Ultrix

Installation Guide

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David Ross
CEO, Ross Video
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Ross Video Code of Ethics

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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.)*

Ultrix · Installation Guide

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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.

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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 device complies with Canadian ICES-003 and part 15 of the FCC Rules.

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

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This equipment is in compliance with the essential requirements and other relevant provisions established under regulation (EC) No 765/2008 and Decision No 768/2008/EC referred to as the “New Legislative Framework”.

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Class A equipment (Broadcasting and communications service for business use).

This device is a business-use (Class A) EMC-compliant device. The seller and user are advised to be aware of this fact. This device is intended for use in areas outside home.

Type of Equipment	User’s Guide
A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
Class A Equipment (Industrial Broadcasting & Communication Equipment)	This equipment is **Industrial (Class A) electromagnetic wave suitability equipment** and seller or user should take notice of it, and this equipment is to be used in the places except for home.

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This equipment has been tested under the requirements of CISPR 22:2008 or CISPR 32:2015 and found to comply with the limits for a Class A Digital device.

> **Notice** — *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.*

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

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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.

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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.

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Contents

Introduction

This guide is for system administrators and installers of the Ross Video Ultrix router. It provides instructions on how to physically install your router.

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

- "**Introduction**" summarizes the guide and provides important terms, and conventions.
- "**Getting Started**" provides an overview for creating a routing system using the Ultrix routers, and general information to keep in mind before installing and configuring your Ultrix routers.
- "**Hardware Overview**" provides a basic introduction to the Ultrix front and rear panels.
- "**Physical Installation**" provides instructions for the basic physical installation of the Ultrix routers.
- "**Cabling**" provides instructions on how to connect the Ultrix router to a network, connecting a video reference signal, cabling for a Multiviewer Head, and connecting to source and destination devices.
- "**Input and Output Cabling**" provides additional information on the input and output designations for each Ultrix router model.
- "**Technical Specifications**" provides the specifications, such as pinouts and power consumption, for the Ultrix routers.
- "**Software Licenses**" provides third-party software license information for your Ultrix router.

If you have questions pertaining to installation of this Ross Video product, please contact us at the numbers listed in the section "**Contacting Technical Support**" on page 10. 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 Ultrix router:

- ***DashBoard User Manual***, Ross Part Number: 8351DR-004
- ***Ultricore User Guide***, Ross Part Number: 2201DR-104
- ***Ultrix Quick Start Guide***, Ross Part Number: 2101DR-002
- ***Ultrix SFP Modules Guide***, Ross Part Number: 2101DR-008
- ***Ultrix User Guide***, Ross Part Number: 2101DR-004

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 section "**Assigning an IP Address**" in the ***Ultrix 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 Ultrix 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.

- **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 2.1 provides a simplified example and may differ from what your facility requires.

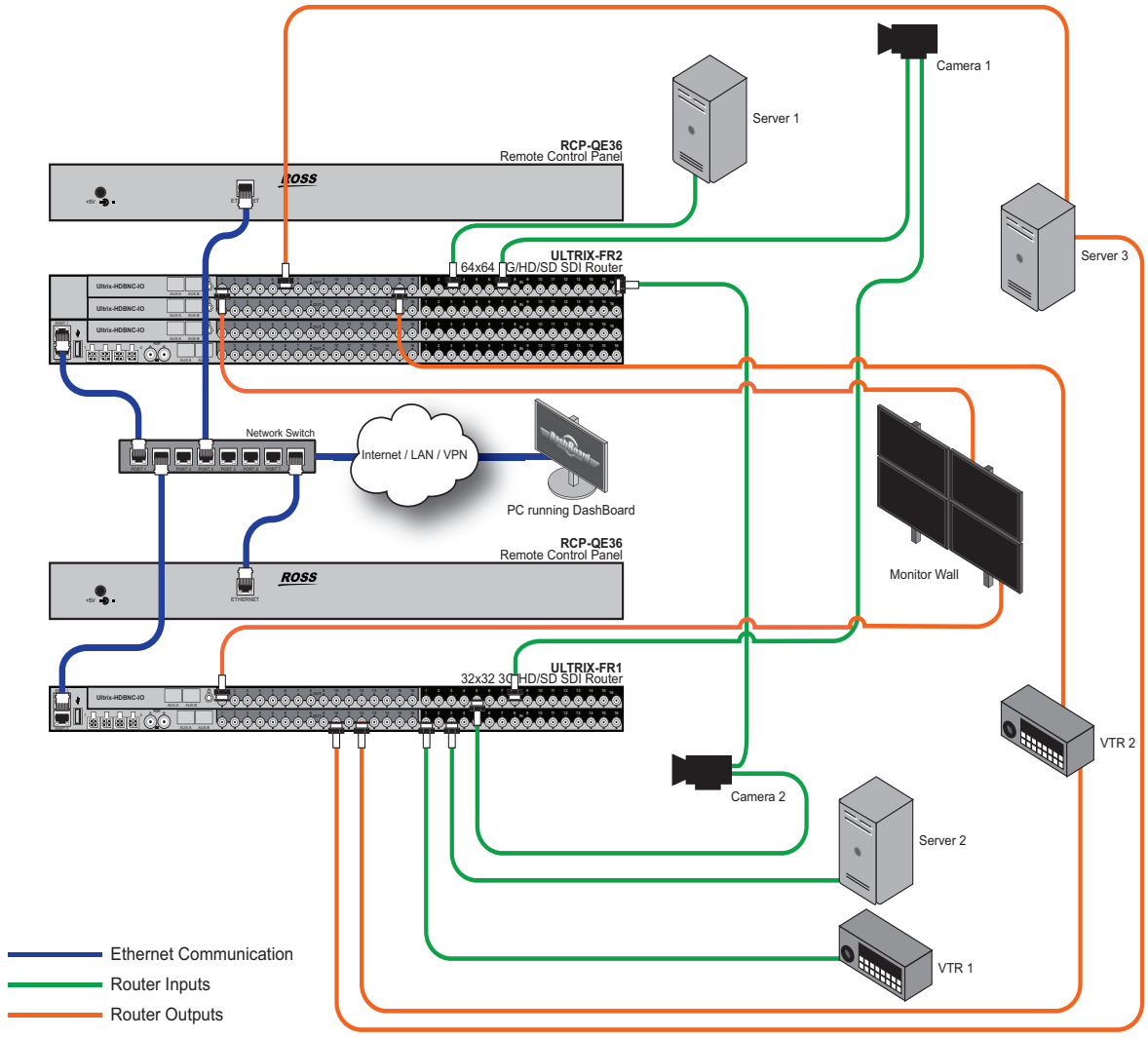


Figure 2.1 Example of a Routing System

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). Ultrix can assign a level to a matrix or signal type and even individual ports on unrelated matrices if required.

Interface and Connectivity

Keep in mind that the Ultrix router uses ethernet protocols to communicate to other devices in your routing system. An Ultrix 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 Ultrix router in DashBoard, refer to the ***Ultrix 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 Ultrix 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.

Marketing Codes

The Ultrix routers is expandable from one I/O Board up to four I/O Boards depending on the chassis. Each I/O Board supports 16 inputs, 16 outputs and 2 unpopulated AUX ports (SFPs).

Table 2.1 List of Ultrix Products

Model Number	Description
1RU Models	
ULTRIX-FR1	Provides 16x16 inputs/outputs on HD-BNCs and 2 unpopulated AUX ports in a 1RU chassis
ULTRIX-HDB-IO	Provides additional 16x16 inputs/outputs on HD-BNCs and 2 unpopulated AUX ports
2RU Models	
ULTRIX-FR2	Provides 16x16 inputs/outputs on HD-BNCs and 2 unpopulated AUX ports in a 2RU chassis
ULTRIX-HDB-IO	Provides additional 16x16 inputs/outputs on HD-BNCs and 2 unpopulated AUX ports
5RU Models	
ULTRIX-FR5	Provides 16x16 inputs/outputs on HD-BNCs and 2 unpopulated AUX ports in a 5RU chassis
ULTRIX-HDB-IO	Provides additional 16x16 inputs/outputs on HD-BNCs and 2 unpopulated AUX ports

Small Form-factor Pluggable (SFP) Modules

The AUX ports can be populated with one of the following options listed in **Table 2.2**.

Table 2.2 List of SFP Modules

Model Number	Description
SFP-HDM-OUT	SDI to HDMI/DVI Transmitter.
SFP-HDM-IN	HDMI/DVI to SDI Receiver
SFP-ANA-IO	Composite CODEC Transceiver that provides 1 analog input and 1 analog output

Table 2.2 List of SFP Modules

Model Number	Description
SFP-MADI-COAX	MADI Transceiver that provides a MADI Link with up to 64 channels in and out.
SFP-FIBER-3G	3G SDI Optical Transceiver that provides 1 optical input and 1 optical output.
SFP-HDB-IO-3G	3G SDI HD-BNC Transceiver that provides 1 SDI input and 1 SDI output
SFP-HDB-IN-12G	12G SDI HD-BNC Dual Receiver that provides 1 SDI input.
SFP-HDB-OUT-12G	12G SDI HD-BNC Dual Receiver that provides 1 SDI output.
SFP-MADI-850MM	3G SDI multi-mode optical transceiver (850 nanometer multi-mode)
SFP-MADI-1300MM	3G SDI multi-mode optical transceiver (1330 nanometer multi-mode)
SFP-MADI-1310SM	3G SDI optical transceiver that supports MADI

Getting Started

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.

