ULTRIX-FR1, ULTRIX-FR2, and ULTRIX-FR5 User Guide

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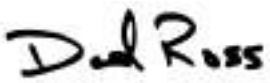

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Ultrix · User Guide

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- Software Issue: **6.3.0**

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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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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.

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

European Union

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".

Warning — *This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.*

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This equipment is in compliance with the provisions established under the Radiocommunications Act 1992 and Radiocommunications Labelling (Electromagnetic Compatibility) Notice 2008.

Korea

This equipment is in compliance with the provisions established under the Radio Waves Act.

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.

International

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.*

Warranty and Repair Policy

The Ultrix systems are 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.

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.

Security and Privacy

If you would like more information on how Ross Video security and privacy practices have been applied to Ultrix, what you should know about maintaining security of this product, and how we can partner with you to ensure security throughout this product's life-cycle, contact techsupport@rossvideo.com.

Ross Video has implemented reasonable administrative, technical, and physical safeguards to help protect against security incidents and privacy breaches involving a Ross Video product provided those products are used in accordance with Ross Video instructions for use. However, as systems and threats evolve, no system can be protected against all vulnerabilities and we consider our customers the most important partner in maintaining security and privacy safeguards. If you have any concerns, we ask that you bring them to our attention, and we will investigate. Where appropriate, we will address the issue with product changes, technical bulletins and/or responsible disclosures to customers and regulators. Ross Video continuously strives to improve security and privacy throughout the product life-cycle using practices such as:

- Privacy and Security by Design
- Product and Supplier Risk Assessment
- Vulnerability and Patch Management
- Secure Coding Practices and Analysis
- Vulnerability Scanning
- Access Controls appropriate to Customer Data

- Incident Response
- Clear paths for two-way communication between customers and Ross Video

If you would like to report a potential product related privacy or security issue (incident, breach, or vulnerability), contact techsupport@rossvideo.com.

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Contents

Introduction

This guide covers the configuration and operation of the Ross Video ULTRIX-(NS)-FR1, ULTRIX-(NS)-FR2, and ULTRIX-(NS)-FR5 routers. If you are configuring an ULTRIX-FR12, refer to the ***ULTRIX-FR12 User Guide***.

✶ For information on creating and managing databases for your routing system, refer to the ***Ultrix and Ultricore Database Guide***.

The following chapters are included:

- "**Introduction**" summarizes the guide and provides important terms, and conventions.
- "**Getting Started**" provides general information to keep in mind before configuring your Ultrix, instructions for configuring the Ultrix network settings, and assigning a name to identify the router.
- "**Role-Based Access Control**" outlines the use of the RBAC feature within the DashBoard software application for the Ultrix routers.
- "**Using DashBoard**" outlines the Ultrix tree view in DashBoard, and how to navigate the nodes.
- "**Navigating the Product Info Interfaces**" summarizes the Product Info interfaces (formerly the System Status interfaces in software versions prior to v6.1).
- "**Navigating the System Configuration Interfaces**" summarizes the configures the interfaces used to configure the connection points in your routing system.
- "**Navigating the Device Configuration Interfaces**" summarizes the interfaces that define the physical outputs, inputs, and communication ports of the Ultrix router.
- "**Software License Keys**" provides instructions for enabling the licensed features of your Ultrix router.
- "**Enabling a Service**" outlines how to enable a communication protocol, and configure the additional settings on the router for each protocol (if required). A summary of the supported commands is also provided.
- "**Timing and Reference Setup**" outlines how to configure the reference and time settings for your Ultrix router.
- "**Configuring the SDI I/O Ports**" provides instructions on how to manage your hardware matrices, configure an AUX port, and assign an UltriScape (Multiviewer) head to a physical output.
- "**UltriSync Configuration**" provides an overview of the UltriSync licenses, and how to configure the UltriSync settings for an input port.
- "**UltriClean Configuration**" provides an overview of the UltriClean licensed feature, and how to configure the Clean Switch mode for an output port.
- "**UltriSRC Configuration**" outlines how to assign an UltriSRC license to an input port.
- "**Configuring an Audio Matrix**" summarizes how to enable the audio matrix, the audio mapping options when using SDI embedded audio or MADI signals, how to set the audio transition mode for an audio channel.
- "**UHD Gearbox Configuration**" provides instructions on how to set up your Gearbox groups.
- "**ULTRIX-IP-IO Setup**" outlines how to configure receivers and senders for the Ultrix router to be used in video and audio streaming when at least one ULTRIX-IP-IO blade is installed in a slot of an Ultrix router.
- "**ULTRIX-IPX-IO Setup**" outlines how to configure receivers and senders for the Ultrix router to be used in video and audio streaming when an ULTRIX-IPX-IO blade is installed in a slot of an Ultrix router.

- "**ULTRIX-SFP-IO Setup**" outlines how to utilize the ports for the Ultrix router when an ULTRIX-SFP-IO blade is installed in a slot of an Ultrix router.
- "**UltriStream Setup**" provides information on the UltriStream licensed feature for the Ultrix routers.
- "**UltriProc Setup**" provides information on the SDR/HDR conversion and Color Correction options available when one of the UltriProc licenses is enabled on an Ultrix router.
- "**Ultrimix-Dante Setup**" provides information on installing the Ultrimix-Dante license, and configuring it for the Ultrix routing system.
- "**Using Remote Control Panels**" provides information on operating the Ultrix router with Ross remote control panels (RCP).
- "**Operation with Ross Devices**" provides general information for operating the Ultrix router in a routing system that also includes Ross NK Series devices.
- "**ULTRIX-UCCI Redundancy**" outlines the ULTRIX-UCCI Control redundancy feature for the ULTRIX-FR5.
- "**Managing your Ultrix Settings**" outlines how to import and export archived files (*.ufs) of your Ultrix router settings to another Ultrix router.
- "**Monitoring the Hardware**" outlines how to monitor the router hardware via the DashBoard status fields.
- "**Monitoring the Communications**" summarizes how to verify communications on an Ethernet port, an Ultricore connection, and the overall communication status of the Ultrix router.
- "**Monitoring the Signals**" outlines how to monitor the reference signal, the inputs and outputs signals via the options in the Frame Configuration interface of DashBoard.
- "**DashBoard Interface Overview**" summarizes the functions, menus, and parameters of the Ultrix tabs and windows in DashBoard.
- "**Glossary**" provides a definitions of commonly used terms and conventions for this guide.

If you have questions pertaining to the operation of Ultrix, 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 and configuring your Ultrix:

- ***DashBoard User Manual***, Ross Part Number: 8351DR-004
- ***Ultricore BCS User Guide***, Ross Part Number: 2201DR-106
- ***Ultriscape User Guide***, Ross Part Number: 2101DR-018
- ***ULTRIX-NS-FR1, ULTRIX-NS-FR2 Quick Start Guide***, Ross Part Number: 2101DR-002
- ***ULTRIX-FR5 Quick Start Guide***, Ross Part Number: 2101DR-502
- ***ULTRIX-NS-FR5 Quick Start Guide***, Ross Part Number: 2101DR-503
- ***Ultrix and Ultricore Database Guide***, Ross Part Number: 2201DR-109
- ***ULTRIX-FR1, ULTRIX-FR2, and ULTRIX-FR5 Installation Guide***, Ross Part Number: 2101DR-003
- ***ULTRIX-FR12 Installation Guide***, Ross Part Number: 2101DR-603
- ***ULTRIX-FR12 Quick Start Guide***, Ross Part Number: 2101DR-602
- ***ULTRIX-FR12 User Guide***, Ross Part Number: 2101DR-604
- ***ULTRIX-MODX-IO User Guide***, Ross Part Number: 2101DR-020
- ***Ultrix SFP Modules Guide***, Ross Part Number: 2101DR-008
- ***Walkabout Application Note***, Ross Part Number: 2201DR-003

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 As** 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 ***Ultrix Installation 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 As**," you would click the **File** menu and then click **Save As**.

Important Instructions

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

✶ An error message displays when an object overlaps a tile or when one tile overlaps another in the workspace.

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

An effective routing system takes careful planning. Routing systems may consist of many devices either located within the same facility, or across multiple locations. Routing devices (routers) must connect and communicate with each other and any control system devices all on a high speed network.

✶ DashBoard is required to configure the Ultrix router.

Configuration Overview

The generalized work-flow of configuring your Ultrix router is:

1. Configure the network interface settings for the Ultrix router.
2. Establish DashBoard connectivity.
3. Configure Ultrix device system settings
4. Define a database for the router.
5. Set up control panels.

✶ Ultrix supports a maximum of 25 DashBoard clients with 50 other TCP/IP connections (remote control panels, third-party control systems, etc.).

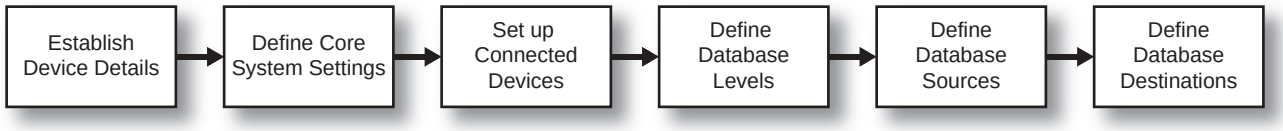


Figure 1 Process for Configuring an Ultrix Router

Establish Communications

Walkabout is a DashBoard system for network device discovery. Ultrix supports the Walkabout system for configuration of its IP settings. Once you establish communications over Ethernet between the Ultrix router and DashBoard, you can proceed to use the interfaces in DashBoard that enable Ultrix to communicate with the other devices in your routing system.

✶ Ross Video recommends a Memory Allocation of at least 4GB in DashBoard to ensure reliable operation. Refer to the ***DashBoard User Guide*** for details on setting the Memory Allocation value.

Network Settings

The Ultrix network settings may be changed by either the DashBoard Walkabout interface, or the Ultrix front panel interface. A complete network setting requires a static IP address, a network mask address, and a gateway address. These should be supplied by your IT Department for this device.

Using Walkabout in DashBoard

Walkabout is a Ross router utility operating within DashBoard that enables you to configure the network settings for Ross routers, remote control panels, and other devices. Once a valid

connection is established with Walkabout, the router is listed in the Tree View of DashBoard and available for monitoring and configuration using the options in DashBoard.

Ultrix supports a basic configuration mode via the Walkabout system for initial configuration of IP settings. Use Walkabout to:

- specify device IP settings and names
- specify a name for your routing system
- specify the system role (e.g. primary, backup, device)
- select a system to join from a list of valid system names assigned to controllers
- set communications server from a list of valid communication server devices (or IP)

For More Information on...

- the features of Walkabout, refer to the document ***Configuring Devices Using Walkabout***.

Using Walkabout to Assign the Initial IP Address to the Router

Once the Ultrix router is physically installed and cabled to your facility network, you will need to assign it an initial static IP Address to enable DashBoard to locate it on your network. Establishing an initial IP Address enables DashBoard to communicate with the router and update the Basic Tree View with the Ultrix nodes.

✶ After you edit a cell in the **Walkabout** table, it is recommended to wait approximately 1 minute, then click **Refresh** to apply the new settings.

To assign the initial static IP address for the Ultrix router

1. Launch DashBoard.
2. From the DashBoard client main toolbar, select **File** > **Show Walkabout**.

   The DashBoard window displays the **Walkabout** table.
3. Click **Refresh**, located at the bottom of the Walkabout tab, to ensure the list in the Walkabout interface is current.
4. In the **Walkabout** table, find the entry for the Ultrix you want to configure.

✶ A factory default Ultrix will display Ultrix in the **Name** field and an IP address of 192.168.20.140.

5. Use the **Name** field to assign a unique identifier to the Ultrix router.

   This will also be the name displayed in the Tree View of DashBoard.
6. To assign a new IP address:
   a. Double-click the **Address** field.
   b. Enter the IP Address supplied by your IT Department for this device.
   c. Press **Enter** to save the new address.
7. Ensure the **Netmask** field is set to match your network requirements.
8. Use the **Gateway** field to specify the IP Address for connection outside of the local area network (LAN).
9. Click **Reboot** in the row of the **Walkabout** table for the Ultrix router.

   The router reboots and the new settings are applied.

Adding the Ultrix Router to the Tree View in DashBoard

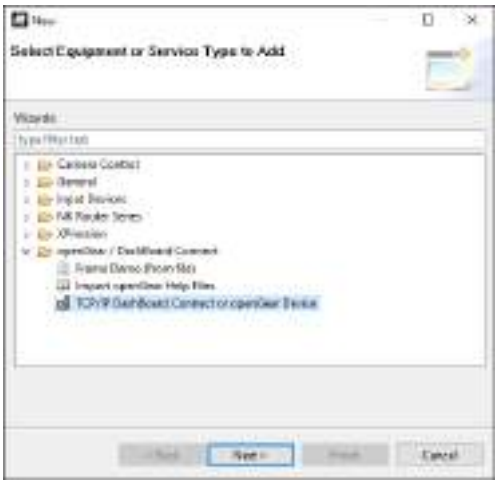
Once you have assigned the Ultrix router a static IP Address, you can then manually add it to the Tree View in DashBoard. Manually adding the Ultrix router displays its node in the Tree View, granting you access to the interfaces described in the chapter "**DashBoard Interface Overview**".

To manually add the Ultrix router to the Tree View in DashBoard

1. In the **Basic Tree View** toolbar of DashBoard, click .

   The **Select Equipment or Service Type to Add** dialog opens.

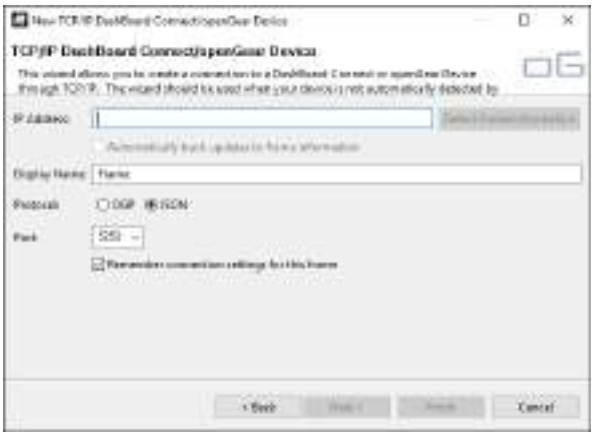
2. Expand the **openGear/DashBoard Connect** node.



3. Select **TCP/IP DashBoard Connect or openGear Device**.
4. Click **Next >**.

   The **TCP/IP DashBoard Connect/openGear Device** dialog opens.

5. Select the **JSON** radio button as the **Protocol**.



6. Enter the IP Address for the router in the **IP Address** field that you assigned in "**To assign the initial static IP address for the Ultrix router**".
7. Perform one of the following steps:
   - In the text fields provided, enter the display name for the Ultrix router, and port of the panel you wish to add; or
   - Click **Detect Frame Information** to automatically retrieve the connection details.
8. Click **Finish**.

Updating the Network Settings for the Ultrix Router

✶ This section is not applicable if your router is already set to the correct IP address.

Once you establish initial communications with the Ultrix router, and it displays in the DashBoard Tree View, you may wish to review or change the IP Address and other settings according to your facility network requirements.

✶ This procedure requires a reboot of the router.

To update the network settings for the Ultrix router

1. Locate the Ultrix in the Tree View of DashBoard.
2. Expand the **Ultrix** node to display a list of sub-nodes in the Tree View.
3. Double-click the **Product Info** node.
4. Select the **Network** tab.
5. Locate the **Settings** area.
6. Edit the fields as required.

✶ Do not assign the Ultrix to an IP address in the range of 192.168.12.0-192.168.12.255. These are reserved addresses.

7. Click **Apply**.
8. Click **Reboot**. This button is located at the bottom of the window.

Re-naming the Ultrix Router

If you installed multiple Ultrix routers in your system, each router must have a unique name assigned to it via its front panel menu system. This ensures that the router is easily identifiable in the Walkabout interface and uniquely identifies its inputs and outputs in the DashBoard database interfaces.

Throughout the DashBoard interface, actual sockets (inputs and outputs) of a router (or matrix) are referred to by hierarchical dotted notation: **Frame.Slot.Port.Type.Channel** where **Frame** identifies the physical router chassis housing the matrix/matrices. By default, each Ultrix router ships with the name “Ultrix” automatically set. By re-naming each Ultrix router, you are providing a unique identifier for the sockets within the router system.

You can rename a router via the options in DashBoard or via the front panel. This section outlines both methods.

Re-naming the Ultrix Router via DashBoard

Each Ultrix router can be given a unique name that is used on internal menus and as the identifier in the tree views of DashBoard.

✶ Changing the router name *after* database configuration takes time to propagate through the system, and for DashBoard to reconnect, resuming stable system operation. Sufficient time must be allowed when making this change before attempting to use the system. This time will vary depending on features, matrix size, and configuration. In the case of the ULTRIX(-NS)-FR1 and ULTRIX(-NS)-FR2, the worst case will be 3-4 minutes. In the case of the ULTRIX(-NS)-FR5, the worst case is 10 minutes. The router name is typically assigned during initial commission and very rarely ever changed again.

✶ This procedure requires a reboot of the router.

To re-name the Ultrix router via DashBoard

1. In the Tree View of DashBoard, double-click the **Product Info** node.

   The **Product Info** interfaces display in the DashBoard window.

2. Select the **Setup** tab.
3. Use the **Device Name** field to specify the new name for the Ultrix router.

✶ Ultrix does not support Unicode characters.

4. Press **Enter** to apply the new name.
5. Click **Reboot**.

✶ It may take several seconds or more for the Ultrix node name to update in the Tree View of DashBoard.

Re-naming the Ultrix Router via the Front Panel

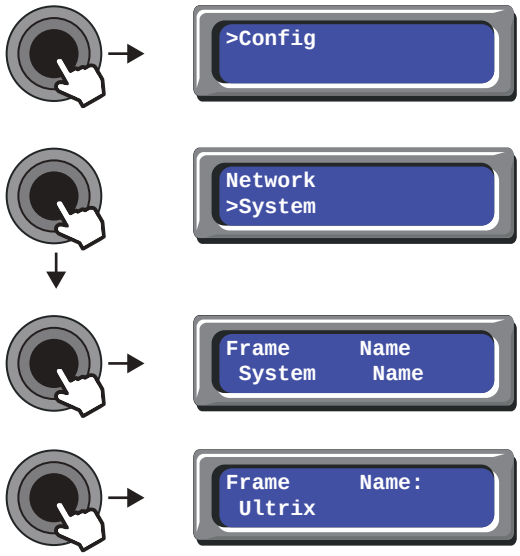
The LCD Display on the Ultrix front panel reports the chassis IP Address, the unique name of the router, and reports when an error or warning condition is occurring on the router. Next to the LCD Display is a five-direction round finger joystick that is used to access and navigate the Ultrix messages and menus on the LCD Display.

For More Information on...

- using the joystick to navigate the front panel menu system, refer to the ***Ultrix Installation Guide***.

To re-name an Ultrix router via the front panel

1. Navigate to the **Frame Name** menu via the front panel as follows:



   The current name for the router is displayed in the bottom line of the **Frame Name:** field. The first character position in the field will alternate flash with an underscore character. This provides visual feedback to the current cursor position.

2. Use the joystick to assign a new name to the router.
   - Pressing the joystick **LEFT**/**RIGHT** positions the cursor.
   - Pressing **UP**/**DOWN** selects a character.
3. Press the joystick **IN** to apply the new name.
4. Ensure the cursor is positioned at the front of the name.

5. Press the joystick **LEFT** to navigate back up the menu tree.

Role-Based Access Control

This chapter outlines the use of Role-Based Access Control (RBAC) within the DashBoard software application for the Ultrix.

✶ This feature requires software version 6.1.0 or higher.

Before You Begin

Ensure the following:

- The Ross Platform Manager and appropriate licenses are purchased to use RBAC features.
- The RPM Server is configured and added to DashBoard.
- The permissions for the devices in your routing system are defined via the Ross Platform Manager.

For More Information on...

- configuring the Ross Platform Manager and Server, refer to the ***DashBoard RPM User Guide***.
- the Ultricore Profiles feature, refer to the ***Ultrix and Ultricore Database Guide***.

Enabling RBAC for an Ultrix

The RBAC feature determines access to an individual devices (Ultrix or Ultricore) via a DashBoard instance (client). Once RBAC is enabled, any DashBoard without RPM will not be allowed to connect to the device unless the user enters a 'master password'.

- If a DashBoard instance has RPM and the account for the current user is configured to allow access to the device, the user will be able to continue using the device.
- If the user does not have access, the device will be disconnected from DashBoard until a user with access rights is signed-in.

To enable RBAC on an Ultrix

1. Launch DashBoard.
2. Locate the Ultrix node in the Tree View.
3. Expand the Ultrix node to display a list of sub-nodes.
4. Expand the Ultrix sub-node.
5. Double-click the **Product Info** sub-node.

   The Product Info interface displays.
6. Select the **Setup** tab.
7. Locate the **RPM Role Based Access Control Required** area.
8. Click **Role Based Access Settings**.

   The Change RBAC Settings dialog opens.
9. From the **RPM Role Based** options, select **On**.

✶ The **RPM Role Based** is set to **Off** by default.

10. Use the **Client Master Password** field to specify the text string a user can enter to gain access to this device when RPM is not present in DashBoard or if DashBoard is unable to connect to the RPM Server.

11. Click **Done**.
    - The Change RBAC Settings dialog closes.
    - On the Setup tab, the **RPM Role Based Access Control Required** field now reports **On**.

To verify that RBAC is enabled

1. Close the **Product Info** interface in DashBoard.
2. Locate the device node in the DashBoard Tree View.
3. Right-click the device node.
4. Select **Disconnect**.

   The device node displays a grayed out icon.
5. Right-click the device node.
6. Select **Connect**.

   The device node displays with a lock icon. Any user attempting to access this device will be prompted to enter the password specified in step 10 in the previous procedure.

Accessing a Device with RBAC Enabled

Once the Ultrix is accessed through DashBoard are configured to require connection to an authenticated DashBoard instance (client), connection requests from unauthenticated sources are declined. A Lock icon displays next to the Ultrix node in the Basic Tree View to indicate that RBAC is enabled for that device. If RBAC is enabled but your system is not using an RPM Manager or Server or the RPM Server is unavailable, you will need to enter a Client Master Password to gain access to the device. This section outlines how to use a Client Master Password to access a device when RBAC is enabled.

✶ If RPM is used, access to the device is based on the privileges of the current user signed into DashBoard.

For More Information on...

- managing access control in DashBoard, refer to the ***DashBoard RBAC User Guide***.

To access an Ultrix when RBAC is enabled

1. Locate the Ultrix node in the Tree View of DashBoard.

   Notice that the node displays an icon with a lock symbol.
2. Double-click the Ultrix node.

   The Password dialog opens.
3. Enter the password as defined in step 10 of "**To enable RBAC on an Ultrix**".
4. Click **Login**.

   The Password dialog closes and the Ultrix node displays a green icon and its tree nodes are accessible.

✶ Entering an incorrect password denies access and the device icon is lit red.

Using DashBoard

This chapter outlines the Ultrix tree view in DashBoard, and how to navigate the nodes.

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

For More Information on…

- the DashBoard client software, refer to the ***DashBoard User Manual***.
- the database interfaces in DashBoard, refer to the ***Ultricore and Ultrix Database Guide***.

Ultrix in DashBoard

Ultrix groups the configuration, monitoring, and operating features in a Tree View in the DashBoard client window. Each node of the tree opens to reveal one or more sub-nodes, giving access to the features for your router.

Figure 2 Example of the Ultrix Nodes in a DashBoard Window

Ultrix includes the following interfaces, as separate nodes, in the DashBoard Tree View.

UltriScape

The first node provides access to the UltriScape Layout Editor, and UltriScape Head interfaces. UltriScape is the integrated Multiviewer for Ultrix routers. Use the UltriScape Layout Editor to manage the layouts and the UltriScape Head to assign sources to the UltriScape Head outputs. You must have at least one UltriScape license key installed to access the UltriScape interfaces. Refer to the ***UltriScape User Guide*** for details.

Product Info

Double-clicking the Product Info node displays two types of tabs within the same DashBoard window: Status (read-only) tabs located on the left, and a series of configuration options (tabs) located on the right. Refer to "**Navigating the Product Info Interfaces**" for details on this node.

System

The System tree includes three sub-nodes: Configuration, Control, and Monitoring.

- The Configuration sub-node enables you to set up communications with devices in the routing system. Refer to "**Navigating the System Configuration Interfaces**" for details.
- The Control sub-node is not implemented on the Ultrix routers.
- The Monitoring sub-node enables you to manage what types of alarm conditions to monitor for each slot and port that is populated in your Ultrix router. Refer to "**Navigating the Monitoring Interfaces**" for details.

Database

Expanding the Database node enables you to configure the databases, matrices, destinations, sources, group, levels, soft panels, and salvos for the routing system. Refer to the ***Ultrix and Ultricore Database Guide*** for details.

Navigating the Ultrix Interfaces in DashBoard

The interfaces are accessed by expanding the Ultrix node in the DashBoard Tree View and selecting the appropriate sub-node. Several of the interfaces are organized in a table layout with a toolbar on the bottom, and a toolbar on the left side of the tab.

For More Information on...

- the Database interfaces for your router, refer to the ***Ultricore and Ultrix Database Guide***.

To access the Ultrix interfaces in DashBoard

1. Locate the Ultrix node in the Tree View of DashBoard
2. Expand the Ultrix node to display a list of sub-nodes.

✶ When accessing an Ultrix, the first sub-node provides access to the Ultriscape settings for the Multiviewer licensed featured. If the Ultriscape sub-node is not displayed, an Ultriscape license is not enabled on the router. Refer to the ***Ultriscape User Guide*** for details.

3. Expand the second sub-node.

4. Double-click the **Product Info** sub-node to display that interface in the right pane of the DashBoard window.

   The Product Info interface displays two panes within the same DashBoard window: status (read-only) fields in the left pane, and a series of tabs with configurable menus and settings in the right pane. Refer to "**Navigating the Product Info Interfaces**" for an overview of the available tabs, menus, and settings.

5. Expand the **System** sub-node.

   The System tree includes three sub-nodes: Configuration, Control, and Monitoring.

✶ The Control sub-node is not implemented on the Ultrix routers.

6. Expand the **Configuration** sub-node.

   The Configuration tree includes two sub-nodes: Ultrix and Connections. Refer to "**Navigating the System Configuration Interfaces**" for an overview of the Configuration sub-nodes.

   - The Configuration > Ultrix node provides access to the Device Configuration interfaces. Refer to "**Navigating the Device Configuration Interfaces**" for details.
   - The Configuration > Connections node enable you to manage the available devices in your routing system that are auto-detected by your Ultrix router. Refer to "**Connections Interface**" for details.

7. Expand the **Monitoring** sub-node.

   The Alarm Configuration sub-node displays. This node provides interfaces for enabling the video and audio alarms, and a central interface to monitor those alarms. Refer to "**Navigating the Monitoring Interfaces**" for an overview of the available tabs, menus, and settings.

Navigating the Product Info Interfaces

The Product Info interface provides hardware information, network settings, access controls, options for creating backups of your settings, and general management for your router. This chapter summarizes the Product Info interfaces (formerly the System Status interfaces in software versions prior to v6.1).

Overview

The Product Info interface displays two panes within the same DashBoard window: status (read-only) fields in the left pane, and a series of tabs with configurable menus and settings in the right pane.

Figure 3 Example of the Product Info Interface for an Ultrix

The following sections briefly outline each tab displayed on the Product Info interface starting with the leftmost tab.

Product Tab

The Product tab provides read-only information about the general hardware and software status.

Table 1 summarizes the read-only information displayed in the Product tab.

Table 1 Product Info — Product Tab

Item	Parameters	Description
Product	<text>	Indicates the product name
Vendor	<text>	Indicates the supplier/manufacturer
System Version	#	Indicates the build version
Serial Number	#	Indicates the serial number

Table 1 Product Info — Product Tab

Item	Parameters	Description
Uptime	#h #m #s	Indicates the number of hours since the last reboot
System Time	DD mm dd yyyy hh:mm:ss	Indicates the current date based on the internal clock (if no connection to an NTP Server is available) where: • DD represents the calendar day • mm represents the month • dd represents the day • yyyy represents the year • hh:mm:ss represents the current local time

Other Tab

Table 2 summarizes the read-only information displayed in the Other tab.

Table 2 Product Info — Other Tab

Item	Parameters	Description
Frontend Software Date	#	Read-only information used by Ross Technical Support.
Backend Software Date	#	
Device FW Rev	#	

Network Tab

The Network tab provides network setup options and options to specify DashBoard client access.

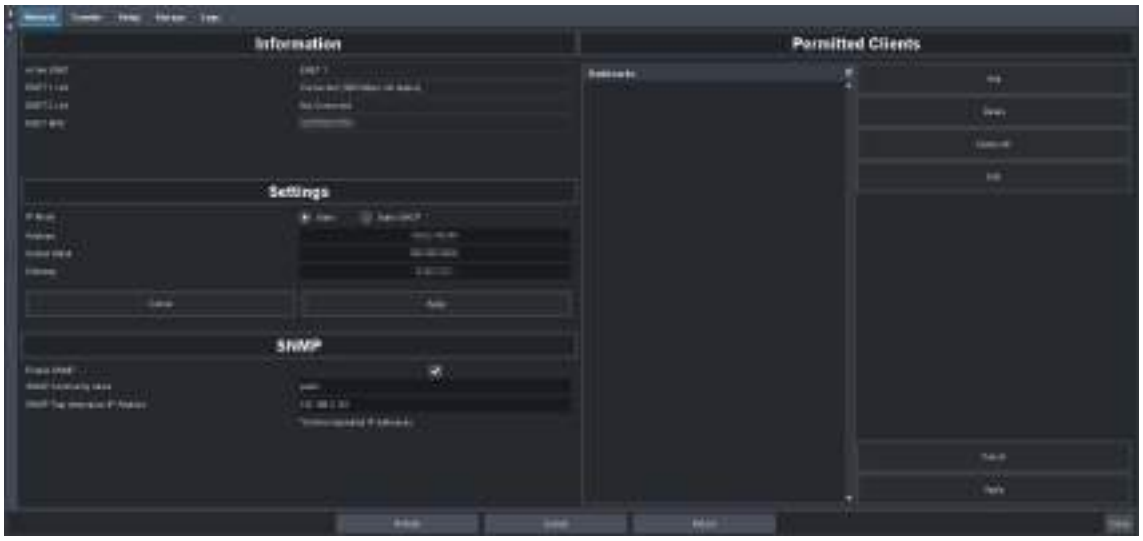


Figure 4 Example of the Ultrix Product Info > Network Tab

Table 3 summarizes the fields and menus displayed in the Network tab.

Table 3 Product Info — Network Tab

Item	Parameters	Description
Information (Read-only)		
Active ENET	ENET #	Indicates which Ethernet port on the router is the primary network connection
ENET # Link	Connected (x, y)	Indicates that a valid network link is configured on the specified Ethernet port of the device where: • x represents the connection speed (Mbps) • y represents the link type (e.g. full duplex)
	Not Connected	Ethernet communications for the device are invalid. The Ethernet cable may be disconnected on the rear panel or the Ethernet network may be down or experiencing problems.
ENET MAC	<number>	Indicates the MAC Address for the device
Settings		
IP Mode	Static	The user manually specifies the network settings for the device
	Static DHCP	The DHCP service for your network assigns the network settings to the router. Once the settings are validated, they are static.
Address	###.###.###.###	Specifies the IP address for the device
Subnet Mask	###.###.###.###	Specifies the subnet mask for the device
Gateway	###.###.###.###	Specifies the gateway for communication outside of the local area network (LAN)
Cancel		Ignores any unsaved changes made to the Address, Subnet Mask, and Gateway settings and reverts back to the current running values.
Apply		Updates the Address, Subnet Mask, and Gateway settings
SNMP[a]		
Enable SNMP	Selected	Enables the SNMP Agent on the device
	Cleared	Disables the SNMP Agent on the device
SNMP Community Name	#	Specifies the SNMP Agent identifier for communications. The default is ultricore. For stronger security, it is strongly recommended that users set their own community string.
SNMP Trap Destination IP Address	###.###.###.###	Specifies the target address the device sends SNMP traps to
Permitted Clients		

Table 3 Product Info — Network Tab

Item	Parameters	Description
DashBoards:	#	Lists the IP Address of each DashBoard client that is allowed to communicate with this device
Add		Enables you to add a new DashBoard client to the Permitted Clients list
Delete		Deletes the selected DashBoard client from the Permitted Clients list
Delete All		Clears all entries in the Permitted Clients list
Edit		Enables you to modify the selected entry in the Permitted Clients list
Cancel		Ignores any unsaved changes made to the Permitted Clients list and reverts back to the current running values
Apply		Updates the Permitted Clients list settings

a. Requires the Ultricore-SNMP license key.

Transfer Tab

The Transfer tab provides three sub-tabs to manage the settings, profiles, and user credentials for your system.

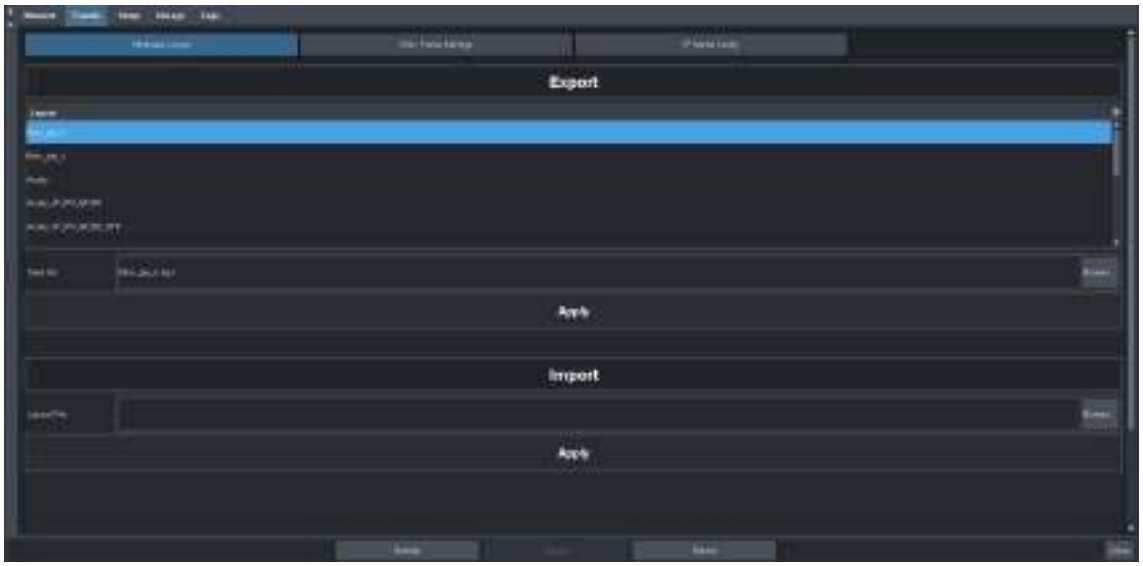


Figure 5 Example of the Product Info > Transfer > Ultriscape Layouts Tab

UltriScape Layouts Sub-tab

Table 4 summarizes the sub-tabs displayed on the UltriScape Layouts sub-tab.

Table 4 Transfer — Ultriscape Layouts

Section	Item	Parameters	Description
Export	Layout	<layout name>	Selects the layout to be exported
	Save As... (read-only)	*.lay	Automatically updates with the name of the layout archive
	Browse...	Enables you to save or re-name the layout to a specific location	
	Apply	Click to begin exporting the file to the specified location	
Import	Layout File (read-only)	*.lay	Indicates the last layout file that was imported
	Browse...	Enables you to specify the layout to import	
	Retrieve Layout As:	<layout name>	Indicates the file currently selected for importing
	Apply	Click to send the file to the device	

Ultrix Frame Settings Sub-tab

Table 5 summarizes the sub-tabs displayed on the Ultrix Frame Settings sub-tab.

Table 5 Transfer — Ultrix Frame Settings

Item	Parameters	Description
Export		
Save As: (read-only)	*.ufs	Automatically updates with the name of the frame settings archive
Browse...		Enables you to save or re-name the frame file to a specific location
Apply		Click to begin exporting the file to the specified location
Import		
Settings File:	*.ufs	Indicates the last frame file that was imported
Browse...		Enables you to specify the frame file to import
Apply		Click to send the file to the device

IP Media Config Sub-tab

Table 6 summarizes the sub-tabs displayed on the IP Media Config sub-tab.

Table 6 Transfer — IP Media Config Settings

Item	Parameters	Description
Export		
IP Media Config	slot#x	Indicates the blade that the IP settings will be downloaded from where: • **slot#** represents the physical router slot • **x** indicates the blade type (e.g. IP, IPX)

Table 6 Transfer — IP Media Config Settings

Item	Parameters	Description
Save As:	*.imc	Indicates the file that the selected blade will be archived to
Browse...		Enables you to save or re-name the IP media file to a specific location
Download All:	Selected	Archives the configuration of all available IP blades in this router
	Cleared	Archives only the selected blade
Download		Captures the settings of the selected IP blade(s) to the file indicates in the Save As field
Import		
Slot to Target:	slot#x	Indicates the blade that the IP settings will be uploaded to where: • **slot#** represents the physical router slot • **x** indicates the blade type (e.g. IP, IPX)
IP Media Config File	*.imc	Indicates the last file that was imported to the router
Browse...		Enables you to specify the file to upload
Upload All:	Selected	Uploads the selected file to all available blades
	Cleared	Uploads the selected file to the specified blade
Upload		Imports the selected *.imc file to the specified IP blade(s)

Setup Tab

The Setup tab provides global settings such as assigning a device name, enabling remote control mode on a router, and determining access to the device.

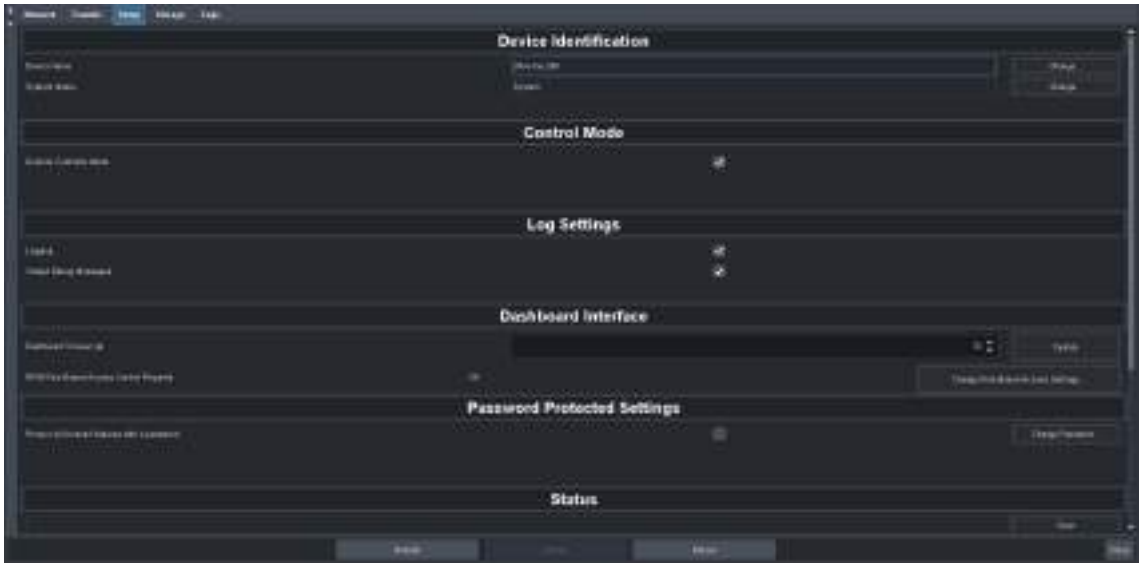


Figure 6 Example of the Ultrix Product Info > Setup Tab

Table 7 summarizes the options displayed in the Setup tab.

Table 7 Product Info — Setup Tab

Item	Parameters	Description
Device Identification		
Device Name	<name>	Provides a unique identifier for the router in the Tree View of DashBoard
System Name	<name>	Provides a unique identifier for the routing system
Control Mode		
Remote Controller Mode	Selected	Enables the primary device (Ultricore BCS) in your routing system to control this router. This hides the Database nodes in the Tree View.
	Cleared	This router cannot be controlled and monitored by a primary device
Log Settings		
Logging	Selected	Enables the router to update the entries in the Logs tab
	Cleared	Disables this feature
Output Debug Messages	Selected	Only use this feature under the guidance of Ross Technical Support.
	Cleared	
DashBoard Interface		
DashBoard Timeout	10-300s	Sets the maximum number of seconds that DashBoard waits until it queries Ultrix. The default is 70 seconds.
Update		Applies the new value in the DashBoard Timeout menu
RPM Role Based Access Control Required (read-only)	On	Any DashBoard without RPM will not be allowed to connect to the device unless the user enters a 'master password'
	Off	Disables RBAC support
Role Based Access Settings		Displays the Change RBAC Settings dialog. Refer to "**Role-Based Access Control**" for details.
Password Protected Settings		
Protect all licensed features with a password	Selected	Enables the password-protected feature that prevents unauthorized changes to license keys. When the Port License tab is locked, users require a password to access/edit the license key information.
	Cleared	Disables this feature (the Port License tab is editable). This is the default.
Change Password...		Enables you to specify a password at least 8 characters long. It is recommended to change the password from the default value that is assigned at the factory.

Table 7 Product Info — Setup Tab

Item	Parameters	Description
Status		
Status (read-only)	mm/dd/yy ERROR: Duplicate device name [abc] for ID [#]	Reports when multiple devices, with the same name, are communicating with the Ultrix router where: • **mm/dd/yy** represents the date of the error • **[abc]** represents the device name • **[#]** represents the ID number assigned to the device
	Clear	Clears the Status field entry
Ultricore Profile Settings		
Credential Mode	Disable	All users have full access to all settings and interfaces of the router. This is the default.
	OS Users	
	Ultricore Users	Users must enter their credentials as defined by the Ultricore Profiles feature
Routing Behavior		
Salvo/Multi-Crosspoint Take Completion	Require All Crosspoints	The Take operation will fail entirely if any destinations are locked or protected
	Best Effort	The Take operation will be performed for any valid routes and fail for locked or protected routes

Storage Tab

Table 8 summarizes the read-only displayed in the Storage tab.

Table 8 Product Info — Storage Tab

Item	Parameters	Description
Internal	OK	There are no storage space issues detected
	WARNING	Less than 20% of the storage space is available
	CRITICAL	Less than 10% of the storage space is available
SD Card	OK	There are no storage space issues detected

Logs Tab

There are three logs that can be viewed from the Logs tab: System Log, Controller Communications Log, and DashBoard Communications Log. The read-only information displayed in the logs is used by Ross Technical Support for diagnostic and troubleshooting purposes.

Navigating the System Configuration Interfaces

This chapter summarizes the System > Configuration interfaces.

Configuration Tree Overview

Expanding the top **Configuration** node enables you to access the sub-nodes that manage the available devices in your routing system that are auto-detected by your Ultrix router.

Figure 7 Expanded Ultrix Configuration Nodes in the Tree View

Double-click the first sub-node to display the **Device Configuration** interface in the right pane of the DashBoard window. Refer to "**Navigating the Device Configuration Interfaces**" to learn more about the features of the Device Configuration interface.

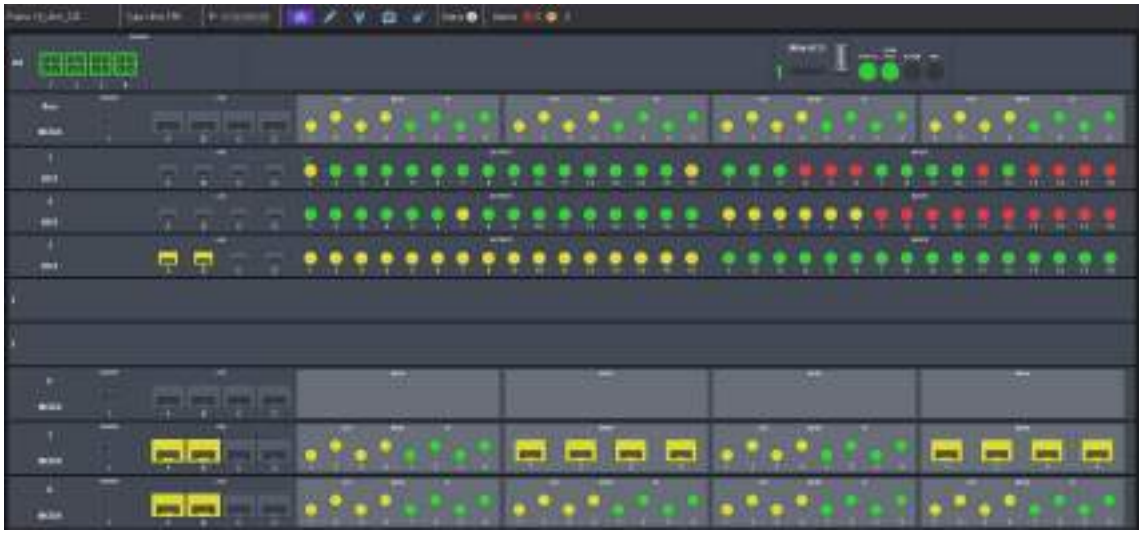


Figure 8 Example of a Device Configuration Interface with Multiple Blades

Double-click the **Connections** sub-node to display a series of tabs in the right pane of the DashBoard window. The following sections outline the tabs, fields, and settings available in the **Connections** interface.

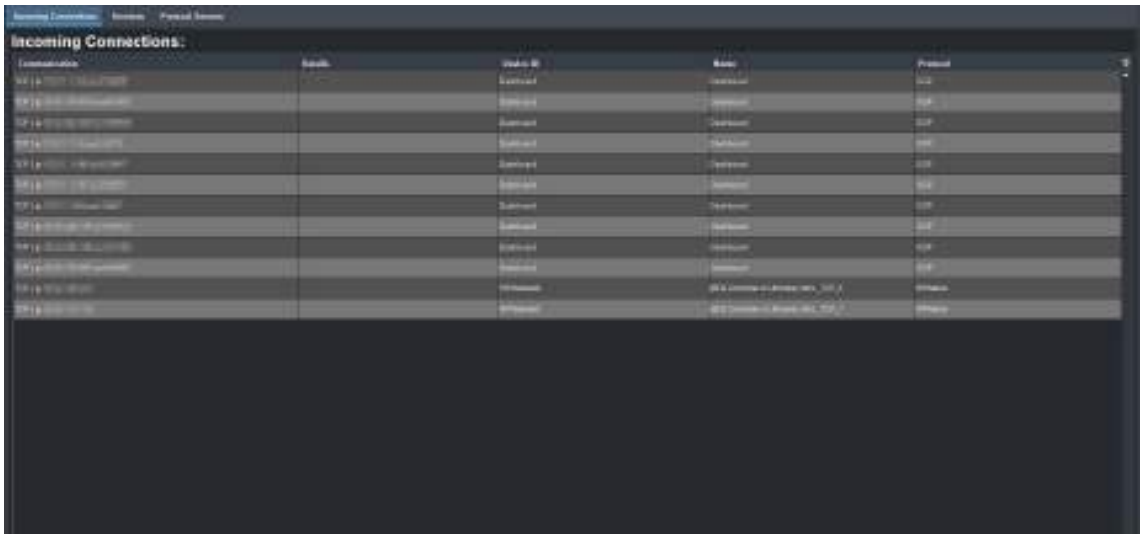


Figure 9 Example of the Ultrix > Connections > Incoming Connections Interface

Connections Interface

The Connections interface lists and configures the connection points in your routing system. The interface is organized into three tabs: Incoming Connections, Services, and Protocol Servers. The following sections outline each tab.

✶ Prior to software version 6.1, the Connections interface tabs and fields were included in the Database > Connections and Database > Third-Party Matrices interfaces.

Incoming Connections Tab

The Incoming Connections table lists the connection details of remote client devices under the supervision of the active database currently communicating with the router.

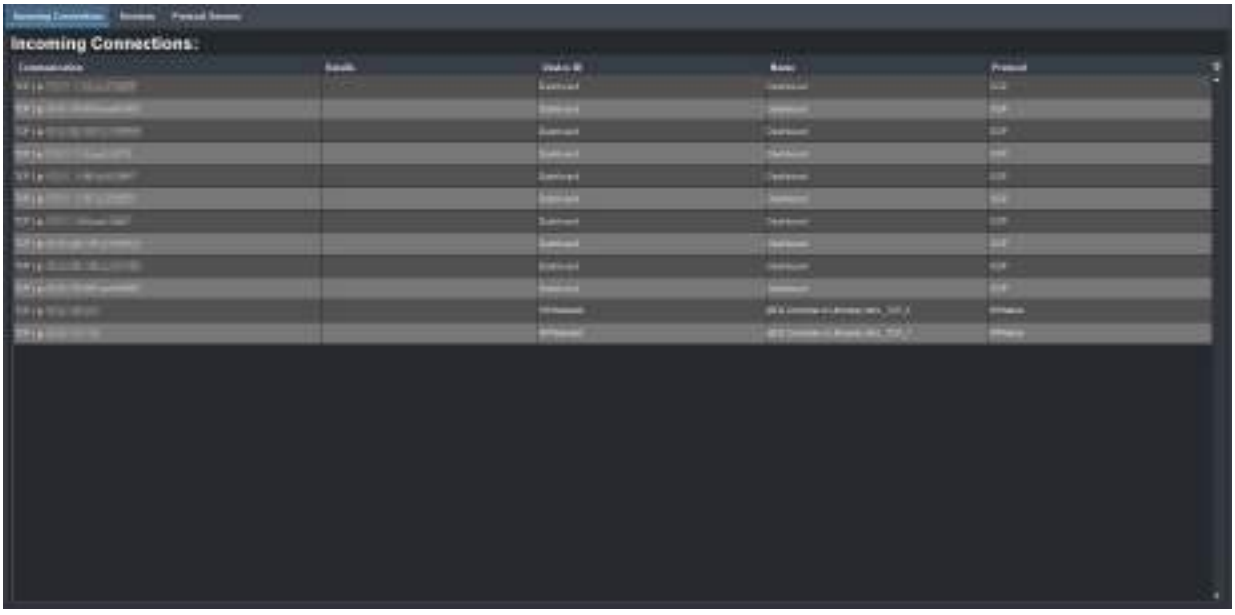


Figure 10 Example of Entries in a Connections > Incoming Connections Interface

Table 9 summarizes the fields displayed in the Incoming Connections tab.

Table 9 Connections — Incoming Connections

Item	Parameters	Description
Communication	tcp	The device is communicating over a network connection. Note that the DashBoard client computer, the router, and the external device must be on the same network.
	ip: #	Specifies the IP Address of the device on the network
	ip: localhost	Specifies that the device is the router you are currently configuring
	port:#####	Specifies the ethernet port the devices is associated with on the network
	TBUS | port:	The device is communicating via the specified T-Bus port
Description	<text>	Provides a short textual description of the device
Device ID	<name>	Specifies the external device for the connection point
Name	<name>	Assigns a unique identifier for the device in the routing system. This name is also used when matrices are defined in the system.
Protocol	GVG Native	The device uses the third-party GVG protocol to communicate
	NVISION	This device communicates via the third-party NVISION protocol
	OGP	This device uses the openGear Protocol to communicate
	Probel SW-P-08	The device communicates via the Probel SW-P-08 protocol
	Ross NK	The device uses the Ross NK protocol to communicate (T-Bus or TCP only)
	TSL UMD v3.1	The device uses TSL UMD protocol version 3.1
	TSL UMD v4.0	The device uses TSL UMD protocol version 4.0
	TSL UMD v5.0	The device uses TSL UMD protocol version 5.0
	Ultrix	The device uses the Ross Ultrix protocol to communicate (TCP only)

Services Tab

The Services tab lists the available communications protocols and provides options for enabling/disabling each protocol for the router.

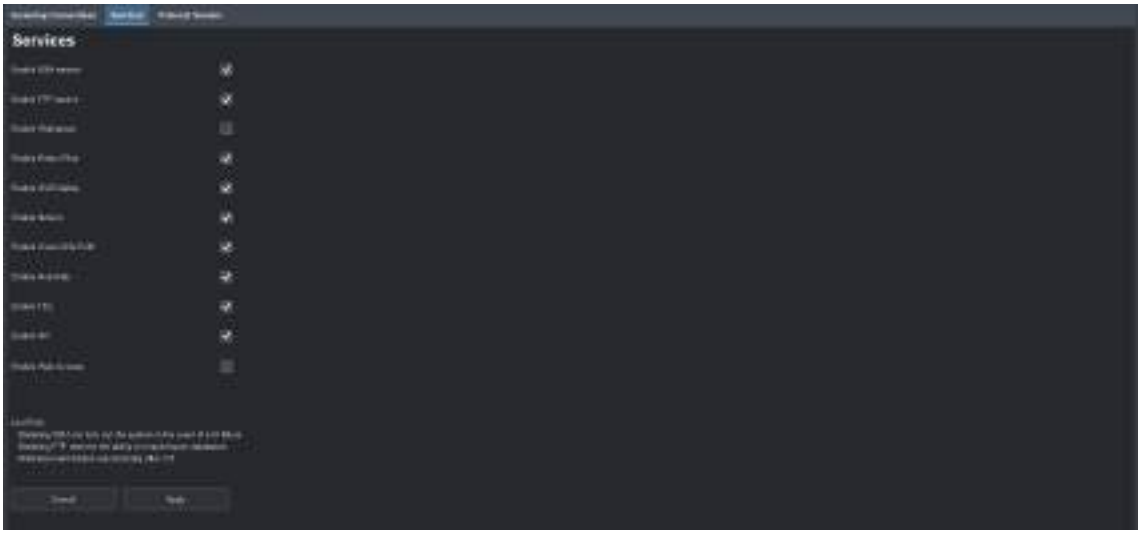


Figure 11 Example of the Connections > Services Tab

Table 10 summarizes the options displayed on the **Services** tab.

Table 10 Connections — Services

Item	Description
SSH service	Enables the ability to log onto the primary device via an SSH server. Secure Shell (SSH) Login is a client-server protocol used by system administrators to securely log onto remote systems and execute commands over an unsecured network. SSH may also be used by Technical Support for advanced troubleshooting.
FTP service	Enables the ability to communicate with the Ultrix over an FTP connection
Walkabout	Enables the primary device to communicate with devices in the Walkabout system
Ember Plus	Enables the primary device to communicate with a third-party control system via the Ember+ media distribution protocol
GVG Native	Enables the primary device to communicate via the GVG Series 7000 Native protocol and is available over an RS-422 or RS-232 serial connection, as well as ethernet connection.
Nvision	Enables the primary device to communicate via a limited sub-set of the NVISION serial NP0010 protocol, and the NVISION NP16 Ethernet protocol. Requires the Ultricore-NVISION license.
Probel SW-P-08	Enables the primary device to communicate via the Probel SW-P-08 protocol. This protocol is available over an RS-422 or RS-232 serial connection, as well as an ethernet connection.
RossTalk	Communications via the RossTalk protocol (a plain text based protocol that allows control of Ross Video equipment)

Table 10 Connections — Services

Item	Description
TSL	Enables the primary device to communicate via the TSL UMD v3.1, TSL UMD v4.0, and TSL UMD v5.0 protocols.
NK	Enable this option if there are Ross NK series devices or signal types the primary device itself does not handle. The Ross NK series devices must be connected to the Ethernet network by virtue of an Ross NK-IPS or NK-NET devices to enable communication with the primary device.
Enable Web Access	Remote access and upgrades are disabled by default (the Upload button is disabled in the DashBoard interfaces). Remote upgrades may optionally be enabled through DashBoard via this option. ✶On bootup or power cycle, this option will default back to disable (box is unselected). You must select the box again if you wish to enable web access and firmware upgrades after a bootup or power cycle.

Protocol Servers Tab

The Protocol Servers tab lists the currently active servers running in the routing system. This tab is auto-populated based on the external devices on the same network as your primary device.

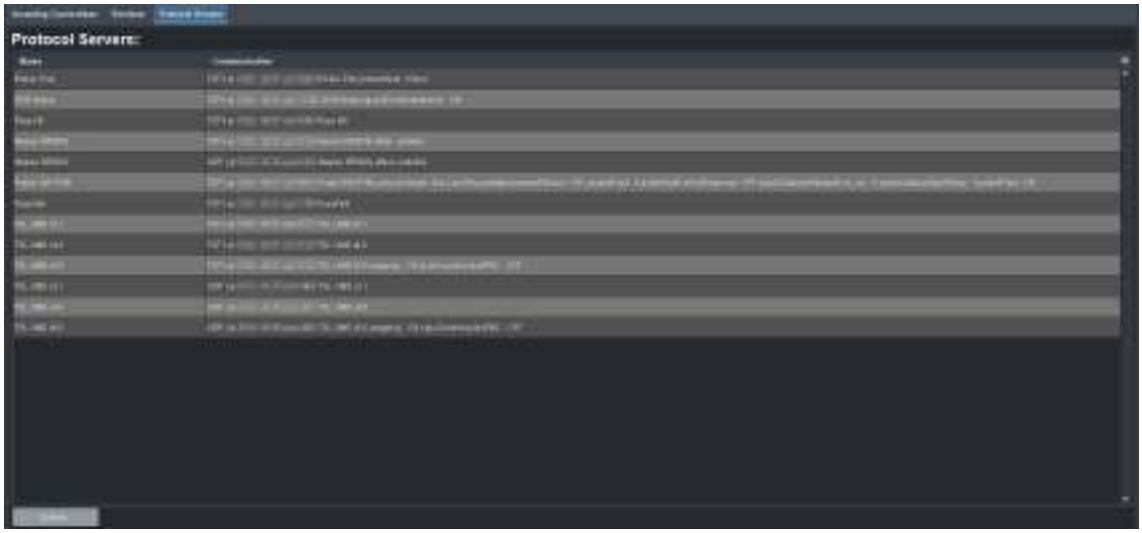


Figure 12 Example of the Connections > Protocol Servers Interface

Table 11 summarizes the fields displayed in the **Protocol Servers** tab.

Table 11 Connections — Protocol Servers

Item	Description
Name	Indicates the unique identifier for the device in the routing system. This name is also used when matrices are defined in the system
Communication	Indicates the communication protocol, IP Address, Port Number, and configuration details of the device.

Server Options Dialog

Click **Options** (located in the bottom left corner) to display the **Server Options** dialog. This dialog provides additional settings for the supported protocol servers.

Figure 13 Example of the Services > Server Options Dialog

Table 12 summarizes the fields displayed in the **Server Options** dialog.

Table 12 Connections — Protocol Servers > Server Options

Item	Parameters	Description
GVG Native		
L4 Echo	No	The Ethernet Layer 4 acknowledge is disabled. This is the default.
	Yes	The Ethernet Layer 4 acknowledge is enabled
Probel SW-P-08		
Protocol Variant	Use Last Req	The Ultrix will respond using protocol variant (extended/non-extended) as per the received request format. This is the default.
	Non-Extended	Ultrix will always replay using non-extended formatting
	Extended	Ultrix will respond with extended formatting
Matrix Mode	No	Ultrix will use information from the LEVEL section of the protocol to control Ultrix levels
	Yes	Ultrix will use information from the MATRIX_ID section of the protocol to control Ultrix levels
Do not wait for ACK	No	Ultrix will wait for message acknowledgments between connect responses. This is the default
	Yes	Ultrix will not wait for message acknowledgments between connect responses
Batch Collate Time (ms)[a]	#	Wait up to 100 milliseconds for multiple commands received before processing. The default is 0 (which disables this feature).

Table 12 Connections — Protocol Servers > Server Options

Item	Parameters	Description
Batch Collate Split Size (# of commands)	#	Wait up to 100 received commands before processing. The default is 0 (which disables this feature).
Unused Field	#	Send number (0-15) in either Level or Matrix field - which ever is not used as per Matrix Mode setting. The default is 0.
Probel Filter	Yes	Probel SW-P-08 crosspoint tally responses are provided when there are no status changes resulting from the crosspoint connect message.
	No	Removes the Probel Crosspoint Switch filter
TSL UMD v5.0		
Wrapping	No	The DLE/STX wrapping is not enabled. This is the default.
	Yes	Enables the DLE/STX wrapping for TCP/IP transport
PBC in Count	No	Packet Byte Count is not included in total byte count. This is the default.
	Yes	Packet Byte Count is included in total byte count
Nvision		
Offset	0	The Ultrix level matches the NVISION level
	1	The Ultrix level is the NVISION level plus 1
Ember+		
Mode	Virtual	Each level is represented by a Matrix and the Labels will be the one defined in the Destinations and Sources interfaces
	Physical	The whole router is represented as a single Matrix and the physical socket labels are used. The external control system using Ember+ commands bypasses the virtual IO mapping and directly controls the Ultrix physical socket connections. Therefore the Ultrix should not be switched by any other devices

a. When the Batch Collate Split Size and Batch Collate Time are both active, the option that occurs first will release the batch, and the Batch Collate Split Size and the Collate Time values are reset.

Navigating the Device Configuration Interfaces

The Device Configuration interfaces enable you to define the physical outputs, inputs, and communication ports of the Ultrix router. You can also monitor the overall status of the Ultrix router, or just the status of a specific signal path or port on the rear panel. This chapter briefly summarizes each interface.

Overview

The Device Configuration interfaces are accessed via the System > Configuration tree in DashBoard.

Figure 14 Expanded Ultrix Configuration Nodes in the Tree View

Double-click the Ultrix sub-node to display the Device Configuration interfaces in the DashBoard window.

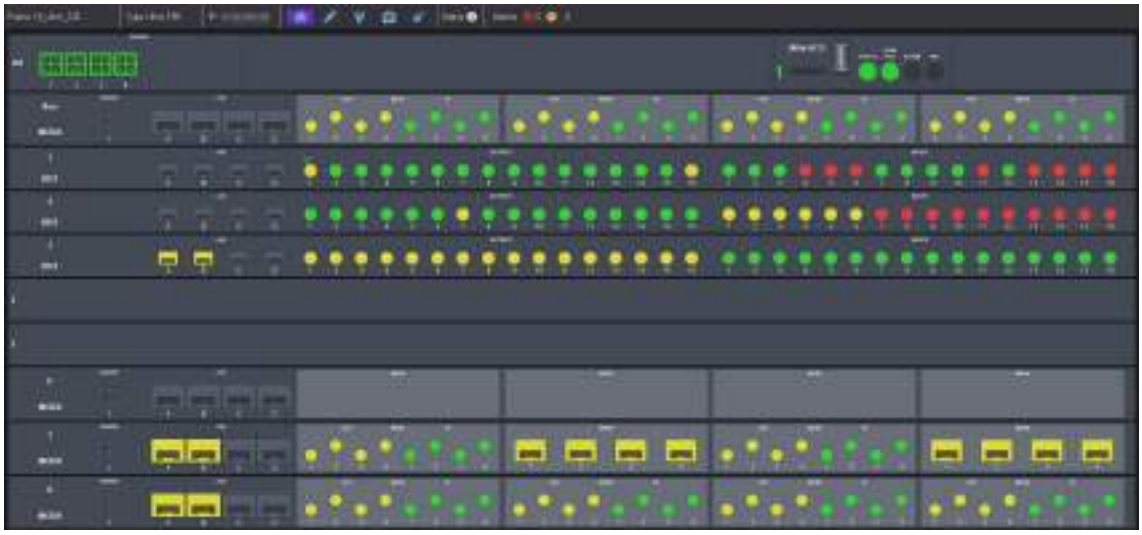


Figure 15 Example of a Device Configuration Interface with Multiple Blades

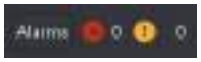
Navigation Toolbar

A toolbar always displays at the top of each Device Configuration interface. (**Figure 16**) From this toolbar you can quickly monitor the overall status, verify the IP address, and navigate between the Device Configuration interface. This section outlines the read-only fields and buttons on the toolbar (from left to right).

Figure 16 Example of the Navigation Toolbar

Table 13 outlines the read-only fields and buttons on this toolbar starting with the leftmost field.

Table 13 Device Configuration — Toolbar

Item	Description
Frame (read-only)	This field reports the unique identifier assigned to the router
Type (read-only)	This field reports the model of the router. **Figure 16** shows an ULTRIX-FR5.
IP (read-only)	This field reports the current TCP/IP network address assigned to the router
	Displays the home page (frame view) that includes a map of the router rear panel. Selecting a blade displays the options for that blade. Selecting one or more ports display the options for the port(s). Refer to "**Frame View Interface**" for details.
	Displays the configuration options for the ports on the rear panel. Refer to "**Port Configuration Interface**" for details.
	Displays the global configuration options for the router, such as network settings, specifying a reference source, and enabling alarms. Refer to "**Frame Configuration Interface**" for details.
	Displays the options to configure an ULTRIX-SFP-IO blade or a port that is populated with an SFP module. Refer to "**SFP Configuration Interface**" for details.
	Displays options for managing the license keys for your router. Refer to "**Licenses Interface**" for details.
Status	
	Select this button to display a list of changes for the active slots
Alarms	
	Indicates the total number of warnings (red icon) and errors (yellow icon) the router is currently reporting. Select the **Alarms** button to view a list of the current alarm messages.

Frame View Interface

When the Device Configuration interface is first displayed in the DashBoard window, the Frame View is automatically selected. This interface provides a map of the rear panel. The number of slots and the available connections depends on the router model and the type of blade(s) installed in each slot. Colors and icons indicate port status.

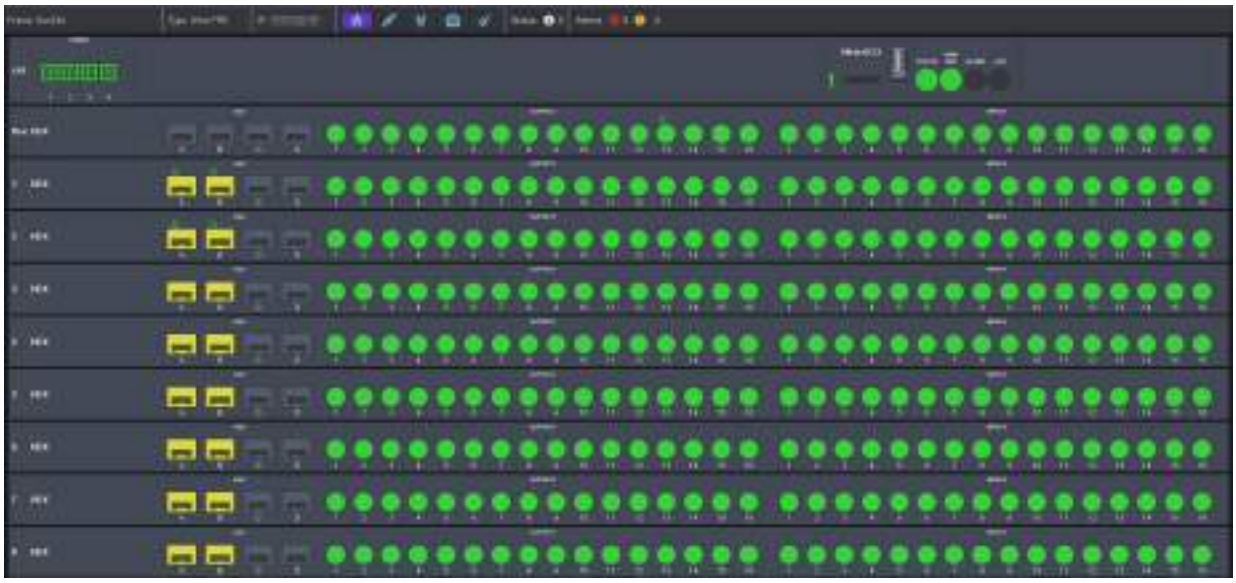


Figure 17 Example of the Frame View Page — ULTRIX-FR5 with ULTRIX-HDX-IO Blades

The top row of the router map represents the power connections (left side), and any UCCI blades installed (right side). Selecting a power connector displays the Frame Configuration > Fans & Power tab. Selecting a port from an Ultrix-UCCI blade displays its options in the Port Configuration interface.

Each subsequent row represents a populated slot in the chassis. Selecting a slot displays its options in the Port Configuration interface.

Selecting a port displays its options and status on the Port Configuration interface. When a port is selected, its label (located under the port image) is lit blue. Refer to "**Port Configuration Interface**" for information on the types of menus and fields on this interface.

Each port is lit green, yellow, or red to indicate its status:

- Red — no signal is present or is a type/format that is not supported.
- Yellow — an SDI signal is present without embedded audio.
- Green — an SDI signal is present with embedded audio.

Selecting any other ports navigates directly to the relevant configuration and status page.

Port Configuration Interface

The Port Configuration interface reports individual I/O port status and settings. Selecting a slot updates the table for all installed ports. Selecting a port displays only the options for that port (the label under the port icon is lit blue). You can also choose to filter the information displayed in the table (e.g. only inputs, or only outputs).

Figure 18 Example of the Port Configuration Interface for a Specific Slot

1) Populated Slots	3) Slot Map
2) View Options	4) Port Configuration Table

1. Populated Slots

A row of buttons representing the slots available on the rear panel. Selecting a button displays the options specific to that slot. This provides quick I/O module selection to view status and port configuration. **Figure 18** shows that Slot 1 was selected.

2. View Options

The Views options in this area enable you to filter the information displayed on the Port Configuration interface. Choose from the following:

› Baseband/IP — Toggle this button to select between baseband (SDI) signals or IP signals (blade dependent).

✶ The IO Module option is also available when there is at least one ULTRIX-MODX-IO blade installed. Refer to the ***ULTRIX-MODX-IO User Guide*** for details.

› Ports/Channels — Toggle this button to select between primary signal view (SDI) or embedded audio channel view.

› Inputs/Outputs — Toggle this button to specify the type of port to display in the table.

› Select All — Select this button to change the port view to see all ports of a specific type (input or output).

› Clear All — Select this button to clear the port view to allow individual port selection.

3. Slot Map

This area provides a graphic representing the physical ports of the selected slot. Select a port image to display its details in the Port Configuration Table. A port label is highlighted in blue when the table displays information specific to that port. The color of the port denotes its signal status as follows:

› Red — no signal present or is of type not supported.

› Yellow — an SDI signal is present but does not include embedded audio.

› Green — an SDI signal is present and includes embedded audio.

› Gray — the port is not in use or it is not populated with an SFP module.

A port may also display a character above it:

› **D** — the port is currently assigned to Ultrimix-Dante.

› **i** — the port is currently assigned as part of a Gearbox quad-link group.

