Ä

RG-S2300

RGOS 10.2(5)

Ώ ∧©2009

Ώ ∧ ˘ Ά ˛ Â

Ώ ∧ ˩˘ a Ո Ά
˛ à à à à à è à è ˛
Â

RGOS® à à à

Red-Gian® à à 锐捷® à

Ώ ∧ Ά ˘ a Â

Ά ˘ è ˘ a ˥ ˘ Ώ ∧
Â Ώ ∧ Ά è ˩˘
Ά à a ˘ Ո ˘ Ώ
∧ a Â

ЎĄ ў ий RGOS®10.2(5) Â

[x | y | ...] ÿ ч ۷ a Â

// ۷ ὴ Â

3.

˘

ЊѪ Ю

~ ầ ầ Ү Â

ầ ầ ầ Ἰ

Ἆ ἶ ۷ ۷ a ˘ ҥ

Ἆ ἶ ۷ ὲ ҥ ˆ ҥ /۱ ầ
˜ ˘ έ Ѧ ὴ Â

Ἆ ҥ ف ˘ Ҙ ЊѪЮ ˘ Ѧ
Ь Â

---

1 ʒ

ʒ ˘ ⅃Л ʒ Â

ў ЛЮ '

ʒ

╠

ʒ

ʒ **no default**

CLI

⅄ ʒ

CLI

CLI

1.1. ʒ

ǂ a ⅄ ˘ ʒ ɑ ⅃

Л ʒ Â

ʒ Ю /ʅ ^ ?˜ ⅃Л ʒ ʒ Â

˘ ˝I

^ User EXEC ˜ ˘ ⅃Л ʒ Â Ю˘ ⅄ ⅃Л

ʒ˘ з ʒ ╥ ≠ ⅄ ˘ show ʒ Â

ʒ a Â

ʒ˘ ˝I ^ Privileged EXEC ˜ Â ˘

ʒ Â Ю˘ ⅃Л

ʒ˘ з Â

^ à ˜ ʒ˘ ң

Â ˘ ʒ Ю ˘ ╠

Ѐ Â ˘ ˝I Â ÿ

˘ ⅃Л Â

Ю ʒ à à à Â

⅄ и “Ruijie” Â

ʒ '

ʒ			ЮО	
User EXEC ^ ~	″I Â	Ruijie>	**exit** ʒ Â ˘ **enable** ʒ Â	ầ
Privileged EXEC ^ ~	ЮО ˘ **enable** ʒ Â	Ruijie#	˘ **disable** ʒ Â ˘ **configure** ʒ Â	ʒ Â É ʒ Â
			˘ **exit** ʒ **end** ʒ˘	
Global configuration ^ ~	ЮО ˘ **configure** ʒ Â	Ruijie(config)#		

ֿ ՈՆ ֿ ֽ Â ЮО '

ֽ	
Help	ֽ ЮО ╠ Â
abbreviated-command-entry?	ֿ ֽ Â ' Ruijie# **di**? dir disable
abbreviated-command-entry<Tab>	ֽ Â ' Ruijie# **show conf<Tab>** Ruijie# **show configuration**
?	ֽ ЮО Â ' Ruijie# **show ?**
command keyword ?	ЮО ֿ Â ' Ruijie(config)# **snmp-server community ?** WORD SNMP community string

1.4. ҳ no default

ҳ **no** Â ˘ **no** ╖ ˘
б ҳ ↙ Â ҳ **no shutdown** ҳ
shutdown ↙ ˘ . Â a **no**
Â

ҳ **default** ˘ ҳ **default** ҳ й Â
ҳ ╖ ˘ Ю **default** **no**
↓ Â ↑ ҳ ╖ ˘ Ю˘ **default**
no ↙ Â **default** ҳ ╖ ˘ ↓
й Â

1.5. CLI

Ю CLI ↓ Â

CLI '

	⊮	↙ ╠
% Ambiguous command: "show c"	˘ ҳ Â	ҳ˘ ⊮ /! Â ↓ Â
% Incomplete command.	ҳ ↓ Â	ҳ˘ ¨Ą /! Â ↓ ↓ Â
% Invalid input detected at '^' marker.	ҳ ˘ /!^ ^~ ң Æ Â	ҳ Ю /!˘ ҳ Â

1.6. ↓ ҳ

ҳ Â з ҳ
↑ Â

ÿ ↓ ҳ ҳ˘ Ю '

Ctrl-P Э ˩	˩ ʒ ʒ Â ÿ ˘ ˩ ˥ Â
Ctrl-N Ю ˩	Ctrl-P Э ˩ ˩˘ ˩ ʒ ʒ Â ˩ ˥ Â

~

˩ ˘ VT100 Â

1.7.

ʒ ˩ ╖ Â '

ʒ ╟

1.7.1.

Ю '

╖		
╟ ˝I Â	˩ Ctrl-B	˝I Â
	˩ ˩ Ctrl-F	˝I ˩ Â
	Ctrl-A	˝I ʒ Â
	Ctrl-E	˝I ʒ Â
Â	Backspace	˝I Â
	Delete	˝I Â
╟ Â	Return	˩ Э ╟ ˘ Ю ˘ Â
	Space	˩ Э ╟ ˘ Ю ˘ Â

1.7.2.

	Ctrl-B
	Ctrl-A
	Ctrl-F
	Ctrl-E

mac-address-table static

```
mac-address-table static 00d0.f800.0c0c vlan 1
interface
$tatic 00d0.f800.0c0c vlan 1 interface fastEthernet
$tatic 00d0.f800.0c0c vlan 1 interface fastEthernet 0/1
```

Ctrl-A

```
-address-table static 00d0.f800.0c0c vlan 1 interface $
```

1.8. CLI

1.8.1. Show ϡ

show ϡ ˘ ˩ Л∪ Л∪Ю ϡ'

ϡ	
Ruijie# **show** *any-command* **|** **begin** *regular-expression*	show ϡ ˘ Л∪ Л∪ ˩ Â

~

Ю **Show** ϡ

Ш˙ ˘ Л∪Ю ˩ Â

show ϡ ˘ ˩ Л∪ Л∪Ю ϡ'

ϡ	
Ruijie# **show** *any-command* | **exclude** *regular-expression*	show ϡ ˘ Л∪ ˘ è Â
Ruijie# **show** *any-command* | **include** *regular-expression*	show ϡ ˘ ˘ è Â

~

show ϡ ˘ ˩ˆ ˘ "|"˜ Â ˩˘ ˩ Л∪ ‡ ˆ ˜ Â 3 Ш˙ Â

1.9. ϡ ˩

ϡ ˩ ╖ ˘ ˩ Л∪ й ϡ ˩˘ '

"mygateway" Ьѫ ѝ "ip route 0.0.0.0 0.0.0.0 192.1.1.1" ɻˇ

‡ ɻ Â

ʒ ɻˇ ɻЛυ ʒ ʒ Â ˇ … ɻ ʒ
ʒ ɬ ˇ ɻ ɻЛυ ɻ ɬ Â

ɻ ʒ ʒ ʒ ʒ ˇ
ЮЎ **alias ?** ɻЛυ ɻЛυ ɻ ʒ '

```
Ruijie(config)#alias ?
aaa-gs              AAA server group mode
acl                 acl configure mode
bgp                 Configure bgp Protocol
config              globle configure mode
......
```

ʒ ɻ ╠ ˇ ɻ ⁄ˆ *˜ ˇ з ЛυЮ
'

**command-alias=original-command*

ˇ EXEC ЮЎ ʒ ɻ ”s” ”show” Â ‡ ”s?” ɻЛυ
ɻ ’s’ ɻ ╠ '

```
Ruijie#s?
*s=show  show  start-chat  start-terminal-service
```

ɻ ʒ ʒ a ˇ ‡ ⁄ ʒ Â ˇ
EXEC Ю ɻ ”sv” ʒ ʒ ”show version”ˇ ‡'

```
Ruijie#s?
*s=show  *sv=”show version” show  start-chat
start-terminal-service
```

ɻ ÿ ʒ ˇ a Â Э ˇ
ʒ ˇ a ɻ'

```
Ruijie# s?
show  start-chat  start-terminal-service
```

ʒ ɻ ≠ ɻЛυ ɻ ʒ ╠ ˇ Ю ʒ
ɻ ”ia” ʒ ”ip address”ˇ ‡ Ю'

```
Ruijie(config-if)#ia ?
  A.B.C.D  IP address
  dhcp     IP Address via DHCP

Ruijie(config-if)#ip address
```

”**ip address**” ʒ ⁄ ˇ з ɻ ʒ Â

ʒ ɻ ˇ ‡ a Â

show aliases ֽ ۔ Ո ۔ Â

1.9.1. CLI

CLI ˘ PC Â ╟ ˘
˚ ˚ у ۔ ۔ Ո CLI Â ۔
ˆ Console˜ ˘ ы ˆ Outband˜ Â
۔˘ ۔ Ո Telnet Â ч
۔ Ո ֽ Â

ÿ ˘ ϧ ˚ ˘ Э ˚ ^
TFTP˜ ˘ ϧ Â ϧ ˚ ╗
˘ ϧ ↓ ϧ Â ϧ **enable secret**
╗ Â

2.2.2. ϧ

ϧ˘ 15 Â

2.2.3. ↓ ϧ

Л н Ю ϧ ↓ ϧ Â

ϧ	
Ruijie(config)# **enable password** [**level** *level*] {*password* | *encryption-type encrypted-password*}	ϧ Â ↓ 15 ϧ˘ з ↓ ϧ Ю Â 15 ϧ˘ ˘ ╟ й ϧ Â 15 ϧ 15 ϧ ↓˘ Â
Ruijie(config)# **enable secret** [**level** *level*] {*encryption-type encrypted-password*}	ϧ˘ ╗ б ϧ ↓˘ ϧ ╗ Â й ˘ ϧ Â
Ruijie# **enable** [*level*] Ruijie# **disable** [*level*]	⁋ ˘ ÿ æ ⁋ ϧ Â

ϧ ˘ **level** ˘ ‡ й Ня ϧ Â
ϧ Л˘ ϧ ↓ Â

2.2.4.

Ю˘ ↓ ч ↓ ϧ ' ^ 1 ˜
^ 15 ˜ Â ↓ Л Ъ й ϧ ⁋ 16 Â
а ↓ ϧ˘ ↓ Л Ъ а ↓ а ↓ ϧ Â

ϧ Ю˘ Н а ϧ Â й
˘ й ϧ Â

2.2.4.1. ٦

٦˘ ‡ ⅄ Л٥ ٦ æ

’ ٦ ˘ ‡ ⅄ Л٥ ٦

Â

⅄ Л٥ Ю ٦ ٦ '

٦	

Ruijie#

<cr>

Ю reload ҳ è ҳ й '

```
Ruijie# configure terminal
Ruijie(config)# privilege exec all reset reload
Ruijie(config)# end
```

1 ˘ ҳ '

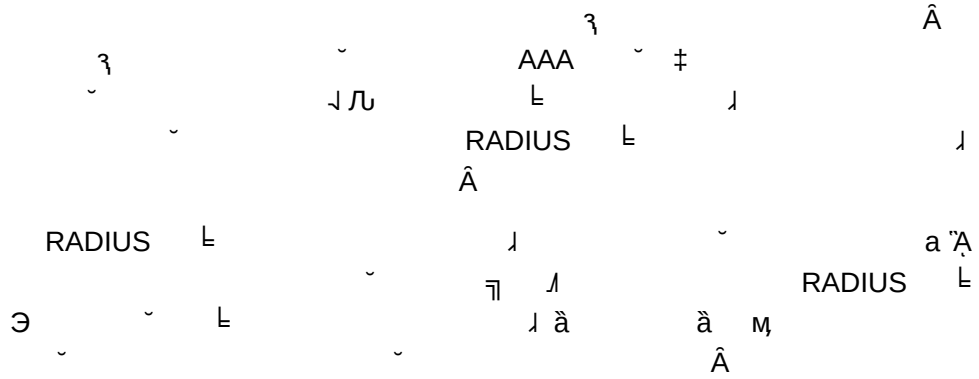
```
Ruijie# disable 1
Ruijie> reload ?
% Unrecognized command.
```

2.2.5. ^ line˜ ҳ

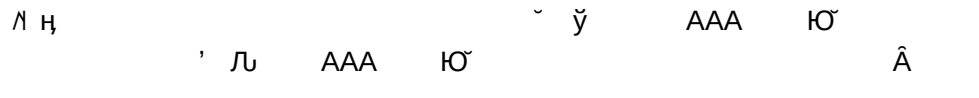
Л ң ^ TELNET

2.3.

2.3.1.



2.3.2.



Ruijie(config)# **username** *name* [**password** *password* | **password** *encryption-type encrypted password*]	
Ruijie(config)# **username** *name* [**privilege** *level*]	

2.3.3.

Ruijie(config-line)# **login local**	AAA
Ruijie(config-line)# **login authentication** {**default** | *list-name*}	AAA AAA Radius

AAA à Radius Л AAA
Â

2.4.

2.4.1.

(à à)
(à à)Л Â ″I
ь Â ≠ Л Л
Â ў Y
Â

2.4.2.

Л Э Â
Л Л ь Ю Ю
Ÿ Â Л Л ‡ Э a
Ä Э Â
Э Э Л
Ю Л Â

Ruijie# **clock set** *hh:mm:ss month day year*	Â

2008-1-30 05:54:43

```
Ruijie# clock set 05:54:43 1 30 2008      //
Ruijie# show clock                        //
05:54:43 CHN-BJ Wed 2008-01-30
```

2.4.3.

Л Л Ю **show clock**

Ю

```
Ruijie# sh clock                          //
05:54:43 CHN-BJ Wed 2008-01-30
```

2.4.4.

 calendar a
 Ю≠ Â
 a
 Â

Ю **clock update-calendar**
 Â

Ruijie# **clock update-calendar**	

Ю

```
Ruijie# clock update-calendar
```

2.5.

2.5.1.

reload [modifiers] scheme Ю(è)
 Â ╗
 Э Âmodifers **reload**
 Â

˘ ┘ з 1 ˘
Ю˘ 1 a ё 1
˘ ˘ ‡ ь ё 1 ˘ ÿ Â string
┘ Э Â 2005-01-10 14:31˘ Э
˘ ┘ Л **reload at** *08:30 11 1 newday* Â
2005-12-10 14:31˘

2.5.3.

Ю Ю

Ruijie# **reload in** *mmm* [*reload-reason*]	*mmm* **reload** **reload** *reload-reason*( )
Ruijie# **reload in** *hhh:mm* [*reload-reason*]	*hhh* *mm* **reload** **reload** *reload-reason*( )

Ю 125 2005-01-10 12:00)

```
Ruijie# reload in 125 test                    //
Ruijie# reload in 2:5 test                    //
Ruijie# show reload                          //
System will reload in 7485 seconds.
```

2.5.4.

a **reload** Ю **reload** Â

2.5.5.

Ю

32 ˘ ‡ ↓ è 32 ~ ù ę ˘
ɻ ↓ у ↓ у Â Ю˘ Лυ é ɻ ù ɻ ˘
S2924G à R2692 Â

2.6.2. ɻ

Л ң Ю ę ɻ '

ę	
Ruijie(Config)# **hostname** *name*	ɻ ˘ ɻ ↓ ˘ a . 255 Â

↓ Лυ Ю **no hostname** ɻ æ ÂЮ ɻ RGOS'

```
Ruijie# configure terminal                    //
Ruijie(config)# hostname RGOS      //          ɻ  ù RGOS
RGOS(config)#                                  //ɻ
```

2.6.3. ę

ę ˘ ‡ ɻ ^ ɻ 32 ˘ ‡ ↓
è 32 ~ ù ˘ ɻ ↓ у ↓ у Â ↓
Лυ Ю **prompt** ę ę ˘ ę ↓ EXEC
Â

ę	
Ruijie# **prompt** *string*	ę ˘ ɻ ↓ . ˘ 32 ˘ ‡ ↓ è 32 Â

↓ Лυ Ю **no prompt** ę ù Â

2.7.

2.7.1.

˘ ⅃ Â ⅃ Л
Â ⅃ Л… ч ^ banner˜ '
Â ˘ ˘
"I Э Â ˘ ⅃ Л ѝ ^
. ˜ Â ⅄˘ ў
Â Ю˘ Â

2.7.2.

⅃ Л… ˘ ˘
Â ⅃ Л ЛЮ ҂ '

҂	
Ruijie(config)# **banner motd** *c message c*	(message of the day) Â c ↑ ˘ ↑ ⅃ Л ('&') Â ↑ ⅄˘ ⅄ ˘ ⅃ Л ˘ ↑ ˘ ˘ ↑ ⅄ Ў ˘ ‡ Â ˘ a ѝ↑ ˘ a 255 Â

⅃ Л Ю **no banner motd** Â
Ю ˘ (#) ѝ↑ ˘
ѝ Notice: system will shutdown on July 6th. ˘ Ю'

```
Ruijie(config)# banner motd #                    //   ↑
EntfigC72C58112B21A1>-6<02C8>-6<1B5B>]TJ0 -1.29423B
```

Ruijie(config)# **banner login** *c message c*	Â *c* ¦ ˘ ¦ ɻ Л Ъ ('&') Â ¦ ɻ ˘ ɻ ˘ ɻ Л Ъ ˘ ¦ ˘ ¦ ɻ Ÿ ˘ ‡ Â ˘ a ѝ¦ ˘ a 255 Â

ɻ Л Ъ Ю **no banner login** Â

Ю ˘ (#) ѝ¦ ˘

ѝ Access for authorized users only. Please enter your password. ˘

Ю'

```
Ruijie(config)# banner login #                    //   ¦
```

2.8.2. à

ў ˘ Э ˘ ˚ ˘ ˚
˘ Ctrl ˚ ˘ Boot ˚ ˘ ң Л^
Л ~ Â ┘ Л Â ┘
Л Ю Ю ҂ '

҂	
Ruijie# **show version**	à

2.8.3. ˚

˚ ў Э Â
' ˘ ' ' Э Л˘
Э ^ ˘ ‡ й ~ ˘
˘ ┘ ^ ~ ┘ Л
Ю Ю ҂ '

҂	
Ruijie# **show version devices**	
Ruijie# **show version slots**	

2.8.4. ╟ ў ┛

┘ Л ҂ **show mainfile** ҂ ╟ ў ┛˘

2.9.2.

Ruijie(config-line)# **speed** *speed*	bps 9600 19200 38400 57600 115200 9600

```
Ruijie# configure terminal                    //
Ruijie(config)# line console 0          //          57600 bps
Ruijie(config-line)# speed 57600        //          57600
Ruijie(config-line)# end                          //
Ruijie# show line console 0                     //
CON     Type    speed   Overruns
* 0     CON     57600   0
Line 0, Location: "", Type: "vt100"
Length: 25 lines, Width: 80 columns
Special Chars: Escape  Disconnect  Activation
            ^^x     none       ^M
Timeouts:      Idle EXEC    Idle Session
            never       never
History is enabled, history size is 10.
Total input: 22 bytes
Total output:  115 bytes
Data overflow:  0 bytes
stop rx interrupt:  0 times
Modem: READY
```

2.10. Telnet

2.10.1.

Telnet TCP/IP

Telnet Client

Л н LINE Ю ҳ '

ҳ	

LINE Э˘ ↓

Ruijie(config-line)# **exec-timeout** *20*

line_rcms_script.text Telnet

```
configure terminal
line tty 1 16
transport input all
no exec
end
```

```
Ruijie# execute flash:line_rcms_script.text
executing script file line_rcms_script.text ......
executing done
Ruijie# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)# line vty 1 16
Ruijie(config-line)# transport input all
Ruijie(config-line)# no exec
Ruijie(config-line)# end
```

PC TFTP Flash CLI

2.13.

