If the audio signal being switched is a 48 kHz signal but does not conform to the required 48 kHz sampling rate, the board will convert the signal using high-quality add/drop sampling technology so that the signal can be switched synchronously.

When used with the analog audio board, the digital audio board can be used for D/A conversion, eliminating the need for dedicated tie-lines or additional conversion equipment.

Stereo Analog Audio or Dual Mono Audio Board
This board provides true stereo audio processing and broadcast-quality performance with differential, high-impedance bridging inputs and low-impedance outputs.

ORDERING INFORMATION

Chassis, Fans and Power Supplies
CRS-FRM128-CPL
7 RU chassis w/PS, MC, fan for CPL control
CRS-FRM128-XPT
7 RU chassis w/PS, MC, fan for XPT bus control
CRS-FRM64-CPL
4 RU chassis w/PS, MC, fan for CPL control
CRS-FRM64-XPT
4 RU chassis w/PS, MC, fan for XPT bus control
CRS-PLS128-XPT
8 RU chassis w/PS, MC, fan for XPT bus control
CRS-PLS128-CPL
8 RU chassis w/PS, MC, fan for CPL control
CRS-FAN128
Fan module – use with 128x128 7 RU chassis
CRS-FAN64
Fan module – use with 64x64 4 RU chassis
CRS-PLSFAN-128
Fan module – use with 128x128 8 RU chassis

I/O & Matrix (1 Circuit Card is I/O and Matrix)
CRS-AA128
Analog audio, stereo, or dual mono board (24 dBFS)
CRS-AES128
AES/EBU digital audio board (7 RU chassis)
CRS-AV128
Analog video board
CRS-SD128
Serial digital video board
CRS-3G128
3 Gb/s high-definition video board
CRS-TC128
Time code board
CRS-PORT128
RS-422 port board

Rear Panels
CRS-AA-AP
Analog audio rear panel, Phoenix
CRS-AA50-AP
Analog audio rear panel, DB50
CRS-AES-AP
Balanced AES/EBU rear panel, Phoenix
CRS-AES50-AP
Balanced AES/EBU rear panel, DB50
CRS-BNC-AP
BNC rear panel
CRS-3G-AP
3 Gb/s high-definition rear panel
CRS-EBU-AP
Balanced AES transformer rear panel, Phoenix
CRS-PORT9-AP
Port, DB9 rear panel

Accessories
CRS-CBL1
Analog audio: DB50 to pigtail (4.5 meters – 14.5 feet)
CRS-CBL2
AES audio: DB50 to pigtail (4.5 meters - 14.5 feet)
CRS-MC-CPL
Matrix control board for CPL communications
CRS-MC-CPL2
Matrix control board for 8 RU chassis and CPL communications
CRS-MC-XPT
Matrix control board for XPT bus communications
CRS-MC-XPT2
Matrix control board for 8 RU chassis and XPT bus communications
CRS-TDM
TDM expander board
**SPECIFICATIONS**

**7 RU Chassis**
- One analog PAL or NTSC color black looping reference input, 75Ω BNC

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<th>Dimensions</th>
<th>cm</th>
<th>in.</th>
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<tr>
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<td>48.3</td>
<td>19.0</td>
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<tr>
<td>Weight (max.)</td>
<td>27.2 kg</td>
<td>60 lbs.</td>
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**4 RU Chassis**
- One analog PAL or NTSC color black looping reference input, 75Ω BNC

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<tr>
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<td>48.3</td>
<td>19.0</td>
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<tr>
<td>Weight (max.)</td>
<td>27.2 kg</td>
<td>60 lbs.</td>
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**8 RU Chassis**
- One analog PAL or NTSC color black looping reference input, 75Ω BNC

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</thead>
<tbody>
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<tr>
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<tr>
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<td>Weight (max.)</td>
<td>31.8 kg</td>
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**Power**
- 90-260V operating voltage 50-60 Hz
- Power consumption: 600W max.

**Environmental**
- Operating temperature: 0 to 40° C
- Operating humidity: 10 to 90%, non-condensing

**Analog Video**

**Inputs**
- System bandwidth: 30 MHz (+0.5 dB, –2 dB)
- 75Ω BNC, terminating, DC coupled
- Nominal level: 1 Vp-p, max. 3 Vp-p
- Return loss: >40 dB DC to 10 MHz

**Outputs**
- 75Ω BNC, terminating, DC coupled
- Nominal level: 1 Vp-p, max. 3 Vp-p
- Return loss: >40 dB DC to 10 MHz
- One 75Ω QC monitor output

**Serial Digital Video**
- Selectable automatic re-clocking at 143 Mb/s, 177 Mb/s, 270 Mb/s, and 360 Mb/s. Non-standard bit rates are “bypass” switched from 5 Mb/s to 360 Mb/s
- Automatic input cable EQ to 300M of Belden 1694A or equivalent (including 8281) for data rates up to and including 360 Mb/s

