Industrial Lite-Managed PCI Ethernet Switch Card

ICS-4040 User's Manual

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Getting to Know Your Switch Card

1.1 About the ICS-4040

The ICS-4040 is a cost-effect and powerful industrial Ethernet switch card. This card has many functions, and it can operate under high temperature and dusty environment. The ICS-4040 can be managed by WEB interface and a useful Window utility — Open-Vision. Open-Vision is powerful and useful network management software. With its friendly user interface, you can easily configure multiple switches at the same time, and monitor the status of the switch cards.

1.2 Software Features

- PCI Local Bus specification, Rev 2.2
- World's fastest Redundant Ethernet Ring: O-Ring (Recovery time < 10ms over 250 units connection)
- Multiple Redundant Ethernet technology RSTP/STP, O-Ring, fast recovery mode supported to protect your industrial network
- Relay output for power failure (Optional)
- Easy-to-configure: Web / Windows utility for network management

1.3 Hardware Features

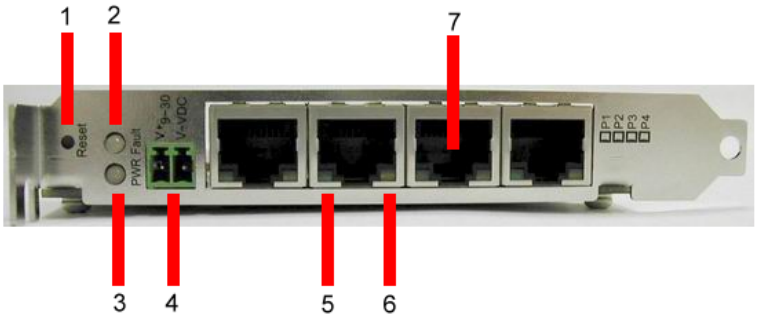
- Redundant external DC power inputs (PCI power and external DC 9~30V power on terminal block)
- Operating Temperature: -10 to 60°C
- Storage Temperature: -40 to 85°C
- Operating Humidity: 5% to 95%, non-condensing
- 4 10/100Base-T(X) Ethernet ports

Hardware Overview

2.1 Front Panel

The following table describes the labels on the front panel of ICS-4040:

Port	Description
10/100 RJ-45 fast Ethernet ports	4 10/100Base-T(X) RJ-45 fast Ethernet ports support auto-negotiation. Default Setting : Speed: auto Duplex: auto Flow control : disable
External Power Input	External power input with DC 9~30V.
Reset	Push reset button 3 seconds to reset the configuration of switch. Push reset button 5 second to reset the switch into **Factory Default.**



ICS-4040 front panel

1. Reset button. Push the button 3 seconds to restore the configuration; 5 seconds for factory default.
2. LED for Fault Relay. When the fault occurs, the amber LED will be light on.
3. LED for Power. When the PCI power on, the green led will be light on. When PCI power off and External Power on, the red led will be light on.
4. External power input with DC 9~30V.
5. LED for Ethernet ports link/act status.
6. LED for Ring ports indication.
7. 10/100Base-T(X) Ethernet ports.

2.2 Front Panel LEDs

LED	Color	Status	Description
PWR	Green	On	Power of PCI interface or external power on
Fault	Amber	On	Fault indicator. Power failure or Port down/fail.
Ethernet	Green	On	Ethernet Link/Act LED
Ring	Amber	On	– Ring mode indicate "Ring port" – Fast Recovery indicate "Act port"

2.3 DIP Switch

The operating mode of ICS-4040 can be configured by DIP switch. The setting of the DIP switch is shown as table below:

Function / DIP SW Number	DIP SW 1	DIP SW 2
O-Ring	On	On
Redundant Mode (Fast recovery mode)	On	Off
RSTP	Off	On
Normal	Off	Off

Note: When ICS-4040 operated in Redundancy mode by DIP SW, The default setting is shown as below:

1. The O-Ring mode will set P1 to be the 1st Ring port and P2 to be the 2nd ring port.
2. The Redundant mode will set P1 ~ P4 to the 1st ~ 4th priorities.

Cables

3.1 Ethernet Cables

The ICS-4040 has standard 100BASE-TX/10BASE-T Ethernet ports. According to the link type, the switch use CAT 3, 4, 5,5e UTP cables to connect to any other network device (PCs, servers, switches, routers, or hubs). Please refer to the following table for cable specifications.

Cable Types and Specifications

Cable	Type	Max. Length	Connector
10BASE-T	Cat. 3, 4, 5 100-ohm	UTP 100 m (328 ft)	RJ-45
100BASE-TX	Cat. 5 100-ohm UTP	UTP 100 m (328 ft)	RJ-45

3.1.1 100BASE-TX/10BASE-T Pin Assignments

With 100BASE-TX/10BASE-T cable, pins 1 and 2 are used for transmitting data, and pins 3 and 6 are used for receiving data.

RJ-45 Pin Assignments

Pin Number	Assignment
1	TD+
2	TD-
3	RD+
4	Not used
5	Not used
6	RD-
7	Not used
8	Not used

The ICS-4040 also supports auto MDI/MDI-X operation. You can use a straight-through cable to connect PC to switch. The following table below shows the 10BASE-T/ 100BASE-TX MDI and MDI-X port pin outs.

MDI/MDI-X pins assignment

Pin Number	MDI port	MDI-X port
1	TD+(transmit)	RD+(receive)
2	TD-(transmit)	RD-(receive)
3	RD+(receive)	TD+(transmit)
4	Not used	Not used
5	Not used	Not used
6	RD-(receive)	TD-(transmit)
7	Not used	Not used
8	Not used	Not used

Note: "+" and "-" signs represent the polarity of the wires that make up each wire pair.

WEB Management

4.1 Configuration by Web Browser

This section introduces the configuration by Web browser.

4.1.1 About Web-based Management

An embedded HTML web site resides in flash memory on the CPU board, . It contains advanced management features and allows you to manage the switch from anywhere on the network through a standard web browser such as Microsoft Internet Explorer.

The Web-Based Management function supports Internet Explorer 5.0 or later. It is based on Java Applets with an aim to reduce network bandwidth consumption, enhance access speed and present an easy viewing screen.

Note: By default, IE5.0 or later version does not allow Java Applets to open sockets. You need to explicitly modify the browser setting in order to enable Java Applets to use network ports.

