VX40, VX80, VX160, VX320 and VX320 Video

KVM Fiber Matrix Switch

Product Manual

Subject: VX40, VX80, VX160, VX320, VX320 Video Router Product Manual

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Preface

About this Product Manual

This product manual is divided into three sections, for Hardware, Safety Requirements and Product Support. These are sub-divided to help you easily find the topics and procedures you are looking for. This manual also contains Appendices.

Part 1 – Hardware: This section of the manual contains all the information and instructions on how to assemble your equipment.

Part 2 – Safety Requirements: Thinklogical™ strongly recommends that you read this section of the manual prior to starting the hardware assembly.

Part 3 – Product Support: Thinklogical™ provides the best customer support available. If you have any questions or need to contact the company, please refer to this section of the manual.

Conventions Used in this Manual

As you read this manual you will notice certain conventions that bring your attention to important information. These are **Notes** and **Warnings**. Examples are shown below.

Note: Important Notes appear in blue text preceded by a yellow exclamation point symbol, like this.

A note is meant to call the reader's attention to helpful information at a point in the text that is relevant to the subject being discussed.

Warning! All Warnings appear in red text, followed by blue text, and preceded by a red stop sign, like this.

A warning is meant to call the reader's attention to critical information at a point in the text that is relevant to the subject being discussed.

BEFORE STARTING ANY PROCEDURE, IT IS RECOMMENDED THAT YOU READ THE INSTRUCTIONS THOROUGHLY BEFORE PROCEEDING.

Introduction

The Logical Solution

The VX40, VX80, VX160, VX320 and VX320 Video are high performance modular routers and non-blocking matrix switches for complete, end-to-end routing of video and peripheral signals over multi-mode or single-mode fiber optic cable. These highly reliable and resilient routers are expandable from (VX40 and VX80) 5x5 up to 80x80 or 40x40 Duplex ports providing bidirectional matrix routing and (VX160) 20x20 up to 320x320 or 160x160 Duplex ports providing bidirectional matrix routing and (VX320) 16x16 up to 640x640 or 320x320 Duplex ports providing bidirectional matrix routing and (VX320 Video) 16x16 up to 320x320 Duplex ports providing matrix routing, which allows for flexible deployment configurations.

The VX Routers from Thinklogical™ includes:

- Redundant, Current Sharing Power Supply Modules
- Redundant Controller Cards
- Single Fan Tray (includes three fans)

Optional Modules (Spares):

VX 40 Router Data Upstream Card, 5 Ports, SFP+

VX 40 Router Data Downstream Card, 5 Ports, SFP+

VX 40 Router Redundant Controller Card

VX 40 Router Power Module

VX 40 Router Fan Tray

VX 80 Router Data Input/Output Card, 5 Ports, SFP+

VX 80 Router Data Downstream Card, 5 Ports, SFP+

VX 80 Router Redundant Controller Card

VX 80 Router Power Module

VX 80 Router Fan Tray

VX 160 Router Data Upstream Card, 20 Ports, SFP+

VX 160 Router Data Downstream Card, 20 Ports, SFP+

VX 160 Router Redundant Controller Card

VX 160 Router Power Module

VX 160 Router Fan Tray

(For VX320 and VX320 Video)

VX 320 Router Data Input/Output Card, 16 Ports, SFP+

VX 320 Router Redundant Controller Card

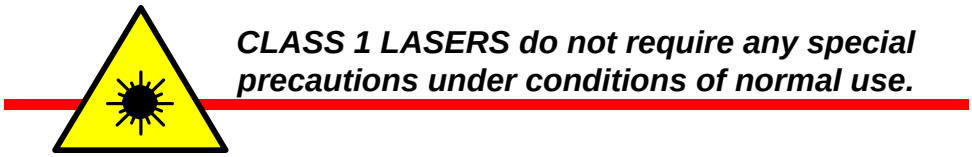
VX 320 Router Power Module

VX 320 Router Fan Tray

The VX40, VX80, VX160, VX320, and VX320 Video Routers are available with LC-type fiber connectors.

See **Appendix A** on page 45 for the complete line of the Thinklogical VX Routers.

Warning! The VX Routers are a Class 1 LASER product that emits near infrared light. Do not look directly into the fibers or the fiber optic ports.



CLASS 1 LASERS do not require any special precautions under conditions of normal use.

Theory of Operation

MRTS Technology

Thinklogical VX Routers are used together as a system with our Thinklogical Velocity Extenders utilizing breakthrough, patent-pending technology for transmission and reception of DVI, keyboard, mouse, and high-speed data peripherals. This technology, known as **M**ulti **R**ate **T**ransmission **S**ystem (MRTS), provides end-to-end data transmission with unparalleled performance. This new, unique optic platform enables multiple data streams to be transmitted long distances over single or multiple fibers with complete reconstruction of the data clock at the destination end point. The result is perfect synchronization with each transmitted stream.

All new products are designated with our "Powered by **MRTS Technology**" ***logo.***

Powered by
MRTS Technology

MRTS is a highly reliable technology and delivers powerful benefits to our customers when combined with our new SFP+ optics. The new MRTS Technology has the ability to transport every frame of a 1920 x 1200 @ 60Hz (or higher) video stream with no compression, along with all desktop peripherals (keyboard, mouse, etc., including 480Mbps USB 2.0) with no perceptible latency. Moreover, these signals can be transmitted distances from just a few meters up to 40 kilometers over single-mode or multi-mode fibers.

MRTS allows for traditional AV implementations and video routing to be incorporated into the same switch fabric, providing greater value, flexibility, performance and security. Additional unique capabilities include the ability to support 6.25Gbps bandwidth per stream, between 50% and 100% higher than our nearest competitors (typically 1.485Gbps to 3.2Gbps). This is significant because a single DVI stream requires a 5.4Gbps data rate to accommodate the 165MHz of video data. Our competitor's lower bandwidth capability is generally manifested in either dropped frames or lower resolution associated with compressing schemes. Not so with MRTS Technology.

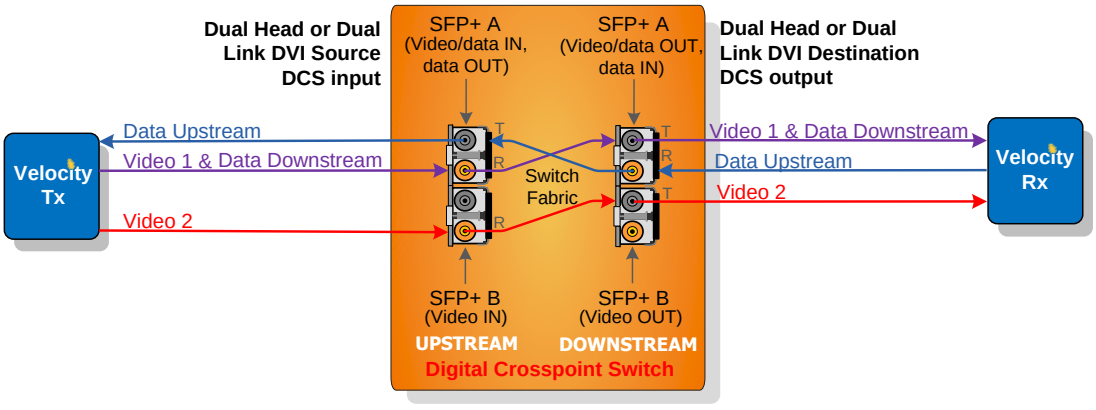


Figure 1: MRTS Technology

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System Features

System Features	VX40/VX80	VX160	VX320	VX320 Video
Matrix Size	80x80	320 Duplex	640 Duplex	320x320
Matrix Size Non-Blocking	80x80 Duplex Non-Blocking OR 40x40 Duplex Bi-Directional Non-Blocking	160x160 Duplex Bi-Directional Non-Blocking	320x320 Duplex Bi-Directional Non-Blocking	320x320 Duplex Non-Blocking
Scalability	5 Ports	20 Ports (40 min)	16 Ports	16 Ports
Compatible with Velocity KVM and Video Extenders from Thinklogical™	✓	✓	✓	✓
Each Video Connection Supports 6.25 Gbps	✓	✓	✓	✓
Single Mode and Multi Mode	✓	✓	✓	✓
Redundant, Hot-Swappable and Current Sharing Power Supply Modules	✓	✓	✓	✓
Hot Swappable SFP+ Optical Modules	✓	✓	✓	✓
Hot Swappable Fan Tray with Annunciator Port (for alarms)	✓	✓	✓	✓
Hot Swappable Redundant Controller Card (optional)	✓	✓	✓	✓
Controllable via LAN or Serial Connection	✓	✓	✓	✓
SNMP (2C) Control Protocol	✓	✓	✓	✓
X4 Configurator Software Included	✓	✓	✓	✓
Multicasting and Macros Supported	✓	✓	✓	✓

Table 1: VX Router System Features

Technical Specifications

Humidity 5-95% RH, non-condensing

Operating Temperature 0-50° C (32-122° F)

Alarm Relay contacts Maximum DC: 1A at 30VDC

Maximum AC: 0.3A at 125VAC

Contact resistance maximum: 100 mΩ

Power Requirements AC Input: 100-240VAC, 47-63 Hz

Universal AC Power Supply

Technical Specifications	VX40/VX80	VX160	VX320	VX320 Video
Physical Dimensions-Rack Size	EIA 19” (48.26 cm)	EIA 19” (48.26 cm)	EIA 19” (48.26 cm)	EIA 19” (48.26 cm)
Physical Dimensions-Height	6 RU 10.50” (26.70 cm)	16 RU 28.0” (71.12 cm)	24 RU 42.0” (106.60 cm)	13 RU 22.75” (57.8 cm)
Physical Dimensions-Width	17.16” (43.59 cm)	17.19” (43.7 cm)	17.19” (43.7 cm)	17.19” (43.7 cm)
Physical Dimensions-Depth	15.32” (16.57” including card pulls; 42.09 cm)	Depth: 15.0” (15.75” including card pulls; 40 cm)	Depth: 15.32” (15.61” including card pulls; 39.64 cm; w/cable management: 18.36” including card pulls; 46.64 cm)	Depth: 14.2” (15.32" including card pulls; 38.9 cm)
Power Consumption	Approximately 400 Watts Fully Loaded	Approximately 850 Watts Fully Loaded	Approximately 1700 Watts Fully Loaded	Approximately 800 Watts Fully Loaded
Actual Weight	37.1 lbs. (16.83 kg)	103.5 lbs. (46.87 kg)	132.0 lbs. (59.87 kg)	78 lbs. (35.38 kg)
Shipping Weight	100 lbs. (45.36 kg)	152 lbs. (68.95 kg)	160 lbs. (72.57 kg)	100 lbs. (45.36 kg)

Table 2: VX Router Technical Specifications

NOTE: *All modules may be replaced without interruption to other module functions (except Primary Controller Card).*

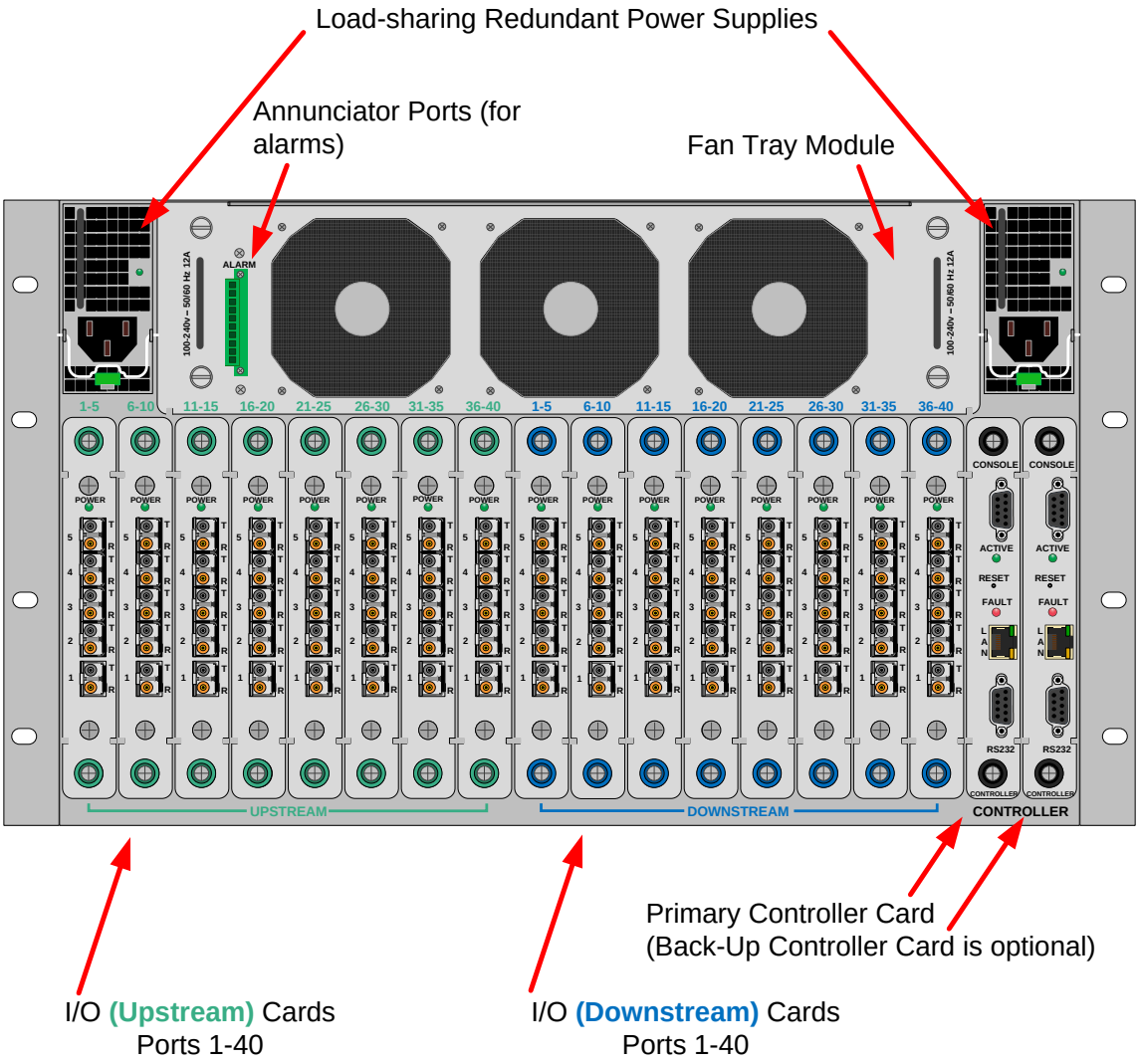


Figure 2: VX40 Router – Rear View

NOTE: *All modules may be replaced without interruption to other module functions.*

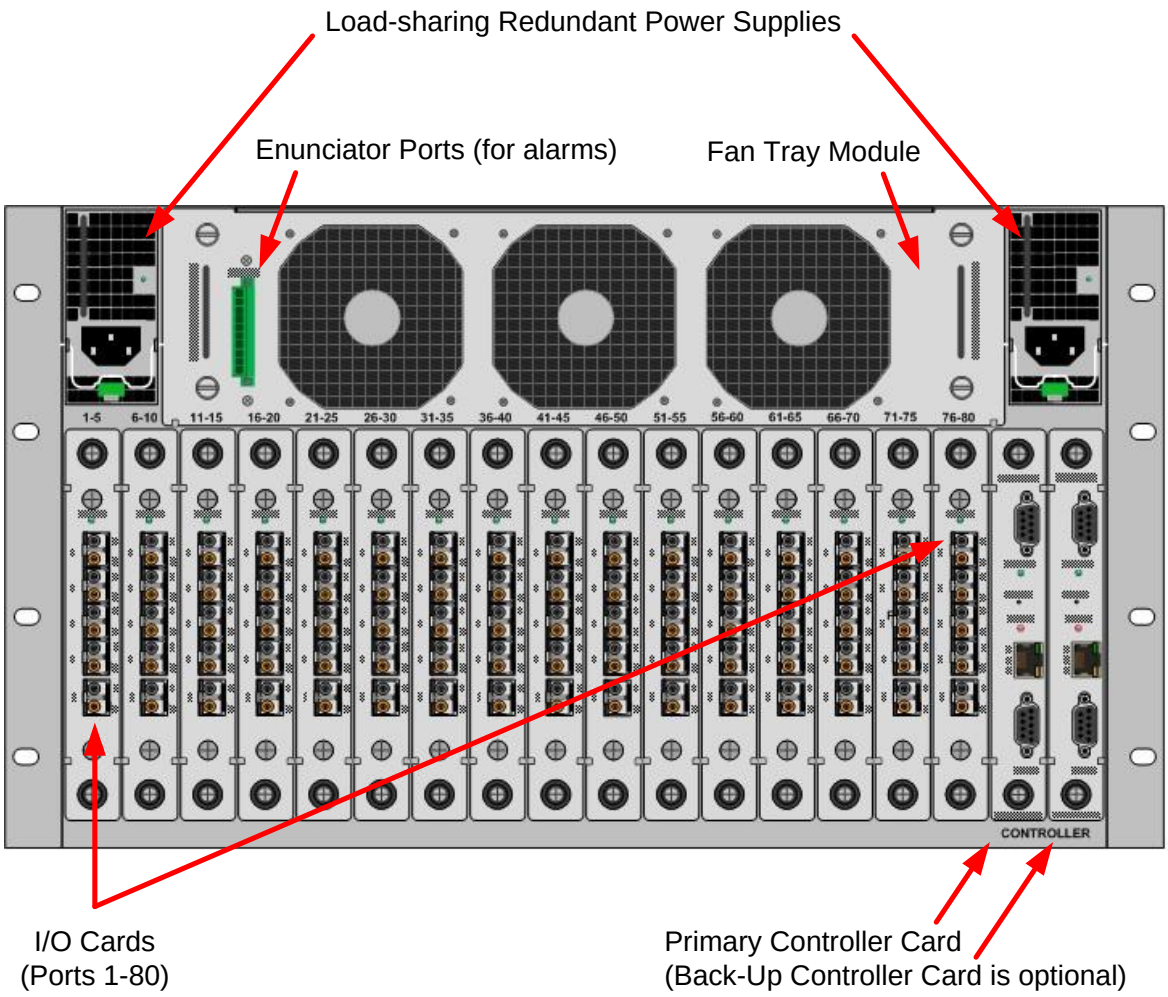


Figure 3: VX80 Router – Rear View

NOTE: All modules may be replaced without interruption to other modules functions (except Primary Controller Card)

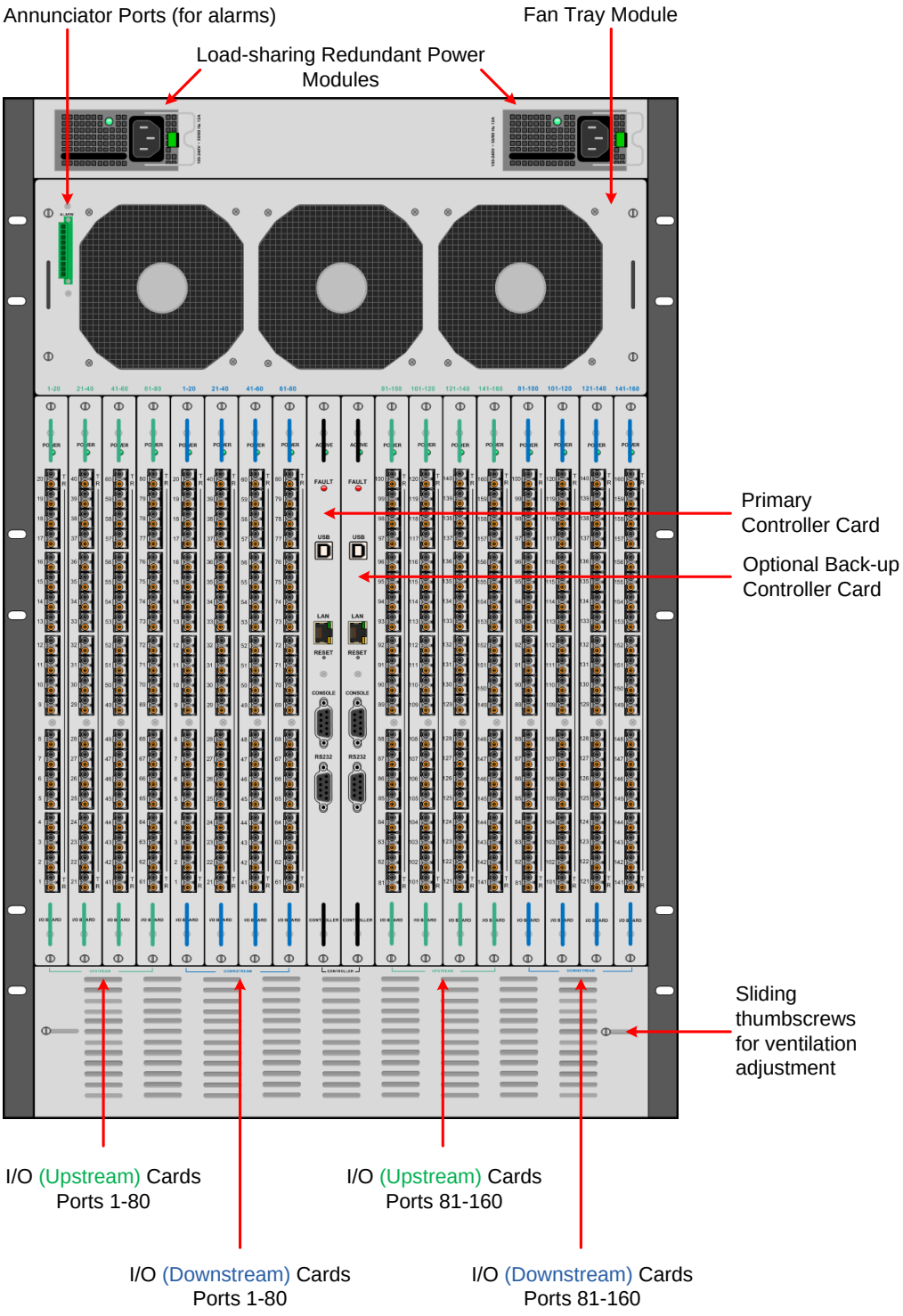


Figure 4: VX160 Router – Rear View

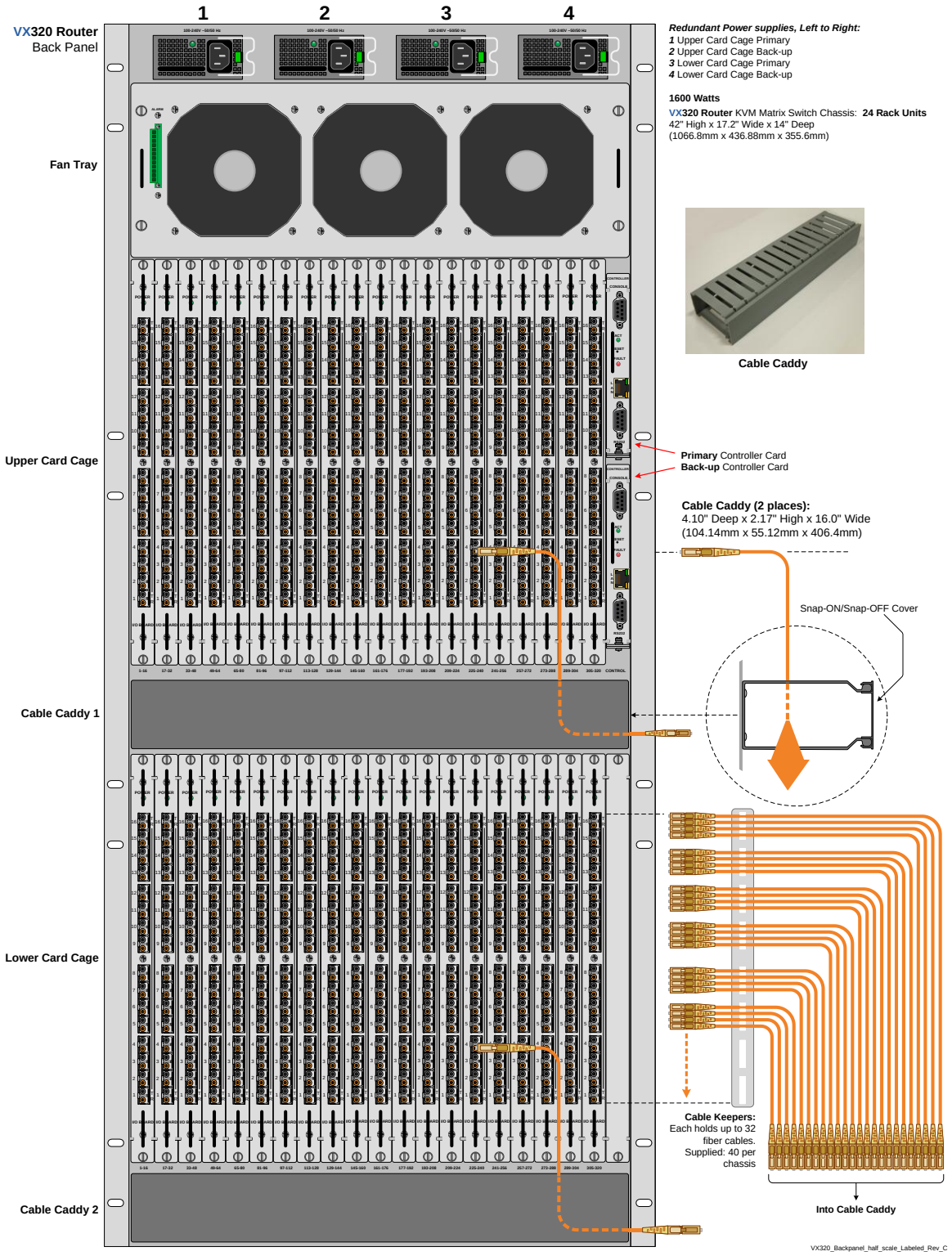


Figure 5: VX320 Router – Rear View

Note: All modules may be replaced without interruption to other module functions
(except Primary Controller Card)

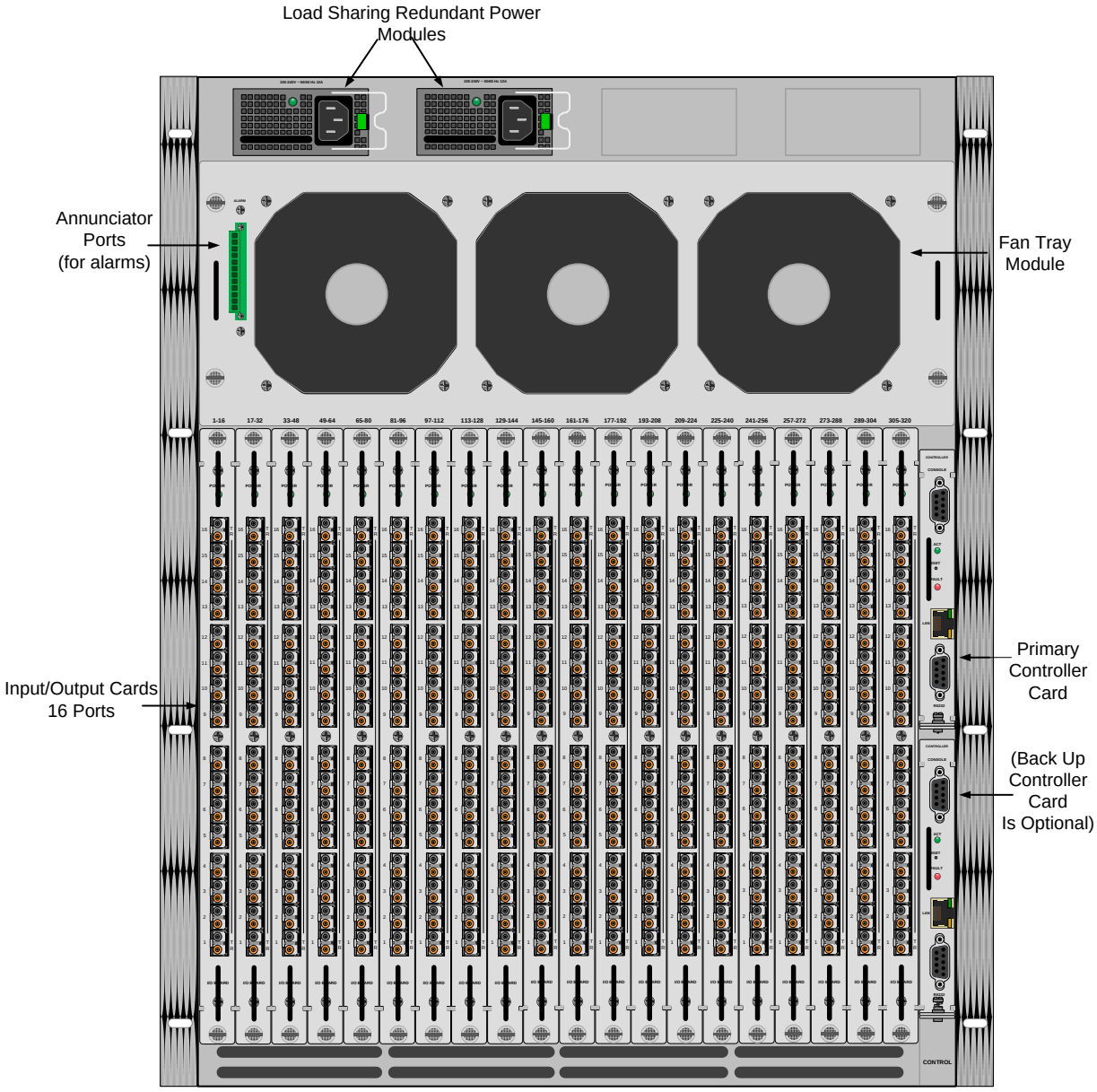


Figure 6: VX320 Video Router – Rear View

Part 1: Hardware

Contents

When you receive your Thinklogical™ VX40 Router, you should find the following items:

- VX40 Chassis (includes 2 Power Modules, 1 Fan Tray Unit, and 1 Controller Card)
- Power Cords – (2) PWR-000006-R (International connections may differ)
- CAT5 Cable Assembly, 15 Feet – CBL000001-015FR
- Product Manual CD
- Product Quick Start Guide
- Chassis Options:
  - Redundant Controller Card – VXM-000005
  - Spare Fan Tray – VXM-000006
  - Spare Power Module(s) – VXM-000007
  - Data Upstream Card, 5 Ports – VXM-DI0005
  - Data Downstream Card, 5 Ports – VXM-DO0005

The VX40 ships configured to customer specifications. All physical connections to the product use industry-standard connectors.

*If you have ordered an EAL4 certified unit, please verify that you have received the proper materials. The router should be labeled as VXR-000040 Rev B. This information is located on a sticker just inside the front door of your router along with the serial number information. Please also check that you have the correct version of the Velocity Matrix Router 40 Data Upstream Card (VXM-DI0005 Rev A) and Velocity Matrix Router 40 Data Downstream Card (VXM-DO0005 Rev A). This information is located on a sticker on the card with serial information.

When you receive your Thinklogical™ VX80 Router, you should find the following items:

- VX80 Chassis (includes 2 Power Modules, 1 Fan Tray Unit, and 1 Controller Card)
- Power Cords – (2) PWR-000006-R (International connections may differ)
- CAT5 Cable Assembly, 15 Feet – CBL000001-015FR
- Product Manual CD
- Product Quick Start Guide
- Chassis Options:
  - Redundant Controller Card – VXM-000005
  - Spare Fan Tray – VXM-000006
  - Spare Power Module(s) – VXM-000007

- Data Input/Output Card, 5 Ports – VXM-DI0005

When you receive your Thinklogical™ VX160 Router, you should find the following items:

- VX160 Chassis (includes 2 Power Modules, 1 Fan Tray Unit, and 1 Controller Card)
- Power Cords – (2) PWR-000056-R (International connections may differ)
- CAT5 Cable Assembly, 15 Feet – CBL000001-015FR
- Product Manual CD
- Product Quick Start Guide
- Chassis Options:
  - Fail-Over Controller Card – VXM-000001
  - Spare Fan Tray – VXM-000002
  - Spare Power Module(s) – VXM-000003
  - Data Upstream Card, 20 Ports – VXM-DI0020
  - Data Downstream Card, 20 Ports – VXM-DO0020

The VX160 ships configured to customer specifications. All physical connections to the product use industry-standard connectors.

*If you have ordered an EAL4 certified unit, please verify that you have received the proper materials. The router should be labeled as VXR-000160 Rev B. This information is located on a sticker just inside the front door of your router along with the serial number information. Please also check that you have the correct version of the Velocity Matrix Router 160 Data Upstream Card (VXM-DI0020 Rev B) and Velocity Matrix Router 160 Data Downstream Card (VXM-DO0020 Rev B). This information is located on a sticker on the card with serial information.

When you receive your Thinklogical™ VX320 Router, you should find the following items:

- VX 320 Chassis (includes 4 Power Modules, 1 Fan Tray Unit, and 1 Controller Card)
- Power Cords – (4) PWR-000056-R (International connections may differ)
- CAT5 Cable Assembly, 15 Feet – CBL000001-015FR
- Product Manual CD
- Product Quick Start Guide
- Chassis Options:
  - Fail-Over Controller Card – VXM-000008
  - Spare Fan Tray – VXM-000009
  - Spare Power Module(s) – VXM-000010

- Data Input/Output Card, 16 Ports – VXM-D00016

The VX320 Router ships configured to customer specifications. All physical connections to the product use industry-standard connectors.