› **M** — the port is currently assigned as an UltriScape (Multiviewer) output.

› **/** — the port is currently configured with UltriSync (frame sync) license.

Select individual ports to toggle port details list. The port identifying number/letter is highlighted when included in the port details list.

✶ Selecting a non-signal port (such as a power connector, or reference port) opens the status and configuration interface for the port type.

4. Port Configuration Table

A table that displays details on each port for the selected slot. The columns and rows depend on the blade type that populates the slot. Refer to the following sub-sections for blade-specific details. The table is filtered by the selections made via the **View Options**. For example, to monitor/configure a single audio input:

a. From the **Selection Options**, click **Clear All**.

b. From the **Views Options**, click **Channels**.

c. Select the required I/O port.

The table updates to display only the selected port. You may add more ports to view by selecting them on the rear panel graphic display.

SDI I/O Blades

Selecting any blade (HD-BNC, SFP, HDX, etc.) using the buttons located in the Populated Slots selection bar, displays the Port Configuration table for the selected blade. The location of the port is reported at the top of the interface. **Figure 19** shows the interface for an HD-BNC I/O blade installed in Slot 2 with only the information for the outputs displayed.

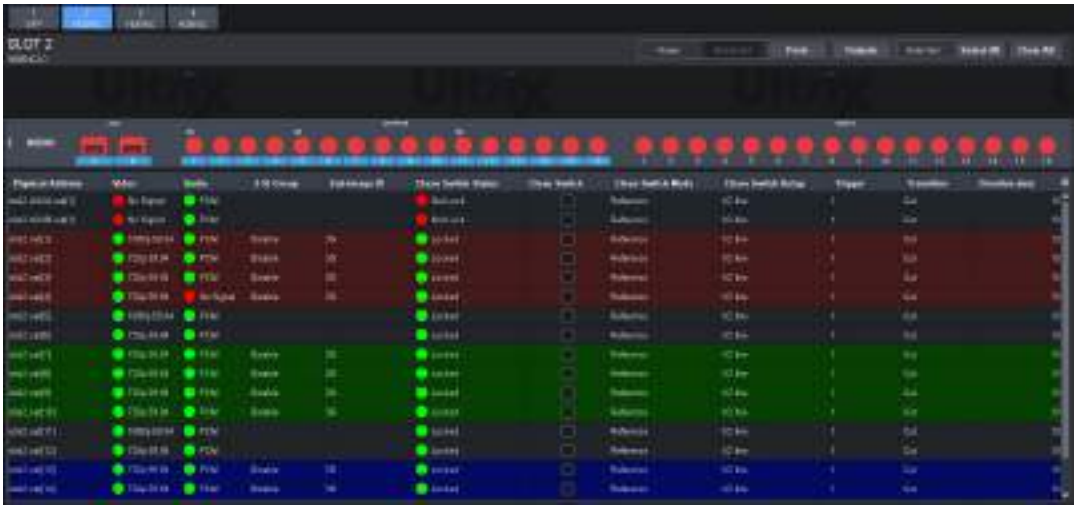


Figure 19 Example of Port Configuration Interface — HD-BNC I/O Blade

For More Information on…

- the available SDI I/O options on the Port Configuration Interface, refer to "**Configuring the SDI I/O Ports**".

ULTRIX-IP-IO and ULTRIX-IPX-IO Blades

When an ULTRIX-IP-IO or ULTRIX-IPX-IO blade is installed in a router slot, selecting a specific port on the rear panel map displays configurable options for that port. You can configure the sender, and

receiver streams the port will manage. Refer to "**ULTRIX-IP-IO Setup**" for details on using this interface.

Figure 20 Example of Port Configuration Interface — ULTRIX-IP-IO Port Selected

Table 14 summarizes the fields displayed in the options in the Port Configuration interface for the ULTRIX-IP-IO and ULTRIX-IPX-IO blades.

Table 14 Port Configuration — ULTRIX-IP-IO or ULTRIX-IPX-IO Blades

Item	Parameters	Description
Port Status (read-only)	OK (Green)	The selected port is ready to accept stream setting changes
	NOT READY (Red)	Failure to communicate with the port. The router will continue to re-establish connection with the port until it is successful.
Sender Bandwidth (read-only)	# of 25Gb used	Reports the amount of data the router is currently transmitting on the specified port
Receiver Bandwidth (read-only)	FREE	Reports the amount of data the router is currently receiving on the specified port
Senders		
Port	slot.port.type.ch	Specifies the blade port when subscribing to streams
Name	<text>	Specifies a unique identifier for the sender stream
Type		Indicates whether the stream includes video or audio data
Signal Format	#	Indicates the video format detected on the stream
Codec	#	Specifies the AES67 standard that the blade will default to for all IP-based audio sender streams
Channels	#	Specifies the maximum number of audio channels available for configuration within the specified stream
Transport IP	#	Specifies the IP address for the stream
UDP Port	#	Indicates the port associated with the IP address and the communication protocol for the stream

Table 14 Port Configuration — ULTRIX-IP-IO or ULTRIX-IPX-IO Blades

Item	Parameters	Description
Redundancy		Indicates if Redundancy Mode (protection switching) is enabled for the specified port
Session ID	#	Indicates the ID number assigned to the blade within the system
Stream ID	#	Indicates the ID number assigned to the specific stream within the system
Alarm Severity	Indicates any detected errors for the specific stream	
Alarm Description		
Receivers		
Port	slot.port.type.ch	Specifies the port for the receiver stream
Name	<text>	Specifies a unique identifier for the receiver stream
Type		Indicates whether the stream includes video or audio data
Signal Format	#	Indicates the video format detected on the stream
Codec	#	Specifies the AES67 standard that the blade will default to for all IP-based audio receiver streams
Channels	#	Specifies the maximum number of audio channels available for configuration within the specified stream
Transport IP	#	Specifies the IP address for the stream
UDP Port	#	Indicates the port associated with the IP address and the communication protocol for the stream
Redundancy	#	Indicates if Redundancy Mode (protection switching) is enabled for the specified port
Session ID	#	Indicates the ID number assigned to the blade within the system
Stream ID	#	Indicates the ID number assigned to the specific stream within the system
Alarm Severity	Indicates any detected errors for the specific stream	
Alarm Description		

Frame Configuration Interface

The Frame Configuration interface is organized into a series of sub-tabs that provide options for configuring the global settings of the router. By default, the Communications tab is selected.

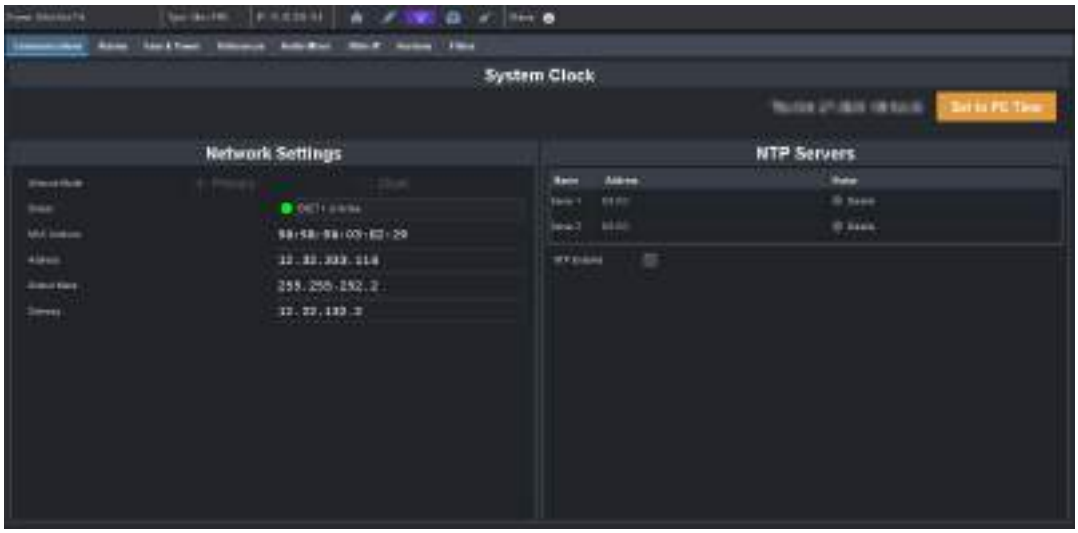


Figure 21 Example of a Frame Configuration Interface

Communication Tab

The Communications tab shows the network settings and Network Time Protocol (NTP) settings. You can also monitor the status of the Ethernet connection of the Ultrix router. From here you can verify the network settings of the active Ethernet port on the router, and view the mode of the control system (primary/client). Refer to "**Getting Started**" for details on configuring these settings.

Alarms Tab

From the Alarms tab you can specify what components the Ultrix router monitors such as the power supplies, fans, network status, the SD Card, the chassis battery, and the interior chassis temperature.

By default, the Ultrix monitors the following components (these options are enabled):

- System Error
- Temperature
- Primary Power
- Redundant Power
- SD Card Presence
- Battery
- Storage Space
- Fan 1
- Fan 2
- Fan 3 (applicable only to the ULTRIX-NS-FR1, ULTRIX-NS-FR2, and ULTRIX(-NS)-FR5)
- Fan 4 (applicable only to the ULTRIX-NS-FR2, and ULTRIX(-NS)-FR5)
- Fan 5 (applicable only to the ULTRIX(-NS)-FR5)

The Alarms tab also displays read-only State column that reports the status of each enabled alarm using color indicators which vary in severity from green (valid), yellow (caution), to red (alarm). For

example, if the SD Card status is set to red in the Alarms tab, an SD Card is not detected or the SD Card not mounted correctly inside the chassis.

Fans & Power Tab

The Fans & Power tab displays read-only fields that report on the fan status and PSU connections of the Ultrix router. Color indicators vary in severity from green (valid), yellow (caution), to red (alarm). In the case of multiple messages, the most severe alarm is reported for a single row in the tables.

Table 15 summarizes the fields and menus displayed in the Fans & Power tab.

Table 15 Frame Configuration — Fans & Power

Item	Parameters	Description
Fans		
Fan Name	FAN #	Indicates the specific fan within the chassis
	Slot #, x	Indicates the specific fan within the chassis where # represents the physical slot and x the location (front, middle, back)
Fan State	Active (Green)	Indicates that the chassis core components[a] temperature is within the normal range (below 70°C (158°F)) and the fans are running without errors detected
	Inactive (Yellow)	The chassis fan is not currently enabled or installed.
	Warning (Red)	An error condition is detected on the chassis fan and an alarm is raised. Verify that the fan is installed correctly.
Fan Speed (%)	#	Indicates the current speed of the chassis fans
Fan Speed State	OK (Green)	The fans are running at the specified Minimum Fan Speed value
	Caution (Yellow)	Indicates that at least one chassis core component temperature is between 70°C and 80°C (158°F and 176°F). The Minimum Fan Speed value is overridden.
	Warning (Red)	Indicates that at least one chassis core component temperature is above 80°C (176°F). The Minimum Fan Speed value is overridden and the fans are running at the maximum speed.
Minimum Fan Speed	40-100	Sets the speed of the interior chassis fans. This value will be overridden when a chassis core component is detected to be at a temperature above 70°C (158°F).
Power Supplies		
PSU	#	Indicates the specific power supply unit installed within the chassis

Table 15 Frame Configuration — Fans & Power

Item	Parameters	Description
Power State	Active (Green)	Normal operation; no hardware errors associated with the PSU
	Inactive (Yellow)	A hardware error is detected on the specified PSU. Verify that the PSU is correctly installed, and that power is available.
	Warning (Red)	Indicates the minimum number of PSU[b] are not detected
Ultricool Server Enabled	Selected	Enables the ability for the router to accept control connections from an Ultricool.
	Cleared	Disables this feature. Select this option if your routing system does not include an Ultricool.

a. This term refers to the installed I/O blades, and the ULTRIX-UCCI module.
b. The ULTRIX(-NS)-FR5 requires a valid connection to an Ultripower. An ULTRIX(-NS)-FR2 requires a minimum of 2 PSU to be connected at all times. For ULTRIX(-NS)-FR1 routers, a minimum of 1 PSU is required.

References Tab

The References tab is organized into two areas: Detect References, and Triggers.

- The Detect References area displays read-only fields that report the status on the reference signal. Refer to "**Specifying a Default Reference Format**" for details.
- The Triggers area provides options for configuring the reference signal for the routing system. From this table you can configure up to four reference triggers which then can be assigned to the inputs and outputs of the router. Refer to "**Configuring a Reference Trigger for the Ultrix Router**" for details.

Audio Mixer Tab

Configures the inbuilt audio mixer (if an ULTRIMIX-MXR license is enabled on the frame). Refer to "**ULTRIMIX-MXR**" for details on configuring the settings on this tab.

Ultrix-IP Tab

✶ The Ultrix-IP settings are only available when an ULTRIX-IP-IO or ULTRIX-IPX-IO blade is installed in at least one of the rear panel slots.

The Ultrix-IP tab provides options for monitoring and configuring the individual SFP+ ports, the transport protocol, and PTP settings that are required for the streaming of video and/or audio. The options are organized into sub-tabs: Port Bandwidth, IP System, Port Network, PTP, NMOS, and LLDP. **Table 16** summarizes the fields and menus displayed on the Ultrix-IP tabs.

Table 16 Frame Configuration — Ultrix-IP

Item	Parameters	Description
Port Bandwidth		
This tab provides an estimate of the actual bandwidth of the Ethernet links: • all packets received on the Ethernet links (media and processor traffic) • transmit bandwidth (packets sent from the processor to the Ethernet links) • receive bandwidth (packets sent on the link and forward to the processor) This tab also provides counters for the receive errors, transmit errors, packet size ranges, and general bytes.		
IP System		
This tab reports on the media traffic, whether the router port is enabled to send SMPTE ST 2022-7 streams within a protection switching network, the Ember+ connection status, and the DNS status.		
Port Network		
Port	slot***x***.port***y***	Specifies the port on the ULTRIX-IP-IO or ULTRIX-IPX-IO blade you are configuring where: • ***x*** represents the physical slot that the blade is installed in • ***y*** represents the physical port on the blade
Link	UP	A valid network connection is detected on this port
	DOWN	The port is experiencing a connection error to the network
Speed (Gbps)	#	Indicates that the link is operating at the specified speed
MAC Address	#:#:#:#:#:#	Indicates the MAC Address currently assigned to the Ultrix router for the specified port
FEC	#	Reports if your module includes a built-in FEC (DR/FR/LR)
IP Mode	Static	The user manually supplies the network settings for the specified blade port
	DHCP	Automates the assignment of the network settings for the specified blade port. This is the default.
IP	#.#.#.#	Indicates the IP Address currently assigned to the selected blade port. The default is 128.0.0.0 <port #>.
Subnet Mask	#.#.#.#	Indicates the subnet mask for the specified blade port. The default is 255.255.255.0.
PTP		
Profile	IEEE 1588 Default	The ULTRIX-IP timing uses the IEE1588 standard
	AES67 Media	The ULTRIX-IP timing uses the AES67 Media standard
	SMPTE ST 2059-2	The ULTRIX-IP timing uses the SMPTE ST 2059-2 standard. This is the default.

Table 16 Frame Configuration — Ultrix-IP

Item	Parameters	Description
Domain	#	Specifies that the ULTRIX-IP is within the specified group of clocks in your network
Priority 1	#	Assigns the first priority level to the ULTRIX-IP during a Grandmaster election where a value of: • 1 is the highest priority • 255 is the lowest priority This is applicable when the Slave Only is set to False
Priority 2	#	Assigns the secondary priority level to the ULTRIX-IP during a Grandmaster election where a value of: • 1 is the highest priority • 255 is the lowest priority This is applicable when the Slave Only is set to False
Slave Only	True	Defines the ULTRIX-IP as a follower only device in the system; the ULTRIX-IP cannot be used as a Grandmaster or Master device
	False	The ULTRIX-IP can be used as a Grandmaster or Master device
Slot	slot***x***.port***y***	Specifies the port on the ULTRIX-IP-IO or ULTRIX-IPX-IO blade you are configuring where: • ***x*** represents the physical slot that the blade is installed in • ***y*** represents the physical port on the blade
State	LOCKED	Status of PTP on the system
	FREE RUN	
Grand Master ID	#	Reports the ID number assigned to the Grandmaster within the system
Priority #	#	Standard PTP fields used to determine who wins a PTP election
Clock Class	#	Standard PTP field that states the class of the clock used on the system
Offset from Master	#	Correction time offset from the master in nanoseconds
Mean Path Delay	#	Average time in nanoseconds it takes a packet to traverse end to end from the PTP master
Steps Removed	#	Specifies how long the ULTRIX-IP will wait for a delay request
Port	slot***x***.port***y***	Specifies the port on the ULTRIX-IP-IO or ULTRIX-IPX-IO blade you are configuring where: • ***x*** represents the physical slot that the blade is installed in • ***y*** represents the port on the blade
Status	Slave	Status of PTP on the interface
	Listening	

Table 16 Frame Configuration — Ultrix-IP

Item	Parameters	Description
Link	Up	The link for the specified port is valid
	Down	The link for the specified port is invalid (fails)
Sync Interval	#	Specifies often the ULTRIX-IP port sends Sync messages
Announce Interval	#	Specifies how often the ULTRIX-IP sends Announce messages
Announce Receipt Timeout	#	Controls how long the ULTRIX-IP port will wait before declaring the Grandmaster absent and initiating a new election
NMOS		
Control Access Interface	Indicates the ports that are enabled for NMOS communication	
NMOS Service Ports	IS-04	Specifies the port the NMOS IS-04 Node service is listening on
	IS-05	Specifies the port the NMOS IS-05 Connection service is listening on
	IS-08	Specifies the port the NMOS IS-08 Connection service is listening on
	IS-10	Specifies the port the NMOS IS-10 Connection service is listening on
RDS > Discovery	RDS	Allows the user to set an RDS IP in the Registry Service Address field and forces the router to register to a specific RDS
	mDNS	The router uses mDNS to automatically register in an RDS on the network with the lowest priority
Security	Indicates whether the Security Options are configured for the port. Refer to "**NMOS IS-10 Setup**".	
Auth. Server	Indicates if the port is configured to register to a specific NMOS IS-10 Authorization Server on the network. Refer to "**NMOS IS-10 Setup**".	
DNS Domain	Indicates the network domain the port is subscribed to	
LLDP (read-only)		
The Link Layer Device Protocol (LLDP) tab reports which device/port is connected to each media ethernet (eth#) interface available on the ULTRIX-IP and ULTRIX-IPX blades. When a field is blank, the external device has not provided that status.		

Versions Tab

This tab summarizes the firmware and what is installed in each slot of the router.

Filters Tab

Use the options in the Filters tab to determine what information is reported/monitored based on the signal type.

SFP Configuration Interface

The SFP Configuration interface is applicable when:

- at least one ULTRIX-SFP-IO blade is installed; or,
- at least one AUX port is populated in an installed blade.

From this interface you can configure each populated AUX and/or SFP port on the blade. This interface is organized into two sub-tabs: AUX Ports and SFP Ports.

For More Information on...

- cabling your blade, refer to the ***ULTRIX-FR1, ULTRIX-FR2, and ULTRIX-FR5 Installation Guide***.

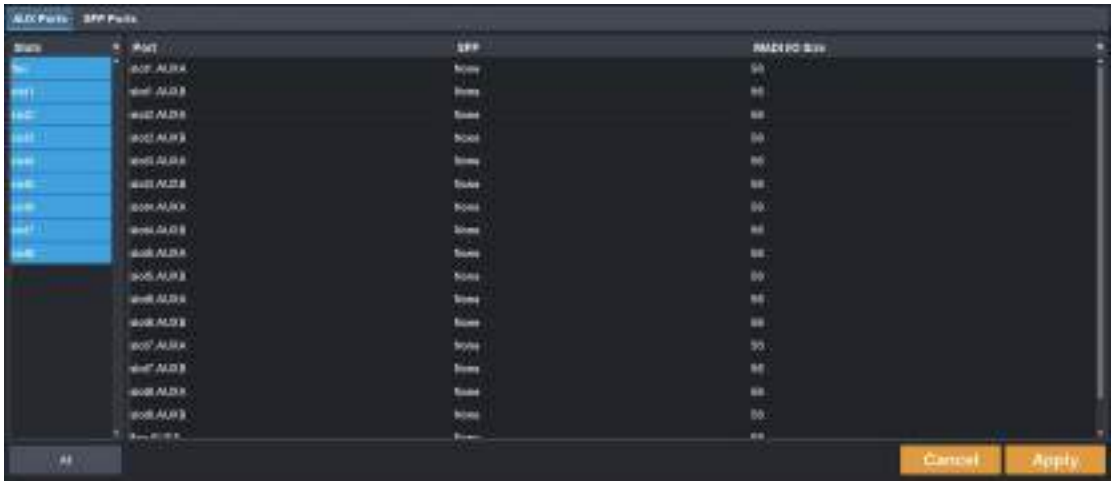


Figure 22 Example of the AUX Ports Configuration Interface

AUX Ports Tab

The information in the AUX Ports tab is organized into two areas: a table on the left that lists the slots with available AUX ports, and a table on the right that provides details on each SFP port of a selected slot. Each row of the table reports the port name, type of SFP module installed, and the number of MADI channels set for that SFP (if applicable). Refer to "**Configuring an AUX Port**".

SFP Ports Tab

The information in the SFP ports tab is organized into two areas: a table on the left that lists the slots with available SFP ports, and a table on the right that provides details on each SFP port of a selected slot. Each row of the table reports the port name, and type of SFP module installed. Refer to "**ULTRIX-SFP-IO Setup**".

Licenses Interface

The Licenses interface displays the License Keys tab, and a tab for each licensed feature that is enabled on the router.

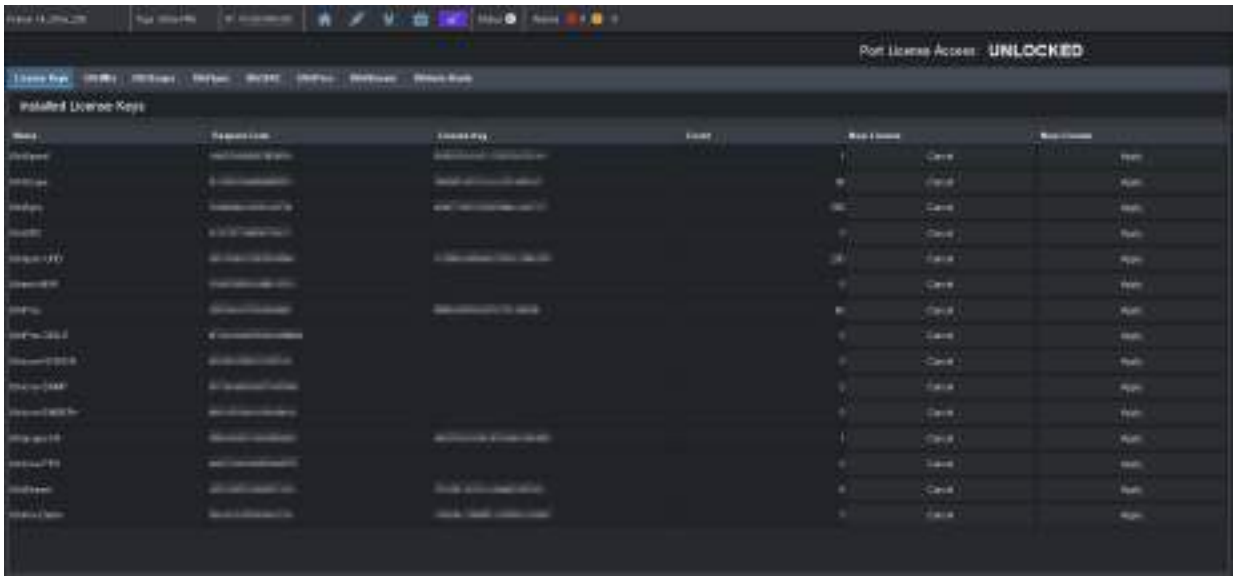


Figure 23 Example of the Licenses Interface

✶ The Licenses interface takes up to 35 seconds to register any changes to the table entries.

License Keys Tab

Use the fields in this tab to manage the licenses for your router. From here you can view which licensed features on which slots are enabled, and enter license keys for new features.

For More Information on...

- the available licensed features, refer to "**Software License Keys**" for details.

UltriMix Tab

Use the options on this tab to enable or disable embedded audio support per slot. Refer to "**Configuring an Audio Matrix**" for details.

UltriScape Tab

The UltriScape tab reports on the number of UltriScape licenses installed, and the number of UltriScape Heads enabled on the Ultrix router. From this tab, you can assign an UltriScape Head to a physical OUT socket on the router. Refer to the ***Ultriscape User Guide*** for details.

✶ At least one UltriScape license must be installed for a slot before you can assign an UltriScape Head to a router output in that slot.

The UltriScape tab is organized into three columns:

- **Head** — read-only fields that report the physical address name of an UltriScape output.
- **Port** — used to enable/assign an UltriScape Head.
- **Format** — used to select the an UltriScape output format.

UltriSync Tab

The UltriSync tab reports on the number of UltriSync-3G and UltriSync-UHD licenses installed, and the number of slots with the licensed enabled on the Ultrix router. The UltriSync tab is organized into three columns:

- **Port** — read-only fields that report the physical address name of an Ultrix router output.
- **3G License** — used to enable the UltriSync-3G on the specified port.

- **UHD License** — used to enable the UltriSync-UHD on the specified port.

✶ The UltriSync-UHD is only available for the ports of a slot depending on the type of blade installed in that slot. Refer to "**UltriSync Configuration**" for details.

UltriSRC Tab

The UltriSRC tab reports on the number of UltriSRC licenses installed, and the number of AUX ports with the license enabled on the Ultrix router. The UltriSRC tab is organized into two columns:

- **Port** — read-only fields that report the physical address name of the Ultrix AUX port.
- **License** — used to enable the UltriSRC on the specified port.

Refer to "**UltriSRC Configuration**" for details.

UltriProc Tab

The UltriProc tab is organized into two tables: the left table provides the options for selecting the data rate and assigning the license to an I/O type. The table on the right lists the available ports and provides the option to enable/disable the UltriProc feature. Refer to "**UltriProc Setup**" for details.

UltriStream Tab

The UltriStream tab lists the available slots that this license can be assigned to, the type of blade, and the port name. The License column provides the option to enable/disable the license for each slot.

✶ UltriStream is only available for the AUX D ports on the supported blades. Refer to "**UltriStream Setup**" for details.

Ultrimix-Dante Tab

The Ultrimix-Dante tab lists the available slots that this license can be assigned to, the type of blade and the port name. The License column provides the option to enable/disable the license for each slot.

✶ Ultrimix-Dante is only available for the AUX C ports on the supported blades. Refer to "**Ultrimix-Dante Setup**" for details.

Software License Keys

The Ultrix routers have software options that license functions and features. This chapter outlines the available software licensed features, and how to install a software key for a licensed feature.

Before You Begin

When installing a software license key on the Ultrix router:

- You must have the DashBoard client installed and communicating with the Ultrix router that you wish to install the key for.
- Ensure that you are using DashBoard version 9.10 or higher. This information is available by selecting **Help** > **About DashBoard** from the DashBoard main toolbar.

License Keys Overview

Table 17 provides a brief summary on the types of licensed features available for the Ultrix router.

✶ The per slot UltriMix license comes standard with every Ultrix router.

Table 17 List of Ultrix Licensed Features

License	Description
Ultrimix-Dante	Enables 64 x 64 input/output audio channels via ethernet on the AUX C port of an ULTRIX-HDX-IO or ULTRIX-MODX-IO blade
ULTRIMIX-MXR	A license that enables the configuration and use of audio mixer soft panels.
UltriProc-3DLUT	A license that enables color correction, Proc Amps, and HDR conversion on Ultrix I/Os but also enables SDR/HDR conversion with a 3D-LUT RGB Cube file. Only applicable to ULTRIX-HDX-IO or ULTRIX-MODX-IO blades.
UltriProc	A license that enables color correction, Proc Amps, and HDR conversion on Ultrix I/Os; can be assigned to inputs or outputs. Only applicable to ULTRIX-HDX-IO or ULTRIX-MODX-IO blades.
UltriScape	Each license enables one Multiviewer Head (output) per slot. Each slot supports up to three Multiviewer Heads.
UltriSpeed	A license that enables the use of UHD 12Gbps SDI signaling on all slots of the Ultrix router. The 12Gbps SDI signaling through an SFP module installed in an AUX port is also supported. You must order the SFP module separately. This license is required if you wish to configure a UHD Gearbox.
UltriSRC	A per input license enabling Sample Rate Conversion (SRC) on MADI audio inputs. This allows MADI inputs that are not synchronized to the frame reference.
UltriStreamOut	A license that enables the ability to encode one NDI stream of a configured UltriScape Multiviewer Head per ULTRIX-HDX-IO or ULTRIX-MODX-IO blade.

Table 17 List of Ultrix Licensed Features

License	Description
UltriSync	A per input 3G frame sync license enabling alignment to router sync.
Ultrisync-UHD	A per input frame sync license to support UHD video rates. Each slot supports up to 3 Ultrisync-UHD ports. Requires software version 4.2.0 or higher and is applicable only to the ULTRIX-HDBNC-IO and ULTRIX-SFP-IO blades.
Ultriscape-CA	A license that enables the display of CEA-608, CEA-708, and OP-47 closed caption data on a Multiviewer Head.
Ultricore-EMBER+	A license that enables the use of the EMBER+ protocol for video and audio streaming via an ULTRIX-IP-IO or ULTRIX-IPX-IO blade.
Ultricore-NVISION	A license that enables the use of the NVISION protocol on all slots of the Ultrix router.
ULTRICORE-PRO	A licensed that provides full Ultricore Profiles support on Ultrix frames.
Ultricore-SNMP	A license that enables basic SNMP monitoring on Ultrix routers.

Installing a License Key

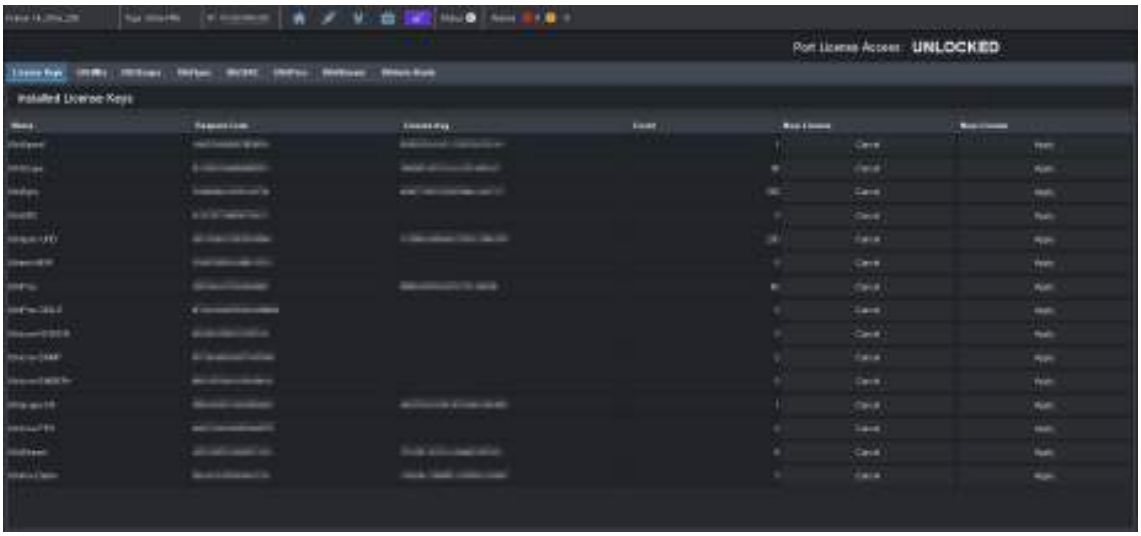
Ross Video uses license keys to control user access to specific Ultrix features. You can obtain a key for an Ultrix licensed feature from Ross Video Technical Support.

To install an Ultrix license key

1. Locate the Ultrix in the Tree View of DashBoard.
2. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
3. Expand the **Systems** sub-node.
4. Expand the **Configuration** sub-node.
5. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
6. Select  .

   The **Licenses** page opens with **License Keys** sub-tab automatically selected.



7. Make a note of the character string in the **Request Code** field for the license you wish to enable.
8. Contact Ross Video Technical Support using the information found in "**Contacting Technical Support**".
   a. When you speak to your Technical Support representative, tell them your name, your facility name, and the **Request Code** from step 7.
   b. You will be given a License Key for the licensed feature.
9. Enter the provided License Key in the applicable **License Key** field of the **Licenses** tab.

✶ You can also right-click on the row for the License Key you are installing, and copy the Request Code to or paste the License Key from the Microsoft® Windows® clipboard.

10. Click **Apply** in the row for the License Key you entered in step 9.
11. Verify that the **Count** field is updated to report each installed License Key.

To activate a license for a specific slot/head

1. Install the license key as outlined in the procedure "**To install an Ultrix license key**".
2. In the **Licenses** sub-tab, select the required sub-tab.
   - Each row in the tab represents a slot or UltriScape head in the Ultrix router (with slot 1 as the topmost slot in the router).
   - The Port column in the tab represents the I/O (or output for the head).

✶ Click **Clear Offline Ports** to hide the I/O ports if the slot does not have a blade installed. Click **Show Offline Ports** to list those ports in the tab columns.

   - The Format column represents the video format assigned to that head.

3. In the **Port** column, select the cell for the slot/head you want to enable.

   A drop-down menu displays that lists the available ports.

4. Select **Enable** to apply the license.

Removing a License Key

When you want to move an Ultrix licensed feature from one slot to another in the same router, you must first disable the Ultrix feature on the current Ultrix router.

✶ Removing a License Key also removes user access to all of the Ultrix features associated with that License Key.

To remove a Ultrix license key

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **License Keys** sub-tab is automatically selected.
6. To remove a license key for a specific slot:
   a. Select the sub-tab for the license type you want to remove.

      Each row in the sub-tab represents a slot in the Ultrix router. Each column represents a type of licensed feature.
   b. Select **None** or **Disable** to remove the license for the selected slot.

✶ If available, click **Disable All** to remove all the licenses of this type from all slots.

✶ If you wish to apply the same license key to another slot, follow the steps outlined in the procedure "**Installing a License Key**".

7. To remove a license key from the router:
   a. On the License Keys sub-tab, located the row for the licensed feature you want to remove.
   b. Click **Cancel** in the row.

Locking Access to the Licenses

The Ultrix includes a password-protected feature that prevents unauthorized changes to license keys. When the License tab is locked, users require a password to access/edit the license key information. This feature is disabled by default (the License tab is editable).

Enabling the Port License Lock

To lock the tab, you must enable the Password Protected settings in the System Status > Setup tab.

To enable the lock on the Port License tab

1. In the Tree View of DashBoard, double-click the **Product Info** node.

   The **Product Info Interfaces** display in the DashBoard window.
2. Select the **Setup** tab.
3. In the **Password Protected Settings** area, select the **Protect all Licensed features** with a password box.
4. Click **Apply** at the bottom of the **Setup** tab.

Changing the Password

It is recommended to change the password from the default value that is assigned at the factory.

✶ A password must be at least 8 characters long.

To change the password

1. Click **Change Password**.

   The **Enable Password Protection** dialog opens.
2. If you are changing the password from the default value:
   a. In the **Password** field, type **`r0ssUltrix`**.
   b. Click **Apply**.

      The **Change Password** dialog opens.
3. If you are changing the password from a value other than the default:
   a. In the **Password** field, type the character string for the current password.
   b. Click **Apply**.

      The **Change Password** dialog opens.

4. Use the **Password** field to type the current password.
5. Use the **New Password** field to type the character string for the new password.
6. Use the **Confirm Password** field to type the same character string you entered in step 5.
7. Click **Apply**.

   The **Change Password** dialog closes and the **Port License** tab is now locked.

Unlocking the Port Licenses via Password

A user can unlock the Port License tab by clicking the **Unlock** button and entering a password.

To unlock the Port Licenses tab via password

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .
6. Click **Unlock...** .

   The **Protected Access** dialog opens.
7. In the **Password** field, type the password as defined in step 5 of the procedure "**To enable the lock on the Port License tab**".
8. Click **Apply**.

The **Protected Access** dialog closes and the **Licenses** tab is now editable.

✶ To re-lock the **Licenses** tab, click **Lock**.

Enabling a Service

The Ultrix routers support a set of third-party protocols that enable the router to communicate with devices in your routing system. Before creating a connection point (in your database) to each device, you must first enable the required protocol(s) on the Ultrix router, and configure any settings required for communication.

This chapter outlines how to enable a communication protocol, and configure the additional settings on the router for each protocol (if required). A summary of the supported commands is also provided.

If you have questions about the operation of your Ross devices, contact us at the numbers listed in "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

For More Information on...

- how to create connection points in a database, refer to the ***Ultrix and Ultricore Database Guide***.

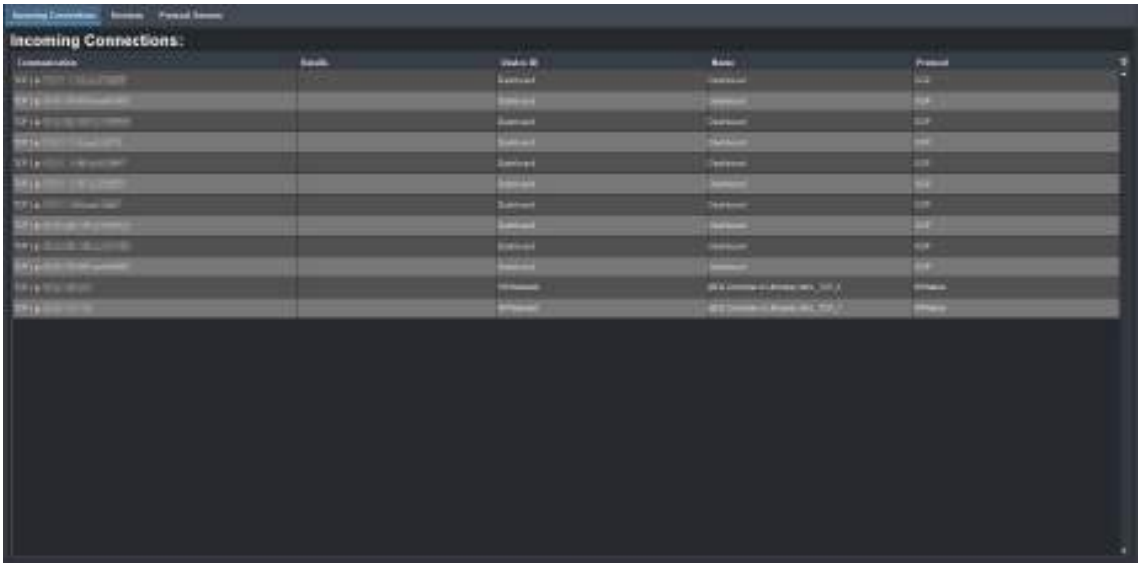
Enabling a Communication Service

Use the options in the System > Configuration > Connections > Services interface to enable or disable each required service (protocol). This allows your router to communicate with an external device that uses the enabled third-party protocol.

To enable a service

1. Locate the Ultrix node in the Tree View of DashBoard
2. Expand the Ultrix node to display a list of sub-nodes.
3. Expand the **System** sub-node.
4. Expand the **Configuration** sub-node.
5. Double-click the **Connections** sub-node.

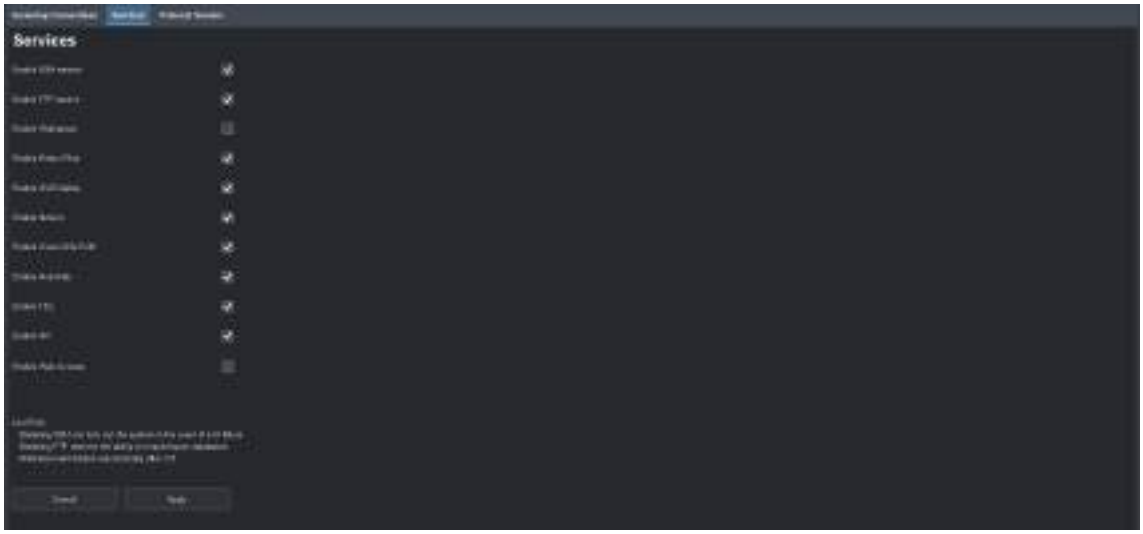
   The Connections interface opens in the DashBoard window with the Incoming Connections tab automatically selected.



6. Select the **Services** tab.

   The Services tab lists the available communications protocols and provides options for enabling/disabling each protocol for the router.

✶ Some services require that a license key is also enabled on your router. Refer to the "**Software License Keys**" to learn more.



7. Enable or disable a service by selecting or clearing the associated box. Choose from the following:

   - SSH service — Enables the ability to log onto the Ultrix router via an SSH server. Secure Shell (SSH) Login is a client-server protocol used by system administrators to securely log onto remote systems and execute commands over an unsecured network. SSH may also be used by Ross Technical Support for advanced troubleshooting.
   - FTP service — Enables the ability to communicate with the Ultrix router over an FTP connection.
   - Walkabout — Enables the Ultrix router to communicate with Ross Video devices in the Walkabout system.
   - Ember Plus — Enables the Ultrix router to communicate with a third-party control system via the Ember+ media distribution protocol.
   - GVG Native — Enables the Ultrix router to communicate via the GVG Series 7000 Native protocol and is available over an RS-422 or RS-232 serial connection, or ethernet connection.
   - Nvision — Enables the Ultrix router to communicate via a limited sub-set of the NVISION serial NP0010 protocol, and the NVISION NP16 ethernet protocol.
   - Probel SW-P-08 — Enables the Ultrix router to communicate via the Probel SW-P-08 protocol. This protocol is available over an RS-422 or RS-232 serial connection, as well as an ethernet connection.
   - RossTalk — Communications via the RossTalk protocol (a plain text based protocol that allows control of Ross Video equipment).
   - TSL — Enables the Ultrix router to communicate via the TSL UMD v3.1, TSL UMD v4.0, and TSL UMD v5.0 protocols.
   - NK — Enable this option if there are Ross NK series devices or signal types the Ultrix router itself does not handle. The Ross NK series devices must be connected to the ethernet network by virtue of an Ross NK-IPS or NK-NET devices to enable communication with the Ultrix router.

8. Click **Apply**.

Configuring the Service Settings

The Protocol Servers tab lists the currently active servers running in the routing system. This tab is auto-populated based on the external devices on the same network as your router and using the protocols enabled in the Services tab. Some services require you to configure additional settings on the router. This section briefly summarizes those additional settings.

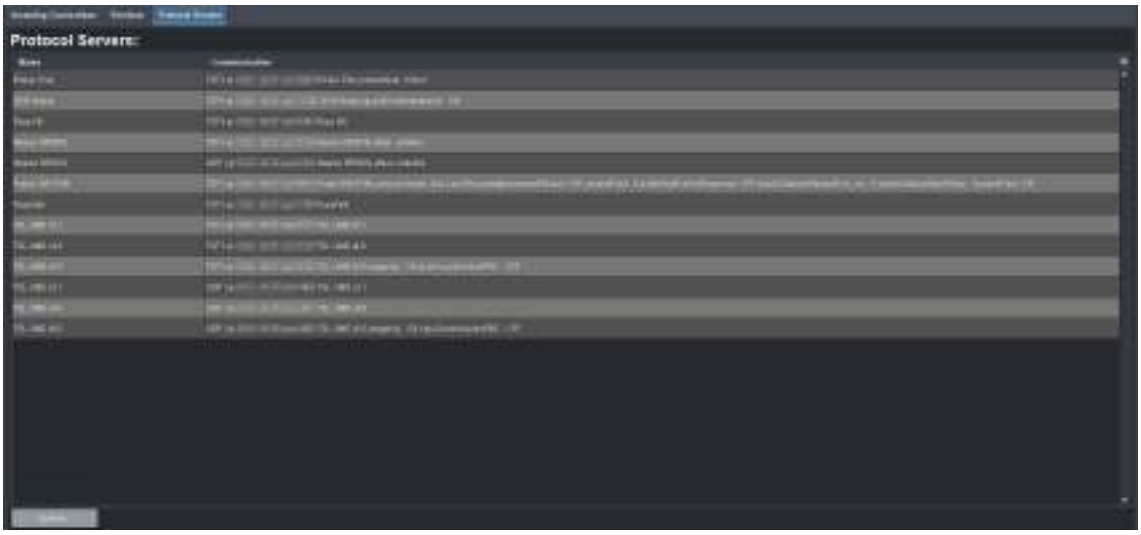
For More Information on...

- the supported protocols, refer to "**Server Options and Supported Commands**".

To configure the protocol settings

1. Locate the Ultrix node in the Tree View of DashBoard
2. Expand the Ultrix node to display a list of sub-nodes.
3. Expand the **System** sub-node.
4. Expand the **Configuration** sub-node.
5. Double-click the **Connections** sub-node.

   The Connections interface opens in the DashBoard window with the Incoming Connections tab automatically selected.
6. Select the **Protocol Services** tab.



7. Click **Options** (located in the bottom toolbar).

   The **Server Options** dialog opens.

8. Locate the options for the third-party protocol you wish to configure for communications.
9. Refer to the following sections for a summary of the settings based on the protocol.
10. Click **Apply**.

    The **Server Options** dialog closes and the new settings are applied.

Third-Party Protocols

The Ultrix control system is able to control third-party matrix devices. Two popular routing protocols are available to enhance compatibility: GVG Series 7000 and Probel SW-P-08.

You must define an interface for the system to access third-party matrix devices. The connection point must be compatible with the settings of the external device you are trying to control.

Before proceeding, ensure that you have the following connection specifics:

- Communication protocol
- Communication type (TCP/IP or serial[1])

Ethernet Communication

The Ethernet interfaces to these protocols are automatically started with Ultrix and no further configuration is necessary. However, you must configure your external control systems to match the settings outlined in **Table 18**. The **Protocol Options** are outlined with the respective protocol details in the following sections.

The Ultrix router can communicate with third-party external devices via a TCP connection. By default, Ultrix provides a server process for the following Ethernet protocols:

Table 18 Supported Protocols — Ethernet Connection

Protocol	Default Port
GVG Native Series 7000	TCP: 12345
Probel SW-P-08	TCP: 8910
RossTalk	TCP: 7788

1. Only available natively. Serial connections from Ultrix requires an external USB-serial converter.

Table 18 Supported Protocols — Ethernet Connection

Protocol	Default Port
TSL UMD v3.1	TCP: 5727 UPD: 4490
TSL UMD v4.0	TCP:5728 UDP: 4491
TSL UMD v5.0	TCP: 5729 UDP: 4492

Serial Communication

Ultrix may communicate directly with third-party devices using a native serial protocol. A USB-to-Serial converter must be used to give the Ultrix a serial communication port. Refer to **Table 19** for information on the supported protocols.

- Only USB-serial devices based on these chip-sets are supported: FTDI Chip, Belkin, Prolific PL 2303, and Silicon Labs CP210x.

Table 19 Supported Protocols — Serial Connections

Protocol	Settings				
	Type	Baud	Data Bits	Parity	Stop Bits
GVG Native Series 7000	RS232 or RS422	38400	8	None	1
Probel SW-P-08	RS232 or RS422	38400	8	None	1
TSL UMD v3.1	RS422 or RS485	38400	8	Even	1
TSL UMD v4.0	RS422 or RS485	38400	8	Even	1
TSL UMD v5.0	RS422 or RS485	38400	8	Even	1

- A serial connection point must be implemented on Ultrix before communications can start. The settings may be changed from the protocol defaults to suit your requirements. The **Protocol Options** are outlined with the respective protocol details in the following sections.

Server Options and Supported Commands

Some protocols require additional settings be configured on the router. The following sections outline these required settings based for each protocol.

GVG Series 7000 Native Protocol Commands

The router supports the GVG Series 7000 Native protocol and is available over an RS-422 or RS-232 serial connection, as well as an ethernet connection. Refer to **Table 20** for connection details.

Table 20 Default GVG Native Connection Types

	Setting
Serial	
Connection Type	RS422 or RS232
Baud	38400
Data Bits	8

Table 20 Default GVG Native Connection Types

	Setting
Parity	None
Stop Bits	1
Ethernet	
Port (incoming)	12345
Port (outgoing)	12345[a]

a. For outgoing connections, port 12345 is the default value but is user configurable.

Table 21 summarizes the Server Options for the GVG Series 7000 Native protocol.

Table 21 Server Options — GVG Series 7000 Native

Option	Setting	Notes
L4 Echo	Yes	Send command acknowledgments on protocol layer 4 (Ethernet only)
	No	Do not send acknowledgments. This is the default.

To send GVG Native commands to the router

1. Create a network connection to the router on TCP/IP **Port 12345**.
2. A valid connection is reported in the Connections > Incoming Connections interface.
3. Refer to **Table 22** for a list of supported GVG Native Protocol commands.

Table 22 GVG Native Protocol Commands

Message		Notes
Command	**Description**	
BK[,parameter]		
BK,D	Force next QD command to return status of all destinations	Clears the flags associated with the D,no_parameter command. After BK,D is sent, the next QD,no_parameter command will result in destination statuses or all destinations being returned.
BK,E	Request status of level 4 echo setting	
BK,E,ON	Set level 4 echo to on	An err=00 response will be returned for successful commands that do not generate their own response (e.g. Take commands). This is a per session setting.
BK,E,OFF	Set level 4 echo to off (default)	No response will be given for commands that do not generate their own response.
PR,dest_name,level_bitmap	Protects a specific destination from having its source changed	ER error-code response is currently not supported.
QC[,dest_name]	Query Combined Destination status by name	
QD[,dest_name]	Query Destination status by name	No information is returned for unmatched destination levels
Qd[,dest_name]	Query Destination status by name	Sets response src_name to NO_XPT for unmatched destination levels
QI,destIndex,lvlIndex	Query Destination status by index[a]	
Qi,destIndex,lvlIndex	Query Destination status by index[a]	The srcIndex returned will be 0xfffe if an error condition applies to the crosspoint being reported.
QJ[,destIndex]	Query Destination status by index[a]	No information is returned for unmatched destination levels

Table 22 GVG Native Protocol Commands

Message Command	Description	Notes
Qj	Query Destination status by index[a]	Sets response srcIndex to 0xFFFe for unmatched destination levels
QN,parameter		
QN,S	Query source names/labels	As defined inactive database
QN,D	Query destination names/labels	As defined inactive database
QN,L	Query level names/labels	As defined inactive database
QN,IS	Query names via source index[a]	
QN,ID	Query names via destination index[a]	
QT	Query date and time[a]	
TA,dest_name,nbr_sources,src_name_entry1[,...src_name_entryn]	Takes sources (on specified levels) to specified destination, by name rather than index	Src_name_entryn = src_name,level_bitmap
TD,dest_name,src_name_entry	Takes same source to all or specified levels	Src_name_entryn = src_name[,levelbitmap] No levelbitmap=all destination levels
TI,destIndex,srcIndex[,levelIndex]	Request take by index with level index[a]	
TJ,destIndex,nbr_sources,srcIndex,level_bitmap[,...,srcIndex,level_bitmap]	Takes sources (on specified levels) to specified destinations by index rather than name; allows breakaways	
TS,salvo_name	Request Take Salvo	TS,salvo_name
UP,dest_name,level_bitmap	Removes Protect from specified destination	ER, error-code response is currently not supported.

a. Zero-based hex logical index numbering.

For More Information on...

- these commands, refer to the GVG protocol documentation.

NVISION Commands

This section outlines the NVISION protocol commands supported by the router.

✶ Ensure that the Ultricore-NVISION license is installed for your router. Refer to the ***Ultrix User Guide*** for details.

Table 23 summarizes the settings in the **Server Options** dialog for the NVISION protocol.

Table 23 Server Options — NVISION protocol

Option	Setting	Notes
Offset	0	The Ultrix level matches the NVISION level
	1	The Ultrix level is the NVISION level plus 1

NVISION NP16 Ethernet Protocol

The router supports the NVISION NP16 Ethernet protocol. **Table 24** outlines the default values for the router when using NP16.

Table 24 Default Connection Types — NVISION NP16

	Setting
TCP Port	5194

NP16 Commands

The NP16 protocol defines the message format as follows:

`Protocol ID | Sequence Number | byte count | Command`

Each field consists of a 32bit number where:

- `Protocol ID` — 0x0000000C (Router Control Protocol)
- `Sequence number` — controller generated and added to Ultrix response message
- `byte count` — total number of bytes in message including header (<8176)
- `Command` — refer to **Table 25**.

✶ The protocol is zero based, meaning that destination 0 in the protocol relates to destination ID#1 in Ultrix. This is true for sources, destinations, and level values.

Refer to **Table 25** for a list of supported NP16 commands.

Table 25 NP16 Protocol Commands

Message		Notes
Command	**Description**	
0x0000 0050	Performs a TAKE	
0x0000 0051	Set Output LPR	Sets or releases a lock or protect on a destination
0x0000 0052	Get Status of Outputs	Retrieves the crosspoint status
0x0000 0059	Router Partition Information	
0x0000 005E	Crosspoint Tally	Retrieves the crosspoint status
0x0000 0070	Machine Control Take	Format 1 only

NVISION NP0010 Serial Protocol

The router supports a limited sub-set of the NVISION serial NP0010 protocol.

Table 26 outlines the router default values for an NP0010 serial connection.

Table 26 Default Connection Types — NVISION NP0010 Serial

	Setting
Connection Type	RS232, RS422
Baud	9600, 19200, 38400, 56700, 115200
Data Bits	8
Parity	No
Stop Bits	1

Refer to **Table 27** for a list of supported NP0010 commands.

Table 27 NP0010 Protocol Commands

Message		Notes
Command	**Description**	
0x50	Take	Non-timestamped version only
0x51	Destination status	Get destination status
0x55	Lock destination	Assert a destination lock

Table 27 NP0010 Protocol Commands

Message		Notes
Command	Description	
0x56	Protect destination	Assert a destination protect
0x58	Release destination lock/protect	Releases the destination lock and protect
0x66	Destination LPR state	Get destination locked/protect/released status

Probel SW-P-08 Protocol Commands

The router supports the Probel SW-P-08 protocol and is available over an RS-422 or RS-232 serial connection, as well as ethernet connection. **Table 28** provides the default values for this protocol.

Table 28 Default Probel SW-P-08 Connection Types

	Setting
Serial	
Connection Type	RS422 or RS232
Baud	38400
Data Bits	8
Parity	None
Stop Bits	1
Ethernet	
Port (incoming)	8910
Port (outgoing)	8910[a]

a. For outgoing connections, port 8910 is the default value but is user configurable.

Table 29 summarizes the settings in the **Server Options** dialog for the Probel SW-P-08 protocol.

Table 29 Server Options — Probel SW-P-08 protocol

Option	Setting	Notes
Protocol Variant	Non-extended	Use non-extended commands only
	Extended	Use extended commands only
	Use Last Request	Use command set as per last received command format (e.g. if received a non-extended command, reply in a non-extended format). This is the default.
Matrix Mode	Yes	Swap matrix and level fields
	No	Do not swap matrix and level fields. This is the default.

Table 29 Server Options — Probel SW-P-08 protocol

Option	Setting	Notes
Unused Field	#	Send number (0-15) in either Level or Matrix field - which ever is not used as per Matrix Mode setting. The default is 0.
Do not wait for ACK	Yes	Ultrix will not wait for message acknowledgments between connect responses
	No	Ultrix will wait for message acknowledgments between connect responses. This is the default.
Batch Collate Time[a]	# milliseconds	Wait up to 100 milliseconds for multiple commands received before processing. The default is 0 (which disables this feature).
Batch Collate Split Size	# received commands	Wait up to 100 received commands before processing. The default is 0 (which disables this feature).

a. When both Batch Collate Split Size and Batch Collate Time are both active, the option that occurs first will release the batch, and the Batch Collate Split Size and the Collate Time values are reset.

Table 30 lists the supported Probel SW-P-08 Serial Protocol commands.

Table 30 Probel SW-P-08 Native Protocol Commands

Request Message		Response Message		Notes
Cmd ID	Description	Cmd ID	Description	
01	Crosspoint Interrogate	03	Crosspoint Tally	Get single crosspoint status
02	Crosspoint Connect	04	Crosspoint connected	Take single crosspoint
10	Protect Interrogate	11	Protect Tally	Get destination protect status
12	Protect Connect	13	Protect connected	Set destination protect
14	Protect Disconnect	15	Protect dis-connected	Turn off destination protect
17	Protect Device Name Request	18	Protect Device Name Response	Get name of device that hold protect
19	Protect Tally Dump Request	20	Protect Tally Dump	Get all protect status
21	Crosspoint Tally Dump Request	22, 23	Crosspoint Tally Dump	Get all crosspoint status Cmd22: Byte max dest 191 Cmd23: Word max. dest. 65535
97	Implementation Request	98	Implementation Status	Get list of commands supported
100	All Source Names Request	106	Source Name Response	Get all source names (8 char. max.)
101	Single Source Name Request	106	Source Name Response	Get single source names (8 char. max.)
102	All Destination Association Name Request	107	Destination Association Name Response	Get destination names (8 char. max.)
103	Single Destination Association Names Request	107	Destination Association Name Response	Get single destination name (8 char. max.)
104	All UMD Labels Request	108	UMD Label Response	Only one set of labels is currently supported. UMD Labels replicate source labels. (16 char. max.)
105	Single UMD Labels Request	108	UMD Label Response	Get single source label (16 char. max.)
120	Crosspoint Connect On Go Group Salvo	122	Crosspoint Connect On Go Group Salvo Acknowledge	Add crosspoint to preset group

Table 30 Probel SW-P-08 Native Protocol Commands

Request Message		Response Message		Notes
Cmd ID	Description	Cmd ID	Description	
121	Crosspoint Go Group Salvo	123	Crosspoint Go Done Group Salvo Acknowledge	Switch/clear preset group
124	Crosspoint Salvo Group Interrogate	125	Crosspoint Group Salvo Tally	Preset group status
EXTENDED				
129	Extended Crosspoint Interrogate	131	Extended Crosspoint Tally	Get crosspoint status
130	Extended Crosspoint Connect	132	Extended Crosspoint Connected	Take single crosspoint
138	Extended Protect Interrogate	139	Extended Protect Tally	Get destination protect status
140	Extended Protect Connect	141	Extended Protect Connected	Protect a destination
142	Extended Protect Disconnect	143	Extended Protect Disconnected	Turn off protect for a destination
147	Extended Protect Tally Dump	148	Extended Protect Tally Dump Message	Get all protect status for given level
149	Extended Crosspoint Tally Dump	151	Extended Crosspoint Tally Dump Word Message	Get destination status for given level
228	Extended All Source Names	234	Extended Source Name Response	Get source names (8 char max.)
229	Extended Single Source Name	234	Extended Source Name Response	Get single source name (8 char max.)
230	Extended All Destination Association Names	235	Extended Destination Association Names Response	Get all destination names (8 char. max.)
231	Extended Single Destination Association Name	235	Extended Destination Association Names Response	Get single destination name (8 char. max.)
232	Extended Single UMD Label Request	236	Extended UMD Labels Response	Get all source labels (16 char. max.)
233	Extended Single UMD Label Request	236	Extended UMD Labels Response	Get single source label (16 char. max.)
248	Extended Crosspoint Connect On Go Group Salvo	250	Extended Crosspoint Connect On Go Group Salvo Acknowledge	Preset group acknowledge
124	Crosspoint Group Salvo Interrogate	253	Extended Crosspoint Group Salvo Tally	Preset group status

RossTalk Commands

The RossTalk protocol is a plain text based protocol that allows control of Ross Video equipment.

✶ Each command should be terminated by a carriage return and a line feed (CR/LF).

To send RossTalk commands to the router

1. Create a network connection to the router on **Port 7788**.
2. At the prompt, enter the commands you wish to send. Refer to **Table 31** for a list of supported commands.

Table 31 RossTalk Protocol Commands

Message		Notes
Command	Description	
GPI ##	Execute the salvo number corresponding to the numerical ## extension of the command	For example, GPI 04 triggers the salvo <salvo_name>[4] as listed in the Ultrix database
TIMER ##:RUN	Request Timer ID to start/resume	
TIMER ##:STOP	Request Timer ID to stop	
TIMER ##:PAUSE	Request Timer ID to pause	

Table 31 RossTalk Protocol Commands

Message		Notes
Command	**Description**	
TIMER ##:END	Request Timer ID to end	
TXTLABEL ID:<id>; TEXT:<text>; BGCLR:<bgcolor>; TXTCLR:<textcolor>	Where: • <id> is a unique "rosstalk id" associated with an Ultriscape RossTalk display object. This field is compulsory. • <text> is the text to be displayed. This field is optional. • <bgcolor> is the background color of the text label. Specified in comma separated RGB format using 2 byte hex values (e.g. RR,GG,BB). This field is optional. • <textcolor> is the text color of the text label. Specified in comma separated RGB format using 2 byte hex values (e.g. RR,GG,BB). This field is optional.	There is a 20 character maximum. Messages with only the id field will be ignored. The following is an example of a message: TXTLABEL ID:25; TEXT:CAM1; BGCLR:0x00,0x00,0x00; TXTCLR:0xFF,0xFF,0xFF Note that <bgcolor> and <textcolor> are specified as R,G,B triplet. For example: • 255,255,255 or 0xff,0xff,0xff is white • 0,0,0 or 0x0,0x0,0x0 is black • 255,0,0 or 0xff,0x0,0x0 is red
XPT D:<dest> S:<source> I:<user_id> [L:<levels>]	Crosspoint command for a router TAKE where: • <dest> is the logical destination ID from the active database (1-based) • <source> is the logical source ID from the active database (1-based) • <user_id> is the numeric user/panel ID that will be used to request the switch • <levels> is an optional parameter specifying comma-separated list of 1-based level IDs to switch (for breakaway, e.g. L:1,2,4). If no levels are specified, a follow switch (all valid levels) is requested. • <levels> supports ranges specified by two numbers separated by dash (e.g. L:1-16)	Range start value must be less than the end value Single levels and ranges can be mixed in the list (e.g. L:1,3,4-8,12-17) There are no spaces between numbers or ranges Invalid numbers or improperly specified ranges will be ignored An argument is separated from its value using a single colon (:) Command arguments are separated single spaces The arguments may be specified in any order, (e.g. these are equivalent: XPT D:1 S:4 I:2 and XPT S:4 I:2 D:1) Examples: • ID 7 requesting to switch Dest 2 to Source 1 on Levels 1,3,5 and 12-16 • XPT I:7 D:2 S:1 L:1,3,5,12-16

For More Information on...

- adding a RossTalk label to an Ultriscape layout, refer to the ***Ultriscape User Guide***.

TSL UMD Protocol v3.1 Commands

Table 32 outlines the default values for the router when using TSL UMD v3.1.

Table 32 Default Connection Types — TSL UMD v3.1

	Setting
Serial	
Connection Type	RS422
Baud	38400
Data Bits	8
Parity	Even
Stop Bits	1
Ethernet	
TCP Port	5727
UDP Port	4490

Protocol Implementation

The router implements the protocol with the following structure:

```
DisplayID|Control|DisplayData
```

Table 33 lists the supported TSL UMD Protocol v3.1 commands.

Table 33 TSL UMD Protocol v3.1 Commands

Protocol Breakdown	Description	UltriScape System Use
Display Address	0 - 126 display identification enumeration	DisplayID associated with source or destination
Control Byte		
Bit 0	Tally 1 status (1=on, 0=off)	Tally 1 (Red)[a]
Bit 1	Tally 2 status	Tally 2 (Green)[a]
Bit 2	Tally 3 status	Not used
Bit 3	Tally 4 status	Not used
Bits 4-5	Brightness value	Not used
Bit 6	Reserved	Not used
Bit 7	0	Not used
Display Data	16 ASCII display characters (20h-3Eh)	UMD display text

a. Green/Red may be swapped by configuring the Global Tally Settings in the UltriScape Head interface.

Refer to **Table 34** when using TSL UMD v3.1 and configuring PiP Tallies in an UltriScape Head.

Table 34 UltriScape Tally Display — TSL UMD v3.1

Red Tally	Green Tally	Display
ON	ON	RED IS ON
ON	OFF	RED IS ON
OFF	ON	GREEN IS ON
OFF	OFF	OFF (no tallies are lit)

TSL UMD Protocol v4.0 Commands

Table 35 outlines the default values for the router when using TSL UMD v4.0.

Table 35 Default Connection Types — TSL UMD v4.0

	Setting
Serial	
Connection Type	RS422
Baud	38400
Data Bits	8
Parity	Even
Stop Bits	1
Ethernet	
TCP Port	5728
UDP Port	4491

Protocol Implementation

The router implements the protocol with the following structure:

`Header | Control | DisplayData | VBC | XData`

Table 36 lists the supported TSL UMD Protocol v4.0 commands.

Table 36 TSL UMD Protocol v4.0 Commands

Protocol Breakdown	Description	UltriScape System Use
Header	0x80 + 0 - 126 display address	DisplayID associated with source or destination
Control Byte		
Bit 0	Tally 1 status (1=on, 0=off)	Not used
Bit 1	Tally 2 status	Not used
Bit 2	Tally 3 status	Not used
Bit 3	Tally 4 status	Not used
Bit 4-5	Brightness value	Not used
Bit 6	0=display data, 1=command data	Display data only (0)
Bit 7	0	Not used
Display Data	16 ASCII display characters (20h - 7Eh)	UMD display text
VBC		
Bits 3-0	Byte count of XData	
Bits 6-4	Minor protocol version (v4.0=0)	
Bit 7	0	
XData1		
Bits 0-1	Right Hand tally value[a]	Not implemented
Bits 2-3	Text display value[a]	Sets text background color
Bits 4-5	Left hand tally value[a]	Displayed in either border or text background; can be either or both
Bit 6	Reserved	
Bit 7	0	
XData2		
Bits 0-1	Right Hand tally value	Not implemented
Bits 2-3	Text display value	Not implemented
Bits 4-5	Left hand tally value	Not implemented

a. Where 0=off, 1=Red, 2=Green, 3=Amber

TSL UMD Protocol v5.0 Commands

Table 37 outlines the default values for the router when using the TSL UMD v5.0 protocol.

Table 37 Default Connection Types — TSL UMD v5.0

	Setting
Serial	
Connection Type	RS422
Baud	38400
Data Bits	8
Parity	Even
Stop Bits	1
Ethernet	
TCP Port	5729
UDP Port	4492

Table 38 summarizes the settings in the **Server Options** dialog for the TSL UMD v5.0 protocol.

Table 38 Server Options — TSL UMD v5.0 protocol

Option	Setting	Notes
Wrapping	Yes	Wrap commands for TCP mode
	No	Do not wrap commands (UPD mode). This is the default.
PBC in Count Value	Yes	Include the Packet Byte Count field when calculating the byte count value
	No	Do not include the Packet Byte Count field in the byte count value. This is the default.

Protocol Implementation

Ultrix implements the protocol with the following structure:

```
PBC | Ver | Flags | Screen | DMSG (Index, Control, Length, Text)
```

Table 39 lists the supported TSL UMD Protocol v5.0 commands.

Table 39 TSL UMD Protocol v5.0 Commands

Protocol Breakdown	Description	UltriScape System Use
PBC	Total byte count of packet	
Ver.	Minor version number (0=v5.00)	
Flags		
Bit 0	0=ASCII strings, 1=UTF-16LE	
Bit 1	0=display data, 1=screen control	Display data only (0)
Bits 2-7	Reserved (0)	Not used
Screen	16bit Screen ID	ScreenID associated with source or destination
DMSG		
Index	16bit Display Address	DisplayID associated with source or destination
Control		

Table 39 TSL UMD Protocol v5.0 Commands

Protocol Breakdown	Description	UltriScape System Use
Bits 0-1	Right hand tally value[a]	Sets right-hand tally indicator color
Bits 2-3	Text display value[a]	Sets text background and border color
Bits 4-5	Left hand tally value[a]	Sets left-hand tally indicator color
Bits 6-7	Brightness value (0-3)	Not implemented
Bits 8-14	Reserved (0)	
Bit 15	0=display data, 1=command data	Display data only (0)
Length	Byte count of text	
Text	Text as defined by Flag 0 setting	UMD display text

a.Where 0=Off, 1=Red, 2=Green, 3=Amber

Timing and Reference Setup

This chapter outlines how to configure the reference and time settings for your Ultrix router.

For More Information on…

- cabling the reference source for your router, refer to the ***Ultrix Installation Guide***.
- monitoring the reference status, refer to "**Monitoring the Reference Signal**".

Specifying a Default Reference Format

If you did not connect a reference source signal to the **REF** port on the Ultrix rear panel, you can still configure a Default Reference format using the options in the Frame Configuration interface. Note that this Default Reference setting only applies to start-up with no reference source connected.

Keep the following in mind:

- If you connect a valid reference source to the **REF** port, it will take precedence over the Default Reference setting.
- If the connected reference source becomes unavailable, the Ultrix router will use the last known good reference format until a re-boot or power cycle occurs (at which time the Default Reference setting will be applied).
- If the Ultrix router does not have a valid reference signal connected to it, UltriScape still needs a reference to output correctly. Specifying the Default Reference Format provides an internal reference signal of either NTSC or PAL rates to allow UltriScape to still output with no system reference signal connected.

To specify the default reference format for the Ultrix router

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **References** tab.
7. Use the **Detect Reference** area to manage the reference formats for the Ultrix router.