Preparing for Web Management

The default setting is as below:

IP Address: **192.168.10.1**

Subnet Mask: **255.255.255.0**

Default Gateway: **192.168.10.254**

User Name: **admin**

Password: **admin**

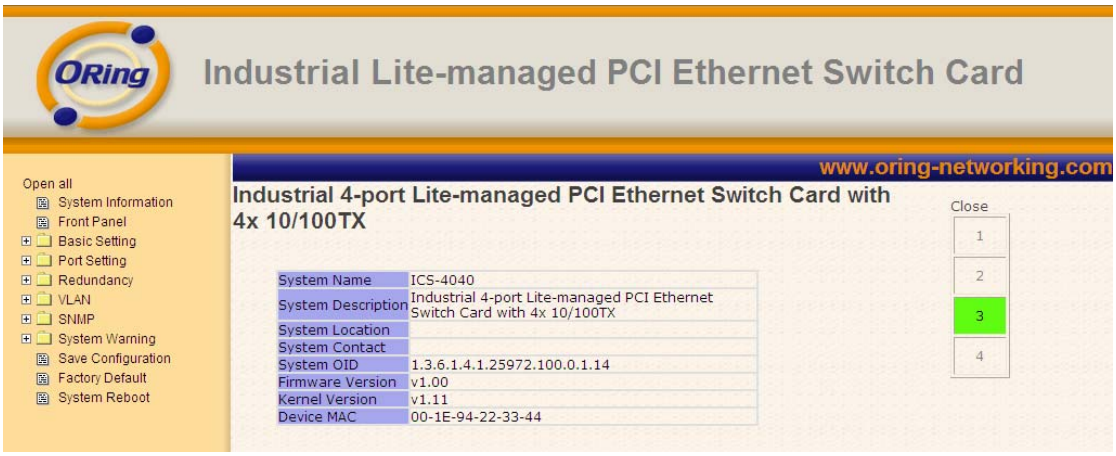
System Login

1. Launch the Internet Explorer.
2. Type http:// and the IP address of the switch. Press "**Enter**".

3. The login screen appears.
4. Key in the username and password. The default username and password is "**admin**".
5. Click "**OK**" button, then the main interface of the Web-based management appears.

Login screen

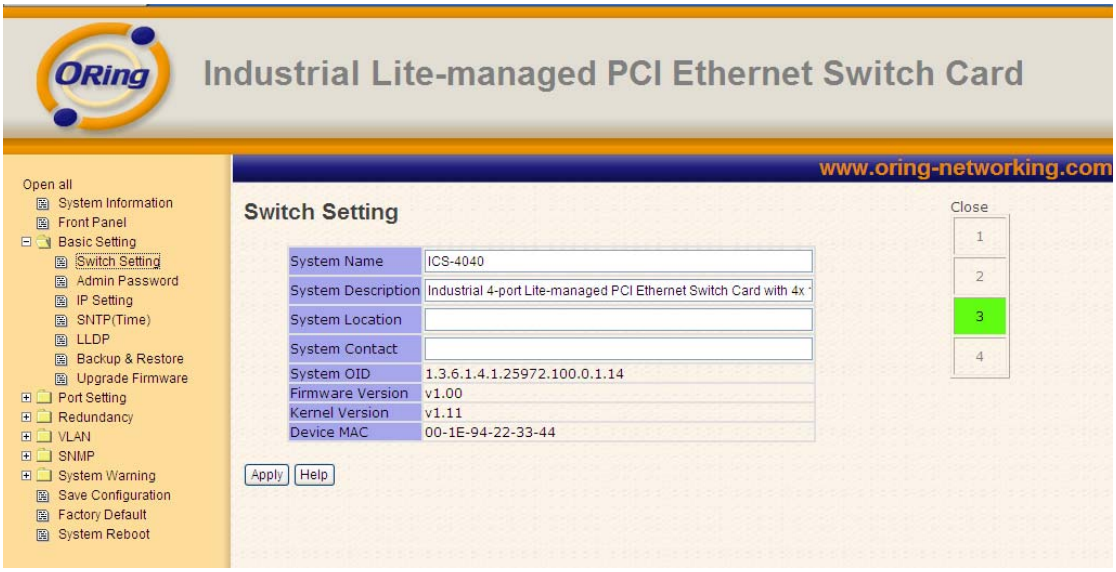
Main Interface



Main interface

4.1.2 Basic Setting

4.1.2.1 Switch setting



Switch setting interface

The following table describes the labels in this screen.

Label	Description
System Name	Assign the name of switch. The maximum length is 64 bytes
System Description	Display the description of switch.
System Location	Assign the switch physical location. The maximum length is 64 bytes
System Contact	Enter the name of contact person or organization
Firmware Version	Display the switch's firmware version
Kernel Version	Display the kernel software version
MAC Address	Display the unique hardware MAC address assigned by manufacturer (default)

4.1.2.2 Admin Password

Change web management login username and password for secured management

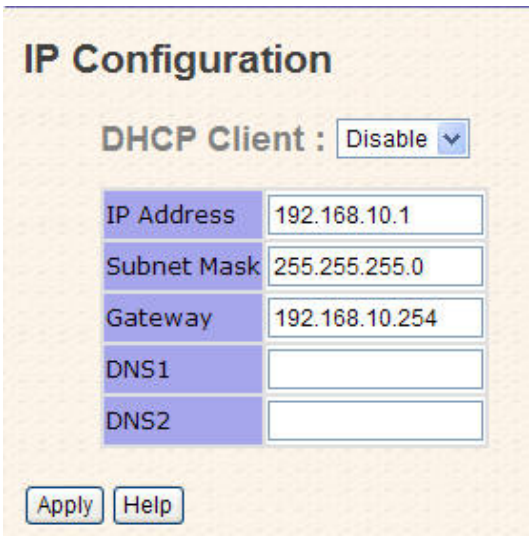
Admin Password interface

The following table describes the labels in this screen.

Label	Description
User name	Key in the new username (The default is "**admin**")
New Password	Key in the new password (The default is "**admin**")
Confirm password	Re-type the new password.
Apply	Click "**Apply**" to set the configurations.

4.1.2.3 IP configuration

You can configure the IP Settings manually or bet the IP address automatically in DHCP client mode in "IP Configuration" page.



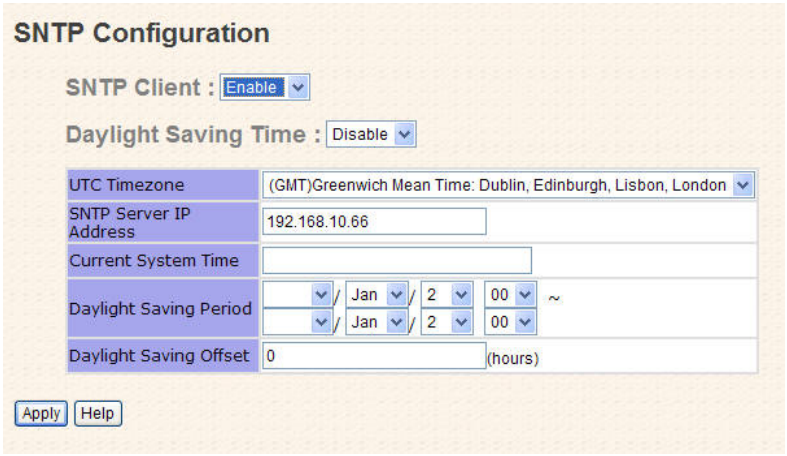
IP Configuration interface

The following table describes the labels in this screen.

