

NV8500 Family Digital Routers

User's Guide



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NV8500 Family Digital Routers—User’s Guide

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Note

Return Material Authorization (RMA) required for all returns.

Change History

The table below lists the changes to the Digital Router User's Guide.

- User's Guide Part # UG0034-03
- Software version: -none-

Rev	Date	ECO	Description	Approved By
1.0	21 Apr 09	15703	Initial release.	DM, DC
2.0	10 Oct 09	16114	Incorporates material for the NV8576, NV8280, and NV8144 with corrections and new information.	DM, DC
2.1	12 Jan 10	16272	Minor corrections, page 74, 76.	DM, DC
2.2	27 Mar 10	16912	Changes to SFP modules; UniConfig connections; Added signal numbering for backplanes. Changed WECO to terminal block. Added monitoring functions for NV8144.	DEM, RH, BH

Restriction on Hazardous Substances (RoHS)

Miranda is in compliance with EU Directive RoHS 2002/95/EC governing the restricted use of certain hazardous substances and materials in products and in our manufacturing processes.

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Important Safeguards and Notices

This section provides important safety guidelines for operators and service personnel. Specific warnings and cautions appear throughout the manual where they apply. Please read and follow this important information, especially those instructions related to the risk of electric shock or injury to persons.

Warning

Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any service other than that contained in the operating instructions unless you are qualified to do so.

Symbols and Their Meanings



The lightning flash with arrowhead symbol within an equilateral triangle alerts the user to the presence of dangerous voltages within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle alerts the user to the presence of important operating and maintenance/service instructions.



The Ground symbol represents a protective grounding terminal. Such a terminal must be connected to earth ground prior to making any other connections to the equipment.



The fuse symbol indicates that the fuse referenced in the text must be replaced with one having the ratings indicated.



The presence of this symbol in or on Miranda equipment means that it has been designed, tested and certified as complying with applicable Underwriter's Laboratory (USA) regulations and recommendations.



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General Warnings

A warning indicates a possible hazard to personnel which may cause injury or death. Observe the following general warnings when using or working on this equipment:

- Heed all warnings on the unit and in the operating instructions.
- Do not use this equipment in or near water.
- This equipment is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting the equipment inputs or outputs.
- Route power cords and other cables so they are not likely to be damaged.
- Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp cloth.
- Dangerous voltages may exist at several points in this equipment. To avoid injury, do not touch exposed connections and components while power is on.
- Do not wear rings or wristwatches when troubleshooting high current circuits such as the power supplies.
- To avoid fire hazard, use only the specified fuse(s) with the correct type number, voltage and current ratings as referenced in the appropriate locations in the service instructions or on the equipment. Always refer fuse replacements to qualified service personnel.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- Have qualified service personnel perform safety checks after any service.

General Cautions

A caution indicates a possible hazard to equipment that could result in equipment damage. Observe the following cautions when operating or working on this equipment:

- When installing this equipment, do not attach the power cord to building surfaces.
- To prevent damage to equipment when replacing fuses, locate and correct the problem that caused the fuse to blow before re-applying power.
- Use only the specified replacement parts.
- Follow static precautions at all times when handling this equipment.
- This product should only be powered as described in the manual. To prevent equipment damage, select the proper line voltage on the power supply(ies) as described in the installation documentation.
- To prevent damage to the equipment, read the instructions in the equipment manual for proper input voltage range selection.
- Some products include a backup battery. There is a risk of explosion if the battery is replaced by a battery of an incorrect type. Dispose of batteries according to instructions.
- Products that have (1) no on/off switch and (2) use an external power supply must be installed in proximity to a main power output that is easily accessible.



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1. Introduction

The NV8500 family is a series of highly flexible high-density routers supporting Standard Definition (SD), High Definition (HD) and 3.0 Gb/s (3Gig) video signals, and AES Asynchronous audio signals. This section provides an overview of the NV8500 family of routers, including signal flow and rates, power supply, active cards and frame expansion. It is recommended that you read this section before starting any installation tasks.

Product Overview

The NV8500 family is composed of several routers that are either standalone routers or routers that can be connected together to create larger switching matrices called “expandable” router frames. Expandable router frames are denoted by the word “Plus.” A fully non-blocking matrix architecture allows for one-to-one and one-to-many routing. Because inputs and outputs are independent, configurations do not have to be numerically squared or identical in number.

Standalone routers allow for configurations as small as 9 inputs and 18 outputs, increasing in increments of 9 inputs or 18 outputs. Expandable routers allow for configurations as small as 9 inputs and 9 outputs, increasing in increments of 9 inputs or 9 outputs. When two routers are connected together, the number of inputs and outputs that can be switched doubles. The two connected routers are considered a single matrix.

The following is a list of routers within the NV8500 family.

Router	Switching Matrix	Expandable	Expanded Switching Matrix	Configurations based on
NV8144	144 × 144	No	—	9 inputs and 18 outputs
NV8280	288 × 576	No	—	9 inputs and 18 outputs
NV8280-Plus	288 × 288	Yes	576 × 576	9 inputs and 9 outputs
NV8576	576 × 1152	No	—	9 inputs and 18 outputs
NV8576-Plus	576 × 576	Yes	1152 × 1152	9 inputs and 9 outputs

Input cards, output cards, control cards, crosspoint cards, monitor cards, and power supply modules are “hot swappable” and installed through the front of the frame for easy access. The rear of the router features a back plate into which backplanes housing different types of connectors for receiving and distributing signals are installed. Each backplane receives or distributes signals for a single card allowing for maximum switching configuration flexibility. The back plate also contains connections to system functions, such as a router control system, alarms or reference signals.

1. Introduction

Product Overview

Mounting

The NV8500 family router frames mount in a standard 19" rack. The frame heights are as follows:

NV8576, NV8576-Plus	32RU	55.97"	1.422 m
NV8280, NV8280-Plus	16RU	27.97"	0.710 m
NV8144	8RU	13.97"	0.355 m

The depth of each frame is approximately 17". With 3" clearance for cabling, the minimum mounting depth is approximately 20". Doors add 0.8" of depth.

When placing the rack in your facility, be sure to leave enough space for air flow through the front and rear of the router and within easy access of an AC power source. For installation instructions, see [Rack Mount](#) on page 49.

Fuses

Routers in the NV8500 family have no user-serviceable fuses.

Cooling

Router frames in the NV8500 family have one or more fan trays providing forced air cooling through five speed-controlled fans. In the NV8144, NV8280 and NV8280-Plus frames, a single fan tray is located at the top of the chassis. For the NV8576 and NV8576-Plus frame, there are two fan trays: one located at the top and one located at the bottom of the chassis. Fan trays are accessed from the front of the frame. The fans draw cooling air from the center-front of the router, through the door, and exhaust it through the rear of the frame at the top and bottom. The router must have the door correctly installed and closed for proper airflow through the chassis.

Caution

If airflow is impeded, overheating may occur.

Each fan features speed control which spins the fan at the optimal rate required to ensure that a constant temperature is maintained within the router. Temperature sensors on the fans sense the exiting temperature and increase or decrease the speed of the fan as required. By rotating only as required to meet cooling needs, fan noise is significantly reduced in partially loaded frames or in environments with lower ambient temperatures. Maintaining a constant temperature also increases circuitry life span.

Each fan features two LEDs that indicate if the fan is receiving power and if there is a failure. For more information, see [Indicator LEDs](#) on page 101.

There is a removable air filter located on the inside of the door assembly. It is recommended that maintenance filters be performed on a regular basis. For more information, see [Air Flow](#) on page 103.

Power Supply

Power for the NV8500 family routers frames is supplied through the Miranda PS8100 power supply module. The module is either installed in the router frame (the NV8144) or installed in an external, separate frame, the NV8000. The NV8000 can house up to 4 modules. Each PS8100 module produces 850 Watts.

The number and type of power supply modules required, and if and how many NV8000 power supply frames are required, depends on which and how many routers are being used. For redundancy, additional (optional) power supply modules can be installed as a backup power source should the primary module fail. For a list of power requirements, see [Connecting to Power](#) on page 85.

The PS8100 power supply module accepts a wide range of AC input voltages and produces five +48 VDC outputs. The power supply automatically senses the AC input voltage range (90–130 and 180–250 VAC) and adjusts to maintain a relatively constant DC output; no voltage selection is required.

The five regulated outputs are directed to modules in the router where on-board regulators produce the DC voltages required by the local circuits. Each output powers one of the five green LEDs and output test points located on the front of the PS8100 power supply module. Under normal operation, all five LEDs are lit. For more information on LEDs, see [Indicator LEDs](#) on page 101.

Figure 1-1 shows the PS8100 power supply module architecture.

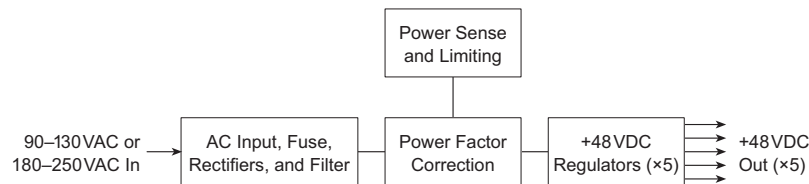


Figure 1-1. PS8100 Power Supply Module Diagram

For information on making power supply connections, see [Connecting to Power](#) on page 85.

The PS8100 power supply module, and the NCV8000 power supply frame, have no serviceable fuses.

Cooling is provided by a single low-speed fan located along the front edge of each PS8100 power supply module, which draws a small quantity of air across the internal heat sinks.

1. Introduction

Signal Rates and Flow

Routers in the NV8500 family support SD, HD and 3Gig video signals, and AES3 Digital Audio Asynchronous audio signals, both balanced and unbalanced. The following table lists the standards and rates for each signal type. HD signals are managed through active 3Gig cards. Embedded audio signals are passed through. For a description of each card and corresponding part numbers, see [Input Cards](#) on page 38 and [Output Cards](#) on page 40.

Signal Type	Standard	Rates Supported
Audio AES3 asynchronous (balanced or unbalanced)	AES3	Sample rates 32 to 192kHz (passed through)
Standard Definition (SD-SDI)	SMPTE 259M	Auto re-clock at 270 Mb/s or auto bypass with pass-through from 19 Mb/s to 360 Mb/s
3Gig (SD-SDI, HD-SDI and 3.0Gb/s combined)	SMPTE 259M, 292M 424M	Auto re-clock at 270 Mb/s and 1.483, 1.485, 2.966, 2.970 Gb/s or auto bypass with pass-through from 19 Mb/s to 3.0 Gb/s

Reference signals are required for proper switching of video signals. See [Video Reference](#) on page 35. No reference is required for AES3 Digital Audio Asynchronous signals.

[Product Overview](#) on page 1

Signal Flow

Routers switch incoming signals to designated output connections. Switching is directed by settings configured in the router control system, which sends commands to the control card. In turn, the control card directs how switching occurs on the crosspoint card. For a description of control cards and crosspoint cards, see [Active Cards](#) on page 37.

Standalone Routers

The NV8500 family standalone routers include the NV8144, NV8280 and NV8576. The NV8144 can house two 144 x 144 crosspoint cards (one required and one optional for redundancy).

The NV8280 and NV8576 router frames each house up to 8 crosspoint cards and an optional redundant crosspoint cardset (a single module). The NV8280 crosspoint cards having a switching matrix of 144 x 144 and the NV8576 crosspoint cards have a 288 x 288 matrix. The crosspoint card slots are numbered 1 through 10, from left to right. An optional redundant crosspoint cardset can be installed in slots 5 and 6. All other crosspoint cards are installed in slots 1 through 4 and slots 7 through 10. The 8 crosspoint cards are divided into 2 sets of 4, with each set of 4 fanning out and distributing inputs to all outputs.

Each standalone router switches signals via the crosspoint card differently. In a fully loaded NV8144 frame (i.e., all active cards installed), all inputs are sent to the crosspoint cards for distribution to any or all outputs.

In a fully loaded NV8280 or NV8576 frame, inputs on the left side of the frame (when facing the front of the router) are forwarded to crosspoint cards 1, 2, 7 and 8. Inputs situated on the right side of the frame are forwarded to crosspoint cards 3, 4, 9 and 10, as shown in Figure 1-2 on page 6. All

1. Introduction

Signal Rates and Flow

inputs are also forwarded to the optional redundant crosspoint cardset. The optional redundant crosspoint cardset feeds any input to any output depending on which active crosspoint card it is taking over for.

Outputs are distributed from each crosspoint card to specific output cards such that crosspoint cards in the left side of the frame (when facing the front of the router) feed output cards located in the left side of the frame. Similarly, crosspoint cards in the right side of the frame feed output cards located in the right side of the frame, as shown in Figure 1-3 on page 7.

For more information on crosspoint cards, the slots into which they are inserted, and the signals switched, see [Crosspoint Slots and Signals Switched](#) on page 13.

Router	Maximum Switching Matrix	Signals switched by one Crosspoint Card	Inputs	Forwarded to Crosspoint Cards in Slots
NV8144	144 × 144	144 × 144	1–72	1, 2, 7 and 8
			73–144	3, 4, 9 and 10
NV8280	288 × 576	144 × 144	1–144	1, 2, 7 and 8
			145–288	3, 4, 9 and 10
NV8576	576 × 1152	288 × 288	1–288	1, 2, 7 and 8
			289–576	3, 4, 9 and 10

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Signal Rates and Flow

As an example, NV8576 has 8 crosspoint cards that each manage up to 288×288 signals and are divided into 2 sets of 4, with each set of 4 fanning out and distributing 288 inputs (1–288 and 289–576) to all 1152 outputs. In a fully loaded frame, inputs 1–288 on the left side of the frame (when facing the front of the router) are forwarded to crosspoint cards 1, 2, 7 and 8. Inputs 289–576, situated on the right side of the frame, are forwarded to crosspoint cards 3, 4, 9 and 10. (See Figure 1-2 and Figure 1-3 on page 7.)

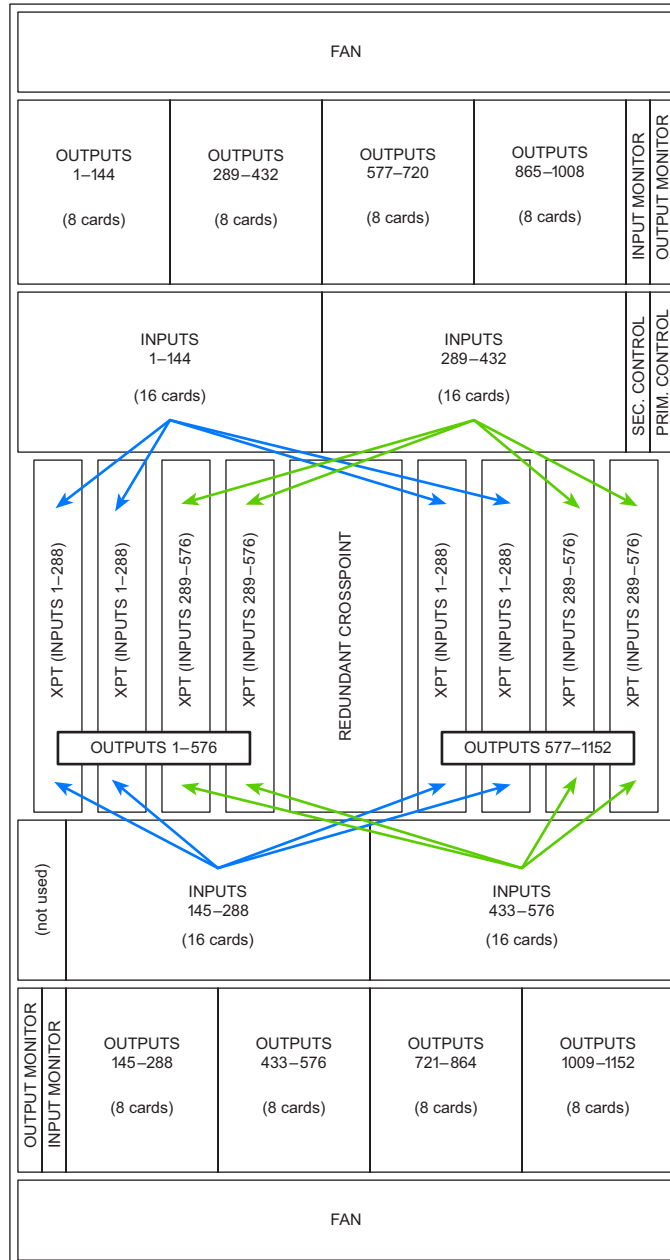


Figure 1-2. Example of NV8576 Inputs Signal Flow (Front View)

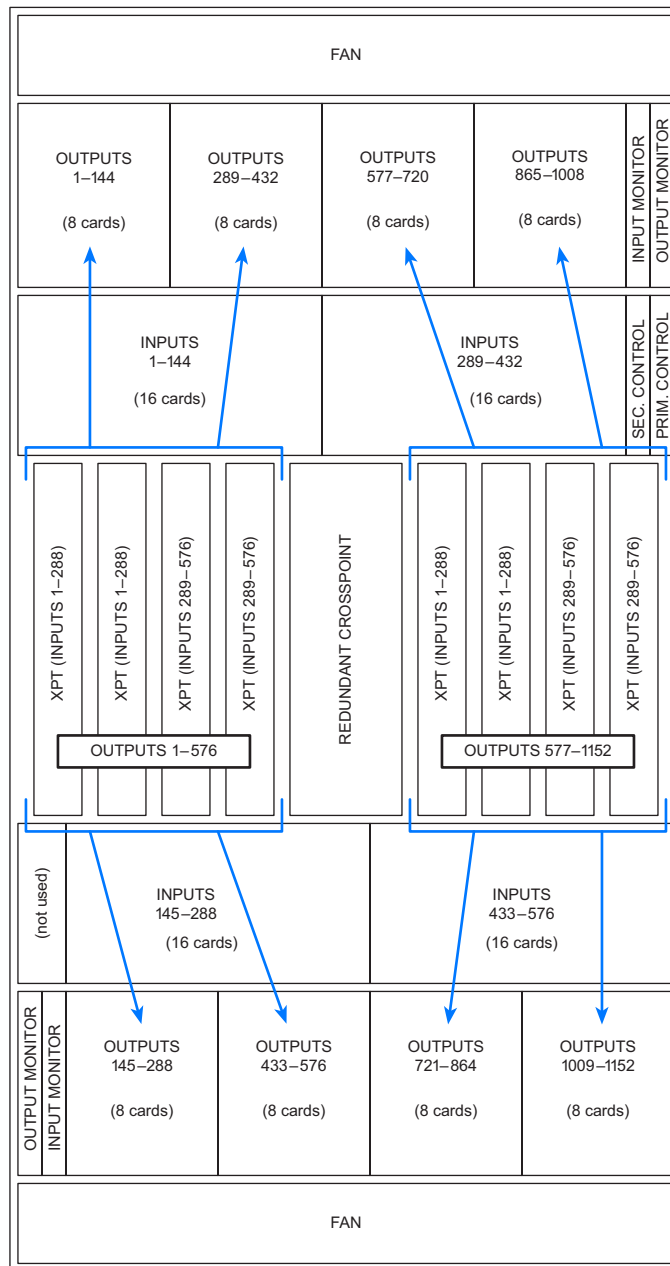


Figure 1-3. Example of NV8576 Outputs Signal Flow (Front View)

Expandable Routers

Expandable routers in the NV8500 family (NV8280-Plus and NV8576-Plus) can be used as a standalone router or connected to an identical router to increase the switching matrix. The signal flow of inputs and outputs in an expandable router is identical to a standalone router, with one exception: signals are being received from or distributed to a connected router. When two expandable routers are connected, signals from one router are distributed to the second connected router, and vice versa, through expansion connections and expansion output cards. Each output only goes through a crosspoint card once. Before an output is forwarded to a connected router, it first goes through the crosspoint card on the local router for switching to the expansion connections through which it is

1. Introduction

Signal Rates and Flow

sent to the second router. From the expansion connection on the first router, the signal is sent directly to the corresponding expansion connection on the second router and then directly to that output card.

Figure 1-4 illustrates the signal flow for two connected NV8576-Plus routers. Outputs 577–864 on the first router (Router 1) through the output connections to the second router (Router 2) and the reverse flow of signals between the two routers.



Figure 1-4. Example of Signal Flow Between Two NV8576-Plus Routers

Slots and Corresponding Signal Numbers

Signals are received and distributed through I/O cards and connectors housed on a backplane. The I/O card and number and type of connectors varies depending on whether the signal is an input or output, and whether the frame is a standalone router (NV8144, NV8280 or NV8576) or in expanded mode and connected to a second router frame (NV8280-Plus or NV8576-Plus).

Each signal is assigned a number that corresponds to the physical input or output connector and to the slot in which an input card or output card is installed. In the NV8500 family, each backplane in a standalone frame contains either 9 input connectors or 18 output connectors. (See [Backplanes](#) on page 29.) This means that in the standalone router frame, Input Slot 1 corresponds to inputs 1–9, Input Slot 2 corresponds to inputs 10–18, and so on, up to the maximum. Output slots are similarly

1. Introduction

Signal Rates and Flow

numbered with Output Slot 1 corresponding to outputs 1–18, Output Slot 2 to outputs 19–36, and so on.

Each card inserted in a slot manages a range of numbers. However, when making physical connections on the backplanes, each connector has a specific signal number assigned. For details on signal numbering on backplanes, see [Backplane Connectors and Individual Signal Numbers](#) on page 59.

Figure 1-5 shows the standalone NV8576 frame and which signal numbers correspond to which slots when viewing the router from the front.

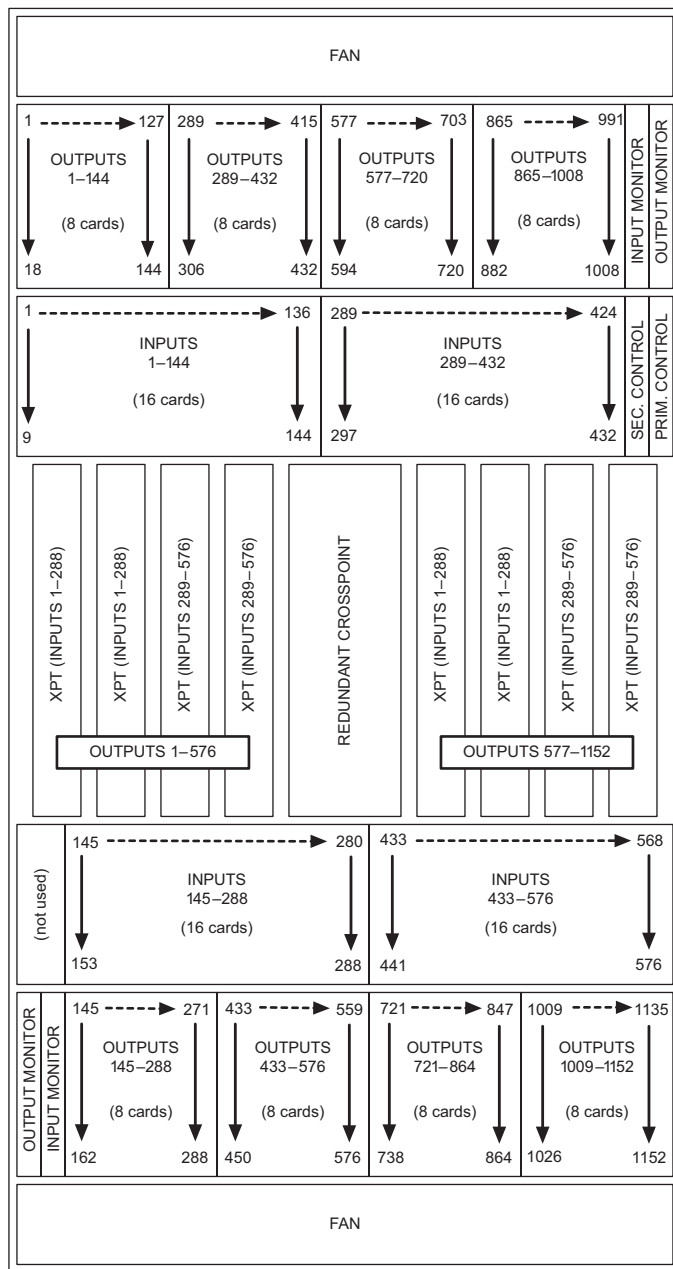


Figure 1-5. Example of NV8576 Slots and Corresponding Signal Numbers (Front View)

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Signal Rates and Flow

Figure 1-8 shows the standalone NV8280 frame and which signal numbers correspond to which slots when viewing the router from the front.

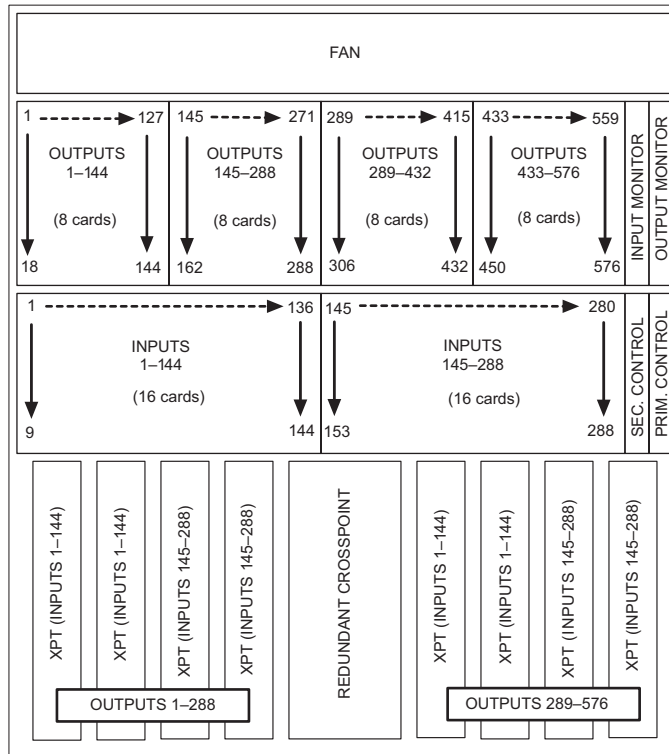


Figure 1-6. Example of NV8280 Slots and Corresponding Signal Numbers (Front View)

Figure 1-7 shows the standalone NV8144 frame and which signal numbers correspond to which slots when viewing the router from the front.

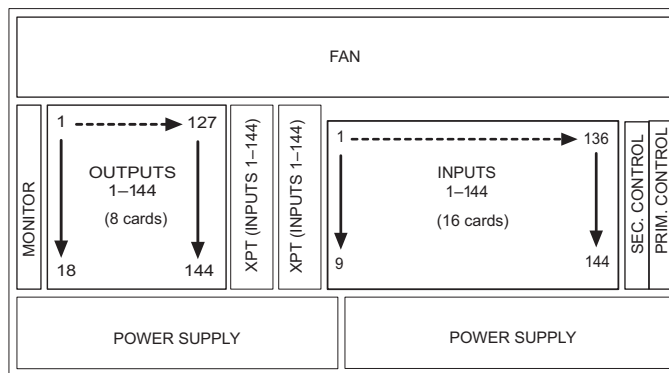


Figure 1-7. Example of NV8144 Slots and Corresponding Signal Numbers (Front View)

Expandable Frames and Signal Numbers

Expandable router frames contain backplanes similar to the standalone routers except that the connectors housed on the backplanes are different. Each backplane contains either 9 input connectors or 9 output connectors plus two high-density expansion connectors. This means that input slot 1 corresponds to inputs 1-9, input slot 2 corresponds to inputs 10-18, and so on, up to the maximum. For outputs, output slot 1 corresponds to local outputs 1-9 and forwards through the expansion connectors outputs to the second router, and so on. For example, in the NV8576-Plus frame, output

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Signal Rates and Flow

slot 1 corresponds to local outputs 1–9 and forwards through the expansion connectors outputs 577–585 to the second router, and so on.

When two expandable router frames are connected one router is designated as Router 1 and the other as Router 2. Each router manages inputs and outputs locally. In addition, each router forwards inputs to the connected router and receives inputs from the connected router, effectively doubling the total number of inputs and outputs. For example, when two NV8576-Plus routers are connected, each router switches up to 576 inputs and 576 outputs locally. In addition, each router forwards 576 inputs to the connected router and receives 576 inputs from the connected router, for a total of 1152 inputs and 1152 outputs.

Because each signal must have a unique signal number, when two expandable router routers are connected together, signals are numbered from 1 to the total of the two connected frames. For example, the NV8576-Plus frame can switch 576 x 576. When two frames are connected the switching matrix expands to a maximum of 1152 x 1152. The number for the two connected frames is 1–1152, incorporating both routers instead of two routers both managing signals numbered 1–576. For more information on signal numbering, see [Slots and Corresponding Signal Numbers](#) on page 8.

The number assigned to a signal depends from which router the signal originates. For example, if using two NV8576-Plus frames, Router 1 has local inputs 1–576 and Router 2 has local inputs 577–1152. Similarly, Router 1 has local outputs 1–576 and sends outputs 577–1152 to Router 2. Router 2 has local inputs 577–1152 and sends outputs 1–576 to Router 1.

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Figure 1-8 shows which signal numbers correspond to which slots when viewing two connected NV8576-Plus routers from the front.

Router 1

FAN			
OUTPUTS 577-720 TO OTHER FRAME		OUTPUTS 865-1008 TO OTHER FRAME	
LOCAL OUTPUTS 1-144 (16 cards)		LOCAL OUTPUTS 289-432 (16 cards)	
INPUTS 1-144 (16 cards)		INPUTS 289-432 (16 cards)	
XPT (INPUTS 1-288) (OUTPUTS 1-288)	XPT (INPUTS 1-288) (OUTPUTS 577-864)	REDUNDANT CROSSPOINT	
XPT (INPUTS 289-576) (OUTPUTS 1-288)	XPT (INPUTS 289-576) (OUTPUTS 577-864)	XPT (INPUTS 1-288) (OUTPUTS 289-576)	XPT (INPUTS 1-288) (OUTPUTS 865-1152)
XPT (INPUTS 289-576) (OUTPUTS 577-864)	XPT (INPUTS 289-576) (OUTPUTS 289-576)	XPT (INPUTS 289-576) (OUTPUTS 865-1152)	XPT (INPUTS 289-576) (OUTPUTS 865-1152)
(not used)	INPUTS 145-288 (16 cards)	INPUTS 433-576 (16 cards)	
OUTPUT MONITOR INPUT MONITOR	LOCAL OUTPUTS 145-288	LOCAL OUTPUTS 433-576	
	OUTPUTS 721-864 TO OTHER FRAME (16 cards)	OUTPUTS 1009-1152 TO OTHER FRAME (16 cards)	
FAN			

Router 2

FAN			
OUTPUTS 1-144 TO OTHER FRAME		OUTPUTS 289-432 TO OTHER FRAME	
LOCAL OUTPUTS 577-720 (16 cards)		LOCAL OUTPUTS 865-1008 (16 cards)	
INPUTS 577-720 (16 cards)		INPUTS 865-1008 (16 cards)	
XPT (INPUTS 577-864) (OUTPUTS 577-864)	XPT (INPUTS 577-864) (OUTPUTS 1-288)	REDUNDANT CROSSPOINT	
XPT (INPUTS 865-1152) (OUTPUTS 577-864)	XPT (INPUTS 865-1152) (OUTPUTS 1-288)	XPT (INPUTS 577-864) (OUTPUTS 865-1152)	XPT (INPUTS 577-864) (OUTPUTS 289-576)
XPT (INPUTS 865-1152) (OUTPUTS 1-288)	XPT (INPUTS 865-1152) (OUTPUTS 865-1152)	XPT (INPUTS 865-1152) (OUTPUTS 289-576)	XPT (INPUTS 865-1152) (OUTPUTS 865-1152)
(not used)	INPUTS 721-864 (16 cards)	INPUTS 1009-1152 (16 cards)	
OUTPUT MONITOR INPUT MONITOR	LOCAL OUTPUTS 721-864	LOCAL OUTPUTS 1009-1152	
	OUTPUTS 145-288 TO OTHER FRAME (16 cards)	OUTPUTS 433-576 TO OTHER FRAME (16 cards)	
FAN			

Figure 1-8. NV8576-Plus Signals and Corresponding Numbers for Connected Pair (Front View)

Figure 1-9 shows which signal numbers correspond to which slots when viewing two NV8280-Plus routers from the front.

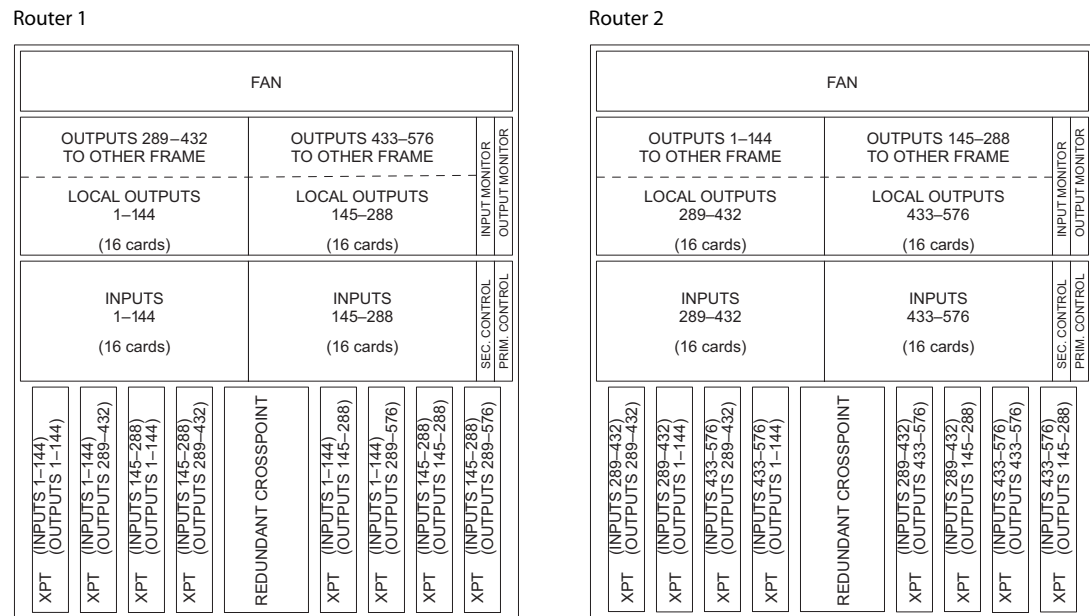


Figure 1-9. NV8280-Plus Signals and Corresponding Numbers for Connected Pair (Front View)

Crosspoint Slots and Signals Switched

The crosspoint cards manage signal switching. The crosspoint cards differ depending on the NV8500 family router frame:

- For the NV8144, NV8280 and NV8280-Plus each card switches up to 144 inputs x 144 outputs.
- For the NV8576 and NV8576-Plus each card switches up to 288 inputs x 288 outputs.

The NV8144 has two slots for crosspoint cards. One is required and one is optional for redundancy. The redundant crosspoint card takes over switching should the primary crosspoint card fail. All inputs are sent to both the primary and redundant crosspoint card and switched to any or all outputs as needed.

The NV8280, NV8280-Plus, NV8576 and NV8576-Plus have 8 slots for 8 crosspoint cards and two slots for a redundant crosspoint cardset (a single module composed of two joined cards). Depending on the slot in which it is installed, the crosspoint card switches different signals. Slots are numbered 1 through 10, from left to right, when facing the front of the router. The redundant crosspoint cardset occupies slots 5 and 6. (Refer to Figure 1-5 on page 9 and Figure 1-8 on page 12.)

The optional redundant crosspoint cardset can be installed as a backup for any of the other 8 crosspoint cards. The redundant crosspoint cardset can take over active control from any crosspoint card installed. For more information, see [Setting Redundant Crosspoint Switching](#) on page 98.

Because the crosspoint cards installed in a specific slot manage specific outputs, depending on your configuration, you may not need all 8 crosspoint cards. For example, if you are only switching inputs 1-288 and outputs 1-288 using a stand-alone NV8576 router, crosspoint cards are required only in slots 1 and 2. The other slots can remain empty.