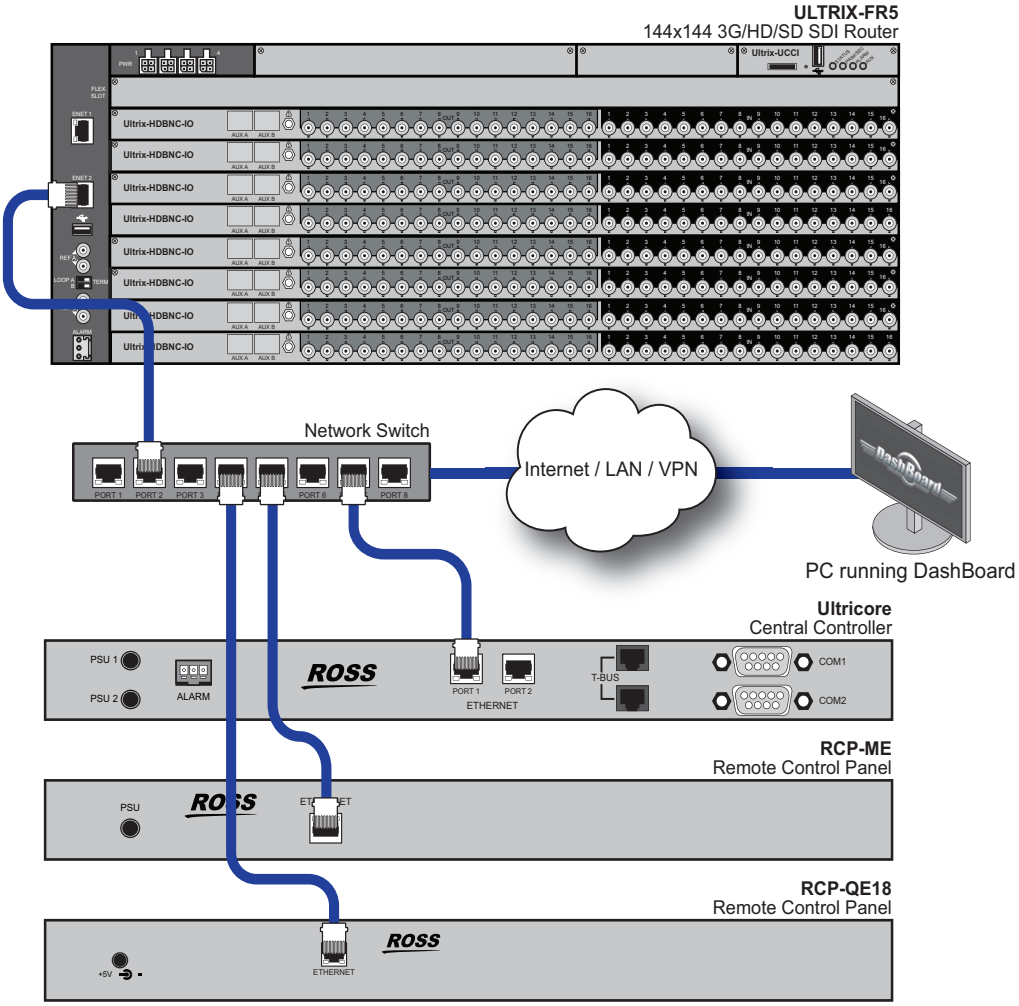


Figure 2.2 Example of a Possible Layout

✶ The Ultrix family communicates via a standard IT Ethernet communications network (1000/100/10Mbps). For installations comprising a managed switch, ensure TCP ports 15000 and 5000 are not blocked for inter-device communications.

MC1 Connection

Communication between the MC1-MK and the Ultrix router is via an ethernet connection. Ultrix can support up to ten MC1 connections.

For More Information on...

- the MC1-MK workflow, refer to the ***MC1-MK Installation*** and ***Operation Guides***.

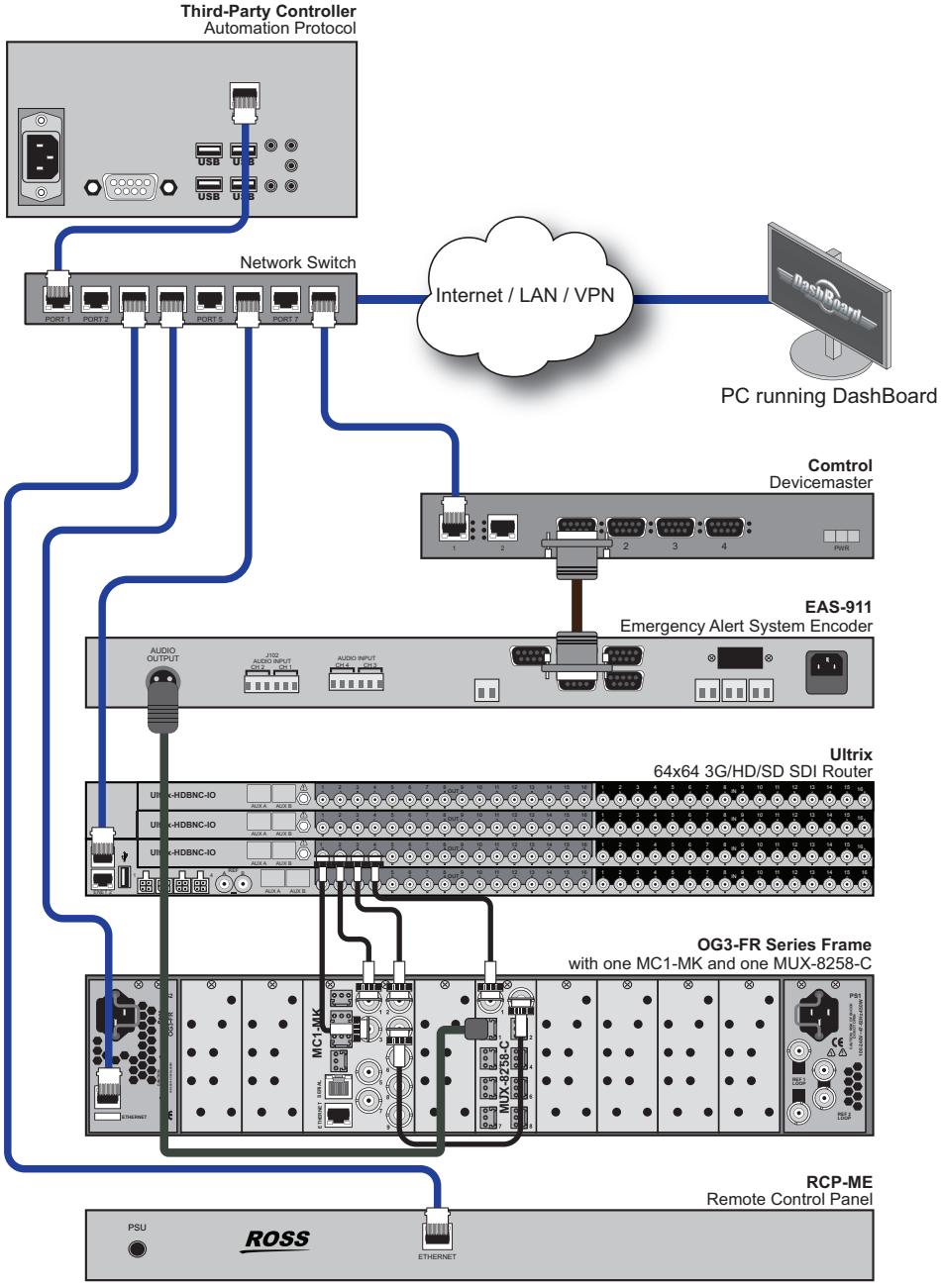


Figure 2.3 Example of an MC1 Workflow with an Ultrix Router

Hardware Overview

There are three router models in the Ultrix family: ULTRIX-FR1, ULTRIX-FR2, and ULTRIX-FR5. All routers fit into the standard 19” rack. This chapter presents information on the Ultrix front and rear panels.

Front Panel Overview

The Ultrix router is designed to be operated with the door closed to ensure adequate cooling via the fans. The front panel includes the same features regardless of the router model. **Figure 3.1** shows an ULTRIX-FR1.

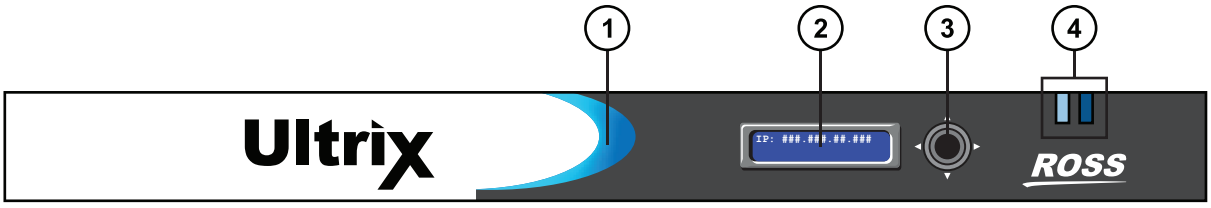


Figure 3.1 Front Panel — ULTRIX-FR1

1) Front Panel Wave Light	3) Navigation Positioner
2) LCD Display	4) ENET Port LEDs

1. Front Panel Wave Light

The front panel provides various system status indication via the 'wave light'. The concave section of the black front panel bezel emits light of various colors to indicate system function.

Table 3.1 Front Panel Wave Light

Status	Description
Blue	When lit blue, this indicates normal operation.
Red	When lit red, this indicates a serious issue that requires immediate attention.

2. LCD Display

The LCD display reports on the overall system status, IP address of the panel, and current fault conditions. During normal operations, the display reports the Device Name (user assigned) and the active IP address of the panel. Under some conditions, fault conditions are reported such as: device boot status, Walkabout locate mode indication, SRAM battery warnings, and firmware upgrade states. The information on the display alternates between normal operation and the error messages.

3. Navigation Positioner

The front panel includes a five-direction round finger joystick that is used to navigate the messages on the LCD Display.

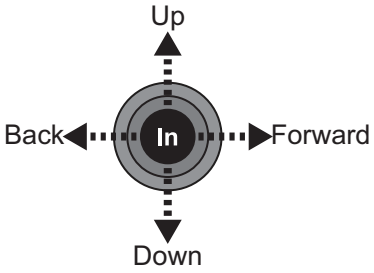


Figure 3.2 Positioner Movement

Use the following actions to navigate the parameters:

- **In** — pressing once brings the menu system onto the monitor output; holding for two seconds exits the menu system. This position is also used to enter the menu values/parameters.
- **Up** — pressing once selects the menu, item, or value above the current selection; holding scrolls to the top of the available selections.
- **Down** — pressing once selects the menu, item, or value below the current selection; holding scrolls to the bottom of the available selections.
- **Forward** — pressing once moves from menu to item to value.
- **Back** — pressing once moves from value to item to menu.

4. ENET Port LEDs

Table 3.2 describes the two Ultrix front panel LEDs that are used to monitor ethernet communication activity of the Ultrix router. When facing the front panel, the left LED reports the status of the **ENET 1** port while the right LED reports the status of the **ENET 2** port. Refer to the section "**Rear Panel Overview**" on page 18 for details.

Table 3.2 Front Panel LEDs

LED	Status	Description
ENET #	Bright Blue	A valid physical ethernet connection is established, and the port is active. There is data transfer activity on the indicated Ethernet port.
	Dim Blue	A valid physical ethernet connection is established, but the port is not the active one. There is no data transfer activity on the indicated Ethernet port.
	Off	No valid ethernet connection to the indicated Ethernet port.

Interior of the Router

The interior of the router is accessed by removing the door from the chassis.

