IT-ES618-IM-4D Series
Managed Industrial Ethernet Switch
User Manual

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IT-ES618-IM-4D Series User Manual

Statement

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Revision History

Version No.	Date	Reason
V1.0.0	2013-7	Creating Documents

Notes

In reading this manual, please pay attention to the following symbols,

Information necessary to explain

Special attention

Content

CHAPTER 1 SUMMARIZE 1

1.1 INTRODUCTION 1
1.2 FEATURES 1

- **SUPPORT IEEE802.3, IEEE802.3U, IEEE 802.3X, IEEE802.1Q, IEEE802.1P 1**
- **SW-RING RING NETWORK PATENT TECHNOLOGY (FAULT RECOVERY**

TIME<20MS） 1

CHAPTER 2 HARDWARE DESCRIPTION 3

2.1 PANEL DESIGN 3
2.2 POWER SUPPLY INPUT 7
2.3 RELAY CONNECTION 7
2.4 DIP SWITCH 7
2.5 COMMUNICATION PORT 7
2.6 SERIAL PORT CONNECTION 9
2.7 LED INDICATOR 10
2.8 INSTALLATION 10

CHAPTER 3 APPEARANCE AND DIMENSION 12

3.1 APPEARANCE 12
3.2 DIMENSION 13

CHAPTER 4 PACKLING LIST 14

CHAPTER 5 CONFIGURE IT-ES618-IM-4D SERIES ETHERNET SWITCH 15

5.1 MODIFY IP ADDRESS 15
5.2 LOGIN WEBSERVER 16
5.3 INTRODUCTION CONFIGURE INTERFACE 17
5.3.1 Main menu 17
5.3.2 System status 18
5.3.2.1 Device information 18
5.3.2.2 Port information 19
5.4 SERIAL DEVICE SERVER 19
5.4.1、Configure serial port parameter 19
5.4.2、Configure working mode 21
5.4.3. Serial port information 24
5.5 Port configuration 24
5.5.1 Port settings 24
5.5.2 Bandwidth management 26
5.6 L2 FEATURES 28
5.6.1 VLAN 28
5.6.1.1 Based on port VLAN 28
5.6.1.2 Based on IEEE 802.1Q VLAN 28
5.6.2 Static filtering 32
5.6.3 QoS 33
5.7 REDUNDANCY 36
5.7.1 SWRing 36
5.7.2 RSTP 43
5.7.3 Port trunking 45
5.8 ACCESS PROFILE 46
5.8.1 User name and password 46
5.9 REMOTE MONITORING 47
5.9.1 SNMP management 47
5.9.2 Relay alarm 49
5.10 TRAFFIC STATISTICS 50
5.10.1 RX frame statistics 50
5.10.2 TX frame statistics 51
5.11 NETWORK DIAGNOSIS 51
5.11.1 Port mirroring 51

5.12 BASIC SETTINGS 52
5.12.1 Device address 52
5.12.2 System identification 53
5.12.3 System File Upgrade 54
5.12.4 System logout 56
CHAPTER 6 OTHER FUNCTION CONFIGURE 57
6.1 DIP SWITCH 57
6.1.1 Factory default 57
APPENDIX 1 GLOSSARY TABLE 58
APPENDIX 2 DEFAULT FACTORY 59
APPENDIX 3 TREATMENT OF COMMON PROBLEMS 60

CHAPTER 1 SUMMARIZE

1.1 Introduction

IT-ES618-IM-4D series is an industrial, management, redundant industrial Ethernet switch and integrate 4 port serial device server. It included
1. IT-ES618-IM-4D(RS-232)-P(12/48VDC), Support 8 ports 10/100Base T(X) and 4 ports RS-232,
2. IT-ES618-IM-4D(RS-485)-P(12/48VDC), Support 8 ports 10/100BaseT(X) and 4 ports RS-485/422,
3. IT-ES618-IM-4F-4D(RS-485)-P(12/48VDC), Support 1-4 ports is 10/100BaseT(X) Ethernet, 5-8 ports is 100BaseFX fiber port and 4 ports RS-485/RS-422,
4. IT-ES618-IM-2F-4D(RS-232)-P(12/48VDC), Support 1-6 ports is 10/100BaseT(X) Ethernet, 7-8 ports is 100BaseFX fiber port and 4 ports RS-232,
5. IT-ES618-IM-4F-4D(RS-232)-P(12/48VDC), Support 1-4 ports is 10/100BaseT(X) Ethernet, 5-8 ports is 100BaseFX fiber port and 4 ports RS-232,
6. IT-ES618-IM-2F-4D(RS-485)-P(12/48VDC), Support 1-6 ports is 10/100BaseT(X) Ethernet, 7-8 ports is 100BaseFX fiber port and 4 ports RS-485/422,

It adopted SW-Ring redundant technology (Recovery time<20ms), users can set the redundant easily to increase network reliability, furthermore. It adopted no fan, low power consumption design, IP40, corrugate high strength iron shell, the performance is more steadily. It accorded with CE, FCC standard and Industrial 4 class, DIN rail installation and wide operating temperature (-40~85°C), it can satisfied some kinds of industrial environment, it can provide reliable and quickly solution for your Ethernet device.

SWRing™ is designed as rapid redundancy network arithmetic. It provided recover technology for fault of rapid redundant network, the recovery time<20ms.

1.2 Features

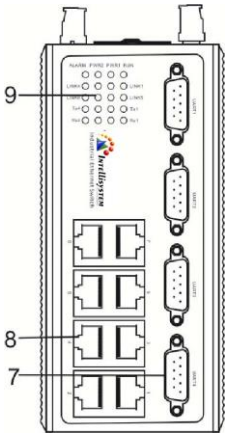
- Support IEEE802.3, IEEE802.3u, IEEE 802.3x, IEEE802.1Q, IEEE802.1p
- 8 pieces 10/100Base-TX port and 100Base-FX fiber port
- Back panel bandwidth: 1.6 Gbps
- SW-Ring ring network patent technology (Fault recovery time<20ms）
- Support Port based VLAN and IEEE 802.1Q VLAN
- Support IGMP Snooping 、flow statistics and bi-directional port mirroring
- Support 802.1p _QOS
- Support RSTP
- Support SNMP
- Support port bandwidth limit function, optimizing bandwidth utilization
- Support 4 port RS-232 or RS-485/ RS-422 port the serial port server
- Support applications accessing based on Socket
- Support Server , Client and UDP
- Support Windows serial driver model
- Support TCP, UDP, APR, ICMP and DHCP
- Support through the gateway, cross routing communication
- Serial port support adaptive function（Realcom）

- Support WEB configuration, CLI command line, Telnet management function
- 2K MAC address table
- Support power reverse connection protection.
- Support redundant power supply, delay alarm output, heat radiation naturally and LED indicator front and back
- IP40 protection grade
- Industrial grade 4 design, -40~85℃ work temperature，5%～95% relative humidity
- Power requirements 24VDC（12～48VDC）
- DIN-rail, hanging and panel mounting

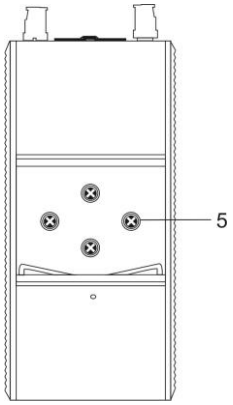
CHAPTER 2 HARDWARE DESCRIPTION

2.1 Panel design

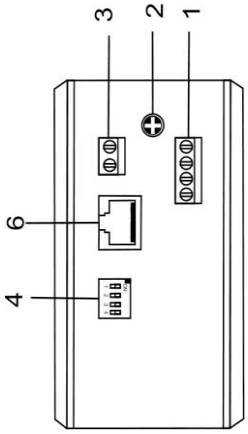
IT-ES618-IM-4D（RS-232)-P(12/48VDC)



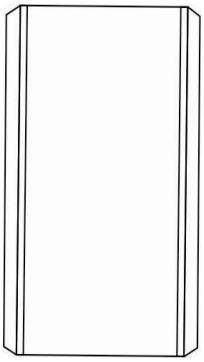
Front panel



Back panel



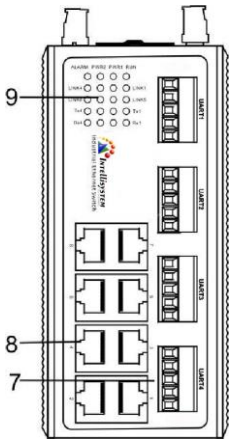
Top panel



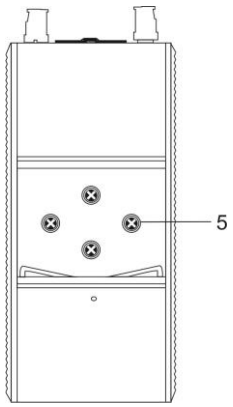
Bottom panel

1. PWR1/PWR2 power input
2. Ground screw
3. Relay output terminal block
4. DIP switch
5. DIN-Rail mounts
6. CONSOLE port
7. RS-232 serial port
8. 10Base-T /100Base-TX port
9. LED indicator

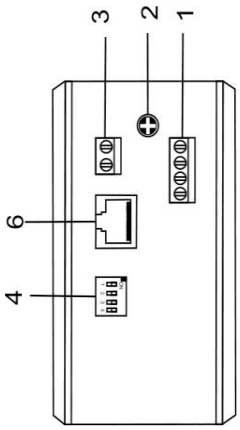
IT-ES618-IM-4D(RS-485)-P(12/48VDC)



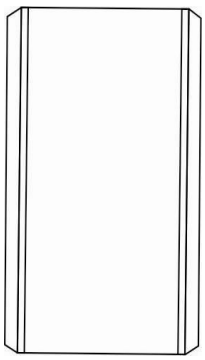
Front panel



Back panel



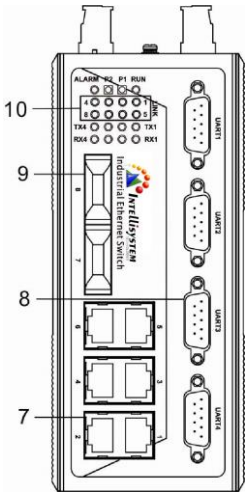
Top panel



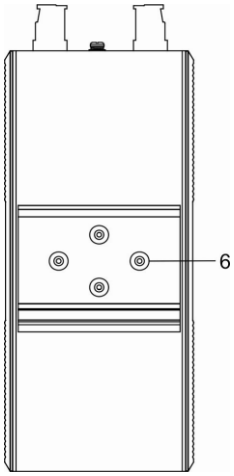
Bottom panel

1. PWR1/PWR2 power input
2. Ground screw
3. Relay output terminal block
4. DIP switch
5. DIN-Rail mounts
6. CONSOLE port
7. RS-485/422 serial port
8. 10Base-T /100Base-TX port
9. LED indicator

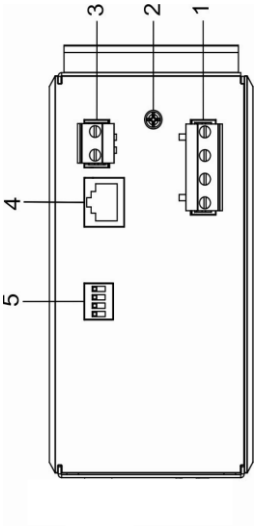
IT-ES618-IM-2F-4D(RS-232)-P(12/48VDC)



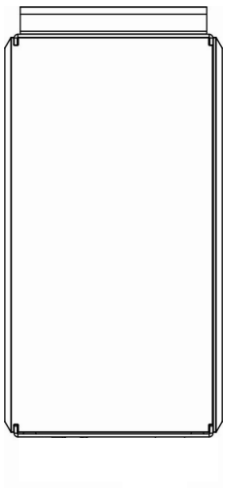
Front panel



Back panel



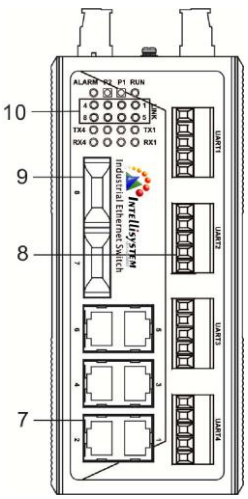
Top panel



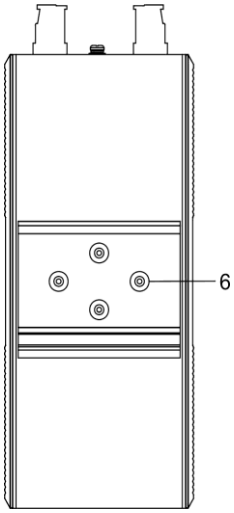
Bottom panel

1. PWR1/PWR2 power input
2. Ground screw
3. Relay output terminal block
4. CONSOLE port
5. DIP switch
6. DIN-Rail mounts
7. 10Base-T /100Base-TX port
8. RS-232 serial port
9. 100Base-FX port
10. LED indicator

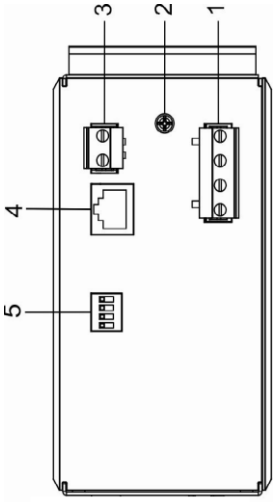
IT-ES618-IM-4F-4D(RS-485)-P(12/48VDC)



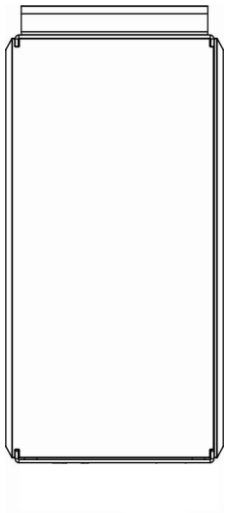
Front panel



Back panel



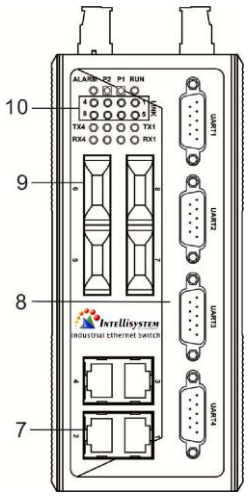
Top panel



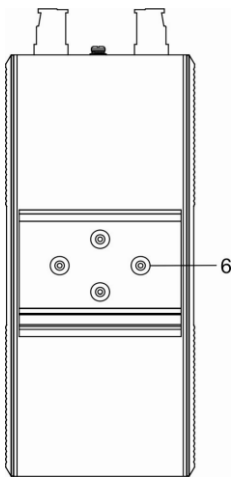
Bottom panel

1. PWR1/PWR2 power input
2. Ground screw
3. Relay output terminal block
4. CONSOLE port
5. DIP switch
6. DIN-Rail mounts
7. 10Base-T /100Base-TX port
8. RS-485/422 serial port
9. 100Base-FX port
10. LED indicator

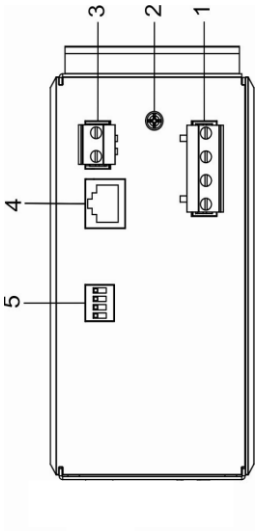
IT-ES618-IM-4F-4D(RS-232)-P(12/48VDC)



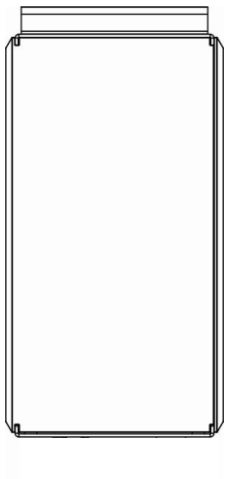
Front panel



Back panel



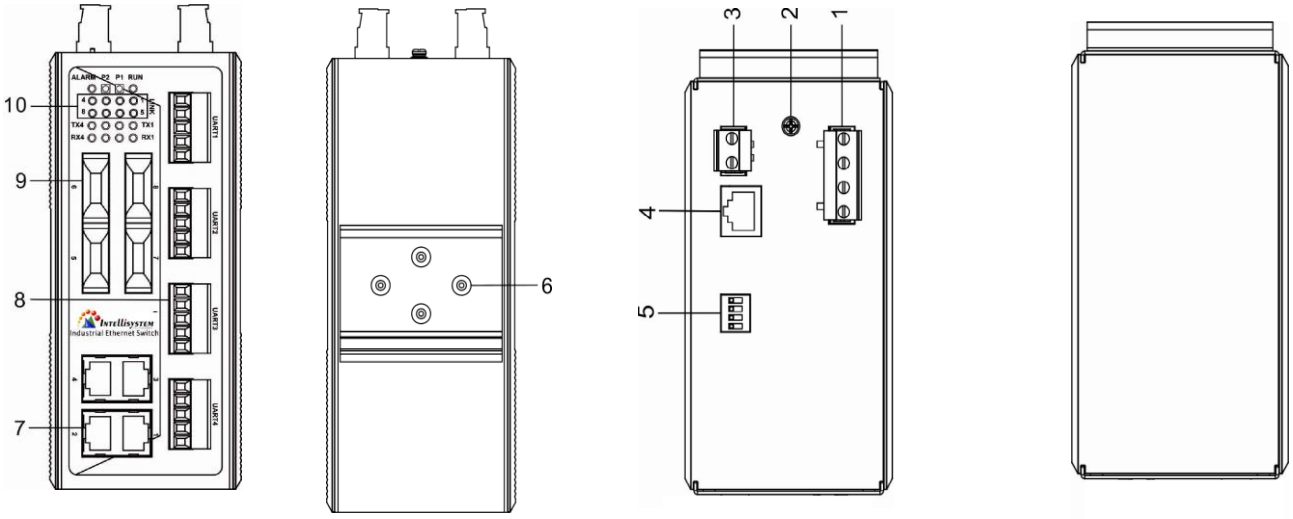
Top panel



Bottom panel

1. PWR1/PWR2 power input
2. Ground screw
3. Relay output terminal block
4. CONSOLE port
5. DIP switch
6. DIN-Rail mounts
7. 10Base-T /100Base-TX port
8. RS-232 serial port
9. 100Base-FX port
10. LED indicator

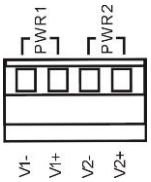
IT-ES618-IM-2F-4D(RS-485)-P(12/48VDC)



Front panel Back panel Top panel Bottom panel

1. PWR1/PWR2 power input
2. Ground screw
3. Relay output terminal block
4. CONSOLE port
5. DIP switch
6. DIN-Rail mounts
7. 10Base-T /100Base-TX port
8. RS-485/422 serial port
9. 100Base-FX port
10. LED indicator

2.2 Power supply input



IIT-ES618-IM-4D series top panel provided 4 bit power supply input terminal block, support DC input. DC power supply input supported redundancy function, provided PWR1 and PWR2 power input, can use for single, and can connect 2 separately power supply system, use 1 pair terminal block connect the device at the same time. If one of the power systems broke, the device can work un-interruptible. Built-in over-current protection, Reverse connection protection.

2.3 Relay connection

The relay owns two contacts of the terminal block on the top pane of IT-ES618-IM-4D series. It is used to detect both power failure and port failure. The two wires attached to contacts form an open circuit when:

(1) IT-ES618-IM-4D series has lost power supply from one of the DC power inputs.

(2) One of the ports is failure.

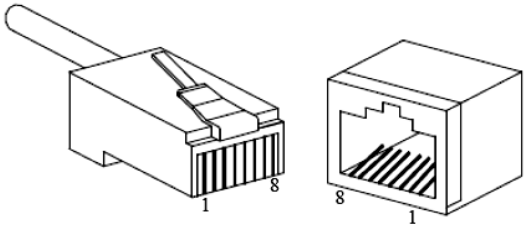
2.4 DIP switch

Top panel provided 4 bits DIP switch to do function configure（OFF is default factory）,1 and 4 keep for future function. 2 is recovery default factory. 3 is for upgrade. Please power off and power on when you change the status of DIP switch.

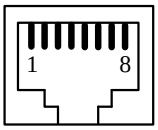
2.5 Communication port

10Base-T /100Base-TX Ethernet port

10Base-T/100Base-TX Ethernet port is located on front panel and the type is RJ45. The pinout of RJ45 port connects to UTP or STP. The distance is not more than 100m. 100Mbps Ethernet connector takes 100Ω of UTP 5, 10Mbps Ethernet connector takes 100Ω of UTP 3, 4, 5.