Label	Description
DHCP Client	To enable or disable the DHCP client function. When DHCP client function is enabled, the IP address of the switch will be assigned from the DHCP server of the network. After clicking "**Apply**" button, a popup message will show up to inform you when the DHCP client is enabling. The current IP address will be lost and you should get the new IP address from the DHCP server. The default setting is disabled.
IP Address	To assign the IP address of this device. If DHCP client option is enabled, this item is not configurable. The network DHCP server will assign the IP address for the switch and it will be displayed in this column. The default IP is 192.168.10.1
Subnet Mask	To assign the subnet mask of the IP address. If DHCP client function is enabled, this item is not configurable. The default subnet mask is 255.255.255.0
Gateway	To assign the network gateway for the switch. The default IP address of the gateway is 192.168.10.254
DNS1	To assign the primary DNS IP address
DNS2	To assign the secondary DNS IP address
Apply	Click "**Apply**" to set the configurations.

4.1.2.4 SNTP Configuration

The SNTP (Simple Network Time Protocol) settings help you to synchronize the time from the Internet.



SNTP Configuration interface

The following table describes the labels in this screen.

Label	Description
SNTP Client	Enable or disable SNTP function to get the time from the SNTP server.
Daylight Saving Time	Enable or disable daylight saving time function. When daylight saving time is enabling, you need to configure the daylight saving time period.
UTC Time zone	Set the switch location time zone. The following table lists the different location time zone for your reference.

Local Time Zone	Conversion from UTC	Time at 12:00 UTC
November Time Zone	- 1 hour	11 am
Oscar Time Zone	-2 hours	10 am
ADT - Atlantic Daylight	-3 hours	9 am
AST - Atlantic Standard EDT - Eastern Daylight	-4 hours	8 am
EST - Eastern Standard CDT - Central Daylight	-5 hours	7 am
CST - Central Standard MDT - Mountain Daylight	-6 hours	6 am
MST - Mountain Standard PDT - Pacific Daylight	-7 hours	5 am
PST - Pacific Standard ADT - Alaskan Daylight	-8 hours	4 am
ALA - Alaskan Standard	-9 hours	3 am
HAW - Hawaiian Standard	-10 hours	2 am
Nome, Alaska	-11 hours	1 am

CET - Central European FWT - French Winter MET - Middle European MEWT - Middle European Winter SWT - Swedish Winter	+1 hour	1 pm
EET - Eastern European, USSR Zone 1	+2 hours	2 pm
BT - Baghdad, USSR Zone 2	+3 hours	3 pm
ZP4 - USSR Zone 3	+4 hours	4 pm
ZP5 - USSR Zone 4	+5 hours	5 pm
ZP6 - USSR Zone 5	+6 hours	6 pm
WAST - West Australian Standard	+7 hours	7 pm
CCT - China Coast, USSR Zone 7	+8 hours	8 pm
JST - Japan Standard, USSR Zone 8	+9 hours	9 pm
EAST - East Australian Standard GST Guam Standard, USSR Zone 9	+10 hours	10 pm
IDLE - International Date Line NZST - New Zealand Standard NZT - New Zealand	+12 hours	Midnight

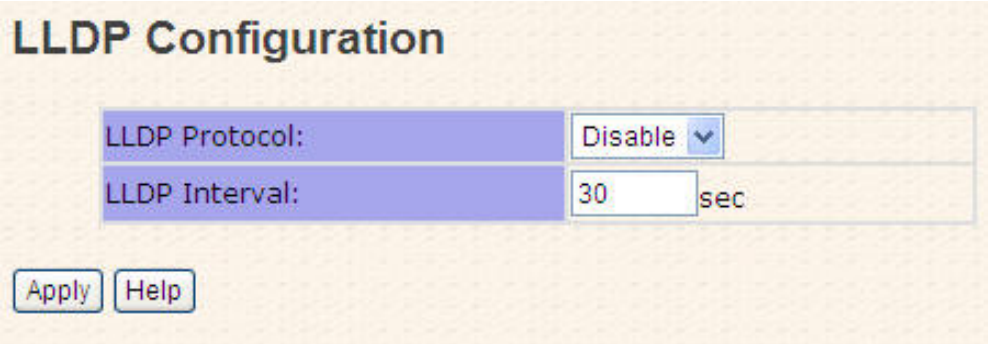
The following table describes the labels in this screen.

Label	Description
SNTP Sever IP Address	Set the IP address of SNTP server.
Daylight Saving	Set up the Daylight Saving beginning time and Daylight Saving

Period	ending time.
Daylight Saving Offset	Set up the offset time of Daylight saving.
Switch Timer	Display the current time of switch.
Apply	Click "**Apply**" to activate the configurations.

4.1.2.5 LLDP

LLDP (Link Layer Discovery Protocol) function allows the switch to advertise its information to other nodes on the network and store the information it discovers.

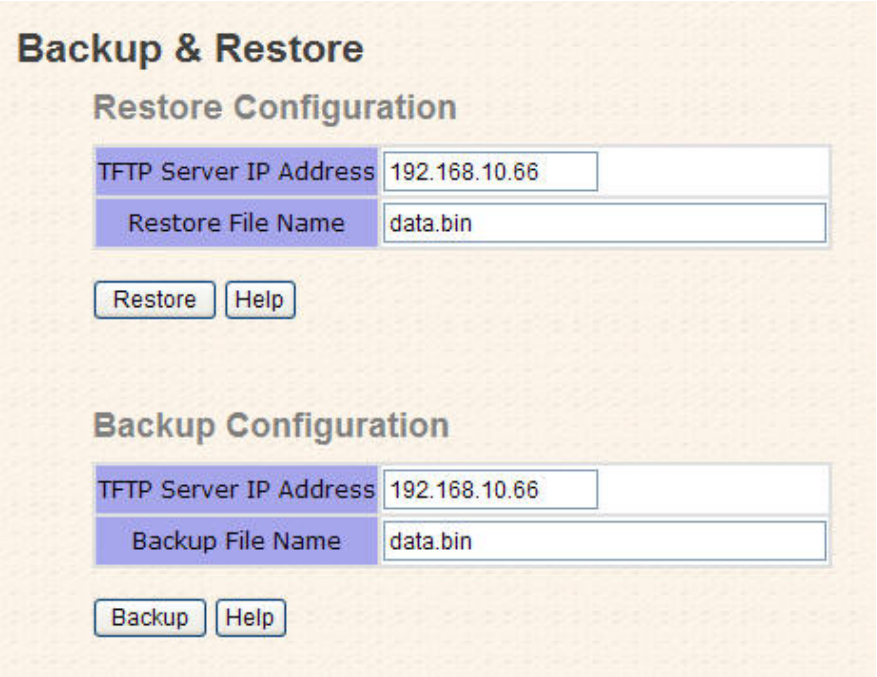


The following table describes the labels in this screen.

Label	Description
LLDP Protocol	"**Enable**" or "**Disable**" LLDP function.
LLDP Interval	The interval of resend LLDP (by default at 30 seconds)
Apply	Click "**Apply**" to activate the configurations.
Help	Show help file.

4.1.2.6 Backup & Restore

You can save current configuration from the switch to TFTP server, or restore the configuration from TFTP server in this page.