SSH Server/Telnet Server/Web Server

Ruijie(Config)# **enable service snmp-agent**	SNMP Server
Ruijie(Config)# **enable service ssh-server**	SSH Server
Ruijie(Config)# **enable service telnet-server**	Telnet Server
Ruijie(Config)# **enable service web-server**	Http Server

no enable service

```
Ruijie# configure terminal                    //
Ruijie(config)# enable service ssh-server     //    SSH Server
```

2.14. HTTP

Web HTTP

Ruijie(Config)# **ip http port** *number*	HTTP 80
Ruijie(Config)# **ip http authentication** { **enable** | **local** }	web enable **enable** enable password enable secret 15 **local** username 15

no Http Server 8080

```
Ruijie# configure terminal                    //
Ruijie(config)# enable service web-server     //    Web Server
Ruijie(config)# username name password pass   //
Ruijie(config)# username name privilege 15    //
Ruijie(config)# ip http port 8080             //
Ruijie(config)# ip http authentication local //
```

3 LINE

3.1.

LINE '

LINE

╗ / LINE VTY

LINE Ю ┘ Л

3.2. LINE

3.2.1. LINE

LINE ˘ ┘ Л LINE Ю˝ é LINE Â
LINE ˘ ЛЮ ҳ'

ҳ	
Ruijie(config)# **line** [**aux** | **console** | **tty** | **vty**] *first-line* [*last-line*]	LINE

3.2.2. ╗ / LINE VTY

Ю˝ line vty ѝ 5 Â ┘ Л ҳ ╗ line vty Â
VTY ┘ Л ╗ 36 Â

ҳ	
Ruijie(config)# **line vty** *line-number*	LINE VTY ╗
Ruijie(config)# **no line vty** *line-number*	LINE VTY

3.2.3. Line Ю ┘

LINE Ю ┘ Л ˘ ┘ Л ҳ Â
Ю˝ VTY ┘ Л ' è TTY˝ a

Â

4

4.1.

CTRL TFTP Xmodem

4.2.

ÿ ЛЪЮ

TFTP

XMODEM

4.2.1. TFTP

ÿ ЮCLI ЮTFTP Server Location ‡ TFTP Server IP

Ruijie# **copy tftp:** *//location/ filename* **flash:** *filename*	URL *filename*

CLI ЮTFTP Server ÿ

Ruijie# **copy flash:** *filename* **tftp:** *//loca tion/filename*	*filename* URL

4.2.2. XMODEM

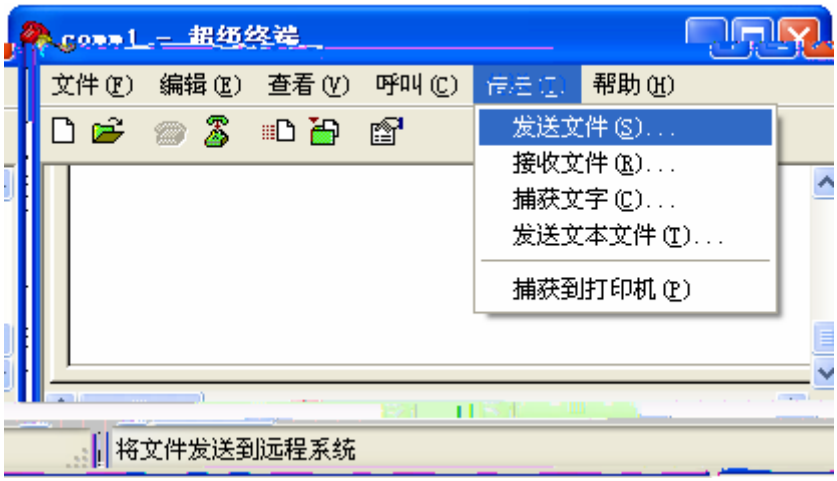
ÿ ў Ю ˚ ˘ ⁄ ÿ Э ˚ ў Â

CLI ֆ Ю˘ Ю ˚ Ю '

Ю ˘ ”I Windows ' ⁄

Ю ЛЬЮ ֆЮ ˚ ' ⁄ ў Windows ˘ “

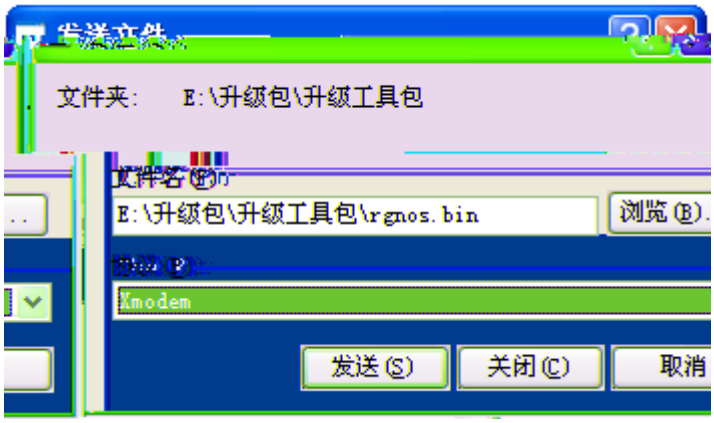
” “ ˚ ”Ⅱ ˘ في 1 '



في 1

˚ ⁄ ў Ю ˚ ˘ “Xmodem”

“ ” ‡ Windows Лu Â في 2 '



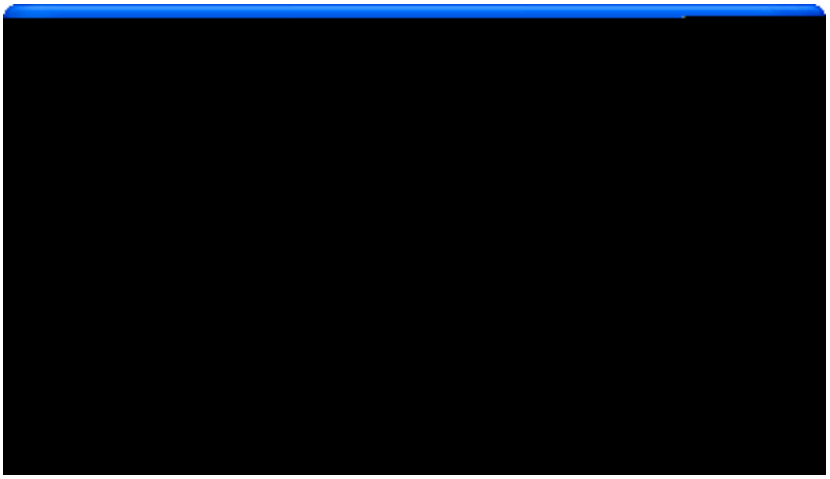
في 2

ֆ	
Ruijie# **copy xmodem flash**:*filename*	ÿ ў Ю ˚ ⁄ и *filename* Â

CLI ֆ Ю˘ Ю ˚ Э '

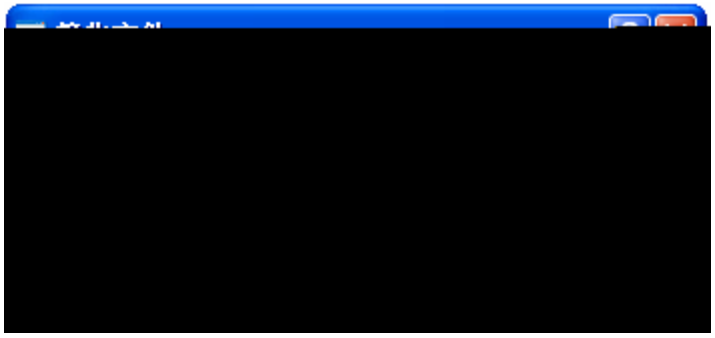
Э ˘ ”I Windows ' ⁄

Ю ЛЪЮ ҂ Э ˚ ’ Л ў Windows ˘ “
” “ ˚ ”╖ Â ف 3 ’



ف 3

Э ˚ Æ ˘ “Xmodem”˘ “
”˘ ˚ ˩ ˘ “ ” Л
˚ Â ف 4 ’



ف 4

҂	
Ruijie# **copy flash**:*filename* **xmodem**	ÿ Э ˚ *filename* ў

4.2.3. ˘

a ˘ ˩Ъ Э tftp xmodem ˘
˚ Э Â ╖ Л˘ ╟ ˘ ˘ ˚ ╟

˘ ˘ a ў Â

˘ ˚ Э ˘ ╟ a ⅄'

1˜ ˘ ⅄ ˘ ˘ ˘ ˘ ╟ Æ˘
Ї Ą ╟ Â

2˜ ˘ ´ Л Ł´ ˘ ˘ ˚
˘ Â ″I ˘ ˘ Æ Â Ї Ą ╟ ˘
╟ ⅄ ╖ ╟ ˘ ´ Ł´ ˘ Â

╟ ˘ ╖ ' ў ╖ ˘ ÿ ˘
´ Ł´ ˘ ў
a ˘ ˘ ˚ ˘ ˘ ˘ Л
Â

˜

˘ ў ˘ ⅄ ˘ ÿ ˘ ÿ
Â ˘ ´ ´ ⅄ ˘ Â ˘
a ⅄ ˘ ‡ ⅄ ˘ Â
˘ ˘ ⅄ **show version** ´ ˚
б ˘ ˘ ˘ a ў ⁋ ^
' **redundancy force-switchover**˜ ˘ ‡ ˘ Â

˘ ˚ ˘ '

1˜ ˘ ˚ ˚ ⅄ й **rgos.bin**

2˜ Э **copy** ҷ˘ ˚ Ю Э

3˜ Э ÿ ˘ ў ÿ ў ˘ ╖˘ ╖
Ю '

```
Upgrade Slave CM MAIN successful!!
Upgrade CM MAIN successful!!
```

1˜ Æ

2˜ Ї Ą ╟ Л˘ ˘ ˚ ˘ Ю '

```
Installing is in process ......
Do not restart your machine before finish !!!!!!
......
```

3˜ ˘ Л˘ Ю '

```
Installing process finished ......
Restart machine operation is permited now !!!!!!
```

4~ Ю '

```
System restarting, for reason 'Upgrade product !'.
```

5~ 5 6 a 7

```
System load main program from install package ......
```

6~

```
A new card is found in slot [1].
System is doing version synchronization checking ......
Current software version in slot [1] is synchronous.
System needn't to do version synchronization for this card ......
```

Ю '

```
System is doing version synchronization checking ......
Card in slot [3] need to do version synchronization ......
```

```
Version synchronization begain ......
Keep power on, don't draw out the card and don't restart your
machine before finished !!!!!!
```

```
Transmission is OK, now, card in slot [3] need restart ...
Software installation of card in slot [3] is in process ......
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!
Software installation of card in slot [3] has finished
successfully ......
The version synchronization of card in slot [3] get finished
successfully.
```

Э ч a

5 έ

5.1. Ping

ὴ ˘ Echo ˘
˘ Л ˘
Echo ˘ Л Л ὰ Л ˘ RGOS
Ping έ˘ Л Л ╠ ὰ Æ Â

Ping ϟ Ю˘ Ю˘ Л
Ping ╖ ˘ Ю˘ Л Л Ping ╖ Â

ϟ	
Ruijie# **ping** [*ip*] [*address* [**length** *length*] [**ntimes** *times*] [**data** *data*][**source** *source*] [**timeout** *seconds*]]	**Ping**' έ

Ping ╖ ˘ Л Л Ю ˘ 5
ὴ 100Byte IP ˘ ^ ὴ 2 ~ ˘
б ┐ ^ ┼ a ˘ Л Ὼ ┼ ┐
~˘ ‡ ¦ ! Ľ Л’ б a ┐ ˘ ‡ ¦ C Ľ Л’
˘ ‡ ¦ . Ľ Л Â Л Â Л Ю ὴ ping
'

```
Ruijie# ping 192.168.5.1
Sending 5, 100-byte ICMP Echoes to 192.168.5.1, timeout is 2
seconds:
< press Ctrl+C to break >
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/10
ms
```

Ping ╖ ˘ Л Ю Â Ping ˘ Л Л
ὰ ὰ Â Ping ╖ ˘ Л ≠
˘ Л Ю ὴ Ping '

```
Ruijie# ping 192.168.5.197 length 1500 ntimes 100 data ffff source
192.168.4.190 timeout 3
Sending 100, 1000-byte ICMP Echoes to 192.168.5.197, timeout
is 3 seconds:
  < press Ctrl+C to break >
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

```
Success rate is 100 percent (100/100), round-trip min/avg/max
= 2/2/3 ms
Ruijie#
```

5.2. Traceroute

Traceroute ϧ˘ ˩Л Ъ ÿ ˘
Â **Traceroute** ϧ ў ˘ ˘
Æ Æ Â

‡ ˘ ˘ TTL
1 Â TTL й 0 ˘ ˘
a ˩ Â ‡˘ Traceroute ϧ '
″I TTL й 1 ˘ ICMP
˘ Л Ъ a ˘ й TTL ˘ Л TTL ╗ 1
Л ˘ ˩ γ TTL ˘ Ю ˘
˘ ICMP TTL ˘ Ю
ÿ ˘ IP Â

Traceroute ϧ ˩Л Ъ Ю ˘ έ ϧ
Ю'

ϧ	╗
Ruijie# **traceroute** [*protocol*] [*destination* [**probe** *probe*] [**ttl** *minimum maximum*] [**source** *source*] [**timeout** *seconds*]]	

ЛЪЮ й Traceroute ч ˘ й ˘ й
a Â

1¨

6

6.1.

ў ў ˘ Ѭ Â
ѧў ѝ ЛЬЮ ч '

γ (L2 interface)

Ь (L3 interface) (Ь)

6.1.1. γ (L2 interface)

ў γ Ѭ ѧў ѝ ЛЬЮ

Switch Port

L2 Aggregate Port

6.1.1.1. Switch Port

Switch Port Э ˘ ѵ γ ╗ Â ѧ Лъ
Access Port Trunk Portў ѧ Лъ Switch Port ҳ˘
ѝ Access Port Trunk Port Â Switch Port
б γ ˘ з а Â

6.1.1.1.1.Access Port

Access Port ѵ VLAN, ѵ VLAN Â
Â

VLAN

Access ѵ VLANў Лъ VLAN VLANў
ѧ Лъ а Â

б

Access Port а TAG ˘ з ѵ ЛЬЮ Ь '

Untagged

VID ѝ Access Port VLAN Tagged

VID й 0 Tagged

Untagged

Access Port a TAG ˘ й TAG ╕ VLAN TAG Â
˘ ╕ TAG˘ Ѭ Â

Tagged

Access TAG ˘ ЛЬЮ ˚ '

TAG VID˙ VLAN ID˜ б VLAN ID л ˘ ˘
TAG л Â

TAG VID˙ VTBT(E)2f0 Tc 0 Tw 3.891 0 Td[<02C5>51<03E2D9208 Tc 0.

TAG VID˙

6.1.2. Ь (L3 interface)

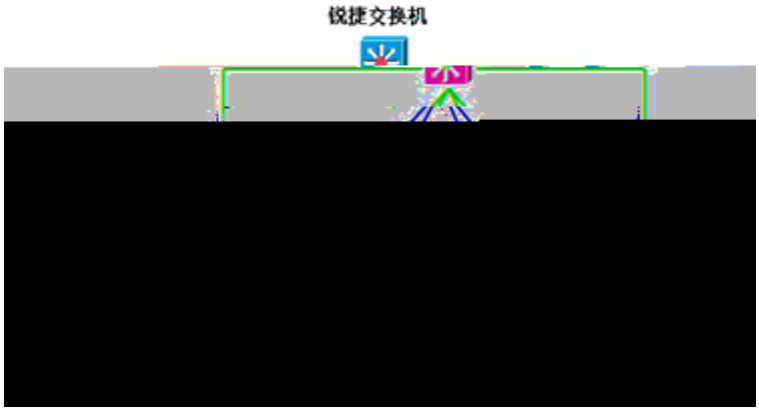
ў Ь Ⱶ

SVI (Switch virtual interface)

6.1.2.1. SVI(Switch virtual interface)

SVI ˘ Ь Â SVI ⅃ Л ѝ
˘ ⅃ Â ≠ ⅃ Л… SVI ѝ ˘
VLAN ˘ ⅃ Ь VLAN
Â … SVI ˘ ⅃ **interface vlan** ⅋ … SVĭ
⅄ SVI¦ IP VLAN Â

ف ˘ VLAN20 ў ⅃ ˘ Ь ˘
VLAN20 ў A VLAN30 ў B VLAN20 SVI1
VLAN30 SVI2 Â



ف 1

SVI ⅃ γ ѝ DHCP Client

ң DHCP Client ╖ ˘ a DHCP Server ╖ Â

έ Ю ê SVI Ì Â

6.2.

˘ ˘ ˘

6.2.1. Л ‡

Switch Portў è Л ч ǂ ' Л˘ Э Л Â
Л й 2ў Э Л й 3ў ‡ Л й
2/3 Â Л ÿ 0ў Â Л ‡ ' ˘
ÿ Л˘ ÿ ┘˘ ÿ Э Ю ˘ Л ÿ 1
╖ Â Э Л ÿ 1˙ Э ˘ Л ÿ ┘ Â
┘ Лъ ӯ ˘ ч ӯ ^ ″I ~ ˘
ӯ ˘ ┘ Л Â ≠ ┘ Лъ ҳ **show** ҳ
Лъ Э Â

Aggregate Portў è Л й 1˙ Aggregate Port Â

SVIў è Л SVI VLAN VID Â

~

Э Л й 0ў ╟ (┘ ´) Л ÿ 1
Â

6.2.2. ҳ

┘ Ю interface ҳ Â

ҳ	

Ruijie(config)# **interface** *ID*	ЮO interface ʒ˘ Â ≠ ˩ Л∪ ЮO interface range interface range macro ʒ Â ⅋ ˩ ε ˩

ЮО ЮО **interface range** ҳ'

```
Ruijie# configure terminal
Ruijie(config)# interface range fastethernet 1/1 - 10
Ruijie(config-if-range)# no shutdown
Ruijie(config-if-range)#
```

ЮО ŧ /ʌ ˛˜ range'

```
Ruijie# configure terminal
Ruijie(config)# interface range fastethernet 1/1-5, 1/7-8
Ruijie(config-if-range)# no shutdown
Ruijie(config-if-range)#
```

6.2.3.2. ЬЖ

Ю **define interface-range** ҳ ⱶ fastethernet1/1-4 ⱶ'

```
Ruijie# configure terminal
Ruijie(config)# define interface-range resource
fastethernet 1/1-4
Ruijie(config)# end
```

Ю ⱶ ⱶ'

```
Ruijie# configure terminal
Ruijie(config)# define interface-range ports1to2N5to7
fastethernet 1/1-2, 1/5-7
Ruijie(config)# end
```

Ю ⱶ ports1to2N5to7 '

```
Ruijie# configure terminal
Ruijie(config)# interface range macro ports1to2N5to7
Ruijie(config-if-range)#
```

Ю ⱶ ports1to2N5to7'

```
Ruijie# configure terminal
Ruijie(config)# no define interface-range ports1to2N5to7
Ruijie# end
```

6.2.4. Ӯ

ˇ ˩ Л∪ Ӯ Â ˩ Л∪ ὲ Ӯ Â Ӯ ˇ ầ ầ ˩ ầ Ӯ ˇ ˩ Ӯ ˇ Ӯ ˇ ˩ Л∪ Â

ҳ ˩ Â Aggregate Port SVI a Ӯ Â

ҳ ˩ Ӯ Â

и Aggregate Port ˇ ὲ Ӯ ˇ ‡ ╗ AP Â Aggregate Port a ˩ Â

```
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 1/1
Ruijie(config-if)# medium-type fiber
Ruijie(config-if)# end
```

6.2.5.

й ╠ в ╖ ˇ ┘Л╚ й ж ┘
ˇ ≠ (Description) Â ┘Л╚ Ы
ё ┘ ˇ ˇ Gigabitethernet 1/1 ┐ А ж ˇ
┘Л╚ й ╕ Port for User A ╘ Â

╕	
Ruijie(config-if)# **description** *string*	ˇ 32 Â

Ю Gigabitethernet 1/1 '