However, due to router architecture, crosspoint cards *must* be installed in adjacent pairs to successfully route signals: cards must be installed in pairs in slots 1 & 2, slots 3 & 4, slots 5 & 6 or slots 7

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Signal Rates and Flow

& 8. Crosspoint cards can not be installed individually in slots. For example, you could install crosspoint cards in slots 1, 2, 5 and 6. But you could not install crosspoint cards in only slots 1, 3, and 5.

Backplane Connectors and Individual Signal Numbers

When making physical connections to a router, each connector on a backplane has a unique signal number assigned. Signal numbers are assigned to each connector based on two factors: 1) where individual connectors are located on the backplane, and 2) where in the router frame the backplane is installed.

Connector Location and Signal Number

Each connector on a backplane corresponds to a signal number. Signal numbers are assigned from top-to-bottom in ascending order. The lowest signal number is assigned to the top connector with each connector below being assigned the next incremental number. For example, if a backplane corresponds to an input card installed in Input Slot 1, the nine connectors correspond to signals 1–9, with 1 being the top connector, 2 being the connector directly below 1, 3 being the connector below 2, and so on. Similarly, if an input card is installed in Input Slot 2, the associated backplane connectors would correspond to signals 10–18, with 10 being the top connector, 11 the next connector below 10, and so on.

For an enumeration of the NV8576 and NV8576-Plus I/O connectors and corresponding signal number, see [NV8576 I/O Signal Numbering](#) on page 119.

Figure 1-10 is an example of connectors on a backplane installed in either Input Slot 1 for inputs, Output Slot 1 for outputs, or Output Slot 1 for expansion signals plus outputs. Each connector corresponds to a signal number with the lowest signal number—in this example ‘1’—at the top ascending in order to the last connector.

For details on each backplane type and connectors, see [Backplanes](#) on page 29.

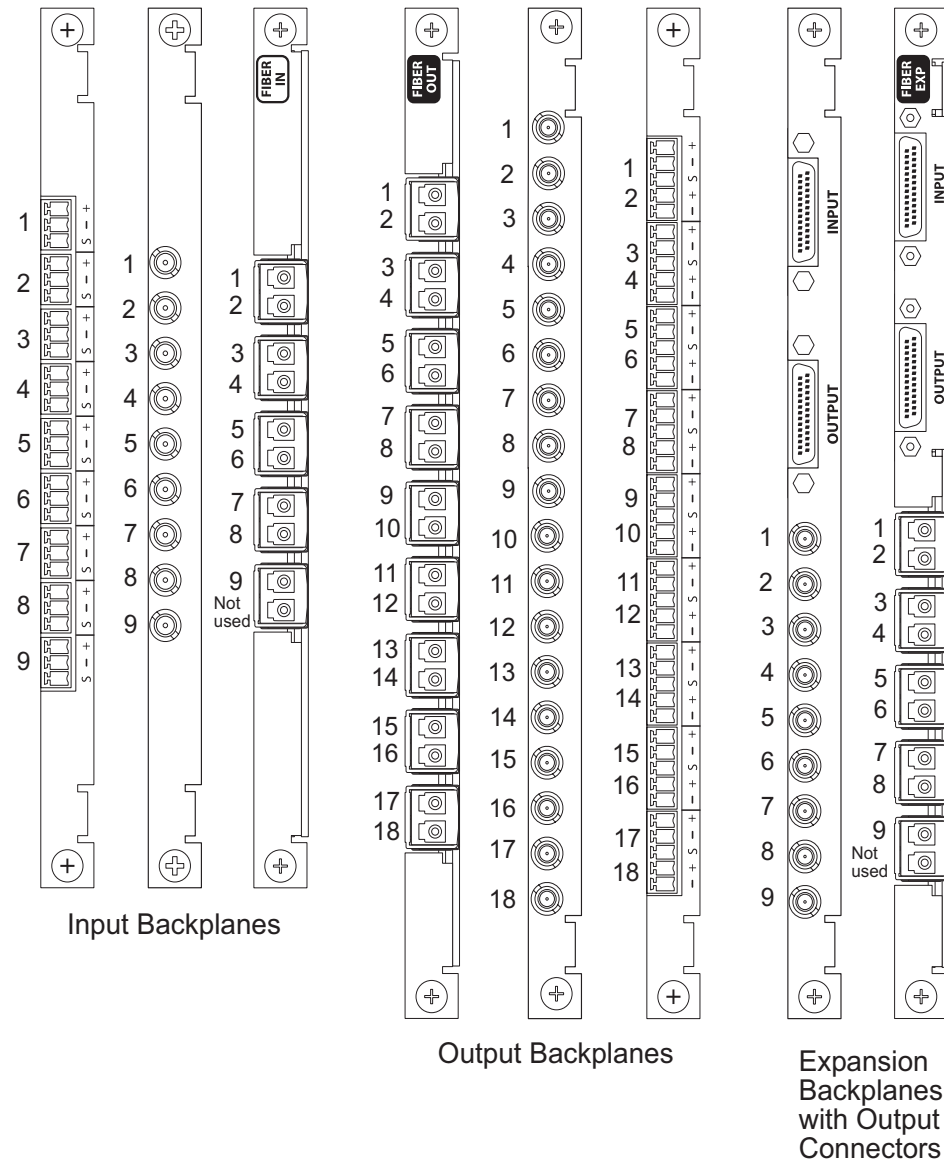


Figure 1-10. Example of Signal Numbering for Backplanes in Slot 1

Card Slot and the Range of Signal Numbers

Active cards are inserted in slots through the front of the router and connect to corresponding backplanes installed on the rear of the frame. When viewed from the front of the router, card slots are numbered in ascending order from left-to-right, such that Slot 1 is the first slot on the left, Slot 2 is the next card slot to the right of Slot 1, Slot 3 is the next card slot to the right of Slot 2, and so on.

The slot into which the card is installed determines the range of signal numbers assigned to the backplane. For example, an input card is installed in Input Slot 1 manages inputs 1–9. The connec-

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Signal Rates and Flow

tors on the backplane associated with the input card are assigned signal numbers 1–9. For more details on router card slots and the range of signal numbers assigned each slot, see [Slots and Corresponding Signal Numbers](#) on page 8.

Important: Although card slots are numbered from left-to-right in ascending order when facing the front of the router frame, physical signal connections are made to backplane connectors located on the *rear* of the frame. This means that when facing the rear of the router the slots are numbered the *opposite*, or right-to-left. To put it another way, when you are facing the rear of the frame, the card slots, and resulting range of signal numbers associated with each slot, are in *reverse order*. For example, when viewing the router frame from the rear Input Slot 1 (signals 1–9) corresponds with the backplane installed in the farthest *right* location. Input Slot 2 is the next slot to the *left* of Slot 1, Input Slot 3 is the next slot to the *left* of Slot 2, and so on.

Figure 1-11 illustrates how connectors are associated with signal numbers when facing the *rear* of the router frame. In this example, each number represents a signal number assigned to an individual connector on a backplane receiving inputs. Each column corresponds to the range of signal numbers managed by the card in that slot. In this example, there are a total of 16 input card slots. Notice that signals are numbered in ascending order from top-to-bottom and right-to-left.

Note

For an enumeration of the NV8576 and NV8576-Plus I/O connectors and corresponding signal number, see [NV8576 I/O Signal Numbering](#) on page 119.

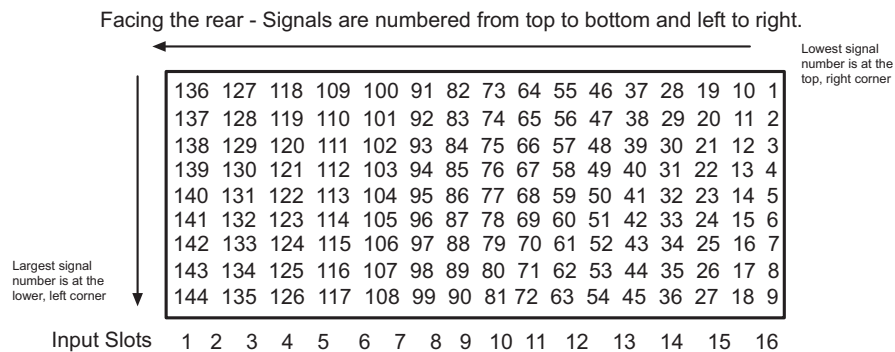


Figure 1-11. Example of backplane connectors and corresponding signal numbers

NV8576 and NV8576-Plus Note

All connectors and corresponding signals are numbered from top-to-bottom. This includes the NV8576 and NV857-Plus frame, which have two separate regions for backplanes: one in the upper half of the frame and one in the lower half of the frame. Backplanes installed in the lower portion of the frame are rotated 180° from those in the upper portion and “face” in the opposite direction. (See [Backplanes](#) on page 29.) Even though the backplanes are installed differently in the upper and lower regions, the signal numbering for each backplane connector *is identical*. In other words, whether the backplane is installed in the upper region or lower region, when facing the rear of the router frame the signal numbers applied to connectors are always numbered in ascending order from top-to-bottom and right-to-left.

LC input backplanes and LC expansion backplanes have five sets of two connectors each for a total of 10 connections. Because only 9 input signals are managed by an input card and only 9 output signals are managed by an expansion card, one connector is left unused. For the NV8576 and the NV8576-Plus, in the upper region of the frame the bottom connector is not used. In the bottom

region of the frame the backplanes are rotated 180° from those in the upper portion and “face” in the opposite direction. Therefore, therefore the top connector is not used.

For signal numbering purposes, the signal numbers in the lower frame start with the *second connector* and not the first connector. In other words, in the lower region of the frame, signal numbering starts with the first usable LC connector.

Figure 1-12 illustrates how signal numbers are applied to LC input backplanes and LC expansion backplanes in both the upper region and lower region of the router frame.

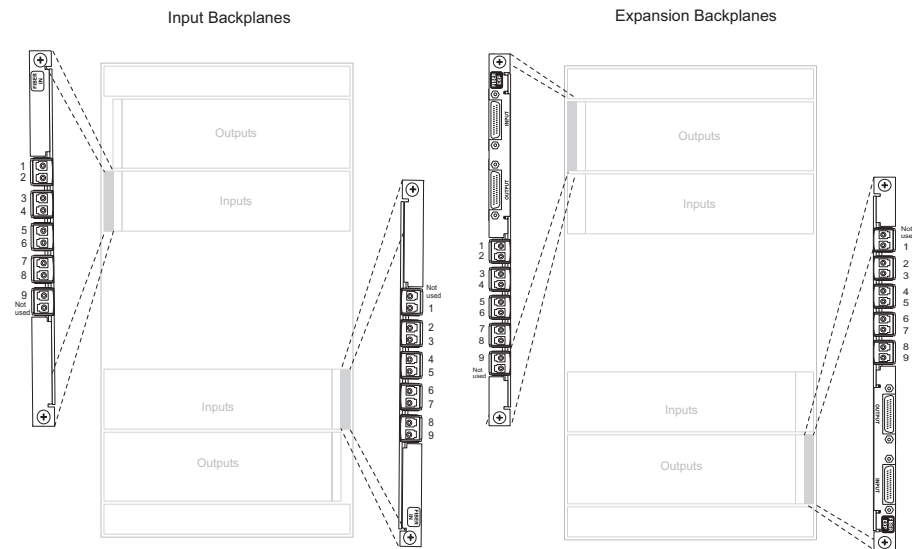


Figure 1-12. Example of Signal Numbers and LC Backplanes (rear view)

Connectors, Signal Numbers and Specific Frames

The following illustrate how signals are numbered in each NV8500 Family router. When making physical connections, it is important to review the numbering sequences to ensure the correct signal number is associated with the correct signal connector.

For inputs, each card slot manages nine signals. For outputs, each card slot manages 18 signals. For expansion cards installed in output card slots, each slot manages 9 output signals and two expansion signals.

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Signal Rates and Flow

Figure 1-13 illustrates the signal number ranges when facing the **rear** of the NV8576 or NV8576-Plus router. For an enumeration of the NV8576 and NV8576-Plus I/O connectors and corresponding signal number, see [NV8576 I/O Signal Numbering](#) on page 119.

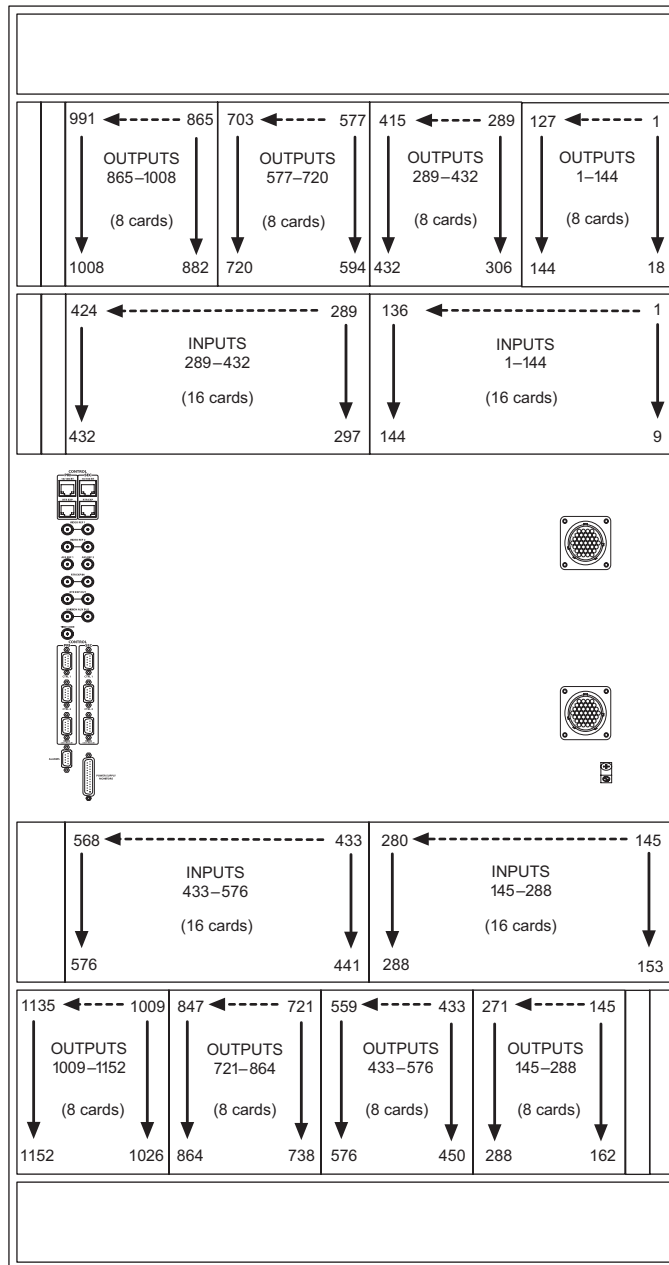


Figure 1-13. Signal Numbering for NV8576 and NV8576-Plus (Rear View)

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Signal Rates and Flow

Figure 1-14 illustrates the signal number ranges when facing the **rear** of the NV8280 or NV8280-Plus router.

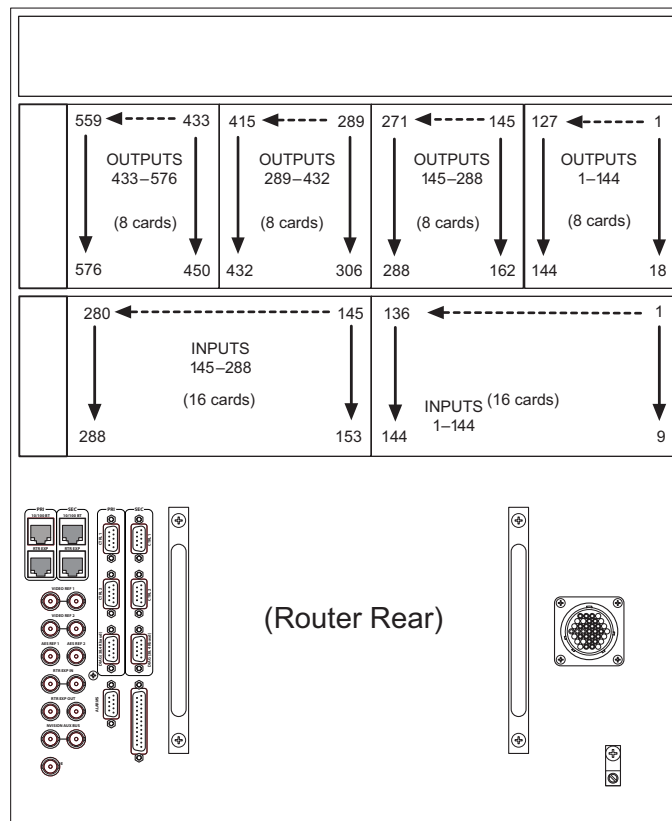


Figure 1-14. Signal Numbering for NV8280 and NV8280-Plus (Rear View)

Figure 1-15 illustrates the signal number ranges when facing the **rear** of the NV8144 router.

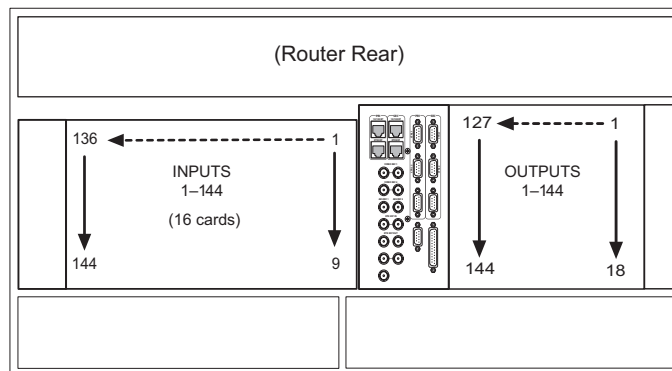


Figure 1-15. Signal Numbering for NV8144 (Rear View)

1. Introduction

Front Module Slots and Rear Connections

Router frames in the NV8500 family have slots for input, output, monitor, control and crosspoint cards. Cards are installed in slots from the front of the router frame. The rear of the router is a back plate into which backplanes containing connections for receiving, distributing or monitoring signals are installed. The back plate also contains connections for system functions, such as a control system, alarms or references.

Active circuitry is contained on the input cards, output cards, control cards, power supply modules and fan trays installed through the router's front. The backplane modules are passive and do not contain active circuitry, with the exception of the backplane containing LC (fiber optic) connectors.

Depending on the router frame, up to four internal motherboards span the frame and distribute I/O signals, control signals, timing information and power. Active cards plug into the motherboards from the front of the router and backplanes plug into the same motherboards from the rear. Each input card and output card has a corresponding backplane. All cards are "hot-swappable," but the cards must be paired with the appropriate corresponding backplane. Each backplane features LEDs that warn if an incorrect card is installed in the corresponding card slot for that backplane. For more information, see [Backplanes](#) on page 29.

Front Slots

Router frames in the NV8500 family have common card slots. For more information on each type of card housed in the router frames, see [Active Cards](#) on page 37. For information on signal numbering and corresponding card slots, see [Slots and Corresponding Signal Numbers](#) on page 8.

NV8144

Figure 1-16 shows the front of the NV8144 router frame with the door removed. At the top of the frame is the fan tray. Directly below the fan tray are slots for active cards. On the far left are 8 slots for output cards. Directly to the right of the output cards is a single slot for the monitor card. Near the center of the frame, to the right of the output cards, are two slots. The first slot holds a 144 x 144 crosspoint card. The second slot holds a second, optional 144 x 144 crosspoint card for redundancy.

To the right of the crosspoint card slots are 16 slots for input cards. To the right of the input card slots are two additional slots for the primary and secondary control cards.

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Front Module Slots and Rear Connections

Below the active card slots, at the bottom of the frame, are two power supply modules.

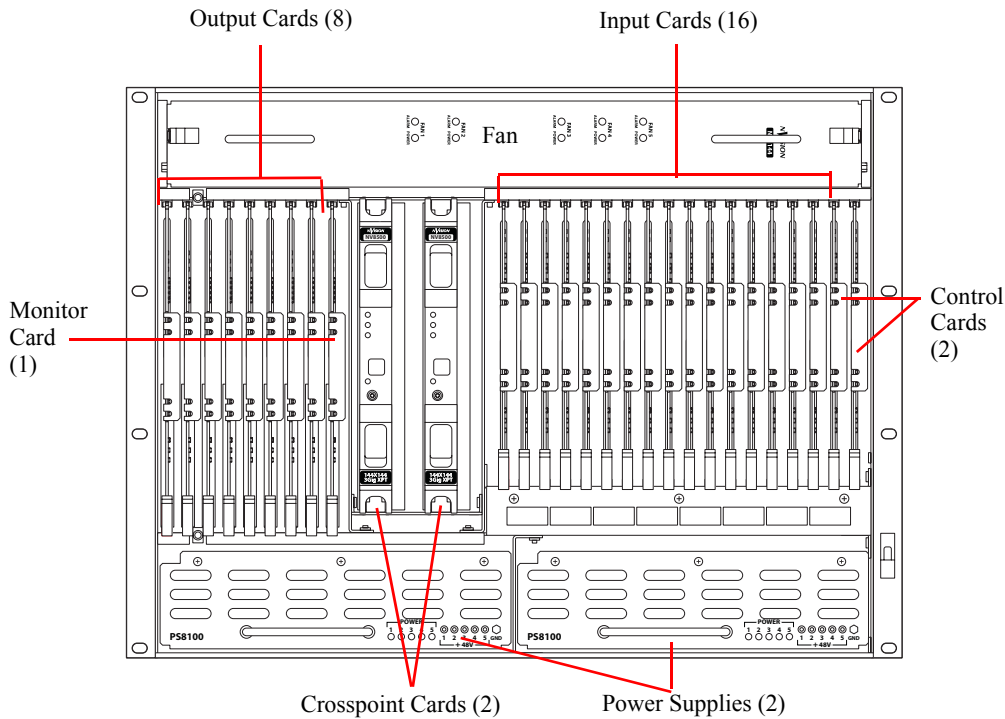


Figure 1-16. NV8144 with Door Removed (Front View)

NV8280 and NV8280-Plus

Figure 1-17 on page 22 shows the front of the NV8280/NV8280-Plus router frame with the door removed. The NV8280 and the NV8280-Plus have identical frames. What makes an NV8280-Plus able to connect to another NV8280-Plus frame are the unique expansion output cards and corresponding expansion output backplanes located on the rear of the router. For more information, see [Frame Expansion](#) on page 45.

From this view, you can see the modules inserted in the slots. At the top of the frame is the fan tray. Directly below that are 32 slots for output cards. Below the output cards are 32 slots for input cards, for a total of 64 cards. To the far right of the output card slots are two additional slots for the input monitor and output monitor cards. Similarly, to the far right of the input card slots are two additional slots for the primary and secondary control cards.

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Front Module Slots and Rear Connections

Below the input card slots, at the bottom of the frame, are 10 crosspoint card slots. The fifth and sixth crosspoint card slots house an optional redundant crosspoint cardset (two-card module).

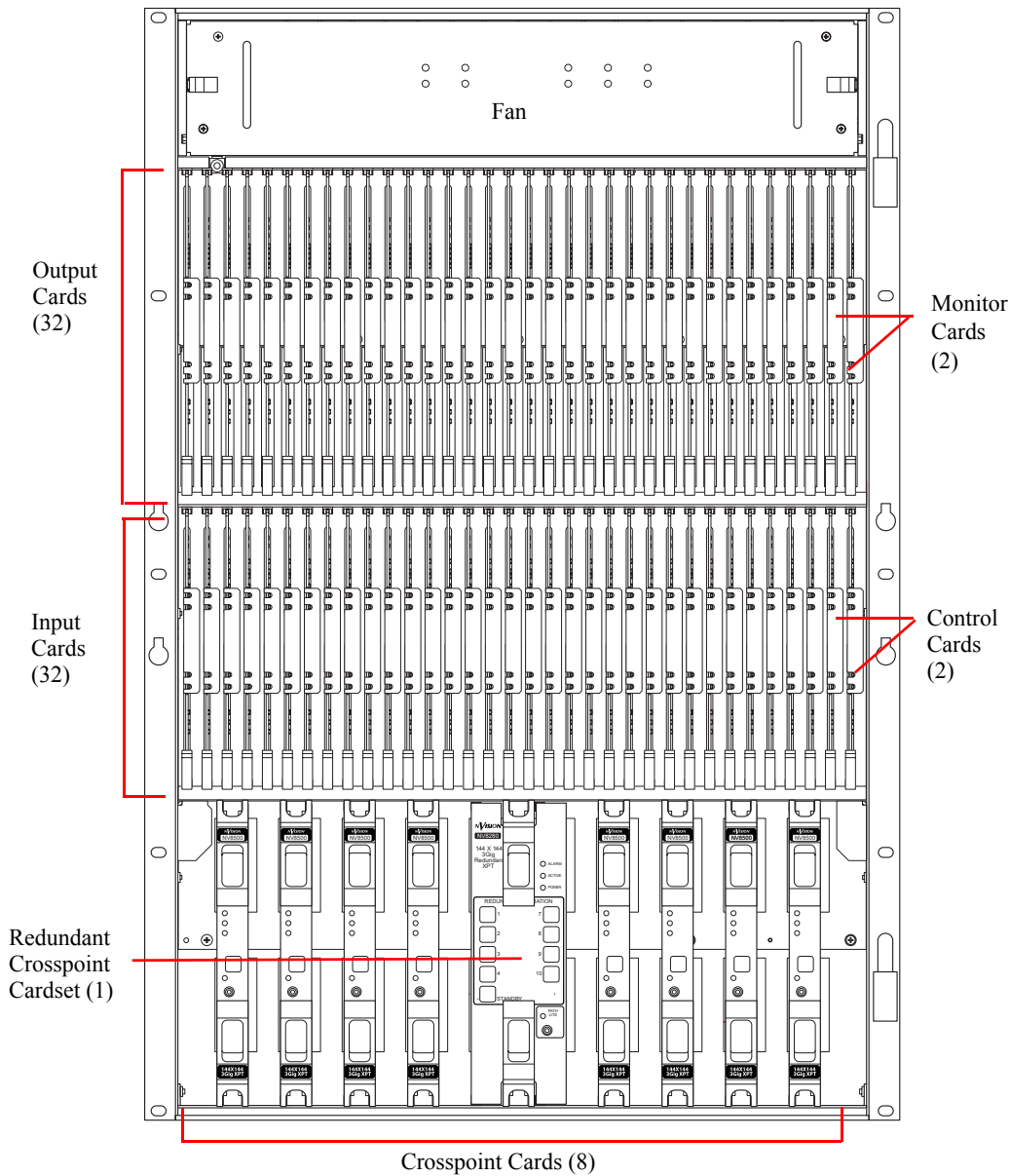


Figure 1-17. NV8280/NV8280-Plus with Door Removed (Front View)

NV8576 and NV8576-Plus

Figure 1-18 shows the front of the NV8576 router frame with the door removed. From this view, you can see the modules inserted in the slots. The NV8576 and the NV8576-Plus have identical frames. Unique expansion output cards and corresponding expansion output backplanes enable the NV8576-Plus router to connect to another NV8576-Plus frame. The frames themselves are not changed. For more information, see [Frame Expansion](#) on page 45.

The router is divided into three general regions: upper, middle and lower. The upper and lower regions are mirror images of each other featuring 32 slots for output cards and 32 slots for input

1. Introduction

Front Module Slots and Rear Connections

cards, for a total of 64 output cards and 64 input cards. In the upper region, to the far right of the output card slots, are two additional slots for the input monitor card and the output monitor card. Similarly, to the far right of the input card slots are two additional slots for the control cards (one primary and one secondary). Two more monitor card slots are featured in the lower region to the far left of the output cards, as shown in Figure 1-18 on page 23.

In the middle region are 10 slots for crosspoint cards. The fifth and sixth crosspoint card slots house an optional redundant crosspoint cardset.

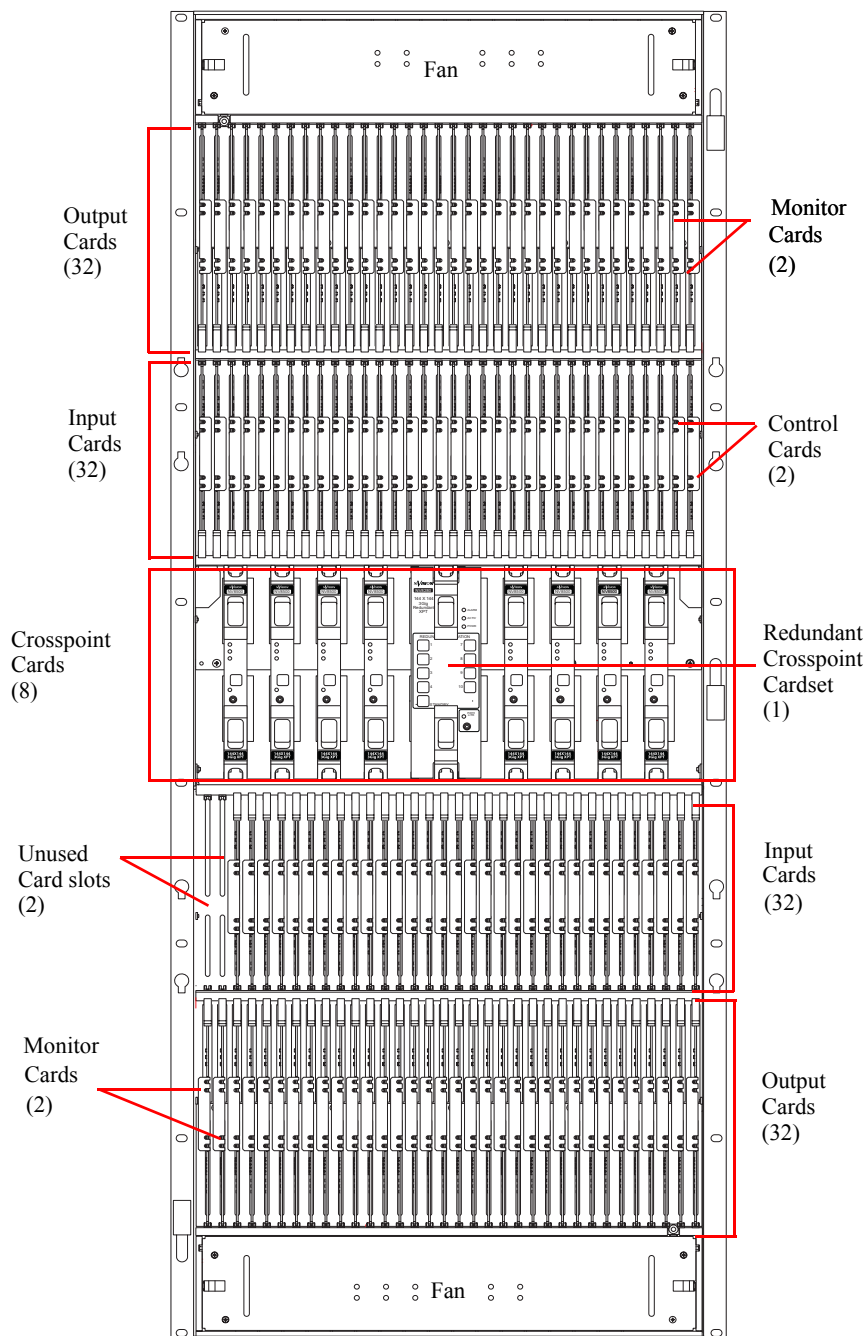


Figure 1-18. NV8576/NV8576-Plus with Door Removed (Front View)

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Front Module Slots and Rear Connections

Rear Connections

The rear of the NV8500 family router frames (Figure 1-21 on page 28) feature a back plate containing openings for installing interchangeable backplanes housing connectors. The type and number of connectors change depending on the signal being managed and which of the NV8500 family routers are being used.

NV8144

The rear of the NV8144 houses backplanes and system connections. When facing the rear, the farthest left-hand section has a blank plate. This corresponds to the control cards, which are installed through the front of the router frame. Next to the control card plate are 16 backplanes housing connectors for receiving incoming signals. These backplanes are installed in slots that correspond to active cards for inputs. (See [Front Slots](#) on page 20.) The middle section contains system connections, such as audio and video references, control systems, and so on. For details, see [System Connections](#) on page 32.

To the right of the section containing the system connections is a single backplane for monitor signals. To the right of the monitor backplane are 8 backplanes housing connectors for distributing outgoing signals. These backplanes are installed in slots that correspond to active cards for outputs.

At the very top of the frame are grills for exhausting warm air dispersed by the fans in the fan tray. Near the bottom of the frame are two power connections for connecting the two power supply modules to power. To the right of the left-most power connection is a connection for alarms. For details, see [System Alarm](#) on page 36.

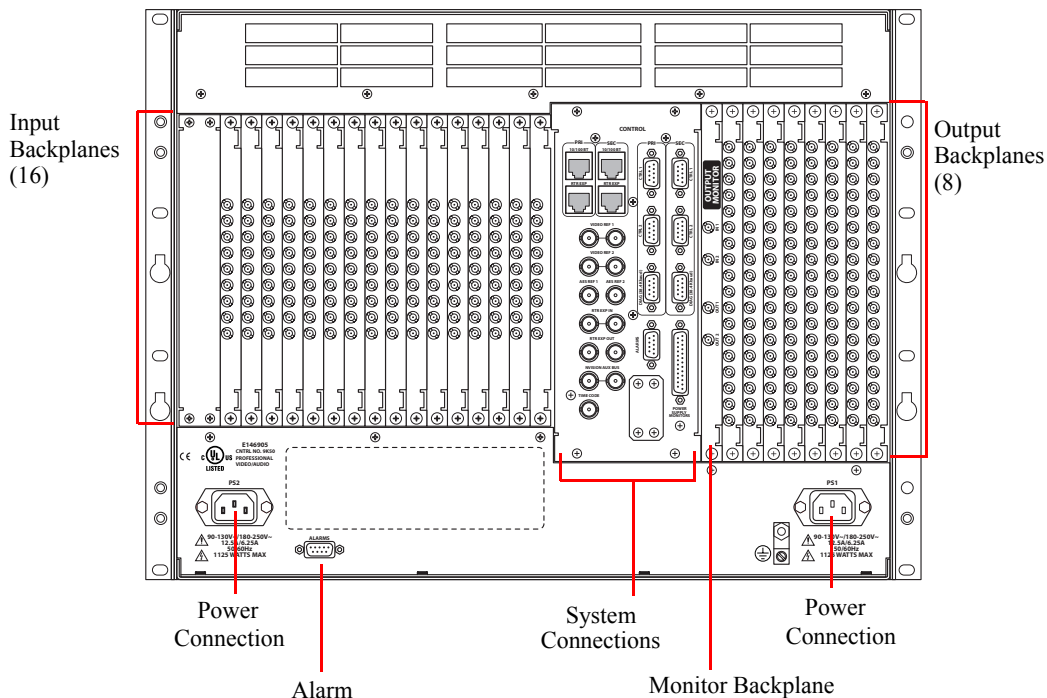


Figure 1-19. NV8144 Rear of Router Frame (Rear View)

NV8280 and NV8280-Plus

The rear of the NV8280 and NV8280-Plus house backplanes and system connections, as shown in Figure 1-20 on page 26. At the very top of the frame are grills for exhausting warm air dispersed by

1. Introduction

Front Module Slots and Rear Connections

the fans in the fan tray. Directly below the fan tray, starting from the left-hand side when facing the rear of the router, are two backplanes for monitor signals. These backplanes contain 4 DIN 1.0/2.3 monitor connections that send input and output monitor signals to monitoring equipment. To the right of the monitor backplanes are 32 backplanes housing connectors for distributing outgoing signals. These backplanes are installed in slots that correspond to active cards for outputs. (See [Front Slots](#) on page 20.)

The output backplanes can either contain 18 DIN 1.0/2.3, terminal block, or LC connectors *or if for expansion* 9 DIN 1.0/2.3, terminal block, or LC connectors and 2 high-density connectors for sending signals between two connected NV8280-Plus frames. For more information on backplanes, see [Backplanes](#) on page 29.

