NRG

NRG-FR1, NRG-FR1-LCP, NRG-FR2, and NRG-FR2-LCP Installation Guide

www.rossvideo.com

ROSS

Thank You for Choosing Ross

You've made a great choice. We expect you will be very happy with your purchase of Ross Technology.

Our mission is to:

1. Provide a Superior Customer Experience
   - offer the best product quality and support
2. Make Cool Practical Technology
   - develop great products that customers love

Ross has become well known for the Ross Video Code of Ethics. It guides our interactions and empowers our employees. I hope you enjoy reading it below.

If anything at all with your Ross experience does not live up to your expectations be sure to reach out to us at *solutions@rossvideo.com*.

David Ross
CEO, Ross Video
dross@rossvideo.com

Ross Video Code of Ethics

Any company is the sum total of the people that make things happen. At Ross, our employees are a special group. Our employees truly care about doing a great job and delivering a high quality customer experience every day. This code of ethics hangs on the wall of all Ross Video locations to guide our behavior:

1. We will always act in our customers' best interest.
2. We will do our best to understand our customers' requirements.
3. We will not ship crap.
4. We will be great to work with.
5. We will do something extra for our customers, as an apology, when something big goes wrong and it's our fault.
6. We will keep our promises.
7. We will treat the competition with respect.
8. We will cooperate with and help other friendly companies.
9. We will go above and beyond in times of crisis. *If there's no one to authorize the required action in times of company or customer crisis - do what you know in your heart is right. (You may rent helicopters if necessary.)*

NRG · Installation Guide

- Ross Part Number: **2200DR-403-01**
- Revision: 1
- Release Date: December 9, 2025.
- Software Issue: **7.1**

The information contained in this Guide is subject to change without notice or obligation.

Copyright

Patents

Patent numbers US 7,034,886; US 7,508,455; US 7,602,446; US 7,802,802 B2; US 7,834,886; US 7,914,332; US 8,307,284; US 8,407,374 B2; US 8,499,019 B2; US 8,519,949 B2; US 8,743,292 B2; GB 2,419,119 B; GB 2,447,380 B; and other patents pending.

Notice

The material in this manual is furnished for informational use only. It is subject to change without notice and should not be construed as commitment by Ross Video Limited. Ross Video Limited assumes no responsibility or liability for errors or inaccuracies that may appear in this manual.

Trademarks

- Google® is a registered trademark of Google Inc.
- Microsoft® Excel® and Internet Explorer® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- Mozilla® and Firefox® are registered trademarks of the Mozilla Foundation.
- Oracle® and Java® are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.
- Safari® is a trademark of Apple Inc., registered in the U.S. and other countries.

Safety Notices

Refer to the "**Important Regulatory and Safety Notices**" document that accompanied your product.

Statement of Compliance

This product has been determined to be compliant with the applicable standards, regulations, and directives for the countries where the product is marketed.

Compliance documentation, such as certification or Declaration of Compliance for the product is available upon request by contacting techsupport@rossvideo.com. Please include the product; model number identifiers and serial number and country that compliance information is needed in request.

EMC Notices

United States of America — FCC Part 15

This equipment has been tested and found to comply with the limits for a class A Digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canada

This Class “A” digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe “A” est conforme a la norme NMB-003 du Canada.

Korea — Class A Statement

이 기기는 업무용 환경에서 사용할 목적으로 적합성 평가를 받은 기기로서 가정용 환경에서 사용하는 경 우 전파간섭의 우려가 있습니다.

This device has been evaluated for conformity for use in a business environment. When used in a home environment, there is a danger of interference.

Europe

This equipment is in compliance with the essential requirements and other relevant provisions of **CE Directive 93/68/EEC**.

International

This equipment has been tested to **CISPR 32:2015** along with amendments **AMD1:2019**, and found to comply with the limits for a Class A Digital device.

Important — *This is a Class A product. In domestic environments, this product may cause radio interference, in which case the user may have to take adequate measures.*

General Handling Guidelines

- Careful handling, using proper ESD precautions, must be observed.
- Power down the system before PCB removal.

A Word About Static Discharge

Throughout the many procedures in this manual, please observe all static discharge precautions.

Caution — *Avoid handling circuit boards in high static environments such as carpeted areas, and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame, and exercise proper grounding precautions when working on circuit boards.*

Warranty and Repair Policy

The product is backed by a comprehensive one-year warranty on all components.

Notice — *Changes or modifications to this equipment not expressly approved by Ross Video Ltd. could void the user's authority to operate this equipment.*

If an item becomes defective within the warranty period Ross will repair or replace the defective item, as determined solely by Ross.

Warranty repairs will be conducted at Ross, with all shipping FOB Ross dock. If repairs are conducted at the customer site, reasonable out-of-pocket charges will apply. At the discretion of Ross, and on a temporary loan basis, plug in circuit boards or other replacement parts may be supplied free of charge while defective items undergo repair. Return packing, shipping, and special handling costs are the responsibility of the customer.

This warranty is void if products are subjected to misuse, neglect, accident, improper installation or application, or unauthorized modification.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profit). Implied warranties, including that of merchantability and fitness for a particular purpose, are expressly limited to the duration of this warranty.

This warranty is TRANSFERABLE to subsequent owners, subject to Ross' notification of change of ownership.

Environmental Information

The equipment may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.

If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration. You can also contact Ross Video for more information on the environmental performances of our products.

This appliance may contain a Coin type battery which should not be treated as household waste.

To ensure that the battery will be treated properly use the appropriate take-back systems in your area. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

Company Address

Ross Video Limited
8 John Street
Iroquois, Ontario
Canada, K0E 1K0

Ross Video Incorporated
P.O. Box 880
Ogdensburg, New York
USA 13669-0880

General Business Office: (+1) 613 • 652 • 4886
Fax: (+1) 613 • 652 • 4425

Technical Support: (+1) 613 • 652 • 4886
After Hours Emergency: (+1) 613 • 349 • 0006

E-mail (Technical Support): techsupport@rossvideo.com
E-mail (General Information): solutions@rossvideo.com
Website: http://www.rossvideo.com

Contents

Introduction

This guide is for system administrators and installers of the Ross Video NRG-FR1, NRG-FR1-LCP, NRG-FR2, and NRG-FR2-LCP routers.

This guide contains the following chapters that cover the installation of your router:

- "**Introduction**" summarizes the guide and provides important terms, and conventions.
- "**Getting Started**" provides an overview for creating a routing system using the NRG routers, and general information to keep in mind before installing and configuring your NRG.
- "**Hardware Overview**" provides a basic introduction to the NRG front and back panels.
- "**Physical Installation**" provides instructions for connecting the NRG to a network, and how to power on the router.
- "**Video Reference**" provides instructions for connecting a video reference signal to the NRG.
- "**Cabling the SDI Inputs**" outlines the SDI input cabling for each NRG.
- "**Cabling the SDI Outputs**" outlines the SDI output cabling for each NRG.
- "**Cabling for the NRG-MV**" outlines the Multiviewer Head cabling designations when an NRG-MV license is enabled on the router.
- "**Cabling the DisplayPort**" outlines the DisplayPort output cabling for each NRG.
- "**Connecting to Ross Devices**" provides workflow examples with other Ross devices.
- "**Technical Specifications**" provides the specifications, such as dimensions and power consumption, for each NRG router.
- "**Software Licenses**" provides third-party software license information for your NRG.
- "**Glossary**" briefly defines the terms used throughout this guide.

If you have questions pertaining to installation of this Ross Video product, contact us at the numbers listed in "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

Related Publications

It is recommended to consult the following Ross documentation before installing your NRG router:

- ***DashBoard User Guide***, Ross Part Number: 8351DR-004
- ***NRG-FR1 and NRG-FR1-LCP Quick Start Guide***, Ross Part Number: 2200DR-401
- ***NRG-FR2 and NRG-FR2-LCP Quick Start Guide***, Ross Part Number: 2200DR-402
- ***NRG User Guide***, Ross Part Number: 2200DR-404
- ***Ultricore BCS User Guide***, Ross Part Number: 2201DR-106
- ***Ultrix and Ultricore Database Guide***, Ross Part Number: 2201DR-109

✶ The user documentation is available for download from our website.

Documentation Conventions

Special text formats are used in this guide to identify parts of the user interface, text that a user must enter, or a sequence of menus and sub-menus that must be followed to reach a particular command.

Interface Elements

Bold text is used to identify a user interface element such as a dialog box, menu item, or button. For example:

In the **Save Layout** dialog, click **OK**.

User Entered Text

Courier text is used to identify text that a user must enter. For example:

In the **Language** box, enter **`English`**.

Referenced Guides

Italic text is used to identify the titles of referenced guides, manuals, or documents. For example:

For more information, refer to the ***NRG User Guide***.

Menu Sequences

Menu arrows are used in procedures to identify a sequence of menu items that you must follow. For example, if a step reads "**File** > **Save**," you would click the **File** menu and then click **Save**.

Important Instructions

Star icons are used to identify important instructions or features. For example:

✶ When the NRG router cannot connect to the network, a **Message** dialog box opens to report the connection problem.

Contacting Technical Support

At Ross Video, we take pride in the quality of our products, but if problems occur, help is as close as the nearest telephone.

Our 24-hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support is provided directly by Ross Video personnel. During business hours (Eastern Time), technical support personnel are available by telephone. After hours and on weekends, a direct emergency technical support phone line is available. If the technical support person who is on call does not answer this line immediately, a voice message can be left and the call will be returned shortly. This team of highly trained staff is available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

- **Toll Free Technical Support (North America)**: 1-844-652-0645
- **Toll Free Technical Support (International)**: +800 1005 0100
- **Technical Support**: (+1) 613-652-4886
- **After Hours Emergency**: (+1) 613-349-0006
- **E-mail**: techsupport@rossvideo.com
- **Website**: http://www.rossvideo.com

Getting Started

A routing system requires careful planning. This can include allocating common connector numbers across several router levels or partitions within the routing system to ensure that source and destination equipment switch on just one switch command.

General Overview

Figure 1 provides a simplified example and may differ from what your facility requires.

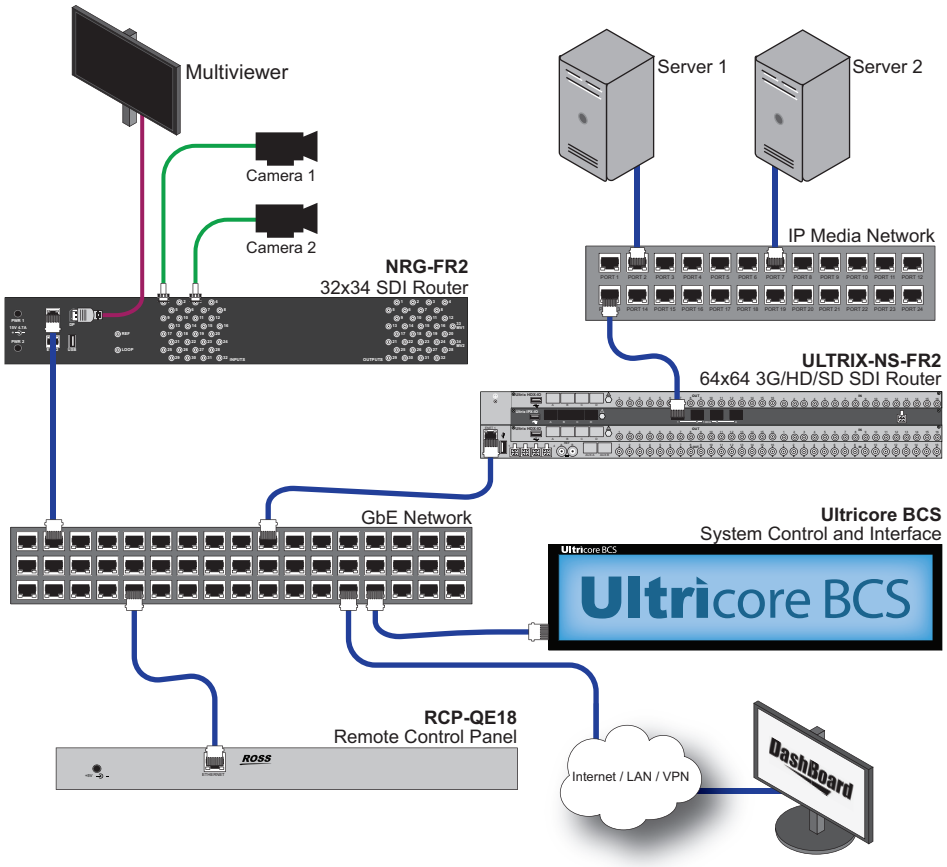


Figure 1 Example of a Simple Routing System

Signal Distribution

A broadcast router is a device that switches signals generated by broadcast equipment from a nominated input to a nominated output. An input is a physical socket on a router, a source is a virtual grouping of inputs tied together under a label. The inputs may be routed to any number of outputs providing signal distribution.