```
Ruijie# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 1/1
Ruijie(config-if)# description PortForUser A
Ruijie(config-if)# end
```

Юў ┘ Â ┘Л╚
Â ˇ ‡ Э a ˇ
╖ Â ≠ ┘Л╚
Â ч ' Up Downў
ˇ й downў ‡ й up Â

╕	
Ruijie(config-if)# **shutdown**	

Ю Gigabitethernet 1/2'

```
Ruijie# configure terminal
Ruijie(config)# interface gigabitethernet 1/2
Ruijie(config-if)# shutdown
Ruijie(config-if)# end
```

6.2.6. ˇ ┤ ˇ

à ┤ Â

ЛЮ ╕ ┤ Switch Port Â

३	

Ruijie(config-if)# **Mtu** *num*	MTU Num <64-9216>

Ю Gigabitethernet 1/1 MTU

```
Ruijie# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 1/1
Ruijie(config-if)# mtu 64
Ruijie(config-if)# end
```

S2300 н MTU ˘ й 1528Bytes˘ Â

MTU ↓ ˚ Â

6.2.8. γ

Ю γ ˘ VLAN Ї VLAN Ь Ї Ь Â

γ Ю '

	γ
Switch port	access port
VLAN	VLAN 1 4094
VLAN˜ access port	VLAN 1
Native VLAN˜ trunk port	VLAN 1
ӯ	copper
	Up
↓	
Aggregate port	

6.2.8.1. Switch Port

6.2.8.1.1. access/trunk port

ў Switchport (access/trunk port) Ю Â

Ы Ю **switchport** è ҙ Switch Port

ҙ	
Ruijie(config-if)# **switchport mode** {**access** | **ђ0wk**	

Ю .1e.79.Ў(0. BT /TT1313m08 601m.2T f BT32 /T01313m8T60(.10.90.78 0. BT /T

interface <*interface*>	˜I , ˜I˘ ˜I
switchport mode hybrid	ѝ ѝ hybrid
no switchport mode	
switchport hybrid native vlan *id*	hybrid VLAN
switchport hybrid allowed vlan [[**add**] [**tagged**	**untaged**]] |**remove**] **vlist**	‡

```
Ruijie# configure terminal
Ruijie(config)# interface g 0/1
Ruijie(config-if)# switchport mode hybrid
Ruijie(config-if)# switchport hybrid native vlan 3
Ruijie(config-if)# switchport hybrid allowed vlan untagged
20-30
Ruijie(config-if)# end
Ruijie# show running interface g 0/1
```

6.2.8.2. L2 Aggregate Port

ў … L2 Aggregate Port L2 Aggregate Port Â

ЛЛ Ю **aggregateport** … L2 Aggregate Port é ľ Aggregate Port Ł Â

6.2.8.3. Æ

Ю Л **clear** ќ Æ Â ќ Л Switch Port,L2 Aggregrate port ,Routed port,L3 Aggregate port ˘ ЛЮ ѝ **clear** ќ'

ќ	
Ruijie# **clear counters** [*interface-id*]	Â
Ruijie# **clear interrface** *interface-id*	˚ Æ

ЛЛ ќ **show interfaces** ˘ Ю **clear counters** ќ˘ ЛЛ Â a ˘ ‡ L2 Â

Ю Gigabitethernet 1/1 '

```
Ruijie# clear counters gigabitethernet 1/1
```

~

S23 н oversize 1518 ˘ 1518 a 2044(UNTAG˜ FCS˜ , TAG ˘ a 2048) ˘ ˘ 2044(UNTAG˜ FCS˜ TAG ˘ 2048)

ֽ	
Ruijie(config-if)# **ip address dhcp**	DHCP IP

DHCP ч ֽ˘ ˩Л Э ЛЮ '

1˜ ˆ debug˜ ֽ˘ ˘ ў .

2˜ ֽ˘ DHCP Â

DHCP ˘ ֽ ЛЮ ֽ'

ֽ	
Ruijie# **debug ip dhcp client**	DHCP

DHCP ˘ ֽ ЛЮ ֽ'

ֽ	
Ruijie# **show dhcp lease**	DHCP

6.3. ˩ ע ע

╖ ,X/Q[illegible]Ð[illegible]dU”Ds9P~Ð[illegible]FdU”O3•Ù”GV3~1Ðp“~1

```
VLAN   : V5
Description          : SVI 5
AdminStatus         : up
OperStatus          : down
Primary Internet address     :  192.168.65.230/24
Broadcast address         :  192.168.65.255
PhysAddress         : 00d0.f800.0001
LastChange          : 0:0h:0m:5s
```

ЛЬЮ й Aggregate Port 3 '

```
Ruijie# show interfaces aggregateport 3
Interface   : AggreatePort 3
Description :
AdminStatus : up
OperStatus  : down
Hardware    : -
Mtu        : 1500
LastChange  : 0d:0h:0m:0s
AdminDuplex : Auto
OperDuplex  : Unknown
AdminSpeed  : Auto
OperSpeed   : Unknown
FlowControlAdminStatus : Autonego
FlowControlOperStatus  : Disabled
Priority    : 0
```

ЛЬЮ GigabitEthernet 1/1 '

```
Ruijie# show interfaces gigabitEthernet 1/1 switchport
Interface  Switchport Mode     Access    Native    Protected
VLAN lists
---------- ---------- --------- --------- --------- ---------
------------
gigabitethernet 1/1       Enabled  Access       1          1
Enabled   All
```

ЛЬЮ й Gigabitethernet 2/1 '

```
Ruijie# show interfaces gigabitethernet 1/2 description
Interface          Status    Administrative    Description
------------  ---------      -----------    ----------------
gigabitethernet 2/1     down       down        Gi 2/1
```

ЛЬЮ й

```
Ruijie# show interfaces gigabitethernet 1/2 counters
Interface : gigabitethernet 1/2
5 minute input rate ' 9144 bits/sec, 9 packets/sec
5 minute output rate ' 1280 bits/sec, 1 packets/sec
```

```
InOctets           : 17310045
InUcastPkts        : 37488
InMulticastPkts    : 28139
InBroadcastPkts    : 32472
OutOctets          : 1282535
OutUcastPkts       : 17284
OutMulticastPkts   : 249
OutBroadcastPkts   : 336
Undersize packets  : 0
Oversize packets   : 0
collisions         : 0
Fragments          : 0
Jabbers            : 0
CRC alignment errors : 0
AlignmentErrors    : 0
FCSErrors          : 0
dropped packet events (due to lack of resources): 0
packets received of length (in octets):
64:46264, 65-127: 47427, 128-255: 3478,
256-511: 658, 512-1023: 18016, 1024-1518: 125
```

6.5. line-detect

Â

Â

Â	Â
Ruijie(config)# **interface** *interface*	Â
Ruijie(config-if)# **line-detect**	Â

Â

Â

Â

Â

```
Ruijie(config)#interface gigabitEthernet 0/1
Ruijie(config-if-GigabitEthernet 0/1)#line-detect

Interface : GigabitEthernet 0/1
start cable-diagnoses,please wait...
cable-daignoses end!this is result:
4 pairs
pair state     length(meters)
---- ---------- --------------
A    Ok        1
pair state     length(meters)
---- ---------- --------------
B    Ok        2
pair state     length(meters)
---- ---------- --------------
C    Short     1
pair state     length(meters)
---- ---------- --------------
D    Short     1
```

'

pairs	˘ ˩ Â
State	˘ Þ ' OK˟ ~ ˘ Short˟ ~ ˘ Open˟ ~ Â Ю˘ ”I ˩ A à B ч й OK˘ C à D ч й Short Â ”I ˩ A à B à C à D й OK Â
Length	˘ Æ й Â ˩ state й OK Â ˥ ˘ /ˈ ˘ Л˩ Â й Short Open length Â

6.6. LinkTrap

˩ Л˩ LinkTrap˘ ˥ ˘
Link ˩ у˘ SNMP LinkTrap, ˩ ‡ a Â Ю˘ ˥
Â

6.6.1.

Ruijie(config-if)# [**no**] **snmp trap link-status**	link trap .

6.6.2.

Link trap:

```
Ruijie(config)# interface gigabitEthernet 1/1
Ruijie(config-if)# no snmp trap link-status
```

7 Aggregate Port

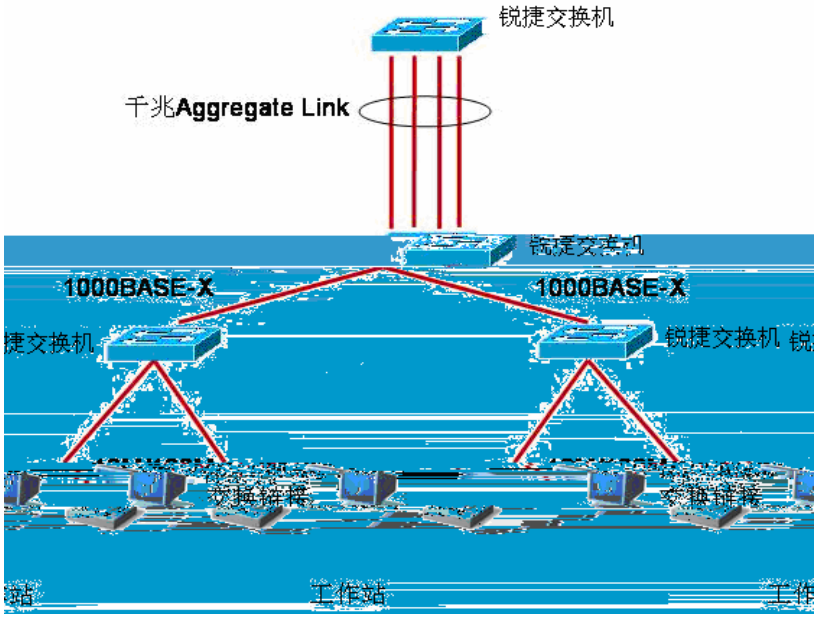
Э Aggregate Port Â

7.1.

7.1.1. Aggregate Port

˙ ˩ Л∪
ѝ Aggregate Poît ЛЬЮ AP˜ Â AP ╖ IEEE802.3ad
˘ ˩ Л∪ ˘ ˩ Â

AP ˘ ╟ ᛏ AP
è Э Â AP ˘ a
è Э Â



ي 1 ѝ AP

7.1.2.

AP ˩ Л∪ MAC à MAC ˘ MAC + MAC
à IP ˘ IP Л∪ IP + IP
ᛏ AP Â ˩ Л∪ **aggregateport load-balance** ᛏ

Â

MAC MAC ↾ AP
Â a ↿ MAC ˘ a ↿˘ ↿ MAC ˘ ÿ ↿
Â

MAC MAC ↾ AP
Â ↿ MAC ˘ ÿ ↿ ˘ a ↿ MAC
˘ ÿ a ↿ Â

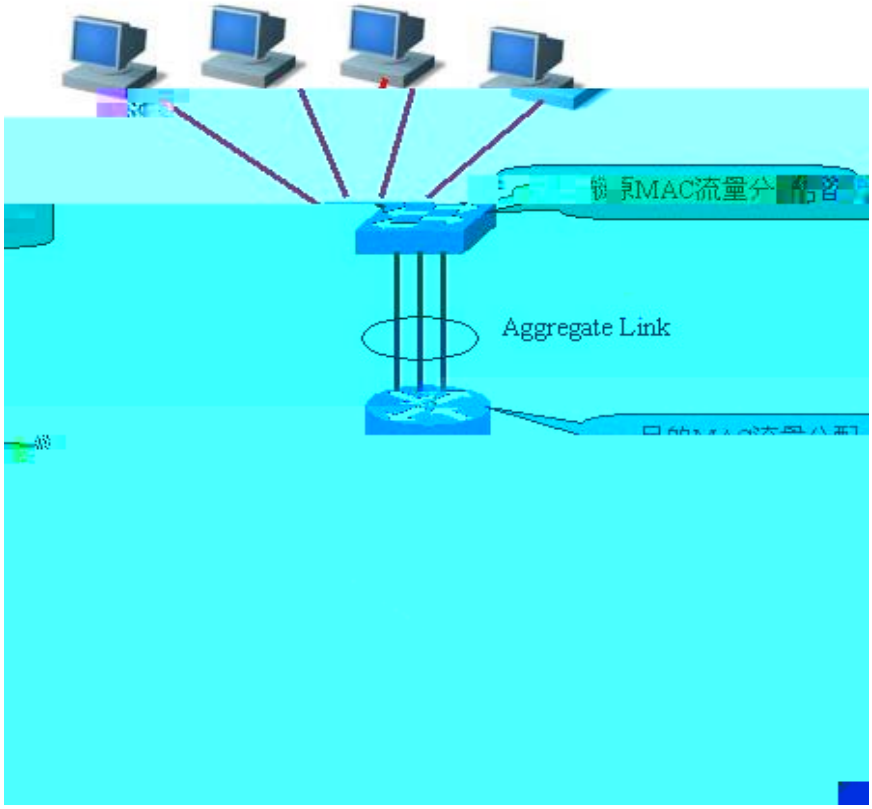
MAC+ MAC MAC MAC
↾ AP Â έ a ↿ MAC+ MAC ↿
↾ ↿ AP Â

IP IP IP IP ↾ Â a ↿
IP IP a ↿ ˘ ↿ IP IP ‡
↿ Â Ь ˘
Ю γ ˘ ‡ ╟ γ MAC MAC
Â

IP + IP IP IP ↾ Â
Ь ˘ Ю γ ˘ ‡ ╟
γ MAC Â έ a ↿ IP+ IP ↿ ↾
↿ AP Â

a ↿ ↾ ˘ Л ≠ ↾
Э˘ Ӏ↾ Â

Юفي ˘ AP б ˘ ^ في
Э 4 ↿ PC ˜ Л ̀й ˘ ^ في Ю 2 ↿ PC ˜
MAC MAC ˘ ̀й б è ў
è ↾ ˘ ̀й MAC ’
˘ ‡ ̀й MAC Â



في 2 AP في

~

S2352 ң 6 Aggregate Portˇ è Aggregate Port 1 Aggregate Port 5
ˆ ˜I ˘ Aggregate Port 6 ˆ ˜I Â

	MAC ¦ Â

7.2.2. Aggregate Port

AP Â

γ ↙ ╗ γ AP

AP a ╗ Â

╗ a AP ˘ AP ╠… Â

╗ AP˝ AP ↙ ʖ Â

ÿ AP ˘ ‡ ѝ ε ╗ AP Â

~

╗ AP ⅄ , a Э , AP.

7.2.3. Aggregate Port

Ю˝ Ю ╗ AP'

ʖ	
Ruijie(config-if-range)# **port-group** *port-group-number*	╗ AP(AP a ˘ ‡ ↙ … AP) Â

Ю **no port-group** ʖ AP Â

Ю γ Л∪ 0/1 γ AP 5 '

```
Ruijie# configure terminal
Ruijie(config)# interface range gigabitEthernet 0/1
Ruijie(config-if-range)# port-group 5
Ruijie(config-if-range)# end
```

↙Л∪ Ю ʖ Ruijie(config)# **interface aggregateport** *n* (n ѝ AP ⅄) … AP(AP n a)Â

7.2.4. Aggregate Port

Ю˝ Ю AP '

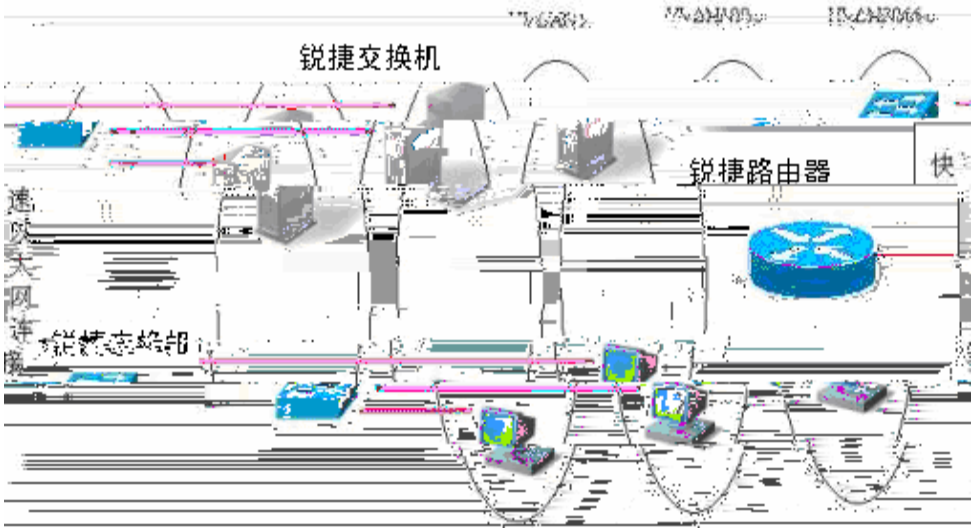
8 VLAN

IEEE802.1q VLAN

8.1.

VLAN ˆ Virtual Local Area Networkˇ ˇ
Э ĵ Â ISO γ Â VLAN ĵ
a ɻ Æ Â VLAN ɻ ˇ
Æ ˇ Â γ à
VLAN à ˇ a è VLAN Â Л˘
ў è a ɻ VLAN ў ˇ ‡
Ь ˇ Ю في Â

ɻ Л Ъ ЊЖ ѝ VLAN ˇ
ĵ ˇ з ɻ Л Ъ VLAN Â ╗ à
ˇ a ÿ Э Â



في 1

ˇ VLAN IP Â ŋ
ˇ ɻ IP ў ɻ VLANˇ VLAN
Ь ˆ Ь ˜ Â Ь ɻ Л Ъ SVI ˆ Switch Virtual Interfaces˜ VLAN IP Â SVI ˇ IP Â

VLAN State	Active	Active˘ Inactive

8.2.3.… à VLAN

ЮЎ ┘Л∪… VLAN"

҂	
Ruijie(config)# **vlan** *vlan-id*	VLAN ID Â VLAN ID˘ ‡ … VLAN˘ VLAN ID˘ ‡ VLAN Â ˆ ┘ ˜ и VLAN Ê

Ruijie(config)# **name** *vlan-name*

Ruijie(config-if)# **switchport mode access**	ЊЖ VLAN ˆ γ ACCESS ˜
Ruijie(config-if)# **switchport access vlan** *vlan-id*	ϯ VLAN

Ю Ethernet 1/10 ѝ Access ╗ VLAN20'

```
Ruijie# configure terminal
Ruijie(config)# interface fastethernet 1/10
Ruijie(config-if)# switchport mode access
Ruijie(config-if)# switchport access vlan 20
Ruijie(config-if)# end
```

Ю '

```
Ruijie(config)# show interfaces gigabitEthernet 3/1 switchport
Switchport is enabled
Mode is access port
Acsess vlan is 1,Native vlan is 1
Protected is disabled
Vlan lists is ALL
```

8.3. VLAN Trunks

8.3.1. Trunking

Trunk Л∪ è ˆ ˜ ˇ Trunk ┘Л∪ VLAN Â

Trunk 802.1Q Â Юفي Trunk Â

Ruijie(config-if)# **switchport mode trunk**	Trunk
Ruijie(config-if)# **switchport trunk native vlan** *vlan-id*	Native VLAN

Trunk Trunk **no switchport trunk**

8.3.3. Trunk VLAN

Trunk VLAN 1 4094 a Trunk VLAN VLAN a Trunk

Trunk VLAN

Ruijie(config-if)# **switchport trunk allowed vlan** {**all** | [**add** | **remove**

8.3.4. Native VLAN

Trunk TAG UNTAG 802.1Q Â è UNTAG
Native VLAN Â Native VLAN VLAN 1 Â

ЮЎ ┘Л∪ и Trunk Native VLAN Â

╕	
Ruijie(config-if)# **switchport trunk native vlan** *vlan-id*	Native VLAN

Trunk Native VLAN VLAN 1Ў **no switchport trunk native vlan** ╕ Â

Native VLAN VLAN IDЎ Trunk ў ╠ TAG Â

Native VLAN и a VLAN ў a ╠… VLAN Â ў Native VLAN ┘Л∪ a ┘ VLAN Â ў Native VLAN a Â

8.4. VLAN

ЮЎ ┘Л∪ VLAN Â VLAN VID à VLAN à VLAN Л∪ VLAN Â ЛЮ ╕'

╕	
show vlan [**id** *vlan-id*]	VLAN

Ю VLAN '