**Inputs**
- Conforms to SMPTE-259M
- 75Ω unbalanced BNC connector
- Return loss: >15 dB min.

**Outputs**
- Conforms to SMPTE-259M
- 75Ω unbalanced BNC connector
- Return loss: >15 dB min., 10-360 MHz
- Signal amplitude: 800 mV ±10% when terminated into 75Ω
- DC offset 0.5V max. when terminated into 75Ω
- One 75Ω BNC QC monitoring output

**3 Gb/s High-Definition Video (3G/HD/SD Support)**
- 10 Mb/s – 3 Gb/s system bandwidth
- Automatic input cable EQ to 80M of Belden 1694A for data rates up to and including 3 Gb/s

**Inputs**
- Conforms to SMPTE-259M, SMPTE-292M, and SMPTE-424M
- 75Ω unbalanced BNC connector, self terminating
- Return loss: >15 dB 5 MHz to 1.5 GHz, >10 dB 1.5 GHz to 3 GHz

**Outputs**
- Conforms to SMPTE-259M or SMPTE-292M
- 75Ω unbalanced BNC connector, self terminating
- Return loss: >15 dB 5 MHz to 1.5 GHz, >10 dB 1.5 GHz to 3 GHz

**Analog Audio**

**Inputs**
- Balanced, terminal strip or 50-pin D connector
- Maximum input level: +24 dBu

**Outputs**
- Balanced, terminal strip or 50-pin D connector
- Maximum output level: +24 dBu

**Processing**
- 24-bit A-to-D and D-to-A audio conversion
- Sum, swap, invert and duplicate

**Digital Audio**

**Inputs**
- Conforms to AES-3id-1995, SMPTE-276-M AES/EBU
- Balanced, terminal strip, or 50-pin D connector. Unbalanced, 75Ω BNC
- Maximum input level: +24 dBu

**Output**
- Conforms to AES-3id-1995, SMPTE-276-M AES/EBU
- Balanced, terminal strip, or 50-pin D connector
- Maximum output level: +24 dBu
- Sum, swap, invert and duplicate

**Time Code**
- SMPTE 12M, SMPTE time code
- Terminal strip or 50-pin D connector

**Data**
- RS-485 or RS-422
- 9-pin D connector
- True port-oriented data switching with dynamic pin assignment for master and slave operation

**Sync Inputs (used for video switch point locating):**
- **Video**
  - Type: BNC, Hi-z looping, PAL/NTSC analog black or HD tri-level sync (CRS-MC-XXX controller modules)
  - HD formats supported: 1080i50/60, 1080p24/25/30, 1080p24/25/30, 720p60, auto-detected
  - Level: Nominal 1 Vp-p (±6 dB) video
  - Return Loss: >25 dB 0.1-5 MHz; >25 dB at 0.1-5 MHz, when terminated into 75Ω

- **Audio**
  - Type: AES 48 kHz, BNC, Hi-z looping
  - Level: 1 Vp-p
  - Return Loss: >15 dB at 0.1 MHz; >25 dB at 6 MHz, when terminated into 75Ω
The Apex Plus digital audio routing switcher combines the features that audio professionals love with the adaptability, reliability, and serviceability that broadcasters demand—all while using less power and less space than any other system available.

Grass Valley offers one of the broadest selections of routing switchers, including Apex—a patent-pending digital audio routing switcher that provides the highest density and reliability available for large-scale broadcast infrastructures.

Central to the Apex system is its adaptability. Scaling to 2048x2048 via a unique Dynamic RAM Routing (DRR) switching architecture, it offers the simplest expansion path available—for both studio and mobile users. Apex handles any data rate a facility could ever need, supporting simultaneous synchronous and asynchronous signals from 30 to 100 kHz. And it offers a set of audio features not found in any other system—including a silent-switching design that eliminates unwanted clicks and pops.

The Apex routing switcher is also highly reliable and serviceable. It uses redundant TDM processing boards to keep signals moving through a facility without interruption. It features redundant power supplies to maximize uptime, and uses a common air chamber and an N+1 fan arrangement to ensure even, uninterrupted cooling. Plus its components are all front removable and hot-swappable.

Adaptable to Any Large-Scale Audio Environment

Apex uses an 11 RU 512 input and 512 output chassis housing a unique DRR routing core enabling both a dense and feature-rich product. The system features cost-effective, reliable linear expansion: you can interconnect multiple chassis to create routing switchers as large as 2048x2048 using only a handful of interconnection cables and without the need for expensive distribution amplifiers.

Apex offers similar physical flexibility in that its chassis can be stacked vertically or horizontally.

Each Apex can contain one of two I/O board types: one for 75Ω signals and one for 110Ω signals. Each accommodates 32 AES pairs. The 75Ω board offers unbalanced BNC connectors and BNC MADI ports. The 110Ω board offers balanced DB25 connectors and BNC MADI ports. Both feature a field-programmable gate array (FPGA) design that minimizes components and power requirements and increasing overall system reliability.

The multi-format support of the Apex routing switcher includes AES digital audio (75Ω unbalanced and 110Ω balanced), Multiple Audio Distribution Interface (MADI), and Dolby E formats.