Routing Layers or Levels

Each physical router (or signal type) may be thought of as a layer or level of the routing system (e.g. a video level, an audio level). The NRG may operate as a stand alone router or participate in a multi-level system.

Interface and Connectivity

Keep in mind that the NRG router uses ethernet protocols to communicate to other devices in your routing system. An NRG routing system may use distributed control across the Internet, a LAN, or a VPN. Use your DashBoard client to set up each router via the router interfaces or using the options available for each device in your system.

✶ Ensure that you are using the latest version of the DashBoard client software. The DashBoard software and user manual are available from the Ross Video website.

For More Information on...

- configuring the NRG router in DashBoard, refer to the ***NRG User Guide***.

Remote Control Panels

Remote control panels (e.g. RCP-QE, RCP-ME) provide a physical switching surface to control the router switching. Each panel uses data derived from the NRG database to display text on LCDs and assign functions to the buttons.

When the system is powered up, the router restores its crosspoint status. The remote control panel requests the status of the router and displays the current status for the selected destination.

Local Control Panels (LCP)

The NRG-FR1-LCP and NRG-FR2-LCP each include physical buttons on the front panel. The front panel buttons are programmable back-lit buttons. The number of buttons depends on the router type. The NRG-FR1-LCP provides 8 function, 16 source, and 16 destination buttons. The NRG-FR2-LCP provides 16 function, 32 source, and 32 destination buttons.

For More Information on...

- the front panel features, refer to "**Front Panel Overview**".
- the default button assignments, refer to the ***NRG User Guide***.

Topology

When installing devices in a network topology, consider the physical placement of the devices in the network and how the communications (data) will flow within that network. Consideration must also be given to the distances between devices, physical interconnections, transmission rates, and signal types that you are installing.

✶ The NRG family communicates via a standard IT ethernet communications network (1GbE). For installations comprising a managed switch, ensure TCP ports 15909 are not blocked for inter-device communications.

Hardware Overview

This chapter presents information on the NRG front and back panels.

Front Panel Overview

There are four router models in the NRG family: NRG-FR1, NRG-FR1-LCP, NRG-FR2, and NRG-FR2-LCP. All routers fit into the standard 19” rack.

✶ The physical buttons do not display a text label. **Figure 3** and **Figure 5** show the default function assignments as a reference only.

Figure 2 Front Panel — NRG-FR1

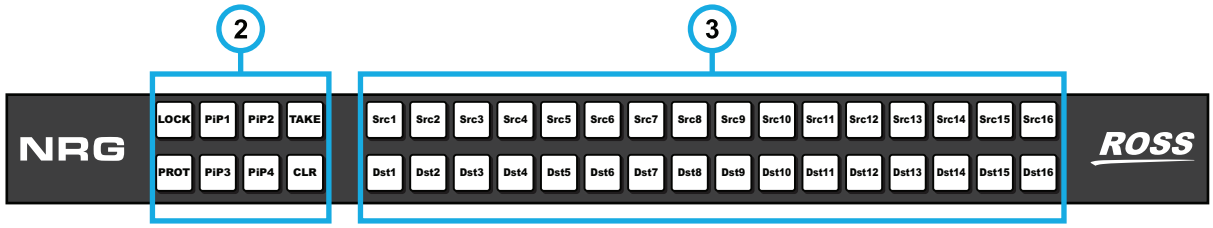


Figure 3 Front Panel — NRG-FR1-LCP

Figure 4 Front Panel — NRG-FR2

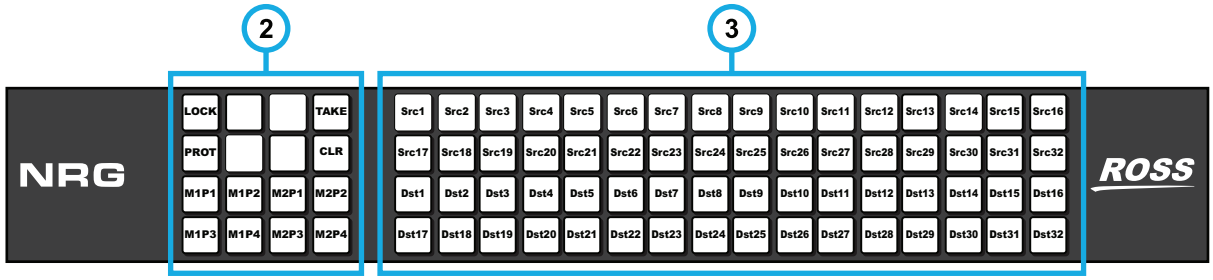


Figure 5 Front Panel — NRG-FR2-LCP

1) STATUS LED	2) Function Buttons	3) Sources and Destinations Buttons

1. STATUS LED

The NRG-FR1 and NRG-FR2 routers indicate their status by a pulsating LED.

Table 1 STATUS LED Behavior

LED Color	Description
Solid Blue	System is operating correctly with no errors
Blinking White	Walkabout locate identification feature
Solid Red	An error condition occurred. Consult the ***NRG User Guide*** for details on the alarming features.

2. Function Buttons

The NRG-FR1-LCP (**Figure 6**) and NRG-FR2-LCP (**Figure 7**) include programmable buttons that are assigned default functions from the factory. You can choose to keep the default assignments, or reassign to other functions as required. Refer to the ***NRG User Guide*** for details on configuring these buttons.

✶ The physical buttons do not display a text label. **Figure 6** and **Figure 7** show the default function assignments as a reference only. The default PiP and M#P# functions shown below are fully licensed with NRG-MV.

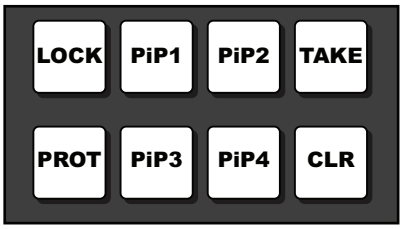


Figure 6 NRG-FR1-LCP — Function Buttons

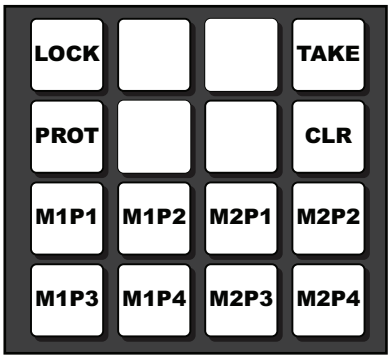


Figure 7 NRG-FR2-LCP — Function Buttons

3. Sources and Destinations Buttons

The NRG-FR1-LCP and NRG-FR2-LCP provide buttons allocated to the sources (Src) and destinations (Dst) in your routing system.

› **NRG-FR1-LCP** — by default, the 16 buttons in the top row are assigned as sources and the 16 buttons in the bottom row are assigned as destinations. (**Figure 8**)

› **NRG-FR2-LCP** — by default, the top two rows are assigned as sources and the bottom two row of buttons are assigned as destinations. (**Figure 9**)

✶ The physical buttons do not display a text label. **Figure 8** and **Figure 9** show the default function assignments as a reference only.

Figure 8 NRG-FR1-LCP — Src and Dst Buttons

Figure 9 NRG-FR2-LCP — Src and Dst Buttons

Back Panel Overview

The back panel provides a support structure for connecting input or output signals, and two looping reference connections. Note that the number of connections depends on the router model.

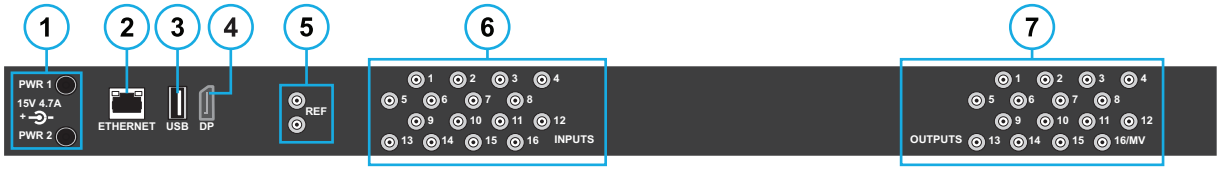


Figure 10 Back Panel — NRG-FR1 and NRG-FR1-LCP

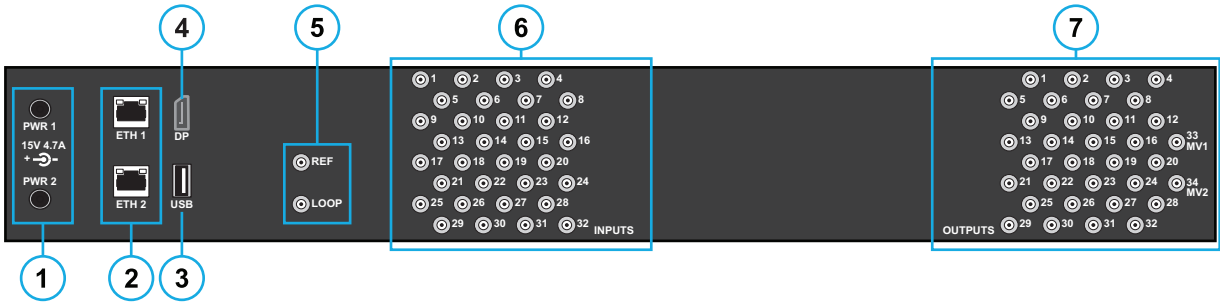


Figure 11 Back Panel — NRG-FR2 and NRG-FR2-LCP

1) PWR Connections	4) DisplayPort (DP)	7) SDI OUTPUTS HD-BNCs
2) ETH Port(s)	5) Video REF Ports	
3) USB Port	6) SDI INPUTS HD-BNCs	

1. PWR Connections

There are two power supply connectors (PWR) located on the back of each NRG router numbered 1-2 starting from the top connector. Each connector requires a 15VDC connection to an external power supply.

Caution — *The NRG router automatically powers on when power is applied.*

Each NRG router ships with one power supply. An option is available to order a second power supply for redundancy.

2. ETH Port(s)

Each ETH port is an RJ45 connector used to connect the router to an external GbE Gigabit ethernet. Each port has its RJ45 connector wired as a Network Interface Card (NIC).