Specifying the Time Source

The Ultrix router requires an external time source in order to accurately report the time-of-day. The options in the Frame Configuration interface enable the selection of time/date source via an NTP Server in your facility, or you can set the device time to match the computer which is running the current DashBoard client.

Using an NTP Server as the Time Source

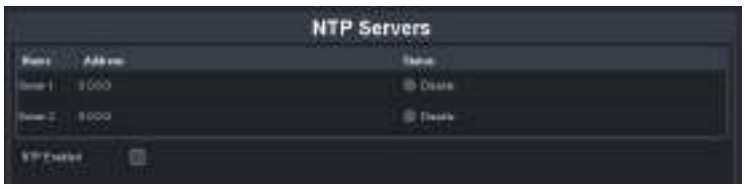
✶ Before proceeding, contact your IT Department to learn the IP address(es) of the NTP server(s) in your facility.

To specify an NTP Server as the time source for the Ultrix router

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens and the **Communications** tab is automatically selected.
6. Locate the **NTP Servers** area on the **Communications** tab.



7. If you are using one NTP server, enter the IP address in the **Address** field of the **Server 1** row.
8. If using a backup NTP server:
   a. Enter the IP address of the first NTP server in the **Address** field of the **Server 1** row.
   b. Enter the IP address of the backup NTP server in the **Address** field of the **Server 2** row.
9. Select the **NTP Enabled** box.
10. Verify that the **Status** field(s) in the **NTP Servers** table report a valid connection to the listed IP address(es). You may need to refresh the interface as follows:
    a. Close the **Device Configuration** interface.
    b. Re-open the **Device Configuration** interface by repeating steps 1 to 4 to update the field(s).

Using the DashBoard Client Computer as the Time Source

This section outlines how to set the Ultrix to the local time without using an NTP Server. Instead, you will set the time to the values reported by the DashBoard client computer you are using.

✶ The time the Ultrix reports is not linked to this computer. It is a once off setting of the time to match the computer time when the **Set to PC Time** button is selected on the Ultrix interface. If the DashBoard client computer time changes, you will need to update the time reported on the router by repeating the procedure below.

To specify the DashBoard client computer as the time source for the Ultrix router

1. Expand the **Devices** node.
2. Double-click the node for your Ultrix router.

   The **Device Configuration** interface opens.
3. Select  .

   The **Frame Configuration** page opens and the **Communications** tab is automatically selected.
4. Locate the **NTP Servers** area on the **Communications** tab.
5. Click **Set to PC Time**. This button is located in the top right corner of the **Communications** tab.

Configuring a Timing Offset

You can choose to offset the Ultrix System Status and Device interfaces with respect to UTC Time or Daylight Saving Time. Note that the UTC offset does not include any Daylight Saving offset that may be in force. The Daylight Saving Time is enabled separately.

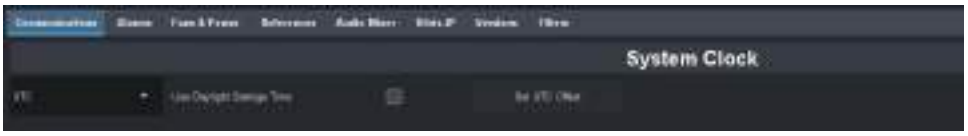
✶ At startup, the UTC Offset is set to 0 to ensure the displayed time matches the system time.

To specify an offset

1. Expand the **Devices** node.
2. Double-click the node for your Ultrix router.

   The **Device Configuration** interface opens.
3. Select  .

   The **Frame Configuration** page opens and the **Communications** tab is automatically selected.
4. Locate the time offset options at the top of the **System Clock** area.



5. To specify an UTC offset, select your current time zone offset from the **UTC** drop-down menu.

   Once set, the offset will be added or subtracted based off of the system clock, including NTP.
6. To add one hour to the currently selected UTC Offset (and enable Daylight Saving Time to the clocks displayed in the System Clock and Device interfaces), select the **Use Daylight Saving Time** box.
7. Click **Set UTC Offset** to apply your changes.

Configuring a Reference Trigger for the Ultrix Router

If multiple reference formats will be fed into the Ultrix router, you can configure a reference trigger with a custom switching point. This is useful when you will be manually changing the reference signal format that is fed into the **REF** port on the Ultrix rear panel.

✶ A variety of switching points across the routing switchers may be required to deal with the range of digital video formats that are available.

To configure the reference trigger for the router

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **References** tab.
7. Locate the **Triggers** area in the **References** tab.

✶ Refer to the ***Ultrix Installation Guide*** for information on the available REF ports and cabling requirements.

The **Detected** field indicates the format of the reference signal connected to the connected REF port on the router.

8. Use the **SDI Video Format** field to select the switch timing that will be used by the router when switching inputs/outputs.
9. If you selected **Custom** in step 8, use the **Custom** field to specify the time (number of microseconds) from the start of the custom switching line to the actual switching event. The maximum value is 65,535us.
10. Repeat steps 8 and 9 to configure additional triggers as required.

Configuring the SDI I/O Ports

Ultrix is capable of switching video signals[1] from 270Mbps to 12Gbps[2]. This format flexibility permits SD, HD, 3G and UHD video signals to be used seamlessly in the same system. Ultrix also comes complete with an audio matrix side-chain to enable multiplexing, de-multiplexing, channel swapping and processing of the SDI embedded audio.

This chapter provides a general overview of the available options when configuring the SDI I/O and AUX ports on the ULTRIX-HDX-IO and ULTRIX-HDBNC-IO blades.

For More Information on...

- the options available on the Port Configuration interface, refer to "**Port Configuration Interface**".
- configuring the UHD Gearbox, refer to "**UHD Gearbox Configuration**".
- configuring the ULTRIX-IP-IO ports, refer to "**ULTRIX-IP-IO Setup**".
- configuring the ULTRIX-IPX-IO ports, refer to "**ULTRIX-IPX-IO Setup**".
- configuring the ULTRIX-SFP-IO ports, refer to "**ULTRIX-SFP-IO Setup**".
- configuring the ULTRIX-MODX-IO ports, refer to the ***ULTRIX-MODX-IO User Guide***.
- the audio features of the Ultrix router, refer to "**Configuring an Audio Matrix**" and "**Ultrimix-Dante Setup**".

Using the Device Configuration Interface

The Device Configuration interface in DashBoard enable you to define the physical outputs, inputs, and communication ports of the Ultrix router. You can also monitor the overall status of the router, or just the status of a specific signal path or port on the rear panel. Use the top toolbar of the interface to navigate the interfaces for configuring your blades and ports on the router.

-  **Port Configuration** — reports individual I/O port status and settings. Selecting a slot updates the table for all installed ports. Selecting a port displays only the options for that port (the label under the port icon is lit blue).
-  **SFP Configuration** — configure each populated AUX port on the blade. Also provides options for configuring ports on the ULTRIX-SFP-IO blade.

For More Information on...

- the Device Configuration interface, refer to "**Navigating the Device Configuration Interfaces**".

Throughout the DashBoard interface, actual sockets (inputs and outputs) of a router (or matrix) are referred to by hierarchical dotted notation: `Frame.Slot.Port.Type.Channel` where:

- `Frame` identifies the physical router chassis housing the matrix/matrices.
- `Slot` identifies which slot in the matrix the socket is located in.
- `Port` identifies the physical input or output socket.
- `Type` identifies the generic signal type (e.g. SDI, audio).
- `Channel` identifies the audio channel within an SDI stream.

These designators may be assigned more user friendly names if required. Refer to the ***Ultricore and Ultrix Database Guide*** for details.

1. SMPTE standard rates.
2. Requires the UltriSpeed license.

Configuring an AUX Port

The various modules available for Ultrix provide SFP+ slots for expansion of the base module I/O blade. Refer to the ***Ultrix SFP Modules Guide*** for a list of available SFP modules from Ross Video.

Keep the following in mind:

- The FLEX slot in the ULTRIX(-NS)-FR5 does not support any I/O in the AUX ports.
- The ULTRIX-SFP-IO blade only supports MADI in the AUX A and AUX B ports.
- The ULTRIX-IP-IO blade supports Ultriscape outputs (SDI video) only on AUX 1 and AUX 2.
- The ULTRIX-IPX-IO blade supports Ultriscape outputs (SDI video) only on AUX A and AUX B.

✶ Some licensed features require access to specific AUX ports on the blade. Refer to "**UltriStream Setup**" and "**Ultrimix-Dante Setup**".

Before You Begin

You may also need to install an:

- UltriSpeed license for each slot that includes an SFP-HDB-IN-12G and/or SFP-HDB-OUT-12G.
- UltriScape license for each AUX port that will be used to provide an UltriScape head output.
- UltriSRC license for each AUX port configured for asynchronous MADI input.

Configuring an AUX Port

Once the SFP module is installed in an AUX port, you must specify the port type. Select SDI Video for video SFP types, or MADI for audio SFP types. MADI audio SFP types allow you to specify the channel quantity (either 56 or 64) as per your facilities' standard.

The **SFP Configuration** interface is organized into two sub-tabs: AUX ports, and SFP ports. The AUX Ports tab lists all the AUX ports for all blades in the Ultrix chassis. The SFP Ports tab lists all the ULTRIX-SFP-IO blade ports.

For More Information on...

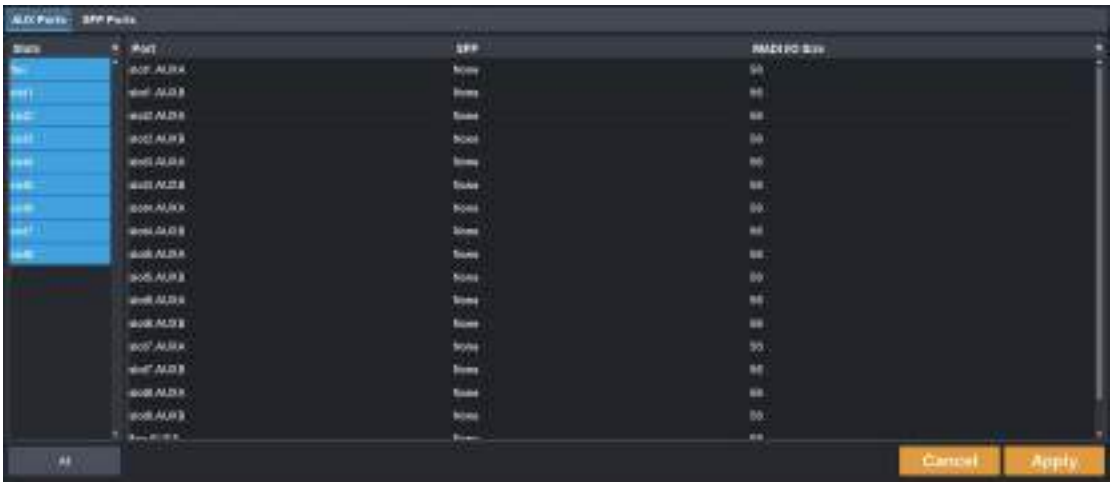
- configuring an AUX port on the ULTRIX-MODX-IO blade, refer to the ***ULTRIX-MODX-IO User Guide***.
- configuring an SFP port on the ULTRIX-SFP-IO blade, refer to "**Configuring an SFP Port**".

To configure an AUX port

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **SFP Configuration** page opens with the AUX Ports tab selected.



6. From the **Slots** table, select the router slot for the port you want to configure.

   The tab updates to display a list of available ports based on the slot(s) selected.
7. Locate the row for the port you want to configure.
8. In the SFP column, select either SDI Video or MADI as appropriate for the fitted port.
9. Click **Apply** to save your changes.

Configuring the SDI I/O Ports

The Port Configuration interface displays the available SDI configuration options in a table format. Use the top toolbar to select a specific blade, or click Multi to select multiple blades of the same type. Use the Views toolbar to filter the table rows. For example, in **Figure 24** the user is viewing the ULTRIX-HDX-IO blade in slot 3, but has filtered the table to display only the Input Ports.

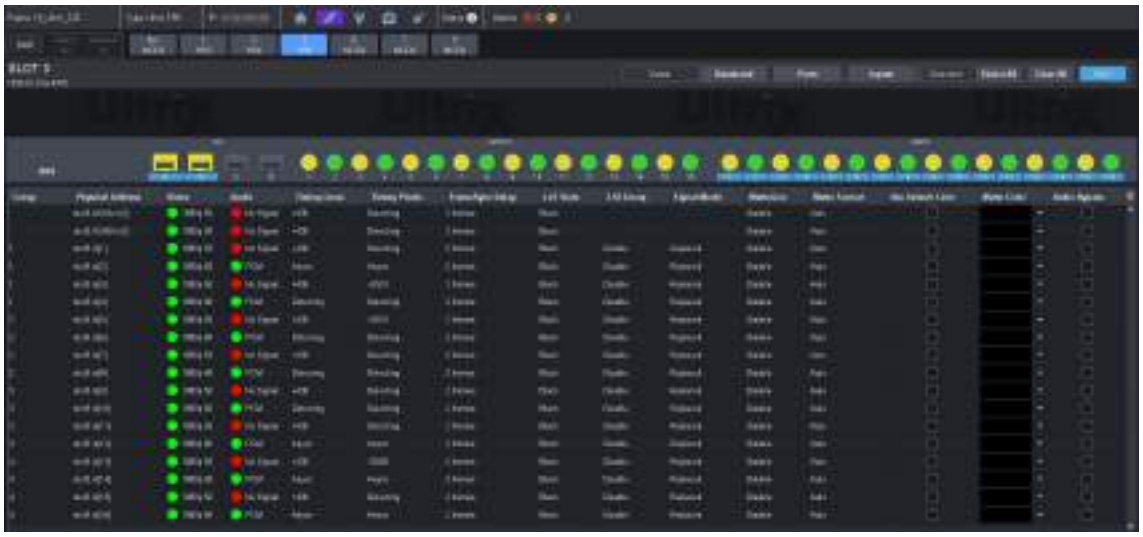


Figure 24 Example of an ULTRIX-HDX-IO Blade in the Port Configuration Interface

This section outlines the options in the Port Configuration interface for the Ultrix based on the Views settings. Some options may depend on the blade type and installed license keys.

Baseband View

When in Baseband view, you can choose to view options based on the port or channel, and signal type (inputs or outputs).

Baseband > Ports > Inputs View

Table 40 summarizes the options when Views is set to Baseband > Ports > Inputs. (**Figure 24**)

Table 40 Port Configuration — Views > Baseband > Ports > Inputs

Item	Parameters	Description
Group	#	Indicates the Gearbox group where Group 1 is the first in the blade
Physical Address	slot#.port[#]	Lists the physical ports, in ascending order, of the Ultrix router. Each row represents a port.
Video (read-only)	#	If a port is used for video signals, this field indicates the video format
Audio (read-only)	#	If a port is used for audio signals, this field indicates the type of audio detected (e.g. PCM, AES etc.).
Timing Lines (read-only)	#	Reports the value of timing difference between input and frame reference in number of lines.
	Detecting	The timing difference is being detected; updates the field approximately every 33 seconds.
	Async	There is no timing relationship between the input signal and the frame reference.
Timing Pixels (read-only)	#	Reports the value of timing difference between input and frame reference in number of pixels.
	Detecting	The timing difference is being detected; updates the field approximately every 33 seconds.
Timing Pixels (read-only)	Async	There is no timing relationship between the input signal and the frame reference
Frame Sync Delay	# frame(s)	Specifies the frame buffer size for the selected input port
LoS State[a]	Black	Sets the input to black during the loss of signal
	Freeze	Sets the input to the last valid frame of video before the loss of signal
2-SI Group	Enable	Gearbox is available on the indicated I/O Group in groups of 4 consecutive I/O. For example, selecting Enable in the row for slot1.in[1] creates a Gearbox group from slot1.in[1] to slot1.in[4]. Note that I/O Groups for Gearbox are defined in the table using colored backgrounds.
	Disable	The indicated I/O is not included in a Gearbox configuration
Signal Medic (read-only)[b]	Not available	This port does not support the Gearbox feature.
	Good	This port is included in a Gearbox setup.
	Replaced	This port can be included in a Gearbox setup but is currently not included in the 12G link.

Table 40 Port Configuration — Views > Baseband > Ports > Inputs

Item	Parameters	Description
Matte Gen	Disable	Disable an internally generated test pattern. This is the default.
	Static	Generates a static color matte
	Bouncing Box	Generates a static color matte with a complimentary colored moving box
	Luma Sequence	Generates a luminance shifting sequence based on chosen color
Matte Format	#	Specifies the signal format of the generated test pattern. If you select Auto, the test pattern automatically matches the incoming signal type.
Use Default Color	Selected	
	Cleared	
Matte Color	#	Specifies the color of the test signal
Audio Bypass	Selected	When Audio Bypass is enabled for an input, the audio will follow the SDI regardless of any individual audio channel routing or configuration on the output. The individual channels of an input in Bypass mode are still de-multiplexed and available for audio routing via the audio matrix.
	Cleared	Disables this feature

a. This affects UltriScape and routed destinations.
b. Use this field to replace a missing 3G signal when one or more of the four 3G signals for a Gearbox configuration are unavailable.

Baseband > Ports > Outputs View

Table 41 summarizes the options when Views is set to Baseband > Ports > Outputs.

Table 41 Port Configuration — Views > Baseband > Ports Outputs

Item	Parameters	Description
Group	#	Indicates the Gearbox group where Group 1 is the first in the blade
Physical Address (read-only)	slot#.port[#]	Lists the physical ports, in ascending order, of the Ultrix router. Each row represents a port.
Video (read-only)	#	If a port is used for video signals, this field indicates the video format
Audio (read-only)	#	If a port is used for audio signals, this field indicates the type of audio detected (e.g. PCM, AES etc.).

Table 41 Port Configuration — Views > Baseband > Ports Outputs

Item	Parameters	Description
2-SI Group	Enable	Gearbox is available on the indicated I/O Group in groups of 4 consecutive I/O. For example, selecting Enable in the row for slot1.in[1] creates a Gearbox group from slot1.in[1] to slot1.in[4]. Note that I/O Groups for Gearbox are defined in the table using colored backgrounds.
	Disable	The indicated I/O is not included in a Gearbox configuration
Sub-Image ID	3G	Some legacy equipment does not accept a 2SI SMPTE-352 payload identifier for quad-link SDI. You may need to select this if you are connecting legacy equipment to the specified output on the Ultrix.
	2SI	Set the SMPTE-352 payload identifier to 2SI for quad-link.
Clean Switch Status (read-only)	Locked	The specified output is locked to its input.
	Not Locked	The specified output is not locked to its input.
Clean Switch	Selected	Clean Switch is applied to the specified output. The Clean Switch Delay value is applied.
	Cleared	Clean Switch is not applied to the specified output.
Clean Switch Mode	Reference	Clean Switch is based on the reference signal available on the REF port of the router
	Input	Clean Switch is based on the input signal available on the specified port of the router
Clean Switch Delay	#	Specifies the Clean Switch buffer depth. Select between 1/16 to full line to clean switch between signals with slight timing offsets.
Trigger	#	Specifies which reference signal trigger to use. Refer to the user guide for your router.

Table 41 Port Configuration — Views > Baseband > Ports Outputs

Item	Parameters	Description
Transition	Cut	The audio input channel is immediately switched to its selected output. A transition to or from Dolby® will always be a Cut transition regardless of what the Transition setting is set to.
	V Fade	The original audio input channel fades down to silence followed by the new input channel fades up from silence to unity gain level
	X Fade	The original audio input channel fades down to silence as the new input fades up from silence, and both will be mixed
	Cut Fade	The original audio input channel cuts to silence and the new input fades up from silence to unity gain level
	Fade Cut	The original audio channel fades down to silence and the new input is cut in at unity gain level.
	Quiet Cut	The original audio channel performs a V Fade transition with a 5ms duration
Duration (ms)	#	Specifies the length of the audio fade, in milliseconds, between audio transitions

Baseband > Channels > Inputs View

Table 42 summarizes the columns that display when Views is set to Baseband > Channels > Inputs.

Table 42 Port Configuration — Views > Baseband > Channels > Inputs

Item	Parameters	Description
ID (read-only)	slot#.port[#].ch	Auto-generated identifier for the channel where: • slot# represents which slot in the matrix the socket is located in • port[#] identifies the physical input or output socket • ch identifies the audio channel within an SDI stream For example, slot1.out[4].audio.ch10.
Label (read-only)	<text>	Reports the text label that identifies the port in other interfaces of the database. This virtual label is used instead of the slot.port.type.channel format for logical label assignment. For example, you might re-name the port: slot1.AUXA.audio.ch1 to OUT AES 1.
Signal (read-only)	Provides status information on the specified channel.	

Table 42 Port Configuration — Views > Baseband > Channels > Inputs

Item	Parameters	Description
Gain (dB)	#	Provides a +/- 20dB gain range in 0.50dB increments. If you have added a gain to an input channel, the gain value specified for the output channel is an addition. For example, if you set the gain for an input to 10dB, then specify a gain of 2dB on the output, the total gain will be 12dB on the final output
Invert	Selected	Inverts the polarity of the audio signal for the selected channel
	Cleared	Disables this feature
Sum	Selected	Sum two adjacent audio channels. Each selected channel will carry the average of the two input channels ((A+B)/2). Select the Sum box for the first channel. The Sum box for the second channel is automatically selected. When the input is summed, the original signals are no longer available for output.
	Cleared	Disables this feature
Audio Delay (ms)	#	Applies up to 500ms of delay per channel. Note that an UltriSync license must be enabled to the port.

Baseband > Channels > Outputs View

Table 43 summarizes the columns that display when Views is set to Baseband > Channels > Outputs.

Table 43 Port Configuration — Views > Baseband > Channels > Outputs

Item	Parameters	Description
ID (read-only)	slot#.port[#].type.ch	Auto-generated identifier for the channel where: • slot# represents which slot in the matrix the socket is located in • port[#] identifies the physical input or output socket • type identifies the generic signal type (e.g. audio) • ch identifies the audio channel within an SDI stream For example, slot1.out[4].audio.ch10.
Label (read-only)	<text>	Reports the text label that identifies the port in other interfaces of the database. This virtual label is used instead of the slot.port.type.channel format for logical label assignment. For example, you might re-name the port: slot1.AUXA.audio.ch1 to OUT 1.
Signal (read-only)	Provides status information on the specified channel.	

Table 43 Port Configuration — Views > Baseband > Channels > Outputs

Item	Parameters	Description
Gain (dB)	#	Provides a +/- 20dB gain range in 0.50dB increments. If you have added a gain to an input channel, the gain value specified for the output channel is an addition. For example, if you set the gain for an input to 10dB, then specify a gain of 2dB on the output, the total gain will be 12dB on the final output
Invert	Selected	Inverts the polarity of the audio signal for the selected channel
	Cleared	Disables this feature
Sum	Selected	Sum two adjacent audio channels. Each selected channel will carry the average of the two input channels ((A+B)/2). Select the Sum box for the first channel. The Sum box for the second channel is automatically selected. When the input is summed, the original signals are no longer available for output.
	Cleared	Disables this feature
Tone Mode	Enable	Enable test tones for the specified channel
	Disable	Disables this feature
Tone Freq	#	Specifies the type of test tone to embed in the output

Loss of Input Signal

If the input signal is absent, the output is automatically set to SDI black and Ultrix uses the last known and valid video format detected on the output. This feature is similar to a “squelch” control. High-speed digital devices will try to lock to any signal. If there is no direct input, they will try to equalize noise (to a point), possibly resulting in down-stream equipment having issues with a non-valid SDI stream. If there is a router input that is either not terminated, or the upstream device outputs a non-valid signal, then the input is forced to SDI black.

UltriSync Configuration

This chapter provides an overview of the UltriSync licenses, and how to configure the UltriSync settings for an input port.

Overview

UltriSync allows the re-timing of asynchronous or time offset input signals to the frame reference. UltriSync is a per input feature and requires a license for each input that will be used by the UltriSync. There are two license types:

UltriSync

This license allows for SDI data rates up to 3Gbps (1080p). This license is available on AUX A, AUX B, and Inputs 1-16 (a maximum of 18 ports).

UltriSync-UHD

This license allows the Frame Sync to operate at up to 12Gbps (2160p) data rates. This license is available for the ULTRIX-HDBNC-IO, ULTRIX-HDX-IO, or ULTRIX-SFP-IO blades only.

- This license is available on 3 inputs per ULTRIX-HDBNC-IO or ULTRIX-SFP-IO blade:
  - AUX B or Input 1
  - Input 5 or Input 6
  - Input 11 or Input 12
- On the ULTRIX-HDX-IO, this license is provides the following port assignments (with a maximum of 16 ports):
  - AUX A or Input 1, Input 2-4
  - AUX B or Input 5, Input 6-8
  - AUX C or Input 9, Input 10-12
  - AUX D or Input 13, Input 14-16

Before You Begin

Ensure to:

- Monitor the video input signals via the **Timing Lines** and **Timing Pixels** fields in the **Port Configuration** page. These fields report the amount of detected timing offset (in lines and pixels respectively) between the incoming signal and the frame reference signal. The timing fields are updated every 15 seconds. This information is useful in deciding where to install an UltriSync license as follows:
  - If there is an input that is out of time with regards to the frame reference, then it would beneficial to synchronize it with the frame reference.
  - If the timing is +/- half-line, then UltriClean can accommodate the synchronization. The amount of pixels per line depends on the video standard being used. For example, 1080p is actually 1920x1080 pixels (nominally), so 1920 pixels makes one line.
- Install one (or more) UltriSync licenses. Refer to "**Installing a License Key**".
- Verify that the video source signals are the same format as the frame reference.

Configuring UltriSync for an Input Port

UltriSync allows configuration of the frame buffer size between 1 frame and 2 frames. Data is clocked out of the buffer using the frame reference, thus timing arbitrarily timed input signals to a common clock. The size of the buffer can determine its resilience to incoming signal disturbances.

To assign an UltriSync license to an input port

1. Install the license key as outlined in the procedure "**Installing a License Key**".
2. From the **Device Configuration** interface, select  .

   The **License** page displays with the **License Keys** tab selected.
3. Select the **UltriSync** tab.

   Each row in the tab represents a port on the Ultrix router with each column a type of UltriSync license.
4. Select the box in the applicable **License** column for the port you want to enable an UltriSync license for.

To configure the UltriSync settings for an input port

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .
6. In the **Physical Address** column, locate the row for the input port you wish to configure.
7. In the **FrameSync Delay** column, select the buffer size for the required port. Choose from the following:
   - **1 frame** — ensures a short delay (up to 1 frame) in router throughput, but is susceptible to incoming stream disturbances like a non-clean upstream switch.
   - **2 frames** — delays the signal between 1 and 2 frames depending on signal to reference timing offset. If an incoming signal is corrupted at a line or single frame rate, then a 2 frame buffer can repeat the last known good frame for the corrupted frame thus ensuring a clean output.

✶ If there is a 1 or 2 frame timing difference between the audio and video, try setting the FrameSync Delay to 1 frame to minimize the difference.

UltriClean Configuration

This chapter provides an overview of the UltriClean licensed feature, and how to configure the Clean Switch mode for an output port.

Overview

UltriClean allows users to enable a Clean Switch mode and apply a line buffer (delay) on a per output basis. Incoming video is buffered based on the timing of the input, and is then output based on the timing of the Ultrix system reference (including any offsets added in the Triggers setup). Users can then switch between inputs that are not perfectly co-timed without perceiving any glitches of the incoming data. Video source timing must remain within the buffer to properly switch between sources (buffer depth is user-configurable).

Before You Begin

Ensure that:

- All video sources must be the same video format, locked to the same reference, and vertically timed to within the selected Clean Switch window.
- Reference triggers are correctly configured. The trigger format for the selected trigger must match the input video format or an equivalent custom trigger set up to comply with RP-168 Switch point. Refer to "**Configuring a Reference Trigger for the Ultrix Router**" for details on setting up a reference trigger.

Notes on Timing

It possible that you may find a discrepancy on an output from Ultrix when trying to set the horizontal time to zero with respect to the reference.

This is because there is a certain amount of latency through the Ultrix router even with Clean Switch disabled for the port. Due to our industry leading internal processing engine which supplies advanced features, a certain amount (though minimal) of delay should be expected. This should not pose a problem for most digital downstream equipment. If you do encounter a problem, we recommend using an external line sync device (such as our SFS-8622 openGear card) to zero time the Ultrix router output.

While it may be technically possible to zero time (horizontally) the output of the Ultrix router, it is not recommended for the following reasons:

- While you can zero time the output if you disable Clean Switch for that output, there will still be a large timing window that you have to exceed in order to get the output timing to re-sync. This is due to the line sync is always enabled even though it is put into a very low line length mode (resulting in a small the timing window). As a result, every timing adjustment applied to the input is ignored on the output until the window is exceeded. Once it is exceeded, the output timing jumps. You will need to adjust the timing incrementally until the timing is set to zero. This is further complicated during a power cycle where the timing may not be exactly zero as the window may have moved slightly on re-boot.
- The frame syncs output timing is hard coded to match the timing of a synchronous input that is zero timed at the input to the router.

It is recommended that all synchronous inputs to the router be zero timed to the inputs of the router instead of trying to zero time the router outputs.

Configuring Clean Switch Mode for an Output Port

The Clean Switch mode uses the input signal timing to decide when a frame of active picture begins.

To configure the Clean Switch mode for an output port

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .
6. In the **Physical Address** column, locate the row for the output port you wish to configure.
7. To enable Clean Switch mode for an output, select the **Clean Switch** box for the output you want to configure.
8. Use the **Clean Switch Mode** menu to specify timing source. Choose from the following:
   - **Reference** — The Clean Switch is based on the reference signal available on the REF port of the router.
   - **Input** — The Clean Switch is based on the input signal available on the specified port of the router.

To configure the Clean Switch timing window

1. Navigate to the **Port Configuration** interface as outlined in "**To configure the Clean Switch mode for an output port**".
2. In the **Physical Address** column, locate the row for the output port you wish to apply a delay to.
3. Click in the **Clean Switch Delay** cell for the output you want to configure.

   A drop-down menu displays.
4. Use the drop-down menu to specify the buffer size to apply.

✶ This will effectively delay the signal up to the amount specified minus signal-to-reference offset for a maximum delay of the chosen setting.

✶ Select Full Line to add one full line of delay to the output. This will align the output horizontally with the reference but with one full line delayed vertically (two lines when using 3G Level B). This option is useful if you want a horizontally timed output.

UltriSRC Configuration

This chapter outlines how to assign an UltriSRC license to an input port.

For More Information on...

- cabling your MADI inputs, refer to the ***Ultrix Installation Guide***.
- configuring an AUX port, refer to "**Configuring an AUX Port**".
- audio matrices with MADI, refer to "**MADI Overview**".

Assigning UltriSRC to an Input Port

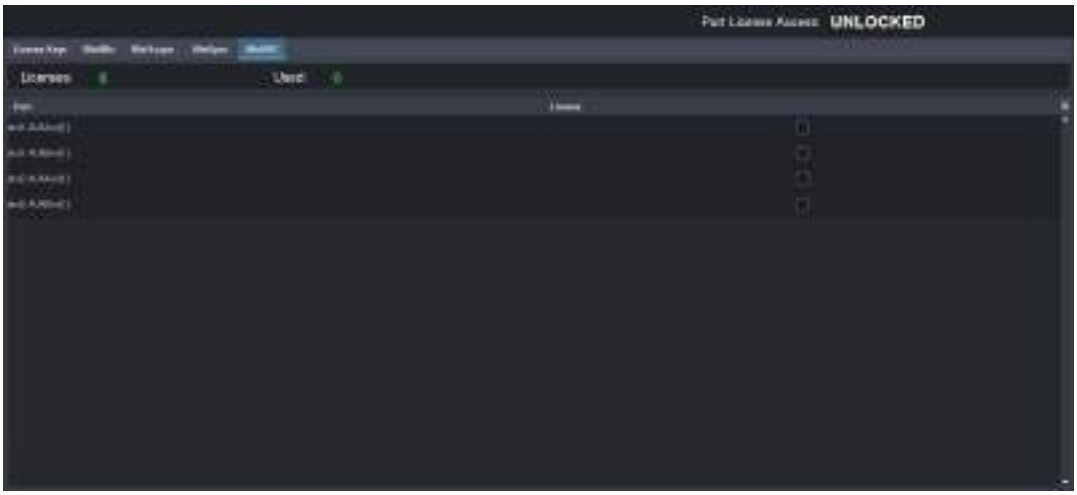
The UltriSRC license is a per port license enabling Sample Rate Conversion for MADI audio inputs. The sample rate conversion will re-sample incoming MADI up to 48kHz. This allows MADI sources that are not reference-locked to the Ultrix.

To assign an UltriSRC license to an input port

1. Install the license key as outlined in the procedure "**Installing a License Key**".
2. From the **Device Configuration** interface, select  .
3. Select the **UltriSRC** tab.

   Each row in the tab represents a physical AUX port on the Ultrix.

   Each column in the second table represents a type of licensed feature and indicates whether it is enabled for that input.



4. Select the box in the **License** column for the physical port you want to enable an UltriSRC license for.

Configuring an Audio Matrix

The UltriMix sub-system provides advanced audio integration, including the ability to embed and de-embed audio on all of the inputs and outputs of the router. Users also have complete flexibility to process, swap, sum, mute, or route any discrete or embedded audio input to any output. UltriMix is perfect for applications where audio is constantly changing, and it can be added as needed without throwing away any initial investment in the system.

The Ultrix routers include the following features:

- 16 AES audio channels coming from each input SDI video stream
- Asynchronous processing of all audio channels
- Support for MADI on the AUX ports when a SFP-MADI-COAX, SFP-MADI-850MM, or SFP-MADI-1300MM is installed
- Audio channel status Dolby® bit capture and overwrite capabilities

Audio Routing Overview

The Ultrix router handles high-bandwidth, broadcast-quality, digital video and audio signals, and embedded audio signals. The Ultrix router can perform signal processing functions like audio shuffling and insert into and extra from MADI streams.

Each SDI I/O allows for up to 1 stream of 16 channels of 48kHz sampled, 24bit audio, for a total of 16 channels. If there are audio channels that are received at a higher rate than 48kHz, the number of channels is limited.

Before You Begin

Keep the following in mind when using the UltriMix feature:

- By default, all embedded audio is de-multiplexed at each input and passed through processing (proc-amps) and the audio matrix.
- Each input has an Audio Bypass configuration option. When Audio Bypass is enabled for an input, the audio will follow the SDI regardless of any individual audio channel routing or configuration on the output. The individual channels of a input in Bypass mode are still de-multiplexed and available for audio routing via the audio matrix.
- Re-mapping of all audio channels from source to destination with transitions is available
- Audio processing controls are available for each audio channel (gain, sum, invert, tone insert)
- Audio summing of any two adjacent channel pairs is available (1 + 2, 3 + 4, 5 + 6, etc.)

General Configuration Workflow

You may wish to use the following process when defining the database for your audio workflow.

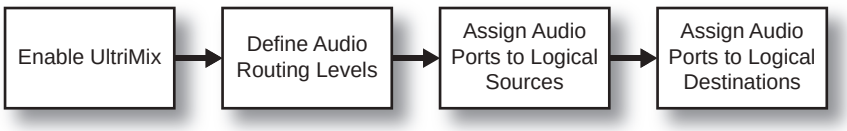


Figure 25 Process for Configuring the Audio Channels

Enabling the Audio Matrix

You must enable the audio matrix (UltriMix) before you can map the individual audio channels.

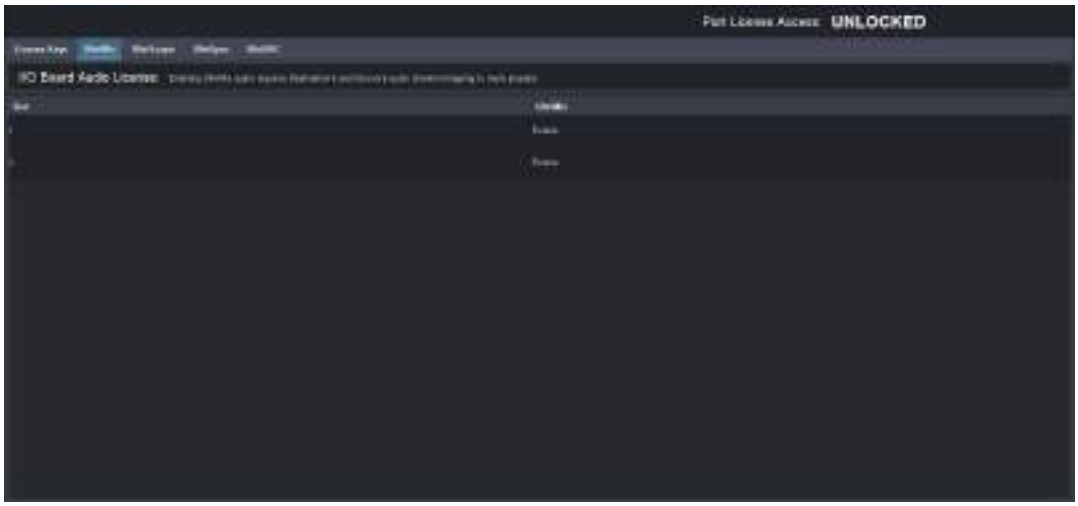
✶ It is recommended to enable/disable the UltriMix feature before database configuration.

To enable the audio matrix

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Licenses** page opens with **License Keys** sub-tab automatically selected.
6. Select the **UltriMix** sub-tab.



7. Locate the row for the slot you wish to enable the UltriMix feature for.
8. From the **UltriMix** column, select **Enable**.
9. Repeat steps 7 and 8 as required.

Audio Matrix Routing and Processing

Table 44 summarizes the audio mapping options when using SDI embedded audio or MADI signals.

Table 44 Audio Mapping Options

Source		Destination		Result
Audio Mapping	Input Proc Amp Available	Audio Mapping	Output Proc Amp Available	
EMB	✓	EMB	✓	Switches based on logical configuration (with full breakaway support)
EMB, PT	✓	EMB	✓	Switches logical configuration (but passes through each channel defined as pass-through from the SDI input content)
EMB, DS	X	EMB	X	Switches logical configuration (but mutes for each channel that has “disconnect” defined)
EMB	✓	MADI	✓	Follows breakaway operation based on logical mapping
EMB, PT	✓	MADI	X	Switches logical configuration (but passes through each channel defined as pass-through from the SDI input content)
EMB, DS	X	MADI	X	Switches logical configuration (but mutes for each channel that has “disconnect” defined)
MADI	✓	MADI	✓	Switches based on logical configuration (with full breakaway support)
MADI, PT	✓	MADI	X	Not Valid
MADI, DS	X	MADI	X	Switches logical configuration (but mutes for each channel that has “disconnect” defined)

Table Legend

✓	Feature is enabled/available or SDI embedded audio is mapped to audio levels.
X	Feature is not enabled/available or no audio levels are mapped
EMB	Source or destination is mapped for SDI embedded audio channels
MADI	Source or destination is mapped for MADI audio channels
PT	‘passthrough[1].audio’ is defined for some or all source levels
DS	‘disconnect[1].audio’ is defined for some or all source levels

Notes on Using the Audio Bypass

- Selecting Audio Bypass in the Device Configuration interface forces the embedded audio of the input SDI stream to bypass the audio routing section and be routed with the SDI to a Destination for all embedded audio channels.
- Selecting Audio Bypass in the Device Configuration interface for MADI inputs or outputs results in a non-valid situation where MADI channels cannot be routed.

Defining the Database Audio Levels

A level is a term used to describe a section or layer of the routing system (e.g. video level, audio level). Refer to "**Defining the Levels in a Database**" for instructions on how to define a level in your database. For each audio level, you will assign a port channel.

✶ If an audio level is not defined for a given input or output channel of the port, then the output will remain at its default selection (**`slot1.in[1].audio.chxx`**). For example, if OUT 3 is selected to IN 10 but only channels 1 - 4 are defined in the logical map, then OUT 3 will have channels of IN 1 audio mapped to channels 5 - 16.

In **Figure 26**, Levels 2-6 are defined for audio channels.

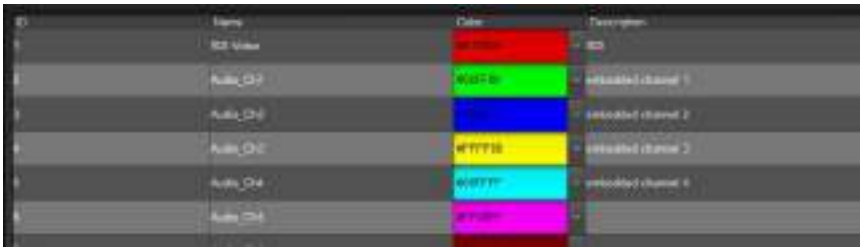


Figure 26 Example of Defined Audio Levels in a Database

MADI Overview

Multi-channel Audio Digital Interface (MADI) is the industry standard for the transmission of up to 64 audio channels on a single cable. The Ultrix router supports the following SFP module options that provide the ability to route discrete MADI:

- SFP-MADI-COAX — the AUX port can receive and transmit MADI signals of 125Mbps over 75Ω coaxial cables via HD-BNC connectors.
- SFP-MADI-850MM, SFP-MADI-1300MM — the AUX port can receive and transmit MADI optical signals as defined in SMPTE 297-2006.

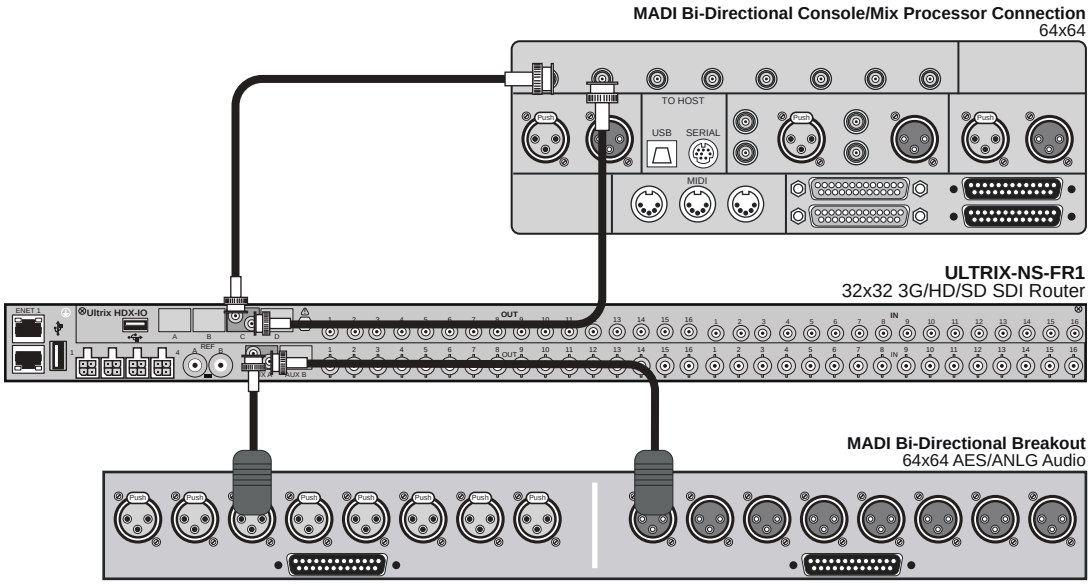


Figure 27 Example of Ultrix Audio Interconnect using Two SFP-MADI-COAX Options

For More Information on...

- the specifications for your SFP module, refer to the ***Ultrix SFP Modules Guide***.

Before You Begin

Ensure an SFP Module that supports MADI is physically installed in an AUX port of the Ultrix router.

✶ Downstream equipment of the Ultrix MADI output may report signal on all channels due to Ultrix setting status bits. This is to ensure maximum equipment compatibility.

Configuring an AUX Port for MADI

Each SFP Module that supports MADI includes an IN (Rx) connector and an OUT (Tx) connector.

✶ External MADI devices must be timed to the Ultrix reference signal unless an UltriSRC license is enabled for a given SFP port.

For More Information on…

- on the input and output connections for your module, refer to the ***Ultrix SFP Modules Guide***.

MADI Inputs

A MADI input source is identified in the routing system using the nomenclature **Frame.Slot.Port.Type.Channel**. For example, **`ultrix.slot4.AUXA-in1.audio.ch5`** where AUXA represents the physical **AUX** port the SFP module is installed, and **`ch5`** represents Channel 5 in the MADI signal.

You must define the MADI input channels in the database for your Ultrix router to be able to route the individual MADI channels.

MADI Outputs

A MADI output source is identified in the routing system using the nomenclature **Frame.Slot.Port.Type.Channel**. For example, **`ultrix.slot4.AUXB-out1.audio.ch64`** where AUXB represents the physical AUX port the SFP module is installed in, and ch64 represents Channel 64 in the MADI signal.

You must define the MADI output channels in the database for your Ultrix router to be able to route the individual MADI channels.

Mapping the Audio Channels

You can configure audio channels from DashBoard. Note that source and destination logical mapping is required to complete the setup of the Ultrix embedded audio routing.

For More Information on…

- mapping the audio channels in a database, refer to the ***Ultricore and Ultrix Database Guide***.

Specifying the Audio Transition Mode

You can specify an audio transition mode for each audio channel output.

To set the audio transition mode for an audio channel

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.

5. Select  .

   The **Port Configuration** page opens.

6. Select the I/O Module (slot) containing the output(s) you wish to configure.
7. Select **Outputs** from the **Views** toolbar.

   The **Port Configuration** page updates to display the options for the selected outputs.

8. Use the **Transition** field to set the audio transition mode for the audio channel. Choose from the following:
   - **Cut** — The audio input channel is immediately switched to its selected output. A transition to or from Dolby® will always be a Cut transition regardless of what the Transition setting is set to.
   - **V Fade** — The original audio input channel fades down to silence followed by the new input channel fades up from silence to unity gain level.
   - **X Fade** — The original audio input channel fades down to silence as the new input fades up from silence, and both will be mixed.
   - **Cut Fade** — The original audio input channel cuts to silence and the new input fades up from silence to unity gain level.
   - **Fade Cut** — The original audio channel fades down to silence and the new input is cut in at unity gain level.
   - **Quiet Cut** — The original audio channel performs a V Fade transition with a 5ms duration.
9. Use the **Duration** field to specify the length of the audio transition in milliseconds.

Applying Proc Amps to the Embedded Audio Input

Ultrix includes Processing Amplifiers (Proc Amps) for the audio inputs. For each audio channel of an input signal, you can set the Bypass Mode, invert selected channels, and sum two adjacent audio channels or apply audio delay. The Proc Amp settings are applied before going through the audio matrix.

To set up processing of the embedded audio input

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.

5. Select  .

   The **Port Configuration** page opens.

6. From the Ultrix rear panel map, select the port for the audio input you wish to process.

   The **Port Configuration** tab updates to display the audio options for the selected input.

7. Select the **Audio Bypass** box to a prevent breakaway switching of untimed sources. The router will alarm when the audio signal becomes asynchronous to the reference signal provided on the **REF** port of the router.

✶ Select the **Audio Bypass** box if the input is asynchronous to other inputs. This will avoid any improper mapping of the associated audio channels onto other asynchronous outputs.

8. To apply a gain to a channel, use the associated **Gain** field to select a value between -20dB and 20dB.

9. To invert a channel, select the associated **Invert** box.
10. To sum two adjacent audio channels, select the **Sum** box for the first channel.

    The **Sum** box for the second channel is automatically selected.

✶ Each selected channel will carry the average of the two input channels ((A+B)/2). When the input is summed, the original signals are no longer available for output.

11. Apply up to 500ms of delay per channel.

✶ The audio delay feature requires an UltriSync license applied to the port.

12. If required, repeat steps 6 to 11 for each audio input you want to configure.

Applying Proc Amps to the Embedded Audio Outputs

The Ultrix router includes Processing Amplifiers (Proc Amps) for the audio outputs. Proc Amp adjustments are applied in the following order:

1. Gain — This option provides a +/- 20dB gain range in 0.50dB increments. If you have added a gain to an input channel, the gain value specified for the output channel is an addition. For example, if you set the gain for an input to 10dB, then specify a gain of 2dB on the output, the total gain will be 12dB on the final output.
2. Invert — This option enables you to invert the polarity of the audio signal for the selected channel.
3. Sum — This option enables the selected channels to carry the average of the specified channels ((A+B)/2).

To configure the embedded audio outputs

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Port Configuration** page opens.
6. From the Ultrix rear panel map, select the port for the output you wish to configure.

   The **Port Configuration** interface updates to display the audio options for the selected output.
7. Use the **Trigger** menu to specify which reference signal trigger to use. Refer to "**Configuring a Reference Trigger for the Ultrix Router**" for details.
8. To apply a gain to a channel, use the associated **Gain** field to select a value between -20dB and 20dB.
9. To invert a channel, select the associated **Invert** box.
10. To two adjacent audio channels, select the **Sum** box for the first channel.

    The **Sum** box for the second channel is automatically selected.

✶ Each selected channel will carry the average of the two channels ((A+B)/2). When the output is summed, the original signals are no longer available for output.

11. To insert a test tone into a channel:

a. Use the **Tone Freq** menu to specify the type of test tone to embed in the output.

a. Use the **Tone Mode** menu to enable test tones for that channel.

12. Repeat steps 6 to 11 for each channel you wish to configure.

Examples of Audio Configured Databases

UltriMix enables access to the 16 audio channels embedded in the SDI stream.

Muting Embedded Channels

Once the various channels are mapped to levels, then we may treat those channels individually akin to them being independent physical connections to the router. For example, we may define a source to the router as:

Source	SDI	Level 1	Level 2	Level 3	Level 4	...
Input1	SDI.in[1]	SDI.in[1].ch1	SDI.in[1].ch2	SDI.in[1].ch3	SDI.in[1].ch4	...
...	...	...	...	...	...	...

With this mapping, we may route the embedded channels to any other audio enabled destination by selecting levels required prior to making our route selection.

Consider the case where only the first audio group (Embedded channels 1, 2, 3 and 4) are needed for routing. What occurs to the other 12 channels of the SDI stream that are not mapped?

The remaining audio channels within the SDI stream are still there and even though they are not explicitly defined within the logical map. They will remain at a default routing of 1-to-1 (i.e.; input #1 embedded channel #8 will always be routed to output #1 embedded channel #8). It may be undesirable to have these extra embedded audio channels routed this way, so a “Disconnect” may be defined for the input channels not required.

Source	SDI	Level 1	Level 2	Level 3	Level 4	Level 5	...	Level 16
Input1	SDI.in[1]	SDI.in[1].ch1	SDI.in[1].ch2	SDI.in[1].ch3	SDI.in[1].ch4	Disconnect	...	Disconnect
.....	...	...	...	...	...		...	...

Switching Bilingual Sources

This example assumes the following setup:

- Embedded audio channels 1 and 2 are the primary channels.
- Incoming sources have English on Embedded channels 1 and 2, and French on 3 and 4.

The **Sources** are defined as follows:

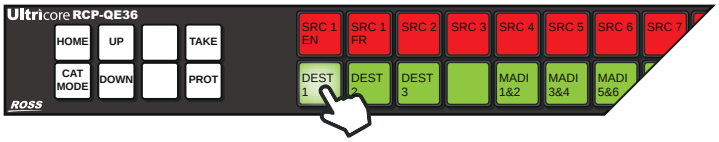
Sources	SDI	Level A1	Level A2	Level A3	Level A4	...
SRC1 EN	SDI.in[1]	SDI.in[1].ch1	SDI.in[1].ch2	SDI.in[1].ch3	SDI.in[1].ch4	...
SRC1 FR	SDI.in[1]	SDI.in[1].ch3	SDI.in[1].ch4	SDI.in[1].ch1	SDI.in[1].ch2	...

The **Destinations** are defined as follows:

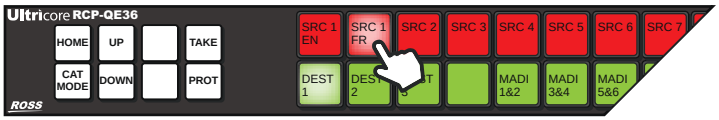
Destinations	SDI	Level A1	Level A2	Level A3	Level A4	...
Dest 1	SDI.out[1]	SDI.out[1].ch1	SDI.out[1].ch2	SDI.out[1].ch3	SDI.out[1].ch4	...
...	...	...	...	...	...	...

To route Src1 to Dest1 and swap the Primary Audio from English to French

1. Select the **Destination**.



2. Select the **Source**.



The resulting status would be:

Status	SDI	Level A1	Level A2	Level A3	Level A4
Dest1	SDI.in[1]	SDI.in[1].ch3	SDI.in[1].ch4	SDI.in[1].ch1	SDI.in[1].ch2

The Destination will have the video from SDI.in[1] but embedded channels Level A1 and Level A2 will have the input SDI embedded channels 3 and 4 respectively which we have previously defined as being our French language stereo pair. Note that in this example the English language stereo pair are still available but now on the destination channels Level A3 and Level A4.

If pair Level A3 and Level A4 are not required to be muted, the source definitions change to contain a 'disconnect' in the Level A3 and Level A4 levels (and any other levels requiring muting):

Sources	SDI	Level A1	Level A2	Level A3	Level A4	...
SRC1 EN	SDI.in[1]	SDI.in[1].ch1	SDI.in[1].ch2	disconnect[1].ch1	disconnect[1].ch1	...
SRC1 FR	SDI.in[1]	SDI.in[1].ch3	SDI.in[1].ch4	disconnect[1].ch1	disconnect[1].ch1	...

Embedded Channel Routing

Embedded audio routing encompasses the following scenarios:

- Embedded channels to embedded channels
- Embedded channels to MADI channels
- MADI channels to Embedded channels
- MADI channels to MADI channels

To accommodate these scenarios, the database source table defines many individual channels in addition to the standard SDI plus audio source. In the examples below, In 1 is our SDI and audio source - our normal “audio follow video” source. Also defined are the individual embedded audio channels that will allow routing of these to other audio destinations.

✶ If all 16 channels of embedded audio are not required or used, then only the in-use channels need be defined. This can serve to reduce the source table size to just the required definitions.

The Source definitions for SDI IN 1 and its individual embedded audio channels are defined as follows:

Sources	SDI	Level A1	Level A2	...	Level A15	Level A16
In1	sdi.ch1	audio.ch1	audio.ch2	...	audio.ch15	audio.ch16
In1 ch1		audio.ch1	audio.ch1	...	audio.ch1	audio.ch1
In1 ch2		audio.ch2	audio.ch2	...	audio.ch2	audio.ch2
...	...	...	...	...	...	...
In1 ch16		audio.ch16	audio.ch16	...	audio.ch16	audio.ch16

The Destinations for SDI outputs are defined as follows:

Destination	SDI	Level A1	Level A2	...	Level A15	Level A16
Out1	sdi.ch1	audio.ch1	audio.ch2	...	audio.ch15	audio.ch16
Out2	sdi.ch1	audio.ch1	audio.ch2	...	audio.ch15	audio.ch16
...	...	...	...	...	...	...

The Source definitions for MADI inputs are defined as follows:

Sources	SDI	Level A1	Level A2	...	Level A15	Level A16
MADIch1		audio.ch1	audio.ch1	...	audio.ch1	audio.ch1
MADIch2		audio.ch2	audio.ch2	...	audio.ch2	audio.ch2
...		...	...	...	...	...
MADIch63		audio.ch63	audio.ch63	...	audio.ch63	audio.ch63
MADIch64		audio.ch64	audio.ch64	...	audio.ch64	audio.ch64

The Destinations for MADI outputs are defined as follows:

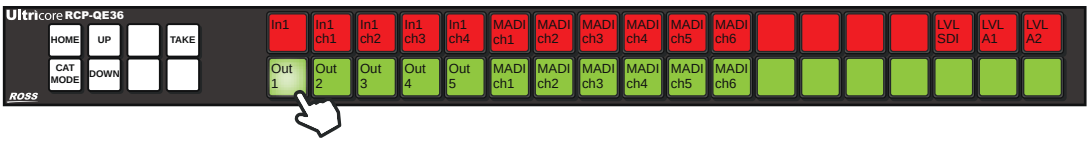
Destination	SDI	Level A1	Level A2	...	Level A15	Level A16
MADIch1		audio.ch1		...		
MADIch2		audio.ch2		...		
...				...		
MADIch63		audio.ch63		...		
MADIch64		audio.ch64		...		

Embedded Channels to Embedded Channels

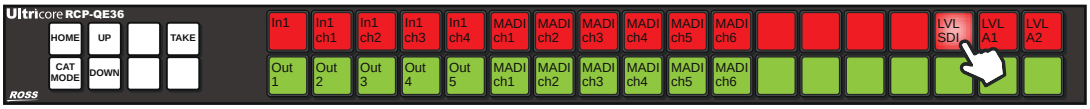
If we wish to perform the route as illustrated below (a channel swapping route) where the audio.ch3 and audio.ch4 are to be routed to destination audio.ch1 and audio.ch2, we need to route the embedded channels individually as our default mapping provides no common control levels between source audio.ch3 and audio.ch4 and destination audio.ch1 and audio.ch2.

To route Audio Channels 3 and 4 from Src1 to SDI OUT 1 Channels 1 and 2

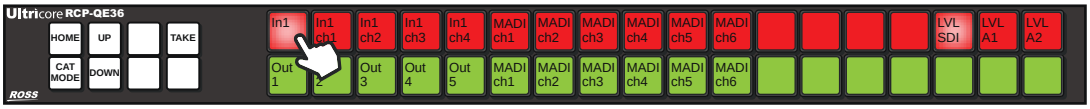
1. Select the **Destination** (Out 1).



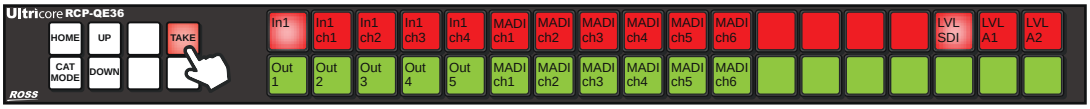
2. Perform the first switch (Switch the SDI Level) as follows:
   a. Select the **SDI Level**.



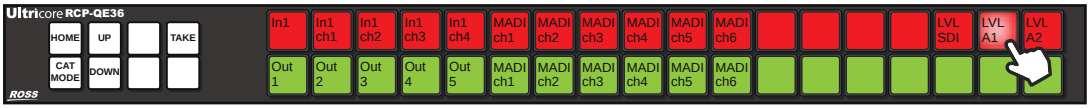
   b. Select the **Source** (In 1).



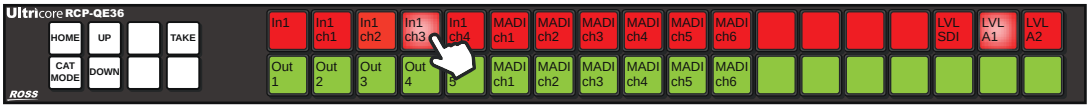
   c. Press **TAKE** to switch.



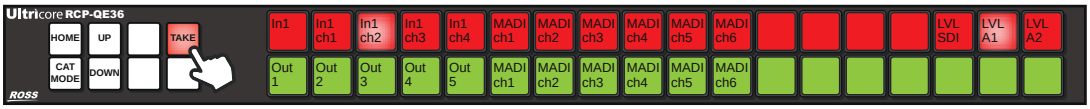
3. Perform the second switch (Source In1ch3 on Audio Level 1) as follows:
   a. Select **Level A1**.



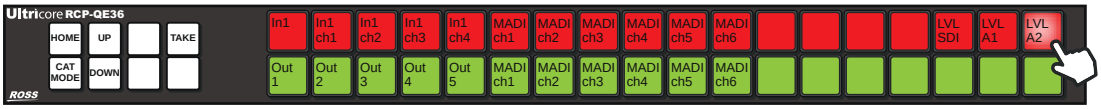
   b. Select the **Source** (In1 ch3).



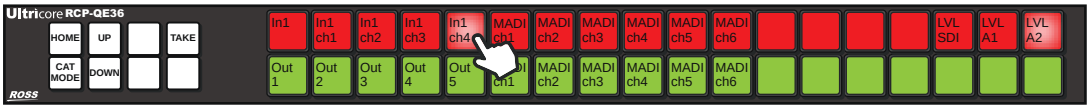
   c. Press **TAKE** to switch.



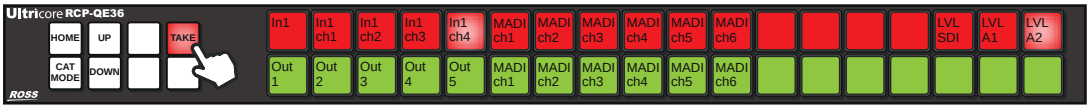
4. Perform the third switch (Source In1ch4 on Audio Level 2) as follows:
   a. Select **Level A2**.



   b. Select the **Source** (In1ch4).



   c. Press **TAKE** to switch.



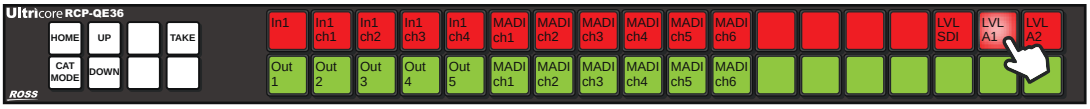
The Level buttons serve to indicate the Destination channels we are routing to.

Embedded Channels to MADI Channels

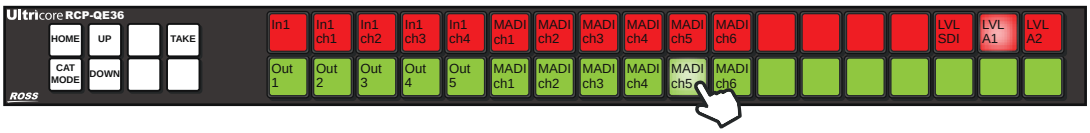
To route embedded channels to MADI channels, select a MADI channel destination, then select the appropriate source. If the current level mask or breakaway contains level A1, then level A1 does not need specific selection. As the destination **`MADIchx`** contains only physical port assignments in level A1, then all other levels are ignored.

The following illustrates routing source In1 embedded ch3 and ch4 to our MADI destination on ch5 and ch6 respectively:

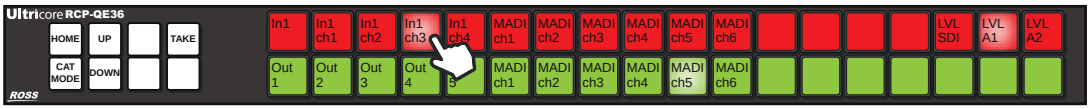
1. Select the **Audio Level**.



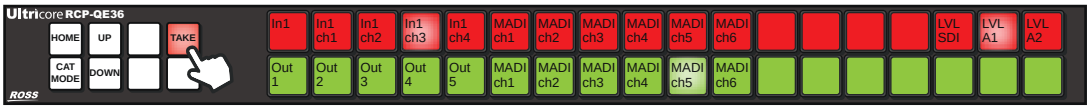
2. Perform the first switch (Source In1ch3 to Destination MADIch5) as follows:
   a. Select the **Destination** (MADIch5).



   b. Select the **Source** (In1ch3).

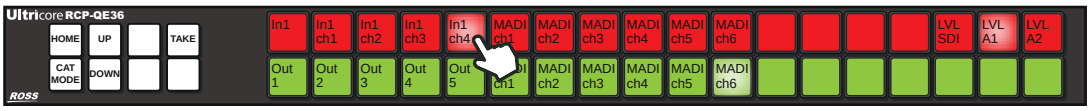


   c. Press **TAKE** to switch.

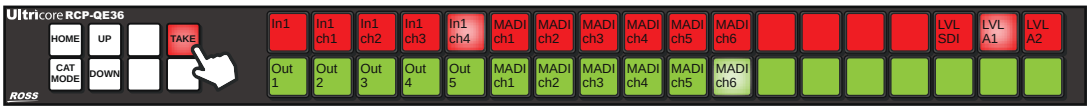


3. Perform the second switch (Source In1ch4 to MADIch6) as follows:
   a. Select the **Destination** (MADIch6).

   b. Select the **Source** (In1ch4).



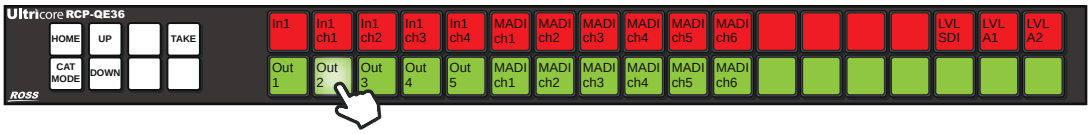
   c. Press **TAKE** to switch.



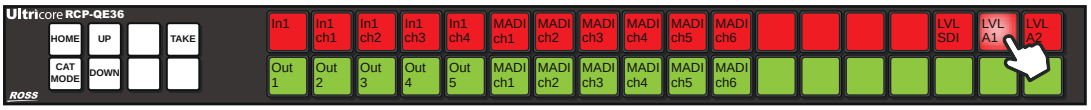
MADI Channels to Embedded Channels

Routing MADI input ch5 and ch6 to SDI embedded ch1 and ch2 of Out 2 is as follows:

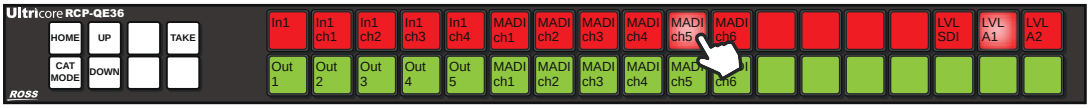
1. Select the **Destination** (OUT 2).



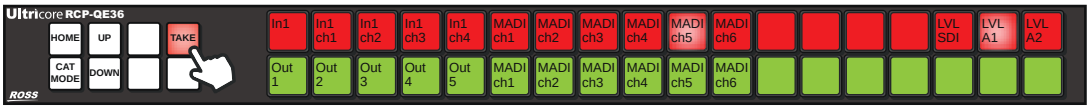
2. Perform the first switch as follows:
   a. Select **Level A1**.



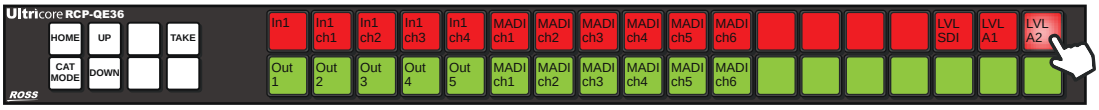
   b. Select the **Source** (MADIch5).



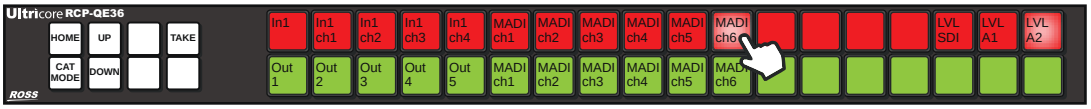
   c. Press **TAKE** to switch.



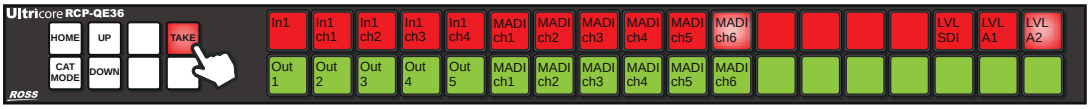
3. Perform the second switch.
   a. Select **Level A2**.



   b. Select the **Source** (MADIch6).



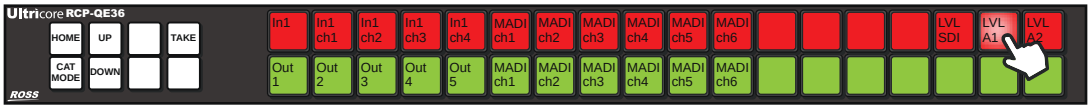
   c. Press **TAKE** to switch.



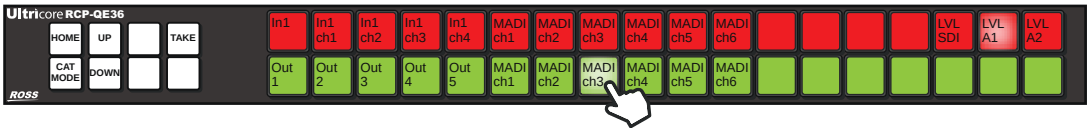
MADI Channels to MADI Channels

Routing MADI inputs to MADI outputs is as follows:

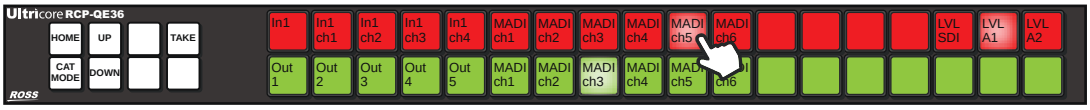
1. Select the **Destination**.



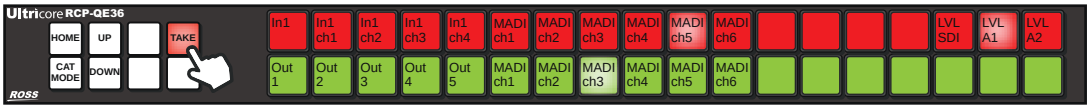
2. Perform the first switch.
   a. Select the **Destination** (MADIch3).



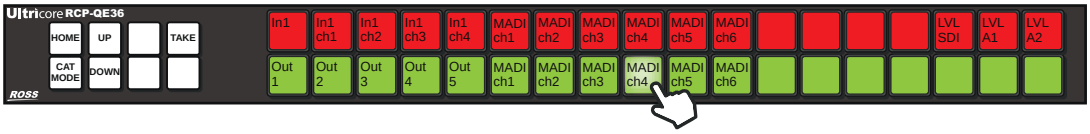
   b. Select the **Source** (MADIch5).



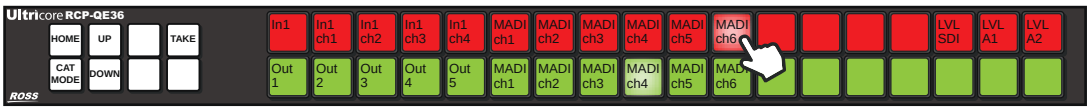
   c. Press **TAKE** to switch.



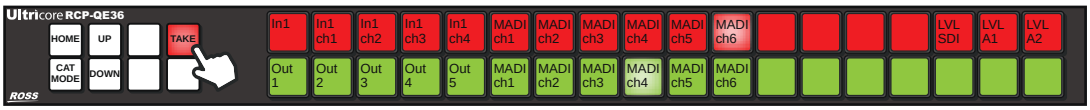
3. Perform the second switch.
   a. Select the **Destination** (MADIch4).



   b. Select the **Source** (MADIch5).



   c. Press **TAKE** to switch.