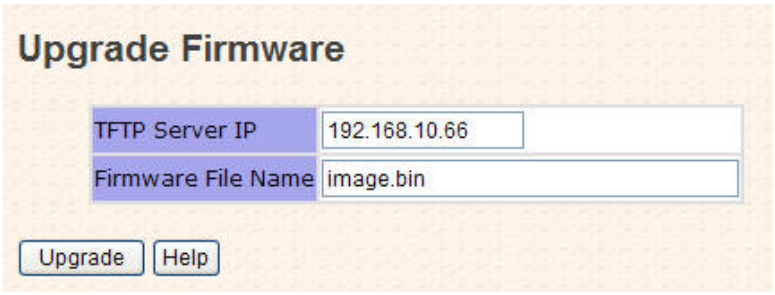
Backup & Restore interface

The following table describes the labels in this screen.

Label	Description
TFTP Server IP Address	Fill in the TFTP server IP
Restore File Name	Fill in the file name.
Restore	Click "**restore**" to restore the configurations.
Restore File Name	Fill the file name.
Restore	Click "**restore**" to restore the configurations.
Backup	Click "**backup**" to backup the configurations.

4.1.2.7 Upgrade Firmware

Upgrade Firmware page allows you to update firmware of the switch. Before updating, make sure you have had your TFTP server ready and the firmware image (i.e., image.bin) is on the TFTP server.

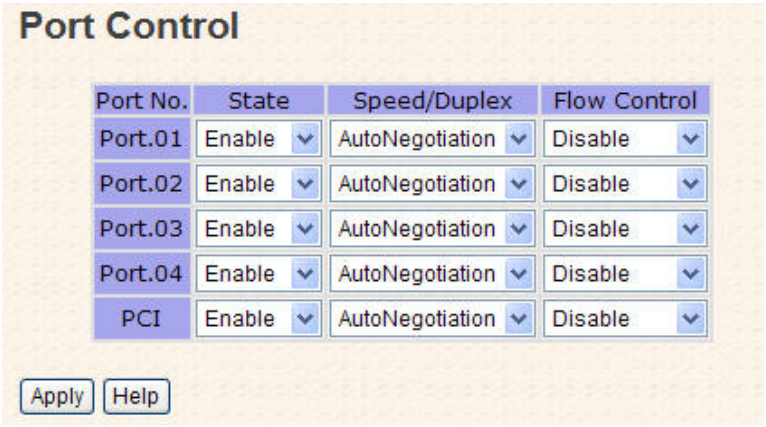


Update Firmware interface

4.1.3 Port Configuration

4.1.3.1 Port Control

By this function, you can set the state, speed/duplex, and flow control



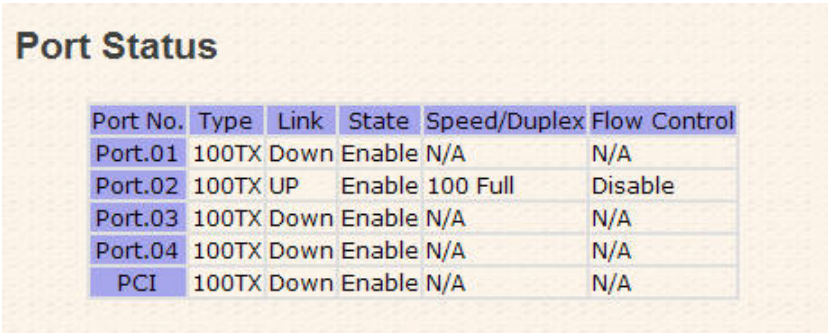
Port Control interface

The following table describes the labels in this screen.

Label	Description
Port NO.	Port number for setting.
State	Enable/Disable the port.
Speed/Duplex	You can set Auto-negotiation, 100 full, 100 half, 10 full, 10 half mode.
Flow Control	Support symmetric and asymmetric mode to avoid packet loss when congestion occurred.
Apply	Click "**Apply**" to activate the configurations.

4.1.3.2 Port Status

The following information provides the current port status.

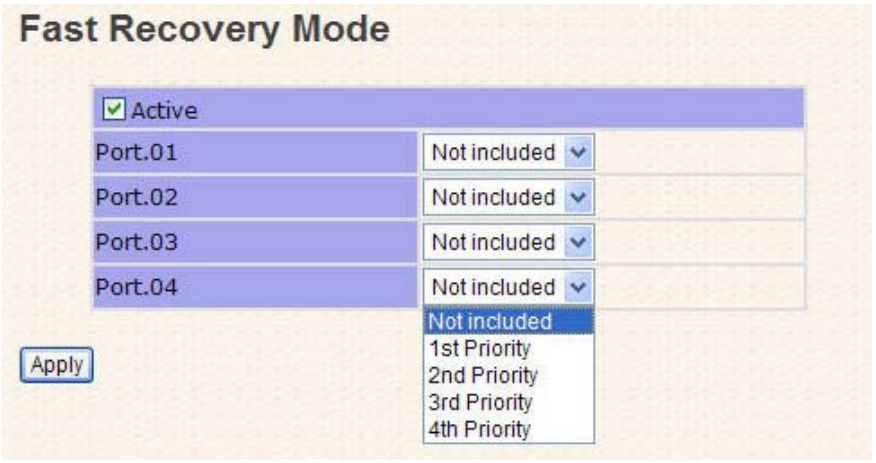


Port Status interface

4.1.4 Redundancy

4.1.4.1 Fast Recovery Mode

The Fast Recovery Mode can be set to connect multiple Ethernet ports of ICS-4040 to one or more switches. Fast Recovery Mode supports 4 priorities for redundant links, only the 1st priority port will be the activated port, the other ports configured with lower priority will be the backup path.



Fast Recovery Mode interface

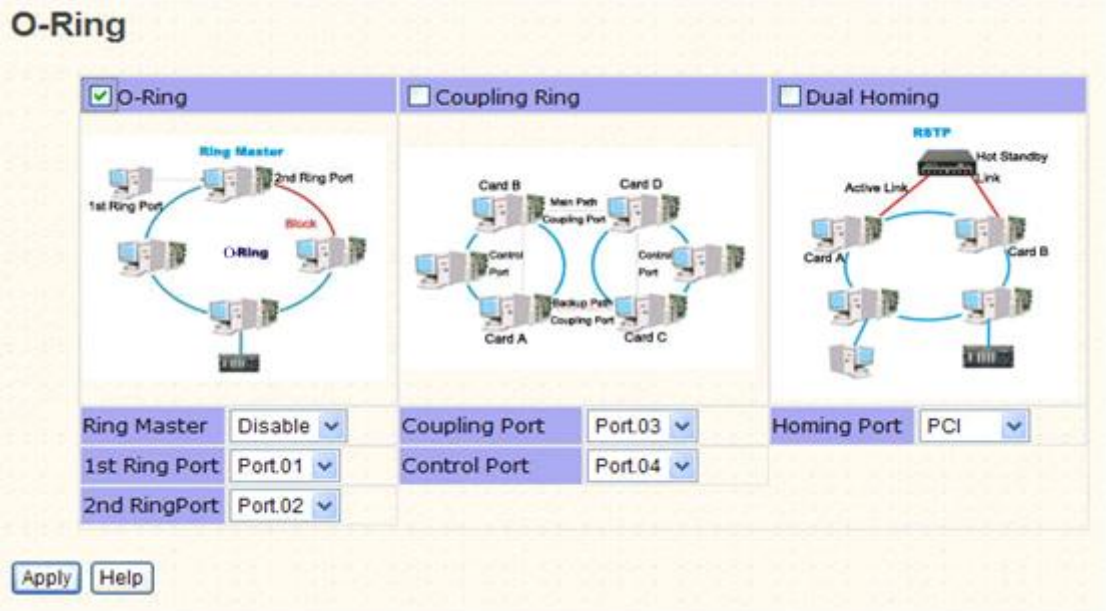
The following table describes the labels in this screen.