On the NRG-FR2 and NRG-FR2-LCP, connect ETH1 as the primary ethernet connection to bridge the external ethernet network to the local communications bus for monitoring and control of the router. Only connect ETH2 when a redundant connection is required. At least one ethernet connection is required to bridge the external ethernet network to the local communications bus for monitoring and control of the router.

Notice — *The ETH ports do not provide Power-over-Ethernet (PoE).*

3. USB Port

The USB 2.0 port is used only for IP address recovery or as directed by Ross Technical Support.

4. DisplayPort (DP)

The NRG router includes one standard port that provides a DisplayPort v1.2a output. This port is used to monitor a Multiviewer output (with an NRG-MV license), or a 1080p video source.

✶ Audio support is not implemented on the DP port.

5. Video REF Ports

Two looping HD-BNC inputs are provided to accept reference signals supporting the following reference types: analog black, tri-level sync, and AES/DARs.

6. SDI INPUTS HD-BNCs

The number of input (source) HD-BNCs depends on the router model you are using.

› The NRG-FR1 and NRG-FR1-LCP each provide 16 SDI inputs via HD-BNCs.

› The NRG-FR2 and NRG-FR2-LCP each provide 32 SDI inputs via HD-BNCs.

7. SDI OUTPUTS HD-BNCs

The number of output (destination) HD-BNCs depends on the router model you are using.

› The NRG-FR1 and NRG-FR1-LCP each provide 16 SDI outputs via HD-BNCs.

› The NRG-FR2 and NRG-FR2-LCP each provide 34 SDI outputs via HD-BNCs.

✶ When the NRG-MV licensed feature is enabled, BNC 16 on the NRG-FR1 and NRG-FR1-LCP can be assigned to the Multiviewer Head. The NRG-FR2 and NRG-FR2-LCP support up to two Multiviewer Heads (requires two licenses). If one license is enabled, BNC 33 can be assigned to Multiviewer Head 1. When two licenses are enabled, BNC 33 and BNC 34 can be assigned to Head 1 and Head 2 respectively. Refer to the ***NRG User Guide*** for details on the NRG-MV licenses.

Physical Installation

If you have questions pertaining to the installation of your NRG router, contact us at the numbers listed in "**Contacting Technical Support**".

Before You Begin

Caution — *The NRG router utilizes side-to-side airflow management (right to left looking at the front of the chassis). It is a requirement that the sides of the mounted NRG router are not obscured.*

These installation guidelines assume the following:

- The relevant Ross equipment is installed into a ventilated rack frame. The relative humidity in the environment of the equipment should be <70% (non-condensing). The ambient temperature of the air entering the front panel should not exceed 40°C (104°F), and should not fall below 0°C (32°F). It is recommended to leave a 1RU gap between each chassis.
- Ensure that adequate space exists in front, behind, and on both sides of the router for airflow exhaust.
- Ensure that adequate space exists on both sides of the router and side access is not blocked from the rear.
- If a Ross openGear frame is included in the installation, it is recommended that the NRG router be installed directly above the openGear frame.
- The install location of the router should be accessible, dry, and dust-free.
- The socket/outlet should be installed near the equipment and be easily accessible.
- The routing system is well planned and designed. Consideration must be given to inputs and outputs across multiple router levels and typical operating scenarios for breakaways.
- Valid IP addresses are assigned to the equipment.

✶ Ross Video recommends that the equipment is installed to any relevant standards and approvals by qualified and experienced personnel.

Static Discharge

Throughout this chapter, please heed the following cautionary note:

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Unpacking

Unpack each NRG you received from the shipping container and ensure that all items are included. If any items are missing or damaged, contact your sales representative or Ross Video directly.

Mounting Requirements

The NRG router is designed for installation into a standard 19" equipment rack. It has integrated rack ears, allowing it to be screwed in using standard screws and cage nuts.

The NRG mounts in the rack frame by means of four rack screws fastened through the front and back mounting ears. This should normally be sufficient to carry the load, including the weight of accompanying cables.

Under some conditions, the ambient air temperature inside rack-mount cabinets can be greater than the ambient temperatures within a room. For safe long term reliability, ensure the ambient air temperatures at the router right-side intake are within the router's specified operating temperature range. Adequate ventilation within a rack frame must also be maintained.

For More Information on...

- installation and mounting your NRG, refer to the ***NRG Quick Start Guide*** for your router.
- the technical specifications for the NRG router, refer to "**Technical Specifications**".

Connecting the NRG Router to a Network

The NRG is connected directly to your network so that it can exchange data and communicate with other devices in your router system and the computer running the DashBoard client. After a physical connection is established, DashBoard is used to configure the network settings for the NRG. The exact steps for connecting your NRG to your facility network depend on the network requirements of your facility.

Keep the following in mind:

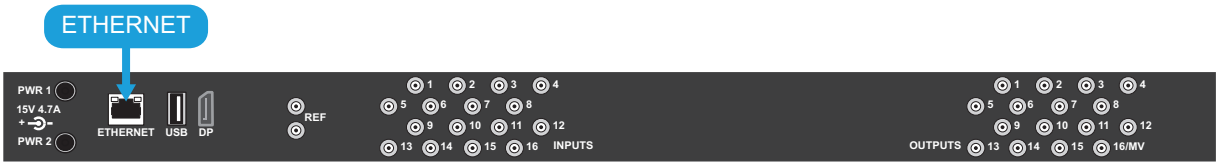
✶ Contact your IT department before connecting to your facility network to ensure that there are no conflicts. They will provide you with an appropriate value for the IP address, subnet mask, and gateway for your NRG.

✶ If difficulties or problems are experienced when connecting the NRG to a network hub, or with assigning IP addresses, contact your network administrator.

To establish a physical connection to the network for the NRG-FR1 or NRG-FR1-LCP

✶ A 1GbE connection is required.

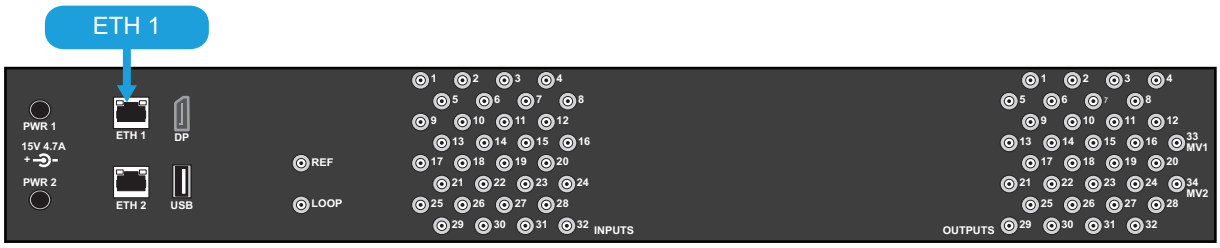
1. Connect one free end of a standard CAT 5/5e/6 ethernet cable to a free port of the network hub.
2. Connect the other end of the same cable to the **ETHERNET** port on the rear of the NRG router.



To establish a physical connection to the network for the NRG-FR2 or NRG-FR2-LCP

✶ A 1GbE connection is required.

1. To connect the primary network connection for the router:
   a. Connect one free end of a standard CAT 5/5e/6 Ethernet cable to a free port of the network hub.
   b. Connect the other end of the same cable to the **ETH 1** port on the rear of the NRG router.



2. To connect the redundant network connection for the router:
   a. Connect one free end of a second straight through CAT 5/5e/6 cable to a free port of the network hub.
   b. Connect the other end of the same cable to the **ETH 2** port on the rear of the NRG router.

Powering on the NRG Router

The NRG ships with the required power supply. This power supply provides regulated +15V DC (±2%) @ up to 4.65A. The DC Power cord has a locking connector that securely fastens into a power supply DC jack on the NRG chassis.

There are two PWR sockets on the back of each NRG router. Either PWR socket may be used to power the frame. The second PWR socket allows full power redundancy.

Warning Hazardous Voltages — *The safe operation of this product requires that a protective earth connection be provided. This protective earth is provided by the ground conductor in the equipment's supply cord. To reduce the risk of electrical shock to operator and service personnel, this ground connector must be connected to an earthed ground.*

Warning — *In some countries it may be necessary to supply the correct mains supply cord. Use only certified cords for the country of use.*

Before You Begin

Keep in mind that:

- Each NRG router requires a minimum of one +15V DC, 4.65A PSU.
- For redundancy, an optional second PSU can be used.
- For redundancy, each power cord should be connected to a separate power source for protection against failure of the A/C power circuit. In the event of one power supply failure, the panel load is seamlessly transferred to the other connected redundant power supply.

Notice — *The NRG router automatically powers on when power is applied.*

To connect the primary power supply to the NRG

Warning — *The power supply connector of the NRG power supply module must be fully inserted into the NRG PWR port and the locking collar fully secured before use. Failure to do so may damage the PSU port on the NRG chassis.*

Caution — *Ensure to connect the DC Power cord of the power supply to the PWR jack on the NRG before connecting the power supply to the power source.*

Caution — *Use of improper adapters may damage the NRG and will void the warranty.*

1. Connect the male end of the supplied power cable into the NRG socket marked **PWR 1**.

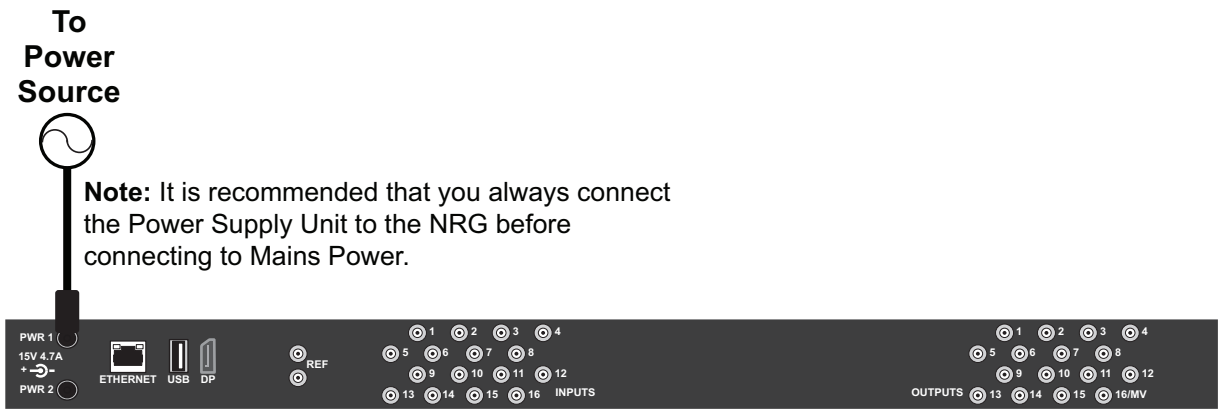


Figure 12 Connecting the Power Cable to an NRG-FR1 or NRG-FR1-LCP

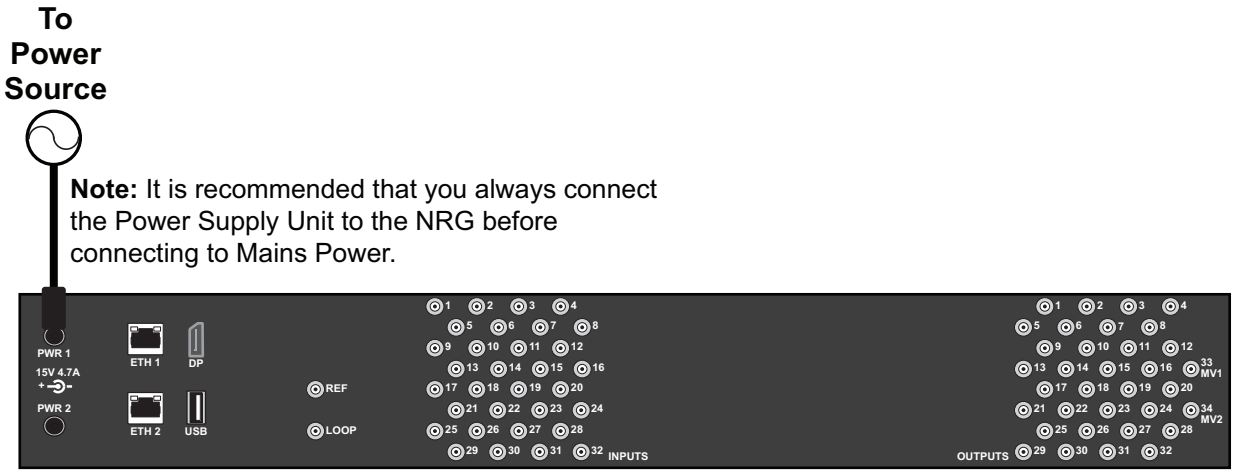


Figure 13 Connecting the Power Cable to an NRG-FR2 or NRG-FR2-LCP

2. Connect the supplied power cable into the power supply.
3. Connect the supplied power cable's three-prong male connector to Mains Power.

