Utah Scientific

The Utah-400 iP Routing Switcher

System Setup and Operations

The Utah-400 iP Routing Switcher - Operators' Manual

- Document Number: 82101-0084

- Document Version: 2.0

- Date: September 8, 2008

- Printed in U.S.A.

Copyrights and Trademarks

© 2008 Utah Scientific, Inc., All rights reserved. Any use or reproduction of this guide's contents without the prior written consent of Utah Scientific, Inc. is strictly prohibited.

- Utah-400 is a trademark of Utah Scientific, Inc.

- Windows, Windows 2000 and Windows NT are registered trademarks of Microsoft Corporation.

- All other product names and any registered or unregistered trademarks mentioned in this guide are used for identification purposes only and remain the exclusive property of their respective owners.

Notice

Information contained in this guide is subject to change without notice or obligation. While every effort has been made to ensure that the information is accurate as of the publication date, Utah Scientific, Inc. assumes no liability for errors or omissions. In addition, Utah Scientific, Inc. assumes no responsibility for damages resulting from the use of this guide.

FCC Compliance (USA) and Digital Equipment Compliance (Canada)

This equipment has been tested and found to comply with the limits for a Class A, digital device, pursuant to Part 15, Subpart B of the FCC Rules and the Canadian EMC Requirement (ICES-003). 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 their own expense. Shielded cables must be used to ensure compliance with the FCC Class A limits.

Declaration of Conformity

Utah Scientific, Inc.

4750 Wiley Post Way, Suite 150
Salt Lake City, Utah 84116-2878 U.S.A.

We declare our sole responsibility that the Utah-400 Digital Routing Switcher is in conformance with the following standards:

Emission

- EN55022:1994+A1&A2

Immunity

- EN55024:1998
- EN61000-3-2
- EN61000-3-3

Safety

- IEC 60950-1:2001 /EN 60950-1:2001

Following the provisions of the Directive(s) of the Council of the European Union:

- EMC Directive 89/336/EED
- Low Voltage Electrical Directive 72/23/EEC

Utah Scientific, Inc. hereby declares that the product specified above conforms to the above Directive(s) and Standard(s).

$$C\ E$$

Important Safeguards and Notices

This section provides important safety guidelines for the Operator and Service Personnel. Specific warnings and cautions are found throughout the guide where they apply, but may not appear here. Please read and follow the important safety information, specifically those instructions related to risk of fire, electric shock, or injury to persons.

Safety Symbols

- Hazardous Voltage symbol

- Caution symbol. The product is marked with this symbol when it is necessary to refer to the manual to prevent damage to the product.

Warnings

Please observe the following important warnings:

- Any instructions in this guide that require opening the chassis, changing a power supply, or removing a board, should be performed by qualified personnel only. To reduce the risk of electric shock, do not perform any service unless you are qualified to do so.

- Heed all warnings on the unit and in the operating instructions.

- Do not use this product in or near water. Disconnect AC power before installing any options or servicing the unit unless instructed to do so by this manual.

- This product is grounded through the power cord ground conductor. To avoid electric shock, plug the power cord into a properly wired receptacle before connecting the product inputs or outputs.

- Route power cords and other cables so they won't be damaged.

- The AC receptacle (socket) should be located near the equipment and be easily accessible.

- Disconnect power before cleaning. Do not use any liquid or aerosol cleaner - use only a damp cloth.

- Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed conductors and components while power is on. Do not insert anything into either of the systems two-power supply cavities with power connected.

- Do not wear hand jewelry or watches when troubleshooting high current circuits, such as power supplies. During installation, do not use the door handles or front panels to lift the equipment as they may open abruptly and injure you.

- To avoid fire hazard when replacing fuses, use only the specified correct type, voltage and current rating as referenced in the appropriate parts list for this product. Always refer fuse replacement to qualified service personnel.

- Have qualified personnel perform safety checks after any service.

Cautions

Please observe the following important cautions:

- When installing this equipment do not install power cords to building surfaces. To prevent damage when replacing fuses, locate and correct the problem that caused the fuse to blow, before reconnecting power.

- Use only specified replacement parts

Notices

Please observe the following important notes:

- When the adjacent symbol is indicated on the chassis, please refer to the manual for additional information.

- For the HD-2020 Chassis and Master Control Panel, refer to "Connecting and Disconnecting Power" - Chapter 2 (Hardware Installation).