In the section directly below the output backplanes, starting from the left, is a blank backplate. This covers the back of the slots into which the control cards are installed (through the front of the router). Next to the backplate are 32 backplanes housing connectors for receiving incoming signals. These backplanes are installed in slots that correspond to active cards for inputs. Each backplane contains either 9 coax, terminal block, or LC connectors.

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Front Module Slots and Rear Connections

Near the bottom of the frame are connections for system and power functions. For details, see [System Connections](#) on page 32.

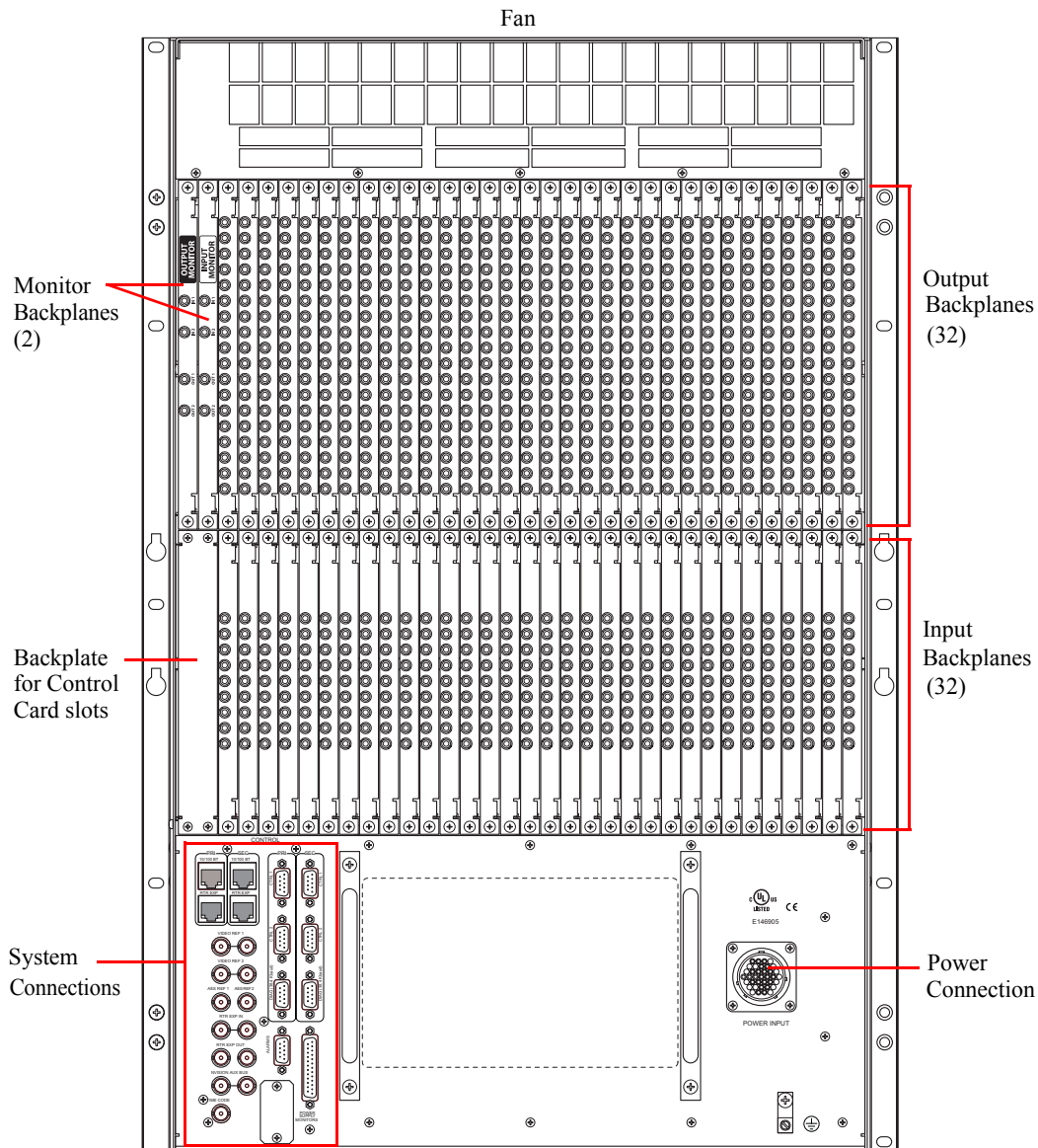


Figure 1-20. NV8280/NV8280-Plus Rear of Router Frame (Rear View)

NV8576 and NV8576-Plus

Similar to the front of the router, the rear of the frame is divided into three general regions: upper, middle and lower. The upper and lower regions are mirror images of each other featuring a total of 32 slots for output backplanes corresponding to output cards and 32 slots for input backplanes corresponding to input cards, for a total of 64 backplanes for outputs and 64 backplanes for inputs. The input backplanes can contain either 9 DIN 1.0/2.3, terminal block, or LC connectors, through which incoming signals are received. The output backplanes can one of two sets of connectors: 18 DIN 1.0/2.3, terminal block, or LC connectors that distribute outgoing signals *or if for expansion* 9 DIN 1.0/2.3, terminal block, or LC connectors that distribute outgoing signals plus 2 high-density con-

1. Introduction

Front Module Slots and Rear Connections

nectors for sending signals between two connected NV8576-Plus frames. For more information on backplanes, see [Backplanes](#) on page 29.

In the upper region, to the far left of the output backplanes are two additional backplanes. Each backplane contains 4 DIN 1.0/2.3 coax connections that send signals to monitor cards. (See Figure 1-21 on page 28.) Likewise, in the lower region, to the far right of the input backplanes are two more backplanes for monitor signals. In the middle region of the frame, are connections for system and power functions, as shown in Figure 1-21 on page 28.

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Front Module Slots and Rear Connections

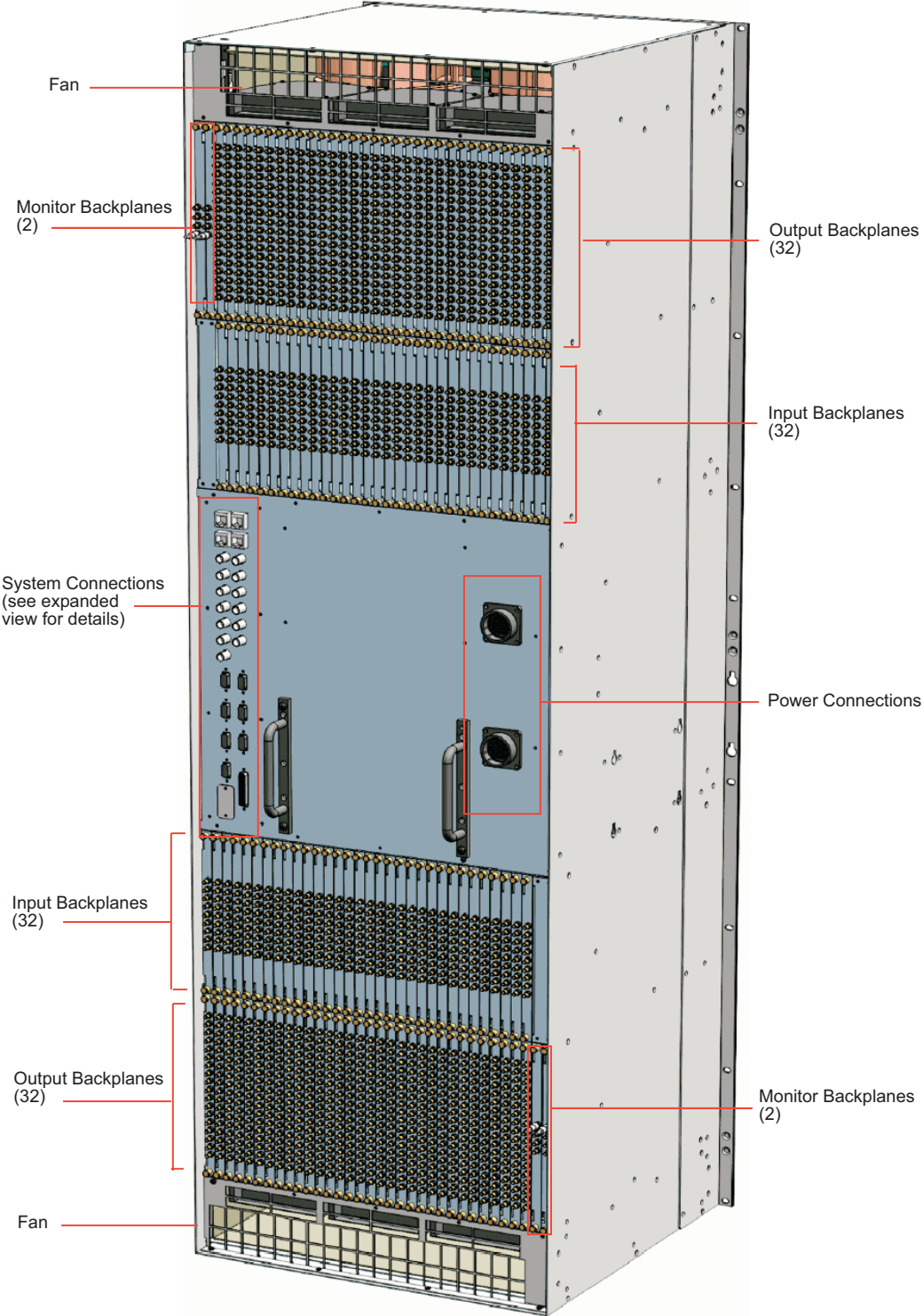


Figure 1-21. NV8576/NV8576-Plus Rear of Router Frame (Rear View)

Backplanes

The rear of the NV8500 family of routers feature rear backplane modules. Each backplane contains connectors that receive or distribute signals. Each signal type requires a specific connector and backplane. For example, fiber optic signals require backplanes housing LC connectors. Different types of backplanes can be combined in a single router frame. This enables you to meet different signal and cabling requirements in a single router frame.

The type of backplane installed depends on the signal being managed and whether the router is a standalone or expandable router. There are different backplanes for different tasks. Certain backplanes are used for receiving inputs or distributing outputs, other backplanes receive or distribute signals for monitoring purposes, and when two expandable router frames are connected, unique backplanes manage the distribution of signals between the two frames.

Backplanes containing DIN 1.0/2.3 or terminal block connectors are passive while backplanes with LC connectors have active circuitry.

For proper operation, each backplane must match its corresponding input card, output card, or monitor card. For example, if a backplane is to receive coaxial input signals, then a coax input card must be installed in the corresponding card slot. For a description of each type of active card, see [Active Cards](#) on page 37.

Connectors on a backplane differ depending on the signals being managed and whether the router is being used in standalone or expanded mode.

Signal	Input Connectors	Output Connectors	Output Plus Expansion Connectors	Cable	Part Number
AES3 Asynch. Unbalanced	9 DIN 1.0/2.3	18 DIN 1.0/2.3	9 DIN 1.0/2.3 plus 2 expansion	coax, proprietary	Input EM0791 Output EM0793 Expansion EM0789
AES3 Asynch. Balanced	9 terminal block	18 terminal block	9 terminal block plus 2 expansion	coax, proprietary	Input EM0828 Output EM0829 Expansion EM0830
SD, HD, 3Gig (coax)	9 DIN 1.0/2.3	18 DIN 1.0/2.3	9 DIN 1.0/2.3 plus 2 expansion	coax, proprietary	Input EM0791 Output EM0793 Expansion EM0789
SD, HD, 3Gig (fiber optic)	9 LC	18 LC	9 LC plus 2 expansion	fiber optic, proprietary	Input EM0691 Output EM0694 Expansion EM0698
Monitor	2 DIN 1.0/2.3	2 DIN 1.0/2.3	NA	coax, proprietary	Input EM0715 Output EM0714 (Note: The NV8144 uses only one backplane, the EM0715).

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Front Module Slots and Rear Connections

Figure 1-22 is an example of some of the different types of backplanes. In the NV8576 and NV8576-Plus frames, backplanes installed in the lower portion of the router are rotated 180° from those in the upper portion and “face” in the opposite direction. Expansion backplanes featuring terminal block connectors and two expansion connectors are currently under development.

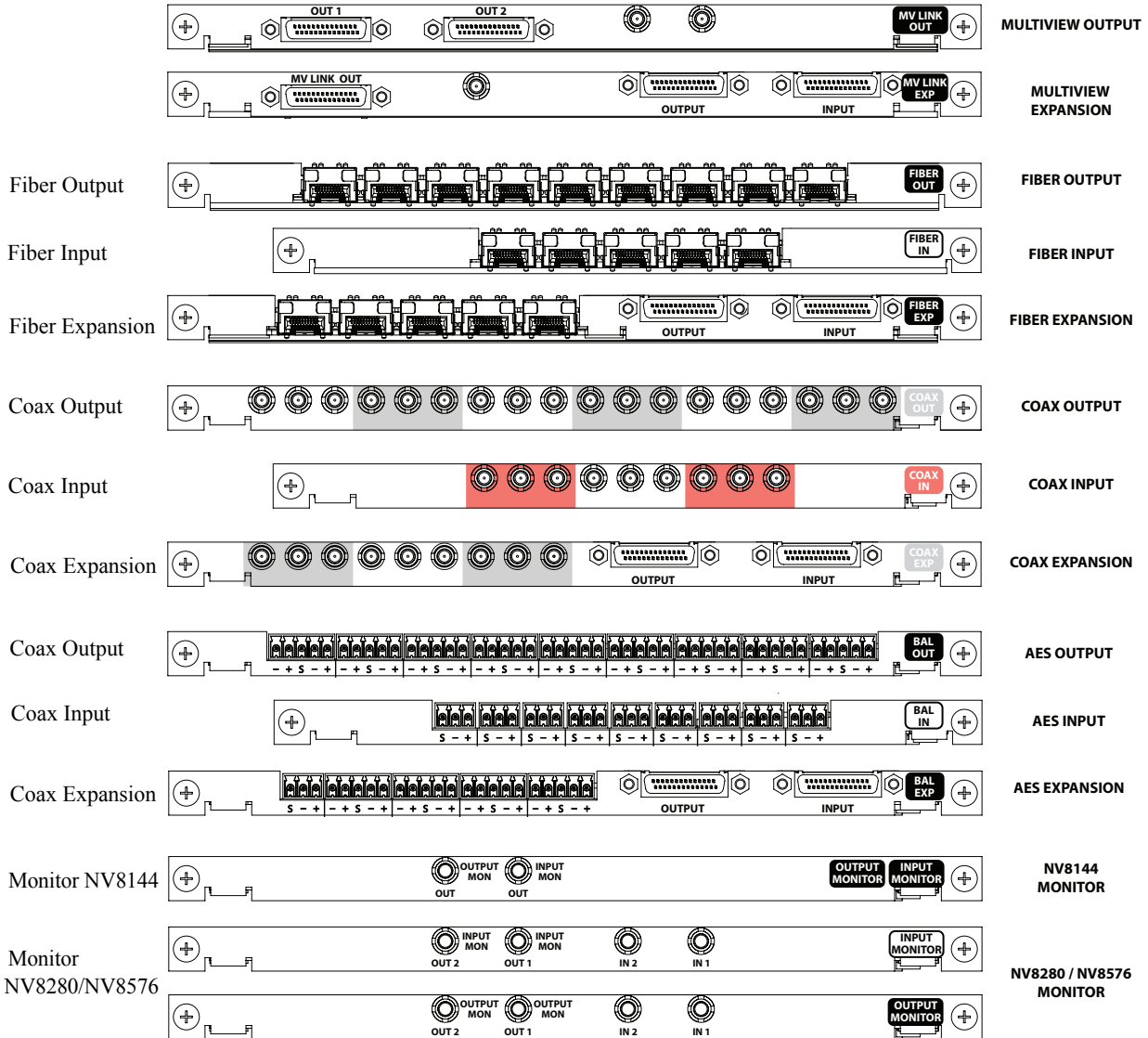


Figure 1-22. Backplanes

Viewing from top to bottom backplanes are grouped by connector type with one backplane for inputs, the next for outputs and the third for expansion signals. The first set of backplanes feature LC connectors for fiber optic signals (SD, HD, 3Gig), followed by DIN 1.0/2.3 connectors for coax signals (SD, HD, 3Gig and AES unbalanced), and lastly terminal block connectors for coax signals (SD, HD, 3Gig and AES balanced). The last three backplanes are for monitoring signals. There is a single backplane for the NV8144 and two backplanes for monitoring inputs and outputs in the NV8280, NV8280-Plus, NV8576 and NV8576-Plus frames.

Notice that the LC connectors are actually modules containing two connectors each. The input backplane and the expansion backplane contain 5 modules totalling 10 LC connectors each. The output backplane contains 9 modules for a total of 18 LC connectors. When making input and

expansion connections, the bottom LC connector remains empty because only 9 signals are allowed on the input backplane and the expansion backplane.

About Monitor Backplanes

Depending on the router frame, up to 4 monitor cards can be installed. Each monitor card produces 2 signals that can be sent to monitoring equipment for the purpose of assessing signal presence and quality. There is a single type of monitor card; not different monitor cards for monitoring inputs or outputs. Whether the card monitors inputs, outputs, or both depends on the type of router frame, the slot into which it is installed on the frame, and the backplane associated with the card.

The monitor card must have a corresponding monitor backplane installed. (See Figure 1-22 on page 30.) The backplane contains connectors through which signals are sent from the “mated” monitor card to monitoring equipment. For the NV8144 there is a single monitor backplane that monitors both inputs and outputs. Backplane connectors are labeled ‘OUTPUT MON’ and ‘INPUT MON’.

For the NV8280 and NV8576 there is one monitor backplane for inputs and a separate monitor backplane for outputs. The backplane connectors are labeled ‘IN 1’, ‘IN 2’, ‘OUT 1’ and ‘OUT 2’. Two of the connectors connect cables to the monitoring equipment. The other two connectors are used for “chaining together” multiple monitor cards or multiple routers.

The connectors labeled ‘IN’ on the backplane:

- Cross-connect monitor cards to other monitor cards, such as when two expandable frames (NV8280-Plus or NV8576-Plus) are connected together, which enables the monitoring equipment access to all inputs or outputs, or
- Connect to an ‘OUT’ connector when cross-connecting multiple monitor cards in the same frame to each other. This only applies to NV8576 or NV8576-Plus.

The connectors labeled ‘OUT’ on the backplane:

- Connect to an ‘IN’ connector when cross-connecting monitor cards (as noted above), or
- Send signals for monitoring purposes to monitoring equipment.

The NV8280/NV8280-Plus and NV8576/NV8576-Plus router frames have separate monitor card slots for monitoring inputs and outputs. The NV8280/NV8280-Plus router frame uses two cards: one for inputs; one for outputs. The NV8576/NV8576-Plus router frame uses four cards: two for inputs; two for outputs. The card slot determines the signals monitored: a monitor card in the input monitor card slot monitors inputs; a monitor card in the output monitor card slot monitors outputs.

In the NV8280/NV8280-Plus, the input monitor card receives one signal from each input card. Similarly, an output monitor card receives one signal from each output card. The NV8576/NV8576-Plus monitor cards work exactly the same way except that the monitor cards in the upper portion of the router frame receive signals only from the output cards and input cards located in the upper region. Likewise, the monitor cards in the lower region of the frame receive signals only from the input and output cards installed in the lower region of the frame.

To maximize efficiency, only one signal is sent from each input or output card to the monitor card for forwarding to monitoring equipment. This means that only one signal from each input card or output card is monitored at any give time.

Whether or not input and/or output monitor signals can be accessed and managed depends on the application version currently loaded on the router’s control cards and if a Monitor Level has been created using UniConfig. (See the *UniConfig User’s Guide*.)

1. Introduction

Front Module Slots and Rear Connections

System Connections

Routers in the NV8500 family feature connections for managing system functions, located on the rear of the router, as shown in Figure 1-23. The following is an example of an NV8576 router frame. While the system connections may not be positioned exactly as shown in this example, all connections are labeled as indicated and perform the functions stated in the following sections.

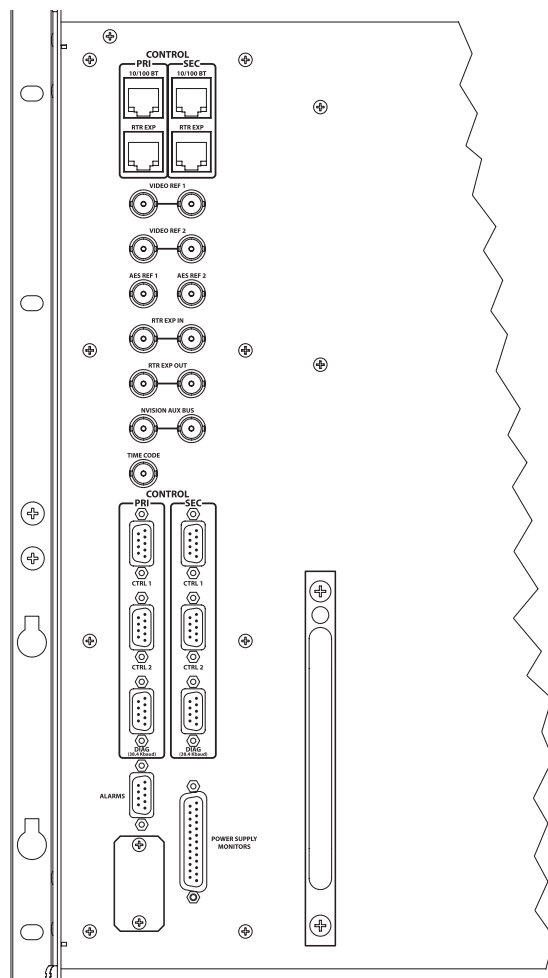


Figure 1-23. System Connections for NV8576 Router Frame

These connections allow you to connect:

- A router control system.
- Reference signals.
- A PC running the UniConfig application.
- System alarms that sends notification of a system failure, such as a fan or power supply malfunction.

Router Control System Connections

Router control systems run on a separate platform connected to the router. The router provides two ways to connect to a router control system: serial or Ethernet. There is also an Miranda Aux Bus connection present, but it is not being used at this time. The router control system determines which

connection is used. For example, to connect to the Miranda NV9000 control system an Ethernet connection is preferred.

Serial Control Connections

The NV8500 family routers have four serial ports, as shown in Figure 1-24. The ports are divided into two sets, one primary control ('PRI') and one secondary control ('SEC'). Primary control is the connection to the primary control card. Secondary control is the connection to the secondary control card (which is optional for redundancy). Each set is further divided into connections that correspond to router control systems: 'CTRL 1' corresponds to the primary control system and 'CTRL 2' corresponds to an alternate control system. Using 'CTRL 2' connections you can connect to an alternate control system (i.e., backup system) or set up dual control. For installation instructions, see [Serial Control Connections](#) on page 70.

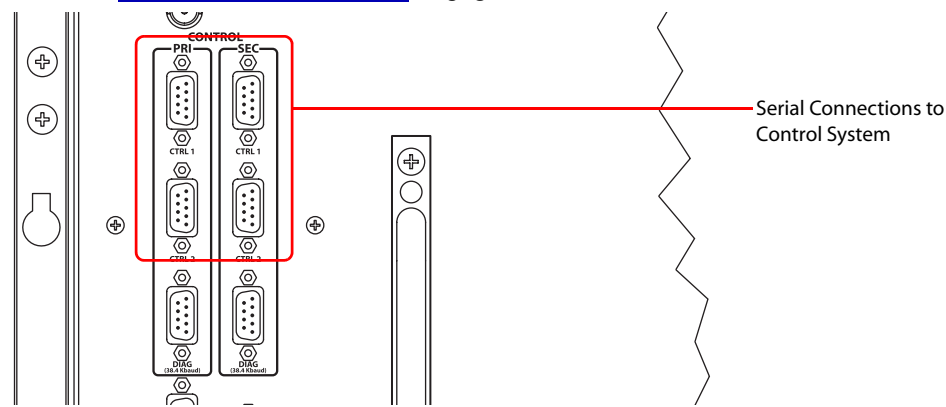


Figure 1-24. Serial Control Connections (Rear View)

Ethernet Control Connections

The router has two Ethernet ports, labeled '10/100BT', as shown in Figure 1-25. These ports are also divided into two sets, one primary ('PRI') and one secondary ('SEC'). The primary port connects an NV9000 router control system to the primary control card. The secondary port connects an NV9000 router control system to the secondary control card. For installation instructions, see [Ethernet Control Connections](#) on page 72.

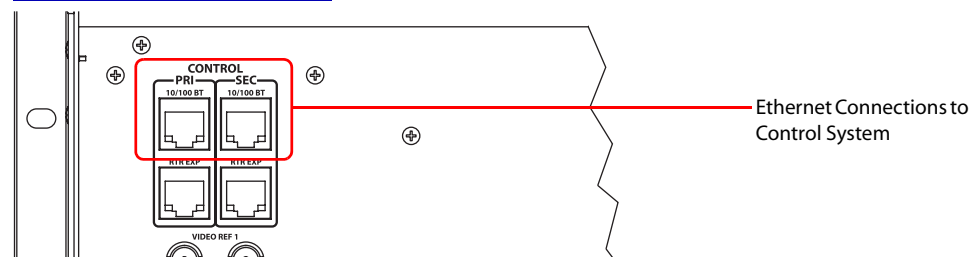


Figure 1-25. Ethernet Control Connections (Rear View)

1. Introduction

Front Module Slots and Rear Connections

For the router to communicate with the router control system through an Ethernet connection, you must configure an IP address in the control card. The IP address is set using UniConfig. However, UniConfig runs on a PC and similarly cannot communicate with the router until an IP address has been entered. Therefore, you must use a serial connection—using the ‘DIAG’ port(s)—to the computer (PC) running UniConfig to define the IP address(es). (See [Serial Control Connections](#) on page 70.)

Aux Bus Control Connections

The Miranda Aux Bus connection is located on the rear of the router. However, the Aux Bus connection is not used at this time.

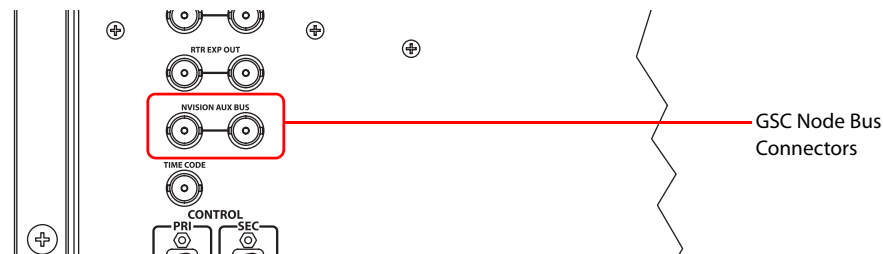


Figure 1-26. AUX Bus Control Connections (Rear View)

Control System Expansion Connections

In order to manage two connected expandable router frames (NV8280-Plus or NV8576-Plus), control system expansion connections need to be connected between the routers. Expansion control system connections are located on the rear of the router, as shown in Figure 1-27.

There are two connections provided. Only one is required for control system expansion connections. The other connection is available as a redundant connection, providing a backup connection to the control system should the other connection fail.

For instructions on making control system expansion connections, see [Control System Expansion Connections](#) on page 73.

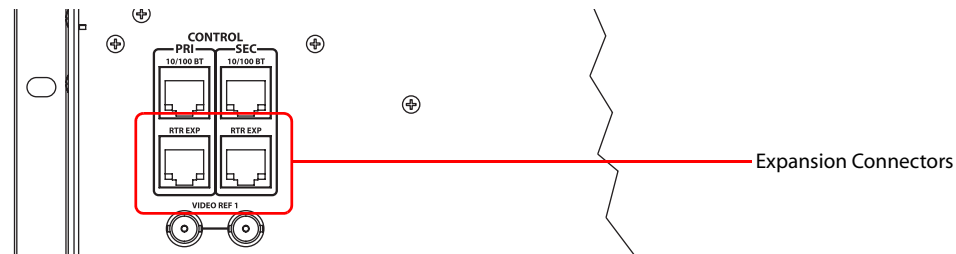


Figure 1-27. Expansion Control System Connections (Rear View)

Diagnostic Connections

The diagnostic connections enable the router to communicate with the UniConfig application. UniConfig runs on a PC separate from the router and is used to perform system setup tasks, and configure and monitor the router. Please refer to the *UniConfig User's Guide*.

Diagnostic connections connect the router to the computer (PC) running the UniConfig application. Two diagnostic connections are located on the rear of the router, labeled ‘DIAG’. The ports are divided into two sets: one primary (‘PRI’) and one secondary (‘SEC’), as shown in Figure 1-28. The primary control connects to the primary control card. The secondary control connects to the

secondary (optional for redundancy) control card. For instructions, see [Making Diagnostic Connections](#) on page 74.

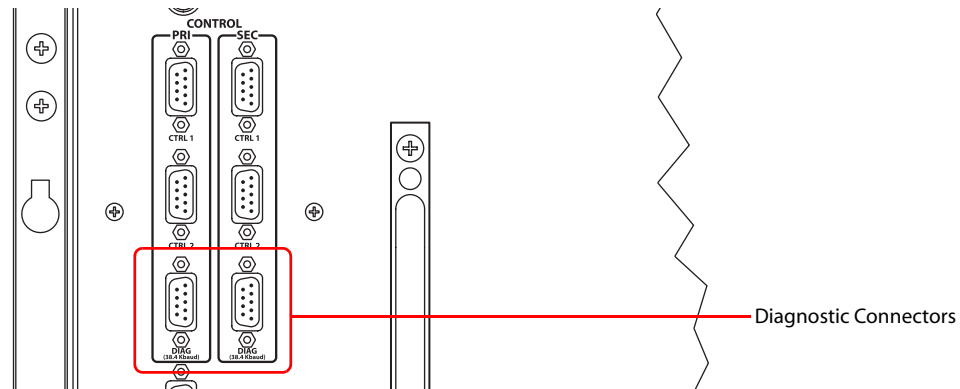


Figure 1-28. Permanent Diagnostic Connections (Rear View)

AES Reference Connections

The AES reference is used for clock generation, which provides a timing reference for AES synchronous signals and for timing circuits on the control card.

Routers in the NV8500 family have two AES reference connections labeled ‘AES REF1’ and ‘AES REF2’, as shown in Figure 1-29. Both connections are shared by the primary control card and the secondary control card. (See [Control Cards](#) on page 38.) The AES reference connections are “redundant” and use the same reference type. When both reference connections are connected, if one reference fails, the control card automatically fails-over to the redundant reference.

The AES reference connection requires a stable signal source of AES with a sample rate of 48kHz. For instructions on making AES reference connections, see [Making AES Reference Connections](#) on page 75.

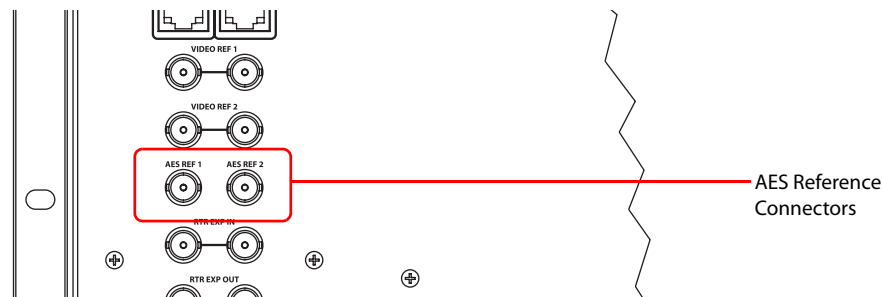


Figure 1-29. Connections to AES References (Rear View)

Video Reference

Routers in the NV8500 family provide timing reference connections for video signals, labeled ‘VIDEO REF 1’ and ‘VIDEO REF 2’, as shown in Figure 1-30. Located on the rear of the router, these connections provide a reference input for determining the router’s video frame switch point. The video reference connections require a stable source of PAL, NTSC or Tri-level sync.

If a video reference is present, signals switch at the defined frame and line switch points. If a video reference is not present, the router still performs the switch, but to an internal reference. If a video reference is not connected, the control card displays a lit red LED. (See [Indicator LEDs](#) on page

1. Introduction

Front Module Slots and Rear Connections

101.) For instructions on making video reference connections, see [Making Video Reference Connections](#) on page 76.

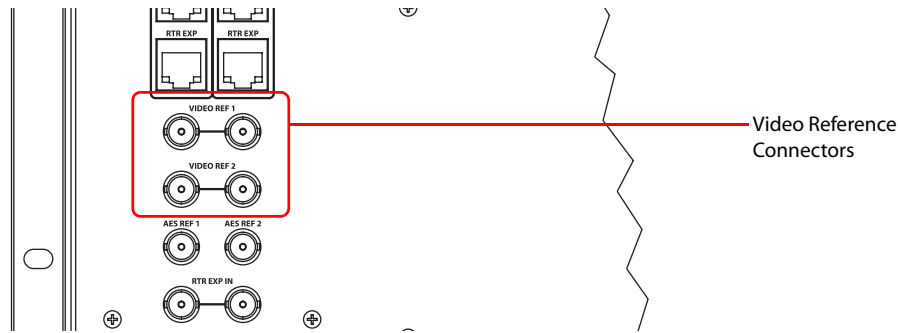


Figure 1-30. Connections to Video References (Rear View)

Redundant and Dual References

There are two video reference connections. The same reference can be used for both connections or a different reference for each connection. When using the same, or “redundant,” references for both connections, if one reference fails, the control card fails-over to the redundant reference. When using different references, or “dual” references, switch takes can occur based on one or the other reference. For example, if ‘VIDEO REF 1’ uses NTSC as a reference and ‘VIDEO REF 2’ uses PAL as a reference. Using UniConfig, the type of setting is selected: redundant or dual, and if dual, which outputs use which video reference on an output by output basis. (See the *UniConfig User’s Guide*.)

Time Code Reference Connection

There are two connections for a reference source for Time Code signals labeled ‘TIME CODE’, as shown in Figure 1-31. However, time code signals are not supported at this time.

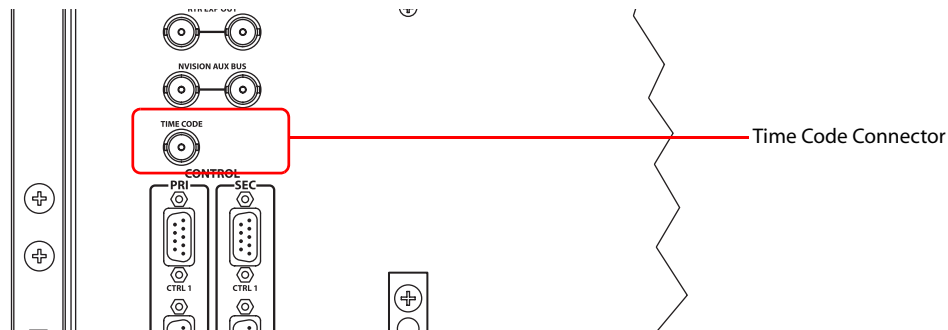


Figure 1-31. Time Code Reference Connection (Rear View)

System Alarm

Routers in the NV8500 family have a system alarm that sends notification of a malfunction, such as when a fan or power supply is not functioning properly. The NV8000 power supply frame (used for the NV8280/NV8280-Plus and the NV8576/NV8576-Plus) and the routers each have alarm connections that can be connected to external equipment that display visual signals when an alarm is activated. Creation of an external alarm indicator is outside the scope of this manual, however basic instructions on wiring the alarm connection for external monitoring is provided. See [Alarm Indicator Equipment](#) on page 84.

In addition to an alarm connection, the routers are connected to a router control system that receives status information from the router's control card(s). (See [Router Control System Connections](#) on page 32.) The control card reads the status of NV8000's power supply and fans through the 'Power Supply Monitors' connection. (See [Power Supply](#) on page 3.) In addition, the control card monitors the router's power supply, fans, and video reference connections. Both NV8000 and router information is communicated to the router control system and viewable using UniConfig. (See the *Uni-Config User's Guide*.)