To connect a second power supply to the NRG

1. Connect the male end of the second supplied power cable into the NRG socket marked **PWR 2**.
2. Connect the supplied power cable into the second power supply.
3. Connect the supplied second power cable's three-prong male connector to Mains Power.

Video Reference

The NRG routers handle high-bandwidth, broadcast-quality, digital video and audio signals, and embedded audio signals. Digital video signals can be 12G, 6G, 3G, high definition, or standard definition. The NRG routers support SMPTE standards 259M, 292M, 296M, 372M, 424M, 425M (level A/B), 2081M, and 2082M.

Overview

All NRG routers accept a video reference signal. If connected, a video references ensures that switching occurs in the default vertical interval across all router levels. The default switching pulse complies with ***SMPTE RP168*** as follows:

- line 6 for SD (PAL reference)
- line 10 for SD (NTSC reference)
- line 7 for HD (1080i)
- line 7 for HD (720p)
- line 7 for 3G (1080p)

Alternatively, you can set your own custom switching point to meet the requirements of your system. For example, if the default settings for the switching pulse occur within the data elements of your signal, you need to assign your own switching trigger.

If the reference signal is absent, the NRG router will generate a free-running switching pulse over 40ms. The status of the switching reference may be monitored in DashBoard, where one of three conditions may be reported: Local, PAL reference present or NTSC reference present.

✶ If a reference is not connected to the NRG, the Multiviewer Head output on the **DP** port outputs 1080. 59.94Hz (NTSC) or 1080p 50Hz (PAL) by default. To connect the **DP** port to a 1080p 60Hz monitor, a reference must be first connected to the NRG.

For More Information on...

- setting a custom switching trigger, refer to the ***NRG User Guide***.

Cabling for a Single NRG Router

Each NRG router accepts a single composite or tri-level sync signal to feed timing information to the routing system.

✶ When only video referencing one router, the other BNC connector of the video reference loop needs to be terminated.

To connect the video reference source to a single NRG router

- Connect a 75ohm coaxial cable between the video reference signal output and a **REF** port on the back panel of the NRG router.

✶ Use the second **REF** port as a loop when configuring the NRG router for a loop-through work flow.

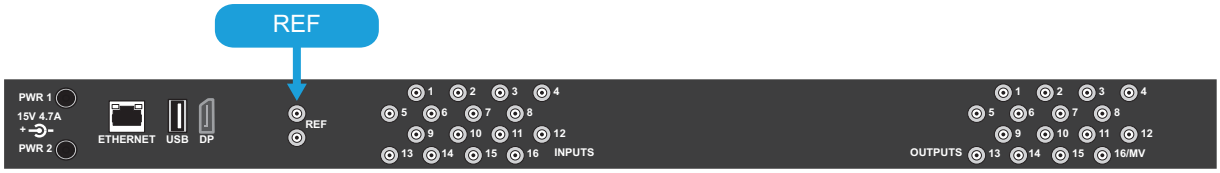


Figure 14 Video Reference Cabling — NRG-FR1, NRG-FR1-LCP

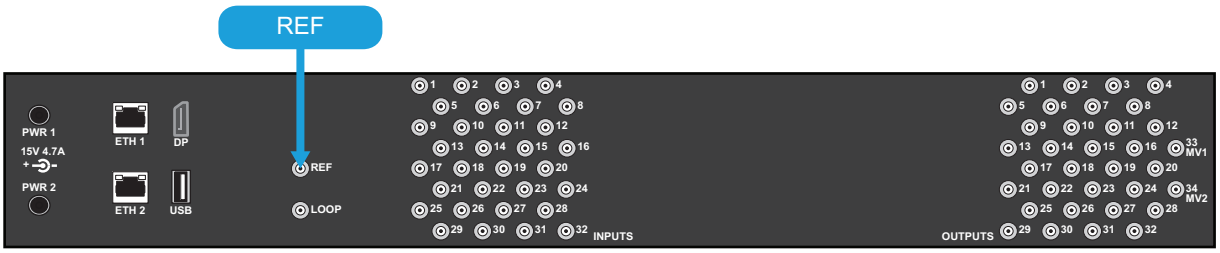


Figure 15 Video Reference Cabling — NRG-FR2, NRG-FR2-LCP

Reference Cabling for Multiple NRG Routers

The NRG router switches on frame boundaries. There are two 75ohm **REF** input BNCs on each NRG router arranged as a passive loop-through pair. Normally, a single Black Burst signal is looped through each of the routers which are located together and a 75ohm terminator is connected to the last BNC socket. An individual Black Burst signal should be wired to NRG routers which are more than a few meters apart.

✶ When using a video reference with any of the NRG router components, users must remember to terminate the last video reference that is not looped with a 75ohm BNC terminator.

To cable multiple routers that will switch on with the same reference

1. Cable the first router as outlined in the previous section.
2. Connect the top **LOOP** connector on the back panel of the first router to the **REF** connector on the back panel of the second NRG router using a 75ohm coaxial cable.
3. Continue looping the **REF** connectors across the routers that you want referenced to this signal.
4. Ensure that the last NRG router in the video referencing loop has a 75ohm termination connected to its **LOOP** connector.

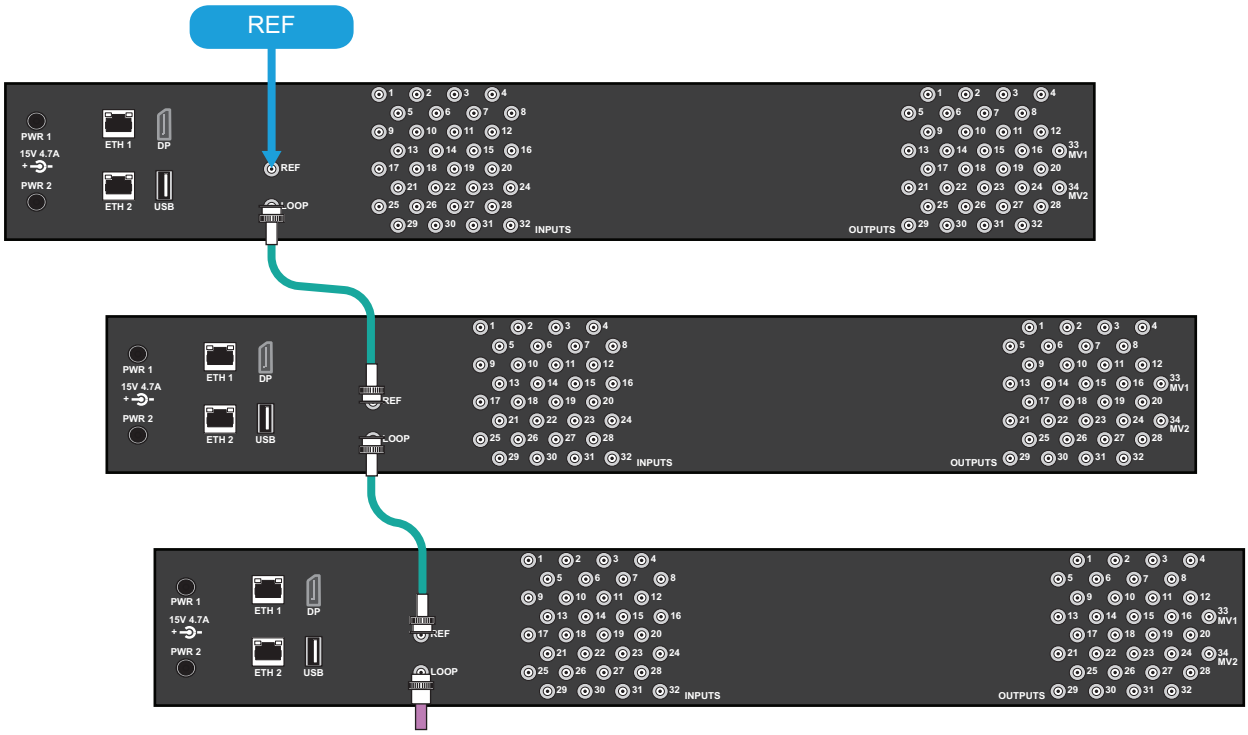


Figure 16 Connecting Multiple Routers for Simultaneous Switching — NRG-FR2, NRG-FR2-LCP

Cabling the SDI Inputs

This chapter outlines the SDI input cabling for each NRG router.

Overview

The NRG routers support high-bandwidth, broadcast-quality, digital video and audio signals, and embedded audio signals. Digital video signals can be 12G, 3G, high definition, or standard definition. The NRG routers support SMPTE standards 259M, 292M, 296M, 372M, 424M, 425M (level A/B), 2081M, and 2082M.

NRG-FR1 and NRG-FR1-LCP

Each NRG-FR1 and NRG-FR1-LCP provides 16 SDI inputs. The HD-BNCs are numbered starting with **INPUT 1** at the top left corner.

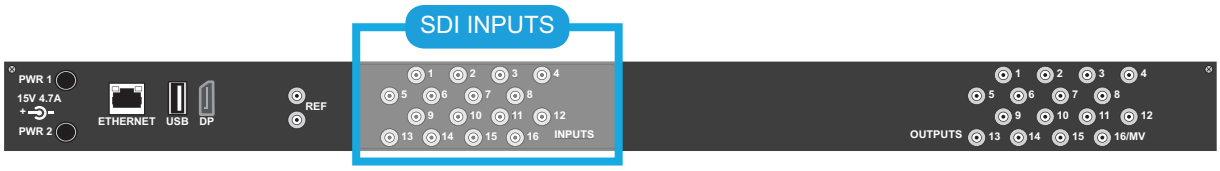


Figure 17 NRG-FR1, NRG-FR1-LCP — SDI Inputs

NRG-FR2 and NRG-FR2-LCP

Each NRG-FR2 and NRG-FR2-LCP provides 32 SDI inputs. The HD-BNCs are numbered starting with **INPUT 1** at the top left corner.