UHD Gearbox Configuration

Ultrix provides maximum performance and quality with standard configurations supporting data rates up to 12Gbps. In addition, you can purchase the UltriSpeed software license that enables 12Gbps performance throughout every signal path within the router. When combined with the inherent capabilities within the router, the UltriSpeed license also enables routing of the emerging single link UHD (50Hz, 60Hz) standard alongside Quad-link UHD signals, and seamlessly switch these signals back and forth to each other.

✶ The Ultrix Gearbox function supports the two sample interleave (2SI) format of quad link. Note that Square Division Quad Split is not implemented.

Example Setup for Multiplexing

Assign Gearbox Group 1 on the Ultrix router to be 4:1 (multiplex four 3Gbps inputs into a single 12Gbps output). The router OUT 1 BNC is the combined signal of IN 1-4. The OUT 2, 3, and 4 BNCs are reserved by the system.

Table 45 Example Mapping for Multiplexing

Name	Channel 1	Channel 2	Channel 3	Channel 4
Source				
QUAD IN	slot2.in[1]	slot2.in[2]	slot2.in[3]	slot2.in[4]
Destination				
12G OUT	slot2.out[1]			

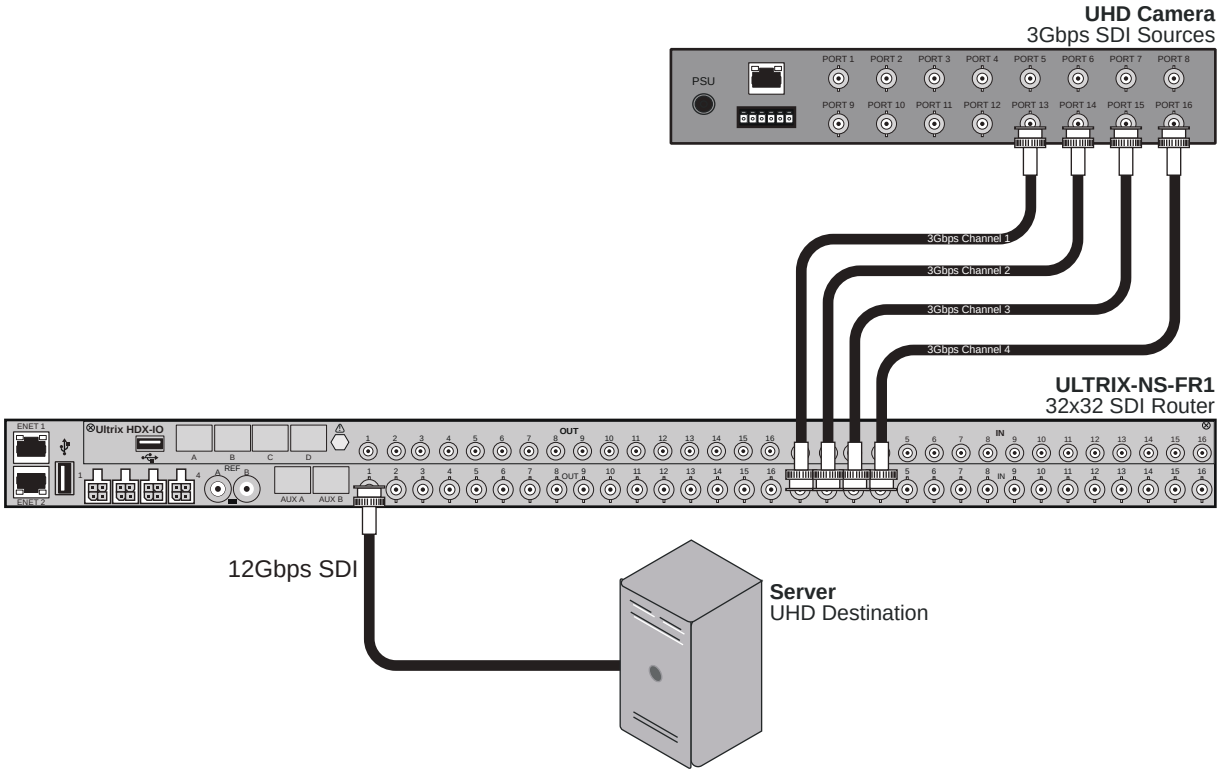


Figure 28 Example of Gearbox Workflow of an Ultrix Router — Multiplexing to a 12Gbps Signal

Example Setup for De-multiplexing

Assign Gearbox Group 1 on the Ultrix router to be 1:4 (de-multiplex a single 12Gbps input into four 3Gbps outputs). The router OUT 1, 2, 3, and 4 BNCs are the split output signals.

Table 46 Example Mapping for De-multiplexing

Name	Channel 1	Channel 2	Channel 3	Channel 4
Source				
12G IN	slot1.in[4]			
Destination				
QUAD OUT	slot2.out[1]	slot2.out[2]	slot2.out[3]	slot2.out[4]

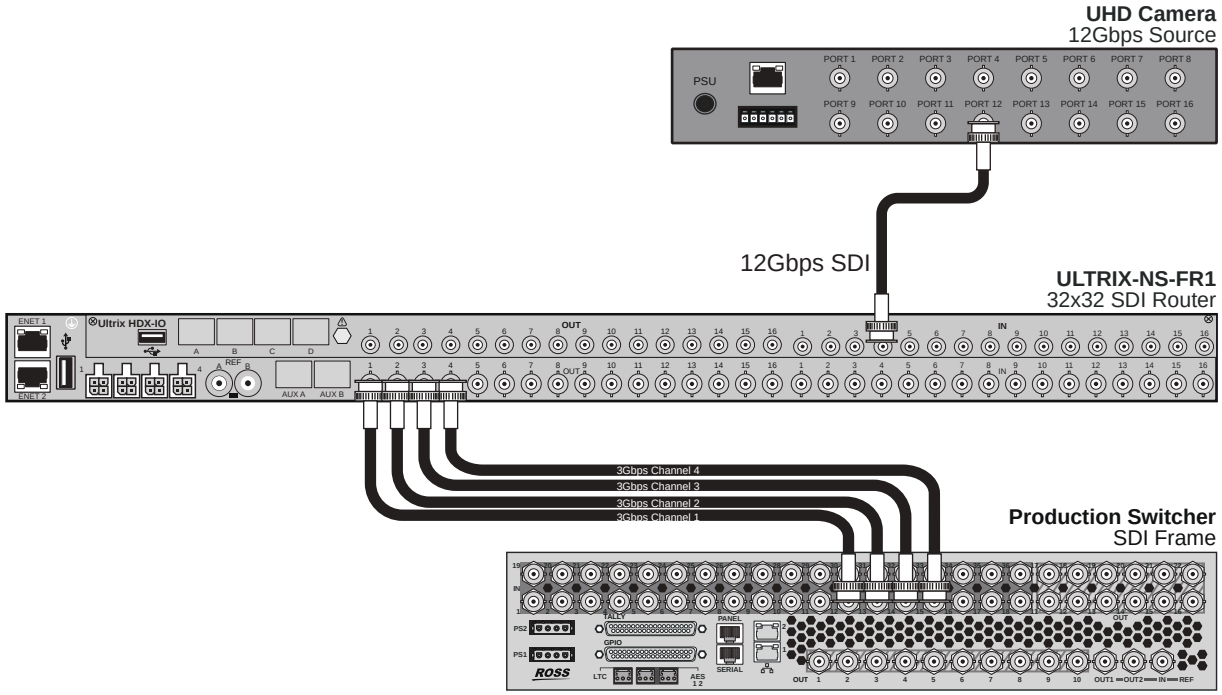


Figure 29 Example of Gearbox Workflow of an Ultrix Router — De-multiplexing a 12Gbps Signal

Gearbox Overview

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).

- When you enable a Gearbox input group, Ultrix multiplexes the signals of the four 3Gbps Level A channels together.
- When you enable a Gearbox output group, Ultrix takes the signals of the four 3Gbps Level A channels together and provides a single 12Gbps signal to an output.

The most common application of a Gearbox is when there are quad channels coming in and out of the Ultrix router. The first channel is used as the port for those I/O to define single level of logical I/O while only the audio on the first channel is available.

For More Information on...

- cabling for a Gearbox application, refer to the ***Ultrix Installation Guide***.

Signal Medic

The Signal Medic is a function that attempts to 'repair' the incoming Gearbox signal group if one of the four input stream is temporarily interrupted. The Signal Medic will replace the missing stream with an interpolated version derived from the other incoming signals.

For More Information on...

- the Signal Medic options, refer to **Table 40**.

Gearbox Timing

Ultrix Gearbox requires all four of the input signals be within 350ns of each other. Cable lengths to the Gearbox input should be as matched as practicable.

For More Information on...

- the cable length specifications, refer to the ***Ultrix Installation Guide***.

Configuring the Ultrix Router for Multiplexing Quad Input Signals

When I/O ports are enabled for a Gearbox, the first port of the group is the designated port for mapping (the other three ports of the group are reserved but not used).

Before You Begin

Ensure the following steps are completed before configuring the router to multiplex a 12Gbps signal:

1. Install the UltriSpeed software license for the Ultrix router that will multiplex the four 3Gbps into one 12Gbps signal.
2. Set up a connection between the external device that will provide the four 3Gbps input signals and the Ultrix router, ensuring the four input signals are cabled to the Ultrix rear panel as outlined in **Table 47**.

Table 47 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]

3. Set up a connection between the Ultrix router and the external device that will receive the 12Gbps signal.
4. Make a note of the physical **IN** BNCs on the Ultrix router that will receive the 3Gbps signals.
5. Make a note of the physical **OUT** BNC on the Ultrix router that will transmit the 12Gbps signal.

Assigning Physical Router Inputs to a Gearbox Group

The Gearbox inputs are automatically arranged in groups of four (e.g. slot1.in[1] to slot 1.in[4] is one group). You can enable up to four Gearbox groups per Ultrix slot.

To assign router inputs to a UHD Gearbox group

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.

3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Port Configuration** page opens.
6. From the top toolbar, select the slot that the UltriSpeed license was installed for.
7. In the **Physical Address** column, locate the first input port in the Gearbox group you wish to configure for multiplexing four 3Gbps signals.
8. In the **2-SI Group** column, click the cell for the first input port of the Gearbox group.

   A drop-down menu opens.
9. Select **Enable**.

   The new setting is applied to the selected port and the three associated ports in the same Gearbox group. Note that only the first input in the Gearbox group (e.g. slot1.in[1]) will display in the **Matrix I/O** lists in the **Database** > **Third Party Matrices** and **Database** > **Sources** tabs.

Assigning a Multiplexed 12Gbps Signal in the Database

You can assign the new 12Gbps signal in the Ultrix database much like assigning an input of any other signal type. However, the new 12Gbps signal is now the first input in the Gearbox group (e.g. slot1.in[1]) to a Destination in the database.

The original 3Gbps signals will still display in the Matrix I/O lists in the Ultrix database and can still be managed as individual sources in the database.

Example of a Gearbox Database for Inputs

Table 48 provides an example of mapping the Gearbox inputs in an Ultrix database.

Table 48 Example of Gearbox Input Database Mapping

Source Name	SDI	Level A1	Level A2
GearBox In 1	Slot**x**.in[1].sdi.ch1	Slot**x**.in[1].audio.ch1	Slot**x**.in[1].audio.ch2
GearBox In 2	Slot**x**.in[7].sdi.ch1	Slot**x**.in[7].audio.ch1	Slot**x**.in[7].audio.ch2
GearBox In 3	Slot**x**.in[13].sdi.ch1	Slot**x**.in[13].audio.ch1	Slot**x**.in[13].audio.ch2

For More Information on...

- managing the sources in a database, refer to the ***Ultricore and Ultrix Database Guide***.

Configuring the Ultrix Router for De-multiplexing a 12Gbps Signal

The Ultrix router is capable of de-multiplexing a 12Gbps SDI sources into four separate 3Gbps SDI output signals.

Before You Begin

Ensure the following steps are completed before configuring the router to de-multiplex a 12Gbps signal:

1. Install the UltriSpeed software license for the Ultrix router that will de-multiplex the 12Gbps signal.
2. Set up a connection between the external device that will provide the 12Gbps signal to the Ultrix router.
3. Setup a connection between the Ultrix router and the external device that will receive the four 3Gbps signals.
4. Make a note of the physical **IN** BNC on the Ultrix router that will receive the 12Gbps.
5. Make a note of the physical **OUT** BNCs on the Ultrix router that will transmit the processed 3Gbps signals.

Configuring the Ultrix Router for De-multiplexing a 12Gbps Signal

De-multiplexing an 12Gbps signal produces four 3Gbps SDI signals. These SDI signals can then be assigned to separate Ultrix router outputs.

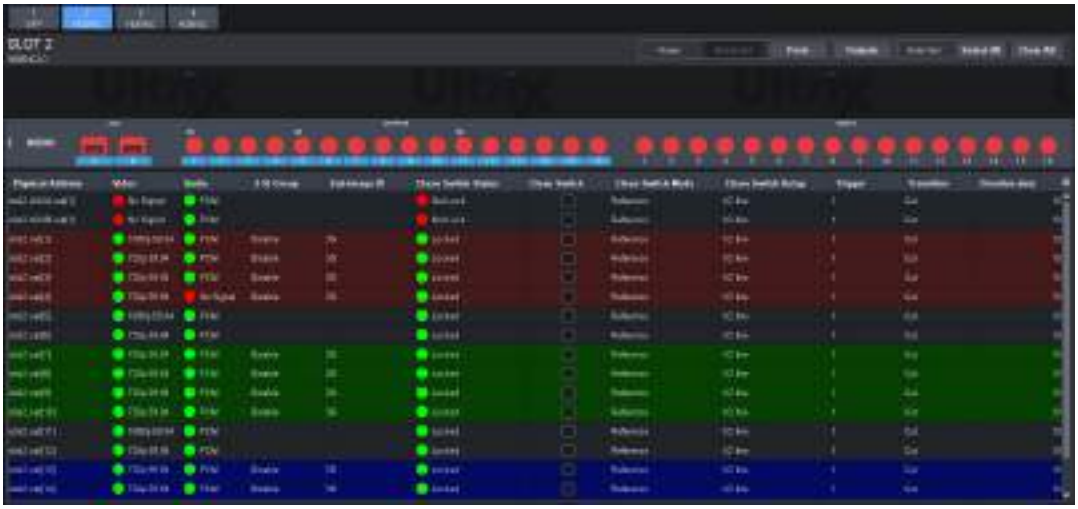
To assign the de-multiplexed signals to a Gearbox group

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Port Configuration** page opens.
6. From the top toolbar, select the slot for the Gearbox group.
7. From the Views area of the tab, click the last button and select **Outputs** from the **I/O** dialog.

   The **Port Configuration** page updates to displays the ports configured as **Outputs** for the slot.



8. In the **Physical Address** column, locate the first output port in the Gearbox group you wish to configure for multiplexing.
9. In the **2-SI Group** column, click the cell for the first output port of the Gearbox group.

   A drop-down menu opens in the column.
10. Select **Enable**.

The new setting is applied to the selected port and the three associated ports in the same Gearbox group.

Assigning the De-multiplexed 12Gbps Signal to a Destination in the Database

You can assign the new 3Gbps signals as outputs in the Ultrix database much like assigning a destination of any other signal type. Refer to "**Defining the Destinations in a Database**" for details on configuring destinations in your database.

You can still assign the original 12Gbps signal as a source in the Ultrix database much like assigning a source of any other signal type. Refer to "**Defining the Sources in a Database**" for information on managing the sources in a database.

Example of a Gearbox Database for Outputs

Table 48 provides an example of mapping the Gearbox outputs in an Ultrix database.

Table 49 Example of Gearbox Output Database Mapping

Destination Name	SDI	Level A1	Level A2
GearBox Out 1	Slot**x**.out[1].sdi.ch1	Slot**x**.out[1].audio.ch1	Slot**x**.out[1].audio.ch2
GearBox Out 2	Slot**x**.out[7].sdi.ch1	Slot**x**.out[7].audio.ch1	Slot**x**.out[7].audio.ch2
GearBox Out 3	Slot**x**.out[13].sdi.ch1	Slot**x**.out[13].audio.ch1	Slot**x**.out[13].audio.ch2

ULTRIX-IP-IO Setup

This chapter outlines how to configure receivers and senders for the Ultrix router to be used in video and audio streaming when an ULTRIX-IP-IO blade is installed in a slot of an Ultrix router chassis.

✶ The ULTRIX-IP-IO supports multicast IP Addresses in the range of 225.x.x.x to 239.x.x.x. Note that some addresses in this range are reserved by IANA.

For More Information on...

- the installation and cabling of the ULTRIX-IP-IO, refer to the ***Ultrix Installation Guide***.

What are Receivers, Senders, and Streams?

The following terms may be used throughout this chapter:

Device

A physical, virtual, or software application that may include multiple sources, destinations, senders, or receivers.

Flow

The continuous raw media content. It can contain more than one essence (e.g. an audio flow can contain multiple channels, and an SDI flow may contain audio and video essences).

A flow is independent of the transport protocol. For example, 48kHz LPCM audio is a flow; AES67 is one type of stream which can carry the flow.

Flows cannot generally be passed around natively, and need to be encapsulated in a stream. Flows from the same source are considered “editorially equivalent”, but may be encoded differently. For example, a video source may be encoded as 4:2:2 YCbCr uncompressed, 4:4:4 RGB uncompressed, and h.265 encoded. Each of these would be a separate flow from a common source.

Receiver

An element within a device that receives exactly one stream, which contains one flow from a network.

Sender

An element within a device which presents exactly one flow, packaged as a stream onto a network.

Stream

One flow, encapsulated within a transport protocol. Examples include SMPTE ST 2022-6, SMPTE ST 2110-20 Video, or SMPTE ST 2110-30 Audio.

Before You Begin

This section provides information to keep in mind before setting up Ultrix-IP streams.

✶ Each ULTRIX-IP-IO blade has four ENET ports with 25Gb bandwidth per port. The ports are grouped into two pairs where the first pair is ENET 1 and ENET 2; the second pair is ENET 3 and ENET 4.

Audio Streams

Keep the following in mind when setting up audio IP streams:

- Each ENET pair can support a maximum of 8 audio streams.
- Only ENET 1 and ENET 3 support audio streams at this time.
- ENET 2 and ENET 4 are used only for redundant audio streams.
- Each audio stream can carry from 1 to 16 channels.

Video Streams

Keep the following in mind when setting up video IP streams:

- The ULTRIX-IP-IO supports multicast IP Addresses in the range of 225.x.x.x to 239.x.x.x for video and audio.
- When using 1080p or lower video formats, each ENET pair can support up to 8 video streams with a maximum of 16 streams per ULTRIX-IP-IO blade.
- When using UHD 6G formats (2160p 30/29.97/25Hz), each ENET pair can support up to 4 video streams with a maximum of 8 streams per ULTRIX-IP-IO blade.
- When using UHD 12G formats (2160p 60/59.94/50Hz), each ENET pair can support up to 4 video streams with a maximum of 8 streams per ULTRIX-IP-IO blade. If the Redundant option is enabled for the ENET pair, up to 4 video streams (2 streams in the first port and 2 redundant streams in the second port) are available.
- When using a mix of UHD 6G and 12G formats, each ENET pair can support up to 4 video streams. For example, 3x12G streams and 1x6G stream.

Redundant Streams

The ULTRIX-IP-IO blade also provides protection switching as per SMPTE 2022-7. This option can be enabled for each pair on the blade.

Keep the following in mind when setting up redundant streams:

- You will need to assign a unique IP address to each stream (primary and secondary).
- ENET 2 is reserved for redundant streams when the Redundant option is enabled for that ENET pair.
- ENET 4 is reserved for redundant streams when the Redundant option is enabled for that ENET pair.
- When an ENET pair is in redundant mode, the stream must be added to the first port of the ENET pair (ENET 1 or ENET 3) and a duplicate (secondary) stream is automatically added to the second port (ENET 2 or ENET 4 respectively).

Automatic Sender Session Description Protocol (SDP) Updates

When a sender stream is active and its SDI input video format changes to a different and valid format, if the new format is allowed by the session (as defined by the Adaptive Input Allowed Input Rates setting) and results in an overall system valid configuration (no Ultrix-IP bandwidth limit will be exceeded), the sender stream will update itself to use this new format, generating a new version of its SDP. The Session and NMOS IDs do not change when the sender stream SDP update is performed. This allows the existing streams to adapt so that the Ultrix-IP does not need to track new streams. This feature is always enabled and cannot be disabled.

Ultrix-IP monitors all active connections on the system and when senders are updated, the system will issue a connection update to all affected receivers with the latest information about the sender (the updated SDP description). When using an Ultricore BCS, the Ultricore BCS automatically updates the receivers when the subscribed sender changes.

This feature is helpful to avoid receivers to be configured with a stale version of the associated sender. If the parameters of a sender change, an SDP update is triggered, which is then forwarded to all receivers affected by the identified update.

Quick Updates when Streaming from the Ultricore BCS

When the format of the SDI input video changes, the Ultrix-IP updates its own sender and SDP, and the Ultricore BCS is notified of this change. The Ultricore BCS then issues a connection update to all receivers using this sender. The ST 2110 stream and SDP file are also updated and the video sender resumes with the new format.

Protection from Invalid Video Scenarios

If a loss of signal occurs, an automatic SDP update will not occur. In addition, when an input with a non-matching frame rate is detected, an alarm in DashBoard is raised. The SDP file remains unchanged, but the sender does not transmit the packets. This prevents the entire system from switching to an invalid video format or unstable video input.

Using any Supported Control Protocol

The advertised SDP file updates to reflect a valid video format change through all supported control protocols, including NMOS, Ember+, and DashBoard advertised network streams. This enables the Ultrix-IP to use the new SDP file, and enables the user to update the connections of any active receivers to the new format without having to recreate the sender streams.

Requirements

To take advantage of this feature, you will need to:

- Configure the receivers and senders and ensure they are active on the router. If a sender is disabled (not active), the incoming changes on the router port of the ULTRIX-IP-IO blade will not cause any change on the active configuration.
- When configuring the senders, specify the video format(s) you want to stream via the **Adaptive Input Allowed Input Rates** option for each applicable ULTRIX-IP-IO blade port.

Overview

The generalized work flow of configuring your ULTRIX-IP-IO is:

1. Download and install the latest version of the DashBoard client software.
2. Contact your IT department for the required IP addresses for your ULTRIX-IP-IO ports.
3. Cable the ULTRIX-IP-IO ports.
4. Configure the protocol settings for the ULTRIX-IP-IO.
5. Configure the Port Network settings.
6. Define the Network Stream Groups.
7. Specify the timing requirements for the ULTRIX-IP-IO.
8. Configure the sender streams for the ULTRIX-IP-IO.
9. Make your connections.
10. Continue to set up your database as outlined in the ***Ultricore and Ultrix Database Guide***.

Setups with an Ultricore BCS

An Ultricore BCS with the Ultrix-IP license enables the video senders/receiver endpoints to be reported as available ports to the router database. The video senders/receivers are seen as part of a single video-IP matrix, and the audio senders/receivers are part of a single audio-IP matrix.

✶ When a video sender stream is active and the video format changes on the SDI input of that stream, the Ultricore BCS will automatically detect the update and then updates all the receivers subscribed to that sender. This allows the existing streams to adapt.

Refer to the ***Ultricore BCS User Guide*** for details on setting up and configuring the Ultricore BCS in your routing system.

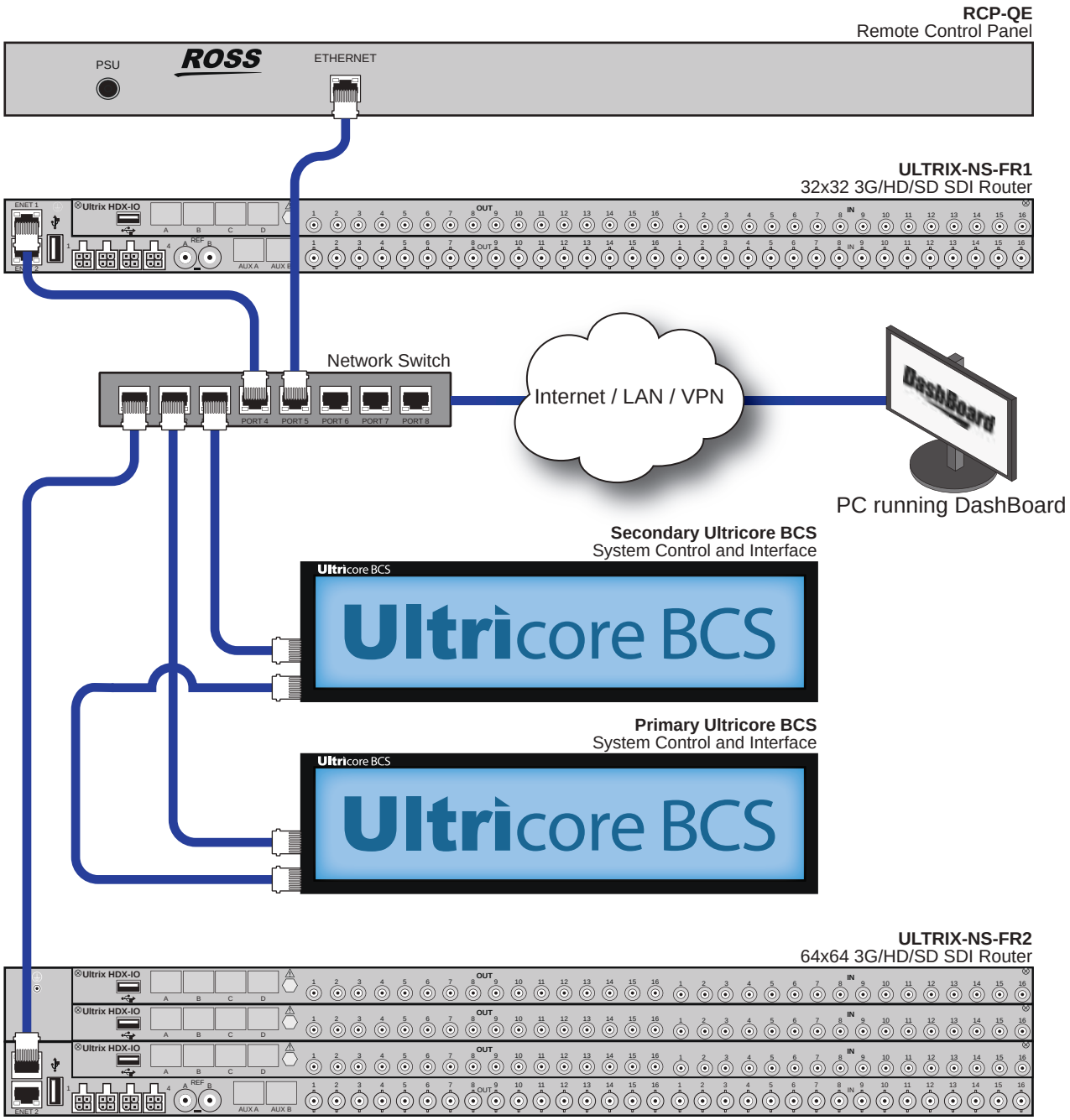


Figure 30 Example Setup with an Ultricore BCS Redundancy System

Configure the Protocol Settings

The Ultrix-IP supports media distribution based on NMOS, and Ember+. This section outlines each protocol.

✶ Any changes made to the ULTRIX-IP-IO settings requires a frame reboot.

Configuring the NMOS Settings

The Network Media Open Specifications (NMOS) is enabled by default on the device if one or more ULTRIX-IP-IO blades are present. The Ultrix router will automatically look for advertised NMOS registries using mDNS and will publish the Device Name and other info in the Frame Configuration > Ultrix-IP > NMOS interface. You can also choose to register the router when using Registry Service Discovery (RDS).

To configure the NMOS settings

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Ultrix-IP** tab.

   The **Port Network** sub-tab is automatically selected in the left toolbar.
7. Select the **NMOS** tab on the left toolbar.

✶ It is not recommended that your media network and management network use the same subnet.

8. Use the **Static RDS** box to determine how the router will register in an RDS system.
   - Selecting the box allows the user to set an RDS IP in the Registry Service Address field and forces the router to register to this specific RDS.
   - Clearing the box configures the router to use mDNS to automatically register in an RDS on the network with the lowest priority.
9. Use the **Channel Mapping** field to specify the port used for the RDS.
10. Use the **Connection Port** field to specify the port the NMOS IS-05 Connection service is listening on.
11. Use the **Node Port** field to specify the port the NMOS IS-04 Node service is listening on.
12. Click **Apply** to save your changes.

Ember+ Communications

Each ULTRIX-IP-IO blade provides two Ember+ ports for controllability. One port will export the first 8 streams and the second port provides access from streams 9 to 16. The Ember+ port will be available on Port 9095 for the IP address assigned to each ULTRIX-IP-IO ports 1 and 3. If accessing it through the Ultrix Frame Configuration > Ultrix-IP System interface, the ports will be distributed based on slot position as follows:

- Streams 1-8 to Port 500**x**8
- Streams 9-16 to Port 500**x**9

where **x** is the router slot that the ULTRIX-IP-IO is installed in.

✶ If the Ultrix router includes two ULTRIX-IP-IO blades, and the intention is to control it via Ember+, a total of 4 Ember+ port connections are needed.

To establish a connection between the Ember+ client and the Ultrix, you will need to:

1. Add the Ultrix in the Ember+ client interface using the IP Address assigned to the Ultrix router.
2. Enable SDP patching with the Ember+ client to establish video and audio receivers on the Ultrix.
3. Ensure that all network streams have a consistent audio channel count.

Establishing a Connection

Ensure that SDP patching is enabled with the Ember+ client to establish receivers on the Ultrix.

✶ Ultrix implements BESS v1.1 for Ember+ support to communicate with third-party controllers.

Mapping

You will need to configure the Senders, and then use the Ember+ controller interface (e.g. Lawo VSM) to map the sources to the targets. Refer to the documentation that came with your Ember+ controller for details.

Configuring the Port Network

By assigning an IP Address to each port of the ULTRIX-IP-IO blade, you are able to uniquely identify it on the network and control it via the DashBoard interface. Each port can be configured separately for media traffic.

✶ All ENET ports are set to DHCP by default.

To assign the network settings for an ULTRIX-IP-IO port

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Ultrix-IP** tab.

   The **Port Network** sub-tab is automatically selected in the left toolbar.
7. In the **Ultrix-IP Port Network** table, locate the row for the slot#.port# you wish to configure.
8. If you are manually configuring the Ethernet settings:
   a. Click the cell in the **IP Mode** column and select **Static**.
   b. Use the **IP** field to specify the static IP Address for the port. This is the IP Address that is used to control and communicate with the specified port.
   c. Use the **Subnet Mask** field to specify the subnet mask for the port.
   d. Use the **Gateway** field to specify the gateway for communications outside of the local area network (LAN) the ULTRIX-IP-IO will use.

9. If you want the network settings for the port to be automatically obtained, and DHCP service is available on your control network, click the cell in the **IP Mode** column and select **DHCP**.
10. Click **Apply** to save the new settings.
11. Repeat this procedure for the second port you wish to configure.
12. Click **Reboot** to apply the new settings. This button is located at the bottom of the interface.

    The Ultrix is temporarily taken off-line during the reboot.
13. Verify the new settings reported on the Frame Configuration status fields.

Configuring the Timing Settings

The Ultrix supports the Precision Time Protocol (PTP) as defined in the ***IEEE 1588-2008*** standard and the ***SMPTE ST-2059*** specification.

✶ The Ultrix behaves only as a follower and cannot be used as a Boundary Clock or Grandmaster.

Configuring the PTP Settings

You can synchronize the Ultrix to real-time clocks of other devices in the same network. You create a profile (use the default settings or create a custom profile) that identifies the Ultrix to the Grandmaster clock.

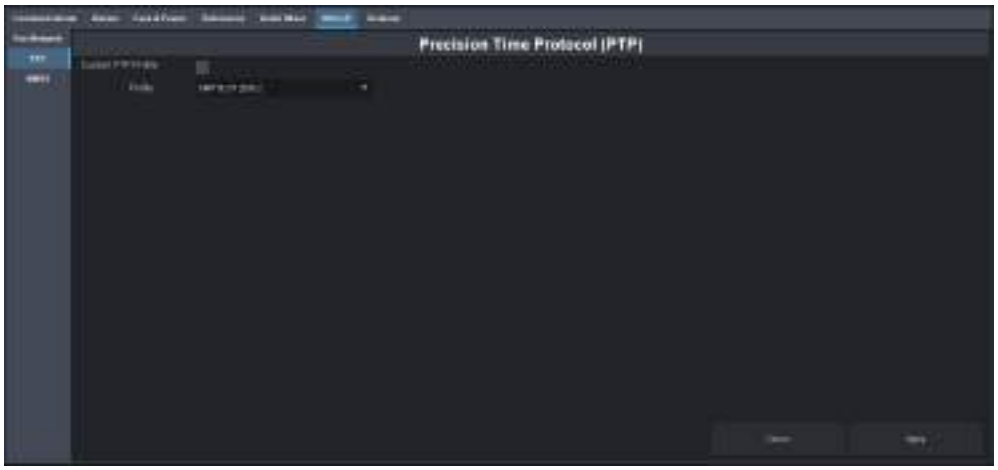
✶ There are several criteria that PTP clocks compare to determine who will be master and who will be follower (called the Best Master Clock Algorithm, or BMCA), and they are evaluated in order: Priority1, clock class, accuracy, scaled log variance, Priority2, clock ID (similar to the MAC address). Practically, Priority1 is the only setting configured on all clocks to control the outcome of the Grandmaster election. If Priority1s are equal, the next criterion is evaluated (clock class) and the criteria are evaluated in succession until a Grandmaster is determined.

To configure a PTP default profile for the Ultrix

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select **Ultrix-IP** > **PTP**.



7. Use the **Profile** menu to specify the standard/specification used for PTP. The default is SMPTE ST 2059-2.

✶ The **Domain** is automatically set if the **Custom PTP Profile** is not selected.

8. Click **Apply**.

To create a custom PTP profile for the Ultrix

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.

5. Select  .

   The **Frame Configuration** page opens.

6. Select **Ultrix-IP** > **PTP**.
7. Select the **Custom PTP Profile** box.
8. Use the **Domain** menu to specify the sub-domain the PTP clock is assigned to. The default is 127.

✶ There can be multiple PTP domains operating concurrently within a network. The domain is a field in all PTP message headers. Messaging between entities are segregated by domain (e.g. the Ultrix is an endpoint configured for domain 128 and ignores messages from a neighboring clock configured for domain 127).

Configuring the PTP Settings for a Specific Port

Once you create a PTP profile for the Ultrix, you may want to uniquely define the PTP settings for each ULTRIX-IP-IO port.

To configure the PTP settings for a specific port

1. In the **Ultrix-IP** > **PTP** tab of the **Frame Configuration** page, select the **Custom PTP Profile** box for the required port.
2. Use the **Name** field to assign a unique identifier to the port.
3. Use the **Sync Interval** field to specify the number of seconds at which synchronization messages are sent from the master clock to the specified ULTRIX-IP-IO port.

4. Use the **Announce Interval** field to specify the rate of announce messages that the specified ULTRIX-IP-IO port requests from the master clock during a unicast session.
5. Use the **Announce Receipt Timeout** field to specify the number of seconds the specified ULTRIX-IP-IO port waits for an announce interval message before timing out.
6. Click **Apply**.

Enabling Redundant Mode

The ULTRIX-IP-IO enables a user to protect their streams to ensure mission critical operation. Using SMPTE ST 2022-7, they can run the same video and audio over two separate, redundant networks in case an error occurs.

✶ This section is only applicable if your system requires protection switching.

Before You Begin

Ensure that:

- your source is capable of sending SMPTE ST 2022-7 streams
- the Ultrix is set up within a protection switching network

Enabling the Redundant Mode

By default, the Redundant mode is disabled.

To enable the Redundant Mode for an ENET pair

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Ultrix-IP** tab.

   The **Port Network** sub-tab is automatically selected in the left toolbar.
7. In the **Ultrix-IP Port Network** table, locate the ENET pair you wish to configure.

   Each row in the table is an ENET port on an installed ULTRIX-IP-IO blade.
8. Select the **Redundant** box for the ENET pair you wish to configure for protection switching.
9. Click **Apply**.

Configuring the Ultrix for Protection Switching

You will need to assign a unique IP address to each stream (primary and redundant) in the same multicast range

To configure the Ultrix for protection switching

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.

4. Double-click the **Ultrix** node.

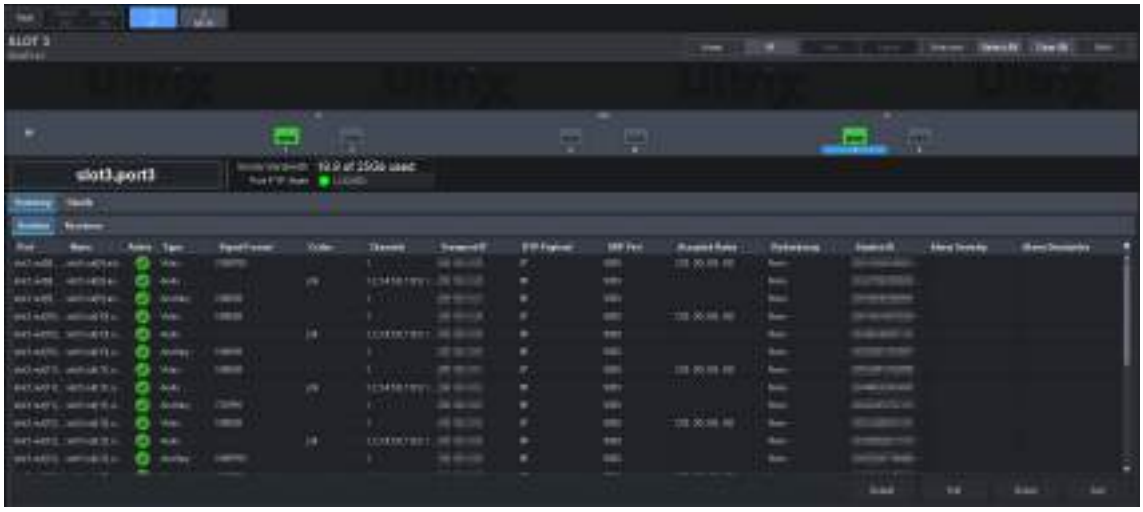
   The **Device Configuration** interface opens.

5. Select  .

   The **Port Configuration** page opens.

6. Select the first port of the ENET pair you enabled the Redundant mode for in the router rear panel map, located at the top of the **Port Configuration** page.

   The **Port Configuration** page updates to display the Summary, and Details tabs for the port. The port label, on the router panel map, also displays with a light-blue background. In the example below, the user selected slot3.port3 to configure.



7. Configure the primary Senders as outlined in "**Configuring the Senders**".
8. Configure the redundant Sender stream for the ENET pair as follows:
   a. In the **Details** > **Senders** tab, select the first port of the ENET pair you enabled Redundant Mode for.
   b. Click **Edit**. This button is located in the bottom right corner of the tab.

      The **Edit Senders** dialog opens.

   c. Use the **Secondary IP** menus to specify the IP address for the secondary (redundant) stream. Ensure that it is the same IP Address as the primary stream.
   d. Use the **Secondary UDP** port to specify the UDP port for the secondary (redundant) stream. Ensure that it is not the same value as the primary stream.
   e. Click **OK**.
   f. Verify the new settings are reported in the Redundancy column of the Senders tab.
9. Configure the primary Receivers as outlined in "**Configuring the Receivers**".
10. Configure the redundant Receiver stream as follows:
    a. Select **Details** > **Receivers**.
    b. Select the row for the first port of the ENET pair you enabled Redundant Mode for.
    c. Click **Edit**.
    d. Use the **Secondary IP** menus to specify the IP address for the secondary (redundant) stream. Ensure that it is the same IP Address as the primary stream.

e. Use the **Secondary UDP** port to specify the UDP port for the secondary (redundant) stream. Ensure that it is not the same value as the primary stream.

f. Click **OK**.

g. Verify the new settings are reported in the Redundancy column of the Receivers tab.

Configuring the Senders

You will need to specify the IP encapsulation properties for the active video and audio. For each input signal, you need to specify the IP encapsulation properties for the active video and audio. A sender stream on the ULTRIX-IP-IO can be configured with any multicast IP address in the range of 225.x.x.x to 239.x.x.x.

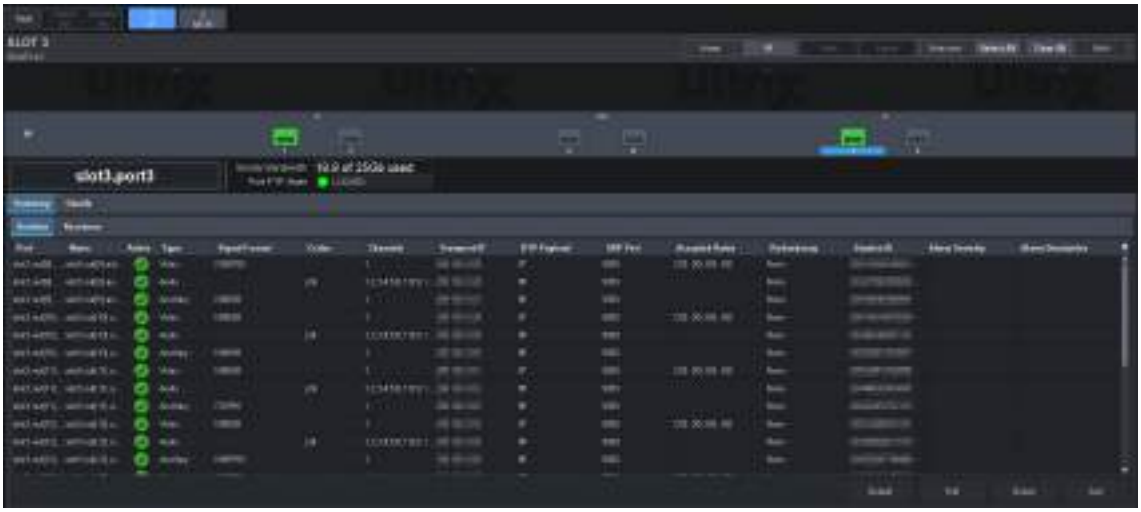
✶ Make note of the bandwidth allocation for the ULTRIX-IP-IO port to determine the available capacity of the port. You can add as many streams to fill up the 25Gb bandwidth of the selected ENET port. Once that maximum is reached, new streams will not be accepted and updates will only be accepted if the new bandwidth used does not exceed 25Gb.

To display the Senders tab for a port in DashBoard

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. On the router rear panel map, locate the required ULTRIX-IP-IO slot.
6. Select the port on the ULTRIX-IP-IO slot you wish to configure.

   The **Port Configuration** page updates to display the options for the port with the Summary tab automatically selected.
7. Select the **Senders** sub-tab.



To add advertised sender streams

1. Click **Default**. This button is located in the bottom right corner of the tab.

   The **Setup Default Senders** dialog opens.

2. Use the **IP Address** field to specify the IP range for the sender.

   In the above example, the user entered 239.8.7.1 as the starting point for the sender streams. Each subsequent advertised stream after this IP Address (e.g. 239.8.7.2, 239.8.7.3, 239.8.7.4 etc.) will be added to the Senders tab.

3. Use the **UDP Port** field to specify the RTP port for the advertised stream.
4. Use the **Video RTP Payload** and **Audio RTP Payload** fields to specify the Real-time Transport Protocol (RTP) payload IDs used by that sender stream.
5. Use the **Video Format** field to specify the video format of the signal available for the advertised stream.
6. Use the options in the **Adaptive Input Allowed Input Rates** area to specify the video formats that the stream is allowed to follow should the input SDI video format change while the sender is enabled.

✶ This is not a bandwidth reservation. If a sender is set to allow 12G inputs, it is not guaranteed that it would follow that video format as all device setups is constrained by the available bandwidth on the Ethernet side. If the new video input is valid, but the overall system configuration is invalid, the sender will be updated but an alarm is still raised to the user to alert of a video mismatch.

✶ When the sender is updated, all protocols or interfaces that advertise it will be updated with a new configuration set and SDP. This includes NMOS, Ember+, and all DashBoard tabs where the sender is visible.

7. Use the **Audio Codec** field to specify the audio compression format for the advertised stream.
8. Use the **Audio Channels** field to specify the maximum number of audio channels in each stream.
9. Select the **Add Ancillary Stream** box to include the ST 2110-40 ancillary data.
10. Click **OK**.

    The **Setup Default Senders** dialog closes and the Senders tab updates to list the sender streams advertised using the IP Address specified in step 2.

✶ Make a note of the automatically assigned label in the **Name** field for each stream. This name will be used in the database to represent the specific stream as an output (destination).

To manually add a sender stream

1. Click **Add**. This button is located in the bottom right corner of the tab.

   The **Add Senders** dialog opens.

2. Use the **IP Address** field to specify the sender.

   The audio and ancillary (ANC) data will receive the selected IP address with one for audio and the second for the ANC.

3. Edit the **UDP Port** to specify the source port to transmit the data.
4. Use the **Type** menu to select the type of stream that will be available at the specified IP Address.

✶ It is recommended to not edit the **UDP Port** field as this field is auto-populated by the advertised stream.

5. Use the **Output** menu to assign the SDI input signal to the sender stream.
6. If you selected **Video & Audio**, or **Video** in step 4, use the **Video Format** menu to specify the video format of the signal available to the sender.
7. Use the options in the **Adaptive Input Allowed Input Rates** area to specify the video formats that the stream is allowed to follow should the input SDI video format change while the sender is enabled.

✶ This is not a bandwidth reservation. If a sender is set to allow 12G inputs, it is not guaranteed that it would follow that video format as all device setups is constrained by the available bandwidth on the Ethernet side. If the new video input is valid, but the overall system configuration is invalid, the sender will be updated but an alarm is still raised to the user to alert of a video mismatch.

✶ When the sender is updated, all protocols or interfaces that advertise it will be updated with a new config set and SDP. This includes NMOS, Ember+, and all DashBoard tabs where the sender is visible.

8. If you selected **Video & Audio**, or **Audio** in step 4:
   a. Use the **Audio Codec** menu to specify the audio compression format for the sender.
   b. Use the **Audio Channels** menu to specify the maximum number of audio channels in the specified stream.
9. Click **OK**.

   The **Add Senders** dialog closes and the new stream is added to the Senders tab.

✶ Make a note of the automatically assigned label in the **Name** field for the stream. This name will be used in the database to represent the specific stream as an output (destination).

To edit a sender stream

1. Select the row for the sender stream you wish to edit in the Senders tab.
2. Click **Edit**.
3. Edit the fields as required.

✶ The fields with yellow backgrounds are read-only and cannot be edited.

4. Click **OK**.

Configuring the Receivers

Receivers are the representation of connections on the router and report the information related to all traffic that is received. Receivers can be manually created by manually specifying the IP and UDP ports of the sender on the **Port Configuration** tab, but usually the process of managing receivers is done by the external network device.

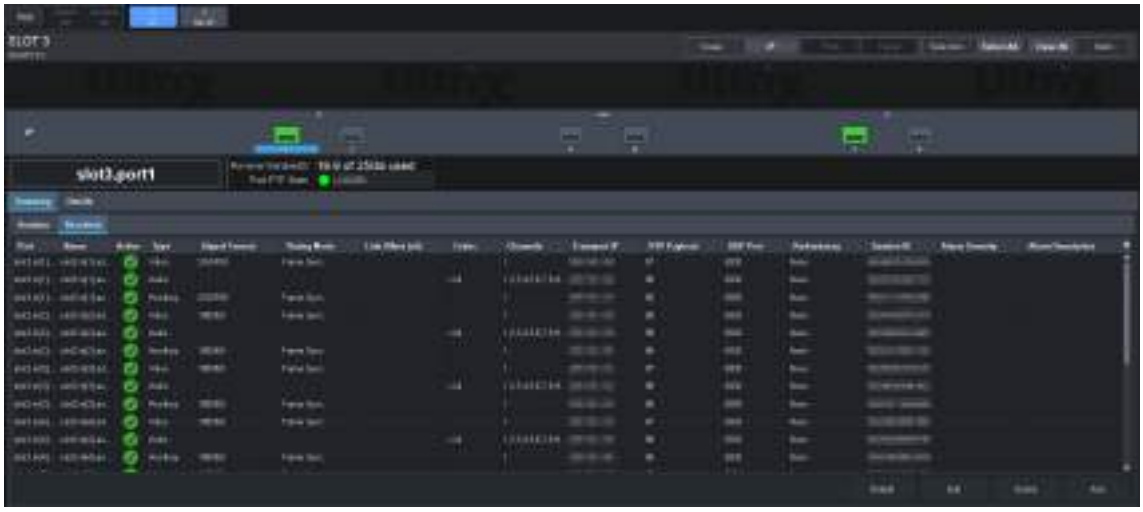
This section outlines what is currently present/active on the **Port Configuration** tab and outlines how to manually specify receivers on the router using this interface.

To display the Receivers tab for a port in DashBoard

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. On the router rear panel map, locate the required ULTRIX-IP-IO slot.
6. Select the port on the ULTRIX-IP-IO slot you wish to configure.

   The **Port Configuration** page updates to display the options for the port with the Summary tab automatically selected.
7. Select the **Receivers** sub-tab.



To add a series of receivers

1. In the **Receivers** sub-tab, click **Default**. This button is located in the bottom right corner of the tab.

   The **Setup Default Receivers** dialog opens.

2. Use the **IP Address** field to specify the IP range for the receiver.

   In the above example, the user entered 239.19.8.1 as the starting point for the receiver streams. Each subsequent advertised stream after this IP Address (e.g. 239.19.8.2, 239.19.8.3, 239.19.8.4 etc.) will be added to the Receivers tab.
3. Use the **UDP Port** field to specify the RTP port the receivers will use.
4. Use the **Video Format** field to specify the video format of the signal the receivers will output.
5. Use the **Audio Codec** field to specify the audio compression format for the receiver streams.
6. Use the **Audio Channels** field to specify the maximum number of audio channels in each stream.
7. Click **OK**.

   The **Setup Default Receivers** dialog closes and the Receivers tab updates to list the receiver streams using the IP Address specified in step 2.

✶ Make a note of the automatically assigned label in the **Name** field for each stream. This name will be used in the database to represent the specific stream as an input (source).

To manually add a single receiver

1. In the **Receivers** tab, click **Add**. This button is located in the bottom right corner of the tab.

   The **Add Receivers** dialog opens.
2. Use the **IP Address** menu to specify the IP Address for the transport stream for the receiver.
3. Use the **UDP port** menu to specify the UDP port number of the transport stream for the receiver.
4. Use the **Type** field to specify the type of signal.

✶ Selecting **Video+Audio** automatically creates table entries for one video and multiple audio streams.

5. If you selected **Video** or **Video+Audio** in step 4, use the **Video Format** field to specify the video format for the stream.
6. If you selected **Audio** or **Video+Audio** in step 4, use the **# of Audio Channels** field to specify the audio channels in the stream.
7. Use the **Transport IP** field to specify the UDP IP address of the transport stream for the signal.
8. Click **OK** to create a new entry in the **Receivers** tab.

   The **Add Receivers** dialog closes and the **Receivers** tab updates with the new receiver stream.

✶ Make a note of the automatically assigned label in the **Name** field for the stream. This name will be used in the database to represent the specific stream as an input (source).

Troubleshooting

Table 50 provides brief explanations for some common stream setup messages.

Table 50 Troubleshooting the Error Messages

Error Message	Cause
Cannot set default due to maximum allowable streams has reached	ENET pair has reached the maximum number of allowable streams
Cannot add 2160P59 video due to maximum allowable UHD streams has reached	
Primary and Secondary UDP port cannot be the same	When in Redundant mode, the primary and secondary streams must have the same IP address but different UDP ports assigned.
This IP port does not have enough bandwidth to add 2160P29 video stream	The ENET port has reached the maximum 25G bandwidth.
slot#.port# is a redundant IP port. It is reserved for redundant senders.	The ENET pair is in Redundant mode and you cannot edit the second port (ENET 2 or ENET 4) of the pair.
UHD video must be assigned to output 1, 2, 3, 4, 9, 10, 11, or 12.	The UHD video stream (6G or 12G) format must be assigned to one of the inputs/outputs 1-4 or 9-12.
Address x.x.x.x:x is being used by slotx.out[y].#.chz	Each stream must have a unique network address
Video Format mismatch detected	The input video format does not match those selected/enabled in the **Adaptive Input Allowed Input Rates** setting of the sender stream, or input is not valid.

Using Senders and Receivers in the Router Database

Throughout the DashBoard interface, the senders and receiver streams (outputs and inputs respectively) of a router (or matrix) are referred to by hierarchical dotted notation: **Slot.Port[x].Type.Channel** where:

- **Slot** identifies which slot in the router chassis the ULTRIX-IP-IO blade is located in.
- **Port[x]** identifies the physical port on the ULTRIX-IP-IO blade.
- **Type** identifies the generic signal type (e.g. SDI, audio).
- **Channel** identifies the audio channel within the stream. If the stream is video, the channel number is fixed to 1.

Figure 31 Example of Senders in the Port Configuration Interface

✶ These designators may be assigned more user friendly names if required. Refer to the ***Ultricore and Ultrix Database Guide*** for details.

Integration Examples

This section describes use cases for video streams.

Using 3G HD Video

The following setups use 3G HD video or lower formats. All streams can fit within the first ENET port but there is a maximum of eight video streams per pair.

Redundancy Mode is Disabled

Figure 32 shows two ULTRIX-FR5 routers with the first router (Frame A) transmitting eight 3G HD video streams and the second router (Frame B) receiving eight 3G HD streams.

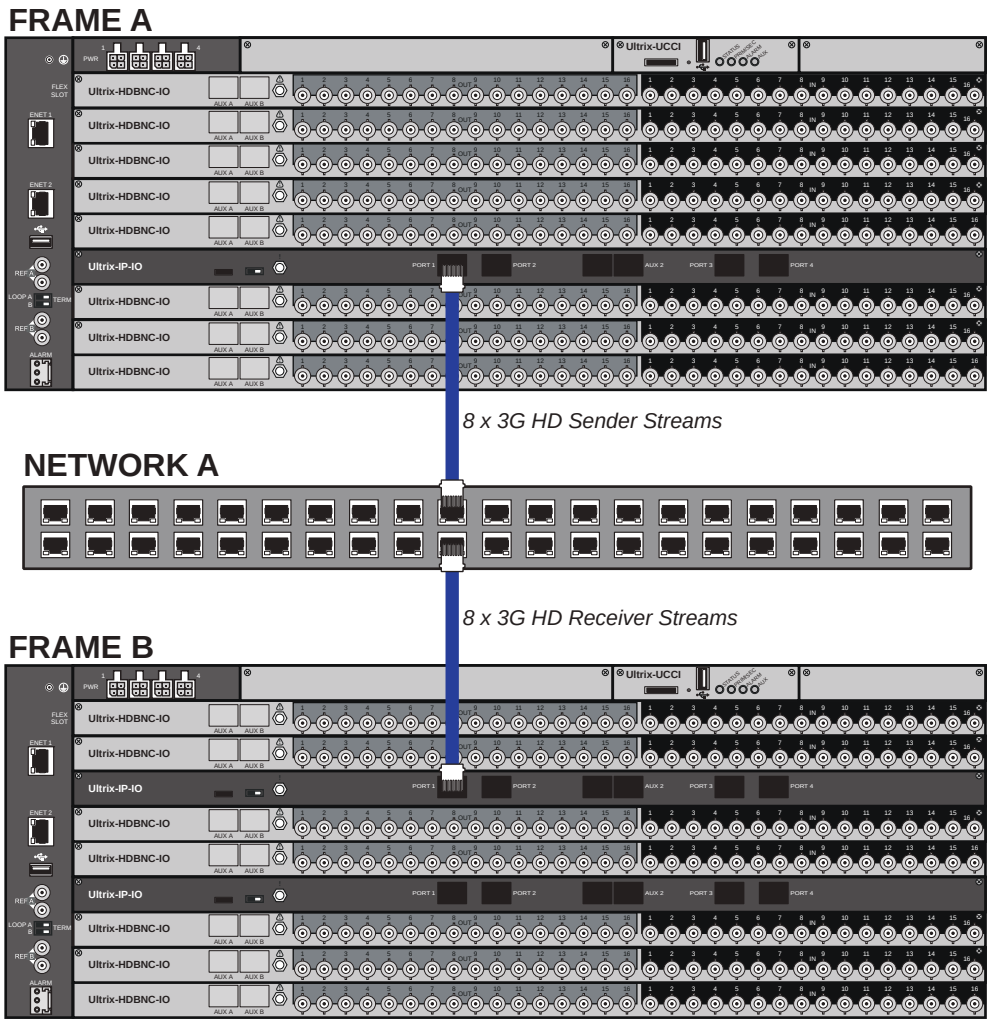


Figure 32 Example of ULTRIX-IP-IO with 3G HD Video Streams

In this setup you would configure eight video streams with 1080p 59.94 format (including the audio streams) without redundancy.

1. For Frame A you would configure eight video sender streams with 1080p 59.94 format (pairing two audio sender streams per video stream).
2. For Frame B you would configure eight video receiver streams with 1080p 59.94 format (pairing two audio receiver streams per video stream).
3. Ensure that the receiver IP address on Frame B matches the existing sender address on Frame A.

Redundancy Mode is Enabled

In this setup, there are eight video streams with 1080p 59.94 format (including the audio streams) but the Redundancy Mode is enabled. All streams can fit within the first ENET port but there is a limit of eight video streams per pair. The second ENET port is reserved for the redundant streams.

Figure 33 shows two ULTRIX-FR5 routers with one router (Frame A) transmitting eight 3G HD primary video streams and eight 3G HD secondary streams. The second router (Frame B) receives two sets of eight 3G HD streams (primary and secondary).

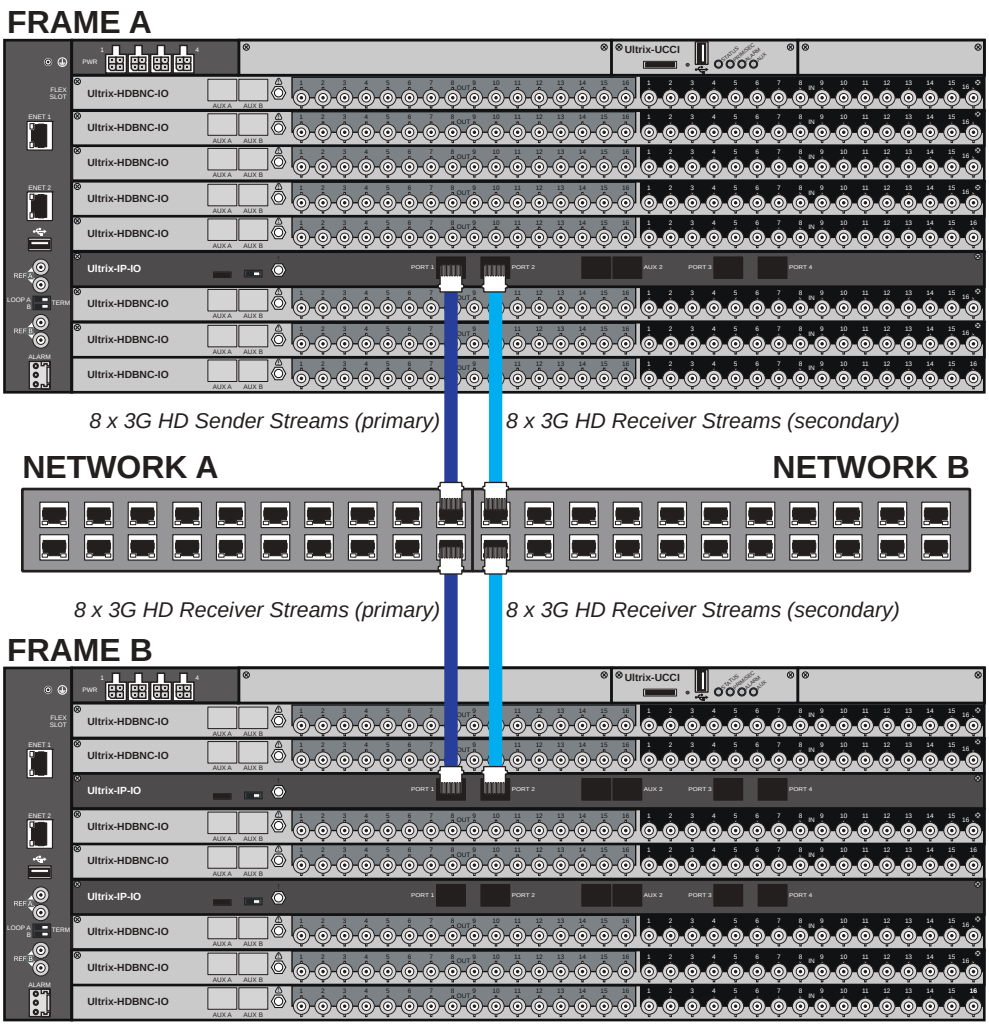


Figure 33 Example of ULTRIX-IP-IO with 3G HD Video Streams — Redundancy Mode

In this setup you would configure eight video streams with 1080p 59.94 format (including audio streams) with the Redundancy Mode enabled for each ENET pair in use.

1. For Frame A you would:
   a. configure two sets of eight video sender streams with 1080p 59.94 format (pairing two audio sender streams per video stream).
   b. enable Redundant Mode for the ENET pair where ENET 1 will transmit the primary streams and ENET 2 will transmit the secondary (redundant) streams.
2. For Frame B you would:
   a. configure two sets of eight video receiver streams with 1080p 59.94 format (pairing two audio sender streams per video stream).
   b. enable Redundant Mode for the ENET pair. ENET 1 will receive the primary streams and ENET 2 will receive the secondary (redundant) streams.

Using UHD 12G Video Format

When using UHD 12G video formats (60/59.94/50Hz), there is a limit of two video streams per ENET port with a maximum of three video streams per ENET pair.

Redundancy Mode is Disabled

Figure 34 shows two ULTRIX-FR5 routers with one (Frame A) transmitting three 12G UHD video streams and the second router (Frame B) receiving three 12G UHD streams.

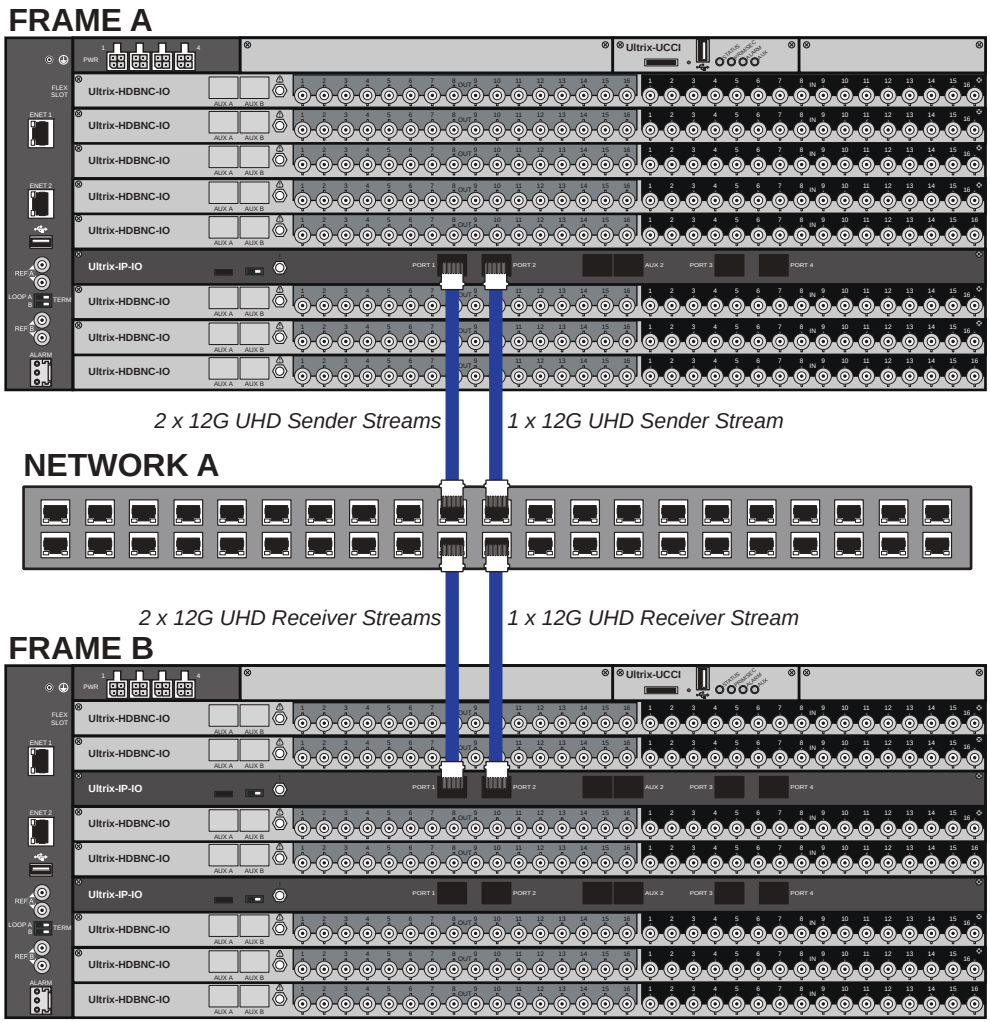


Figure 34 Example of ULTRIX-IP-IO with 12G UHD Video Streams

In this setup you would configure three video streams with 2160p 59.94 format without redundancy.

1. For Frame A you would configure two video sender streams with 2160p 59.94 format on ENET 1 and one 2160p 59.94 video sender stream on ENET 2.
2. For Frame B you would configure two video receiver streams with 2160p 59.94 format on ENET 1 and one 2160p 59.94 video receiver stream on ENET 2.
3. Ensure that the receiver IP addresses on Frame B match the existing sender addresses on Frame A.

Redundancy Mode is Enabled

In this setup, there are two video streams with 2160p 59.94 format (including the audio streams) but the Redundancy Mode is enabled. There is a limit of two video streams per ENET port. The second ENET port is reserved for the redundant streams.

Figure 35 shows two ULTRIX-FR5 routers with one router (Frame A) transmitting two 12G UHD primary video streams and two 12G UHD secondary streams. The second router (Frame B) receives a primary set of two 12G UHD streams and a secondary set of two 12G UHD streams.

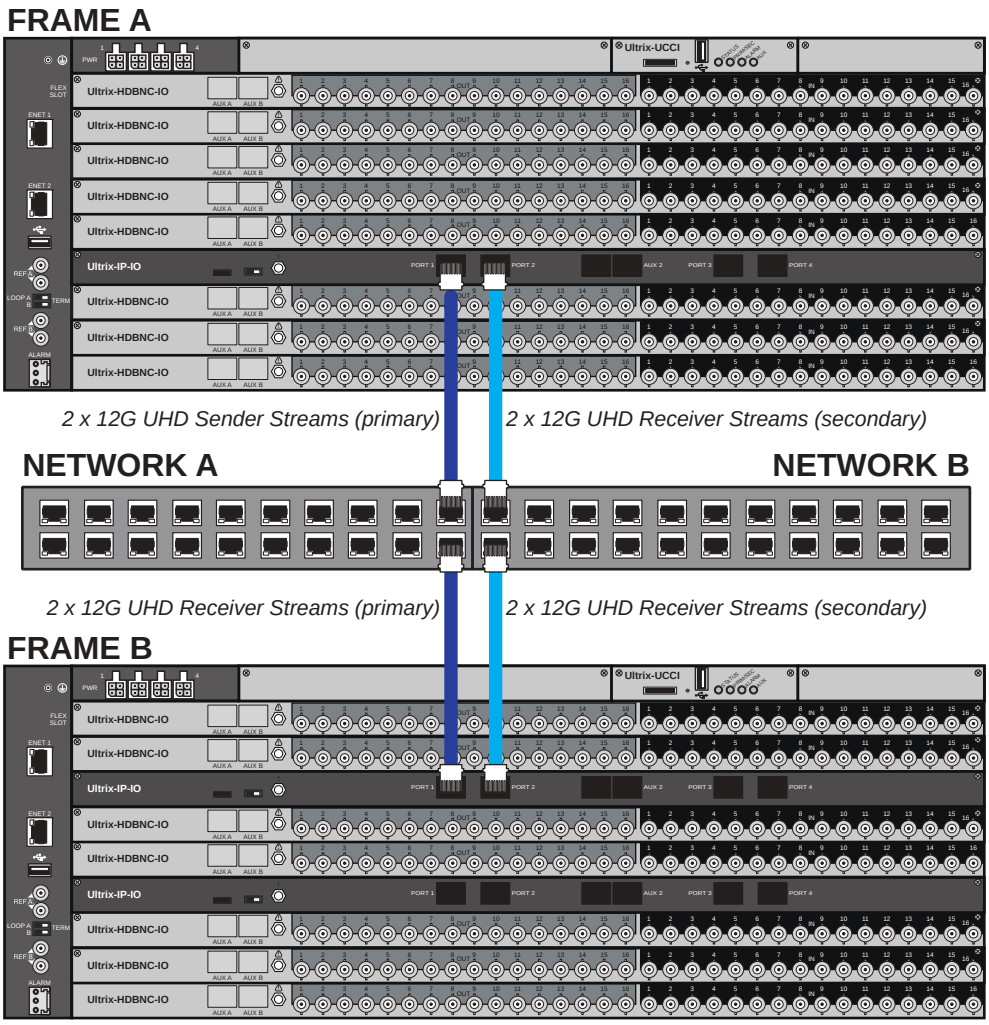


Figure 35 Example of ULTRIX-IP-IO with 12G UHD Video Streams — Redundancy Mode

In this setup you would configure two video streams with 2160p 59.94 format with Redundancy enabled for each ENET pair in use.

1. For Frame A you would:
   a. enable Redundant Mode for the ENET pair where ENET 1 will transmit the primary streams and ENET 2 will transmit the secondary (redundant) streams.
   b. configure two sets of two 12G UHD video sender streams with 2160p 59.94 format.
2. For Frame B you would:
   a. enable Redundant Mode for the ENET pair. ENET 1 will receive the primary streams and ENET 2 will receive the secondary (redundant) streams.
   b. configure two sets of two video receiver streams with 2160p 59.94 format.

Using Multiple Video Streams with Different Formats

In this setup, there are multiple video streams with different video formats with a total bandwidth of all streams totaling less than 25Gb.

