

# TRINITY™

## OPTICAL VIDEO ROUTING SWITCH



### TRINITY Products

#### One box. All formats. Maximum versatility.

The Trinity™ series of optical video routing switches provides an unprecedented ability to control and manage high bandwidth audio and video signals for the video post-production, broadcast, transport, and intelligence industries. Through its all-optical nature, Trinity expands the capabilities of today's broadcast infrastructure to meet the needs of existing & future broadcast standards.

Routing via optical fiber permits far greater distances without amplifying and re-clocking. All-optical switching enables the signal to be routed with universal interfaces capable of handling virtually any audio and video signal, whether analog or digital. The Trinity series supports virtually all protocols and feed rates – AES, SMPTE-276M, 259M, and 292M, ASI/DVB, NTSC, PAL, QAM, and others.

Trinity is designed to integrate seamlessly with the existing routing infrastructure. It supports the popular SMS-7000 Native Protocol for control, and works with familiar strategies like global tie-line management. Available in two standard frames, 1RU (up to 16x16 crosspoints) and 3RU (up to 32x32 crosspoints), Trinity delivers compact routing with the highest performing product in its class.

#### Optical: the logical choice

While the majority of audio and video transport signals are carried over copper today, distances are limited to a few hundred meters for transporting new high definition standards such as 1080i and 1080p. Signal transport by optical fiber permits far greater distances without amplifying and re-clocking, providing greater flexibility in facility & equipment optimization. In other applications, optical format provides the required signal security, by eliminating EMI present in electrical routing. Other users demand the signal purity that comes with all-optical routing.

Should fiber be the physical layer of choice, switching optically is simple logic. All-optical switching enables the signal to be routed with universal interfaces capable of handling virtually any audio and video signal, whether analog or digital. Operating as a highly integrated protocol layer to existing infrastructure, optical routing allows bypassing of multiple expensive electrical conversion points, extending the operating range to 20 km or more. With the zero latency of the signal, there is no need to re-clock/frame sync with a house reference (restore time base of incoming signal). Unlike electrical routing, no jitter is accumulated through multiple switches.

Trinity is the right product choice in an optical video strategy, and can be integrated as part of an end-to-end optical solution, or within existing infrastructure with OE converters at key locations.

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#### Ultimate flexibility

The Trinity family provides maximum flexibility in an ultra compact platform. Trinity is offered in both a 1RU frame, capable of a maximum of 16x16 crosspoints, and a 3RU frame, capable of a maximum of 32x32 crosspoints.

### Key Product Features

- △ Highest performance optical router available
- △ Compact 1RU and 3RU optical routing systems
- △ 4x4 to 32x32, including asymmetric configurations
- △ Add versatility of optical-layer routing to existing infrastructure
- △ Universal optical interfaces offer future proof extensions to 1080p
- △ Supports single & mixed-format signals, TDM, CWDM, and DWDM

- △ Supports all video & audio formats in single frame
  - AES signals, SMPTE-276M, SMPTE-259M, 292M
  - ASI/DVB, NTSC, PAL, QAM
- △ Seamless integration with today's routing infrastructure
  - Supports standard SMS-7000 Native Protocol
  - Supports global tie-line management strategies

- △ Supports all standard optical connector formats
  - LC, SC, ST
- △ Supports all standard optical passbands:
  - MMF (850 thru 1310 nm)
  - SMF (1260 thru 1620 nm)
- △ Low power consumption:
  - only 30 W for 16x16 matrix
- △ Easy to control & easy to use

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## OPTICAL VIDEO ROUTING SWITCH

### TRINITY Products (cont.)

Asymmetric port configurations are available, from 4x4 to 4x32. For maximum flexibility, the Trinity-R model permits re-assignment of ports, eliminating the need to dedicate input & output ports, providing 32 total fiber connections in any 1:1 connection mapping. All models support simultaneous bi-directional traffic, for single and multi-wavelength signals.

Trinity supports virtually all protocols and feed rates – AES, SMPTE-276M, 259M, and 292M, ASI/DVB, NTSC, PAL, QAM, and others. Trinity also supports all standard connector types – LC, SC, and ST, and all standard wavelengths, including both single mode (1260 nm to 1620 nm) and multimode (850 nm to 1310 nm) fiber.

#### Seamless integration into existing router infrastructures

Optical switching can simply be viewed as a logical and flexible extension to the existing protocol layers in today's video routing. Trinity has been designed to integrate seamlessly with existing routing infrastructures, providing the immediate ability to add optical capabilities into standard broadcast architectures. It supports the popular SMS-7000 Native Protocol, allowing Trinity to operate under a single, unified control system alongside other consolidated media assets. Trinity can be operated as a single matrix, or as one of many matrices in a centralized or distributed management approach.

Under SMS-7000 control, Trinity will support Global Tie-Line Management, allowing for transparent routing of signals between levels, so that sources on a remote

routing matrix become available to users on the local matrix through software-controlled interconnections. It also supports Logical Matrix Mapping, maximizing crosspoint efficiency by partitioning a physical matrix into multiple logical matrices.