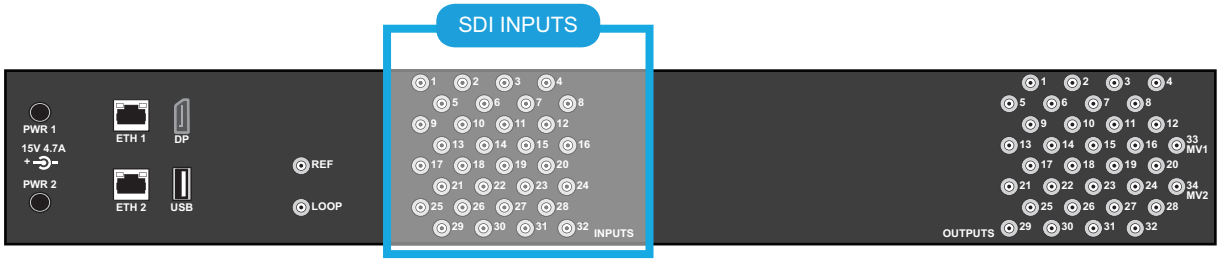


Figure 18 NRG-FR2, NRG-FR2-LCP — SDI Inputs

Connecting to the SDI Source Devices

The Source connections (**INPUTS**) on the NRG back panel are located on the left-hand side and are clearly defined with white text next to the HD-BNCs.

ESD Susceptibility — *Anti-static precautions must be taken when fitting or removing all cables. Wear an earthed wrist wrap strap if possible, or place both hands on the metal rack frame before handling the cables.*

To connect SDI source devices to the NRG router

1. Refer to **Figure 17** and **Figure 18** for the specific input designations for your router.
2. Connect the end of a 75ohm coaxial cable with HD-BNC connectors to an **INPUT** HD-BNC on the NRG back panel.
3. Connect the other end of the coaxial cable to the device that will supply the signal to that **INPUT** HD-BNC on the NRG router.

Cabling the SDI Outputs

This chapter outlines the SDI output cabling for each NRG router.

Overview

The NRG routers support high-bandwidth, broadcast-quality, digital video and audio signals, and embedded audio signals. Digital video signals can be 12G, 3G, high definition, or standard definition. The NRG routers support SMPTE standards 259M, 292M, 296M, 372M, 424M, 425M (level A/B), 2081M, and 2082M.

NRG-FR1 and NRG-FR1-LCP

Each NRG-FR1 and NRG-FR1-LCP provides 16 SDI outputs. The HD-BNCs are numbered starting with **OUTPUT 1** at the top left corner.

✶ If the NRG-MV licensed feature is enabled, OUT 16 is allocated to Multiviewer Head 1. Refer to "**Cabling for the NRG-MV**" for details.

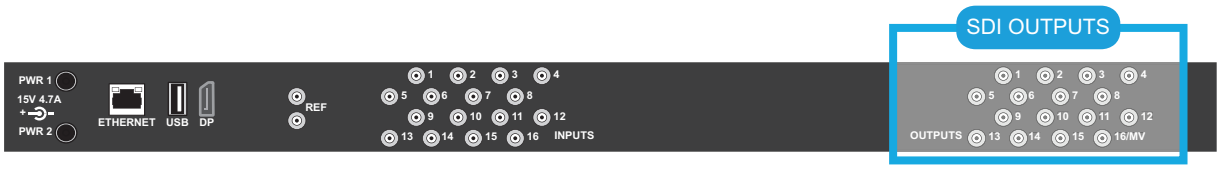


Figure 19 NRG-FR1, NRG-FR1-LCP — SDI Outputs

NRG-FR2 and NRG-FR2-LCP

Each NRG-FR2 and NRG-FR2-LCP provides 34 SDI outputs. The HD-BNCs are numbered starting with **OUTPUT 1** at the top left corner.

✶ If one NRG-MV licensed feature is enabled, OUT 33 is allocated to Multiviewer Head 1. If two licenses are enabled, OUT 34 is allocated to Multiviewer Head 2. Refer to "**Cabling for the NRG-MV**" for details.

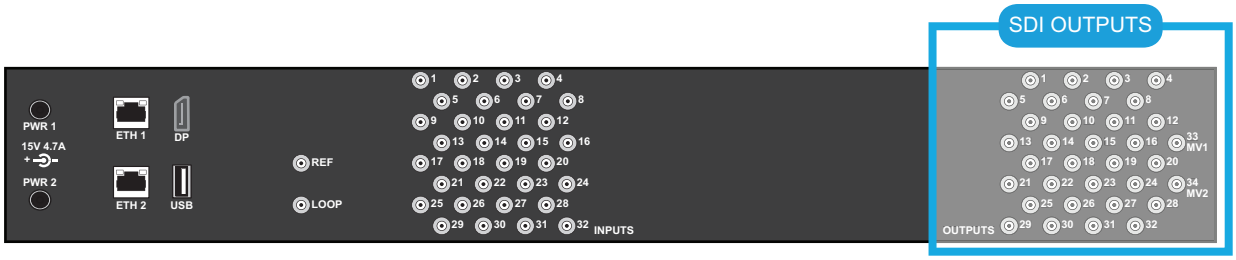


Figure 20 NRG-FR2, NRG-FR2-LCP — SDI Outputs

Connecting to the SDI Destination Devices

The destination connections (**OUTPUTS**) on the NRG back panel are located on the right-hand side and are clearly defined with white text next to the HD-BNCs.

ESD Susceptibility — *Anti-static precautions must be taken when fitting or removing all cables. Wear an earthed wrist wrap strap if possible, or place both hands on the metal rack frame before handling the cables.*

To connect SDI destination devices to the NRG router

1. Refer to the following sections to learn more about the specific output designations for your router.
2. Connect the end of a 75ohm coaxial cable with HD-BNC connectors to an **OUTPUT** HD-BNC on the back panel.
3. Connect the other end of the coaxial cable to the device that will ingest the signal from that **OUTPUT** HD-BNC on the router.

Cabling for the NRG-MV

This chapter outlines the NRG-MV BNC cabling designations for each NRG router.

✶ if the DP port will output the Multiviewer Head, refer to "**Cabling the DisplayPort**".

Overview

The number of Multiviewer Heads for your NRG router depends on the router model and the number of enabled NRG-MV licenses. **Table 2** lists the output BNCs on the back panel that can be assigned to a Multiviewer Heads based on the type of router.

✶ The BNC outputs are available for SDI output routing when not assigned to Multiviewer Heads.

Table 2 Outputs Allocated for Multiviewer Heads

Model	Multiviewer Head 1	Multiviewer Head 2
NRG-FR1	OUT 16/MV	--
NRG-FR1-LCP	OUT 16/MV	--
NRG-FR2	OUT 33 MV1	OUT 34 MV2
NRG-FR2-LCP	OUT 33 MV1	OUT 34 MV2

Cabling Designations

This section outlines the NRG-MV Head cabling designations for each NRG router.

NRG-FR1 and NRG-FR1-LCP Cabling

Figure 21 illustrates the BNC allocated for Multiviewer Head 1 on the NRG-FR1 and NRG-FR1-LCP.

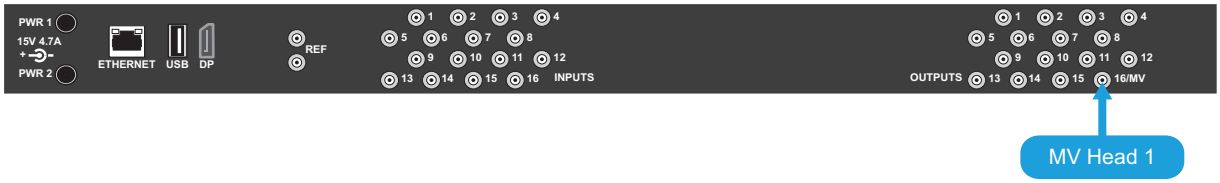


Figure 21 Example of NRG-MV Head 1 Mapping — NRG-FR1, NRG-FR1-LCP

NRG-FR2 and NRG-FR2-LCP Cabling

Figure 22 illustrates the BNCs allocated for NRG-MV Heads on the NRG-FR2 and NRG-FR2-LCP.

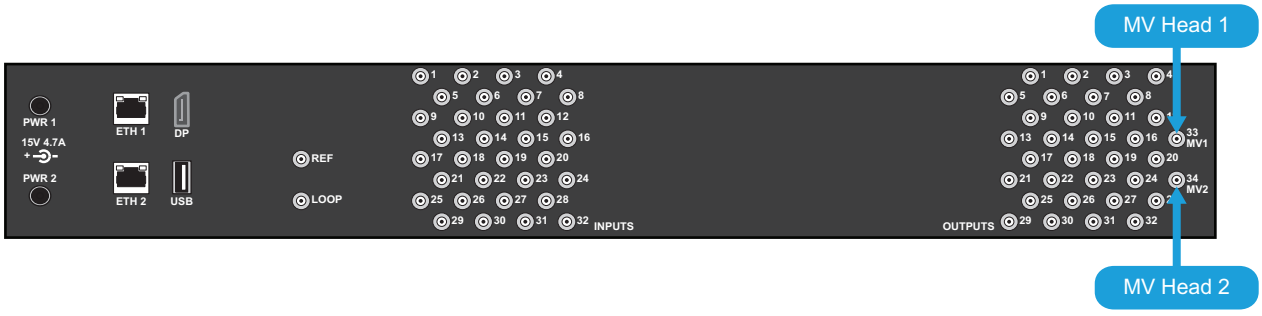


Figure 22 Example of NRG-MV Head 1 and 2 Mapping — NRG-FR2, NRG-FR2-LCP

Cabling the DisplayPort

This chapter outlines the DisplayPort output cabling for each NRG router.

Overview

Each NRG router includes a DisplayPort connection via a dedicated **DP** port (v1.2A). This offers flexibility for installations where an SDI input is not available or preferred by providing:

- the ability to drive a range of displays, from local monitors and Multiviewers to large-scale LED walls on sets and in stadiums;
- a solution for display processors that require a DisplayPort input;
- support for other AV-centric devices.

Before You Begin

Keep the following in mind:

- The DisplayPort (**DP**) port supports 1080p 50Hz, 1080p 59.94Hz, and 1080p 60Hz.
- If a reference is not connected to the NRG, the NRG-MV Head output on the **DP** port outputs 1080p 59.94Hz (NTSC) or 1080p 50Hz (PAL) by default.
- To connect the **DP** port to a 1080p 60Hz monitor, a 60Hz reference must be first connected to the NRG. Refer to "**Video Reference**" for cabling information. Some 60Hz monitors do not support 59.94Hz.
- The device connected to the **DP** port must support the same the resolution and frame rate of the selected signal as follows:
  - › **NRG-MV Head** — the resolution and frame rate of the reference signal.
  - › **SDI Passthrough** — the resolution and frame rate of the reference signal.

NRG-FR1 and NRG-FR1-LCP

Each NRG-FR1 and NRG-FR1-LCP provides one **DP** port. The **DP** port is a standard DisplayPort connection that supports hot-plug detection.

✶ The cable must support DisplayPort v1.2A for full format functionality.

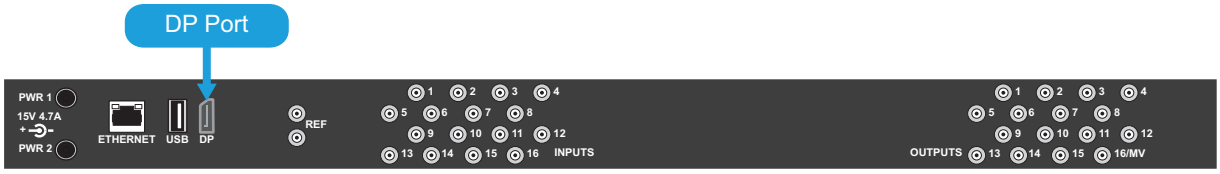


Figure 23 NRG-FR1, NRG-FR1-LCP — DP Port

NRG-FR2 and NRG-FR2-LCP

Each NRG-FR2 and NRG-FR2-LCP provides one **DP** port. The **DP** port is a standard DisplayPort connection that supports hot-plug detection.