The alarm connection is labeled 'ALARMS' and is located on the rear of the router, as shown in Figure 1-32. For instructions on making alarm connections, see [Making Alarm Connections](#) on page 83.

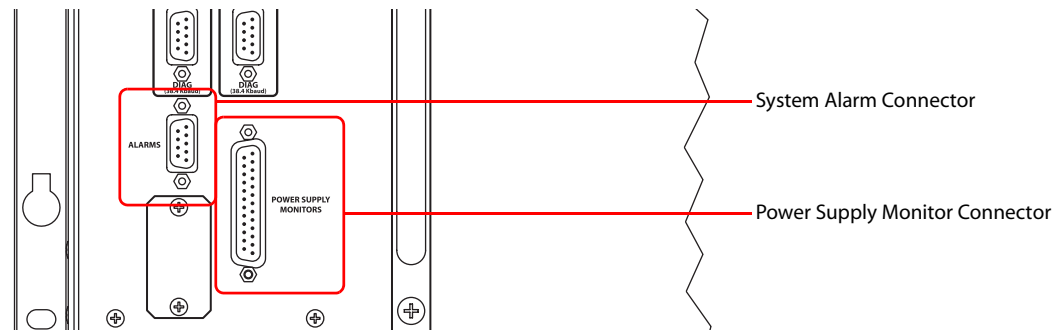


Figure 1-32. System Alarm Connection (Rear View)

Active Cards

Routers in the NV8500 family feature several active cards that manage incoming signals, process commands from the control system, perform signal switching, and distribute outgoing signals. Each card slides into a card guide and has a lever that holds the card in place and aids card ejection.

In any frame, there are:

- Two control cards—one primary and one secondary (which is optional, for redundancy).
- Up to 64 input cards—AES Asynchronous (balanced or unbalanced), SD or 3Gig.
- Up to 64 output cards—AES Asynchronous (balanced or unbalanced), SD or 3Gig.
- Up to 8 crosspoint cards.
- One redundant crosspoint card or crosspoint cardset (optional).
- Up to four monitor cards (optional).

The cards and their functions are described in the following sections. For information on installing cards, see [Installing Cards](#) on page 53.

Combining Input Cards and Output Cards

When you are connecting two expandable router frames (NV8280-Plus and NV8576-Plus), different combinations of input cards and output cards can be installed. For example, if two connected NV8576-Plus routers are configured for 576 inputs and 1152 outputs, input cards and crosspoint cards are not needed in both routers because the output cards on the second frame receive signals directly from the expansion cables.

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Active Cards

‘Expansion’ output expansion cards (EM0695) receive signals from an expandable router’s local input connections and from a second router connected through expansion cables. These cards also send signals back to the first router. If there are any input cards installed in a second frame, those signals must be delivered to the first frame and vice versa. ‘Expansion’ output cards are used when outputs are required in both the local and the second (connected) frame.

‘Filler’ output cards (EM0692) feed signals exclusively to the expansion cables connecting the two router frames and do not feed any connectors within the local frame. ‘Filler’ cards expand inputs and not outputs.

For a description of each card, see [‘Expansion’ Output Cards](#) on page 42 and [‘Filler’ Output Cards](#) on page 43.

Control Cards

A router has two control cards (EM0666), one primary and one secondary. The secondary card is optional and used as a redundant, or stand-by, controller. Each card receives commands from the router control system, and in turn, controls the input, output, crosspoint and monitor cards. Only the active control card sends commands to the I/O cards. The active control card updates the stand-by control card.

Both the primary control card and the secondary control card receive commands from the router control system, but only the active control card responds. Because both cards receive router control system commands, if the active control card fails, the stand-by control card automatically takes over processing without interruption. In addition, the primary control card and secondary control card communicate with each other. Should either control card fail, the newly active control card communicates the failure to the router control system.

The control card receives power from the motherboard and includes a status reporting circuit. Four LEDs on the front of the control card indicate the card’s status: low battery (red), alarm (red), active (amber), and operating normally (green). For more information, see [Indicator LEDs](#) on page 101.

Input Cards

Depending on the router frame, a router can hold up to 64 input cards, each processing up to 9 input signals. Input cards are designed for either coaxial or fiber optic signals and can manage SD, HD, and 3Gig video signals, and AES Asynchronous (balanced or unbalanced) audio signals. Input cards receive incoming signals through connectors housed on backplanes. The input card must be paired with the correct corresponding backplane. For example, if the input card manages coax signals, it must be paired with a backplane containing coax connectors appropriate for that signal. (See [Backplanes](#) on page 29.)

The following lists the different input cards available:

Input Card	Signal Types	Standard	Rates	Backplane
EM0687	Asynchronous Digital Audio Unbalanced	AES3	Sample rates 32 to 192kHz (passed through)	EM0791 (coax)
EM0687	Asynchronous Digital Audio Balanced	AES3	Sample rates 32 to 192kHz (passed through)	EM0828 (terminal block)

Input Card	Signal Types	Standard	Rates	Backplane
EM0689 (coax)	SD	259M	Video rates from 19 Mb/s to 360 Mb/s. Automatic reclocking at 270 Mb/s. Reclocking bypassed at other rates.	EM0791 (coax)
EM0783 (coax)	3Gig, HD, SD	259M	Video rates from 19 Mb/s to 3 Gb/s. Automatic reclocking at 270 Mb/s and 1.483, 1.485, 2.966, 2.970 Gb/s. Reclocking bypassed at other rates.	EM0791 (coax)
EM0693 (fiber optic)		344M 292M 424M		EM0696 (fiber optic)

Input Card Functions

All input cards have 9 cable equalizers. Each distributes five copies of the signal to the motherboard. The motherboard forwards the copies to crosspoint cards for distribution to output cards, or if an expandable frame, to expansion connectors for distribution to a connected frame. An incoming signal can be distributed to any or all output cards.

Figure 1-33 shows the signal flow for an input card.

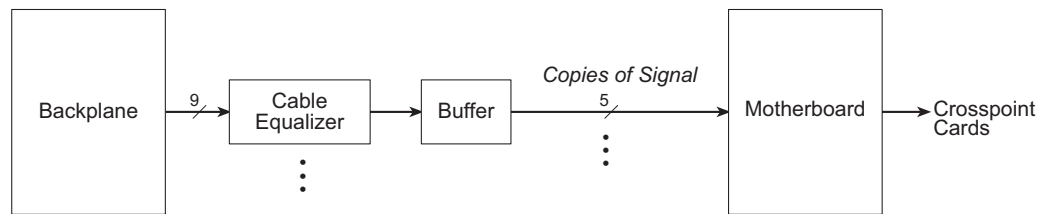


Figure 1-33. Input Card Block Diagram

Visual Indicators

All input cards have a circuit that performs status reporting and drives the card's functions. Five LEDs on the front of the input card indicate the card's status: alarm (red), power good (green), software is loaded (amber), and whether the communication with the control card is good (green) or bad (red). For more information, see [Indicator LEDs](#) on page 101.

Crosspoint Cards

A router frame can house up to 8 crosspoint cards and one redundant crosspoint cardset (2-card module). The crosspoint card for the NV8144 (EM0799) and the NV8280/NV820-Plus (EM0799) switch 144 inputs x 144 inputs. The crosspoint card for the NV8576/NV8576-Plus (EM0662) can receive and distribute 288 inputs x 288 outputs. Both types of crosspoint cards can switch signals with rates ranging from 19 Mb/s to 3.0 Gb/s for video signals and sample rates of 32 to 96 kHz for digital audio asynchronous signals.

Crosspoint cards receive signals from the input cards (via the motherboard). The crosspoint card then switches the signals, as directed by the control card, to the appropriate output cards (again, via the motherboard).

The crosspoint card slot in which the crosspoint card is installed determines which of the full range of signals are managed. For details, see [Crosspoint Slots and Signals Switched](#) on page 13.

Redundant Crosspoints

A second crosspoint card can be installed in the NV8144 as a redundant card should the primary crosspoint fail. Similarly, an optional, redundant crosspoint cardset can be installed in crosspoint

1. Introduction

Active Cards

slots 5 and 6 in the NV8280/NV820-Plus (EM0678) and the NV8576/NV8576-Plus (EM0676) router frames. These crosspoint cardsets are unique and cannot be used in place of another crosspoint card. When a redundant crosspoint cardset is installed in these slots, function buttons located on the front of the module become active. When an operator presses a particular button, the crosspoint card set can either take over active control from another crosspoint card or act as a ‘hot’ backup in stand-by mode. If it is configured to take active control, the redundant crosspoint cardset takes over the current functions of a specific, selected crosspoint card creating 8-to-1 redundancy. For details, see [Setting Redundant Crosspoint Switching](#) on page 98.

Figure 1-34 shows the flow of signals through a crosspoint card.

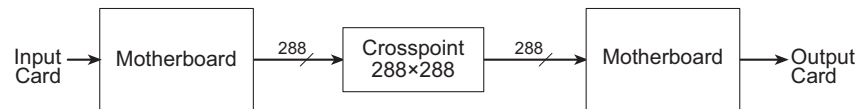


Figure 1-34. Crosspoint Block Diagram

Visual Indicators

The crosspoint card and redundant crosspoint cardset includes a status reporting circuit. Five LEDs on the front of the card or cardset indicate the card’s status: alarm (red), power good (green), software is loaded (amber), and whether there is good (green) or bad (red) communication with the control card. For more information, see [Indicator LEDs](#) on page 101.

Output Cards

Depending on the router frame, a router can hold up to 64 output cards. Output cards distribute outgoing signals through connectors housed on backplanes. The output card must be paired with the correct corresponding backplane. For example, if the output card manages fiber optic signals, it must be paired with a backplane containing LC (fiber optic) connectors. (See [Backplanes](#) on page 29.)

There are three categories of output cards, each managing a unique set of signals: ‘standalone’, ‘expansion’ and ‘filler’:

- ‘Standalone’ output cards manage local signals for the frame in which they are installed. These cards are typically installed in standalone routers frames (NV8144, NV8280 and NV8576). There are ‘standalone’ output cards for SD, HD, and 3Gig video signals and AES3 Asynchronous digital audio signals.
- ‘Expansion’ output cards manage local signals *and* signals from the expansion connectors when two expandable router frames are connected (NV8280-Plus and NV8576-Plus). There are ‘expansion’ cards for SD, HD, and 3Gig video signals and AES3 Asynchronous digital audio signals.
- ‘Filler’ output cards manage signals *only* from the expansion connectors when two expandable router frames are connected (NV8280-Plus and NV8576-Plus). They do not handle local output signals. There are ‘filler’ cards for HD and 3Gig video signals and AES3 Asynchronous digital audio signals, but not for SD signals.

Output cards can distribute SD, HD, and 3Gig video signals and AES3 Asynchronous digital audio signals. Different signal types can be mixed in a single frame to meet specific switching configuration needs.

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Active Cards

‘Expansion’ and ‘filler’ cards can be combined in a single expandable router frame (NV8280-Plus and NV8576-Plus). ‘Standalone’ cards are used exclusively in a standalone router frame (NV8144, NV8280 and NV8576).

The following is a list of the different output cards available:

Output Card	Category	Signal Types	Standard	Rates	Corresponding Backplane
AES Asynchronous Signals (Unbalanced and Balanced)					
EM0688	Standalone	Unbalanced	AES3	Audio sample rates 32 to 192kHz (passed through)	EM0793 (18 coax)
EM0688	Expansion				EM0789 (9 coax, 2 expansion)
EM0688	Filler				EM0789 (9 coax, 2 expansion)
EM0688	Standalone	Balanced	AES3	Audio sample rates 32 to 192kHz (passed through)	EM0829 (18 terminal block)
EM0688	Expansion				EM0830(9 terminal block, 2 expansion)
EM0688	Filler				EM0830 (9 terminal block, 2 expansion)
Video Signals (Coax Cable)					
EM0690 (coax)	Standalone	SD	SMPTE 259M	Video rates from 19 Mb/s to 360 Mb/s. Automatic reclocking at 270 Mb/s. Reclocking bypassed at other rates.	EM0793 (18 coax)
EM0691 (coax)	Expansion (no Filler)				EM0789 (9 coax, 2 expansion)
EM0785 (coax)	Standalone	3Gig, HD, SD	SMPTE 259M 344M 292M 424M	Video rates from 19 Mb/s to 3 Gb/s. Automatic reclocking at 270 Mb/s and 1.483, 1.485, 2.966, 2.970 Gb/s. Reclocking bypassed at other rates.	EM0793 (18 coax)
EM0787 (coax)	Expansion				EM0789 (9 coax, 2 expansion)
EM0692 (coax)	Filler				EM0789 (9 coax, 2 expansion)
Video Signals (Fiber Optic Cable)					
EM0697 (fiber optic)	Standalone	3Gig, HD, SD	SMPTE 259M 344M 292M 424M	Video rates from 19 Mb/s to 3 Gb/s. Automatic reclocking at 270 Mb/s and 1.483, 1.485, 2.966, 2.970 Gb/s. Reclocking bypassed at other rates.	EM0694 (18 coax)
EM0695 (fiber optic)	Expansion				EM0698 (9 coax, 2 expansion)
EM0692 (fiber optic)	Filler				EM0789 (9 coax, 2 expansion)

Output Card Functions

Output cards process 18 signals. The functions of each type of output card are described in the following sections.

‘Standalone’ Output Cards

‘Standalone’ cards are used in standalone router frames (NV8144, NV8280 and NV8576). The cards receive 18 signals from the crosspoint card (via the motherboard). The card contains 18 re-clockers. The re-clocker creates two copies of the signal, feeding one copy to a cable driver and one

1. Introduction

Active Cards

copy to a 18×1 MUX. The cable driver forwards the signal to a connector (DIN 1.0/2.3, terminal block or fiber optic) to distribute the outgoing signal. The 18×1 MUX sends the output to the motherboard, which in turn forwards the signal to output monitor cards.

Note

Cable drivers are not present on output cards managing fiber optic signals.

Figure 1-35 shows the flow of a signal through the ‘Standalone’ output card. For signal re-clocking rates, see [Signal Rates and Flow](#) on page 4.

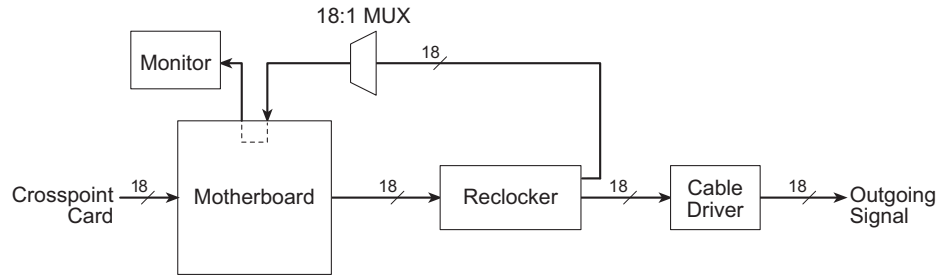


Figure 1-35. ‘Standalone’ Output Block Diagram (Coax Cards)

‘Expansion’ Output Cards

‘Expansion’ output cards (also called “plus” output cards) are used with the NV8500 family expandable frames (NV8280-Plus and NV8576-Plus). Each ‘expansion’ card receives 18 signals from the local crosspoint cards (via the motherboard). 9 of these signals feed a 2x1 MUX.

The ‘expansion’ card forwards 9 additional signals to cable drivers. The cable drivers feed the outputs to an expansion connector for distribution to a second connected router. At the same time, the second router sends 9 signals to the first router through a second expansion connector. Signals arriving through these expansion connectors are forwarded, through a cable receiver, to the 2x1 MUX mentioned above.

The 2x1 MUX feeds the signal to one of 9 reclockers. The reclocker creates two copies of the input, feeding one copy to a cable driver and one copy to a 9x1 MUX. The cable driver forwards the output to a DIN 1.0/2.3 (coax), terminal block, or LC connector to distribute the outgoing signal. The MUX sends the output to the motherboard, which in turn forwards the signal to the output monitor cards.

Note

Cable drivers are not present on output cards managing fiber optic signals.

The ‘expansion’ cards on the local router and the ‘expansion’ cards on the connected router “mirror” each other, performing identical tasks. To illustrate, the ‘expansion’ output cards receive and distribute signals as follows, where card 1 belongs to the local router and card 2 belongs to the connected router:

- Card 1 receives 9 signals from the local crosspoint cards (one copy of the local input). It sends these signals to both the output monitor cards and to local I/O connectors as outgoing signals.
- Card 1 also sends 9 additional local signals to the expansion connectors and on to card 2.
- Card 1 receives 9 signals from card 2 through the expansion connectors.
- At the same time, card 2 performs the exact same tasks card 1 is performing.

Figure 1-36 shows the flow of a signal through the ‘expansion’ output card:

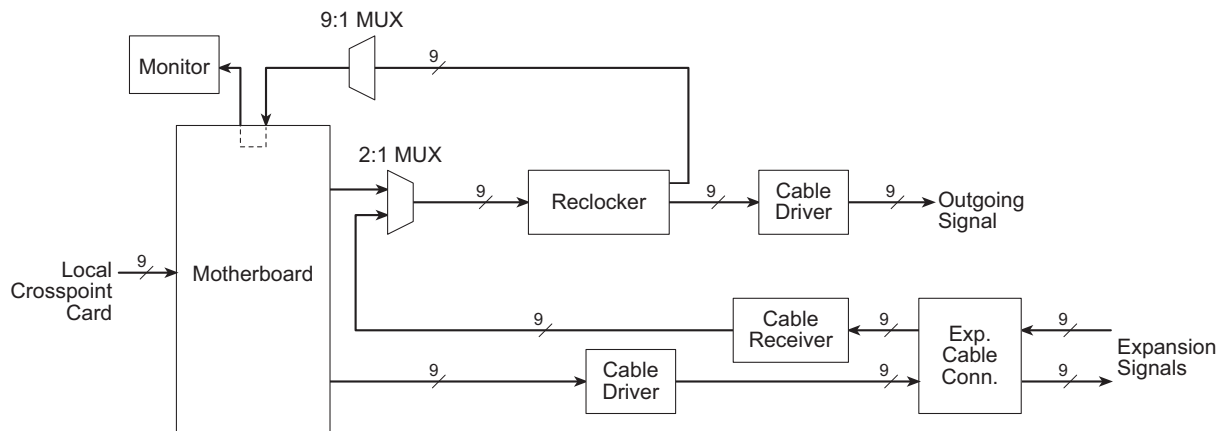


Figure 1-36. ‘Expansion’ Output Block Diagram (Coax Cards)

‘Filler’ Output Cards

The NV8576-Plus and NV8280-Plus use ‘filler’ output cards to allow expansion of the router’s input space when expansion of the output space is not required. If the output space is later expanded, ‘filler’ output cards can be replaced with ‘expansion’ output cards. ‘Expansion’ and ‘filler’ cards can be inter-mixed in a single frame as needed.

When two routers are connected, the ‘filler’ cards on the local router forward 9 signals to a cable driver. The cable driver feeds the outputs to one of two expansion connectors for distribution to a second, connected router. The other expansion connector holds the cable in place for the eventual replacement of the ‘filler’ card with a ‘expansion’ card.

Note

Cable drivers are not present on output cards managing fiber optic signals.

Figure 1-37 shows the flow of a signal through the ‘filler’ output card:

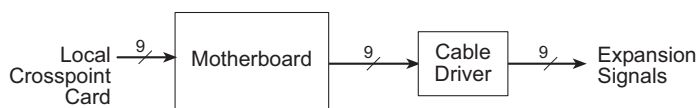


Figure 1-37. ‘Filler’ Output Block Diagram

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Visual Indicators

All output cards feature a circuit that performs status reporting and drives the card's functions. Five LEDs on the front of the input card indicate the card's status: alarm (red), power good (green), software is loaded (Amber), and the communication with the control card is good (green) or bad (red). For more information, see [Indicator LEDs](#) on page 101.

Monitor Cards

Depending on the router frame, up to 4 monitor cards (EM0663) can be installed. Each monitor card produces 2 signals that can be sent to monitoring equipment for the purpose of assessing signal presence and quality. The monitor card must have a corresponding monitor backplane that sends the signals to the monitoring equipment. Each backplane has 4 connectors: 2 inputs and 2 outputs. An operator can select any 4 signals (two inputs and two outputs) to monitor using UniConfig or through the NV9000 router control system. When two expandable frames are connected, monitor connections are cross-connected to allow the monitoring equipment access to all inputs or outputs.

Only one signal is sent from each input or output card to the monitor card for forwarding to monitoring equipment. This means that only one signal from each input card or output card is monitored at any give time.

The NV8144 uses one monitor card, which receives signals from each of the 8 output cards. The signals are then sent to monitoring equipment through connectors on a unique monitor backplane (EM0714).

The NV8280/NV8280-Plus and NV8576/NV8576-Plus router frames have separate slots for monitor cards monitoring inputs or outputs. The NV8280/NV8280-Plus router frame has slots for one of each while the NV8576/NV8576-Plus router frame has slots for two of each. The input monitor card and the output monitor card slots use the same monitor card (EM0663) and the signal processing is the same for each. However, different backplanes are used to distribute input monitor signals (EM0715) or output monitor signals (EM0714).

In the NV8280/NV8280-Plus, the input monitor card receives one signal from each of input card. Similarly, an output monitor card receives one signal from each output card. The NV8576/NV8576-Plus monitor cards work exactly the same way except that the monitor cards in the upper portion of the router frame receive signals only from the output cards and input cards located in the upper region. Likewise, the monitor cards in the lower region of the frame receive signals only from the I/O cards installed in the lower region of the frame.

For connection information, see [Making Monitor Connections](#) on page 77.

Frame Expansion

Two identical NV8500 family expandable router frames (NV8280-Plus or NV8576-Plus) can be connected to create a switching matrix of up to 1152 inputs and 1152 outputs. The two frames are linked by connecting expansion connections on one router to expansion connections on a second router. The expansion connections are:

- I/O Signals—Each frame has up to 128 signal expansion connectors, each forwarding 9 signals between two connected routers. Connectors reside on the output expansion backplane. See [Expansion Signal Connections](#) on page 64.
- Control System—Only one router frame of the pair is connected directly to the router control system. Using control system expansion connections, control system connections are required between the two routers. This enables the control system to see both routers through one control system connection. See [Control System Expansion Connections](#) on page 73.
- Monitor System—Only one router frame of the pair is connected directly to the monitoring equipment. Monitor connections are required between the two routers. This enables the monitoring equipment to see both router frames through one monitor connection. See [Expansion Frame Monitor Connections](#) on page 81.

Figure 1-38 shows the flow of signals between two connected router frames. The signals are forwarded to the connected router through signal expansion connections.

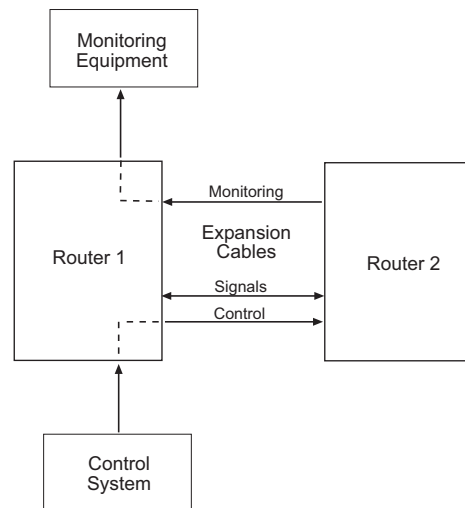


Figure 1-38. Frame Expansion Diagram

1. Introduction

Frame Expansion

2. Installation

When you are setting up an NV8500 family router for the first time, or reconfiguring an existing router configuration, there are certain steps that must be performed. It is recommended that initial installation and later reconfiguration tasks be performed in a specific order to avoid possible complications.

Perform installation and reconfiguration tasks in the following order:

- 1 Mount the router in a rack. If reconfiguring, skip this step if the router is already rack mounted and not being remounted. See [Rack Mount](#) on page 49.
- 2 Install backplanes in the appropriate rear backplane slots. If reconfiguring, remove backplanes and reinstall in the newly desired slots. See [Installing Backplanes](#) on page 50.
- 3 Install active cards in the appropriate front card slots. If reconfiguring, remove cards and reinstall in the newly desired slots. Make sure that the appropriate backplane is installed for each active card. See [Installing Cards](#) on page 53.
- 4 Make connections between the source of incoming signals and the destination of outgoing signals, and the router. If reconfiguring, change signal connections to match new backplane and active card configuration. See [Making Signal Connections](#) on page 58.
- 5 Make connections between the router and the router control system. If reconfiguring, skip this step if all necessary router control system connections are still adequate. See [Making Router Control System Connections](#) on page 70.
- 6 Make diagnostic connections. Diagnostic connections enable the router and UniConfig to communicate. This is important when initially configuring the router and any time the router is reconfigured. See [Making Diagnostic Connections](#) on page 74.
- 7 Make connections to signals acting as references for audio and video signals. If reconfiguring, verify that all necessary reference connections are made for the signals being routed. See [Making AES Reference Connections](#) on page 75 and [Making Video Reference Connections](#) on page 76.
- 8 Connect to external equipment to monitor signal quality. See [Making Monitor Connections](#) on page 77.
- 9 Connect the alarm connection on the router to an external indicator. If reconfiguring, skip this step if alarm connections are still adequate. See [Making Alarm Connections](#) on page 83.
- 10 Connect power, being sure to install PS8100 modules *after* power is connected. See [Connecting to Power](#) on page 85.
- 11 Install UniConfig. If reconfiguring, UniConfig does not need to be reinstalled. See the UniConfig User's Guide.

2. Installation

Package Contents

Package Contents

When your NV8500 family products from Miranda arrive, immediately inspect the shipping container for any obvious damage. If the container is damaged, unpack and inspect the contents. If the contents are damaged, notify the carrier immediately.

When unpacking the shipping container, look for the packing slip and compare it against the contents to verify that everything ordered was received. If anything is missing (or if equipment is damaged unrelated to shipping), please contact Miranda technical support. See [Technical Support Contact Information on page iii](#).

The package does not contain mounting rack, network cables, video cables, mounting screws, or grounding wire.

Note

The NV8280/NV8280-Plus and the NV8576/NV8576-Plus use a separate power supply frame, the NV8000.

This document does not address the shipment or installation of any other equipment or software that can be used in conjunction with the routers, including control systems or configuration software.

Preparing for Installation

You will need the following items before getting started:

- A PC running Windows® 2000 or higher, or Windows XP Professional.® This PC is required for system configuration.
PC hardware requirements:
 - CD drive.
 - EIA-232 serial COM port (DE9) capable of operating at 38.4kbps.
 - 10BaseT or 10/100BaseT (preferred) Ethernet port.
- 100 MB/s Ethernet switch with at least 4 ports.
- Ethernet cables (category 5) with RJ-45 connectors.
- EIA-232 serial cable with DE9 connectors, wired straight-through, male to female.
- Coaxial cable and 75Ω BNC connectors.
- Belden 1855a, or equivalent, cable and DIN 1.0/2.3 connectors *and/or* LC connectors and fiber optic cable.
- Reference video source (BNC) at the line rate appropriate for your system.
- (Optional) Tool for connecting DIN 1.0/2.3 connectors.
- Frame rack suitable for mounting the router.

Depending on the nature of your usage, you will also need an assortment of video cables, video sources, video monitors, and tools. WECO cables are provided for WECO connectors.

Rack Mount

Routers in the NV8500 family are designed to mount in a 19" (482.6 mm) EIA rack. The NV8280/NV8280-Plus and NV8576/NV8576-Plus also use an additional frame that requires mounting, the NV8000 power supply, which provides power to the router. Although it is not required that both the router and NV8000 power supply be mounted in the same rack, this manual assumes only one rack frame is being used.

How to Rack Mount the Router

- 1 Determine the placement of the router frame, and if applicable, the NV8000 power supply frame in the rack, and the rack in the facility. When placing the frames and rack, keep in mind the following requirements (For details, see [Mounting](#) on page 2):
 - The NV8144 requires 8RUs, the NV8280/NV8280-Plus requires 16RUs and the NV8576/NV8576-Plus requires 32RUs of vertical space.
 - The NV8000 power supply requires 3RUs of vertical space. For each router, two NV8000 power supply frames are required totalling 6RUs of vertical space.
 - Be sure to locate the rack near an accessible AC source power outlet. The AC source is used to power either the NV8144 frame or the NV8000 power supply, which supplies power to the associated router.
 - To ensure proper cooling, leave space for unrestricted air flow through the front of the router, and a minimum of six inches clearance at the rear where the cooling fans are located.
- 2 If using an NV8000 power supply, locate the power supply frame. If not using a NV8000, skip to Step 6.
- 3 If the NV8000 was shipped with the PS8100 power supply modules in the frame, remove them to make the frame lighter for installation.

Important

Do not reinstall the PS8100 power supply modules. The modules are installed after power is connected. For more information, see [Connecting to Power](#) on page 85.

- 4 Lift the NV8000 power supply frame into position and attach the NV8000 to the front of the rack with the appropriate screws. Be sure to leave room for the router frame to be mounted in the rack. Place screws in all frame mounting screw holes.
- 5 Repeat Steps 2 through 4 for the second NV8000 power supply frame.
- 6 Locate the NV8500 family router frame.
- 7 Remove the front door by turning the retaining screws counter clockwise, opening the door, and lifting it free of the hinges.

Caution

Do *not* use the front door handle to lift the entire frame. Doing so may damage the door.

2. Installation

Installing Backplanes

- 8 If the router was shipped with the circuit boards and fan tray in the frame, consider removing them to make the frame lighter for installation. If removing circuit boards, be sure to note which card was installed in which slot for later reinstallation.

Caution

Handle all circuit boards with care. Be sure to use electrostatic discharge (ESD) protection and place the circuit boards in ESD bags or on an ESD surface. Do not stack boards without ESD protection.

- 9 Lift the frame into position and attach the router frame to the front of the rack with the appropriate screws. Be sure to place screws in all frame mounting screw holes.

Caution

An equipment jack or two people are required to lift and install the router frame. The router frame is considered too heavy for one person to lift and install in the rack.

- 10 If removed, reinstall the fan trays in the fan slots at the top and bottom of the router. The tray is inserted right-side up.
- 11 If removed, reinstall circuit boards. Be sure to install them in the correct location. For installation instructions, see [Installing Cards](#) on page 53.
- 12 Reinstall the front door.

Installing Backplanes

Routers in the NV8500 family use backplanes to connect different signal types. A backplane receives or distributes signals for an associated input card or output card. Backplanes are inserted into slots at the rear of the router. Coax backplanes are passive and contain no active circuitry, whereas backplanes for fiber optic signals contain active circuitry.

Each backplane must have a corresponding input card or output card installed in the associated slot (through the front of the router). For more information, see [Installing Cards](#) on page 53.

Caution

Although different backplanes may appear to be identical (e.g., contain the same type of connectors), components may differ. Always verify that the backplane matches the associated active input card or output card.

Note

Usually all backplanes are installed in each router frame at the factory. However, instructions are provided for reconfiguration purposes.

2. Installation

Installing Backplanes

Figure 2-1, shows the backplane locations at the rear of an NV8576 router. For the NV8576-Plus, the backplane location is identical, but the output backplanes have unique connectors for connecting to a second NV8576-Plus router frame.

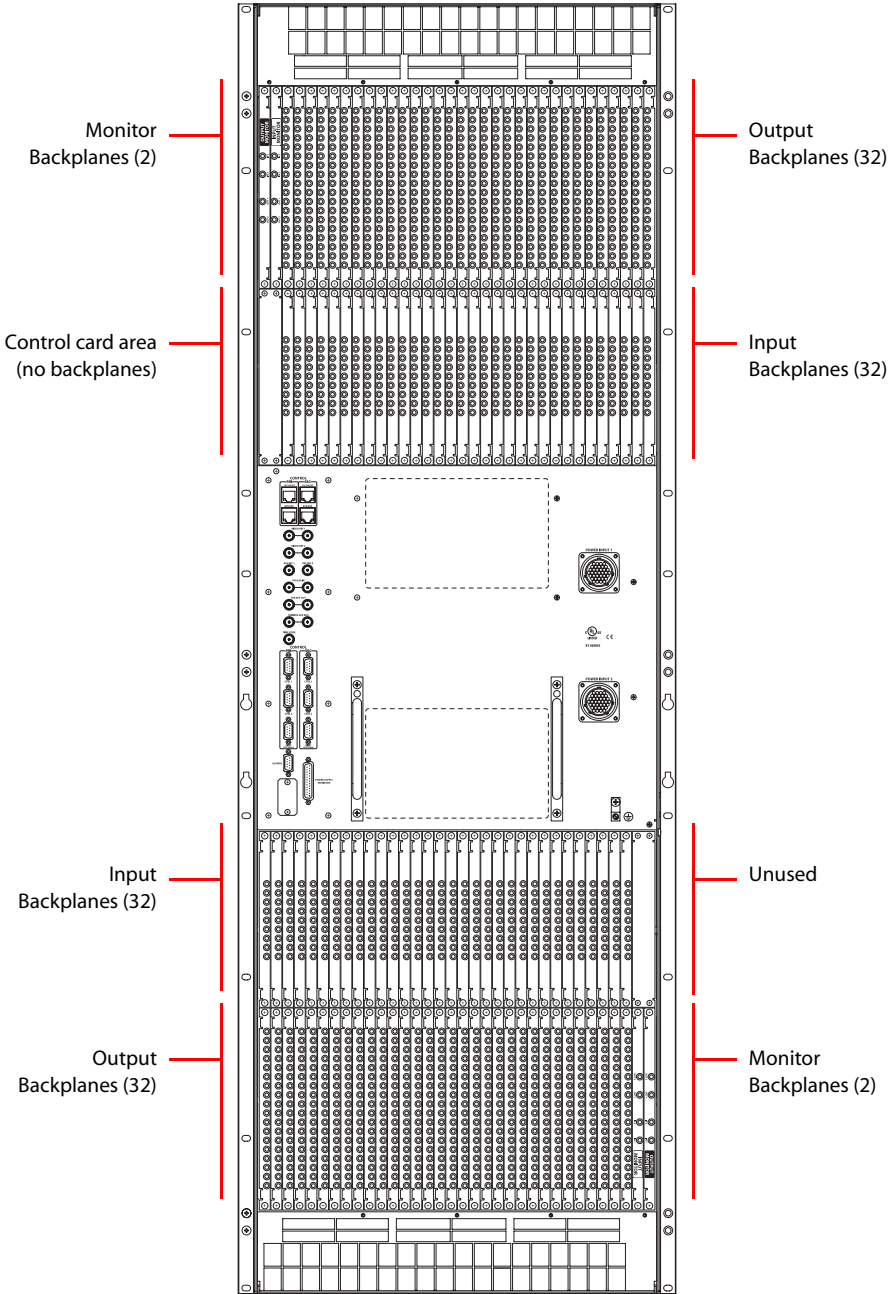


Figure 2-1. NV8576 Frame with Backplanes (Rear View)

2. Installation

Installing Backplanes

Figure 2-2, shows the backplane locations at the rear of an NV8280 router. For the NV8280-Plus, the backplane location is identical, but the output backplanes have unique connectors for connecting to a second NV8280-Plus router frame.