*If you have ordered an EAL4 certified unit, please verify that you have received the proper materials. The router should be labeled as (VXR-000320 Rev A). This information is located on a sticker just inside the front door of your router along with the serial number information. Please also check that you have the correct version of the Velocity Matrix Router 320 Data Input and Output Card (VXM-D00016 Rev A). This information is located on a sticker on the card with serial information.

When you receive your Thinklogical™ VX320 Video Router, you should find the following items:

- VX 320 Chassis (includes 2 Power Modules, 1 Fan Tray Unit, and 1 Controller Card)
- Power Cords – (2) PWR-000056-R (International connections may differ)
- CAT5 Cable Assembly, 15 Feet – CBL000001-015FR
- Product Manual CD
- Product Quick Start Guide
- Chassis Options:
  - Fail-Over Controller Card – VXM-000008
  - Spare Fan Tray – VXM-000009
  - Spare Power Module(s) – VXM-000010
  - Data Input/Output Card, 16 Ports – VXM-D00016

The VX320 Video Router ships configured to customer specifications. All physical connections to the product use industry-standard connectors.

VX Modules

The inspired modular approach of the VX40, VX80, VX160, VX320 and VX320 Video allows for all critical system components including power supplies, cooling fans and pluggable optics (SFP+) to be hot-swappable, thus minimizing business impact in the unlikely event that a component should fail.

Power Supplies

The dual redundant power supplies ensure continuous, uninterrupted power. The supplies are current sharing which means the supplies equally share the load. If a power supply were to fail, a single power supply can withstand the entire current load of the VX Router system. Although the VX Routers functions properly with one Power Module, it is recommended that both

Modules be used, preferably connected to two independent power sources (for redundancy). Additionally, the hot-swappable feature allows for easy replacement of a module (in case of failure) without interrupting the VX Routers system functionality.

Fan Tray

The VX Routers use 3 DC fans all located conveniently in one modular fan tray. The tray is designed to move air horizontally through the enclosure. This hot-swappable fan tray allows for easy replacement of the module (in case of failure) without interrupting the system functionality. Any 2 DC fans will adequately cool either system.

The Fan Tray is also equipped with an Annunciator Port for the use of alarms. The system alarms can be configured to trigger an external control system or generate SNMP Traps.

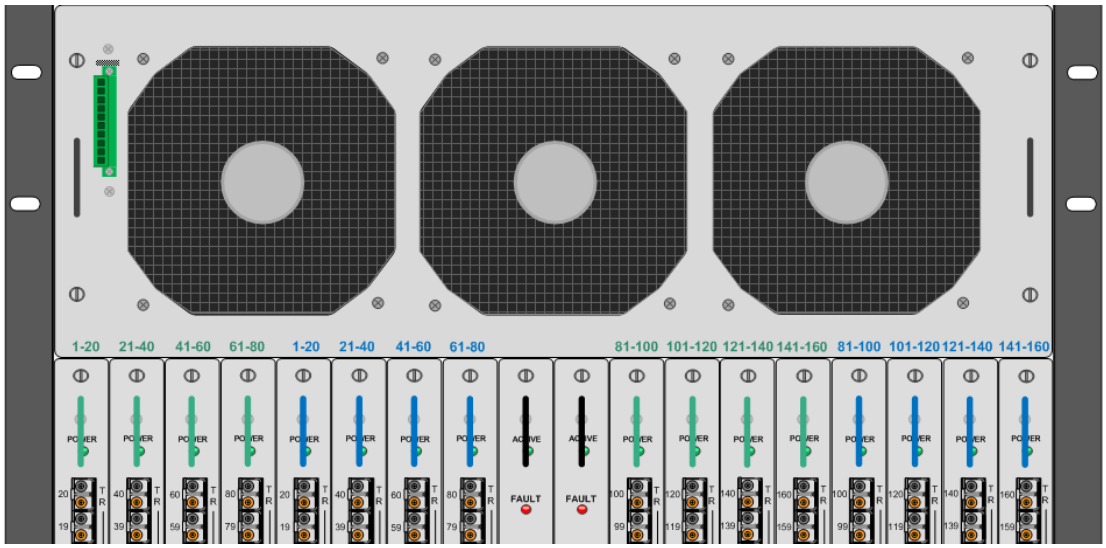


Figure 7: VX Router Fan Tray with Alarm Annunciator

The VX Routers Critical Hardware Alarms are as follows:

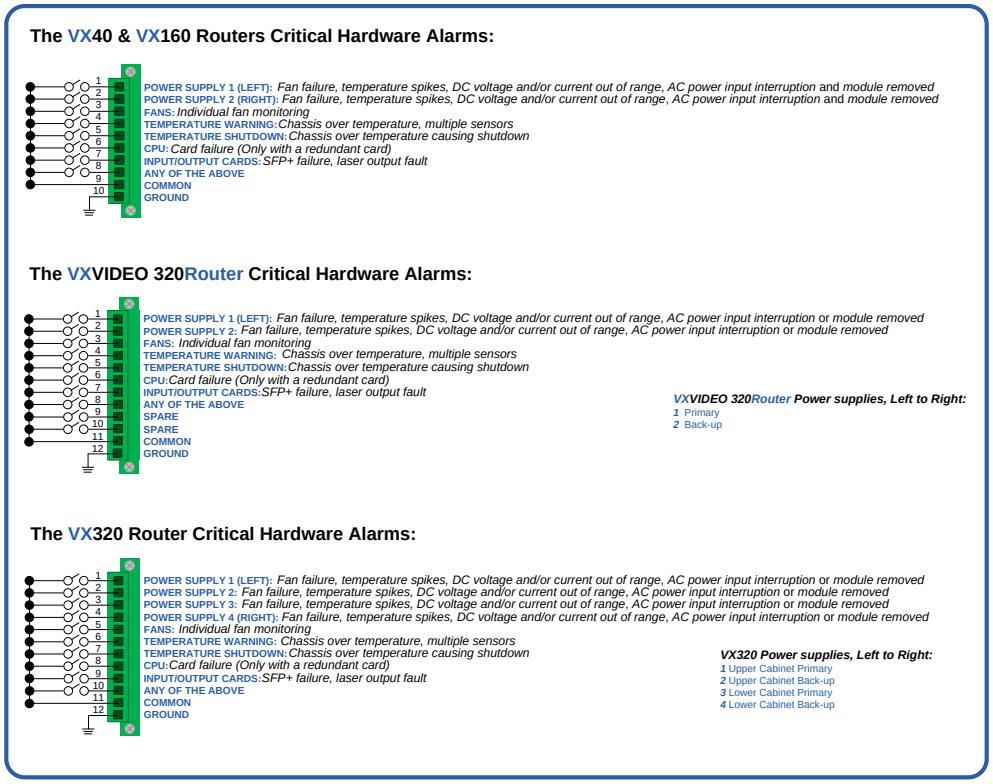


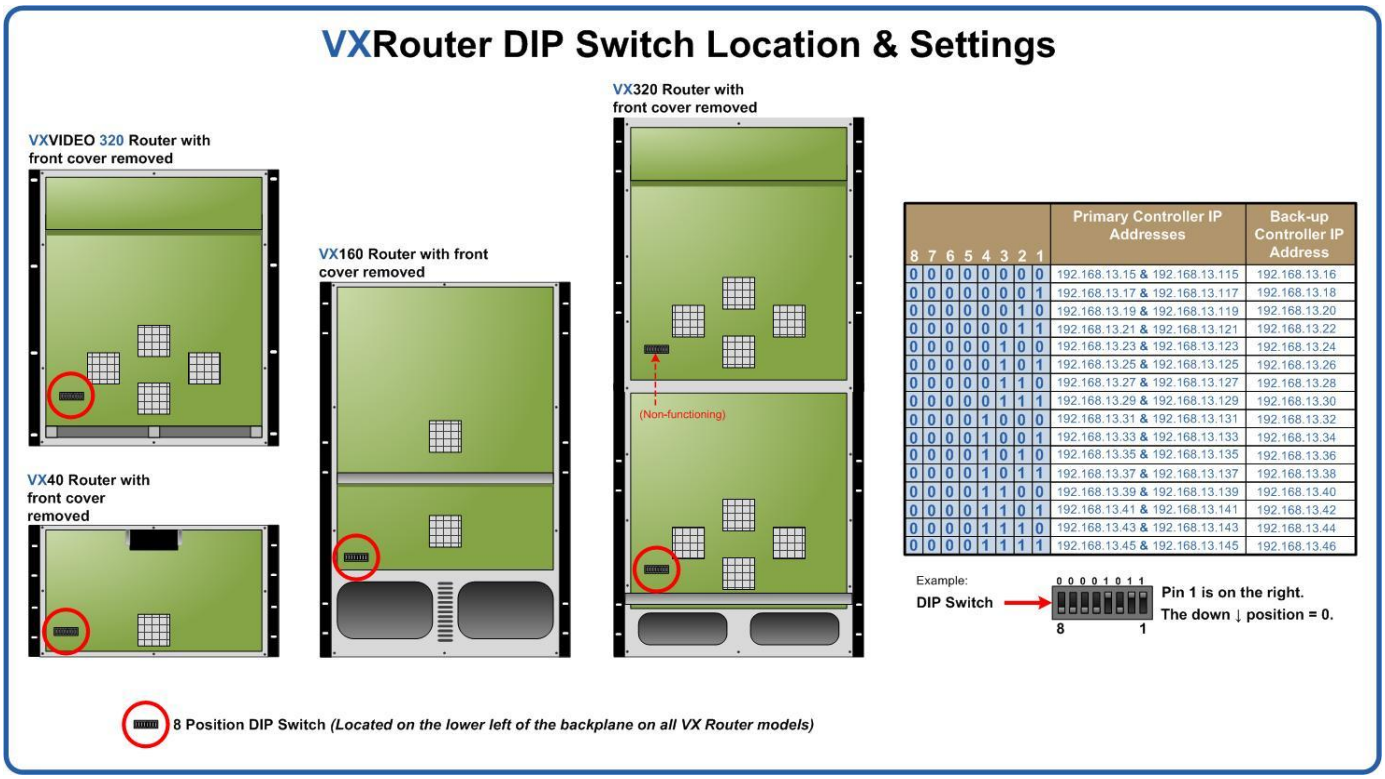
Figure 8: Alarm Descriptions and Drawing for the VX 40 and VX 160 and VX 320

If the rack unit VX 160 is mounted in restricts the front air intake, additional vents are located at the bottom rear of the VX 160 unit. These vents can be opened or closed to allow more or less air flow through the use of a sliding thumbscrew.

Controller Card

The hot-swappable Controller Card connects the Router to an external Linux or Windows CPU. The serial port can also be used for 3rd party controller integration (such as Crestron, AMX or home-spun interfaces). Also, the X4 Configurator Software (Appendix C) can be used to control the Router via the LAN port.

If the VX Router is to be controlled via ethernet, it will require a static IP address. This value can be set via the DIP switch to the values listed below. The factory default setting will be 192.168.13.15.



8	7	6	5	4	3	2	1	Primary Controller IP Addresses	Back-up Controller IP Address
0	0	0	0	0	0	0	0	192.168.13.15 & 192.168.13.115	192.168.13.16
0	0	0	0	0	0	0	1	192.168.13.17 & 192.168.13.117	192.168.13.18
0	0	0	0	0	0	1	0	192.168.13.19 & 192.168.13.119	192.168.13.20
0	0	0	0	0	0	1	1	192.168.13.21 & 192.168.13.121	192.168.13.22
0	0	0	0	0	1	0	0	192.168.13.23 & 192.168.13.123	192.168.13.24
0	0	0	0	0	1	0	1	192.168.13.25 & 192.168.13.125	192.168.13.26
0	0	0	0	0	1	1	0	192.168.13.27 & 192.168.13.127	192.168.13.28
0	0	0	0	0	1	1	1	192.168.13.29 & 192.168.13.129	192.168.13.30
0	0	0	0	1	0	0	0	192.168.13.31 & 192.168.13.131	192.168.13.32
0	0	0	0	1	0	0	1	192.168.13.33 & 192.168.13.133	192.168.13.34
0	0	0	0	1	0	1	0	192.168.13.35 & 192.168.13.135	192.168.13.36
0	0	0	0	1	0	1	1	192.168.13.37 & 192.168.13.137	192.168.13.38
0	0	0	0	1	1	0	0	192.168.13.39 & 192.168.13.139	192.168.13.40
0	0	0	0	1	1	0	1	192.168.13.41 & 192.168.13.141	192.168.13.42
0	0	0	0	1	1	1	0	192.168.13.43 & 192.168.13.143	192.168.13.44
0	0	0	0	1	1	1	1	192.168.13.45 & 192.168.13.145	192.168.13.46

Figure 9: VX Router DIP Switch Locations and Setting

The simplest network connection is an isolated network with only the VX Router, the control server, and any control clients using static IP addresses. The VX Router can be set to any of the above settings. The control server must be at **192.168.13.9**, and the control clients could then be set to any other addresses in the **192.168.13.X** family.

If static IP addresses for the control server and its clients are not possible, then the control server will require two (2) network interfaces with one interface set to the static address **192.168.13.9** and dedicated to the VX Router(s) while the other network interface can be configured as required by the facility's network administrator.

A **Back-Up Controller Card is optional** to ensure uninterrupted functionality if the Primary Controller Card should fail or need to be replaced. The Primary Controller Card should always be in the left or upper controller slot. This card must have a LAN connection that allows it to communicate with both the Primary Controller and a server having an IP address of **192.168.13.9**. Without this interface the back-up controller will never take control of the router. The server should have the firewall turned off or be configured so that it is able to respond to pings from the Primary and back-up controllers.

Note: Removing the Primary Controller Card when it is Active will power down the VX Router and interrupt service. Refer to page 39 "How to Replace a Controller Card".

Note: When using a Back-up Controller configuration in a Secure Application with Restrictive Switching, both controllers must have the same Restrictive Switching Table files (see Appendix D: Secure Applications).

Input/Output Cards

The hot-swappable Input/Output (I/O) cards provide excellent in-service expansion capabilities in convenient sets of 5 ports per I/O card for the VX40 and VX80, sets of 20 ports per I/O card for the VX160 or sets of 16 ports per I/O card for the VX320, thus allowing re-configuration without interrupting signal processing.

Each I/O card consists of one Transmit (T) and one Receive (R) optic per port. I/O Cards are available with LC-type fiber connectors and can be assembled with Single-mode or Multi-mode optics (SFP+). Each individual I/O Card lists the ports as 1 through 5 on the VX40 and VX80, as 1 through 20 on the VX160 and as 1 through 16 on the VX320 and VX320 Video. The Fan Tray module lists the port numbers

(all numbering is bottom to top, left to right. See figs. 10-12 on pg. 13). A LED located at the top of each I/O card indicates when power is ON to that card.

The VX40 Router consists of a single 80 input by 80 output non-blocking switch matrix. This allows any port on any I/O card (Upstream or Downstream) to be connected to any other port. The VX40 is designed so that 8 I/O card slots on the left side are used for Upstream Cards and 8 I/O card slots on the right side are used for Downstream Cards. The Upstream and Downstream Cards are functionally equivalent. Either card can be used interchangeably for routing signals, but they physically can only plug into their respective slots in the VX40 chassis. Thus, the VX40 can connect any Upstream Port optical input or any Downstream Port optical input (SFP+ R) to any Upstream and/or any Downstream Port optical output (SFP+ T). Figure 10 depicts a bi-directional connection from Upstream Port 1 to Downstream Port 1. This requires two switch connections, one from Upstream optical input to Downstream optical output, and one from Downstream optical input to Upstream optical output.

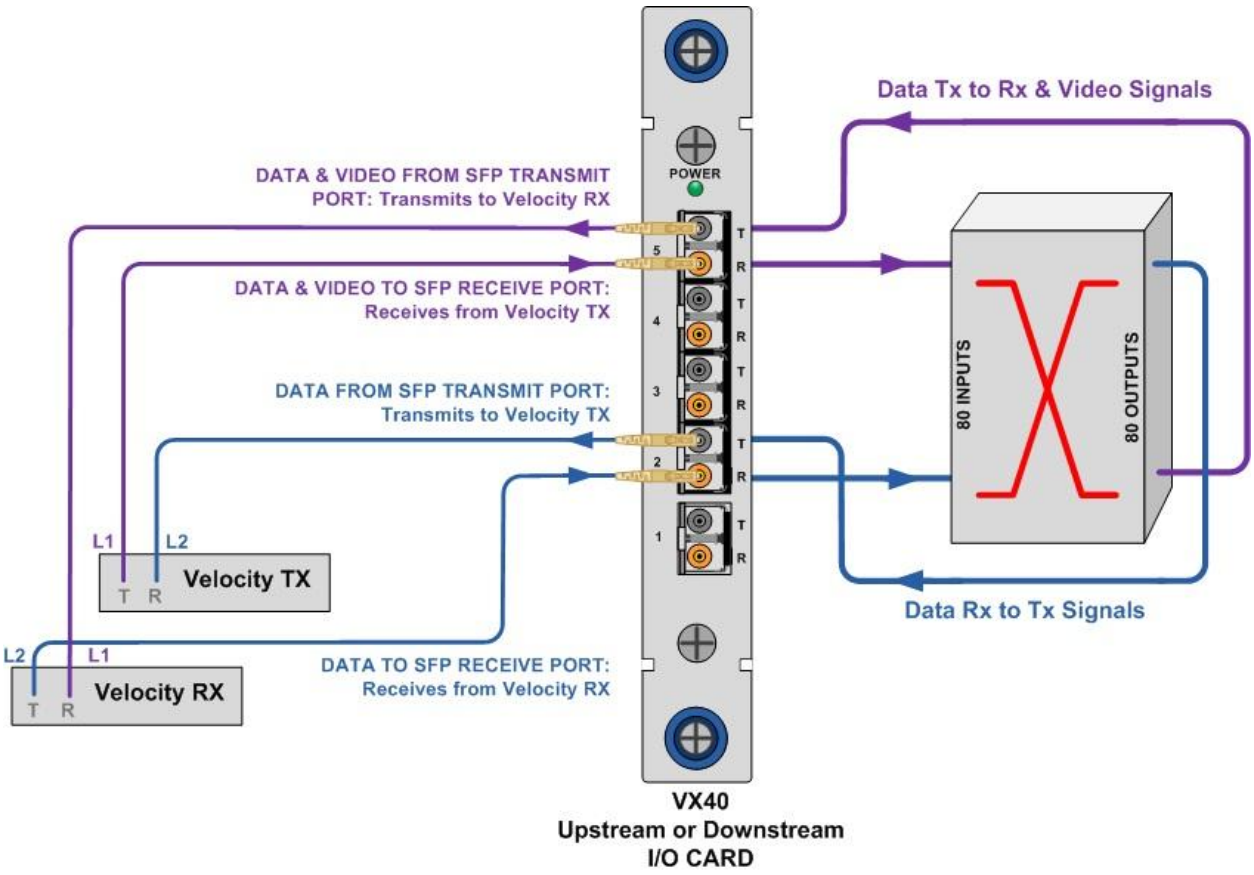


Figure 10: Concept of VX 40 Input/Output Flows

The VX80 Router also consists of a single 80 input by 80 output non-blocking switch matrix. This allows any port on any I/O card to be connected to any other port. The VX80 is designed so that all 16 I/O card slots accept the same type of card. The VX80 I/O card is functionally and physically the same as the VX40 Upstream Card. The VX80 Router configuration can have a minimum of one I/O Card. Each VX80 I/O card contains 5 ports, so that when fully configured, the VX80 will contain 16 I/O cards. The 16 I/O cards provide a total of 80 Optical Input/Output connections (SFP+ T/R). The switching matrix connects any optical input (SFP+ R) to any optical output (SFP+ T), even if it is the same Port number (i.e. Port 1 R connected to Port 1 T).

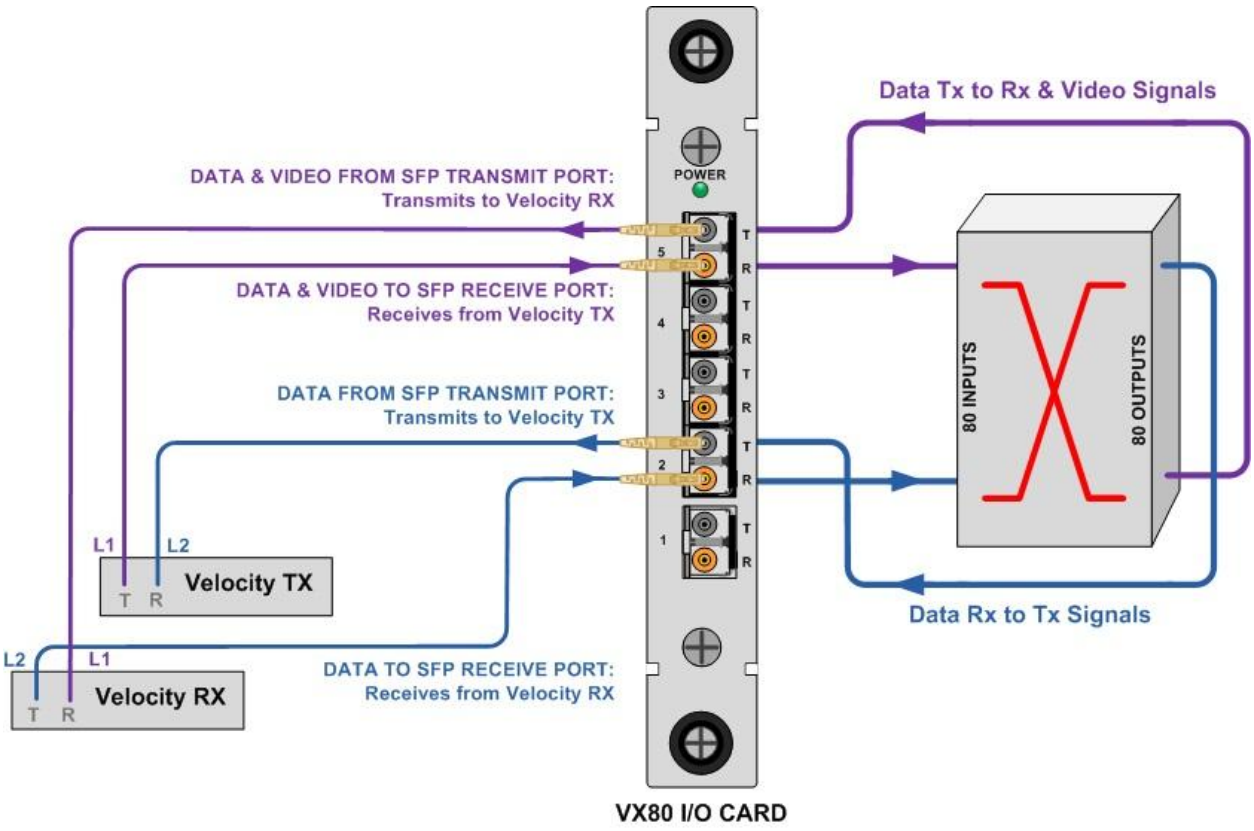


Figure 11: Concept of VX 80 I/O Flows

The VX160 contains two independent 160x160 fully non-blocking switch matrices. One switching matrix connects any Upstream Port optical input (SFP+ R) to any Downstream Port optical output (SFP+ T). The other switching matrix connects any Downstream Port optical input (SFP+ R) to any Upstream Port optical output (SFP+ T). The VX160 Router configuration must have a minimum of 1 Upstream Card (Green) and 1 Downstream Card (Blue), each containing 20 ports. When fully configured, the VX160 will contain 8 Upstream cards and 8 Downstream cards. The 8 Upstream cards provide a total of 160 Optical Input/Output connections (SFP+ T/R) described as Upstream Ports 1-160. The 8 Downstream cards provide a total of 160 Optical Input/Output connections (SFP+ T/R) described as Downstream Ports 1-160. Figure 12 depicts a bidirectional connection from Upstream Port 1 to Downstream Port 1, showing downstream flow through one 160x160 fully non-blocking switch matrix, and upstream flow through another 160x160 fully non-blocking switch matrix.

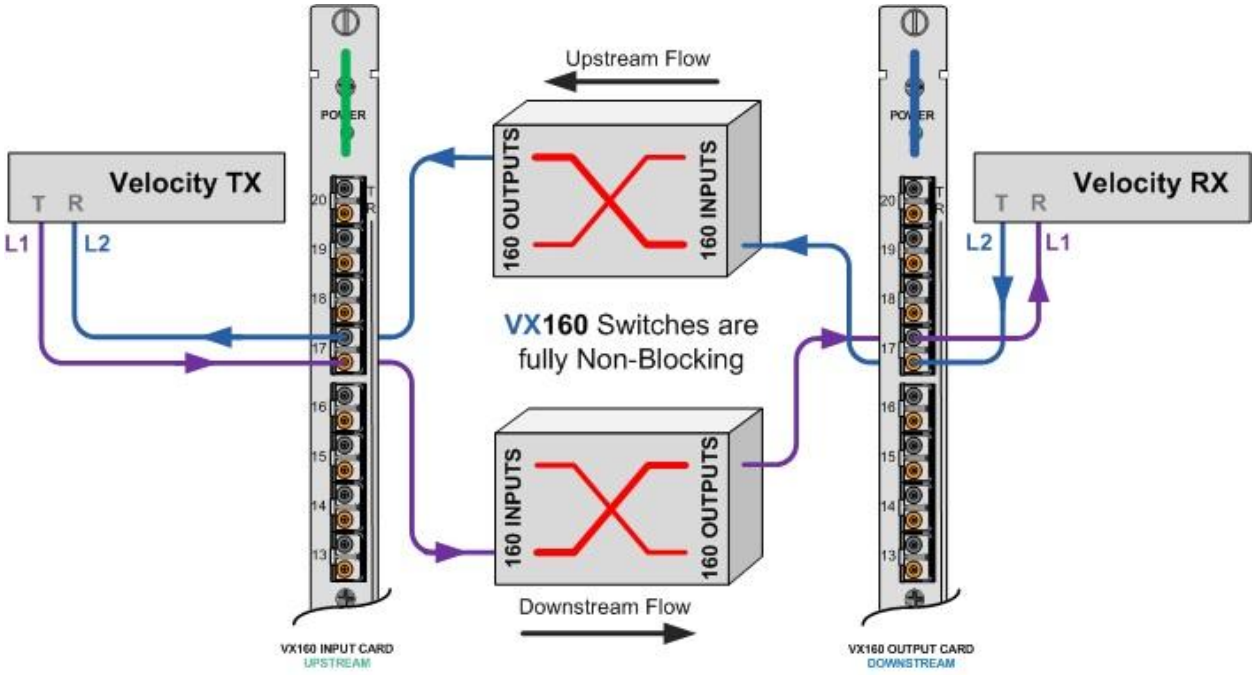


Figure 12: Concept of VX 160 Upstream and Downstream Flows

The VX320 Router configuration can have a minimum of one I/O Card in either the Upper Card Cage or the Lower Card Cage. The VX320 Router is constructed with one fully non-blocking 320x320 switch matrix in the Upper Card Cage and another fully non-blocking 320x320 switch matrix in the Lower Card Cage. Each VX320 I/O card contains 16 ports, so that when fully configured, the VX320 will contain 20 I/O cards in the Upper Card Cage and 20 I/O cards in the Lower Card Cage. The 20 I/O cards in the Upper Card Cage provide a total of 320 Optical Input/Output connections (SFP+ T/R) described as Upper Card Cage Ports 1-320. Similarly, the 20 I/O cards in the Lower Card Cage provide a total of 320 Optical Input/Output connections (SFP+ T/R) described as Lower Card Cage Ports 1-320. The Upper Card Cage switching matrix connects any Upper Card Cage Port optical input (SFP+ R) to any Upper Card Cage Port optical output (SFP+ T), even if it is the same Port number (i.e. Port 1 R connected to Port 1 T). Similarly, the Lower Card Cage switching matrix connects any Lower Card Cage Port optical input (SFP+ R) to any Lower Card Cage Port optical output (SFP+ T), even if it is the same Port number (i.e. Port 1 R connected to Port 1 T). Figure 13 depicts a bidirectional connection. One direction is the connection from the Upper Card Cage Port optical input (SFP+ R) to the Upper Card Cage Port optical output (SFP+ T), showing Video/Data flow from the TX to the RX being routed through the Upper Card Cage 320x320 fully non-blocking switch matrix. The other direction is the connection from the Lower Card Cage Port optical input (SFP+ R) to the Lower Card Cage Port optical output (SFP+ T), showing the Data (KMASS) flow from the RX to the TX being routed through the Lower Card Cage 320x320 fully non-blocking switch matrix.