Figure 36 shows two ULTRIX-FR5 routers with one router (Frame A) transmitting four 3G HD video streams and one 12G UHD video stream on ENET 1. The second router (Frame B) receives four 3G HD streams and one 12G UHD video stream on ENET 1.

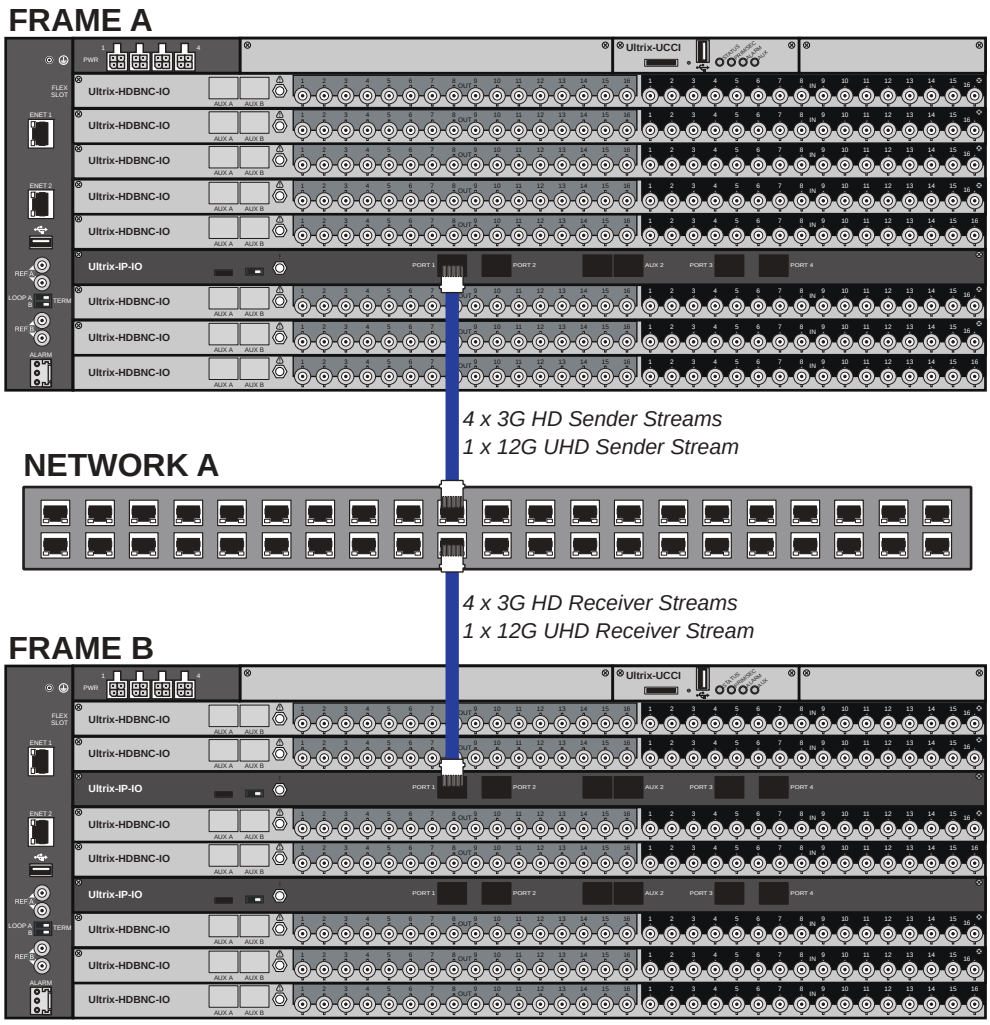


Figure 36 Example of ULTRIX-IP-IO with Multiple Streams with Different Video Formats

In this setup you would configure a total of five video streams on each ENET port of each router.

1. For Frame A you would configure:
   a. four video sender streams with 1080p 59.94 format on ENET 1.
   b. one 2160p 59.94 video sender stream on ENET 1.
2. For Frame B you would configure:
   a. four video receiver streams with 1080p 59.94 format on ENET 1.
   b. one 2160p 59.94 video receiver stream on ENET 1.
3. Ensure that the receiver IP addresses on Frame B match the existing sender addresses on Frame A.

ULTRIX-IPX-IO Setup

This chapter outlines how to configure receivers and senders for the Ultrix router to be used in video and audio streaming when an ULTRIX-IPX-IO blade is installed in a slot of an Ultrix router chassis.

✶ The ULTRIX-IPX-IO supports multicast IP addresses in the range of 225.x.x.x to 239.x.x.x. Note that some addresses in this range are reserved by IANA.

For More Information on...

- the installation and cabling of the ULTRIX-IPX-IO, refer to the ***Ultrix Installation Guide***.

What are Receivers, Senders, and Streams?

The following terms may be used throughout this chapter:

Device

A physical, virtual, or software application that may include multiple sources, destinations, senders, or receivers.

Flow

The continuous raw media content. It can contain more than one essence (e.g. an audio flow can contain multiple channels).

A flow is independent of the transport protocol. For example, 48kHz LPCM audio is a flow; AES67 is one type of stream which can carry the flow.

Flows cannot generally be passed around natively, and need to be encapsulated in a stream. Flows from the same source are considered “editorially equivalent”, but may be encoded differently.

Receiver

An element within a device that receives exactly one stream, which contains one flow from a network.

Sender

An element within a device which presents exactly one flow, packaged as a stream onto a network.

Stream

One flow, encapsulated within a transport protocol. Examples include SMPTE ST 2110-20 Video, SMPTE ST 2110-30 Audio, or SMPTE ST 2110-40 ANC.

Before You Begin

This section provides information to keep in mind before setting up ULTRIX-IPX-IO streams.

✶ Each ULTRIX-IPX-IO blade has four QSFP28 ports (ETH1-ETH4) with 100Gb bandwidth per port.

Hardware

The Ultrix software currently supports:

- 100Gb QSFP28 transceiver modules based on 4x25Gb NRZ optical lanes, either requiring no FEC or RS(528,514) KR4 FEC, for multi-mode or single-mode fibers, up to power class 7 (5W). For example, 100GBASE-SR4, 100GBASE-SWDM4, 100GBASE-PSM4, 100GBASE-CWDM4, 100GBASE-4WDM-10/20/40, 100GBASE-CLR4, 100GBASE-LR4.
- 100Gb QSFP28 transceiver modules based on 1x100Gb PAM4 optical lane, either requiring no FEC or providing built-in RS(544,514) KP4 FEC, for multi-mode or single-mode fibers, up to power class 7 (5W). Compliant with the 100G Lambda MSA, including built-in RS(544,514) KP4 FEC. For example, 100GBASE-DR, 100GBASE-FR, 100GBASE-LR.
- 100Gb QSFP28 transceiver modules based on 4x25Gb NRZ over shielded balanced copper cabling, requiring RS(528,514) KR4 FEC. For example, 100GBASE-CR4.

✶ Contact Ross Technical Support about other QSFP28 transceiver modules not listed above.

Audio Streams

Keep the following in mind when setting up the ULTRIX-IPX-IO streams:

- The blade supports a maximum of 4 audio streams per SDI (64 audio streams per blade) only through the first ENET pair ETH1/ETH2 when used with a stand-alone router.
- The ULTRIX-IPX-IO is compliant with the SMPTE ST 2110-30 Levels A and C (partial). This results in 1 to 8 channels at 1ms packet time, or 1 to 16 channels at 125µs packet time.
- The Packet Time is a global setting per ULTRIX-IPX-IO slot for all receivers and senders.

Video and ANC Streams

Keep the following in mind when setting up video and ANC IP streams:

- Each ENET pair can support up to 8 redundant video/ANC streams with a maximum of 16 streams per ULTRIX-IPX-IO blade.

Protection Switching (SMPTE 2022-7)

The ULTRIX-IPX-IO blade also provides protection switching as per SMPTE 2022-7. This option must be enabled globally to enable/disable it for any pair of two streams on the blade.

Keep the following in mind when setting up redundant streams:

- You will need to assign a unique IP address to each stream (primary and secondary).
- Video and ANC streams 1 to 8 are mapped to ETH1 as the primary stream and ETH2 as the secondary stream.
- Video and ANC streams 9 to 16 are mapped to ETH3 as the primary stream and ETH4 as the secondary stream.
- All 64 audio streams are mapped to ETH1 as the primary stream and ETH2 as the secondary stream.

Automatic Sender Session Description Protocol (SDP) Updates

When a sender stream is active and its SDI input video format changes to a different and valid format, if the new format is allowed by the session (as defined by the Adaptive Input Allowed Input Rates setting) and results in an overall system valid configuration (no ULTRIX-IPX-IO bandwidth limit will be exceeded), the sender stream will update itself to use this new format, generating a new version of its SDP. The Session and NMOS IDs do not change when the sender stream SDP update is performed. This allows the existing streams to adapt so that the ULTRIX-IPX-IO does not need to track new streams. This feature is enabled by default.

✶ You can disable this feature by deselecting all Adaptive Input Allowed Input Rates (HD, 3G, 6G, 12G) and selecting a single video format. Only that format will be announced and transmitted. Any other format will stop packet transmission and no SDP updates will occur. Switching between sources with the same video format is still allowed.

This feature is helpful to avoid receivers to be configured with a stale version of the associated sender. If the parameters of a sender change, an SDP update is triggered, which is then forwarded to all receivers affected by the identified update.

✶ When using an Ultricore BCS, the Ultricore BCS automatically updates the receivers when the subscribed sender changes.

Quick Updates when Streaming from the Ultricore BCS

When the format of the SDI input video changes, the ULTRIX-IPX-IO updates its own sender and SDP, and the Ultricore BCS is notified of this change. The Ultricore BCS then issues a connection update to all receivers using this sender. The ST 2110 stream and SDP file are also updated and the video sender resumes with the new format.

Protection from Invalid Video Scenarios

When an input with a non-matching frame rate is detected, an alarm in DashBoard is raised. The SDP file remains unchanged, but the sender does not transmit the packets. This prevents the entire system from switching to an invalid video format or unstable video input.

Using any Supported Control Protocol

The advertised SDP file updates to reflect a valid video format change through all supported control protocols, including NMOS, Ember+, and DashBoard advertised network streams. This enables the ULTRIX-IPX-IO to use the new SDP file, and enables the user to update the connections of any active receivers to the new format without having to recreate the receiver connection manually when the sender changes.

Requirements

To take advantage of this feature, you will need to:

- Include an Ultricore BCS (or a broadcast controller) in the routing system to identify the sender SDP change and update all receivers associate with that SDP.
- Configure the receivers and senders and ensure they are active on the router. If a sender is disabled (not active), the incoming changes on the router port of the ULTRIX-IPX-IO blade will not cause any change on the active configuration.
- When configuring the senders, specify the video format(s) you want to stream via the **Adaptive Input Allowed Input Rates** option.
- Use Ultricore BCS to establish routes from senders to receivers.

Overview

The generalized work flow of configuring your ULTRIX-IPX-IO is:

1. Download and install the latest version of the DashBoard client software.
2. Contact your IT department for the required IP addresses for your ULTRIX-IPX-IO ports.
3. Cable the ULTRIX-IPX-IO ports.
4. Configure the protocol settings for the ULTRIX-IPX-IO.
5. Specify the timing requirements for the ULTRIX-IPX-IO.
6. Configure the streams for the ULTRIX-IPX-IO.
7. Continue to set up your database as outlined in the ***Ultrix and Ultricore Database Guide***.

Setups with an Ultricore BCS

An Ultricore BCS with the Ultricore-IP license enables the video senders/receiver endpoints to be reported as available ports to the router database. The video and ancillary senders/receivers are seen as part of a single video-IP matrix, and the audio senders/receivers are part of a single audio-IP matrix.

✶ When a video sender stream is active and the video format changes on the SDI input of that stream, the Ultricore BCS will automatically detect the update and then updates all the receivers subscribed to that sender. This allows the existing streams to adapt.

Refer to the ***Ultricore BCS User Guide*** for details on setting up and configuring the Ultricore BCS in your routing system.

Configure the Protocol Settings

The ULTRIX-IPX-IO supports media distribution based on NMOS, and Ember+. This section outlines how to configure each protocol.

✶ Changes made to the ULTRIX-IPX-IO settings may require a frame reboot.

Configuring the NMOS Settings

The Network Media Open Specifications (NMOS) is enabled by default on the device if one or more ULTRIX-IPX-IO blades are present. The Ultrix router will automatically look for advertised NMOS registries using mDNS and will publish the Device Name and other info in the Frame Configuration > ULTRIX-IPX-IO > NMOS tab. You can also choose to register the router when using Registry Service Discovery (RDS).

To configure the NMOS settings

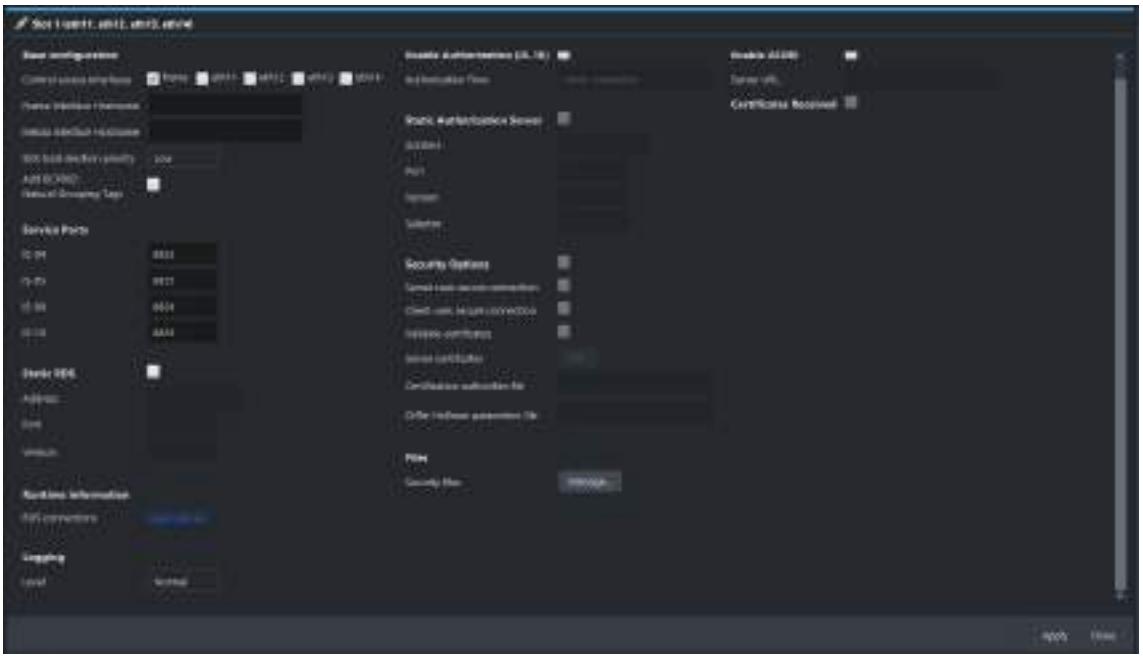
1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Ultrix-IP** tab.

7. Select the **NMOS** tab on the left toolbar.
8. Select the row for the router slot you wish to configure.

   The NMOS dialog opens for the selected slot. In the following example, the user selected Slot 1.



✶ It is not recommended that your media network and management network use the same subnet.

9. Use the **Control Access Interfaces** options to enable or disable control via each port.
10. Select the **Add BCP-022-01** box to enable AWA BCP-002-01 natural grouping of NMOS resources by the Ultrix. This option is disabled by default.
11. Use the **Service Ports** fields to specify each TCP port as follows:
    - Use the IS-04 field to specify the port the NMOS IS-04 Node service is listening on.
    - Use the IS-05 field to specify the port the NMOS IS-05 Connection service is listening on.
    - Use the IS-08 field to specify the port the NMOS IS-08 Connection service is listening on.
    - Use the IS-10 field to specify the port the NMOS IS-10 Connection service is listening on
12. To force the Ultrix to register to a specific Registry Service Discovery on the network:
    a. Select the **Static RDS** box.
    b. Use the **Address** field to set the static IP that the router will use to register to this specific RDS.
    c. Use the **RDS Port** field to specify the port used for the RDS.
    d. Use the **RDS Version** field to specify the version of the NMOS registry API.

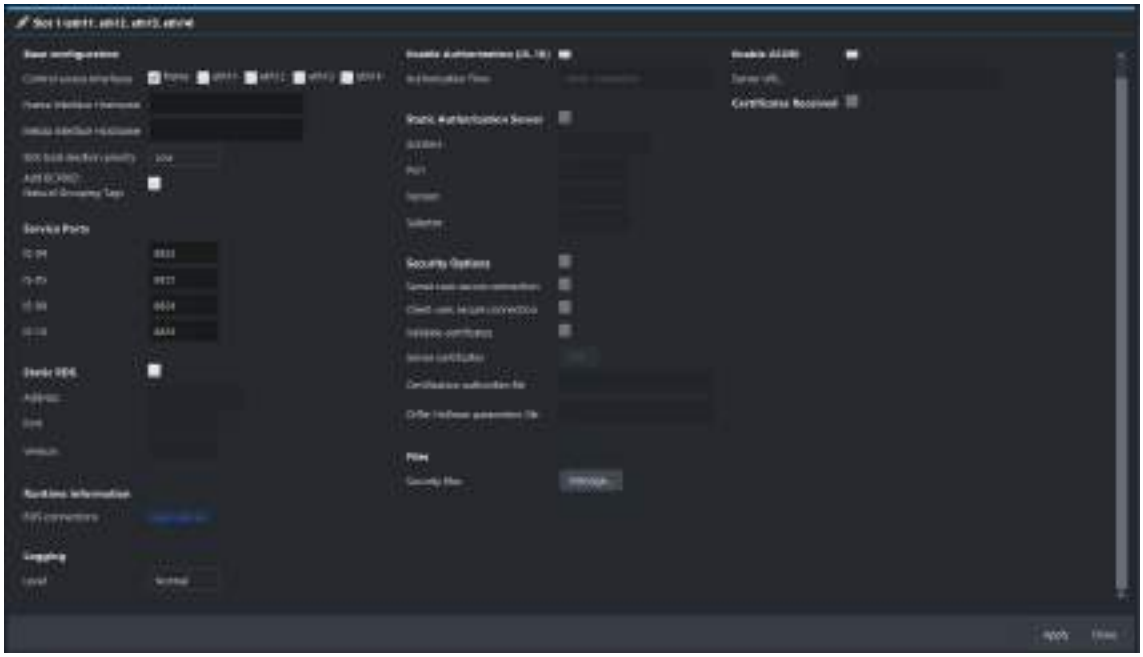
NMOS IS-10 Setup

The following procedure is only applicable if you have both an NMOS Authorization Server and an RDS that is enabled for secure communication via NMOS IS-10.

To configure the ULTRIX-IPX-IO for NMOS IS-10

1. From the **Frame Configuration** page, select **Ultrix-IP** > **NMOS**.
2. Select the row for the router slot you wish to configure.

The NMOS dialog opens for the selected slot. In the following example, the user selected Slot 1.



3. Select the **Enable Authorization (IS-10)** box to enable NMOS IS-10 Authorization for the router on this slot.
4. Use the **Authorization Flow** field to define which mode the device will use to authenticate with the Authorization Server.
5. To force the Ultrix to register to a specific NMOS IS-10 Authorization Server on the network:
   a. Select the **Static Authorization Server** box.
   b. Use the **Address** field to set the static IP that the Ultrix router will use to connect to the Authorization Server.
   c. Use the **Port** field to specify the port used for NMOS IS-10.
   d. Use the **Version** field to specify the version of the NMOS IS-10 registry API.
   e. Use the **Selector** field to define the location for the registry API. Refer to the IS-10 specification for details.
6. Use the **Security Options** to define the NMOS IS-10 secure communication:
   - **Server uses secure connection** — select this option if the Ultrix router will use secure communication when it is the server and will receive connection requests from an Ultricore BCS or other controller device.
   - **Client uses secure connection** — select this option if the Ultrix router will use secure communication when the router is the client (for the registration with RDS and Authorization server).
   - **Validate certificates** — select this option only when troubleshooting communication issues. This will enable the system setup to bypass the actual validation of the client provided certificates. This option should not be selected for production services.
   - **Server certificates** — Click **Set** to open a dialog to set the server certificates by creating entries that references the uploaded security files based on its types/Algorithm used. The files are uploaded via the Security files field. The files are used by the server to validate certificates and it needs to have a key algorithm, private keys, and certificate chain file.

7. Use the **Files** > **Security files** > **Manage** to upload security files as follows:
    - The categories are pre-defined and not all are required for all setups. For example, some systems might not need a Diffie-Hellman file but most systems will require a Certificates authorities.
    - Once these files are uploaded, they become available for the user to select via the Security Options > Certificates authorities file field and the Diffie-Hellman parameters file field.

To enable ACME support

1. Select the **Enable ACME** box.
2. Use the **Server URL** field to type the IP address of the ACME server the Ultrix will connect to.
3. Select the **Certificate Received** box to enable the Ultrix router to report when a valid ACME certificate is sent by the NMOS device. The status is reported in the ACME column on the main page of the NMOS tab.

Ember+ Communications

If the Ultricore-EMBER+ license is enabled, each ULTRIX-IPX-IO blade provides16 streams via one port. The Ember+ port will be available on Port 9095 for the IP address assigned to each ULTRIX-IPX-IO port. If accessing it through the Ultrix Frame Configuration > Ultrix-IP > System interface, the ports will be distributed based on slot position as follows:

- Streams 1-16 to Port 50**xx**8 where **xx** is the router slot that the ULTRIX-IPX-IO is installed in.

To establish a connection between the Ember+ client and the Ultrix, you will need to:

1. Add the Ultrix in the Ember+ client interface using the IP Address assigned to the Ultrix router.
2. Enable SDP patching with the Ember+ client to establish video and audio receivers on the Ultrix.
3. Ensure that all network streams have a consistent audio channel count.

Establishing a Connection

Ensure that SDP patching is enabled with the Ember+ client to establish receivers on the Ultrix.

✶ Ultrix implements BESS v1.1 for Ember+ support to communicate with third-party controllers.

Mapping

You will need to:

1. Configure the sender sessions in DashBoard.
2. Use the Ember+ controller interface (e.g. Lawo VSM) to map the sources to the targets. Refer to the documentation that came with your Ember+ controller for details.

Configuring the Port Network

By assigning an IP Address to each QSFP28 port of the ULTRIX-IPX-IO blade, you are able to uniquely identify it on the network and control it via the DashBoard interface. Each QSFP28 port can be configured separately for media traffic.

To assign the network settings for an ULTRIX-IPX-IO port

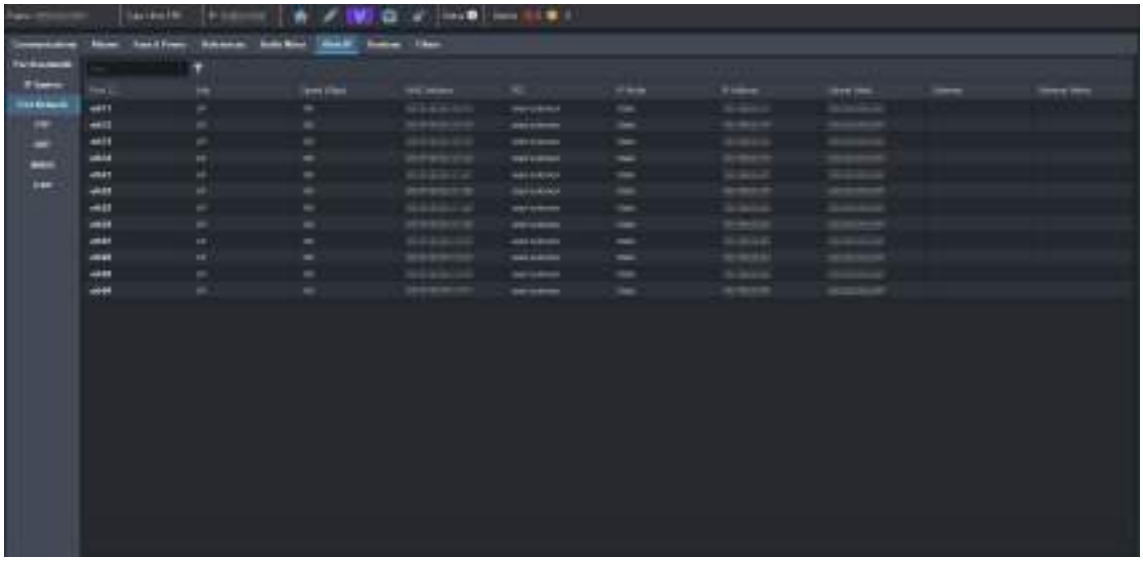
1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

The **Device Configuration** interface opens.

5. Select  .

   The **Frame Configuration** page opens.

6. Select the **Ultrix-IP** tab.
7. Select the **Port Network** sub-tab.



8. Locate the row for the slot > port you wish to configure.

✶ All QSFP28 ports are set to DHCP by default.

9. If you are manually configuring the network settings:
   a. Click the cell in the **IP Mode** column and select **Static**.
   b. Use the **IP Address** field to specify the static IP Address for the port. This is the IP Address that is used to control and communicate with the specified port.
   c. Use the **Subnet Mask** field to specify the subnet mask for the port.
10. To select the FEC mode:
    a. Select the cell in the FEC column.
    b. Perform one of the following:
       - Select the FEC mode that matches the ULTRIX-IPX-IO port and the corresponding switch port; or
       - Select Disabled for modules with built-in FEC (DR/FR/LR).
11. If you want the network settings for the port to be automatically obtained, and DHCP service is available on your control network, click the cell in the **IP Mode** column and select **DHCP**.
12. Repeat this procedure for each QSFP28 port you wish to configure.
13. Verify the new settings reported on the Frame Configuration status fields.

Configuring the Timing Settings

The Ultrix supports the Precision Time Protocol (PTP) as defined in the ***IEEE 1588-2008*** standard and the ***SMPTE ST-2059*** specification.

✶ The Ultrix behaves only as a follower and cannot be used as a Boundary Clock or Grandmaster.

Configuring the PTP Settings

You can synchronize the Ultrix to real-time clocks of other devices in the same network. You create a profile (use the default settings or create a custom profile) that identifies the Ultrix to the Grandmaster clock.

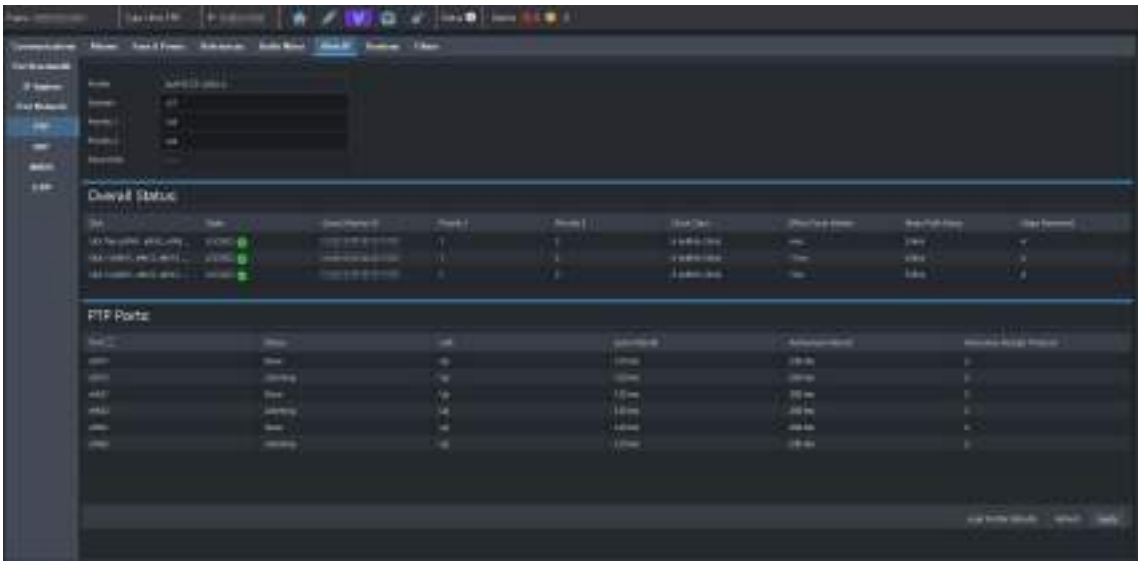
✶ There are several criteria that PTP clocks compare to determine who will be master and who will be follower (called the Best Master Clock Algorithm, or BMCA), and they are evaluated in order: Priority1, clock class, accuracy, scaled log variance, Priority2, clock ID (similar to the MAC address). Practically, Priority1 is the only setting configured on all clocks to control the outcome of the Grandmaster election. If Priority1s are equal, the next criterion is evaluated (clock class) and the criteria are evaluated in succession until a Grandmaster is determined.

To configure a PTP default profile for the Ultrix

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Ultrix-IP** tab.
7. Select the **PTP** sub-tab.



8. Use the **Profile** menu to specify the standard/specification used for PTP. The default is SMPTE ST 2059-2.

✶ The **Domain** is automatically set.

9. Click **Apply**.

To create a custom PTP profile for the Ultrix

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.

4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.

5. Select  .

   The **Frame Configuration** page opens.

6. Select **Ultrix-IP** > **PTP**.
7. Use the **Profile** menu to select a standard/specification used for PTP.
8. Edit the required parameter(s) according to the PTP parameters used by the system.

✶ There can be multiple PTP domains operating concurrently within a network. The domain is a field in all PTP message headers. Messaging between entities are segregated by domain (e.g. the Ultrix is an endpoint configured for domain 128 and ignores messages from a neighboring clock configured for domain 127).

Configuring the PTP Settings for a Specific Port

Once you create a PTP profile for the Ultrix, you may want to uniquely define the PTP settings for each QSFP28 port.

To configure the PTP settings for a specific port

1. From the **Frame Configuration** page, select **Ultrix-IP** > **PTP**.
2. Locate the **PTP Ports** area of the **PTP** tab.

3. Locate the row for the port you wish to configure.
4. Use the **Sync Interval** field to specify the number of seconds at which synchronization messages are sent from the master clock to the specified ULTRIX-IPX-IO port.
5. Use the **Announce Interval** field to specify the rate of announce messages that the specified ULTRIX-IPX-IO port requests from the master clock during a unicast session.
6. Use the **Announce Receipt Timeout** field to specify the number of seconds the specified ULTRIX-IPX-IO port waits for an announce interval message before timing out.
7. Click **Apply**.

Specifying an NTP Server as the Time Source

You can choose to use an NTP Server as the system time source for an ULTRIX-IPX-IO blade.

✶ The media time source is always provided by PTP.

✶ Before proceeding, ensure the Ultrix is configured to access the NTP Server in your facility. Refer to "**Using an NTP Server as the Time Source**" for details.

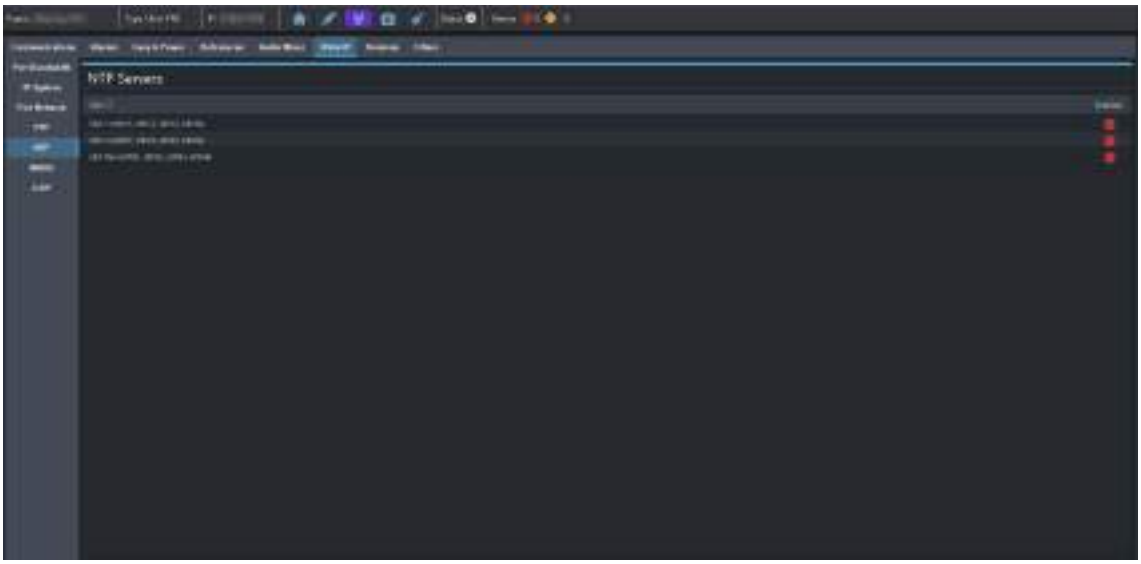
To specify an NTP Server as the time source for an ULTRIX-IPX-IO

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Ultrix-IP** tab.
7. Select the **NTP** sub-tab.

   The sub-tab lists each ULTRIX-IPX-IO slot as a separate row.
8. Locate the row for the required ULTRIX-IPX-IO slot you wish to enable NTP as the time source.
9. Select the **Enabled** box for that row.



Configuring the Senders

For each sender output, you need to specify the IP encapsulation properties for video, audio, and ancillary sender streams. A sender stream on the ULTRIX-IPX-IO can be configured with any multicast IP address in the range of 225.x.x.x to 239.x.x.x.

- Make note of the bandwidth allocation for the ULTRIX-IPX-IO port to determine the available capacity of the port. You can add a maximum of 8 video sessions per ETH port. Once that maximum is reached, new streams will not be accepted and updates will only be accepted if the new bandwidth used does not exceed 100Gb.
- The stream count for each ENET redundant pair is 8+8. The first ENET pair (ETH1, ETH2) transports output streams 1 to 8. The second ENET pair (ETH3, ETH4) transports output streams 9 to 16.

To display the Add Senders menu for a port in DashBoard

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.

3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

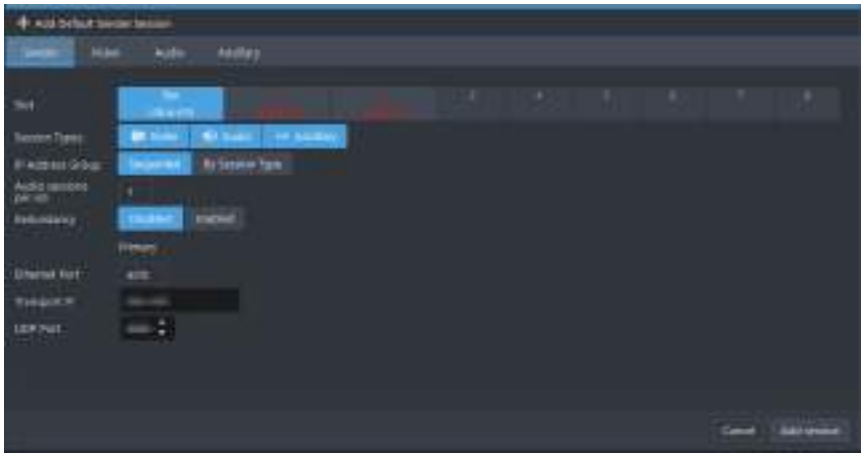
   The **Device Configuration** interface opens.
5. On the router rear panel map, select the required ULTRIX-IPX-IO slot.

   The **Port Configuration** page updates to display the options for the blade with the Summary tab automatically selected.
6. Click **Add Senders**.

To add advertised sender streams

1. From the **Add Senders** menu, click **Default**.

   The **Add Default Sender Session** dialog opens.



2. Use the **Transport IP** field to specify the IP range for the sender.
3. Use the **UDP Port** field to specify the RTP port for the advertised stream.
4. Use the **Session Types** options to select the type of stream(s) that will be available at the specified IP range and UDP port.
5. If you selected **Video** in step 4:
   a. Select the **Video** tab from the dialog toolbar.
   b. Use the options in the **Adaptive Rates** area to specify the video formats that the stream is allowed to follow should the input SDI video format change while the sender is enabled.
   c. Use the **RTP Payload** field to specify the Real-time Transport Protocol (RTP) payload IDs used by that sender stream.

✶ This is not a bandwidth reservation. If a sender is set to allow 12G inputs, it is not guaranteed that it would follow that video format as all device setups is constrained by the available bandwidth on the Ethernet side. If the new video input is valid, but the overall system configuration is invalid, the sender will be updated but an alarm is still raised to the user to alert of a video mismatch.

✶ When the sender is updated, all protocols or interfaces that advertise it will be updated with a new configuration set and SDP. This includes NMOS, Ember+, and all DashBoard tabs where the sender is visible.

6. If you selected **Audio** in step 4:
   a. Select the number of **Audio sessions per sdi** from 1 to 4.
   b. Select the **Audio** tab from the dialog toolbar.

c. For each session:

- Use the **Audio Channels** to select the audio channels to be transported by each audio stream. One audio channel can be transported in multiple sessions.
- Use the **Audio Codec** to specify the audio encoding format for each audio stream.
- Use the **RTP Payload** to specify the Real-time Transport Protocol (RTP) payload IDs used by each audio stream.

7. If you selected **Ancillary** in step 4:

   a. Select the **Ancillary** tab from the dialog toolbar.

   b. Use the **RTP Payload** field to specify the Real-time Transport Protocol (RTP) payload IDs used by that sender stream.

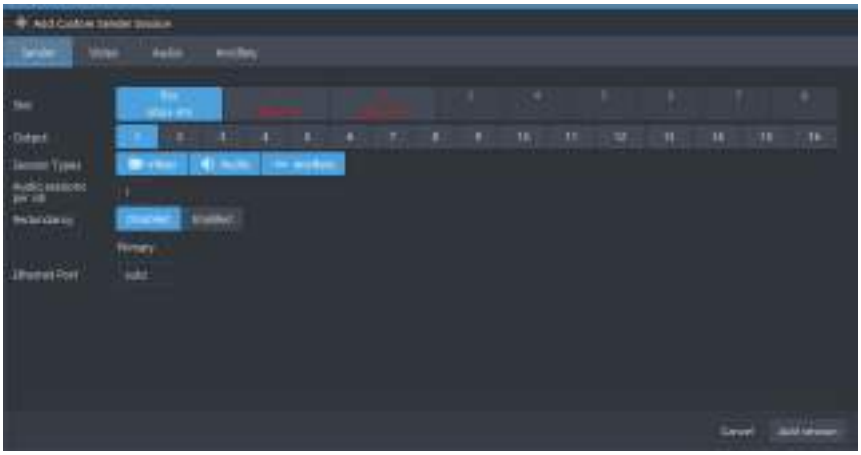
8. Click **Add session**.

   The **Add Default Sender Session** dialog closes and the **Port Configuration** page updates to list the sender streams advertised using the IP Address specified in step 2.

To manually add a sender stream

1. From the **Add Senders** menu, click **Custom**.

   The **Add Custom Sender Session** dialog opens.



2. Use the **Output** options to assign the SDI input signal to the sender stream.
3. Use the **Session Types** options to select the type of stream(s) that will be available at the specified IP Address.
4. If you selected **Video** in step 3:

   a. Select the **Video** tab from the dialog toolbar.

   b. Use the **Transport IP** field to specify the sender.

   c. Edit the **UDP Port** to specify the source port to transmit the data.

   d. Use the **RTP Payload** field to specify the Real-time Transport Protocol (RTP) payload IDs used by that sender stream.

   e. Use the **Adaptive Rates** options to specify the video formats that the stream is allowed to follow should the input SDI video format change while the sender is enabled.

✶ This is not a bandwidth reservation. If a sender is set to allow 12G inputs, it is not guaranteed that it would follow that video format as all device setups is constrained by the available bandwidth on the Ethernet side. If the new video input is valid, but the overall system configuration is invalid, the sender will be updated but an alarm is still raised to the user to alert of a video mismatch.

✶ When the sender is updated, all protocols or interfaces that advertise it will be updated with a new configuration set and SDP. This includes NMOS, Ember+, and all DashBoard tabs where the sender is visible.

5. If you selected **Audio** in step 3:
   a. Select the number of **Audio sessions per sdi** from 1 to 4.
   b. Select the **Audio** tab from the dialog toolbar.
   c. For each session:
      - Use the **Audio Channels** to select the audio channels to be transported by each audio stream. One audio channel can be transported in multiple sessions.
      - Use the **Audio Codec** to specify the audio encoding format for each audio stream.
      - Use the **RTP Payload** to specify the Real-time Transport Protocol (RTP) payload IDs used by each audio stream.
      - Use the **Transport IP** field to specify the sender for the audio stream.
      - Edit the **UDP Port** to specify the source port to transmit the audio data.
6. If you selected **Ancillary** in step 3:
   a. Select the **Ancillary** tab from the dialog toolbar.
   b. Use the **Transport IP** field to specify the sender for the ancillary stream.
   c. Edit the **UDP Port** to specify the source port to transmit the ancillary data.
   d. Use the **RTP Payload** field to specify the Real-time Transport Protocol (RTP) payload IDs used by that sender stream.
7. Click **Add session**.

   The **Add Senders Session** dialog closes and the **Port Configuration** page updates to list the sender streams advertised using the IP Address specified in step b.

Configuring the Receivers

Receivers are the representation of connections on the router and report the information related to all traffic that is received. Receivers can be manually created by manually specifying the IP and UDP ports of the sender on the **Port Configuration** tab, but usually the process of managing receivers is done by the external broadcast controller.

✶ The Ultrix supports one-to-many connections (where one source can be routed to multiple targets) via ST-2110 multicast distribution. This enables you assign the same transport IP to multiple receivers of the same type. Note that you must still assign an unique IP for each sender stream configured.

This section outlines what is currently present/active on the **Port Configuration** tab and outlines how to manually specify receivers on the router using this interface.

To display the Add Receivers menu for a port in DashBoard

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. On the router rear panel map, locate the required ULTRIX-IPX-IO slot.
6. Select the port on the ULTRIX-IPX-IO slot you wish to configure.

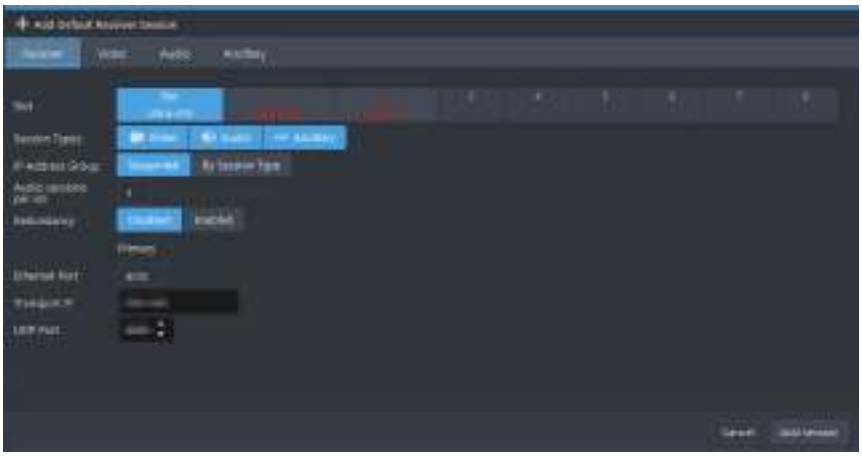
The **Port Configuration** page updates to display the options for the port with the Summary tab automatically selected.

7. Click **Add Receivers**.

To add a default receiver

1. From the **Add Receivers** drop-down menu, select **Default**.

   The **Add Default Receiver Session** dialog opens.



2. Use the **Session Types** options to specify the type of data the streams will include.
3. Use the **IP Address Group** options to specify how to define the series of receiver streams.
4. Use the **Transport IP** field to specify the IP range for the receiver.
5. Use the **UDP Port** field to specify the RTP port the receivers will use.
6. If you selected **Video** in step 2:
   a. Select the **Video** tab from the dialog toolbar.
   b. Verify the **Video Format** field reports the video format of the signal the receivers will output.
   c. Use the **Timing Mode** options to determine whether the stream output will be aligned to the router reference, or if a timing offset is applied to timestamps in the sender's RTP packets.
   d. Verify that the **IP Preview** field reports the correct IP range.
7. If you selected **Audio** in step 2:
   a. Select the number of **Audio sessions per sdi** from 1 to 4.
   b. Select the **Audio** tab from the dialog toolbar.
   c. For each session:
      - Use the **Audio Channels** to select the audio channels to be transported by each audio stream. One audio channel can be transported in multiple sessions.
      - Use the **Audio Codec** to specify the audio encoding format for each audio stream.
      - Use the **RTP Payload** to specify the Real-time Transport Protocol (RTP) payload IDs used by each audio stream.
      - Use the **Link Offset** field to set the timing offset value used by this receiver.
8. If you selected **Ancillary** in step 2:
   a. Select the **Ancillary** tab from the dialog toolbar.
   b. Verify the **Ancillary Format** field reports the format of the signal the receivers will output.

c. Use the **Timing Mode** options to determine whether the stream output will be aligned to the router reference, or if a timing offset is applied to timestamps in the sender's RTP packets.

d. Verify that the **IP Preview** field reports the correct IP range.

9. Click **Add session**.

   The **Add Default Receiver Session** dialog closes and the **Port Configuration** page updates to list the receiver streams advertised using the IP Address specified in step 4.

To manually add a receiver session

1. From the **Add Receivers** drop-down menu, select **Custom**.

   The **Add Receiver Session** dialog opens.

✶ Click **SDP** to add receivers manually by providing the sender SDP instead of the Transport IP, UDP port, etc.

2. Use the **Input** options to assign the SDI output signal to the receiver stream.
3. Use the **Session Types** options to specify the type of data the streams will include.

✶ Selecting both **Video** and **Audio** automatically creates table entries for one video, one ancillary, and up to four audio streams.

4. If you selected **Video** in step 3:

   a. Select the **Video** tab from the dialog toolbar.

   b. Use the **Video Format** field to specify the video format for the stream.

   c. Use the **Timing Mode** options to determine whether the stream output will be aligned to the router reference, or if a timing offset is applied to timestamps in the sender's RTP packets.

   d. Use the **Transport IP** field to specify the UDP IP address of the transport stream for the signal.

   e. Use the **UDP port** menu to specify the UDP port number of the transport stream for the receiver.

5. If you selected **Audio** in step 3:

   a. Select the number of **Audio sessions per sdi** from 1 to 4.

   b. Select the **Audio** tab from the dialog toolbar.

c. For each session:

- Use the **Audio Channels** to select the audio channels to be transported by each audio stream. One audio channel can be transported in multiple sessions.
- Use the **Audio Codec** to specify the audio encoding format for each audio stream.
- Use the **RTP Payload** to specify the Real-time Transport Protocol (RTP) payload IDs used by each audio stream.
- Use the **Link Offset** field to set the timing offset value used by this receiver.

6. If you selected **Ancillary** in step 3:
   a. Select the **Ancillary** tab from the dialog toolbar.
   b. Use the **Video Format** field to specify the video format for the stream.
   c. Use the **Timing Mode** options to determine whether the stream output will be aligned to the router reference, or if a timing offset is applied to timestamps in the sender's RTP packets.
   d. Use the **Transport IP** field to specify the UDP IP address of the transport stream for the signal.
   e. Use the **UDP port** menu to specify the UDP port number of the transport stream for the receiver.
7. Click **Add sessions**.

   The **Add Receiver Session** dialog closes and the **Port Configuration** page updates to list the new receiver stream.

✶ Make a note of the automatically assigned label in the **Name** field for the stream. This name will be used in the database to represent the specific stream as an input (source).

Configuring the Redundant Mode for SMPTE ST-2022-7

The ULTRIX-IPX-IO enables a user to protect their streams to ensure mission critical operation. Using SMPTE ST 2022-7, they can run the same video, audio, and ancillary over two separate, redundant networks in case an error occurs.

✶ This section is only applicable if your system requires protection switching.

Before You Begin

Ensure that:

- your source is capable of sending SMPTE ST 2022-7 streams
- the Ultrix is set up within a protection switching network

Enabling the Redundant Mode

✶ By default, the Redundant mode is disabled for each session.

To enable the Redundant Mode for a session pair

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

The **Frame Configuration** page opens.

6. Select the **Ultrix-IP** tab.
7. Select the **IP System** sub-tab.
8. In the top table, locate the primary port for the protection switching pair.

   Each row in the table is a port on an installed ULTRIX-IPX-IO blade.

9. Select the **Redundancy** cell for the pair you wish to configure for protection switching.
10. Click **Apply**.

Configuring the Ultrix for Protection Switching

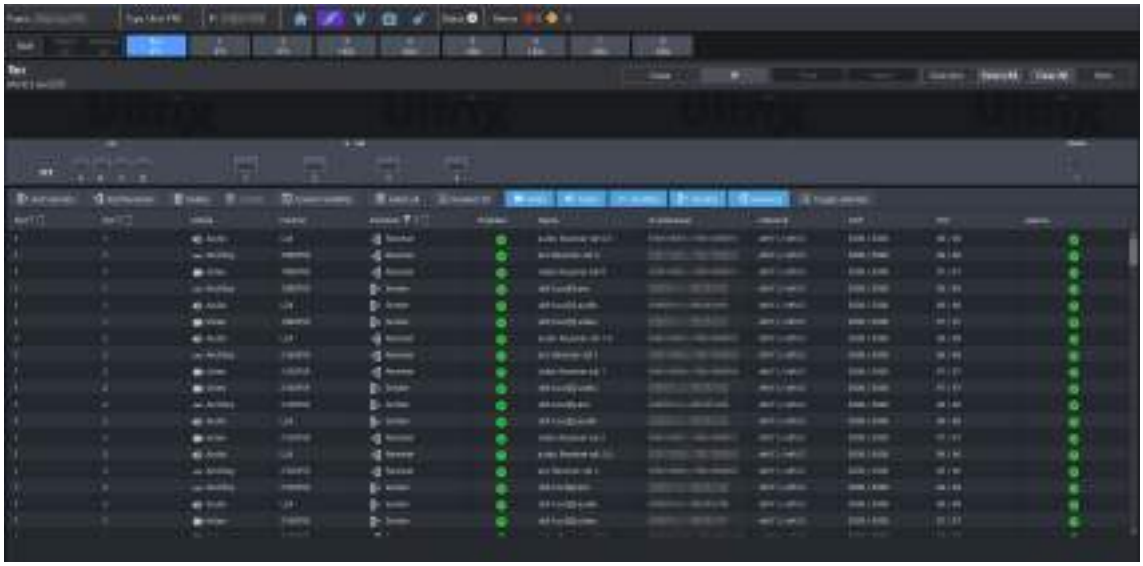
You will need to assign a unique IP address to each stream (primary and redundant).

To configure the Ultrix for protection switching

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Port Configuration** page opens.



6. Configure the primary sender stream as outlined in "**Configuring the Senders**" and set the **Redundancy** to **Enabled**.
7. Configure the secondary sender stream as outlined in "**Configuring the Senders**" and set the **Redundancy** to **Enabled**.

a. Use the **Secondary IP** menus to specify the IP address for the secondary (redundant) stream. Ensure that it is not the same IP address as the primary stream.

b. Use the **Secondary UDP** port to specify the UDP port for the secondary (redundant) stream. Note that the secondary UDP port can be the same as the primary stream.

8. Configure the primary receiver stream as outlined in "**Configuring the Receivers**" and set the **Redundancy** to **Enabled**.

9. Configure the secondary receiver stream as outlined in "**Configuring the Receivers**" and set the **Redundancy** to **Enabled**.

a. Use the **Secondary IP** menus to specify the IP address for the secondary (redundant) stream. Ensure that it is not the same IP address as the primary stream.

b. Use the **Secondary UDP** port to specify the UDP port for the secondary (redundant) stream. Note that the secondary UDP port can be the same as the primary stream.

Troubleshooting

Table 51 provides brief explanations for some common stream setup messages.

Table 51 Troubleshooting the Error Messages

Error Message	Cause
Cannot set default due to maximum allowable streams has reached	The ENET pair has reached the maximum number of allowable streams.
Cannot add 2160P59 video due to maximum allowable UHD streams has reached	
Primary and Secondary UDP port cannot be the same	When in Redundant mode, if the primary and secondary streams have the same IP address, the UDP ports must be different.
This IP port does not have enough bandwidth to add a new stream	The port has reached the maximum 100G bandwidth.
slot#.port# is a redundant IP port. It is reserved for redundant senders.	The ENET pair is in Redundant mode and you cannot edit the second port (ENET 2 or ENET 4) of the pair.
Address x.x.x.x:x is being used by slotx.out[y].#.chz	Each stream must have a unique network address.
Video Format mismatch detected	The input video format does not match those selected/enabled in the **Adaptive Input Allowed Input Rates** setting of the sender stream, or input is not valid.
100G link is down	One of the following is occurring: • The cable and/or optical module is not properly connected. • There is an FEC setting mismatch between the ULTRIX-IPX-IO and switch endpoints. If your module includes a built-in FEC (DR/FR/LR), the ULTRIX-IPX-IO FEC Mode must be set to Disabled. Refer to "**Configuring the Port Network**".

ULTRIX-SFP-IO Setup

This chapter outlines how to utilize the ports for the Ultrix router when an ULTRIX-SFP-IO blade is installed in a slot of an Ultrix router chassis.

For More Information on…

- the installation and cabling of the ULTRIX-SFP-IO, refer to the ***ULTRIX-FR1, ULTRIX-FR2, and ULTRIX-FR5 Installation Guide***.

Overview

The Ultrix router automatically detects when the ULTRIX-SFP-IO blade is installed. Each signal is made available in the Ultrix routing system much like those available via the standard IN and OUT HD BNCs for each slot. The signals are initially named using the standard Frame.Slot.Port.Type.Channel nomenclature where Port is reported as the physical AUX and/or SFP port on the Ultrix rear panel that the module is installed in. The options in the SFP Configuration interface for a module are the same as those for video and audio signals on the BNCs.

✶ MADI SFP modules are only supported in the AUXA and AUXB ports.

For More Information on…

- the supported modules for the ULTRIX-SFP-IO blade, refer to the ***ULTRIX-FR1, ULTRIX-FR2, and ULTRIX-FR5 Installation Guide*** and ***Ultrix SFP Modules Guide***.

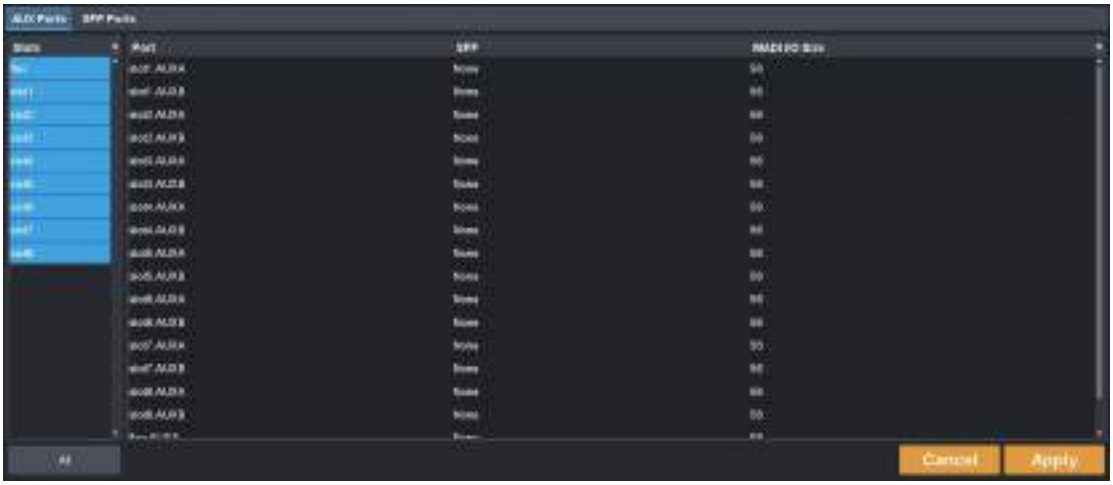


Figure 37 Example of the SFP Configuration Interface

Before You Begin

You may also need to install an:

- UltriSpeed license if the ULTRIX-SFP-IO includes an SFP-HDB-IN-12G, SFP-FIBER-12G, and/or SFP-HDB-OUT-12G.
- UltriScape license for each port that will be used to provide an UltriScape head output.
- UltriSRC license for each AUX port configured for asynchronous MADI input.

Configuring an SFP Port

Once the SFP module is installed in a port, you must specify the port type. Select SDI video for video SFP types, or MADI for Audio SFP types. MADI audio SFP type allow you to specify the channel quantity - either 56 or 64 as per your facilities' standard.

The SFP Configuration interface is organized into two sections: AUX settings, and SFP settings. The AUX Settings lists all the AUX port settings for all blades in the frame. The SFP Settings list all the SFP I/O port settings.

To configure the settings for an SFP port

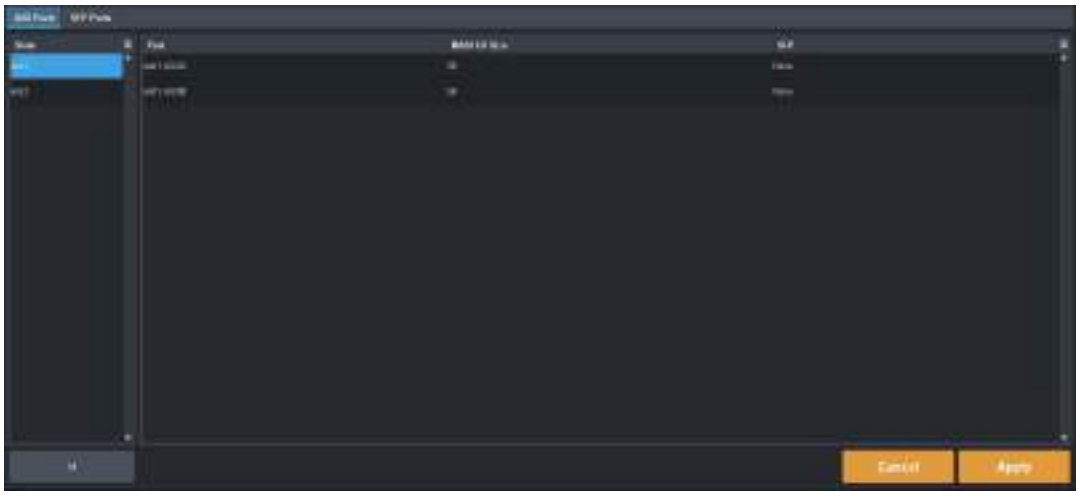
1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **SFP Configuration** page opens.
6. Select the tab appropriate to the port location you wish to configure.
7. From the **Slots** table on the left, select the required ULTRIX-SFP-IO blade.

✶ Click **ALL** to display the available SFP/AUX ports available in the router.

The **Settings** table updates to display the port name, and the type of signals for each populated port.



8. Locate the row for the port you want to configure.
9. In the **SFP** column for the port, verify the type of signal the port will provide.
10. If applicable, use the **MADI I/O Size** menu for the AUX port to specify the input and output configuration for the port.

✶ MADI is only available in the AUX ports. The SFP I/O ports 1-16 does not support MADI I/O.

11. Click **Apply** to save your changes.

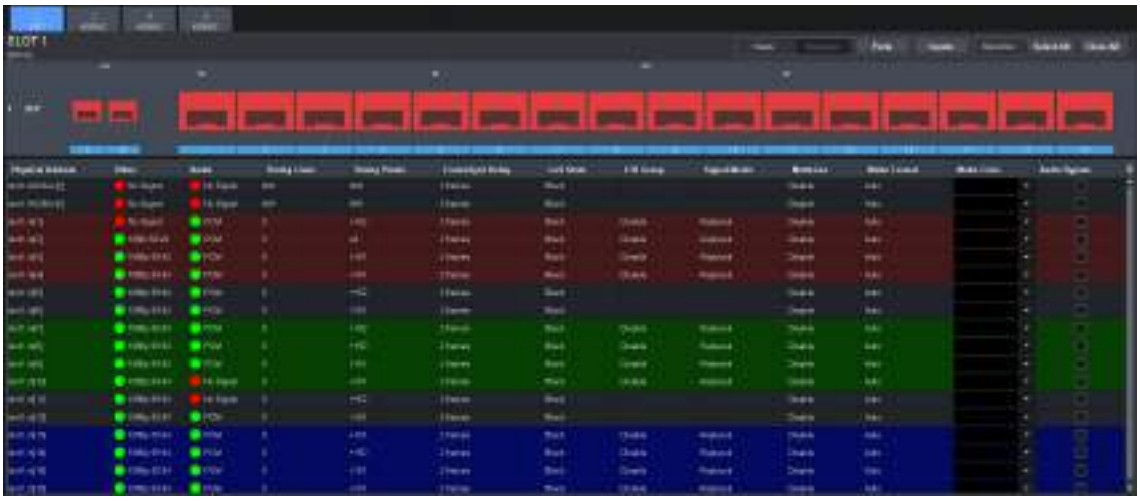
To monitor an SFP port

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Port Configuration** page opens.
6. Select the button for the slot that houses the port you want to verify.

   In the example below, the user selected Slot 1.



7. Select the SFP port you want to verify.

   The label under the selected port is now lit blue and the page updates with information about the port. In the example above, the user is monitoring all ports on the blade.

UltriStream Setup

This chapter provides information on the UltriStream licensed features for the Ultrix routers.

✶ The UltriStream license is supported on the ULTRIX-HDX-IO and ULTRIX-MODX-IO blades only.

✶ The UltriStream license requires router software version 5.2.0 or higher.

Overview

The UltriStream licensed feature provides the ability to encode one NDI stream of a configured UltriScape Multiviewer Head per ULTRIX-HDX-IO or ULTRIX-MODX-IO blade.

✶ The Multiviewer Head for the video source must be one from the same blade that is transmitting the NDI stream. For example, a licensed ULTRIX-MODX-IO blade in Slot 1 cannot send an NDI stream of a Multiviewer Head from a licensed ULTRIX-HDX-IO blade in Slot 2.

An UltriStream license is supported on the following routers:

- ULTRIX-NS-FR1
- ULTRIX-NS-FR2
- ULTRIX-NS-FR5
- ULTRIX-FR5
- ULTRIX-FR12

Features

An UltriStream license provides the following features:

- Configure and send one full bandwidth NDI Stream (encode only)
- Video source for the stream can be selected from any Multiviewer Head of the licensed blade[1]
- Supports Unicast transport modes only
- Provides monitoring of the encode stream state and video format
- Configure the names for NDI device alias, stream, and group(s)
- Assign Static or DHCP IP addresses

Before You Begin

Ensure the following:

- The AUX D port on the blade is populated with an **SFP-RJ45-1G** module. Refer to the ***Ultrix SFP Modules User Guide*** for specifications.
- Your facility IT Department provided the required network settings to be assigned to the AUX D port you plan to enable for the UltriStream license for.
- The UltriScape Head(s) are enabled and configured as outlined in the ***UltriScape User Guide***.
- The UltriStream and the Ultrimix-Dante licenses cannot be enabled on the same slot. By enabling an UltriStream license on a slot, you will be prevented from enabling an Ultrimix-Dante license on that slot until you disable the applied UltriStream license.

1. Requires an UltriScape license.

Installing an UltriStream License

Ross Video uses license keys to control user access to specific features. You can obtain a key for a licensed feature from Ross Video Technical Support. Use the key to assign an UltriStream license to a supported blade in the Ultrix router.

To install an UltriStream license key

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Licenses** page opens with **License Keys** sub-tab automatically selected.
6. Make a note of the character string in the **Request Code** field for the UltriStream license.
7. Contact Ross Video Technical Support using the information listed in "**Contacting Technical Support**".
   a. When you speak to your Technical Support representative, tell them your name, your facility name, and the **Request Code** from step 6.
   b. You will be given a License Key for the UltriStream.
8. Enter the provided License Key in the applicable **License Key** field of the **Licenses** tab.

✶ You can also right-click on the row for the License Key you are installing, copy the Request Code to or paste the License Key from the Microsoft® Windows® clipboard, and click **Yes**.

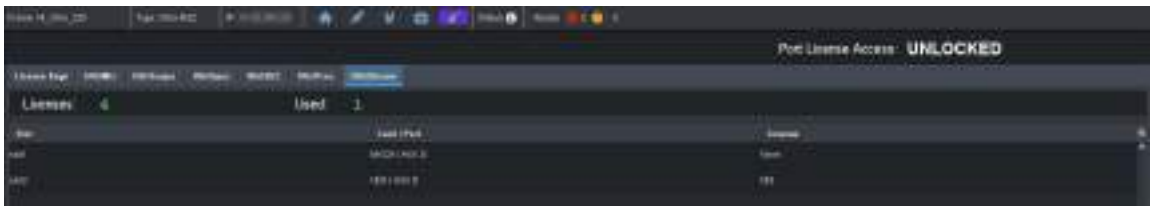
9. Click **Apply** in the row for the License Key you entered in step 8.
10. Verify that the **Count** field is updated to report each installed UltriStream License Key.

To activate an UltriStream license for a specific blade

1. In the **Licenses** interface, select the **UltriStream** sub-tab.

   The interface is organized into a table with three columns. The left column (Slot) lists the available slots that the license can be assigned to. The center column (Card | Port) lists the type of blade and the port name. The right column (License) provides the option to enable/disable the license for the specified slot.

✶ All NDI capable blades use the AUX D port for UltriStream.



2. Verify that the top **Licenses** read-only field reports the total number of purchased UltriStream licenses for the router. In the example above, there are a total of 4 licenses purchased with 1 in use.
3. In the table, locate the row for the slot you wish to enable the UltriStream license.
4. Use the **License** column to select **NDI** for the slot.

Accessing the UltriStream Interface

Once an UltriStream license is enabled for a slot, you can access the UltriStream settings via the DashBoard **Port Configuration** tab.

To display the UltriStream interface

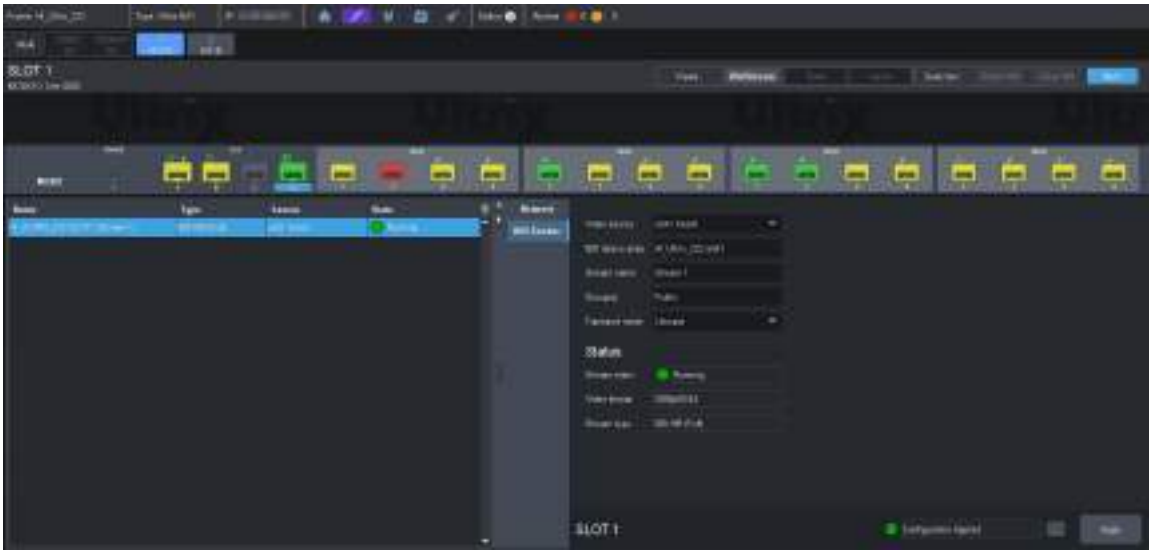
1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Port Configuration** page opens.
6. From the Slot toolbar (at the top of the **Port Configuration** page), select the button for the slot you enabled the license on.
7. Perform one of the following:
   - Set the **Views** to **UltriStream**; or
   - Click the **AUX D** port on the blade map of the **Home** page  .

   The Port Configuration page updates to display the UltriStream interface. In the following example, the ULTRIX-MODX-IO blade in Slot 1 was selected.

✶ An NDI icon displays above an AUX D port when a license is enabled.



Overview

The UltriStream interface is organized into three areas: an I/O map of the selected blade (top), a table listing the configured streams (left pane), and options for configuring the UltriStream for the selected AUX D port (right pane).

Figure 38 Example of the Port Configuration > UltriStream Areas

1. Blade I/O Map

The top includes a map of the ports available on the selected blade. Note that the AUX D port in the UI changes color based on the state of the NDI stream (green when the stream is valid, and red for error conditions). When **View** is set to **UltriStream**, the AUX D port is automatically selected on the Blade I/O Map and any other port is not selectable from this map. A small NDI icon displays over the AUX D port when an UltriStream license is enabled.

2. Status Table

The left panel includes a read-only table that lists the licensed stream(s) on AUX D. Each table row represents a stream and reports the Name, Type, Source, and State for that stream. Refer to **Table 52** for more information.

✶ Only one stream can be configured at this time.

3. Configuration Options

The right panel includes two tabs:

› Network — provides options for configuring the network settings for AUX D. Refer to **Table 53**.

› NDI Sender — provides options for configuring the NDI encoded stream, and read-only fields used to monitor the encoding status. Refer to **Table 54**.

✶ When a blade is selected that does not have an UltriStream license enabled, the UltriStream > Network and the UltriStream > NDI Sender tabs are disabled (grayed out).

4. Configuration Status Toolbar

The toolbar is located in the bottom right corner and includes a status field and two buttons.

› The status field reports the status of changes made in the UltriStream tabs and menus. A status indicator can vary in severity from green (valid), yellow (caution), to red (alarm).

› Select  to view details on the current status message.

› Click **Apply** to save any changes made to the UltriStream tabs and menus.