The adaptability of the Apex also extends to its signal support. Unlike other routing switchers that force you to purchase separate board sets and sample rate converters to handle multiple signal types, the Apex system can automatically detect a signal’s type (synchronous or asynchronous), its rate (from 30 kHz to 100 kHz), and then switch it properly—without any additional modifications or intervention. It can even switch a signal that has lost its reference.

An Apex chassis features two sync reference inputs supporting video and audio reference signals. This design enables use of a video reference for audio switching while also supporting the proper, uncorrupted switching of Dolby E signals.

Unrivaled Audio Features

Designed with audio professionals in mind, the Apex offers an unrivaled set of signal-processing features. These features include a silent-switching design to minimize unwanted clicks and pops. This feature can be turned on or off as needed.
APEX PLUS DIGITAL AUDIO ROUTING SWITCHER

For full mono routing, the Apex routing switcher offers an AES Pair Breakaway feature. While input and output signals are always tied together as a left/right pair, the internal routing engine separates the pairs—hence the term breakaway—to handle the signals independently. This independent switching allows a control solution to view the routing switcher as either a single-level stereo system in which the pairs switch together, or in a single-level mono system with two levels of mono audio. This capability also allows the Apex to support a full complement of audio pair manipulation modes, including normal, mix, and reverse.

Ensuring High Reliability

To maximize uptime and reliability, the Apex routing switcher uses redundant DRR processing boards. Should a board fail, a secondary board will take over immediately.

The system also employs redundant DDR expansion links between chassis—and connects those links in a fully connected star topology. This topology ensures that every chassis is speaking to every other chassis, eliminating the weak-link pitfalls of serial or daisy-chain topologies.

To ensure even, uninterrupted cooling, the Apex system uses a common air chamber and an N+1 fan arrangement—the same high-performance cooling approach used in the Trinix NXT digital video routing switcher. Additionally, the Apex system design curbs overall power usage by minimizing circuit board and component counts. This significantly reduces the load on the cooling system, increasing the overall reliability of the system.

The Apex supports two power supplies that operate as completely redundant supplies. That is, one supply can fully provide enough power to operate the router even under maximum load.

The power supplies of the Apex routing switcher are also load sharing. In a system with two power supplies, for example, both supplies actively supply power at the same time. This approach improves overall system reliability by lowering the output of each supply. Lowering the average output of a supply, relative to its maximum, reduces the likelihood of its failure.

Ensuring High Serviceability

The Apex also offers maximum serviceability. Its passive rear panel allows all modules to be hot swapped from the front of the chassis—even power supplies and fans. This approach permits keeping the router online during upgrades and to avoid going behind the equipment rack to perform any service-oriented tasks.

Complete Control Solution Support

The Apex routing switcher is designed to be supported by the Grass Valley Jupiter control solution.

Facility Fit

The Apex routing switcher supports a broad range of audio signal formats, such as 30 to 100 kHz synchronous or asynchronous AES (balanced or unbalanced), Dolby E, or MADI signals, which can be timed to either video or audio sync.
75Ω Version
- AES–3id–1995 coaxial transmission of AES signals
- SMPTE 274M for coaxial transmission of AES signals
- AES–11–1997 synchronization standard

Inputs
- Input Connector: 75Ω BNC unbalanced (50Ω compatible)
- Input Sample Rate: 30 to 100 kHz

Outputs
- Output Connector: 75Ω BNC unbalanced (50Ω compatible)
- Output Impedance: 75Ω
- Output Sample Rate: 30 to 100 kHz (sync/async)

110Ω Version
- AES–3–1992 with the exception of 75Ω coaxial I/O
- AES–11–1997 synchronization standard

Inputs
- Input Connector: 25-pin D female
- Input Impedance: typical 110Ω ±20%, at frequencies from 100 kHz to 12 MHz
- Input Sample Rate: 30 to 100 kHz

Outputs
- Output Connector: 25-pin D female
- Output Impedance: typical 110Ω ±20%, at frequencies from 100 kHz to 12 MHz
- Output Sample Rate: 30 to 100 kHz (sync/async)

MADI
- AES–10

Inputs
- Input Connector: 75Ω BNC unbalanced (50Ω compatible)

Outputs
- Output Connector: 75Ω BNC unbalanced (50Ω compatible)

Alarm
The relay connector is a BNC type and meets SMPTE 269M–1999

Power
- Total: 163W

AC Power Input
- Mains Connection: IEC connector, separate mains input for each power supply module

Voltage Range: 100 to 240V 50-60 Hz, universal, auto-ranging

ORDERING INFORMATION

Frames, Fans and Power Supplies
APX-FRM-35075-IN/-OP
Apex 512 input and output chassis – 1PS, 1CX, 1CL, 1FM – unbalanced (75Ω)

APX-FRM-35110-IN/-OP
Apex 512 input and output chassis – 1PS, 1CX, 1CL, 1FM – balanced (110Ω)