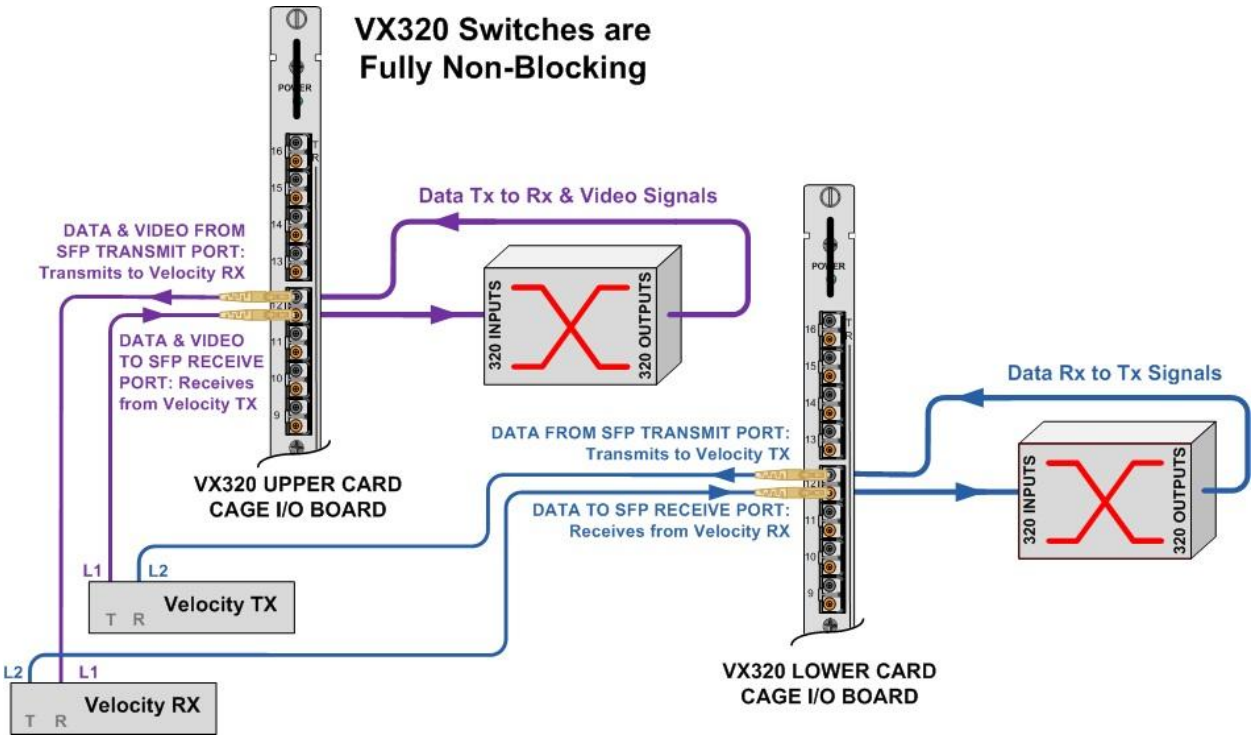


Figure 13: Concept of VX 320 Upper and Lower Card Cage Flows

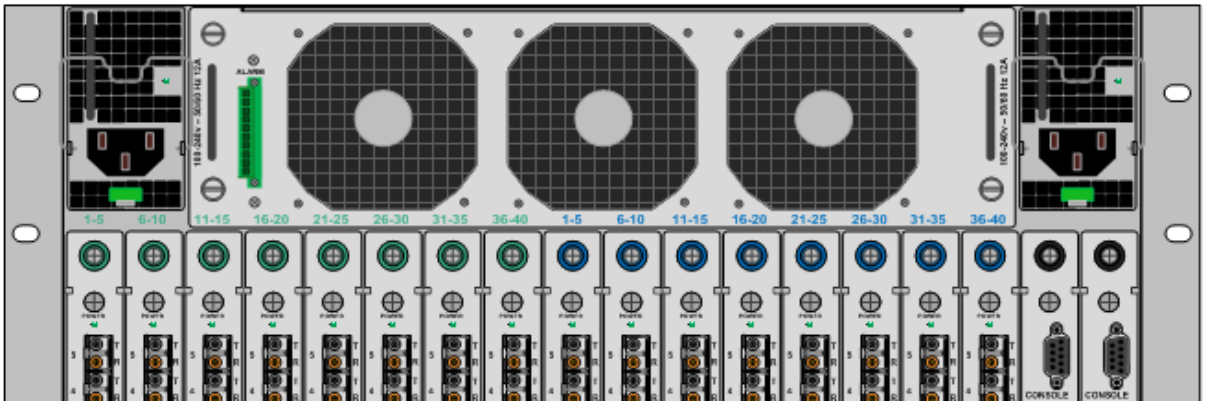


Figure 14: Input / Output Port Numbering on the VX40

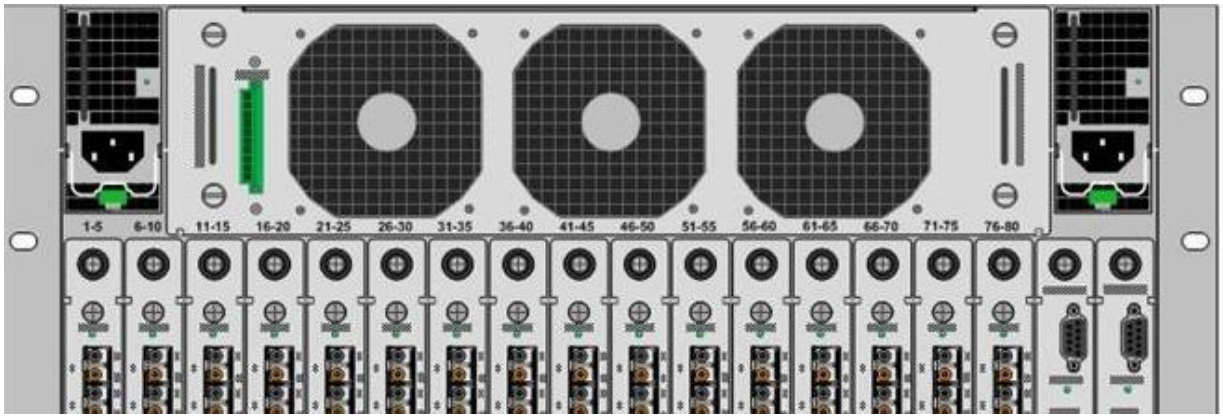


Figure 15: Input / Output Port Numbering on the VX80

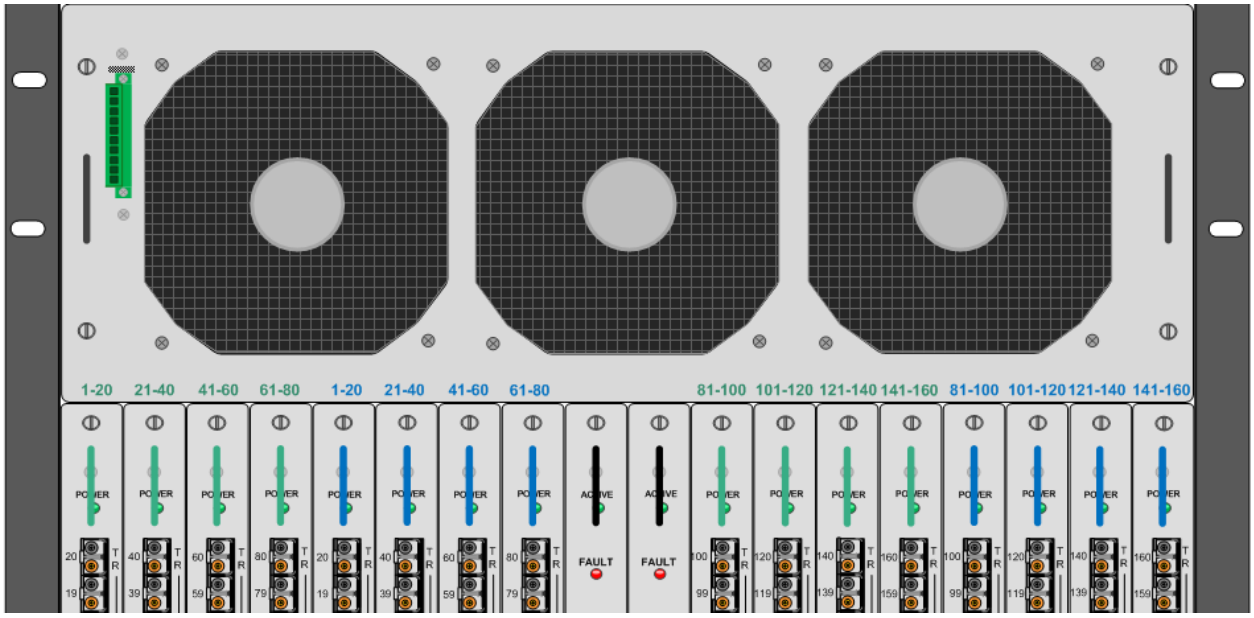


Figure 16: Input / Output Port Numbering on the VX160

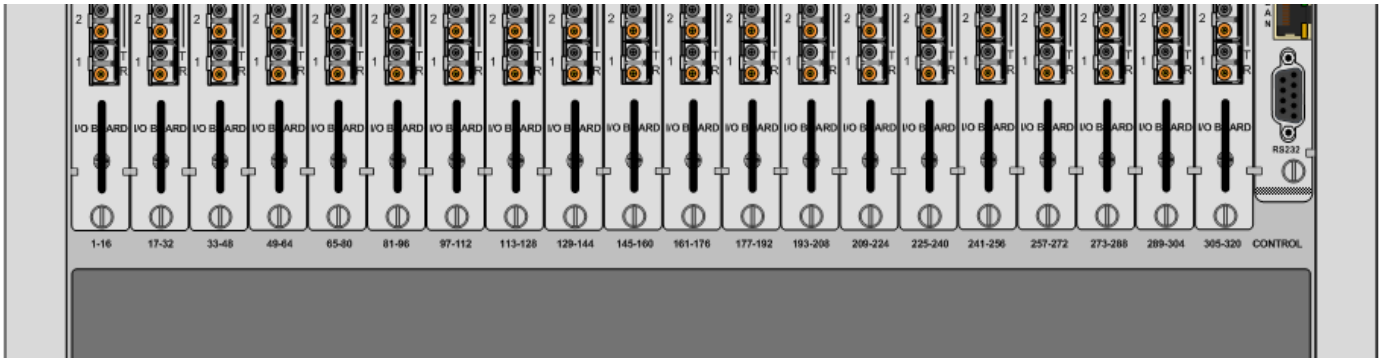


Figure 17: I/O Board Port Numbering on the VX320 Video and VX320 (Same for Upper and Lower Card Cages.)

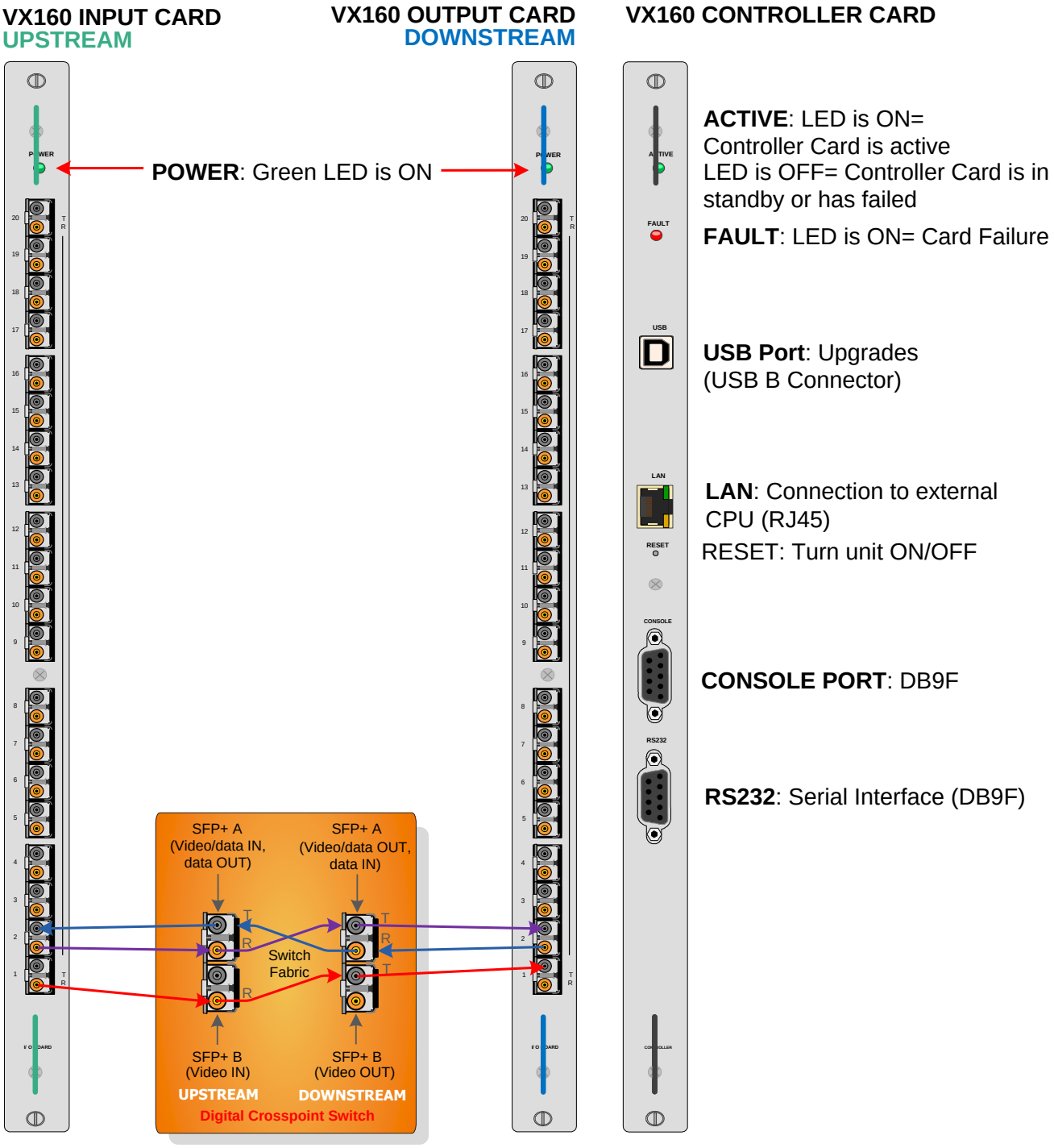


Figure 18: The VX 160 Upstream Card, Downstream Card and Controller Card

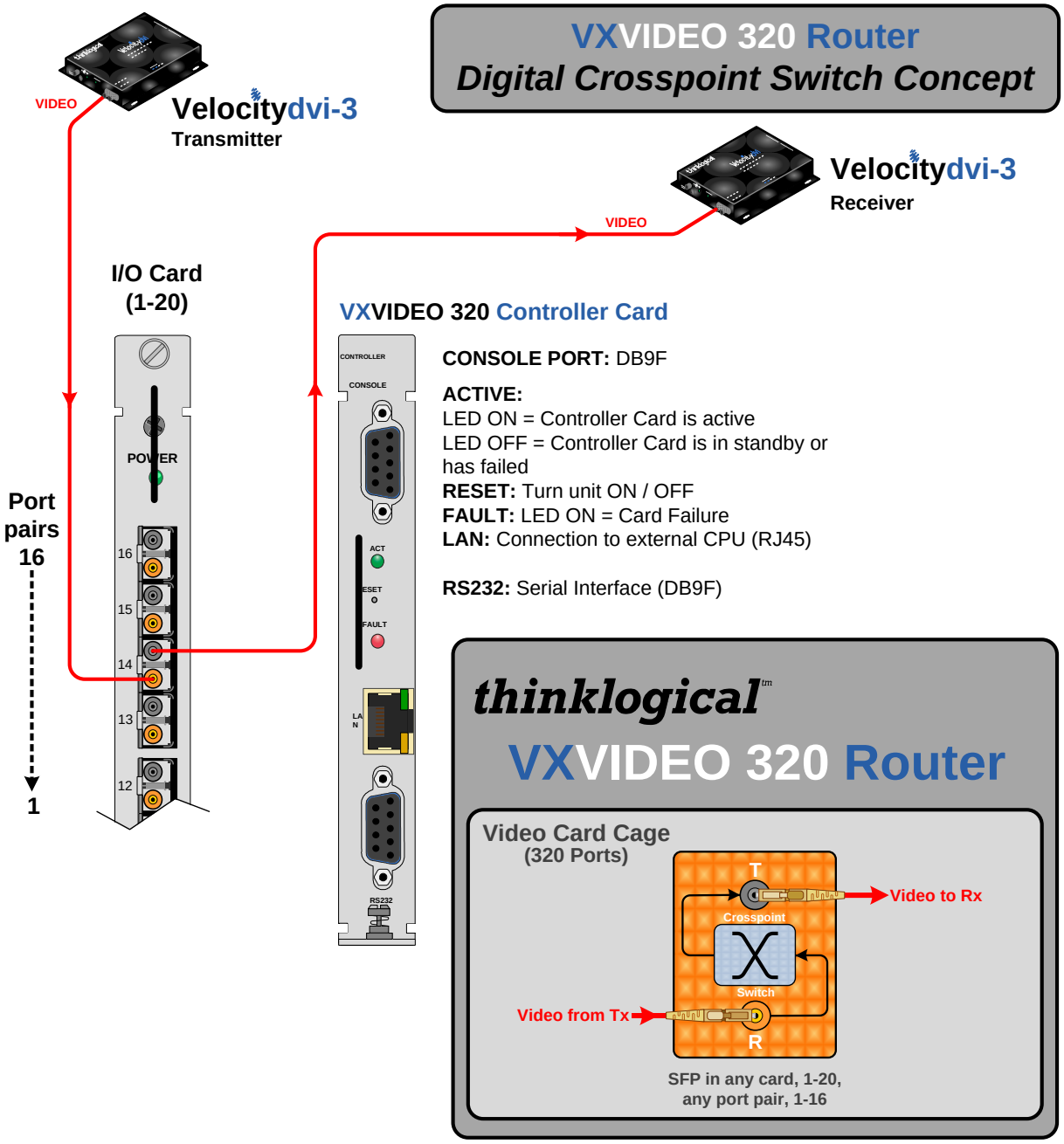


Figure 19: The VX 320 Video I/O Card and Controller Card

Pluggable SFP+

The SFP+ Optical Module is a 8Gb/s Short-Wavelength Transceiver designed for use in bi-directional Fiber Optic Channel links. The modules are hot-pluggable and operate with 3.3VDC.

Each Input and Output card contains rows of SFP+ modules that serve as the fiber-optic couplers for the fiber cables to and from the Thinklogical Tx and Rx Extenders. Individual cards can be removed for ease of access to the SFP+ modules.

Always use dust caps to protect against damage when a fiber optic connector is not attached to its coupling device (fiber optic equipment, bulkheads, etc.)

Figure 20a: SFP+ Module

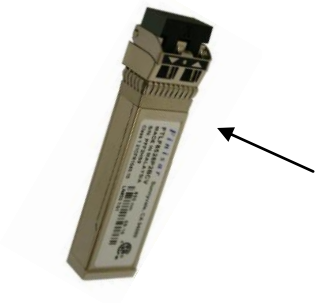


Figure 20b: It is good practice to install dust plugs in unused SFP+s.

Each I/O card can have as many as 5 SFP+ for a VX 40, 20 SFP+ modules for a VX 160, and 16 SFP+ for a VX 320 each mounted within a grounded metal enclosure. Each SFP+ module is locked into its enclosure with a built-in latch handle that can be opened for removal or locked for installation.

Figure 21a: SFP+ latch closed

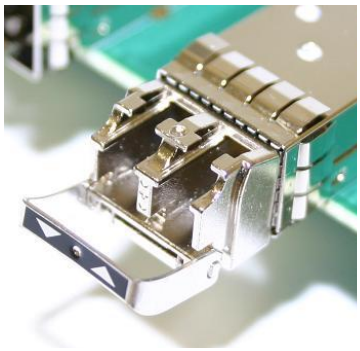


Figure 21b: SFP+ latch open

The latch handle spans the two LC ports and arrows printed on the handle indicate which port is an INPUT ( ) and which is an OUTPUT ( ).

Fiber Optic Cable

Fiber Optic Cable Requirements

Thinklogical recommends SX+ Laser Enhanced (50µm) fiber for your VX Router and Velocity Extension System. Multi-mode fiber has the ability to extend up to a maximum of 1000m, where Single-mode fiber has the ability to extend distances beyond 1000m.

Warning! Do not use APC (Angle Physical Contact) Connectors! If inserted into an SFP+, APCs will destroy the SFP+.

Patch Panels

A Patch Panel is a panel of connectors/ports that connect incoming and outgoing lines. Patch panels are typically chosen for cable management, allowing long fiber runs to be kept in place and to minimize handling. **If your application involves the use of Single-Mode Extenders, your patch panel connectors must be APC.**

Handling Fiber Optic Cable

Unlike copper cabling, fiber optic cable requires special handling. A small spec of dust or a scratch to the ferrule tip can attenuate the optical signal so that it becomes unusable.

Warning! The ends of the connectors (the ferrule) should never come in contact with any foreign object, including fingertips.

Warning! Minimum bend radius must be 1.5". Be careful not to pinch the fiber when using ties.

Installing Fiber into Input/Output Cards

Step 1: Grasp the LC connector of the fiber optic cable by the sides and remove the dust cap.

Warning! Laser in use! Do not look directly into the opening.

Step 2: Open the LC retractable and carefully insert the fiber connector into the SFP+ port until it locks into place.

Removing Fiber from Input/Output Cards

Step 1: The LC connector has a locking feature that can be released by depressing the latch-release tab located on the side of the connector. With the tab depressed, slowly remove the cable by pulling the connector straight out of the SFP+ port.

Warning! Laser in use! Do not look directly into the opening.

Step 2: Immediately install a dust cap on the ferrule to protect the fiber tip.

Connecting to Thinklogical™ Velocity Extenders

The VX Routers are designed to work with any Thinklogical product designed with the MRTS technology (e.g. Velocity Extenders). The VX Routers and Velocity Extenders are a new, unique class of cost-effective matrix switching and KVM extension designed for a variety of high-performance computing environments. Comprised of a fiber-in, fiber-out matrix switch and a fiber-optic KVM extender (with a transmitter and receiver), this complete system provides transparent and secure routing, switching and extension of video and high-speed data peripherals to remote destinations with ease.

Connecting to the Receiver

The Velocity Receiver serves as the Destination (desktops, theaters, conference rooms, editing suites, control consoles, video walls, etc). Depending on your configuration, your KMASS devices (audio, keyboard, mouse, etc) are first connected to the Receiver using standard cables. Power can then be supplied to the unit. The Receiver then connects to the VX Router Downstream ports using fiber (Multi-mode fiber for distances up to 1000m; Single-mode fiber for distances beyond 1000m).

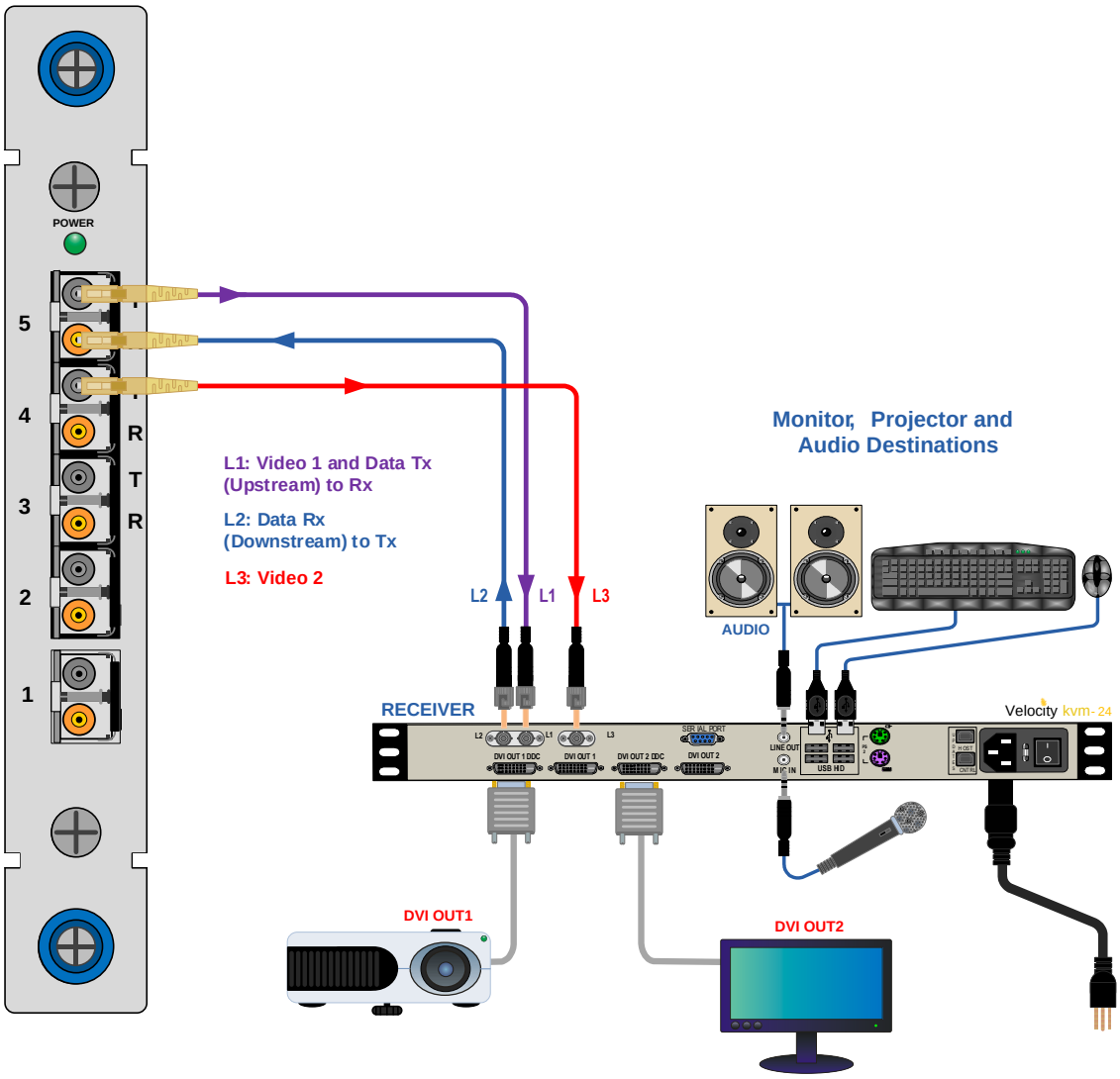


Figure 22: Connecting the *Thinklogical*™ VelocityKVM-24 Extender Receiver to the VX40/VX80

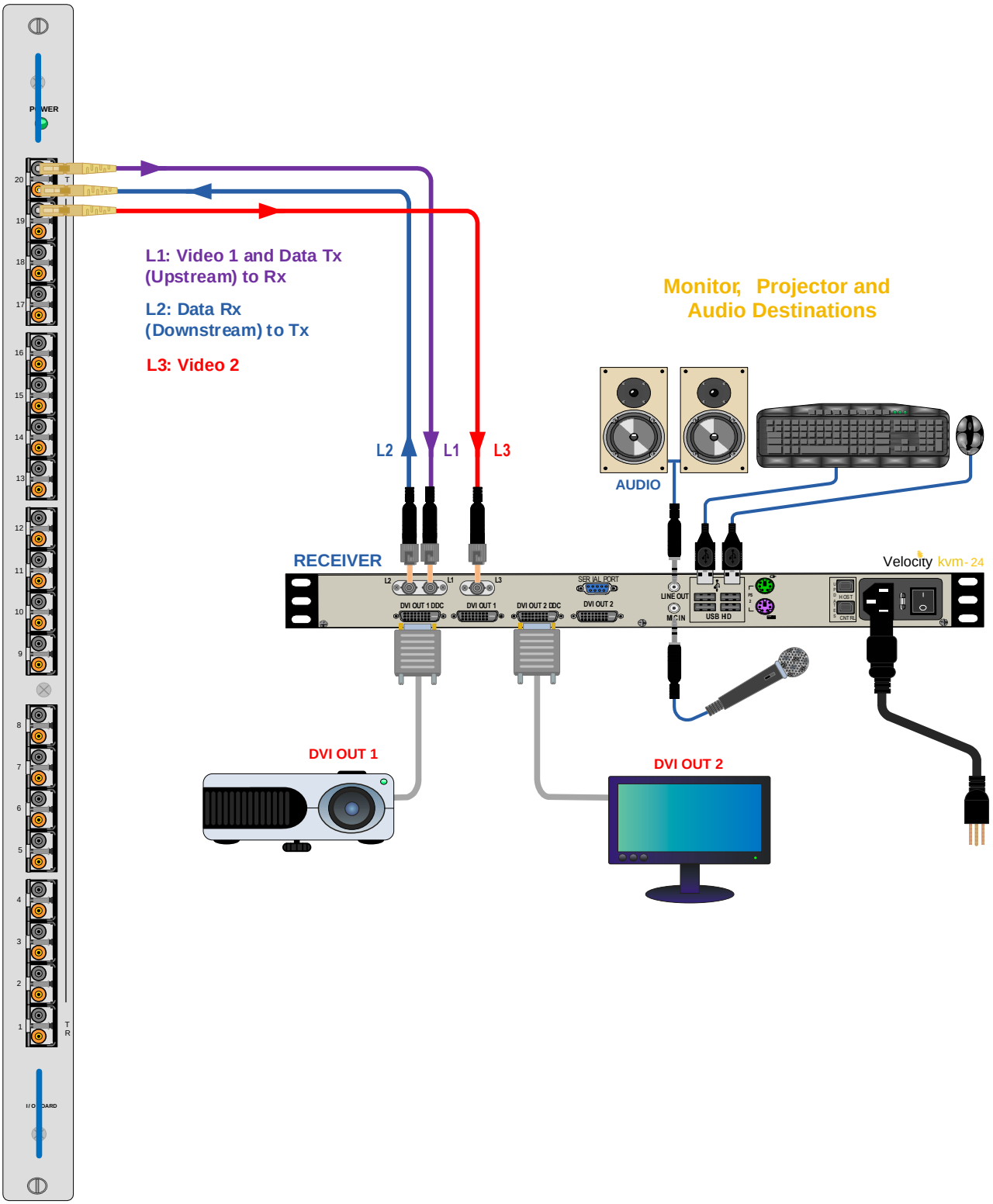


Figure 23: Connecting the *Thinklogical*™ VelocityKVM-24 Extender Receiver to the VX 160

Connecting to the Transmitter

The Transmitter serves as the Source (computer and video entities). Depending on your configuration, your local KMASS devices (keyboard, mouse, etc) are first connected. The video sources (e.g. computers) are then connected followed by any local video devices. Power can then be supplied to the unit. The Transmitter connects to the VX 160 Upstream ports using fiber (Multi-mode fiber for distances up to 1000m; Single-mode fiber for distances beyond 1000m).

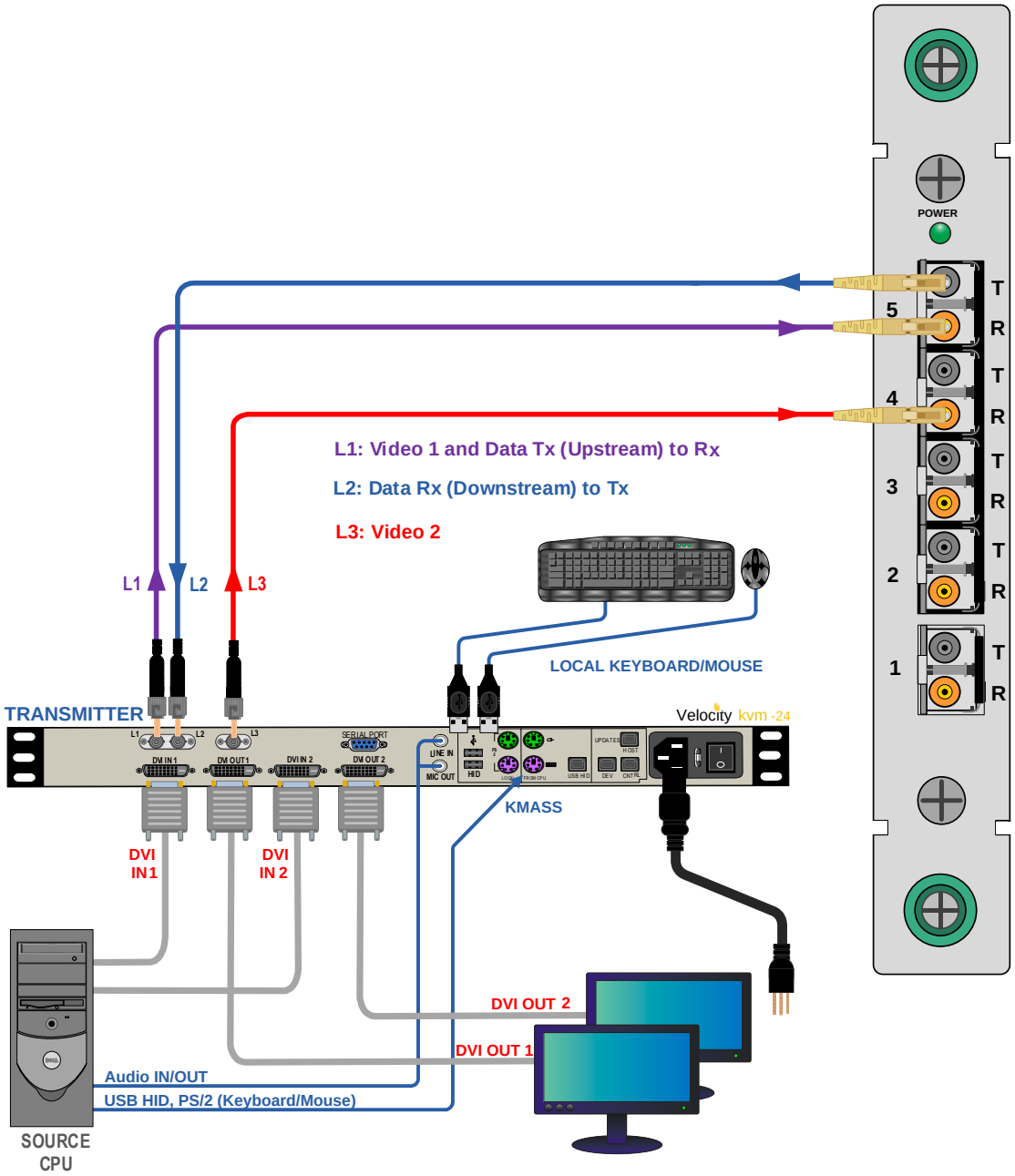


Figure 24: Connecting the *Thinklogical*™ VelocityKVM-24 Extender Transmitter to the VX 40/VX80

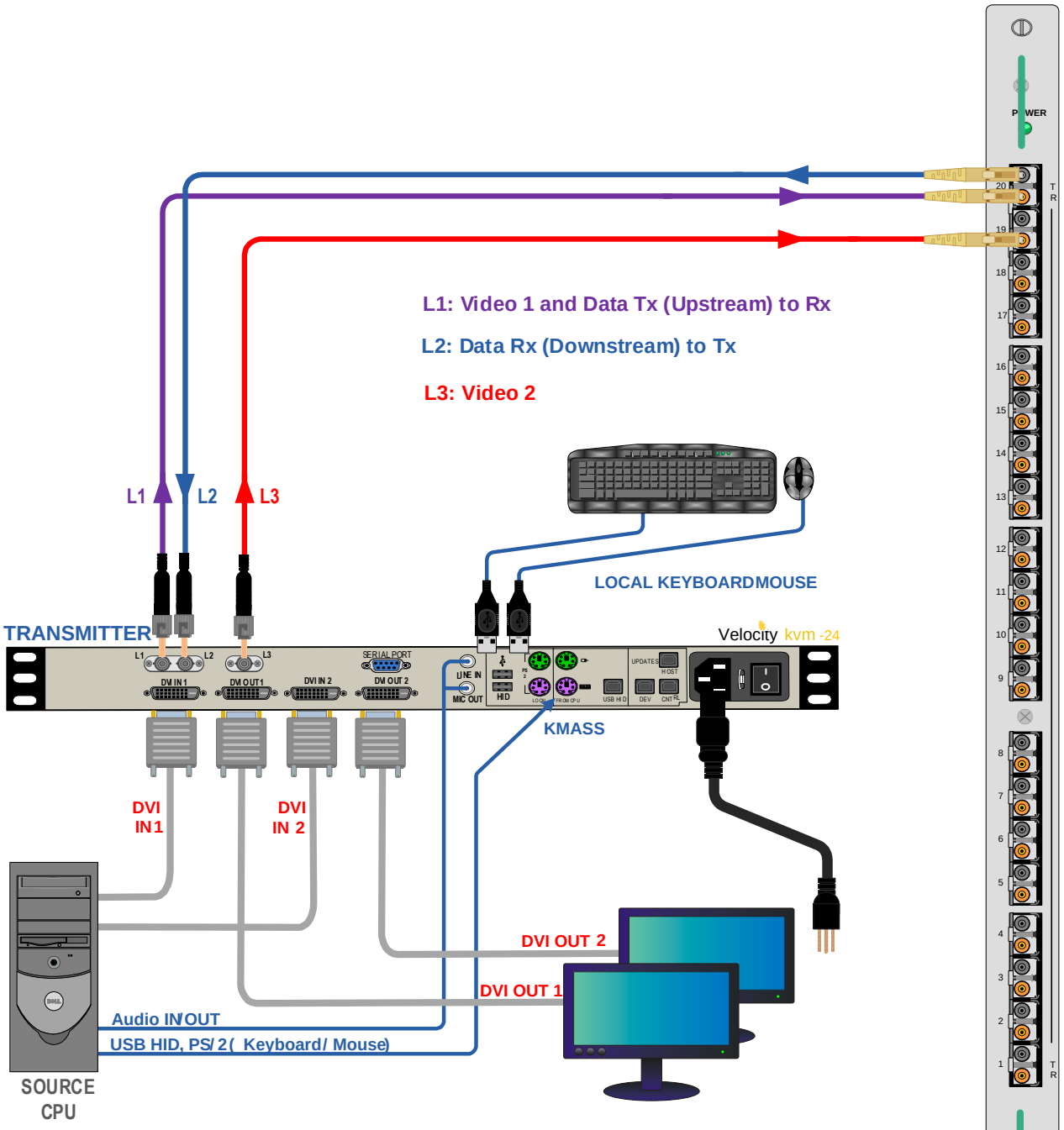


Figure 25: Connecting the *Thinklogical*™ VelocityKVM-24 Extender Transmitter to the VX 160

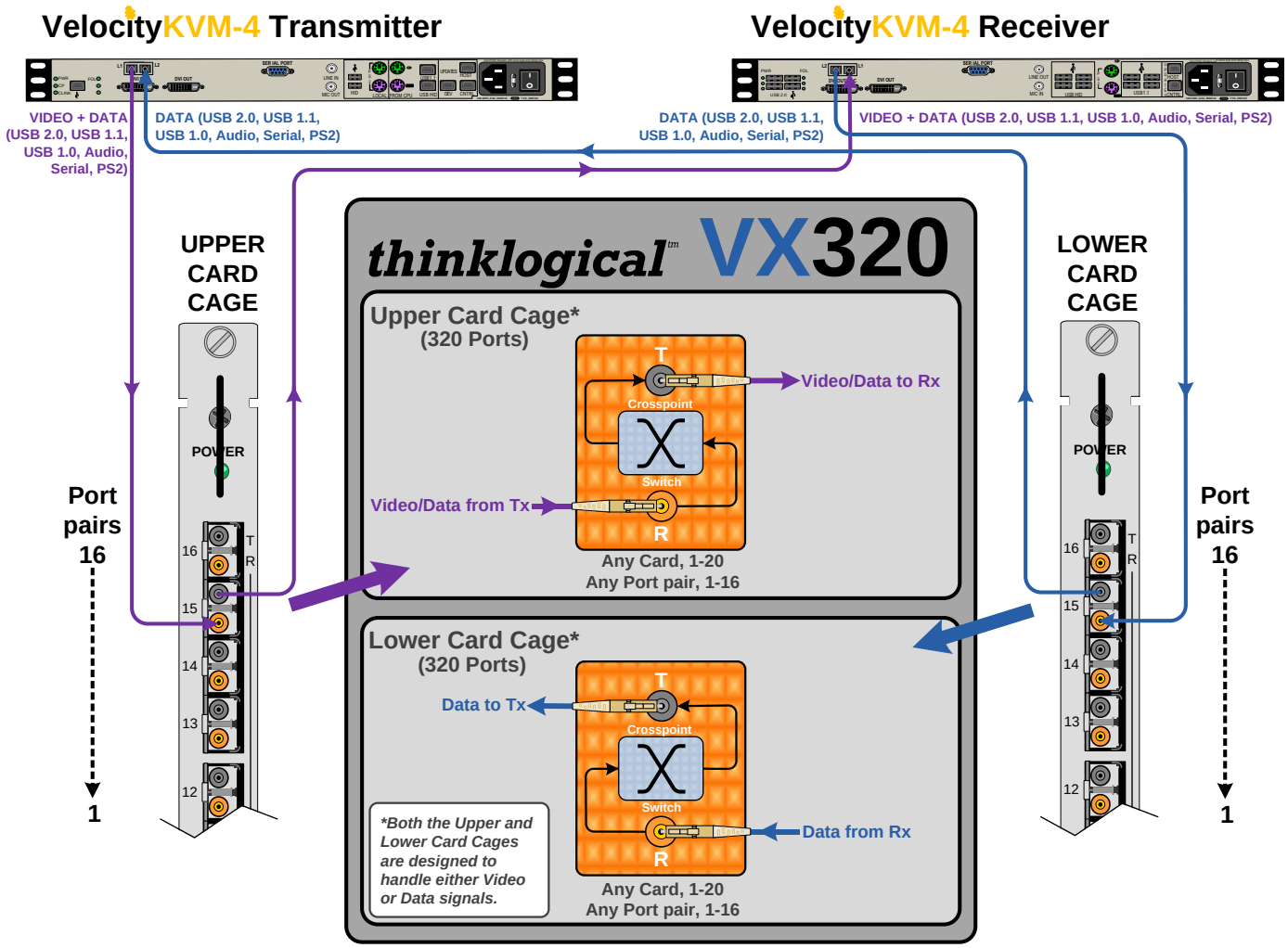


Figure 26: Connecting the *Thinklogical*™ VelocityKVM-4 Extender Transmitter and Receiver to the VX 320

Installation

All physical connections to the product use industry-standard connectors. Non-supplied cables that may be needed are commercially available. All connections are found on the rear of the unit.