RJ45 port supports automatically MDI/MDI-X connection. It can connect PC, Server, Converter and HUB .Corresponding connection of Pin 1,2,3,6 is like this: 1→3, 2→6, 3→1, 6→2. The definition of Pin is displayed as below.

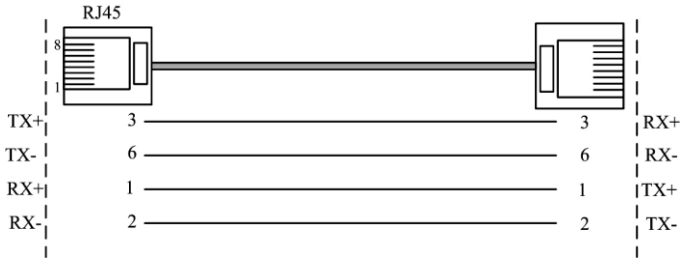


PIN	MDI	MDI-X
1	TX+	RX+
2	TX-	RX-
3	RX+	TX+
6	RX-	TX-
4, 5, 7, 8	—	—

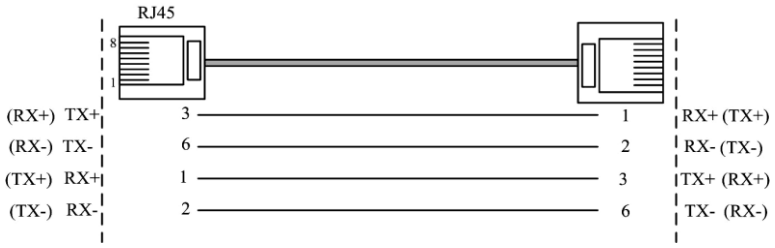
Information necessary to explain:

Note: “TX±”Transmitting data±, “RX±”receiving data±, “—”no use

MDI（**straight-through cable**）:



MDI-X（**Cross-over cable**）:



100Base-FX fiber port

100Base-FX port works with full-duplex, SM or MM SC/ST optional. The fiber port must be used in pair, TX (transmitting) port connects remote switch’s RX (receive) port; RX (receiving) port connect remote switch’s TX (transmitting) port.

Suppose: If you make your own cable, we advise to label the two sides of the cable with the same letter (A-to-A and B-to-B, shown as below, or A1-to-A2 and B1-to-B2).

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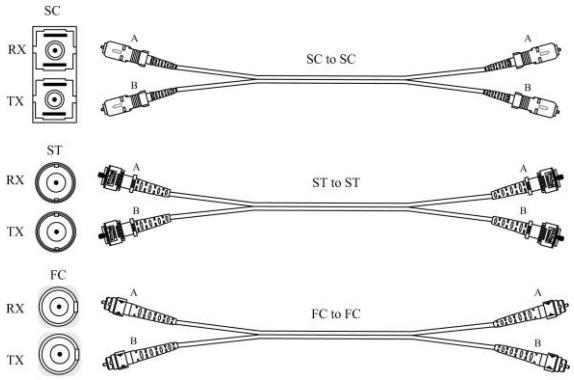
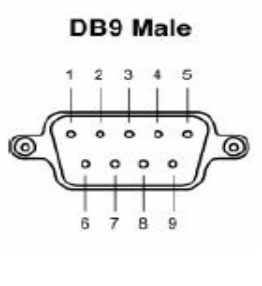


2.6 Serial port connection

RS-232 Serial port:



DB9 Male（RS-232）

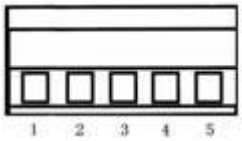
PIN	RS-232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	—

RS-485 Serial port:

PIN	RS-485
1	D+
2	D-
3	/
4	/
5	/

RS-422 Serial port:

PIN	RS-422
1	T+
2	T-
3	GND
4	R+
5	R-



RS-485/422

2.7 LED Indicator

LED	Indicator	Description
PWR1	ON	P1 connection regularly
	OFF	P1 Power supply have no connection or unwonted
PWR2	ON	P2 connection regularly
	OFF	P2 Power supply have no connection or unwonted
Run	ON/OFF	Device unwonted
	Flashing	Device working steadily
Link/ACT	ON	Established effective network connection
	Flashing	Network in activity statues
	OFF	Did not established effective network connection
RX	Flashing	In receiving data
	OFF	None data receive
TX	Flashing	In transmitting data
	OFF	None data transmit

2.8 Installation

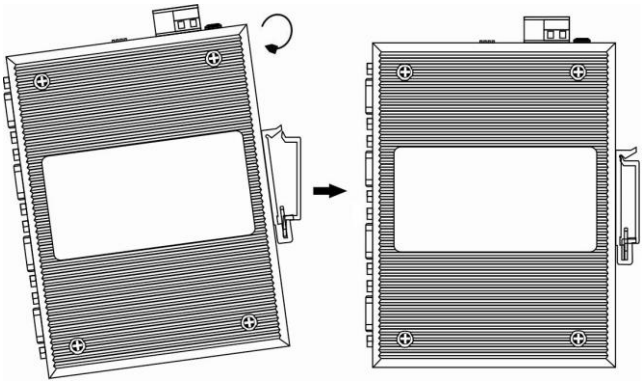
Before installation, confirm that the work environment meet the installation require, including the power needs and abundant space. Whether it is close to the connection equipment and other equipment are prepared or not.

1. Avoid in the sunshine, keep away from the heat fountainhead or the area where in intense EMI.
2. Examine the cables and plugs that installation requirements.
3. Examine whether the cables be seemly or not (less than 100m) according to reasonable scheme.
4. Screw, nut, tool provide by yourself.
5. Power: redundant 12~48VDC or 100~240VAC power input
6. Environment： working temperature -25～70℃
   Relative humidity 5%～95%

DIN-Rail Installation

In order to use in industrial environments expediently, IT-ES618-IM-4D adopts 35mm DIN-Rail installation, the installation steps as follows:

1. Examine the DIN-Rail attachment
2. Examine DIN Rail is firm or not and the position is suitable or not.
3. Insert the top of the DIN-Rail into the slot just below the stiff metal spring.
4. The DIN-Rail attachment unit will snap into place as shown below.



Wiring Requirements

Cable laying need to meet the following requirements,

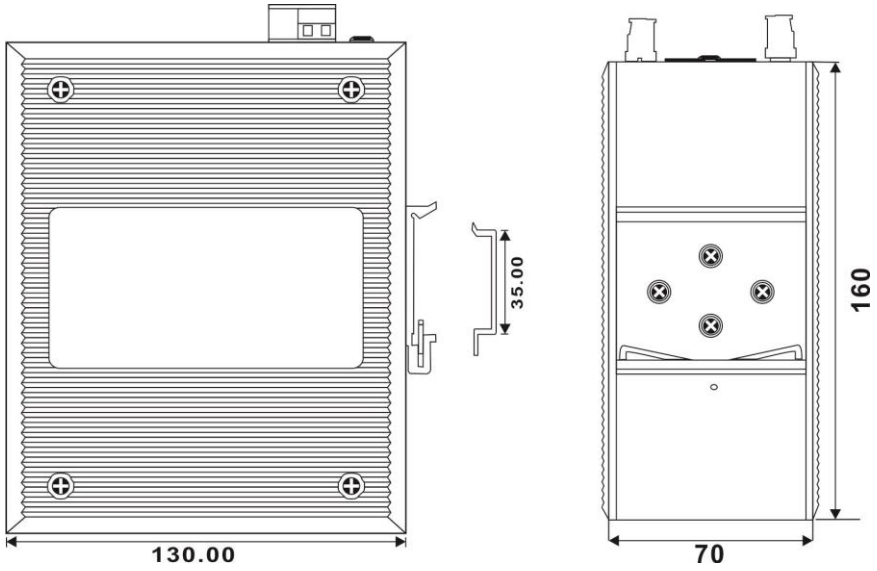
1. It is needed to check whether the type, quantity and specification of cable match the requirement before cable laying;
2. It is needed to check the cable is damaged or not, factory records and quality assurance booklet before cable laying;
3. The required cable specification, quantity, direction and laying position need to match construction requirements, and cable length depends on actual position;
4. All the cable cannot have break-down and terminal in the middle;
5. Cables should be straight in the hallways and turning;
6. Cable should be straight in the groove, and cannot beyond the groove in case of holding back the inlet and outlet holes. Cables should be banded and fixed when they are out of the groove;
7. User cable should be separated from the power lines. Cables, power lines and grounding lines cannot be overlapped and mixed when they are in the same groove road. When cable is too long, it cannot hold down other cable, but structure in the middle of alignment rack;
8. Pigtail cannot be tied and swerved as less as possible. Swerving radius cannot be too small (small swerving causes terrible loss of link). Its banding should be moderate, not too tight, and should be separated from other cables;
9. It should have corresponding simple signal at both sides of the cable for maintaining.

Chapter 3 Appearance and Dimensions

3.1 Appearance

IT-ES618-IM-4D series

3.2 Dimensions



CHAPTER 4 PACKLING LIST

Please check the packaging and accessories by your first using. Please inform us or our distributor if your equipment have been damaged or lost any accessories, we will try our best to satisfy you.

Description	Quantity
Intellisystem Industrial Ethernet switch	1
User manual	1
CD	1
Warranty card	1
Product Qualified Card	1

CHAPTER 5 Configure IT-ES618-IM-4D series Ethernet switch

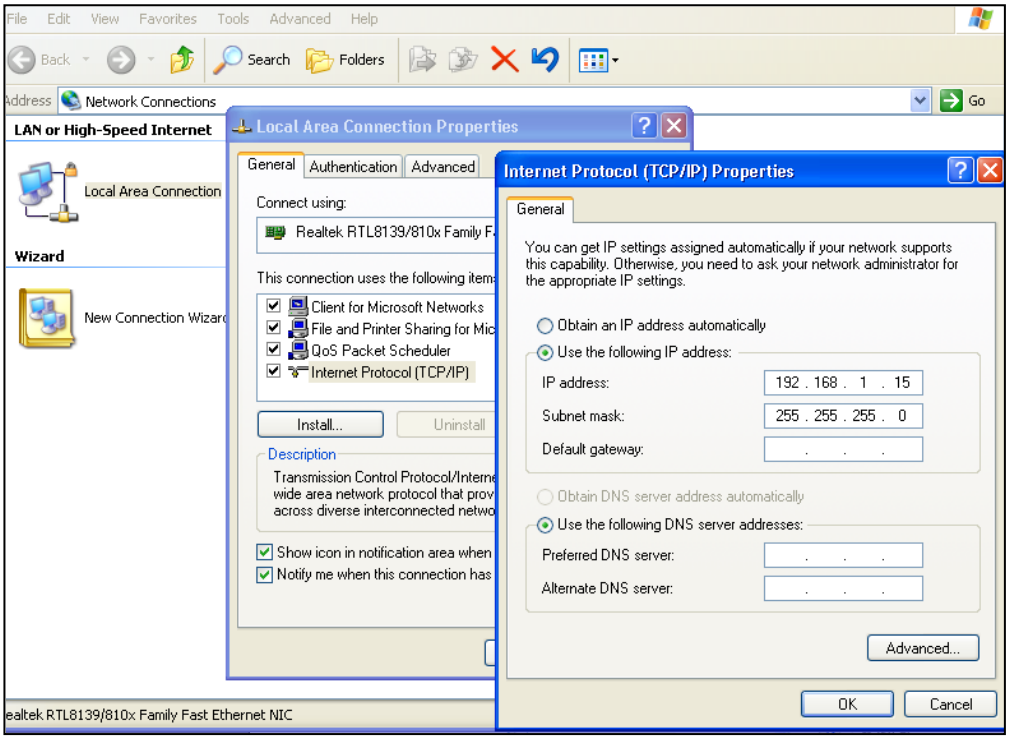
5.1 Modify IP address

IT-ES618-IM-4D series default address is: 192.168.1.254, subnet mask is: 255.255.255.0. When entering into IT-ES618-IM-4D series Web interface through internet explorer, the IP address of IT-ES618-IM-4D series and PC must be in the same Local Area Network.

You can modify PC's or IT-ES618-IM-4D series IP address to make sure that they are in the same Local Area Network. Operating process can follow method 1 or method 2 as below,

Method 1: Modify PC's IP address

- Click Start->Control panel->network connections->Local area Connection->Properties->Internet protocol （TCP/IP）Setting PC's IP address: 192.168.1.X (X is less than 254, from 2 to 253).
- Click "OK", IP address modifies successfully



Method 2: Modify IT-ES618-IM-4D series IP address through the management software.

- Install the management software on the PC.
- Enter into the management interface, click "Search" to search the device.
- After searching the device, move mouse to the device, click right key, modify the device's IP address, Please make sure the device and PC in the same Local Area Network.

This configuration example does not use the Advanced button in the last picture. In one and the same network card allows the use of multiple IP pseudo-address when use the advanced configuration of the IP address, at which does not change the original address can still access the switch device. But in the IGMP polling and IEEE 802.1x polling windows system can not handle correctly, Unix-like system does not have this problem. The advanced users have to pay attention to this issue.

Configuration preparing

1. The lowest requirement for user's computer is as below:

- Install operating system (Windows XP/2000,etc)
- Install Ethernet card
- Install Web explorer (IE6.0 or higher version)
- Install and start TCP/IP protocol

2. Establish the correct network configuration

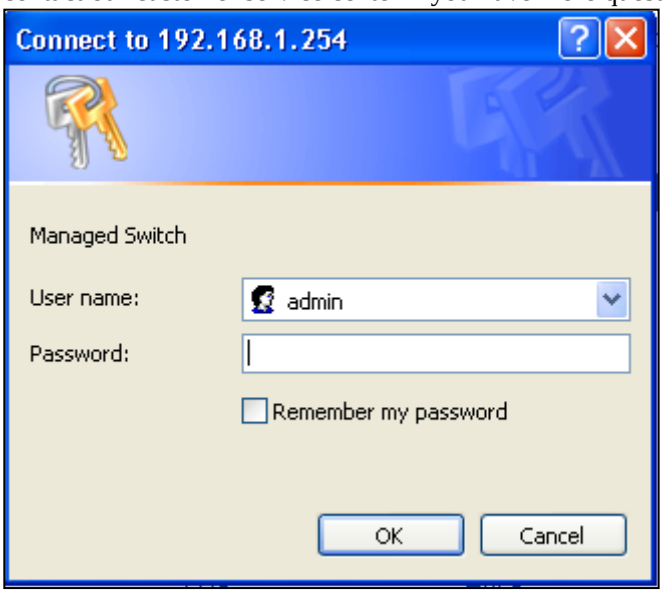
The default management IP address of IT-ES618-IM-4D series: 192.168.1.254, subnet mask as: 255.255.255.0. Before access to the configuration interface, the computer's IP address and the switch must be configured in the same subnet (IP address configuration, please refer to "5.1") if need local configuration; Computers and switches must be routed reach if for remote configuration.

How to log on to Web Server

Please type in the default IP of switch on the browser's address bar, and then will pop-up a window by clicking the "enter" key which shows you have to enter your user name and password. The default username and password is "admin". You can enter your username and password 3 times if you found the username and password is incorrect. If the 3 input error, the browser will display a "401 Unauthorized" error message. Refresh the page and then enter the correct user name and password, log on to the Web Server, it will recommend to modify the user name and password. Please contact our customer service center if you have more questions.

5.2 Login Webserver

Please type in the default IP of switch on the browser's address bar, and then will pop-up a window by clicking the "enter" key which shows you have to enter your user name and password. The default username and password is "admin". You can enter your username and password 3 times if you found the username and password is incorrect. If the 3 input error, the browser will display an "Access denied" error message. Refresh the page and then enter the correct user name and password, log on to the Web Server, it will recommend to modify the user name and password. Please contact our customer service center if you have more questions.



（Figure 5.2.1）

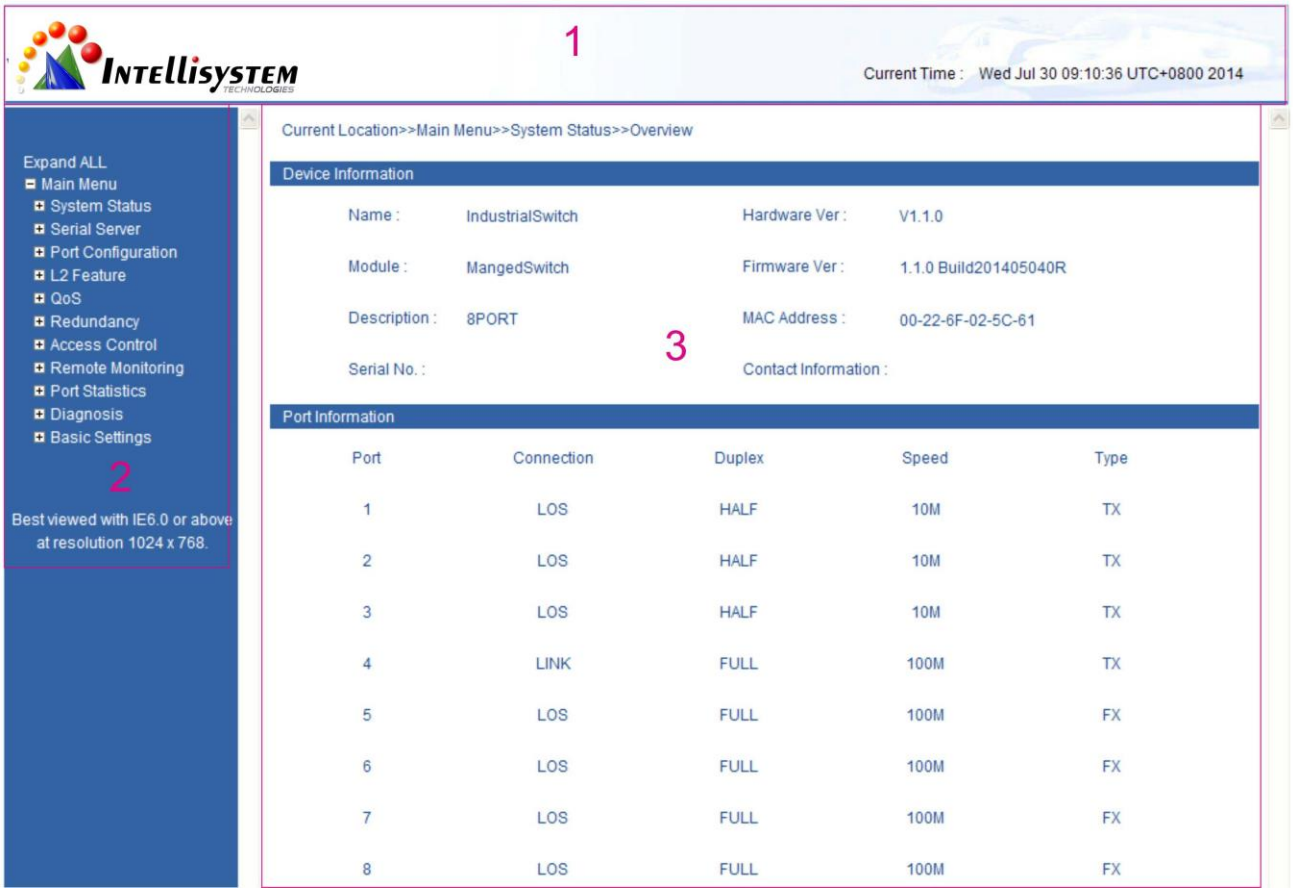
The default username and password is [admin], case sensitive for this series. The default password is with administrator privileges.

:

Before entering the IT-ES618-IM-4D series switch Webserver, you must delete temporary IE files, and clear IE history, or perhaps because IE cookies due to an unknown error.
The user name and password are case sensitive. Such as unclear devices IP address, can be obtained through the management software search. (attached)

5.3 Introduction configure interface

The Web configuration page is divided into: 1 titles, 2 main menu, 3 configuration menu bar area three parts. Click the menu item in the menu bar, you can enter the corresponding configuration interface, display device state information and data configuration. As shown in Figure 5.3.1.



（Figure 5.3.1）

5.3.1 Main menu

Menu Introduction:

Main Menu	Tag	Function
System Status	System information	Display device information and port information such as software version, IP address, etc.
Serial device servers	Serial configuration	Serial parameter and Working mode configuration
	Serial information	Display incorrect data statistics and connection information that send by serial port.
Port Configuration	Port settings	Display and configure information of each port: such as connection status, configuration modes, flow status etc.