Company Information

Utah Scientific, Incorporated

4750 Wiley Post Way, Suite 150
Salt Lake City, Utah 84116-2878 U.S.A.

- Telephone: +1 (801) 575-8801
- FAX: +1 (801) 537-3098
- Technical Services (voice): +1 (800) 447-7204
- Technical Services (FAX):   +1 (801) 537-3069
- E-Mail -General Information: info@utsci.com
- E-Mail -Technical Services: service@utsci.com
- World Wide Web: http://www.utahscientific.com
- **After Hours Emergency**: +1 (800) 447-7204. Follow the menu instructions for Emergency Service.

Warranty Policies

Hardware Warranty

Utah Scientific, Inc. warrants to the original purchaser that the Utah Scientific hardware is free from defects in materials and workmanship and will perform substantially in accordance with the accompanying written materials under normal use and service for a period of ten (10) years from the date of shipment. Any implied warranties on hardware are limited to ten (10) years. Some states/jurisdictions do not allow limitations on duration of an implied warranty, so the above limitation may not apply to certain specific purchasers.

Software Warranty

Utah Scientific warrants that the software will perform substantially in accordance with the accompanying written materials for a period of one (1) year from the date of shipment.

Customer Remedies

For the first one (1) year after purchase of the software and the first ten (10) years after the date of purchase of the hardware, Utah Scientific's and its suppliers' entire liability and purchaser's exclusive remedy shall be, at Utah Scientific's option, either:

- Return of the price paid, or

- Repair or replacement of the software or hardware that does not meet the above warranties and is returned to Utah Scientific under the returned materials authorization (RMA) process with freight and forwarding charges paid.

After the initial warranty periods, purchaser's exclusive remedy is the repair or replacement of the hardware upon payment of a fixed fee to cover handling and service costs based on Utah Scientific's then-current price schedule. The above warranties are void if failure of the software or hardware has resulted from an accident, abuse, or misapplication. Any replacement software or hardware will be warranted for the remainder of the original warranty period or thirty (30) days, whichever is longer.

No other warranties. To the maximum extent permitted by applicable law, Utah Scientific and its suppliers disclaim all other warranties, either express or implied, including, but not limited to implied warranties of merchantability and fitness for a particular purpose, with regard to the software, the accompanying written materials, and any accompanying hardware. This limited warranty gives the purchaser specific legal rights. These rights may vary in certain states/ jurisdictions.

No liability for consequential damages. To the maximum extent permitted by applicable law, in no event shall Utah Scientific or its suppliers be liable for any damages whatsoever (including without limitation, damages for loss of business profits, business interruption, loss of business information, or any other pecuniary loss) arising out of the use of or inability to use Utah Scientific products, even if Utah Scientific has been advised of the possibility of such damages. Because some states/jurisdictions do not allow the exclusion or limitation of liability for consequential or incidental damages, the above limitation may not apply in those circumstances.

The Utah-400 iP Routing Switcher - Operators' Manual

Introduction

Installation

System Management

CHAPTER 1   *Introduction*

This chapter contains the following:

Overview

The UT400-IPW is a 24 Port 10/100/1000 Ethernet Switch with two integral 5 Gb/Sec stacking ports. The stacking ports allow it to be expanded up to 192 ports as an integral system. It has the ability to be managed manually from a RS-232 CLI port, a browser based web interface, or with the patented Utah Scientific real time control mechanism.

Features

The router contains a robust feature set, including standard redundant power supplies and the following switching features:

- Jumbo Frame support up to 10 kilobyte.
- 8K MAC address support.
- 4K VLAN Support, including private and shared VLAN's.
- Link Aggregation with up to 16 members per group.
- Wire speed based MAC learning.
- QoS with up to four queues per port.
- Advanced QoS control lists that allow decisions based on IP TOS, DSCP, EtherType, VLAN, or UDP/TCP Ports.
- Ingress and Egress queue shapers to fine tune network bandwidth utilization.
- Advanced Security parameters with up to 128 shared entries.
- Port mirroring for diagnostic or security applications.

The UT400-IPW is intended to be rack or cabinet mounted, and cable entry position is selectable between the front and the rear.