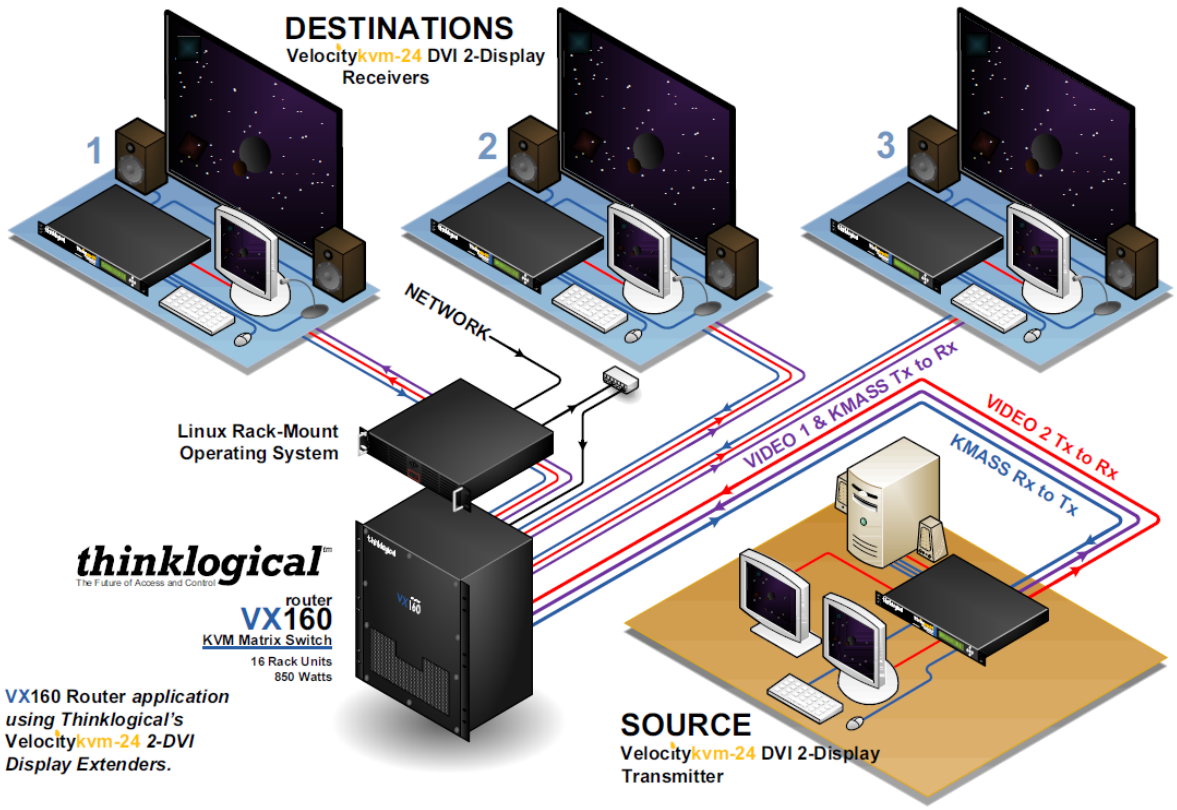


Figure 27: Typical VX 160 Router Application using VelocityKVM System 24 Extenders

Set-Up

Note: Insure that all thumb screws are finger tight so that all the modules are properly held in the chassis.

1. Carefully remove the VX Router from its shipping container. Inspect the VX Router to make certain that no damage occurred during shipment.
2. All of the I/O cards are installed at the factory to meet the configuration. Insure that the I/O cards are properly seated in the unit. All of the I/O cards have thumb screw retainers.
3. After checking the I/O cards, go to the top of the unit. There are two power supplies located in the top part of the chassis. Verify that the power supplies

are secure in the chassis.

Note: The VX320 must have ALL four power modules powered ON within a 5 second time frame.

4. Located directly below the power modules is a fan tray. The fan tray has thumb screws holding them into the chassis. Verify that the fan tray is secure. Cooling is accomplished by the fan trays and fans in the power supply units. Air is forced into the chassis from the fan tray. This cools the vertically mounted I/O cards, the integrated circuits on the Backplane, as well as removing any heat generated by the power modules.

Note: When mounting the chassis in a rack, insure that none of the fans have restricted air flow.

5. The temperature in the chassis is monitored in several locations. The power supplies have an internal temperature sensor that is monitored constantly for any conditions that may indicate a problem. Other temperature sensors are mounted in the fan trays, on the Controller card(s), on the I/O cards, and on the Backplane.

Note: If any of these sensors detect an over temperature condition, power will be removed from all sensitive components and the system will shut down.

6. As a further safeguard, all fan speeds are monitored and any fan speed that does not meet specification will cause the unit to set alarm condition.

Warning! Do not remove the Front Door when the unit is powered. The Backplane Integrated Circuits will overheat when operating without the Front Door attached.

Note: All of these conditions send out notifications prior to shut down. For a detailed list of the alarm descriptions, see Figure 8: *Alarm Descriptions and Drawing* on page 15.

7. When the VX Router has been inspected and found to be in good condition, the installation process can begin.

Order of Installation Events

Please refer to the **Quick Start Guides** included with your products for detailed instructions. The Quick Start Guides are also available in **Appendix B**.

How to Replace Modules

How to Install or Replace Input/Output Cards

Note: No shutdown is required prior to installing/replacing Input/Output Cards.

Step 1

Turn the two thumbscrews counterclockwise until they disengage from the chassis. Pull the card out using both handles.

Warning! Do not pull on the thumbscrews when removing the module – damage may occur!

OR

If a blank panel is present, remove the blank panel from the desired location using the thumbscrews.

Step 2

Place the new module upright so that the POWER LED is on the top. Grasp the module by the handles or by the outer edge of the aluminum housing. The card should slide freely until it reaches the backplane connector. At this point, use just enough force to firmly engage the card with the mating connector.

Warning! If the module does not slide into the connector, do not force it! Damage may occur. Remove the card and start over.

Step 3

Once the module is completely seated, hand-tighten the thumbscrews.

Warning! Do not tighten the thumbscrews with a screwdriver.

How to Install or Replace a Controller Card

Note: When using a single Controller, the left Controller slot is always Primary.

 **Note: Replacing the Active Controller Card will interrupt service.**

When replacing a Controller Card in a system with redundant controllers you may remove the Controller that is not active (Active LED is Off) without interrupting service. Before removing a Primary Controller that is active you should cause a Fail-over to the Back-up Controller. This can be done by removing the LAN connection from the active Controller and waiting approximately 20-50 seconds for the Back-up Controller to take control, as indicated by the Active LED. After the Primary Controller is removed and replaced (following Steps below), the Primary Controller will re-take control of the system and become the Active Controller.

Step 1

Turn the thumbscrews counterclockwise until they disengage from the chassis. Pull the Controller Card out using both black handles.

Step 2

Place the new module upright so that the ACTIVE LED is on the top. Grasp the module by the handles or by the outer edge of the aluminum housing. The card should slide freely until it reaches the backplane connector. At this point, use just enough force to firmly engage the card with the mating connector.

 **Warning! If the module does not slide into the connector, do not force it! Damage may occur. Remove the card and start over.**

Step 3

Once the module is completely seated, hand-tighten the thumbscrews.

 **Warning! Do not tighten the thumbscrews with a screwdriver.**

Step 4

Replace the LAN cable connection and/or the RS232 cable connection.

How to Replace a Fan Tray

The VX Routers use three DC fans to move air horizontally through the enclosure. Be sure not to block the air vents on the front and rear of the unit, and leave at least 2” of space on both sides.

 **Note: Be sure to leave adequate ventilation space on both sides of the units (2” minimum), especially if the units (e.g. Extenders) are being stacked above or below the VX Router.**

 **Note: No shutdown is required prior to replacing the Fan Tray.**

Step 1

Turn the four thumbscrews counterclockwise until they disengage from the chassis.

Step 2

Pull the Fan Tray module out using both black handles.

Step 3

Place the new module so that the aluminum housing is on the bottom. Hold the new Fan Tray by the black handles and slide the aluminum housing into the black card guides.

Warning! Do not operate the unit without a Fan Tray installed for greater than 10 minutes.

Step 4

Hand-tighten the thumbscrews.

Warning! Do not tighten the thumbscrews with a screwdriver.

How to Replace a Power Supply

Warning! Disconnect the power cord before proceeding!

Note: No shutdown is required prior to replacing a Power Supply.

a. The Power Modules are universal input 120-240VAC 50-60Hz. Use the proper power cord for your region (supplied with the unit). Although the VX Router functions properly with one Power Module, it is recommended that both Modules be used, preferably connected to two independent power sources (for redundancy).

Step 1

Grasp the black handle with one hand.

Step 2

Slide the green tab to the left with the other hand.

Step 3

Pull the Power Module out of the chassis.

Step 4

Insert the new Power Module into the chassis and slide it in until it reaches the backplane connector. The module should slide freely until it reaches the backplane connector. At this point, use just enough force to firmly engage the card with the mating connector.

Warning! If the module does not slide into the connector, do not force it! Damage may occur. Remove the module and start over.

Part 2: Safety Requirements

Symbols found on the product

Markings and labels on the product follow industry-standard conventions. Regulatory markings found on the products comply with requirements.

Regulatory Compliance

Thinklogical™ products are designed and made in the U.S.A. Products have been tested by a nationally recognized testing laboratory and found to be compliant with the following standards (both domestic USA and many international locations).

North America

These products comply with the following standards:

Safety

ANSI/UL60950-1: 1st Edition (2003)

CAN/CSA C22.2 No. 60950-1-03

LASER Safety

CDRH 21CFR 1040.10

Class 1 LASER Product

Electromagnetic Interference

FCC CFR47, Part 15, Class A

Industry Canada ICES-003 Issue 2, Revision 1

Australia & New Zealand

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

European Union

Declaration of Conformity

Manufacturer's Name & Address: **Thinklogical™**
100 Washington Street
Milford, Connecticut 06460 USA
Telephone (203) 647-8700

Product Name

Model: VX 40 Router, VX 160 Router and VX 320 Router

These products comply with the requirements of the Low Voltage Directive 72/23/EEC and the EMC Directive 89/336/EEC.

Standards with Which Our Products Comply

Safety

CENELEC EN 60950-1, (2006)

LASER Safety

IEC60825:2001 Parts 1 and 2

Class 1 LASER Product

Electromagnetic Emissions

EN55022: 1994 (IEC/CSPIR22: 1993)

EN61000-3-2/A14: 2000

EN61000-3-3: 1994

Electromagnetic Immunity

EN55024: 1998 Information Technology Equipment-Immunity Characteristics

EN61000-4-2: 1995 Electro-Static Discharge Test

EN61000-4-3: 1996 Radiated Immunity Field Test

EN61000-4-4: 1995 Electrical Fast Transient Test

EN61000-4-5: 1995 Power Supply Surge Test

EN61000-4-6: 1996 Conducted Immunity Test

EN61000-4-8: 1993 Magnetic Field Test

EN61000-4-11: 1994 Voltage Dips & Interrupts Test

Supplementary Information

The following statements may be appropriate for certain geographical regions and might not apply to your location.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigencies du Règlement sur le matérial brouilleur du Canada.

Warning! This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications in which case the user may be required to take adequate corrective measures at their own expense.

Note: This Class A digital apparatus complies with Canadian ICES-003 and has been verified as being compliant within the Class A limits of the FCC Radio Frequency Device Rules (FCC Title 47, Part 15, Subpart B CLASS 1), measured to CISPR 22: 1993 limits and methods of measurement of Radio Disturbance Characteristics of Information Technology Equipment.

Note: The user may notice degraded audio performance in the presence of electromagnetic fields.

Note: If using a keyboard that is noise susceptible, a ferrite ring on the keyboard cable may be needed to comply with Immunity Requirements

Product Serial Number

Thinklogical™ products have a unique serial number, imprinted on an adhesive label that is fixed to the bottom of the chassis. The serial number includes a date-code. The format for the date-code is 2 digits for the month, 2 digits for the day and 2 digits for the year, plus two or three digits for a unique unit number. This serial number is also found on the original shipping carton.

Connection to the Product

Connections and installation hardware for our products use industry-standard devices and methods. All wiring connections to the customer equipment are designed to minimize proprietary or customized connectors and cabling. Power connections are made with regionally appropriate power cords and approved methods.

Part 3: Thinklogical™ Support

Customer Support

Thank you for choosing Thinklogical™ products for your application. We appreciate your business and are dedicated to helping you successfully use our products. Thinklogical™ is always here to help.

Thinklogical™ is an engineering company and we will make every effort to ensure that you receive the information you require directly from our most knowledgeable engineers. We believe that the first line of support is the design engineer that developed the product. Therefore, your questions will be handled promptly by our in-house engineers who are most familiar with your products.

To contact Thinklogical™ use the following telephone numbers and internet-based methods:

Website

Check out our website for current product offerings, support information and general information about all of the products we offer.

Our internet website offers product information on all current systems, including technical specification sheets and installation guides (for viewing online or for download), product diagrams showing physical connections and other information you might need.

Internet: **www.thinklogical.com**

Note: Most online documents are stored as Adobe Acrobat "PDF" files. If you do not have the Adobe Acrobat reader needed to view PDF files, visit www.adobe.com for a download.

Email

Thinklogical™ is staffed Monday through Friday from 8:30am to 5:00pm, Eastern Time Zone. We will try to respond to your email inquiries promptly, use the following email addresses for your different needs:

info@thinklogical.com – Information on Thinklogical™ and our products.

sales@thinklogical.com – Sales Department - orders, questions or issues.

support@thinklogical.com – Product support, technical issues or questions, product repairs and request for Return Authorization.

Telephone

Telephone Sales: Contact our expert, technically oriented sales staff via telephone in Milford, CT at **(203) 647-8700** or if in the continental US, you may use our **toll-free number (800) 291-3211**. We are here Monday through Friday from 8:30am to 5:00pm, Eastern Time Zone. Ask for their direct dial phone number when you call.

Telephone Product Support: Contact Product Support via telephone in Milford, Connecticut at **(203) 647-8700**. The support lines are manned Monday through Friday, 8:30am to 5:00pm, Eastern Time Zone.

International Sales: Please contact our US sales staff in Milford, CT at **(203) 647-8700**. We are here Monday through Friday, 8:30am to 5:00pm, Eastern Time Zone (same as New York City). If leaving a voice message, please provide a "best time to call back" so we may reach you at your convenience.

Our switchboard attendant will direct your call during regular business hours. We have an automated attendant answering our main telephone switchboard after regular business hours and holidays. You can leave voice messages for individuals at any time. Our Sales Representatives have direct numbers to speed up your next call to us.

Fax

Our company facsimile number is **(203) 783-9949**. Please indicate the nature of the fax on your cover sheet and provide return contact information.

Product Support

Thinklogical's™ support personnel are available Monday through Friday from 8:30am to 5:00pm, Eastern Time Zone. If your application might require assistance at some time outside

of our normal business hours, please contact us beforehand and we will do our best to make arrangements to help you with your Thinklogical™ products.

Warranty

Thinklogical™ warrants this product against defects in materials and workmanship for a period of one year from the date of delivery. Thinklogical™ and its suppliers disclaim any and all other warranties.

Note: *Thinklogical*™ Inc. products carry a one year warranty, with longer term available at time of purchase on most products. Please refer to your product invoice for your products Warranty Terms & Conditions.

Defect remedy shall be, repair or replacement of the product, provided that the defective product is returned to the authorized dealer within a year from the date of delivery.

If you wish to return your device, contact the *Thinklogical*™ authorized dealer where you purchased the device, or if you purchased directly, call Thinklogical™ at 1-800-291-3211 (USA).

Return Authorization

If you must return a product to *Thinklogical*™ directly:

Contact **Customer Support** at **1-800-291-3211** or **203-647-8700**.

Customer Support will ask you to describe the problem and will issue you a **R**eturn **M**erchandise **A**uthorization number (RMA#).

Pack the device in its original box, if possible, and return it with the RMA# on the box.

Note: Do not return a product to Thinklogical™ without a *Return Material Authorization Number.*

Return address for products with Return Material Authorization:

thinklogical™
a subsidiary of logical solutions

Attn: RMA#

100 Washington Street

Milford, CT 06460 USA

PH: 800-291-3211 (USA only)

Our Address

If you have any issue with the product, have product questions or need technical assistance with your Thinklogical™ system, please call us at **800-291-3211 (USA only)** or **(203) 647-8700** and let us help. If you'd like to write us, our mailing address is:

Thinklogical™ Inc.

100 Washington Street

Milford, CT 06460 USA

Appendix A: Ordering Information

Thinklogical's VX40 Router	
Part Number	**Description**
	Velocity Matrix Router 40
VXR-000040	Velocity Matrix Router 40 Chassis
VXR-000040 REV B	Velocity Matrix Router 40 Chassis, Common Criteria EAL 4 Certified
	Velocity Matrix Router 40 Data Cards
VXM-DI0005	Velocity Matrix Router 40 Data Upstream Card, 5 Ports, SFP+, Multi-mode
VXM-DI0005 REV A	Velocity Matrix Router 40 Data Upstream Card, 5 Ports, SFP+, Multi-mode, Common Criteria EAL 4 Certified
VXM-DO0005	Velocity Matrix Router 40 Data Downstream Card, 5 Ports, SFP+, Multi-mode
VXM-DO0005 REV A	Velocity Matrix Router 40 Data Downstream Card, 5 Ports, SFP+, Multi-mode, Common Criteria EAL 4 Certified
VXM-DI0S05	Velocity Matrix Router 40 Data Upstream Card, 5 Ports, SFP+, Single-mode
VXM-DO0S05	Velocity Matrix Router 40 Data Downstream Card, 5 Ports, SFP+, Single-mode
VXM-DI0E05	Velocity Matrix Router 40 Vacant Data Input Card, 5 Ports, No SFP+
VXM-DO0E05	Velocity Matrix Router 40 Vacant Data Output Card, 5 Ports, No SFP+
	Velocity Matrix Router 40 Spares
VXM-000005	Velocity Matrix Router 40 Controller Card
VXM-000006	Velocity Matrix Router 40 Fan Tray
VXM-000007	Velocity Matrix Router 40 Power Supply

Table 3: VX40 Router Ordering Information

Thinklogical's VX160 Router	
Part Number	**Description**
	Velocity Matrix Router 160
VXR-000160	Velocity Matrix Router 160 Chassis
VXR-000160 REV B	Velocity Matrix Router 160 Chassis, Common Criteria EAL 4 Certified
	Velocity Matrix Router 160 Data Cards
VXM-DI0020	Velocity Matrix Router 160 Data Upstream Card, 20 Ports, SFP+, Multi-mode
VXM-DI0020 REV B	Velocity Matrix Router 160 Data Upstream Card, 20 Ports, SFP+, Multi-mode, Common Criteria EAL 4 Certified
VXM-DO0020	Velocity Matrix Router 160 Data Downstream Card, 20 Ports, SFP+, Multi-mode
VXM-DO0020 REV B	Velocity Matrix Router 160 Data Downstream Card, 20 Ports, SFP+, Multi-mode, Common Criteria EAL 4 Certified
VXM-DI0S20	Velocity Matrix Router 160 Data Upstream Card, 20 Ports, SFP+, Single-mode
VXM-DO0S20	Velocity Matrix Router 160 Data Downstream Card, 20 Ports, SFP+, Single-mode
VXM-DI0E20	Velocity Matrix Router 160 Vacant Data Input Card, 20 Ports, No SFP+
VXM-DO0E20	Velocity Matrix Router 160 Vacant Data Output Card, 20 Ports, No SFP+
	Velocity Matrix Router 160 Spares
VXM-000001	Velocity Matrix Router 160 Controller Card
VXM-000002	Velocity Matrix Router 160 Fan Tray
VXM-000003	Velocity Matrix Router 160 Power Supply

Table 4: VX160 Router Ordering Information

Thinklogical's VX320 Router	
Part Number	**Description**
	Velocity Matrix Router 320
VXR-000320	Velocity Matrix Router 320 Chassis
VXR-000320 REV A	Velocity Matrix Router 320 Chassis, Common Criteria EAL 4 Certified
	Velocity Matrix Router 160 Data Cards
VXM-D00016	Velocity Matrix Router 320 Data Upstream/Downstream Card, 16 Ports, SFP+, Multi-mode
VXM-D00016 REV A	Velocity Matrix Router 320 Data Upstream/Downstream Card, 16 Ports, SFP+, Multi-mode, Common Criteria EAL 4 Certified
VXM-D00S16	Velocity Matrix Router 320 Data Upstream/downstream Card, 16 Ports, SFP+, Single-mode
VXM-D00E16	Velocity Matrix Router 320 Vacant Data Upstream/Downstream Card, 16 Ports, No SFP+
	Velocity Matrix Router 160 Spares
VXM-000008	Velocity Matrix Router 320 Controller Card
VXM-000009	Velocity Matrix Router 320 Fan Tray
VXM-000010	Velocity Matrix Router 320 Power Supply

Table 5: VX320 Router Ordering Information

Thinklogical's VX320 Video Router	
Part Number	**Description**
	Velocity Matrix Router 320 Video
VXR-V00320	Velocity Matrix Router 320 Chassis
	Velocity Matrix Router 160 Data Cards
VXM-D00016	Velocity Matrix Router 320 Data Upstream/Downstream Card, 16 Ports, SFP+, Multi-mode
VXM-D00S16	Velocity Matrix Router 320 Data Upstream/downstream Card, 16 Ports, SFP+, Single-mode

VXM-D00E16	Velocity Matrix Router 320 Vacant Data Upstream/Downstream Card, 16 Ports, No SFP+
	Velocity Matrix Router 160 Spares
VXM-000008	Velocity Matrix Router 320 Controller Card
VXM-000009	Velocity Matrix Router 320 Fan Tray
VXM-000010	Velocity Matrix Router 320 Power Supply