Label	Description
Active	Activate the fast recovery mode.
port	Port can be configured as 4 priorities. Only the port with highest priority will be the active port. 1st Priority is the highest.
Apply	Click "**Apply**" to activate the configurations.

Note: If you configure redundancy mode by DIP switch, it is not allowed to change the operation mode by WEB UI.

4.1.4.2 O-Ring

O-Ring is one of the most powerful redundant ring technologies in the industry field. With its advanced technology, the recovery time of O-Ring is less than 10 ms over 250 units. It can minimize the interruption cause by network topology change. There are three ring topology supported: O-Ring, Coupling Ring and Dual Homing.



O-Ring interface

The following table describes the labels in this screen.

Label	Description
O-Ring	To enable O-Ring.
Ring Master	There should be one and only one Ring Master in a ring. However if there are two or more switches which set Ring Master to enable, the switch with the lowest MAC address will be the actual Ring Master and others will be Backup Masters.
1st Ring Port	The primary port, when this switch is configured in O-Ring.
2nd Ring Port	The backup port, when this switch is configured in O-Ring.
Coupling Ring	To enable Coupling Ring. Coupling Ring can be used to divide a big ring into two smaller Rings to avoid effecting all switches when network topology change. It is a good application for connecting two Rings.
Coupling Port	Set a port as coupling port to link to the Coupling Port of the switch in another ring. Coupling Ring need four switch to construct an active and a backup link. The coupled four ports of

	four switches will be operated at active/backup mode.
Control Port	Set a port as Control Port to link to the Control Port of the switch in the same ring. Control Port used to transmit control signals.
Dual Homing	To enable Dual Homing. By selecting Dual Homing mode, Ring will be connected to normal switches through two RSTP links (i.e., backbone Switch). The two links act as active/backup mode, and connect each Ring to the normal switches in RSTP mode.
Apply	Click "**Apply**" to activate the configurations.

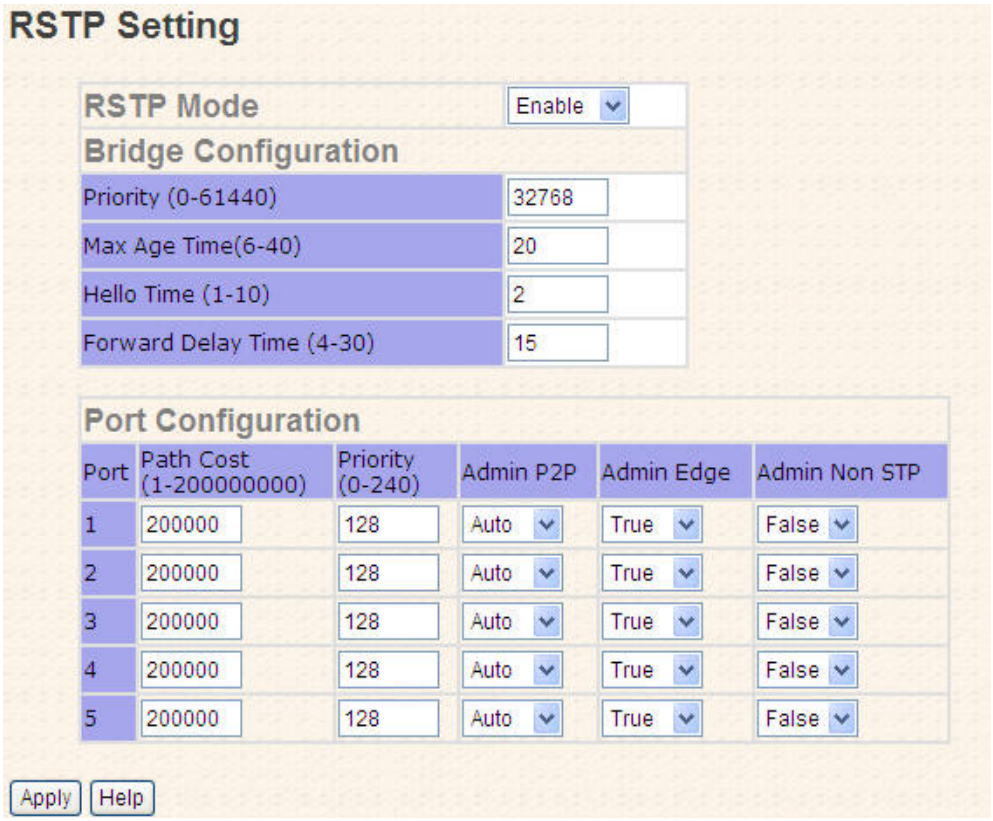
Note: It is not recommended to set one switch as a Ring Master and a Coupling Ring at the same time due to heavy load of system.

4.1.4.3 RSTP

The Rapid Spanning Tree Protocol (RSTP) is an evolution of the Spanning Tree Protocol (STP). It provides faster convergence of spanning tree after a topology change. The system also supports STP and the system will detect the connected device that is running STP or RSTP protocol automatically.

RSTP setting

You can enable/disable RSTP function, and set parameters for each port.



RSTP Setting interface

The following table describes the labels in this screen.

Label	Description
RSTP mode	You must enable or disable RSTP function before configuring the related parameters.
Priority (0-61440)	A value used to identify the root bridge. The bridge with the lowest value with the highest priority and is selected as the root. If the value changes, you must restart the switch. The value must be multiple of 4096 according to the rule of the protocol.
Max Age (6-40)	The number of seconds for a bridge to wait without receiving Spanning-tree Protocol configuration messages before reconfiguration. Enter a value between 6 through 40.
Hello Time (1-10)	The time that controls switch sends out the BPDU (Bridge Protocol Data Unit) packet to check RSTP current status. Enter a value between 1 through 10.
Forwarding Delay Time (4-30)	The number of seconds a port to wait before changing from its learning/listening state to forwarding state. Enter a value between 4 through 30.
Path Cost (1-200000000)	The cost of the path to the other bridge from this transmitting bridge at the specified port. Enter a number 1 through 200000000.
Priority (0-240)	Decide which port should be blocked by setting the priority in LAN. Enter a number 0 through 240. The value of priority must be the multiple of 16
Admin P2P	Some of the rapid state transactions that are possible within RSTP are dependent upon whether the port concerned can only be connected to exactly one other bridge (i.e., It is served by a point-to-point LAN segment), or it can be connected to two or more bridges (i.e., It is served by a shared medium LAN segment). This function allows the P2P status of the link to be manipulated administratively. True means P2P enabled. False means P2P disabled.
Admin Edge	The port directly connected to end stations, and it cannot create bridging loop in the network. To configure the port as an edge port, set the port to "**True**".
Admin Non STP	The port includes the STP mathematic calculation. STP algorithm is included for "**True**" setting, STP algorithm is not