Switch View

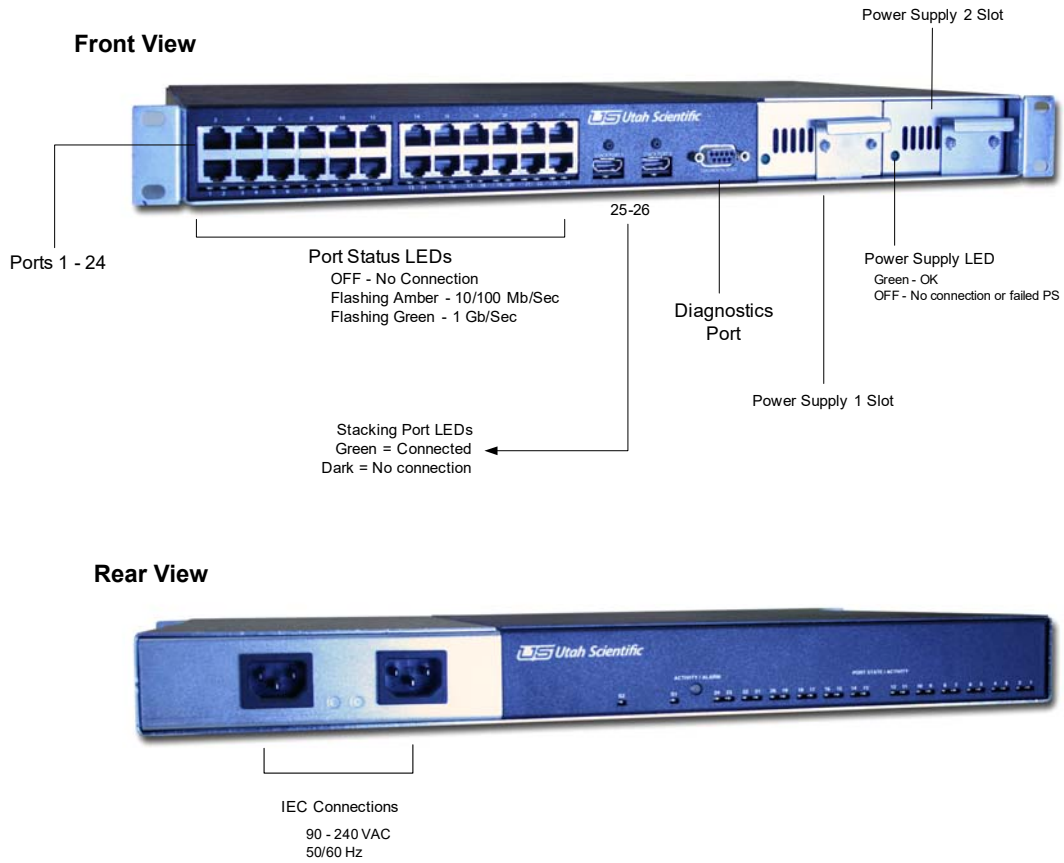(The following images contain the ID of each LED, and Connector)
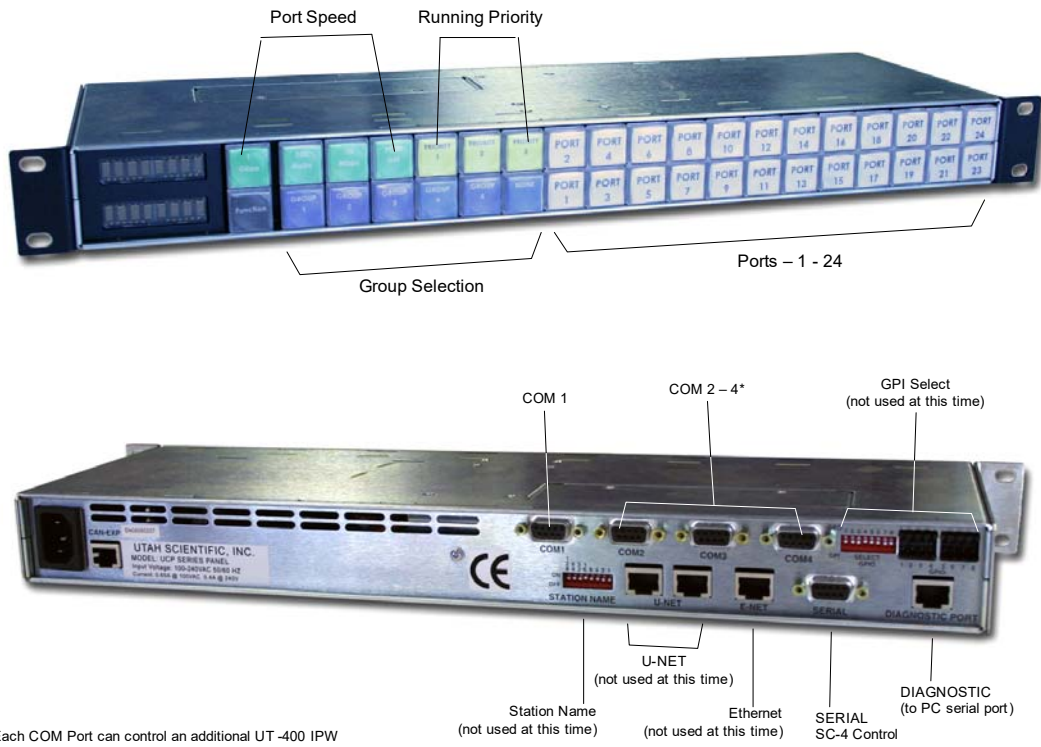
UT-400-IPW/RCP