Notice — *For reliable performance, it is recommended that the Ultrix front panel not be opened for longer than one minute.*

Figure 3.3 Overview of the Chassis Interior — ULTRIX-FR1

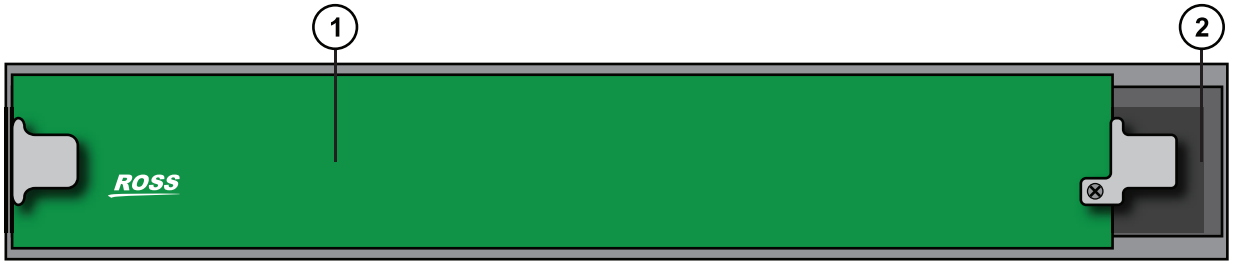


Figure 3.4 Overview of the Chassis Interior — ULTRIX-FR2

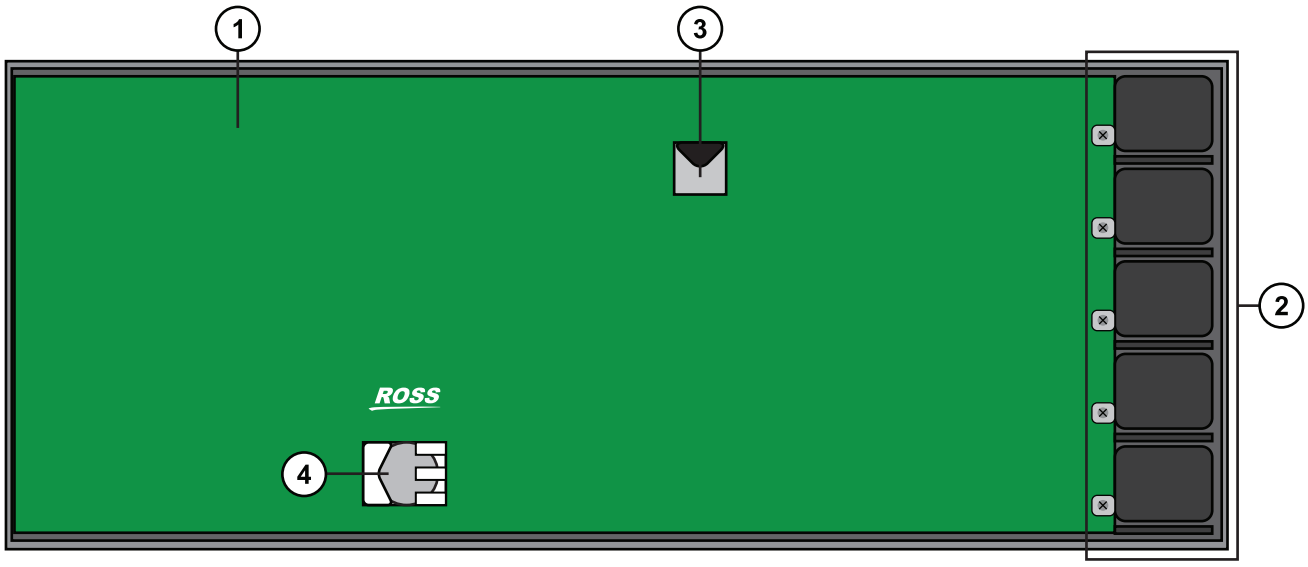


Figure 3.5 Overview of the Chassis Interior — ULTRIX-FR5

1) Main Board	3) MicroSD Card
2) Cooling Fan Module(s)	4) Battery

1. Main Board

The Main board is the main switching matrix for the I/O Boards. It also distributes power and communication from the main control and the I/O Boards.

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.*

2. Cooling Fan Module

The Ultrix router comes standard with a Cooling Fan Module installed in the right-side of the chassis. This module mates directly to the control board of the router (located in the back of the chassis).

Notice — *The two sides of the Ultrix router have perforations that are needed to ventilate the boards and components inside the chassis. Do not block these perforations.*

The fans intake air at the right-side of the chassis, then the fans blow the air over the I/O Boards. The air flows from right to left, to the exit ventilation holes on the left-side of the chassis.

On the ULTRIX-FR1 and ULTRIX-FR2 chassis, the Cooling Fan Module also houses the MicroSD card that is a key component of the router operating system. Do not remove this card unless directed by Ross Technical Support.

✶ A three-way jumper is available on the ULTRIX-FR1 and ULTRIX-FR2 Cooling Fan Modules. Do not change its settings unless directed by Ross Technical Support.

3. MicroSD Card (ULTRIX-FR5 only)

The MicroSD provides system storage and a default software build. Do not remove this card unless directed by Ross Technical Support.

4. Battery

The ULTRIX-FR5 uses this battery to serve as an emergency backup power source for the essential memory of the router. On the ULTRIX-FR1 and ULTRIX-FR2 chassis, this battery is located on the Cooling Fan Module. Refer to the ***Ultrix User Guide*** for information on monitoring and replacing this battery.

Rear Panel Overview

The rear panel provides a support structure for connecting input or output signals, and two looping reference connections. Note that the number of populated slots in your router may differ from what is presented here.

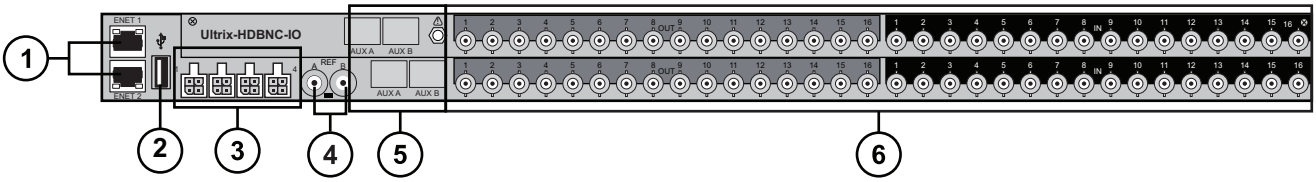


Figure 3.6 Rear Panel — ULTRIX-FR1

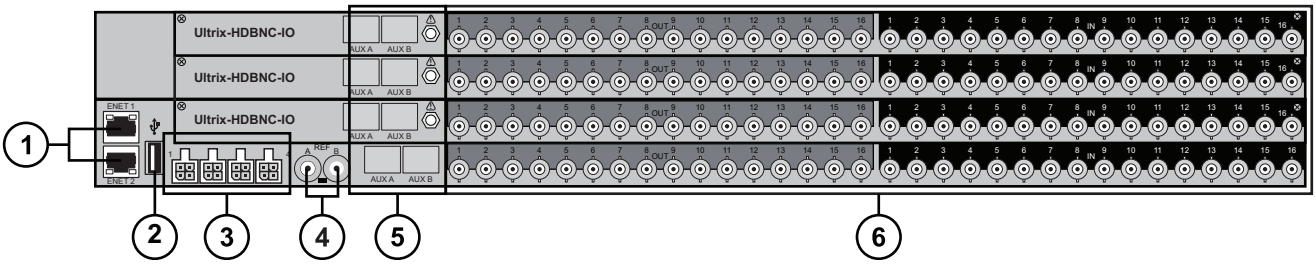


Figure 3.7 Rear Panel — ULTRIX-FR2

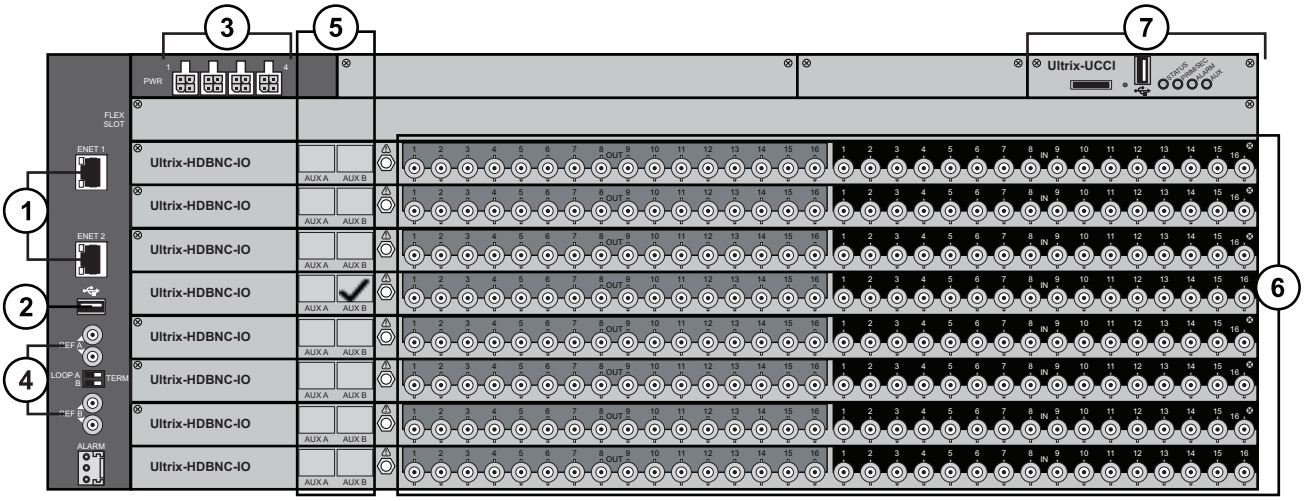


Figure 3.8 Rear Panel — ULTRIX-FR5

1) Ethernet Connections	4) Video Reference Connections	7) Ultrix-UCCI Slot
2) USB Port	5) Auxiliary SFP Ports	
3) PSU Connections	6) Input and Output Connections	

1. Ethernet Connections

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

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

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.

2. USB Port

The USB port provides the ability for various USB-serial converts to be attached for serial communications with the Ultrix router. Refer to the section "**Supported USB-Serial Converters**" on page 43 for a list.

3. PSU Connections

There are four power supply connectors located on the rear of each Ultrix router numbered 1-4 starting from the leftmost connector. Each connector requires a 15VDC connection to an external power supply.

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

- The ULTRIX-FR1 ships with one power supply. An option is available to order a second power supply for redundancy.
- The ULTRIX-FR2 ships with two power supplies. An option is available to order a third power supply to enable n+1 redundancy or two additional power supplies for full redundancy.

Notice — *The ULTRIX-FR2 chassis requires a minimum of two power supplies.*

- The ULTRIX-FR5 requires power from an Ultripower power supply only.

4. Video Reference Connections

Two (individual or looping) HD-BNC inputs are provided to accept reference signals supporting the following reference types: analog black, tri-level sync, and AES/DARs. The **REF A** port is the primary reference port.

✶ The **REF B** port is not implemented. Use this port only in a loop-through workflow.

✶ A switch is located between the HD-BNCs. Do not move this switch from its default position.

5. Auxiliary SFP Ports

The AUX ports can be populated with Small Form-factor Pluggable (SFP) modules from the factory or by installing modules in the field. For a list of SFPs available from Ross Video, refer to **Table 2.2** on page 12.

If an AUX port is populated on the Ultrix rear panel, its status is reported in DashBoard and options are provided for mapping and labeling the I/O as required.

6. Input and Output Connections

The number of input and output HD-BNCs depends on the router model you are using. Each row of 16x16 HD-BNCs is a separate Ultrix-HDBNC-IO Board (known as a slot in the Frame Slot Port Channel (FSPC) nomenclature). These I/O Boards provide non-blocking connectivity for up to 32x32 inputs/outputs in the ULTRIX-FR1, 64x64 inputs/outputs in the ULTRIX-FR2, or 144x144 inputs/outputs in the ULTRIX-FR5.

Notice that the Slots are numbered sequentially with Slot 1 as the topmost slot except on the ULTRIX-FR5. On the ULTRIX-FR5, the topmost slot is identified as the FLEX Slot with the second topmost slot identified as Slot 1.

✶ The FLEX Slot in the ULTRIX-FR5 is not implemented. You cannot install an Ultrix-HDBNC-IO Board in this slot.

7. Ultrix-UCCI Slot

The Ultrix-UCCI slot houses the Ultricore-CC Internal board which includes a Micro SD Card slot, a USB port, and four status LEDs.