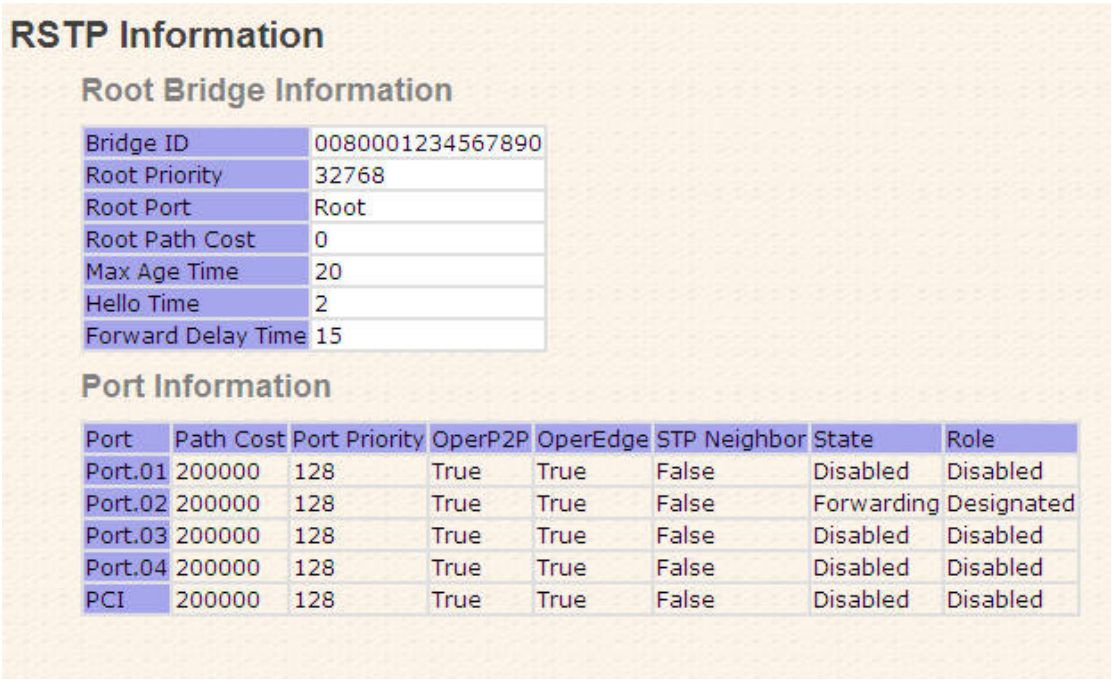
	included for "**False**" setting.
Apply	Click "**Apply**" to set the configurations.

NOTE: Follow the rule to configure the MAX Age, Hello Time, and Forward Delay Time:

2 x (Forward Delay Time value –1) ≥ Max Age value ≥ 2 x (Hello Time value +1)

RSTP Information

Result of RSTP algorithm is shown at this table.



RSTP Information

Root Bridge Information

Bridge ID	0080001234567890
Root Priority	32768
Root Port	Root
Root Path Cost	0
Max Age Time	20
Hello Time	2
Forward Delay Time	15

Port Information

Port	Path Cost	Port Priority	OperP2P	OperEdge	STP Neighbor	State	Role
Port.01	200000	128	True	True	False	Disabled	Disabled
Port.02	200000	128	True	True	False	Forwarding	Designated
Port.03	200000	128	True	True	False	Disabled	Disabled
Port.04	200000	128	True	True	False	Disabled	Disabled
PCI	200000	128	True	True	False	Disabled	Disabled

RSTP Information interface

4.1.5 SNMP Configuration

Simple Network Management Protocol (SNMP) is the protocol developed to manage nodes (servers, workstations, routers, switches and hubs etc.) on an IP network. SNMP enables network administrators to manage network performance, find and solve network problems, and plan for network growth. Network management systems learn of problems by receiving traps or change notices from network devices implementing SNMP.

4.1.5.1 SNMP – Agent Setting

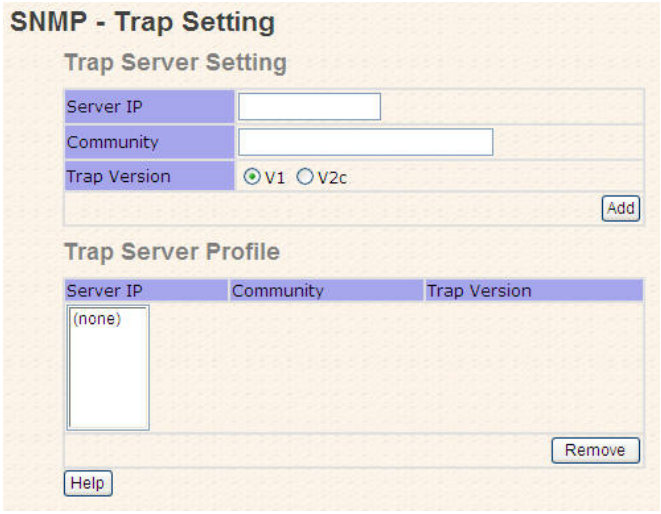
You can set SNMP agent related information by Agent Setting Function.

The following table describes the labels in this screen.

Label	Description
SNMP – Agent Setting	SNMP Community should be set for SNMP. Four sets of "Community String/Privilege" are supported. Each Community String is maximum 32 characters. Keep empty to remove this Community string.

4.1.5.2 SNMP –Trap Setting

A trap manager is a management station that receives traps, the system alerts generated by the switch. If no trap manager is defined, no traps will issue. Create a trap manager by entering the IP address of the station and a community string. To define management stations as trap manager and enter SNMP community strings and selects the SNMP version.



SNMP – Trap Setting interface

The following table describes the labels in this screen.

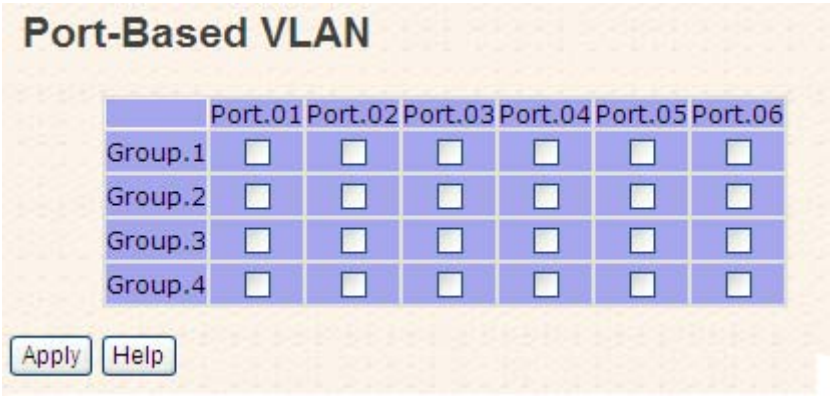
Label	Description
Server IP	The server IP address to receive Trap
Community	Community for authentication
Trap Version	Trap Version supports V1 and V2c.
Add	Add trap server profile.
Remove	Remove trap server profile.
Help	Show help file.