Front View

Power Supply 2 Slot

25-26

Ports 1 - 24

Port Status LEDs
OFF - No Connection
Flashing Amber - 10/100 Mb/Sec
Flashing Green - 1 Gb/Sec

Diagnostics
Port

Power Supply LED
Green - OK
OFF - No connection or failed PS

Power Supply 1 Slot

Stacking Port LEDs
Green = Connected
Dark = No connection

Rear View

IEC Connections
90 - 240 VAC
50/60 Hz

FIGURE 1-1. Switch View

Panel View

Port Speed   Running Priority

Group Selection

Ports – 1 - 24

COM 1   COM 2 – 4*   GPI Select
(not used at this time)

U-NET
(not used at this time)

Station Name
(not used at this time)

Ethernet
(not used at this time)

SERIAL
SC-4 Control

DIAGNOSTIC
(to PC serial port)

* Each COM Port can control an additional UT -400 IPW

FIGURE 1-2. Panel View

Panel Cabling

RJ-45 to 9-pin male adapter
UTSCI part # 140064-04
connect to COM 1

RJ-45 to 9-pin male adapter

UTSCI part # 140064-04
connect to diagnostic port

1 each CAT 5E 10 foot

Ethernet cable
UTSCI part # 94005-0010
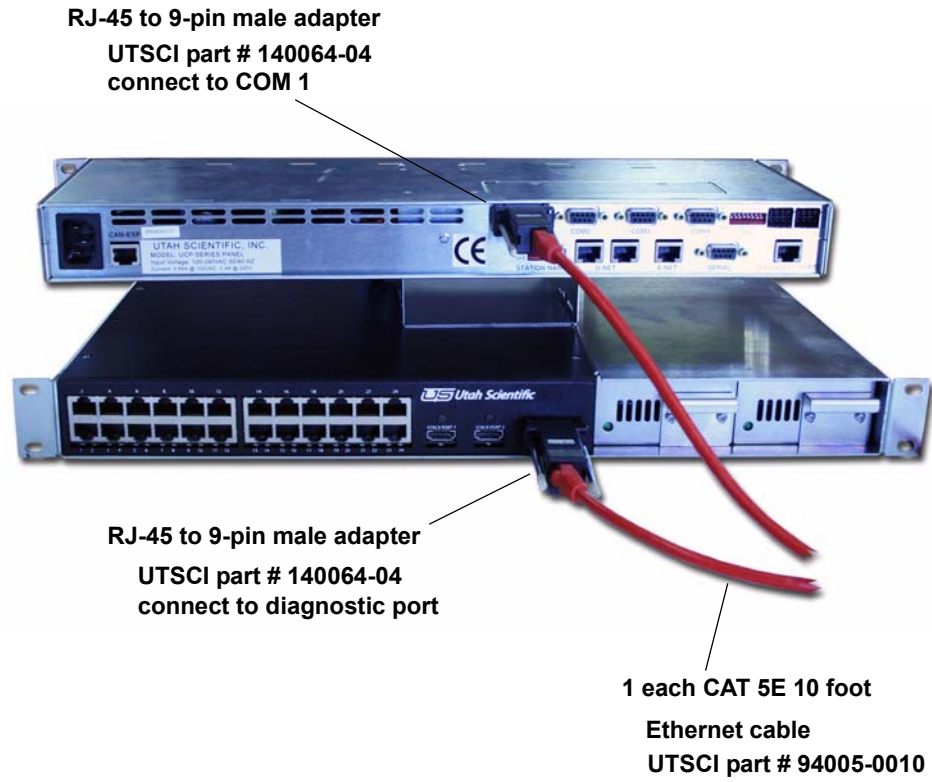
FIGURE 1-3. Panel cable connection

CHAPTER 2   *Installation*

This chapter contains the following:

Cable Orientation for Non-CP switch

The UT-400-IPW can accommodate facilities requiring rear cable orientation by removing both front and rear panel covers, then turning the board 180 degrees to the opposite position.
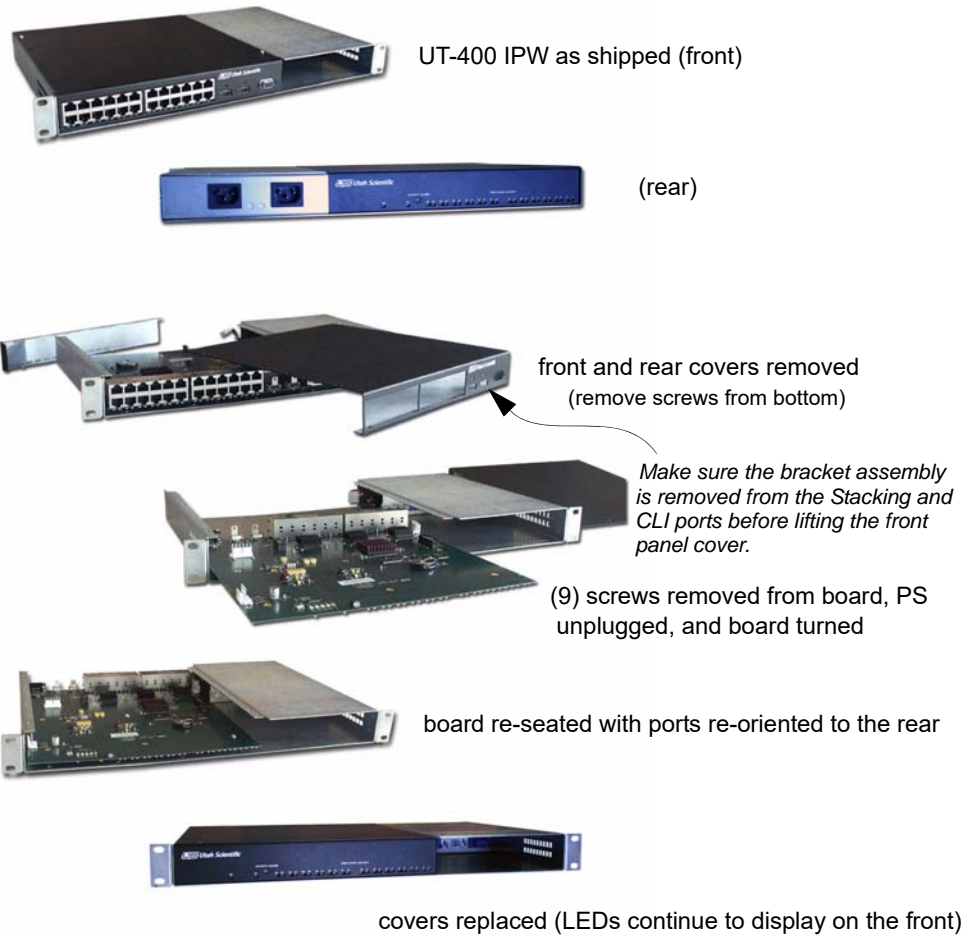
UT-400 IPW as shipped (front)

(rear)

front and rear covers removed
(remove screws from bottom)

Make sure the bracket assembly is removed from the Stacking and CLI ports before lifting the front panel cover.

(9) screws removed from board, PS unplugged, and board turned

board re-seated with ports re-oriented to the rear

covers replaced (LEDs continue to display on the front)

FIGURE 2-1. Utah-400 IPW cable re-orientation

Rack Mounting

Installing the Utah-400 iP components

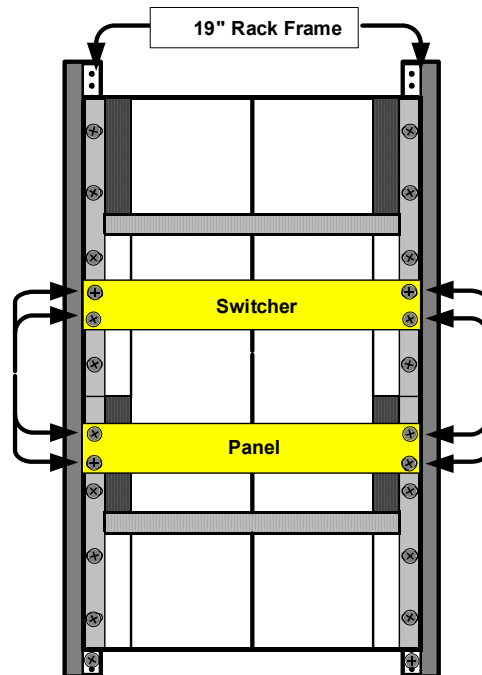Use the following steps to install the Utah-400 iP system components into the rack frame(s):

FIGURE 2-2.   UTAH-400 IPW/RCP mounted in 19" Rack Frame

1. Install both Utah-400 iP chassis components in the same, or separate 19" rack frames as needed.

   a. Determine the height to mount the remote panel and switcher in the rack frame.

   b. Pick the chassis up from the shipping carton at the left and right side frames.

   c. Move the chassis to the 19" rack frame and carefully slide it into the rack frame.

   d. Align remaining mounting holes, install remaining rack screws through mounting holes and then snug them down.

   e. Finally, tighten all rack screws installed in the chassis mounting holes.