APX-PS-34000
Apex power supply 150W, 100-240 VAC 50-60 Hz

APX-FM-34000
Apex fan module with two fans

I/O & Matrix
APX-IN-34075
Apex 75Ω input board – 32 inputs

APX-IN-34110
Apex 110Ω input board – 32 inputs

APX-OP-34075
Apex 75Ω output board – 32 outputs

APX-OP-34110
Apex 110Ω output board – 32 outputs

APX-MX-34000A
Apex TDM matrix board – 1024x256

Accessories
APX-CX-34000
Apex matrix controller – XPT control

APX-CL-35075-IN/-OP
Apex 75Ω configuration board

APX-CL-35110-IN/-OP
Apex 110Ω configuration board

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Setting the standard for superior signal performance and uncompromising reliability, the Trinix NXT is the best-selling digital video routing switcher in the world. With more than 30% lower operating costs and the unique capability to upgrade existing systems with 3 Gb/s processing, as well as multiviewer and fiber optic I/O, Trinix NXT protects system investment now and into the future.

The Grass Valley Trinix NXT digital video routing switcher is designed for continuous and reliable operation in large and very large configurations. Its reliability and scalability are field-proven in configurations up to 2,048 inputs and outputs. The routing switcher’s superb heat management—along with its efficient power usage, low cooling costs, and long system life—results in the lowest operating costs in the industry. Simply put, it sets the standard and is the secure choice for business requirements today and in the future.

A Pedigree of Reliability
The original Trinix platform is the world’s most popular broadcast routing switcher, with more than sixty million crosspoints continuously in service. This means a pedigree of reliability that can be trusted now and into the future.

All Trinix routing switcher customers can upgrade to 3 Gb/s, and add the latest feature options such as the integrated Trinix NXT Multiviewer, no matter when they purchased their routing switcher. This illustrates the long-term support and forward-thinking design of the Trinix platform.

Superior Design
Not all digital processing is the same. The Trinix NXT routing switcher architecture keeps the signal path as simple as possible while incorporating the very best and latest circuit technology. This architecture reduces the number of separate circuit boards, which, in turn, shrinks the number of local power supply components, interconnections, and distributed control circuits. Fewer circuits mean more straightforward signal paths and more room on boards for optimized layouts. Special PC board substrate materials, the use of the latest generation of 3 Gb/s devices and designs, and other advanced engineering techniques enhance the ability of these boards to ensure that you will spend less time troubleshooting or adding workarounds to recover signals that have reached their limits.

The result is superior signal stability and unmatched performance—even in the tight jitter tolerance ranges of 3 Gb/s processing. Independently certified to meet or exceed all 3 Gb/s standards, the Trinix NXT also features improved SDI and HD-SDI handling, making it the best routing switcher for any signal type.

Better Cooling
With fewer duplicated circuits, the Trinix NXT routing switcher has an industry-leading low power consumption, which reduces operating costs and air-conditioning expenses.

Reducing boards and connectors also increases the routing switcher’s internal airspace. This airspace, along with its low-power circuitry, makes the Trinix NXT much easier to cool. The Trinix NXT routing switcher is also more resistant to hot spots, which degrade signal performance and cause early failure.

The Trinix NXT routing switcher uses a common plenum chamber and all its cooling power is applied to all the circuits. It also uses blowers rather than noisy fans to improve cooling efficiency.

The airflow of the routing switcher follows natural convection from bottom to top, which suits air conditioning installations as they are designed to handle hotter air higher up.

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**KEY FEATURES**

- Digital video routing switcher – highly optimized circuitry for better 3 Gb/s (1080p) and HD-SDI signal performance
- Proven performance with more than 60,000,000 crosspoints installed
- Low power and operating costs, reduced fan noise, and extended service life
- Routes different formats and frame rates in the same chassis. One routing switcher satisfies all of your operational requirements
- Supports configurations up to 2048x2048 to meet your routing switcher needs today and as your business evolves
- Switches large numbers of crosspoints simultaneously:
  - High-capacity, frame-accurate control interface
  - Prevents interference between separate operations on the same routing switcher
- Unique protected path redundancy with automatic failover and passive path switching
- Front-loading, hot-swappable modules for ease of service
- Comprehensive SNMP and Web-based monitoring tools for ease of service – locally or remotely
- Trinix NXT Integrated Multiviewer:
  - 32 scalars/inputs and 8 outputs per multiviewer board
  - Simultaneously supports all video standards on all inputs and outputs
  - Supports 128+ images on a single output without rescaling
- Trinix NXT Fiber Optic I/O:
  - SD / HD / 3 Gb/s E-to-O and O-to-E signal conversion and optical transmission up to 50 km
  - Electrical or optical boards in the same chassis at the same time
  - CWDM SFP support for optical multiplexing

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The reliability limitation of most redundancy solutions is that they use an active, and therefore failure-prone, circuit to implement the change over from main to spare. Protected paths use passive path selection to change over. For this reason, the Trinix NXT routing switcher can deliver the additional protection of a redundant solution without degrading its reliability.

Protected Router
The protected router system uses the same dual-path concept as the protected-path option and has the same high-reliability passive-path selection. The signal protection covers the entire routing switcher as redundancy is available and takes over path-by-path if any component fails for any reason.