Main Menu	Tag	Function
	Bandwidth management	Set the maximum rate of the input/output packets for port.
L2 feature	VLAN	Displays the current list of 802.1Q VLAN, configure and manage 802.1Q VLAN.
	QOS	Configure the DSCP priority.
	Static Multicast	Configure the static multicast MAC address and its corresponding port.
Redundancy	Port Trunking	Configure port trunking group.
	Rapid Ring	Configure the rapid ring network port and type.
	RSTP	Configure the parameters of RSTP.
Access control	Login Settings	Configure different permissions for the user name and password.
Remote Monitoring	SNMP	Set up a simple configuration
	Relay Warning	Set relay alarm type
Port Statistics	Frame statistics	
Diagnosis	Mirror	Configure the mirror port and mirrored port.
System management	Password	Modify user name and password
	Device address	Configure device's IP address, network mask, gateway, DNS server address. Restart device remotely.
	System information	Display and configure device model name, serial number, description and contact information
	Files management	Upload and download configuration files, system upgrade and factory default

Web Timeout Treatment

The system timeout will cancel the login if the user did not login for a long time (The configuration of this login will be remained in the Web interface).

If user doesn't operate the Web interface for a long time, The system will be canceled this login.(but configuration change made in this login will be saved in Web configuration interface.). If the user wants to do any operating on Web configuration interface again, the system will remind user and returns to the login dialog box. Users need to log in again if operating is needed. The timeout time is 300s.

5.3.2 System status

Enter the correct user name and password that the normal IT-ES618-IM-4D series WEB interface display information about the state of the system, including: the main menu, equipment information, port information, and displayed in the upper left corner of the page's Intellisystem Technologies. the registered trademark, the upper right corner of display is the current time, as shown in figure 5.3.2 show:

（Figure 5.3.2）

5.3.2.1 Device informations

Equipment information mainly display basic information, IT-ES618-IM-4D series include: equipment type, equipment name, description of the equipment, equipment, hardware version number, firmware version, the IT-ES618-IM-4D series of MAC address, contact method. As shown in figure 5.3.3

（Figure 5.3.3）

5.3.2.2 Port informations

IT-ES618-IM-4D series a total of 8 ports, ports can confirm whether the port with the equipment complies with the information bar. Equipment at work, via the port status of the port information in the status view, for example in the figure below you can see port 4 is LINK and port connection status as FULL, speed is 100M and port type for the TX(RJ45). As shown in Figure 5.3.4.

LINK：Indicates that the port is in a connected state；

LOS：Indicates that the port is not connected；

FULL：Indicates that the port State is full duplex；

HALF：Indicates that the port State is half-duplex (if the ports are not connected, the port status is HALF)；

Port Information

Port	Connection	Duplex	Speed	Type
1	LOS	HALF	10M	TX
2	LOS	HALF	10M	TX
3	LOS	HALF	10M	TX
4	LINK	FULL	100M	TX
5	LOS	FULL	100M	FX
6	LOS	FULL	100M	FX
7	LOS	FULL	100M	FX
8	LOS	FULL	100M	FX

（Figure 5.3.4）

5.4 Serial device server

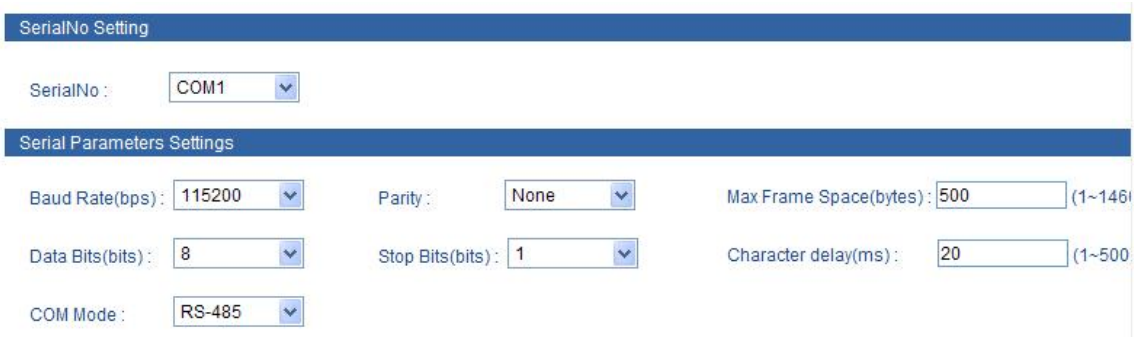
Server configuration includes the serial port configuration and mode of operation of the configuration parameters

5.4.1、Configure serial port parameter

Serial port configuration menu	Optional data	Description
Serial port working mode	RS-232 full duplex/RS-422 full	Serial work mode

	duplex/RS-485 half duplex	
Baud rate（bps）	300-115200（10pcs band rate optional）	Baud rate choice
Parity	None, Even, Odd, Mark, Space	Checkout choice
Data bits（bits）	5,6,7,8	The parameter of serial
Stop bits (bits)	1,1.5,2	The last of the data package
Max frame space(bytes)	1-1460	The length of frame from serial data to Ethernet data.
Character delay（ms）	1-500	The time space from serial data to Ethernet data

Enter into IT-ES618-IM-4D series WEB interface, knock [Serial Server/COM settings], please choice necessary configuration in drop down list, the serial configuration interface is as follows:



（Figure 5.4.1）

Configuration option: [Baud rate], [Parity], [Data Bits], [Stop Bits], [Max Frame Space], [Character Delay] and [COM mode], the explaining is as follows:

[Baud rate]

It is a parameter to check the communication speed. It shows to transfer how many bits in 1 second. For example, 300 baud rate means have 300 bits transferred in 1 second.

[Parity]

Parity bits: It is a simple method to checkout fault in serial communication,
have 4 types: Even, Odd, Mark, Space

[Data Bits]

It is a parameter to check the actual data bits in communication.
When PC send a Packet, actual data is not 8 bits, the standard is 5, 6, 7, 8.。

[Stop Bits]

The last bit of the single Packet. Typical value is 1, 1.5 and 2 bit.
When data bits is 5, stop bit 1.5 and 1 option. When data bits is 6, 7, 8, stop bit 1 and 2 option.

[Max frame space]

The frame length that serial interface data convert into Ethernet data, within the range of setting time, it forward when data is equal to or longer than the setting frames.

Available setting value ranged from1 to 1024.

[Character Delay]

The wait time when serial interface send data do not 1 data frames. If up to this time and do not have data, then send automatic. Can configure 1-500.

[COM mode]

Web interface default work mode if up to the model name, if the product is RS-485, it is RS-485 or RS422, If the product is RS-232, it is RS-232

5.4.2、Configure working mode

Working mode configuration menu：

Configuration menu	Data option		Description
Sessions	1-4		
Working mode	Based mode	TCP Client TCP Server UDP TcpAuto	Choice serial port working mode, default is not open
	Advanced mode	Tcp Server	
		UDP	
Local port	1-65535		COM1 default is 30000，COM4 default is 30003, between them, add step by step
Target address	Default is192.168.0.254		
Target port	1-65535		COM1 default is 31000，COM4 default is 31003, between them, add step by step
Connect mode	Connect immediately/data trigger		Default is connect immediately
AT	0-65535 s		Default is 0
Disconnect Timeout	0-65535 s		Default is 300
RealCom	Open/Close		Default is Close

[Sessions]

Each serial port of serial device servers can support 1-4 sessions. It means serial port of serial device server send the received data to Ethernet through socket. More than one of the sessions means serial port of serial device server sends the received data to Ethernet through more than one socket. Sessions enable to use by checking the corresponding box.

Based mode

1．TCP client

As TCP Client side, serial device server will connect forwardly to TCP/IP network equipment, such as PC. It need to setup to tell serial device server to connect which network address and TCP port number when conditions is matched. After creating socket, serial device server will sent the data received from each serial port through socket On the contrary, the data received from socket will be sent to the corresponding serial port.

TCP Client setting option: [Target address], [Target port], [Connect mode] and [AT]

The explanation of these setting is as follows

[Local port]

The configuration is the same TCP server, default is 0~65535.

[Target address]

The IP address or domain name address that device will connect, both of them can correspond the host computer address on the Internet

[Target port]

The port that device will be connected, default is 1~65535.

[Connect mode]

Connection mode has 2 types: Immediately and Data trigger

Immediately: When IT-ES618-IM-4D series have power supply, it will connect immediately, if connection cut off, it will connect immediately.

Data trigger: Once IT-ES618-IM-4D series receive the data, it will connect immediately.

[AT]

IT-ES618-IM-4D send the AT package accord the setting time, if no response continue 3 times, will be cut off.

If set "0", meaning this function closed, the range is 0-65535 second, default is 0 second.

[Disconnect Timeout]

Setting the vacancy time for connection cut off automatic; if there do not have data transfer, the connection will cut off. If set "0", means do not care how much time vacancy, IT-ES618-IM-4D do not cut off voluntary. The range is 1-65535s. Default is 300s

The figure below is the configuration interface of TCP Client Mode. Session 1 is setting to local address available for router."192.168.2.168"， the "Destination Port" connected to serial port is host computer 192.168.2.168" 31000 port, Connection mode is Immediately, Disconnect Timeout time is 300 seconds, please pay attention to pure TCP Client, TCP Server, UDP or TCP Auto mode. Please close RealCom. Session 3 is setting to Internet address available for router "www.test.com"（the choice this time is DNS）the "Destination Port" connected to serial port is host computer "www.test.com" 31002 port，Connection mode is Immediately, Disconnect Timeout time is 300 seconds, click "Apply', setting successful.

（Figure 5.4.2）

2. TCP server

TCP Server, Passive connect, one pivotal parameter is [Local port], have relationship with other setting, need

combine setting

[Local port]

IT-ES618-IM-4D series provided TCP port can be connect by other TCP/IP node, the TCP port have the relationship with the IT-ES618-IM-4D series's relevant serial interface. The figure as follows is TCP Server setting interface, Session 1 set local port is 30000, external TCP port connect IT-ES618-IM-4D series through this port. Connection keep-alive time is 300 second。 Click "Apply", setting successful as figure 5.4.3

3．UDP

Under the UDP work mode. IT-ES618-IM-4D is server and also client, the relevant setting is "Local port", "Target address" and "Target port". It can support point to point and multicast UDP, setting method is the same as TCP.

4．TCP Auto

In this Mode, serial device server can act as server or client. Before setting this Mode, please ensure related parameters are correct when you turn on the server mode, client mode is automatically disconnected.

5．RealCom

RealCom support TCP Server and TcpAuto, can choice open and close function in RealCom, figure 5.4.3.

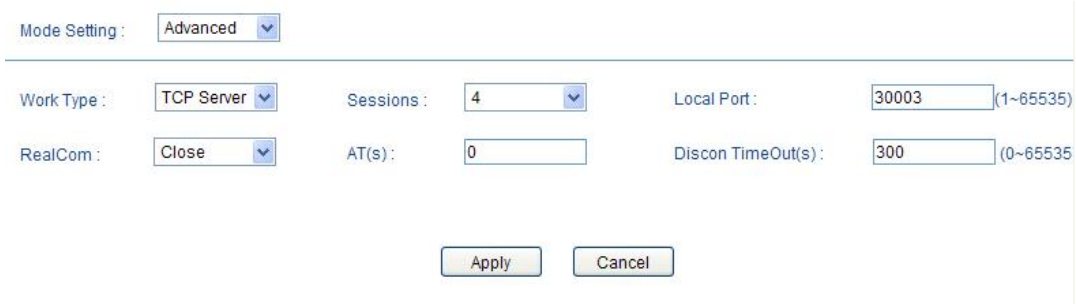
When device open the RealCOM function, can cooperate with VSP Management Software create virtual COM port to communication, now, device's work mode is server, the virtual COM port is client, how to create the Virtual COM port, please the VSP Management Software user manual.

（Figure 5.4.3）

Advanced mode

1. TCP server

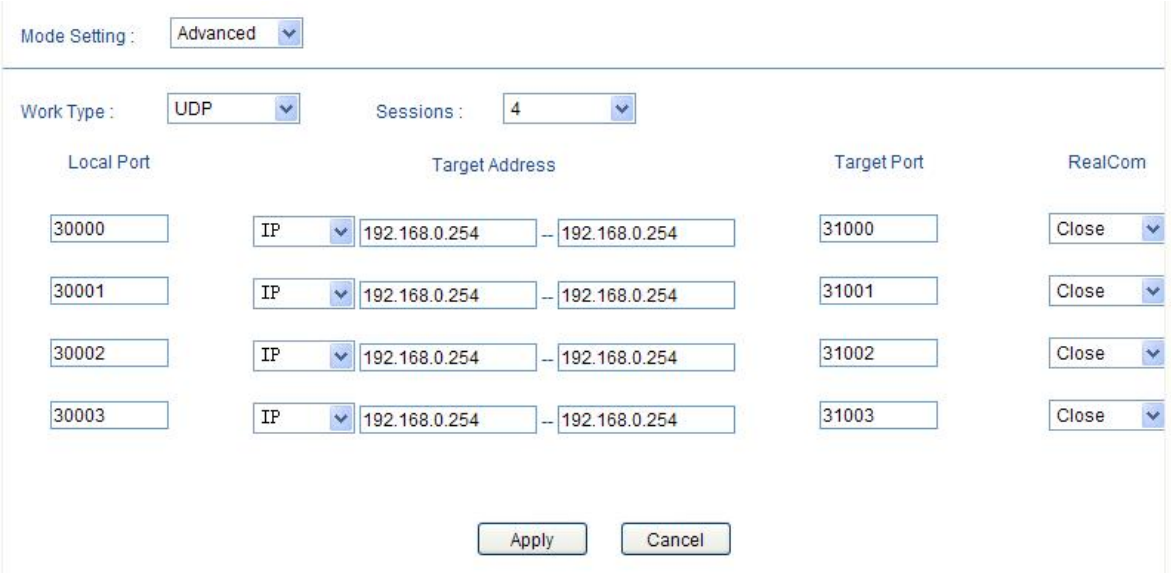
Under this mode, series is server, IT-ES618-IM-4D can choice 0-4 channel connection at the same time, configuration mode is the same based mode. Figure 5.4.4 as follows:



（Figure 5.4.4）

2. UDP

Under this mode, Target address is a address pool, all of the address in pool can connect with NP30XT series, can choice 0-4 channel connect at the same time. Figure 5.4.5 as follows:

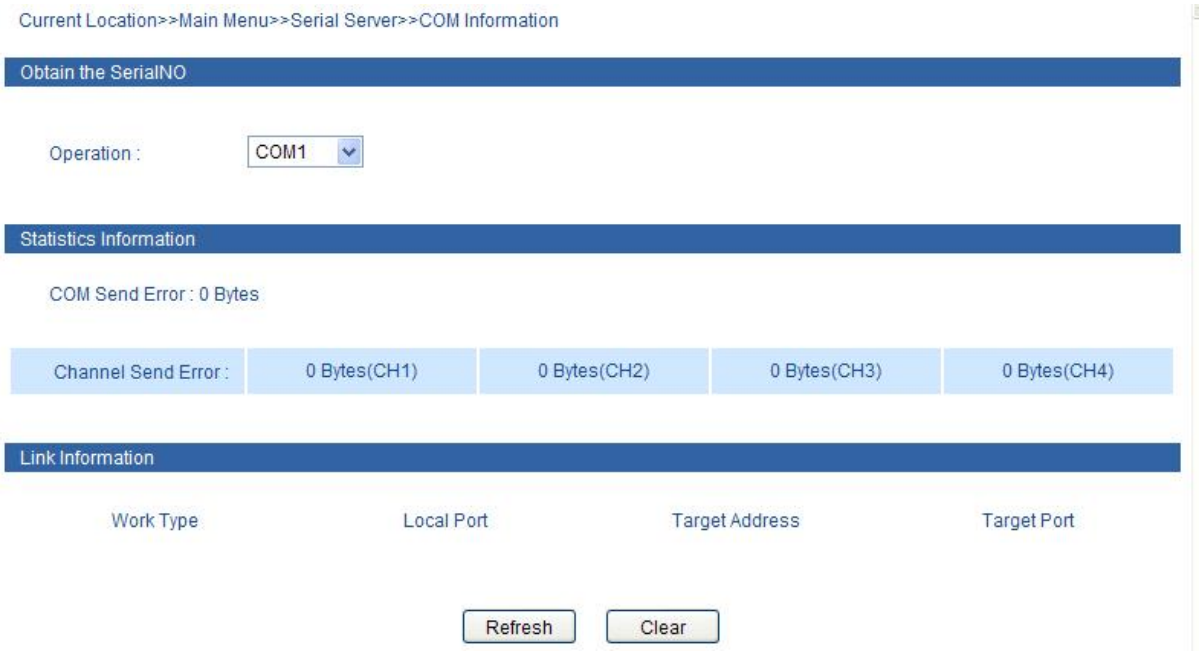


（Figure 5.4.5）

1. Address pool just support Type A and type B address 2. Start address and end address must in the network segment. 3. Start address value must less than or equal to end address.

5.4.3. Serial port informations

It main function of serial port information: Display incorrect data statistics and connection information that send by serial port. Figure as 5.4.6.



（Figure 5.4.6）

5.5 Port configuration

5.5.1 Port settings

The port configuration interface mainly include port type (Electric port or optical port), setup speed mode and

duplex mode, flow control. Only when the port is enabled for the port speed, duplex, flow control will work. Select auto-negotiation, speed, and duplex auto-negotiation.

Configuration Items	Description
Port	Port name, corresponding to mark in panel.
Type	Display port type (TX or FX).
Speed	Display configurable speed of port or auto-negotiation mode.
Duplex	Auto-negotiation（AUTO）, full duplex（FULL）, half duplex（HALF）optional, default mode is auto-negotiation mode.
Enable	Configurable port enables or disable. Selecting square frame is for enable the corresponding port. It cannot transmit data if any port disable. The default is “Enable”.
Flow Control	Whether selecting flow control to the port. Only can selecting flow control when the port enable. The default is off.

Port setting interface, as shown in Figure 5.5.1

（Figure 5.5.1）

This feature is consistent with the port status of the port information, for example: set port 1 and port 2 is for the hundreds of megabytes rate half double work, use network cable connect port 1 and port 2, by port information for a query, you can view the status of port 1 and port 2, as shown in Figure 5.5.2. Port settings and restarts the device when you are finished. View port information column of the port State, rate, whether or not in accordance with reality.

Port Information

Port	Connection	Duplex	Speed	Type
1	LOS	HALF	100M	TX
2	LOS	HALF	100M	TX
3	LOS	HALF	10M	TX
4	LINK	FULL	100M	TX
5	LOS	FULL	100M	FX
6	LOS	FULL	100M	FX
7	LOS	FULL	100M	FX
8	LOS	FULL	100M	FX

（Figure 5.5.2）

:

1. When one end is auto-negotiation, and the other end to force rate setting, according to the Ethernet standard consultation rate for corresponding obligatory rate for half-duplex mode
2. Port flow control auto-negotiation mode can be set only when other modes cannot be set
3. Optical port rate mode, duplex mode, flow control may not be installed. It defaults to full duplex, flow control closed. This feature is consistent with the port status of the port information.

5.5.2 Bandwidth management

Bandwidth management mainly refers to limit the data's egress and ingress bandwidth to save the network sources.

Click [port setting/bandwidth management] and enter into the following interface.

Egress Bandwidth Configuration:

"----" stands for no limitation for the speed, the others are corresponding speed.

As shown in following figure 5.3.3, the forcible egress rate of Port 5 is 8Mbps. Only need to select 8Mbps in egress rate setting of Port 5. The bandwidth of Port 5 as receiver is still 100Mbps, but the forcible egress bandwidth of Port 5 is 8Mbps.