Table 6: VX320 Video Router Ordering Information

Appendix B: Quick Start Guides

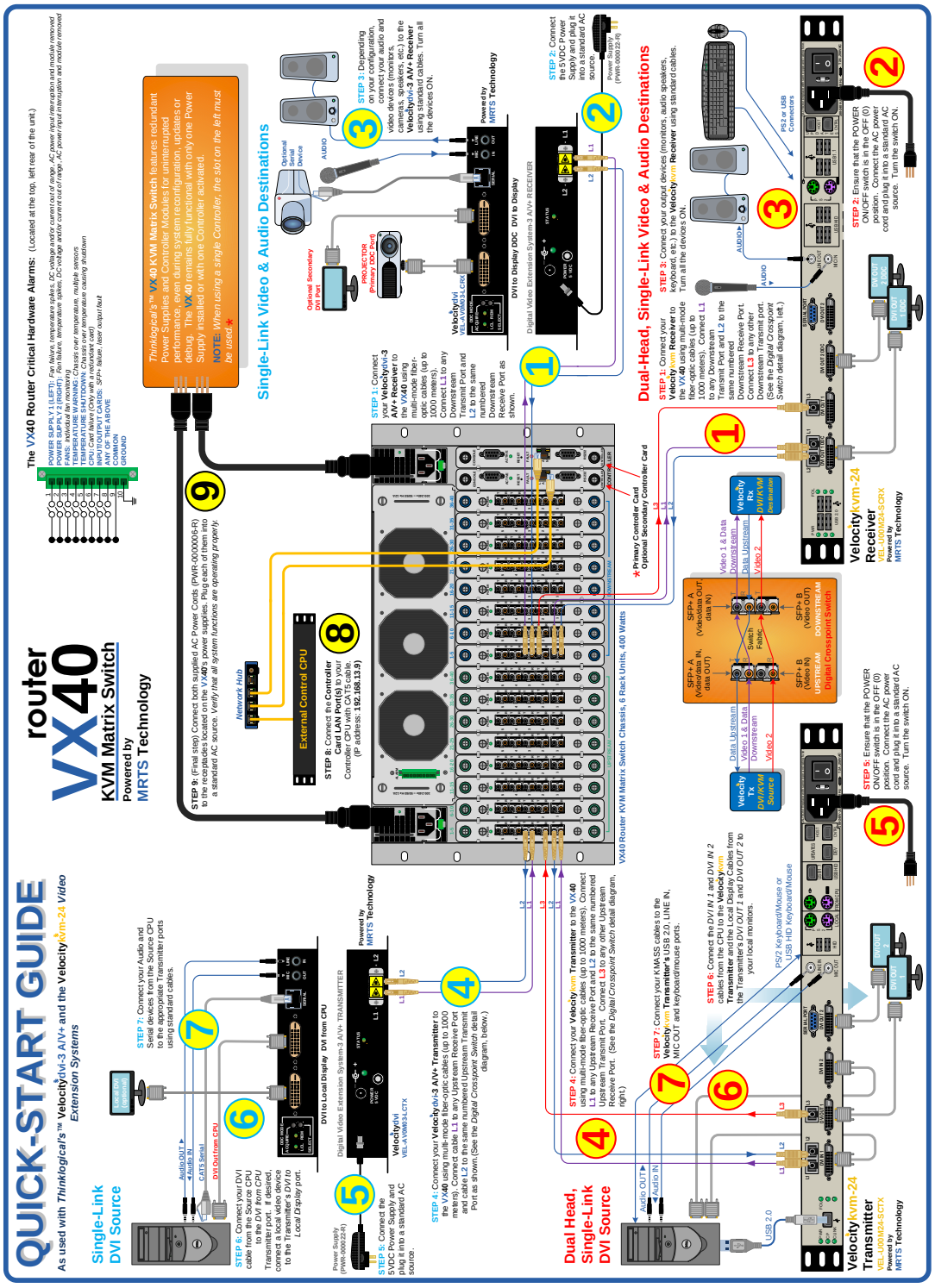


Figure 28: VX40 Router Quick Start Guide

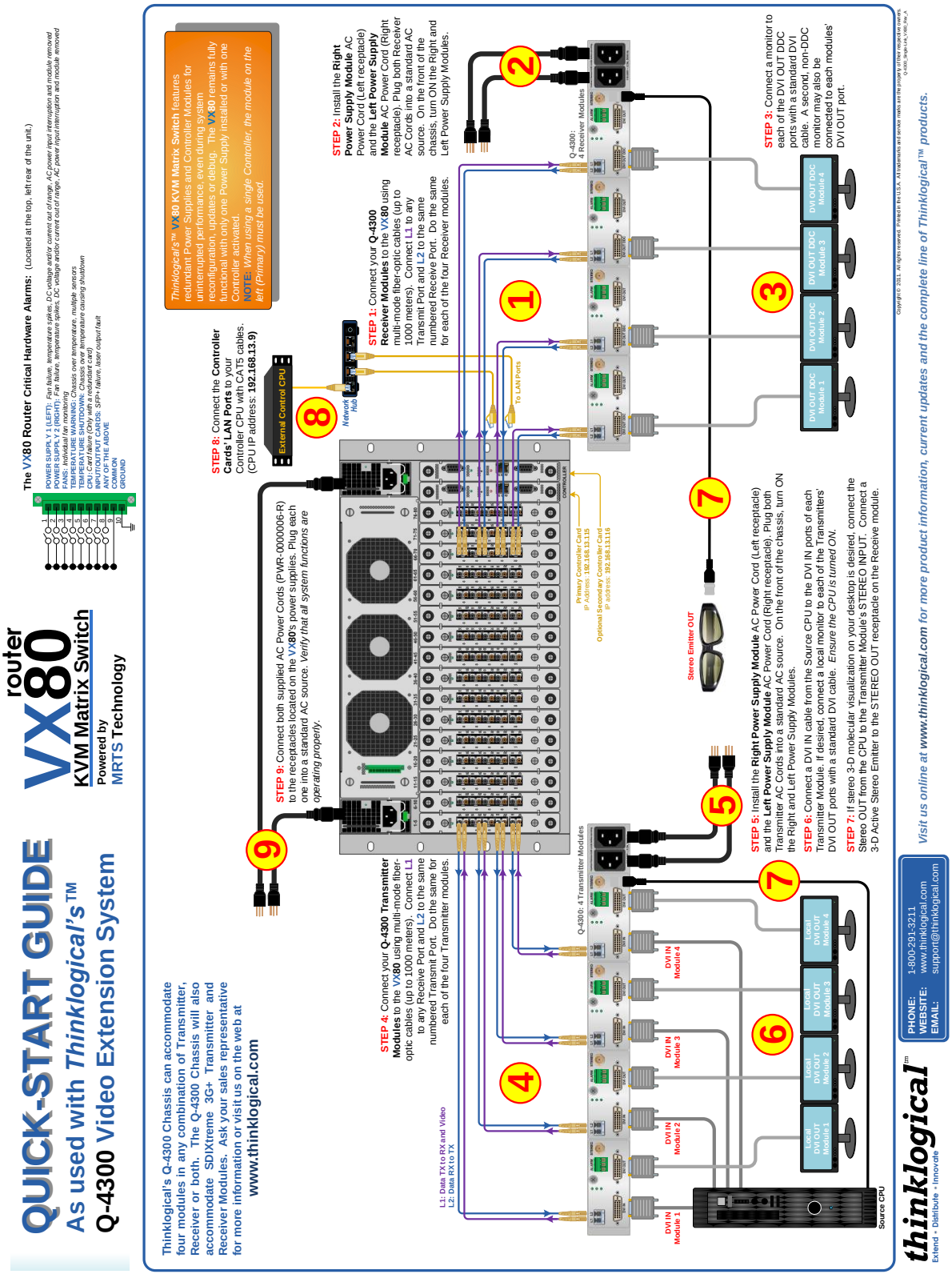


Figure 29: VX80 Router Quick Start Guide

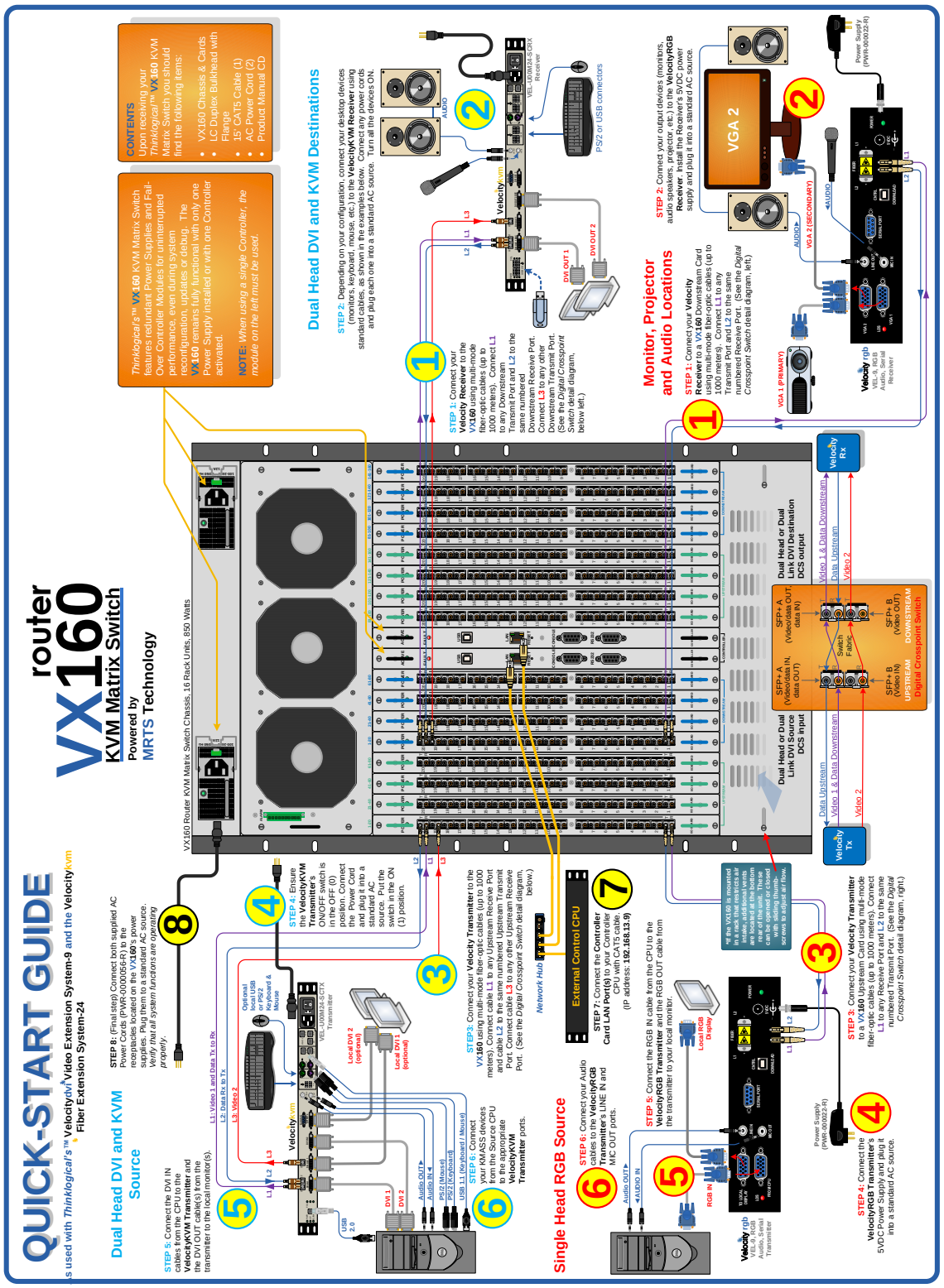


Figure 30: VX160 Router Quick Start Guide

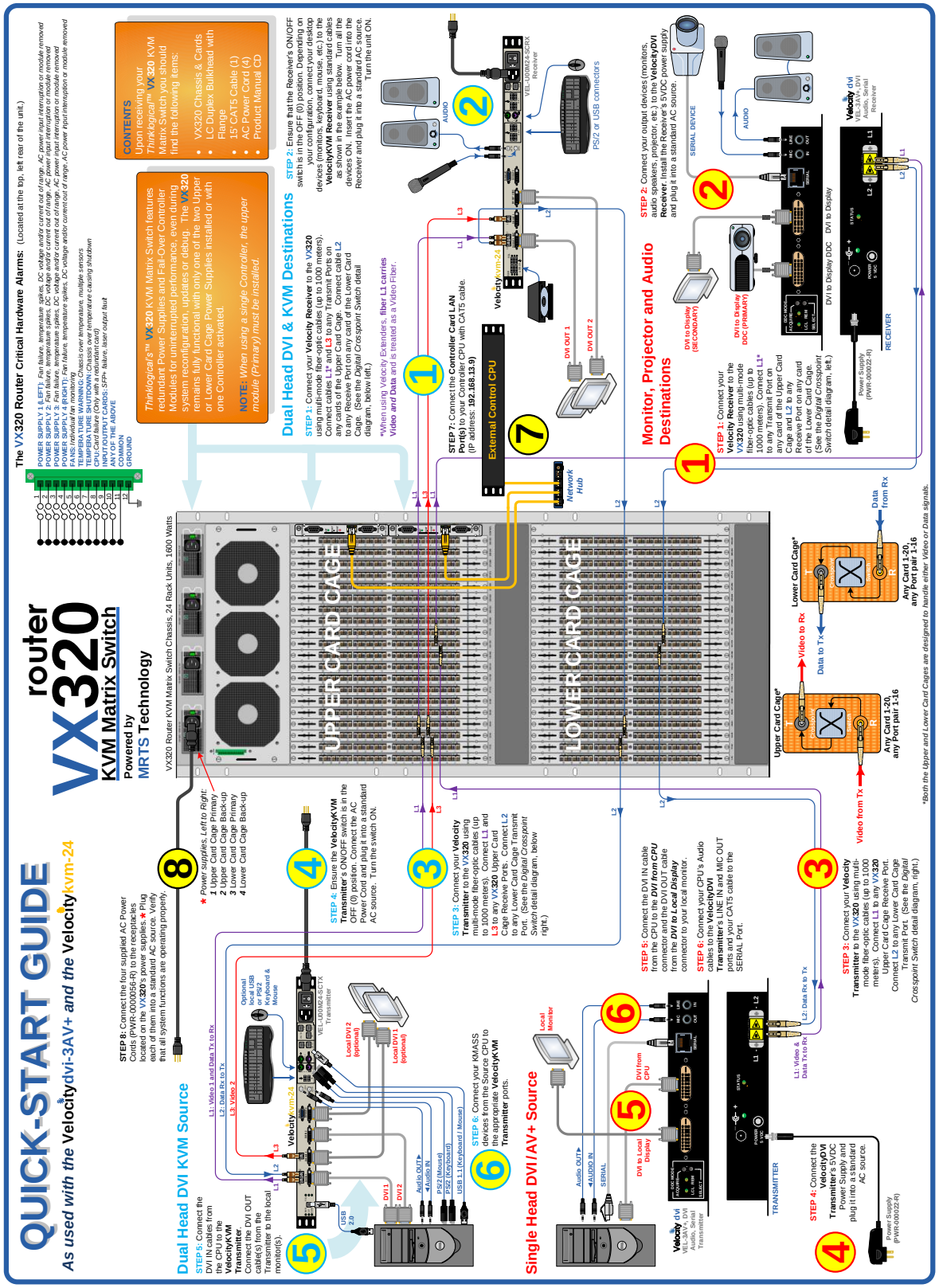


Figure 31: VX320 Router Quick Start Guide

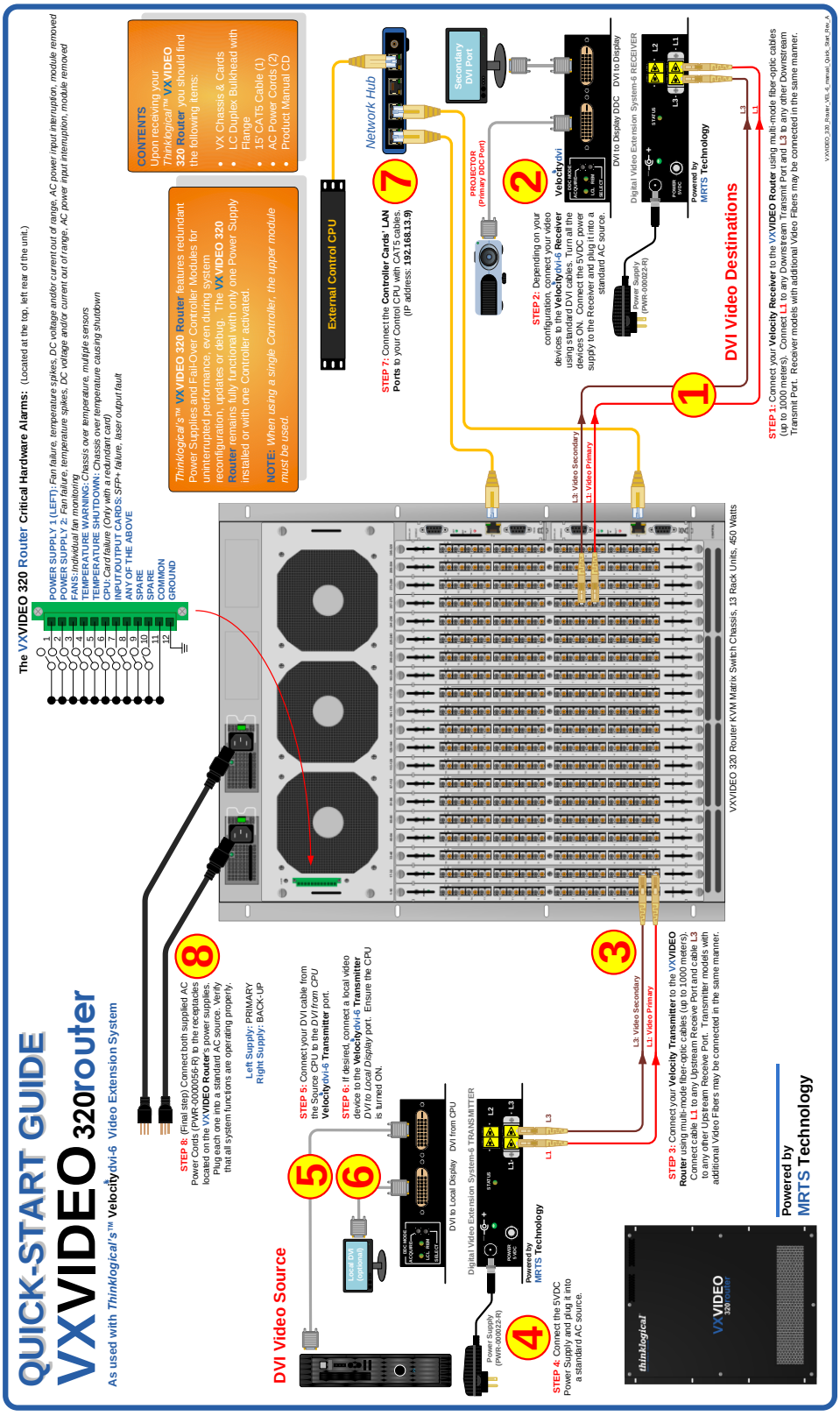


Figure 32: VX320 Video Router Quick Start Guide

Appendix C: SD Flash Card Replacement

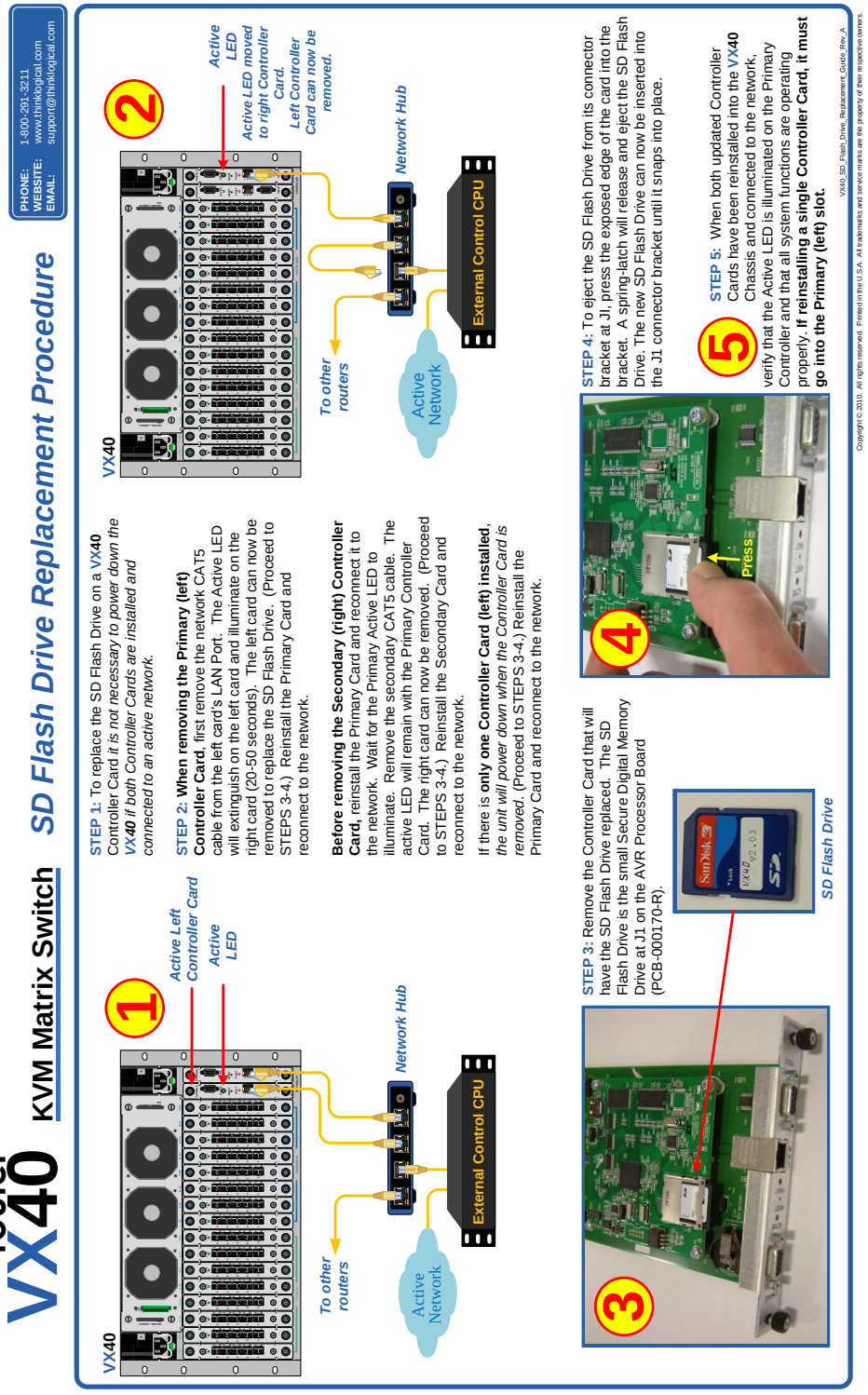


Figure 33: VX40 SD Flash Card Replacement

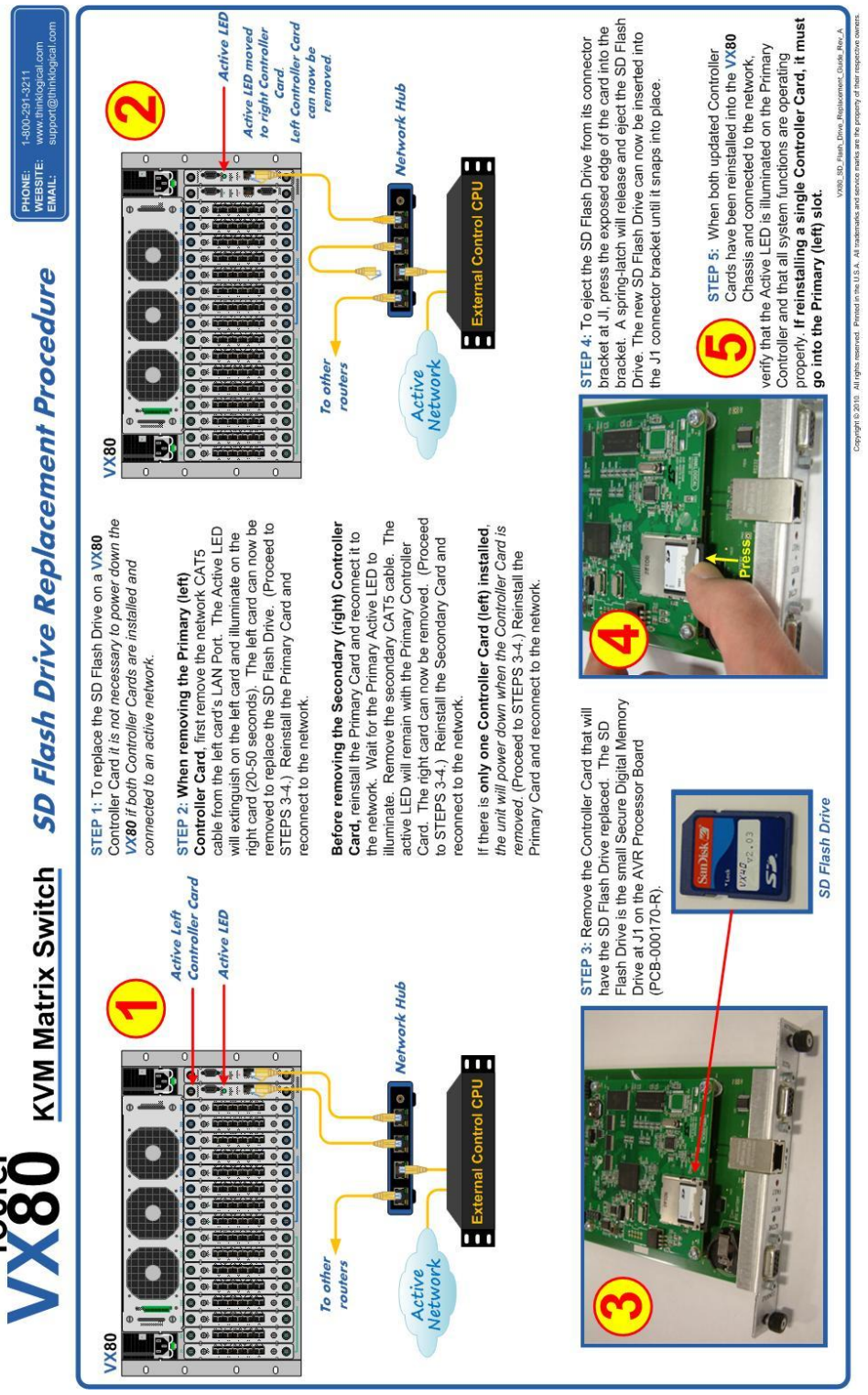


Figure 34: VX80 SD Flash Card Replacement

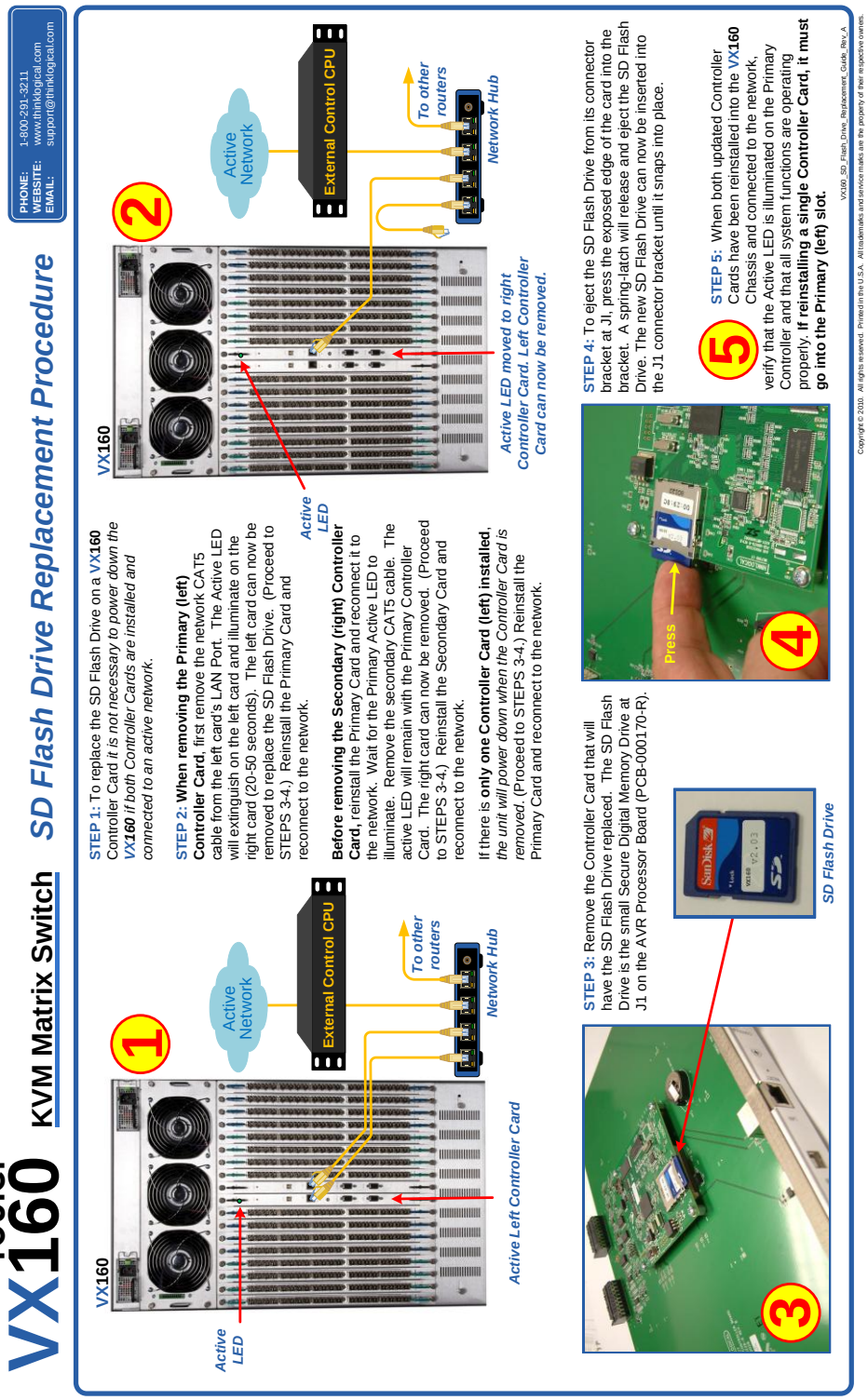


Figure 35: VX160 SD Flash Card Replacement

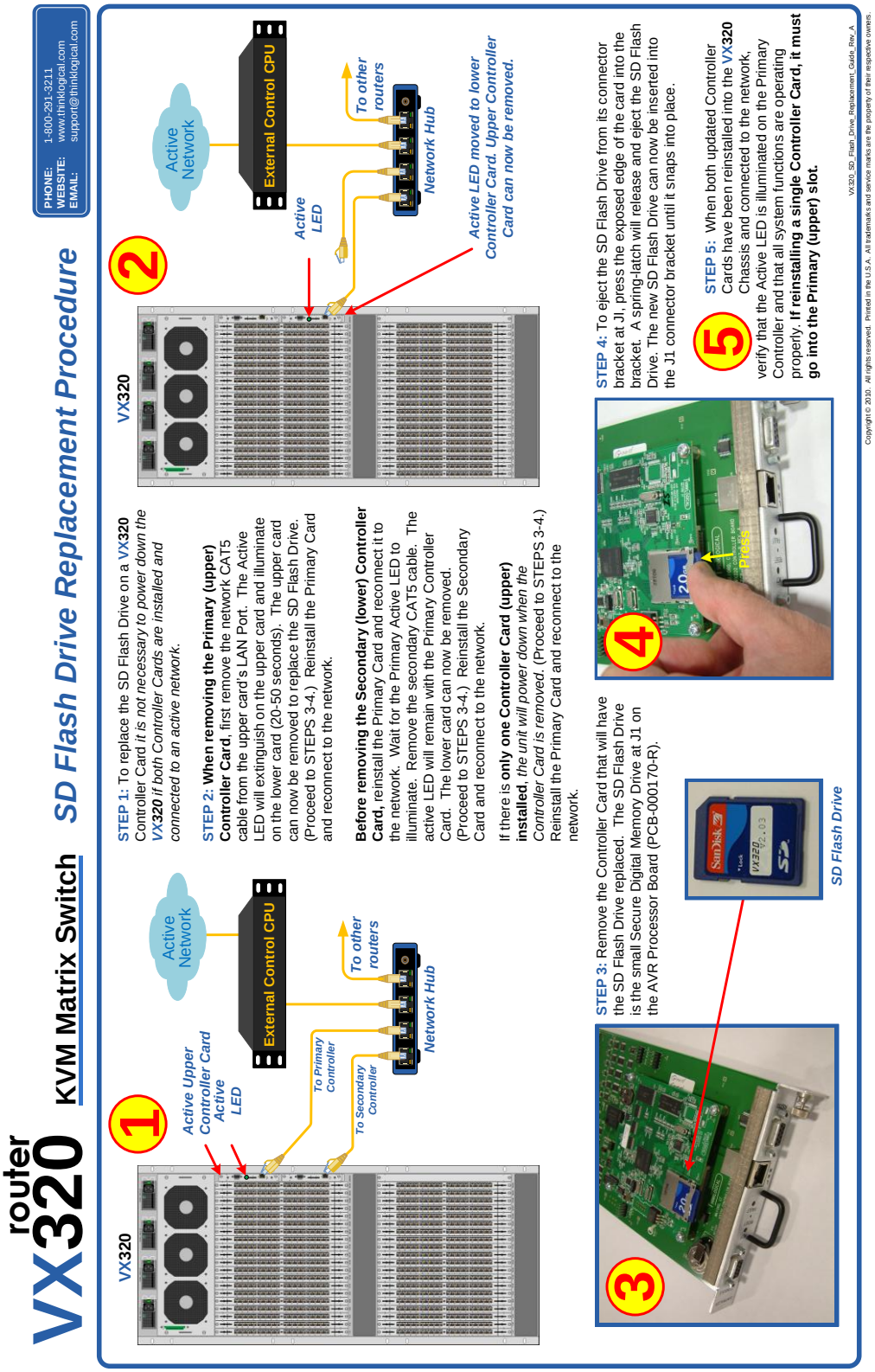


Figure 36: VX320 SD Flash Card Replacement

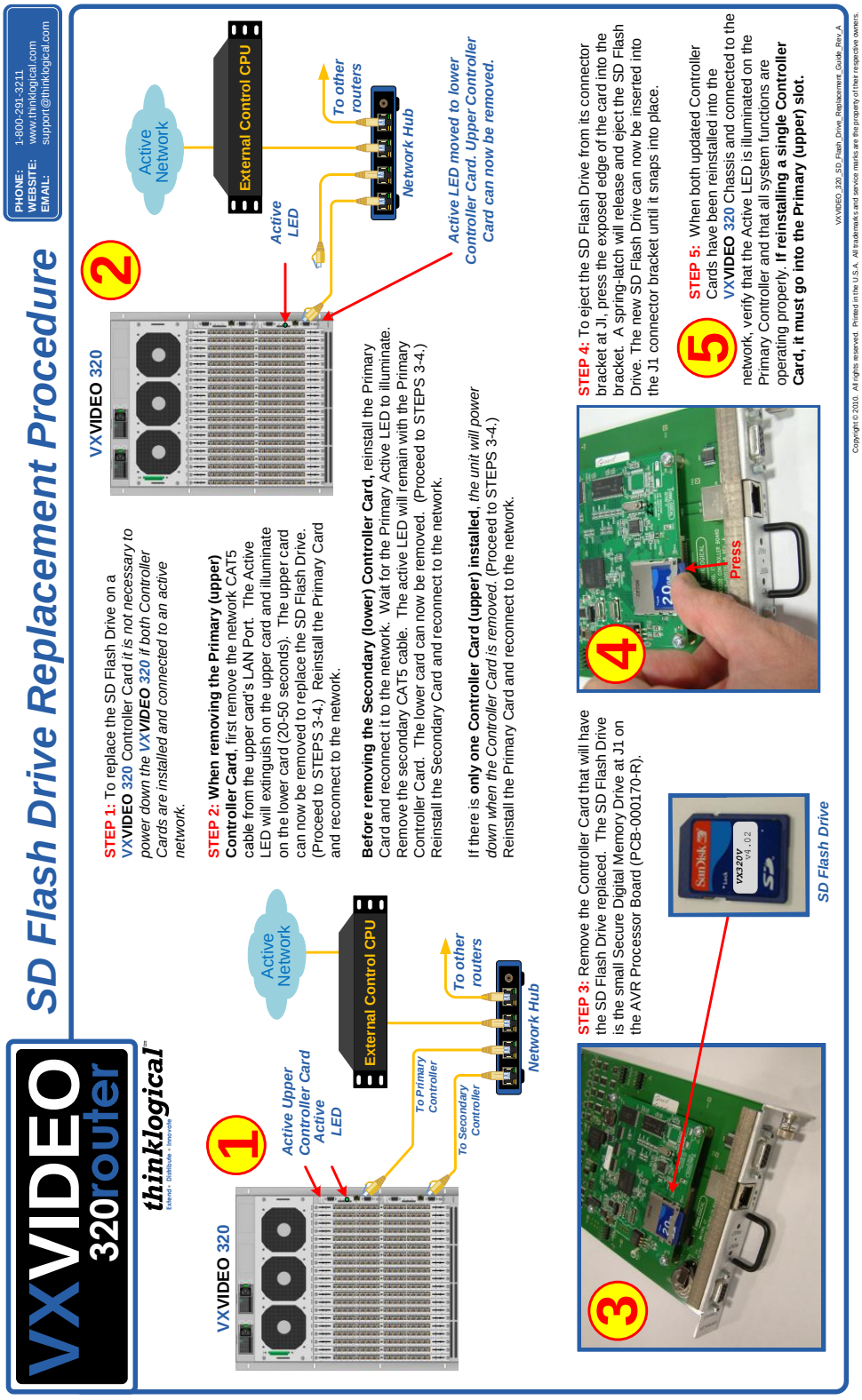


Figure 37: VX320 Video SD Flash Card Replacement

Appendix D: Secure Applications

VX Router Control

For use in a secure application, the VX Router and External Computer (server) used to manage the Router must be located in a physically secure environment to which only a trusted administrator has access. Similarly, the server used to manage the VX Router must be protected physically and with suitable identification/authentication mechanisms to ensure that only trusted administrators have access.

Restrictive Switching

Restrictive Switching is used to provide for multiple levels of security classification domains on the same VX Router. Each destination needs to ensure that no unauthorized content is displayed or accessed. Therefore, each input and output needs to be prioritized. Priorities can range from 1 to the total number of ports that can be connected in a switch matrix. An output can connect to an input with a priority greater than or equal to its priority. Thus, a priority level of 1 on an output can connect to any input (priority 1,2,3,…).

The user must provide a table defining the priorities for each input and output of the switch matrix. This table is in the form of a comma separated value (csv) file. This file contains the values in three columns, Port Direction (i=input, o=output), Port Number, Port Priority.

For example:

I/O	Number	Priority
"i",	1,	1
"i",	2,	2
"i",	3,	3
"i",	4,	1
"i",	5,	3
"o",	1,	1
"o",	2,	3
"o",	3,	2
"o"	4,	4
"o",	5,	1

Output 1 can connect to ports 1-5.
Output 2 can connect to ports 3 and 5.
Output 3 can connect to ports 2, 3, and 5.
Output 4 cannot connect to any ports.
Output 5 can connect to ports 1-5.