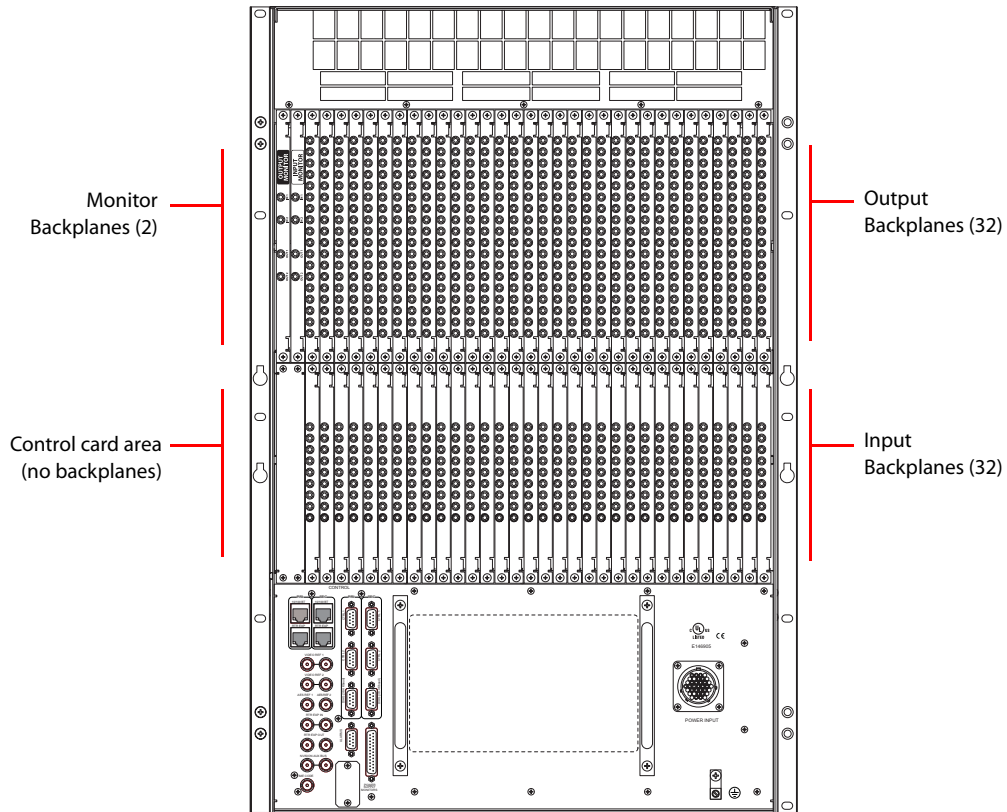


Figure 2-2. NV8280 Frame with Backplanes (Rear View)

Figure 2-3, shows the backplane locations at the rear of an NV8144 router.

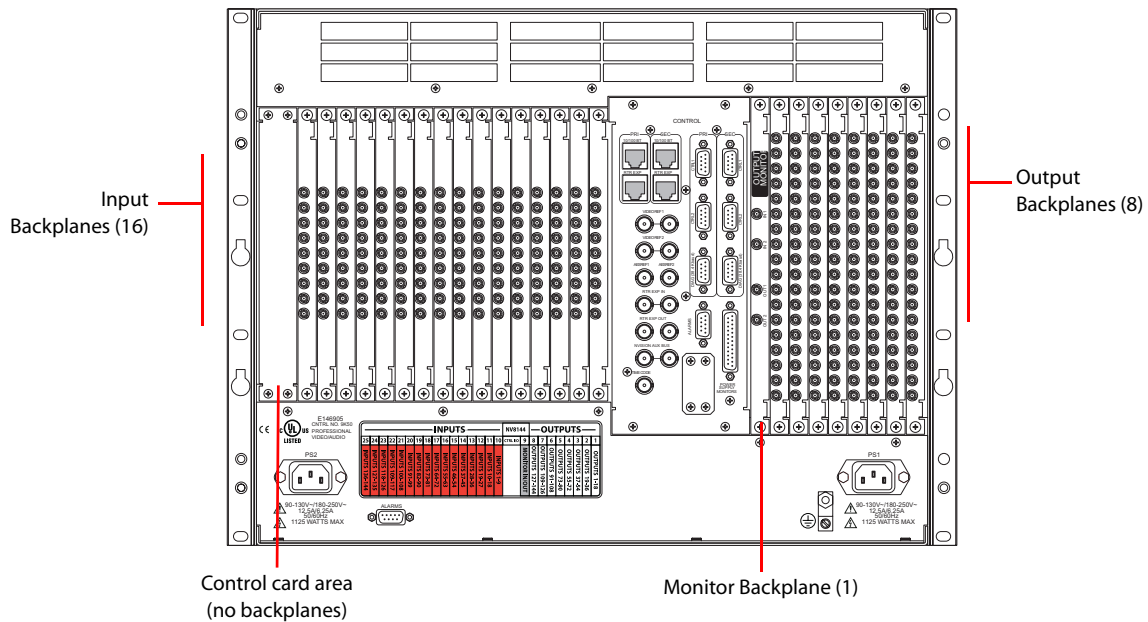


Figure 2-3. NV8144 Frame with Backplanes (Rear View)

How to Install a Backplane

- 1 Facing the rear of the router, locate the slot into which a backplane is to be installed. If you are reconfiguring the router, relocate backplanes as needed.
- 2 Insert the new backplane into the frame being sure to align the printed circuit board with the stamped guides in the frame. Use gentle pressure at the top of the backplane to ensure the backplane connector is fully mated with the motherboard.
- 3 Tighten the two spring-loaded backplane retention screws.
- 4 To maintain proper airflow for cooling, all backplane slots must have a backplane or cover plate installed.

Installing Cards

Routers in the NV8500 family use a number of active cards that manage incoming signals, forwarding of control system commands, signal switching, and distribution of outgoing signals. Cards slide into a card guide in such a way that the connectors on the rear of the card interface with the motherboard. Each card is color-coded with an ejector lever that matches the color of the card guide into which the card is installed in the router frame. For a description of each card, see [Active Cards](#) on page 37.

For each card installed, a corresponding backplane must also be installed. The backplane contains the connectors that connect to cabling for the receiving and distribution of signals. (See [Backplanes](#) on page 29.) As you install cards, check the corresponding backplane. If the red LED on the backplane lights, the card and backplane do not match. If the green LED on the backplane lights, the card and backplane are a correcting pairing. (See [Indicator LEDs](#) on page 101.)

2. Installation

Installing Cards

For information on how cards are grouped in a specific router frame, see [Signal Flow](#) on page 4.

How to Install Active Cards in the NV8144

Caution

Do not drop, roughly handle, or stack circuit boards. If you cannot easily insert or remove a board, stop and contact Miranda Technical Support.

Insert cards into the frame by sliding them into card guides from the front of the router. Insert the card in designated card guides:

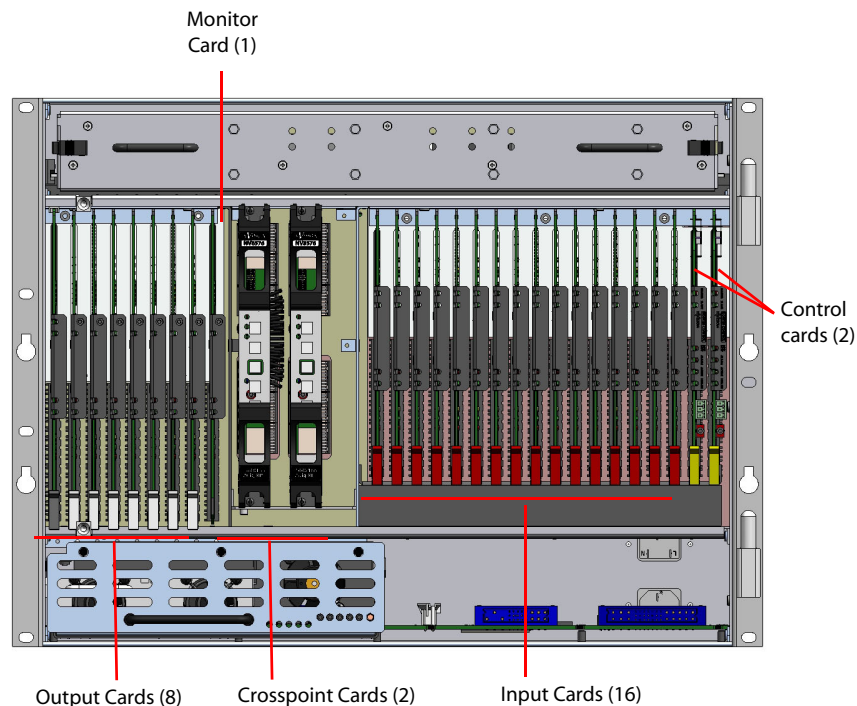


Figure 2-4. NV8144 Frame (Front View)

For information on how cards are grouped in a specific router frame, see [Signal Flow](#) on page 4.

- 1 Insert **input** cards in slots with red card guides. The card's red ejector lever is located at the bottom.
- 2 Insert **output** cards in slots with white card guides. The card's white ejector lever is located at the bottom of the slot.
- 3 Insert **control** cards in slots with yellow card guides. The card's yellow ejector lever is located at the bottom.
- 4 Insert **crosspoint** cards in slots with black card guides. The crosspoint card slots are located between the output card and input card slots, in the middle of the frame. Levers are located at the top and bottom.
- 5 Insert the **monitor** card in the slots the with blue and gray card guides located to the right of the output card slots. The card's ejector lever is located at the bottom.
- 6 For each card, press the lever(s) inward, making sure each card is fully seated in its slot.
- 7 Reinstall and close the frame door after all cards have been installed. The door must be closed for the router cooling system to work properly.

How to Install Active Cards in the NV8280 and NV8280-Plus

Caution

Do not drop, roughly handle, or stack circuit boards. If you cannot easily insert or remove a board, stop and contact Miranda Technical Support.

Insert cards into the frame by sliding them into card guides from the front of the router. Insert the card in designated card guides:

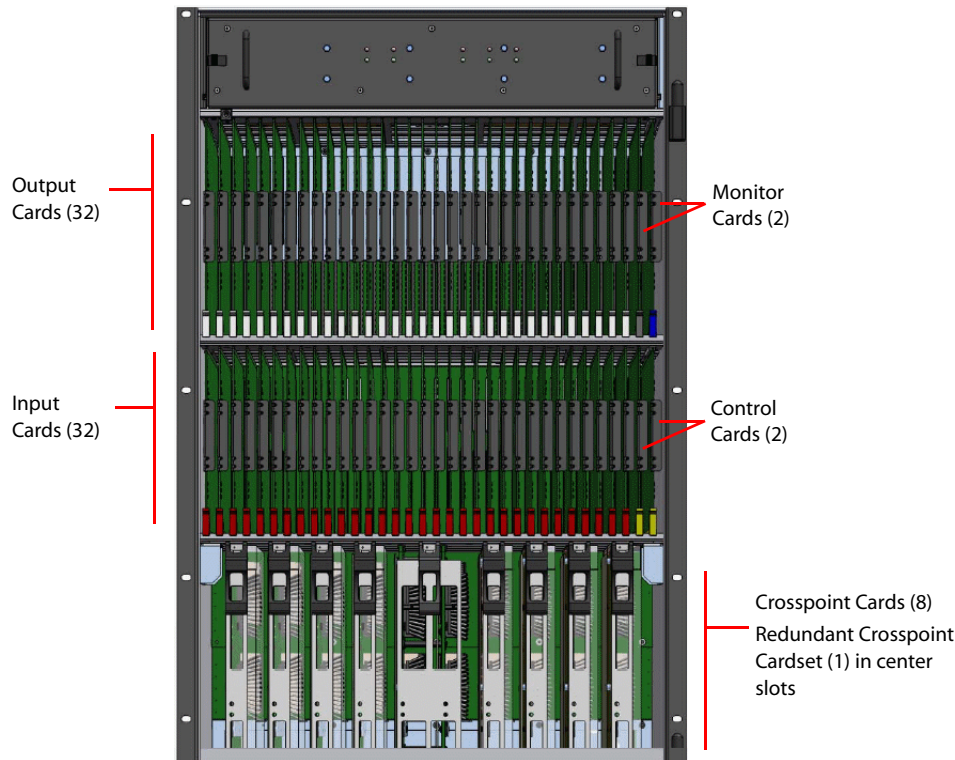


Figure 2-5. NV8280 and NV8280-Plus Router Frame

- 1 Insert **input** cards in slots with red card guides. The card's red ejector lever is located at the bottom.
- 2 Insert **output** cards in slots with white card guides. The card's white ejector lever is located at the bottom.
- 3 Insert **control** cards in slots with yellow card guides. The card's yellow ejector lever is located at the bottom.
- 4 Insert **crosspoint** cards in slots with black card guides. The crosspoint card has two ejector levers located at the top and bottom. When facing the front of the router frame, the crosspoint card slots are numbered 1 through 10, from left to right.

Crosspoint cards *must* be installed in adjacent pairs. If you do not need a full complement of crosspoint cards, you must still install crosspoint cards in adjacent pairs. (See [Crosspoint Slots and Signals Switched](#) on page 13.) Install two crosspoint cards in each set of two adjacent slots, as follows:

- Slots 1 and 2
- Slots 3 and 4
- Slots 7 and 8

2. Installation

Installing Cards

- Slots 9 and 10

- 5 Insert the optional redundant crosspoint cardset in crosspoint card slots 5 and 6. The redundant crosspoint cardset can take over active control from any crosspoint card installed. For more information, see [Setting Redundant Crosspoint Switching on page 98](#).
- 6 Insert the **monitor** cards in the two slots with blue and gray card guides located to the right of the output cards. The card's ejector lever is located at the bottom. Both monitor cards are the same (EM0663). However, the *output* monitor is always in the outside position; the *input* monitor is always in the inside position.
- 7 For each card, press the lever(s) inward, making sure each card is fully seated in its slot.
- 8 Reinstall and close the frame door after all cards have been installed. The door must be closed for the router cooling system to work properly.

How to Install Active Cards in the NV8576 and NV8576-Plus

Important

When you install cards in the upper bays, their ejector levers are *down*. Cards in the lower bays slots are installed with their ejector levers *up*. Crosspoint cards have two ejectors, one at the top and one at the bottom.

Caution

Do not drop, roughly handle, or stack circuit boards. If you cannot easily insert or remove a board, stop and contact Miranda Technical Support.

2. Installation

Installing Cards

Insert the cards into the frame by sliding them into card guides from the front of the router. Insert the card in designated card guides:

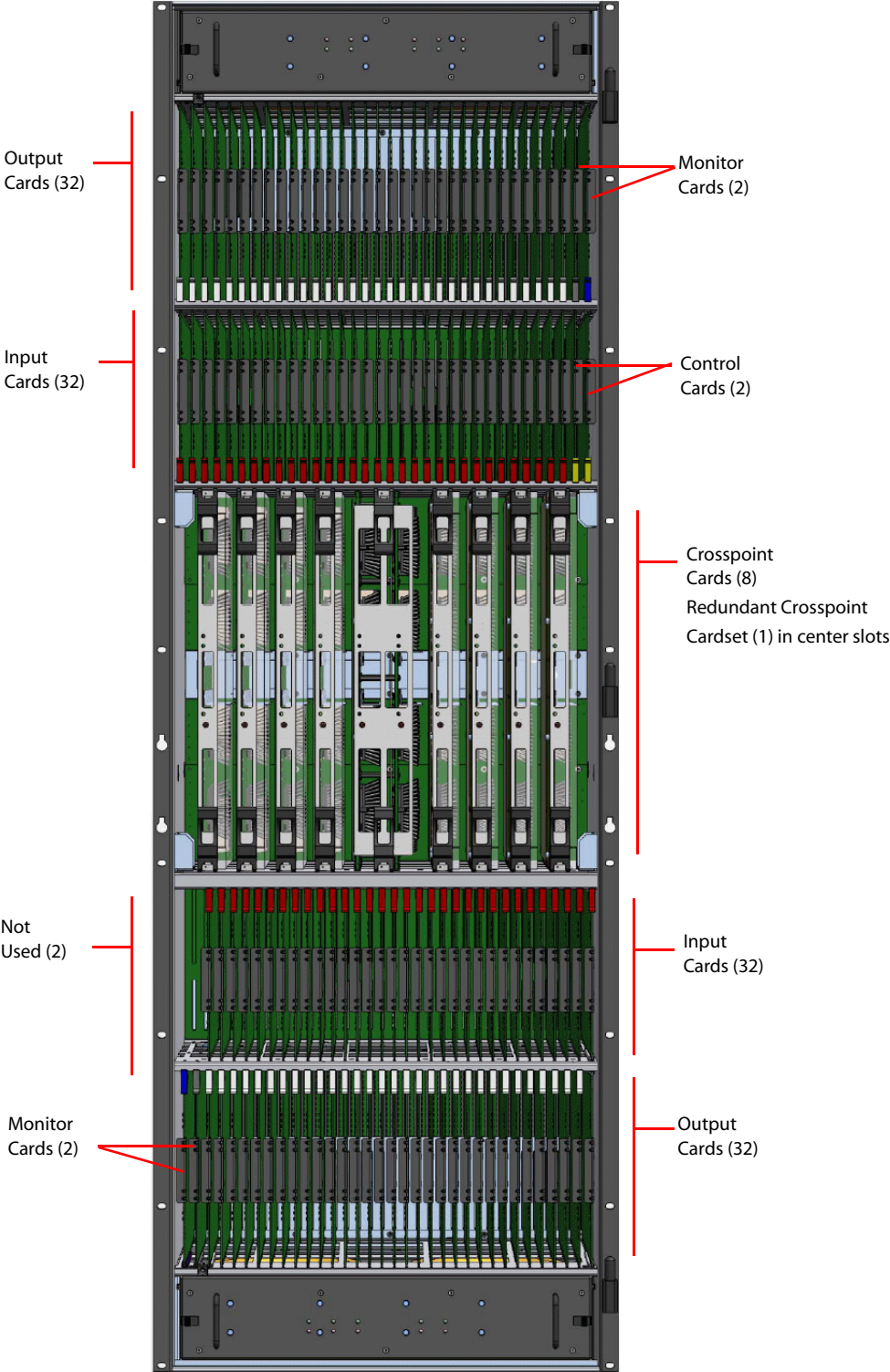


Figure 2-6. NV8576 and NV8576-Plus Router Frame

2. Installation

Making Signal Connections

- 1 Insert **input** cards in slots with red card guides:
In the upper bay, the card's red ejector lever is located at the bottom.
- 2 Insert **output** cards in slots with white card guides:
In the upper bay, the card's white ejector lever is located at the bottom.
In the lower bay, *the card is inverted*, and the card's white ejector lever is located at the top.
- 3 Insert **control** cards in slots with yellow card guides:
 - In the upper bay, the card's yellow ejector lever is located at the bottom.
 - In the lower bay, *the card is inverted*, and the card's yellow ejector lever is located at the top.
- 4 Insert **crosspoint** cards in slots with black card guides *in the center of the router frame*. Levers are located at the top and bottom of each card. When facing the front of the router, crosspoint card slots are numbered 1 through 10, from left to right.

Crosspoint cards *must* be installed in adjacent pairs. If you do not need a full complement of crosspoint cards, you must still install crosspoint cards in adjacent pairs. (See [Crosspoint Slots and Signals Switched](#) on page 13.) Install two crosspoint cards in each set of two adjacent slots, as follows:
 - Slots 1 and 2
 - Slots 3 and 4
 - Slots 7 and 8
 - Slots 9 and 10
- 5 Insert the optional redundant crosspoint cardset in crosspoint card slots 5 and 6. The redundant crosspoint cardset can take over active control from any crosspoint card installed. For more information, see [Setting Redundant Crosspoint Switching on page 98](#).
- 6 Insert the **monitor** cards in the two slots with blue and gray card guides, located next to the output cards. Both monitor cards are the same (EM0663). However, the *output* monitor is always in the outside position; the *input* monitor is always in the inside position.
 - In the upper bay, the card's ejector lever is located at the bottom.
 - In the lower bay, *the card is inverted*, and the card's ejector lever is located at the top.
- 7 For each card, press the lever(s) inward, making sure each card is fully seated in its slot.
- 8 Reinstall and close the frame door after all cards have been installed. The door must be closed for the router cooling system to work properly.

Making Signal Connections

For the NV8500 family of routers to manage incoming and outgoing signals properly, the inputs and outputs at the rear of the router must be connected to cables that receive and distribute the signals. If you are connecting two expandable router frames, additional signal expansion connections must also be connected. These connections allow each router to send signals to, and receive signals from, the other router. (See [Expansion Signal Connections](#) on page 64.)

Backplane Connectors and Individual Signal Numbers

When making physical connections to a router, each connector on a backplane has a unique signal number assigned. Signal numbers are assigned to each connector based on two factors: 1) where individual connectors are located on the backplane, and 2) where in the router frame the backplane is installed. Before making signal connections, it is important to review how signal numbers are associated with individual connectors on the backplanes. For detailed information and a guide to backplane connectors and related signal numbers, see [Backplane Connectors and Individual Signal Numbers](#) on page 14.

Note

For an enumeration of the NV8576 and NV8576-Plus I/O connectors and corresponding signal number, see [NV8576 I/O Signal Numbering](#) on page 119.

Local Signal Connections

Cables are connected to the I/O connections using DIN 1.0/2.3 connectors and Belden 1855A cable, or an equivalent, LC connectors and fiber optic cable, or WECO connectors and coax cable.

For DIN 1.0/2.3 installation, it is recommended that you use a connector tool designed for tightly spaced connectors. There are several DIN 1.0/2.3 connectors and cables suitable for use with the router. For a complete list of connectors and cables, contact Miranda Technical Support. See [Technical Support Contact Information on page iii](#).

WECO output connectors have 5 pins. Each connector handles two outputs (two negative pins and two positive pins) that share a middle pin for shielding (or ground). WECO input connectors have three pins with each positive and negative pin sharing a single shielding pin. The spacing on the pins is 3.5 mm. WECO connectors are provided with the router package.

LC backplanes are composed of modules each containing two LC connectors. The input backplane has 5 modules for a total of 10 possible connections. The output backplane has 9 modules totalling 18 LC connectors. When connecting inputs, do *not* connect to all 10 connections. You can only make a total of 9 connections. When connecting to LC connectors on the input backplane, make connections as follows:

- For the NV8144 and the NV8280, leave the bottom connector empty.
- For the NV8576, in the upper region of the frame, leave the bottom connector empty. In the bottom region of the frame the backplanes are rotated 180° from those in the upper portion and “face” in the opposite direction, therefore leave the top connector empty.

Figure 2-11 on page 64 illustrates the LC input backplane and which connector is left unused. The illustration also indicates how signal numbers are associated with individual connectors.

For a list of which signals are managed by each slot and the corresponding backplane and I/O connectors, see [Signal Flow](#) on page 4.

For monitor connections, see [Making Monitor Connections](#) on page 77.

2. Installation

Making Signal Connections

How to Make Local I/O Connections

- 1 Locate the *input* connections at the rear of the router. Connectors are on backplanes containing 9 DIN 1.0/2.3, 9 LC or 9 WECO connectors each.

Figure 2-7, shows the backplane locations at the rear of an NV8576 router. For the NV8576-Plus, the backplane location is identical, but the output backplanes have unique connectors for connecting to a second NV8576-Plus router frame. (See [Expansion Signal Connections](#) on page 64.) For an enumeration of the NV8576 and NV8576-Plus I/O connectors and corresponding signal number, see [NV8576 I/O Signal Numbering](#) on page 119.

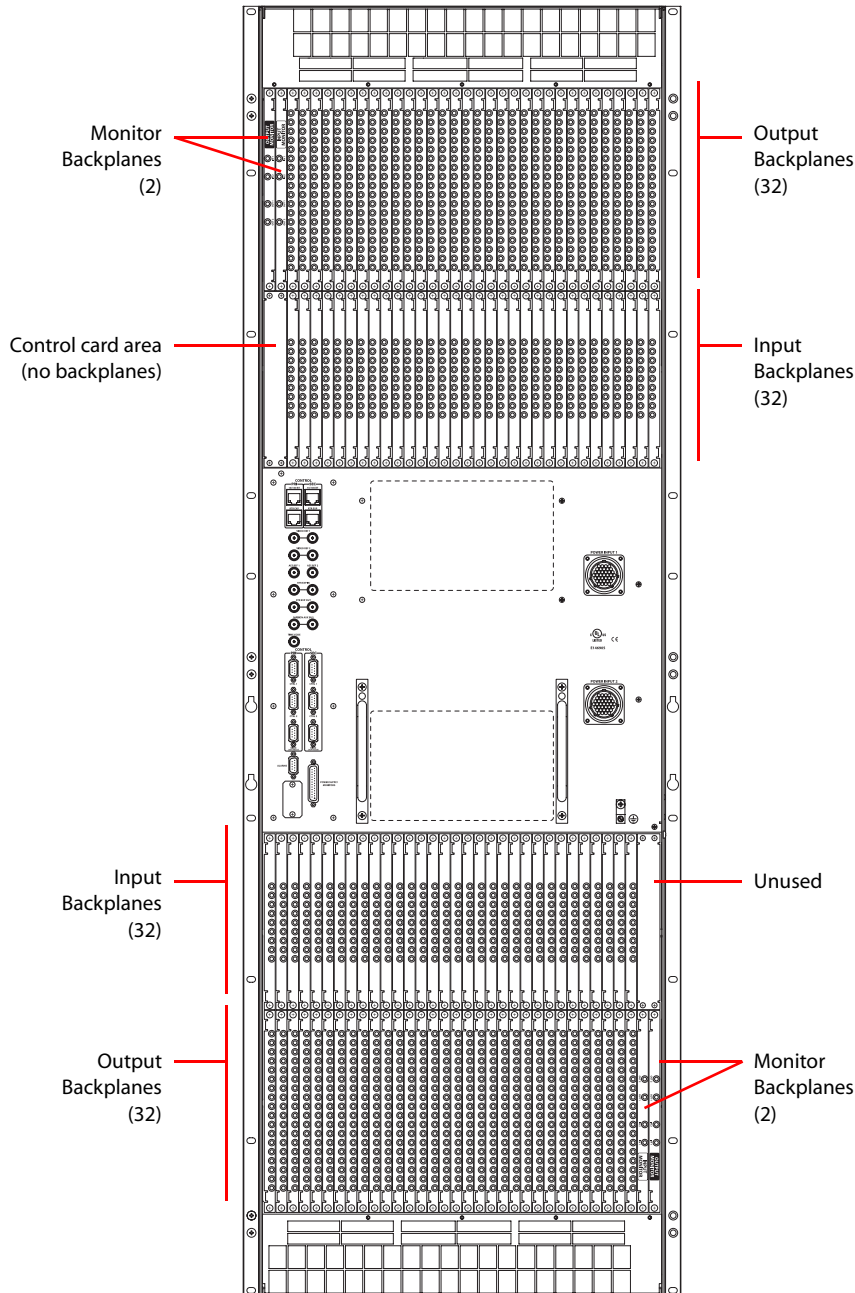


Figure 2-7. NV8576 Frame with DIN 1.0/2.3 Backplanes (Rear View)

2. Installation

Making Signal Connections

Figure 2-8, shows the backplane locations at the rear of an NV8280 router. For the NV8280-Plus, the backplane location is identical, but the output backplanes have unique connectors for connecting to a second NV8280-Plus router frame. (See [Expansion Signal Connections](#) on page 64.)

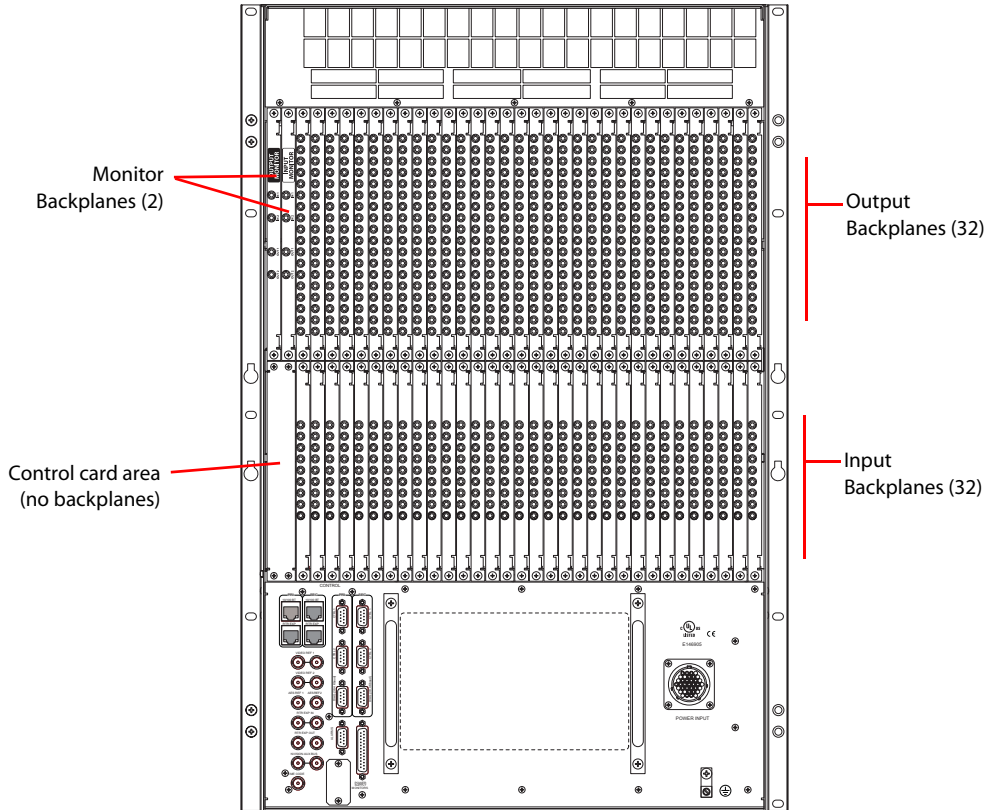


Figure 2-8. NV8280 Frame with DIN 1.0/2.3 Backplanes (Rear View)

2. Installation

Making Signal Connections

Figure 2-9, shows the backplane locations at the rear of an NV8144 router.

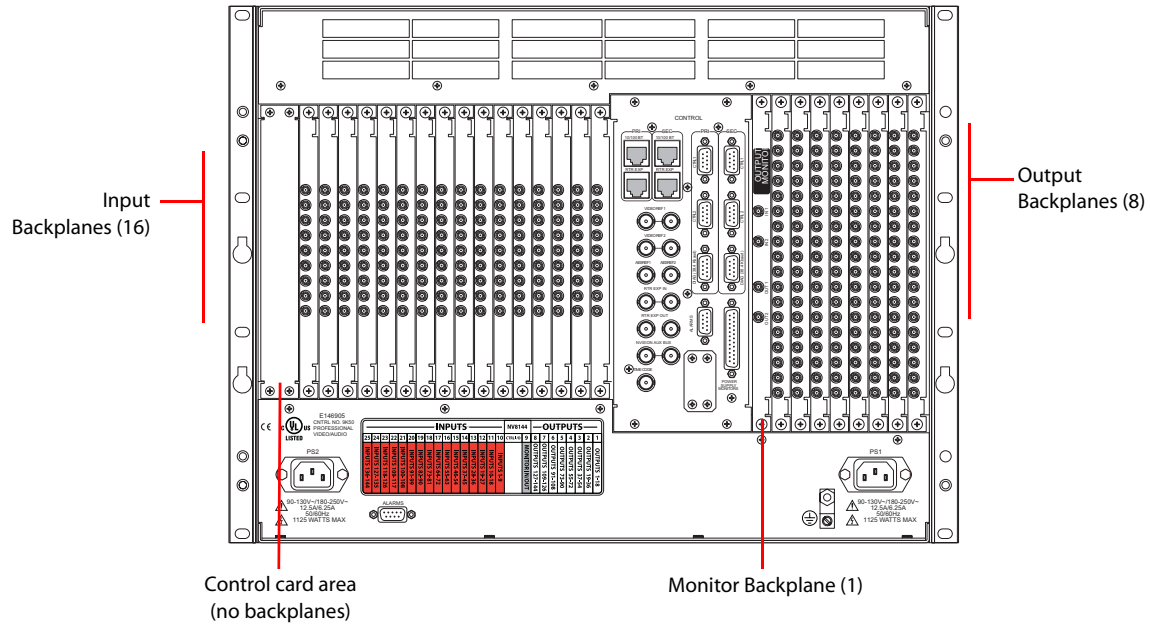


Figure 2-9. NV8144 Frame with DIN 1.0/2.3 Backplanes (Rear View)

- For each input, connect to an input connector using a DIN 1.0/2.3 connector and 1855A Belden cable, or an equivalent, or a LC connector and fiber optic cable, or a WECO connector and coax cable. For details on the signal number assigned to an individual connector, see [Backplane Connectors and Individual Signal Numbers](#) on page 14.

**NV8576,
NV8576-Plus
Note**

Signals are numbered in ascending order from top-to-bottom. This is true for backplanes in both the upper region and in the lower region of the NV8576 or NV8576-Plus frame. Although the backplanes are installed in “mirrored” position, the signal numbering is identical.

Important! LC backplanes are composed of 5 modules of two connectors each for a total of 10 possible connections. Do *not* connect to all 10 connections. Only 9 of the connectors are used. Make LC connections as follows:

2. Installation

Making Signal Connections

For the NV8144 and the NV8280, the bottom connector is not used. Only connect to the first 9 connectors, starting at the top and connecting to each connector in turn, leaving the remaining bottom connector empty. See Figure 2-10.

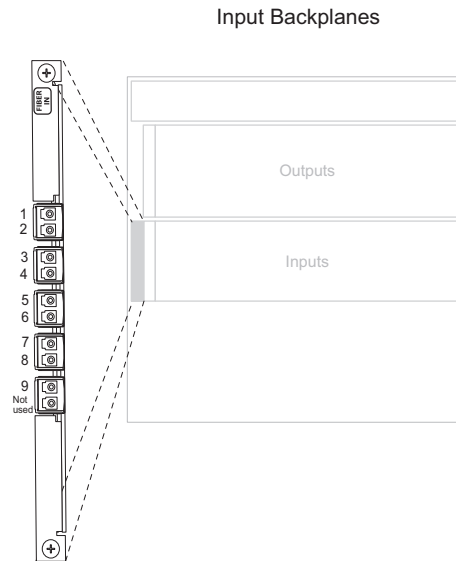


Figure 2-10. NV8280 LC Input Backplanes (Rear View)

For the NV8576, in the upper section of the frame, only connect to the first 9 connectors. Start at the top and connect to each connector in turn, leaving the remaining bottom connector empty.

In the bottom section of the frame the backplanes are rotated 180° from those in the upper portion and “face” in the opposite direction. Therefore, only connect to the *last* 9 connectors, start-

2. Installation

Making Signal Connections

ing at the *bottom* and connecting to each connector in turn, leaving the remaining top connector empty. See Figure 2-11.

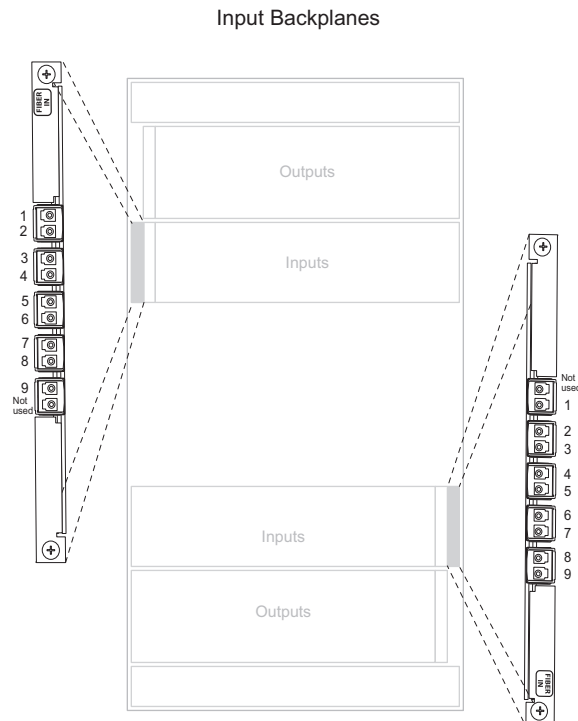


Figure 2-11. NV8576 LC Input Backplanes (Rear View)

- 3 Connect the other end of the cable to the source of the incoming signal.
- 4 Locate the *output* connections on the rear of the router.

Backplanes in the standalone router frames (NV8144, NV8280, NV8576) contain 18 connectors each.

Backplanes in the expansion router frames (NV8280-Plus, NV8576-Plus) contain 9 connectors each *plus* two additional connectors used for expansion. See [“Expansion Signal Connections” on this page](#).