Table 3.2 describes the four status LEDs.

Table 3.3 Ultrix-UCCI LEDs

LED	Status	Description
Status	Green	Indicates the Ultrix-UCCI is powered and the last re-boot was successful
	Flashing Green	Indicates the Ultrix-UCCI is powered and in the progress of a re-boot
	Red	Indicates the Ultrix-UCCI is powered but requires a re-boot
Prim/Sec	Green	Indicates the Ultrix-UCCI is configured and functioning as a Master
	Red	
Alarm	Green	
	Red	Indicates the Ultrix-UCCI is experiencing an error condition; verify the message(s) on the router front panel LCD display and DashBoard
	Off	Indicates the Ultrix-UCCI is operating correctly and is not experiencing any errors
Aux	Green	
	Red	

Physical Installation

If you have questions pertaining to the installation of your Ultrix router, please contact us at the numbers listed in the section "**Contacting Technical Support**" on page 10.

Before You Begin

Notice — *The Ultrix 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 Ultrix 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 module.
- 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 Ultrix router be installed directly above the openGear frame.
- If the ambient temperature of the installation site is likely to reach temperatures at the high end of the specified operating range, you may choose to set the fan speed to medium or high to reduce any potential risk. Refer to the ***Ultrix User Guide*** for instructions on setting the fan speed.
- 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.

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.*

Mounting Requirements

The Ultrix 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 Ultrix 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...

- the technical specifications for the Ultrix router, refer to the chapter "**Technical Specifications**" on page 37.

Connecting the Ultrix Router to a Network

Each Ethernet port is a standard 10/100/1000 RJ45 Ethernet connector and is used to exchange data and communicate with other devices in your router system.

✶ 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 device.

The Ultrix router is connected directly to your network so that it can interface with the devices and the computer running the DashBoard client. After a physical connection is established, DashBoard is used to configure the network settings for the Ultrix. While this section uses the ULTRIX-FR1 as an example, it is applicable to all Ultrix models.

For More Information on...

- downloading and installing DashBoard, refer to the ***DashBoard User Manual***.

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

To establish a physical connection to the network

1. To connect the primary network connection for the Ultrix 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 **ENET 1** port on the rear of the Ultrix router.

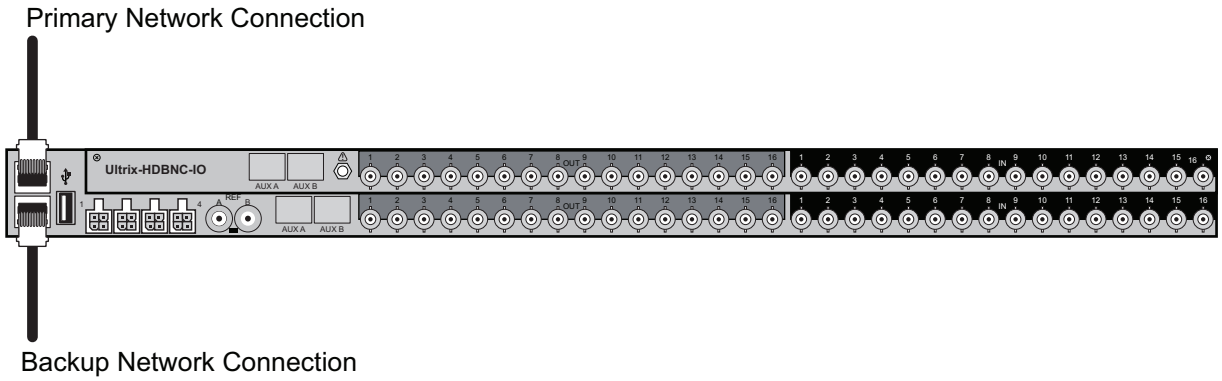


Figure 4.1 ULTRIX-FR1 — Network Connections

2. To connect the redundant network connection for the Ultrix 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 **ENET 2** port on the rear of the Ultrix router.

Powering on the Router

There are four PSU sockets on the back of each Ultrix router. The minimum number of PSU your router requires is based on the router size.

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.*

Powering on the ULTRIX-FR1 and ULTRIX-FR2

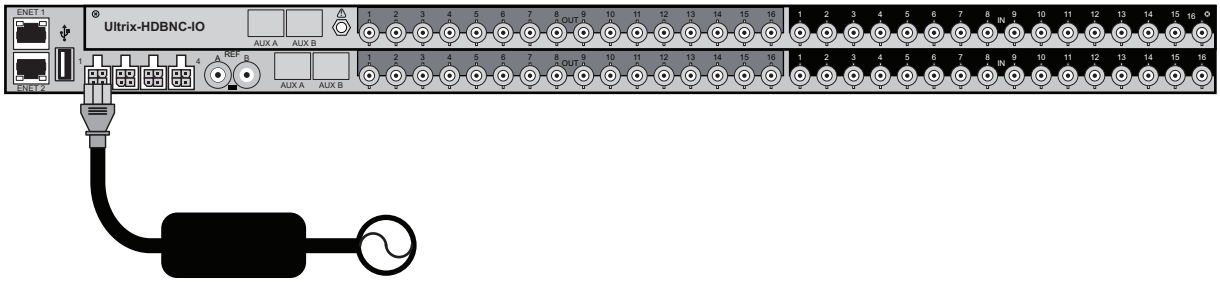
Before you begin, keep in mind that:

- Each ULTRIX-FR1 router requires a minimum of one +15V DC, 32A PSU. For redundancy and load sharing, up to 3 optional PSU can be used.
- Each ULTRIX-FR2 router requires a minimum of two +15V DC, 32A PSU. For redundancy and load sharing, up to 2 optional 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 supplies.

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

To connect the power cables to the ULTRIX-FR1 or ULTRIX-FR2

1. Connect the female end of the provided power cable into the socket marked **PS1**.



Note: It is recommended that you always connect the Power Supply Unit to the Ultrix before connecting to Mains Power.

Figure 4.2 ULTRIX-FR1 — Primary Power Connection

2. Connect the remaining three power cables into the separate power supply sockets.

Notice — *The ULTRIX-FR2 requires a minimum of two power supplies.*

3. Connect the supplied AC power cable into the power module.
4. Connect the supplied power cable's three-prong male connector to Mains Power.

Powering on the ULTRIX-FR5

Each ULTRIX-FR5 router requires powering from an Ultripower Rack Mount Power Supply Unit. Powering an ULTRIX-FR5 from individual external power supplies is not supported. Ultripower is a 1RU 1200W power supply with a redundancy option specifically designed for the Ultrix series routers.

To connect an Ultripower to an ULTRIX-FR5

1. Connect the ends of four power cables to the Ultripower rear panel **OUT** sockets.
2. Connect the free ends of the same power cables to the ULTRIX-FR5 rear panel.

Notice — *Ensure that the power cable end with the ferrite bead connects to the Ultripower port.*

Notice — *The ULTRIX-FR5 automatically powers on when power is applied to Ultripower. Connect DC cables prior to connecting AC power source to the Ultripower. This prevents the ULTRIX-FR5 from trying to draw too much power while only one DC cable is installed.*

✶ Refer to the ***Ultripower User Guide*** for more information on connecting the Ultripower to a power source.

3. Connect an AC power cable to the Ultripower **PSU 1** socket.
4. If Ultripower is fitted with a redundant power module, connect a second AC power cable to the Ultripower **PSU 2** socket.

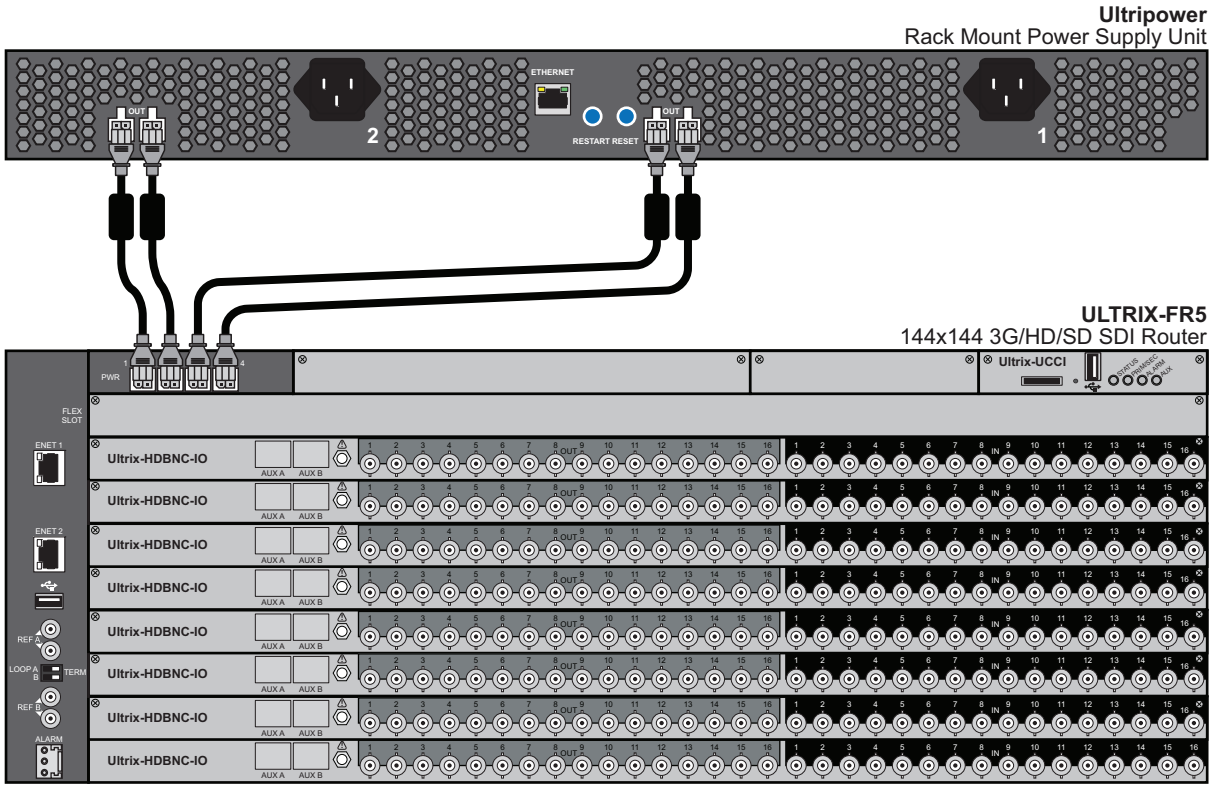


Figure 4.3 ULTRIX-FR5 — Power Connections

Cabling

The Ultrix routers handle high-bandwidth, broadcast-quality, digital video and audio signals, and embedded audio signals. Digital video signals can be 12G[1], 3G, high definition, or standard definition. The Ultrix routers support SMPTE standards 424M, 344M, 259M, and 292M.

While this chapter provides instructions for the physical cabling of the Ultrix router using an ULTRIX-FR1 router as an example, it is applicable to all Ultrix models.

Connecting a Video Reference Source

All Ultrix 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.

For More Information on...

- setting a custom switching trigger, refer to the ***Ultrix User Guide***.
- supported reference formats for Frame Sync/Clean Switch, refer to the section "**Supported FSCS Video Formats for Conversion**" on page 38.