When installing two routing switchers in a dual redundant configuration there is no need for redundant components within each routing switcher, an on-the-shelf spare, or even a patch bay. Rather than have backup solutions on the shelf, they can be online 24x7, waiting and ready all time.

Leading Connectability
Four reference sources, two standard and two optional, provide the flexibility to operate multiple timing planes, or even multiple video standards, within one Trinix NXT chassis. They also enable partitioning the routing switcher to support different operational requirements simultaneously.

The Trinix NXT routing switcher can also support dual or quad outputs, saving the need for bulky, costly external distribution amplifiers. This support is made possible by adding passive external splitters to deliver the extra copies of the signals.

The platform also includes four monitor outputs. Unlike assigning normal outputs to monitoring duties, these are true monitor outputs to really see the signal leaving the routing switcher, not just another copy of the input.

The Trinix NXT routing switcher is supported by the majority of Grass Valley control solutions. These include the Jupiter and Encore control solutions.

The routing switcher also fully supports SNMP, allowing it to easily integrate into your standard monitoring systems, including the Grass Valley NetCentral monitoring application.

To streamline the setup process, the Trinix NXT platform supports our NetConfig™ application. This Ethernet-based software streamlines product installation and in-field upgrades.

Superior Serviceability
Trinix NXT routing switchers have been engineered from the bottom up for serviceability. All active signal path components are hot-swappable from the front of the chassis and the backplanes are all completely passive.

Power supplies, controller board, blowers, and some matrix boards can be installed in redundant configurations.

The comprehensive alarm system, multifaceted communications, and easy parts replacement of the Trinix NXT routing switcher that it keeps running with minimal service effort.

Chassis Size Choice
The Trinix NXT routing switcher offers an unrivalled choice of chassis sizes to match your performance and density requirements. The available sizes include 128x128, 256x256, and 512x512 symmetrical chassis. Asymmetrical chassis include 128x256, 256x512, and 512x1024.

Larger routing switchers can be constructed using several chassis. Many large-scale Trinix NXT routing switchers are already in operation.
**TRINIX NXT DIGITAL VIDEO ROUTING SWITCHER**

Variable Input Flexibility

The unique variable input (VI) board of the Trinix NXT routing switcher platform provides the ultimate in simplicity for those on a migration path from analog to digital. With support for signal types from analog composite through SDI digital to HD-SDI rates, the VI board provides a comprehensive solution. Its exceptional flexibility allows it to handle each input individually so that systems can be migrated, one circuit at a time, from analog to HD-SDI.

In other systems, an entire board has to be changed to upgrade part of the routing switcher, meaning that changes have to be planned in groups that suit the routing switcher, not the operation.

Trinix Expanded Capabilities

Trinix continues to evolve and add value with exciting new capabilities. Existing Trinix installations can be upgraded with the new Trinix NXT Multiviewer, as well as 3 Gb/s electrical and fiber optic I/O boards—a demonstration of the long-term support offered by Grass Valley. While all the signal circuitry is new, these Trinix NXT options are compatible with all previously installed Trinix units as a result of a superior digital and RF architecture—better than 3 Gb/s from the very first chassis sold.

Trinix NXT Multiviewer

The Trinix NXT Multiviewer is a fully integrated, internal component of the Trinix NXT routing switcher and represents a unique, next-generation approach to live event broadcast and production multiviewer solutions in 3G. It optimizes space by eliminating secondary external components and connections that consume valuable rack space, as well as the need for additional cabling and other hardware—all of which lead to a more reliable multiviewer.

Each Trinix NXT Multiviewer includes eight SDI monitor outputs with each output capable of independently supporting any standard video format from 480i to 1080p natively. By using the board’s cascade capability, the system can also support more than 128 images on a single output.

**TRINIX NXT REDUNDANCY OPTIONS**

The Trinix NXT Multiviewer includes two MADI inputs for discrete AES audio monitoring in addition to its embedded audio monitoring capabilities from any source routed to the multiviewer. The multiviewer features sophisticated graphics, tally, and UMD support, along with powerful signal monitoring, status, and alarming while drawing an average of less than 80 watts.

Full-screen expansion of individual tiles for QC is supported, with on-screen mouse and cursor capabilities, enhanced signal monitoring, status, and alarming functions, and the ability to easily import or export configurations. These features enhance operator performance and enable quick screen layout and configuration changes.

The Trinix NXT Multiviewer can be added to any Trinix chassis that has ever been shipped, preserving customers’ investment. No other manufacturer can make this claim.

Trinix Fiber I/O

As the migration to HD and 3G signals continues, so does the need to support their higher bandwidth signals. However, those higher bandwidth signals have distance limitations. To overcome this limitation, Trinix uses a high-quality, proven technology solution: fiber optics.

Fiber is much less restrictive and delivers long-haul signal conversion and transmission up to 50 kilometers/31 miles. With external CWDM optical multiplexing, up to 16 full-bandwidth channels can be transmitted those distances over a single fiber. Moreover, the superior electrical isolation and noise immunity of fiber optics results in enhanced overall signal quality.