- 5 For each output, connect to an output connector using a DIN 1.0/2.3 connector and 1855A Belden cable, or an equivalent, or a LC connector and fiber optic cable, or a WECO connector and coax cable. For details on the signal number assigned to an individual connector, see [Backplane Connectors and Individual Signal Numbers](#) on page 14.
- 6 Connect the other end of the cable to the distribution destination for the outgoing signal.
- 7 For expansion router frames being connected to a second router, make signal expansion connections. (See Expansion Signal Connections following.)

Expansion Signal Connections

Using expansion signal connectors, two routers can send signals between connected router frames creating a matrix of up to 576 x 576 (NV8280-Plus) or 1152 inputs and 1152 outputs (NV8576-Plus). The expansion connections use expansion cables (WC0121) available from Miranda. Connected routers must be situated physically near each other, side by side.

The connections that allow two expandable router frames to send signals between the frames are located on output backplanes. Expansion (output) backplanes have either 9 coax connectors or 9 LC connectors for *local* signals and 2 high-density 28-pin connectors for *expansion* signals.

LC expansion backplanes contain 5 modules of two LC connectors each for a total of 10 possible connections. Do *not* connect to all 10. Only 9 of the connectors are used.

The two expansion connectors on each backplane are labeled ‘INPUT’ and ‘OUTPUT’. You connect the ‘INPUT’ of a backplane on one router to the ‘OUTPUT’ of the same backplane on the other router—in the same location, upper or lower. For example, you connect the ‘INPUT’ at slot 12 on router 1 to the ‘OUTPUT’ at slot 12 on router 2. Similarly, you connect ‘OUTPUT’ at slot 12 on router 1 to the ‘INPUT’ at slot 12 on router 2.

Connections for outputs (the non-expansion connectors on the expansion backplane) are connected to devices as described in [How to Make Local I/O Connections](#) on page 60. Each output connector on the backplane has a unique signal number assigned. Signal numbers are assigned to each connector based on two factors: 1) where individual connectors are located on the backplane, and 2) where in the router frame the backplane is installed. Before making signal connections, it is important to review how signal numbers are associated with individual connectors on the backplanes. For detailed information and a guide to backplane connectors and related signal numbers, see [Backplane Connectors and Individual Signal Numbers](#) on page 14.

How to Make I/O Expansion Connections Between Two NV8280-Plus Routers

- 1 Facing the rear of the **first router** (Router 1), locate the expansion connectors. There are two 28-pin connectors situated slightly apart from the output signal connectors on the I/O backplane. For each expansion connector, connect using Miranda’s expansion connector/cable (WC0121).
- 2 Locate the *output* connectors on the expansion backplanes.

2. Installation

Making Signal Connections

- 3 For each output, connect to an output connector using a DIN 1.0/2.3 connector and 1855A Belden cable, or an equivalent, or a LC connector and fiber optic cable, or a WECO connector and coax cable.

Important! LC expansion backplanes have 5 modules containing two LC connectors each for a total of 10 possible connections. Do *not* connect to all 10 connections. You can only make a total of 9 connections. When making LC connections, connect to the top 9 connectors, starting from the top and working downward leaving the *bottom* connector empty. See Figure 2-12.

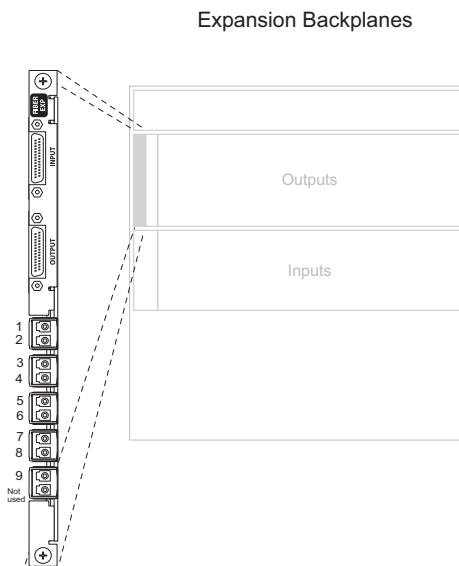


Figure 2-12. NV8280 LC Input Backplane (Rear View)

- 4 Connect the other end of the cable to the distribution destination for the outgoing signal.
- 5 Make expansion connections. Starting with the left-most backplane, connect from the top connector of one backplane on the **first router** (Router 1) to the bottom connector of the corresponding backplane on the **second router** (Router 2).

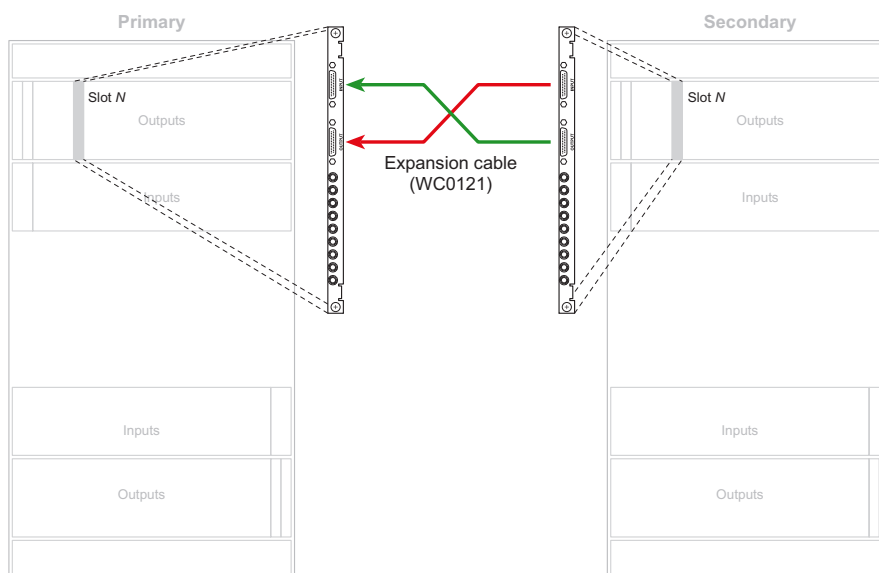


Figure 2-13. Illustration of Expansion Connections

Make sure that the connectors are positioned as follows:

- Black side of connector faces *right*.
- Silver side of connector faces *left*.

Caution

The connector pins are fragile and forcing the connector can cause damage.

6 Repeat step 5 until all expansion connectors are connected.

How to Make I/O Expansion Connections Between Two NV8576-Plus Routers

- 1 Facing the rear of the **first router** (Router 1), locate the expansion connectors. There are two 28-pin connectors situated slightly apart from the output signal connectors on the I/O backplane. For each expansion connector, connect using Miranda's expansion connector/cable (WC0121).
- 2 Locate the *output* connectors on the expansion backplanes.
- 3 For each output, connect to each output connector using a DIN 1.0/2.3 connector and 1855A Belden cable, or an equivalent, or a LC connector and fiber optic cable, or a WECO connector and coax cable. For details on the signal number assigned to an individual connector, see [Backplane Connectors and Individual Signal Numbers](#) on page 14.

2. Installation

Making Signal Connections

Important: LC expansion backplanes have 5 modules of two connectors each for a total of 10 possible connections. Do *not* connect to all 10 connections. You can only make a total of 9 connections. Make LC connections:

**Signal
Numbering
Note**

Signals are numbered in ascending order from top-to-bottom. This is true for backplanes in both the upper region and in the lower region of the frame. Although the backplanes installed in the lower portion of the frame are rotated 180° from those in the upper portion and “face” in the opposite direction, the signal numbering is identical.

In the upper portion of the router frame, leave the bottom connector empty.

In the lower portion of the router frame, leave the top connector empty. (Backplanes installed in the lower portion of the frame are rotated 180° from those in the upper portion and “face” in the opposite direction.)

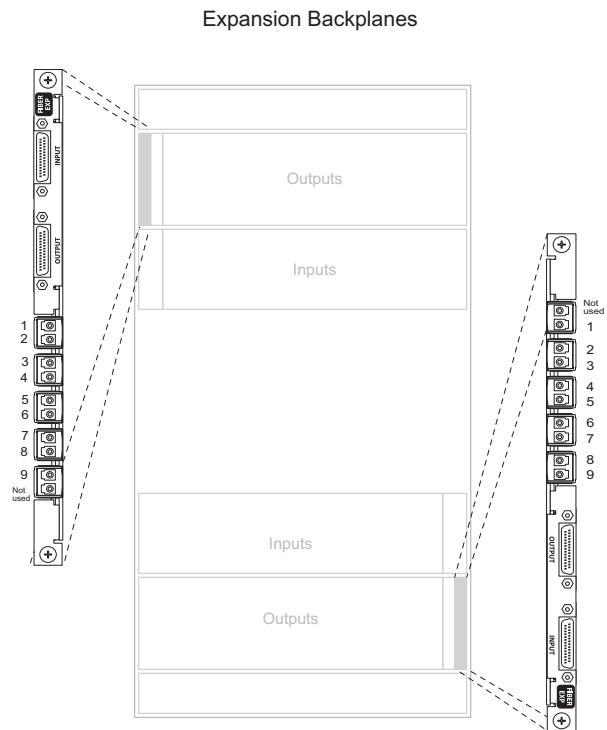


Figure 2-14. NV8576-Plus LC Expansion Backplane (Rear View)

- 4 Connect the other end of the cable to the distribution destination for the outgoing signal.
- 5 Make expansion connections. Starting with the left-most backplane, connect from the top connector of one backplane on the **first router** (Router 1) to the bottom connector of the corre-

2. Installation

Making Signal Connections

sponding backplane on the **second router** (Router 2). Repeat until all expansion connectors are connected. .

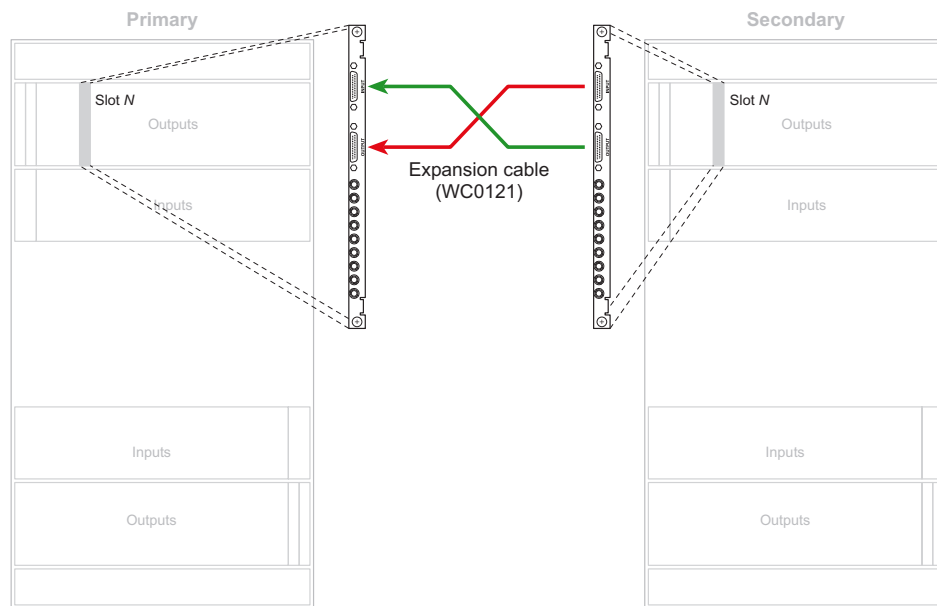


Figure 2-15. Illustration of Expansion Connections

Make sure that the connectors are positioned in the upper portion of the router frame as follows:

- Black side of connector faces *right*.
- Silver side of connector faces *left*.

2. Installation

Making Router Control System Connections

6 Repeat the process in step 5 for the lower portion of the router frame.

Important

In the lower portion, the backplanes are inverted. Consequently, the expansion connectors in the lower bay face the opposite direction as those in the upper portion of the frame.

Be sure when inserting the expansion connector into each expansion connection that the connector is positioned as follows:

- Black side of connector faces *left*.
- Silver side of connector faces *right*.

Caution

The connector pins are fragile and forcing the connector can cause damage.

Making Router Control System Connections

Routers in the NV8500 family must be connected to a router control system such as the NV9000. Different kinds of connections are possible:

- Serial Control—use to connect to a third-party router control system requiring serial control connections.
- Ethernet Control—use to connect to the Miranda NV9000 router control system and to create network connections.
- Miranda Aux Bus—use to connect to a third-party router control system requiring an Aux Bus connection. This connection is not supported at this time.

If connecting two expandable router frames together (NV8280-Plus, NV8576-Plus), only one router is directly connected to the router control system. This router acts as the *primary* router. Additional control system expansion connections are then made between the primary router and the secondary, connected router. This enables the router control system to communicate with both routers through the primary router. (See [Control System Expansion Connections](#) on page 73.)

For the router control system to communicate with the router, you must enter COM port, Baud rate and IP address information in each control card using UniConfig. You must enter this information using a diagnostic connection (the ‘DIAG’ port) between the router and the PC running UniConfig. (See [Making Diagnostic Connections](#) on page 74.) After the information is entered, the router control system connections can “see” the router and the router control system connections can be configured. Refer to the *UniConfig User’s Guide* for details.

Serial Control Connections

Serial control connections are used to connect a router to the router control system. Serial connections are often used for third-party control systems. Although serial connections can be used for the Miranda NV9000 control system, it is recommended that an Ethernet connection is used instead. (See [Ethernet Control Connections](#) on page 72.)

The serial control ports are divided into two sets that communicate with the primary control card or the secondary control card. Additional ports enable you to connect to an alternate control system

2. Installation

Making Router Control System Connections

(i.e., backup system) or to set up dual control, if desired. For a detailed description of the serial control connections, see [Router Control System Connections](#) on page 32.

In order for the router to communicate with the router control system through a serial connection, Comm port and Baud rate settings need to be set in the control card. (See the *UniConfig User's Guide*.)

Serial control connections use SMPTE 207M DE9 connectors and serial (RS-422/489) cable.

How to Make Serial Connections to the Control System

- 1 Locate the serial control connections on the rear of the router, as shown in [Figure 2-16](#). Serial control connections are labeled 'PRI' for the primary control card and 'SEC' for the secondary control card.

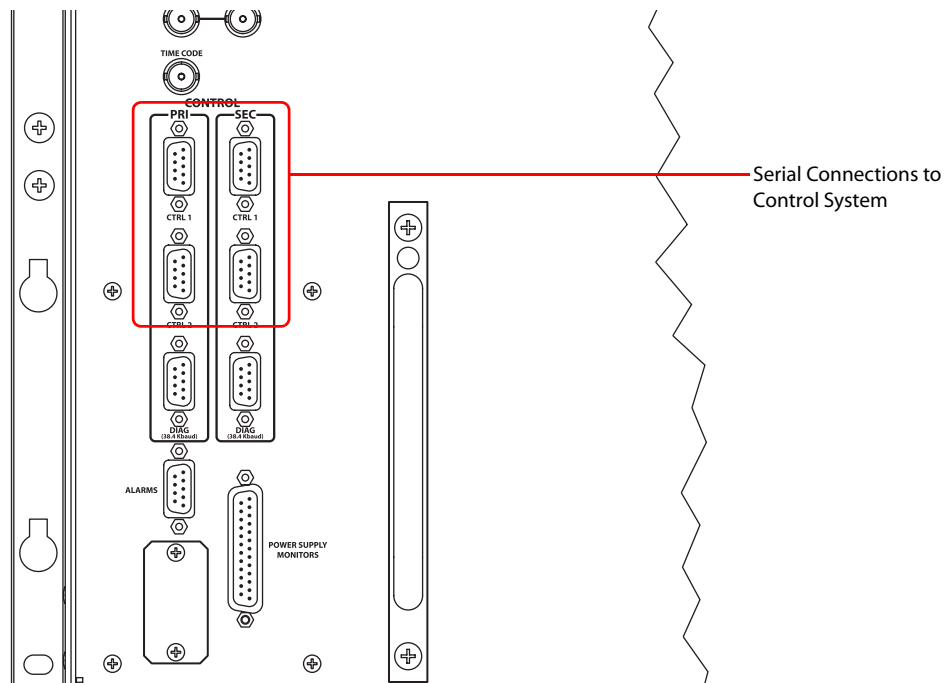


Figure 2-16. Serial Connections to Router Control System

- 2 Connect to the 'CTRL 1' connection in the 'PRI' section using a DE9 connector and serial cable.
- 3 Connect the other end of the serial cable to the (primary) router control system using a DE9 connector.

The following lists the pin wiring for the DE9 connectors:

Control End	Pins	Router End
Ground	1	Ground
Rx-	2	Tx-
Tx+	3	Rx+
Tx Common	4	Rx Common
N/C	5	N/C
Rx Common	6	Tx Common

2. Installation

Making Router Control System Connections

Control End	Pins	Router End
Rx+	7	Tx+
Tx-	8	Rx-
Ground	9	Ground

- 4 If a secondary control card (optional for redundancy) is installed, connect to the 'CTRL 1' connection in the 'SEC' section as described in Steps 2 and 3. (See [Control Cards](#) on page 38.)
- 5 If an alternate control system (e.g., for redundancy or dual control) is being used, make connections as follows:
 - a Connect to the 'CTRL 2' connection in the 'PRI' section using a DE9 connector and serial cable.
 - b Connect the other end of the serial cable to the *secondary* router control system using a DE9 connector. Wire connectors as described in Step 3.
 - c Connect to the 'CTRL 2' connection in the 'SEC' section using a DE9 connector and serial cable.
 - d Connect the other end of the serial cable to the *secondary* router control system using a DE9 connector. Wire connectors as described in Step 3.
- 6 If two expandable router frames (NV8280-Plus or NV8576-Plus) are being connected together, connect the control system expansion connections. (See [Control System Expansion Connections](#) on page 73.)

Ethernet Control Connections

Ethernet control connections connect the router to the router control system using Ethernet connectors. Ethernet connections are especially helpful if the PC running the router control system is going to be on a network. An Ethernet connection is recommended for the Miranda NV9000 control system.

The Ethernet ports are divided into two sets that communicate with the primary control card or the secondary control card. For a detailed description of the Ethernet connections, see [Router Control System Connections](#) on page 32. Unlike serial control connections, there are no Ethernet connections to redundant control systems because redundant control systems can be connected through Ethernet network connections.

For the router to communicate with the router control system through an Ethernet connection, an IP address for the router must be set in the control card. Use UniConfig to make the setting. See the *UniConfig User's Guide*.

The Ethernet control system connections use RJ45 connectors and Cat5, or better, cable. The Ethernet port is 10/100baseT.

How to Make an Ethernet Connection to the Router Control System

- 1 Locate the Ethernet connections on the rear of the router, as shown in Figure 2-17. Ethernet control connections are labeled 'PRI' and 'SEC'.

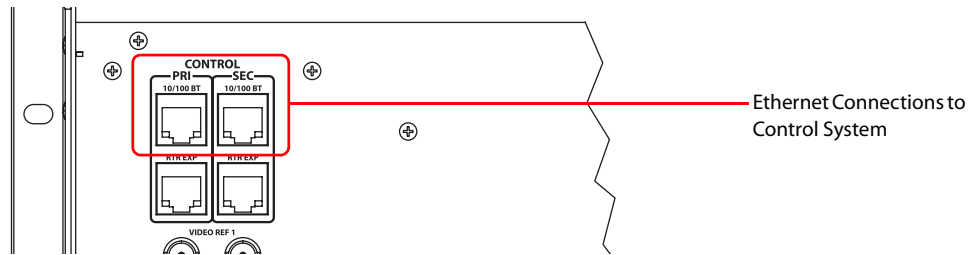


Figure 2-17. Ethernet Connections to Control System (Rear View)

- 2 Connect to the '10/100 B T' Ethernet connection in the 'PRI' section using a RJ-45 connector and Cat5, or better, cable.
- 3 Connect the other end of the cable to an Ethernet hub or switch on the router control system using a RJ-45 connector.
- 4 If a secondary (optional for redundancy; see [Control Cards](#) on page 38) control card is installed, connect to the '10/100 B T' Ethernet connection in the 'SEC' section as described in Steps 2 and 3.
- 5 If two expandable router frames (NV8280-Plus or NV8576-Plus) are being connected together, make the control system expansion connections. (See [Control System Expansion Connections](#) on page 73.)

Aux Bus Control Connections

The NV8500 family of routers have an Aux Bus connection, labeled 'AUX BUS'. However, at this time the connection is not supported. For details, contact Miranda technical support. (See [Technical Support Contact Information on page iii](#).)

Control System Expansion Connections

Control system expansion connections allow two connected expandable router frames to communicate with the router control system. Only one of the routers is actually connected directly to the router control system. This router is the *primary* router. A separate connection is made from the *primary* router to the *secondary* router. This connection allows the router control system to manage both routers through the connection on the primary router.

The control system expansion port is an RJ-45 port. The connection uses standard Ethernet cable.

2. Installation

Making Diagnostic Connections

How to Make Expansion Connections Between Two Routers

Note

Miranda provides the terminators (WC0084). They are small. Be careful not to overlook them.

- 1 Locate the RJ-45 expansion control connections at the rear of the router. The connections are labeled 'PRI' and 'SEC':

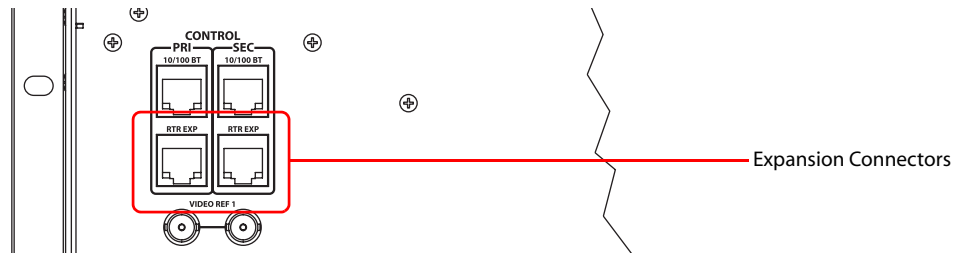


Figure 2-18. Ethernet Connections to Control System (Rear View)

- 2 Using a standard Ethernet cable, connect one of the 'RTR EXP' ports of the primary router (the router directly connected to the control system) to one of the 'RTR EXP' ports of the secondary router.
- 3 Insert a terminator (WC0084) in each of the unused RJ-45 ports.

Making Diagnostic Connections

The diagnostic connections enable routers in the NV8500 family to communicate with the UniConfig application. UniConfig is installed on a unit, separate from the router (e.g., PC), and is used to perform system setup tasks, and configure and monitor the router. For information about using UniConfig, see the *UniConfig User's Guide*.

Diagnostic connections are made by connecting the router to the unit running the UniConfig application. Diagnostic serial connections are located on the rear of the router, labeled 'DIAG'. For a detailed description of the serial connections, see [Diagnostic Connections](#) on page 34.

Router IP Address

If you are using an Ethernet connection between the router and the router control system, an IP address for the router must be set on the control card. Use UniConfig to set the IP address. However, the PC running UniConfig cannot communicate with the router until an IP address for the router is entered. To solve this problem, create a diagnostic connection to UniConfig that lets you enter the IP address before completing all router connections and configurations. (See [Making Diagnostic Connections](#) on page 74.).

There are two diagnostic ports located on the rear of the router, labeled 'DIAG'. The diagnostic ports are fixed at 38400 baud, RS-232. For more information, see the *UniConfig User's Guide*.

How to Make Permanent Diagnostic Connections

- 1 Locate the diagnostic connections on the rear of the router, as shown in Figure 2-19. The diagnostic connections are labeled 'DIAG'.

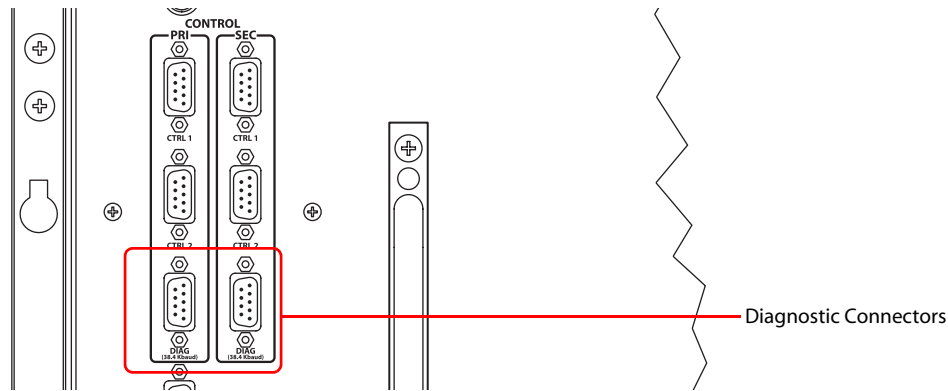


Figure 2-19. Diagnostic Connections (Rear View)

- 2 Connect to the 'DIAG' connection in the 'PRI' section using a DE9 connector and a serial cable. The ports are set for RS-232:

The following lists the DE9 pin connectors for RS-232:

PC End (DCE)	Pins	Router End (DTE)
DCD	1	Ground
RXD	2	TXD
TXD	3	RXD
DTR	4	DSR
Signal Ground	5	Signal Ground
DSR	6	DTR
RTS	7	CTS
CTS	8	RTS
Ground	9	Ground

- 3 Connect the other end of the cable to the PC running the UniConfig application.
- 4 If a secondary (optional for redundancy) control card is installed, connect to the 'DIAG' connection in the 'SEC' section using a DE9 connector and a serial cable as described in Step 2 and Step 3. For more information, see [Control Cards](#) on page 38.

Making AES Reference Connections

The AES reference is used for clock generation and provides a timing reference for AES synchronous signals and for the control card's timing circuits. For optimum audio output, signals must be clock-locked to the same reference.

The NV8500 family of routers have as two AES reference connections labeled 'AES REF 1' and 'AES REF 2'. Both connections are used by the primary and the secondary (optional for redundancy) control card. This provides a backup reference source should one of the sources fail. The

2. Installation

Making Video Reference Connections

AES reference connection requires a stable signal source set at 48 kHz. For a detailed description of the AES reference connections, see [AES Reference Connections](#) on page 35.

How to Make Connections to the AES Reference

Locate the AES reference connections on the rear of the router, as shown in Figure 2-20. AES reference connections are labeled 'AES REF 1' and 'AES REF 2'.



Figure 2-20. AES Reference Connection (Rear View)

- 5 Connect to the 'AES REF1' connection using a BNC connector and 75 Ω cable.
- 6 Connect the other end of the cable to a stable source of 48kHz AES audio signals.
- 7 For redundancy, connect to the 'AES REF 2' connection as described in Step 2.
- 8 Connect the other end of the cable to a stable source of 48kHz AES audio signals.

Making Video Reference Connections

Routers in the NV8500 family provide timing reference connections for analog video signals, labeled 'VIDEO REF 1' and 'VIDEO REF 2'. The control card uses these references to perform takes at the proper point in time (per SMPTE RP168), determining the router's video frame switch points. The video reference connections require a stable source of PAL, NTSC or Tri-level sync. Both video reference connections use 75 Ω BNC connectors and coaxial cable. For a detailed description of the video reference connections, see [Video Reference](#) on page 35.

Each 'VIDEO REF' connection can use the same reference source (redundant) or two unique reference sources (dual). For more information, see [Redundant and Dual References](#) on page 36.

If a video reference is present, signals switch at the defined frame and line switch points. If a video reference is not present, the router performs takes using an internally generated reference signal and the control card displays a lit red LED. (See [Indicator LEDs](#) on page 101.) Switchpoint configuration is managed through the UniConfig application. For detailed instructions, see the *UniConfig User's Guide*.

How to Make Connections to the Video References

Locate the video reference connections on the rear of the router, as shown in Figure 2-21. Video reference connections are labeled 'VIDEO REF 1' and 'VIDEO REF 2'.

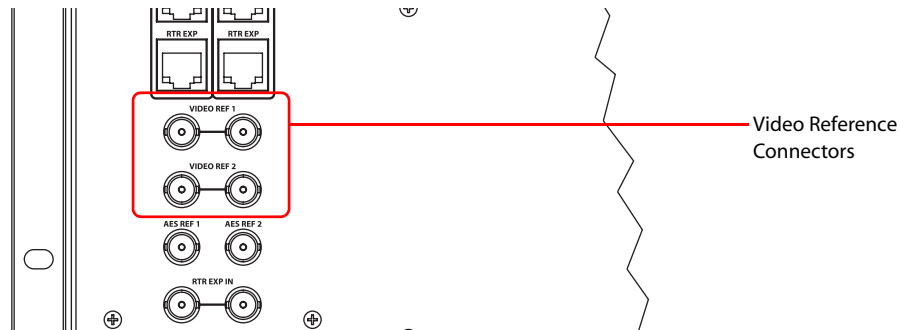


Figure 2-21. Video Reference Connections (Rear View)

- 9 Connect to the 'VIDEO REF 1' connection using a 75 Ω BNC connector and coaxial cable.
- 10 Connect the other end of the cable to a reference signal. Be sure the incoming signal is from a stable source. The signals can be:
 - PAL
 - NTSC
 - Tri-Level Sync (1080i 50/59.94/60 and 720p 50/59.94/60)
- 11 On all unused video reference connections, be sure to terminate the loop-through by installing a 75 Ω BNC terminator.
- 12 Connect to the 'VIDEO REF 2' input connection, as described in Steps 9 through 11.

Making Monitor Connections

The NV8500 family of routers support the monitoring of output and input signals. Whether both outputs and inputs are monitored depends upon the control card currently installed in the router frame. Older control cards run an application that supports only output monitor signals. More recent control cards run an application that supports both output and input signal monitoring.

Control cards running the following application versions support the listed monitor signals:

- Versions 13.0.3.xx and older – The control card supports output monitor signals only (matching FPGA versions: SV0900-06, SV0901-05 and older).
- Versions 14.0.0.xx and newer – The control card supports both input and output monitor signals (matching FPGA versions: SV0900-07, SV0901-06 and newer).

To properly access and control monitor cards and signals, a Monitor Level must be configured in UniConfig. A level is an organizational partition in the router. Levels are based on signal type, which for the Monitor Level is the monitor signal. A Monitor Level solely manages monitor signals.

UniConfig is a configuration application, run on a computer in the network, used to configure routers. This Application Note briefly outlines how to create “monitor levels” in UniConfig. For detailed information on UniConfig, see the *UniConfig User's Guide*.

2. Installation

Making Monitor Connections

Monitor Connections

Each monitor backplane has 4 DIN 1.0/2.3 connectors. Using the proprietary cable provided with the product, connect the monitor backplanes as described for your router and whether in stand-alone or expanded mode.

Monitor backplanes connectors have unique functions. It is strongly recommended that you review [About Monitor Backplanes](#) on page 31 before making monitor connections.

Note

Unused 'In' connectors on the router are not to be terminated.

How to Make NV8144 Monitor Connections

Because NV8144 only uses one monitor card and backplane, this procedure does not apply to the NV8280/NV8280-Plus and NV8576/NV8576-Plus routers.

- 1 Locate the monitor backplane located on the rear of the router frame, as shown in Figure 2-22.

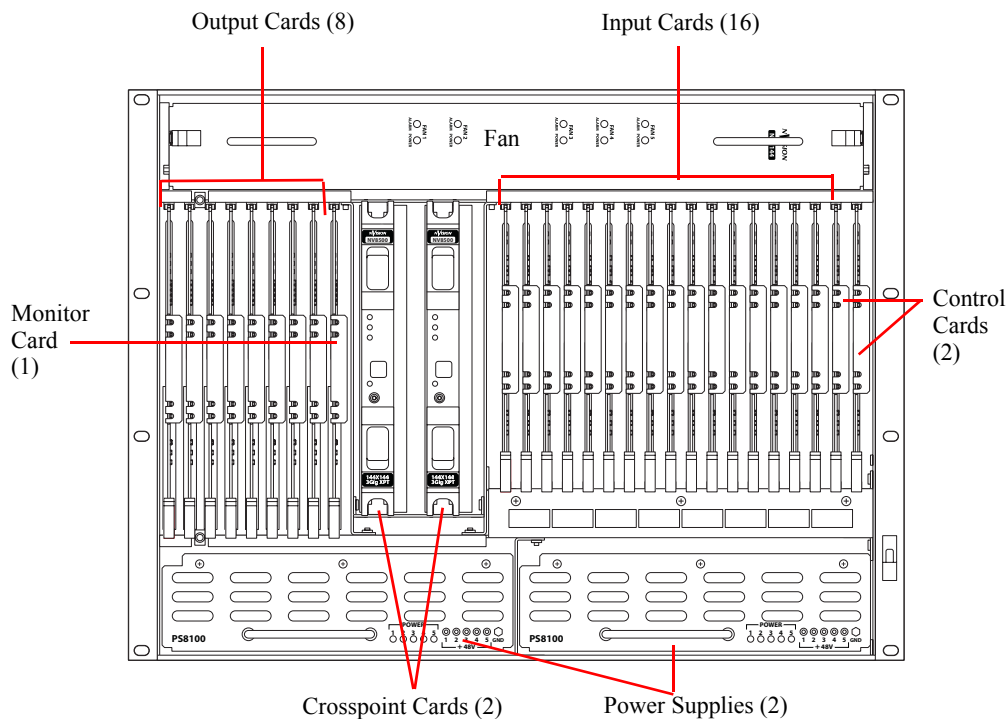


Figure 2-22. NV8144 with Door Removed (Front View)

- 2 For each connection, use a DIN 1.0/2.3 connector and 1855A Belden cable, or an equivalent (provided with product package). Connect 'OUTPUT MON' and 'INPUT MON' on the monitor backplane to your monitoring equipment.

How to Make Output Monitor Connections

Because NV8144 only uses one monitor card and backplane, this procedure does not apply to that router. This procedure applies to the NV8280/NV8280-Plus and NV8576/NV8576-Plus routers.

2. Installation

Making Monitor Connections

- 1 Locate the output monitor backplanes. Figure 2-23 is an example of the NV8576/NV8576-Plus router:

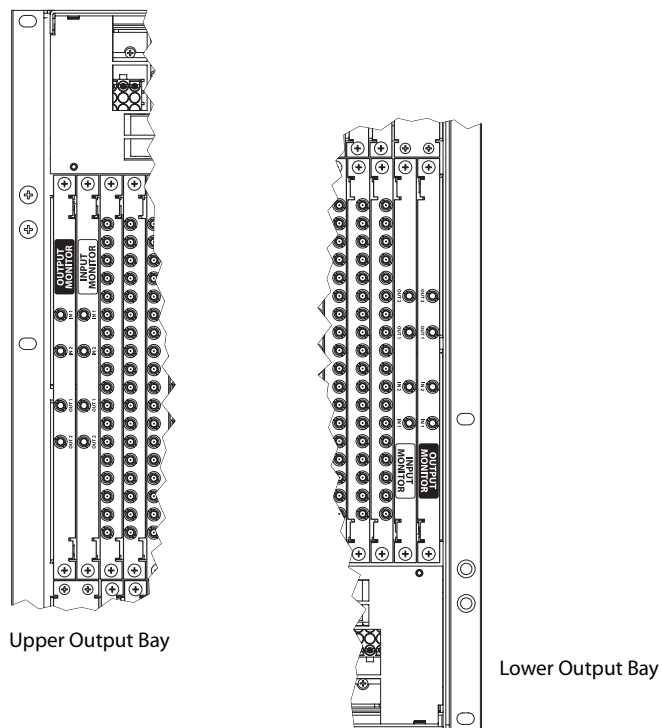


Figure 2-23. Monitor Backplanes

Depending on the router frame, facing the rear of the router, the monitor backplanes are located as follows:

- NV8144—the single monitor backplane is located directly to the right of the output backplanes.
- NV8280/NV8280-Plus—there are two monitor backplanes located in the upper left-hand corner next to the output backplanes.
- NV8576/NV8576-Plus—there are four monitor backplanes: two are located in the upper left-hand corner and two in the lower right-hand corner next to the output cards, as shown in Figure 2-23.

2. Installation

Making Monitor Connections

- 2 For each connection, use a DIN 1.0/2.3 connector and 1855A Belden cable, or an equivalent (provided with product package), and make connections as follows:

NV8144—connect ‘OUTPUT MON’ and ‘INPUT MON’ on the monitor backplane to your monitoring equipment.