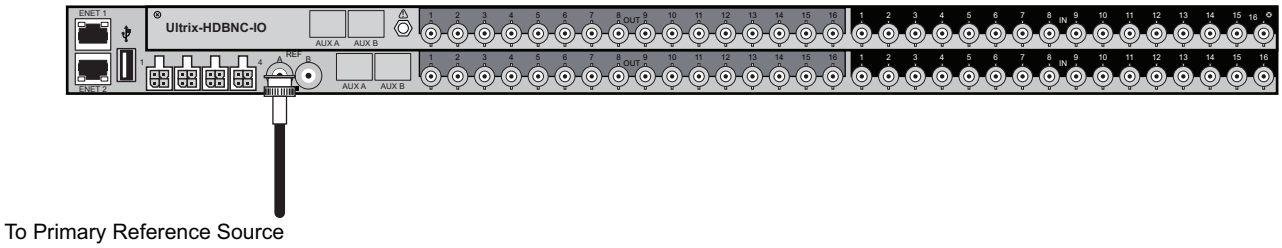
Cabling for the ULTRIX-FR1 and ULTRIX-FR2

The ULTRIX-FR1 and ULTRIX-FR2 each accept a single composite or tri-level sync signal to feed timing information to the routing system.

To connect the video reference source to the ULTRIX-FR1 or ULTRIX-FR2

1. Connect a 75ohm coaxial cable between the video reference signal output and the **REF A** port on the rear panel of the Ultrix router.

✶ Use the **REF B** port only as a loop when configuring the Ultrix router for a loop-through workflow.



To Primary Reference Source

Figure 5.1 Video Reference Cabling — ULTRIX-FR1 or ULTRIX-FR2If you have multiple routers that will switch on with the same reference:

1. Requires installing an Ultrispeed license key for each slot. Refer to the ***Ultrix User Guide*** for details.

a. Connect the **REF B** connector on the rear panel of the router to the **REF A** connector on the rear panel of another router using a 75ohm coaxial cable.

b. Continue looping the **REF** connectors across the routers that you want referenced to this signal.

c. Ensure that the last router in the video referencing loop has a 75ohm termination connected to its **REF B** connector.

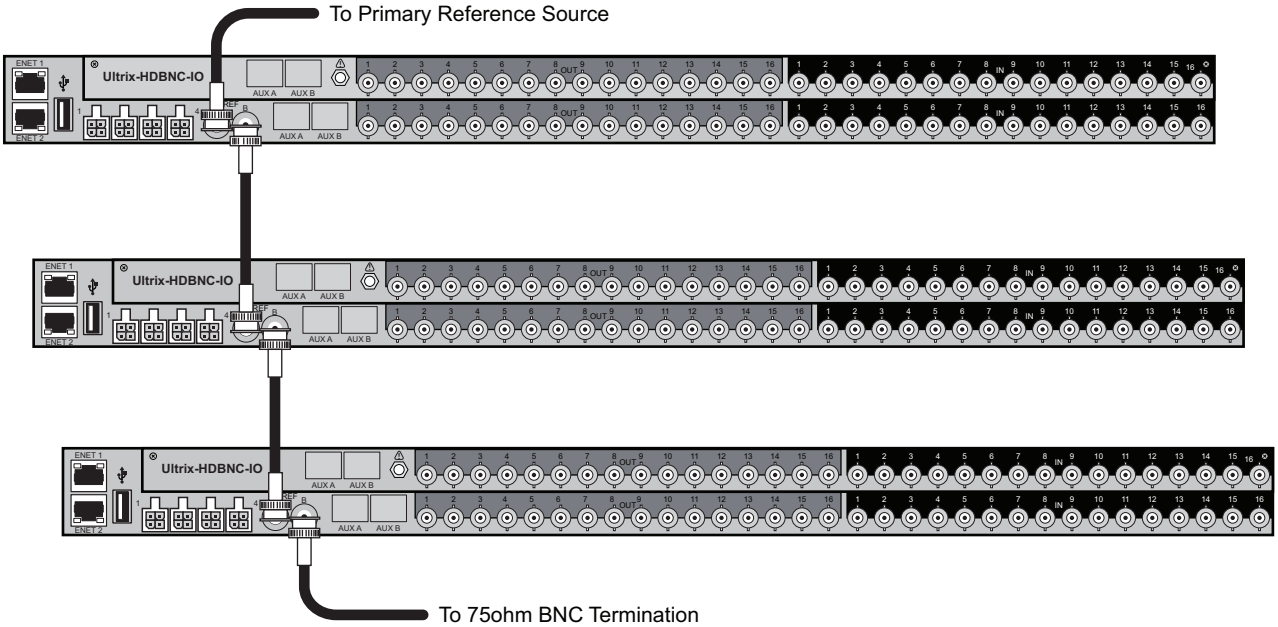


Figure 5.2 Connecting Multiple Routers for Simultaneous Switching

Cabling for the ULTRIX-FR5

The ULTRIX-FR5 consists of two independent reference connections (REF A, REF B). Each may be configured for loop-through or terminating functionality. The ULTRIX-FR5 requires at least one reference connection.

To connect the video reference source to the ULTRIX-FR5

1. Connect a valid reference signal to either BNC in the BNC pair labeled **REF A**.

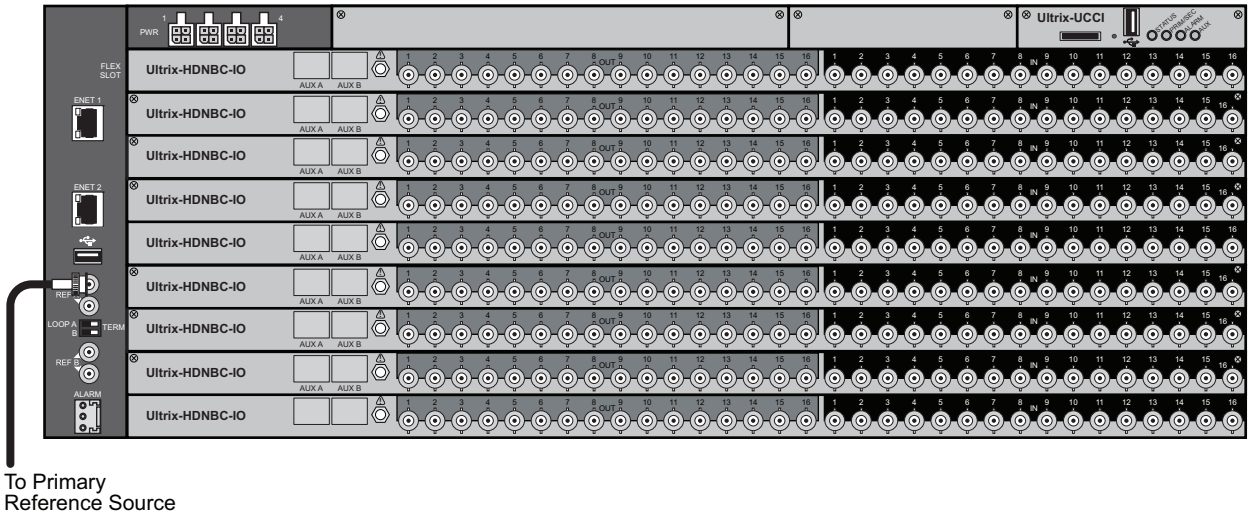


Figure 5.3 Video Reference Cabling — REF A Port on the ULTRIX-FR5

2. Select either TERM or LOOP on the dip-switch labeled 'A' to select the preferred BNC mode.

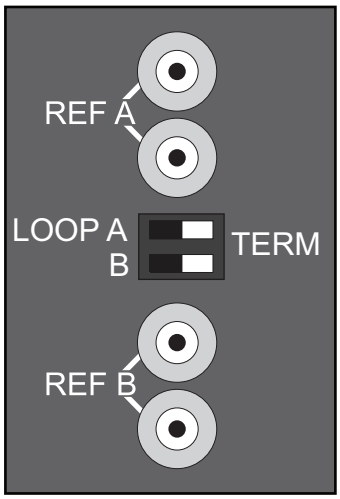


Figure 5.4 ULTRIX-FR5 — DIP Switch in the TERM Positions

Cabling for an UltriScape Head

The number of UltriScape (Multiviewer) Heads for your Ultrix router depends on the number of UltriScape licenses enabled and the total number slots populated with I/O Boards. **Table 5.1** lists the connections on the rear panel that are available for UltriScape Heads.

Table 5.1 Outputs Allocated for UltriScape Heads

Slot	UltriScape Head 1	UltriScape Head 2	UltriScape Head 3
Slot #	AUX A or OUT 1	OUT 5 or OUT 7	OUT 11 or OUT 13

Figure 5.5 illustrates the output connections allocated for UltriScape Heads on a router rear panel.

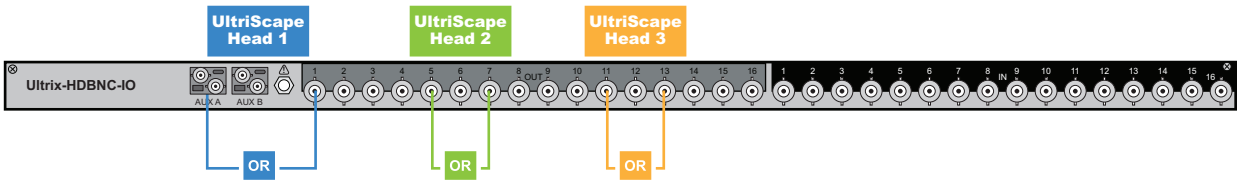


Figure 5.5 Example of UltriScape Head Mapping on a Single Slot

For More Information on...

- cabling the AUX A port, refer to the section "**Connecting the AUX Ports**" on page 31.

To cable ports for an UltriScape Head

1. Connect the end of a 75ohm coaxial cable with an HD-BNC connector on one end to an **OUT** HD-BNC on the Ultrix router rear panel.

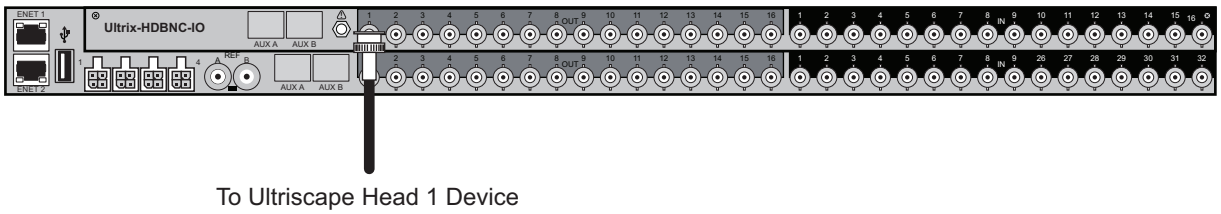


Figure 5.6 Example of Cabling for UltriScape Head 1 — Slot 1 in an ULTRIX-FR1

2. Connect the other end of the coaxial cable to the device that displays the UltriScape Head from that **OUT** HD-BNC on the router.

3. Make a note of the **OUT** HD-BNC you have chosen for the UltriScape Head as this information is needed when you configure the UltriScape Head settings in DashBoard.