Connections

Power connections are made to dual IEC inlets,. Power should always be removed before servicing. Power specs (100-240VAC, 50-60 Hz, 70 VA)

Ethernet Cable Connections

Category 5 or better, 100-ohm UTP or shielded twisted-pair (STP) balanced cable. For 1000 Mbps (gigabit) operation, Category 5E cabling or better is recommended.

If you connect a UT400 IPW twisted-pair port to another switch, which typically have MDI-X ports, the UT400 IPW port automatically operates as an MDI port. If you connect it to an end node, such as a server or PC, which typically have MDI ports, the UT400 IPW port operates as an MDI-X port. In all cases, you can use standard "straight through" cables or "crossover" cables. If you happen to use a correctly wired crossover cable, though, the switch will still be able to automatically detect the MDI/MDI-X operation and link correctly to the connected device.

Other Wiring Rules:

- All twisted-pair wires used for 10 Mbps, and 100 Mbps operation must be twisted through the entire length of the cable. The wiring sequence must conform to EIA/TIA 568-B.
- For 1000Base-T connections, all four pairs of wires in the cable must be available for data transmission; For 10 Mbps connections to the ports, you can use Category 3, 4, or 5
- Unshielded twisted-pair cable, as supported by the IEEE 802.3 Type 10Base-T standard.
- For 100 Mbps connections to the ports, use 100-ohm Category 5 UTP or
- STP cable only, as supported by the IEEE 802.3u Type 100Base-TX standard.
- For 1000 Mbps connections, 100-ohm Category 5E or better cabling is recommended.

Stacking Cable Connections

When using the HDMI connectors on Ports 25 and 26 to interconnect UT400 IPW switches, the cable must be purchased from Utah Scientific. These ports pinouts DO NOT conform to the HDMI standard, and normal cables will not operate. Contact Utah Scientific for cable PN 140022-04.

Stacking ports can be connected in a 'Chain' or a 'Ring' topology, shown in the following illustration. A ring topology is preferred over a chain topology because a ring topology provides redundant paths for data. If a switch in the middle of the stack failed, a ring topology would keep the connections to the remaining switches intact.

Chain Topology
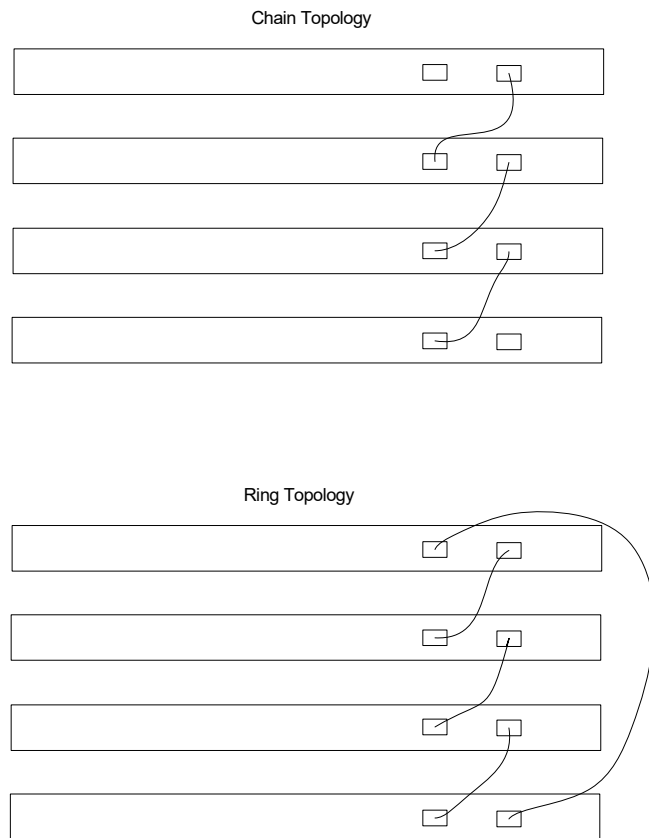
Ring Topology

FIGURE 2-3. Stacking Topology

Console Port Connection

A DB9 connector on the front edge of the UT400-IPW provides access to the diagnostic port for system setup, configuration and monitoring. The pinout of this port is shown in the following table.

TABLE 1.

Pin Name	Pin Number
NC	1
TX(OUT)	2
RX (IN)	3
NC	4
GROUND	5
NC	6
NC	7
NC	8
NC	9

This is an EIA RS-232 interface that runs at 115.2K baud. A terminal emulation program connected to this port should be set to 8 Data Bits, No Parity, and 1 stop bit.