NV8280/NV8280-Plus—connect ‘OUT 1’ and ‘OUT 2’ on the output monitor backplane to your monitoring equipment.

For NV8576/NV8576-Plus:

Connect ‘OUT 1’ of the output monitor backplane in the lower bay, to ‘IN 1’ of the output monitor backplane in the upper bay, as shown in Figure 2-24

Similarly connect ‘OUT 2’ of the output monitor backplane in the lower bay, to ‘IN 2’ of the output monitor backplane in the upper bay, as shown in Figure 2-24.

Connect ‘OUT 1’ and ‘OUT 2’ of the output monitor backplane in the upper bay to your monitoring equipment, as shown in Figure 2-24:

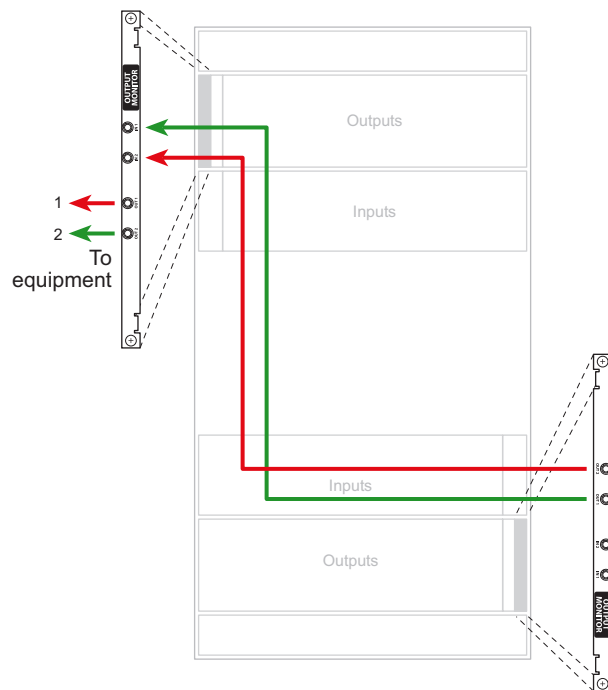


Figure 2-24. Monitor Connections for NV8576(Rear View)

How to Make Input Monitor Connections

Because NV8144 only uses one monitor card and backplane, this procedure does not apply to that router. This procedure applies to the NV8280/NV8280-Plus and NV8576/NV8576-Plus routers.

- 1 Locate the input monitor backplanes as described in step 1 of the previous procedure.
- 2 For each connection, use a DIN 1.0/2.3 connector and 1855A Belden cable, or an equivalent (provided with product package), and make connections as follows:

NV8280/NV8280-Plus—connect ‘OUT 1’ and ‘OUT 2’ on the input monitor backplane to your monitoring equipment.

For NV8576/NV8576-Plus:

- a Connect ‘OUT 1’ of the input monitor backplane in the lower bay, to ‘IN 1’ of the input monitor backplane in the upper bay, as shown in Figure 2-24
- b Similarly connect ‘OUT 2’ of the input monitor backplane in the lower bay, to ‘IN 2’ of the input monitor backplane in the upper bay, as shown in Figure 2-24.
- c Connect ‘OUT 1’ and ‘OUT 2’ of the input monitor backplane in the upper bay to your monitoring equipment, as shown in Figure 2-24:

Expansion Frame Monitor Connections

If you have connected two expandable router frames (NV8280-Plus or NV8576-Plus), only one router is connected directly to the monitoring equipment. This is the primary router. Monitor expansion connections are then made between the primary router and the other, or secondary, router. This enables the monitoring equipment to sample all signals on both routers through the monitor connections on the primary router.

Note

Unused ‘IN’ connectors are not to be terminated.

How to Make Output Expansion Monitor Connections for NV8280-Plus

- 1 Connect ‘OUT 1’ of the output monitor backplane in the *secondary* frame to ‘IN 1’ of the output monitor backplane of the *primary* frame, as shown in Figure 2-25.
- 2 Connect ‘OUT 2’ of the output monitor backplane in the *secondary* frame to ‘IN 2’ of the output monitor backplane of the *primary* frame, as shown in Figure 2-25.

2. Installation

Making Monitor Connections

- 3 Connect 'OUT 1' and 'OUT 2' of the output monitor backplane of the *primary* frame to your monitoring equipment, as shown in Figure 2-25.



Figure 2-25. NV8576-Plus Connections (Rear View)

How to Make Output Expansion Monitor Connections for NV8576-Plus

- 1 For each router frame, connect 'OUT 1' of the lower output monitor backplane to 'IN 1' of the upper output monitor backplane and 'OUT 2' of the lower output monitor backplane to 'IN 2' of the upper output monitor backplane, as shown in Figure 2-26.
- 2 Connect 'OUT 1' of the upper output monitor backplane in the *secondary* frame to 'IN 1' of the lower output monitor backplane of the *primary* frame, as shown in Figure 2-26.
- 3 Connect 'OUT 2' of the upper output monitor backplane in the *secondary* frame to 'IN 2' of the lower output monitor backplane of the *primary* frame, as shown in Figure 2-26.
- 4 Connect 'OUT 1' and 'OUT 2' of the upper output monitor backplane of the *primary* frame to your monitoring equipment, as shown in Figure 2-26.

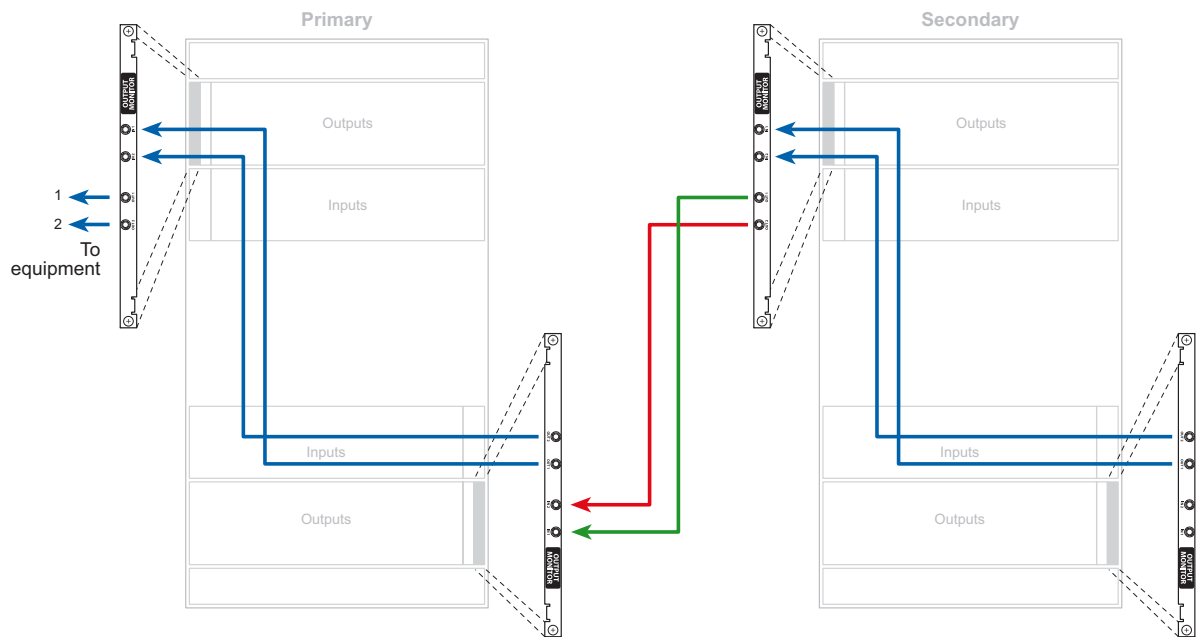


Figure 2-26. NV8576-Plus Connections (Rear View)

Making Alarm Connections

Routers in the NV8500 family provide system alarms that notify you of a malfunction, such as when a fan or power supply is not functioning properly. Alarms can be connected to an external alarm indicator that displays visual cues when an alarm is activated. For the router frames that use the NV8000 power supply frame also has alarm connections. Miranda does not provide external indicator equipment, but does provide instructions on wiring the alarm connections. See [Alarm Indicator Equipment](#) on page 84.

Both the router frames and the NV8000 power supply send status information to the router control system. For more information on the alarm connections, see [System Alarm](#) on page 36.

How to Make Alarm Connections for Routers

- 1 On the rear of the router, locate the 'ALARMS' connection, as shown in Figure 2-27.

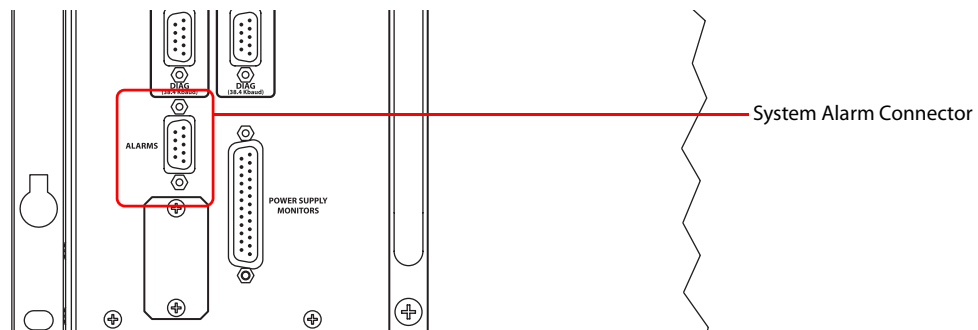


Figure 2-27. System Alarm Connection on Router (Rear View)

- 2 Connect to the 'ALARMS' connection using a DE9 connector and cable.
- 3 Connect the other end of the cable to an external alarm indicator. See [Router Alarms](#) on page 84 for information on wiring the DE9 connector.

How to Make Alarm Connections for the NV8000

- 1 On the rear of the NV8000, locate the 'Alarms' connection.

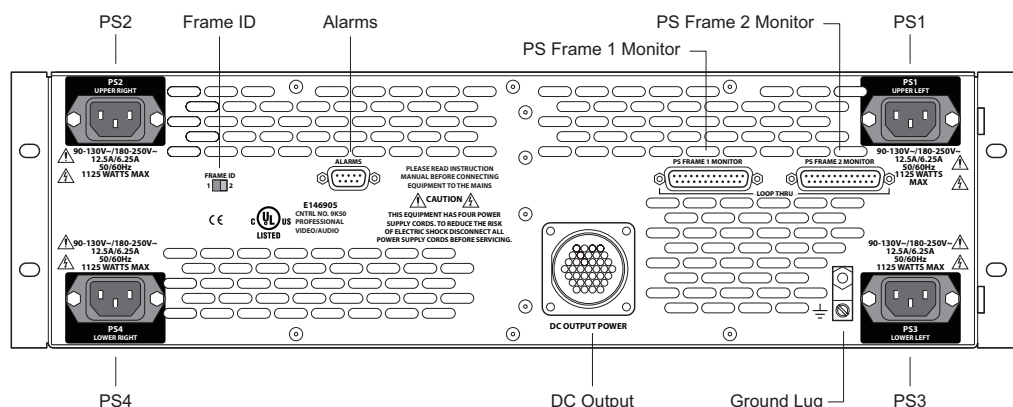


Figure 2-28. NV8000 Power Supply (Rear View)

- 2 Connect to the 'Alarms' connection using a DE9 connector and cable.

2. Installation

Making Alarm Connections

- 3 Connect the other end of the cable to an external alarm indicator. See [“Alarm Indicator Equipment” on this page](#) for information on wiring the DE9 connector.

Alarm Indicator Equipment

An external alarm indicator can be created to display visual cues when a failure has occurred on the NV8000 power supply or a NV8500 family router frame. LEDs can be wired to specific pins on a DE9 connector. Each LED indicates what specific router module has failed.

- For NV8000 power supply alarms, see [NV8000 Power Supply](#) on page 84.
- For NV8500 family router alarms, see [Router Alarms](#) on page 84.

NV8000 Power Supply

The ‘Alarms’ connection on the rear of the NV8000 uses a DE9 connector. An “alarm” or ON condition occurs when the connection between an alarm pin and Alarm_COM (common) opens. The alarm turns OFF when the connection between Alarm_COM and the alarm pin closes again. If a PS8100 power supply module is removed, the alarm circuit remains open.

For an external alarm indicator box, connect to the ‘Alarms’ connection using a DE9 female connector, wiring as shown in Figure 2-29. Each pin monitors a specific function and activates a specific alarm.

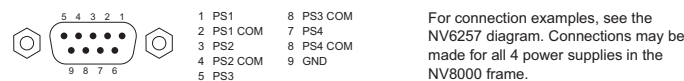


Figure 2-29. NV8000 Power Supply Alarms Connection

Caution

The power supply for the alarm circuit must not exceed 30 VDC. Load resistor values depend on power supply voltage.

Router Alarms

The ‘ALARM’ connection on the rear of the NV8500 family router frame uses a DE9 connector. An “alarm” or ON condition occurs when the connection between an alarm pin and Alarm_COM (common) opens. The alarm turns OFF when the connection between Alarm_COM and the alarm pin closes again.

2. Installation

Connecting to Power

To create an indicator box, connect to the ‘ALARM’ connection using a DE9 female connector, wiring as shown in Figure 2-30. Each pin monitors a specific function and activates a specific alarm.

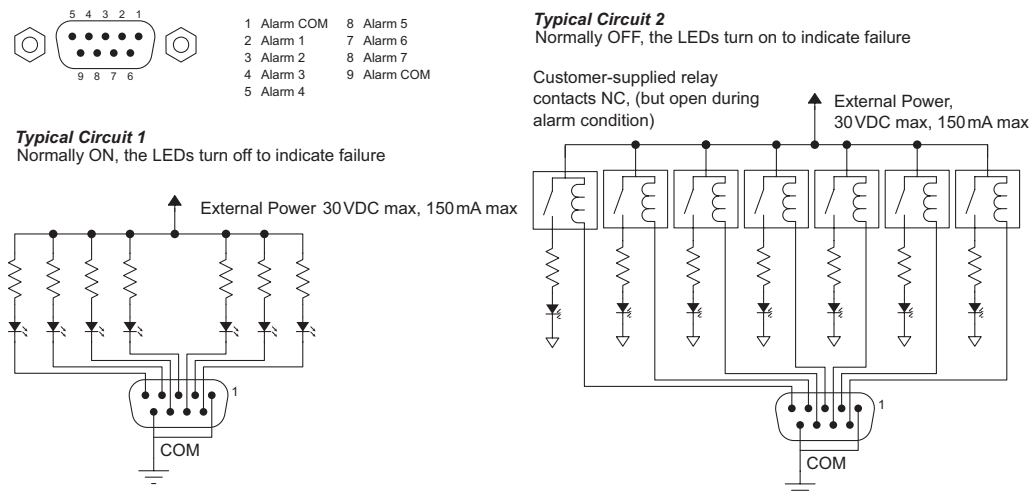


Figure 2-30. Alarm Connections and On/Off Switches

The following lists each DE9 pin and the associated alarm. The pin number listed corresponds to the pin numbers in Figure 2-30 on page 85:

PIN	Signal	Description	Possible Conditions Causing the Alarm
1, 9	Alarm_COM	Common	Common connection for all alarm pins.
2	Alarm_1	Major Alarm	Indicates missing reference inputs, or missing power supplies.
3	Alarm_2	Minor Alarm	Alarm_3, or Alarm_4, or Alarm_5, or Alarm_6
4	Alarm_3	Power Supply	Missing power supply module.
5	Alarm_4	Video Ref	Missing Video Ref 1 or Video Ref 2.
6	Alarm_5	AES Ref	Not used in NV8500 family.
7	Alarm_6	Fans or Temperature	Indicates a fan failure or module over temperature.
8	Alarm_7	Control Module Health	Any control module not “healthy.”

Connecting to Power

Routers in the NV8500 family use power supply modules to power the router frames. The NV8144 uses the PS8100 modules (850 Watts each), which are inserted directly in to the router frame. The NV8280/NV8280-Plus and NV8576/NV8576-Plus routers use Miranda’s NV8000 power supply, an external frame that holds up to four PS8100 power supply modules (850 Watts each). Each NV8000 holds up to two primary power supply modules and two redundant power supply modules.

2. Installation

Connecting to Power

Depending on your system, more than one power supply module may be required. The following table lists the power requirements for a single fully loaded router frame with either coax or fiber optic cards and backplanes:

Frames	Wattage	NV8000s Required	Total Power Supply Modules Required
NV8144 (coax)	850	None	1 required, 1 optional for redundancy
NV8144 (fiber optic)	875	None	1 required, 1 optional for redundancy
NV8280 (coax)	1,700	1	2 required, 2 optional for redundancy
NV8280-Plus (coax)	1,700	1	2 required, 2 optional for redundancy
NV8576 (coax)	3,400	2	4 required, 4 optional for redundancy
NV8576 (fiber optic)	3,600	2	4 required, 4 optional for redundancy
NV8576-Plus (coax)	3,400	2	4 required, 4 optional for redundancy
NV8576-Plus (fiber optic)	3,500	2	4 required, 4 optional for redundancy

For details about power requirements, see [Power Specifications \(NV8000, PS8100\) on page 107](#).

When you are connecting the NV8000 power supply frame to a router, and the power supply frame to power, separate connections are made for power and power monitoring. To create those connections, Miranda provides the following (one set is required per router):

- Two WC0096 power supply cable.
- Two WC0046 monitor cables.

The NV8500 family router frames have a ground lug on the back of the router. We recommend you connect the ground lug to earth ground. Failure to connect the ground does not affect normal operation. However, grounding helps protect you and your equipment in case of a power anomaly such as a lightning strike.

NV8000 Monitor and Alarms Connections

The NV8000 power supply frame has two DB25 connectors, located at the rear. One connection, labeled 'Power Supply Monitor' carries alarm and temperature signals to the router. When two expandable router frames (NV8280-Plus or NV8576-Plus) are connected, each router is connected to the monitor connection on its own pair of NV8000 power supply frames. A loop-through connection passes monitoring information between the two NV8000 power supplies. Monitor connections can be made at the time power is connected.

(See [How to Connect Two NV8000 Frames to One Router Frame \(NV8576 only\)](#) on page 91.)

The other DB25 connector, labeled 'Alarms' presents isolated alarm signals that can be connected to an external alarm indicator. For information on connecting NV8000 alarms connections, see [Making Alarm Connections](#) on page 83.

NV8000 Power Cords and Branch Circuits

For added protection in the event of a main power failure, we recommend that the main power supply connection and the redundant power supply connection to the NV8000 power supply be connected to a separate branch circuits. A wire retainer holds the power cable in place, reducing the possibility of an accidental disconnection.

The power cords are the only means of disconnecting AC power. It is recommended that you clearly mark the line side power connection with its function so that in the event of an emergency, power can be disconnected quickly.

Making Power Connection

Depending on the NV8500 family router frame, power supply modules are installed in either the router frame directly or into the NV8000 power supply frame. For those routers using the NV8000, either one or two NV8000 power supply frames are required. (See [Connecting to Power](#) on page 85 for a list of router frame and power supply requirements.) If two NV8000 frames are required, Miranda provides a special power cable (WC0096) and monitor cables (WC0046) so that you can make the connections between the two power supply frames and the router frame

Caution

Insert PS8100 power supply modules *after* connecting the router to an AC power source.

How to Connect Power to the NV8144

- 1 Locate the power cords and PS8100 power supply modules.

2. Installation

Connecting to Power

- 2 Facing the rear of the router, connect power cords from AC power sources (90–230 VAC, 50–60 Hz) to power supply connections 'Power Input 1' and 'Power Input 2':

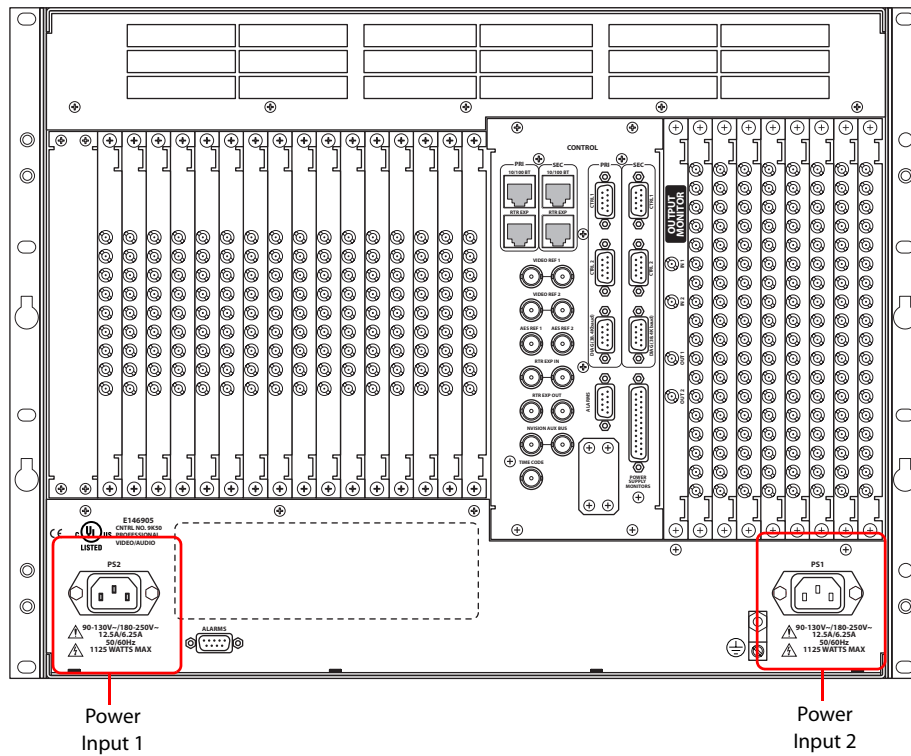


Figure 2-31. NV8144 Power Supply Connections on Router

2. Installation

Connecting to Power

3 Install the PS8100 power supply modules as follows:

At the front of the router, install a *primary* PS8100 power supply module in slots 1, as shown in Figure 2-32.

Optionally, install a *redundant* PS8100 power supply module in slot 2, as shown in Figure 2-32.

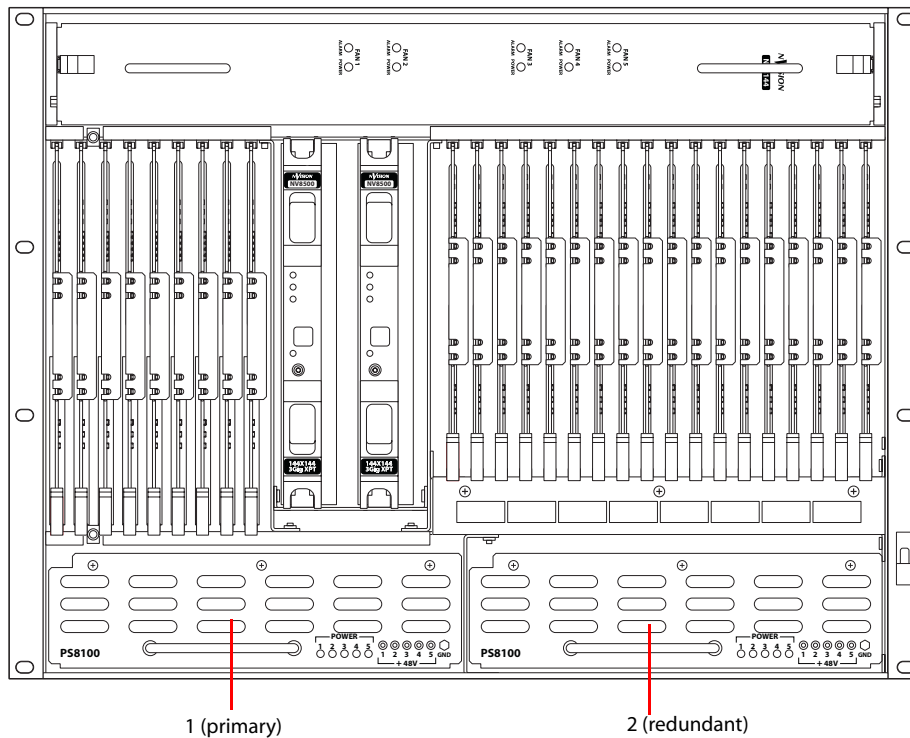


Figure 2-32. NV8000 Power Supply (Front View)

4 Connect the router's ground lug to earth ground using a copper wire from 14 to 6 AWG. The ground lug is located in the lower right corner of the frame.

How to Connect One NV8000 Frame to One Router Frame (NV8280 or NV8576)

- 1 Locate the power cords and PS8100 power supply modules.
- 2 Facing the rear of the **NV8000** frame, connect one end of a power cable (WC0096) to 'DC Output', as shown in Figure 2-33.

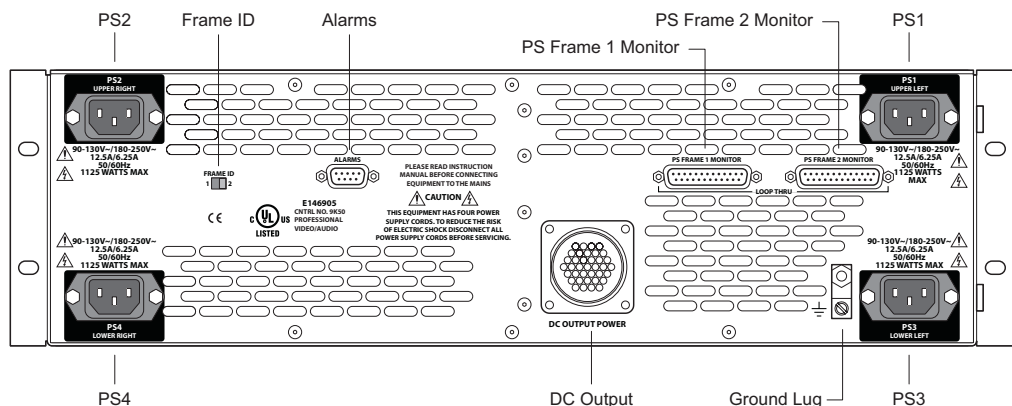


Figure 2-33. NV8000 Power Supply (Rear View)

2. Installation

Connecting to Power

- 3 Facing the rear of the **router**, connect the other end of the power cable to 'Power Input 1', as shown in Figure 2-34 for NV8280/NV8280-Plus or Figure 2-35 on page 90 for NV8576/
NV8576-Plus.

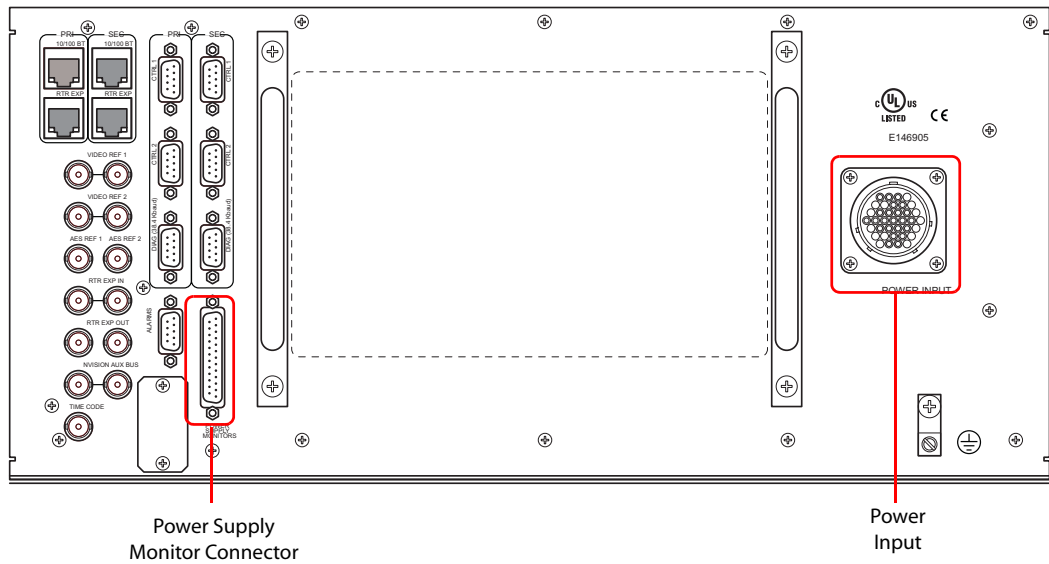


Figure 2-34. NV8280 Power Supply Monitor and Power Supply Connections on Router

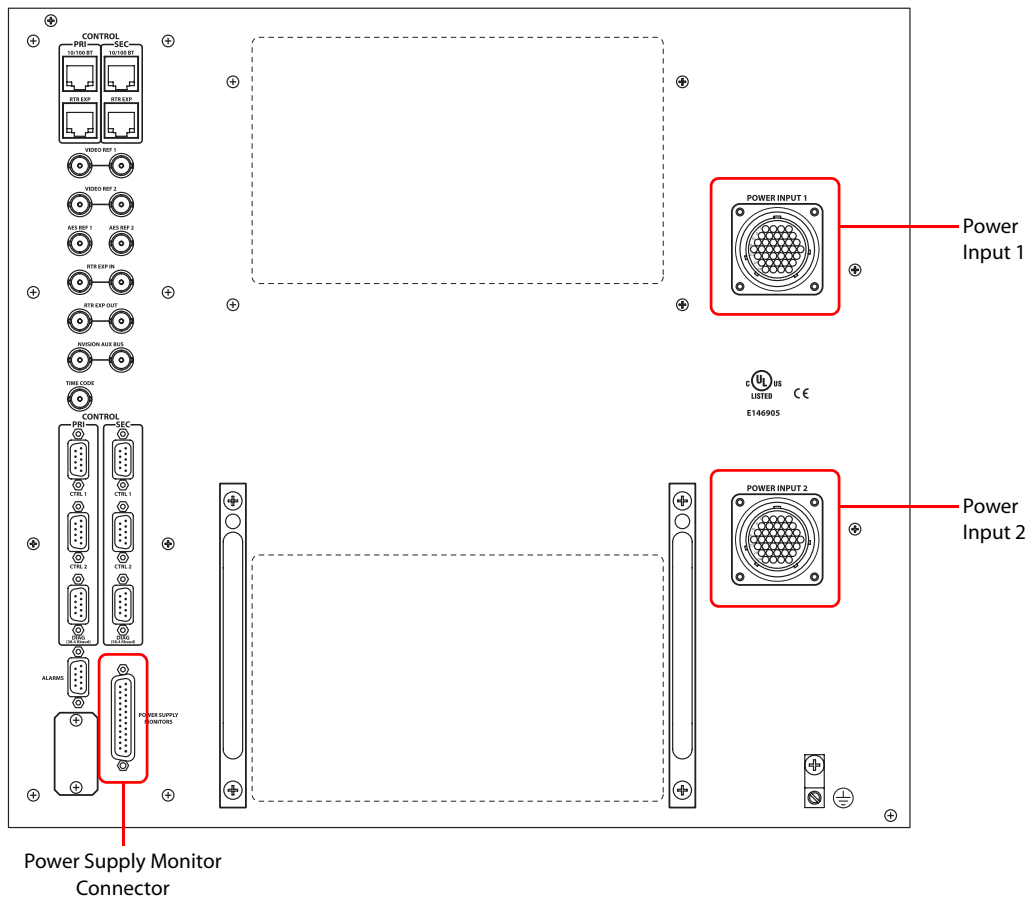


Figure 2-35. NV8576 Power Supply Monitor and Power Supply Connections on Router

2. Installation

Connecting to Power

- Using a WC0046 cable (DB25), connect 'PS Frame 1 Monitor' on the NV8000 power supply frame to 'Power Supply Monitor' on the router frame.
- Connect power cords from AC power sources (90–230 VAC, 50–60 Hz) into power supply connections PS 1 through PS 4. (See Figure 2-35.) Connect one power cord for each PS8100 power supply module you will install.
- Install the PS8100 power supply modules as follows:
 - At the front of the NV8000, install *primary* PS8100 power supply modules in slots 1 and 3, as shown in Figure 2-36.
 - Optionally, install *redundant* PS8100 power supply modules in slots 2 and 4, as shown in Figure 2-36.
 - Repeat this step for the other power supply.

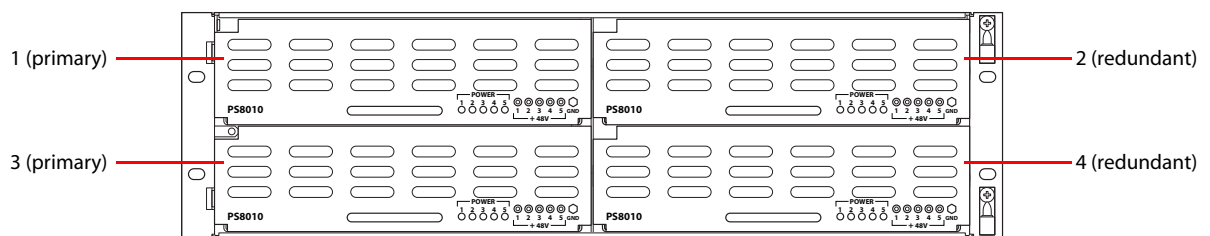


Figure 2-36. NV8000 Power Supply (Front View)

- Connect the **router's** ground lug to earth ground using a copper wire from 14 to 6 AWG. The ground lug is located in the lower right corner of the frame.

How to Connect Two NV8000 Frames to One Router Frame (NV8576 only)

- Locate the power cords and PS8100 power supply modules.
- Facing the rear of one of the **NV8000** frames (Power Supply 1), connect one end of a power cable (WC0096) to 'DC Output', as shown in Figure 2-37.

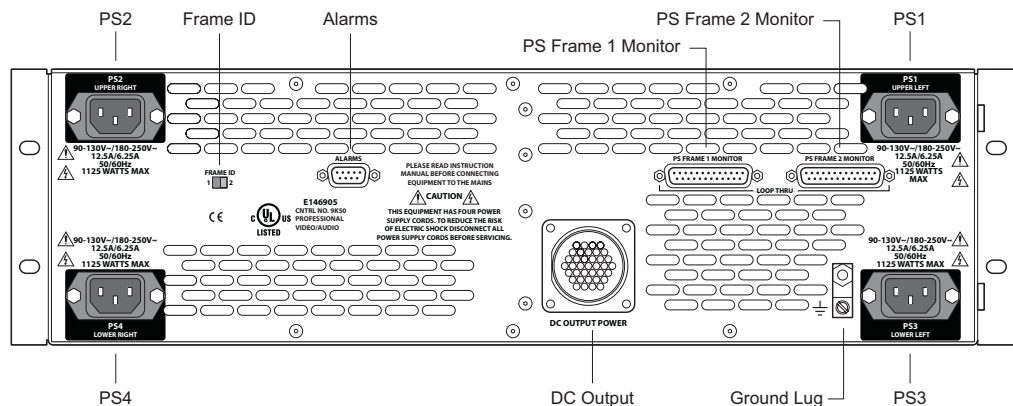


Figure 2-37. NV8000 Power Supply (Rear View)

2. Installation

Connecting to Power

- 3 Facing the rear of the **router**, connect the other end of the power cable to 'Power Input 1', as shown in Figure 2-38.