Network Configuration

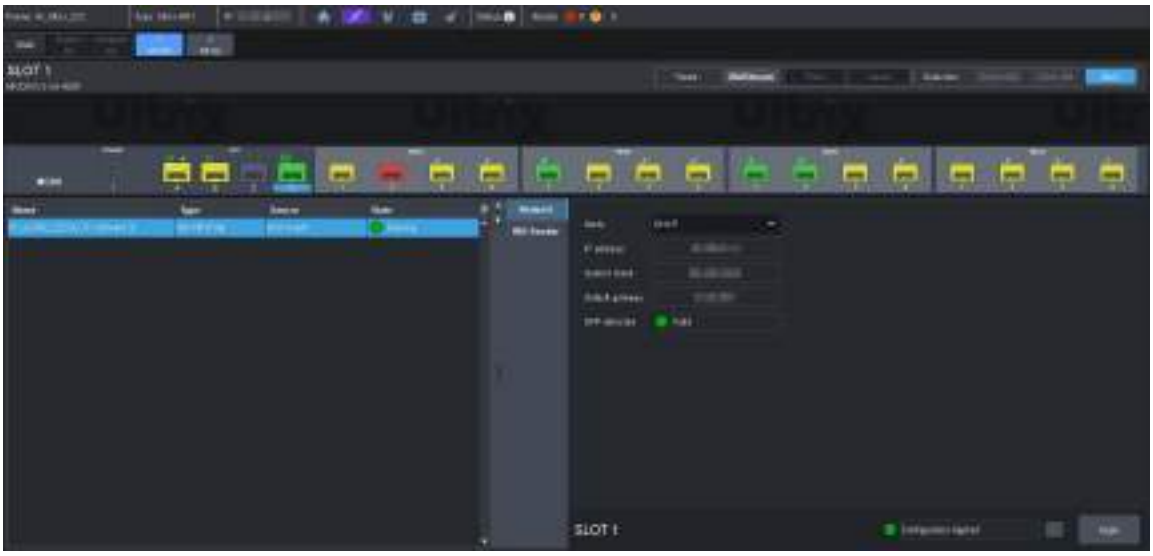
The encoded NDI Stream will be transmitted via the **AUX D** port on the blade. This first requires you to specify how the IP address for the port is assigned (Static or DHCP). Both methods are described below.

✶ When using UltriStream and Ultrimix-Dante, ensure that your NDI and Dante networks are separated. Combining these networks can lead to congestion, performance issues, and degraded Dante audio quality.

✶ Contact your network administrator if difficulties or problems are experienced when assigning IP addresses.

To configure the network settings for the AUX D port

1. Display the UltriStream interface as outlined in "**To display the UltriStream interface**".
2. Select the **Network** sub-tab.



3. If you are manually configuring the network settings:
   a. Use the **Mode** menu to select **Static**.
   b. Use the **IP Address** field to specify the new static IP Address for the AUX D port.

      This is the IP Address that is used by the NDI protocol and Unicast transport to stream the video source.
   c. Use the **Subnet Mask** field to specify the subnet mask for the AUX D port.
   d. Use the **Default Gateway** field to specify the gateway for communications outside of the local area network (LAN) the Ultrix will use.
4. If you want the network settings for the AUX D port to be automatically obtained, and DHCP service is available on your control network, select **DHCP** from the **Mode** menu. This is the default mode.

✶ Verify that a DHCP server is running in your network before setting the Mode to DHCP.

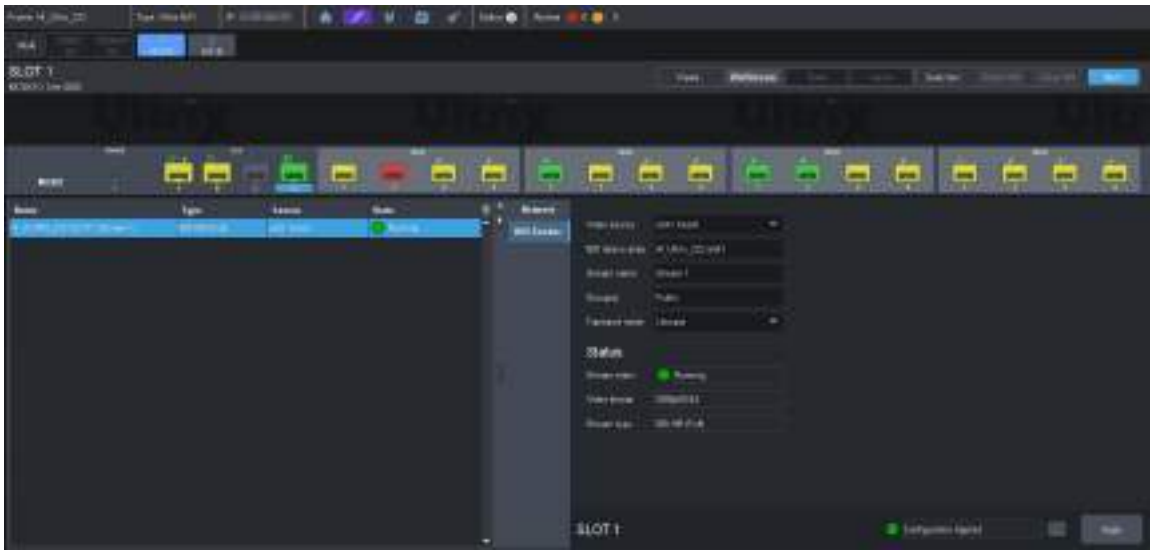
5. Click **Apply** to save the new settings.

Configuring an NDI Sender Stream

✶ Configuration for UltriStream is saved across a reboot or power cycle of the Ultrix router and reapplied on boot.

To configure an NDI Sender stream

1. Display the UltriStream interface as outlined in "**To display the UltriStream interface**".
2. Select the **NDI Sender** sub-tab.



3. Use the **Video source** menu to specify the Multiviewer Head to encode on a slot. The list displays only those Multiviewer Heads that are enabled.
4. Use the **NDI device alias** field to specify a new name that will override the host name.

   The alias name applies to the video stream on the AUX D interface. By default, the name uses the nomenclature of the router name (e.g. "`HI_Ultrix_223`"), followed by the slot (e.g. `slot3`).
5. Use the **Stream name** field to specify a unique identifier for the stream when it appears on the network. For example, `HI_Ultrix_223_SLOT1A`.

   The NDI device alias and Stream name values uniquely identify a stream in the NDI protocol. For example, a NDI Monitor tool discovers a stream named `HI_ULTRIX_223.SLOT1A(RC01)`, where the NDI device alias is `HI_ULTRIX_223.SLOT1A` and the Stream name is `RC01`.
6. Use the **Group(s)** field to specify a group the NDI stream belongs to. If there are multiple groups, use a comma between the names. For example, `Group A,group2,my_group`.

   Only viewers that belong to the same group can view the stream. For example, NDI Access Manager defines NDI Studio Monitor can view streams from the Public group.

✶ The **Transport Mode** menu is automatically set to **Unicast**. The AUX D port applies the User Datagram Protocol (UDP), R-UDP, or TCP for NDI encoding to a single stream.

7. Click **Apply** to save the new settings.

DashBoard Menus Overview

This section briefly summarizes the read-only fields, menus, and editable fields available when an UltriStream license is applied to a router blade, and the **Views** is set to **UltriStream**.

Status Table

Table 52 summarizes the read-only fields displayed in the table located in the left pane of the **Port Configuration** tab when **Views** is set to **UltriStream**.

Table 52 UltriStream — Status Table

Item	Parameters	Description
Name	Reports the identifier assigned to the stream using the nomenclature of `NDI device alias name(stream name)`.	
Type	Reports the type of compression used for NDI encoding	
Source	Reports the video source that is selected in the NDI Sender tab	
State	Running (Green)	The sender stream is operating correctly without errors and the link for the AUX D port is valid
	Stopped (Red)	One of the following is occurring: • the sender stream is no longer running • the sender stream encountered an error

Network Tab

Table 53 summarizes the options displayed in the **Port Configuration** > **UltriStream** > **Network** tab. This tab provides options for configuring the Network (AUX D port) settings.

Table 53 UltriStream — Network

Item	Parameters	Description
Mode	Static	The user manually supplies the network settings for the AUX D port
	DHCP	Automates the assignment of the network settings for the AUX D port. This is the default.
IP address	#	Specifies the IP address assigned to the AUX D port. This address is used to communicate with devices on your streaming network.
Subnet mask	#	Specifies the subnet mask for the AUX D port
Default gateway	#	Specifies the gateway for communications outside of the local area network (LAN)
SFP detected (read-only)	Valid (Green)	The SFP in the AUX D port is valid and operational
	Invalid (Red)	One of the following is occurring with the SFP in the AUX D port: • the SFP is incompatible with UltriStream • the SFP is not operational • the SFP is not installed in the port

NDI Sender Tab

Table 54 summarizes the options displayed in the **Port Configuration** > **UltriStream** > **NDI Sender** tab. This tab provides configuration options and read-only information about the NDI Encoder.

Table 54 UltriStream — NDI Sender

Item	Parameters	Description
Video source	None	Stops the NDI video stream. Select this option if you need to stop the video stream from the associated Multiviewer Head.
	slot#.head#	Specifies which Multiviewer Head to encode on a slot for the encoded sender stream. The list displays only those Multiviewer Heads that are enabled.
NDI device alias	<text>	Assigns a unique identifier to the video stream on the selected AUX D port. The maximum is 30 characters. The default value contains the DashBoard System > Device name (e.g. "`HI_Ultrix_222`"), followed by the slot name (e.g. `slot1`). For example, "`HI_Ultrix_222.slot1`".
Stream name	<text>	Assigns a unique identifier to the stream. The maximum is 30 characters. You can specify a hard-coded name (`<text>`) .
Group(s)	<text>	Assign a unique identifier to indicate a specific group to send the encoded stream as part of (or a comma-separated list of multiple groups, such as `Group A,group 2,my_group`). The default is Public.
Transport mode	Unicast	The NDI stream will automatically be transmitted with an appropriate Unicast transport mechanism (UDP or TCP)
Status (read-only)		
Stream state	Running (Green)	The sender stream is operating correctly without errors and the link for the AUX D port is valid
	Stopped (Red)	One of the following is occurring: • the sender stream is no longer running • the sender stream encountered an error

Table 54 UltriStream — NDI Sender

Item	Parameters	Description
Video format	#	Reports the encoded video format. Verify that this matches the format assigned to the specified Multiviewer Head in the Video source menu. Refer to **Table 55**.
	N/A	The sender stream is unavailable. Verify that the link is valid and is running without errors.
Stream type	NDI-HB (Full)	The stream uses NDI High Bandwidth compression (or Full Bandwidth)

Multiviewer Output Formats

Table 55 lists the resulting NDI encoded Multiviewer output format per Ultrix input reference and Multiviewer head format selection.

Table 55 NDI Encoded Output Format

Ultrix Input Reference Format	Multiviewer Head Output Format		
	1080p	1080i / 1080i-LC	2160p UC
1080p 25	1080p 50	1080i 50	1080p 50
720p 25	1080p 50	1080i 50	1080p 50
720p 50	1080p 50	1080i 50	1080p 50
PAL	1080p 50	1080i 50	1080p 50
1080i 59.94	1080p 59.94	1080i 59.94	1080p 59.94
1080p 23.98	1080p 59.94	1080i 59.94	1080p 59.94
1080p 29.97	1080p 59.94	1080i 59.94	1080p 59.94
720p 59.94	1080p 59.94	1080i 59.94	1080p 59.94
720p 23.98	1080p 59.94	1080i 59.94	1080p 59.94
NTSC	1080p 59.94	1080i 59.94	1080p 59.94
1080i 60	1080p 60	1080i 60	1080p 60
1080p 30	1080p 60	1080i 60	1080p 60
720p 24	1080p 60	1080i 60	1080p 60
720p 30	1080p 60	1080i 60	1080p 60
720p 60	1080p 60	1080i 60	1080p 60

UltriProc Setup

This chapter provides information on the SDR/HDR conversion and Color Correction options available when one of the UltriProc licenses is enabled on an Ultrix router.

✶ The UltriProc licenses are supported on the ULTRIX-HDX-IO or ULTRIX-MODX-IO blades only.

Overview

There are two UltriProc licenses available: UltriProc and UltriProc-3DLUT.

UltriProc

This license allows you to perform color correction, Proc Amps, and HDR conversion on Ultrix I/Os. An UltriProc can be assigned to either inputs or outputs. An UltriProc license key is required for each selected I/O that will be used by the UltriProc.

UltriProc color correction is performed in the Y'CbCr color space or by RGB Color Correctors in the RGB color space. It is additive, allowing you to apply any combination of SDR/HDR and RGB Color Corrector based adjustment to a video signal.

An UltriProc license provides the following SDR/HDR conversion features:

- Built-in HDR/SDR conversion
- Selecting a Tone Mapping mode
- SDI output Y/C clipper to pass/clip extended super-black or super-white ranges
- RGB Color Correction
- Independent ProcAmp controls for the video input and for the video output of the UltriProc
- SDI output Y/C clipper to pass/clip extended super-black or super-white ranges
- SDR/HDR transfer characteristic and colorimetry information inserted into the SDI video 352M payload identifier

UltriProc-3DLUT

The UltriProc-3DLUT license also allows you to perform color correction, Proc Amps, and HDR conversion on Ultrix I/Os but also enables SDR/HDR conversion with a 3D-LUT RGB Cube file including:

- BT.709 and BT.2020 colorimetry/transfer characteristics for Y/C RGB conversion
- Preloaded 3D-LUT RGB Cube files library from BBC (14 files) and NBCU (6 files)
- Ability to load custom 3D-LUT RGB Cube files to perform custom conversions
- Support for Narrow Range (Type I) and Full Range (Type III) 3D-LUT RGB Cube files

SDR/HDR Conversion

Each UltriProc license supports dynamic range and colorimetry/transfer characteristics conversion from/to any of these standards:

- BT.709 SDR
- BT.2020 SDR
- BT.2020 HLG
- BT.2020 PQ
- BT.2020 S-Log3

- BT.2020 SR Live

The video input dynamic range and colorimetry/transfer characteristics settings can be manually configured or can be automatically detected from the SDI video input 352M payload identifier.

The video output dynamic range and colorimetry/transfer characteristics settings can be manually configured or can be automatically set to follow the SDI video input dynamic range and colorimetry/transfer characteristics.

The SDR/HDR conversion also offers the following options:

- Display light or scene light conversion
- Direct mapping or tone (up/down) mapping
- RGB Color Correction with adjustment controls for gamma, lift, gain, and offset

Installing an UltriProc License

Ross Video uses license keys to control user access to specific features. You can obtain a key for a licensed feature from Ross Video Technical Support. Each UltriProc license provides one proc amp engine that can be assigned to one physical port on the router. This section outlines how to install an UltriProc license and is applicable to both license types.

To install an UltriProc license key

1. Launch the DashBoard client.
2. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
3. Expand the **Systems** sub-node.
4. Expand the **Configuration** sub-node.
5. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
6. Select  .

   The **Licenses** page opens with **License Keys** sub-tab automatically selected.
7. Make a note of the character string in the **Request Code** field for each UltriProc license type you wish to install.
8. Contact Ross Video Technical Support using the information listed in "**Contacting Technical Support**".
   a. When you speak to your Technical Support representative, tell them your name, your facility name, and the **Request Code** from step 7.
   b. You will be given a License Key for the UltriProc.
9. Enter the provided License Key in the applicable **License Key** field of the **Licenses** tab.

✶ You can also right-click on the row for the License Key you are installing, and copy the Request Code to or paste the License Key from the Microsoft® Windows® clipboard.

10. Click **Apply** in the row for the License Key you entered in step 9.
11. Verify that the **Count** field is updated to report each installed License Key.

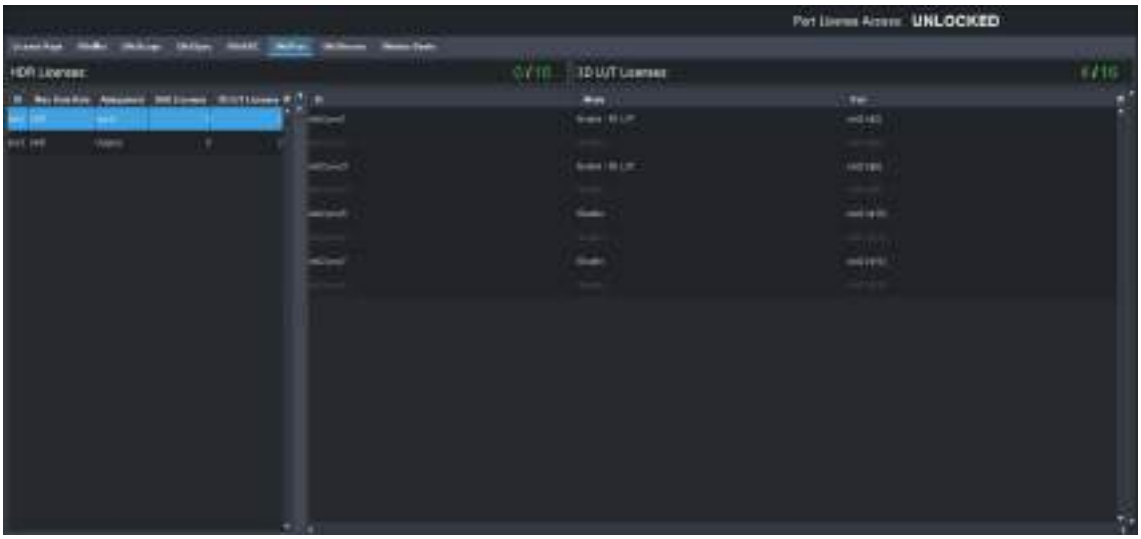
To activate an UltriProc license for a specific port

1. Install the license key as outlined in the procedure "**To install an UltriProc license key**".
2. In the **Licenses** interface, select the **UltriProc** sub-tab.

The interface is organized into two tables: the left table provides the options for selecting the data rate and assigning the license to an I/O type. The table on the right lists the available ports and provides the option to enable/disable the UltriProc feature.

3. For the first slot, use the **Max Data Rate** menu to specify the mode. Choose from the following:
   - 3G — UltriProc operates at data rates up to 3Gbps[1]. The license is available on the even numbered inputs (Input 2, 4, 6, 8, 10, 12, 14, 16) or outputs (Output 2, 4, 6, 8, 10, 12, 14, 16) per blade.
   - UHD Mode — UltriProc operates at data rates up to 6Gbps[2] and 12Gbps[3]. The license is available on 4 inputs (Input 2, Input 6, Input 10, Input 14) or 4 outputs per blade (Output 2, Output 6, Output 10, Output 14). This mode also requires an UltriSpeed license.
4. Use the **Assignment** menu to specify the slot I/O the UltriProc will apply to.
5. Use the **Mode** column, select the license type to apply. Choose from the following:
   - Disable — an UltriProc license is not assigned and the options are unavailable for this slot I/O.
   - Enabled HDR — assigns an UltriProc license to this slot I/O. An UltriProc license can be assigned to any of the individual Proc Amps in the slot, either to Inputs or Outputs, and UHD or 3G.
   - Enable 3D LUT — assigns an UltriProc-3DLUT license to this slot I/O. An UltriProc-3DLUT license can be assigned to any of the 8 individual Proc Amps in the slot, either to Inputs or Outputs, and UHD or 3G.
6. In the **Port** column, select the physical port you want to apply the UltriProc license to.
7. Select **Enable** to apply the UltriProc license to that port.

   In the following example, the user applied 1 UltriProc and 1 UltriProc-3DLUT license in slot2, assigned the Max Data Rate to UHD, assigned the UltriProc licenses to the inputs, and enabled the slot2.proc1, and slot2.proc7 UltriProc engines.



1. 720p 50/59.94/60Hz, 1080i 50/59.94/60Hz, and 1080p 50/59.94/60Hz
2. 2160p 23.98/24/25/29.97/30Hz
3. 2160p 50/59.94/60Hz

Accessing the UltriProc Settings

The UltriProc settings are accessed via the DashBoard **Port Configuration** tab.

To display the UltriProc interface

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Port Configuration** page opens.

✶ You can also click the port with an UltriProc license on the blade map of the **Home** page  to display the UltriProc interface.

6. Toggle the first option in **Views** to **UltriProc**.
7. Toggle the last option in **Views** to **Inputs**.

   The **SDR/HDR Conversion** sub-tab is automatically selected.

✶ A green icon displays next to a port when an UltriProc license is enabled. The example in step 8 shows that an UltriProc-3DLUT license is enabled on Input 14 of slot 2 in an ULTRIX-NS-FR2.

8. From the table in the left pane, select the row for the UltriProc engine to configure.

   In the example below, the user selected `slot2.proc7` that is assigned to `slot2.in[14]`.

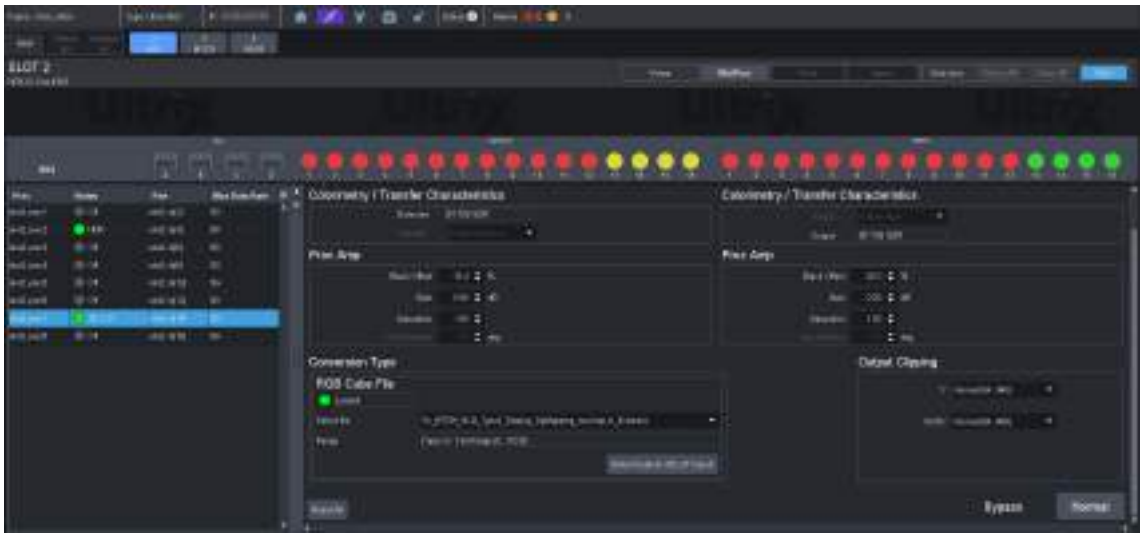


Table 56 summarizes the options displayed in the **SDR/HDR Conversion** sub-tab for each UltriProc engine.

Table 56 UltriProc — SDR/HDR Conversion

Item	Parameters	Description
Input > Colorimetry / Transfer Characteristics		
Detected (read-only)	Reports the colorimetry/transfer characteristics of the input to the UltriProc	

Table 56 UltriProc — SDR/HDR Conversion

Item	Parameters	Description
Override	BT.709 SDR	HD colorimetry/transfer characteristics, Standard Dynamic Range
	BT.2020 SDR	UHD wide colorimetry/transfer characteristics, Standard Dynamic Range
	BT.2020 HLG	UHD wide colorimetry/transfer characteristics, Hybrid Log-Gamma dynamic range
	BT.2020 PQ	UHD wide colorimetry/transfer characteristics, Perceptual Quantizer dynamic range
	BT.2020 SLOG3	UHD wide colorimetry/transfer characteristics, Sony® S-Log3 dynamic range
	BT.2020 SR Live	Wide color gamut recommended for UHDTV1 video signals, Sony® standard range
	Follow Detected	Automatically extracts the dynamic range and colorimetry information from the SDI video input 352M payload identifier and adjusts the SDR/HDR conversion accordingly
Input > Proc Amp		
Black Offset	%	Adjusts the Luma (Y) black offset of the SDI input
Gain	#	Adjusts the Luma and Chroma (Y/C) gain of the SDI input
Saturation	#	Adjusts the intensity of the input color
Hue Rotation[a]	#	Adjusts the input hue level where: • increasing the hue rotation turns the color wheel clockwise; • decreasing the hue rotation turns the color wheel counter-clockwise
Output > Colorimetry / Transfer Characteristics		
Output	BT.709 SDR	HD colorimetry/transfer characteristics, Standard Dynamic Range
	BT.2020 SDR	UHD wide colorimetry/transfer characteristics, Standard Dynamic Range

Table 56 UltriProc — SDR/HDR Conversion

Item	Parameters	Description
Output	BT.2020 HLG	UHD wide colorimetry/transfer characteristics, Hybrid Log-Gamma dynamic range
	BT.2020 PQ	UHD wide colorimetry/transfer characteristics, Perceptual Quantizer dynamic range
	BT.2020 SLOG3	UHD wide colorimetry/transfer characteristics, Sony ® S-Log3 dynamic range
	BT.2020 SR Live	Wide color gamut recommended for UHDTV1 video signals, Sony® standard range
	Follow Input	Automatically follows the dynamic range and colorimetry information as defined in the Input area. In that case, no SDR/HDR conversion is performed but the RGB Color Correction processing is still available.
Output (read-only)	Reports the 352M payload identifier in the SDI video output, and the colorimetry/transfer characteristics	
Output > Proc Amp		
Black Offset	%	Adjusts the Luma (Y) black offset of the SDI output streams
Gain	#dB	Adjusts the Luma and Chroma (Y/C) gain of the SDI output streams
Saturation	#	Adjusts the lightness of the output color
Hue Rotation[b]	#	Adjusts the output hue level where: • increasing the hue rotation turns the color wheel clockwise; • decreasing the hue rotation turns the color wheel counter-clockwise
Conversion Type > Tone Mapping[c]		
Display Light	Uses the EOTF of the SDI input dynamic range and colorimetry/transfer characteristics to convert the SDI input electrical signal to the Display Light units. Uses the inverse EOTF of the SDI output dynamic range and colorimetry/transfer characteristics to convert the Display Light units to the SDI output electrical signal.	
Scene Light	Uses the inverse EOTF of the SDI input dynamic range and colorimetry/transfer characteristics to convert the SDI input electrical signal to Scene Light units. Uses the EOTF of the SDI output dynamic range and colorimetry/ transfer characteristics to convert the Scene Light units to the SDI output electrical signal	

Table 56 UltriProc — SDR/HDR Conversion

Item	Parameters	Description
Direct Mapping, 1-to-1 No Scaling	Performs a straight conversion, without dynamic range compression or expansion, and without colorimetry/transfer characteristics compression or expansion	
Direct Mapping, BT.2408 Scaling	Performs a conversion as defined in ***ITU-BT.2408***	
RGB Cube File[d]		
Status	Cube File Not Used (Green)	The Select File menu is set to [None]
	Valid file (Green)	The last Cube file selected using the RGB Cube file menu is imported and valid
	Invalid file (Red)	An error occurred importing the last selected Cube file. Verify that the file is in a supported format (*.cube)
Select File	[None]	An RGB Cube file is not currently loaded to this proc engine
	<filename.cube>	Indicates the last Cube file loaded to the card. Note that loading a RGB Cube File disables the DashBoard Tone Mapping options Display/Scene light and Direct/Tone Mapping Methods.
Range	Type I - Normal Range [64, 960]	Scales the SDI input signal level [64,940] to drive the 3D-LUT input processing range [0,1023] and will scale the 3D-LUT output processing range [0,1023] back to the SDI output signal level [64,940].
	Type III - Full Range [0,1023]	Drives the full 10-bit SDI input signal level directly to the 3D-LUT input processing range [0,1023] and will scale the 3D-LUT output processing range [0,1023] to the SDI output signal level [0,1023]
Global Custom 3D LUT Import	Click this button to display a dialog that lists the custom *.cube files that are available to import to the specified UltriProc engine	
Output Clipping		
Y’	Normal [64,940]	Limits any processed luminance data to be between 64 and 940 in the active picture region of the video, coming out of the proc amp
	Super White [64,1019]	Limits any processed luminance data to be between 64 and 1019 in the active picture region of the video, coming out of the proc amp
	Super Black [4,940]	Limits any processed luminance data to be between 4 and 940 in the active picture region of the video, coming out of the proc amp

Table 56 UltriProc — SDR/HDR Conversion

Item	Parameters	Description
Y’	Extended Luma [4,1019]	Limits any processed luminance data to be between 4 and 1019 in the active picture region of the video, coming out of the proc amp
Cb’/Cr’	Normal [64,960]	Limits the gain of the blue color difference and the gain of the red color difference data to be between 64 and 960 in the active picture region of the video, coming out of the proc amp
	Wide Color [5,1019]	Limits the gain of the blue color difference and the gain of the red color difference data to be between 5 and 1019 in the active picture region of the video, coming out of the proc amp
Reset All	Returns all editable settings on the **SDR/HDR Conversion** sub-tab to the default values	
Bypass		
Bypass	The video input is passed through without modifications	
Normal	The router is processing the video input through the SDR/HDR converter, and the RGB Color Corrector, and performing the target transform	

a. This option requires an UltriProc license.
b. This option requires an UltriProc license.
c. This option requires an UltriProc license.
d. These options require an UltriProc-3DLUT license.

Bypassing the Video Correction Settings

You can choose to bypass the video correction settings by clicking **Normal** (located in the bottom right corner of the **SDR/HDR Conversion** tab). Note that Normal is the default.

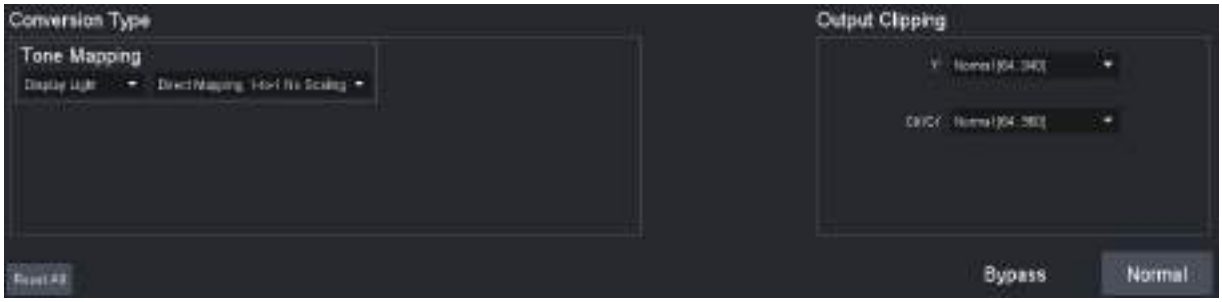


Figure 39 Location of the Bypass and Normal Buttons

When **Normal** is selected, the router port processes the video input through the SDR/HDR converter, the RGB Color Corrector, and performs the target transform.

When **Bypass** is selected, the router port passes through the video input without modifications.

Dynamic Range and Colorimetry/Transfer Characteristics Setup

UltriProc performs the SDR/HDR dynamic range and colorimetry/transfer characteristics conversion as specified in the **Input** and **Output** areas of the **SDR/HDR Conversion** tab. (**Figure 40** and **Figure 41**).

The default Input > Colorimetry/Transfer Characteristics > Override > Follow Detected setting automatically extracts the dynamic range and colorimetry information from the SDI video input 352M payload identifier and adjusts the SDR/HDR conversion accordingly.

Figure 40 Example of the Video Correction > Input Area

The default Output > Colorimetry/Transfer Characteristics > Follow Input setting automatically follows the dynamic range and colorimetry information as defined in the Input area. In that case no SDR/HDR conversion is performed but the other video processing featured such as the Proc Amps and the RGB Color Correction are still available.

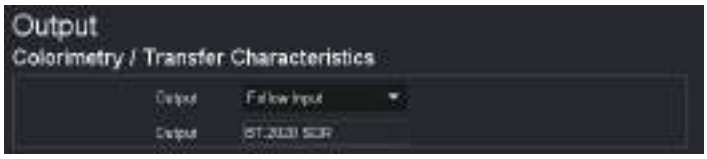


Figure 41 Example of the Video Correction > Output Area

The other options are common to both the **Input** and the **Output** and are used to force a specific SDR/HDR conversion. The following options are available:

- BT.709 SDR — HD colorimetry/transfer characteristics, Standard Dynamic Range
- BT.2020 SDR — UHD wide colorimetry/transfer characteristics, Standard Dynamic Range
- BT.2020 HLG — UHD wide colorimetry/transfer characteristics, Hybrid Log-Gamma dynamic range
- BT.2020 PQ — UHD wide colorimetry/transfer characteristics, Perceptual Quantizer dynamic range
- BT.2020 S-LOG3 — UHD wide colorimetry/transfer characteristics, Sony® S-Log3 dynamic range
- BT.2020 SR Live — UHD wide colorimetry/transfer characteristics recommended for UHDTV1 video signals, Sony® standard range

✶ An alarm is generated if the dynamic range and colorimetry information extracted from the SDI video input 352M payload identifier does not match the specific SDR/HDR conversion as defined by the user.

Proc Amps Setup

UltriProc offers two independent Proc Amps. The **Input Proc Amp** is located upstream of the SDR/HDR conversion and the **Output Proc Amp** is located downstream of the SDR/HDR conversion. Both Proc Amps offer the same controls.

Figure 42 Example of the Input Proc Amp (left) and Output Proc Amp (right) Settings

The Proc Amp settings are cumulative and are executed in this sequence for each input or output:

1. **Black Offset** — adjusts the Luma (Y) black offset of the SDI input or output signal. The value is reported as a percentage of the full black to white signal amplitude with an adjustment range from -20% to +20%, in steps of 0.1%.
2. **Gain** — adjusts the Luma and Chroma (Y/C) gain of the SDI input or output signal. The value is reported in dB with an adjustment range from -20dB to +20dB, in steps of 0.01dB.
3. **Saturation** — adjusts the intensity level of the SDI input or output color.
4. **Hue Rotation** — adjust the hue levels. Increasing the hue rotation turns the color wheel clockwise, and decreasing the hue rotation turns the color wheel counter-clockwise. This option is not available with the UltriProc-3DLUT license.

Selecting a Tone Mapping Conversion Option

The Tone Mapping feature provides two SDR/HDR conversion light options: Display Light or Scene Light.

✶ Tone Mapping is not available with the UltriProc-3DLUT license.

Figure 43 Example of the Tone Mapping Settings

Display Light

The common reference for the transform is the visible light as emitted by a display monitor. When set to Display Light conversion, the router:

1. Uses the EOTF of the SDI input dynamic range and colorimetry/transfer characteristics to convert the SDI input electrical signal to the Display Light units.
2. Uses the inverse EOTF of the SDI output dynamic range and colorimetry/transfer characteristics to convert the Display Light units to the SDI output electrical signal.

Scene Light

The common reference for the transform is the visible light as diffused by the ambient scene. When set to Scene Light conversion, the router:

1. Uses the inverse EOTF of the SDI input dynamic range and colorimetry/transfer characteristics to convert the SDI input electrical signal to Scene Light units.
2. Uses the EOTF of the SDI output dynamic range and colorimetry/transfer characteristics to convert the Scene Light units to the SDI output electrical signal.

Selecting a Tone Mapping Option

The UltriProc built-in SDR/HDR conversion mapping options are:

- Direct Mapping, 1-to-1 No Scaling
- Direct Mapping, BT.2408 Scaling

Direct Mapping, 1-to-1 No Scaling

This Direct Mapping option performs a straight conversion, without dynamic range compression or expansion, and without colorimetry/transfer characteristics compression or expansion. This means that when a HDR input stream is converted to an SDR output stream, all HDR source pixels that are outside the output SDR dynamic range or colorimetry/transfer characteristics will be clipped, losing luminance and/or color information.

Direct Mapping, BT.2408 Scaling

This Direct Mapping option performs a conversion as defined in ***ITU-BT.2408***.

Video Output Clipping Setup

UltriProc provides the options to enable or clip super-blacks and super-whites on the SDI video output Luma (Y') stream. Super-blacks are often found in common color bar test patterns such as the ITU-R BT.814 HDR PLUGE and others. Super-whites may be created when down converting HDR to SDR, where the HDR highlights will be mapped in the 100% to 109% SDR super-white range. Super-blacks and super-whites can also be created with the UltriProc gain and offset controls.

Figure 44 shows the Output Clipping > Y' settings.

Figure 44 Example of Video Correction > SDR/HDR Conversion > Output Clipping

✶ An option to allow extended Chroma (Cb'/Cr') is also available but will rarely be used in practice to maintain interoperability with other equipment.

SDR/HDR Conversion with 3D-LUT RGB Cube Files

✶ The UltriProc-3DLUT license is required to access the NBCU and BBC 3D-LUT libraries.

The UltriProc SDR/HDR built-in conversion engine offers limited tone mapping and inverse tone mapping options. To expand the capability, Ross Video offers a set of pre-loaded 3D-LUT RGB Cube files, each one designed to meet specific conversion requirements. It is also possible for the user to load custom 3D-LUT RGB cube files for specific applications.

If you decide to perform a SDR/HDR conversion using a 3D-LUT RGB Cube file, then the proprietary SDR/HDR transform is natively programmed into the 3D-LUT file. You still need to configure correctly the DashBoard **SDI Input** and the **SDI Output** options as the BT.709 or BT.2020 colorimetry information are required by UltriProc to:

- convert the Y/C to RGB values,
- drive the RGB 3D-LUT input, and then

- convert the RGB 3D-LUT output back to Y/C.

Loading a 3D LUT RGB Cube File

The DashBoard **Conversion Type** > **RGB Cube File** > **Select File** option allows you to select and load one RGB Cube file stored locally on the Ultrix.

✶ Loading a **RGB Cube File** disables the DashBoard **Tone Mapping** options Display/Scene light and Direct/Tone Mapping Methods, and the Proc Amps > Hue Rotation setting. The corresponding Input and Output Gamuts (Override and Output), and Range Type are automatically selected. You cannot manually select these parameters.

Importing a Custom 3D LUT Cube File

✶ This feature is available each Proc Amp instance that has been assigned an UltriProc-3DLUT license.

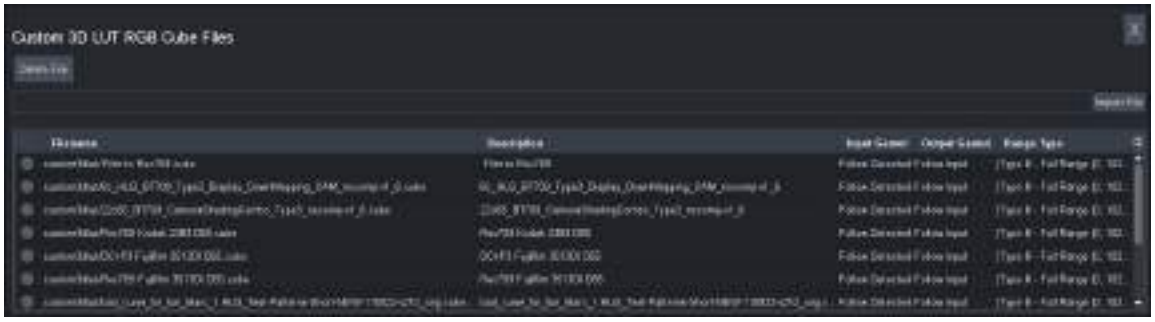
An UltriProc-3DLUT license also enables you to upload a custom 3D LUT Cube file (to a maximum number of 25 files) to the Ultrix router, specify its input / output colorimetry and transfer function, and range type. Once loaded, a file:

- becomes accessible to all UltriProc engines operating in 3D LUT mode within that same router.
- will automatically be added to the list of RGB cube files for loading.
- automatically applies the input and output colorimetry/transform settings defined by the user in the Import table.

To import a custom 3D LUT Cube file

1. Locate the **Conversion Type** > **RGB Cube File** area.
2. Click **Global Custom 3D LUT Import**.

   The Custom 3D LUT RGB Cube Files dialog opens.



3. Click **Import File**.

   The Open File dialog opens.
4. Navigate to the required cube file.
5. Click **Open**.

   The Progress dialog opens to indicate the status of the file import.
6. If required, edit the settings according to the expected cube file characteristics: Description, Input Gamut, Output Gamut, and Range Type.

✶ Click **Delete File** to remove unused cube files to free up space for new.

7. Close the Custom 3D LUT RGB Cube Files dialog.

Specifying the 3D-LUT RGB Cube File Type

A 3D-LUT Cube File is designed to process a specific input/output signal range. The DashBoard option **Range** provides two processing signal ranges:

- Type I – Normal Range [64,940]
- Type III – Full Range [0,1023]

✶ The pre-loaded 3D-LUT RGB Cube files library, most BBC Cube files, and all NBCU Cube files are of Type III.

The **Type I Normal Range** scales the SDI input signal level [64,940] to drive the 3D-LUT input processing range [0,1023] and will scale the 3D-LUT output processing range [0,1023] back to the SDI output signal level [64,940]. This means that a **Type I** 3D-LUT Cube file will clip super-blacks or super-whites on the SDI input and will not be able to generate super-blacks or super-whites on the SDI output.

The **Type III Full Range** will drive the full 10-bit SDI input signal level directly to the 3D-LUT input processing range [0,1023] and will scale the 3D-LUT output processing range [0,1023] to the SDI output signal level [0,1023]. This means that a Type III 3D-LUT Cube file will be able to process super-blacks and super-whites on the SDI input and will be able to generate super-blacks and super-whites on the SDI output.

✶ To allow super-blacks or super-whites on the SDI video output stream, the **Video Output Clipping** option must be set to the **Extended Luma [4,1019]** range.

As described above, the functionality of the **Type I Normal Range** 3D-LUT RGB Cube file is a subset of the functionality of the **Type III Full Range**. For that reason, most applications will be using the **Type III Full Range** 3D-LUT RGB Cube file.

Pre-Loaded RGB Cube Files Library

The UltriProc-3DLUT license provides a library of pre-loaded 3D-LUT RGB Cube files from the BBC and NBCU.

3D-LUT RGB Cube Files from BBC

These 3D-LUT files are designed and copyrighted by the BBC and are available under license. Refer to **Table 57** for details on the available files.

Table 57 Pre-loaded 3D-LUT RGB Cube Files — BBC

BBC LUT #	Conversion and Filename Info
1	BT.2100 PQ 1000 cd/m^2 to BT.2100 HLG, Type III File: BBC/ 1e_PQ1000_HLG_Type3_Transcode_nocomp-v1_6.cube
2	BT.2100 PQ 4000 cd/m2 to BT.2100 HLG, Type III File: BBC/ 2e_PQ4000_HLG_Type3_Transcode_nocomp-v1_6.cube
3	BT.709 SDR to BT.2100 HLG direct-mapping, Type I, display-light File: BBC/ 3a_BT709_HLG_Type1_Display_DirectMapping_nocomp-v1_6.cube
	BT.709 SDR to BT.2100 HLG direct-mapping, Type III, display-light File: BBC/ 3c_BT709_HLG_Type3_Display_DirectMapping_nocomp-v1_6.cube
4	BT.709 SDR to BT.2100 HLG direct-mapping, Type III, scene-light File: BBC/ 4-1a_BT709_HLG_Type3_Scene_DirectMapping_nocomp-v1_6.cube
5	BT.709 SDR to BT.2100 HLG up-mapping, Type III, display-light File: BBC/ 5c_BT709_HLG_Type3_Display_UpMapping_nocomp-v1_6.cube

Table 57 Pre-loaded 3D-LUT RGB Cube Files — BBC

BBC LUT #	Conversion and Filename Info
6	BT.709 SDR to BT.2100 HLG up-mapping, Type III, scene-light File: 6-1a_BT709_HLG_Type3_Scene_UpMapping_nocomp-v1_6.cube
7	BT.2100 HLG to BT.2100 PQ 1000 cd/m^2, Type III File: BBC/ 7c_HLG_PQ1000_Type3_Transcode_nocomp-v1_6.cube
9	BT.2100 HLG to BT.709 SDR down-mapping, Type III, display-light, with SDR super-whites File: BBC/ 9c_HLG_BT709_Type3_Display_DownMapping_SuperWhite_nocomp-v1_6.cube
10	BT.2020 S-Log3 to BT.2100 HLG, Type II, scene-light (use DashBoard Type III option) File: BBC/ 10a_S-Log3-100pc_HLG_Type2_Scene_Transcode_nocomp-v1_6.cube
11	"SR Live" S-Log3 to BT.2100 HLG, Type II, scene-light (use DashBoard Type III option) File: BBC/ 11a_S-Log3-200pc_HLG_Type2_Scene_Transcode_nocomp-v1_6.cube
17	BT.2020 SDR to BT.2100 HLG direct-mapping, Type III, display-light, graded content File: BBC/ 17c_BT2020_HLG_Type3_Display_DirectMapping_nocomp-v1_6.cube
18	BT.2020 SDR to BT.2100 HLG up-mapping, Type III, display-light, graded content File: BBC/ 18c_BT2020_HLG_Type3_Display_UpMapping_nocomp-v1_6.cube
19	BT.2100 HLG to BT.2100 HLG Traditional Camera Look, Type III File: BBC/ 19c_HLG_Camera_to_TraditionalLook_Type3_Conversion_nocomp-v1_6.cube

3D-LUT RGB Cube Files from NBCU

These 3D-LUT files are designed and copyrighted by the NBC Universal (NBCU) and are publicly available free of use. A sub-set of the NBCU 3D-LUT files are pre-loaded as part of the UltriProc-3DLUT license. Refer to **Table 58** for details on the available files.

Table 58 Pre-loaded 3D-LUT RGB Cube Files — NBCU

NBCU LUT #	Conversion and Filename Info
1	BT.709 SDR to BT.2100 HLG, Type III, display-light, direct-mapping File: NBC/ 1-NBCU_SDR2HLG_DL_v1.1.cube
2	BT.709 SDR to BT.2100 HLG, Type III, display-light, up-mapping File: NBC/ 2-NBCU_SDR2HLG_SL_v1.cube
3	BT.2100 HLG to BT.709 SDR, Type III, display-light, down-mapping File: NBC/ 3-NBCU_HLG2SDR_DL_v1.1.cube
4	BT.709 SDR to BT.2100 PQ, Type III, display-light, up-mapping File: NBC/ 4-NBCU_SDR2PQ_DL_v1.cube
5	BT.2100 PQ to BT.709 SDR, Type III, display-light, down-mapping File: NBC/ 5-NBCU_PQ2SDR_DL_v1.cube
7	BT.2100 HLG 1000 cd/m^2 to BT.2100 PQ, Type III, display-light File: NBC/ 7-NBCU-HLG2PQ_1000nit_v1.cube

RGB Color Correction

This section outlines the controls that UltriProc provides to perform basic RGB color correction.

✶ RGB color correction is available with an UltriProc or UltriProc-3DLUT license.

Overview

Under the DashBoard **Port Configuration** interface, the **Color Correction** sub-tab provides controls to perform basic RGB color correction functions.

To display the Color Correction interface

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Port Configuration** page opens.
6. Set the **Views** to **UltriProc**.
7. Select the **Color Correction** sub-tab.

✶ You can also click the port with an UltriProc license on the blade map of the **Home** page  to display the UltriProc interface.

8. From the table in the left pane, select the row for the UltriProc engine to apply the RGB color correction.

Table 59 summarizes the options displayed in the **Color Correction** sub-tab.

Table 59 UltriProc — Color Correction

Item	Parameters	Description
RGB Color Correction		
RGB		Enables you to adjust the Red, Blue, and Green color components simultaneously
R		Enables you to adjust the red color component independently of the other components
G		Enables you to adjust the green color component independently of the other components

Table 59 UltriProc — Color Correction

Item	Parameters	Description
B	Enables you to adjust the blue color component independently of the other components	
Gamma In	#	Applies a gamma function to the RGB' stream
Offset (%)	#	Adjusts the black offset of the RGB' stream
Gain (dB)	#	Adjusts the gain of the RGB' stream
Lift (%)	#	Lifts the black level of the RGB' stream, while applying a gain to keep the peak white at the same level
Inv. Gamma Out	#	Applies an inverse gamma function to the RGB' stream

Using the RGB Color Corrector

Controls are available for the grouped RGB' and for individual R', G', and B' components. The color correction processing is performed as indicated by the prime symbol, in the nonlinearly coded (gamma-corrected) components of the video output.

The RGB Color Corrector processing functions are cumulative and are executed in this sequence:

1. **Gamma In** — applies a Gamma function to the RGB' stream.
2. **Black Offset** — adjusts the black offset of the RGB' stream. The unit is in percentage of the full black to white signal amplitude with an adjustment range from -20% to +20%, in steps of 0.1%.
3. **Gain** — adjusts the gain of the RGB' stream. The unit is in dB with an adjustment range from -20dB to +20dB, in steps of 0.01dB.
4. **Black Lift** — lifts the black level of the RGB' stream, while applying a gain to keep the peak white at the same level. The unit is in percentage of the full black to white signal amplitude with an adjustment range from -20% to +20%, in steps of 0.1%.
5. **Gamma Out** — applies an inverse Gamma function to the RGB' stream.

Monitoring the Color Conversion

The when **Views** is set to **UltriProc**, on the **Port Configuration** interface, a table displays in the left pane that provides status information. (**Figure 45**)

Figure 45 Example of the Monitoring Entries on the Port Configuration > UltriProc Interface

Table 60 summarizes the status table entries.

Table 60 Port Configuration — UltriProc Status Table

Item	Description
Proc	
slot***x***.proc***#*** or flex.proc***#*** or slot***x***.MOD***y***.proc***#***	Reports the status of the UltriProc licenses where: • ***x*** represents a router slot • ***#*** represents the UltriProc engine (one UltriProc license key) • ***y*** represents a module installed in an ULTRIX-MODX-IO blade of the slot
Status	
On (Green)	The UltriProc engine is enabled, the signal on the port is valid, and the Bypass mode is set to **Normal**
Input Mismatch (Yellow)	A change in the Input > Colorimetry / Transfer Characteristics > Override setting is detected
Rate Mismatch (Yellow)	The License > Max Data Rate is set to 3G, but an UHD (6Gbps or 12Gbps) signal is detected
Off (Gray)	The UltriProc engine is disabled and not assigned to a port
Port	
slot***x***.***y***[***z***] or flex.***y***[***z***] or MOD***x***.***y***[***z***]	Reports the status of the port assigned to an UltriProc engine where: • ***x*** represents the slot in the router the port is located in • ***y*** represents the signal direction (in or out) • ***z*** represents the physical connector on the router
Max Data Rate	
3G	UltriProc operates at data rates up to 3Gbps[a]. The license is available on the even numbered inputs (Input 2, 4, 6, 8, 10, 12, 14, 16) or outputs (Output 2, 4, 6, 8, 10, 12, 14, 16) per blade.
UHD	UltriProc operates at data rates up to 6Gbps[b] and 12Gbps[c]. The license is available on 4 inputs (Input 2, Input 6, Input 10, Input 14) or 4 outputs per blade (Output 2, Output 6, Output 10, Output 14). This mode also requires an UltriSpeed license.

a. 1080p 50/59.94/60Hz
b. 2160p 23.98/24/25/29.97/30Hz
c. 2160p 50/59.94/60Hz

UltriProc for SmartCore

This section applies when using SmartCore to create custom Ultritouch soft panels with the UltriProc features.

For More Information on...

- the SmartCore feature, refer to the ***Ultricore BCS User Guide***.

Widgets Overview

There are three UltriProc widgets available for SmartCore:

- Color Correct (The `ultriproccolor` widget)
- Conversion (The `ultriprocconversion` widget)

- ProcAmps (The `ultriprocamps` widget)

Color Correct

This widget includes the RGB Color Corrector processing functions.

Figure 46 Example of the Color Correct Widget on an Ultritouch

Conversion

This widget includes the following functions: Colorimetry/Transfer Characteristics (input/output), Conversion (RGB Cube Files, Tone Mapping), and Output Clipping.

✶ You cannot import a RGB cube file from SmartCore.

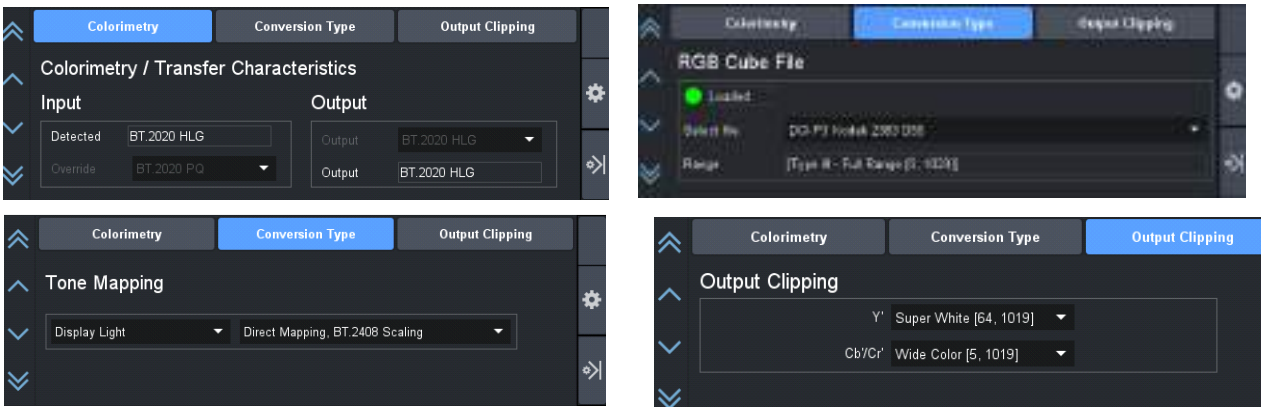


Figure 47 Examples of the Available Conversion Widgets

ProcAmps

This widget includes the Input Proc Amps, and Output Proc Amps.

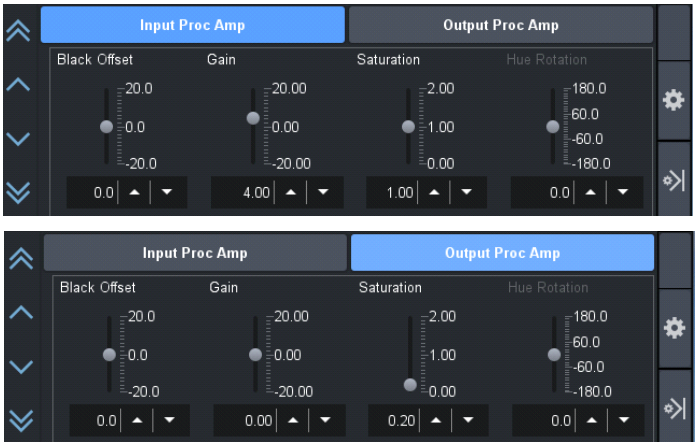


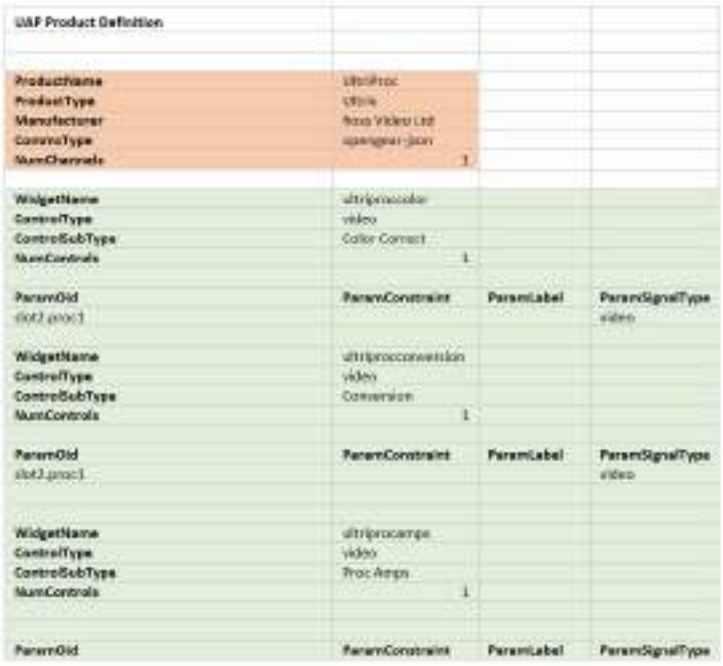
Figure 48 Example of the Input and Output Proc Amp Widgets

Adding an UltriProc to the SmartCore Product Catalog

There are two methods for adding an UltriProc catalog to the SmartCore interface: by importing an *.xlsx file with the parameters and widgets, or manually adding the catalog. This section briefly outlines both methods.

Keep the following in mind:

- Decide which UltriProc engine you would like to control in SmartCore and take note of their IDs. This information is available in the router's License > UltriProc interface.
- The following is an example of an *.xlsx file to import an UltriProc catalog.



UAP Product Definition			
ProductName	UltriProc		
ProductType	Ultrix		
Manufacturer	Ross Video Ltd		
CommsType	opengear-json		
NumChannels	1		
WidgetName	ultriproccolor		
ControlType	video		
ControlSubType	Color Correct		
NumControls	1		
ParamOid	ParamConstraint	ParamLabel	ParamSignalType
slot2.proc1			video
WidgetName	ultriprocconversion		
ControlType	video		
ControlSubType	Conversion		
NumControls	1		
ParamOid	ParamConstraint	ParamLabel	ParamSignalType
slot2.proc1			video
WidgetName	ultriprocamps		
ControlType	video		
ControlSubType	Proc Amps		
NumControls	1		
ParamOid	ParamConstraint	ParamLabel	ParamSignalType

When manually adding an UltriProc to SmartCore:

1. In the **Product Catalog** tab, click **Add** in the **Product Data** toolbar.
   - Use the Model Name to assign a unique identifier to this product. For example, enter the label for the required UltriProc engine.
   - Set the Product Type to Ultrix.
   - Set the Channels to 1.
   - Set the Comms Type to opengear-json.
2. Click **Add** in the **Widget Data** toolbar.
   - Set the Enter Widget Name to one of the UltriProc widgets. See "**Widgets Overview**".
   - Set the Control type to video.
   - Set the Sub-control type to conversion.
   - Set the Number of Controls to 1.
3. Click **Add** in the **Parameter Data** toolbar for a selected WidgetID.
   - Set the Param OID to the slot and proc engine ID. For example, `slot2.proc1`.
4. In the **Data Manager** tab, click **Add** to connect to an Ultrix Frame and attach a Product Data entry.
   - Set the Device Name to `Ultrix_slot#.proc#`. For example, `Ultrix_slot2.proc1`.

- Set Product to UltriProc.
- Use the Device IP field to specify the IP address of the Ultrix router.
- Click Get Details to auto-populate the remaining fields.

5. In the **Signal Path Manager** tab, click **Assign**.
   - Use the Select Device menu to select the device added in step 4.
   - Set the Product Type to UltriProc.
   - Set the Select Channel to 0.

Soft Panels for UltriProc

You can create a soft panel that displays one or two UltriProc windows.

To create a soft panel for UltriProc

1. Create an Ultritouch PB soft panel and ensure to include:
   - the UltriProc assigned Sources and Destinations for control.
   - a drawer window assigned to Presets.

   This will auto reveal the UltriProc Presets for control from an Ultritouch panel when selecting a source or destination that has a SmartCore template attached.
2. If desired, rename button labels by editing the Widget Data > Control Sub Type menu from the User Assigned Parameter (UAP) menu.
3. To display two sets of SmartCore presets, add another Preset to the Home View Config > Drawer Window options for the panel.

To access the UltriProc options on a soft panel

1. Load the soft panel to your Ultritouch.
2. Click  to display the UltriProc options.
3. Select from Color Correct, Conversion, or Proc Amps.

4. Click  to display the UltriProc Control menu.

Ultrimix-Dante Setup

The Ultrimix-Dante license provides 64 x 64 input/output audio channels accessible via ethernet on the AUX C port of the ULTRIX-HDX-IO and ULTRIX-MODX-IO blades. It utilizes the Audinate® Dante® proprietary IP-based audio transport system. This chapter provides information on installing the Ultrimix-Dante license, and configuring it for the Ultrix routing system.

✶ The Ultrimix-Dante license requires Ultrix router software version 5.6.0 or higher.

Overview

The Audinate Dante system provides a centralized control via the Dante Controller, a software application available on Microsoft® Windows® and MacOS®. This system manages the transport over the IP link, and presents users with a cross-connect interface that allows control of the channel routing only. IP control is managed by the Dante controller.

Ultrix identifies the Dante channels as a single pipeline consisting of 64 input and 64 output channels. Ultrimix-Dante enables the Ultrix router to include Audinate Dante audio inputs and outputs into the Ultrix routing matrix. Audio sources from a Dante network can be configured as inputs into the Ultrix router. The Ultrix router can also output audio channels to the same Dante network.

The Ultrimix-Dante license is supported on the following routers:

- ULTRIX-NS-FR1
- ULTRIX-NS-FR2
- ULTRIX-NS-FR5
- ULTRIX-FR5
- ULTRIX-FR12

✶ The AUX B audio channels are not available for use when Ultrimix-Dante is enabled on a blade. AUX B can still be used to route SDI video.

Features

The Ultrimix-Dante license provides the following features:

- Licensable on the ULTRIX-HDX-IO and ULTRIX-MODX-IO blades only
- Provides 64 input and 64 output Audinate Dante channels via the AUX C port on the blade
  - › non-redundant only
  - › requires a GigE Copper SFP
  - › on a separate network from UltriStream (the GigE SFP in the AUX D port of the same blade)
- AUX C audio channels are added to the routing database (we recommend separate databases for the AUX B and AUX C maps)
- Sampling Frequency of 48kHz
- Support for the L24, and L16 codecs (linear PCM only)
- Capable of bridging different timing domains between the Dante network and Ultrix reference
- Dante latency (Link-offset) available: 2ms, 3ms, 4ms, 5ms, and 10ms
- IP connection management via the Dante controller
- AES67 mode is enabled by default

Before You Begin

Ensure the following:

- You have access to the computer running the Dante Controller application to assign audio receivers and transmitters to the Ultrix router blade(s). Refer to the Audinate website for details.
- The AUX C port on the router blade is populated with an **SFP-RJ45-1G** module. Refer to the ***Ultrix SFP Modules User Guide*** for specifications.
- Your facility IT Department provided the required network settings for each AUX C port you plan to enable for the Ultrimix-Dante license for.
- The UltriStream and the Ultrimix-Dante licenses cannot be enabled on the same slot. By enabling an Ultrimix-Dante license on a slot, you will be prevented from enabling an UltriStream license on that slot until you disable the applied Ultrimix-Dante license.
- When Ultrimix-Dante is enabled on a slot, the UltriSRC license state cannot be changed.
- It is recommended to create separate databases for AUX B and AUX C before installing an Ultrimix-Dante license.
- Ultrimix-Dante utilizes an ASRC (Asynchronous Sample Rate Converter) to bridge the Dante clock domain (PTP) to the Ultrix clock domain. Both the Dante and Ultrix networks have the same 48kHz sampling frequency.

Installing an Ultrimix-Dante License

Ross Video uses license keys to control user access to specific features. You can obtain a key for a licensed feature from Ross Video Technical Support. Use the key to assign an Ultrimix-Dante license to a supported blade in the Ultrix router.

To install an Ultrimix-Dante license key

1. Launch the DashBoard client.
2. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
3. Expand the **Systems** sub-node.
4. Expand the **Configuration** sub-node.
5. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
6. Select  .

   The **Licenses** page opens with **License Keys** sub-tab automatically selected.
7. Make a note of the character string in the **Request Code** field for the Ultrimix-Dante license.
8. Contact Ross Video Technical Support using the information listed in "**Contacting Technical Support**".
   a. When you speak to your Technical Support representative, tell them your name, your facility name, and the **Request Code** from step 7.
   b. You will be given a License Key for the Ultrimix-Dante.
9. Enter the provided License Key in the applicable **License Key** field of the **Licenses** tab.

✶ You can also right-click on the row for the License Key you are installing, copy the Request Code to or paste the License Key from the Microsoft Windows clipboard, and click **Yes**.

10. Click **Apply** in the row for the License Key you entered in step 9.
11. Verify that the **Count** field is updated to report each installed Ultrimix-Dante License Key.

To activate an Ultrimix-Dante license for a specific slot

1. In the **Licenses** interface, select the **Ultrimix-Dante** sub-tab.

   The interface is organized into a table with three columns. The left column (Slot) lists the available slots that the license can be assigned to. The center column (Card | Port) lists the type of blade and the port name. The right column (License) provides the option to enable/disable the license for the specified slot.

✶ All Dante capable blades use the AUX C port for Ultrimix-Dante.

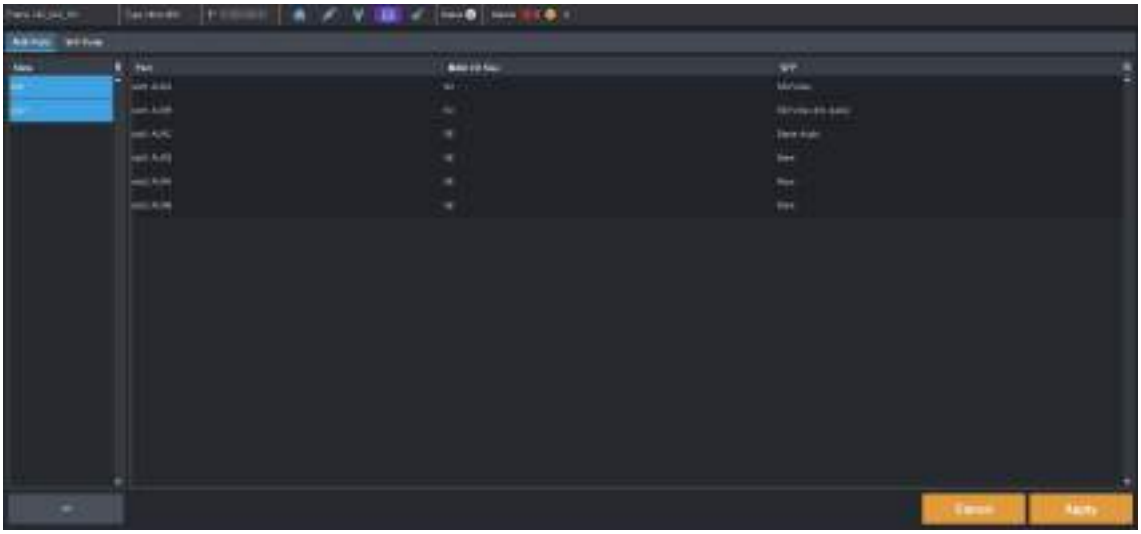
2. Verify that the top **Licenses** read-only field reports the total number of purchased Ultrimix-Dante licenses for the router.
3. In the table, locate the row for the slot you wish to enable the Ultrimix-Dante license.

✶ The FLEX slot of the ULTRIX-FR5 does not support Ultrimix-Dante.

4. Use the **License** column to select **Dante** for the slot.

Once the license is activated on the blade:

- AUX C on the SFP Configuration > AUX Ports interface has its SFP setting set to Dante Audio.
- If AUX B was assigned to SDI Video, there is no change to the SFP setting.
- If AUX B was assigned to MADI, it is now set to None. The SDI Video will still map to SDI Video (but without audio).



Accessing the Ultrimix-Dante Interface

Once an AUX C port is assigned to Dante Audio, you can access the Ultrimix-Dante settings via the DashBoard **Port Configuration** tab. The Port Configuration > Views > Ultrimix-Dante option for that

slot is now editable. This interface is used to configure the Ultrimix-Dante network settings, view performance metrics, and then monitor it during operation.

To display the Ultrimix-Dante interface

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Port Configuration** page opens.
6. From the Slot toolbar (at the top of the **Port Configuration** page), select the button for the slot you enabled the license on.
7. Perform one of the following:
   - Set the **Views** to **Ultrimix-Dante**; or
   - Select the **AUX C** port on the blade map of the **Home** page  .

   The Port Configuration page updates to display the Ultrimix-Dante interface.

Overview

The Ultrimix-Dante interface is organized into three areas: an I/O map of the selected blade (top), a table listing the configured channels (left pane), and options for configuring and monitoring the Ultrimix-Dante channels for the selected AUX C port (right pane). A toolbar at the bottom reports status messages.

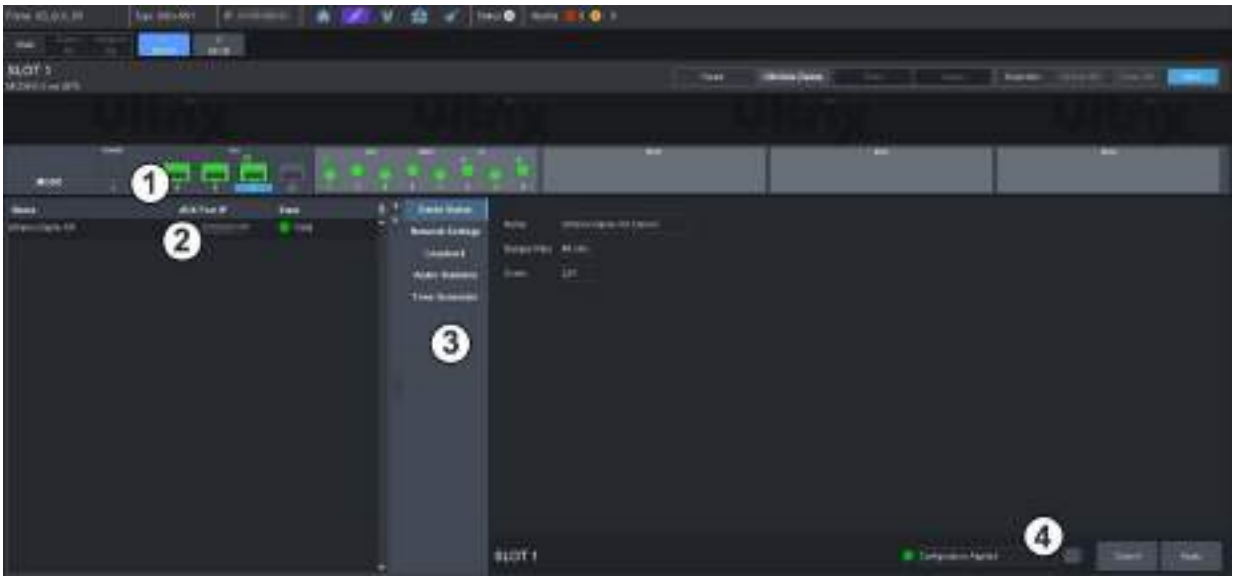


Figure 49 Example of the Port Configuration > Ultrimix-Dante Areas

1. Blade I/O Map

The top includes a map of the ports available on the selected blade. Note that the AUX C port in the UI changes color based on the state of the SFP connection and license status (green when the connection is valid, and red for error conditions). When **View** is set to **Ultrimix-Dante**, the AUX C port is automatically selected on the Blade I/O Map and any other port is not selectable from this map. A small icon displays over the AUX C port when an Ultrimix-Dante license is enabled.

› A green icon indicates that the license is enabled and the port is populated with a valid SFP module.

› A red icon indicates that the license is enabled but an SFP module is not plugged into the port.

› A gray icon indicates that the license is not enabled.

2. Status Table

The left panel includes a read-only table that reports the selected slot that includes the licensed Dante channel(s) on AUX C. Refer to **Table 61** for more information.