CHAPTER 3   *System Management*

This chapter contains the following:

Introduction

UT400-IPW switches can be managed in several ways, or not at all if the application does not require it. Each switch ships with the management IP address set to 192.168.5.200 and the management VLAN set to 1. All other parameters are set to defaults so that it can be immediately used without management. Default settings are -

- • Port speed - AutoNegotiate
- • VLAN's - All ports set to VLAN 1
- • Ingress and Egress queue policiers - All Off.
- • QoS - All ports set to QCL 1, QCL's configured to use IP ToS.

If changes are required to parameters within the switch, the following methods can be used.

Remote Control Panel

The remote control panel allows access to three functions within the switch; it allows the user to select port speed, VLAN membership, and Quality of Service settings in the switch.

Remote Control panel Usage - Status

To see the parameters a particular port is set to, simply press and release that port button. The port button will light, and then the port speed, VLAN membership, and QoS setting will be indicated on the dedicated buttons.

To see global status, a particular function button can be pressed and held, and all of the ports that are set to correspond to that button will then light. For example, to see which ports are located in VLAN 2, simply press and hold the GROUP 2 button, and all port buttons that are a member of that group will light.

Remote Control Panel usage - Control

To change a particular setting on a port, control is invoked by pressing and holding the port button, and pressing the desired function button while the port button is held down.

For example, to turn port 7 off, press and hold the port 7 button and then press and release the PORT OFF button. This will disable port 7 of the switch.

A note on the port rate buttons - The 10 Mb and 100 Mb buttons indicate connection in a Full Duplex mode. It is possible that a port will connect to a PC or other device in a half duplex mode. If it does, when that port is displaying status none of the Port Speed lamps will be lit.

Telnet / Diagnostic Interface

The telnet and Command Line Interface sections are grouped together because the format of the commands is identical between the interfaces. The connection to the switch differs between the two interfaces. To use the CLI, connect a PC running a terminal emulation program to the DB9 RS-232 port. See the installation section for cable and setting parameters.

The telnet interface requires a telnet client application. Connection is made via any one of the switches Ethernet ports, as long as the VLAN of the port matches the management VLAN (default is 1) and the IP subnets of the management port and the device communicating to it match. Note that the switch supports only 1 concurrent telnet or web browser connection.

Telnet / Diagnostic command structure

The user interface is a modified command line interface that uses a text based menu system. When you first connect to the switch, pressing the carriage return key will list the possible menu items. Typing in one of the menu items (IE 'Port') and pressing return will move you into that sub-menu. Pressing the carriage return while in one of these sub-menus will list the available commands at that level. Typing 'up' followed by carriage return will move you back up one level in the menu.

The menu sections and their general purpose are listed below.

- System - This menu is used to soft reset the switch, determine current SW version, or return settings to factory defaults.

- Stack - This is a single element menu, and returns the state of the switches in a stack or ring topology.

- IP - Menu for querying or setting the IP address of the switch.

- Port - menu for querying or setting the parameters of the switch ports including their rate, duplex mode, frame size, and also for viewing port statistics.

- ACL - Sets or views parameters for Access Control Lists, which can be used to set security parameters on the switch.

- MAC - Used for querying MAC address discovered by the switch.

- VLAN - Menu used to view or set VLAN parameters within the switch.

- PVLAN - Menu used to view or set private VLAN parameters within the switch.

- Aggr - menu used to set or view link aggregation parameters within the switch.

- Mirror - Menu used to set up port mirroring within the switch.

- QoS - Menu used to configure quality of service parameters.

- Firmware - Utilities to update switch operating firmware.

- Debug - Debug utilities.

Web Management

The Web Management interface allows the user to configure and monitor all of the features that the Diagnostic or Telnet console does, but in an easy to use GUI interface. Connection is made via any one of the switches Ethernet ports, as long as the VLAN of the port matches the management VLAN (default is 1) and the IP subnets of the management port and the device communicating to it match. Note that the switch supports only 1 concurrent telnet or web browser connection. Internet Explorer and Netscape have been tested with the UT400-IPW.

To access the web management tool, you must first have the IP address and administrative password for the switch. As a default, the IP address is **192.168.5.200**, while the 'admin' password field is left blank.

If these parameters have been changed and you have lost the information, you can retrieve the needed information by connecting to the diagnostic port of the switch, as detailed in the previous section.