#### Superior to other Photonic Solutions

Optical path connections in the Trinity series are made using DirectLight® beam-steering technology, unique to Polatis. Highly reliable, and originally designed for network carrier applications, this technology is superior in performance, functionality & ease of integration. Trinity has the lowest optical signal loss (only 1 dB in its 16x16 crosspoint matrix), highest signal stability (0.05 dB), highest return loss (>55 dB), and lowest channel crosstalk (<-70 dB). The result is maximum optical transparency for high bandwidth signals.

Unlike other photonic solutions, Trinity can establish and maintain connection routes without a signal present, in a pre-provisioned “ready and waiting state”. Other photonic solutions rely on an optical signal for control feedback to maintain the connection, adding complexity to the control signaling for confirmation of path connection. Not relying on an existing signal also means the Trinity does not introduce modulation to the signal, a feature valued by customers who use Polatis products for RF-over-fiber applications today. Like all Polatis products, traffic can be bi-directional, and carry single or multiple wavelengths

### Trinity External Views



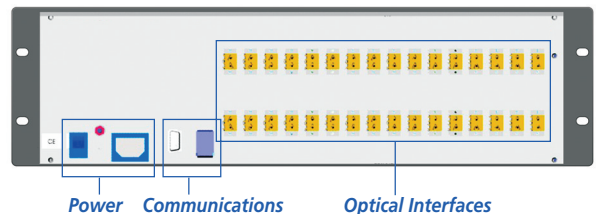
Trinity 1RU front panel.



The Trinity Series features simple, intuitive interfaces.



Trinity 3RU front panel.



## TRINITY Products (cont.)

Also unique in optical routing matrices, Trinity can be configured for either single mode operation or multimode operation, *without electrical regeneration*.

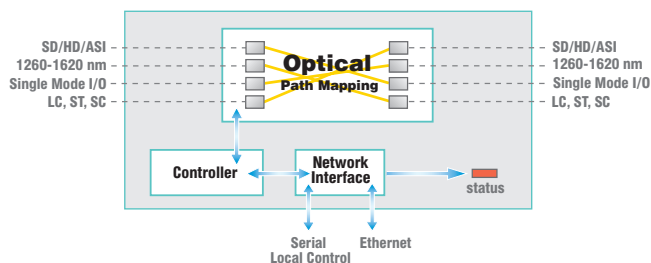
### Applications

Applications range from the straightforward to highly integrated. Straightforward applications include remotely connecting fiber trunks, where the major goal is remote management and eliminating the errors and damage caused by repeated manual patching. Highly integrated implementations include managing large production facilities under a single routing control plane, utilizing the fiber layer for optimal transfer of content from various locations.

Applications include:

- Mobile production vans: fiber source/destination mapping
- RF over Fiber: managing RF signals from antennae arrays
- Cable head-end: remote management of fiber trunks for backhauled content
- Inter and intra-facility fiber management: remote mapping fiber facilities between campus sites
- Minimizing or sharing of optical-electrical converters between long distance links
- Switching for secure communication or video networks
- Sharing expensive processing equipment for post-production houses

## Trinity Internal



*Trinity features an all-optical switch fabric, controlled via a native SMS-7000 interface.*

## Specifications

### Inputs & Outputs

- Port sizes (1RU): 4, 8, 16 (NxN and asymmetric MxN)
- Port sizes (3RU): 24, 32 (NxN and asymmetric MxN)
- Wavelength band: from 1260 to 1620 nm single-mode optical
- Connector types supported: LC, SC, ST
- Return Loss: >55 dB
- Input power: switch dark fiber to +20 dBm

### Signal Formats

- Video: all formats (analog & digital)
- Audio: all formats (analog & digital)
- Data rates: 3 Mb/s to 40 Gb/s+

### Optical Performance

- Optical power loss: < 1 dB
- Signal stability: < 0.05 dB
- Channel crosstalk: < -70 dB
- Signal jitter: none
- Signal delay introduced: none
- Re-clocking: not necessary

### Switching Performance

- Switch speed: 17 msec
- Pre-set path latency: none\*

### Power

- 90-250V operating voltage, 50-60 Hz
- 48 VDC option
- Power Consumption: 25W max (1RU), 50W (3RU)

### Environmental

- Operating Conditions (normal): 10 to 40 C, <85% RH non-condensing
- Operating Conditions (extended): -5 to +55 C, <90% RH non-condensing
- Storage Conditions (normal): -40 to 70 C, <40% RH non-condensing
- Storage Conditions (extended): -40 to 70 C, <95% RH non-condensing

### Indicators and Control

- Indicators: Power and Status
- Controls interfaces: Ethernet (RJ-45), Serial RS-232 (DB-9)
- Protocol: SMS-7000 Native Protocol, TL1

### Frame (1 RU and 3 RU)

Dimensions	mm.	in.
Height 1RU	44.5	1.75
Height 3RU	133.4	5.25
Width	483	19.0
Depth	373	14.7
Weight	5 kg	10.2 lbs.

\* Trinity is capable of switching dark fiber ("always ready"), unlike other optical switches, which must wait for video signal to complete path connection.