Egress

Port	Rate	Port	Rate	Port	Rate	Port	Rate
1	No Limited	2	No Limited	3	No Limited	4	No Limited
5	8M	6	No Limited	7	No Limited	8	No Limited

（Figure 5.5.3）

Ingress Bandwidth Configuration:

Ingress bandwidth limit includes 4 kinds:

1 All frames;

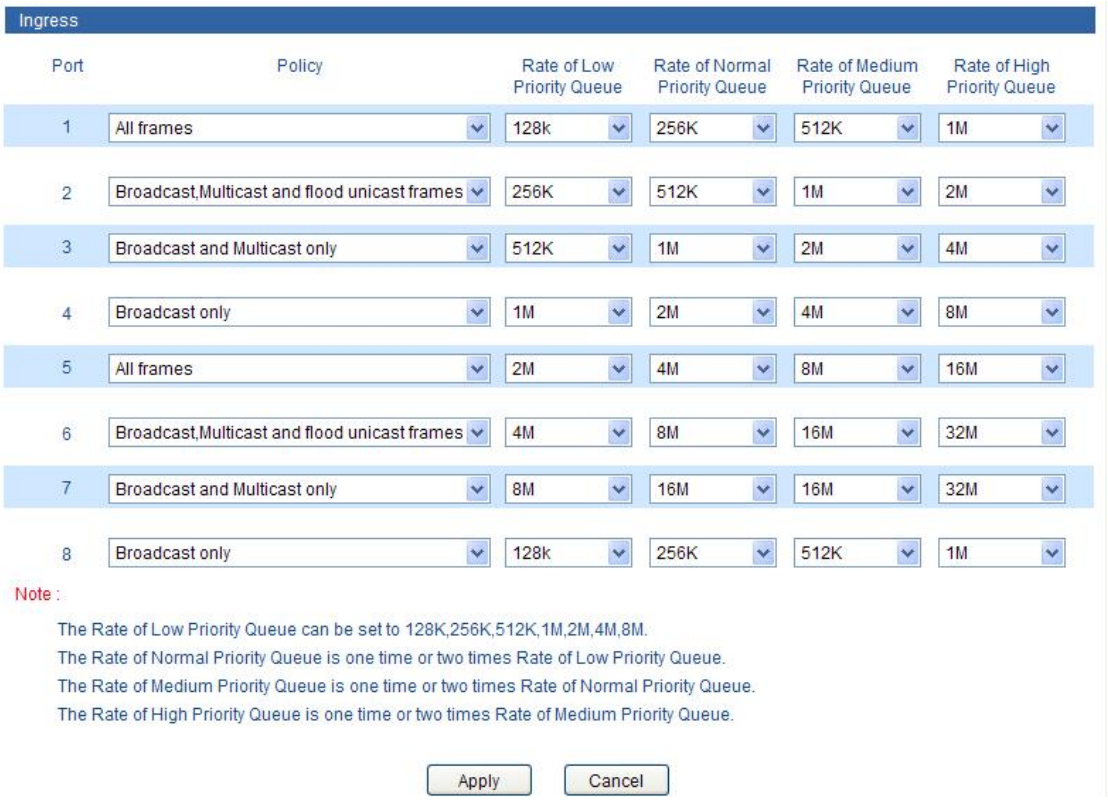
2 Broadcast & Multicast &unicast frames;

3 Broadcast & Multicast only;

4 Broadcasts only

"----" stands for no limitation, the rate of low priority queues （L）can be set as :128k, 256k, 512k, 1M, 2M, 4M, 8M.The rate of normal priority queues（N） is 1 or 2 times as wide as that of low priority queues. The rate of medium priority queues（M）is 1 or 2 times as wide as that of normal one. The rate of high priority queues is 1 or 2 times as wide as that of medium one.

For example, the rate of low priority queues is 256k, and then the rate of normal priority queues can be set for 256k or 512k. Detailed operating as shown in Figure 5.5.4



（Figure 5.5.4）

	Type	Low	Norm	Medium	High
Type	**All frames**	**----**			
	Broadcast, Multicast or unicast frames				
	Broadcast & Multicast only				
	Broadcast only				

The ingress rate is related to CoS priority. Priority Queue is based on QoS setting (the same as QoS assorted setting includes checking CoS priority), or ingress rate will be based on default. CoS priority includes 4 queues: Low，Normal，Medium，High.

Operation method:

1. Choice 2 port at first, for example open the COS priority of port 4 and port 5, please according to 6.5 part
2. Then set port 4's CoS is High, port 5's CoS is LOW in COS mapping setting interface
3. Last set the type of limit package and bandwidth of priority queue in Ingress bandwidth configuration

For example, keep up step 1 and 2, choice "All frame" in port 4 and 5 at step 3. Set 2M in all low priority queue

:

If priority queue bandwidth configuration is available, must mark the enter into port's data pack as CoS.

5.6 L2 Features

5.6.1 VLAN

5.6.1.1 Based on port VLAN

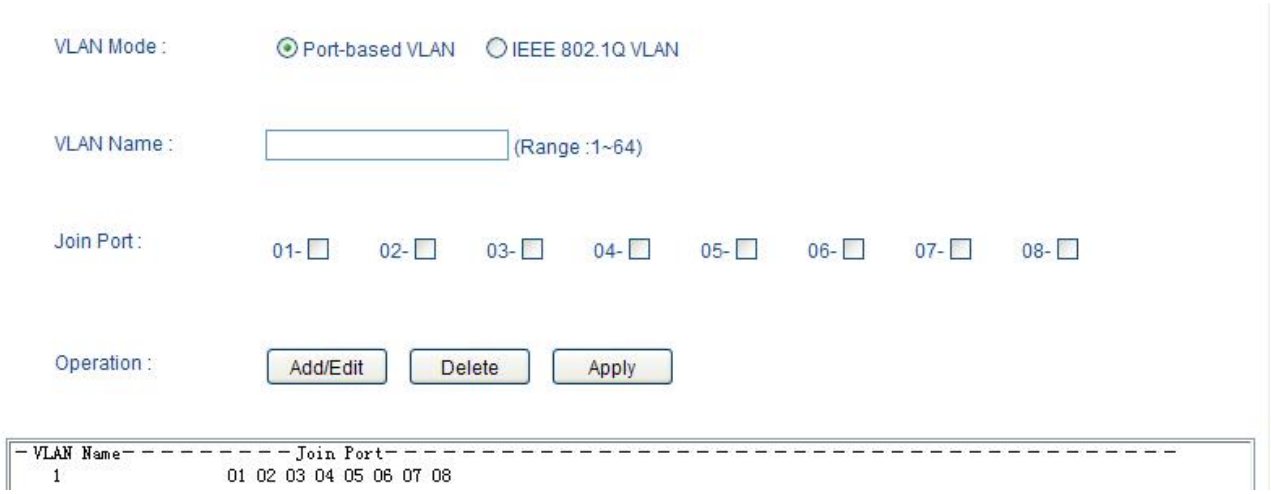
Port VLAN provides a solution that can divide the ports of switch into different virtual private domain. The data cannot be exchanged in the different private domain, so it's more secure to maintenance.

About port VLAN，different VLAN with different identity. Use the same ID identity will lead to internal members of the group be replaced, the new ID identity will create a new forwarding rule; all ports must belong to one or more VLAN.

1. Add Item

Group name can use any valid characteristic in port based VLAN. The same group name means you need to modify the members of the group. A new group name means the new transmission rule is built. The transmission item is not more than 32 in port based VLAN. It just changed the inside exchange rule, cannot achieve across switch

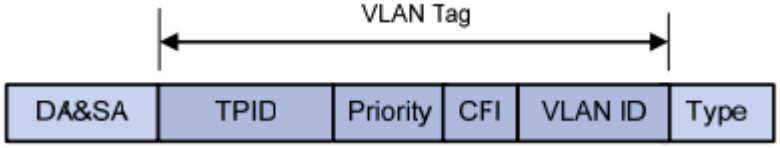
1. Choice “VLAN Group”, like as “3”, means VLAN1,
2. Choice VLAN member, like as choice port 2 and port 3
3. Choice “Add/Edit”
4. Choice “Apply”, then port 2 and port 3 were divided in VLAN3, they are in same VLAN, can transfer and receive data for each other.



5.6.1.2 Based on IEEE 802.1Q VLAN

IT-ES618-IM-4D supports based on 802.1Q VLAN. It deals with messages based on Tag of recognized message （including 802.1p priority and VLAN ID, etc.）.

Frames with 802.1q add 4 byte Tag based on Ethernet frames, including 2 byte TPID, 3 byte Priority, 1 byte CFI and 12 byte VLAN ID.



TPID: a 16-bit field set to a value of 0x8100 in order to identify the frame as an IEEE 802.1Q-tagged frame.

Priority: It indicates the frame priority level. Values are from 0 (best effort) to 7 (highest); 1 represents the lowest priority.

CFI: a 1-bit field. If the value of this field is 1, the MAC address is in non-canonical format. If the value is 0, the MAC address is in canonical format.
VLAN ID: a 12-bit field specifying the VLAN to which the frame belongs. The hexadecimal values of 0x000 and 0xFFF are reserved. All other values may be used as VLAN identifiers, allowing up to 4,094 VLAN.

1. The type of port's Line

IT-ES618-IM-4D series support 2 type port lines:

Access: Port belongs to 1 VLAN, normally, it used for connecting user device, default all port is access port.
Trunk: Port belongs to some VLAN, can transmit and receive some VLAN message, normally, it used for connection of network device.

2. Deal with transmit and receive message

Type	Receive message	
	Message did not take Tag	Message take Tag
Access	Put the VLAN tag point to Port default VLAN ID for message	Put the VLAN tag point to Port default VLAN ID for message
Trunk	Put the VLAN tag point to Port default VLAN ID for message	Keep up VLAN ID, no need replace

Type	Transmit message
Unmodified	Did not modify when transmit, the data packet is the same as enter into switch
Untagged	Did not take the mark when transmit
Tagged	Take the mark when transmit

Unmodified: No need to modify original VLAN mark
Untagged: It is a normal Ethernet message
Tagged: Added a 4 bytes VLAN information after original MAC address and destination MAC address

3. Parameter item description

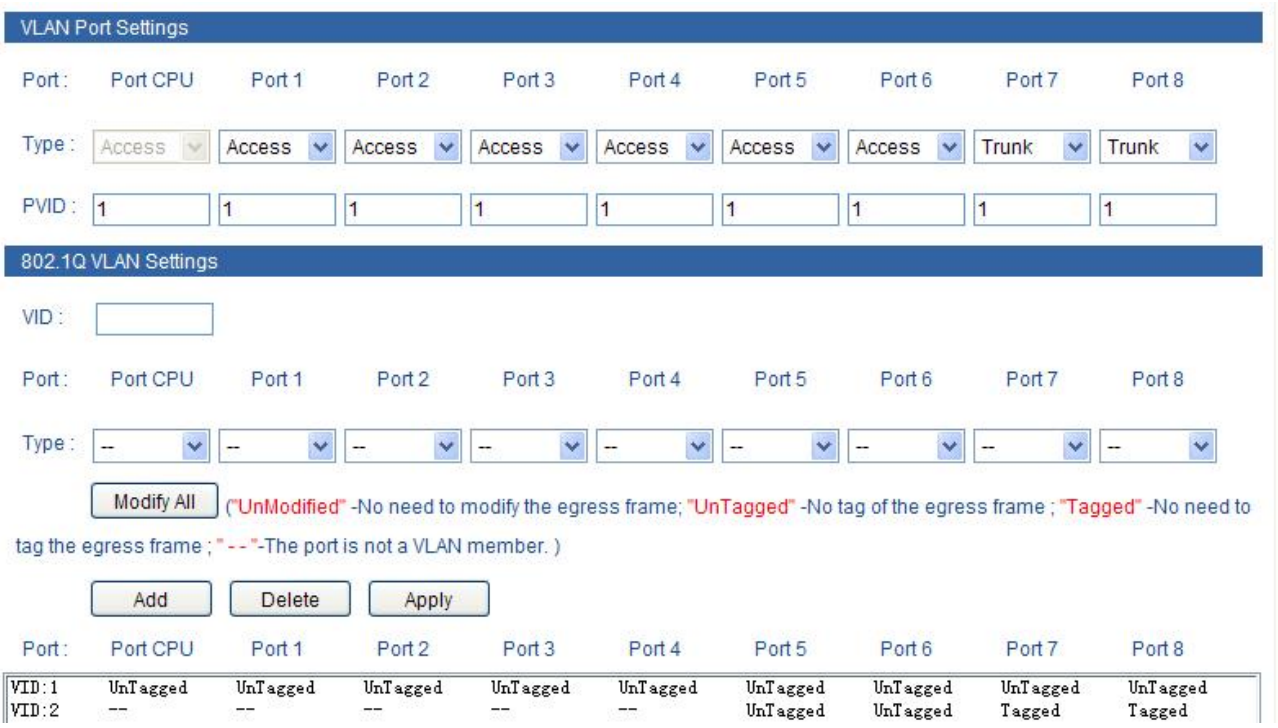
Item	Description
PVID	Port's LAN ID, value range : 1～4095
VID	VLAN ID number, value range: 1～4095
Power type	Include Access and Trunk
Member type	Unmodified, Untagged, Tagged
Modify all	Quickly modify the type of all members at the same time
Add	Add the configuration VLAN into VLAN table
Delete	Choice one VLAN in the table, knock<Delete>, delete VLAN

The default VLAN, all port are Access, PVID: 1, all belong to the members of VLAN1

4. Create VLAN

The step is as follows:
1. Enter into VLAN configuration interface, firstly select port type, Access or Trunk;
2. Input the default PVID of the port in [PVID] text box;
3. Input appointed VLAN into [VID] text box;
4. Set up members' type of each port: Unmodified, Untagged, Tagged
5. Click [Add] button, add VLAN items into the table and click [Apply] and reboot the device. Then creating new VLAN is finished.

As follow figure 5.6.1, create VLAN1, port type: Access, member type: Untagged, member included CPU port and port 1~4. Create VLAN2, type of port 5, 6: Access, member type: Untagged，type of port 7, 8: Trunk, member type: Tagged.



（Figure5.6.1）

We can know as the figure, the type of port 7, 8 is Trunk, can allow the data of VLAN 1 and VLAN 2 pass.

5. Modify VLAN

It can re-configure existing VLAN including modifying member's type and quantity of the port. Steps are as follows:

1. Enter into VLAN configuration interface, firstly select VLAN items which need to modify in VLAN item table, like as VLAN 1.
2. Member's type of VLAN1 shows in current VLAN item setting and set up member's type of the port according to the steps for creating new VLAN.
3. Click [Add] button, select [OK] when reminds whether overwrite it as shown in Figure 5.6.2. Add new VLAN items into table and click [Apply] and reboot the device. Modify VLAN finished.

（Figure 5.6.2）

6. Delete VLAN

Steps of remove VLAN are as follows:

1. Firstly select VLAN items which need to remove, like as VLAN2;
2. after selected, click [Delete], then [Apply]. As shown in Figure 5.6.3:

（Figure 5.6.3）

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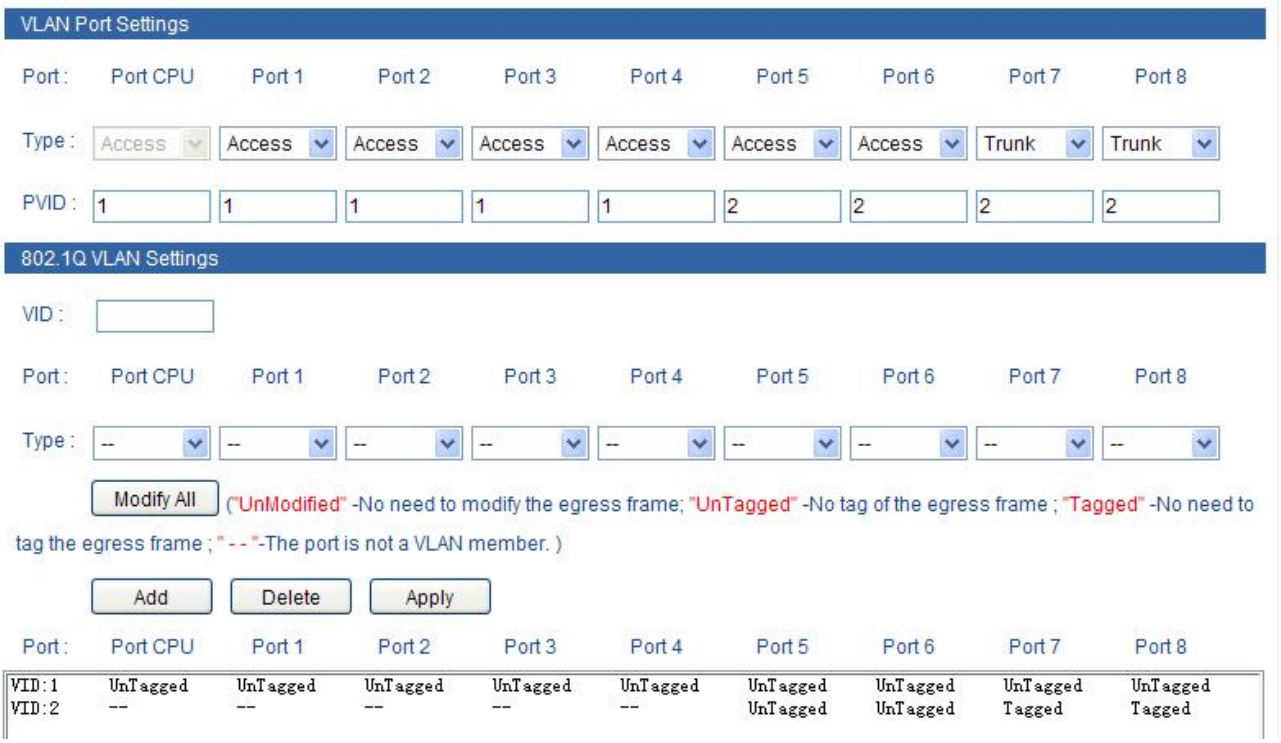
7. VLAN Configuration of Single Ring

1. Need to set one port as managed port, managed port and CPU port must in a same VLAN, figure as 5.6.4, port 1 is managed port.

2. The port that already set in ring network port, the VLAN port type must Trunk and takes Tag, figure as 5.6.4.



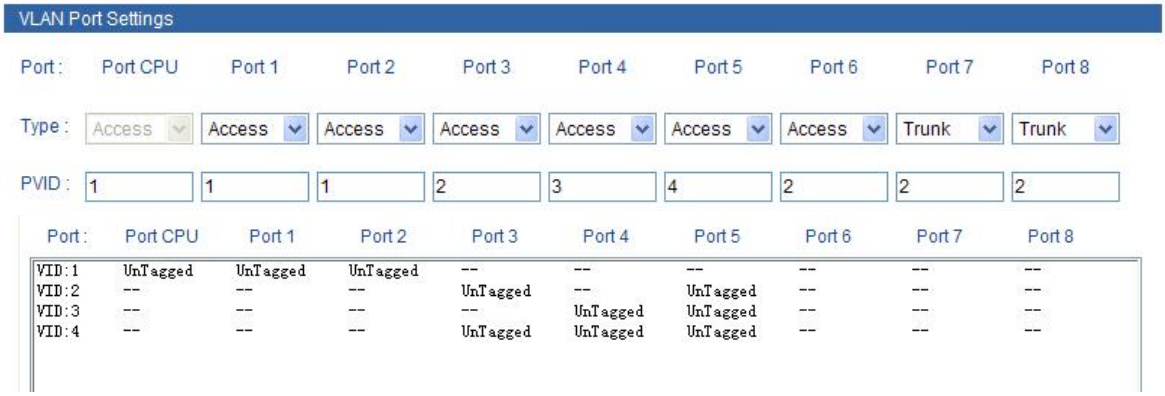
（Figure 5.6.4）

8. Typical VLAN Configuration

Suppose switch's port 3, 4, 5 satisfied to the requirements as follows: port 3 can intercommunicate with Port 5, Port 4 can intercommunicate with Port 5, Port 3 can's intercommunicate with Port 4, How to set VLAN? (Not consider the configuration of other VLAN)

Let's analyze at first, port 3 can intercommunicate with Port 5, the port must belong to a same member of VLAN, the same, Port 4 can intercommunicate with Port 5, the port must belong to a same member of VLA, port 3 and port 4 belongs to different VLAN, figure as 5.6.5

1. Port 3's PVID: 2, Port 4's PVID: 3, Port 5's PVID: 4, port type are both Access.
2. Add VLAN2, VLAN3, VLAN4, the member is 3 and 5, 4 and 5, 3 4 and 5. Port type is Untagged.