Connecting Source Devices

The Source connections on the Ultrix rear panel are located on the right-hand side and are clearly defined with white text on a black background around the HD-BNCs. The HD-BNCs are numbered starting at IN 1 and the total number of BNCs depends on the router model you are using.

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.*

For More Information on...

- source cabling designations for your router, refer to the chapter "**Input and Output Cabling**" on page 35.

To connect source devices

1. Connect the end of a 75ohm coaxial cable with HD-BNC connectors to an **IN** HD-BNC on the Ultrix router rear panel.

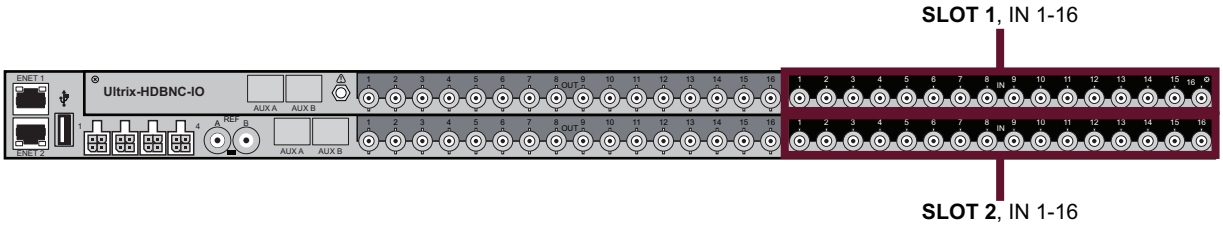


Figure 5.7 Cabling the Video Sources — Location of IN BNCs on an ULTRIX-FR1

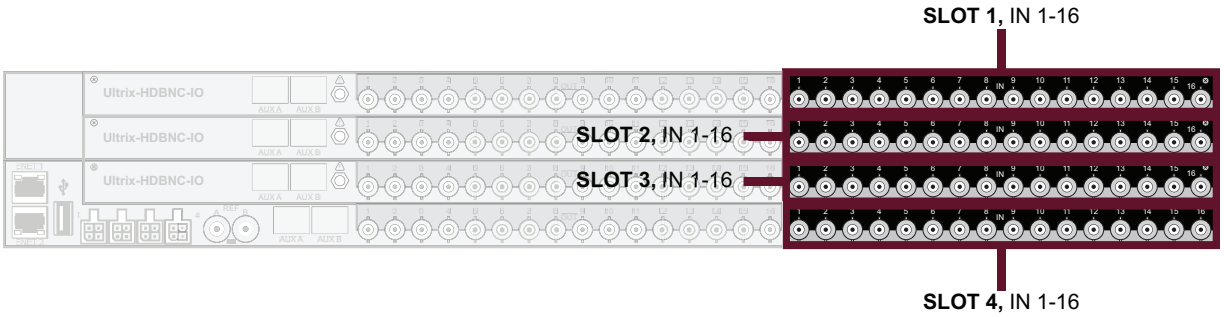


Figure 5.8 Cabling the Video Sources — Location of IN BNCs on an ULTRIX-FR2

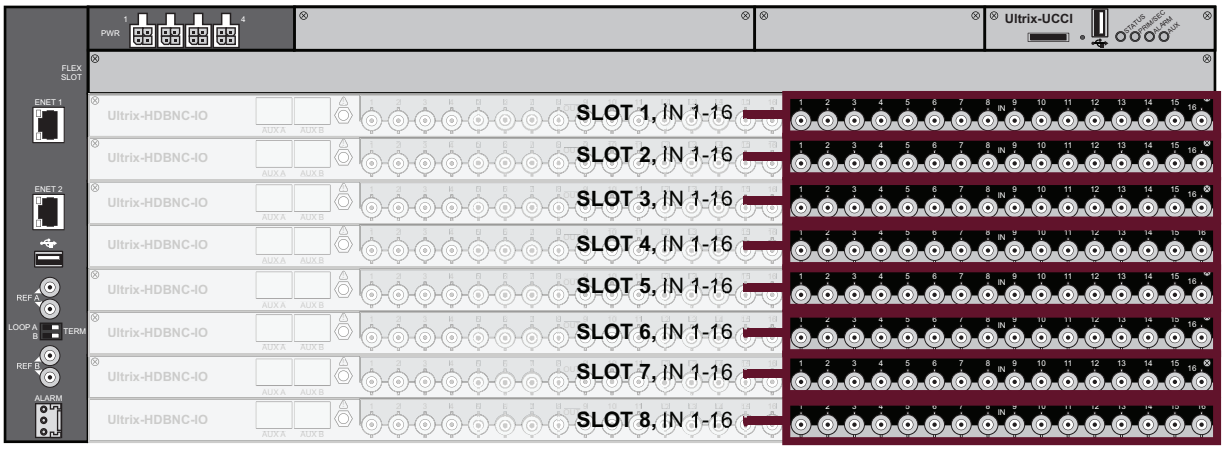


Figure 5.9 Cabling the Video Sources — Location of IN BNCs on an ULTRIX-FR5

2. Connect the other end of the coaxial cable to the device that will supply the signal to that **IN** HD-BNC on the router.

Connecting Destination Devices

The Destination connections on the Ultrix rear panel are located on the left-hand side and are clearly defined with black text on a gray background around the HD-BNCs. The HD-BNCs are numbered starting at OUT 1 and the total number of BNCs depends on the router model you are using.

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.*

For More Information on...

- destination cabling designations for your router, refer to the chapter "**Input and Output Cabling**" on page 35.

To connect destination devices

1. Connect the end of a 75ohm coaxial cable with HD-BNC connectors to an **OUT** HD-BNC on the Ultrix router rear panel.

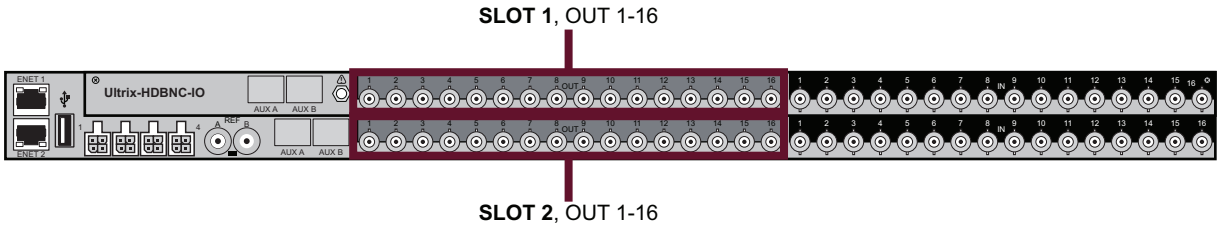


Figure 5.10 Cabling the Video Destinations — Location of OUT BNCs on an ULTRIX-FR1

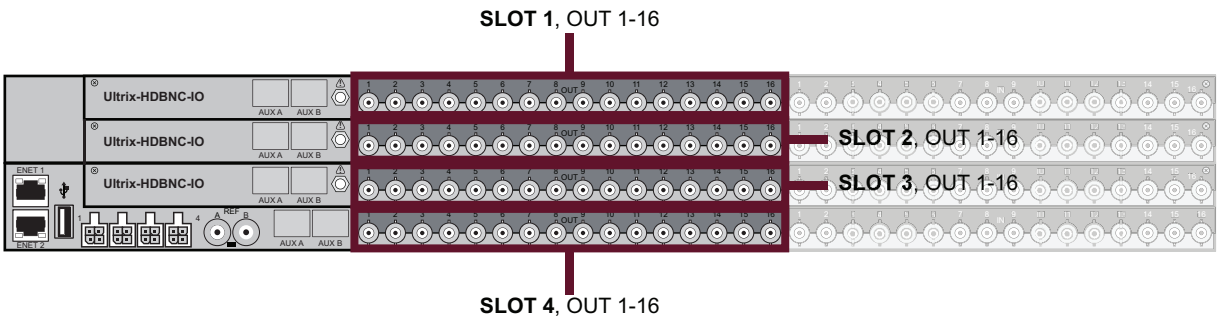


Figure 5.11 Cabling the Video Destinations — Location of OUT BNCs on an ULTRIX-FR2

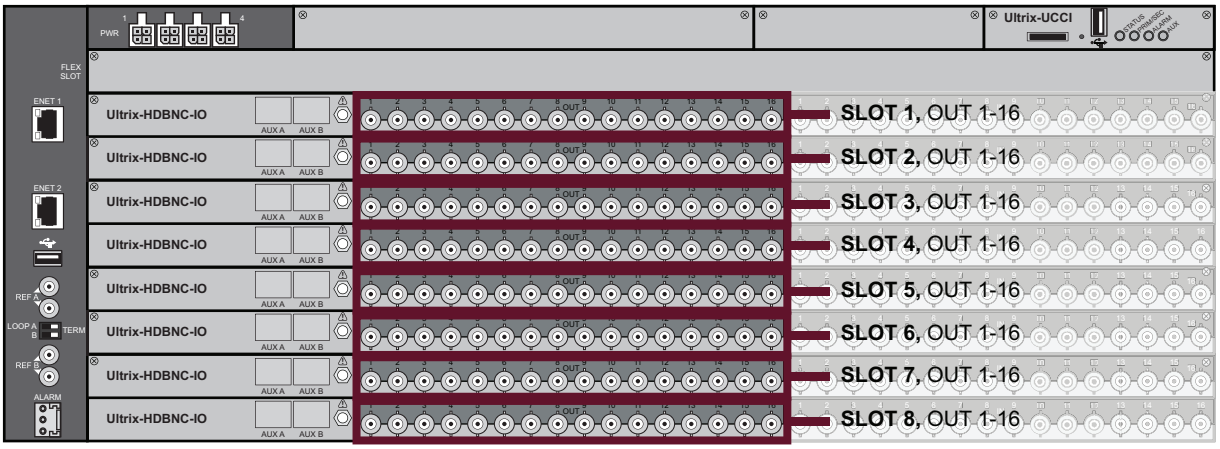


Figure 5.12 Cabling the Video Destinations — Location of OUT BNCs on an ULTRIX-FR5

2. Connect the other end of the coaxial cable to the device that will ingest the signal from that **OUT** HD-BNC on the router.

Gearbox Cabling

A Gearbox is a group of four consecutive inputs or four consecutive outputs that are automatically grouped together in the Ultrix database. The first port of the Gearbox group is used for routing and Ultriscape, while the remaining three ports in the group are reserved but not used (they are not listed in the Third Party Matrices, Sources, and Destinations tabs of the database).

For More Information on...

- supported video formats for a Gearbox, refer to the section "**Supported Video Formats**" on page 39.

Outputs

When you configure a Gearbox output group, Ultrix takes the signals of the four 3G Level A channels together and provides a single 12G signal to an output.

Table 5.2 Gearbox Mapping — Default Output Groups

Group	Channel 1	Channel 2	Channel 3	Channel 4
1	slot#.out[1]	slot#.out[2]	slot#.out[3]	slot#.out[4]
2	slot#.out[7]	slot#.out[8]	slot#.out[9]	slot#.out[10]
3	slot#.out[13]	slot#.out[14]	slot#.out[15]	slot#.out[16]

Figure 5.13 illustrates the connections allocated for Gearbox groups on a router rear panel.