4.1.6 VLAN

A Virtual LAN (VLAN) is a logical network grouping that limits the broadcast domain, which allows you to isolate the network traffic. Only the members of the VLAN will receive traffic from the same members of VLAN. Basically, creating a VLAN from a switch is equivalent of reconnecting a group of network devices to another Layer 2 switch. However, all the network devices are still plugged into the same switch physically. The ICS-4040 switch card supports port-based VLAN only.

4.1.6.1 VLAN Configuration – Port Based

Traffic is forwarded to the member ports of the same vlan group. vlan port based startup, set in the same group of the port, can be a normal transmission packet, without restricting the types of packets.



VLAN Configuration – Port Based VLAN interface

The following table describes the labels in this screen.

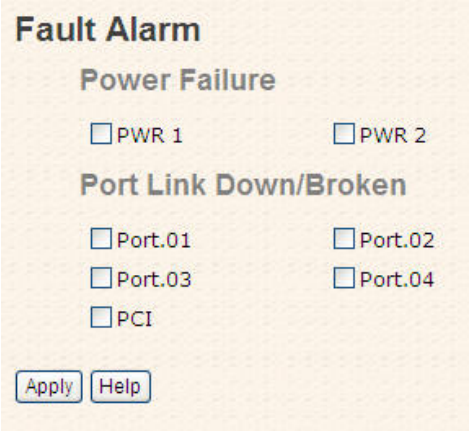
Label	Description
Group	Mark the blank to assign the port into VLAN group.
Apply	Click "**Apply**" to activate the configurations.
Help	Show help file.

4.1.7 Warning

Sending warning message is a very important function for the application of Ethernet switch. You will be informed by SYSLOG and E-MAIL by using ICS-4040. It helps you to monitor the status of the switch card on remote site. When events occurred, the warning message will send the message to your appointed server, E-MAIL, or fault relay.

4.1.7.1 Fault Alarm

When any selected fault event is happened, the Fault LED in switch panel will light up and the electric relay will signal at the same time.



Fault Alarm interface

The following table describes the labels in this screen.

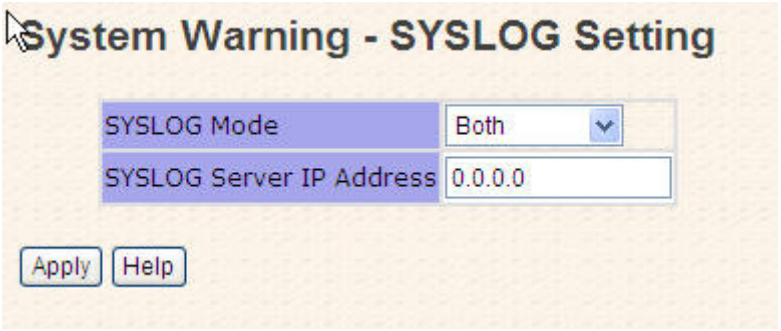
Label	Description
Power Failure	Mark the blank of PWR 1 or PWR 2 to monitor.
Port Link Down/Broken	Mark the blank of port 1 to port 4 to monitor.
Apply	Click "**Apply**" to activate the configurations.
Help	Show help file.

4.1.7.2 System Alarm

System alarm support to send warning notifications: 1. SYSLOG. 2. E-MAIL. You can monitor switch through selected system events.

System Warning – SYSLOG Setting

The SYSLOG is a protocol to transmit event notification messages across networks. Please refer to RFC 3164 - The BSD SYSLOG Protocol



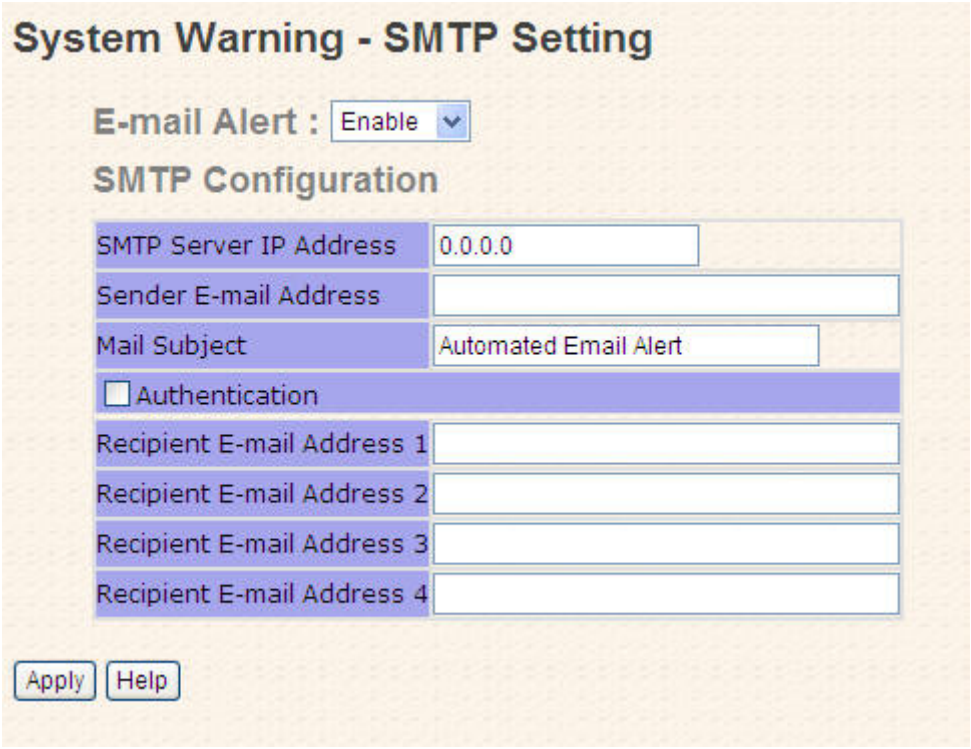
System Warning – SYSLOG Setting interface

The following table describes the labels in this screen.

Label	Description
SYSLOG Mode	**Disable:** disable SYSLOG. **Client Only:** log to local system. **Server Only:** log to a remote SYSLOG server. **Both:** log to both of local and remote server.
SYSLOG Server IP Address	The remote SYSLOG Server IP address.
Apply	Click "**Apply**" to activate the configurations.
Help	Show help file.

System Warning – SMTP Setting

The SMTP is stand for Simple Mail Transfer Protocol. It is a protocol for e-mail transmission through the Internet. Please refer to RFC 821 - Simple Mail Transfer Protocol.