The following dialog wall appear once you have entered the above IP address. When prompted, enter **admin** as your username. Leave the password field blank.:
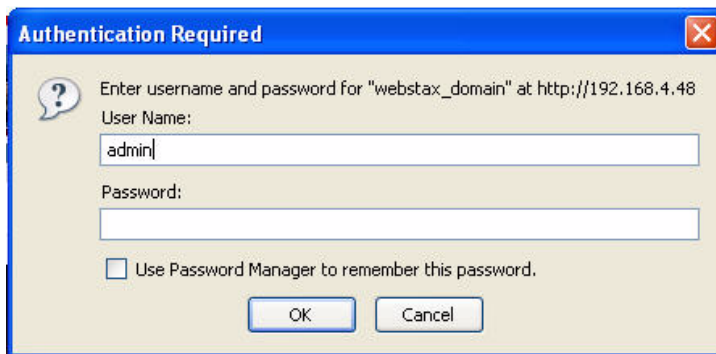
The *Port State Overview* window for the Ethernet Switch will appear (as default) once you have logged in.
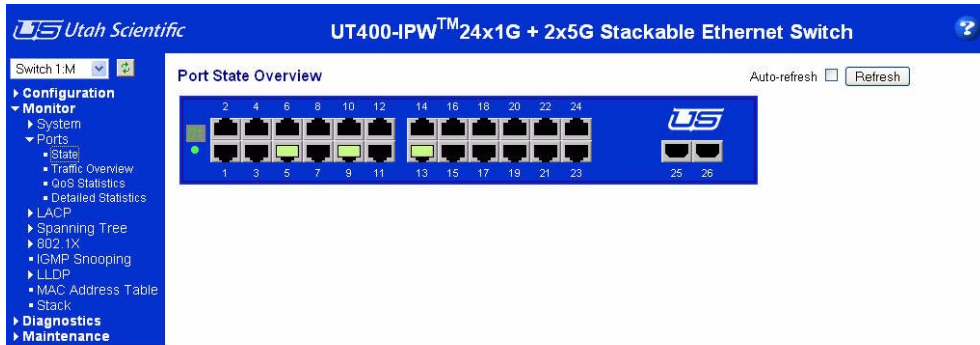

FIGURE 3-1. Web management interface

The four main areas of operation are included in the interface; Configuration, Monitor, Diagnostics, and Maintenance.

FIGURE 3-2. Operational Categories

Each menu expands to cover the broader range of sub-parts, with each window containing its own help screen, accessed by clicking the button on the right side of the interface.

Detailed Configuration Scenarios

This section details some common management scenarios that a user might wish to implement. These are made up scenarios, but are intended to give an understanding of how each management feature works.

QoS

A user has a system with three edit stations all of which need to push data to a common server. It has been determined that bandwidth priority needs to be adjusted to one of the three stations on a completely random basis based on their workflow. In addition to this requirement, each edit station has a network based control connection to the server on TCP port 4998, and that data cannot be prioritized lower than video traffic.

Solution

A QCL, Or Quality of Service Control List, needs to be configured so that the 3 ports can be assigned varying levels of bandwidth, while ensuring that traffic directed at port 4998 passes with a high priority no matter which device it comes from.

Step 1 – Edit QCL #1 so that it has two entries -

1. TOS – Set so that all 8 possible values are LOW.

2. UDP/TCP Port, Range 4998-4998, Class = High.

Step 2 – Edit QCL #2 so that it has two entries -

1. TOS – Set so that all 8 possible values are MEDIUM.

2. UDP/TCP Port, Range 4998-4998, Class = High.

Step 3 – Edit QCL #3 so that it has two entries -

1.TOS – Set so that all 8 possible values are HIGH.

2.UDP/TCP Port, Range 4998-4998, Class = High.

Operation

Once the QCL is configured, to invoke the control the QCL# assigned to each port needs to be modified to 1 for low priority, 2 for medium priority and 3 for high priority. This can be done from the GUI or from a manual control panel.

Port Aggregation Operation

Port aggregation can be used when connecting one network to another where the combined bandwidth of multiple ports is required to meet the link bandwidth needs. This can occur between two Network switches, or a switch and a server with a multi-port network interface card installed.

Aggregation Mode Checkboxes

The Source MAC Address, Destination MAC address, IP Address and port number checkboxes enable the switch to use those parameters to make packet forwarding decisions.

Aggregation Group Definitions

The 'Normal' group indicates a port that is NOT part of an aggregation group. There are two possible global groups that can be on different switches in a stack, providing for some path redundancy. Those groups can have 8 members total. The local groups are all located on a single switch and can have up to 16 members.

VLAN Configuration

VLANs can be implemented to improve security, reduce broadcast traffic, and logically separate different groups of users on the same physical switch. One possible scenario for using VLANs would be to assign members of different departments to different VLAN's when those users would never have a need to share the same data.

Private VLAN Configuration

Private VLANs provide an additional level of isolation, so that a smaller group within a larger VLAN can be isolated.

Index