3. Configuration Options

The right panel includes the following tabs:

› Dante Status — reports read-only information from the Dante Controller.

› Network Settings — provides options for configuring the network settings for an AUX C port. Refer to **Table 63**.

› Loopback — options for configuring the audio loopback mode for each AUX C port. This is an advanced feature used to troubleshoot your connections.

› Audio Statistics — reports read-only information about the Dante receiver and transmitter channels for the AUX C port. This is an advanced feature used to monitor your connections.

› Tone Generator — provides options for troubleshooting the Dante channels.

✶ The Ultrimix-Dante tabs are disabled (grayed out) when a blade is selected that does not have an Ultrimix-Dante license enabled.

4. Configuration Status Toolbar

The toolbar is located in the bottom right corner and includes a status field and two buttons.

› The status field reports the status of changes made in the Ultrimix-Dante tabs and menus. A status indicator can vary in severity from green (valid), yellow (caution), to red (alarm).

› Select  to view details on the current status message.

› Click **Apply** to save any changes made to the Ultrimix-Dante tabs and menus.

Network Configuration

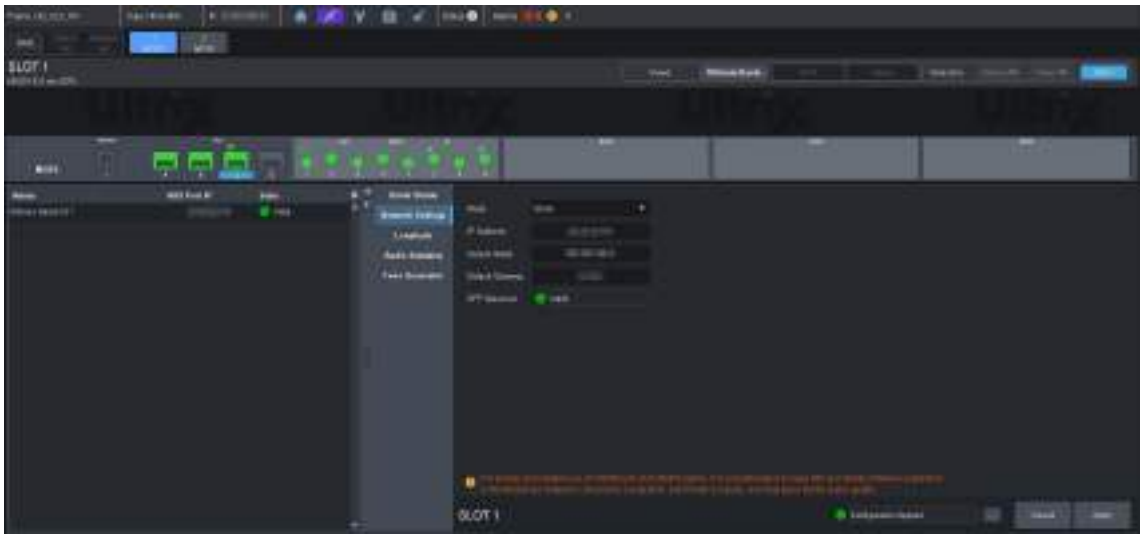
The Dante channel are transmitted and received via the **AUX C** port on each supported Ultrix blade. This first requires you to specify how the IP address for the port is assigned (Static or DHCP). Both methods are described below.

✶ When using UltriStream and Ultrimix-Dante, ensure that your NDI and Dante networks are separated. Combining these networks can lead to congestion, performance issues, and degraded Dante audio quality.

✶ Contact your network administrator if difficulties or problems are experienced when assigning IP addresses.

To configure the network settings for the AUX C port

1. Display the Ultrimix-Dante interface as outlined in "**To display the Ultrimix-Dante interface**".
2. Select the **Network Settings** sub-tab.



3. If you are manually configuring the network settings:
   a. Use the **Mode** menu to select **Static**.
   b. Use the **IP Address** field to specify the new static IP Address for the AUX C port.

      This is the IP Address that is used by the Ultrix router in the Dante network.
   c. Use the **Subnet Mask** field to specify the subnet mask for the AUX C port.
   d. Use the **Default Gateway** field to specify the gateway for communications outside of the local area network (LAN) the Ultrix will use.
4. If you want the network settings for the AUX C port to be automatically obtained, and DHCP service is available on your control network, select **DHCP** from the **Mode** menu. This is the default mode.

✶ Verify that a DHCP server is running in your network before setting the Mode to DHCP.

5. Verify that the **SFP Detected** field reports that a supported SFP module is installed in the AUX C port and its status is valid.
6. Click **Apply** to save the new settings.

Configuring a Dante Connection

This section briefly outlines how to establish communication between the Ultrix router and your Dante network. It is recommended to consult the Dante Controller user documentation for configuration details.

Assigning Dante Channels to the Ultrix Router

This section briefly outlines how to use the Dante Controller software to route the IP audio channels, select the Codec protocol, and configure the latency settings for the Ultrix connection.

To configure the Dante controller settings for Ultrimix-Dante

1. Launch the **Dante Controller** application.
2. Select the **Routing** tab.

   The Dante Controller window displays a matrix of Dante Receivers and Dante Transmitters.
   - Dante Receivers — all the destinations on the Dante network that you can route audio to.
   - Dante Transmitters — all the sources on the Dante network that you can route audio from.

3. On the matrix, select the audio source (Transmitter) that you want to route to the destination (Receiver) by clicking on the box where they intersect.

   A check-mark is shown to confirm that the routing has been made.

4. Display the **Device View** for the Ultrix router.
5. Select the **Device Config** tab.
6. Assign the Codec and Latency values as required by your routing system.

Audio Routing Overview

Once Ultrimix-Dante is configured, and connections are made via the Dante Controller, you can route the audio channels via the Ultrix database. This is done like any other routing on Ultrix as follows:

- The Dante audio channels are made available via AUX C.
- The AUX B audio channels will not be available while Dante channels are in use.
- This will be reflected by an addition of AUX C channels for SOURCES and DESTS in the Ultrix database and issuing take errors for AUX B connections when Ultrimix-Dante is enabled.

For More Information on…

- databases for your routing system, refer to the ***Ultricore Ultrix Database Guide***.

DashBoard Menus Overview

This section briefly summarizes the read-only fields, menus, and editable fields available when an Ultrimix-Dante license is applied to a supported router blade, and the **Views** is set to **Ultrimix-Dante**.

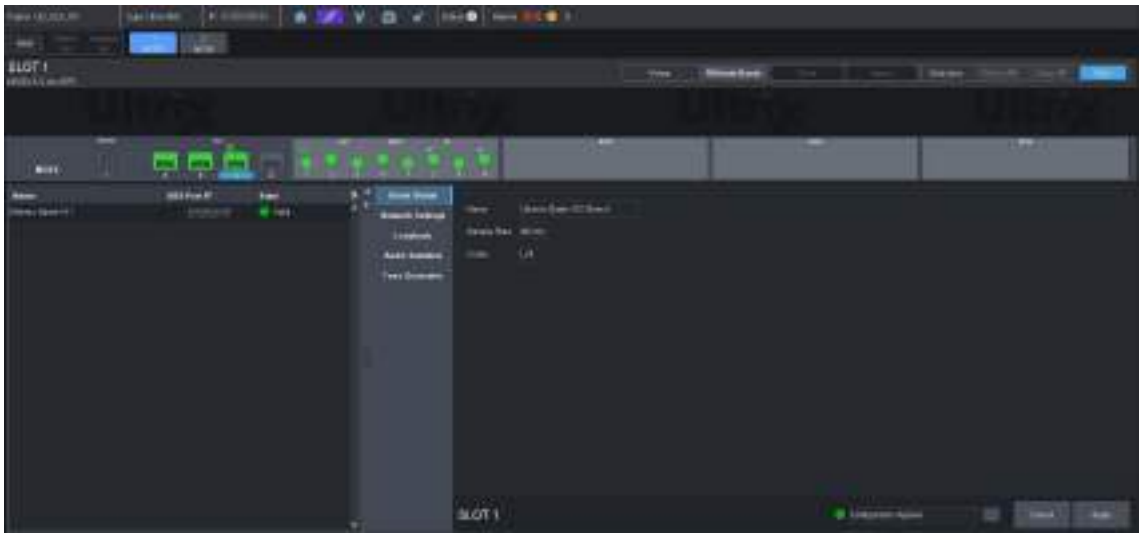


Figure 50 Example of the Ultrimix-Dante > Dante Status Tab in DashBoard

Status Table

Table 61 summarizes the read-only fields displayed in the table located in the left pane of the **Port Configuration** tab.

Table 61 Ultrimix-Dante — Status Table

Item	Parameters	Description
Name	Reports the identifier assigned to the Dante connection	
AUX Port IP	Reports the IP address assigned to this AUX C port	
State	Green	• The Ultrimix-Dante license is enabled • A valid SFP module is installed in this AUX port • The link for the AUX C port is valid • The Dante connection is operating correctly without errors
	Red	The Ultrimix-Dante license is enabled but an SFP is not installed in this AUX C port
	Gray	One of the following is occurring: • the Dante connection is no longer valid • the Ultrimix-Dante license is not enabled for this slot • the Dante connection encountered an error

Dante Status Tab

Table 62 summarizes the read-only fields displayed in the **Port Configuration** > **Ultrimix-Dante** > **Dante Status** tab.

Table 62 Ultrimix-Dante — Dante Status Tab

Item	Parameters	Description
Name	<text>	Reports the name of the Ultrix router within the Dante network
Sample Rate (kHz)	#	The average number of audio samples sent in a second
Codec	L16	Specifies the Codec used to encode the audio data in your Dante network. The Dante Controller labels this value as “Encoding”.
	L24	

Network Settings Tab

The Network Settings tab is used to the AUX C port for communication on the Dante network. This is required before you can stream Dante audio through Ultrimix-Dante.

Table 63 summarizes the options displayed in the **Port Configuration** > **Ultrimix-Dante** > **Network Settings** tab.

Table 63 Ultrimix-Dante — Network Settings

Item	Parameters	Description
Mode	Static	The user manually supplies the network settings for the AUX C port
	DHCP	Automates the assignment of the network settings for the AUX C port. This is the default.
IP Address	#	Specifies the IP address assigned to the AUX C port. This address is used to communicate with the devices in your Dante network.
Subnet Mask	#	Specifies the subnet mask for the AUX C port
Default Gateway	#	Specifies the gateway for communications outside of the local area network (LAN)
SFP Detected (read-only)	Valid (Green)	The SFP in the AUX C port is supported, correctly installed, and operational
	Invalid (Red)	One of the following is occurring with the SFP in the AUX C port: • the SFP does not support audio streaming • the SFP is not operational • the SFP is not installed correctly

Advanced Features

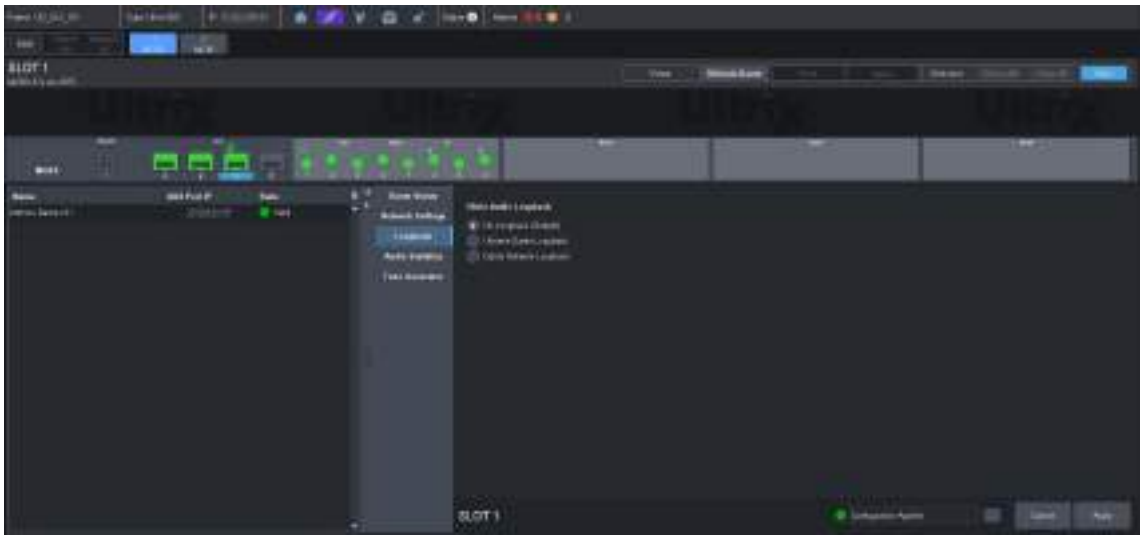
This section briefly outlines troubleshooting and monitoring options for Ultrimix-Dante.

Configuring the Loopback Mode for Ultrimix-Dante

The Loopback tab allows you to troubleshoot your Dante audio data path by enabling loopback at various points in the Ultrix routing system.

To configure the Ultrimix-Dante loopback mode

1. Display the Ultrimix-Dante interface as outlined in "**To display the Ultrimix-Dante interface**".
2. Select the **Loopback** sub-tab.



3. Select one of the following:
   - No Loopback (Default Audio) — The Dante audio channel is not routed back to its source.
   - Ultrimix-Dante Loopback — the incoming Rx data is routed to the transmitter channel at the recovered clock rate.
   - Dante Network Loopback — the incoming Rx data is routed to the transmitter channel as it becomes available.
4. Click **Apply** to save the new settings.

Monitoring the Audio Status

This **Audio Statistics** tab allows you to monitor communications and status about the Dante network as well as the Dante data path. Enable this tab when monitoring the Dante Controller connection for troubleshooting purposes.

Table 64 summarizes the read-only information displayed in the **Port Configuration** > **Ultrimix-Dante** > **Audio Statistics** tab.

Table 64 Ultrimix-Dante — Audio Statistics

Item	Description
Show Metrics	Determines if the Audio Statistics tab displays the status of the Dante Controller connection. The default is Hide Metrics.
Hide Metrics	
Network	
Bandwidth (%)	Reports the amount of audio data the Ultrix router is currently receiving via the Dante network
Bandwidth (Mbps)	
Packets	
Bytes	
Errors	Reports the total number of error packets detected on this Dante instance
Drops	Reports the total number of dropped packets detected on this Dante instance
Dante Audio (RX, TX)	

Table 64 Ultrimix-Dante — Audio Statistics

Item	Description	
Frame Count	The number of frames detected in a sample of this Dante audio instance	
FIFO Underflow Alarm	No Alarm (Green)	Data is being written to the FIFO without errors
	Alarm (Red)	The FIFO cannot provide the requested data as it is empty
	N/A	The Dante audio instance is not configured
FIFO Overflow Alarm	No Alarm (Green)	Data is being written to the FIFO without errors
	Alarm (Red)	The FIFO is full and new data cannot be written to it
	N/A	The Dante audio instance is not configured

Inserting Test Tones

The **Tone Generator** tab allows you to insert generated tones onto transmit channels as well as verify the status of the generated tone on the receive channel. This is useful for creating an external loopback test where an external device or network sends back the data it receives from Ultrimix-Dante. If required, you can also inject errors into the transmit path to verify if the connections are operating correctly.

Table 65 summarizes the options displayed in the **Port Configuration** > **Ultrimix-Dante** > **Tone Generator** tab.

Table 65 Ultrimix-Dante — Tone Generator

Item	Parameters	Description
Tone Generator Enable		
Disabled - Default Audio	Selected	The Rx and Tx have valid data as configured by the user. This is the default
Enabled - Tx Tone Audio	Selected	All channels coming out AUX C will include the internally generated tone
Tone Channel Lock Status		
Reports if a valid tone is received on the specified Rx channels, validating that the Tx tone is received correctly. Note that only RX channels 0 and 1 are checked.		
Channel #	Locked (Green)	Valid tone on Rx channel
	Unlocked (Red)	No valid tone on Rx channel
	Not Configured (Gray)	Tone is not enabled
Cumulative Channel 1/0 Error Counters		
Reports the error count on the Rx channels. Can be used alone or with Error Injection.		
LSB 4 Bits [0:3]	Errors are seen on lower bits. This represents a small scale degradation of signal quality.	
MSB 20 Bits [4:23]	Errors are seen on higher bits. This represents a significant degradation of signal quality.	
Error Injection		

Table 65 Ultrimix-Dante — Tone Generator

Item	Parameters	Description
Manually Inject Errors on the specified Tx channel. This can be used in conjunction with Error counters above if there exists a remote loopback.		
Channel Selection	Select the Tx channel to inject the error on	
Inject Errors	Injects a single error on the specified Tx channel	

ULTRIMIX-MXR

The ULTRIMIX-MXR licensed feature is a virtual audio mixer that can be configured up to 128×64. It can be partitioned into smaller mixers so you can have multiple instances within the frame.

The ULTRIMIX-MXR has access to every input in the system, and its outputs can be routed to any output in the frame, providing tremendous flexibility for audio work-flows. Each input has a 4-band parametric equalizer, noise gate and compressor/limiter. In addition, ULTRIMIX-MXR has 128 direct outputs for simple audio processing as part of its standard feature set. It is controllable via a DashBoard user interface as well as application-specific panels for both the Ultritouch-2 and Ultritouch-4 control panels.

Key Features

- Licensed in 32×16 blocks
- Multiple licenses can be purchased to build a maximum size of 128×64
- 4 Band Parametric EQ per input
- Noise Gate per input
- Compression/Limiter per input
- DashBoard control
- Ultritouch-2 and Ultritouch-4 panel support

Flexible Mapping

Any Ultrix audio input (embedded SDI, MADI, or IP based) may be routed to any mixer input, and any mixer output may be routed to any audio output channel. You may route any audio signal within Ultrix via any mixer input. Also, the mixer outputs may be routed to any Ultrix audio destination, including back into the mixer.

Each ULTRIMIX-MXR license provides an I/O (Input/Output) block of 32 inputs by 16 outputs. A maximum of 4 licenses provides an I/O block of 128 inputs by 64 outputs.The ULTRIMIX-MXR may be partitioned into smaller blocks to provide multiple small audio mixers.

Figure 51 is an example of one audio mixer (one license) with 64 stereo inputs (128 channels) and 32 stereo outputs (64 channels). **Figure 52** is an example of partitioning to obtain two smaller independent ULTRIMIX-MXR I/O blocks. Each partition is stereo 32x16.

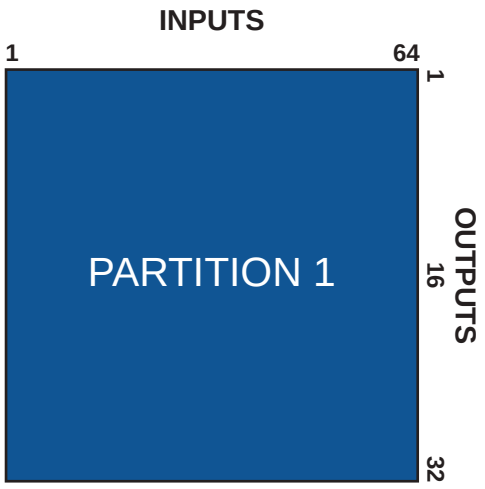


Figure 51 One Audio Mixer — 64x32

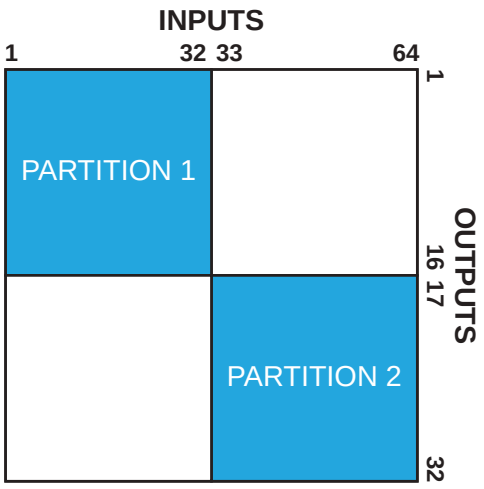


Figure 52 Two Audio Mixers — Each 32x16

Soft Panels

An Audio Mixer soft panel type allows for real-time adjustment of audio levels and audio processing, and provides a familiar interface similar to other audio consoles. Each channel strip is a stereo pair (i.e. two audio channels). Similarly, each output bus is a stereo pair.

By default, the Home View of an audio mixer soft panel is similar to Ross RAVE. The window is divided into channel strips and includes the features you enabled during the soft panel configuration. You also have the option to add drawers to the left and/or right margins of the soft panel window (like an Ultritouch soft panel).

✶ When the router is under Ultricore BCS control, the soft panel provides audio mixing capability only (and not crosspoint switching as the Sources are automatically set to None). To perform crosspoint switching, you must first load the audio mixer soft panel onto the Ultricore BCS panel and then select the sources via that Ultricore BCS panel.

For More Information on...

- audio mixer soft panels, refer to the ***Ultrix and Ultricore Database Guide***.

Figure 53 Example of an Audio Mixer (Desktop) Soft Panel

Setup Overview

This chapter summarizes how to:

1. Install a ULTRIMIX-MXR license(s) for each audio mixer partition you require. You can install up to 4 licenses in a single router. Refer to "**Installing the License Key for an Audio Mixer**".
2. Specify the audio mixer I/O partitions. Refer to "**Configure the Audio Mixer I/O Partitions**".

For More Information on...

- creating sources and destinations with audio mixer I/O mappings, refer to the ***Ultrix and Ultricore Database Guide***.
- configuring an audio mixer soft panel, refer to the ***Ultrix and Ultricore Database Guide***.
- load the audio mixer soft panel to your desktop or an Ultritouch panel, refer to the ***Ultrix and Ultricore Database Guide***.

Installing the License Key for an Audio Mixer

Install the ULTRIMIX-MXR software license for the Ultrix router as outlined in "**Software License Keys**".

Configure the Audio Mixer I/O Partitions

Each ULTRIMIX-MXR license provides a block of audio mixer Inputs and Outputs (I/O). The block size is determined by how many ULTRIMIX-MXR licenses are enabled. This I/O block may be partitioned to create smaller independent mixers.

For example, an Ultrix with four ULTRIMIX-MXR licenses enabled will yield a single audio mixer with an I/O matrix of 64 stereo inputs × 32 stereo outputs. The **Device Configuration** interface in DashBoard enables you to create the following matrices based on how you want to partition the inputs and outputs:

- 1 Mixer where the mixer is a 64×32 (stereo)
- 2 Mixers where each mixer is a 32×16 (stereo)
- 4 Mixers where each mixer is a 16×8 (stereo)
- 8 Mixers where each mixer is a 8×4 (stereo)
- 16 Mixers where each mixer is a 4x2 (stereo)

✶ It is strongly recommended to configure your audio mixer partitions at the same time as configuring the other ports for your router. Changes to mixer partition is a major operation due to existing mixer I/O maps in sources and destinations are no longer valid, and mixer partition assigned to a mixer panel may no longer available.

Master and Monitor Outputs

Each partition has two defined outputs named Master and Monitor. The physical outputs the Master and Monitor buses are assigned to is user configurable. By default, Master is assigned to the first output bus and Monitor is assigned to the last output bus of the partition.

For example, an Ultrix with one ULTRIMIX-MXR license allows a single block of 32×16 audio mixer I/O. This equates to a possible mixer with 16 stereo inputs and 8 stereo outputs, or buses. By default, a single partition on this I/O block will set the Master bus to mixer I/O OUT 1 and the Monitor bus to OUT 8.

With Master set to bus OUT 1 and Monitor set to bus OUT 8, this leaves the remaining 6 outputs as Auxiliary (AUX) buses.

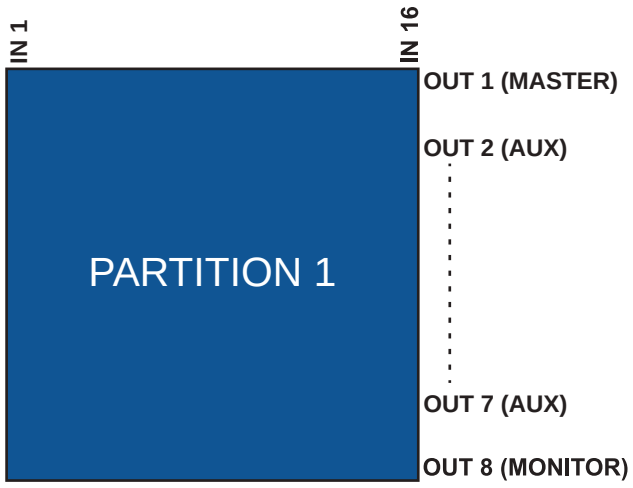


Figure 54 Master and Monitor Outputs within a Partition

The Master and Monitor buses operate in conjunction as follows;

- The Monitor bus follows the Master unless a channel strip has SOLO activated.
- When no channel strip SOLO is activated, the Monitor bus has the same audio mix as the Master bus.
- When a channel strip SOLO is activated, the Monitor bus mutes other channels except for those in SOLO mode. The SOLO button is highlighted (this applies whether the active bus is Master or an AUX).
- Any Master channel strip with SOLO activated does NOT affect the Master bus.
- Multiple channel strip SOLOs are allowed, and they all appear in the Monitor simultaneously.
- Selecting the SOLO Clear button will clear all currently active SOLO channel strips.

The SOLO mode on an auxiliary bus operates differently as there is no specific monitoring bus output for the Auxiliary buses.

- Any channel strip with SOLO activated will MUTE the other channels on that AUX bus.
- When an AUX strip SOLO is activated, the Monitor bus has the same audio mix as an AUX bus with SOLO activated.

Configure the Audio Mixer Partitions

The number of default partitions is determined by the license key you installed.

To configure an audio mixer partition

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Audio Mixer** tab.
7. Click **Audio Mixer Partitions**.
8. Use the **Mixer Partition** menu to specify the number and types of audio partitions you require.
9. Click **Apply**.

Audio Mixer Operation

This section provides examples two possible audio mixer setups: a generic system and a.

Generic Setup

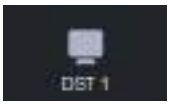
This example assumes the following generic setup seen in **Table 66**. Note that generic physical IO names shown for brevity.

Table 66 Example Mapping for Router Sources and Destinations

	Video	A1	A2
Source			
SRC1	slot1.in[1].sdi	slot1.in[1].audio.ch1	slot1.in[1].audio.ch2
SRC2	slot1.in[2].sdi	slot1.in[2].audio.ch1	slot1.in[2].audio.ch2
SRC3	slot1.in[3].sdi	slot1.in[3].audio.ch1	slot1.in[3].audio.ch2
…	…	…	…
MXR MSTR		slot0.mixer-out[1]	slot0.mixer-out[2]
MXR AUX1		slot0.mixer-out[3]	slot0.mixer-out[4]
…	…	…	…
Destination			
Dest1	slot1.out[1].sdi	slot1.out[1].audio.ch1	slot1.out[1].audio.ch2
Dest2	slot1.out[2].sdi	slot1.out[2].audio.ch1	slot1.out[2].audio.ch2
Dest3	slot1.out[3].sdi	slot1.out[3].audio.ch1	slot1.out[3].audio.ch2
…	…	…	…
MXR IN1		slot0.mixer-in[1]	slot0.mixer-in[2]
MXR IN2		slot0.mixer-in[3]	slot0.mixer-in[4]
…	…	…	…

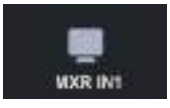
To perform a simple route of audio mixer channels

1. To route a mixer output to a destination:
   a. Choose a destination to receive the mix.

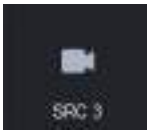


   b. Choose a source for the destination.

2. To route a source audio to a mixer input:
   a. Select the mixer input.



b. Select the required source.



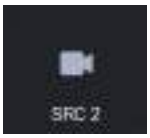
With these route operations, we have routed the output of the Mixer Master bus (assuming Master is set to **Out1** in the mixer partition settings), to our router destination **DST 1**, and then routed audio channels 1 and 2 (as the mixer map is only configured for two channels in this example), of our router source **SRC 3** to the mixer Channel strip 1.

Or, to look at it another way; audio channels 1 and 2 on router destination **DST 1** are connected to the mixer Master bus. The Master bus has router source **SRC 3** audio channels 1 and 2 via Channel strip 1.

3. To add another source to the mix:

a. Select another mixer input.

b. Select the source of the extra channels.



After this route, audio mixer Channel strip 2 receives the audio channels 1 and 2 of **SRC 2**. The **MXR MSTR** can have a mix of **SRC 3** channels 1 and 2, and **SRC 2** channels 1 and 2. Channel strip faders 1 and 2 control the mix of their respective sources. The Mixer Master fader controls the overall level of the mix.

Using Audio Mixer Direct Outputs

ULTRIMIX-MXR provides a direct channels strip output (pre-fader). This allows the use of the equalizer, compressor/limiter, and noise gate without requiring the effects to be routed through a mix bus.

In this example, we assume the mapping seen in **Table 67**.

Table 67 Example Mapping for Router Sources and Destinations

	Video	A1	A2
Source			
SRC1	slot1.in[1].sdi	slot1.in[1].audio.ch1	slot1.in[1].audio.ch2
SRC2	slot1.in[2].sdi	slot1.in[2].audio.ch1	slot1.in[2].audio.ch2
SRC3	slot1.in[3].sdi	slot1.in[3].audio.ch1	slot1.in[3].audio.ch2
…	…	…	…
FX1		slot0.mixerd[a]-out[1]	slot0.mixerd-out[2]

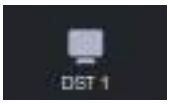
Table 67 Example Mapping for Router Sources and Destinations

	Video	A1	A2
FX2		slot0.mixerd-out[3]	slot0.mixerd-out[4]
…	…	…	…
Destination			
Dest1	slot1.out[1].sdi	slot1.out[1].audio.ch1	slot1.out[1].audio.ch2
Dest2	slot1.out[2].sdi	slot1.out[2].audio.ch1	slot1.out[2].audio.ch2
Dest3	slot1.out[3].sdi	slot1.out[3].audio.ch1	slot1.out[3].audio.ch2
…	…	…	…
MXR IN1		slot0.mixer-in[1]	slot0.mixer-in[2]
MXR IN2		slot0.mixer-in[3]	slot0.mixer-in[4]
…	…	…	…

a. The “d” in the mixer physical label represents Direct Out.

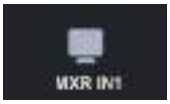
With the above mapping, we can feed the output of the filters (noise gate, equalizer, compressor/limiter) to any destination.

1. Route a channel strip direct output to a destination:
   a. Select the required destination.



   b. Select an output of the mixer as the source.

2. Route a source to the channel strip:
   a. Select a mixer input as a destination for the source.



   b. Select the required source.

   With these route operations, we have routed the direct outputs of mixer Channel strip 1 to our router destination **DST1**, and then routed audio channels 1 and 2 of our router source **SRC3** to the mixer Channel strip 1.

Or, to look at it another way; audio channels 1 and 2 on router destination **DST1** are connected to router source **SRC3** audio channels 1 and 2 via mixer Channel strip 1 filters (gate, compressor/limiter, and equalizer). The settings of the filters will effect the audio channels 1 and 2 of destination **DST1**.

Using Remote Control Panels

When the Ultrix router is configured for Ultricore mode, it responds to switch commands from Ross NK Series and Ross series control devices. These commands contain source, destination, and level designations. Routers acknowledge the switch request with the selected crosspoint switch status after the switch has occurred. The Remote Control Panels (RCP) may operate singularly, or in a linked mode where two or more (up to 10) panels may operate as a larger panel with more buttons.

Connection to Ultrix

The method of connection between Ultrix and an RCP will vary depending on the type of panel. Ethernet enabled devices such as the RCP-ME and RCP-QE communicate with Ultrix directly. Non-ethernet panels such as the RCP-NKQ, RCP-NKM and RCP-NK1 connect through an NK-NET or NK-IPS to convert the native T-Bus commands to ethernet.

Native ethernet panels receive their labels automatically from the Ultrix database upon panel start-up. Any subsequent changes to the database labels are also automatically pushed out to connected ethernet panels. The NK series panels do not automatically get updates from the Ultricore control system and must use a manual process via DashBoard. Refer to the user guide for your RCP for details.

✶ For optimal performance when using a Ross RCP with Ultrix, the **Comms Retry** factor should be set to **80ms** or greater within the RCP configuration. Refer to the user guide for your RCP for details.

RCP-NKM Connection to a Ross NK Router and an Ultrix Router

The RCP connection as shown in **Figure 55** requires a connection point between Ultrix and the NK-NET. Refer to the section "**Connecting to Ross NK Series Devices**" for details.

✶ The NK-NET requires power from the Ross NK Router (over T-Bus).

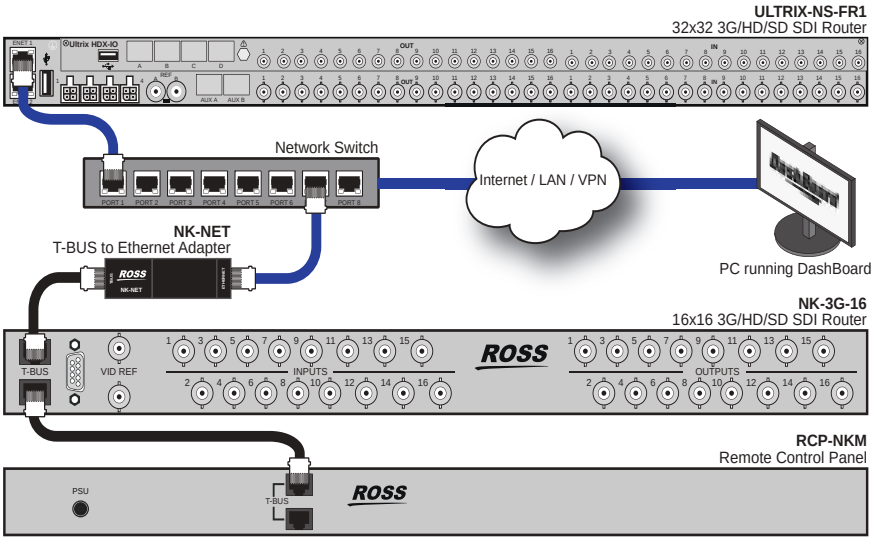


Figure 55 Example of a Connection from an Ultrix Router to an NK-3G-16 and RCP-NKM

RCP-QE Connection to an Ultrix Router

RCP-QE and RCP-ME remote control panels require a a connection point between Ultrix and the panel. Refer to the user guide for your panel for details.

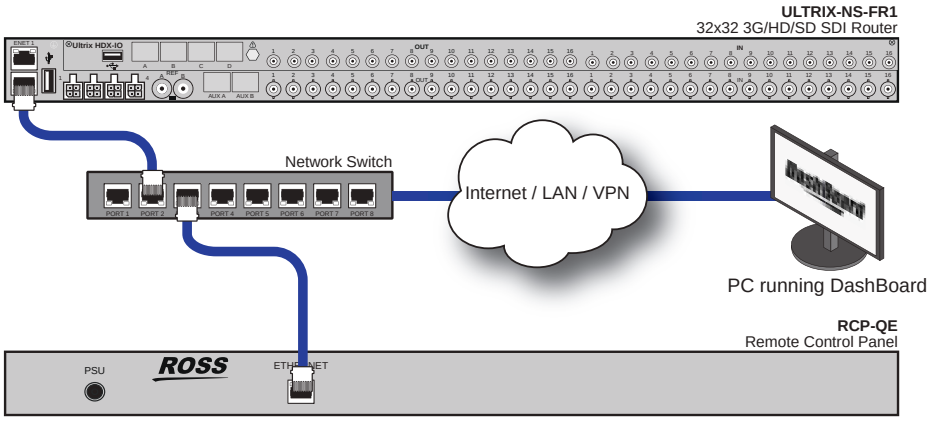


Figure 56 Example of a Connection from an Ultrix to an RCP-QE

RCP-NKM with a NK-IPS and NK Router to an Ultrix Router

The RCP connection as shown in **Figure 57** requires a connection point between Ultrix and the NK-IPS. Refer to the section "**Connecting to Ross NK Series Devices**" for details.

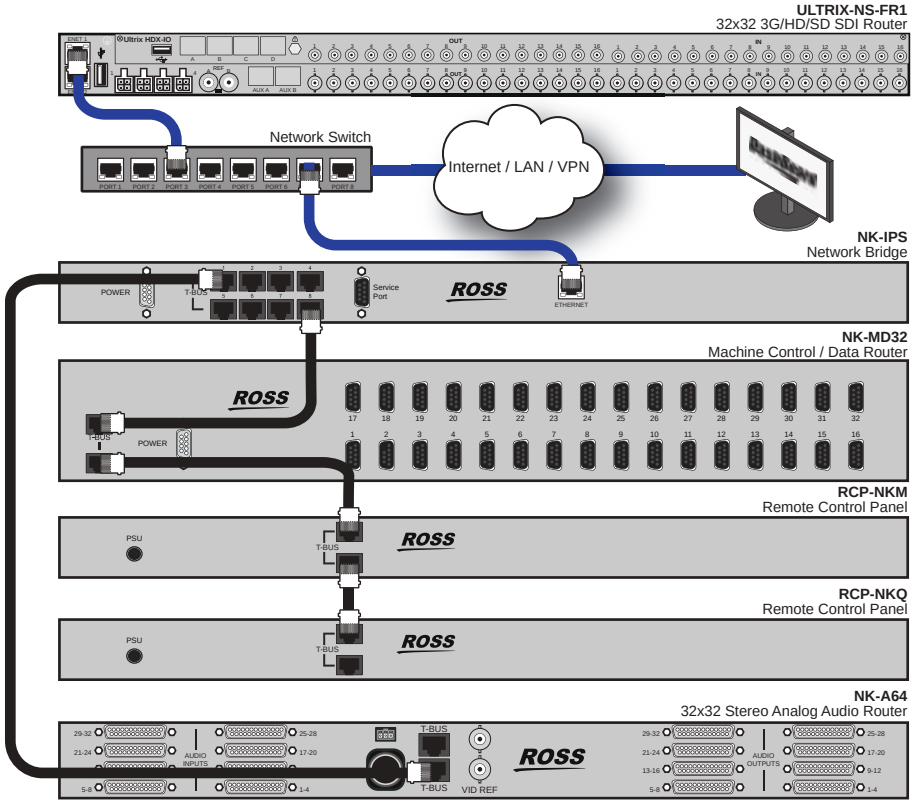


Figure 57 Example of a Connection from an Ultrix Router to an NK-IPS and an RCP-NKM

Remote Control Panel Operation

The control panel functions detailed in this section can be programmed with the Ultricore for full functionality. The examples herein are generic functions applicable to all panel types.

For More Information on...

- specific applications, refer to the user documentation that accompanied your device.

Destination Buttons

Selecting a destination changes the destination the panel controls or switches the next time a **Source** button is pressed. Destinations can be selected by pressing a preset **DESTINATION** button.

When a preset **DESTINATION** button is pressed, that button and its source status button (if a preset key exists on the current view or menu) will be illuminated.

✶ Each panel type has slightly differing method of displaying current status depending on the display type or lack there-of. Refer to individual RCP manuals for details.

Figure 58 illustrates an RCP-QE36 panel where **Outpt1** is the selected destination.

Figure 58 Selecting a Destination Button — Outpt1 Selected

Source Buttons

Source switching is performed by pressing a preset **SOURCE** button. Selecting a source (when a **TAKE** function button is not assigned), results in the controller requesting the selected source to be switched by the router to the panel's current destination. If a **TAKE** function button is assigned to the current view or menu, the **TAKE** button will be illuminated. This indicates that **TAKE** is armed and the requested switch will be completed upon the user pressing the **TAKE** button.

Figure 59 illustrates a panel where **Outpt1** is the destination, **Input 7** is the source, and the **TAKE** is armed.

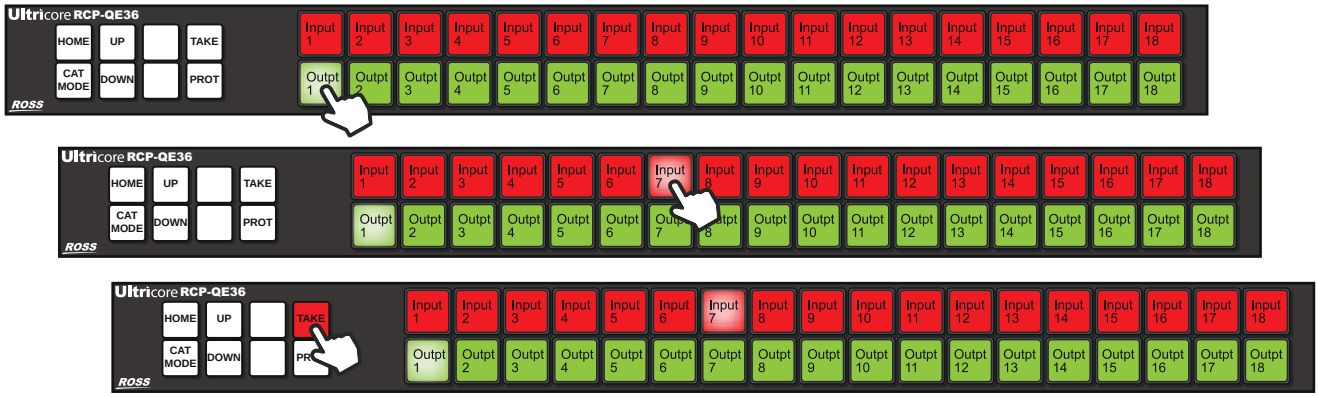


Figure 59 Selecting a Source Button — Camera 7 Selected

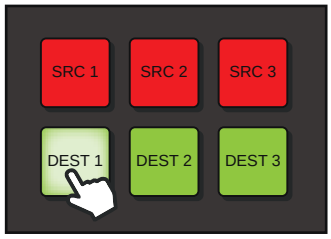
The flow is always destination selection followed by source selection. This switch will be executed with the current panel breakaway/level selections.

Level Buttons

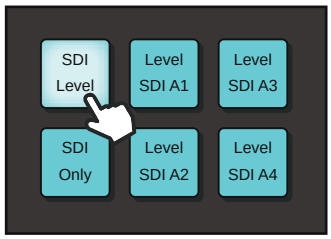
Level buttons select individual router levels. These correspond to the levels tab of the current Ultricore database. Level buttons are cumulative e.g. you may activate other levels after already selecting a level button.

The following sequence of button presses would result in **SRC 1** being routed to **DEST 1** but only on the levels named **SDI**, **SDI A1** and **SDI A2**. Any other levels defined in the current Ultricore database will be ignored and their status will remain as previously selected. If a level is selected in error, press that key again to de-select. The switch occurs once the Source selection is made.

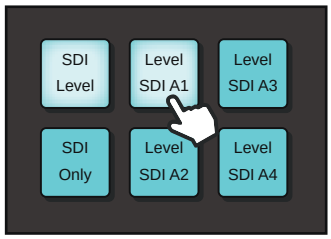
1. Select the **Destination** button.



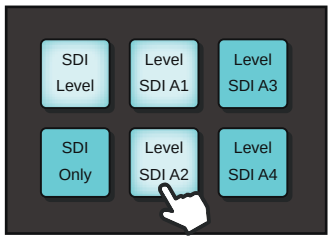
2. Select the **SDI Level** button.



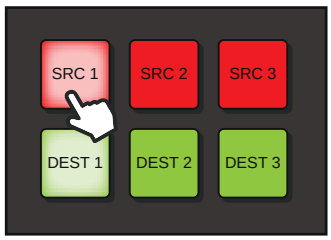
3. Select the **Level SDI A1** button.



4. Select the **Level SDI A2** button.



5. Select the **Source** button.



Breakaway Buttons

Breakaway buttons are buttons tied to a breakaway definitions. A breakaway is a pre-set pattern of levels defined within the panel configuration. Breakaways can be customized from the control

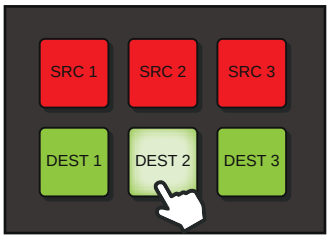
panel's properties settings via the interface in DashBoard. **Figure 60** is an example of configuring a breakaway for a control panel.

Figure 60 Example of a Breakaway Setup Interface

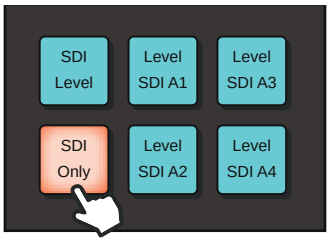
✶ The level numbers correspond to the number in the **ID** column of the **Levels** tab within the current database.

The following sequence of key presses would result in **Src 3** being routed to **Dest 2** but only on the levels included in the **SDI Only** breakaway pattern as defined within the RCP set-up (**Level 1** in this example). The switch occurs once the source selection is made.

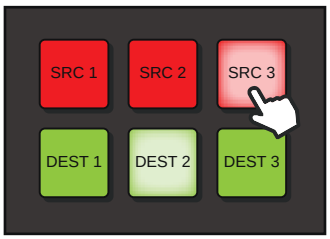
1. Select the **Destination** button.



2. Select the **SDI Only** breakaway button.

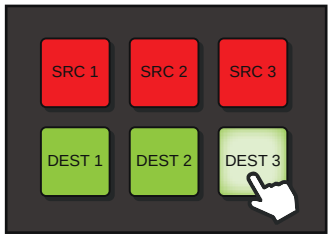


3. Select the **Source** button to activate the switch selection.

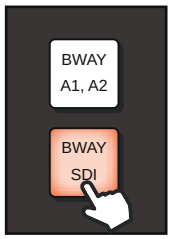


In the following example, the user is switching video from one source (**Src 1**) and embedded audio from another (**Src 2**).

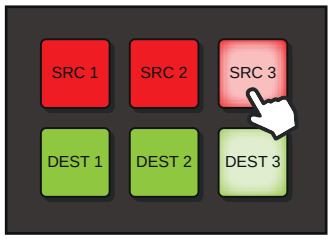
1. Select the **Destination** button.



2. Select the **SDI** breakaway button containing SDI video only level.

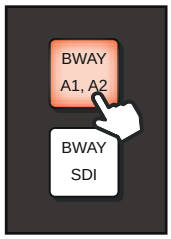


3. Select the **Source** button to activate the switch selection.

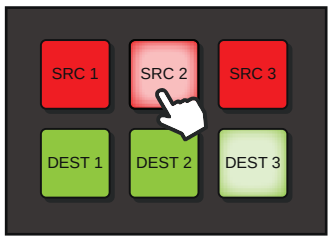


4. Select the breakaway button containing the SDI embedded Ch1 and Ch2 levels.

   Once **BWAY A1, A2** is pressed, **BWAY SDI** becomes unlit.



5. Select the **Source** button for the embedded audio.



Crosspoint Buttons

Crosspoint buttons perform a preset single crosspoint switch in a single button press. A crosspoint key contains a source (e.g. Src 1), a destination (e.g. Dest 1), and breakaway (e.g. SDI Only) within its definition.

Operation with Ross Devices

Ultrix may also connect to Ross NK series devices to expand functionality for signal types the Ultrix router itself does not handle. The Ross NK series devices must be connected to the Ethernet network by virtue of an Ross NK-IPS or NK-NET devices to enable the Ultrix router to communicate with them.

Overview

Introducing an Ultrix router to a Ross NK system will require specific configuration to enable the Ultrix routing system to manage them.

Using RCP-NKx Remote Control Panels

When adding the Ultrix router to an existing system with one or more RCP-NKx devices, each remote control must:

- have the **Virtual routing** enabled on their **Configuration** page
- have the **Comms Retry Delay Factor** set to 80ms or greater
- ensure that the level numbers correspond to the Ultrix Level ID number

Be aware that the RCP-NKx devices do not:

- support Ultrix salvos
- automatically get source and destination labels from the Ultrix router. They must be entered manually or via a global labels file.

Using Ross NK Series Routers

The Ross NK router partitioning not supported. The logical mapping of the Ultricore control system is far more capable and should be implemented there if required.

Keep the following in mind:

- The NK-IPS requires version 2.23 or greater to communicate with an Ultrix router.
- The SCP/A is not supported.
- The SCP/K2 is not supported.
- NK-A64 control level is not supported.

Table 68 outlines the nomenclature that Ultrix automatically uses for Ross NK devices.

Table 68 Default Ultrix Naming for Ross NK Devices

Ross NK Device	Matrix Name	Port Name
NK-3Gxxx	deviceName.SDI	deviceName.slot1.in/out[socket number].SDI.ch1
NK-Axxx	deviceName.An Aud L	deviceName.slot1.in/out[socket number].An Aud L.ch1
	deviceName.An Aud R	deviceName.slot1.in/out[socket number].An Aud R.ch1
NK-Dxxx	deviceName.AES	deviceName.slot1.in/out[socket number].AES.ch1
NK-Mxx	deciceName.Machine Control	deviceName.slot1.in/out[socket number].Machine Control.ch1
NK-MDxxx	deviceName.SDI	deviceName.slot1.in/out[socket number].SDI.ch1
NK-Vxxx	deviceName.An Vid	deviceName.slot1.in/out[socket number].An Vid.ch1

Using Ross Analog Audio Devices (NK-A16, NK-A32, NK-A64)

The Ross NK Analog Audio devices (NK-A16, NK-A32, NK-A64) will present as two matrices: Left and Right respectively. Note that the NK-A64 control level is not supported.

Connection Diagrams

Figure 61 provides an example of a routing system with an Ultrix router, an NK-NET, and several Ross NK devices. Communication between the NK-NET and the Ross NK devices is over T-Bus.

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

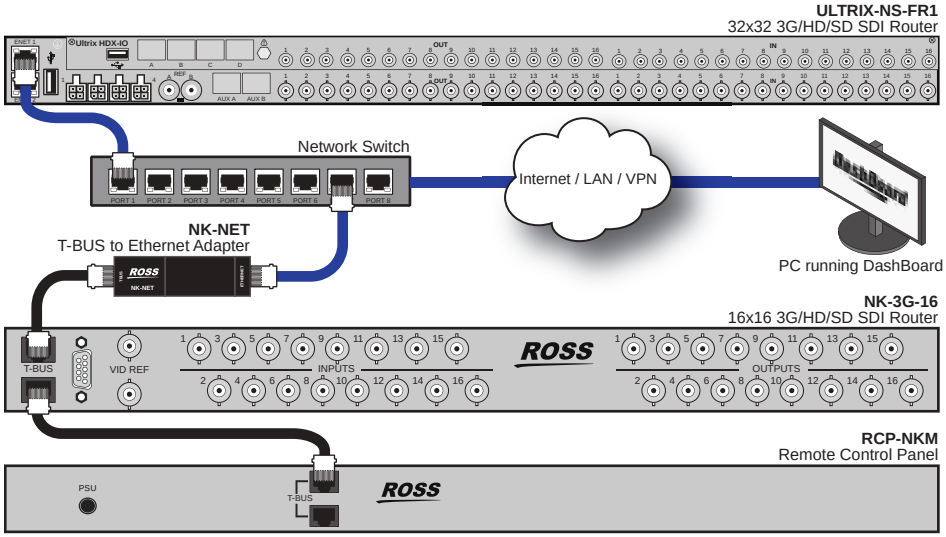


Figure 61 Connection Example with an NK-NET

Figure 62 provides an example of a system with an Ultrix router, an NK-IPS, and several NK devices.

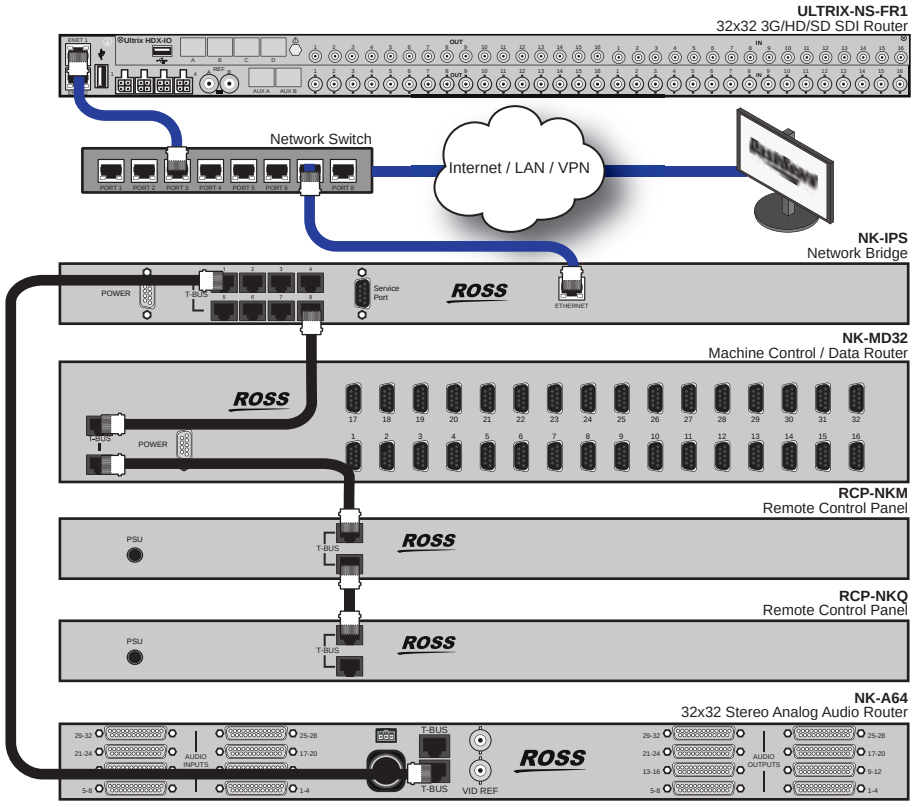


Figure 62 Connection Example with an NK-IPS

Adding Ross NK Series Devices to the Ultrix Routing System

To add a Ross NK series device to the Ultrix routing system:

1. Define a connection point between the Ultrix router and each Ross NK series device. Refer to the chapter "**Device Communication Setup**" for details.
2. Review the logical matrices for the Ultrix database.
3. Assign outputs to the logical destinations in the database as outlined in "**To map a physical output to a destination**".
4. Assign inputs to the logical sources in the database as outlined in "**To map an input to a source**".

Machine-Control (RS-422) Logical Mapping

Connecting an NK-M series router to Ultrix requires some special consideration;

Machine control routing requires two crosspoints for a point to point connection due to the bi-directional nature of the signal. Each physical socket contains a transmit/receive pair. This can be thought of as a source-destination combination and is known as a port.

It is necessary to configure the input and output of the machine control port on the same row ID on the logical mapping tables.

Figure 63 Destination Mapping

Figure 64 Source Mapping

It does not matter where the machine control is mapped (either row 3 or 300), but the input and outputs physical ports must be mapped to the same row ID.

Conditions for Machine Control

Three conditions must be met before machine control can be switched.

1. The NK machine control router is attached and configured within Ultrix (level, destination. and source maps).
2. Selected breakaway or level must include the machine control level.
3. Machine control reciprocal must be enabled on the controller.

Using Ultricore-CC as a System Controller

Ultricore-CC may control one or more Ultrix routers. Ultricore has the advantage of supporting more external connections so is ideal for systems with many external connections (RCPs, DashBoard instances, third-party control).

✶ Ensure a unique device name is assigned for each Ultrix within a system.

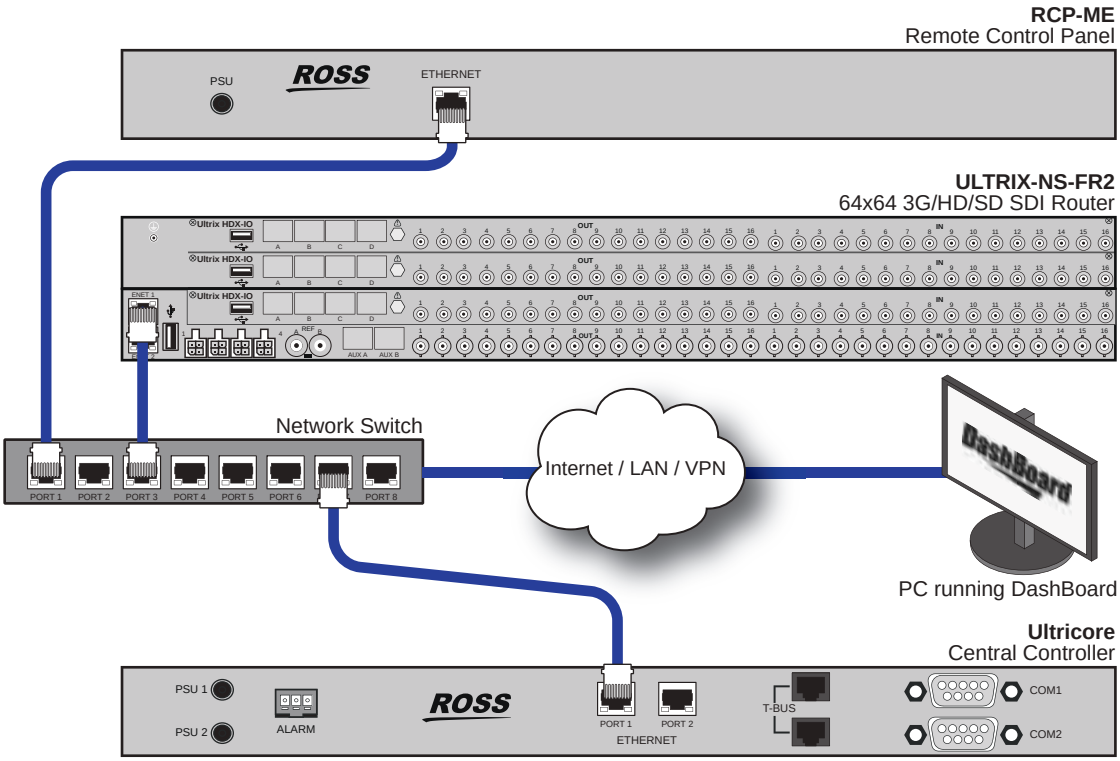


Figure 65 Example Setup Using an Ultrix and an Ultricore

Configuration

The workflow of enabling an Ultricore as a system controller for multiple Ultrix routers:

1. Setup any Ultrix licensing requirements within each Ultrix router.
2. Enable Remote Controller Mode on each Ultrix as outlined in "**Enabling Remote Controller Mode on the Client Ultrix Routers**".
3. Create a basic database within each Ultrix to accommodate the inputs/outputs. Ensure to:
   a. use generic names
   b. a basic level of routing is functional.
4. Create a connection point (via the Ultricore interface) from the Ultricore-CC to each Ultrix.
5. Edit the Ultricore-CC database to control Ultrix specific resources.
6. Configure all RCP devices to connect to the Ultricore-CC system controller.

Ross MC1 Master Control System

The MC1 Master Control System (MC1-MK or the MC1-UHD) is a dedicated card-based solution that provides complete program path protection using input bypass relays, protecting your channel output. Communication between the MC1 card and Ultrix is via an ethernet connection. Any router source can be mapped to any crosspoint button on the MC1 On Air Control interface. Refer to the user documentation for your MC1 card for details on crosspoint button assignment.

Communications between an MC1-MK and the Ultrix Router

✶ Router control on the MC1-MK requires v5.0 software or higher.

Keep the following in mind when configuring the options in the **Configuration** > **Router** interface of the MC1-MK:

- Ensure the **Virtual** menu is set to **Virtual**.
- Ensure the **Delay** value is set to a minimum of **6 frames**.

Keep the following in mind when configuring the options in the **Remote Control** tab of the MC1-MK:

- The Ultrix router uses the **NK Router** protocol in the **Ethernet Port** area.
- Set the **Role** to **Client**.
- Set the **Protocol** to **TCP**.
- Use the **IP Address** field to specify the IP Address of the Ultrix router.
- Set the **Port** field to **5000**.

For More Information on...

- the communications setup for the MC1-MK, refer to the ***MC1-MK Installation Manual***.

Communications between an MC1-UHD and the Ultrix Router

✶ Router control on the MC1-UHD requires the MC1-MASTERCTRL-LICENSE.

Keep the following in mind when configuring the options in the **Remote Control** tab of the MC1-UHD:

- The MC1-UHD uses the GVG Series 7000 Ethernet protocol to communicate with the Ultrix router.
- Set the **Role** to **Network Client**.
- Set the **Packet Type** to **TCP**.
- Use the **Remote IP** field to specify the IP Address of the Ultrix router.
- Set the **Port** field to **5000**.

For More Information on...

- the communications setup for the MC1-MK, refer to the ***MC1-UHD User Guide***.

ULTRIX-UCCI Redundancy

This chapter outlines the ULTRIX-UCCI Control redundancy feature for the ULTRIX(-NS)-FR5. This feature is not available for the ULTRIX(-NS)-FR1 or the ULTRIX(-NS)-FR2.

Before You Begin

The following are required for ULTRIX-UCCI Control redundancy:

- Two ULTRIX-UCCI Control cards physically installed and configured in the ULTRIX(-NS)-FR5.
- When using an ULTRIX-FR5, ensure it is running software 4v10 or higher.
- The ULTRIX(-NS)-FR5 is installed, and fully configured.

✶ Contact Ross Technical Support for installing the second ULTRIX-UCCI Control card in your ULTRIX(-NS)-FR5.

Overview

The ULTRIX-UCCI Control redundancy feature provides built-in redundancy for your routing system. In the event that one ULTRIX-UCCI Control card is affected, the router communications and traffic automatically routes to the second card. When the primary ULTRIX-UCCI Control card is back on-line, communications automatically switch from the secondary to the primary without user interaction. A DashBoard option also exists that enables a user to manually switch from one card to the other.

Monitoring

Communications can be monitored via the LEDs on the ULTRIX-UCCI Control hardware or via the Device Configuration interface in DashBoard.

Using the Physical LEDs

There are two ULTRIX-UCCI Control Card slots in the top-right corner of the ULTRIX-FR5 (**Figure 66**) and ULTRIX-NS-FR5 (**Figure 67**). Each slot houses an Ultricore-CC Internal board which includes a Micro SD Card slot, a USB port, and four status LEDs.

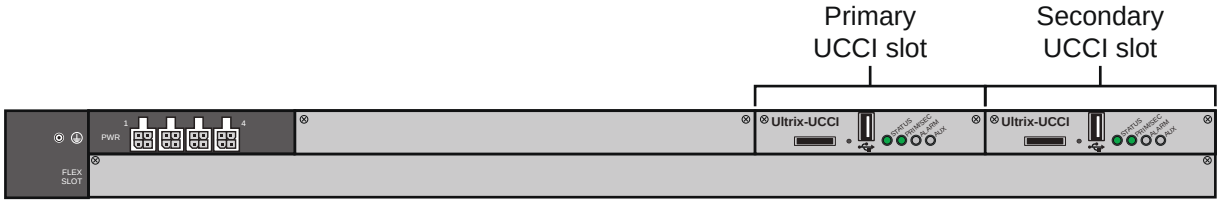


Figure 66 Location of ULTRIX-UCCI Control Slots in an ULTRIX-FR5

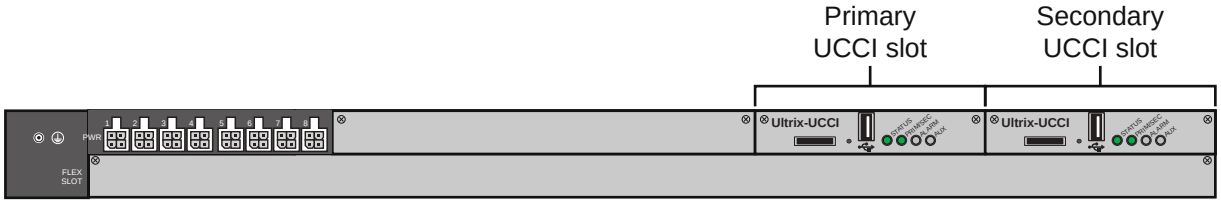


Figure 67 Location of ULTRIX-UCCI Control Slots in an ULTRIX-NS-FR5

Table 69 describes the Ultrix-UCCI status LEDs.

Table 69 Hardware — Ultrix-UCCI LEDs

LED	Status	Description
STATUS	Green	Indicates the ULTRIX-UCCI Control card is powered and the last re-boot was successful
	Flashing Green	Indicates the ULTRIX-UCCI Control card is powered and in the progress of a re-boot
	Red	Indicates the ULTRIX-UCCI Control card is powered but requires a re-boot
PRIM/SEC	Green	Indicates the ULTRIX-UCCI Control card is configured and functioning as the Primary
	Flashing Green	Indicates the ULTRIX-UCCI Control card is in standby (Secondary) mode
ALARM	Red	Indicates the ULTRIX-UCCI Control card is experiencing an error condition; verify the message(s) on the router front panel LCD display and DashBoard
	Off	Indicates the ULTRIX-UCCI Control card is operating correctly and is not experiencing any errors
AUX	This LED is not implemented.	

Using DashBoard

The Device Configuration interface in DashBoard enables you to monitor the ULTRIX(-NS)-FR5 hardware including each ULTRIX-UCCI Control slot.

To monitor an ULTRIX-UCCI Control card via DashBoard

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.

   The Frame View (Home page) automatically displays a rear panel map. This map represents the Ultrix rear panel. In the example below, the router has nine slots populated with HD-BNC I/O blades, and two ULTRIX-UCCI Control cards.

5. Refer to **Table 70** for the ULTRIX-UCCI Control status LEDs.

Table 70 DashBoard — Ultrix-UCCI LEDs

LED	Status	Description
STATUS	Green	Indicates the ULTRIX-UCCI Control card is powered and the last re-boot was successful
	Red	Indicates the ULTRIX-UCCI Control card is powered but is currently re-booting
PRIM/SEC	Green	Indicates the ULTRIX-UCCI Control card is configured and functioning as the Primary
	Off	Indicates the ULTRIX-UCCI Control card is in standby (Secondary) mode
ALARM	Red	Indicates the ULTRIX-UCCI Control card is experiencing an error condition; verify the message(s) on the router front panel LCD display and DashBoard
	Off	Indicates the ULTRIX-UCCI Control card is operating correctly and is not experiencing any errors
AUX	This LED is not implemented.	

Upgrading an ULTRIX-UCCI Control Card

Contact Ross Technical Support for information on upgrading the software on your ULTRIX-UCCI Control card.

Managing your Ultrix Settings

This chapter outlines how to import/export your device configuration settings as archived files.

For More Information on...

- managing your databases, refer to the ***Ultrix and Ultricore Database Guide***.

Overview

The **Product Info** > **Transfer** interface provides options to import and export archived files (*.ufs) of your Ultrix frame settings to another Ultrix. The *.ufs file captures the settings of the Device Configuration interfaces except for:

- database configuration
- UltriScape layouts
- device name
- network settings
- NTP server settings
- installed license keys

✶ This feature requires DashBoard v8.2 or higher and Ultrix software v2.0 or higher.

Exporting the Device Configuration Settings

You create an archive of your device configuration settings using the options in the **Product Info** > **Transfer** tab.

To export your settings to an archived file

1. In the Tree View of DashBoard, double-click the **Product Info** node.

   The **Product Info** interfaces display in the DashBoard window.
2. Select the **Transfer** tab.
3. Click **Ultrix Frame Settings**.
4. Locate the **Export** area on the tab.
5. Click **Browse...** to specify the name and location to save the *.ufs file to.

   The **Save As** read-only field updates with the selected path and file name.
6. Click **Apply**.

   The **Downloading Archive** dialog opens to report the status of the export.

Importing a Frame Settings File

You must re-boot the Ultrix to apply the settings of the imported *.ufs file.

To import an Ultrix Frame Settings file

1. In the Tree View of DashBoard, double-click the **Product Info** node.

   The **Product Info** interfaces display in the DashBoard window.
2. Select the **Transfer** tab.
3. Click **Ultrix Frame Settings**.

4. Locate the **Import** area.
5. Select the *.ufs file you wish to import as follows:
   a. Click **Browse...**

      The **Open** dialog opens.
   b. Use the **Open** dialog to specify the *.ufs file to import.
   c. Click **Open** to close the dialog and load the file.
6. Click **Apply**.

   The **Uploading Archive** dialog opens to report the status of the transfer.

Navigating the Monitoring Interfaces

This chapter summarizes the System > Monitoring interfaces for the Ultrix.

Monitoring Tree Overview

The Monitoring tree provides one sub-node: Alarm Configuration. The Alarm Configuration interface enables you to manage what types of alarm conditions to monitor for each slot and port that is populated in your Ultrix router. The messages are then reported in a separate tab.

Figure 68 Expanded Ultrix Monitoring Nodes in the Tree View

Double-click the Alarm Configuration sub-node to display its interface in the DashBoard window. The interface is organized into two tabs: Alarming Config and Alarming Status. The following sections outline each tab.

Alarming Config Tab

The options on the Alarming Config tab are organized into two sub-tabs based on the type of signal: Video and Audio. By default, the Video Alarms sub-tab is automatically selected.

Video Alarms Sub-tab

The Video Alarms sub-tab is organized into a table where each row represents a specific slot and port in the Ultrix router chassis. Each column provides an option for monitoring a specific aspect of the video signal associated with that port.

Figure 69 Example of the Alarming Config > Video Alarms Sub-tab

Table 71 summarizes the columns displayed in the Video Alarms sub-tab.

Table 71 Alarming Config — Video Alarms Sub-Tab

Item	Description
ID (read-only)	Specifies the actual sockets (inputs and outputs) of a router (or matrix) using the nomenclature of **`slot.port.video.ch`**
Video Black	Reports an error when the current signal of the port is set to black
Video Black Hysteresis (s)	Sets the maximum number of seconds that DashBoard waits before reporting that the signal from this port is set to black
Video Freeze	Reports an error when the video signal, on this specific port, is frozen to the last valid frame of video
Video Freeze Hysteresis (s)	Sets the maximum number of seconds that DashBoard waits before reporting a frozen video signal on the specified port
Video LOS	Reports an error when a loss of signal occurs on the specified port
Video LOS Hysteresis (s)	Sets the maximum number of seconds that DashBoard waits before an error is reported after a loss of a valid signal on this port
Video Format	Reports an error when the video format of the signal is unsupported
Video Format Hysteresis (s)	Sets the maximum number of seconds that DashBoard waits before an error is reported when an unsupported video format is detected on this port
Caption Format	Reports an error when the video signal does not include a valid Closed Captioning packet
Caption Format Hysteresis (s)	Sets the maximum number of seconds that DashBoard waits before an error is reported when the closed caption packet is invalid in the signal on the specified port

Audio Alarms Sub-tab

The Audio Alarms sub-tab enables you to select what audio signals to monitor for audio error conditions.