Note that Port Direction (i or o) is in quotes and that the table must use only the following ASCII printable characters:

Double quotes (or speech marks),	character code = 34	(")
Lower case i	character code = 105	(i)
Lower case o	character code = 111	(o)
Comma	character code = 44	(,)
Carriage Return	character code = 13	(CR)
Line Feed	character code = 10	(LF)

The VX Router will interpret the Restrictive Switching Table (csv file) during the boot-up. Any errors that occur during the Restrictive Switching Table interpretation process will be logged in the messages file at the following location:
var/log/messages

It is recommended that the messages file be reviewed and any errors in the Restrictive Switching Table be corrected before implementing multiple levels of security classification domains on the same VX Router. It is also recommended that Restrictive Switching be fully tested before implementing multiple levels of security classification domains on the same VX Router.

The VX40 Router is actually a single 80 by 80 matrix switch, so it requires 1 table having up to 160 rows. The table lists the priority levels of input ports 1-80 and output ports 1-80. Any input or output ports that are not listed in the table will default to a priority of 1.

The VX160 Router contains a single 160 by 160 matrix switch for the Upstream to Downstream switching paths and another 160 by 160 matrix switch for the Downstream to Upstream switching paths. The first table lists priority levels of Upstream input ports 1-160 and Downstream output ports 1-160. The second table lists priority levels of Downstream input ports 1-160 and Upstream output ports 1-160. Any input or output ports that are not listed in the tables will default to a priority of 1.

The VX320 Router contains a single 320 by 320 matrix switch located in the Upper Card Cage and another 320 by 320 matrix switch located in the Lower Card Cage. The first table lists priority levels of Upper Card Cage input ports 1-320 and Upper Card Cage output ports 1-320. The second table lists priority levels of Lower Card Cage input ports 1-320 and Lower Card Cage output ports 1-320. Any input or output ports that are not listed in the tables will default to a priority of 1.

The Restrictive Switching Table file for the VX40 Router is stored on the Controller card (SD card) at the following location:
var/local/vxrouter/restrict/upstream.csv

The Restrictive Switching Table files for the VX160 Router are stored on the Controller card at the following location:
var/local/vxrouter/restrict/upstream.csv
var/local/vxrouter/restrict/downstream.csv

The Restrictive Switching Table files for the VX320 Router are stored on the Controller card at the following location:
var/local/vxrouter/restrict/upstream.csv
var/local/vxrouter/restrict/downstream.csv

Restrictive switching is disabled when Restrictive Switching Table files are removed. By default, when there are no Restrictive Switching Table files, all input and output ports will have a priority of 1. All VX Routers are shipped without Restrictive Switching Table files stored on the Controller card and therefore do not restrict any connection.

 **Note: When using a Back-up Controller configuration, both controllers must have the same Restrictive Switching Table file(s).**

Administration Access

There are only two methods by which the administrator can access the VX Router Controller Configurations:

1. Using the serial console directly connected to the VX Router.

   It should be noted that while no administrator password is required to use the serial console, physical access to the router is required, therefore the router should be stored in a physically secure location to avoid unauthorized access which may lead to the router being placed in an insecure state.
2. Using SSH access

   The router allows SSH connections to the router for management purposes. SSH sessions are authenticated using an encrypted password file.

   Password Security

   For security purposes, the router defaults to using the Message-Digest Algorithm (MD5) and shadow passwords. It is highly recommended that you do not alter these settings. If you select the older Data Encryption Standard (DES) format, passwords are limited to eight alphanumeric characters (disallowing punctuation and other special characters) and provides a modest 56-bit level of encryption. The single most important thing a you can do to protect the router is create a strong password, which make it less susceptible to a password cracking attack.

   Creating Strong Passwords:

   The password is limited to 127 characters and cannot contain a space.

   Make the Password At Least Eight Characters Long. The longer the password is, the better. If you are using MD5 passwords, it should be 15 characters long or longer. With DES passwords, use the maximum length eight characters.
   Mix Upper and Lower Case Letters. Passwords are case sensitive, so by mixing cases, you will enhance the strength of the password.

   Mix Letters and Numbers. Adding numbers to passwords, especially when added to the middle (not just at the beginning or the end), can enhance password strength.

   Include Non-Alphanumeric Characters. Special characters such as &, $, and > can greatly improve the strength of a password.

Secure Application Examples

The Diagram shows the VX40 Matrix Router in a secure application. The highly secure components are described as the Red Network and the other lower security components are described as the Black Network. The Red Network containing the computers (sources) are shown in a physically secure environment along with the VX Router, the computer server used to manage the Router, and the Network Hub. The Network Hub is a dedicated network that is only used to connect the VX Router to the computer server. This dedicated network does not connect to any other components and does not extend beyond the physically secure environment. The dedicated network connection could be replaced by a direct serial connection (RS-232) between the VX Router and the computer server.

Note that the VX Router and the computer server used to manage the Router must be protected according to the highest security classification of any component in the entire network application.

Also Note that the optical connections and DESTINATION receiver designated as Red Network must be physically secure.

The VX Router can be configured to prevent accidental connection from the Red Network to the Black Network using the Restrictive switching feature. For example, the VX40 Matrix Router Network Diagram should be configured with the following csv file:

```
I,1,2
I,2,2
O,2,2
I,42,2
O,41,2
O,42,2
I,5,1
O,5,1
I,45,1
O,45,1
```

So that the following connection rules will apply:

SOURCE 2 can be connected only to DESTINATION 2.
SOURCE 1 can be connected to both DESTINATION 1 and DESTINATION 2.

The configuration of the VX Router should be reviewed on a regular basis to ensure that the configuration continues to meet the organizational security policy in the face of the following:

•Changes in the VX Router configuration

•Changes in the organizational security policy

•Changes in the threats presented from the untrusted network interfaces

•Changes in the administration and operation staff or the physical environment of the VX Router application

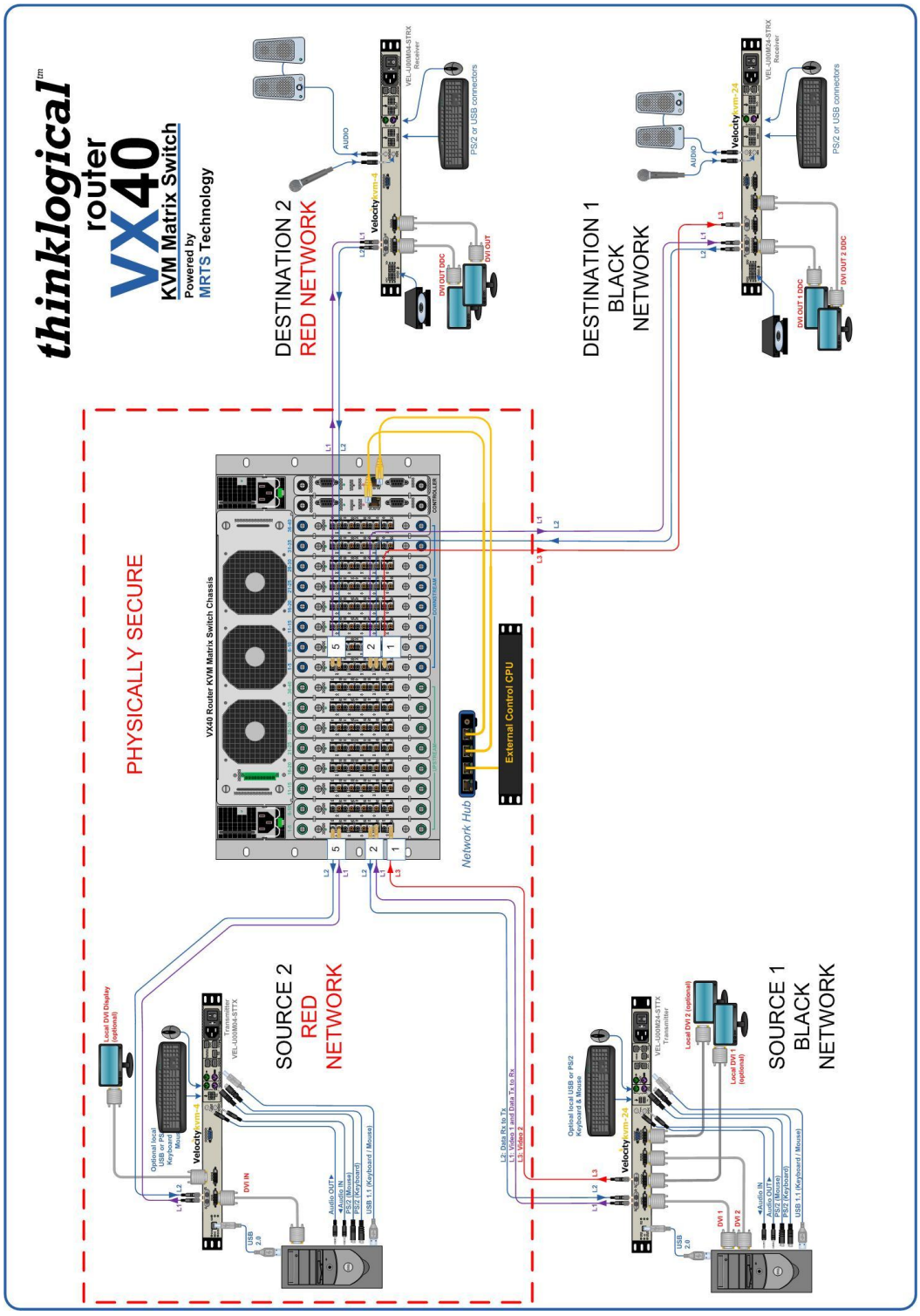


Figure 38: VX40 Secure Application

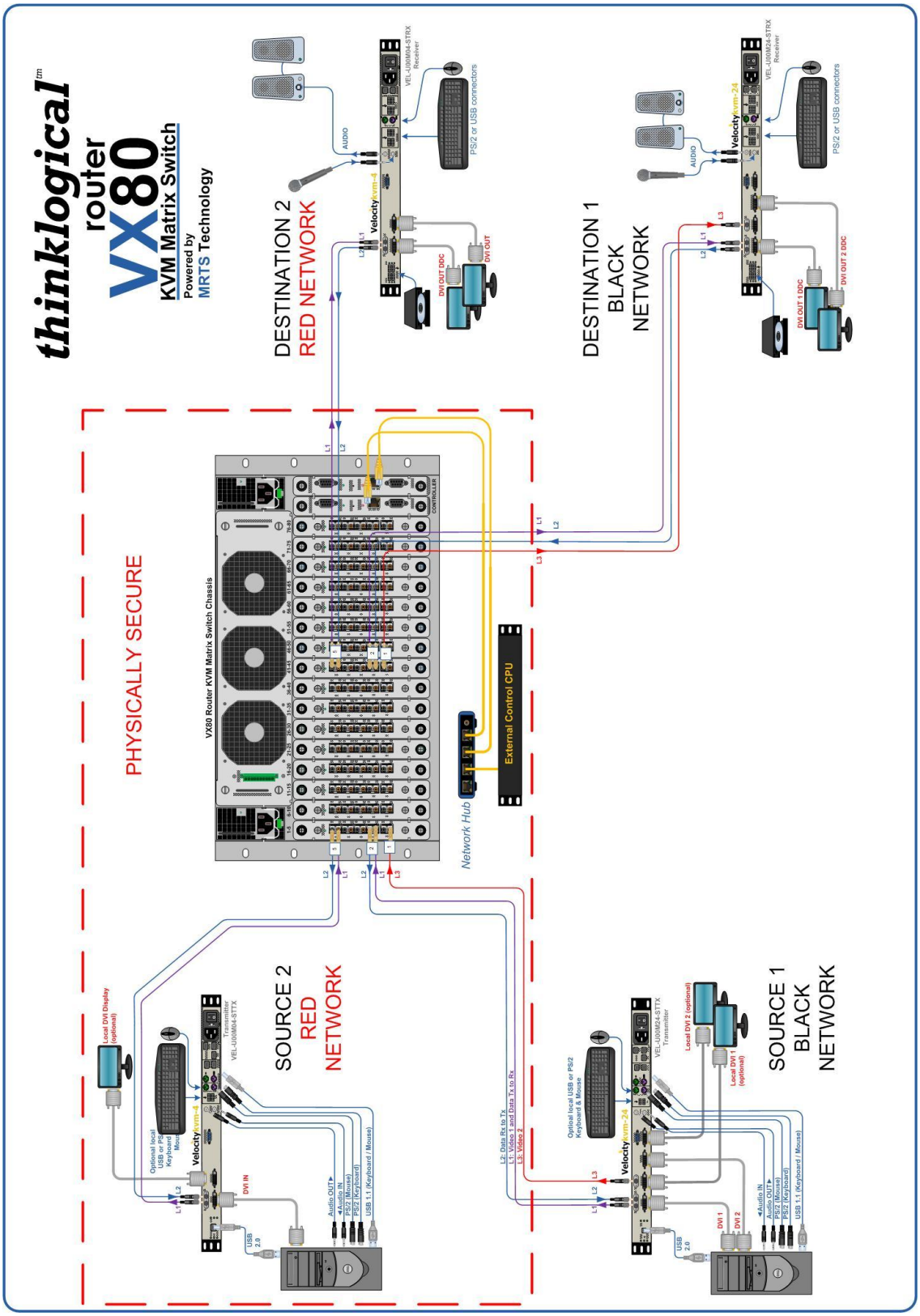


Figure 39: VX80 Secure Application

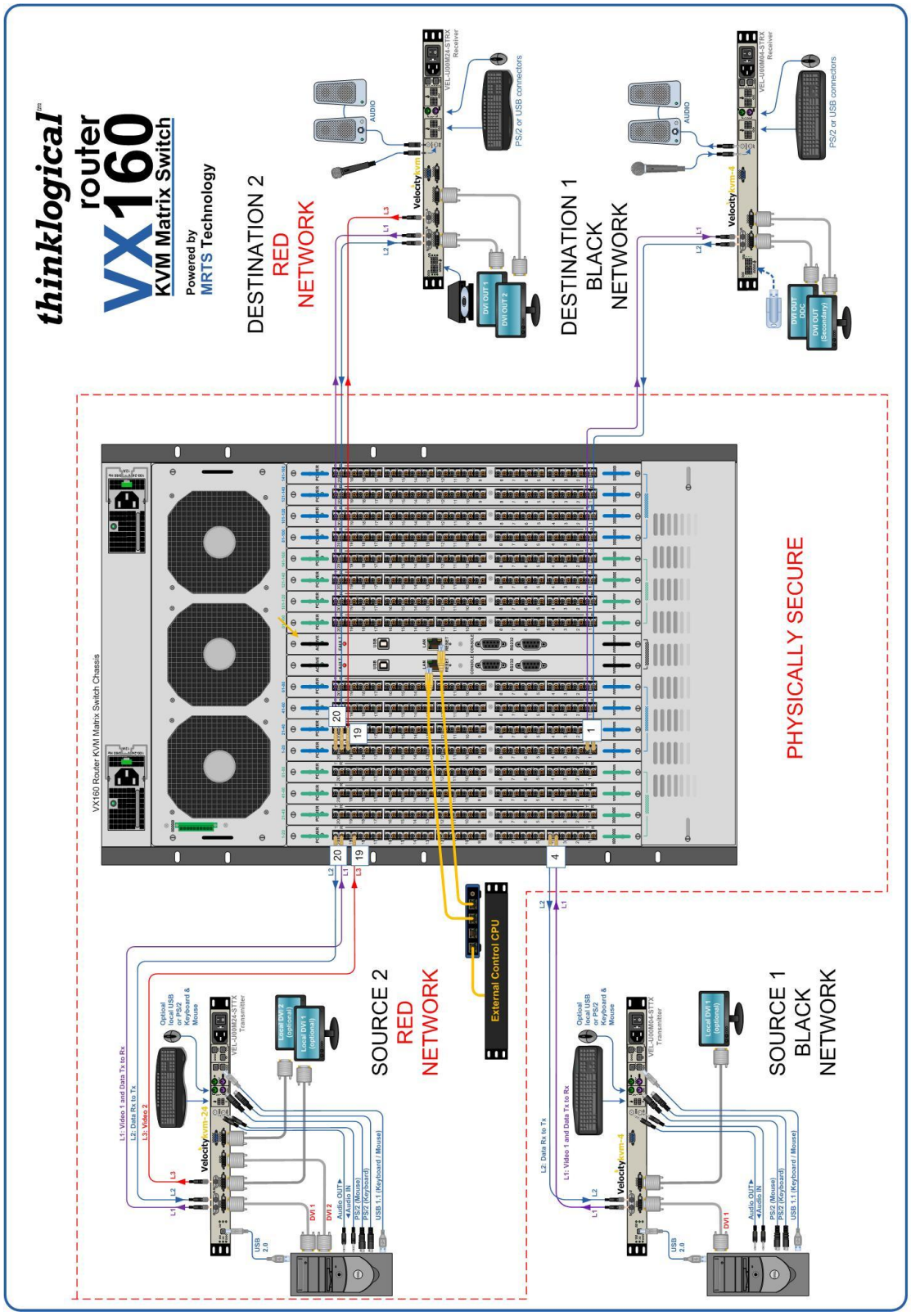


Figure 40: VX160 Secure Application

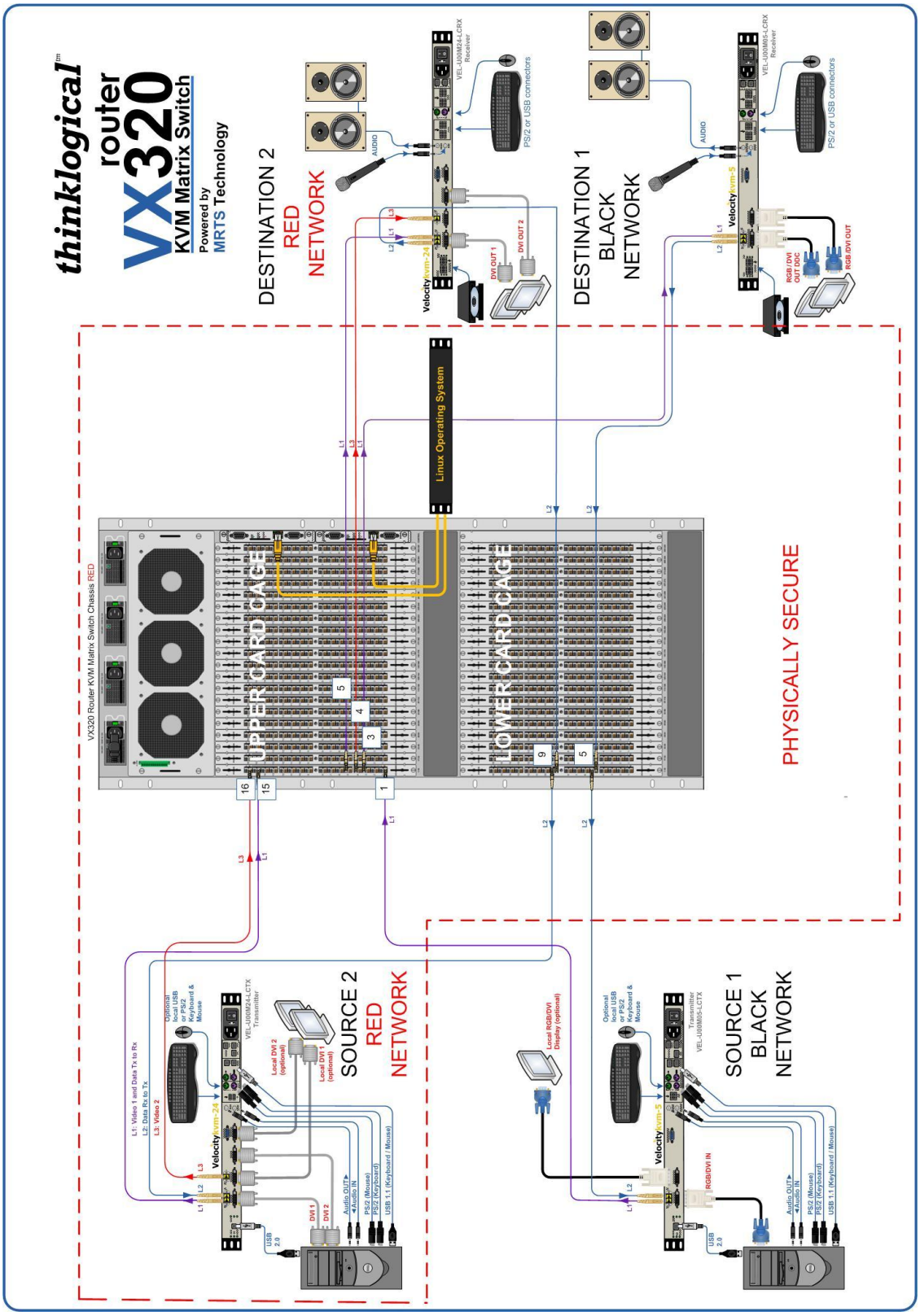


Figure 41: VX320 Secure Application

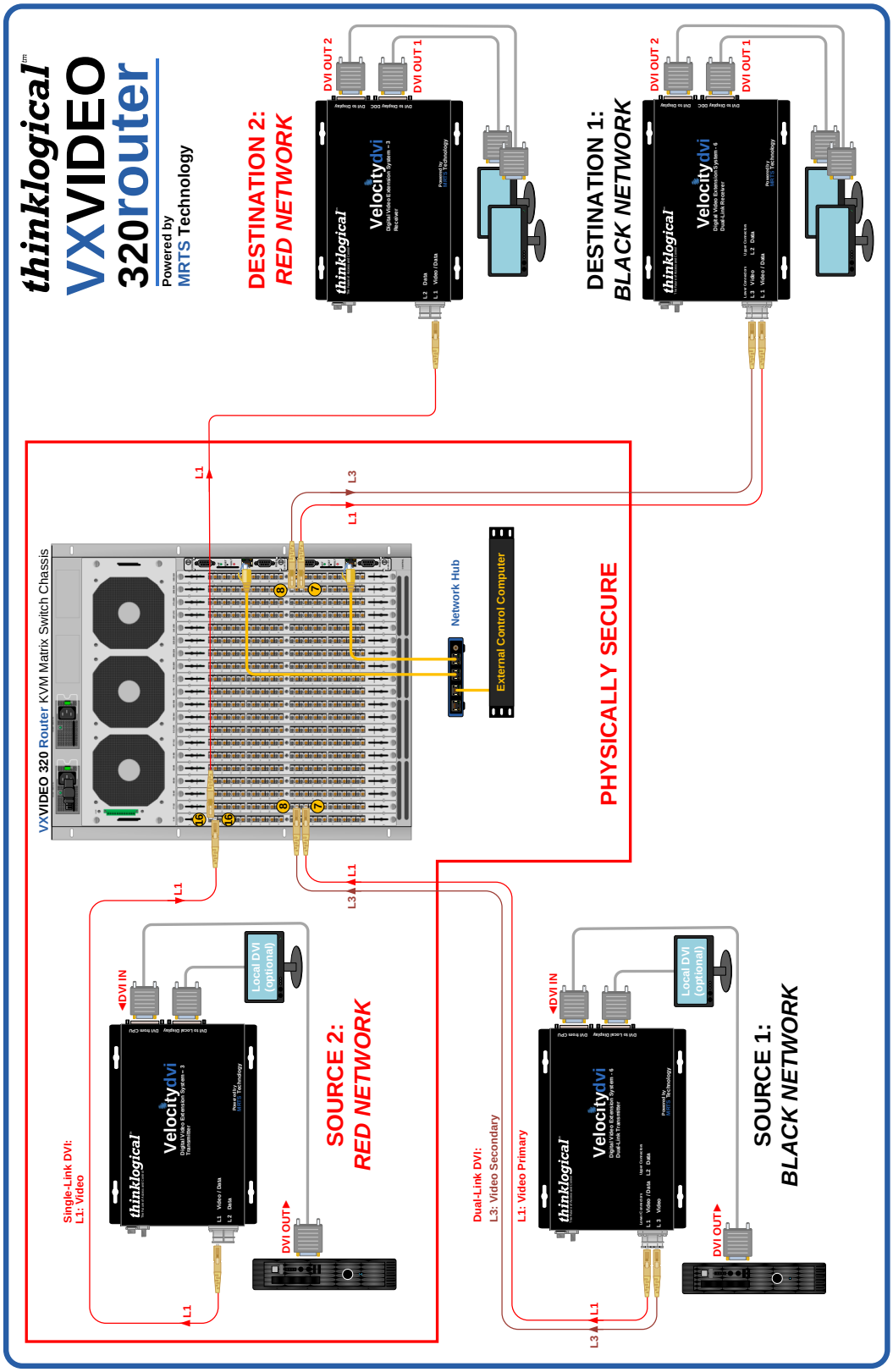


Figure 42: VX320 Video Secure Application

Appendix E: X4 Configurator Software

The X4 Configurator Software allows for easy and intuitive setup and control of the switching between source computer or video entities and user display destinations such as desktops, theaters, conference rooms, editing suites, control consoles, video walls, biomedical imaging arenas, satellite mapping, etc. In addition, single video sources may be multi-cast (one to more than one) or broadcast (one to all) to desired destinations. Additionally, macro presets may be created for saving and recalling commonly used input and output ties.

 **Note: The VX Router line can also be controlled via an ASCII interface. There is an additional manual for the ASCII Interface found on our website or available upon request (VxRouter-ASCII-API)**

Controlling the VX Router(s) with the X4 Configurator software requires an external Control Computer. This computer may be configured to fit in with your facility's exisiting network, but VX Routers require static IP addresses. If your facility will not allow static IP addresses on its own network, then it may be necessary for the Control Computer to have two network cards- one for the facility interface, and an additional one for controlling the routers. Router information is stored by IP Address so it should not change. A web browser is used to manage the VX Router(s).

One or more VX Routers can be controlled via a web-based software package running on a Control Computer running Microsoft Windows or Linux.

Installation, Linux:
The Linux installation is automatic and allows few options.

Installation, Windows:
There are options available during the Windows installation. If, for example your Windows machine already has Python and the pyWin extensions installed, then the first two checkboxes can be unchecked as they are for installing (or unnecessarily reinstalling) those packages.

The install process also asks if the configuration files should be available to just you or to all users. This determines where the configuration files will be placed.

Install Python2.6 _____ (unnecessary if previously installed)
Install Python win32 extension _____(unnecessary if previously installed)
Create LSI/X44 Directory Tree _____(leave checked)
Install X44 Configurator Programs _____(leave checked)
Install X44 Default Configuration Files _____(leave checked)
Create X44 Configurator Service _____(leave checked)
Start X44 Configurator Service _____(leave checked)

After installation (which also starts the web server as a Windows service), open a browser and set the URL to the address of the server machine. Once the network(s) are configured and the control software is running, the control pages can be accessed from any connected client PC by

starting a browser and setting the URL to the name/address of the control server as set by the network administrator.

The user will be greeted with the following login screen:

Figure 43: X4 Configurator Log In Screen

The installation software includes two default accounts as show below. Please log in using admin for first time set up.

Username:	**admin**	**Password:**	**admin**
Username:	**user**	**Password:**	**user**

The first step should be to tell the server about the router. To do this, click the “ADMIN” link (at the top) and the the “ROUTER” tab, and the router page will load.

There are six (6) fields in the page. The first is the name of the router, and this can be whatever is appropriate for your installation. (It is best to avoid punctuation.)

Using alternate stations files from the Thinklogical ftp site:

There are additional stations files available for some of the more common applications. These have names like “VX40 SingleHead.csv”, “VX40 DualHead.csv”, “VX320V QuadHead.csv”, etc.

If one of these would be helpful for your installation, download the file, rename it to “stations.csv”, and copy it into the setup directory for your server (replacing the existing file).

Next, use your browser to access the ADMIN page, ROUTER tab to make sure the type and name of the router match the router type and name found in the newly installed stations file. Press the SAVE button, and your new stations file will be active and available in the CONNECT or STUDIO pages.

NOTE- There is a HELP tab located on each page. This tab will provide you with version information as well as information on the specified page.

CONNECTIONS

When logged in, you will land on the Connections page. This page displays destinations on the left side of the screen and sources on the right. These settings can be changed to meet your preferences.

To make a Connection
a. Click a source to select it
b. Click one or more destinations to make connections

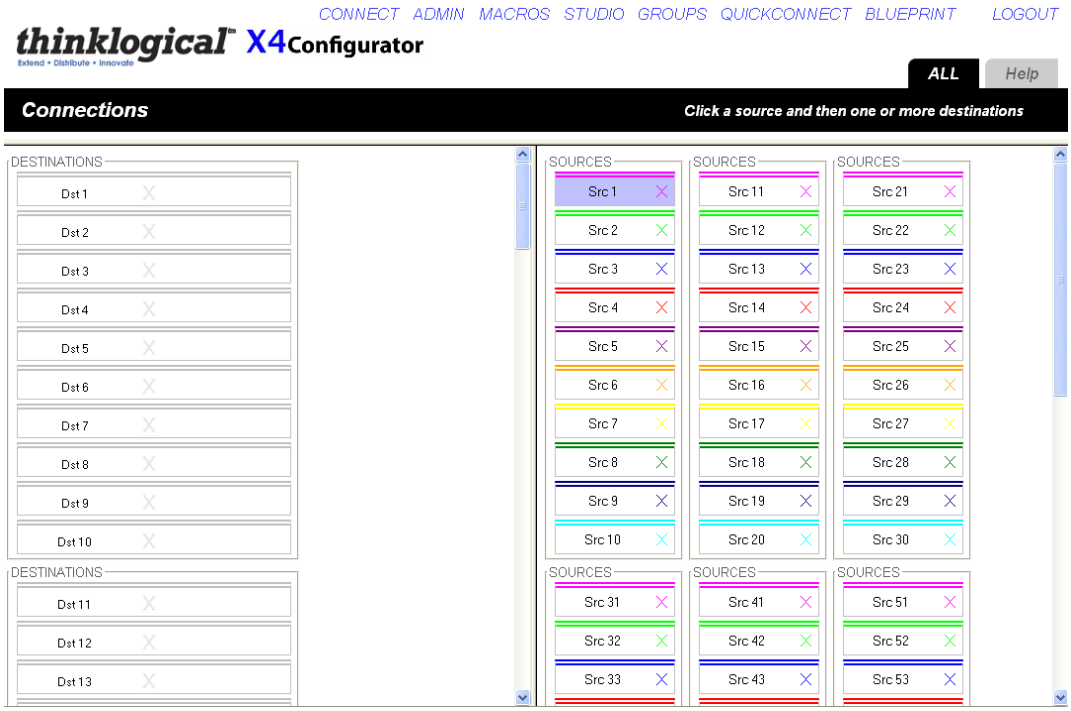


Figure 44: PC 01 has been selected as a source

A connection is made when the name of the source appears in half of the destination box, and the 'X' becomes the same color as the stripe(s) above the source. Many additional destinations can be clicked and connected to the same source. When using sources that have keyboard and mouse (L2) only the first destination connected will have control of the keyboard and mouse, but all connected destinations will be able to see the same video. When L2 is used X4 GUI will make a connection in each direction. For example connecting Src1 to Dst2 will invoke both connection 1 to 2 for the video (L1) and 2 to 1 for the keyboard/mouse (L2).

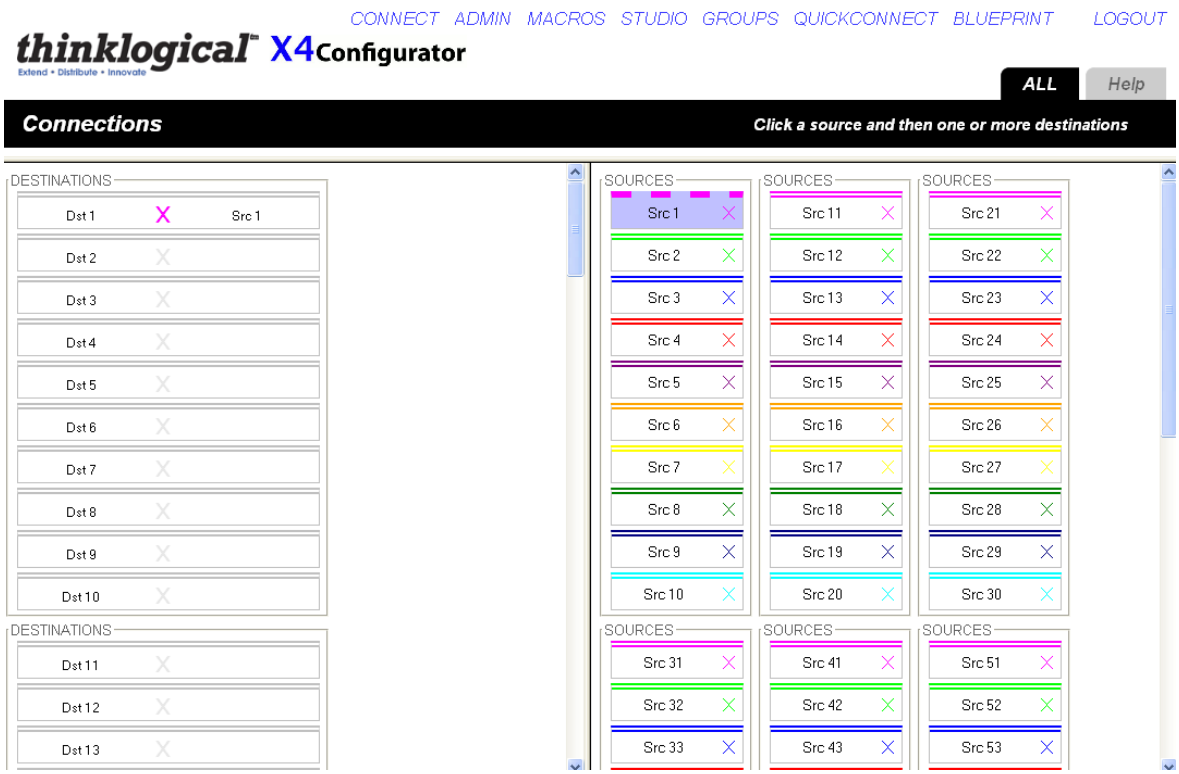


Figure 45: Source PC01 has been connected to Destination DESK 01

To “take” control of the keyboard and mouse on a different connection right click mouse and select “Take Mouse” (View and Share functions). You will be able to tell that the keyboard mouse connection has been switched when the mouse icon appears next to the source.