（Figure 5.6.5）

:

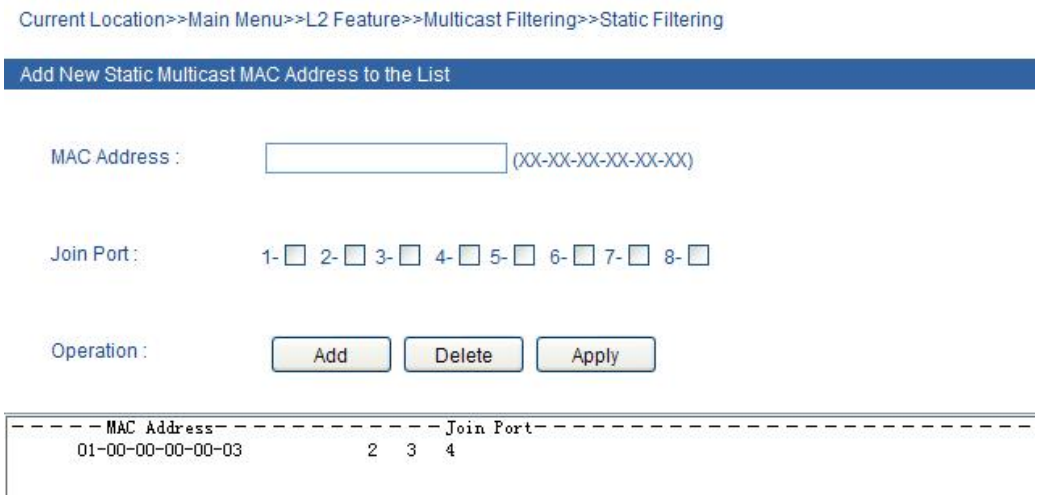
IES7110-2GS series VLAN maximum support 64 VLAN item, VID value range:1~4095
Managed port is the port that manage and configure switch, it must in a same VLAN as CPU port

5.6.2 Static filtering

Devices to provide static MAC address forwarding. Static address table in a multicast MAC address corresponding to a port, if set, all data sent to this address will be forwarded to that port only, but the others could not receive data. Static address is the MAC address does not age once it has been added, this address tables before being deleted remains in effect, and not be restricted by maximum aging time. IT-ES618-IM-4D series supports up to 15 static multicast filtering.

Button [Add/Edit], [Delete] were used for add/delete static Multicast MAC address. Join port is used to choice the transmit port of static MAC address, can point to 1 or more transmit port. Knock [Add], [Delete], static MAC address will be updated. For example, add MAC address "01-00-00-00-00-03" member is port 2，3，4. Multicast MAC address is 1 of highest byte's low byte.

Configuration	Description
MAC Address	Valid multicast address, a multicast MAC address is high byte low for 1
Join Port	Select desired configuration port
Add	The configured static multicast address entries added to the list
Delete	Selected multicast address is a static entry in the list, click <Delete>, delete this entry



（Figure 5.6.6）

All none multicast address did not allow adding in this table and the format must according to XX-XX-XX-XX-XX-XX, did not have space or other illegal character, otherwise, will be display warning information.

（Figure 5.6.7）

5.6.3 QoS

QoS provides four internal queues, each queue supports four different levels of traffic, shorter persistence time of high-priority data packets in the switch, supports lower latency for certain delay-sensitive traffic. According to port ID, MAC address, 802.1p priority tags, DiONetServ and IP TOS, equipment can be abale to put the packets to an appropriate level.

Users can select the QOS priority queue mechanism, the queue mechanism in two ways: weighted Fair mode and strict mode.

Weighted Fair refers to this port sends message according to queue priority High, Medium, Normal and low in proportion of 8:4:2:1 when some ports traffic is heavy. If sending speed is less than bandwidth, the message of each priority queues can send normally; if the port keeps sending in full speed, then the rest of the message of each priority queues will be discarded.

Strict priority: it refers to QoS deals with the message from high priority to low priority. If the low priority queues is full but the message of high priority queues don't finish, the message of low priority queues will be discarded; but if the speed of high priority queue does not reach the port's wire speed, then message of lower priority can send one by one, and the data may be lost because of shortage of bandwidth. The ports always finish all messages of high priority queues first then allow the message of lower priority queues

Default priority is based on port priority, default priority is different from COS and TOS, it did not have relationship with data package, it had relationship with switch port's priority. If the port's priority is higher, the data packet will be transferred at first.

When open port priority, must open inspect COS. The example is as figure 5.6.8: open inspect port, 1, 2, 3, 4 COS, divide port 1, 2, 3, 4 in different priority, COS value corresponding priority no need to set up. Port 1, 2, 3, 4, port 1, the priority is the highest. When these 4 port 's receive data must transfer from other port, because the limited of bandwidth, will be transferred according to priority queue mechanism（If use strict mode, then port 1's data must be transferred over at first. If use Weighted Fair 8:4:2:1, the 4 port will be transferred according 8: 4: 2: 1 ratio）

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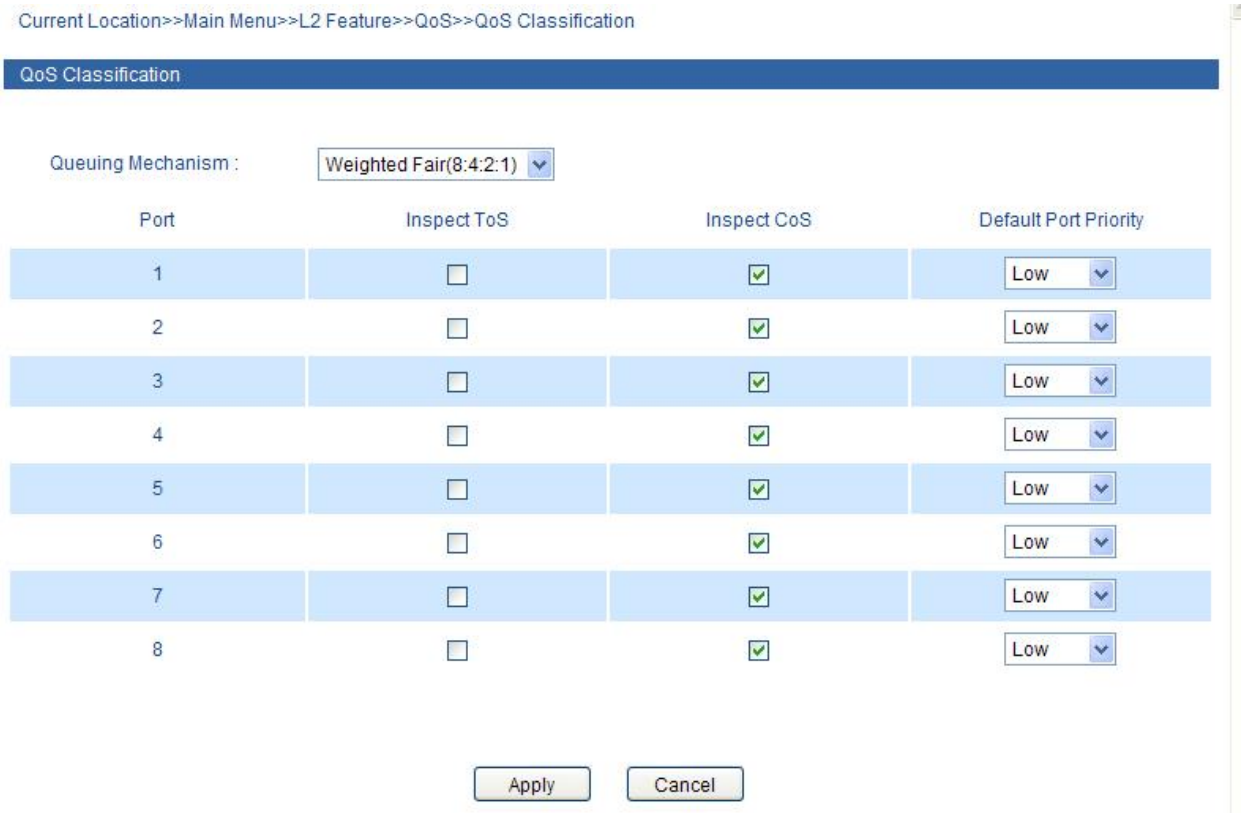


（Figure 5.6.8）

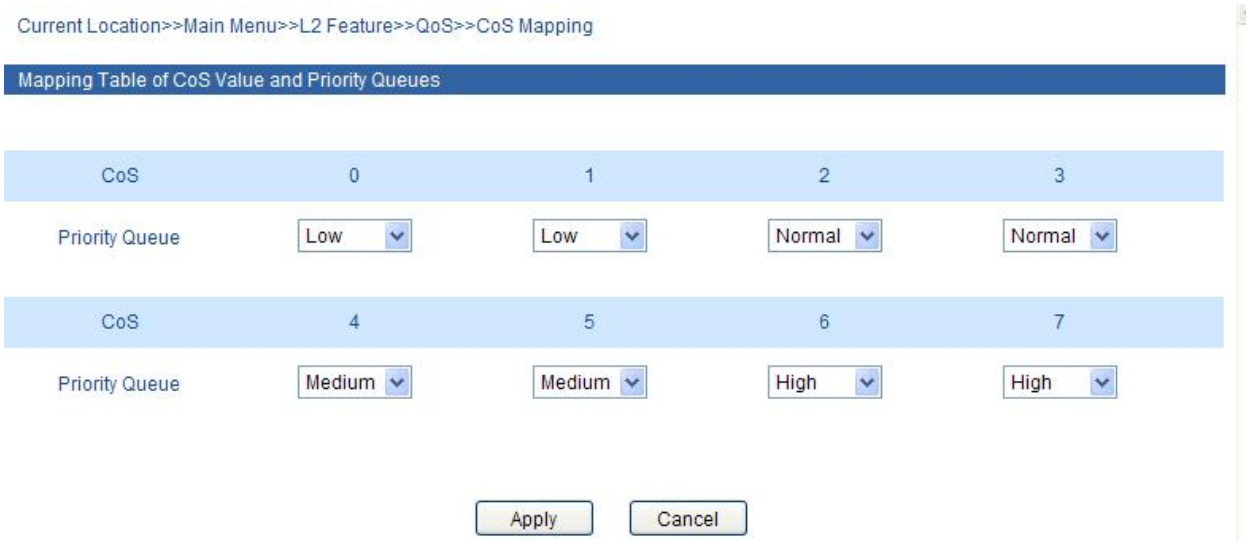
CoS

IEEE P802.1p is the name of a task group active during 1995–98 responsible for adding traffic class expediting and dynamic multicast filtering to the IEEE 802.1D standard. Essentially, they provided a mechanism for implementing Quality of Service (QoS) at the media access control (MAC) level. The group's work with the new priority classes and Generic Attribute Registration Protocol (GARP) was not published separately but was incorporated into a major revision of the standard, IEEE 802.1D-1998. It also required a short amendment extending the frame size of the Ethernet standard by four bytes which was published as IEEE 802.3ac in 1998.

The QoS technique developed by the working group, also known as class of service (CoS), is a 3-bit field called the Priority Code Point (PCP) within an Ethernet frame header when using VLAN tagged frames as defined by IEEE 802.1Q. It specifies a priority value of between 0 and 7 inclusive that can be used by QoS disciplines to differentiate traffic. Although this technique is commonly referred to as *IEEE 802.1p*, there is no standard or amendment by that name published by the IEEE. Rather the technique is incorporated into IEEE 802.1Q standard which specifies the tag inserted into an Ethernet frame.

802.1P defined 8 priorities（0-7）, corresponding 4 priority (High, Medium, Normal, Low)

Default priority mark 0 and 1 is low queue, 2 and 3 is normal queue, 4 and 5 is Medium, 6 and 7 is High.



（Figure 5.6.9）

DiffServ architecture provides each transport packets in the network are classified into different categories, classified information is contained in the IP packet header, DiffServ architecture using the first 6 bits of IP packet header TOS(Type of Service) to carry the packets' classified information. This definition is only for the lower 6 bits, one number does not exceed 63. This definition supports both IPv4 (ToS field) and IPv6 (Traffic Class field). DSCP has 64 priority values (0-63), the lowest priority 0 and the highest priority 63. In fact, the DSCP field is a superset of the IP precedence field, DSCP field definition is backward-compatible with IP precedence field.

So far, the defined DSCP with default DSCP, the value is 0; class selector DSCP defined as the backward-compatible with IP precedence, the value(8,16,24,32,40,48,56); Expedited Forwarding (EF), generally used for low latency service, the recommended value is 46 (101110); identified by forwarding (AF) defines four service levels, each service level has 3 down process, so spent 12 DSCP values ((10,12,14), (18,20,22), (26,28,30), (34,36,38)).

The priority value of the device (1-16) is defined as the lowest priority, as the first queue. Priority value (17-32) is defined as the second queue, the priority value (33-48) is defined as the third queue, the priority value (49-64 is defined as the fastest queue, the highest priority.

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Mapping Table of ToS (DSCP) Value and Priority Queues

ToS(DSCP)	Level	ToS(DSCP)	Level	ToS(DSCP)	Level	ToS(DSCP)	Level
0x00(01)	Low	0x04(02)	Low	0x08(03)	Low	0x0C(04)	Low
0x10(05)	Low	0x14(06)	Low	0x18(07)	Low	0x1C(08)	Low
0x20(09)	Low	0x24(10)	Low	0x28(11)	Low	0x2C(12)	Low
0x30(13)	Low	0x34(14)	Low	0x38(15)	Low	0x3C(16)	Low
0x40(17)	Normal	0x44(18)	Normal	0x48(19)	Normal	0x4C(20)	Normal
0x50(21)	Normal	0x54(22)	Normal	0x58(23)	Normal	0x5C(24)	Normal
0x60(25)	Normal	0x64(26)	Normal	0x68(27)	Normal	0x6C(28)	Normal
0x70(29)	Normal	0x74(30)	Normal	0x78(31)	Normal	0x7C(32)	Normal
0x80(33)	Medium	0x84(34)	Medium	0x88(35)	Medium	0x8C(36)	Medium
0x90(37)	Medium	0x94(38)	Medium	0x98(39)	Medium	0x9C(40)	Medium
0xA0(41)	Medium	0xA4(42)	Medium	0xA8(43)	Medium	0xAC(44)	Medium
0xB0(45)	Medium	0xB4(46)	Medium	0xB8(47)	Medium	0xBC(48)	Medium
0xC0(49)	High	0xC4(50)	High	0xC8(51)	High	0xCC(52)	High
0xD0(53)	High	0xD4(54)	High	0xD8(55)	High	0xDC(56)	High
0xE0(57)	High	0xE4(58)	High	0xE8(59)	High	0xEC(60)	High
0xF0(61)	High	0xF4(62)	High	0xF8(63)	High	0xFC(64)	High

Apply Cancel

（Figure 5.6.10）

5.7 Redundancy

5.7.1 SWRing™

SwRing™ technology provides auto-recovery and re-connection mechanism for broken network. When network is broken, it has link redundancy and self-recovery capability and self-recovery time is less than 20ms. SW-Ring is the patented technology. designed for industrial control network requiring high reliability.

SwRing™ technology support maximum 250 pieces switches, in which the **SwRing™** its self-recovery time is <20ms.

Each port of IT-ES618-IM-4D series switch can be Ring Port to connect other switches. When network is broken, relay for failure alarm will be activated. Redundant organization of **SwRing™** enable backup link to recover network instantly.

Self-developed patented technology for SW-Ring network can realize the intelligent redundancy for industrial Ethernet switch, which can make you easily and conveniently establish redundant Ethernet, and can facilitate the quick recovery of any network section of automatic system disconnected from the network. IT-ES618-IM-4D series supports maximum 4 ring groups. Each group set up 2 ports as Ring Port and a port cannot belong to several rings.

Hello_time setting is time interval of sending detecting packet to network at regular time. The unit is ms. Its

main purpose is to detect network connection. It sends a detecting packet to next door devices by CPU. If they receive it, then reply a confirm packet to ensure network connection is active. If this setting will influence self-recovery time, we suggest advanced users can use it.

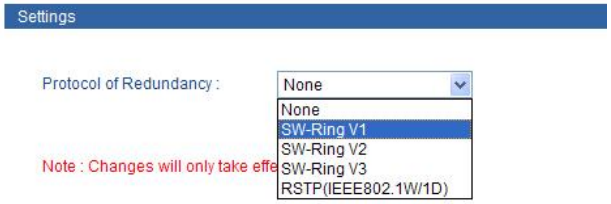
Basic interface of Rapid Ring as shown in figure 5.7.1:

（Figure 5.7.1）

Initial interface display redundancy protocol is none, can configure it through [Settings]. There has 3 type SW-Ring arithmetic: Ring V1,Ring V2 and Ring V3), Ring V1 support single ring, Ring V2 support single and coupling ring, Ring V3 Single ring, coupling ring, chain ring and Dual_homing.

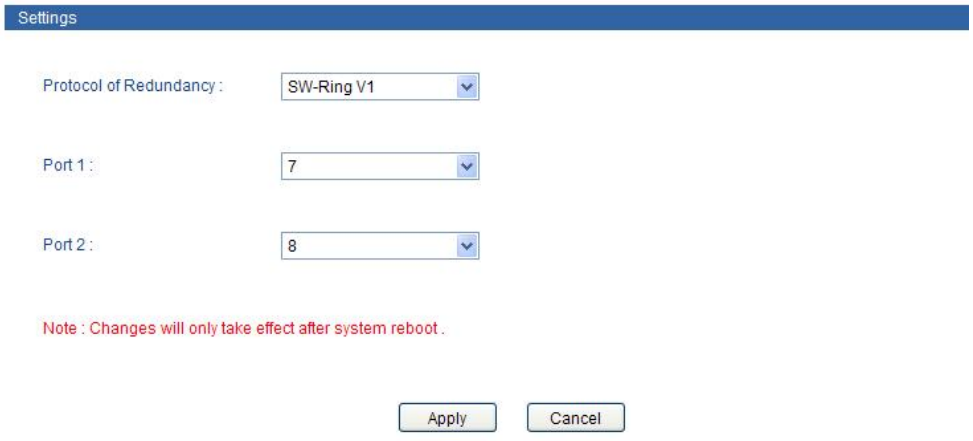
Method to enabled Ring V1:

1. Enable Ring V1，Select Ring V1 in [Settings] drop-down menu, figure as 5.7.2



（Figure 5.7.2）

2. After select Ring V1, Interface as figure 5.7.3, Ring V1 just support single ring

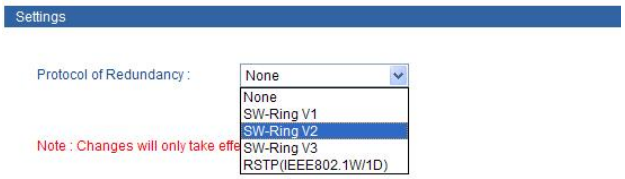


（Figure 5.7.3）

3, Select “Apply”.

Method to enabled Ring V2

1. Enable Ring V2，Select Ring V2 in [Settings] drop-down menu, figure as 5.7.4



（Figure 5.7.4）

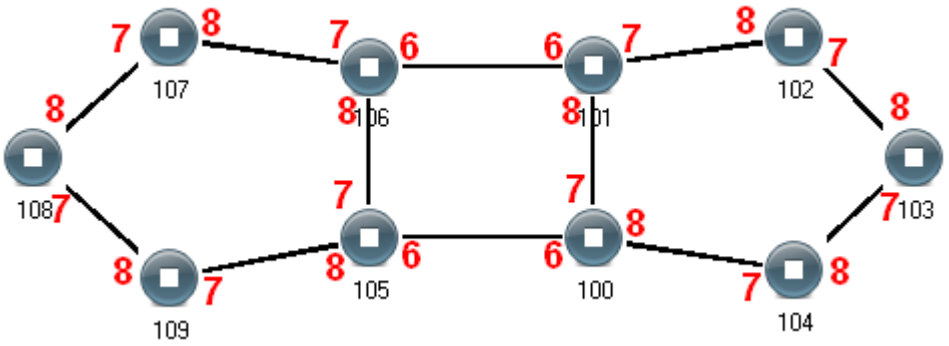
2. Enable ring group 1(or group 2), input network ID (support 0-255 pure digital), select the ring port in ring port 7 and ring port 8, figure as 5.7.5.

（Figure 5.7.5）

Ring V2 can also set Hello_time. Hello_time setting is time interval of sending detecting packet to network at regular time. The unit is ms. Its main purpose is to detect network connection. This setting will influence self-recovery time, we suggest advanced user use it.

1. Method to enable Ring V2 coupling ring

The architecture of coupling ring as figure 5.7.6



Coupling ring（Figure 5.7.6）

Operation method:

1. Select Ring V2, enable ring group 1 and 2. (Hello_time can be disable, if enable, time of sending Hello packet could not be very fast, it will influence CPU operate speed)；

2. Set 105, 106 device's ring port as port 7 and port 8 in ring group 1, network ID:1, type: single ring. Set ring port as port 6 in ring group 2, network ID: 2, type: coupling ring, figure as 5.7.8.