✶ The cable must support DisplayPort v1.2A for full format functionality.

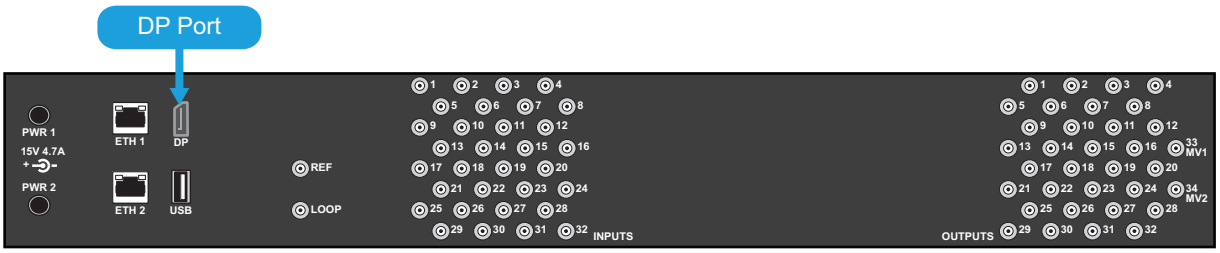


Figure 24 NRG-FR2, NRG-FR2-LCP — DP Port

Supported Video Formats

Ensure that you are using a supported video format. Using unsupported formats may result in undefined behavior. Keep the following in mind:

- **NRG-MV output** — all of the SDI formats listed in **Table 4** can be routed to a PiP within the Multiviewer Head, as long as the signals are transmitted via a single-link (1-cable). The use of physical dual-link (2-cable) and quad-link (4-cable) will only show a component if routed to the Multiviewer Head since the NRG does not support gearbox. When the Multiviewer Head is enabled, the video output format will follow the reference format.
- **DP pass-through** — will only support 1920x1080p (50/59.94/60Hz) Level A. Ensure that the external display monitor connected to the DP port supports 1920x1080p (50/59.94/60Hz) Level A.

Connecting to a Sink Device

A sink refers to a device or component that receives and processes signals or data from a source. For example, a monitor could act as the sink for video signals sent from the NRG router. The NRG router can be used with sinks that support DisplayPort v1.2A as an input.

To achieve optimal video performance:

- Use a DisplayPort cable that is compatible with your video configuration.
- Ensure the cable supports DisplayPort v1.2A.
- Ensure the cable is of an appropriate length to maintain signal integrity.

✶ Using an incompatible or excessively long cable may result in reduced video quality or connectivity issues.

To connect a sink device to the NRG router

1. Refer to **Figure 23** and **Figure 24** for the specific **DP** port location on your NRG router.
2. Connect the end of a cable that supports DisplayPort v1.2A to the **DP** port on the back panel.
3. Connect the other end of the cable to the sink device that will ingest the signal from the **DP** port on the NRG router.

Connecting to Ross Devices

This chapter provides workflow examples with other Ross devices.

Connecting to an Ultricore BCS

Adding an Ultricore BCS allows for greater connectivity and router control. Ultricore BCS adds support for advanced features such as NMOS interoperability, tie-line management, and control system redundancy. The Ultricore BCS supports a set of third-party protocols that allow the Ultricore BCS to communicate with devices in your routing system including the NRG routers.

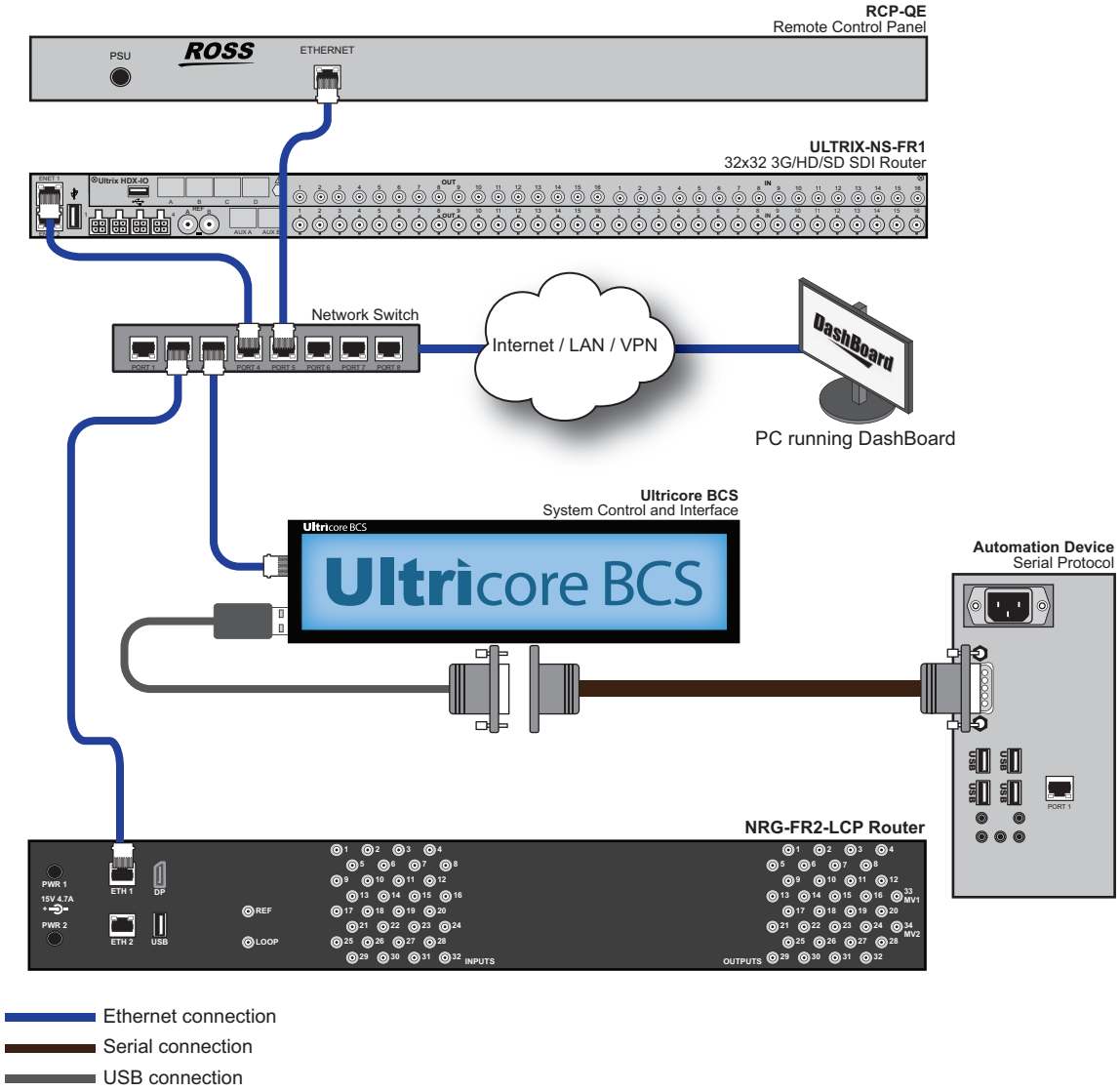


Figure 25 Example of a Simple Routing System with an NRG-FR2-LCP, ULTRIX-NS-FR1, and Ultricore BCS

Connections between an Ultricore BCS and your NRG router

1. Ensure the NRG is connected to the same network as your Ultricore BCS.
2. Create a connection point from the Ultricore BCS to the NRG in DashBoard. Refer to the ***Ultricore BCS User Guide***.
3. Add the NRG to the Ultricore BCS database. Refer to the ***Ultrix and Ultricore Database Guide***.

Connecting to a Ross NK Series Device

Ross NK Series devices, such as routers and remote control panels, communicate within the routing system via the Ross T-BUS interface. However, the NRG routers communicate only via an ethernet protocol via a network connection. If you wish to establish communications between an NRG router and a Ross NK series device, you have two options: establish an ethernet connection from the Ross NK Series device to your facility network via an NK-IPS or NK-NET device, or use an Ultricore CC to establish an NK native T-BUS connection.

✶ The NK-NET requires any Ross NK router to supply phantom power for operation.

To establish communication between an Ross NK device and your NRG router

- Connect the NK device to the same ethernet network as your NRG router using an NK-NET or an NK-IPS, and then set up communications via the Ultricore CC interface in DashBoard.
- Connect the NK device via the T-BUS connections on an Ultricore CC and then set up communications via the Ultricore CC interface in DashBoard.

For More Information on...

- connecting your Ross NK Series device to your facility network, refer to its user documentation.
- connecting your Ultricore CC, refer to the ***Ultricore CC Quick Start Guide*** and ***Ultricore CC User Guide***.

Technical Specifications

This chapter provides technical information for NRG routers.

✶ Specifications are subject to change without notice.

Physical Dimensions

Table 3 Technical Specifications — Physical Dimensions

Dimension	NRG-FR1	NRG-FR1-LCP	NRG-FR2	NRG-FR2-LCP
Width	18.90” (48cm)	18.90” (48cm)	18.90” (48cm)	18.90” (48cm)
Depth	3.15” (8.0cm)	3.15” (8.0cm)	3.15” (8.0cm)	3.15” (8.0cm)
Height	1.71” (4.34cm)	1.71” (4.34cm)	3.42” (8.69cm)	3.42” (8.69cm)
Weight (approx.)	4lbs (1.81kg)	4lbs (1.81kg)	5lbs (2.27kg)	5lbs (2.27kg)

Supported Video Formats

Table 4 Technical Specifications — Supported Formats

Resolution (lines)	Interlace / Progressive	Frame Rate (Hz)	SDI Routing	DP Pass-through Routing	DashBoard Status
SD					
525	I	59.94	✓		480i 59.94
625	I	50	✓		576i 50
HD					
720	P	60	✓		720p 60
720	P	59.94	✓		720p 59.94
720	P	50	✓		720p 50
1080	I	60	✓		1080i 60/1080PsF 30
1080	I	59.94	✓		1080i 59.94/1080PsF 29.97
1080	I	50	✓		1080i 50/1080PsF 25
1080	P	30	✓		1080p 30
1080	P	29.97	✓		1080p 29.97
1080	P	25	✓		1080p 25
1080	P	24	✓		1080p 24
1080	P	23.98	✓		1080p 23.98
1080	PSF	30	✓		1080i 60/1080PsF 30
1080	PSF	29.97	✓		1080i 59.94/1080PsF 29.97
1080	PSF	25	✓		1080i 50/1080PsF 25
1080	PSF	24	✓		1080PsF 24
1080	PSF	23.98	✓		1080PsF 23.98
3G					
720	P (dual stream)	60	✓		720B 60 DS

Table 4 Technical Specifications — Supported Formats (Continued)

Resolution (lines)	Interlace / Progressive	Frame Rate (Hz)	SDI Routing	DP Pass-through Routing	DashBoard Status
720	P (dual stream)	59.94	✓		720B 59.94 DS
720	P (dual stream)	50	✓		720B 50 DS
1080	I (dual stream)	60	✓		1080B 60 DS/DL
1080	I (dual stream)	59.94	✓		1080B 59.94 DS/DL
1080	I (dual stream)	50	✓		1080B 50 DS/DL
1080	P	60	✓	✓	1080p 60
1080	P	59.94	✓	✓	1080p 59.94
1080	P	50	✓	✓	1080p 50
1080	Level B	60	✓		1080B 60 DS/DL
1080	Level B	59.94	✓		1080B 59.94 DS/DL
1080	Level B	50	✓		1080B 50 DS/DL
6G					
2160	P	30	✓		2160p 30
2160	P	29.97	✓		2160p 29.97
2160	P	25	✓		2160p 25
2160	P	24	✓		2160p 24
2160	P	23.98	✓		2160p 23.98
12G (UHD)					
2160	P	60	✓		2160p 60
2160	P	59.94	✓		2160p 59.94
2160	P	50	✓		2160p 50

Power Specifications

The NRG is powered from up to two external power supplies. Each PWR port on the NRG back panel accepts 15VDC power.