```
Ruijie# show vlan
VLAN[1] "VLAN0001"
GigabitEthernet 3/1
GigabitEthernet 3/2
GigabitEthernet 3/3
GigabitEthernet 3/4
GigabitEthernet 3/5
GigabitEthernet 3/6
GigabitEthernet 3/7
GigabitEthernet 3/8
GigabitEthernet 3/9
GigabitEthernet 3/10
GigabitEthernet 3/11
GigabitEthernet 3/12
```

```
VLAN[6] "VLAN0006"
GigabitEthernet 3/1

Ruijie# show vlan  id
```

8.5.2.

Э ˘ ĭ ѝ VLAN 10 à VLAN 20 à VLAN 30 Л
2 ’ 3 VLAN

```
Ruijie(config)#interface range GigabitEthernet 0/2-4
#           Gi 0/2-4    ѝ trunk
Ruijie(config-if-range)#switchport mode trunk
#
Ruijie(config-if-range)#exit
#         Gi 0/2
Ruijie(config)#interface GigabitEthernet 0/2
#       vlan ÿ          ↓ vlan
Ruijie(config-if)#switchport trunk allowed vlan remove 1-4094
#       ╗          ↓ vlan ѝ 10 à 20
Ruijie(config-if)#switchport trunk allowed vlan add 10,20
#         Gi 0/3
Ruijie(config-if)#interface GigabitEthernet 0/3
#       vlan ÿ          ↓ vlan
Ruijie(config-if)#switchport trunk allowed vlan remove 1-4094
#       ╗          ↓ vlan ѝ 10 à 20 à 30
Ruijie(config-if)#switchport trunk allowed vlan add 10,20,30
#         Gi 0/4
Ruijie(config-if)#interface GigabitEthernet 0/4
#       vlan ÿ          ↓ vlan
Ruijie(config-if)#switchport trunk allowed vlan remove 1-4094
#       ╗          ↓ vlan ѝ 20 à 30
Ruijie(config-if)#switchport trunk allowed vlan add 20,30
#
Ruijie(config-if)#exit
              Э      vlan
#     vlan    ˘      vlan id à ↓   à     à
Ruijie#show vlan
VLAN  Name      Status              Ports
---- --------  --------   -------------------------------
  1 VLAN0001   STATIC    Gi0/1, Gi0/5, Gi0/6, Gi0/7
                         Gi0/8, Gi0/9, Gi0/10, Gi0/11
```

```
                            Gi0/12, Gi0/13, Gi0/14, Gi0/15
                            Gi0/16, Gi0/17, Gi0/18, Gi0/19
                            Gi0/20, Gi0/21, Gi0/22, Gi0/23
                            Gi0/24
  10 VLAN0010  STATIC    Gi0/2, Gi0/3
  20 VLAN0020  STATIC    Gi0/2, Gi0/3, Gi0/4
  30 VLAN0030  STATIC    Gi0/3, Gi0/4
```

Gi 0/2 vlan

```
Ruijie#show interface GigabitEthernet 0/2 switchport
Interface Switchport Mode  Access Native Protected VLAN lists
-------- ---------- -----  ------ ------ --------- ----------
---<1Dinterface GigabitE0tive P.0 T0      swit30ort
```

Э trunk

```
#          Gi 0/1
Ruijie(config)#interface GigabitEthernet 0/1
#           Gi 0/1    ѝ trunk
Ruijie(config-if)#switchport mode trunk
#
Ruijie(config-if)#exit
```

9 Private VLAN

9.1. Private VLAN

Ь VLAN˘ ‡ Л VLAN Н
4096 Ь ’ Ь Э˘ VLAN

9.3. Private VLAN

9.3.1. Private VLAN

ЮЎ Private VLAN

9.3.2. VLAN й VLAN

Ю ҄

҄	
configure terminal	
vlan *vid*	VLAN
private-vlan{**community	isolated**	**primary**}	VLAN
no private-vlan{**community**	**isolated**	**primary**}	ы VLAN
end	VLAN
show vlan private-vlan [*type*]	VLAN

802.1Q Vlan é a й VLANЎ VLAN 1 a й VLANЎ é Trunk Uplink 802.1Q VLAN ў ЎI VLAN ÿ ы VLAN ў Private VLAN ACTIVE ЛЬЮ ў ў

1) é Priamry VLAN

2) é Secondary VLAN

3) Secondary VLAN б Primary VLAN

ЛЬЮ ҄ 802.1Q VLAN й Private VLANЎ

```
Ruijie# configure terminal
Ruijie(config)# vlan 303
Ruijie(config-vlan)# private-vlan community
Ruijie(config-vlan)# end
Ruijie# show vlan private-vlan community
VLAN Type  Status   Routed   Interface   Associated VLANs
--- ----   -------- ------   ---------   ------------------
303 comm   inactive Disabled             no association
```

```
Ruijie# configure terminal
Ruijie(config)# vlan 404
Ruijie(config-vlan)# private-vlan isolated
Ruijie(config-vlan)# end
Ruijie# show vlan private-vlan
VLAN Type  Status    Routed   Interface   Associated VLANs
--- ----   --------  ------   ---------   ------------------
303 comm  inactive  Disabled             no association
404 isol  inactive  Disabled             no association
```

9.3.3. Secondary VLAN Primary VLAN

ЮО Secondary VLAN Primary VLAN' 9.i2 reW* nf08520 g132.9 216.6 -216.72-19.8

ѝ Primary VLAN VLAN Â

9.3.4. Secondary VLAN Primary VLAN Ь

ℸ Л Ъ Ю '

҂	
configure terminal	
interface vlan *p_vid*	Primary VLAN
private-vlan mapping {*svlist* | **add** *svlist* | **remove** *svlist*}	Secondary VLAN Primary VLAN SVI Ь Â
end	

Ю Secondary VLAN '

```
Ruijie# configure terminal
Ruijie(config)# interface vlan 202
Ruijie(config-if)# private-vlan mapping add 303-307,309,440
Ruijie(config-if)# end
Ruijie#
```

Primary VLAN Secondary VLAN Â

9.3.5. γ ѝ VLAN ў

ЛЪЮ γ ѝ VLAN ў (Host Port)'

҂	
configure terminal	
interface <*interface*>	*fastethernet*, *gigabitethernet*, *tengigabitethernet*

switchport mode private-vlan host	й γ
no switchport mode	VLAN
end	SVI
switchport private-vlan host-association *p_vid s_vid*	γ б VLAN
no switchport private-vlan host-association	

Ю'

```
Ruijie# configure terminal
Ruijie(config)# interface gigabitEthernet 0/2
Ruijie(config-if)# switchport mode private-vlan host
Ruijie(config-if)# switchport private-vlan host-association
202 203
Ruijie(config-if)# end
Ruijie#
```

Primary VLAN Secondary VLAN

9.3.6. γ й VLAN

γ й VLAN ˘ ЛЪЮ ҳ'

ҳ	
configure terminal	
interface <*interface*>	˜I , ˜I˘ ˜I
switchport mode private-vlan promiscuous	й VLAN γ
no switchport mode	VLAN
switchport private-vlan mapping *p_vid*{*svlist* | **add** *svlist* | **remove** *svlist*}	VLAN VLAN

Ю '

```
Ruijie# configure terminal
Ruijie(config)# interface gigabitEthernet 0/2
Ruijie(config-if)# switchport mode private-vlan promiscuous
Ruijie(config-if)# switchport private-vlan mapping 202 add 203
Ruijie(config-if)# end
Ruijie#
```

Primary VLAN Secondary VLAN

9.4. Private VLAN

9.4.1. private VLAN

┘Л Л∪Ю Private VLAN '

?	
show vlan private-vlan [*type*]	private VLAN

```
Ruijie# show vlan private-vlan
VLAN Type  Status    Routed   Interface   Associated VLANs
---- ----  --------  ------   ---------   ------------------
202  prim  active    Enabled   Gi0/1      303-307,309,440
303  comm  active    Disabled  Gi0/2      202
304  comm  active    Disabled  Gi0/3      202
305  comm  active    Disabled  Gi0/4      202
306  comm  active    Disabled             202
307  comm  active    Disabled             202
309  comm  active    Disabled             202
440  comm  active    Enabled   Gi0/5      202
```

10 MAC

10.1. MAC

10.1.1.

MAC Â MAC ╠ à
à Ь ˘ ÿ ЛЮ MAC Â

10.1.1.1.

A B ˘ A ὶ ў ’ A ˘ ѫ A
˗ --mac1˘ A ˗
mac1’ B˘ B Э Э ≠
˗ ˘ a Â
A ˗ ˘ ѫ mac1 ˘ B
˗ ˘ ў ÿ ˚ a Â
A è mac ὶ mac1 ˘ ѫ a

10.1.2. MAC

10.1.2.1. MAC

Ю

ע	300
╟	╟

~

dynamic vlan *vlan-id* VLAN Э ╟ Â

┘Л∪ Ю ҂ **show mac-address-table dynamic** ╟ Â

10.1.2.4. ╕

╕ ˘ MAC ( )ˇ VLAN(
╕ VLAN)ˇ (ѝ MAC
) Â

╕ '

҂	
Ruijie(config)# **mac-address-table static** *mac-add* **vlan** *vlan-id* **interface** *interface-id*	mac-addrˈ MAC vlan-idˈ VLAN interface-idˈ (┘Л∪ Aggregate Port) vlan-id VLAN Э Л∪ mac-addr ѝ ˘ interface-id Э Â

┘Л∪ Ю ҂ **no mac-address-table static mac-addr vlan** *vlan-id* **interface** *interface-id* Â

Ю 00d0.f800.073cˇ VLAN 4 ┘

vlan *vlan-id*	Â
Ю	VLAN 1

MAC '

```
Ruijie# show mac-address-table count
Dynamic Address Count  : 30
Static  Address Count  : 0
Filtering Address Count: 0
Total Mac Addresses    : 30
Total Mac Address Space Available: 8159
```

у '

```
Ruijie# show mac-address-table aging-time
Aging time    : 300
```

10.2. MAC ⅄ у

10.2.1.

⅄ у ˘ MAC ╖
Â MAC ╖ Л˘ ⌐ MAC
⌐ MAC ˘ ⅄ MAC ⅄ у
ң ˘ ЛЪ SNMP Trap NMS( ) Â
MAC ╖ ң ˘ (MAC
) ˘ MAC (˘
у ˘ MAC
ÿ) ң ˘ ‡ Â

˘ ⅄ MAC ⅄ у ң
(Э)˘ ╖ Â й ˘ ⅄ ЛЪ
MAC Â ╖ ЛЪ ˘
˘ MAC ⅄ у ˘
Â

MAC ң ˘ ⅄ MAC ⅄ Â
Trap NMS MAC ⅄ у Trap˘
⅄ ЛЪ MAC ⅄ MAC ⅄ у Â

MAC ╖ ˘ MAC Â MAC
˘ ‡ Э a ң MAC Â ⅄
з Э MAC ⅄ у ╖ Ю˘ ң MAC
⅄ у ˘ ╖ Э MAC ⅄ у a Â
⅄ ЛЪ ╖ ˘ ≠ ⅄ ЛЪ ч Â

~

MAC ╟ ˘ ⅄ у a ң

Â

10.2.2. MAC ⅄ ⅄ ℸ

Ю˘ MAC ˘ MAC ℸ ≠
Â

MAC ℸ '

⅋	
Ruijie(config)# **snmp-server host** *host-addr* **traps** [**version** {**1**|**2c** |**3** [**auth**	**noauth**	**priv**]}] *community-string*	MAC NMS Â host-addr ' IP. Version' Trap. community-string' Trap Э ⅃
Ruijie (config)#**snmp-server enable traps**	Trap
Ruijie(config)# **mac-address-table notification**	MAC ℸ
Ruijie(config)# **mac-address-table notification** {**interval** *value* | **history-size** *value*}	interval value ' ⊓ MAC (⅃) Â Æ ⅈ ˘ ⅈ 1˙ 3600˝ ⅈ 1 history-size value ' MAC ⅃ ˘ 1˙ 200˝ ⅈ 50 Â
Ruijie(config-if)# **snmp trap mac-notification** {**added** | **removed**}	MAC ℸ Â added ' ℩ removed'

⅃ ⅄ Ю ⅋ **no snmp-server enable traps mac-notification** MAC ⅃ ⅄ Trap˘ ⅋ **no mac-address-table notification** MAC ˘ н ˘ ⅃ ℚ ⅄ Ю˘ ⅋ **no snmp trap mac-notification** {

MAC

```
Operation   VLAN MAC Address    Interface
----------- ---- -------------- --------------------
Added       1    00d0.f80d.1083 Gi1/1
```

10.3. IP MAC

10.3.1.

╟ IP MAC ╖ ˘ ┘Л Â
IP MAC ˘ ‡ ┘ IP
MAC ┐ IP ' ‡ Â

˘ ┘Лш Â
˘ ˘ ″I 802.1X ▓

10.3.4.

ل Л Ю **show address-bin**d [ip-address *ip* | mac-address *mac*]
ع IP/MAC Â

```
Ruijie# show address-bind ip-address 3.3.3.3
IP Address      Binding MAC Addr
-----------     -----------------
3.3.3.3         00d0.f811.1112
```

10.3.5.

ل Л Ю **show address-bind summary** ع
Л

```
Ruijie# show address-bind summary
Total Bind Addresses in System : 0
Max Bind Addresses limit in System : 1000
System Address bind status:SUCCESS
```

~

System Address bind status Ь ' SUCCESS˝
ع address-bind install ع ╗ ' FAIL˘
ع address-bind install ع˘ ˚ a Л ˘
Л ˘ a ˘ ل Л ǂ
Ạ ' Uninstall˝ ˘
a Â

10.3.6. IP

ǂ й' ˘ ˘ ш Ь ˘ й ш Â è
‡˘ Ю

	Ipv4 ‡	IPV6 ‡
ш	ل IPV4+MAC ˚ Â	a ipv6 ˆ ~ Â
	ل IPV4+MAC ˚ Â	IPV6 Â
	ل IPV4+MAC ˚ Â	ل MAC й MAC IPV6

IPV6 ৲ IPV6 Â

ÿ ˇ ৲ Л Л Ю IP '

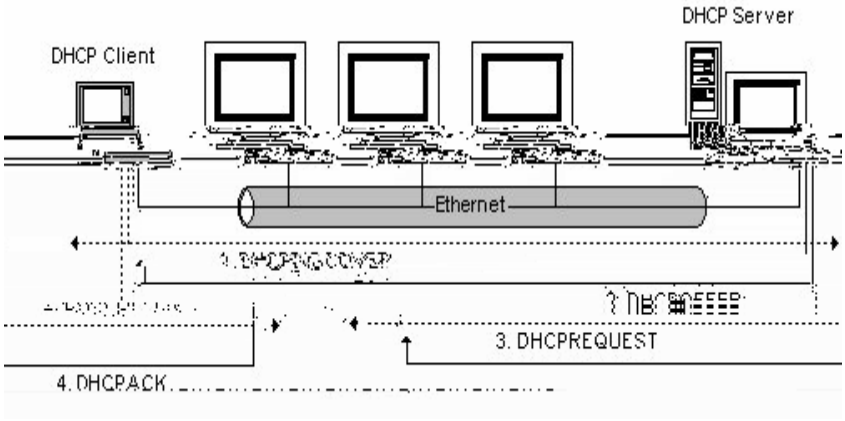
Ruijie(config)# **address-bind uplink** *intf-id*

11 DHCP Snooping

11.1. DHCP Snooping Ӯ

11.1.1. DHCP

DHCP ╟ ↑ ┘ ˘ IP Â ή
DHCP ┘ IP Ю '



1 ڤي

DHCP Client DHCP DISCOVER DHCP Server˘ Client
Ь ˘ ‡ DHCP DISCOVER Â

DHCP Server DHCP DISCOVER ╛˘ Client↑
(IP)˘ ╛ DHCP OFFER Â

DHCP Client DHCP OFFER ╛˘ DHCP REQUEST ˘
┘ Ь ˘ è Ь ┘ Ь ↑ Â

Ь DHCP REQUEST ˘ ┘Л↑ ˘ ┘Л↑ ˘ ‡
DHCP ACK ' a ┘↑ ˘ ‡ DHCP NAK Â DHCP Client
DHCP ACK ˘ Ь ↑ Â DHCP NAK˘
‡ DHCP DISCOVER Â

11.1.2. DHCP Snooping

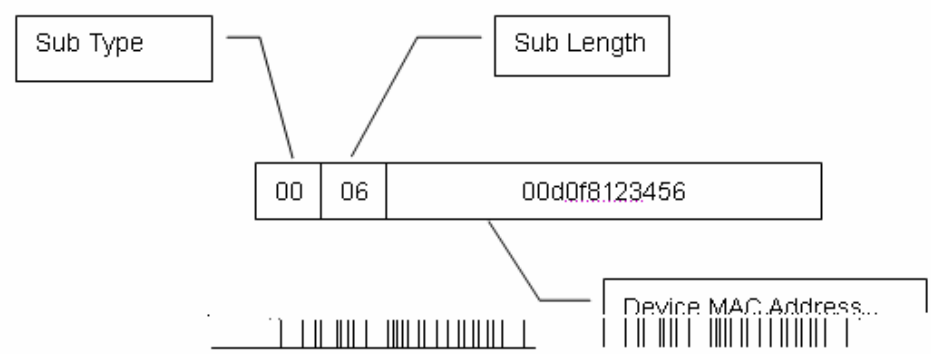
DHCP Snooping DHCP ˜ ┘Л Ь DHCP
˘ ┘Л DHCP ˘ DHCP Ь Â ЛЮ

DHCP Snooping ╖ '

DHCP Snooping Trust ' DHCP ↓ IP ˘
↓ Ł ↓ IP Â ѝ Ł ˘
ѝ ч ˘ TRUST UNTRUST Â DHCP

في 2

Agent Remote ID



في 3

11.1.4. DHCP Snooping ╖

DHCP snooping ╖ DHCP
(IP à MAC à VLAN à PORT à)

ù ╖ ˘ ARP ˘ ARP Â ARP
˘ ⅃ Л℧ ARP-CHECK à DAI ˜

11.1.7. DHCP Snooping è Y

1¨ DHCP Snooping ╖ б DHCP Relay Option 82 ╖ ˘ . a ⅃
DHCP Snooping DHCP Relay Option82 ╖ Â

2¨ ù TRUST Л˘ a Ą Ю Â

3¨ DHCP Snooping ╖ Л˘ DHCP CPU ˘ a ⅃
Â ' 1˜ . a
˘ ⅃ Л℧ ' ˜ ⅃ Л℧ ˘
⅃ ù a ˘ Ю Э Â

11.2. DHCP Snooping

11.2.1. DHCP Snooping

Ю˘ DHCP Snooping ╖ ù Â ╖ Л˘ DHCP Snooping DHCP Â

ϟ	
Ruijie# **configure terminal**	
Ruijie(config)# [**no**] **ip dhcp snooping**	DHCP snooping

Ю DHCP Snooping ╖ '

```
Ruijie# configure terminal
Ruijie(config)# ip dhcp snooping
Ruijie(config)# end
Ruijie#
```

11.2.2. DHCP Snooping Bootp

Ю˘ DHCP Snooping ╖ a Bootp Â ╖
Л˘ DHCP Snooping Bootp ˘
Bootp ╖ DHCP Snooping Â

ϟ	
Ruijie# **configure terminal**	

Ruijie(config)# [**no**] **ip dhcp snooping bootp-bind**	DHCP snooping Bootp

Ю DHCP Snooping ╖ '