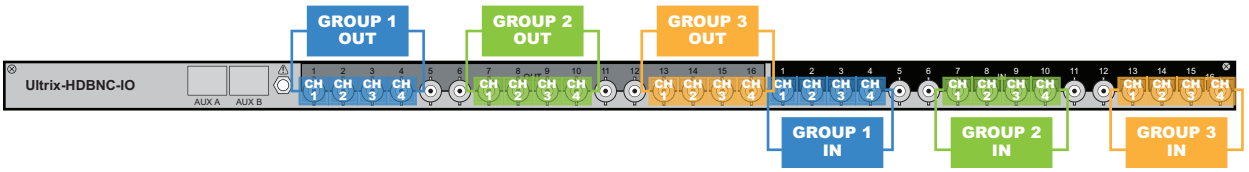


Figure 5.13 Example of Gearbox Mapping on a Single Slot

Inputs

When you enable a Gearbox input group, Ultrix multiplexes the signals of the four 3G Level A channels together.

Table 5.3 Gearbox Mapping — Default Input Groups

Group	Channel 1	Channel 2	Channel 3	Channel 4
1	slot#.in[1]	slot#.in[2]	slot#.in[3]	slot#.in[4]
2	slot#.in[7]	slot#.in[8]	slot#.in[9]	slot#.in[10]
3	slot#.in[13]	slot#.in[14]	slot#.in[15]	slot#.in[16]

Connecting the AUX Ports

The primary function of SFP modules is to provide inputs and outputs different to the formats that the HD-BNCs provide. The number of ports you have depends on the model of Ultrix router you are using and the number of SFPs you have chosen to install in your router.

For More Information on...

- on the SFP modules, refer to the section "**Supported SFP Modules for the AUX Ports**" on page 43.

To connect to a third-party device via an AUX port

1. Connect the end of an interface cable to an **AUX** port on the Ultrix router rear panel.

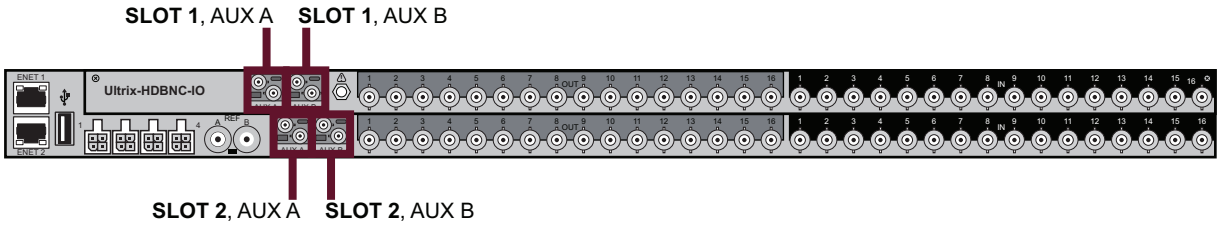


Figure 5.14 Location of AUX Ports — ULTRIX-FR1 with Four SFP-ANA-IO Modules

2. Connect the other end of the interface cable to the device that will communicate with the router via the **AUX** port.

Connecting to an Ultricore

Adding an Ultricore Central Controller (CC) to the system allows for native T-BUS devices to be added to the system, as well as RS-232 or RS-422 third-party control. The Ultricore communicates over ethernet to devices in

your routing system. **Figure 5.15** shows a typical connection of Ultricore with other routing system components. Note that in this arrangement, Ultricore will act as a system master for all switching and database related functions.

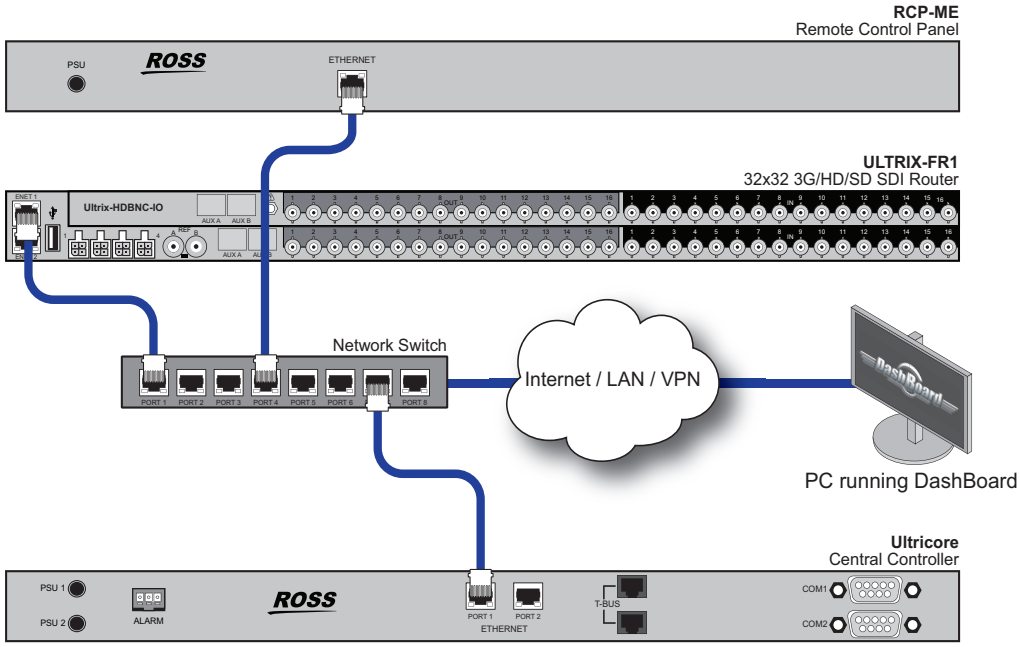


Figure 5.15 Example of a Simple Routing System with Ultrix and Ultricore

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 Ultrix routers communicate only via an ethernet protocol via a network connection. If you wish to establish communications between an Ultrix 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.

To establish communication between an Ross NK device, such as an RCP-NKM, and your Ultrix router

- Connect the NK device to the same ethernet network as your Ultrix router using an NK-NET or an NK-IPS, and then set up communications via the Ultricore interface in DashBoard. (**Figure 5.16**)
- Connect the NK device via the T-Bus connections on an Ultricore and then set up communications via the Ultricore interface in DashBoard. (**Figure 5.16**)

For More Information on...

- connecting your Ross NK Series device to your facility network, refer to its user documentation.

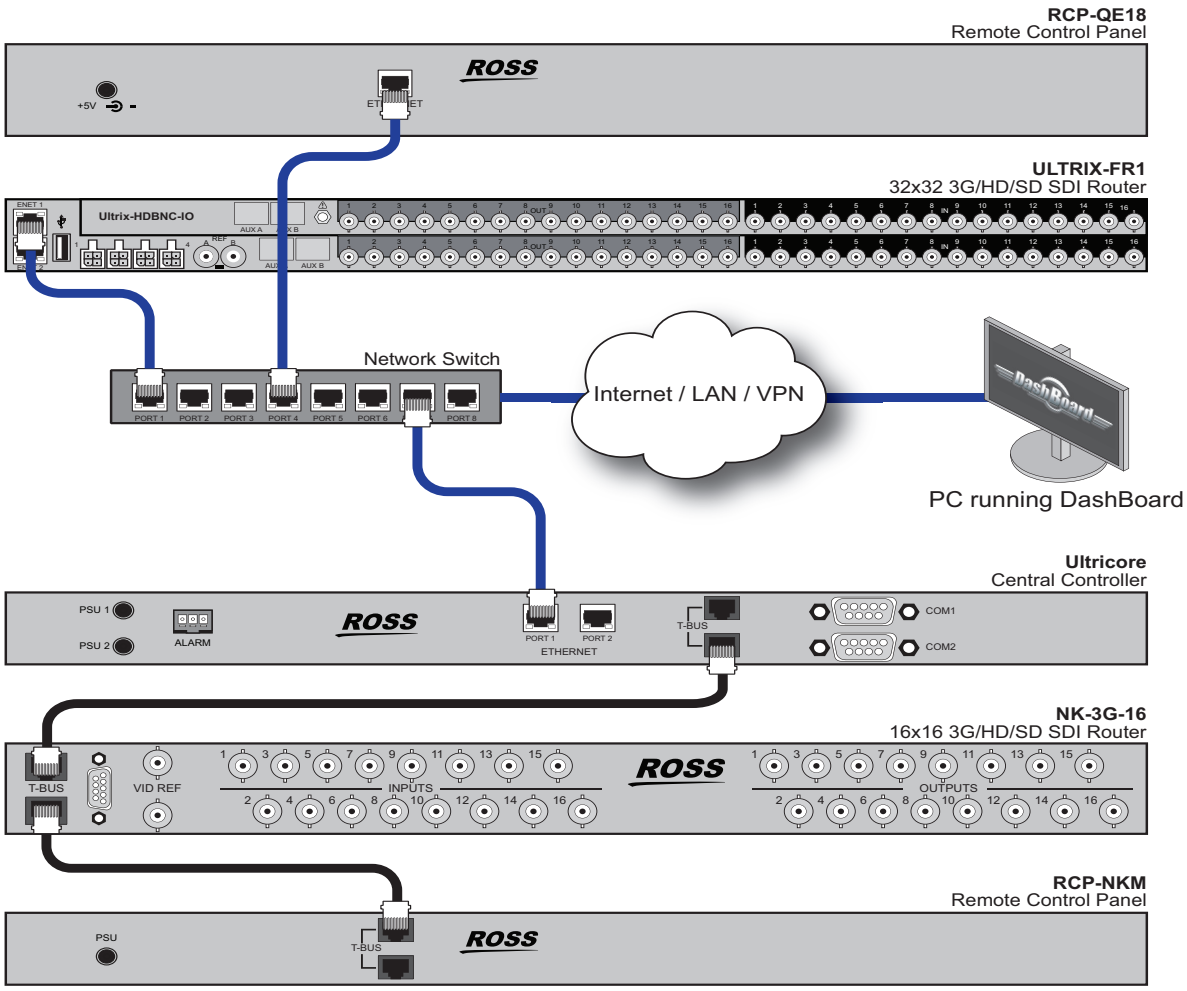


Figure 5.16 Example of a Routing System with Ross NK Devices and an ULTRIX-FR2 Router

Input and Output Cabling

This chapter outlines the default input and output cabling designations for the Ultrix router. The cabling designations are the same regardless of the router model.

SDI Input Cabling

This section outlines the input cabling designations for the Ultrix-HDBNC-IO Boards. The input BNCs are located on the right side of each slot in the Ultrix rear panel.

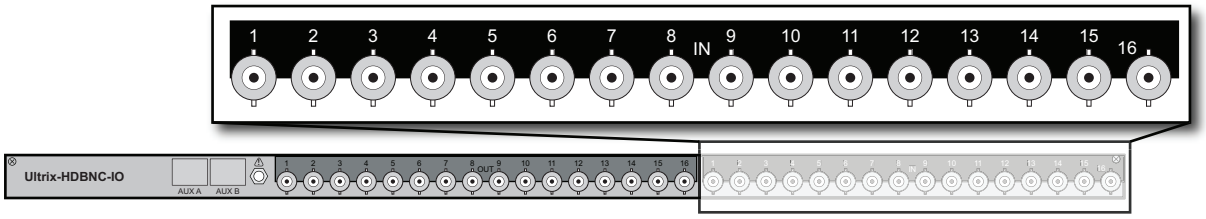


Figure 6.1 Ultrix Rear Panel — IN BNC Mapping for an Ultrix-HDBNC-IO Board

SDI Output Cabling

This section outlines the output cabling designations for the Ultrix-HDBNC-IO Boards. The output BNCs are located on the left side of each slot in the Ultrix rear panel.