Trinix supports both electrical and optical I/O boards—in the same routing switcher, at the same time. This provides users the signal format flexibility when they need it. Trinix Fiber I/O boards are fiber-ready, meaning users decide between a standard or CWDM SFP and when to purchase and install it at the rear panel. It’s plug-and-play simple.
Electrical

General

Input Boards: SI-33110 (SD), Vf-33100 (SD/HD/4:2:2), SI-33200 (SD/HD), and HD-33G (SD/HD/3 Gb/s) – 32 inputs each

Matrix Boards:
- DM128R-3G (SD/HD/3G) 128x128 with redundancy
- DM128-3G (SD/HD/3G) 128x128 without redundancy
- DM256-3G (SD/HD/3G) 256x256

Output Boards: SI-33110 (SD), HD-33120 (SD/HD), and HD-33G (SD/HD/3 Gb/s) 32 inputs each. The SI-33110 is non-reclocking. The HD-33120 and HD-33G are reclocking for all standard rates of 143 M/s to 1.5 Gb/s (HD-33120) and 143 M/s to 3 Gb/s (HD-33G)

Connectors: 750 BNC

Video Inputs

Level: 800 mVp-p (±10%) 75Ω terminating

Return Loss: ≥15 dB up to 1.5 GHz, ≥10 dB 1.5 GHz to 3 GHz

SD: ≥15 dB from 5 MHz to 540 MHz

Sync Inputs

Level: Nominal 1 Vp-p (±6 dB) video

Return Loss:
- ≥40 dB from 100 kHz to 20 MHz
- ≥30 dB from 20 MHz to 30 MHz

Video Outputs

Level: 800 mV p-p ±10% 75Ω

Return Loss: ≥15 dB up to 1.5 GHz, ≥10 dB 1.5 GHz to 3 GHz (except monitor outputs)

Performance Characteristics

Signal Standards: SMPTE 424M, SMPTE 292M-1998, SMPTE 259M-1997 (output rise and fall times correspond to SMPTE 292M)

Equalization:
- 3 Gb/s: automatic up to 140 meters of Belden 1694A or equivalent coax cable
- HD: automatic up to 160 meters of Belden 1694A
- SD: Automatic up to 500 meters of Belden 1694A

Data Reclocking: Switch selectable on an output-by-output basis

Output Jitter:
- 3 Gb/s/2: <0.3 UI
- HD: <0.2 UI
- SD: <0.2 UI

AV to SD-SDI Conversion:
- Signal type: NTSC, PAL
- Signal level: 0.5 – 2 Vp-p, 1 Vp-p nominal
- 75Ω terminating
- Return loss: input >40 dB to 5.75 MHz, output >15 dB to 270 M/s, reference >36 dB to 5 MHz
- Signal/noise: >-59 dB RMS to 5.5 MHz
- Luma frequency response: ± 0.1 dB to 5 MHz
- Chroma/luma delay: <10 ns
- Differential phase: <1 degree
- Differential gain: ±1%

AC Power Input

Mains Connection: IEC connector, separate mains input for each power supply module

Voltage Range: 100-240V

Return Loss: ≥15 dB up to 1.5 GHz, ≥10 dB 1.5 GHz to 3 GHz (except monitor outputs)

Power Supply Chassis:

Operating Current:
- 128x128 chassis: 6.0 A @ 120VAC, 3.0 A @ 240VAC
- 128x256 chassis: 12.0 A @ 120VAC, 6.3 A @ 240VAC
- 256x256 chassis: 12.5 A @ 1200VAC, 6.3 A @ 240VAC
- 512x512 chassis: 20.0 A @ 120VAC, 10.0 A @ 240VAC
- 512x1024 chassis: 20.0 A @ 120VAC, 10.0 A @ 240VAC

Inrush Current:
- 128x128 chassis: 49.0 A
- 128x256 chassis: 25.0 A
- 256x256 chassis: 55.0 A
- 512x512 chassis: 25.0 A
- 512x1024 chassis: 25.0 A

Hold-up Time: Minimum 15 ms at full load

Conducted Emissions: Per FCC Class B, EN55022 Class B

Power Supply DC Output

Voltage: +48 (±0.5) VDC

Current:
- 128x128 chassis: 20.0 A/supply (full redundancy)
- 128x256 chassis: 25.0 A/supply (full redundancy)
- 256x256 chassis: 26.0 A/supply (full redundancy)
- 512x512 chassis: 25.0 A/supply (full redundancy)
- 512x1024 chassis: 25.0 A/supply (full redundancy)

Current Sharing: Yes, maximum 20% differential unbalance

Ripple/Noise: <200 mV p-p

DC Power Input

Input Voltage Range: 42-54 VDC

Operating Current:
- 128x128 chassis: 13.2 A @ 48 VDC
- 128x256 chassis: 23.0 A @ 48 VDC
- 256x256 chassis: 26.3 A @ 48 VDC
- 512x512 chassis: 44.0 A @ 48 VDC
- 512x1024 chassis: 44.0 A @ 48 VDC

Inrush Current:
- 128x128 chassis: 15.0 A
- 128x256 chassis: 25.0 A
- 256x256 chassis: 21.0 A
- 512x512 chassis: 25.0 A
- 512x1024 chassis: 25.0 A

Alarm

The relay connector is a BNC type and meets SMPTE 292M-1999

Environmental

+0°C to +35°C (+32°F to +95°F)

Physical Characteristics

512 x 512 Chassis Dimensions

Main Chassis:
- Height: (28 RU) 1245 mm, 49 in.
- Width: 483 mm, 19 in.
- Depth: 445 mm, 17.5 in.