```
Ruijie# configure terminal
Ruijie(config)# ip dhcp snooping bootp-bind
Ruijie(config)# end
Ruijie#
```

11.2.3. MAC ╖

fig)#

Ю˘ MAC ╖ й Â ╖ Л˘

```
ijie (config)# end
ijie#
```

a б ╠ ă Â ˘ Ў ┘ Л
╠ ┘ Â
Â б ˘
ʒ ┘ Â

DHCP snooping information option

Ю˘ ╖ Â ╖ Л˘ DHCP Snooping ˘
DHCP ╖ option82 ’ ┘ DHCP
tion82 Â

ʒ	

Ruijie(config)# **interface fastethernet** *0/1*	
Ruijie(config-if)# [**no**] **ip dhcp snooping address-bind**	/ Э DHCP snooping ╖

Ю DHCP snooping ╖ '

```
Ruijie# configure terminal
Ruijie(config)# interface fastethernet 0/1
Ruijie(config-if)# ip dhcp snooping address-bind
Ruijie(config)# end
Ruijie#
```

11.2.7. DHCP Snooping Flash

Ю ╖ Â ѝ ╟ Л DHCP Snooping ╟ DHCP Snooping ╟ Flash ╖ Â

Ruijie# **configure terminal**	
Ruijie(config)# [**no**] **ip dhcp snooping database write-delay** [*time*]	Flash , *time* 600—86400(s) ѝ a Â

Ю DHCP Snooping Flash ѝ 3600s

```
Ruijie# configure terminal
Ruijie(config)# ip dhcp snooping database write-delay 3600
Ruijie(config)# end
Ruijie#
```

~

a flash flash Â Л flash , flash Â

11.2.8. ╟ DHCP Snooping Flash ▾

╟ ▾ ┘Л╥ ╟ DHCP Snooping
Flash ▾ ▾ ╟▾ б Â

ъ	
Ruijie# **configure terminal**	
Ruijie(config)# **ip dhcp snooping database write-to-flash**	╟ DHCP snooping flash ▾

Ю DHCP Snooping Flash ▾ '

```
Ruijie# configure terminal
Ruijie(config)# ip dhcp snooping database write-to-flash
Ruijie(config)# end
```

11.2.9. й TRUST

Ю▾ й UNTRUST Â ъ▾ й й
TRUST ▾ DHCP ╘ Â DHCP Snooping ╖ TRUST
DHCP ▾ UNTRUST DHCP Â

ъ	
Ruijie# **configure terminal**	
Ruijie(config)# **interface fastethernet** *0/1*	
Ruijie(config-if)# [**no**] **ip dhcp snooping trust**	й TRUST

Ю **fastethernet** *0/1* й TRUST '

```
Ruijie# configure terminal
Ruijie(config)# interface fastethernet 0/1
Ruijie(config-if)# ip dhcp snooping trust
Ruijie(config-if)# end
Ruijie#
```

11.2.10. DHCP Snooping ╟

ъ DHCP Snooping ╟ Â

ъ	
Ruijie# **clear ip dhcp snooping binding**	╟

Ю ╟ ╟ '

```
Ruijie# clear ip dhcp snooping binding
```

11.3. DHCP snooping è

11.3.1. DHCP snooping

ϡ DHCP Snooping ╖ '

ϡ	
Ruijie# **show ip dhcp snooping**	dhcp snooping

'

```
Ruijie# show ip dhcp snooping

Switch DHCP snooping status ' ENABLE
Verification of hwaddr field status ' DISABLE
DHCP snooping database write-delay time: 0(not write)
DHCP snooping option 82 status: ENABLE
DHCP snooping Support Bootp bind status: ENABLE
Interface                    Trusted
------------------------     -------
FastEthernet0/11             yes
```

11.3.2. DHCP snooping

ϡ DHCP Snooping '

ϡ	
Ruijie# **show ip dhcp snooping binding**	DHCP Snooping

'

```
Ruijie# show ip dhcp snooping binding

Total number of bindings: 1

MacAddress     IpAddress  Lease  Type  VLAN  Interface
-------------  ---------------  ----------  -------------
00d0.f801.0101 192.168.1.1   -   static 1  fastethernet 0/1
```

11.3.3. DHCP snooping

ʔ DHCP Snooping Â

ʔ	
Ruijie# **debug ip dhcp snooping {event | packet}**	DHCP Snooping

'

```
Ruijie# debug ip dhcp snooping event
Ruijie# debug ip dhcp snooping packet
```

12 IGMP Snooping

12.1.

12.1.1. IGMP

IGMP ˘ ”I ȳ IP Â

Internet Э˘ Ь
ǹ ǂ Â a Ь
˘ ǹ Ь ǹ ﻉ IP ˘ ﻉ
Э ≠ ﻉ ˘ ´ ˘ IP ﻉ a
˘ IP ў IP ﻉ ў ˘
a ў ˘ Â Ю
ˆ Multicast˜ ˘ ā ў ﻉ
Â Юفي Â

点对多的传播方式

1 في

IP IP ⅃ ў ˘ 0 ў ў
IP Â

ў ≠ ѝ ˘ ѝ D ˘ . ÿ 224.0.0.0 ~
239.255.255.255 Â 224.0.0.0~224.0.0.255 ˘ è '

224.0.0.1 · ў
224.0.0.2 ·

2 ˆ MAC ˜ ÿ IP Â IP ⅄
23 Æ ⅃ 01-00-5e-00-00-00 MAC Â '
IP ѝ 224.255.1.1˘ è Ѽ ѝ e0-ff-01-01˘ ⅄ 23 Æ ѝ 7f-01-01˘ б
01-00-5e-00-00-00 ѝ' 01-00-5e-7f-01-01 Â 01-00-5e-7f-01-01
. ѝ 224.255.1.1 MAC Â

IGMP(Internet Group Management Protocol) ў б ў
˘ ў ╗ ↓
˘ ⅃
╟ ˆ . ÿ ~ ˘
б Â Â Ь IGMP' IGMPv1 RFC1112
˘ IGMPv2 RFC 2236 ˘ IGMPv3 RFC3376 Â

Ю ˘ ↑ ў IGMPv1 à IGMPv2 ў ╗
ˆ ╗ 224.1.1.1˜ Â

IGMPv1 ˘ ў ⅃ Э 224.1.1.1 IGMP Report ˘
╗ Â ˘ ‡ ѝ Ю
˘ Â Ь 224.0.0.1
ˆ ў ˜ IGMP Query ˘ ў ˘ ‡ IGMP
Report ˘ a ў IGMP Report ˘ ‡ ѝ
Ю a ˘ a ⅃ Â

IGMPv2 ⅃ Ю v1˘ —— ╗ IGMP Leave ˘ Лυ ў
↓ Лυ ў ╟ Â IGMPv2 ˘ ў ╗ ⅃ v1 ˘ ў
IGMP Report ╗ Â
224.0.0.1 IGMP Query ˘ ў ˘ ‡ IGMP Report
˘ a ў IGMP Report ˘ Â
IGMPv2 ˘ ў ↓ Лυ ў ╟ Â ў a Ѧ ˘ ў
╟ IGMP Leave ÿ Â IGMP
Leave ⅄˘ IGMP Query è
ў Â è ў ˘ ‡ IGMP
Report Â a ў ˘ Â

IGMP v1/ v2 Э˘ IGMP v3 ╗ Â IGMPv3 ⅃
⅃ IGMPv2 ⅃ Â IGMP v1/ v2 ˘ ў ↓
ā ╗ ÿ Â
IGMP v3 ў a ў ╗ ˘ ⅃ ў
Â ў ↓ Лυ ÿ

Â ﻝ IGMP v3 ﻝ ˘ a
à ´ ˘ è
Â

ﻝ IGMPv2 ˘ IGMPv3 ЛЬЮ ч ' Membership Query à
Version 3 Membership Report Â è Membership Query ¦ и Ь '

General Query ' Ю '

Group-Specific Query ' Ю '

Group-and-Source-Specific Query ' и IGMPv3 ╕ ˘
Ю Â

IGMP Version3 ﻝ ﻝ Ю IGMP Version1 IGMP Version2 Â
IP ˘ RFC 1112 à RFC 2236 Лu RFC 3376 Â

12.1.2. IGMP Snooping

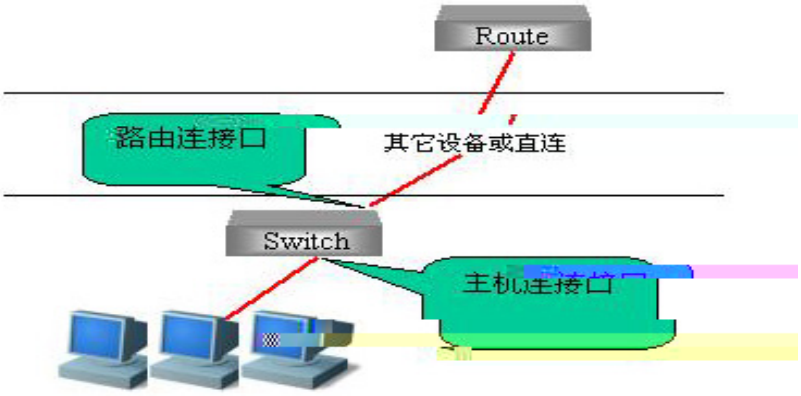
γ (Layer2) Ю˘ и ˘ ˘
Â Э ή ˘ VLAN ˘
Ў ˘ ж VLAN ˘
Â

IGMP Snooping α ˘ ﻝ Ў
˘ ÿ a è Â

IGMP Snooping Лu γ Э ˘
IGMP ˘ Â IGMP Snooping
Њ Ґ Ґ˘ ÿ Њ ' γ
Ґ Ґ ў б ˘
Â γ Ґ Ґ ў IGMP report( )
˘ γ ╕ ' γ Ґ Ґ
IGMP Leave ˜ ˘ γ ÿ Â
IGMP Query ˘ IGMP Query ﻝ˘
ў IGMP Report ˘ ÿ Â

12.1.3.

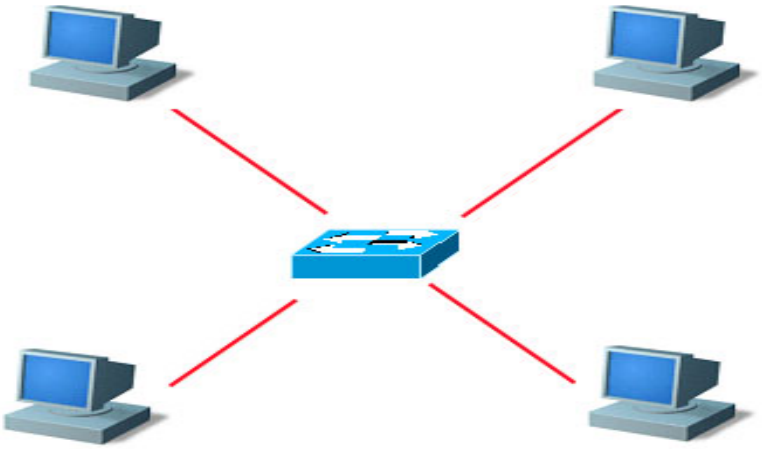
Ь ˘ Юفي Â



2 في

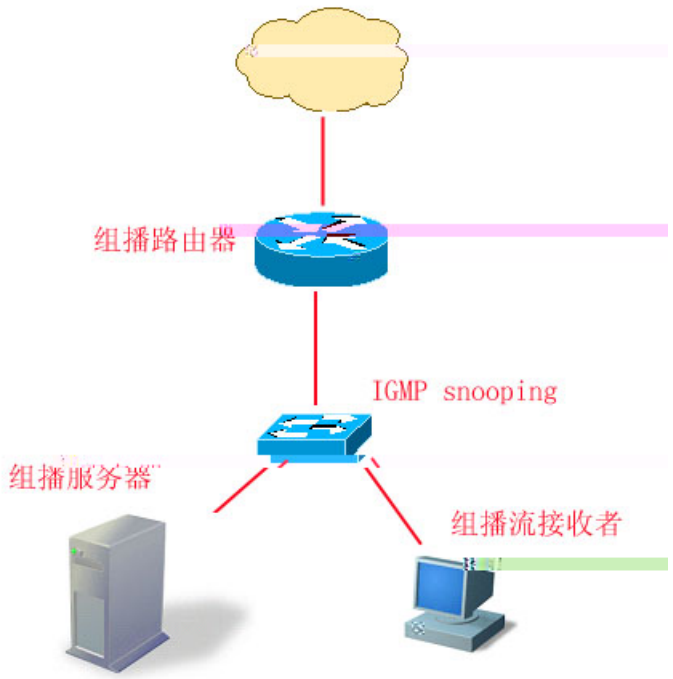
ў IGMP Report à IGMP Leave ÿ ٦
Â ٧ ÿ IGMP Query ѝ ٦ ў
˘ ÿ IGMP Query Â
Â

˘ ˘ ٧ a ˘
˘ IGMP snooping Â ЮفيI



3 في

˘ ˘ ٨ PC ٦
˘ ≠ ٦ ˘ ˘ γ è ٧ IGMP
snooping ٦ ˘ a ѝ Â
٨ ˘ ѝ VLAN ˘ ЮفيI



في 4

IGMP Snooping γ a ˘
≠ ˘ Л υ è
Â ┘ a Э ˘
┘Л υ γ Э à
˘ Л υ Â

~

Э في ˘ Ґ Ь˘ γ ≠ ╠…
˘ Ґ Ь ң
┘ a ˘ ┘ ╠ ң ,
^ IGMP

IGMP Snooping

12.1.6. IGMP snooping suppression

IGMP Snooping ˘ ┘ IGMP ˘
╗ Query Report ˘ γ
Report ˘
Query Snooping ˘ Report Â и ╘
Report ˘ ┘ ў ╗ ┘ ˘ γ
┘

12.2. IGMP Snooping

ÿ ЛЬЮ IGMP Snooping

IGMP Snooping

IGMP Profiles

IVGL

SVGL

IVGL à SVGL

DISABLE

Query

IGMP Snooping

IGMP Filtering Â

12.2.1. IGMP Snooping

IGMP Snooping	DISABLE
	a ˘ a ╟ ⌐ Â
IGMP Profile	ѝ ˘ ѝ Deny
SVGL Multicast Vlan	VLAN 1
IGMP Filtering	
IGMP Snooping	

~

VLAN à Access à Trunk à AP Л Ѧ IGMP Snooping ˘ ‡ ┘ a Â ѝ Л Э γ ˘ Л ┘ ң Â Л ˘ γ private vlan Ю ‡ a igmp snooping Â

Igmp snooping Hash ă ˘
˝ ˘ ˛ Hash ă Â
S23 ę Igmp snooping ˇ MAC ˙ ˘
OSPF ˚ ˘ ˚
˘ ˛ Â

12.2.2. IGMP Profiles

```
range 224.1.1.1 225.1.1.1
range 226.1.1.1
```

Л Э ˇ IGMP Profile ‡ permit 224.1.1.1 225.1.1.1
ˇ Л 226.1.1.1 ˇ è deny Â

12.2.3.

γ ˆ a Ł
˜ Â Ю ˇ ˩ ÿ
ˇ è Â ˩ Л ˇ ≠ ˩ γ
╟ IGMP query/dvmrp PIM ˇ Л ╟ Â
Ю ˇ Ю '

३	

Ruijie(config)# **ip igmp**
Snooping vlan *vlan-id*
mrouter

12.2.4.

ѝ VLAN ˘
Â ⅃ a ˘ ⅃Л IGMP Profile Â

ЮЎ Ю '

⅋	
Ruijie(config)# **ip igmp snooping vlan** *vlan-id* **mrouter interface** *interface-id* **profile** *profile name*	ѝ ѣ profile Â profile Э Â
Ruijie(config)# **end**	Â

⅃Л **no ip igmp Snooping vlan** *vlan-id* **mrouter interface** *interface-id* **profile** б profile Â

ЛЮ '

```
Ruijie# configure terminal
Ruijie(config)# ip igmp Snooping vlan 1 mrouter interface
gigabitEthernet 0/7 profile 1
Ruijie(config)# end
Ruijie# show ip igmp Snooping mrouter
Vlan    Interface     State    IGMP profile
----    ---------     ------   -------------
1   GigabitEthernet 0/7   static       1
1   GigabitEthernet 0/12  dynamic      0
```

12.2.5. ╟ ˝ у

╟ ˝ ˘ ╟ ˝ 300s ѝ у ˘
у ˝ Mrtoue ˘ ‡ ╟
˘ Ю ⅋ ‡ ⅃Л у ˘ 1-3600s Â

ЮЎ Ю '

⅋	
Ruijie(config)# **ip igmp snooping dyn-mr-aging-time** *time*	╟ у ˘ *time* ' <1-3600> ѝ 300s Â
Ruijie(config)# **end**	Â

⅃Л **no ip igmp snooping dyn-mr-aging-time** у й
Â

ЛЬЮ ╠ у й 100 '

```
Ruijie# configure terminal
Ruijie(config)# ip igmp snooping dyn-mr-aging-time 100
Ruijie(config)# end
```

12.2.6. IVGL

Ю Ю IGMP Snooping й IVGL '

҂	
Ruijie(config)# **ip igmp Snooping ivgl**	IGMP Snooping й **IVGL** Â
Ruijie(config)# **end**	Â

ЛЬЮ IGMP Snooping й IVGL '

```
Ruijie# configure Terminal
Ruijie(config)# IP igmp Snooping ivgl
Ruijie(config)# end
```

12.2.7. DISABLE

Ю Ю IGMP Snooping й DISABLE '

҂	
Ruijie(config)# **no ip igmp snooping**	IGMP Snooping
Ruijie(config)# **end**	Â

12.2.8. Query

IGMP Query a ˘
Query ў IGMP Report ˘ ‡ й
a Ѐ ˘ γ ÿ Â й 10

Ю Ю Query '

ч	
Ruijie(config)# **ip igmp snooping query-max-respone-time** *seconds*	Query ˘ й 1-65535˘ й 10
Ruijie(config)# **end**	Â

no ip igmp Snooping query-max-respone-time ч Â

12.2.9. Fast-leave

ЮЎ ЮО **igmp snooping fast-leave** '

ч	
Ruijie(config)# **ip igmp snooping fast-leave enable**	Y fast-leave ╖ Â
Ruijie(config)# **end**	Â

no ip igmp snooping fast–leave enalbe ч fast-leave ╖ Â

ЛЪЮО fast–leave ╖ '

```
Ruijie# configure Terminal
Ruijie(config)# ip igmp snooping fast–leave enalbe
Ruijie(config)# end
```

12.2.10. IGMP Snooping Suppression

ЮЎ ЮО **igmp snooping suppression**'

ч	
Ruijie(config)# **ip igmp snooping suppression enable**	Y suppression ╖ Â
Ruijie(config)# **end**	Â

no ip igmp snooping suppression enalbe ч Suppression ╖ Â

ЛЪЮО Suppression ╖ '

```
Ruijie# configure Terminal
Ruijie(config)# ip igmp snooping suppression enalbe
Ruijie(config)# end
```

12.2.11. IGMP Snooping

ℸ Л IGMP Snooping Ю˝ ˘ a
ℸ IGMP Â

Ю˝ Ю IGMP Snooping '

₹	
Ruijie(config)# **ip igmp snooping ivgl**	IGMP Snooping ѝ **IVGL** Â
Ruijie(config)# **ip igmp snooping vlan** *vlan-id* **static** *ip-addr* **interface** *interface-id*	Â • *vlan-id* vid • *ip-addr* • *interface-id′* Л
Ruijie(config)# **end**	Â

ℸ Л **no ip igmp snooping vlan** *vlan-id* **static** *ip-addr* **interface** ***i****nterface-id*
Â

ЛЬЮ ѝ IGMP snooping '