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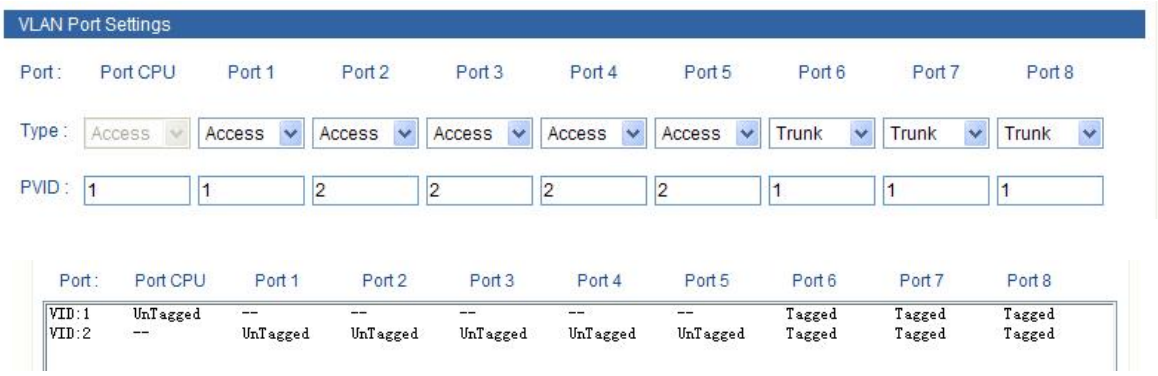
（Figure 5.7.8）

3. Set 100, 101 device's ring port as port 7 and port 8 in ring group 1, network ID: 1, type: single ring. Set ring port as port 6 in ring group 2, network ID: 3, type: coupling ring, figure as 5.7.9.

（Figure 5.7.9）

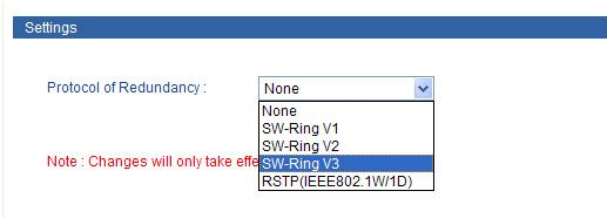
4. Set 107, 108, 109 device's ring port as port 7 and port 8 in ring group 1, network ID: 1, type: single ring. Set 102, 103, 104 device's ring port as port 7 and port 8 in group 1, network ID: 2, type: single ring.
5. Connect 101-104, 105-109 devices' port 3 and port 4 with network cable. Connect 100,101, 105, 106 device's port 6 with network cable. Figure as 5.7.6.
6. Coupling ring can work according to device VLAN, normally 100, 101, 105 and 106 device's VLAN configuration is as figure 5.7.10:



（Figure 5.7.10）

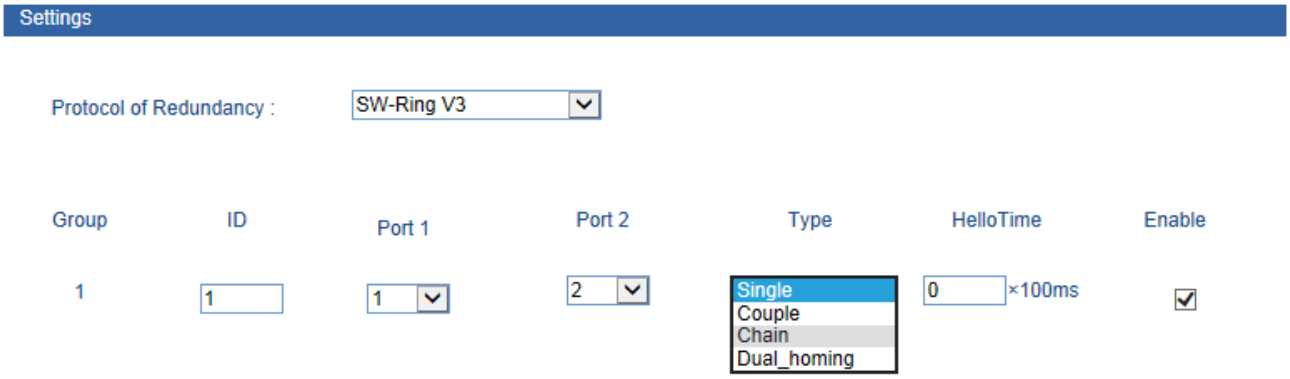
Method to enable Ring V3

1. Enable Ring V3，Select Ring V3 in [Settings] drop-down menu, figure as 5.7.11



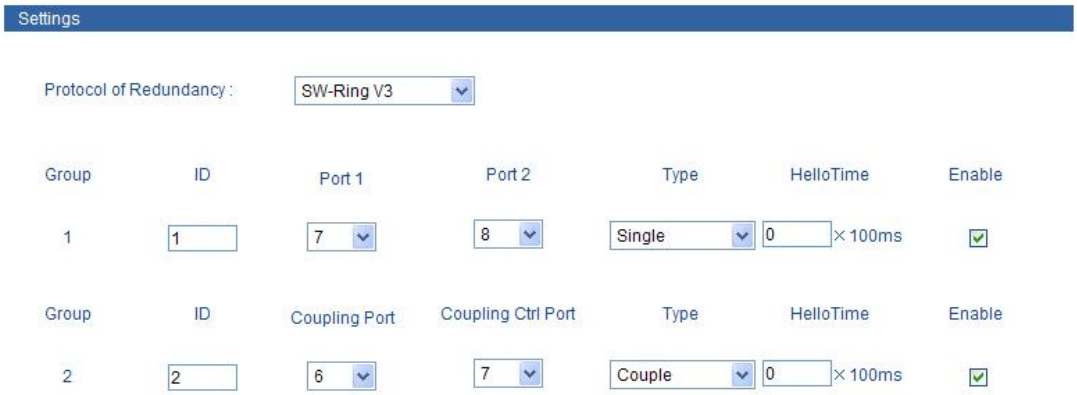
（Figure 5.7.11）

2. After select Ring V3, Configuration interface is as figure 5.7.12, we can see Ring V3 support 4 different ring group: Single, Coupling, Chain and Dual_homing.



（Figure 5.7.12）

3. Enable Ring Group 1（or Group 2, and enter into Network ID（support 0-255 number only. Select Ring Port between Port 7 and Port 8.



（Figure 5.7.13）

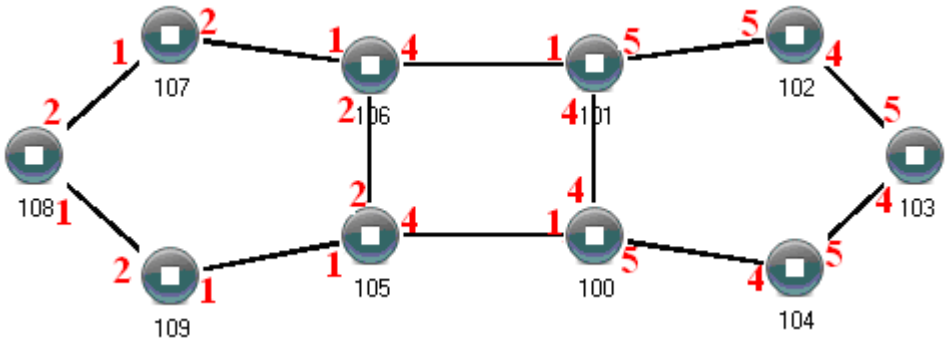
"Chain" refers to strengthen user's capability of making any type of redundant topological structure with flexibility by taking an advanced software technology. In fact, Chain is to cascade several switches already set up to Ring and both sides of chain access to network.

"Dual Homing" refers to a fact that two Rings connect the same switch. This type of configuration is ideal choice for centralized management of several Rings.

Method to enable Chain and Dual Homing is similar to that to enable Single Ring and Coupling Ring. It only needs to select corresponding items in [Type].

1. Method to enable Ring V3 coupling ring

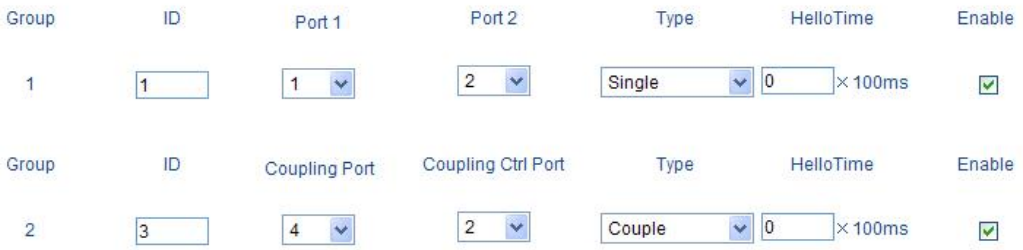
The architecture of coupling ring as figure 5.7.14



Coupling（Figure 5.7.14）

Operation method:

1. Select Ring V3, enable ring group 1 and 2. (Hello_time can be disable, if enable, time of sending Hello packet could not be very fast, it will influence CPU operate speed)；
2. Set 105, 106 device's ring port as port 1 and port 2 in ring group 1, network ID: 1, type: single ring. Set ring port as port 4 in ring group 2, Coupling ctrl port: 2, network ID: 3, type: coupling ring, figure as 5.7.15.



（Figure 5.7.15）

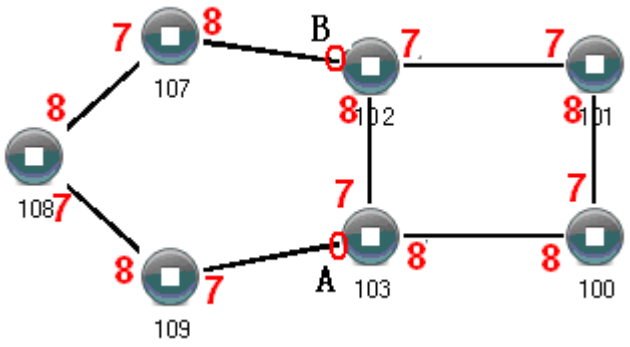
3. Set 100, 101 device's ring port as port 4 and port 5 in ring group 1, network ID: 2, type: single ring. Set ring port as port 1 in ring group 2, Coupling ctrl port: 4, network ID: 3, type: coupling ring, figure as 5.7.16.

（Figure 5.7.16）

4. Set 107, 108, 109 device's ring port as port 1 and port 2 in ring group 1, network ID: 1, type: single ring. Set 102, 103, 104 device's ring port as port 4 and port 5 in group 1, network ID: 2, type: single ring.
5. Connect 100-104 devices' port 4 and port 5 with network cable. Connect 105-109 devices' port 1 and port 2 with network cable, Connect 101 device's port 1 to 106 device's port 4 with network cable, Connect 100 device's port 1 to 105 device's port 4 with network cable.

2. Method to enable Ring V3 Chain ring

The structure of Chain ring as figure 5.7.17



Chain（Figure 5.7.17）

Operating method:

1. Enable Ring Group 1: Hello time can be disable too, if it enable, time of sending Hello packet could not be very fast, or it will influence CPU dealing speed.
2. Set up Port 7 and 8 of Device 100, 101, 102 and 103 to be Ring Port in Ring Group 1, Network ID is1, Ring Type is Single; as shown in figure 5-47. Set up Port 7 and 8 of Device 107, 108 and 109 to be Ring Ports in Ring Group 2, Network ID is 2. Ring Type is Chain; as shown in figure 5.7.19.

（Figure 5.7.18）

（Figure 5.7.19）

3. Use a wire to connect Port 7 and 8 of Device 107-109 in turn to make a chain. Use a wire to connect Port 7 and 8 of Device 100-103 in turn to make a Single Ring, Then use a wire to connect Port 8 of Device 107 and Port 7 of Device 109 to normal port of Device 102 and 103. Chain is finished.

:

1. Port cannot be trunking setting when it is already Ring port.
2. In the same single ring, identity must be consistent; otherwise it will not built a ring and cannot communicate.
3. All ring ports in the VLAN settings must be TRUNK tagged VLAN member, otherwise cannot communicate.

4. To form tangent ring or other complex rings, should pay attention to the ring identity whether is it consistent, different single ring identification must be different.

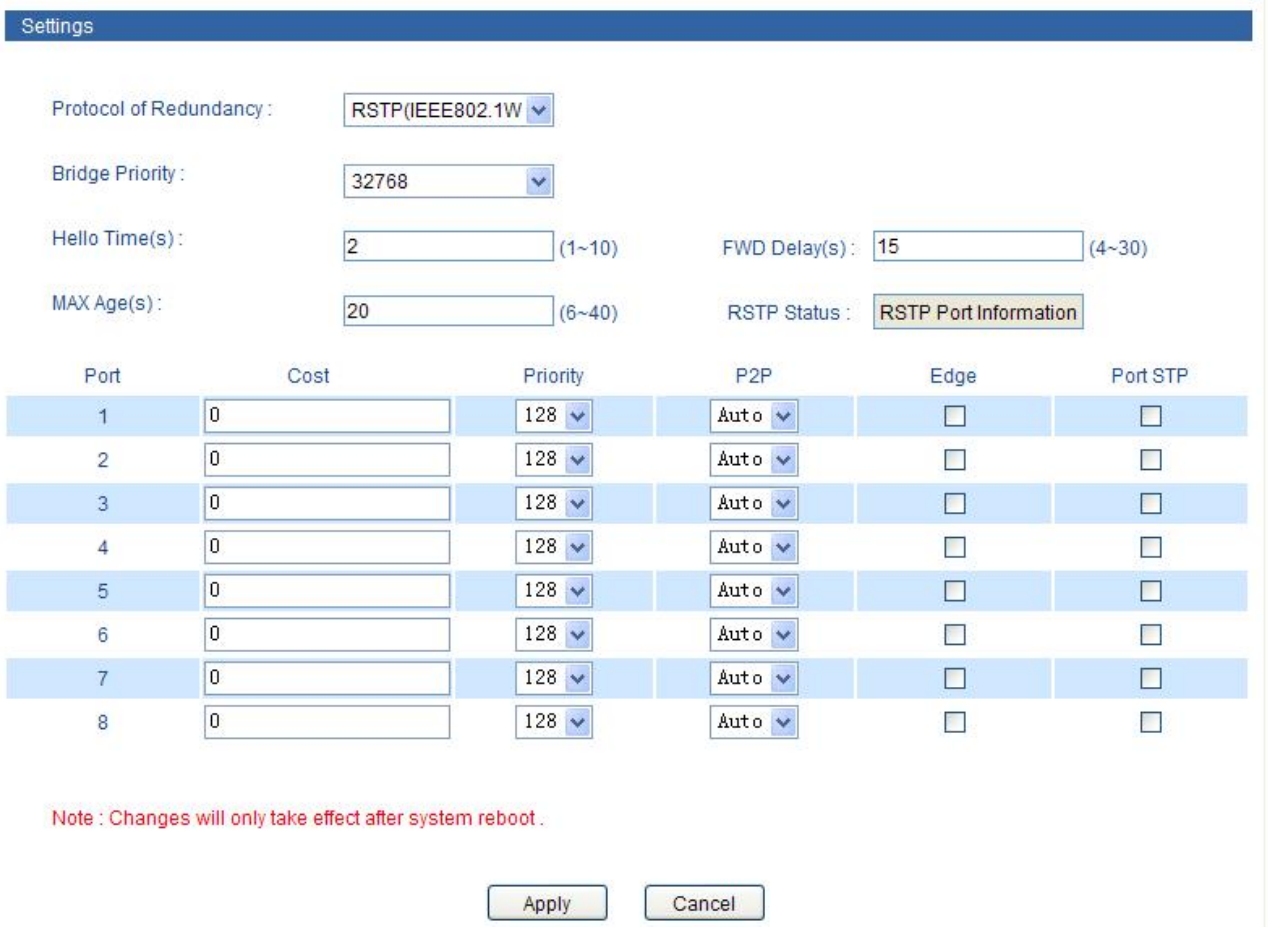
5.7.2 RSTP

The first spanning tree protocol was invented in 1985 at the Digital Equipment Corporation by Radia Perlman. In 1990, the IEEE published the first standard for the protocol as 802.1D, based on the algorithm designed by Perlman. Subsequent versions were published in 1998 and 2004, incorporating various extensions.

Although the purpose of a standard is to promote interworking of equipment from different vendors, different implementations of a standard are not guaranteed to work, due for example to differences in default timer settings. The IEEE encourages vendors to provide a "Protocol Implementation Conformance Statement", declaring which capabilities and options have been implemented, to help users determine whether different implementations will interwork correctly.

Also, the original Perlman-inspired Spanning Tree Protocol, called DEC STP, is not a standard and differs from the IEEE version in message format as well as timer settings. Some bridges implement both the IEEE and the DEC versions of the Spanning Tree Protocol, but their interworking can create issues for the network administrator, as illustrated by the problem discussed in an on-line Cisco document.

In 2001, the IEEE introduced Rapid Spanning Tree Protocol (RSTP) as 802.1w. RSTP provides significantly faster spanning tree convergence after a topology change, introducing new convergence behaviors and bridge port roles to do this. RSTP was designed to be backwards-compatible with standard STP. While STP can take 30 to 50 seconds to respond to a topology change, RSTP is typically able to respond to changes within 3 × Hello times (default: 3 times 2 seconds) or within a few milliseconds of a physical link failure. The so-called Hello time is an important and configurable time interval that is used by RSTP for several purposes; its default value is 2 seconds. Standard IEEE 802.1D-2004 incorporates RSTP and obsoletes the original STP standard Select RSTP function in rapid ring network interface as follows:



（Figure 5.7.20）

Rapid Spanning Tree of concepts:

Switch priority：As the bridge priority，the bridge priority and bridge MAC address combine bridge ID，the smallest ID bridge will become the root bridge on the network.

Polling interval： how often send BPDU packet at one time.

Forwarding delay： the port state of switch remain a forward delay time over the listening and learning.

The maximum aging time： After one switch receive a packet from other switches, how long the packet is valid

The port concepts of RSTP:

Port path overhead： port link cost compared with port priority and port ID.

Port priority： port priority among the net bridge compared with port priority and port ID.

Point to point network connection： directly connect with switches port each other, the port is P2P, which adopted negotiation mechanism, RSTP can achieve port state rapid conversion RSTP.

Directly connect terminal： connect the edge of network switch with terminal devices with **configuration Edge port**，which can achieve port state rapid conversion without the processing Discarding，Learning，Forwarding.

Don't join RST structure： don't participate in RSTP running.

RSTP switch port states:

1. **Blocking**- A port that would cause a switching loop if it were active. No user data is sent or received over a blocking port, but it may go into forwarding mode if the other links in use fail and the spanning tree

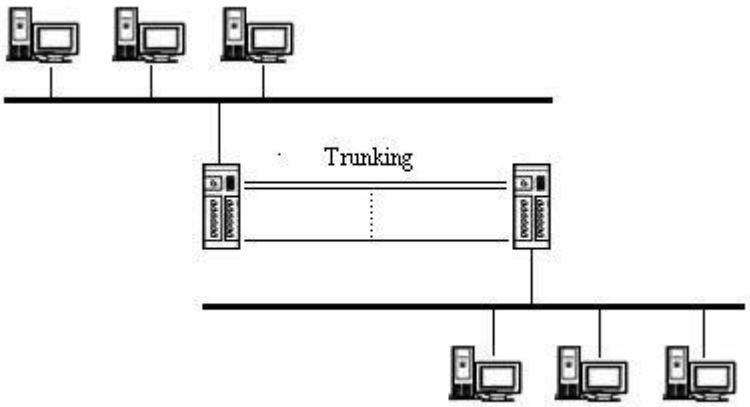
algorithm determines the port may transition to the forwarding state. BPDU data is still received in blocking state. Prevents the use of looped paths.

2. **Listening**- The switch processes BPDUs and awaits possible new information that would cause it to return to the blocking state. It does not populate the MAC address table and it does not forward frames.
3. **Learning**- While the port does not yet forward frames it does learn source addresses from frames received and adds them to the filtering database (switching database). It populates the MAC Address table, but does not forward frames.
4. **Forwarding**- A port receiving and sending data, normal operation. RSTP still monitors incoming BPDUs that would indicate it should return to the blocking state to prevent a loop.