Table 5 Technical Specifications — Power Supply Ratings

Item	Specifications
Output	15VDC @ 4.65A
Output Power	70W
Input	90-264VAC, 50/60Hz
Input Current	1.5A

Maximum Power Ratings

Table 6 outlines the maximum power ratings for each NRG router model.

Table 6 Technical Specifications — Maximum Power Ratings

Item	Specifications[a]
NRG-FR1	31.7W max., 2.11A, 15V
NRG-FR1-LCP	35.2W max., 2.35A, 15V
NRG-FR2	56.6W max., 3.77A, 15V
NRG-FR2-LCP	64.0W max., 4.27A, 15V

a. For the latest power numbers for your configuration, refer to the Ross Configuration Tool on our website.

SDI Inputs

Table 7 Technical Specifications — SDI Inputs

Item	Specification
Standard Input	HD-BNC
Signal Type (SDI Formats)	12GBps 6GBps 3GBps 1.5GBps 270MBps
Impedance	75ohm
Max. Input Level	880mV
Return Loss	Per SMPTE 2082-1
Equalization (typical)	UHD: 65m (213ft) 3G: 175m (574ft) HD: 270m (886ft) SD: 400m (1312ft)

SDI Outputs

Table 8 Technical Specifications — SDI Outputs

Item	Specification
Standard Output	HD-BNC
Signal Type (SDI Formats)	12GBps 6GBps 3GBps 1.5GBps 270MBps
Impedance	75ohm
Amplitude	800mV +/-10%

Table 8 Technical Specifications — SDI Outputs (Continued)

Item	Specification
Rise and Fall Time	12GBps: <45ps 3GBps: < 135ps 1.5GBps: < 135ps 270MBps: <400ps
DC Offset	0.0V +/-0.5V
Jitter	<0.15UI up to 3G <0.20UI 3G and 12G typical (<0.30UI max.)
Return Loss	Per SMPTE 2082-1

Environmental

Table 9 Technical Specifications — Environmental

Item	Specifications
Max. Ambient Temperature Range	0°C to 40°C (32°F to 104°F)
Humidity, non-condensing	< 95%

Ethernet Port Connectors

Each NRG-FR1 and NRG-FR1-LCP router includes one ethernet port. The NRG-FR2 and NRG-FR2-LCP routers include two ethernet ports. Each ethernet port uses a standard single 8-pin, RJ45 connector to interface to an 802.3x ethernet network. While NRG supports 1000Mbps (1GbE), 100Mbps, or 10Mbps network interface speeds, a 1GbE network connection is required.

- The NRG-FR2 and NRG-FR2-LCP ethernet ports are operated in a link aggregated or bonded configuration to provide failover functionality.
- An 1GbE network connection is required.

Specifications

Table 10 Technical Specifications — Ethernet Ports

Item	Specifications
Standards Accommodated	1000BASE-T (GbE) network
Connector Type	RJ45

DisplayPort Connector

Table 11 Technical Specifications — DisplayPort

Item	Specifications
Connector Type	DisplayPort v1.2A

Software Licenses

This chapter provides third-party software license information for your NRG router. This product includes multiple software components which are individually licensed under one or more of the following licenses included in this chapter.

BSD

Copyright (c) 1991,1993, The Regents of the University of California. All rights reserved.

This code is derived from software contributed to Berkeley by Kenneth Almquist.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. <BSD Advertising Clause omitted per the July 22, 1999 licensing change ftp://ftp.cs.berkeley.edu/pub/4bsd/README.Impt.License.Change> California, Berkeley and its contributors.

4. Neither the name of the University nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE REGENTS AND CONTRIBUTORS ``AS IS'' AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE REGENTS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Dual GPL

Portions of this software are copyright (C) 1996-2002 The FreeType Project (www.freetype.org). All rights reserved.

This project is also covered under the GPL v2.

GPL

GNU GENERAL PUBLIC LICENSE
Version 3, 29 June 2007
Copyright (C) 2007 Free Software Foundation, Inc. <http://fsf.org/>
Preamble

The GNU General Public License is a free, copyleft license for software and other kinds of works.

The licenses for most software and other practical works are designed to take away your freedom to share and change the works. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change all versions of a program--to make sure it remains free software for all its users. We, the Free Software Foundation, use the GNU General Public License for most of our software; it applies also to any other work released this way by its authors. You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps: (1) assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

“This License” refers to version 3 of the GNU General Public License.

“Copyright” also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

“The Program” refers to any copyrightable work licensed under this License. Each licensee is addressed as “you”. “Licensees” and “recipients” may be individuals or organizations.

To “modify” a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a “modified version” of the earlier work or a work “based on” the earlier work.

A “covered work” means either the unmodified Program or a work based on the Program.

To “propagate” a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To “convey” a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays “Appropriate Legal Notices” to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1.Source Code.

The “source code” for a work means the preferred form of the work for making modifications to it. “Object code” means any non-source form of a work.

A “Standard Interface” means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The “System Libraries” of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A “Major Component”, in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The “Corresponding Source” for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

2.Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output, given its content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law.

You may make, run and propagate covered works that you do not convey, without conditions so long as your license otherwise remains in force. You may convey covered works to others for the sole purpose of having them make modifications exclusively for you, or provide you with facilities for running those works, provided that you comply with the terms of this License in conveying all material for which you do not control copyright. Those thus making or running the covered works for you must do so exclusively on your behalf, under your direction and control, on terms that prohibit them from making any copies of your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed; section 10 makes it unnecessary.

3.Protecting Users' Legal Rights From Anti-Circumvention Law.

No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work's users, your or third parties' legal rights to forbid circumvention of technological measures.

4.Conveying Verbatim Copies.

You may convey verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5.Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

a. The work must carry prominent notices stating that you modified it, and giving a relevant date.

b. The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to “keep intact all notices”.

c. You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.

d. If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an “aggregate” if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

6.Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

a. Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.

b. Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c. Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d. Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

e. Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

A "User Product" is either (1) a "consumer product", which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, "normally used" refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

"Installation Information" for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.

7.Additional Terms.

"Additional permissions" are terms that supplement the terms of this License by making exceptions from one or more of its conditions. Additional permissions that are applicable to the entire Program shall be treated as though they were included in this License, to the extent that they are valid under applicable law. If additional permissions apply only to part of the Program, that part may be used separately under those permissions, but the entire Program remains governed by this License without regard to the additional permissions.

When you convey a copy of a covered work, you may at your option remove any additional permissions from that copy, or from any part of it. (Additional permissions may be written to require their own removal in certain cases when you modify the work.) You may place additional permissions on material, added by you to a covered work, for which you have or can give appropriate copyright permission.

Notwithstanding any other provision of this License, for material you add to a covered work, you may (if authorized by the copyright holders of that material) supplement the terms of this License with terms:

a. Disclaiming warranty or limiting liability differently from the terms of sections 15 and 16 of this License; or

b. Requiring preservation of specified reasonable legal notices or author attributions in that material or in the Appropriate Legal Notices displayed by works containing it; or

c. Prohibiting misrepresentation of the origin of that material, or requiring that modified versions of such material be marked in reasonable ways as different from the original version; or

d. Limiting the use for publicity purposes of names of licensors or authors of the material; or

e. Declining to grant rights under trademark law for use of some trade names, trademarks, or service marks; or

f. Requiring indemnification of licensors and authors of that material by anyone who conveys the material (or modified versions of it) with contractual assumptions of liability to the recipient, for any liability that these contractual assumptions directly impose on those licensors and authors.

All other non-permissive additional terms are considered "further restrictions" within the meaning of section 10. If the Program as you received it, or any part of it, contains a notice stating that it is governed by this License along with a term that is a further restriction, you may remove that term. If a license document contains a further restriction but permits relicensing or conveying under this License, you may add to a covered work material governed by the terms of that license document, provided that the further restriction does not survive such relicensing or conveying.

If you add terms to a covered work in accord with this section, you must place, in the relevant source files, a statement of the additional terms that apply to those files, or a notice indicating where to find the applicable terms.

Additional terms, permissive or non-permissive, may be stated in the form of a separately written license, or stated as exceptions; the above requirements apply either way.

8.Termination.

You may not propagate or modify a covered work except as expressly provided under this License. Any attempt otherwise to propagate or modify it is void, and will automatically terminate your rights under this License (including any patent licenses granted under the third paragraph of section 11).

However, if you cease all violation of this License, then your license from a particular copyright holder is reinstated (a) provisionally, unless and until the copyright holder explicitly and finally terminates your license, and (b) permanently, if the copyright holder fails to notify you of the violation by some reasonable means prior to 60 days after the cessation.

Moreover, your license from a particular copyright holder is reinstated permanently if the copyright holder notifies you of the violation by some reasonable means, this is the first time you have received notice of violation of this License (for any work) from that copyright holder, and you cure the violation prior to 30 days after your receipt of the notice.

Termination of your rights under this section does not terminate the licenses of parties who have received copies or rights from you under this License. If your rights have been terminated and not permanently reinstated, you do not qualify to receive new licenses for the same material under section 10.

9.Acceptance Not Required for Having Copies.

You are not required to accept this License in order to receive or run a copy of the Program. Ancillary propagation of a covered work occurring solely as a consequence of using peer-to-peer transmission to receive a copy likewise does not require acceptance. However, nothing other than this License grants you permission to propagate or modify any covered work. These actions infringe copyright if you do not accept this License. Therefore, by modifying or propagating a covered work, you indicate your acceptance of this License to do so.

10.Automatic Licensing of Downstream Recipients.

Each time you convey a covered work, the recipient automatically receives a license from the original licensors, to run, modify and propagate that work, subject to this License. You are not responsible for enforcing compliance by third parties with this License.

An “entity transaction” is a transaction transferring control of an organization, or substantially all assets of one, or subdividing an organization, or merging organizations. If propagation of a covered work results from an entity transaction, each party to that transaction who receives a copy of the work also receives whatever licenses to the work the party's predecessor in interest had or could give under the previous paragraph, plus a right to possession of the Corresponding Source of the work from the predecessor in interest, if the predecessor has it or can get it with reasonable efforts.

You may not impose any further restrictions on the exercise of the rights granted or affirmed under this License. For example, you may not impose a license fee, royalty, or other charge for exercise of rights granted under this License, and you may not initiate litigation (including a cross-claim or counterclaim in a lawsuit) alleging that any patent claim is infringed by making, using, selling, offering for sale, or importing the Program or any portion of it.

11.Patents.

A “contributor” is a copyright holder who authorizes use under this License of the Program or a work on which the Program is based. The work thus licensed is called the contributor's “contributor version”.

A contributor's “essential patent claims” are all patent claims owned or controlled by the contributor, whether already acquired or hereafter acquired, that would be infringed by some manner, permitted by this License, of making, using, or selling its contributor version, but do not include claims that would be infringed only as a consequence of further modification of the contributor version. For purposes of this definition, “control” includes the right to grant patent sublicenses in a manner consistent with the requirements of this License.

Each contributor grants you a non-exclusive, worldwide, royalty-free patent license under the contributor's essential patent claims, to make, use, sell, offer for sale, import and otherwise run, modify and propagate the contents of its contributor version.