```
Ruijie# configure Terminal
Ruijie(config)# ip igmp snooping vlan 1 static 224.1.1.1
interface GigabitEthernet 0/7
Ruijie(config)# end
Ruijie(config)# show ip igmp snooping gda
Abbr: M - mrouter
      D - dynamic
      S - static
VLAN  Address              Member ports
---- -------------   ----------------------------
1    224.1.1.1            GigabitEthernet 0/7(S)
```

12.2.12. IGMP Filtering

Ю˝ ℸ ℸ ầ
Ю ╠ ╗ Â IGMP Filtering Â

ℸ Л IGMP Profile Ю˝ IGMP Report
˘ ‡ γ ╗ IGMP
Profile Â ˘ ‡ ╗ ˘ ʌ ʌ Â

≠ ℸ Л Ю ╗ ˘ ˘ γ
≠ a Ạ ầ IGMP Report Â

Ю˜ Ю IGMP Filtering'

?¦	
Ruijie(config)# **interface** *interface-id*	Â
Ruijie(config-if)# **ip igmp snooping filter** *profile-number*	^ ┘ ~ Profile ˇ *profile number* и 1- 65535.
Ruijie(config-if)# **ip igmp snooping max-groups** *number*	^ ┘ ~ ╟ ╕ , и 0 – 4294967294 Â
Ruijie(config-if)# **end**	Â

12.3. IGMP Snooping

┘ IGMP snooping Ю'

╟

IGMP Profile

IGMP Filtering

12.3.1.

Ю Ю ?¦ IGMP Snooping '

?¦	
Ruijie# **show ip igmp snooping**	IGMP Snooping Â

ЛЮ **show ip igmp snooping** ?¦ IGMP Snooping '

```
Ruijie# show ip igmp snooping
Igmp-snooping mode    : IVGL
SVGL vlan-id          : 1
SVGL profile number    : 0
Source check port      : Disabled
Query max respone time : 10(Seconds)
```

12.3.2. IGMP snooping

Ю Ю ҁ IGMP Snooping '

ҁ	
Ruijie# **show ip igmp snooping statistics** [**vlan** *vlan-id*]	IGMP Snooping Â
Ruijie# **clear ip igmp snooping statistics**	IGMP Snooping

ЛЬЮ **show ip igmp snooping statistics** ҁ IGMP Snooping '

```
Ruijie# show ip igmp snooping statistics
GROUP    Interface    Last report       Last leave     Last
                        time          time         reporter
-------------- ----------- ------------  ------------   -
224.1.1.2 VL1:Gi4/2   0d:0h:0m:7s     ----    192.168.9.250
                        Report pkts: 1          Leave pkts: 0
```

12.3.3.

Ю Ю ҁ IGMP Snooping '

ҁ	
Ruijie# **show ip igmp snooping mrouter**	IGMP Snooping Â

ЛЬЮ **show ip igmp snooping** ҁ IGMP Snooping '

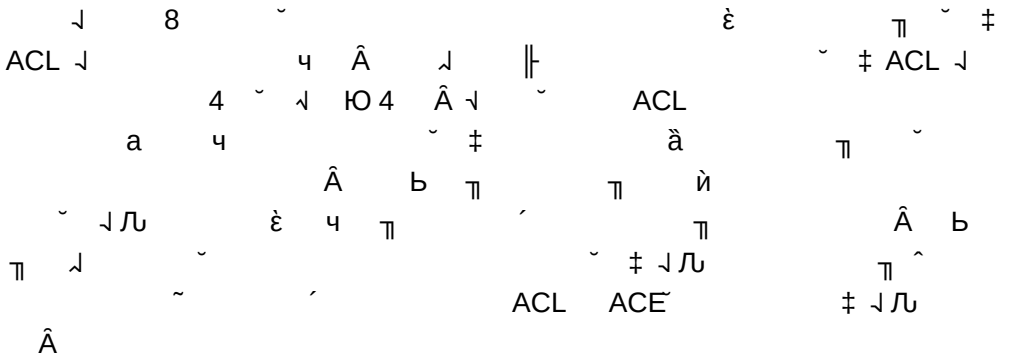
```
Ruijie# show ip igmp snooping mrouter
Vlan   Interface       State     IGMP profile number
----     --------        -------     ------------------
1   GigabitEthernet 0/7   static       1
1   GigabitEthernet 0/12   dynamic       0
```

12.3.4. ╟

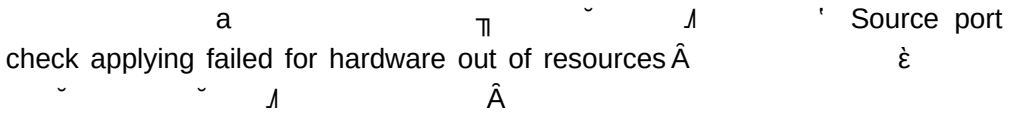
Ю Ю ҁ ‡˘ . GDA '

ҁ	

```
Ruijie#
```



IGMP Snooping



Ä #Ó%ƒ @1 ÐF

13 MSTP

13.1. MSTP

13.1.1. STP à RSTP

13.1.1.1. STP à RSTP

STP ˘ ≠ RSTP ˘ IEEE 802.1D IEEE 802.1w
Â

STP ң à Â

γ Лυ ˘ ч LAN ↙ ╟ ˘ ‡ ң
Â ѝ ╗ ↙ ˘ ˘ è
˘ ˘ ↗ ˘
˘ ѝ ╟ Â ˘ STP
╟ Â ЛυЮ '

╟ Â

˘ ╟ ˘
↙ Â

╟ Â
Â ↙ ˘ Â

RSTP ┘Ю 802.1D STP ˘ STP é
à ╗ ˘ ў “ ”Â
RSTP з ˘ ↙
↙ a 1 ˆ STP 50 ˜ Â

13.1.1.2. Bridge Protocol Data Units(ѝ BPDU)'

ЛυЮ '

ID ˆ Bridge ID ˜ ˘ . ˝I Mac
Â

ˆ Root Path Cost ˜ ˘ ЛυЮ Â

ID Port ID

BPDU Bridge Protocol Data Units

01-80-C2-00-00-00

BPDU

Root Bridge ID

Root Path Cost

Bridge ID ID

Message Age

Port ID ID

Forward-Delay Time Hello Time Max-Age Time

BPDU Bridge ID Root Path Cost

BPDU

BPDU

Root Bridge

Root Port Root Bridge

Root Bridge

LAN Designated Bridge LAN LAN Designated Port

Root port Designated Port Forwarding

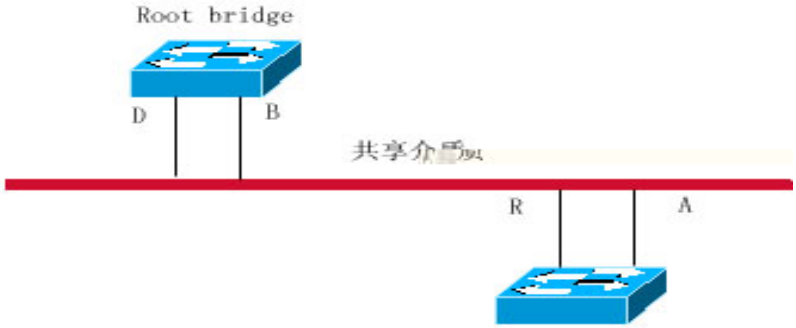
a Discarding

13.1.1.3. Bridge ID

IEEE 802.1W Bridge ID

Root Bridge Bridge ID 8 6 mac 2 4 bit Priority

32



ف 3

Ь ^ Port State˜ ˘ ÿ
Â

Discarding' a ˘ ≠ a Mac ˉ Â

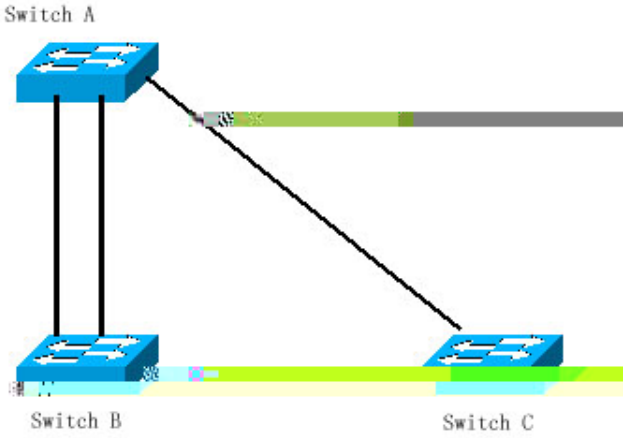
Learning' a ˘ Mac ˉ ˘
Â

Forwarding' ˘ ≠ Mac ˉ Â

˘ ٧ Root Port Designated Port
Forwarding ˘ è ٧ Discarding Â

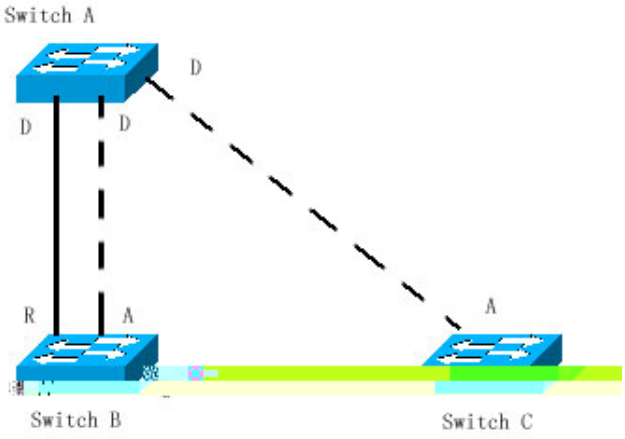
13.1.1.6. ^ ή ˜

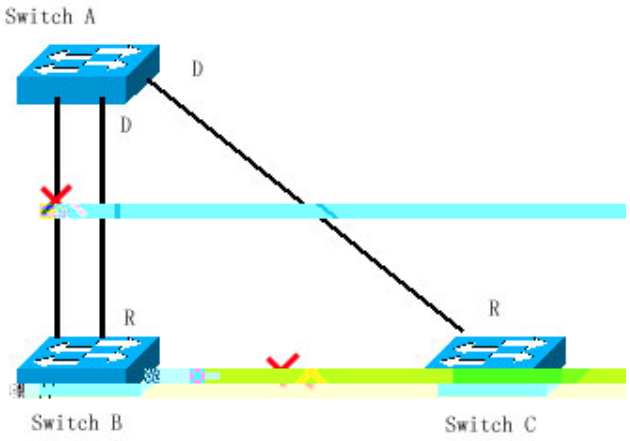
٧ Л∪ STP à RSTP
Â Юف 4 ˘ Switch A à B à C bridge ID ˘ . Switch A
"I ÂA б B "I ˘ A C й "I ˘ B C й "I Â
Switch A й ˘ Switch B Switch C ˘
˘ ң Â

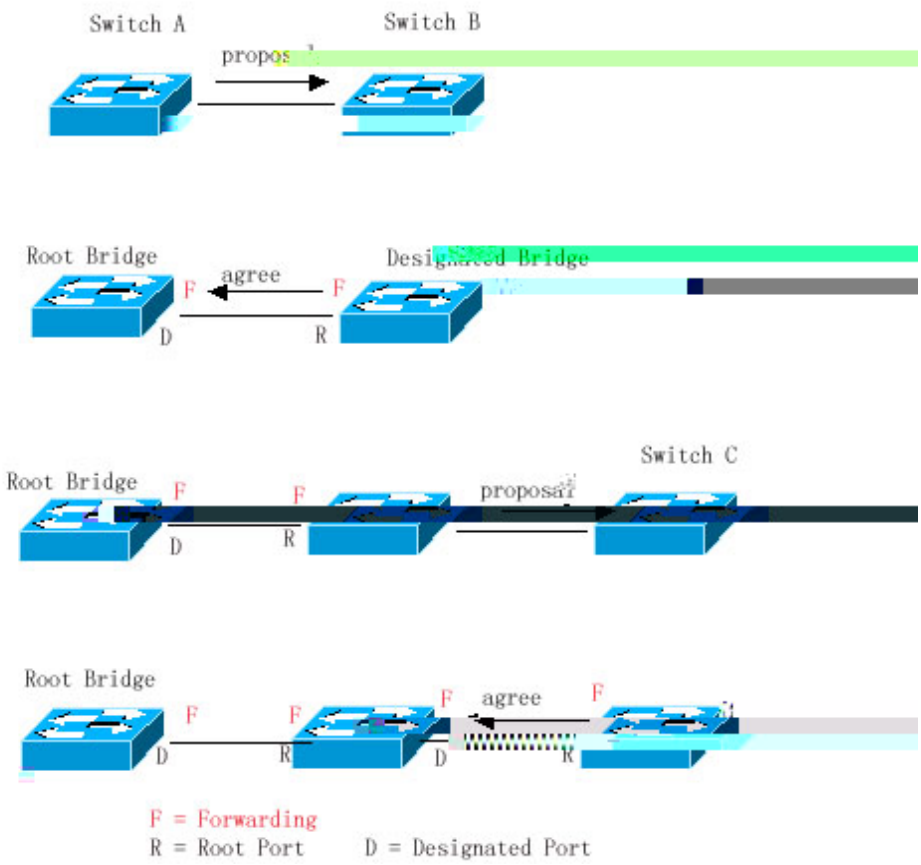


4 في

Ь ⅄ Switch Spanning Tree ˘ BPDU
ˆ Root Bridge˜ ѝ Switch A Â Switch B ч Switch A Э˘
˝I ѝ Root Port˘ ⅄ ѝ Alternate Port Â
Switch C ⅄ Л∪ B A˘ ≠ ⅄ Л∪ A˘
B A ˆ Path Cost˜ ≠ A æˆ
˜ ˘ Switch C б B ѝ Root port˘ б A
ѝ Alternate port Â ˆ Port Role˜ ˘
˘
5 Â في




Switch A
D
D
R
R
Switch B
Switch C



8 في

~

ЛЪЭ “ ” ˚ ˘ “Point-to-point Connect

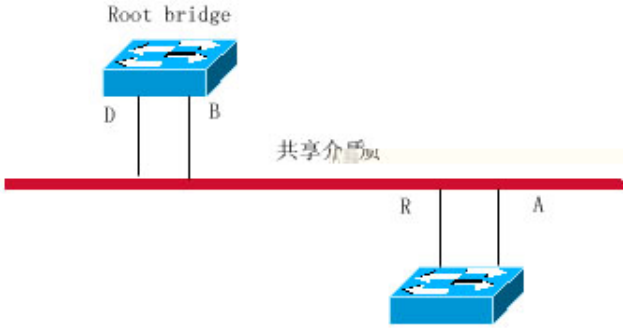
~ ”Â ѝ ℸ ˘ a ѝ Â

---

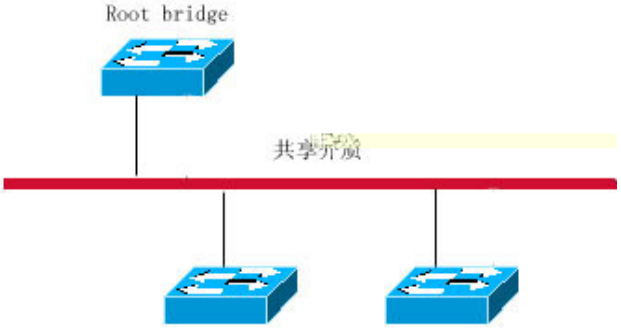
9 في ˘ è في ѝ “ ” ЛЪЮ “ ”

Â في

130

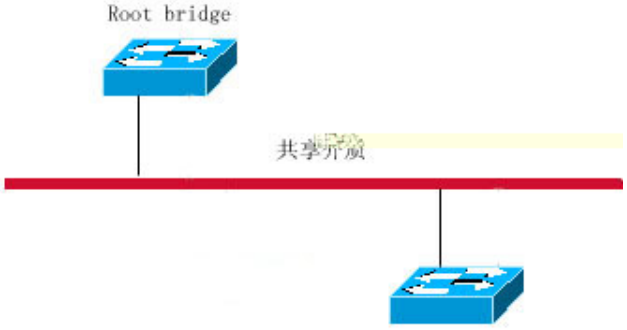


في 9



في 10

ٱ à Юفي ѝ ˘ Ш†



في 11

13.1.1.8. RSTP б STP

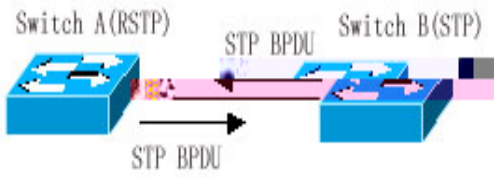
RSTP ٦ Л∪ б STP ˘ RSTP BPDU ٨

╟ б STP RSTP ˘ б STP
ы STP Forwarding ˘ 30 ”Ą Forwarding˘
RSTP ╖ Â

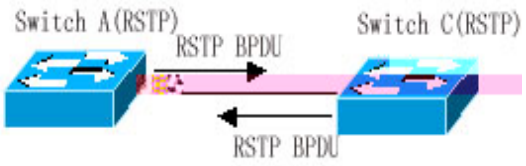
л ˘ RSTP STP Â ﻲ 12 ˘ Switch A
RSTP ˘ Switch B ы STP ˘ ˘ Switch A б
STP ˘ STP BPDU Â л ы Switch C˘
RSTP ˘ Switch A. STP BPDU˘ Switch C ≠ и
б STP ˘ ч л RSTP . ЛЬ STP ˘
æ Â

и RSTP Protocol-migration ╖ RSTP BPDU(
Ю˘ RSTP)˘ Switch A RSTP BPDU˘ Switch C
б RSTP ˘ ч л ЛЬ RSTP
˘ ﻲ 13 Â

Protocol Migration



ﻲ 12



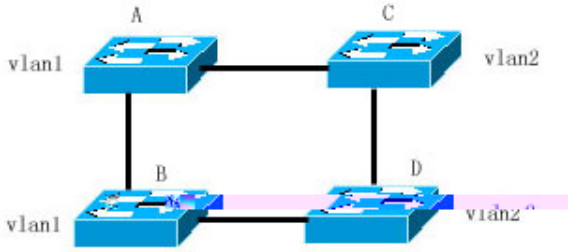
ﻲ 13

13.1.2. MSTP

MSTP˘ MSTP STP à RSTP Э
˘ RSTP FORWARDING Â

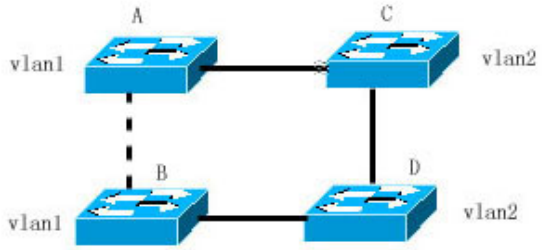
б Vlan ˘ Ю ң ЛЬ
Ю '

ﻲ 14 ˘ A à B Vlan1 ˘ C à D Vlan2 ˘ л Â



في 14

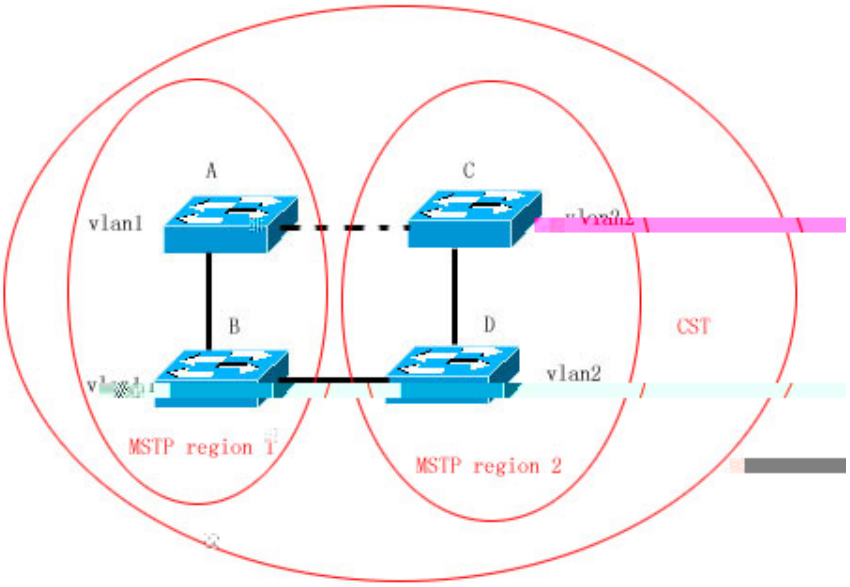
ÿ A C à D B ÿ A B
Ю˜ A B DISCARDING˜ في 15
˜ Â C à D a Vlan1˜ Vlan1 ˘ A
Vlan1 б B Vlan1 Â



في 15

ѝ ¤ ˘ MSTP ң ˘ ⅄Л ⅄ Vlan ǂ
ѝ Instance˜ ⅄ Instance ˆ MST Region˜ ˘
ˆ ѝ IST˜ Internal Spanning-tree˜ ’
MST region ˘ б ѐ MST Region ¨Ą
˘ ˘ ѝ CST˜ Common Spanning Tree˜ Â

˘ ЛЭ ⅄Л MSTP Ю في 16 ' A B
MSTP Region 1 ˘ MSTP Region 1 ң ˘ Л
DISCARDING˜ ⅄ MSTP Region 2 ≠ Â ⅄ Region 1
Region 2 ǂ ч ˘ ч ⅄ “ ” ˘
DISCARDING Â



16 في

˘ ң ˘ ≠ ⅄ Vlan a ⅄ Â

13.1.2.1. ǂ MSTP Region

Л Э ˘ ˘ MSTP ң ˘ ″l ǂ
MSTP Region˘ ⅄ MSTP Region “MST ” ⅄ Â

MST '

MST ⅄ ^ Name˜ ' ⅄ 32 MSTP

STP Ю Instance—vlan ˘ Л Ѧ MSTP˝ Л∪ Â

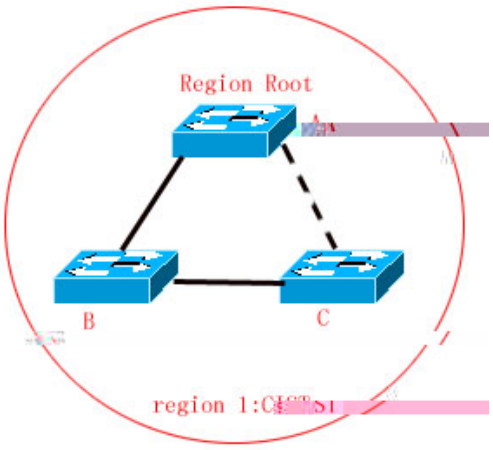
13.1.2.2. MSTP region ˆ IST˜

ǂ MSTP Region Л˘ Region Instance Bridge Priority à Port Priority Instance Root Bridge˝ Л∪ Л Э Port Role˝ Л Port Role Instance FORWARDING DISCARDING Â

˘ MSTP BPDU ˘ IST(Internal Spanning Tree) ˘ Instance ≠ ˆ MSTI˜ ˘ è Instance 0 б CST л й CIST˝ Common Instance Spanning Tree˜ Â ≠ ˘ Instance й “vlan ” à a Â

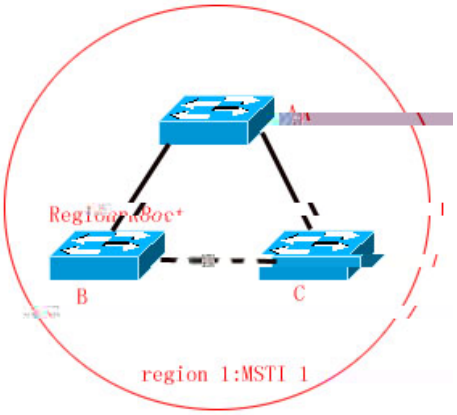
Юفي ˘ Region 1 ˘ A à B à C Â

CIST˝ Instance 0˜ ˘ فى 17˝ A ˙ ˝I ˘ й Region Root˝ Ѧ è ˘ A C DISCARDING Â ˘ Instance 0 “Vlan ” ˘ л A B à B C л ˘ “Vlan ” Â



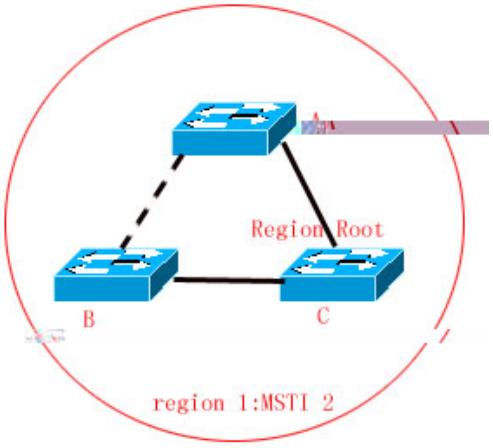
فى 17

MSTI 1ˆ Instance 1˜ ˘ فى 18˝ B ˙ ˝I ˘ й Region Root˝ Ѧ è ˘ B C DISCARDING Â ˘ Instance 1 “Vlan ” ˘ л A B à A C л ˘ “Vlan ” Â



في 18

MSTI 2 Instance 2˜ ˇ في 19˜ C ˙ ˝I ˇ ѝ Region Root˜ ЇĄ è ˇ A B DISCARDING Â ˇ Instance 2 “Vlan ” ˇ ˩ B C à A C ˩ ˇ “Vlan ” Â

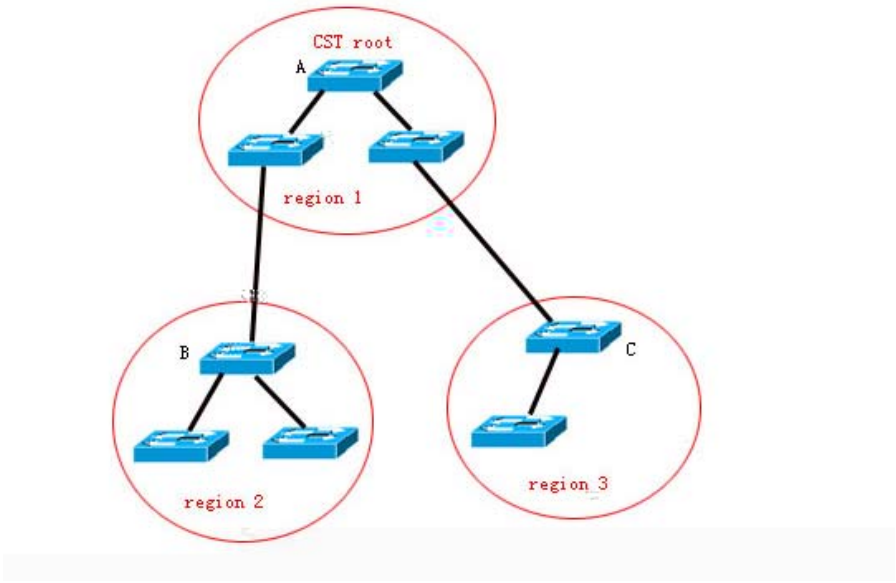


في 19

MSTP a Vlan˘ Л
Vlan ѝ Path Cost Priority˘ Л
MSTP a Â

13.1.2.3. MSTP region ˆ CST˜

MSTP region CST ˩Л ˇ a ˩ MSTP Region ≠ ˇ ѝ CST(Common Spanning Tree) Â في 20 ˇ CST ˇ Bridge ID A ѝ CST (CST Root)˘ ˩ ≠ Region CIST Regional Root Â Region 2 ˇ B CST Root Root Path Cost ˇ Л ѝ Region CIST Regional Root Â ˩ ˇ Region 3 C ѝ CIST Regional Root Â



20

CIST Regional Root a Region Bridge ID Region CST Root Root Path Cost

CIST Regional Root Root Port MSTI Port Role “Master port” Instance Instance FORWARDING Region CST Root “ ” Region

13.1.2.4. Hop Count

IST MSTI a Message Age Max Age BPDU IP TTL Hop Count

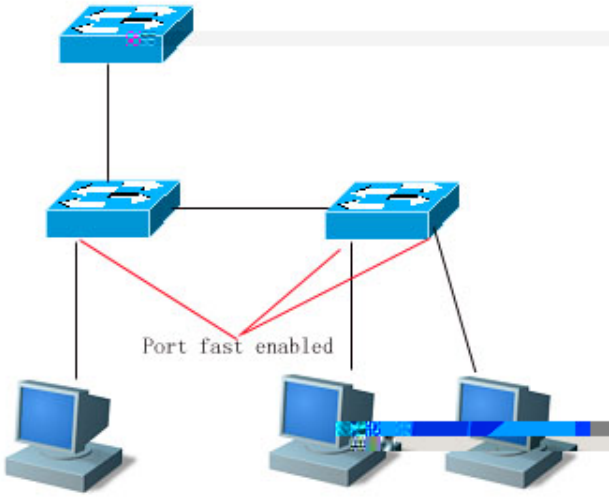
spanning-tree max-hops Region Region Root Bridge Hop Count 1 0 BPDU

ﻝ STP RSTP Region˘ a б
ﻝ Region Â

13.2. MSTP ﻝ

13.2.1. Port Fast

˘ ﻣ ﻝ Л Ъ ﻳ Port Fast˘
Forwarding˘ ﻝ Forwarding ˆ a Port Fast
˘ 30 Forwarding˜ Â Ю ﻓﻲ ﻝ Л Ъ ﻳ
Port Fast enable Â



ﻓﻲ 21

Port Fast BPDU˙ ‡ Port Fast Operational State
ﻳ Disabled Â STP Forwarding Â

13.2.2. ╟ (AutoEdge ╖)

AutoEdge ╖ (ﻳ 3)˘ a Ю
BPDU˙ ‡ ﻳ a ﻝ ˘ ÿ ﻳ
˘ Forwarding Â ╟ ﻳ BPDU ╟
ﻳ Â

ﻝ Л Ъ **spanning-tree autoedge disabled** ﻉ ﻝ ╟ ╖
Â

╖ Â

~

1) ╟ ╖ б Port Fast ă ˘ Л∪ и Â

2) ╖ б Ю ˘ Л∪ STP
a ╖ Â ⊿ ˘ Autoedge
a ˘ ⊿ ˘ Â

3) ″I BPDU Filter˘ ‡ Forwarding˘ a ╟ и
Â

4) ╖ ⊿ б Â

5) AutoEdge ╖ IEEE 802.1D 2004 Нѫ˘ ˘ Bridge
Hello Time и 1.0-2.0 Â Л∪ AutoEdge ╖
Hello Time ˘ ⊿ Â
Hello Time ˘ ″I AutoEdge ╖ Â

13.2.3. BPDU Guard

BPDU Guard enable˘ ≠ Interface enable Â ч
Â

⊿ Л∪ **spanning-tree portfast bpduguard default** ⊰
BPDU Guard enabled ˘ Ю˘ Interface Port
Fast ╟ и ˘ Interface BPDU˘
Error-disabled ˘ Л∪ ’ ⊿ ˘ ⊿
╕ ⊿ ˘ ⊿ Â

≠ ⊿ Л∪ Interface Ю **spanning-tree bpduguard enable** ⊰
Interface BPDU Guard˘ б ˜ Â
Ю Interface BPDU˘ Error-disabled Â

BPDU Guard ╖ Error-disabled ˘ ⊿ Л∪
Ю **errdisable recover** ⊰ ў Â

13.2.4. BPDU Filter

BPDU Filter enable˘ ≠ Interface enable Â ч
Â

⊿ Л∪ spanning-tree portfast bpdufilter default ⊰
BPDU Filter enabled ˘ Ю˘ Interface Port Fast
╟ и ˘ ‡ a BPDU˘ ≠ a BPDU˘
˘ ў a BPDU Â BPDU Port

Fast Operational disabled˝ BPDU Filter ≠ ╟ Â

≠ ┘Л Interface Ю spanning-tree bpdufilter enable ҙ
Interface BPDU Filter enablê б ˜ Â Ю
Interface a BPDU˝ ≠ a BPDU˝ з Forwarding Â

13.2.5. TC Guard

13.2.8. Root Guard ╖

ў ┘ ˘
˘ ┘ . ″I ˘ ÿ
Æ ˘ ┘ ╟ Â Root Guard ╖ ѝ
Â

Root Guard ╖ ˘ è Э ѝ Â
. ″I BPDU ˘ Root Guard ╖
ѝ root-inconsistent (blocked) Â

Root Guard ѝ blocked ˥˘ Root Guard
╖ ╖ ˆ . Ю **spanning-tree guard**
none ϟ˜˜ ѝ Â

~

1) Root Guard γ Â

2) Root Guard ╖ ˥˘ ѝ ˘ ┘ ґ
ѝ Blocked

2) ⌟ a ⌟ Root Guard Loop Guard Â

3) Loop Guard

ֽ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree**	Spanning Tree Â
Ruijie(config)# **end**	Â
Ruijie# **show spanning-tree**	Â
Ruijie# **copy running-config startup-config**	Â

Spanning Tree ˘ ˩ **no spanning-tree** ֽ
Â

13.3.3. Spanning Tree

802.1 ˘ STP à RSTP à MSTP Ь Spanning Tree
¨Ą ˘ Â a
˘ ˩ Â ж ֽ
˘ Л∪ è б a ˘ ⁋ æ
Spanning Tree ˘ Л∪ Â

˘ ÿ MSTP ⁋ RSTP STP ˘ MSTP Region
Â

MSTP Â

˘ ЛЮ Spanning Tree '

ֽ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree mode mstp/rstp/stp**	⁋ Spanning Tree Â
Ruijie(config)# **end**	Â
Ruijie# **show spanning-tree**	Â
Ruijie# **copy running-config startup-config**	Â

Spanning Tree ˘ ˩ **no spanning-tree mode**
ֽ Â

MSTP

Ruijie# **configure terminal**	Â
Ruijie(config)# **interface** *interface-id*	interface ˘ interface Aggregate Link Â
Ruijie(config-if)# **spanning-tree** [**mst** *instance-id*] **port-priority** *priority*	a ↓ instance . ″I ˘ a ╗ instance ˘ . instance 0 Â *instance-id*ď ѝ 0˙ 64 *priority*ў interface . ″I ˘ ↓ ѝ 0 240˝ 16 ˘ ѝ 128