The example of Configuration: The priority of network bridge is “32768”，If there did not have network ID less than itself, itself is root network bridge. There did not have same network ID in network. Every 2 seconds, the network bridge will transmit BPDU message to all appoint port. If did not receive BPDU message more than 20 seconds, it realized port invalid, will calculate the status of network bridge again. Each status exchange for each other if need to transmit, need to wait 15 seconds

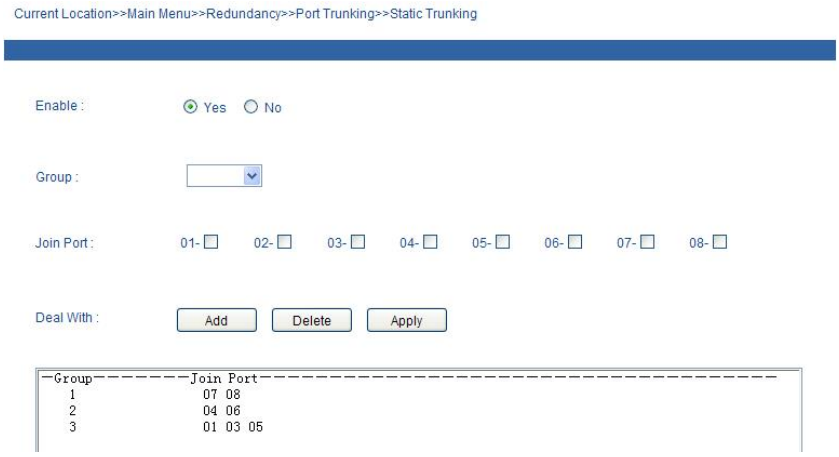
5.7.3 Port trunking

In telecommunications, trunking is a method for a system to provide network access to many clients by sharing a set of lines or frequencies instead of providing them individually. This is analogous to the structure of a tree with one trunk and many branches. Trunking, is set by the configuration software, the two or more physical ports get together into a logical path to increase the bandwidth between the switch and the network node. Trunking is a packaging technology, it is a peer to peer link, both ends of the link are switches, it can be a switch and a router, and also can be a host, switch or router. Based on port trunking function that allows between two or more ports between switches, switches and routers, hosts the switch or router connected in parallel to provide for the simultaneous transmission of higher bandwidth and greater throughput, significantly entire network capacity. Trunking is more economical to increase the bandwidth between the switch and network device, such as servers, routers, workstations, or other switches. Trunking function is to integrate more than one physical port (typically 2-4) to a logical channel.



（Figure 5.7.21）

Pictured in via a link aggregation between two switches form a computer network, Configuring link aggregation functionality through Web pages below。As shown in Figure 5.7.22.



(Figure 5.7.22)

Device supported 3 trunking groups, operate method: choice apply, choice the port need to trunking the port list, Choice setting, available after reboot. If the port already set to Ring port, it cannot set to trunking port. Each trunking group at least has 2 port members, at more 4. 1 port cannot exit in 2 trunking group.

:

1. The trunking groups require all the attributes can be the same, including speed, duplex, STP state etc.
2. If you do not confirm the STP state, please disable RSTP function, or close others, leaving only one STP channel.
3. Port 1 as the system reserved cannot be used as trunking.
4. The ports of having been set to the port aggregation that cannot be set to ring ports.

5.8 Access profile

5.8.1 User name and password

Enterprise usually required two different person to monitor device and manage system/ network. The authority need to separate. Monitor person was in charge of monitor work, system/network person was in charge of system/work management. The switch provided classification management: Administrator authority and Observer authority. Observer just had authority to check the status of switch. Administrator had the authority to configure the parameters of the switch.

Index

User index indicates which group of users. There are three user indexes in drop-down list.

Access level:

Administrator： have the right to check and configure all settings

observer：have the right to check all settings merely

Login name

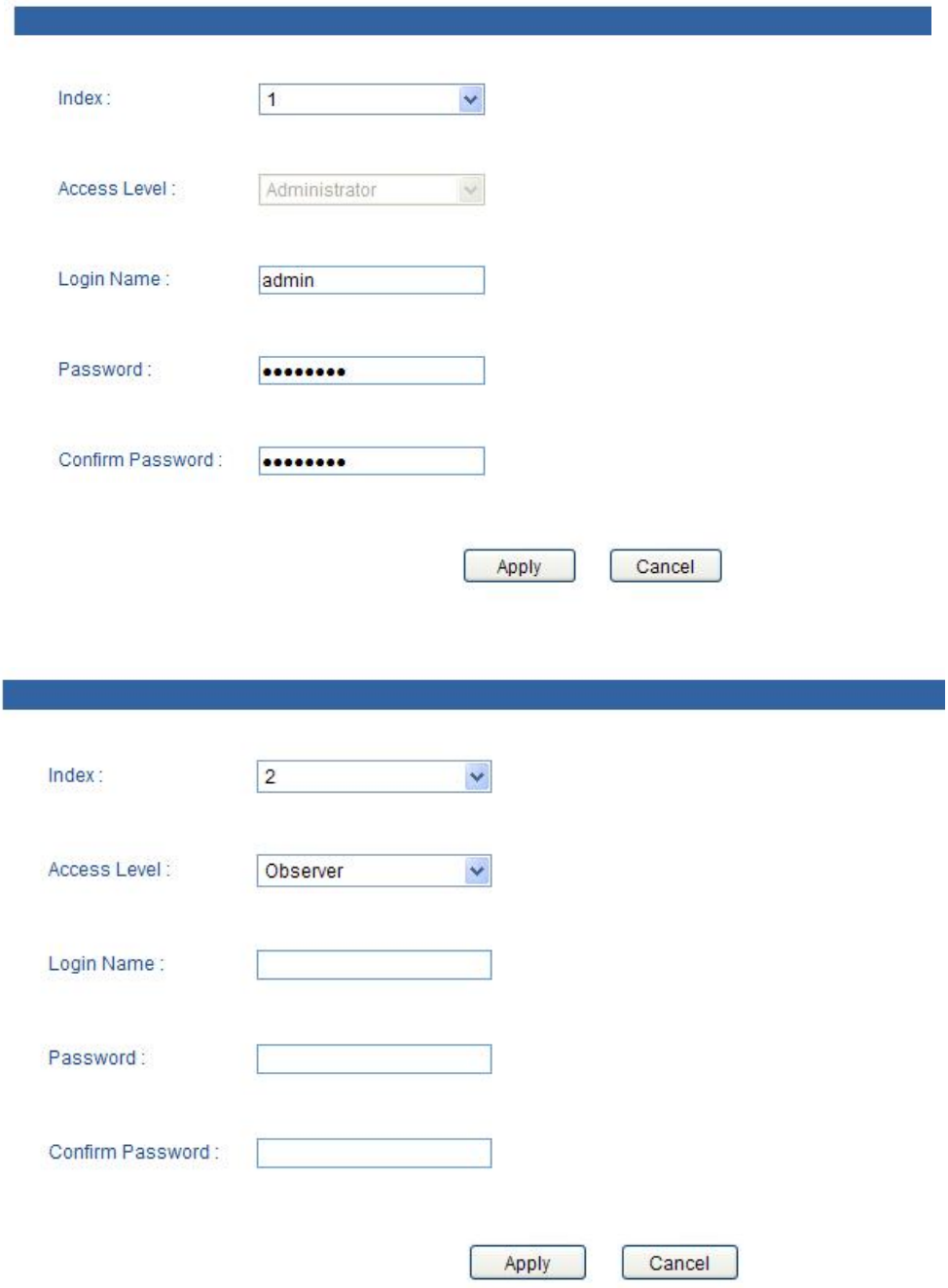
The identity of visitor with the letter combination is no more than 16 bytes

Password:

Visitor use password, user authority allows the letter combination no more than 16 bytes

Confirm password

Make sure the last time input password is correct.



（Figure 5.8.1）

1.Please contact our online technical support if you forget login name and password
2. Set same user mane, the front settings of user name/password will be available.

5.9 Remote monitoring

5.9.1 SNMP management

SNMP management

1. Introduction of SNMP

SNMP (Simple Network Management Protocol) is an internet-standard protocol for managing devices on IP networks. It is used mostly in network management systems to monitor network-attached devices for conditions that warrant administrative attention.

2. Work Mechanism of SNMP

SNMP includes 2 parts: NMS and Agent:

NMS: Network Management Station. Software runs on the manager. The common management platforms are "Quid View", "Sun Net Manager" and "IBM Net View". Agent is the software of the server running in the network device.

NMS can send "Get Request", "Get Next Request" and "Set Request" message to Agent. After Agent gets those messages, it will read or write according to the message type to create Response message and send the Response message back to NMS. Agent will also send Trap message to NMS when the device is abnormal.

3. SNMP Version

Currently SNMP Agent of the device supports SNMP V3 and it is also compatible with SNMP V1and SNMP V2C. It is authenticated by user name and password in SNMP V3.

SNMP V1 and SNMP V2C adopt authentication of Community Name. The SNMP message of the community name which is not authenticated will be discarded. SNMP community name defines the relationship of SNMP NMS and SNMP Agent. User can choose the following one or more features related to community name.

1. Defines MIB view of community name.

2. Setup visit privilege of MIB objective is Write or Read. Community name with Read privilege can check the device information only. Community name with Write privilege can configure the device.

3. Setup appointed basic visit control list of the community name.

IT-ES618-IM-4D series supports SNMP V1/V2c. Both SNMP V1 and V2c use public character strings for match authentication.

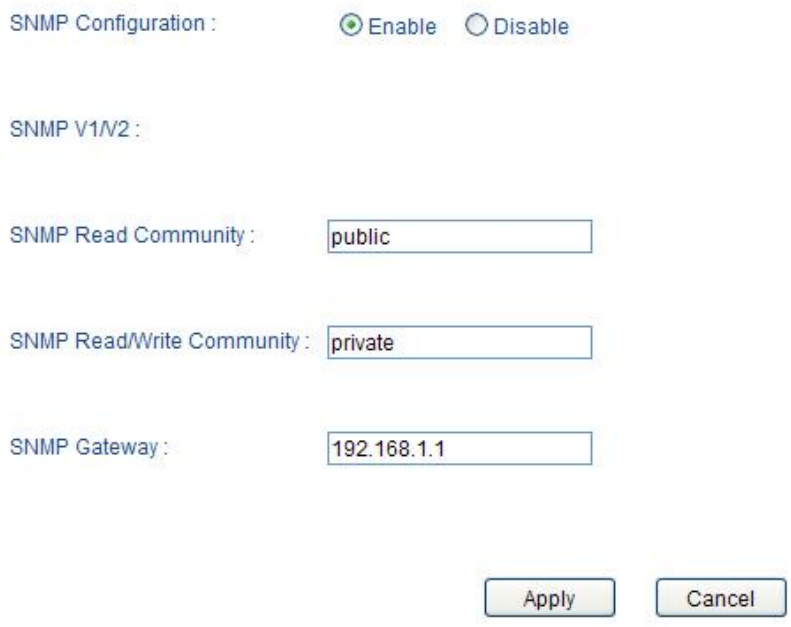
SNMP usually uses UDP Port 161(SNMP) and 162 (SNMP-traps) based on TCP/IP protocol. SNMP protocol agent is existed in network device. MIB (information specific to the device) is uses as device connector. These network devices can be monitored or controlled through the agent. When trap event happens, a message is transmitted by SNMP Trap, an available trap receiver can get this trap information.

SNMP supports 3 kinds of basic operating in total:

Get: Manager can use this to get some variable value of Agent.

Set: Manager can use this to set up some variable value of Agent.

Trap: Agent uses this to send an alarm to manager.



（Figure 5.9.1）

Read Community

Use a character string to name a SNMP community. This community only has Get privilege.

Read/Write Community

Use a character string to name a SNMP community. This community has Get and Set privilege.

SNMP TRAP Gateway

IP address of the receiver of the alarm information sent Agent

The device supports warm start of Trap. If existed IP address in Trap gateway, click "Apply", the Trap receiver can get the trap information. If the trap receiver cannot get trap information, please check network setting and connecting. Please pay attention to the privilege of Read and Write in SNMP Explorer.

5.9.2 Relay alarm

Warning had 2 types: Power alarm, port alarm. Main function: once the devices were in unusual status, can inform administrator in time and repair the status of device quickly, can avoid more lose

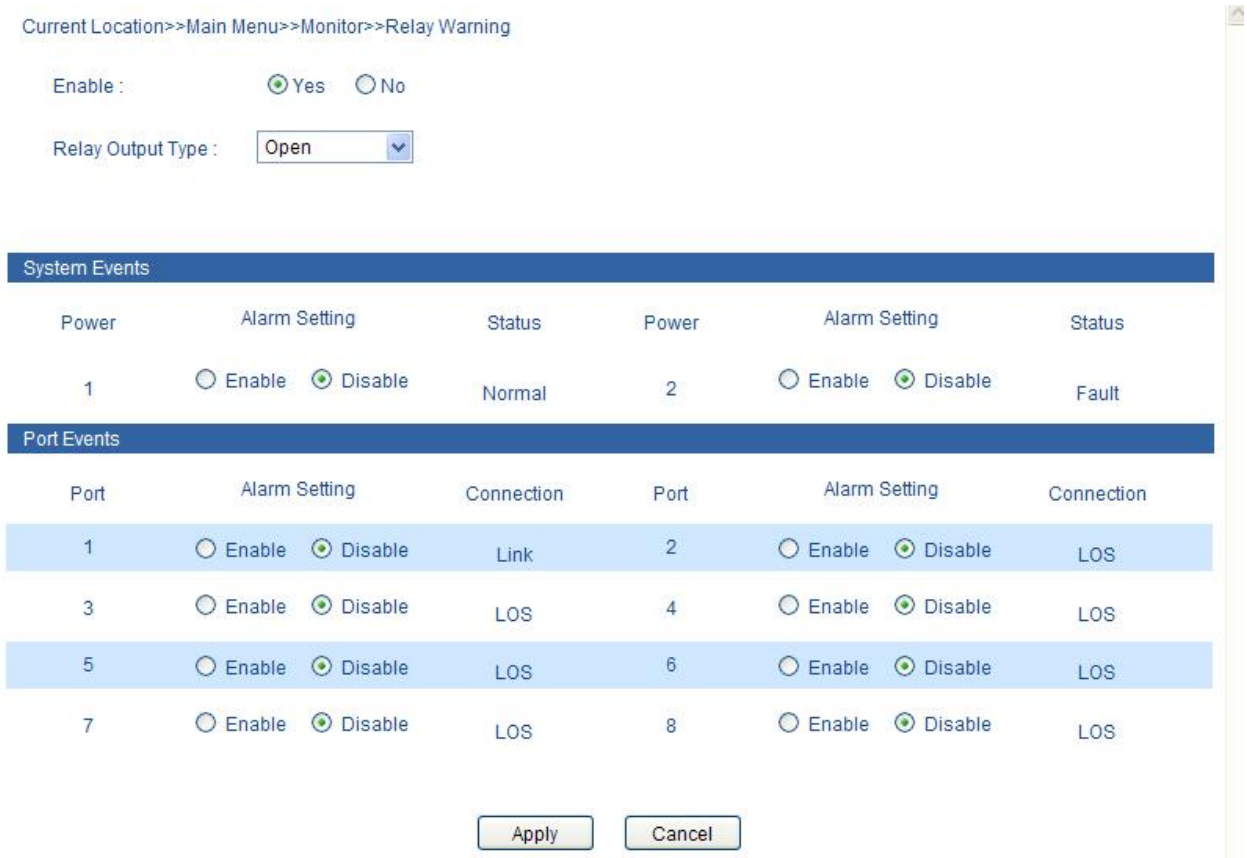
Relay warning input type: Close/Open. Once select close, the light will be bright when alarms have. Relay will be in open status.

Power alarm

IT-ES618-IM-4D series provided dual DC power supply (AC power supply did not have alarm), if one power supply had problem, another will support power supply immediately, dual power supply hot back-up. Select to enable power alarm, if power supply was in unusual status, device will send alarm signal, inform power supply work unusual.

Port Alarm

Alarm when port disconnects. Enable port alarm, if port was in unusual status (Connect or disconnect), device will output a signal, inform the device work unusual.



（Figure 5.9.2）

In default status, the type of relay output is open, the alarm light is OFF, and have no alarm, relay alway open.
When the device have alarm, the light is ON, relay close.

5.10 Traffic Statistics

The function of traffic Statistics is to calculate the data packets in a fixed time, included transmit and receive data packets.

Operate method: Start to calculate after select clear

5.10.1 RX frame statistics

Frame Name	Description
InUnicasts	Valid Unicast Data Frames
InBroadcasts	Valid Broadcast Data Frames
InPause	Number of Valid Flow Control Pause frames
InMulticasts	Valid multicast excluding In Broadcasts
InFCSErr	Number of FCS checkout error frames (completed data)
AlignErr	Number of FCS checkout error frames (uncompleted data)
InGoodOctets	Number of valid received data byte (including FCS)
InbadOctets	Number of invalid received data byte (including FCS)
Undersize	Number of valid data frames less than 64 bytes
Fragments	Fragments (less than 64 bytes, invalid FCS)
In64Octets	Number of frames with 64 bytes (including invalid frames)
In127Octets	Number of frames between 65 and 127 bytes (including invalid frames)
In255Octets	Number of frames between128 and 255 bytes (including invalid frames)
In511Octets	Number of frames between 256 and 511 bytes (including invalid frames)

In1023Octets	Number of frames between 512 and 1023 bytes (including invalid frames)
InMaxOctets	Number of 1024-1518 or 1522 bytes（802.1Q）(including invalid frames)
Jabber	Invalid oversized frames received (more than 1518 or 1522)
Oversize	Valid oversized frames received (more than 1518 or 1522)
InDiscards	Number of Valid discarded frames (because of cache, flow control, etc.)
InFiltered	Valid frames filtered (because of VLAN and so on)

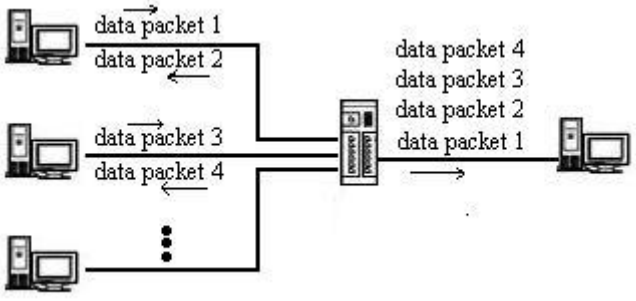
5.10.2 TX frame statistics

OutUnicasts	unicast data frames output
OutBroadcasts	Broadcast data frames output
OutPause	Number of output flow control pause frames
OutMulticasts	Multicast data frames output
OutFCSErr	Invalid FCS frames output
OutOctets	Number of output bytes（including FCS）
Out64Octets	Number of output frames with 64 bytes
Out127Octets	Number of output frames between 65 and 127 bytes
Out255Octets	Number of output frames between 128 and 255 bytes
Out511Octets	Number of output frames between 256 and 511 bytes
Out1023Octets	Number of output frames between 512 and 1023 bytes
OutMaxOctets	Number of output frames between 1024 and 1518 or 1522 bytes（802.1Q）
Collisions	Number of collision in output
Late	Number of collision after frames output 64 bytes
Excessive	Number of unsuccessful output frames（trying more than 16 times with half duplex flow control ）
Multiple	Number of successful output frames（collision more than 1 time）
Single	Number of successful output frames（collision happens in 1 time only ）
Deferred	Number of successful output frames（the receiver is busy, but It sends successfully after a delay）
OutFiltered	Filtered frames output
OutDiscards	Discarded frames output（because of cache, flow control, etc.）

5.11 Network Diagnosis

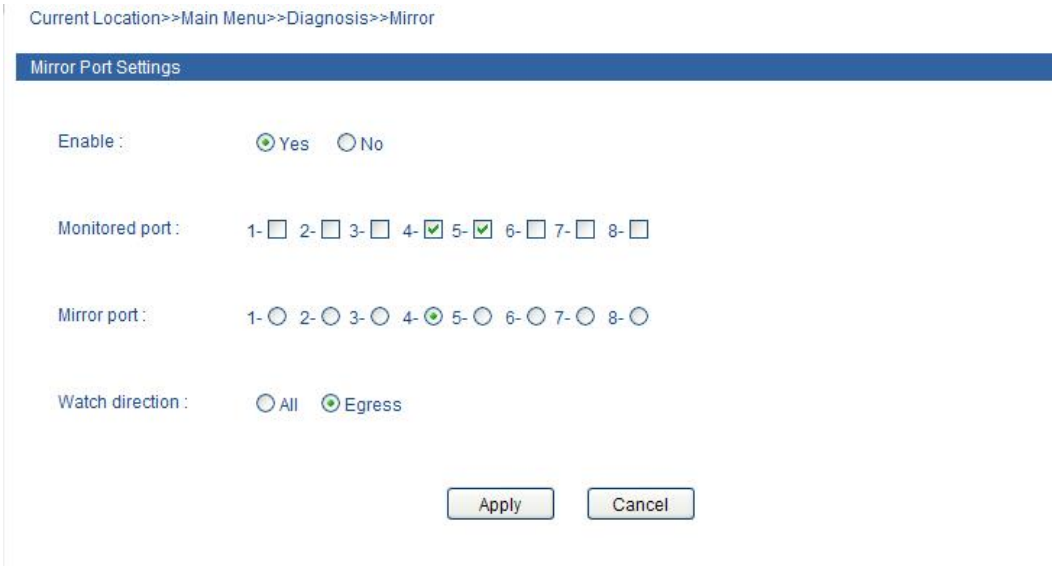
5.11.1 Port mirroring

Port mirroring refers to copy data from the port which need to be monitored to appointed monitoring port for analysis and monitoring. Ethernet switch supports many-for-one mirror which means messages from several ports can be copied to a monitored port. User can appoint the direction of monitored message, such as only monitoring of transmitted messages of appointed port. The device configures port mirroring function through port mirroring group. Each group includes a monitored port and a group of mirror ports. Total bandwidth of mirroring is not more than that of monitored port. It is good to monitor and manage its internal network data when using port mirroring in a company. It is also good to locate the failure when network is cut up.