Figure 46: Take Control of keyboard and mouse

To disconnect a source from a destination you simply click the 'X' on the destination to break the connection.

ADMINISTRATION

When logged in as administrator you use the ADMIN link from the top of the browser window to load the ADMIN page and edit:

a. Stations
b. Groups
c. Router
d. Macros
e. Snapshots

From the ADMIN page you can also access the “Tests” functions and/or view “Help” information on whichever page is current.

NOTE- There is a "Backup" button located on each page that will save a backup file to your desktop for all the current settings. This will allow you to revert to previous settings by reverting to saved files.

You can alternately edit all of the configuration files using a spreadsheet program or text editor. All the files are in .csv format and their locations are described below. Changes made will be automatically updated on the web interface when they are saved.

Configuration Files

The VX family of switches uses .csv formatted spreadsheet files as configuration files. Every configuration file used to setup the web interface has the extension “.csv” for “comma separated values” and can be viewed, modified, and saved using most modern spreadsheets (Microsoft Excel, OpenOffice Calc, GNUmeric, etc.).

The three (3) most important configuration files are found in X44/setup/ and are named: *groups.csv*, *router.csv*, and *stations.csv* .

Linux:
When running in Linux, these files will be found in:
`/opt/lsi/vxrouter/intuicon/X44/setup/`

Windows7:
If during installation you selected to make it available to all users, then the configuration files will be found in: `\ProgramData\LSI\X44\setup\`

If installed for just one user, the files are in:
`\Users\<user's name>\AppData\Roaming\LSI\X44\setup`

WindowsXP:
If the installation was performed for all users, the configuration files will be found in:
`C:\Documents and Settings\All Users\Application Data\LSI\X44\setup`

If installed for one user:
`C:\Documents and Settings\<user's name>\Application Data\LSI\X44\setup`

STATIONS

Stations are descriptions of signal sources or display devices that should be treated as a single entity. A computer is an example of a source station, and the monitor(s), keyboard, and mouse at a user's desk is one example of a destination station.

For example: A computer can have multiple video outputs that will most often be connected to multiple monitor's at the user's desk, so in this case we could say that the "source station" (computer) has two or more "ports". Similarly, a "destination station" might have multiple "heads" (monitors) and each monitor will be connected through its extender to output ports on the switch.

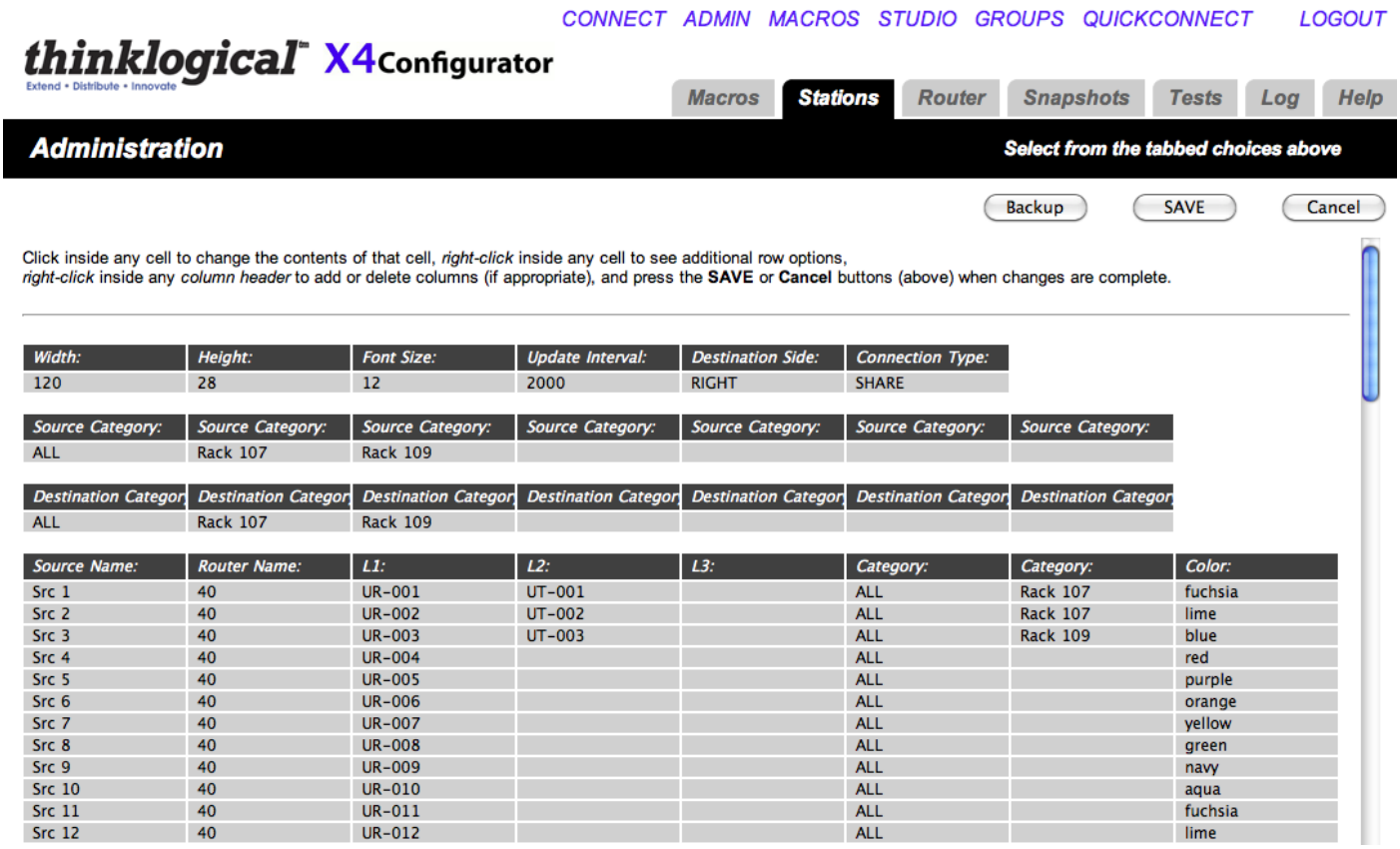
Some stations may need to be protected from accidental (or malicious) connections and disconnections by unauthorized users. To facilitate this, each station has one or more fields used to specify which "groups" (collections of users) can see and control that station.

A station needs: a name, one or more ports within a switch chassis, and some way to determine who has access to the station ("Viewable").

In addition, sources can have different colored stripes across the top to help make connections easier to see. When a destination is connected to a source, the "X" that separates the destination from its active source is given the same color as that assigned to the source. If a connected destination or source has the cursor over it, the stripes at the top of the source and all the destinations connected to it will become thicker and turn the color of that source to make connections easier to discern at a glance.

stations.csv This file creates sources and destinations and determines which router ports are part of which stations.

To view and edit the stations.csv file using web access, set your browser's URL to the web server and select "*ADMIN*" from the links at the top and then "*STATIONS*" from the tabs on the *ADMIN* page.



CONNECT ADMIN MACROS STUDIO GROUPS QUICKCONNECT LOGOUT

thinklogical X4Configurator

Extend • Distribute • Innovate

Macros | Stations | Router | Snapshots | Tests | Log | Help

Administration — Select from the tabbed choices above

Backup | SAVE | Cancel

Click inside any cell to change the contents of that cell, *right-click* inside any cell to see additional row options,
right-click inside any *column header* to add or delete columns (if appropriate), and press the **SAVE** or **Cancel** buttons (above) when changes are complete.

Width:	Height:	Font Size:	Update Interval:	Destination Side:	Connection Type:
120	28	12	2000	RIGHT	SHARE

Source Category:	Source Category:	Source Category:	Source Category:	Source Category:	Source Category:	Source Category:
ALL	Rack 107	Rack 109				

Destination Categor	Destination Categor	Destination Categor	Destination Categor	Destination Categor	Destination Categor	Destination Categor
ALL	Rack 107	Rack 109				

Source Name:	Router Name:	L1:	L2:	L3:	Category:	Category:	Color:
Src 1	40	UR-001	UT-001		ALL	Rack 107	fuchsia
Src 2	40	UR-002	UT-002		ALL	Rack 107	lime
Src 3	40	UR-003	UT-003		ALL	Rack 109	blue
Src 4	40	UR-004			ALL		red
Src 5	40	UR-005			ALL		purple
Src 6	40	UR-006			ALL		orange
Src 7	40	UR-007			ALL		yellow
Src 8	40	UR-008			ALL		green
Src 9	40	UR-009			ALL		navy
Src 10	40	UR-010			ALL		aqua
Src 11	40	UR-011			ALL		fuchsia
Src 12	40	UR-012			ALL		lime

Figure 47: View of Stations on the Administration Page

The first set of rows are for global values that will apply to all the stations and browsers. These include the width, height, and font size for the on-screen icons that represent the stations. The interval (in milliseconds) between browser updates and the type of connection are also global values.

The ***connection type*** setting in the stations.csv file deserves additional detail: Connections are made on the connect page, which represents sources and destinations as individual boxes on opposite sides of the screen. Connections are made by clicking a source to select it and then clicking one or more destinations. The connection type determines how these connections are made.

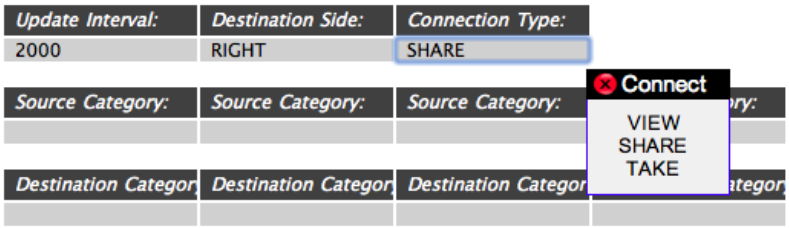


Figure 48: Connection Type Setting

- *VIEW* will cause the newly clicked destination to be fed by the currently selected source in addition to any previously connected destinations. If the source has a back channel for keyboard/mouse control, then only the first destination connected will have control of the keyboard/mouse. All additional destinations will see the video (if there is any), but only the first will control the CPU.

- *SHARE* is much like VIEW, except the last destination connected will have the keyboard/mouse instead of the first. This allows rapid switching of keyboard/mouse control among multiple destinations which is particularly valuable during collaborative work.

- *TAKE* is the final connection type. In the case of a TAKE style connection, only the last destination connected to a source will have both video and keyboard/mouse. Any existing video connections between the selected source and other destinations will be lost so that only the last destination connected will have video from and keyboard/mouse to the source.

Source Category and Destination Category

In the STUDIO page, only a small subset of the sources and destinations can be seen at a single time. Source and destination categories segment the sources and destinations into smaller, more manageable collections. While the CONNECT page allows all the sources to be seen in the same window (with scrolling when necessary), it still makes good sense to separate the stations into smaller related categories to organize the available stations.

To create a category, add the chosen name to the rows with headers titled “Source Category” and “Destination Category”. This will insure that a tab (on the CONNECT page) or a button (on the STUDIO page) will be visible. Adding stations to the categories will be covered in the next section.

The next collections of rows are where the administrator will spend most of their configuration time. The headers for the source stations will have (at least) columns for “Source Name”, ”Router Name”, one or more headers with names ranging from “L1” to “L5”, one or more “Category” headers, and “Color”.

Source Name:	Router Name:	L1:	L2:	L3:	Category:	Category:	Color:
Src 1	40	UR-001	UT-001		ALL	Rack 107	fuchsia
Src 2	40	UR-002	UT-002		ALL	Rack 107	lime
Src 3	40	UR-003	UT-003		ALL	Rack 109	blue
Src 4	40	UR-004			ALL		red
Src 5	40	UR-005			ALL		purple
Src 6	40	UR-006			ALL		orange
Src 7	40	UR-007			ALL		yellow
Src 8	40	UR-008			ALL		green
Src 9	40	UR-009			ALL		navy
Src 10	40	UR-010			ALL		aqua
Src 11	40	UR-011			ALL		fuchsia
Src 12	40	UR-012			ALL		lime

Figure 49: Required Station Headers

Required Headers:

- *Source Name*: This is the name that will appear in the CONNECT and STUDIO screens, and it is also the name that macros will use in connect and disconnect steps.

- *Router Name*: The web server can support multiple VX routers, and a station may span more than one router (perhaps with video on one, data on another). Each router name applies to the port names that follow it until another router name is encountered.

- *L1* through *L5*: The port names below these headers become part of the station. New columns can be added by right-clicking on an existing L column header and selecting “Append” from the drop down menu.

- *Category*: As described previously, categories are subsets of the stations. These let stations be grouped together according to the administrator’s wishes. Each station can belong to multiple categories. New category columns can be added by right-clicking on the Category: header and selecting “Append” from the drop down menu.

- *Color (only found in the Source rows)*: In the “CONNECT” screen, each source icon has a stripe and an “X” whose color is assigned by the “color” field. When a connection is made between source and destination, the name of the source will appear in the destination and the X inside the destination will become the same color as the source’s.

Deleting Unused Columns:

Some columns are not always used. If, for example, the switch will only be serving single headed sources and destinations, then only L1 (first video) and L2 (data/keyboard/mouse) are required and L3 (second video) is unnecessary. To clean up the spreadsheet, right click the L3 header and select “Delete” from the drop down menu, and then confirm your choice. The L3 column will be removed.

Source Name:	Router Name:	L1:	L2:	L3:	Category:	Category:	Color:
Src 1	40	UR-001	UT-001		Column	Rack 107	fuchsia
Src 2	40	UR-002	UT-002		Append	Rack 107	lime
Src 3	40	UR-003	UT-003		Delete	Rack 109	blue
Src 4	40	UR-004			ALL		red
Src 5	40	UR-005			ALL		purple
Src 6	40	UR-006			ALL		orange
Src 7	40	UR-007			ALL		yellow
Src 8	40	UR-008			ALL		green
Src 9	40	UR-009			ALL		navy
Src 10	40	UR-010			ALL		aqua
Src 11	40	UR-011			ALL		fuchsia
Src 12	40	UR-012			ALL		lime

Figure 50: Deleting Unused Column

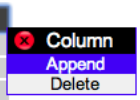
Optional Columns:

- *Viewable*: This column is necessary whenever non-admin user groups are used. Each station, source or destination, is by default hidden from all groups except the admin. To make a station viewable to a group, the group's name must appear in the "Viewable" column on the station's row. This column is created by right-clicking the header for the last column and selecting "Append" from the drop down menu, and then clicking the header in the new column and selecting "Viewable" from the drop down menu. Multiple "Viewable" columns can be added and used so stations can be seen by multiple groups.

- *Takeable*: This column is used in special situations where the ability of one group to take control of a station's keyboard/mouse must be restricted. Only groups whose name is in the takeable column can take the keyboard/mouse from an existing user. This column is created by right-clicking the header for the last column and selecting "Append" from the drop down menu, and then clicking the header in the new column and selecting "Takeable" from the drop down menu. *(*Note: In practice, the Takeable column is almost never needed.)*

Adding Viewable and/or Takeable Columns:

Source Name:	Router Name:	L1:	L2:	Category:	Category:	Color:
Src 1	40	UR-001	UT-001	ALL	Rack 107	fuchsia
Src 2	40	UR-002	UT-002	ALL	Rack 107	lime
Src 3	40	UR-003	UT-003	ALL	Rack 109	blue
Src 4	40	UR-004		ALL		red
Src 5	40	UR-005		ALL		purple
Src 6	40	UR-006		ALL		orange
Src 7	40	UR-007		ALL		yellow
Src 8	40	UR-008		ALL		green
Src 9	40	UR-009		ALL		navy
Src 10	40	UR-010		ALL		aqua
Src 11	40	UR-011		ALL		fuchsia
Src 12	40	UR-012		ALL		lime

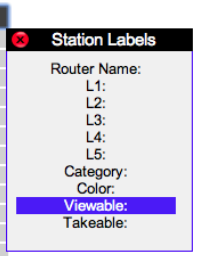


Right click on last column header and select "Append"...

Source Name:	Router Name:	L1:	L2:	Category:	Category:	Color:	Color:
Src 1	40	UR-001	UT-001	ALL	Rack 107	fuchsia	
Src 2	40	UR-002	UT-002	ALL	Rack 107	lime	
Src 3	40	UR-003	UT-003	ALL	Rack 109	blue	
Src 4	40	UR-004		ALL		red	
Src 5	40	UR-005		ALL		purple	
Src 6	40	UR-006		ALL		orange	
Src 7	40	UR-007		ALL		yellow	
Src 8	40	UR-008		ALL		green	
Src 9	40	UR-009		ALL		navy	
Src 10	40	UR-010		ALL		aqua	
Src 11	40	UR-011		ALL		fuchsia	
Src 12	40	UR-012		ALL		lime	

New column is added with same header name.

Source Name:	Router Name:	L1:	L2:	Category:	Category:	Color:	Color:
Src 1	40	UR-001	UT-001	ALL	Rack 107	fuchsia	
Src 2	40	UR-002	UT-002	ALL	Rack 107	lime	
Src 3	40	UR-003	UT-003	ALL	Rack 109	blue	
Src 4	40	UR-004		ALL		red	
Src 5	40	UR-005		ALL		purple	
Src 6	40	UR-006		ALL		orange	
Src 7	40	UR-007		ALL		yellow	
Src 8	40	UR-008		ALL		green	
Src 9	40	UR-009		ALL		navy	
Src 10	40	UR-010		ALL		aqua	
Src 11	40	UR-011		ALL		fuchsia	
Src 12	40	UR-012		ALL		lime	



Left click on new columns header and select "Viewable".

Source Name:	Router Name:	L1:	L2:	Category:	Category:	Color:	Viewable:
Src 1	40	UR-001	UT-001	ALL	Rack 107	fuchsia	user
Src 2	40	UR-002	UT-002	ALL	Rack 107	lime	
Src 3	40	UR-003	UT-003	ALL	Rack 109	blue	
Src 4	40	UR-004		ALL		red	
Src 5	40	UR-005		ALL		purple	
Src 6	40	UR-006		ALL		orange	
Src 7	40	UR-007		ALL		yellow	
Src 8	40	UR-008		ALL		green	
Src 9	40	UR-009		ALL		navy	
Src 10	40	UR-010		ALL		aqua	
Src 11	40	UR-011		ALL		fuchsia	
Src 12	40	UR-012		ALL		lime	

New "Viewable" column now ready for user group names for stations that should be seen.

Figure 51: Adding Optional Columns

GROUPS

"Groups" are used to restrict access to stations and macros. The admin account can access any page, macro, or stations. Other collections of users - "groups" - can be defined to have their access rights strictly limited to specific assets.

groups.csv : This file determines who can use the router's web control and what they will be able to do.

Note: A user is loosely defined as an individual, and a group is a collection of users that share the same permissions and general behaviors. Each user can have a separate username and password, but once logged in the user, while still identified as an individual user, will be treated as a member of a group and will have the permissions allowed to that group.)

The groups.csv file can be edited either directly with a spreadsheet program, or from the web. To use the web browser, enter the URL for the web server in the address field and then select *GROUPS* from the blue links across the top. Only user groups that the admin has authorized can see, modify, and save the *GROUPS* page.

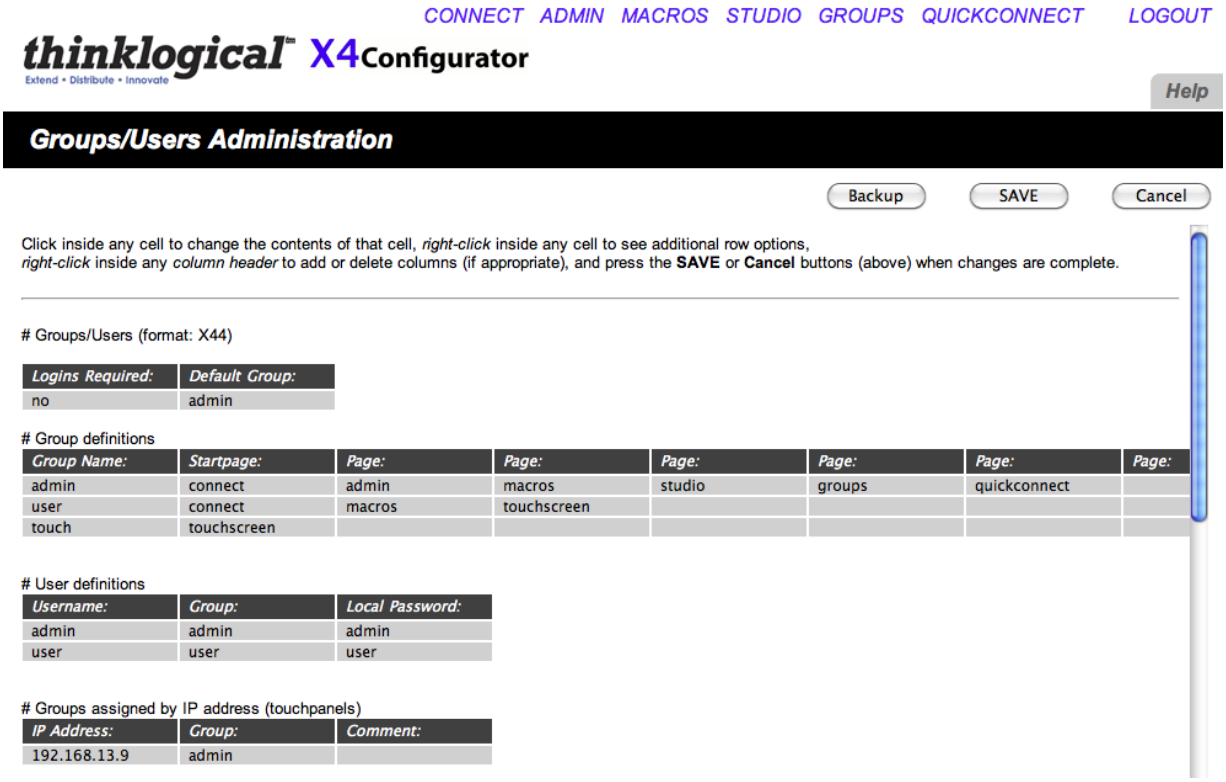


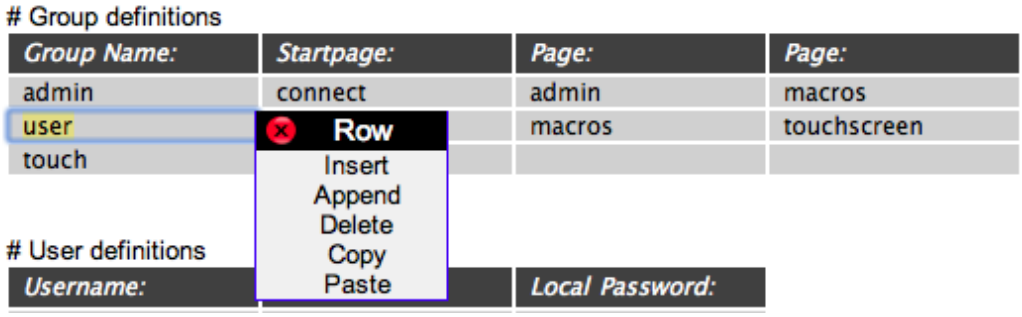
Figure 52: Columns on Groups Page

The first header of the first row is “Logins Required”. If the value beneath is “yes”, then any user attempting to access the web server via a browser will be greeted with a login screen and will not see any pages until successfully logging in. If logins are required, then the value of the next header, “Default Group”, has no meaning.

If logins are *not* required, then users accessing the web server without logging in will always be treated as the group listed beneath “Default Group”. This allows one general use group for casual users without logging in. Administrators and other users can still log in to their accounts and be part of their normally assigned groups.

The next set of lines define the groups. Each row describes a group with a “Group Name”, the “Startpage” they will first see after logging in and then any additional pages that will be available to members of that group. *(These additional pages are the blue links across the top of the pages.)*

To add a new user group, right-click any field in the row directly above where it should appear and select “Append” from the drop down menu. A new row will appear and the new group’s values should be added there.



Right click in previous row pop up the menu, and select “Append” to add a new group row.

Group definitions

Group Name:	Startpage:	Page:	Page:
admin	connect	admin	macros
user	connect	macros	touchscreen
user2	connect	macros	
touch	touchscreen		

After “Append” is selected and “user2”, a startpage, and an additional page entered.

Figure 53: Add New User Group

The next set of rows define users. Each row assigns the values for a user, including the Username, the Group that this user belongs to, and the Local Password for this user. New users can be added in the same manner that a new group was added in the example above.

The final set of rows defines a special class of users that are automatically assigned to a Group based solely on their IP address. These are most often touchpanels that may not have keyboards or sufficient resolution to let a user log in conveniently. Requests from these addresses will *always* be seen as coming from their assigned group - logins from these addresses are not possible.

This allows multiple touchpanels to be part of a common group, or each touchpanel can be an individual group so that each can see only the stations and macros allowed to that group.

The web server software is delivered with logins required set to “no” and the default group set to admin. This is to allow the installer a chance to configure the server right out of the box. After that the administrator can set more restrictive settings if necessary.

Members of the “admin” group can always see every station. Other groups must explicitly be given permissions for each station and macro.

ROUTER

The router tab loads a page that defines the physical routers that the X4 Configurator software will control. Each row describes a different router and requires values for “Router Name”, “Type”, “IP Address”, “Socket” and “Enabled”.

Where appropriate, a drop down list of choices is offered to fill in these values, but it is important that the Type, IP Address (usually 192.168.13.15), and Socket (usually 17567) match the values of the physical router.

The “Enabled” setting determines whether the server will attempt communications with that router. This value can be set to “no” when the router is not available; otherwise the server will periodically attempt to communicate with the router and will show errors. If you are having issues making connections on the router, make sure that this column is set to “Yes”.

The CREATE button will create and save a new default stations.csv file with single head stations (and no back-channel) for every source and destination port for the type of router selected. This function should be used carefully since it will replace the existing station file.

Note: When the CREATE button is used, the previous station file is temporarily saved in the directory setup/backup in case the CREATE button was used accidentally. This directory's contents are temporary and may not persist for more than a few days. If the stations.csv file is accidentally replaced, the administrator should immediately recover the lost file from the setup/backup directory and place it in the setup directory. The location of these directories is described in the previous Configuration Files section.

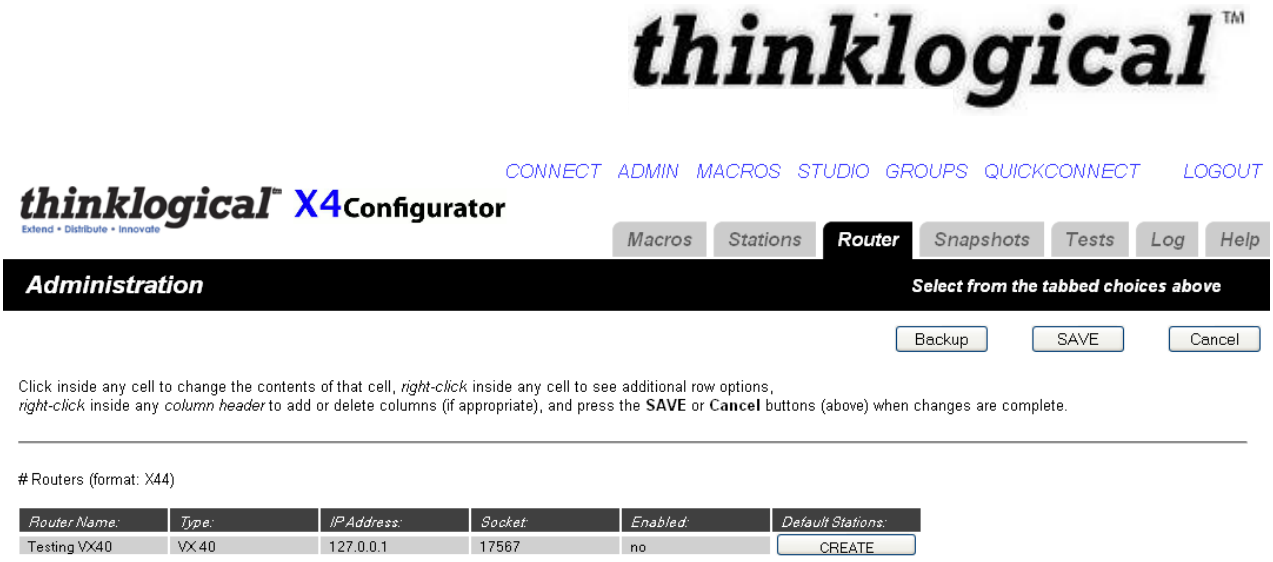


Figure 54: View of Router from Administration Page

MACROS

A macro is a sequence of operations the user can create, save, and recall to repeat steps that will be executed frequently. They can be restricted to specific user groups or made available to all.

Please note that you can also use a .csv file to create, save, edit, and delete macros directly.

To create a new macro, execute the desired commands from the CONNECT page, and then select the MACROS page and press the “Macro from History” button.

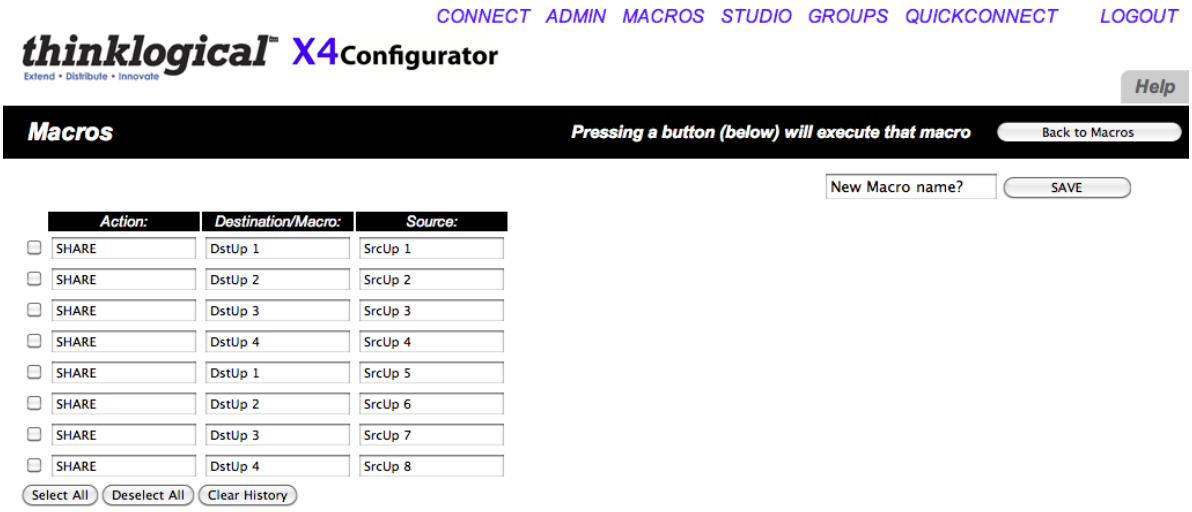


Figure 55: Create a New Macro

Select the steps that should be part of the macro and give it a name (here it’s “1-4”) and press SAVE. Once saved the Macro will appear as a new button on the MACROS page.

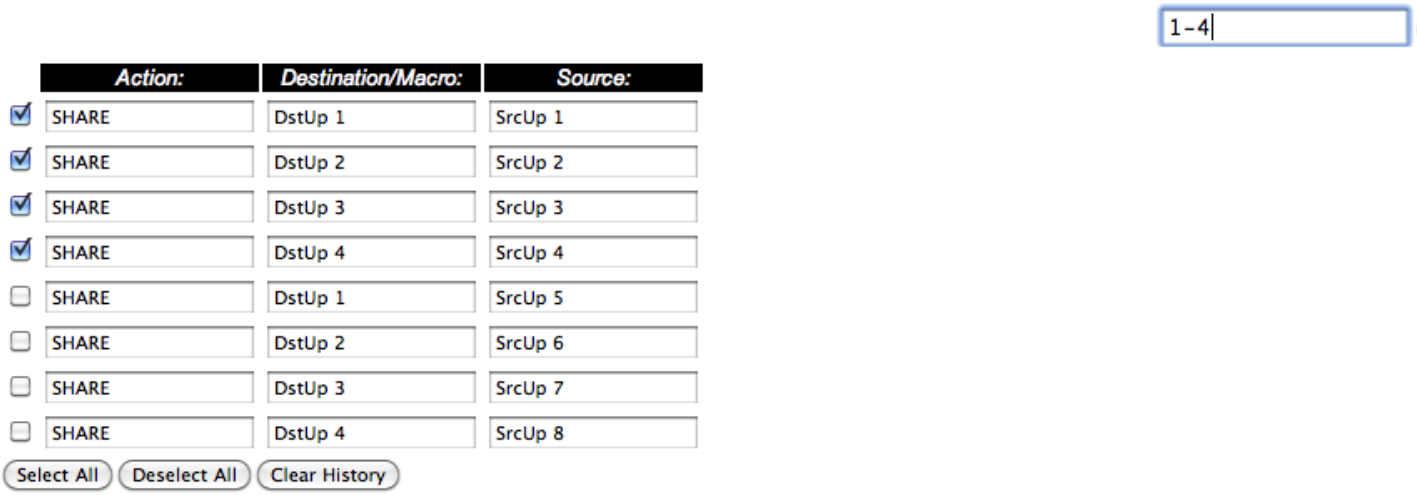


Figure 56: Select Steps for Macro

To edit a Macro, navigate to the “ADMIN” page and then select the “Macros” tab. Then, select the macro’s name from the “First Select Macro...” drop down box.