```
Ruijie#
```

˘ ˩ **no spanning-tree pathcost method**

Ȝ Â

13.3.8. Hello Time

BPDU Â ѝ 2 Â

˘ ЛЪЮ Hello Time'

Ȝ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree hello-time** *seconds*	hello_time˘ ˩ ѝ 1 10 ˘ ѝ 2 Â

Ruijie(config)# **end** = ʒ Ä

13.3.10. Max-Age Time

BPDU Â ѝ 20 Â

˘ ЛЬЮ Max-Age Timeˈ

13.3.14.

```
Ruijie(config-mst)# instance 1 vlan 10-20
Ruijie(config-mst)# name region1
Ruijie(config-mst)# revision 1
Ruijie(config-mst)# show
Multi spanning tree protocol : Enable Name [region1]
Revision 1
Instance Vlans Mapped
-------- --------------------
0 1-9,21-4094
1 10-20
------------------------------
Ruijie(config-mst)# exit
Ruijie(config)#
```

~

vlan instance Ь vlan … ˇ ‡
ˠ ң Э ˩ vlan instance Â

13.3.15. Maximum-Hop Count

Maximum-Hop Count˝ BPDU Region ˩ ˩
Â Instance Â

ˇ ЛЬЮ Maximum-Hop Count˝

҂	
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree max-hops** *hop-count*	Maximum-Hop Count˝ и 1˙ 40˝ и 20
Ruijie(config)# **end**	Â
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

ˇ ˩ **no spanning-tree max-hops** ҂
Â

13.3.16.

˘ ⅃Л BPDU
a ⅃ MSTI ˘ Л б è Â

˘ ЛЬЮ '

⅋	
Ruijie# **configure terminal**	Â
Ruijie(config)#**interface** *interface-id*	
Ruijie(config-if)# **spanning-tree compatible enable**	
Ruijie(config-if)# **end**	Â
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

⅄ ˘ ⅃ **no spanning-tree compatible enable** ⅋
Â

13.4. MSTP ⅃

13.4.1. ⅃

╟ ╖ ╖ Â
è ⅃ Â

13.4.2. Port Fast

Port Fast ⅄ Forwarding Â ѝ BPDU Port Fast Operational State ѝ disabled ÿ б STP Forwarding Â

˘ ЛЬЮ Port Fast

⅋	
Ruijie# **configure terminal**	Â
Ruijie(config)# **interface** *interface-id*	interface ˘ interface Aggregate Link Â

Â

ˇ ЛЬЮ BPDU Guardď

?	

Ruijie#

Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

BPDU Filterˇ ˩ЛЦ ȝ **no spanning-tree portfast bpdufilter default** Â

Interface BPDU Filterˇ ˩ЛЦ Interface ȝ **spanning-tree bpdufilter enable** ˇ **spanning-tree bpdufilter disable** BPDU Guard Â

13.4.6. TC Guard

ˇ ЛЦЮ TC Guard

ȝ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree tc-protection tc-guard**	TC Guard
Ruijie(config)# **end**	Â
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

ˇ ЛЦЮ Ю TC G

13.4.7. BPDU MAC

BPDU MAC ˘ ﻝ ﻝ MAC ﻯ MAC BPDU ˘ ﺣ BPDU Â

˘ ﻝ Лъ ЛъЮ BPDU MAC '

ʒ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **interface** *Interface-id*	interface ˘ interface Aggregate Link Â
Ruijie(config-if)#**bpdu src-mac-check** *H.H.H*	bpdu mac Â
Ruijie(config-if)# **end**	Â
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

bpdu mac ˘ ﻝ Лъ Ю ʒ **no bpdu src-mac-check** Â

13.4.8. Root Guard

˘ ЛъЮ Root Guard

ʒ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **interface Interface-id**	˘ ﻝ Aggregate Link Â
Ruijie(config-if)# **spanning-tree guard root**	Root Guard
Ruijie# **show running-config**	Â

MSTP

?	?
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree Loopguard default**	Loop Guard Â
Ruijie# **show running-config**	Â
Copy(config)#TT0 1 Tf0 Tc 0 Tw 10.177 0 Td4.9[C2_0 1 Tf9.731 0.589 <1E0C11C startup-config	Â

˘ ЛЬЮ Loop Guard

?

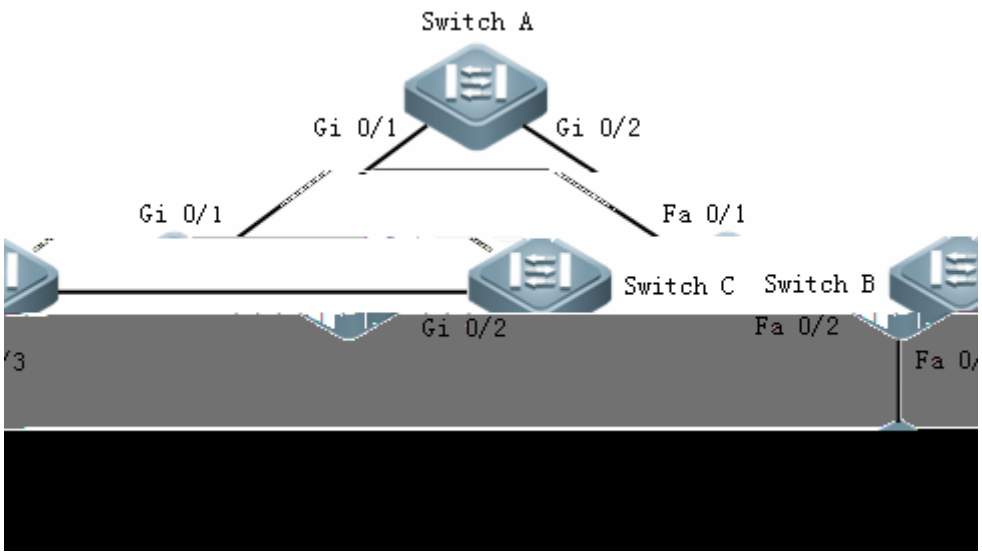
Ruijie# **show spanning-tree summary**	MSTP instance è
Ruijie# **show spanning-tree inconsistentports**	block
Ruijie# **show spanning-tree mst configuration**	MST
Ruijie# **show spanning-tree mst** *instance-id*	instance MSTP
Ruijie# **show spanning-tree mst** *instance-id* **interface** *interface-id*	interface instance MSTP
Ruijie# **show spanning-tree interface** *interface-id*	interface instance MSTP
Ruijie# **show spanning-tree forward-time**	forward-time
Ruijie# **show spanning-tree Hello time**	Hello time
Ruijie# **show spanning-tree max-hops**	max-hops
Ruijie# **show spanning-tree tx-hold-count**	tx-hold-count
Ruijie# **show spanning-tree pathcost method**	pathcost method

13.6. MSTP ή

13.6.1.

1) Ь ⁄ Ь ˇ MSTP Â
2) Э Vlan-Instance ˇ Л∪ MST ⁄ å MST Revision Numberˇ ˝I
3) MSTP
4) BPDU Guard ╖ ˇ PC Э Port Fast ╖ Â

13.6.2.



13.6.3.

1) **Switch A**

Gi 0/1 Gi 0/2 Trunk ˘ … VLAN 2 VLAN 3 Â