（Figure 5.11.1）

Example as figure: Port 4 collects all of the data from port 4 and port 5



（Figure 5.11.2）

1. This function is not often used. Otherwise other port-based higher management function like RSTP, IGMP SNOOPING
2. Port mirroring function can only deal with the normal FCS packets. It cannot deal with error data frames.

5.12 Basic settings

5.12.1 Device address

Device address

Device configuration support two modes, DHCP and static IP address, can get the device's IP address via client when the DHCP function is running, if you need NTP that need to connect internet, please enter the available and correct gateway and DNS address.

IP Address

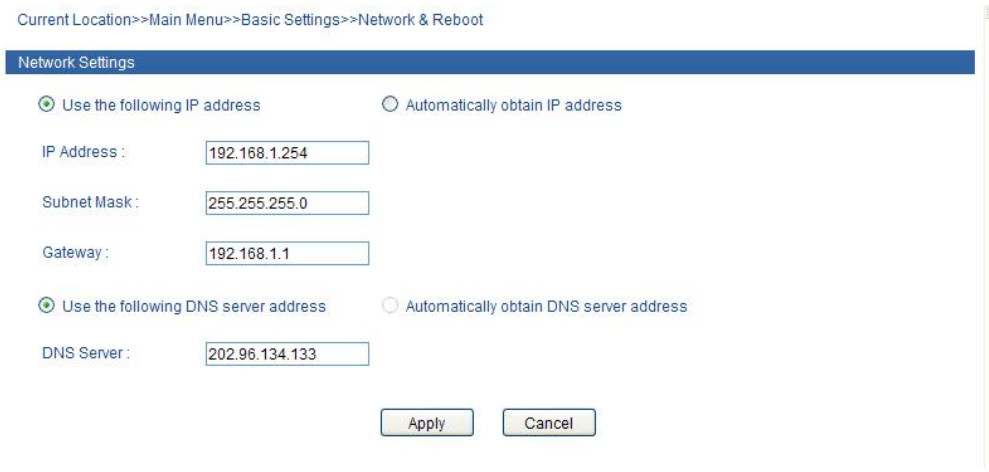
IP address is an address of 32 bits length which is assigned to the device on the internet. The IP address consists of two fields: the network number field (net-id) and the Host ID field (host-id). For can conveniently manage IP address, IP addresses are divided into five categories.

Subnet Mask

Mask is corresponding 32 bits number of IP address. Some are 1, the others are 0. These 1 and 0 can be combined arbitrary in principle, but the first continuous bits are 1 when designing subnet mask. IP address can be divided into 2 parts by subnet mask: subnet address and host address. 1 in IP address and subnet corresponds to subnet address, other bits are host address. A type of address corresponding mask is 255.0.0.0; mask of B type address is 255.255.0.0; mask of C type address is 255.255.255.0.

Default Gateway

Default gateway in the host PC is generally called default route. Default route refer to a kind of router that destination address of IP data packet will choose when it don't find other existing route. All data packets of destination address which don't exist in the list of router will choose default route.



（Figure 5.12.1）

Device reboot

Can reboot the switch remote. Knock [Basic settings & Logout] menu, Enter into reboot interface, Figure as 5.12.2.

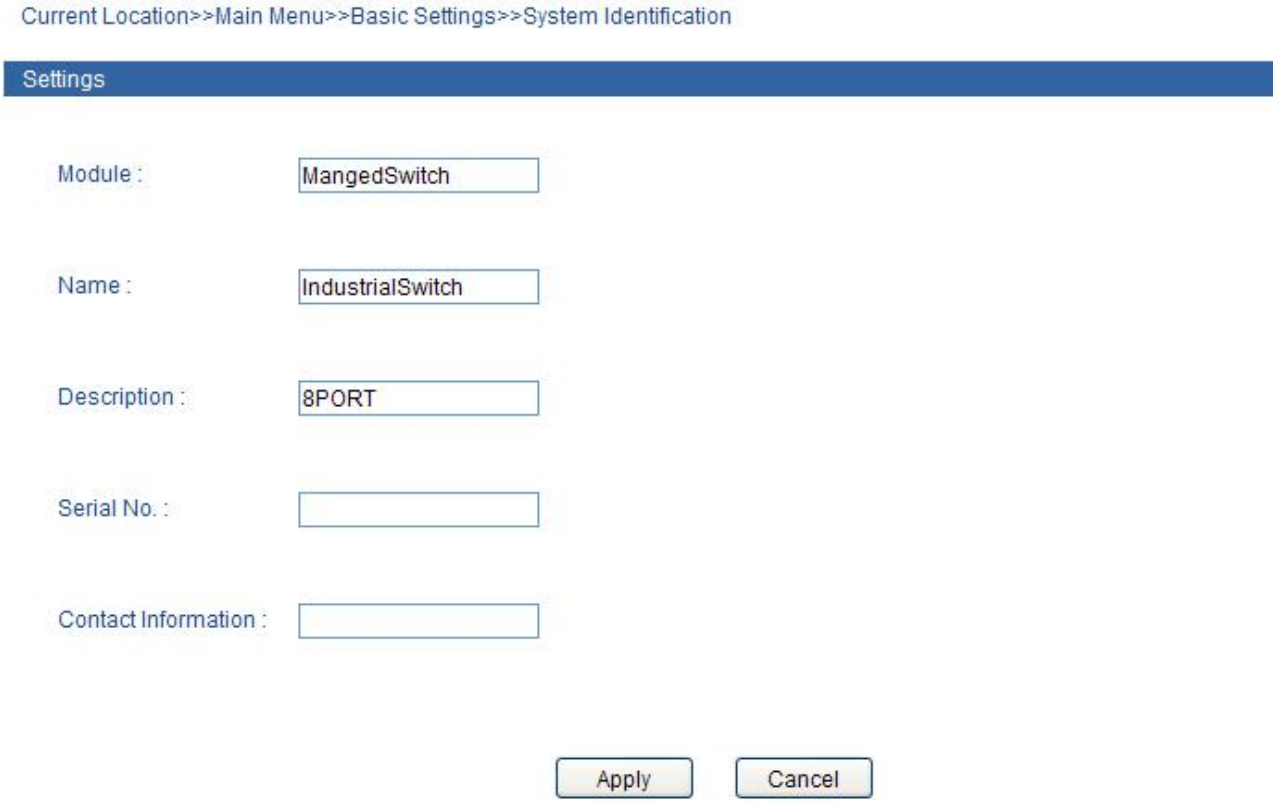
（Figure 5.12.2）

Knock<OK> button, after confirmation, device will be logout. After 20 seconds, know menu bar and back to WEB managed login interface.

Before reboot, please save all configurations. Otherwise, all configuration will be lost

5.12.2 System identification

In System Identification interface we can see Model, Name, Description, Serial NO., and Contact Information. We can modify these above items by this function. It will take effect after system reboot. Figure 5.12.3 is initial device settings of IT-ES618-IM-4D series switch.



（Figure 5.12.3）

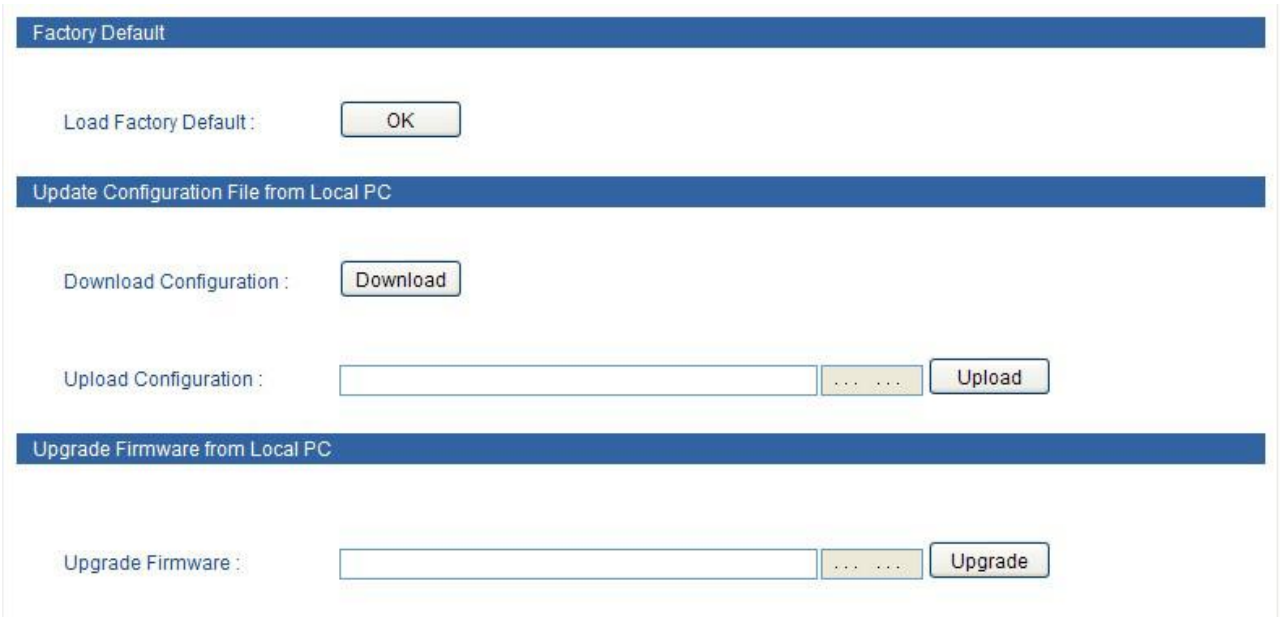
Name
To give a name to each device, length is not more than 16 bytes.

Description
A brief description to a device, the length is not more than 16 bytes.

Serial No.
Display Installation Location of the device, the length is not more than 30 bytes.

5.12.3 System File Upgrade

The menu included 4 functions: Factory default, Download Configuration, upload configuration, upgrade firmware.



（Figure 5.12.4）

1. Factory Default

If you know the IP address of the device, user name and password:

Use IE to login Web interface.

Click "System Management"

Click "System File Update"

Choose "Factory Default"

Click "OK"

Notice: the IP address will be "192.168.1.254".

Open a new interface, input "192.168.1.254" to make a new configuration.

2. Download Configuration

If you know the IP address of the device, user name and password:

Use IE to login Web interface.

Click "System Management"

Click "System File Update"

Choose "Download Configuration"

Click "Download"

Choose the name of the file and the place to save.

3. Upload Configuration

If you know the IP address of the device, user name and password:

Use IE to login Web interface.

Click "System Management"

Click "System File Update"

Choose "Upload Configuration"

Click "Upload"

4. Upgrade Firmware

If you know the IP address of the device, user name and password:

Use IE to login Web interface.

Click "System Management"

Click "System File Update"

Choose "Upgrade Firmware"

Click "Browse" and find the place of uploading the file.

Click "Upgrade"

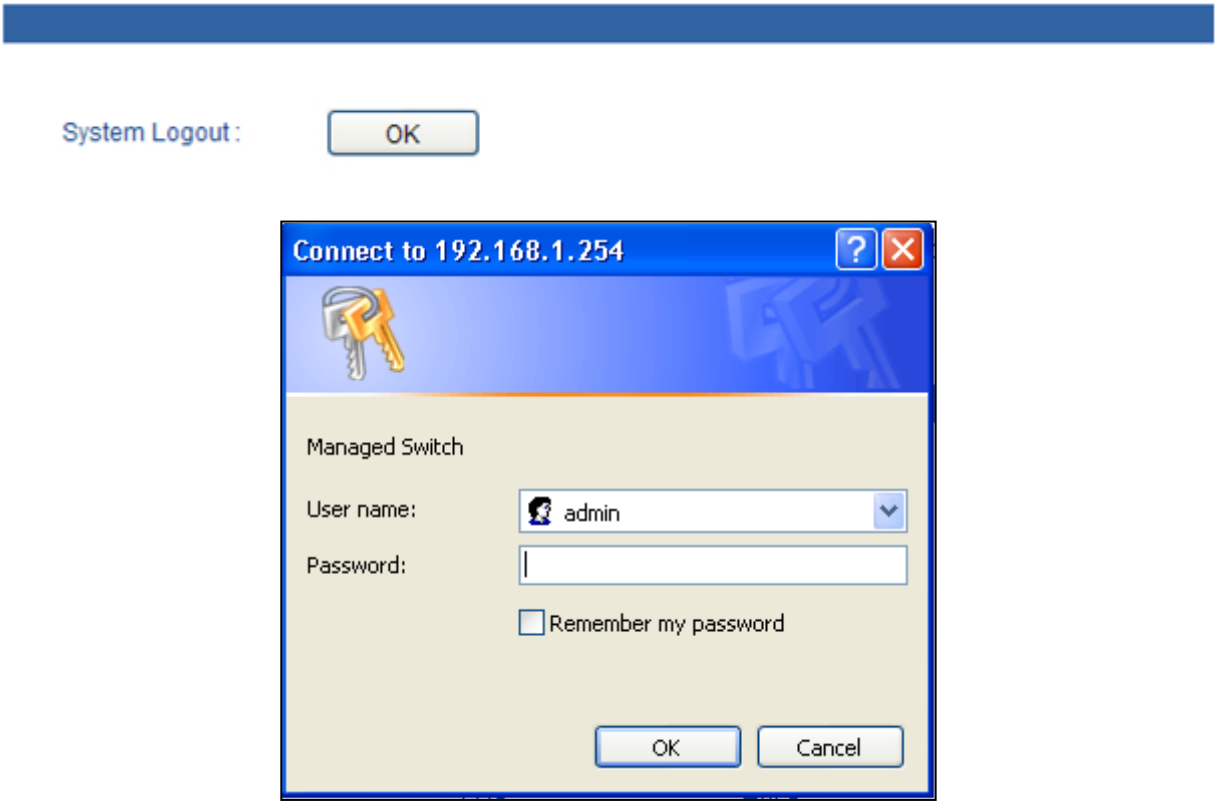
A suggestion" interruption of power is not allowed during uploading", confirm it.

:

1. Load factory default will result in all status be in factory default settings, the IP could be static IP address "192.168.1.254".
2. Upload the configuration file, in the new configuration if static IP is not in the same network segment, the website will not be opened.
3. Use dynamic IP settings, but there is no DHCP server on the network segment, that will result in the relevant part of the IP will not be updated in the new configuration when upload configuration.

5.12.4 System logout

Knock<OK> button, after confirmation, device will be logout. After 20 seconds, know menu bar and back to WEB managed login interface.



（Figure 5.12.5）

Chapter 6 other function configure

6.1 DIP switch

IT-ES618-IM-4D series have 4 DIP switch. Can default factory through DIP 3.

DIP switch	ON function
1	Hold
2	Factory default
3	Hold
4	Hold

6.1.1 Factory default

Put the DIP switch 3 to ON, Power ON again, the default factory finished. After default factory, must put the DIP switch to OFF, otherwise, will default factory again when power ON next time.

:

Except DIP switch 3 need to put ON when default factory. Other DIP switches must always in OFF status, otherwise, the device may work unusual

Appendix 1 Glossary table

	Glossary	Description
A	ARP (Address Resolution Protocol)	An IP address to physical address protocol
	Auto-Negotiation	Switches at both ends of the device in accordance with the maximum performance to auto-negotiate the speed and duplex mode
B	Broadcast Storm	A port send excessive broadcast frame meantime on the network, accumulate the respond to send messages on the network , consume too much network resources or cause the network timeout
	Broadcasting	A forwarding way send data to all branch of network
C	CoS（Class of Service）	namely 802.1p priority program, CoS offer a way for data packets to join priority tag, classify packets into 8 level with the value 0~7 range
D	DHCP （Dynamic Host Configuration Protocol）	Information for the network to assign dynamically IP address, subnet mask and gateway
	DSCP （DiffServe Code Point）	Packaged in IP packet header of 6 bit domain, can classify packets into 64 level with the value 0~63 range
E	Ethernet	Ethernet uses a bus or star-shaped topology and supports transmission rates up to 10Mbps orders of magnitude. A new version called fast Ethernet speeds of up to 100Mbps
F	Flow Control	Flow control allows low-rate devices communicate with high-rate, the flow control can match high rate port contracting speed with low rate port reception speed according to the way of high rate port pause contract
	Frame	Packets contain the header and tail message of physical media layer
	Full-Duplex	Receive and send data in progress at one moment meantime on IEEE802.3x standard
H	Half-Duplex	Receive or send data in one direction at one moment in progress on Backpressure standard.
I	IGMP （Internet Group Management Protocol）	Define the mechanism among hosts and three layers multicast device to establish and maintain the relationship between multicast group members.
	IEEE 802.1p	Add the priority network traffic on MAC sub layer of data link layer.
	IEEE 802.1q	Define the VLAN bridge operation。To manage ,define and operate VLAN on the bridge LAN
Q	QoSQuality of Service）	A technology to resolve the network delay and block problems and so on.
T	Trunking	To make an aggregated group tied up a group of ports together to increase bandwidth and improve the connection reliability.
	ToS （Type of Service）	Packaged in IP packet header of 8 bit domain to perform the different priority packets
U	UDP (User Datagram Protocol）	Face to disconnected unreliable transmission layer protocol
	UTP (Unshielded Twisted Pair)	Not shielded media out of twisted pair

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em@il: info@intellisystem.it WEB: http://www.intellisystem.it

Appendix 2 Default factory

Main Menu	Tag	Function	Main Menu
System status	System information	Name	IT-ES618-IM-4D
		Module	IT-ES618-IM-4D
		Description	
		Serial No.	
Port configuration	Port configuration	Port enable	Enable
		Speed mode	Consult automatic
		Flow control	enable
	Bandwidth management	Egress	No configuration
		Ingress	No configuration
	Storm suppression		No configuration
L2 feature	QoS	802.1p priority	Disable
		Port priority	Disable
		DSCP priority	Disable
	VLAN	802.1Q VLAN	Disable
		Based on port VLAN	Enable
	IGMP snooping		Disable
	Static Unicast FWD		Disable
Redundancy	Port Trunking		Disable
	Rapid Ring	Ring V1	Disable
		Ring V2	Disable
		Ring V3	Disable
	RSTP		Disable
Port Statistics	Traffic Statistics		
Diagnosis	Mirror		Disable
Remote Monitoring	SNMP		Disable
	Relay alarm		
System management	Device management	IP	192.168.1.254
		Subnet mask	255.255.255.0
		Default gateway	192.168.1.1

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Appendix 3 Treatment of common problems

1. Why the page is not normal when configured by a web browser?
Before the access to WEB interface, please clear the IE cache and cookies. Otherwise, the WEB interface may be not normal.

2. How to do if you forgot password?
You can load factory default to get the initial password if forgot the password, the exact method you can search in the management software. The initial user name and password is “admin”.

3. Whether the effects are equivalent that make the configuration via web and by the management software?
Configuration of both is the same, are not in conflict.

4. What kind of alarms will be informed to technical except displayed in the management software?
The computer buzzer of monitoring host will continue to make alarm sound when got alarm information.

5. Why cannot increase the bandwidth after configured trunking?
Check the Trunking Port's properties are coincident, including rate, duplex mode, VLAN etc.

6. How to deal the problem that some of ports cannot access?
When some of ports can no access, that may be line fault, network card failure and switch port failure, by the following test to find faults:
1. Only change a new Ethernet cable.
2. Use the same Ethernet cable and switch port, to replace the computer.
3. Use the same Ethernet cable and computer, to access other ports.
4. If have confirmed switch fault, please contact manufacture to repair.

7. What about the order of port adaptive status detection?
Port to detect the status in the following order: 100Mbps full duplex, 100Mbps half duplex, 10Mbps full-duplex, 10Mbps half duplex, in descending order to detect and automatically connect with the highest speed.