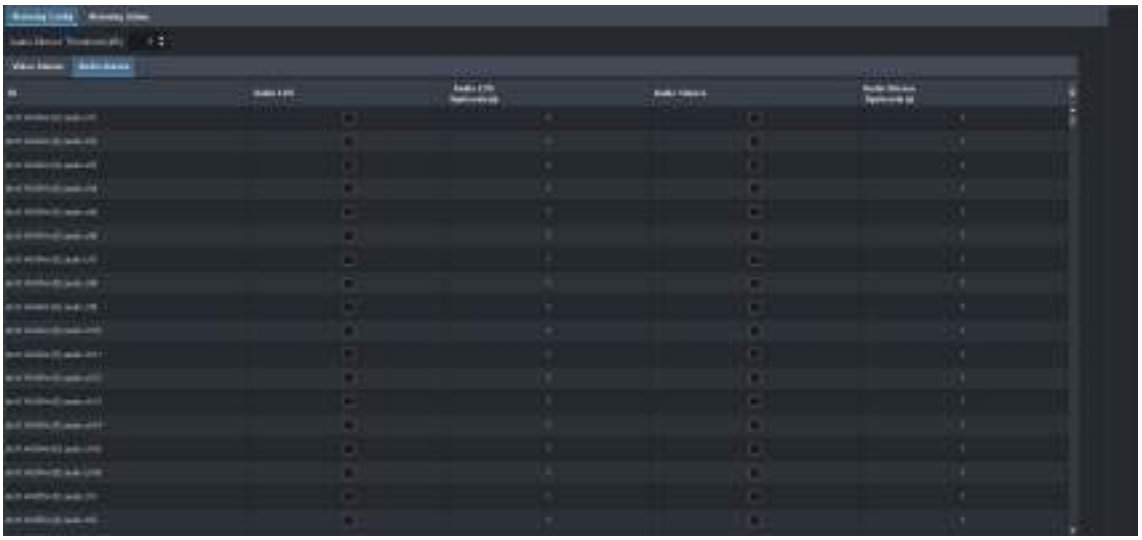


Figure 70 Example of the Alarming Config > Audio Alarms Sub-tab

Table 71 summarizes the columns displayed in the Audio Alarms sub-tab.

Table 72 Alarming Config — Audio Alarms Sub-Tab

Item	Description
Audio Silence Threshold (dB)	Audio below the specified threshold value is considered silent
ID (read-only)	Specifies the audio channel (inputs and outputs) of a router (or matrix) using the nomenclature of **`slot.port.audio.ch`**
Audio LOS	Reports an error when a loss of the specified audio channel occurs
Audio LOS Hysteresis (s)	Sets the maximum number of seconds that DashBoard waits before an error is reported when a loss of this audio channel occurs
Audio Silence	Reports an error when this audio channel is set to silence in the embedded audio signal
Audio Silence Hysteresis (s)	Sets the maximum number of seconds that DashBoard waits before an error is reported when the specified audio channel is silenced in the embedded audio signal

Alarming Status Tab

The Alarming Status tab reports error messages as defined by the settings in the Alarming Config tabs. The tab is organized into a table where the left column displays the available virtual ports. Selecting a port displays the detected error condition(s) for that port.

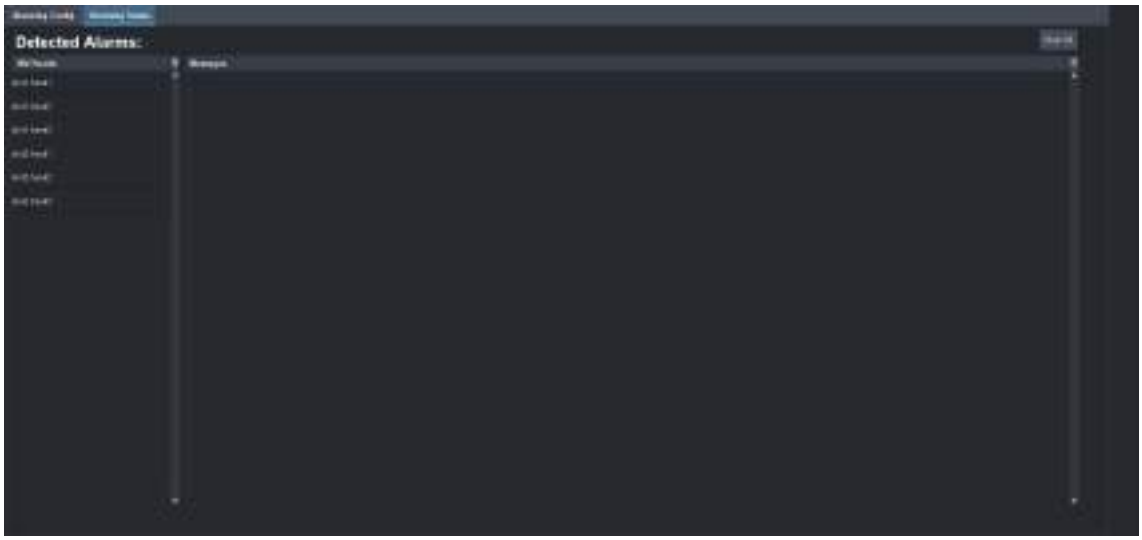


Figure 71 Example of the Alarming Status Tab

Monitoring the Hardware

The Device Configuration interface in DashBoard provides status fields for monitoring the individual Power Supplies (PSU), the internal chassis fans, the SD Card, Ethernet ports, and the flash storage space of your Ultrix router.

Primary and Redundant Power Alarms

The Primary and Redundant Power alarms in the Frame Configuration interface do not consider what ports the PSU are connected on the Ultrix rear panel. The alarms trip only if the required minimum state for main or redundant power is not met. Refer to **Table 73** for the power requirements.

Table 73 PSU Requirements based on Frame Size

Frame Size	Min. PSU	Min. PSU for Redundancy (N+1)	Min. for Fully Redundant (2N)	Max. Redundancy
ULTRIX(-NS)-FR1	1	2	2	4N
ULTRIX(-NS)-FR2	2	3	4	2N
ULTRIX(-NS)-FR5	1 x Ultripower			

Enabling the Alarms for the Router PSU Ports

You can customize the monitoring of the PSU by selecting which units to monitor and display an alarm message when the unit is not detected. The Alarms table fields in the Frame Configuration interface vary in severity from green (valid), yellow (caution), to red (alarm). DashBoard reports the most severe alarm for a single field.

For More Information on…

- the messages displayed in the Fans & Power tab, refer to **Table 74**.

To monitor the hardware status of an Ultrix router

1. In the Tree View of DashBoard, expand the node for the Ultrix router you want to monitor.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Alarms** tab.
7. To add a new item to monitor:

✶ The ULTRIX(-NS)-FR5 has an option of triggering a GPI contact closure for use with external equipment. Select the **Alarm Relay** box to activate for each alarm type required.

   a. Click the **Type** cell in a row that is not assigned to an item to monitor. The row will report "**`Not Configured`**" with a yellow indicator in the **State** cell.

   b. Select a PSU to monitor from the drop-down menu. Choose from the following:

› **PSU #** — Monitors the specified PSU port on the Ultrix rear panel.

› **Primary Power** — Monitors the main power connection (non-PSU port specific) to the Ultrix rear panel and determines whether a sufficient number of power supplies are connected and operating for the router to run reliably (one PSU for an ULTRIX(-NS)-FR1, two PSU for a ULTRIX(-NS)-FR2, and one Ultripower for the ULTRIX-FR5). Refer to **Table 73** for details.

› **Redundant Power** — Monitors additional power supplies connected to the Ultrix rear panel. When the Primary PSU is unavailable and no other PSU ports are in use, an alarm message will be raised to indicate that in the event of a power loss on the primary PSU, the router will lose power. Refer to **Table 73** for details.

8. Refer to **Table 74** for a summary of the possible messages displayed in the Alarms status fields.

Table 74 Alarms — Status Messages

Item	Parameters	Description
System Error	OK (Green)	The last re-boot (power cycle) of the router was successful and no errors are detected.
	Failed (Red)	The last re-boot/power cycle of the router failed. You must re-boot/power cycle the router. If the issue still persists, contact Ross Technical Support.
None	Not Configured (Yellow)	The row in the table is not currently monitoring any component of the Ultrix router.
Fan #	OK (Green)	Normal operation; no hardware errors are associated with the specified fan
	x/y	Indicates the fan speed in RPM where: • x represents the current speed • y represents the maximum speed
	Stalled (Red)	Indicates the specified fan is not running
Primary Power	OK (Green)	Normal operation; no hardware errors associated with the PSU • ULTRIX(-NS)-FR5— an Ultripower connection is detected • ULTRIX(-NS)-FR2 — at least 2 connected PSU are detected • ULTRIX(-NS)-FR1 — at least 1 connected PSU is detected
	Failed (Red)	Indicates the minimum number of PSU[a] are not detected
Redundant Power	OK (Green)	Indicates extra PSU are detected/available; normal operation; no hardware errors associated with the PSU • ULTRIX(-NS)-FR2 — at least 3 connected PSU are detected • ULTRIX(-NS)-FR1 — at least 2 connected PSU are detected
	Failed (Red)	Indicates the minimum number of PSU[b] are not detected
Temperature	OK (Green)	Indicates that the chassis core components temperature is within the normal range
	Warning (Yellow)	Indicates that at least one chassis core component temperature is between 75°C and 80°C (167°F and 176°F)
	Failed (Red)	Indicates that at least one chassis core component temperature is above 80°C (176°F)

Table 74 Alarms — Status Messages

Item	Parameters	Description
Battery	OK (Green)	The battery installed in the Cooling Fan Module of the chassis is operating normally.
	Warning (Yellow)	The battery power is between 1.5V and 2.7V.
	Failed (Red)	The battery power is below 1.5V and requires replacement. Refer to "**Monitoring the Battery**".

a. An ULTRIX(-NS)-FR2 requires a minimum of 2 PSU to be connected at all times. For ULTRIX(-NS)-FR1 routers, a minimum of 1 PSU is required.
b. An ULTRIX(-NS)-FR2 requires a minimum of 2 PSU to be connected at all times. For ULTRIX(-NS)-FR1 routers, a minimum of 1 PSU is required.

Setting the Chassis Fan Speed

The Ultrix router enables you to control the cooling fan speed of the interior chassis fans for optimum cooling.

To set the fan speed

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Fans & Power Supplies** tab.
7. Use the **Minimum Fan Speed** slider to specify how fast the fans the will run.

Monitoring the Internal Memory

The **Device Configuration** interface enables you to monitor the flash storage space of your Ultrix router. This is useful when managing a large number of databases or during upgrades.

To monitor the flash storage space

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Alarms** tab.

7. To enable the **Flash Storage** alarm:
   a. Click the **Type** cell in a row that is not assigned to an item to monitor. The row will report "**`Not Configured`**" with a yellow indicator in the **State** cell.
   b. Select **Flash Storage**.
8. Refer to **Table 75** for a summary of the possible messages displayed in the **Flash Storage** status field.

Table 75 Alarms — Flash Storage

Parameter	Description	Solution
OK	Database and layout storage space is available	
WARNING	Database and layout storage space is low	• Export unused databases and layouts as outlined in "**Exporting a Database**"; or • Delete unused databases as outlined in "**Deleting a Database**"
CRITICAL	Database and layout storage is nearly depleted	

Monitoring the SD Card

The **Device Configuration** interface provides two methods for monitoring the SD Card:

- **SD Card Free Space** — provides an estimate of how much memory is currently allocated on the SD Card.
- **SD Card Presence** — monitors the physical state of the SD Card within the Ultrix chassis.

To monitor the SD Card storage space

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Alarms** tab.
7. To enable the **SD Card Free Space** alarm:
   a. Click the **Type** cell in a row that is not assigned to an item to monitor. The row will report "**`Not Configured`**" with a yellow indicator in the **State** cell.
   b. Select **SD Card Free Space**.
8. Refer to **Table 76** for a summary of the possible messages displayed in the **SD Card Free Space** status field.

Table 76 Alarms — SD Card Free Space

Parameter	Description	Solution
OK	Storage space is available	
WARNING	Less than 20% of the storage space is available	Contact Ross Technical Support
CRITICAL	Less than 10% of the storage space is available	

To monitor the physical state of the SD Card

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Alarms** tab.
7. To enable the **SD Card Presence** alarm:
   a. Click the **Type** cell in a row that is not assigned to an item to monitor. The row will report "**`Not Configured`**" with a yellow indicator in the **State** cell.
   b. Select **SD Card Presence**.
8. Refer to **Table 77** for a summary of the possible messages displayed in the **SD Card Presence** status field.

Table 77 Alarms — SD Card Presence

Parameters	Description
OK (Green)	There are no SD Card issues detected
FAIL	The SD Card is not properly installed in the router chassis. Contact Ross Technical Support.

Monitoring the Ethernet LEDs via the Rear Panel

Each RJ45 connector on the Ultrix rear panel include two LEDs that report the ethernet communication activity and speed. Refer to **Figure 72** for LED locations on the Ultrix rear panel.

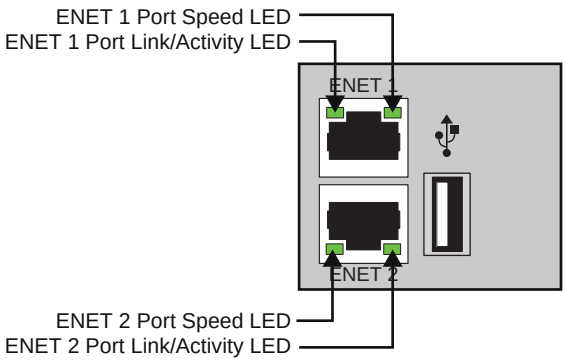


Figure 72 ENET Ports on Rear Panel — ULTRIX(-NS)-FR1 and ULTRIX(-NS)-FR2 LEDs

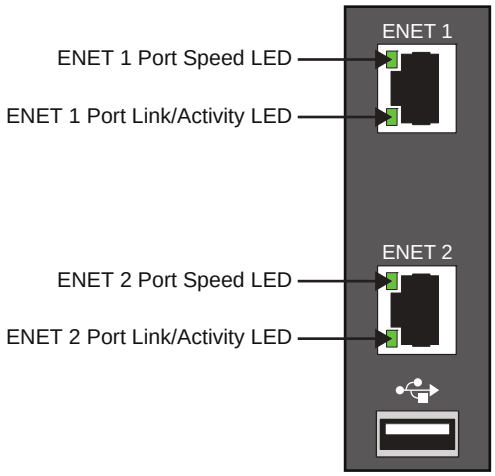


Figure 73 ENET Ports on Rear Panel — ULTRIX(-NS)-FR5 LEDs

Table 78 provides basic LED descriptions.

Table 78 ENET Port LEDs

LED	Status	Description
ENET # - Link/Activity	Green	When lit green, this LED indicates a valid link is established on the specified ENET port.
	Flashing	When flashing green, this LED indicates communication activity is occurring on the specified ENET port.
	Off	When unlit, this LED indicates an invalid link is detected on the specified ENET port. Verify the cable connection on the rear module port and your network connections.
ENET # - Port Speed	Green	When lit green, this LED indicates the ENET Port communication speed is at 1Gbps.
	Yellow	When lit orange, this LED indicates the ENET Port communication speed is at 100Mbps.
	Off	When unlit, this LED indicates the ENET Port communication speed is at 10Mbps.

Monitoring the Battery

The Ultrix router uses a Panasonic® CR2032 battery to serve as an emergency backup power source for the essential memory of the router. This enables the router to power up with the same crosspoint selection as when it was powered off. This battery is located on the Cooling Fan Module installed inside the Ultrix router chassis.

✶ A spare battery was included in the Ultrix Shipping Kit (Ross P/N 2101KR-084) when your router was shipped from the factory.

Enabling the Battery Status Monitoring Feature in DashBoard

You can monitor the battery status via the Alarms table in the Frame Configuration interface.

To configure an alarm for battery status monitoring

1. To In the Tree View of DashBoard, expand the node for the Ultrix router you want to monitor.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **Alarms** tab.
7. Click the **Type** cell in a row that is not assigned to an item to monitor. The row will report "**`Not Configured`**" with a yellow indicator in the **State** cell.

   The **Type** menu opens.
8. Select **Battery** from the **Type** menu.

Replacing a Failed Battery in an ULTRIX(-NS)-FR5

This section describes how to replace a failed battery within the ULTRIX(-NS)-FR5 chassis.

Removing the Door from the Chassis

Caution — *For reliable performance, the Ultrix router should not run without the Cooling Fan Module for more than 5 minutes.*

If the Battery alarm displays a red indicator in the Alarms table of the Frame Configuration interface, you will need to replace the battery installed inside the Cooling Fan Module of the chassis. This module is accessed via the front of the router chassis and requires that you remove the door first. The door is secured to the front of the router chassis with a rare earth magnet on each side.

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semi-conductor 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.*

To remove the door from the ULTRIX(-NS)-FR5

1. With your left hand, grasp the top and bottom of the door at the left sides.
2. With your right hand, grasp the middle of the door on the right side.

Caution — *The door of the ULTRIX-NS-FR5 is heavy. Ensure that you have a firm grip on the door, or that the door is otherwise supported, before removing it from the chassis.*

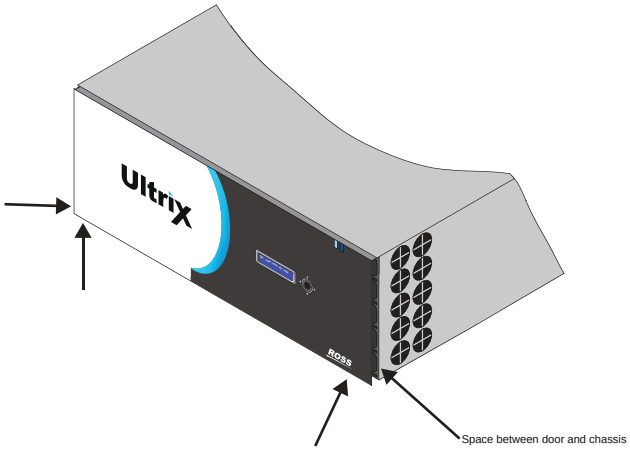


Figure 74 ULTRIX-NS-FR5 Front Panel — Where to Grasp the Door

✶ If you have trouble removing the door from the chassis, use your right-hand fingers in the space between the door and the chassis for added leverage.

3. Pull the right side of the door towards you to disengage it approximately 1.0″ from the chassis.
4. Pull the left side of the door towards you to fully disengage the door from the chassis.

Caution — *Pull the door off without twisting or rotating it at too steep of an angle.*

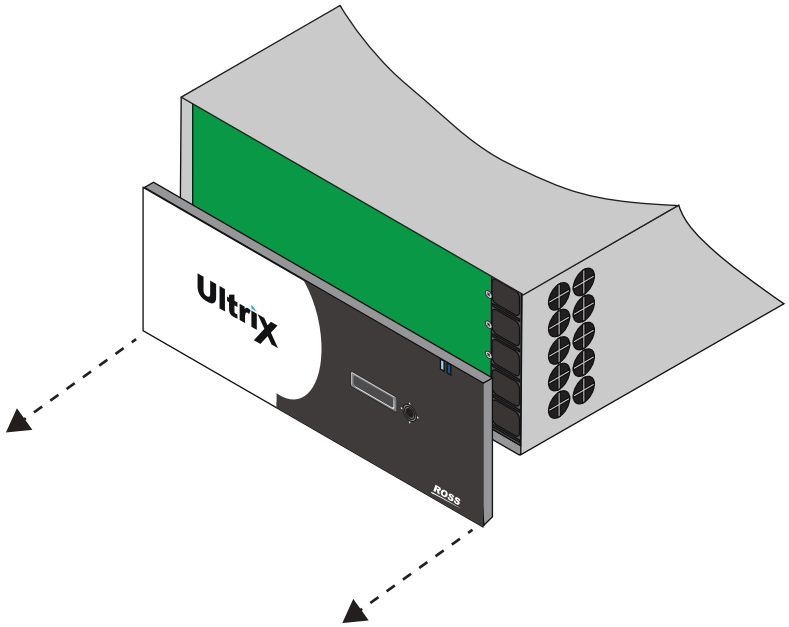


Figure 75 ULTRIX(-NS)-FR5 — Front Panel — Removing the Door

Removing a Battery from the ULTRIX(-NS)-FR5

The battery is located on the Main Board inside the ULTRIX(-NS)-FR5 chassis. You do not need to remove the Cooling Fan Module to replace the battery in an ULTRIX(-NS)-FR5.

Caution — *Only instructed persons may change or service the lithium coin batteries used in this apparatus.*

To remove the battery from an ULTRIX(-NS)-FR5

1. Locate and note the orientation of the failed battery on the Main Board. Refer to **Figure 89** for battery location.

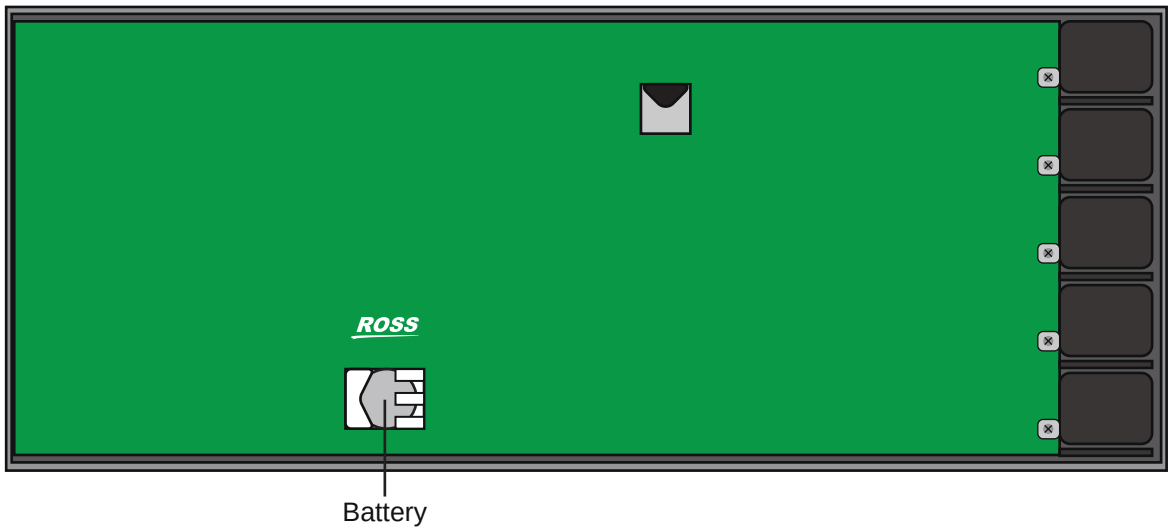


Figure 76 ULTRIX(-NS)-FR5 — Battery Location inside the Chassis

2. Gently move the latch to the left and away from the failed battery.
3. Remove the battery from its slot by pulling it away from the Main Board.

Installing a New Battery in the ULTRIX(-NS)-FR5

Installing a new battery requires you to orient the battery on the Main Board, and secure the battery to the board.

Caution — *Only instructed persons may change or service the lithium coin batteries used in this apparatus.*

To install a new battery in the ULTRIX(-NS)-FR5

1. Hold the battery in one hand and orient it so that the Positive side (+) faces away from you.
2. Pull the latch slightly away to make room for the new battery installation.
3. Slide the battery into the empty slot the failed battery was in.
4. Secure the battery to the Main Board using the latch.

To re-install the door on the ULTRIX(-NS)-FR5

1. Align the door to the front of the router, ensuring that:
   - the door is oriented upright
   - the corner with the Ultrix logo is in your left hand, and
   - the corner with the Ross logo is in your right hand. (**Figure 77**)

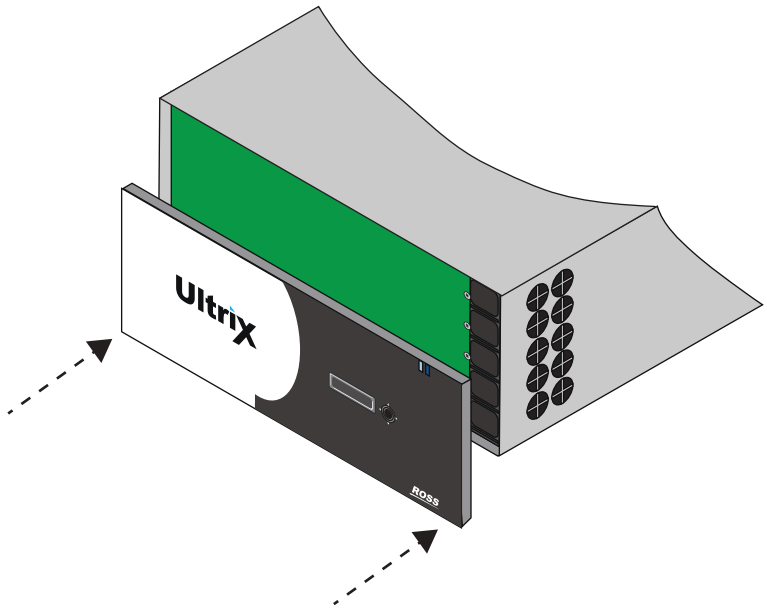


Figure 77 ULTRIX(-NS)-FR5 — Aligning the Door to the Chassis

2. Align the left-side of the door against the chassis.
3. Align the right-side of the door, gently rotating the door into position.
4. Verify that the door is fully seated in place with the magnets securing it to the chassis.

Replacing a Failed Battery in an ULTRIX(-NS)-FR2

This section describes how to replace a failed battery within the ULTRIX-FR2 or ULTRIX-NS-FR2 chassis. Note that the battery location differs depending on the model.

Removing the Door from the Chassis

Caution — *For reliable performance, the Ultrix router should not run without the Cooling Fan Module for more than 5 minutes.*

If the Battery alarm displays a red indicator in the Alarms table of the Frame Configuration interface, you will need to replace the battery installed inside the Cooling Fan Module of the chassis. This module is accessed via the front of the router chassis and requires that you remove the door first. The door is secured to the front of the router chassis with a rare earth magnet on each side.

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semi-conductor 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.*

To remove the door from the ULTRIX(-NS)-FR2

1. With your left hand, grasp the top and bottom of the door at the left sides.
2. With your right hand, grasp the top and bottom of the door at the right side.

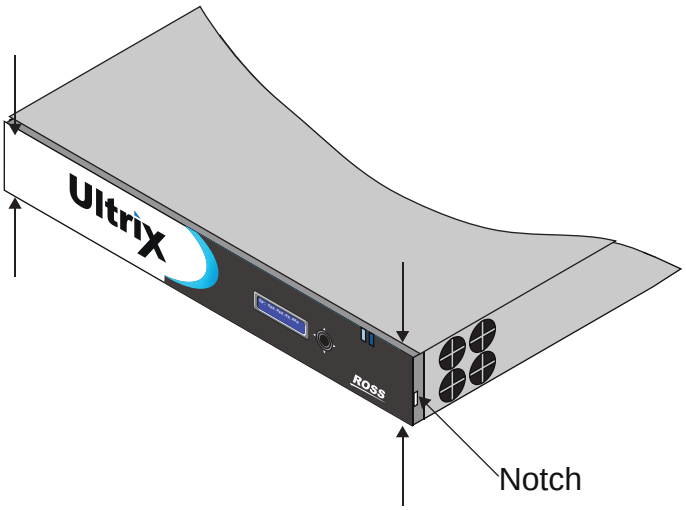


Figure 78 ULTRIX-NS-FR2 Front Panel — Where to Grasp the Door

✶ If you have trouble removing the door from the chassis, you can insert a flathead screwdriver into the notch on either side of the door for added leverage.

3. Pull the right side of the door towards you to disengage it approximately 1.0” from the chassis.
4. Pull the left side of the door towards you to fully disengage the door from the chassis.

Caution — *Pull the door off without twisting or rotating it at too steep of an angle.*

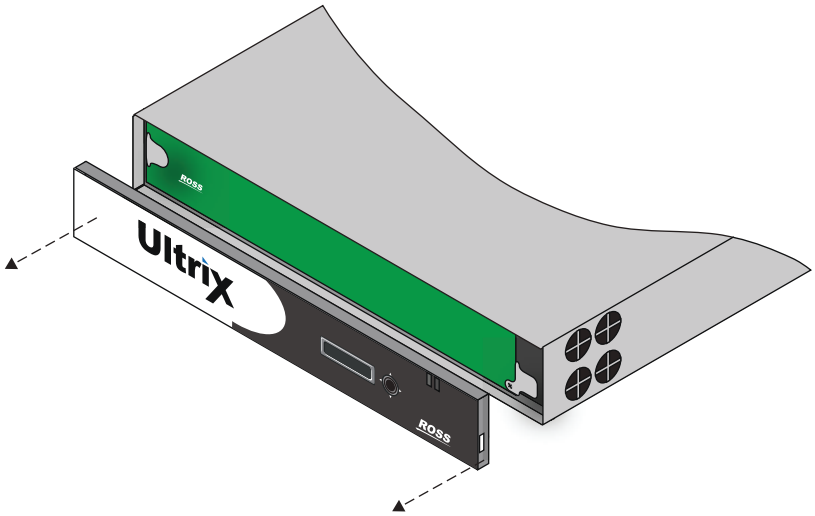


Figure 79 ULTRIX-NS-FR2 Front Panel — Removing the Door

Removing the Cooling Fan Module from the ULTRIX(-NS)-FR2

This section only applies if you are replacing a battery in the ULTRIX(-NS)-FR2.

To remove the Cooling Fan Module from the ULTRIX(-NS)-FR2

1. With the door removed, use a #1 Phillips screwdriver to loosen the screw that affixes the Cooling Fan Module to the Main Board.

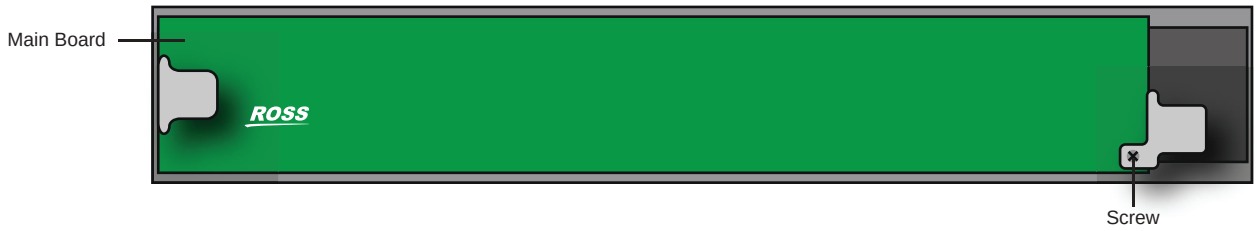


Figure 80 ULTRIX(-NS)-FR2 — Location of Screw for Cooling Fan Module

2. Gently pull the Cooling Fan Module towards you to unseat it from the backplane and to disengage the module from the chassis.

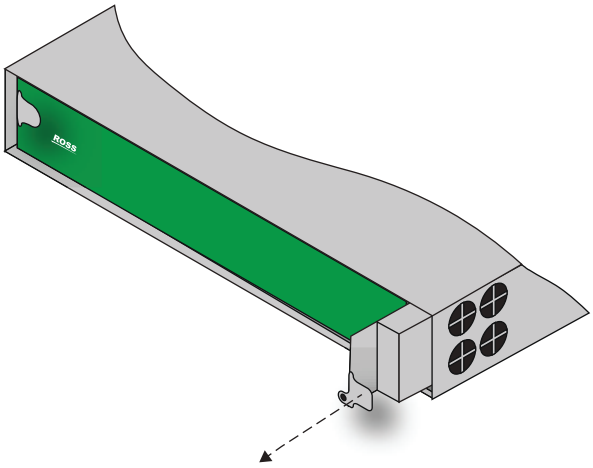


Figure 81 ULTRIX(-NS)-FR2 — Removing the Cooling Fan Module from the Chassis

3. Pull the Cooling Fan Module free from the chassis and set it on a static-free surface.

Removing a Battery from the ULTRIX(-NS)-FR2

The battery is installed in a slot on the side of the Cooling Fan Module and secured in place with a small latch.

Caution — *Only instructed persons may change or service the lithium coin batteries used in this apparatus.*

To remove a failed battery from the ULTRIX(-NS)-FR2 Cooling Fan Module

1. Locate and note the orientation of the failed battery inside the Cooling Fan Module. (**Figure 82**)
2. Gently move the latch to the right and away from the failed battery.
3. Remove the battery from its slot by pulling it away from the Cooling Fan Module.

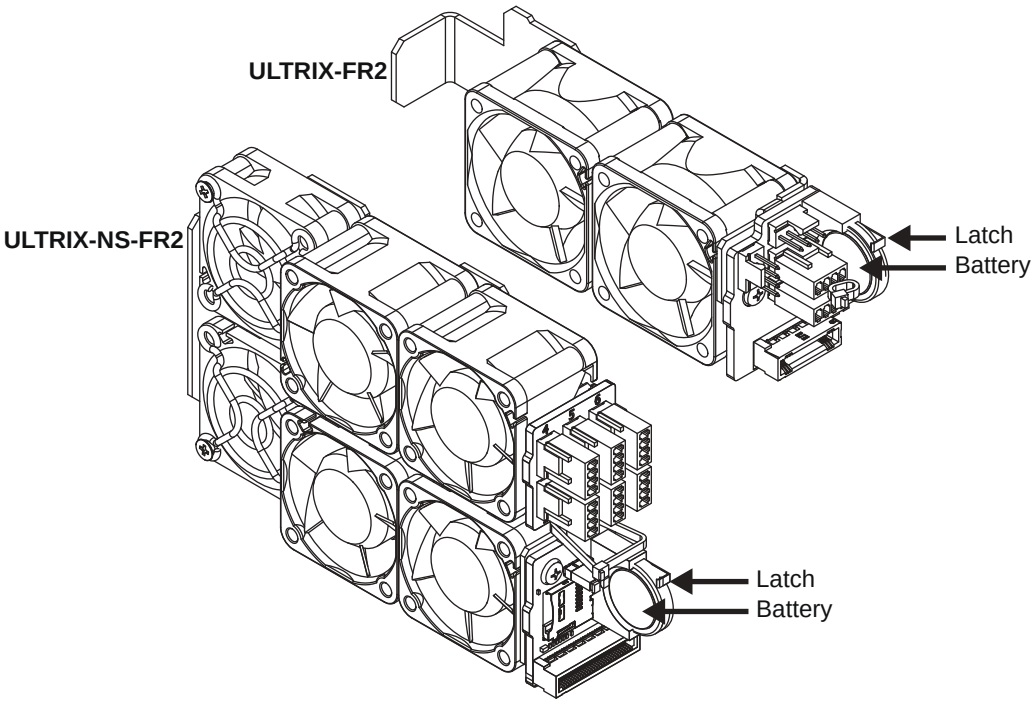


Figure 82 Battery Location inside the Cooling Fan Module — ULTRIX-FR2 and ULTRIX-NS-FR2

Installing a New Battery in the ULTRIX(-NS)-FR2

Installing a new battery requires you to orient the battery on the module, secure the battery to the module, and then re-install the front door on the chassis.

Caution — *Only instructed persons may change or service the lithium coin batteries used in this apparatus.*

To install a new battery in the Cooling Fan Module

1. Hold the battery in one hand and orient it so that the Positive side (+) faces away from you. (**Figure 90**)

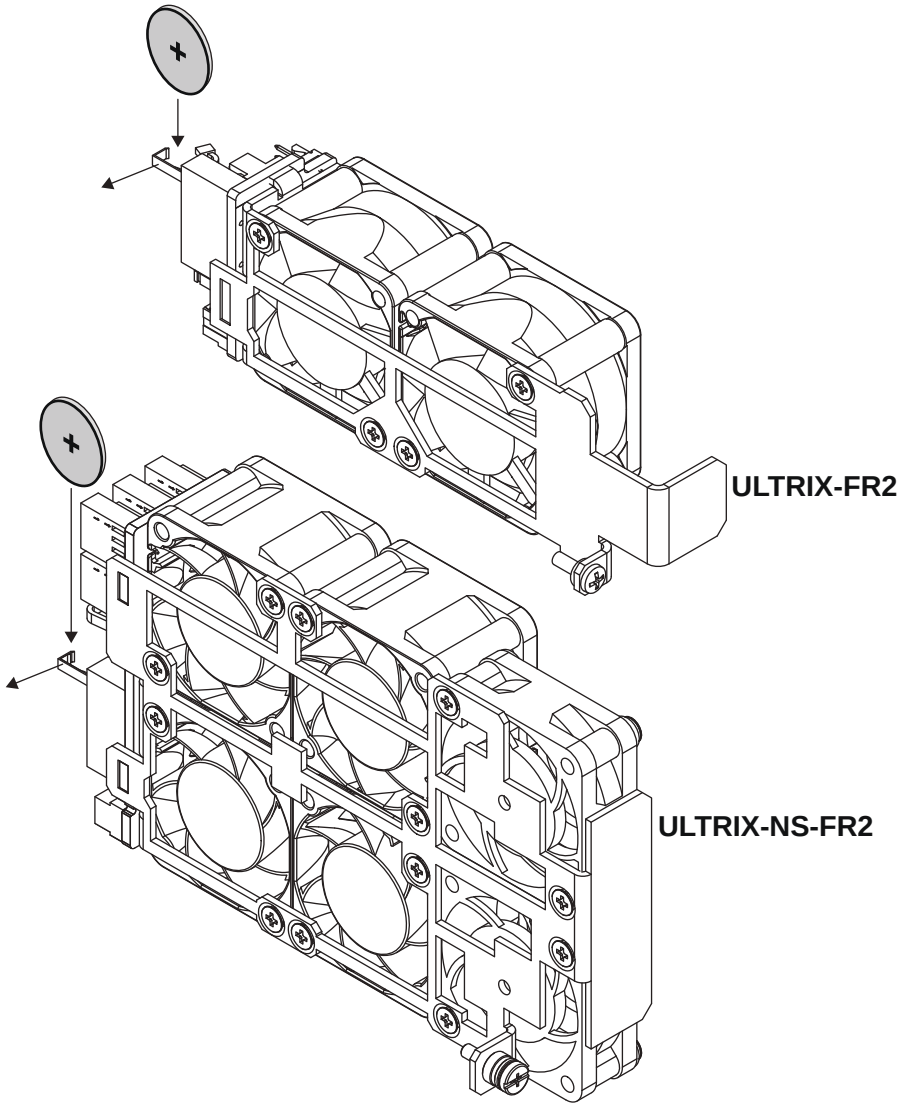


Figure 83 New Battery Orientation —ULTRIX-FR2 and ULTRIX-NS-FR2

2. Slide the battery into the empty slot the failed battery was in.
3. Secure the battery to the module using the latch.

Re-installing the Cooling Fan Module

Once you have installed the new battery into the new Cooling Fan Module, you can re-install the Cooling Fan Module into the Ultrix chassis and replace the door on the front panel.

To install the Cooling Fan Module into the chassis

1. Align the new Cooling Fan Module in its slot inside the chassis.
2. Gently push the Cooling Fan Module into the slot until the module is fully seated. You will feel the back connector of the module engaged with its connector inside the chassis.

3. Use the screw from step 1 in the procedure "**To remove the Cooling Fan Module from the ULTRIX(-NS)-FR2**" to affix the Cooling Fan Module to the frame.

Caution — *The Cooling Fan Module includes a connector that must be fully seated. Reinstalling the Cooling Fan Module retention screw is required to ensure proper contact.*

Re-installing the Door on the Chassis

Caution — *Re-installing the door incorrectly or misaligned can damage the door or internal components.*

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semi-conductor 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.*

To re-install the door on the ULTRIX(-NS)-FR2

1. Align the door to the front of the router, ensuring that the door is oriented upright, the corner with the Ultrix logo is in your left hand, and the corner with the Ross logo is in your right hand. (**Figure 91**)

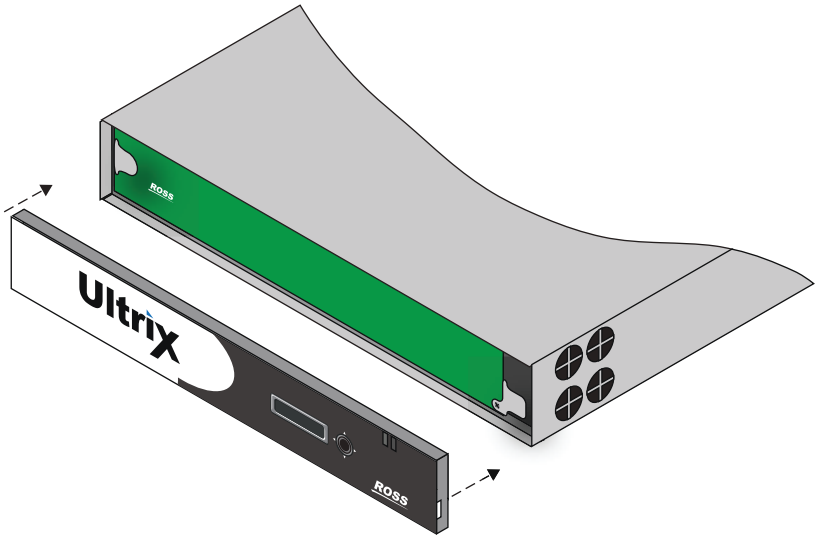


Figure 84 ULTRIX(-NS)-FR2 — Aligning the Door to the Chassis

2. Align the left-side of the door against the chassis.
3. Align the right-side of the door, gently rotating the door into position.
4. Verify that the door is fully seated in place with the magnets securing it to the chassis.

Replacing a Failed Battery in an ULTRIX(-NS)-FR1

This section describes how to replace a failed battery within the ULTRIX-FR1 or ULTRIX-NS-FR1 chassis. Note that the battery location differs depending on the model.

Removing the Door from the Chassis

Caution — *For reliable performance, the Ultrix router should not run without the Cooling Fan Module for more than 5 minutes.*

If the Battery alarm displays a red indicator in the Alarms table of the Frame Configuration interface, you will need to replace the battery installed inside the Cooling Fan Module of the chassis. This module is accessed via the front of the router chassis and requires that you remove the door first. The door is secured to the front of the router chassis with a rare earth magnet on each side.

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semi-conductor 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.*

To remove the door from the ULTRIX(-NS)-FR1

1. With your left hand, grasp the top and bottom of the door at the left sides.
2. With your right hand, grasp the top and bottom of the door at the right side.

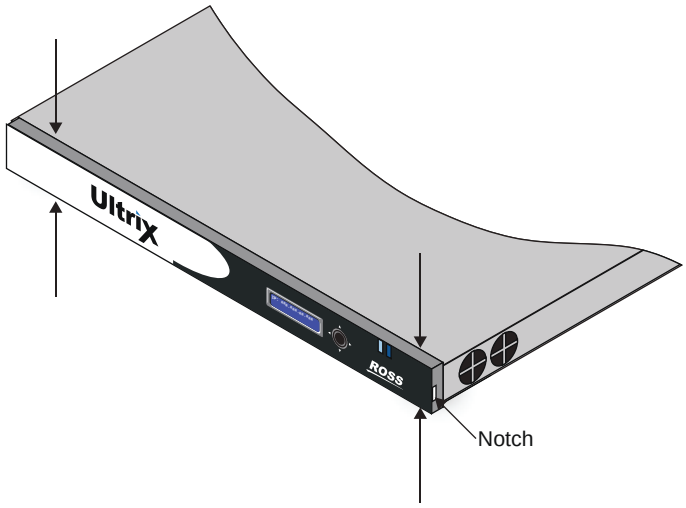


Figure 85 ULTRIX-FR1 Front Panel — Where to Grasp the Door

✶ If you are having trouble removing the door from the chassis, you can insert a flathead screwdriver into the notch on either side of the door for added leverage.

3. Pull the right side of the door towards you to disengage it approximately 1.0” from the chassis.
4. Pull the left side of the door towards you to fully disengage the door from the chassis.

Caution — *Pull the door off without twisting or rotating it at too steep of an angle.*

Figure 86 ULTRIX-NS-FR1 Front Panel — Removing the Door

Removing the Cooling Fan Module from the ULTRIX(-NS)-FR1

This section only applies if you are replacing a battery in the ULTRIX(-NS)-FR1.

To remove the Cooling Fan Module from the ULTRIX(-NS)-FR1

1. With the door removed, use a #1 Phillips screwdriver to loosen the screw that affixes the Cooling Fan Module to the Main Board.

Figure 87 ULTRIX(-NS)-FR1 — Location of Screw for Cooling Fan Module

2. Gently pull the Cooling Fan Module towards you to unseat it from the backplane and to disengage the module from the chassis.

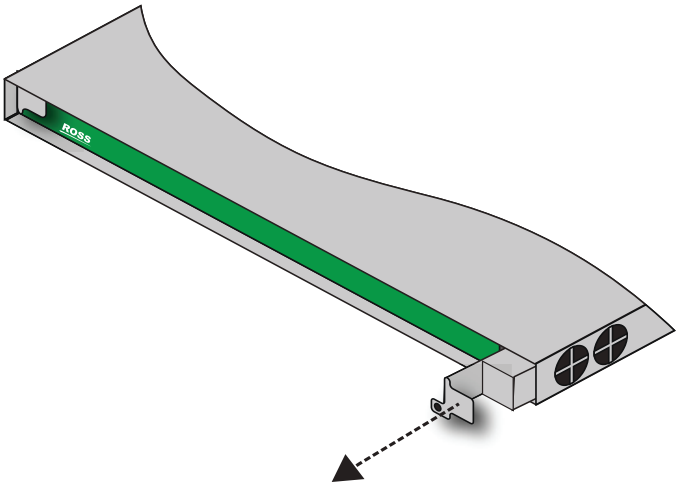


Figure 88 ULTRIX(-NS)-FR1 — Removing the Cooling Fan Module from the Chassis

3. Pull the Cooling Fan Module free from the chassis and set it on a static-free surface.

Removing a Battery from the ULTRIX(-NS)-FR1

The battery is installed in a slot on the side of the Cooling Fan Module and secured in place with a small latch.

Caution — *Only instructed persons may change or service the lithium coin batteries used in this apparatus.*

To remove a failed battery from the ULTRIX(-NS)-FR1 Cooling Fan Module

1. Locate and note the orientation of the failed battery inside the Cooling Fan Module. (**Figure 89**)

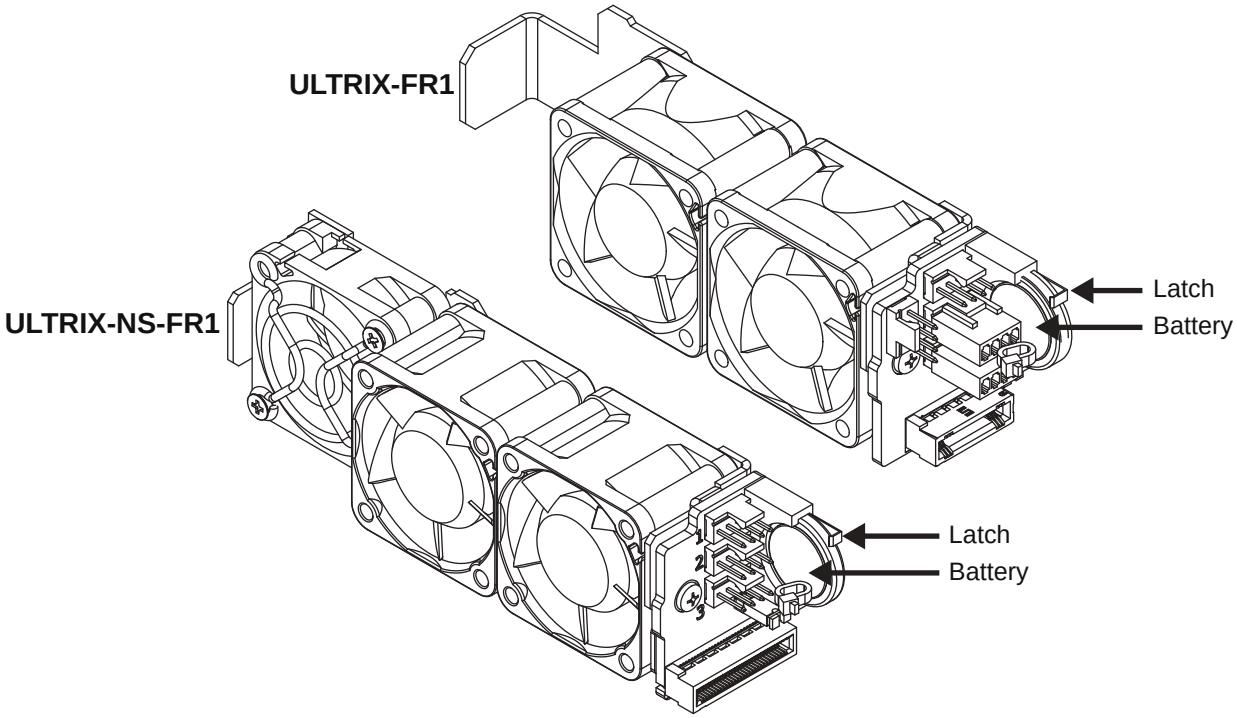


Figure 89 Battery Location inside the Cooling Fan Module — ULTRIX-FR1 and ULTRIX-NS-FR1

2. Gently move the latch to the right and away from the failed battery.
3. Remove the battery from its slot by pulling it away from the Cooling Fan Module.

Installing a New Battery in the ULTRIX(-NS)-FR1

Installing a new battery requires you to orient the battery on the module, and secure the battery to the module.

Caution — *Only instructed persons may change or service the lithium coin batteries used in this apparatus.*

To install a new battery in the Cooling Fan Module

1. Hold the battery in one hand and orient it so that the Positive side (+) faces away from you. (**Figure 90**)
2. Pull the latch slightly away to make room for the new battery installation.
3. Slide the battery into the empty slot the failed battery was in.

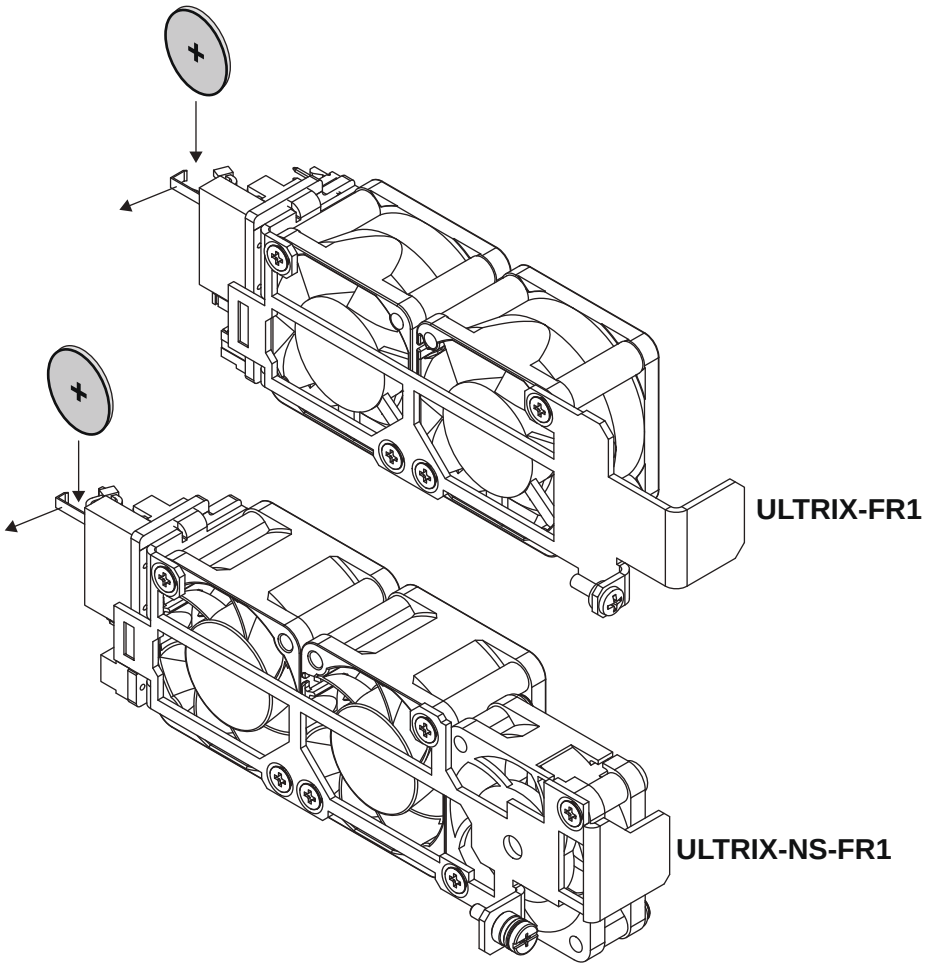


Figure 90 New Battery Orientation —ULTRIX-FR1 and ULTRIX-NS-FR1

4. Secure the battery to the module using the latch.
5. Proceed to the section "**Re-installing the Cooling Fan Module**".

Re-installing the Cooling Fan Module

Once you have installed the new battery into the new Cooling Fan Module, you can re-install the Cooling Fan Module into the Ultrix chassis and replace the door on the front panel.

To install the Cooling Fan Module into the chassis

1. Align the new Cooling Fan Module in its slot inside the chassis.
2. Gently push the Cooling Fan Module into the slot until the module is fully seated. You will feel the back connector of the module engaged with its connector inside the chassis.
3. Use the screw from step 1 in the procedure "**To remove the Cooling Fan Module from the ULTRIX(-NS)-FR1**" to affix the Cooling Fan Module to the frame.

Caution — *The Cooling Fan Module includes a connector that must be fully seated. Reinstalling the Cooling Fan Module retention screw is required to ensure proper contact.*

Re-installing the Door on the Chassis

Caution — *Re-installing the door incorrectly or misaligned can damage the door or internal components.*

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semi-conductor 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.*

To re-install the door on the ULTRIX(-NS)-FR1

1. Align the door to the front of the router, ensuring that the door is oriented upright, the corner with the Ultrix logo is in your left hand, and the corner with the Ross logo is in your right hand. (**Figure 91**)

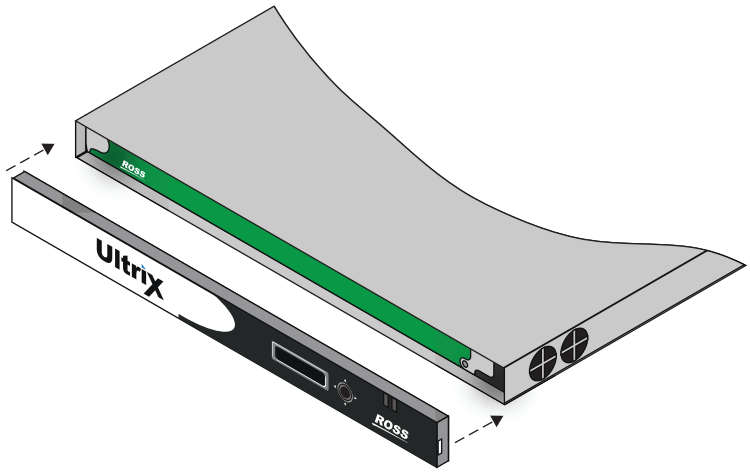


Figure 91 ULTRIX-NS-FR1 — Aligning the Door to the Chassis

2. Align the left-side of the door against the chassis.
3. Align the right-side of the door, gently rotating the door into position.
4. Verify that the door is fully seated in place with the magnets securing it to the chassis.

Monitoring the Communications

This chapter summarizes how to verify communications on an Ethernet port, an Ultricore connection, and the overall communication status of the Ultrix router.

Monitoring the Network Status

The Ethernet ports on the Ultrix rear panel are used to connect to an Ethernet network for communications. An ENET port is set to active when Ultrix automatically detects a valid network link on the port. When a valid link is detected on both ports, the ENET 1 port is set to active and is the primary connection.

✶ There are two ENET ports on the Ultrix rear panel. A fail-over feature enables the Ultrix router to automatically use the second ENET port when the primary ENET connection is lost or unavailable.

To verify the communication status of an Ethernet Port via DashBoard

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Locate the **Status** field in the **Network Settings** area.

   This field reports which **Ethernet** port is currently active.
7. Refer to **Table 79** for a summary of the possible messages displayed in the **Status** field.

Table 79 Frame Configuration — Status Field

Item	Parameters	Description
Status	ENET # is Active (Green)	Ethernet communications for the specified port are valid. The specified ENET port on the Ultrix rear panel is the currently active (in use).
	Inactive (Red)	Ethernet communications for the router are invalid. The following conditions may be occurring: • The ethernet cables are disconnected from the rear panel. • A valid network connection may be unavailable. • The IP Address is for the router is no longer valid.

Monitoring the Ultricore Mode Status

The primary Ultrix router passes all commands to each client Ultrix router in the system. Each client Ultrix router responds back to the primary in minute intervals.

Primary Status

If the Ultrix router is configured as a primary, the **Frame Configuration** > **Communications** tab reports on the status between it and each client router connected to it. Each client is listed in the table, with the most recently connected router displayed at the bottom of the list.

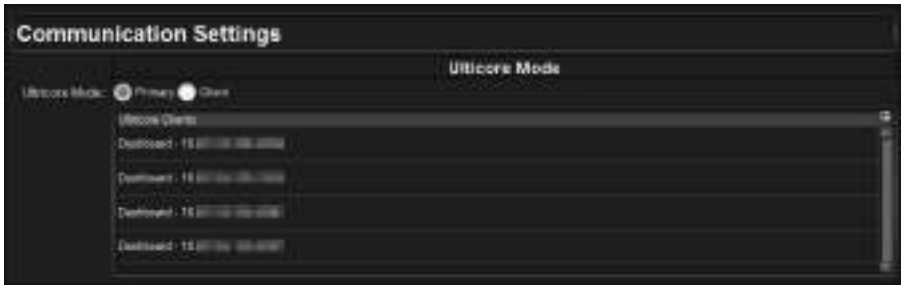


Figure 92 Communications Tab — Example of the Ultricore Mode Field

Client Status

If the Ultrix router is configured as a client, the **Communications** tab reports on the communications between it and the primary.

Troubleshooting

If you have lost communication between the primary Ultrix router and its clients:

1. Verify that each router is installed correctly.
2. Verify that each router is installed with a network connection to your facility.
3. Verify the ethernet settings for each router are valid.
4. Verify that the primary Ultrix router reports a list of valid connections to clients in its **Ultricore Clients** table.
5. Verify that each client Ultrix router is running software compatible to the primary Ultrix router.

Monitoring the Ultrix System Status

The System Status node displays an indicator that varies in severity from green (valid) to red (alarm). This indicator reports the most severe alarm the Ultrix is experiencing. The types of alarms the Ultrix reports is configured via the **Frame Configuration** > **Alarms** tab.

When you hover your mouse cursor over a red System Status node in the Tree View of DashBoard, as seen below, a tool tip displays with a brief error message. The message and indicator continue to report an error until the condition is addressed or the alarm is disabled in the **Alarms** tab.

Figure 93 Example of a Master Alarm Message

For More Information on...

- the monitoring options, refer to "**Navigating the Monitoring Interfaces**".

Using the System Logs in DashBoard

An entry in each log includes a timestamp, a code number, and a description. Messages are written to the log when significant changes occur in the operation of the Ultrix router. These could include: changes to video, reference, audio or time inputs; power-on or reboot cycles; configuration changes that can have an effect on the routing path; alarm conditions.

To access the system logs in DashBoard

1. In the Tree View of DashBoard, double-click the **Product Info** node under the Ultrix node.

   The Product Info interface displays in the DashBoard window.

2. Select the **Logs** tab.

   The **Logs** tab opens.

3. To view the communication log for Ultrix only, select the **System Log** option.
4. To view the log for communications between Ultrix and other devices, select **Controller Communications Log**.
5. To view the log for executed tasks in DashBoard for the router, select **DashBoard Communications Log**.
6. Click **Refresh** to update the entries for the currently selected log.

Enabling SNMP Support

Ultrix routers running software version 3v4 or higher provide optional support for remote monitoring of your router using SNMP (Simple Network Management Protocol). This protocol is compatible with many third-party monitoring tools.

✶ The MIB file provides SNMP traps for the configurable alarms on Ultrix as well as on the power supplies and fans.

Enabling SNMP Support

The SNMP Agent on the Ultrix router uses SNMP version 2 to allow queries of the configured system alarms, and state changes to configured alarms will be sent out as SNMP traps to the specified Trap Destination IP Address(es).

✶ Whenever the options in the SNMP area are edited, the SNMP Agent is restarted on the Ultrix router. It can take up to 10 seconds for all monitored states to be updated. This latency only applies once on startup.

The SNMP monitoring feature for your Ultrix is a software option that you enable in the System Status > Network tab.

To enable SNMP support on the Ultrix

1. Verify that the Ultricore-SNMP license key is installed for the Ultrix router. Refer to "**Installing a License Key**" for details.
2. In the Tree View of DashBoard, double-click the **Product Info** node under the Ultrix node.

   The **Product Info** interface displays in the DashBoard window.
3. Select the **Network** tab.
4. Locate the **SNMP** area of the tab.
5. Select the **Enable SNMP** box.
6. Ensure that the Alarms you want to monitor via SNMP are also enabled on the Ultrix router. Refer to "**Monitoring the Hardware**".

To configure the SNMP Agent using DashBoard

1. In the Tree View of DashBoard, double-click the **Product Info** node under the Ultrix node.

   The **Product Info** interface displays in the DashBoard window.
2. Select the **Network** tab.
3. Locate the **SNMP** area of the tab.
4. Use the **SNMP Community Name** field to specify the SNMP password for GET requests.

✶ The default SNMP Community Name is **`ultricore`**. For stronger security, it is strongly recommended that users set their own community string.

5. Use the **SNMP Trap Destination IP Address** field to specify the target address to which traps should be sent.

   An example of a valid target is provided in the **SNMP** area.

✶ A maximum number of six strings are displayed in the **SNMP Trap Destination IP Address** field at one time. If at the maximum number, you must select a string from the field and delete it before adding a new target entry.

6. Press **[Enter]** to apply the changes.

Monitoring the Signals

This section outlines how to monitor the reference signal, the inputs and outputs signals via the options in the Frame Configuration interface.

Monitoring the Reference Signal

The Sync area of the Frame Configuration interface reports on the signals connected to the REF ports on the Ultrix rear panel.

For More Information on…

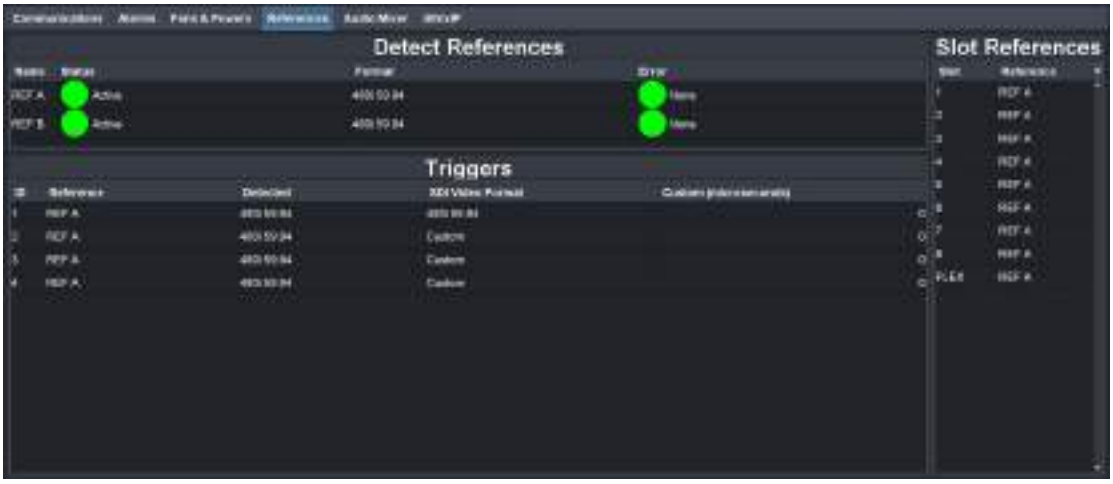
- setting the default reference, refer to "**Specifying a Default Reference Format**".

To monitor the Ultrix reference signal

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **References** tab.



7. Refer to **Table 80** to troubleshoot the messages displayed in the status fields.

Table 80 Frame Configuration — References Status

Item	Parameters	Description
Status	Active (Green)	A valid reference signal is connected to the REF port on the Ultrix rear panel
	No Sync (Yellow)	No signal detected on the REF port on the Ultrix rear panel

Table 80 Frame Configuration — References Status

Item	Parameters	Description
Format	Unknown	A reference signal is detected but the format is not supported by the router
	#	Indicates the video format of the reference signal

Triggers Status

The Triggers area of the Frame Configuration interface reports on the signals connected to the reference ports on the Ultrix rear panel.

To monitor the Ultrix reference signal

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Frame Configuration** page opens.
6. Select the **References** tab.
7. Refer to **Table 81** to troubleshoot the messages displayed in the Detected and Format status fields for each sync trigger.

Table 81 Frame Configuration — Triggers Status

Item	Parameters	Description
Detected	Unknown	The format of the reference signal is not supported by the router
	#	Indicates the video format of the reference signal that is used when the specified Trigger ID is used by an output
Format	Custom	The switching line is specified by the user via the Custom menu
	#	Indicates the video format of the reference signal that the specified Trigger will use

Monitoring the SDI Outputs

The Port Configuration interface enables you to monitor the signal status of the SDI outputs of the Ultrix.

To monitor the status of all the SDI outputs of the Ultrix router

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

The **Device Configuration** interface opens.

5. Select  .

   The **Port Configuration** page opens.

6. From the top row of buttons, click the button for the slot you want to monitor.
7. Locate the row for the output port you wish to monitor.
8. Refer to **Table 82** to troubleshoot the messages displayed in the status fields for each physical output port.

Table 82 Port Configuration — Output Messages

Item	Parameters	Description
Physical Address	slot#.out[#]	Indicates the physical socket on the Ultrix rear panel
Error Status	OK (Green)	Indicates a valid output signal is detected on the specified socket
	No Signal (Red)	Indicates that a valid output signal is not detected on the specified socket
Video	#	Indicates the SDI signal type detected on the specified socket
Audio	#	Indicates the audio signal type detected on the specified socket

Monitoring the SDI Inputs

The Port Configuration interface enables you to monitor the signal status of the SDI inputs of the Ultrix router.

To monitor the status of all the inputs of the Ultrix router

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.

5. Select  .

   The **Port Configuration** page opens.

6. From the top row of buttons, click the button for the slot you want to monitor.
7. Locate the row for the input port you wish to monitor.

8. Refer to **Table 83** to troubleshoot the messages displayed in the status fields for each physical input socket.

Table 83 Port Configuration — Input Messages

Item	Parameters	Description
Physical Address	slot#.in[#]	Indicates the physical socket on the Ultrix rear panel
Error Status	OK (Green)	Indicates a valid input signal is detected on the specified socket
	No Signal (Red)	Indicates that a valid input signal is not detected on the specified socket
Video	#	Indicates the SDI signal type detected on the specified socket
Audio	#	Indicates the audio signal type detected on the specified socket

Monitoring a Specific BNC

The Port Configuration tab enables you to monitor the video and/or audio signal status of a specific port and/or a group of selected ports on the Ultrix rear panel.

To monitor the status of a specific port for the Ultrix router

1. Expand the Ultrix node to display a list of sub-nodes in the Tree View.
2. Expand the **Systems** sub-node.
3. Expand the **Configuration** sub-node.
4. Double-click the **Ultrix** node.

   The **Device Configuration** interface opens.
5. Select  .

   The **Port Configuration** page opens.
6. From the top row of buttons, click the button for the slot you want to monitor.
7. From the blade map, select the port(s) you wish to monitor.

   The label under each selected port is highlighted in blue and the **Port Configuration** tab updates to display information on the selected port(s). In the example below, Port 4 in slot 1 was selected on an ULTRIX-FR2.

8. Click **Video** to monitor the status of the video signal on the selected port.
9. Click **Audio** to monitor the status of the audio channels on the selected port.

Glossary

The following terms are used throughout this guide:

Breakaway — an act of performing a switch on only some of the signals grouped together under one label.

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

Crosspoint — a switch within a matrix. For example, the connection of signal IN 1 to OUT 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.

Flow — the continuous raw media content. It can contain more than one essence (e.g. an audio flow can contain multiple channels, and an SDI flow may contain audio and video essences). A flow is independent of the transport protocol. For example, 48kHz LPCM audio is a flow; AES67 is one type of stream which can carry the flow. Flows cannot generally be passed around natively, and need to be encapsulated in a stream. Flows from the same source are considered "editorially equivalent", but may be encoded differently. For example, a video source may be encoded as 4:2:2 YCbCr uncompressed, 4:4:4 RGB uncompressed, and h.265 encoded. Each of these would be a separate flow from a common source.

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

Head — An OUT port on the Ultrix router that is assigned as an UltriScape (Multiviewer) output.

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

Label — text that is used by control displays to identify a signal as an input or output.

Level — refers to a section of a routing system. For example, a video router would be one level and an audio router would be a second level.

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).

Macro — a recorded sequence of Remote Control Panel operations (local to the panel).

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.

Partition — matrices may be partitioned to behave as smaller independent matrices.

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

Receiver — an element within a device that receives exactly one stream, which contains one flow from a network.

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.

Salvo — a system wide sequence of matrix control operations and crosspoint actions.

Sender — an element within a device which presents exactly one flow, packaged as a stream onto a network.

Stream — one flow, encapsulated within a transport protocol. Examples include SMPTE ST 2022-6, SMPTE ST 2110-20 Video, or SMPTE ST 2110-30 Audio (AES67).

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.

UltriClean — clean switch functionality of the Ultrix routers.

Ultricore — refers to the Ultricore-CC and the Ultricore-BCS unless otherwise stated.

UltriMix — SDI embedded audio manipulation sub-system of the Ultrix routers.

UltriScape — licensed Multiviewer option for Ultrix routers.

UltriSpeed — licensed 12Gbps SDI video option.

UltriSync — a per input licensed frame synchronizer.

ULTRIX-FR1 — refers to all versions of the ULTRIX-FR1 router unless otherwise noted.

ULTRIX-FR2 — refers to all versions of the ULTRIX-FR2 router unless otherwise noted.

ULTRIX-NS-FR1 — refers to the next generation of the ULTRIX-FR1 router. This router displays the Ultrix logo on the front door with a blue dot in the “i”.

ULTRIX-FR2-NS — refers to the next generation of the ULTRIX-FR2 router. This router displays the Ultrix logo on the front door with a blue dot in the “i”.