Power Supply Chassis:
- Height: (4 RU) 178 mm, 7 in.
- Width: 483 mm, 19 in.
- Depth: 533 mm, 21 in.

256x512 Chassis Dimensions

Main Chassis:
- Height: (22 RU) 978 mm (38.5 in.)
- Width: 483 mm (19 in.)
- Depth: 445 mm (17.5 in.)

256 x 256 Chassis Dimensions

Main Chassis:
- Height: (15 RU) 667 mm, 26.25 in.
- Width: 483 mm, 19 in.
- Depth: 445 mm, 17.5 in.

128x256 Chassis Dimensions

Main Chassis:
- Height: (11 RU) 489 mm (19.25 in.)
- Width: 483 mm, 19 in.
- Depth: 445 mm (17.5 in.)

Power Supply Chassis:
- Height: (1 RU) 43.4 mm, 1.71 in.
- Width: 483 mm, 19 in.
- Depth: 413 mm, 17.25 in.

128 x 128 Chassis Dimensions

Main Chassis:
- Height: (8 RU) 356 mm, 14 in.
- Width: 483 mm, 19 in.
- Depth: 445 mm, 17.5 in.

MK-33000 Mounting Kit

(fo port expansion)
- Height: (8 RU) 356 mm, 14 in.
- Width: 483 mm, 19 in.
- Depth: 100 mm, 4 in.
Frames, Fans, and Power Supplies

TRX-NXT-128x128
Trinix NXT system 128 chassis with one PS, one Broadlinx, two fan modules

TRX-NXT-128x256
Trinix NXT system 128x256 chassis with 1 RU PS-chassis, two 1200W power supplies, one Broadlinx, three fan modules

TRX-NXT-256x512
Trinix NXT system 256x512 chassis with one PS, one Broadlinx, three fan modules

TRX-NXT-256x256
Trinix NXT system 256x256 chassis with one PS, one Broadlinx, seven fan modules

TRX-NXT-512x512
Trinix NXT system 512x512 chassis with 1 RU PS-chassis, two 1200W power supplies, one Broadlinx, six fan modules

TRX-NXT-512x1024
Trinix NXT system 512x1024 chassis with two 1 RU power supply chassis, each with four 1200W power supplies, one Broadlinx, and two fan modules

TRX-FAV-512x1024
Trinix front air intake vent - 2 RU vent converts Trinix 512x1024 chassis from bottom to front air intake (fits Trinix NXT-512x1024 chassis only)

TRX-PS-33100
Trinix NXT system power supply: 120 chassis

TRX-PS-33200
Trinix NXT system power supply: 256 and 512 chassis

TRX-PSFRM-1RU
Trinix 1 RU power supply chassis with interconnect cables for 256x512 chassis

TRX-PSU-1200W
Trinix power supply: 256x512 chassis

I/O & Matrix

TRX-FO-3G
Trinix 3G/HD/SD fiber output board kit – 32 outputs, supports data rates from 143 Mb/s to 2.97 Gb/s. Includes one TRX-FO-3G-BRD and one TRX-FBR-3G-3G fiber rear panel. 1310 nm or CWDM dual transmitter SFPs required for operation

TRX-FO-3G-BRD
Trinix 3G/HD/SD fiber input board – 32 inputs, supports data rates from 143 Mb/s to 2.97 Gb/s. Includes one TRX-FBR-3G-BRD and one TRX-FBR-3G-RP fiber rear panel. Dual receiver SFPs required for operation

TRX-FB-3G-RP
Trinix 3G/HD/SD fiber rear panel for Trinix fiber input or output board – 32 inputs or outputs, multi-rate relocking with auto detection, supports data rates from 143 Mb/s to 2.97 Gb/s. SFPs required for operation

TRX-SI-33110
Trinix NXT system SD input board – 32 inputs

TRX-HI-33200
Trinix NXT system HD/SD input board – 32 inputs, dual-rate equalization

TRX-HI-3G
Trinix NXT system 3G input board – 32 inputs, automatic equalization

TRX-VI-33100
Trinix NXT system variable input board – 16 HD/SD/AV and 16 HD/SD signals

TRX-SO-33110
Trinix NXT system SD output board – 32 outputs, non-relocked

TRX-HO-33120
Trinix NXT system HD/SD output board – multi-rate relocker

TRX-HO-3G
Trinix NXT system 3G output board – 32 outputs

TRX-DIP128R-3G
Trinix NXT system matrix board – 128x128 redundant for use with 128 and 256 chassis. Supports 3 Gb/s