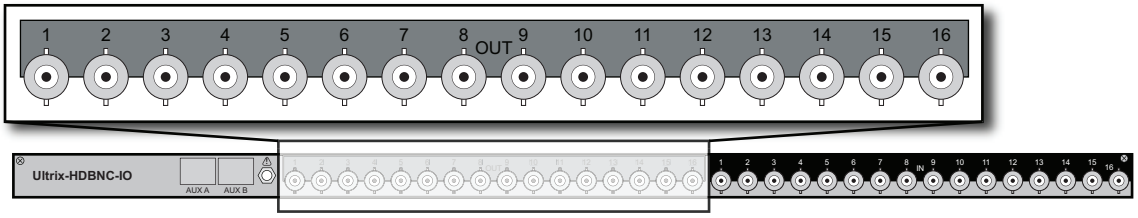


Figure 6.2 Ultrix Rear Panel — OUT BNC Mapping for an Ultrix-HDBNC-IO Board

Technical Specifications

This chapter provides technical information for Ultrix routers. Note that specifications are subject to change without notice.

Physical Dimensions

Table 7.1 Technical Specifications — Physical Dimensions

Item	ULTRIX-FR1	ULTRIX-FR2	ULTRIX-FR5
Width	17.5” (44.45cm)	17.5” (44.45cm)	17.5” (44.45cm)
Depth	7.9” (20cm)	7.9” (20cm)	7.9” (20cm)
Height	1.74” (4.40cm)	3.48” (8.80cm)	8.7” (22cm)
Weight (approx.)	12lb (5.4kg)	17lb (7.70kg)	42.5lb (19.3kg)

Inventory

Table 7.2 Technical Specifications — Inventory

Item	ULTRIX-FR1	ULTRIX-FR2	ULTRIX-FR5
Video Matrix Size (max.)	36x36	72x72	144x144
Fixed I/O Slots[a]	1 (16x16)	1 (16x16)	0
Optional I/O Slots[a]	1 (16x16)	3 (48x48)	8 (128x128)
Audio			
Audio Matrix Size (max.)[b]	512x512	1024x1024	2304x2304
Audio Matrix Size (with Optional MADI SFPs)	768x768	1536x1536	3072x3072
MultiViewer			
UltriScape Licenses per slot	3	3	3
Maximum Multiviewer Heads per System	6	12	24
UHD			
UltriSpeed Licenses per Slot[b]	1	1	1

a. Optional SFP AUX I/O available to support up to 18x18 per slot.
b. Each license enables up to 12Gbps support on all I/O per slot.

Supported FSCS Video Formats for Conversion

Table 7.3 Reference Formats — FSCS Video

Provided Reference Format	Frame Sync/Clean Switch Video
NTSC	480i 59.94Hz
	720p 59.94Hz
	1080i 59.94Hz
	1080p Level A 59.94Hz
	1080p Level B 59.94Hz
Tri-Level 1080i 59.94Hz	480i5 9.94Hz
	720p 59.94Hz
	1080i 59.94Hz
	1080p Level A 59.94Hz
	1080p Level B 59.94Hz
Tri-Level 720p 59.94Hz	720p 59.94Hz
	1080p Level A 59.94Hz
	1080p Level B 59.94Hz
PAL	567i 50Hz
	720p 50Hz
	1080i 50Hz
	1080p Level A 50Hz
	1080p Level B 50Hz
Tri-level 1080i 50Hz	567i 50Hz
	720p 50Hz
	1080i 50Hz
	1080p Level A 50Hz
	1080p Level B 50Hz
Tri-level 720p 50Hz	720p 50Hz
	1080p Level A 50Hz
	1080p Level B 50Hz
1080p 29.97Hz	1080pSF 29.97Hz
	1080p 29.97Hz
1080p 25Hz	1080pSF 25Hz
	1080p 25Hz
1080i 60Hz	1080i 60Hz
	1080p 60Hz
	720p 60Hz

Table 7.3 Reference Formats — FSCS Video

Provided Reference Format	Frame Sync/Clean Switch Video
1080p 30Hz	1080p 30Hz
	1080p 60Hz
720p 60Hz	720p 60Hz
1080pSF 24Hz	1080pSF 24Hz
1080p 24Hz	1080p 24Hz
1080p 23.98Hz	1080p 23.98Hz
1080pSF 23.98Hz	1080pSF 23.98Hz

Supported Video Formats

Table 7.4 Technical Specifications — Supported Formats

Resolution (lines)	Interlace / Progressive	Frame Rate (Hz)	SDI Routing	UltriMix	UltriScape	Gearbox
SD						
525	I	59.94	✓	✓	✓	
625	I	50	✓	✓	✓	
HD						
720	P	60	✓	✓	✓	
720	P	59.94	✓	✓	✓	
720	P	50	✓	✓	✓	
1080	I	60	✓	✓	✓	
1080	I	59.94	✓	✓	✓	
1080	I	50	✓	✓	✓	
1080	P	30	✓	✓	✓	
1080	P	29.97	✓	✓	✓	
1080	P	25	✓	✓	✓	
1080	PSF	24	✓	✓	✓	
1080	PSF	23.98	✓	✓	✓	
1080	P	24	✓	✓	✓	
1080	P	23.98	✓	✓	✓	
3G						
1080	P	60	✓	✓	✓	✓
1080	P	59.94	✓	✓	✓	✓
1080	P	50	✓	✓	✓	✓
1080	Level B	60	✓	✓	✓	
1080	Level B	59.94	✓	✓	✓	
1080	Level B	50	✓	✓	✓	

Table 7.4 Technical Specifications — Supported Formats

Resolution (lines)	Interlace / Progressive	Frame Rate (Hz)	SDI Routing	UltriMix	UltriScape	Gearbox
12G (UHD)						
2160	P	50	✓	✓	✓	
2160	P	59.94	✓	✓	✓	
2160	P	60	✓	✓	✓	

ULTRIX-FR1 and ULTRIX-FR2 Power Specifications

The ULTRIX-FR1 and ULTRIX-FR2 ares powered from up to four external power supplies. Each PSU port on the Ultrix rear panel accepts 15V DC power.

Table 7.5 Technical Specifications — Power Supply Ratings

Item	Specifications
Output	15VDC @ 17A
Output Power	255W
Input	100-240VAC, 50/60Hz
Input Current	4.5A

Table 7.6 Technical Specifications — Power Supply Connections

Item	Specifications
ULTRIX-FR1	Minimum 1 power supply required
	2+ for redundancy
ULTRIX-FR2	Minimum 2 power supplies required
	4 for full redundancy

ULTRIX-FR5 Power Specifications

✶ The ULTRIX-FR5 requires the Ultripower Rack Mount Power Supply Unit.

Table 7.7 Technical Specifications — Power Supply Ratings

Item	Specifications
Output	15VDC @ 20A per connection
Output Power	1200W max. De-rates to 1100W with 110VAC mains supply
Input	100-264VAC, 50/60Hz
Input Current	10A

Table 7.8 Technical Specifications — Power Supply Connections

Item	Specifications
ULTRIX-FR5	Minimum 1 Ultripower fitted with 1 power module
	1 Ultripower fitted with 2 power modules for full redundancy

Maximum Power Ratings

Table 7.9 outlines the maximum power ratings for fully loaded Ultrix router models.

Table 7.9 Technical Specifications — Maximum Power Ratings

Item	Specifications
ULTRIX-FR1 with 2 I/O Boards	~150W
ULTRIX-FR2 with 4 I/O Boards	~310W
ULTRIX-FR5 with 8 I/O Boards	~630W

Inputs

Table 7.10 Technical Specifications — Inputs

Item	Specification
Standard Input	HD-BNC
Signal Type (SDI Formats)	270MB/s 1.5GB/s 3GB/s 12GB/s
Impedance	75ohm
Max. Input Level	880mV
Return Loss	Per SMPTE 2082-1
Equalization (typical)	UHD: 50m (160ft) HD, 3G: 200m (650ft) SD: 400m (1300ft)
SFP AUX Connector	Refer to the section "**Supported SFP Modules for the AUX Ports**" on page 43 for a list of AUX options. Refer to the ***Ultrix SFP Modules Guide*** for more information on these options.

Outputs

Table 7.11 Technical Specifications — Outputs

Item	Specification
Standard Output	HD-BNC
Signal Type (SDI Formats)	270MB/s 1.5GB/s 3GB/s 12GB/s
Impedance	75ohm
Amplitude	800mV +/-10%
Rise and Fall Time	270MB/s: 400-800ps 1.5GB/s, 3GB/s: < 135ps 12GB/s: <45ps

Table 7.11 Technical Specifications — Outputs

Item	Specification
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
SFP AUX Connector	Refer to the section "**Supported SFP Modules for the AUX Ports**" on page 43 for a list of AUX options. Refer to the ***Ultrix SFP Modules Guide*** for more information on these options.

Embedded Audio

Table 7.12 Technical Specifications — Audio Inputs

Item	ULTRIX-FR1	ULTRIX-FR2	ULTRIX-FR5
Audio Channels per SDI I/O	16	16	16
Audio Channels per MADI I/O	Selectable 56 or 64		

Environmental

Table 7.13 Technical Specifications — Environmental

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

MicroSD Card

Table 7.14 Technical Specifications — MicroSD Card

Item	Specifications
Types Supported	Contact Ross Technical Support
Operating Systems Supported	

UltriScape Specifications

Table 7.15 Supported Video Formats

Format	Notes
UltriScape Input	
576i 50Hz	configurable 4:3 (pillarbox view) or 16:9
480i 59.94Hz	configurable 4:3 (pillarbox view) or 16:9
720p 50Hz	
720p 59.94Hz	
1080i 50Hz	

Table 7.15 Supported Video Formats

Format	Notes
1080i 59.94Hz	
1080p 50Hz	
1080p 59.94Hz	
UltriScape Output	
1080p 50Hz	
1080p 59.94Hz	

Ethernet Port Connectors

Each Ultrix router comes standard with two Ethernet ports. Each port uses a standard single 8-pin, RJ45 connector to interface to an 802.3x Ethernet network. Ultrix supports 1000Mbps (GbE), 100Mbps, or 10Mbps network interface speeds. The Ethernet ports are operated in a link aggregated or bonded configuration to provide failover functionality.

Specifications

Table 7.16 Technical Specifications — Ethernet Ports

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

Supported USB-Serial Converters

The following USB-Serial chip-sets are supported:

- FTDI
- Silicon Labs CP210x
- Prolific PL2303
- Belkin

Supported SFP Modules for the AUX Ports

The AUX ports on the Ultrix rear panel can be populated with the following classes of small form-factor pluggable (SFP) modules. Refer to the document ***Ultrix SFP Modules Guide*** for more information on the SFP models and their specifications.

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zlib

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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).