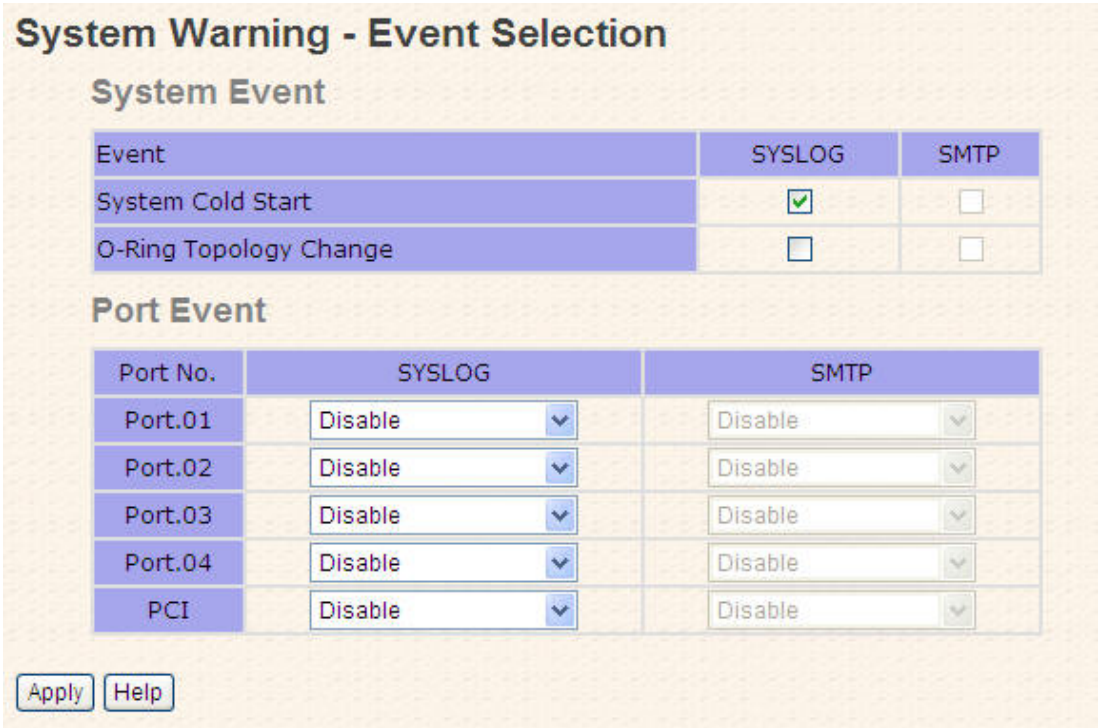
System Warning – SMTP Setting interface

The following table describes the labels in this screen.

Label	Description
E-mail Alarm	Enable/Disable transmission system warning events by e-mail.
Sender E-mail Address	The SMTP server IP address
Mail Subject	The Subject of the mail
Authentication	**Username:** the authentication username. **Password:** the authentication password. **Confirm Password:** re-enter the password.
Recipient E-mail Address	The recipient's E-mail address. It supports 6 recipients for a mail.
Apply	Click "**Apply**" to activate the configurations.
Help	Show help file.

System Warning – Event Selection

SYSLOG and SMTP are the two warning methods that supported by the system. Check the corresponding box to enable system event warning method you wish to choose. Please note that the checkbox can not be checked when SYSLOG or SMTP is disabled.



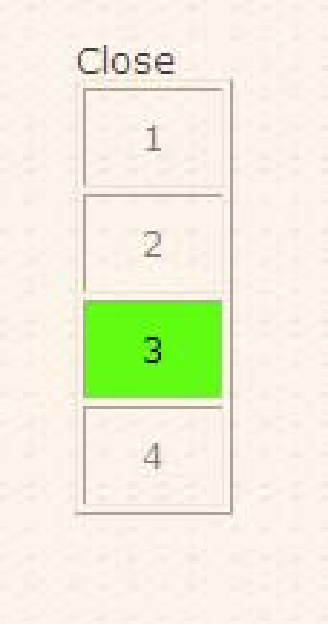
System Warning – Event Selection interface

The following table describes the labels in this screen.

Label	Description
System Event	Event to send notifications
System Cold Start	Alert when system restart
Ring Topology Change	Alert when Ring topology changes
Port Event	**Disable** **Link Up** **Link Down** **Link Up & Link Down**
Apply	Click "**Apply**" to activate the configurations.
Help	Show help file.

4.1.8 Front Panel

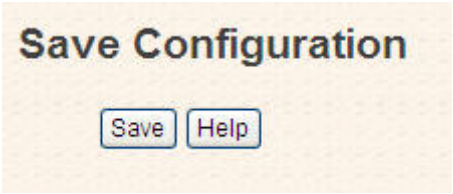
The link status of ICS-4040 is shown here. Click Close to close front panel on web.



Front Panel interface

4.1.9 Save Configuration

If any configuration changed, "**Save Configuration**" should be clicked to save current configuration data to the permanent flash memory. Otherwise, the current configuration will be lost when power off or system reset.



System Configuration interface

The following table describes the labels in this screen.

Label	Description
Save	Save all configurations.
Help	Show help file.

4.1.10 Factory Default

Factory Default interface

This page is to reset switch to default configuration. Click Reset to reset all configurations to the default value. You can select "**Keep current IP address setting**" and "**Keep current username & password**" to prevent IP, username and password been reset to default.

4.1.11 System Reboot

System Reboot interface

Technical Specifications

Technology	
Ethernet Standards	IEEE802.3 10BASE-T IEEE802.3u 100BASE-TX IEEE802.3x Flow Control and Back pressure IEEE802.1D Spanning tree protocol IEEE802.1w Rapid Spanning tree protocol
Ring redundancy	STP RSTP O-Ring Couple Ring Dual Homing Fast recovery mode
Driver Support	Windows 95/NT/98/2000/ME/XP/2003/Vista 32-bit Novel NetWare 3. and above Linux 2.4.x/2.6.x WINCE 4.0/5.0
MAC addresses	1024
VLAN	Port based
Processing	Store-and-Forward
Firmware upgrade	TFTP
Interface	
PCI specification	Meets PCI Local Bus specification, Rev 2.2 PCI 32-bit Bus Master architecture
Wake On LAN	Supports Wake On LAN (WOL) through PCI bus
RJ45 Ports	4 x 10/100Base-T(X), Auto MDI/MDI-X
LED Indicators	Per Unit : Power (Green/Red) RJ45 Ports: Per Port : Link/Activity(Green/Blinking Green), Ring Port (Amber)
Power Requirements	
Power Input Voltage	PCI Power: + 5V DC on PCI bus External Power: +9 ~ 30VDC in Terminal block

Reverse Polarity Protection	Present
Power Consumption	3.5 Watts Max
Environmental	
Operating Temperature	-10 to 60°C
Storage Temperature	-40 to 85°C
Operating Humidity	5% to 95%, non-condensing
Mechanical	
Dimensions(W x D x H)	124mm(W) x 100mm(D)
Regulatory Approvals	
EMI	FCC Part 15, CISPER (EN55022) class A
EMS	EN61000-4-2 (ESD), EN61000-4-3 (RS), EN61000-4-4 (EFT), EN61000-4-5 (Surge), EN61000-4-6 (CS)
Warranty	3 years