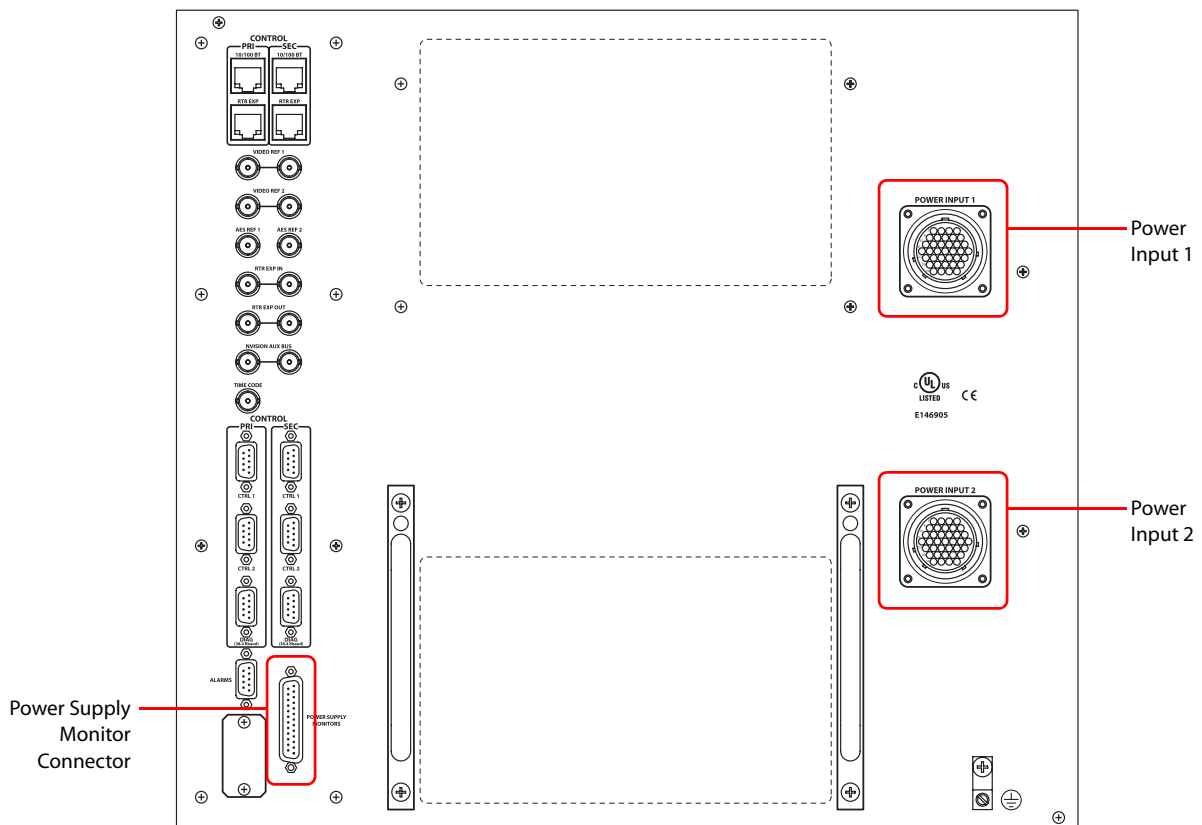


Figure 2-38. NV8576 Power Supply Monitor and Power Supply Connections on Router

- 4 Similarly, connect the other **NV8000** frame (Power Supply 1) to 'Power Input 2' using the WC0096 power cable.
- 5 Using a WC0046 cable (DB25), connect 'PS Frame 1 Monitor' on Power Supply 1 to 'Power Supply Monitor' on the router frame.
- 6 Using a second WC0046 cable (DB25), connect 'PS Frame 2 Monitor' on Power Supply 1 to 'PS Frame 2 Monitor' on Power Supply 2.
- 7 Set the Frame ID switch of Power Supply 1 to '1' and set the Frame ID switch of Power Supply 2 to '2'.
- 8 Connect power cords from AC power sources (90–230 VAC, 50–60 Hz) into power supply connections PS 1 through PS 4. (See Figure 2-37 on page 91.) Connect one power cord for each PS8100 power supply module you will install.

- 9 Install the PS8100 power supply modules as follows:
 - a At the front of the NV8000, install *primary* PS8100 power supply modules in slots 1 and 3, as shown in Figure 2-39.
 - b Optionally, install *redundant* PS8100 power supply modules in slots 2 and 4, as shown in Figure 2-39.
 - c Repeat this step for the other power supply.

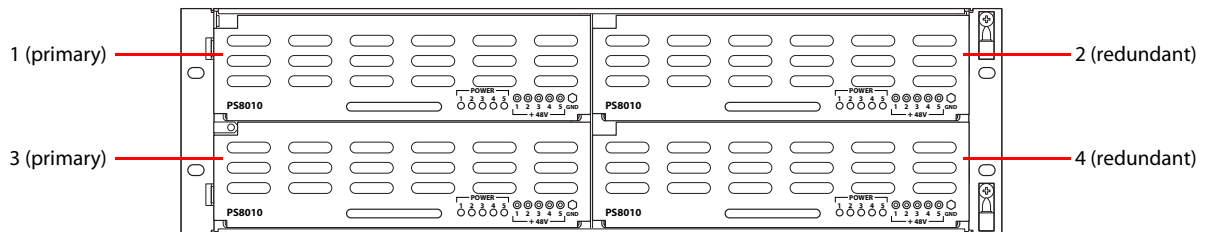


Figure 2-39. NV8000 Power Supply (Front View)

- 10 Connect the **router's** ground lug to earth ground using a copper wire from 14 to 6 AWG. The ground lug is located in the lower right corner of the frame.
- 11 If you have two NV8280-Plus or NV8576-Plus frames, connect power similarly for both frames. Four NV8000 frames are required to power two NV8280-Plus or NV8576-Plus frames.

Verification

When installation is complete, perform the following checks to make sure the router is operating properly:

- If using an NV8000 power supply frame, check that all 5 green power LEDs on the front of each PS8100 power supply module are lit. If any or all LEDs are off:
 - Check that the PS8100 power supply module is fully seated in its slot.
 - Check for +48 volts at each of the 5 front test points.
- On the router frame, check that the LEDs on the input cards, crosspoint cards, control cards, and output cards are lit and indicating a “healthy” system. See [Indicator LEDs](#) on page 101 for a list of normal and alert LED states.
- Make sure that the flow of air through the front of the router is unimpeded and the door is properly installed and closed. For more information, see [Air Flow](#) on page 103.

2. Installation

Verification



3. Configuration

Before being placed into service, the NV8500 family of routers must be configured for your particular router control system and settings. Configuration is managed through UniConfig, which resides on a PC and is separate from the router.

For information on using UniConfig, see the *UniConfig User's Guide*.

3. Configuration



4. Operation

A router control system is required to use routers in the NV8500 family. The control system provides an interface for operations and maintenance personnel. Through the control system, signal switching can be actively configured, reference inputs selected, partitions for organizing signal switching created, and certain system functions monitored.

The NV8500 family of routers are designed to partner with the Miranda NV9000 control system. However, Miranda routers are designed with a degree of flexibility and can be used with certain third-party control systems. For detailed information on using the Miranda NV9000 control system, see the associated User's Guide. For information on using third-party control systems, see the third-party vendor literature. For more information on compatible control systems. Contact Miranda technical support, see [Technical Support Contact Information on page iii](#).

Miranda Control Systems

Most facilities require multi-level switching capability (audio follow video, for example) and intuitive device naming capabilities. The control system used dramatically affects how operators use the routers and the ease with which devices are accessed.

Miranda's control system runs on an NV9000 system controller that is separate from the router. The router control system can be loaded (a) on a primary controller only or (b) on both primary and secondary (redundant) controllers, creating a fail-over backup. The control system includes control panels for managing routers and other network equipment.

Miranda's control systems offer a variety of control surfaces, support redundancy, and facilitate expansion as routing needs change. The control system is also capable of interfacing with third-party signal routing equipment. Because of the variety of features, capabilities and limitations of other manufacturers' equipment, users are urged to work closely with Miranda's technical staff and with the supplier of the third-party equipment when integrating it into an NV9000 control system.

Third-Party Control Systems

Miranda provides assistance to users wanting to configure Miranda products to function with third-party control systems. However, because Miranda does not manufacture or warrant control systems from other vendors, we cannot guarantee overall performance or answer all possible configuration-related questions. For assistance, contact the manufacturer of the control system in use.

In many cases, router features and functionality are limited when using a third-party control system. For example, the third-party system may not optimally manage mono routing, while the NV9000 control system easily manages this function.

Please consult with Miranda if you are considering using a third-party interface to control an NV8500 family router. Refer to the [Technical Support Contact Information on page iii](#).

4. Operation

Setting Redundant Crosspoint Switching

Setting Redundant Crosspoint Switching

The NV8280/NV8280-Plus and NV8576/NV8576-Plus of routers' redundant crosspoint cardset has nine function buttons, as shown in Figure 4-1.

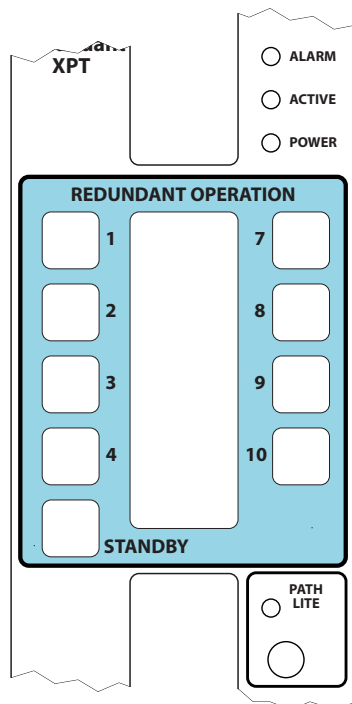


Figure 4-1. Redundant Crosspoint Cardset Function Buttons

Each of the buttons is labeled. Labels 1–4 and 7–10 refer to crosspoint cards in slots 1–4 and 7–10. The label 'Standby' refers to the redundant crosspoint itself. The buttons essentially select which crosspoint card is in stand-by mode.

When the operator presses button 1, for instance, the crosspoint in slot 1 goes to stand-by mode and the redundant crosspoint becomes active.

When the operator presses 'Standby', the redundant crosspoint goes to stand-by mode and any other crosspoints return to active mode.

The brightness of the button indicates the button state:

- Off. The crosspoint is not available.
- Dim. The crosspoint is available and active (not in stand-by mode).
- Bright. The crosspoint is in stand-by mode.

How to Change Redundant Crosspoint Settings

- 1 Open the door. at the front of the router.
- 2 Press a crosspoint button to place the crosspoint in stand-by mode. The redundant crosspoint becomes active.

4. Operation

Setting Redundant Crosspoint Switching

- 3 Press the 'Standby' button to place the redundant crosspoint in stand-by mode and revert all other crosspoints to active mode.

Note

You cannot switch another crosspoint to stand-by mode without first pressing the 'Standby' button.

- 4 Close the door when you are finished. The air cooling system requires the door to be closed.

4. Operation

Setting Redundant Crosspoint Switching

5. Maintenance

Routers in the NV8500 family do not require any periodic electrical or physical maintenance. Other than cleaning the fan air intake filter, all that is required is periodic inspection of the system to make sure no failures have occurred.

It is recommended that the system's indicator LEDs be checked on a regular basis to ensure that the system is operating properly. (See [Indicator LEDs](#) on page 101.) It is also a good idea to regularly make sure cooling air flow to the power supply fans is unobstructed.

Caution

Only qualified service personnel should perform procedures in this section.

Fuse Replacement

There are no user-serviceable fuses.

Indicator LEDs

Indicator LEDs indicate whether DC power is present and if a card is operating normally. LEDs are visible when the router front door is closed. In the following sections, LEDs are listed in the order they appear on the cards, from top to bottom.

Power Supplies

The five green LEDs on the front of the power supply modules indicate presence of the five +48 VDC outputs of the five branch circuits. All five LEDs should be lit at all times when AC power is present. If any LED is off, either the power supply has failed or the branch circuit is shorted.

Backplanes

Each backplane has indicator LEDs. If the red LED on the backplane lights, the card and backplane do not match. If the green LED on the backplane lights, the card and backplane are a correcting pairing. (See [Backplanes](#) on page 29.)

5. Maintenance

Indicator LEDs

Control Cards

The LEDs on the control cards can be monitored to determine whether the card is operating normally. The meanings of the LED indicators are as follows:

LED Indicator	Function
Red (low battery)	Normally OFF. If lit, indicates that the battery needs replacing. See Battery Replacement on page 103.
Red (alarm)	Normally OFF. If lit, indicates a problem or fault. Check the external reference signals. If that does not resolve the problem, refer to the system status window in UniConfig for additional information. If you cannot resolve the problem, call Miranda technical support. For contact information, see Technical Support Contact Information on page iii .
Yellow (active card)	Normally ON. Indicates the card is the active control card. On the standby control card, this LED should be OFF.
Green (health, power)	Normally ON. Indicates the card has power and is operating normally.

Input and Output Cards

The LEDs on the input and output crosspoint cards can be monitored to determine whether the cards are operating normally. The LEDs indicate the following:

LED Indicator	Function
Red (alarm)	Normally OFF. If lit, it indicates a problem. Replace the card or call Miranda technical support. For contact information, see Technical Support Contact Information on page iii.
Green (Power)	Normally ON. Indicates the card has power and is operating normally.
Yellow (health)	Normally ON. Indicates software has loaded and the card is operating normally.
Green (good communication)	Normally ON. Indicates good communication with the control card.
Red (bad communication)	Normally OFF. If lit, indicates that communication is not working properly with the control card; the communication is “bad.”

Crosspoint Cards

The LEDs on the crosspoint cards can be monitored to determine whether the cards are operating normally. The LEDs indicate the following:

LED Indicator	Function
Red (alarm)	Normally OFF. If lit, it indicates a problem. Replace the card or call Miranda technical support. For contact information, see Technical Support Contact Information on page iii.
Green (Power)	Normally ON. Indicates the card has power and is operating normally.
Yellow (health)	Normally ON. Indicates software has loaded and the card is operating normally.

Air Flow

Routers in the NV8500 family draw cooling air from the front of the router, through the door, and exhausts heated air through the rear of the frame. The router must have the door properly installed and closed for proper airflow through the chassis. For maximum air flow, regularly inspect router fans and filters.

Caution If airflow is impeded overheating may occur.

Fan Cleaning and Replacement

Two fan trays each containing five cooling fans are located at the top and bottom of the router frame. The tray can be removed for inspection or cleaning by opening the frame front door, sliding the latches that hold the fan module in place, and pulling the module out of the frame. If the fans become dusty or clogged with lint, use a vacuum or compressed air to clean the dust off. Also check the openings at the back of the frame where air enters and exits to be sure dust and lint have not accumulated.

Each fan tray is easily replaced simply by sliding it out of the front of the frame and inserting a new tray.

Intake Filter Screen Cleaning

The NV8500 family of routers have an air filter mounted in the door.

To remove the filter, open the router door by releasing the two thumbscrews. Locate the filter enclosure on the inside of the door. Tabs on the bottom of the filter act as hinges and tabs at the top of the filter lock it in place.

The router can be operated safely with the door opened for short periods of time. If the filter is only lightly contaminated, clean the filter by vacuuming loose debris or by blowing air from the inside outward. Rinse filters badly loaded with debris with cold water or wash them with warm water and mild detergent. Be sure the filter is completely dry before re-installing it.

Battery Replacement

If the red Low Battery LED indicator on the control card is lit, the battery located on the front edge of the card needs replacing. Grasp the exposed edge of the battery with your fingers and pull it towards you to remove it.

Important Do not use a metallic tool to remove the battery.

Call Miranda for replacement battery information. For contact information, see [Technical Support Contact Information on page iii](#).

5. Maintenance

Troubleshooting

When you insert the new battery, be careful to observe the correct polarity.

Caution

To prevent explosion of the battery and possible equipment damage or harm to personnel, be sure the battery is oriented with the correct polarity. Polarity markings are visible on the card's battery housing.

Troubleshooting

Many system issues are caused by easily corrected errors, such as poor quality or missing input or reference signals, incorrect configuration, and so on. This section lists common problems and their solutions in the most likely order of occurrence. Refer also to the [Introduction](#) on page 1 for an overview of the system and its major components. Try troubleshooting the system yourself, and if you are not successful, call Miranda Technical Support as explained near the front of this manual.

In the event that a problem is caused by a bad circuit board, swapping the bad board with a replacement circuit board is the quickest solution. To order replacement boards or other components, contact Miranda technical support. See [Technical Support Contact Information on page iii](#).

Symptom	Possible Causes and Solutions
System not powering up.	Verify that the power cord(s) are plugged into the frame and the AC power source. Use a voltmeter to verify the presence of power.
One or a few cards or PS8100 power supply modules are not powering up or not operating properly.	Check that the card or module is fully seated in the frame. Reset the card or module by reseating it in the frame. Check that all five green LEDs on the front of the PS8100 power supply modules are lit. If an LED is not lit, it indicates a branch circuit may be faulty, which could affect only certain modules in the frame. Replace the PS8100 power supply module.
Intermittent signal on one or two outputs.	Check input and output cable continuity and cable terminations. Swap each card in the signal path with another card to see if the problem moves with the card. If so, replace the card. If all cables, terminations, and cards check out OK, call Miranda technical support. (See Technical Support Contact Information on page iii.)
Intermittent or missing signals on all outputs.	Check the control card, which processes the references to produce sync. A synchronous system requires an operational control card in order to pass signals. An asynchronous system will operate in its last state even if the control card is removed. Change over to the reserve control card to see if the problem goes away. Possible low voltage on PS8100 power supply module. Check power test points on the module. Voltages at power supply test points may be slightly high in lightly loaded systems. Replace the PS8100 power supply module if any test points indicate low voltage.

Obtaining Service

For service advice, warranty exchange, warranty repair, or out-of-warranty repair:

- 1 Call Miranda Customer Support at the telephone number in the front of this manual under [Technical Support Contact Information on page iii](#). Our Customer Service Personnel will help you resolve any service issues.
- 2 If you need an exchange or repair, Miranda will assign you a Return Material Authorization (RMA) number. **Do not return equipment without first receiving an RMA number.** Miranda uses the RMA to track receipt of the equipment and to record repair or replacement information.
- 3 For out-of-warranty equipment, the Miranda Technical Support Engineer estimates the cost of repair when you call and requests a purchase order payable to Miranda.
- 4 If repair or exchange is required, package the assembly in an antistatic bag and place it in a shipping box with plenty of padding to prevent damage.
- 5 Address the package using the Shipping Address listed in the front of this manual under [Technical Support Contact Information](#) on page iii, and ship the equipment to Miranda at your company's expense.
- 6 When repair or replacement of in-warranty equipment is complete, Miranda return ships the items at our expense. For out-of-warranty equipment Miranda charges a shipping and handling fee. The standard shipping method is second day.
- 7 For out-of-warranty service, Miranda will send your company an invoice following the repair or replacement.

5. Maintenance

Obtaining Service



6. Technical Details

This section provides technical specifications for the NV8500 family of routers and the NV8000 power supply.

Power Specifications (NV8000, PS8100)

For the NV8280, NV8280-Plus, NV8576, and NV8576-Plus power is supplied through a separate frame, the NV8000 Power Supply. The following table provides power specifications for the NV8000 for powering the Routers:

Type	Parameters
AC input	90–130/180–250 VAC, 50/60 Hz, automatic ranging
AC fuses	No user serviceable fuses
AC connectors	4, IEC 320 (one for each PS8100 module installed)
AC power	PS8100, 850 Watts, one IEC 320
AC power usage	Power based on PS8100 modules: NV8144: 1000 Watts nominal (144×144), power factor corrected. NV8280, NV8280-Plus: 1750 Watts nominal (288×576, 288×288 Expandable), power factor corrected. NV8576, NV8576-Plus: 3500 Watts nominal (576×1152, 576×576 Expandable), power factor corrected (Each frame requires two NV8000 frames).
Modules and module slots	NV8144, NV8280, NV8280-Plus: Required minimum number of PS8100 modules: 2 primary (2 optional redundant). NV8576, NV8576-Plus: Required minimum number of PS8100 modules: 4 primary (4 optional redundant).
Dimensions	3RUs high (5.22 inches, 132.6 mm) 19.0" (482.6 mm) wide. 17.5" (444.5 mm) deep, approximately. Add 3" for cable clearance.
Weight	24 lbs (10.9 kg); 50 lbs (22.7 kg) fully loaded
DC power	NVISION connector to NV8000, DC cable: WC0096
Power supply alarm connection	DE9; reads each PS8100 status
Power supply monitor connection	DB25, loop-through possible
Environmental	Operating temperature: 0–40° C Relative humidity: 0 to 90%, non-condensing
Regulatory compliance	UL listed and CE compliant

6. Technical Details

Mechanical Specifications

Mechanical Specifications

The following table provides mechanical specifications for router frames:

Type	Parameter
Dimensions	NV8144: 8RU (13.97 inches, 354.8 mm) high 19.0 inches (482.6 mm) wide 17.2 inches (436.9 mm) deep NV8280, NV8280-Plus: 16RU (27.97 inches, 710.4 mm) high 19.0 inches (483 mm) wide 17.2 inches (436.9 mm) deep NV8576, NV8576-Plus: 32RU (55.97 inches, 1421.6 mm) high 19.0 inches (483 mm) wide 17.2 inches (436.9 mm) deep Add 3" (75 mm) for cable clearance. The door adds 0.8" (20 mm) to the depth.
Weight	NV8144: <i>not available</i> NV8280, NV8280-Plus: <i>not available</i> NV8576, NV8576-Plus: 169.86 lbs (77.05 kg; 308.80 lbs (140.07 kg) fully loaded
Mounting	EIA 310-C, 19.0 inches (483 mm)
Grounding terminal	Copper, accepts 14-6 AWG
Modules and module slots	NV8144: 16 input cards, 9 signals each 8 output cards, 18 signals each 2 crosspoint cards (1 primary, 1 optional redundant) 2 control cards (1 primary, 1 optional secondary) 1 monitor card, 1 fan module
Modules and module slots	NV8144: 16 input cards, 9 signals each 8 output cards, 18 signals each 2 crosspoint cards (1 primary, 1 optional redundant) 2 control cards (1 primary, 1 optional secondary) 1 monitor card, 1 fan module

6. Technical Details

Mechanical Specifications

Modules and module slots	<p>NV8280: 32 input cards, 9 signals each 32 output cards, 18 signals each 9 crosspoint cards (8 primary, 1 optional redundant) 2 control cards (1 primary, 1 optional secondary) 2 monitor cards, 2 fan modules</p> <p>NV8280-Plus: 32 input cards, 9 signals each 32 output cards, 9 signals each plus 2 high density interconnects for expansion 9 crosspoint cards (8 primary, 1 optional redundant) 2 control cards (1 primary, 1 optional secondary) 2 monitor cards, 2 fan modules</p> <p>NV8576: 64 input cards, 9 signals each 64 output cards, 18 signals each 9 crosspoint cards (8 primary, 1 optional redundant) 2 control cards (1 primary, 1 optional secondary) 4 monitor cards, 2 fan modules</p> <p>NV8576-Plus: 64 input cards, 9 signals each 64 output cards, 9 signals each plus 2 high density interconnects for expansion 9 crosspoint cards (8 primary, 1 optional redundant) 2 control cards (1 primary, 1 optional secondary) 4 monitor cards, 2 fan modules</p>
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The following table provides additional mechanical specifications:

Type	Parameter	
Diagnostic	Type	Serial port
	Standard	SMPTE 207M, EIA-422/EIA-232, configurable
	Connector	2, DE9
Serial control	Type	Serial port (2 per control card)
	Standard	SMPTE 207M, EIA-422
	Connector	4, DE9
Ethernet	Type	10/100 base T
	Standard	IEEE 802.3
	Protocol	NVISION Ethernet protocol
	Connector	2, RJ-45
GSC Node Bus / Aux Bus control	Type	Serial
	Standard	Proprietary
	Connector	2, BNC, loop-through, non-terminating pair
	Impedance	75 ohms

6. Technical Details

Environmental Specifications

Output signal monitor	Type	Standard definition and high definition digital video
	Standard	See related section of this specification for standard for each monitored signal type.
	Connector	DIN 1.0/2.3
	Impedance	75 ohms
	Signal details	See related section of this specification for details for each monitored signal type, I/O levels, and return loss.
I/O expansion	NV8280-Plus:	
	Type	Proprietary
	Standard	See related section of this specification for standard for each signal type sent between routers.
	Connector	64, proprietary
	Signal Details	See related section of this specification for details for each monitored signal type, I/O levels, and return loss.
	NV8576-Plus:	
	Type	Proprietary
	Standard	See related section of this specification for standard for each signal type sent between routers.
	Connector	128, proprietary
	Signal Details	See related section of this specification for details for each monitored signal type, I/O levels, and return loss.
Control expansion	Type	10Base2 port
	Connector	2, BNC, loop-through
	Impedance	50
Redundant crosspoint control	NV8144:	
	Connector	DB25
Redundant crosspoint card set (2 cards combined)	NV8280, NV8280-Plus, NV8576, NV8576-Plus:	
	No connector	Internal
Power supply monitor	Connector	DB25

Environmental Specifications

The following table provides environmental specifications for all routers:

Type	Parameter
Operating temperature	0–40° C
Relative humidity	0 to 90%, non-condensing

Audio Specifications

The following table provides audio specifications:

Type	Parameter	
Audio reference input	Type	Serial digital audio
	Standard	AES3id
	Sample rate	48 kHz
	Connector	2, BNC (redundant)
	Impedance	75 ohms
	Input level	0.5 V pp to 2.0 V pp
AES3 inputs/outputs	Type	Balanced digital audio
	Standard	AES3
	Sample rate	Synchronous 48 kHz. Asynchronous 32 kHz to 192 kHz
	Connector	WECO
	Impedance	110 ohms
	Input level	200 mV to 10 Vpp
	Output level	2 Vpp
AES3id inputs/outputs	Type	Unbalanced digital audio
	Standard	AES3id
	Sample rate	Synchronous 48 kHz. Asynchronous 32 kHz to 192 kHz
	Connector	DIN 1.0/2.3
	Impedance	75 ohms
	Input level	100 mV to 1.2 V pp
	Output level	1 V \pm 10%

6. Technical Details

Video Specifications

Video Specifications

The following table provides video specifications:

Video Reference

Parameter	Specification
Type	Analog video reference
Standard	PAL, NTSC or tri-Level sync
Connector	Loop-through, BNC
Impedance	75 ohms or Hi-Z ($> 20\text{ k}\Omega$), not selectable
Input Level	0.5 V pp to 2.0 V pp
Input Return Loss	$>30\text{ dB}$ to 5 MHz

SD Inputs and Outputs

Parameter	Specification
Type	Standard definition serial digital video
Standard	SMPTE 259M
Data rates	Automatic re-clocking at 270 Mb/s or auto bypass with pass-through from 19 Mb/s to 360 Mb/s
Connector	DIN1.0/2.3
Impedance	75 ohms
Cable equalization	350 m Belden 169A, 200 m Belden 1855A, or equivalent cable, at 270 Mb/s
Router path	Non-inverting
Input and output return loss	$> 15\text{ dB}$, 5 to 540 MHz
Output level	800 mV pp $\pm 10\%$
Output rise/fall time	600 ps $\pm 10\%$
Output overshoot	$\leq 10\%$ of amplitude max
Output alignment jitter	$\leq 0.2\text{ UI pp}$ from 1.0 kHz to 27 MHz
Output timing jitter	$\leq 0.2\text{ UI pp}$ from 10 Hz to 1.0 kHz

3Gig (3.0 Gb/s, HD and SD) Inputs/Outputs

Parameter	Specification
Type	High definition serial digital video
Standard	SMPTE 259M, 292M and 424M
Data rates	Automatic re-clocking at 270 Mb/s and 1.483, 1.485, 2.967, 2.970 Gb/s or automatic bypass with pass-through from 19 Mb/s to 3.0 Gb/s
Connector	DIN1.0/2.3
Impedance	75 ohms

6. Technical Details

Time Code Specifications

Cable equalization	(For cables listed or equivalent cables) 400 m Belden 1694A, 250 m Belden 1855A at 270 Mb/s 150 m Belden 1694A, 100 m Belden 1855A at 1.5 Gb/s 100 m Belden 1694A, 45 m Belden 1855A at 3.0 Gb/s
Router Path	Non-inverting
Input and output return loss	> 15 dB, 5 MHz to 1.5 GHz; > 10 dB, 1.5 GHz to 3.0 GHz
Output level	800 mV pp \pm 10%
Output rise/fall time	\leq 135 ps
Output overshoot	\leq 10% of amplitude max
Output alignment jitter	\leq 0.3 UI pp from 100 kHz to 300 MHz
Output timing jitter	\leq 2.0 UI pp from 10 Hz to 100 kHz

Time Code Specifications

The following table provides time code specifications for the following routers:

Type	Parameter	
Time code reference input	Type	1 BNC
	Standard	SMPTE 12M
	Connector	BNC terminating
	Data Rates	1/30th to 80 times normal
	Impedance	75 ohms

6. Technical Details

Time Code Specifications

7. Part Numbers

This appendix provides a list of parts provided by Miranda for the NV8500 family of routers, the NV8000 power supply frame and power supply modules. Unless otherwise noted, part numbers apply to all routers in the NV8500 family.

Table 7-1. Power Supply

Part Number	Description
PS8100	Power supply module (850 Watts)
WC0046-00	Power supply monitor cable
WC0096-00	Power supply cable

Table 7-2. Frame Expansion

Part Number	Description
WC0121	Expansion cable (4 meters)
WC0084	Terminator

Table 7-3. Input Cards and Backplanes

Input Card Part Number	Signal Types	Standard	Rates	Corresponding Backplane
EM0687	Asynchronous digital audio, unbalanced	AES3	Sample rates 32 kHz to 96 kHz (passed through)	EM0791 (coax)
EM0687	Asynchronous digital audio, balanced	AES3	Sample rates 32 kHz to 96 kHz (passed through)	EM0828 (WECO)
EM0689 (coax)	SD	259M	Video rates from 19 Mb/s to 360 Mb/s. Automatic reclocking at 270 Mb/s. Reclocking bypassed at other rates.	EM0791 (coax)
EM0783 (coax)	3Gig, HD, SD	259M	Video rates from 19 Mb/s to 3 Gb/s. Automatic reclocking at 270 Mb/s and 1.483, 1.485, 2.966, 2.970 Gb/s. Reclocking bypassed at other rates.	EM0791 (coax)
EM0693 (fiber optic)		344M 292M 424M		EM0696 (fiber optic)

Table 7-4. Output Cards and Backplanes

Output Card Part Number	Category	Signal Types	Standard	Rates	Corresponding Backplane
AES Asynchronous Signals (Unbalanced and Balanced)					
EM0688	Standalone	Unbalanced	AES3	Audio sample rates 32 kHz to 96 kHz (passed through)	EM0793 (18 coax)
EM0688	Expansion				EM0789 (9 coax, 2 expansion)
EM0688	Filler				EM0789 (9 coax, 2 expansion)

7. Part Numbers

Output Card Part Number	Category	Signal Types	Standard	Rates	Corresponding Backplane
EM0688	Standalone	Balanced	AES3	Audio sample rates 32 kHz to 192kHz (passed through)	EM0829 (18 WECO)
EM0688	Expansion				EM0830 (9 WECO, 2 expansion)
EM0688	Filler				EM0830 (9 WECO, 2 expansion)
Video Signals (Coax Cable)					
EM0690 (coax)	Standalone	SD	SMPTE 259M	Video rates from 19 Mb/s to 360 Mb/s. Automatic reclocking at 270 Mb/s. Reclocking bypassed at other rates.	EM0793 (18 coax)
EM0691 (coax)	Expansion (no Filler)				EM0789 (9 coax, 2 expansion)
EM0785 (coax)	Standalone	3Gig, HD, SD	SMPTE 259M 344M 292M 424M	Video rates from 19 Mb/s to 3 Gb/s. Automatic reclocking at 270 Mb/s and 1.483, 1.485, 2.966, 2.970 Gb/s. Reclocking bypassed at other rates.	EM0793 (18 coax)
EM0787 (coax)	Expansion				EM0789 (9 coax, 2 expansion)
EM0692 (coax)	Filler				EM0789 (9 coax, 2 expansion)
Video Signals (Fiber Optic Cable)					
EM0697 (fiber optic)	Standalone	3Gig, HD, SD	SMPTE 259M 344M 292M 424M	Video rates from 19 Mb/s to 3 Gb/s. Automatic reclocking at 270 Mb/s and 1.483, 1.485, 2.966, 2.970 Gb/s. Reclocking bypassed at other rates.	EM0694 (18 coax)
EM0695 (fiber optic)	Expansion				EM0698 (9 coax, 2 expansion)
EM0692 (fiber optic)	Filler				EM0789 (9 coax, 2 expansion)

Table 7-5. Crosspoint Cards and Backplanes

Crosspoint Card Part Number	Type	Corresponding Backplane
EM0662	3Gig 288×288 crosspoint for NV8576/NV8576-Plus	None
EM0799	3Gig 144×144 crosspoint for NV8280/NV8280-Plus	None
EM0799	3Gig 144x144 crosspoint for NV8144	None
EM0676	Redundant 288×288 crosspoint for NV8576/NV8576-Plus	None
EM0678	Redundant 144×144 crosspoint for NV8280/NV8280-Plus	None
—	No redundant 144×144 crosspoint for NV8144	None

Table 7-6. Control Cards and Backplanes

Control Card Part Number	Type	Corresponding Backplane
EM0666	NV8576/NV8576-Plus, NV8280/NV8280-Plus and NV8144	None

7. Part Numbers

Table 7-7. Monitor Cards and Backplanes

Monitor Card Part Number	Type	Corresponding Backplane
EM0663	3Gig monitor for NV8576/NV8576-Plus, NV8280/NV8280-Plus and NV8144 (Note: The NV8144 uses only one monitor card and only one backplane, the EM0714).	Input EM0715 Output EM0714
EM0663	NV8144	EM0846

Table 7-8. Frames

Part Number	Description
FR0045	NV8144 frame.
FR0044	NV8280 frame.
FR0074	NV8280-Plus frame.
FR0043	NV8576 frame.
FR0073	NV8576-Plus frame.

7. Part Numbers

8. NV8576 I/O Signal Numbering

Signals are received and distributed through I/O cards and connectors housed on a backplane. Each signal is assigned a number that corresponds to the physical input or output connector and to the slot in which an input card or output card is installed. The following illustrations list the signal numbers assigned to I/O connections on the NV8576 and NV8576-Plus frames. For more information on signal numbering, and for numbering on the NV8280, NV8280-Plus and NV8144 frames, see [Backplane Connectors and Individual Signal Numbers](#) on page 14.

A. Glossary

3Gig	The combination of SD, HD and 3.0 Gb/s video signals. Rates 270, 1,483, 1,485, 2,996, 2,970 Mb/s up to 3.0 Gb/s.
AC	Alternating Current.
CE	Conformité Européenne. European health and safety product label.
dBu	Unit of audio level where 0 dBu is 0.775 V rms.
DC	Direct Current.
EIA	Electronic Industries Alliance. A trade organization for electronics manufacturers in the United States. The organization helps develop standards on electronic components, consumer electronics, electronic information, telecommunications, and Internet security.
ESD	Electrostatic discharge.
HD	High Definition (HD-SDI). Video signal rates: SMPTE 259M at 1.483 and 1.485 Gb/s.
IEC	International Electrotechnical Commission. An international standards organization dealing with electrical, electronic and related technologies.
IEEE	Institute of Electrical & Electronics Engineers. An international non-profit, professional organization for the advancement of technology related to electricity.
IMD	Inter-modulation distortion.
I/O	Input/Output.
LAN	Local Area Network.
LC	Small form factor connector for optic signals.
LED	Light Emitting Diode.
RU	Rack Unit. A standard measure or size for frames (1.75 inches).
SD	Standard Definition (SD-SDI). Video signal rates: SMPTE 259M at 143, 177, 270 and 360 Mb/s and SMPTE 344M at 540 Mb/s.
SMPTE	Society of Motion Picture and Television Engineers. www.smpte.org . An international professional association, based in the United States of America, of engineers working in the motion imaging industries.
UL	Underwriters Laboratory Incorporated. Develops standards and test procedures for materials, components, assemblies, tools, equipment and procedures, chiefly dealing with product safety and utility.
UniConfig	Application that configures routers.
V	Volts.
VAC	Volts, Alternating Current.
VDC	Volts, Direct Current.
WECO	Connector for AES asynchronous balanced signals. WECO output connectors have 5 pins. Each connector handles two outputs (two negative pins and two positive pins) that share a middle pin for

A. Glossary

shielding (or ground). WECO input connectors have three pins with each positive and negative pin sharing a single shielding pin. The spacing on the pins is 3.5 mm. WECO (matching pair) connectors are provided with the router package.



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