In the following three paragraphs, a “patent license” is any express agreement or commitment, however denominated, not to enforce a patent (such as an express permission to practice a patent or covenant not to sue for patent infringement). To “grant” such a patent license to a party means to make such an agreement or commitment not to enforce a patent against the party.

If you convey a covered work, knowingly relying on a patent license, and the Corresponding Source of the work is not available for anyone to copy, free of charge and under the terms of this License, through a publicly available network server or other readily accessible means, then you must either (1) cause the Corresponding Source to be so available, or (2) arrange to deprive yourself of the benefit of the patent license for this particular work, or (3) arrange, in a manner consistent with the requirements of this License, to extend the patent license to downstream recipients. “Knowingly relying” means you have actual knowledge that, but for the patent license, your conveying the covered work in a country, or your recipient's use of the covered work in a country, would infringe one or more identifiable patents in that country that you have reason to believe are valid.

If, pursuant to or in connection with a single transaction or arrangement, you convey, or propagate by procuring conveyance of, a covered work, and grant a patent license to some of the parties receiving the covered work authorizing them to use, propagate, modify or convey a specific copy of the covered work, then the patent license you grant is automatically extended to all recipients of the covered work and works based on it.

A patent license is “discriminatory” if it does not include within the scope of its coverage, prohibits the exercise of, or is conditioned on the non-exercise of one or more of the rights that are specifically granted under this License. You may not convey a covered work if you are a party to an arrangement with a third party that is in the business of distributing software, under which you make payment to the third party based on the extent of your activity of conveying the work, and under which the third party grants, to any of the parties who would receive the covered work from you, a discriminatory patent license (a) in connection with copies of the covered work conveyed by you (or copies made from those copies), or (b) primarily for and in connection with specific products or compilations that contain the covered work, unless you entered into that arrangement, or that patent license was granted, prior to 28 March 2007.

Nothing in this License shall be construed as excluding or limiting any implied license or other defenses to infringement that may otherwise be available to you under applicable patent law.

12.No Surrender of Others' Freedom.

If conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot convey a covered work so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not convey it at all. For example, if you agree to terms that obligate you to collect a royalty for further conveying from those to whom you convey the Program, the only way you could satisfy both those terms and this License would be to refrain entirely from conveying the Program.

13.Use with the GNU Affero General Public License.

Notwithstanding any other provision of this License, you have permission to link or combine any covered work with a work licensed under version 3 of the GNU Affero General Public License into a single combined work, and to convey the resulting work. The terms of this License will continue to apply to the part which is the covered work, but the special requirements of the GNU Affero General Public License, section 13, concerning interaction through a network will apply to the combination as such.

14.Revised Versions of this License.

The Free Software Foundation may publish revised and/or new versions of the GNU General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies that a certain numbered version of the GNU General Public License “or any later version” applies to it, you have the option of following the terms and conditions either of that numbered version or of any

later version published by the Free Software Foundation. If the Program does not specify a version number of the GNU General Public License, you may choose any version ever published by the Free Software Foundation.

If the Program specifies that a proxy can decide which future versions of the GNU General Public License can be used, that proxy's public statement of acceptance of a version permanently authorizes you to choose that version for the Program.

Later license versions may give you additional or different permissions. However, no additional obligations are imposed on any author or copyright holder as a result of your choosing to follow a later version.

15.Disclaimer of Warranty.

THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16.Limitation of Liability.

IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MODIFIES AND/OR CONVEYS THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

17.Interpretation of Sections 15 and 16.

If the disclaimer of warranty and limitation of liability provided above cannot be given local legal effect according to their terms, reviewing courts shall apply local law that most closely approximates an absolute waiver of all civil liability in connection with the Program, unless a warranty or assumption of liability accompanies a copy of the Program in return for a fee.

LGPL

GNU LESSER GENERAL PUBLIC LICENSE
Version 3, 29 June 2007
Copyright (C) 2007 Free Software Foundation, Inc. <http://fsf.org/>

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

This version of the GNU Lesser General Public License incorporates the terms and conditions of version 3 of the GNU General Public License, supplemented by the additional permissions listed below.

0. Additional Definitions.

As used herein, “this License” refers to version 3 of the GNU Lesser General Public License, and the “GNU GPL” refers to version 3 of the GNU General Public License.

“The Library” refers to a covered work governed by this License, other than an Application or a Combined Work as defined below.

An “Application” is any work that makes use of an interface provided by the Library, but which is not otherwise based on the Library. Defining a subclass of a class defined by the Library is deemed a mode of using an interface provided by the Library.

A “Combined Work” is a work produced by combining or linking an Application with the Library. The particular version of the Library with which the Combined

Work was made is also called the “Linked Version”.

The “Minimal Corresponding Source” for a Combined Work means the Corresponding Source for the Combined Work, excluding any source code for portions of the

Combined Work that, considered in isolation, are based on the Application, and not on the Linked Version.

The “Corresponding Application Code” for a Combined Work means the object code and/or source code for the Application, including any data and utility programs needed for reproducing the Combined Work from the Application, but excluding the System Libraries of the Combined Work.

1.Exception to Section 3 of the GNU GPL.

You may convey a covered work under sections 3 and 4 of this License without being bound by section 3 of the GNU GPL.

2.Conveying Modified Versions.

If you modify a copy of the Library, and, in your modifications, a facility refers to a function or data to be supplied by an Application that uses the facility (other than as an argument passed when the facility is invoked), then you may convey a copy of the modified version:

a. under this License, provided that you make a good faith effort to ensure that, in the event an Application does not supply the function or data, the facility still operates, and performs whatever part of its purpose remains meaningful, or

b. under the GNU GPL, with none of the additional permissions of this License applicable to that copy.

3.Object Code Incorporating Material from Library Header Files.

The object code form of an Application may incorporate material from a header file that is part of the Library. You may convey such object code under terms of your choice, provided that, if the incorporated material is not limited to numerical parameters, data structure layouts and accessors, or small macros, inline functions and templates (ten or fewer lines in length), you do both of the following:

a. Give prominent notice with each copy of the object code that the Library is used in it and that the Library and its use are covered by this License.

b. Accompany the object code with a copy of the GNU GPL and this license document.

4.Combined Works.

You may convey a Combined Work under terms of your choice that, taken together, effectively do not restrict modification of the portions of the Library contained in the Combined Work and reverse engineering for debugging such modifications, if you also do each of the following:

a. Give prominent notice with each copy of the Combined Work that the Library is used in it and that the Library and its use are covered by this License.

b. Accompany the Combined Work with a copy of the GNU GPL and this license document.

c. For a Combined Work that displays copyright notices during execution, include the copyright notice for the Library among these notices, as well as a reference directing the user to the copies of the GNU GPL and this license document.

d. Do one of the following:

   1) Convey the Minimal Corresponding Source under the terms of this License, and the Corresponding Application Code in a form suitable for, and under terms that permit, the user to recombine or relink the Application with a modified version of the Linked Version to produce a modified Combined Work, in the manner specified by section 6 of the GNU GPL for conveying Corresponding Source.

   2) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (a) uses at run time a copy of the Library already present on the user's computer system, and (b) will operate properly with a modified version of the Library that is interface-compatible with the Linked Version.

e. Provide Installation Information, but only if you would otherwise be required to provide such information under section 6 of the GNU GPL, and only to the extent that such information is necessary to install and execute a modified version of the Combined Work produced by recombining or relinking the Application with a modified version of the Linked Version. (If you use option 4d0, the Installation Information must accompany the Minimal Corresponding Source and Corresponding Application Code. If you use option 4d1, you must provide the Installation Information in the manner specified by section 6 of the GNU GPL for conveying Corresponding Source.)

5.Combined Libraries.

You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities that are not Applications and are not covered by this License, and convey such a combined library under terms of your choice, if you do both of the following:

a. Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities, conveyed under the terms of this License.

b. Give prominent notice with the combined library that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

6.Revised Versions of the GNU Lesser General Public License.

The Free Software Foundation may publish revised and/or new versions of the GNU Lesser General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library as you received it specifies that a certain numbered version of the GNU Lesser General Public License “or any later version” applies to it, you have the option of following the terms and conditions either of that published version or of any later version published by the Free Software Foundation. If the Library as you received it does not specify a version number of the GNU Lesser General Public License, you may choose any version of the GNU Lesser General Public License ever published by the Free Software Foundation.

If the Library as you received it specifies that a proxy can decide whether future versions of the GNU Lesser General Public License shall apply, that proxy's public statement of acceptance of any version is permanent authorization for you to choose that version for the Library.

MIT

Copyright 1987, 1988 by MIT Student Information Processing Board.

Permission to use, copy, modify, and distribute this software and its documentation for any purpose is hereby granted, provided that the names of M.I.T. and the M.I.T. S.I.P.B. not be used in advertising or publicity pertaining to distribution of the software without specific, written prior permission. M.I.T. and the M.I.T. S.I.P.B. make no representations about the suitability of this software for any purpose. It is provided “as is” without express or implied warranty.

zlib

Copyright (C) 1995-1998 Jean-loup Gailly and Mark Adler

This software is provided 'as-is', without any express or implied warranty. In no event will the authors be held liable for any damages arising from the use of this software.

Permission is granted to anyone to use this software for any purpose, including commercial applications, and to alter it and redistribute it freely, subject to the following restrictions:

1. The origin of this software must not be misrepresented; you must not claim that you wrote the original software. If you use this software in a product, an acknowledgment in the product documentation would be appreciated but is not required.

2. Altered source versions must be plainly marked as such, and must not be misrepresented as being the original software.

3. This notice may not be removed or altered from any source distribution.Jean-loup Gailly Mark Adler jloup@gzip.org madler@alumni.caltech.edu

The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files ftp://ds.internic.net/rfc/rfc1950.txt (zlib format), rfc1951.txt (deflate format) and rfc1952.txt (gzip format).

Glossary

The following terms are used throughout this guide:

Connection Point — setting to define a communication connection between an NRG and a device in the routing system.

Crosspoint — a switch within a matrix. For example, the connection of signal INPUT 1 to OUTPUT 1 requires one crosspoint.

Destination — a label applied to a router output (or group of outputs).

Device — a physical, virtual, or software application that may include multiple sources, destinations, senders, or receivers.

DP port — refers to the physical DisplayPort port on the back panel of each NRG router.

Hard Panel — a physical hardware panel of buttons that is used to control the routing system.

Head — An OUTPUT port on the NRG router that is assigned as a Multiviewer output when an NRG-MV license is enabled.

IP Address — a setting that defines the Internet protocol address of a device within a network.

Local Control Panel (LCP) — refers to the physical buttons located on the front panel of the NRG-FR1-LCP and NRG-FR2-LCP.

Logical (virtual) Label — a name for a group of routing system inputs or outputs.

Logical (virtual) Routing — the action of switching a group of otherwise unrelated signals via a common label (name).

Map — a table that defines the allocation of names (labels) to router input and output sockets.

Matrix — the part of the routing system that performs the actual signal switching tasks.

Picture in Picture (PIP) — a sub-picture in a Multiviewer output.

Remote Control Panel (RCP) — a physical hardware panel of buttons that is used to control the routing system.

Resource — a source or destination of a router configuration; an external device providing some conversion functionality for use within the routing control system.

Sink Device — a device or component that receives and processes signals or data from a source.

Soft Panel — a DashBoard interface that represents a panel of buttons that is used to control the routing system.

Source — a label applied to a router input (or group of inputs).

T-Bus — the Ross Video proprietary routing communication method via a defined physical interface.