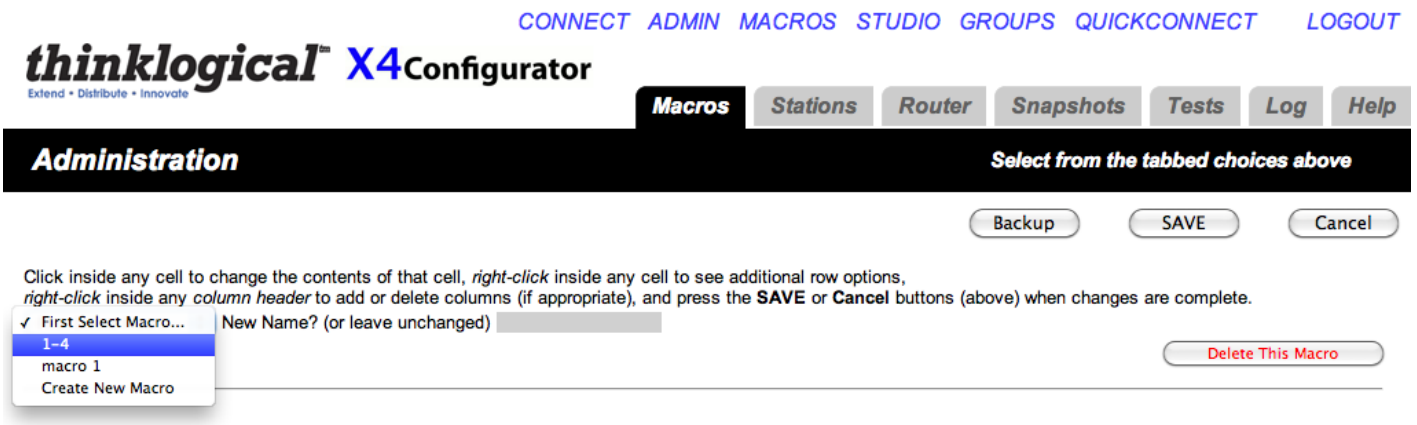


Figure 57: Selecting a Macro to Edit

Once a macro has been selected you can view and edit information about the macro.

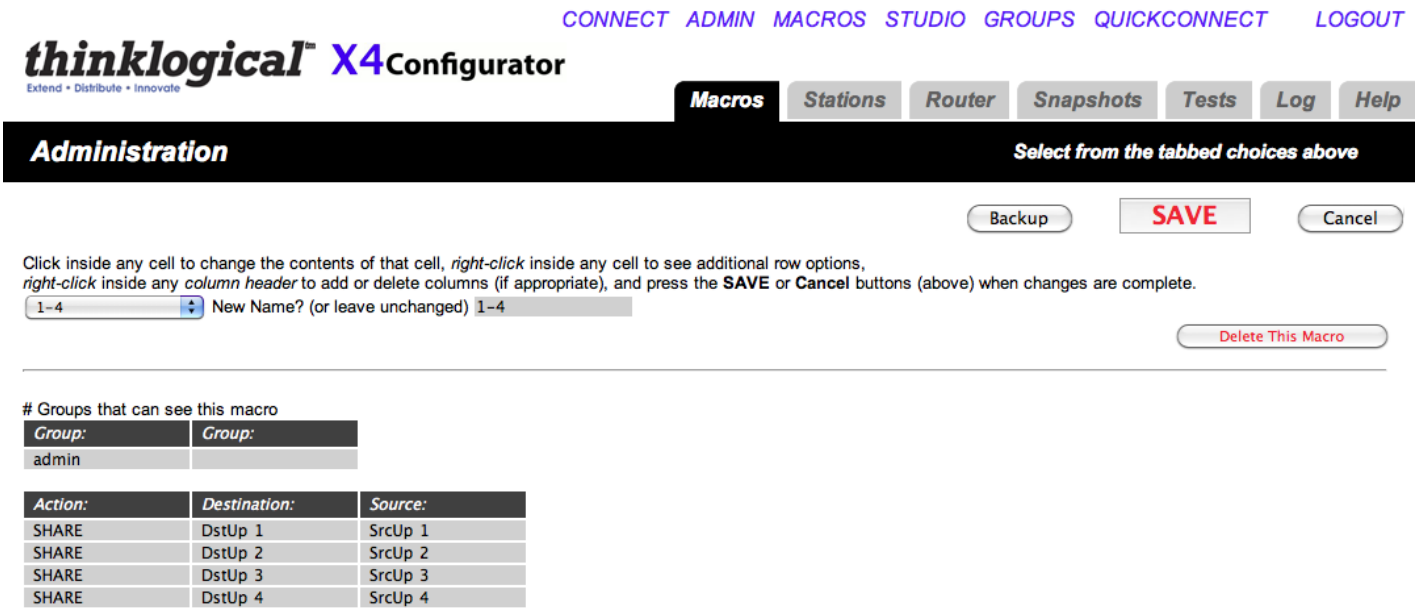


Figure 58: Editing a Macro

The “Group” rows define which user group(s) will be able to see and execute this macro.

Steps can be added or deleted by right-clicking within any element in a row. Existing steps can be modified by left clicking within the *Action*, *Destination*, or *Source* columns.

To change the name of a macro, type the changed name into the text input area to the right of the label, “New Name? (or leave unchanged), and press the “SAVE” button on the right.

To delete a macro, select it from the “First Select Macro...” pull down list and then press the “Delete This Macro” button at the far right. This step cannot be undone.

It is also possible to create new macros from the ADMIN-MACROS page.
From the “First Select Macros...” pull down menu, find and select the “Create New Macro” line (at the very bottom of the list).

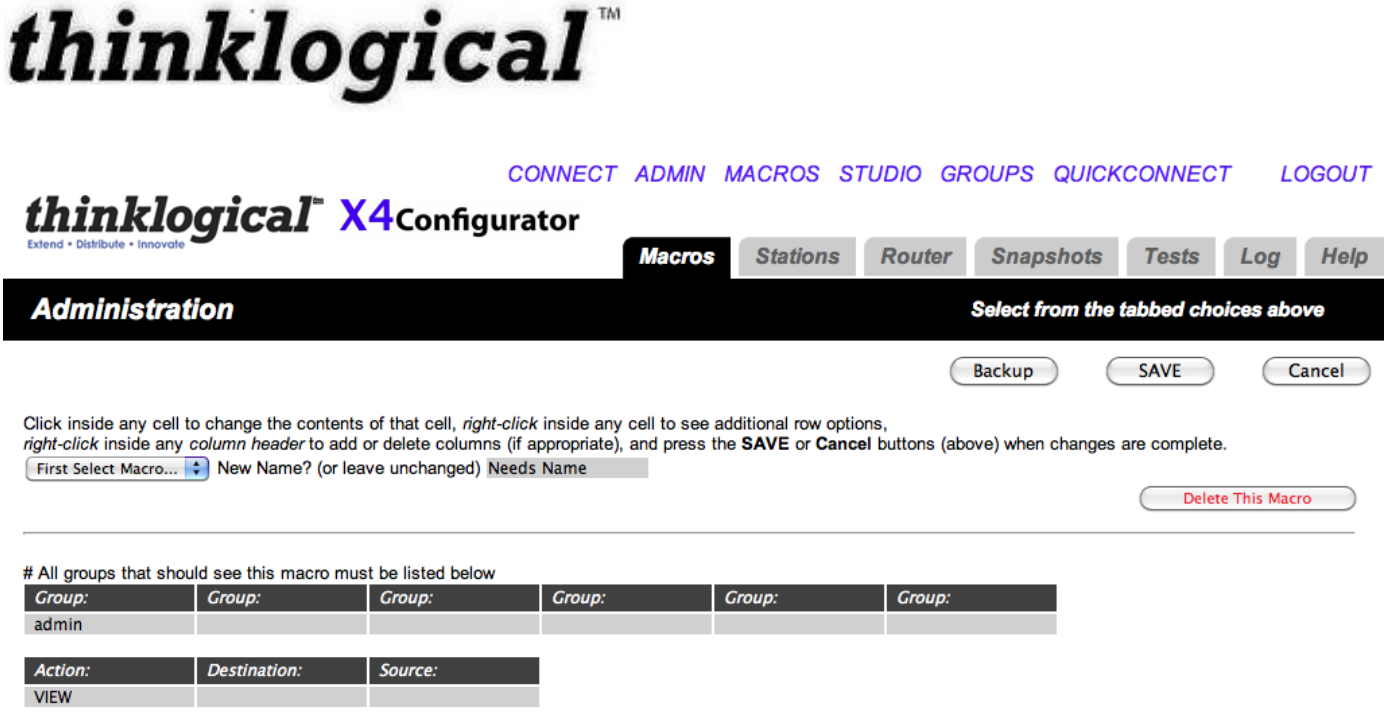


Figure 59: Create a New Macro

The recommended first step is to change the name from “Needs Name” to something more appropriate. After that, the action, destination, and source fields should be filled in with the appropriate values for the desired activity. More action rows can be added in the usual fashion (right click on the last row, select “Append” from the drop down menu, fill in the new line) until the macro contains all the actions necessary. Then press “SAVE”. The new Macro will appear on the Macros page.

TOUCHSCREENS

Please see Appendix F for configuration instructions.

TESTS

The Test tab allows you to test the port connections of a VX Router.

How to Perform a Test

a. From the Router drop down list, select the router you want to test.

b. Choose from the ‘Select a Test’ drop down menu:

1. 1 to 1, 2 to 2, etc
2. Broadcast chosen source to all
3. Cycle through sources
4. Cycle through destinations

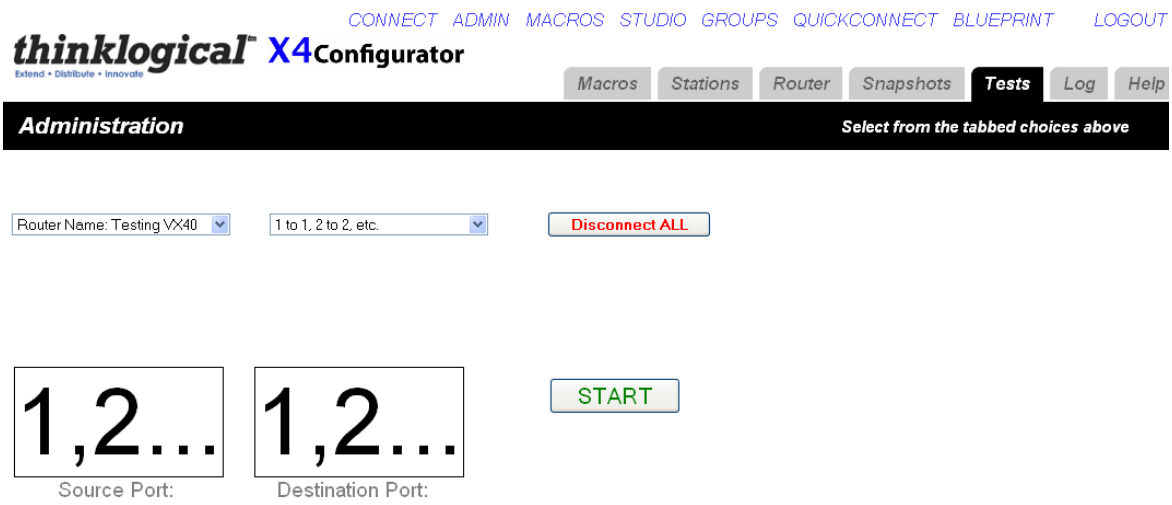


Figure 60- Test Function

SNAPSHOTS

Snapshots are recorded and executed from the "Snapshot" tab of the ADMIN page. Snapshots are a way of recording and saving the connections of every single port on one or more routers, including whether or not they are connected at all. When a snapshot is played back or "executed" every port will be reset to the connections that were present when the snapshot was recorded.

NOTE- This process can be disruptive. It should only be used to set all connections to a known state. Since every port is reset and reconnected, even ports that are already connected the same way the snapshot recorded will temporarily lose their connections before being reconnected.

To create a new snapshot, select ""'Create New Snapshot" from the pull-down list. "Press to record" will appear and should be pressed when the system is connected and ready to be recorded. A name box will also appear with a default name for the new snapshot. Clicking the "Press to Record" button will cause the system to interrogate every port and save the settings to a new .csv file in the setups/snapshots/ directory with the same name as the snapshot.

To change the name of a snapshot or delete it, select it from the pull-down list. Its name will appear in the text input box next to "Change name here", as well as a "Delete This Snapshot" button. To change the name, change the text in the input box. To delete it, click the "Delete" button and then accept the action on the confirmation pop-up.

Existing Snapshots will appear as buttons and selecting one of these buttons will execute the snapshot after an "Are you sure?" confirmation pop up.

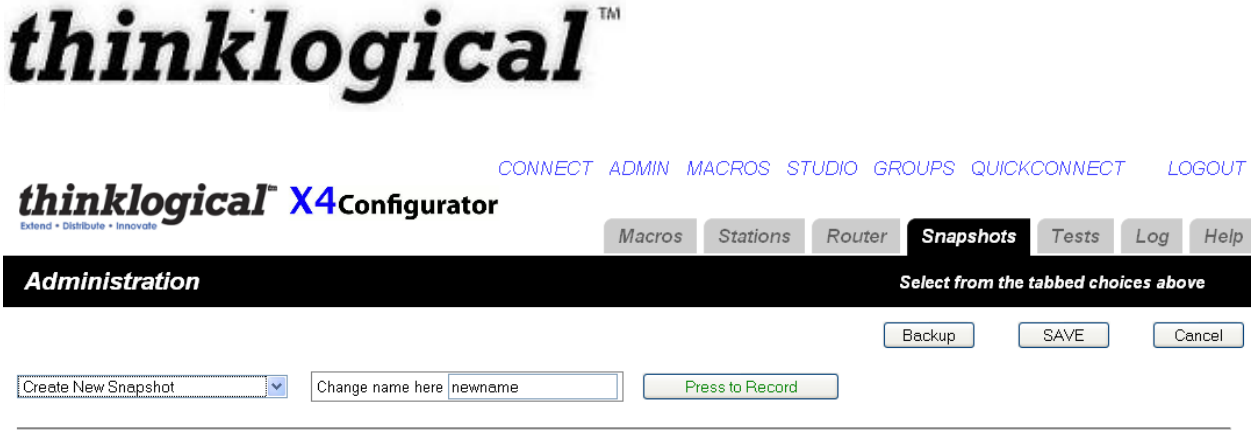


Figure 61- Snapshots

STUDIO

The Studio page is an alternate view to the Connections tab. Connecting ports in the Studio view is a different process and has additional options. (To add this page to the links please see the Groups section.) This page is not designed for use as an administration page. To navigate back to other pages use the back arrow in your browser.

To make a connection, select both a destination and a source (in any order). They will turn blue when selected.

"TAKE" will cause any existing destinations for the selected source to be disconnected, and then the chosen destination will be given the only connection for the chosen source, as well as having control of the mouse and keyboard.

"(VIEW)" will not disturb any existing connections from the source, but the new destination will not receive control of the keyboard/mouse. This is useful if a user wishes to monitor a source without disturbing any existing users of that source.

The (VIEW) button is rendered with parenthesis to remind users that VIEW only gives them the ability to see the source and not control it. Destination boxes with sources that are connected using VIEW will show the source name in parenthesis meaning that the source can be seen but not controlled. Only one destination will show the source name without parenthesis, and that is the one with the keyboard mouse channel.

NOTE: If no other destination is using the source at the time the (VIEW) button is pressed, then the new destination will also get control of the keyboard/mouse.)

"SHARE" is a hybrid of the first two commands. No existing video connections for the given source are broken, but the new destination will also receive control of the keyboard/mouse. This is useful when two or more user destinations are viewing the same source and they wish to take turns controlling the keyboard and mouse. The video will be present at both destinations, but whoever presses SHARE last will have control of the keyboard/mouse.

And as described previously in the (VIEW) section, if SHARE is used to connect a source to a destination, the source name will appear *without* parenthesis in that destination and *with* parenthesis in any other previous destinations also showing that source.

There are also Lock and Unlock buttons to keep control of chosen sources and destinations. When a user has a source or destination (or both) locked, they can be assured that no other user will be able to take video, keyboard or mouse from that source.

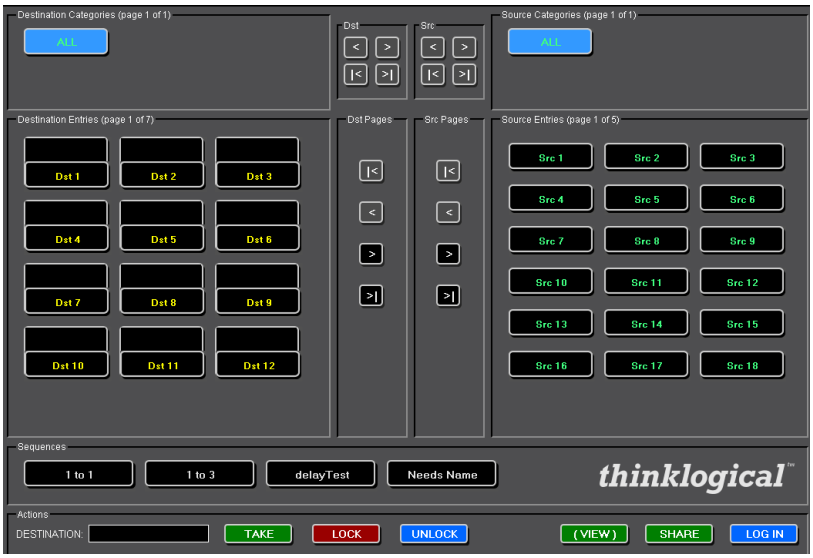


Figure 62- Studio View

BLUEPRINT

This function will allow you to add a .png or .jpeg file with your facility blueprint and make connections. To add this page see Groups section.

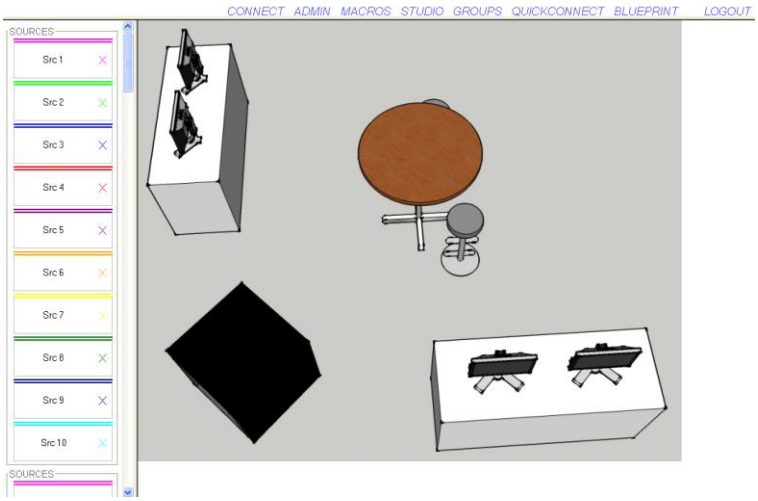


Figure 63- Blueprint View

LOGS

To view a log of the activity of the switch you can click on the Logs tab under ADMIN. This will allow you view logins, operations, connections, errors and system updates. This

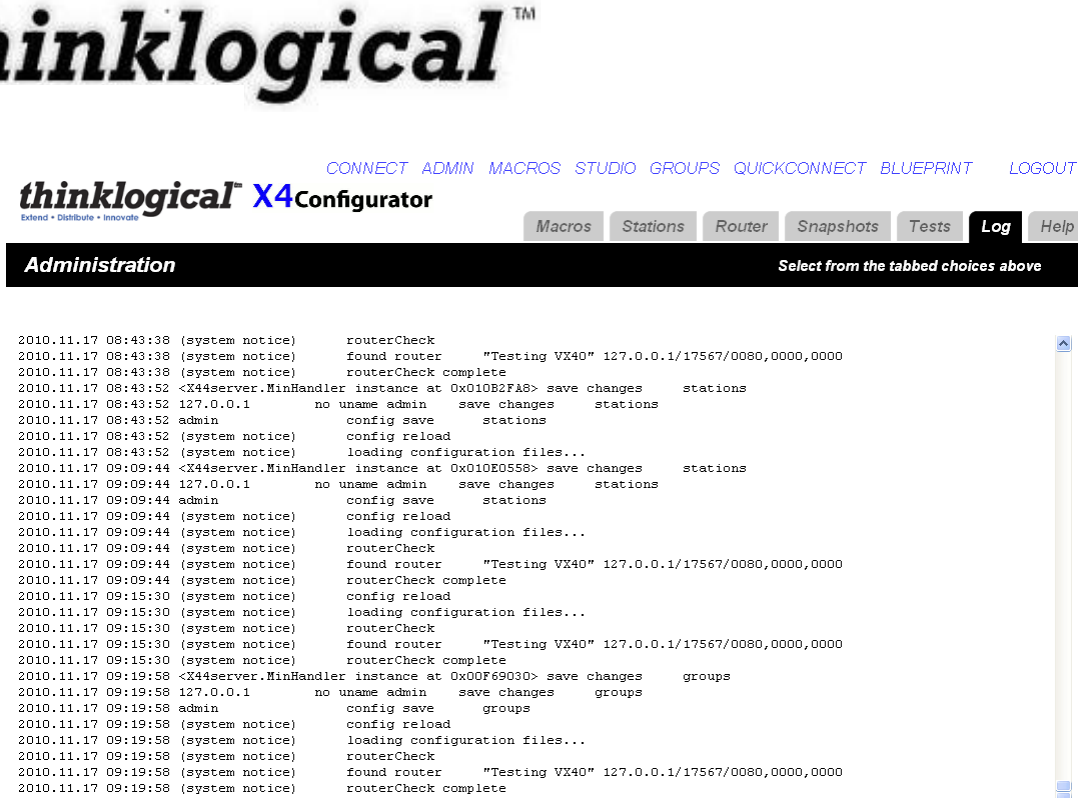


Figure 64- View of Log File

CONFIGURATION FILE STRUCTURE

The configuration files (stations, groups, router, macros) all share a similar structure. The are encoded in the .csv (comma separated values) format to allow easy access from spreadsheet programs, text editors, and the web-server program itself.

Configuration Files, In General

There are four kinds of rows: blank, comments, headers, and values.

If a row is blank, it is ignored. This allows the creation of white space between blocks of data.

If the first character in the first field of a row is '#', then the contents of the entire row will be ignored . This gives the administrator the ability to enter and save comments.

If the first field in a row ends with ':' (colon), then the program interprets the entire row as a series of "headers". A header describes the meaning and usage of all the fields below the header in that column, until a new series of headers replaces the current ones and supplies new meanings for the values below it.

There are three ways of interpreting the values found in the fields below a header:

- The first is "global". This value is assigned to the name defined in the header above it and it

will apply throughout the application. Examples of a global value would be: “Font Size”, “Connection Type”, and “Update
Interval”.

Width:	Height:	Font Size:	Update Interval:	Destination Side:	Connection Type:
120	28	12	2000	RIGHT	SHARE

Figure 65- Global Values

- The second type of value is part of a list. If there are multiple headers with the same name, then the values found below those headers will be added to a list with that name. Examples of lists include “Source Category”, “Destination Category”, and “Viewable”.

Source Category:	Source Category:	Source Category:	Source Category:
ALL	Rack 107	Rack 109	

Figure 66- List Values

- The final type of value is defined when the entire row is meant to be thought of as an “object”. A good example of an object would be a “station” which has its own name, some number of input and/or output ports that should all be switched at the same time, and additional other fields.

Source Name:	Router Name:	L1:	L2:	L3:	Category:	Category:	Color:
Src 1	40	UR-001	UT-001		ALL	Rack 107	fuchsia
Src 2	40	UR-002	UT-002		ALL	Rack 107	lime
Src 3	40	UR-003	UT-003		ALL	Rack 109	blue
Src 4	40	UR-004			ALL		red

Figure 67- Object Values

In the example above, the station with the source name “Src 1” has fields for the router name “40”, the ports used in that router (“UR-001” and “UT-001”), the categories that will show it (“ALL” and “Rack 107”), and the color that this source and the destinations will display when they are connected (“fuchsia”).

X4 Configurator imitates a simplified model of a spreadsheet within the user’s browser. Rows can be added or removed by left-clicking on any of the light gray “value” rows and choosing the proper choice from the drop down menu. New columns can be added by right-clicking on any of the dark “header” fields and selecting “Append” or “Delete” from the drop down menu.

Source Name:	Router Name:	L1:	L2:	L3:	Category:	Category:	Color:
Src 1	40	UR-001	UT-001		ALL	Rack 107	fuchsia
Src 2	40	UR-002	UT-002		ALL	Rack 107	lime
Src 3	40	UR-003	UT-003		ALL	Rack 109	blue
Src 4	40				ALL		red
Src 5	40				ALL		purple
Src 6	40				ALL		orange
Src 7	40				ALL		yellow
Src 8	40				ALL		green
Src 9	40	UR-009			ALL		navy

Row
Insert
Append
Delete
Copy
Paste

Figure 68: Right clicking a row

Source Name:	Router Name:	L1:	L2:	L3:	Category:	Category:	Color:
Src 1	40	UR-001	UT-001			Rack 107	fuchsia
Src 2	40	UR-002	UT-002			Rack 107	lime
Src 3	40	UR-003	UT-003			Rack 109	blue
Src 4	40	UR-004			ALL		red
Src 5	40	UR-005			ALL		purple

Column
Append
Delete

Figure 69: Right clicking a column

Source Name:	Router Name:	L1:	L2:	L3:	L3:	Category:	Category:
Src 1	40	UR-001	UT-001			ALL	Rack 107
Src 2	40	UR-002	UT-002			ALL	Rack 107
Src 3	40	UR-003	UT-003			ALL	Rack 109
Src 4	40	UR-004				ALL	
Src 5	40	UR-005				ALL	
Src 6	40	UR-006				ALL	
Src 7	40	UR-007				ALL	
Src 8	40	UR-008				ALL	
Src 9	40	UR-009				ALL	
Src 10	40	UR-010				ALL	
Src 11	40	UR-011				ALL	
Src 12	40	UR-012				ALL	

Figure 70- After selecting “Append” from the “Column” drop down

Source Name:	Router Name:	L1:	L2:	L3:	L3:	Category:	Category:
Src 1	40	UR-001	UT-001				107
Src 2	40	UR-002	UT-002				107
Src 3	40	UR-003	UT-003				109
Src 4	40	UR-004					
Src 5	40	UR-005					
Src 6	40	UR-006					
Src 7	40	UR-007					
Src 8	40	UR-008					
Src 9	40	UR-009					
Src 10	40	UR-010					
Src 11	40	UR-011					
Src 12	40	UR-012					

Station Labels
Router Name:
L1:
L2:
L3:
L4:
L5:
Category:
Color:
Viewable:
Takeable:

Figure 71- Left click a column header to see header name choices

While each file uses a similar method to define and populate various objects, the kinds of objects created by each file depends on the file name and the software module that reads it.

1. "groups.csv" will be read and interpreted by the module "groups.pyc" to create user groups, individual user accounts, and IP addresses that will always be assigned to specific groups.
2. "stations.csv" will be read and interpreted by "stations.pyc" to set general values for station button sizes and fonts, and also to create the source and destination objects and their constituent ports.
3. "macros" is a directory. Within it are individual files - one for each macro. Since macros can be limited to specific groups, there are "Group:" columns at the top that set who can see and execute each group.

APPENDIX F: Touch Panel Configuration

The Touch Panel allows user-friendly access to the Thinklogical X4 Configurator software for simple actions to be made with the touch of the screen. The unit connects independently to a network and with a onetime configuration, the set-up is easily performed.

NOTE: There is an additional Touch Panel manual available with further detail on set-up and use available from Thinklogical.

There are two ways to configure a touchpanel. One is to use a USB keyboard connected directly to the touchpanel and make any necessary changes directly on that panel. The other is to connect one or more touchpanels to a network and log into them remotely. Both methods are described below.

In both cases, you will first need to decide the IP address of the web server before configuring the touchpanel(s).

Direct Configuration:

1. Attach the USB keyboard to a USB port on the Touch Panel
2. Press Ctrl - Alt - F1 on the Touch Panel to go into text mode
3. When the login appears, type in the following-

   username: root

   password: emac_inc

Remote Configuration: Each touchpanel is shipped with DHCP enabled by default.

1. Attach one or more touchpanels to a network with a DHCP server
2. Use "ssh" to access each touchpanel in turn
3. When the login appears, log in with the following values:

   username: root

   password: emac_inc

To set up the network:

4. Type cd /etc/network
5. Using vi, edit “interfaces”
6. In the section for eth0,

a. Modify the dhcp line to say “static”

b. Insert a line "address 192.168.13.161" (with whatever IP address you've chosen for this Touch Panel)

c. Add "netmask 255.255.255.0"

d. Save and exit

The completed interface file should look something like this after modification:

```
# /etc/network/interfaces -- configuration file for ifup(8), ifdown(8)

# The loopback interface
auto lo
iface lo inet loopback

allow-hotplug eth0
iface eth0 inet static
address 192.168.13.171
netmask 255.255.255.0
gateway 192.168.13.1
```

To set the browser to find the server:

7. Type cd /etc/network
8. Using vi, edit “homepage” (a single line file that, by default,reads: "http://192.168.13.9/touch")

   a. Change the IP address to match that of the web server (also called the “Control Computer”)

   b. Save and exit

The files have now been configured, but the Touch Panel will not use them yet:

9. Type “sync”
10. Type “reboot”

The touch panel will blank its screen and reboot with the new values.

If you are using the Remote Configuration method on multiple touch panels, watch to see which panel blanks and reboots so you can tell which one you've just configured and label it with the proper IP address.

USING THE TOUCHPANEL

The Touch Panel starts up in Detail mode by default, with destinations on the left and sources on the right.

Selecting one or more destinations and a source and then pressing the “Connect” button at the bottom will cause those destinations to be fed by that source, *but only the first destination connected will have control of the keyboard/mouse.*

Selecting a destination that is already connected to a source (but does not have the keyboard/mouse for that source) and then pressing “Take Mouse” will cause the connected source’s keyboard/mouse to be assumed (taken) by the selected destination.

Macro buttons are available on a separate screen which can be viewed by pressing the “Macros” button at the top of the page.

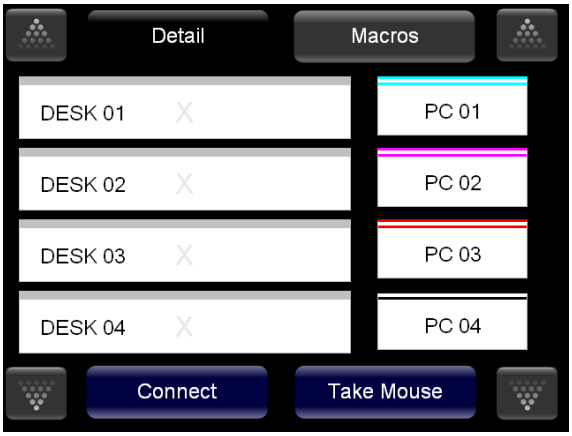


Figure 72- View of Touch Screen

To “take” control of the keyboard and mouse on a different connection simply press the connection for 1.5 seconds. You will be able to tell that the keyboard mouse connection has been switched when the mouse icon appears next to the source.

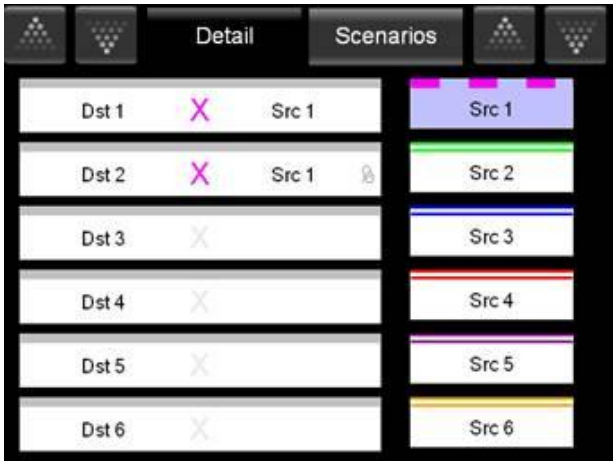


Figure 73- Touch Screen Take control of keyboard mouse

APPENDIX G: MIB FILE

The MIB (Management Information Base) file contains information on the operational status of the VX Router hardware. The file is located on our FTP site and on the install disk included with your VX Router. It is also included on the VX Router SD Card in the directory /user/share.snmp/mibs

LSI-ROOT.txt
LSI-ROUTER-API-INTERFACE.txt
LSI-SFP.txt
LSI-VXROUTER.txt