TRX-DM-128-3G
Trinix NXT system matrix board – 128x128 for use with 128 and 256 chassis. Supports 3 Gb/s

TRX-DM256-3G
Trinix NXT system matrix board – 256x256 for use with 512 chassis. Supports 3 Gb/s

TRX-MV2-3G
Trinix NXT multiviewer kit. Includes one each TRX-MV2-3G-BRD, TRX-MV2-3G-RP, and software. Provides up to 8 SDI scaled multiviewer display outputs from 32 internal routing switcher sources

TRX-MV2-3G-BRD
Trinix NXT multiviewer board. Provides up to 8 SDI scaled multiviewer display outputs from 32 internal routing switcher sources

TRX-MV2-3G-RP
Trinix NXT multiviewer rear panel. Provides connections for 8 SDI output ports, 1 each of video cascade input/output, 2 MADI discrete audio inputs, 2 RJ-45 network connections

TRX-MV-SW-UPGRADE
Trinix NXT multiviewer software Upgrade. Includes configuration and operation applications

TRinix Fiber SFP Dual Receiver

SFP-13103G-M1DRX
SFP HD/SD/3G 1310-1610 nm M1 dual receiver

TRX-CTRL-CPL
CPL control

TRX-CTRL-KST
XPT control

TRX-BL-33000
Trinix NXT system Broadlinx software board – NIC, sync, output monitor

TRX-MK-33000
Trinix NXT system mounting kit for port expanders (fits 18 PEs)

TRX-FM-33000
Trinix NXT system fan module

TRX-PE2x2-3G
Trinix NXT system port expander – 16 port; 2x2: 3G/HD/SD

TRX-PE4X1-3G
Trinix NXT system port expander – 8 port; 4x1: 3G/HD/SD

Tinix Fiber SFP Dual Transmitter

SFP-13103G-M1DXT
SD/HD/3G 1310 nm M1 dual transmitter

SFP-CWDM3G-1
SD/HD/3G 1470-1490 nm dual transmitter

SFP-CWDM3G-2
SD/HD/3G 1510-1530 nm dual transmitter

SFP-CWDM3G-3
SD/HD/3G 1550-1570 nm dual transmitter

SFP-CWDM3G-4
SD/HD/3G 1590-1610 nm dual transmitter

SFP-CWDM3G-5
SD/HD/3G 1310-1330 nm dual transmitter

SFP-CWDM3G-6
SD/HD/3G 1350-1370 nm dual transmitter

SFP-CWDM3G-7
SD/HD/3G 1390-1410 nm dual transmitter

SFP-CWDM3G-8
SD/HD/3G 1430-1450 nm dual transmitter

Accessories

Trinix Fiber SFP Dual Transmitter
GLOBAL SERVICES

Now, more than ever, media enterprises need broadcast infrastructure suppliers to provide superior technical personnel and the supporting logistics structure to deploy and support cost-effective, predictable, reliable solutions. Grass Valley Global Services has the depth of knowledge, industry experience, and technical expertise to achieve these objectives. The Global Services portfolio provides everything necessary to ensure maximum uptime and high velocity problem resolution.

Grass Valley Global Services offerings deliver tangible returns on investment. The Global Services organization does this by providing the resources to insure maximum value from an investment in Grass Valley infrastructure products—from initial startup through the entire in-service lifespan. Global Services empowers facilities to meet tactical day-to-day objectives while giving staff more time to focus on strategic business initiatives. A global presence, logistics expertise, and world-renown team of media professionals from Grass Valley are here to help achieve financial performance objectives by reducing risk while boosting operational efficiencies.

GLOBAL SERVICES PROVIDES:

- A global network of field engineers with the experience, knowledge, and skills to keep complex broadcast infrastructure systems up to date, operational, and optimized
- A worldwide parts distribution system that ensures rapid access to replacement parts
- A team of educators skilled in the nuances of the broadcast infrastructure
- Solution architecture and integration services to optimize every implementation
- Project management services that save staff time, improve efficiency, and control budgets
- Technical and operational training that maximizes productivity through tailored learning paths
- Comprehensive support agreements that ensure every Grass Valley routing switcher, master control, and modular product remains in peak condition—all while supporting the enterprise’s need for financial predictability

MAXIMIZE AND OPTIMIZE YOUR INVESTMENT

With program production and distribution becoming ever more complex and affecting business issues on a daily basis, you need a trusted partner that understands those complexities and how to convert them into opportunities. Grass Valley Professional Services helps you to:

- **Define**: We consult with you to help define your business and technology requirements and then design the right solutions to meet them.
- **Deploy**: Our professional service organization, backed by proven project management methodologies, can take you from design through deployment, commissioning and training.
- **Support**: We offer a complete portfolio of support services to keep your systems running, and help manage your long-term maintenance needs.

For information about Grass Valley, please visit [www.grassvalley.com](http://www.grassvalley.com).

Join the Conversation at GrassValleyLive on Facebook, Twitter, and YouTube.

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