```
Ruijie# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)# interface gigabitEthernet 0/1
Ruijie(config-if)# switchport mode trunk
Ruijie(config-if)# exit
Ruijie(config)# interface gigabitEthernet 0/2
Ruijie(config-if)# switchport mode trunk
Ruijie(config-if)# exit
Ruijie(config)# vlan 2
Ruijie(config-vlan)# exit
Ruijie(config)# vlan 3
Ruijie(config-vlan)# exit
```

ŕ MSTP ˘ VLAN 2 Instance 1˘ VLAN 3 Instance 2˘ MST ł ŕ ruijie˘ MST Revision Number ŕ 1˘ MST ˘ Â

```
Ruijie(config)# spanning-tree mode mstp
Ruijie(config)# spanning-tree mst configuration
Ruijie(config-mst)# instance 1 vlan 2
%Warning:you must create vlans before configuring instance-vlan
relationship
Ruijie(config-mst)# instance 2 vlan 3
%Warning:you must create vlans before configuring instance-vlan
relationship
```

```
Ruijie(config-mst)# name ruijie
Ruijie(config-mst)# revision 1
Ruijie(config-mst)# show
Multi spanning tree protocol : Enable
Name    : ruijie
Revision : 1
Instance  Vlans Mapped
-------- ---------------------------------------------
0       : 1, 4-4094
1       : 2
2       : 3
---------------------------------------------------
Ruijie(config-mst)# exit
Ruijie(config)# spanning-tree
Enable spanning-tree.
#         Э      Instance 0    ˛ ˝l    ѝ 4096
Ruijie(config)# spanning-tree mst 0 priority 4096
```

2) **Switch B**

```
#          Gi 0/1    Gi 0/2      Trunk   ˘ …    VLAN 2    VLAN 3 Â
Ruijie(config)# interface gigabitEthernet 0/1
Ruijie(config-if)# switchport mode trunk
Ruijie(config-if)# exit
Ruijie(config)# interface gigabitEthernet 0/2
Ruijie(config-if)# switchport mode trunk
Ruijie(config-if)# exit
Ruijie(config)# vlan 2
Ruijie(config-vlan)# exit
Ruijie(config)# vlan 3
Ruijie(config-vlan)# exit
#          ѝ MSTP     ˘      VLAN 2       Instance 1˝     VLAN 3
Instance 2˝       MST      ˩    ѝ ruijie˘  MST Revision Number ѝ 1˝
     Â
Ruijie(config)# spanning-tree mode mstp
Ruijie(config)# spanning-tree mst configuration
Ruijie(config-mst)# instance 1 vlan 2
%Warning:you must create vlans before configuring instance-vlan
relationship
Ruijie(config-mst)# instance 2 vlan 3
%Warning:you must create vlans before configuring instance-vlan
relationship
Ruijie(config-mst)# name ruijie
Ruijie(config-mst)# revision 1
Ruijie(config-mst)# exit
Ruijie(config)# spanning-tree
Enable spanning-tree.
```

```
#          Э       Instance1    .  ″l    й 4096
Ruijie(config)# spanning-tree mst 1 priority 4096
```

3) Switch C

```
#          Fa 0/1     Fa 0/2       Trunk   ˇ  …   VLAN 2    VLAN 3 Â
Ruijie(config)# interface fastEthernet 0/1
Ruijie(config-if)# switchport mode trunk
Ruijie(config-if)# exit
Ruijie(config)# interface fastEthernet 0/2
Ruijie(config-if)# switchport mode trunk
Ruijie(config-if)# exit
Ruijie(config)# vlan 2
Ruijie(config-vlan)# exit
Ruijie(config)# vlan 3
Ruijie(config-vlan)# exit
#           й MSTP     ˇ       VLAN 2        Instance 1˘      VLAN 3
Instance 2˘       MST      ɹ    й ruijie˘  MST Revision Number й 1˘
     Â
Ruijie(config)# spanning-tree mode mstp
Ruijie(config)# spanning-tree mst configuration
Ruijie(config-mst)# instance 1 vlan 2
%Warning:you must create vlans before configuring instance-vlan
relationship
Ruijie(config-mst)# instance 2 vlan 3
%Warning:you must create vlans before configuring instance-vlan
relationship
Ruijie(config-mst)# name ruijie
Ruijie(config-mst)# revision 1
Ruijie(config-mst)# exit
Ruijie(config)# spanning-tree
Enable spanning-tree.
#          Э       Instance 2    .  ″l
Ruijie(config)# spanning-tree mst 2 priority 4096
#          BPDU Guard ╖  ˇ              Fa 0/3  й  Port Fast Â
Ruijie(config)# spanning-tree portfast bpduguard default
Ruijie(config)# interface fastEthernet 0/3
Ruijie(config-if)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected
to a single host. Connecting hubs, Ruijiees, bridges to this
interface when portfast is enabled,can cause temporary loops.
Ruijie(config-if)# end
#
Ruijie# show spanning-tree
StpVersion : MSTP
SysStpStatus : ENABLED
MaxAge : 20
```

```
HelloTime : 2
ForwardDelay : 15
BridgeMaxAge : 20
BridgeHelloTime : 2
BridgeForwardDelay : 15
MaxHops: 20
TxHoldCount : 3
PathCostMethod : Long
BPDUGuard : enabled
BPDUFilter : Disabled
LoopGuardDef  : Disabled
###### mst 0 vlans map : 1, 4-4094
BridgeAddr : 00d0.f82a.aa8e
Priority: 32768
TimeSinceTopologyChange : 0d:0h:19m:44s
TopologyChanges : 1
DesignatedRoot : 1000.00d0.f822.33aa
RootCost : 0
RootPort : 1
CistRegionRoot : 1000.00d0.f822.33aa
CistPathCost : 200000
###### mst 1 vlans map : 2
BridgeAddr : 00d0.f82a.aa8e
Priority: 32768
TimeSinceTopologyChange : 0d:0h:1m:46s
TopologyChanges : 7
DesignatedRoot : 1001.00d0.f834.56f0
RootCost : 200000
RootPort : 2
###### mst 2 vlans map : 3
BridgeAddr : 00d0.f82a.aa8e
Priority: 4096
TimeSinceTopologyChange : 0d:0h:1m:44s
TopologyChanges : 5
DesignatedRoot : 1002.00d0.f82a.aa8e
RootCost : 0
RootPort : 0
#        Fa 0/1
Ruijie# show spanning-tree interface fastEthernet 0/1
PortAdminPortFast : Disabled
PortOperPortFast : Disabled
PortAdminAutoEdge : Enabled
PortOperAutoEdge : Disabled
PortAdminLinkType : auto
PortOperLinkType : point-to-point
PortBPDUGuard : Disabled
```

```
PortBPDUFilter : Disabled
PortGuardmode  : None
###### MST 0 vlans mapped :1, 4-4094
PortState : forwarding
PortPriority : 128
PortDesignatedRoot : 1000.00d0.f822.33aa
PortDesignatedCost : 0
PortDesignatedBridge :1000.00d0.f822.33aa
PortDesignatedPort : 8002
PortForwardTransitions : 1
PortAdminPathCost : 200000
PortOperPathCost : 200000
Inconsistent states : normal
PortRole : rootPort
###### MST 1 vlans mapped :2
PortState : discarding
PortPriority : 128
PortDesignatedRoot : 1001.00d0.f834.56f0
PortDesignatedCost : 0
PortDesignatedBridge :8001.00d0.f822.33aa
PortDesignatedPort : 8002
PortForwardTransitions : 5
PortAdminPathCost : 200000
PortOperPathCost : 200000
Inconsistent states : normal
PortRole : alternatePort
###### MST 2 vlans mapped :3
PortState : forwarding
PortPriority : 128
PortDesignatedRoot : 1002.00d0.f82a.aa8e
PortDesignatedCost : 0
PortDesignatedBridge :1002.00d0.f82a.aa8e
PortDesignatedPort : 8001
PortForwardTransitions : 1
PortAdminPathCost : 200000
PortOperPathCost : 200000
Inconsistent states : normal
PortRole : designatedPort
```

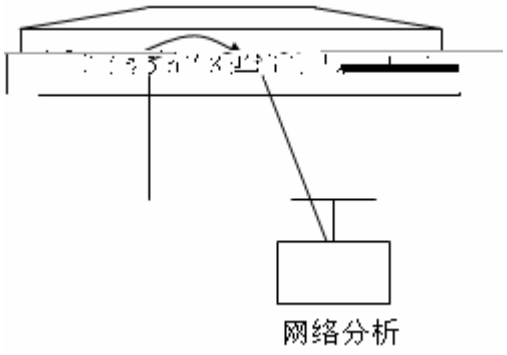
14 SPAN

14.1.

14.1.1. SPAN

ٮ Л৬ SPAN Э Э ٨ ٲ
RMON ٲ Э ٲ Э Â SPAN Э
MIRROR Э ٲ Â

˘ في 1 ˘ ”I 5 Э ”I 10ˇ 10
Э ٲ 5 ˘ ٮ 5 Э Â



في 1 SPAN

SPAN ٮ Л৬ ÿ ˘ Â

SPAN a ˘ ٧ ÿ
Â ˘ 100Mbps
1000Mbps ٮ Â

14.1.2. Ү

S2300 a ˘ . Юˇ
a ٯ Эˇ a Â

S2300 ң Эˇ Igmp Snooping ╖ ˘ ӂ Igmp
˘ ٮ ٯ ≠ a Â

S2300 ң Эˇ Ю MAC a a
Â

14.2. SPAN

ɬ SPAN

14.2.1. SPAN

SPAN Â ɻ Ɲ
˘ ɻ ɻ Â

ɻ SPAN ˘ Switched port à routed port AP ɻ Ɲ ŭ
Â SPAN a Â

ɻ Ɲ SPAN disabled port Э˘ ˘ SPAN a Э
Â **Show monitor session session number** ɮ
SPAN Â SPAN Э ɻ a Э
ɻ Â

14.2.2.

SPAN ƜЮ '

' Э Â SPAN
˘ ɻ Â ˘ ÿ
ɻ ˘ ˘ a SPAN ╖ ˘ Ÿ
Â

' ÿ Â SPAN
˘ ɻ Â ˘ ÿ
ɻ ˘ ɻ ˘ ≠ a Â
ɻ ɻ˘ ɻ ˘
MAC à MAC à VLAN ID Ɲ TTL ɻ ɣ Â ɻ ˘
≠ ɻ ɣ Â

ɻ ɻ ' Э ч Â SPAN ˘ ɻ
Â

14.2.3.

(≠ ɻ) ɻ Ɲ switched port à routed port AP˘
ɬ Â SPAN ˘ ɻ Ɲ ˘ ɻ ɻ ˘
a Â

ƜЮ '

1) ⅃Л switched portˇ routed port AP Â

2) a ⅃Л⅄ ⅃ ѝ Â

3) ⅃Л ⅃ Â

4) ⅃Л VLAN a VLAN Â

14.2.4.

SPAN (≠ ≀)ˇ Â

ЛЬЮ '

⅃Л switched port à routed port AP Â

14.3. SPAN

ϯ Э SPANˇ ЛЬЮ :

14.3.1. SPAN

ℸ	
SPAN	

14.3.2. SPAN

ЛЬЮ ‡ SPAN Â

ϳ[illegible]port SPAN ╔

╗ AP ˘ SPAN
↓ Â

14.3.3. … SPAN

… SPAN ( ) ( ) Â

ʒ	
Ruijie(config)# **monitor session** *session_number* **source interface** *interface-id* [	-] {**both**	**rx**	**tx**}	Â *interface-id* /ˡ Â
Ruijie(config)# **monitor session** *session_number* **destination interface** *interface-id* {**encapsulation	switch**}	Â *interface-id* /ˡ ╗ *encapsulation* ╗ , ╗ *switch* ╗ Â

SPAN ˘ ↓ **no monitor session** *session_number* ʒ Â SPAN ˘ ↓ **no monitor session all** ʒ Â **no monitor session session_number source interface** *interface-id* ʒ **no monitor session** *session_number* **destination interface** *interface-id* ↓

ЮO ȳ ӟ ȯ Ã ôL8$d4ò ¸ È

15 IP

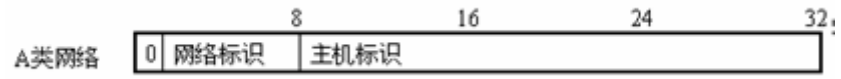
15.1. IP

15.1.1. IP Ӯ

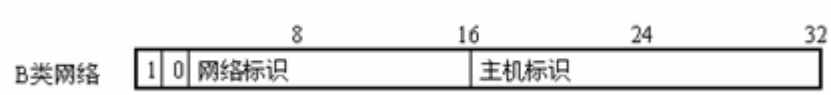
IP 32 Æ γ ˘ ѝ ˘ Â
˘ ↑ ѝ ˘ 8 Æ˘ ÿ 0~255˘ Ґ . Ł Л ˘
Ґ 192.168.1.1 Ł IP Â

IP ♩ ₦Ж˘ IP Â 32 Æ IP ч ↑
' 1˜ ↑ ' 2˜ ↑ Â ↑ Æ ˘
IP ♩ Л ↑ Â

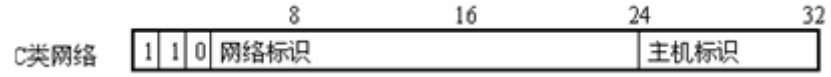
A ˘ Æ ѝ Ґ 0 Ł˘ 7 Æ Л˘ 24 Æ
Â 128 A Â



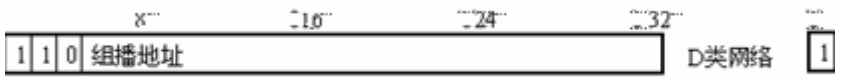
B ˘ ч Æ ѝ Ґ 10 Ł˘ 14 Æ Л˘ 16 Æ
Â 16,348 B Â



˘ Ь Æ ѝ Ґ Ł˘ Æ Л˘ Æ
Â Â



˘ Æ ѝ Ґ Ł˘ è Æ ѝ Â



Æ ỳ Ĭ 1111 Ŀ a ǂ ˘ ỳ E ˘
Â

˘ IP ˘ IP
ǂ Â б ˘ ‡ ǂ IP
Â ﻯ Ш ㄴ Ո ㄴ ﻯ ^ CNNIC˜ ˘ IP ǂ
ỳ ﻯ ㄴ б Ⲗ ǂ Ὼ Ⲗ ^ ICANN,Internet Corporation for Assigned Names and Numbers˜ Â ỳ ˘ a
IP ˘ ≠ a ǂ ˘ ǂ ж Â

Ю ỳ б ㄴ '

A	0.0.0.0	
	1.0.0.0~126.0.0.0	ㄴ
	127.0.0.0	
B	128.0.0.0~191.254.0.0	ㄴ
	191.255.0.0	
C	192.0.0.0	
	192.0.1.0~223.255.254.0	ㄴ
	223.255.255.0	
D	224.0.0.0~239.255.255.255	ㄴ
E	240.0.0.0~255.255.255.254	
	255.255.255.255	

è ж Ь ˘ a ˘
ǂ ˘ ‡ IP
ÂЮ ỳ ˘ RFC 1918 ЊЖ'

	IP	
A	10.0.0.0~10.255.255.255	1 A
B	172.16.0.0~172.31.255.255	16 B

C	192.168.0.0~192.168.255.255	256 C

IP à TCP/UDP è ˇ RFC 1166 Â

15.1.2. IP

15.1.2.1. ^ ARP˜

ˇ IP ч ' 1˜ ˇ
ˇ ˇ Э
MAC ˇ Э й MAC ˇ MAC
Э Ъ IP ' 2˜ ˇ Э Ъ IP ˇ Л
≠ Â

Э ч Л IP ˇ 48 MAC Â
IP MAC й ھ Ъ

16 DHCP Relay

16.1.

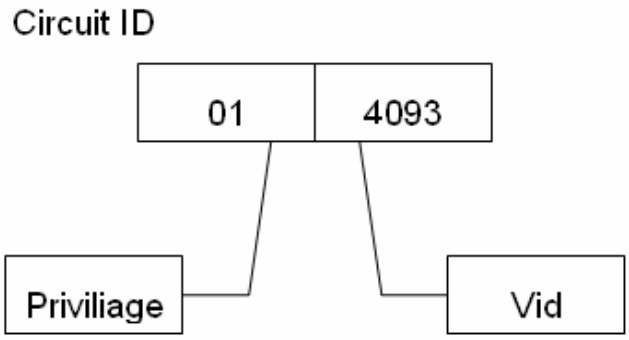
16.1.1. DHCP

DHCP ╟ ↑ ┘ ˘ IP Â

DHCP Client DHCP DISCOVER DHCP Server Â DHCP Server
Л DHCP DISCOVER Л˘ Client↑ , IP
˘ DHCP OFFER Â DHCP Client DHCP OFFER Л˘
┘ Â ┘ DHCP REQUEST ' a ┘ ˘
DHCP DISCOVER Â Ь DHCP REQUEST ˘ IP
ˆ è ~ ┘Л↑ ˘ ┘Л↑ ˘ ‡ DHCP ACK '
a ┘↑ ˘ ‡ DHCP NAK Â DHCP Client DHCP ACK ˘
Ь ↑ ' DHCP NAK˘ ‡ ┘ DHCP
DISCOVER Ї Л IP Â

16.1.2. DHCP Ъ ˆ DHCP Relay Agent˜

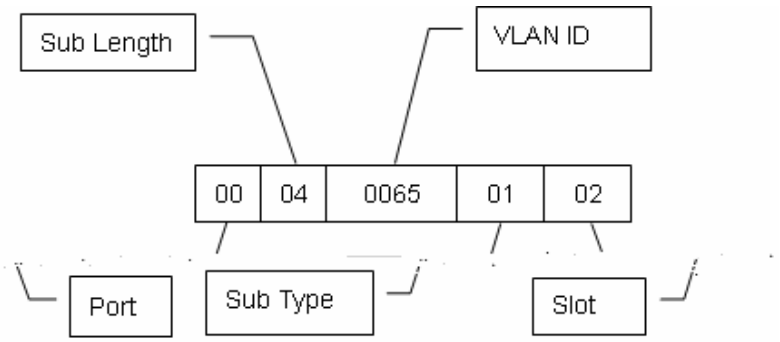
DHCP IP й 255.255.255.255˜
˘ a Â й ╟ IP↑ ˘ DHCP Relay Agent
ч Â DHCP IP DHCP
Server˘ ┘ ˘ DHCP DHCP Client Â DHCP Relay
Agent ˘ Æ a ┘ DHCP Client DHCP
Server Â ┘ DHCP Server ┘ ╟ IP
˘ . Client—Relay Agent—Server DHCP ╟ IP Â



في 2

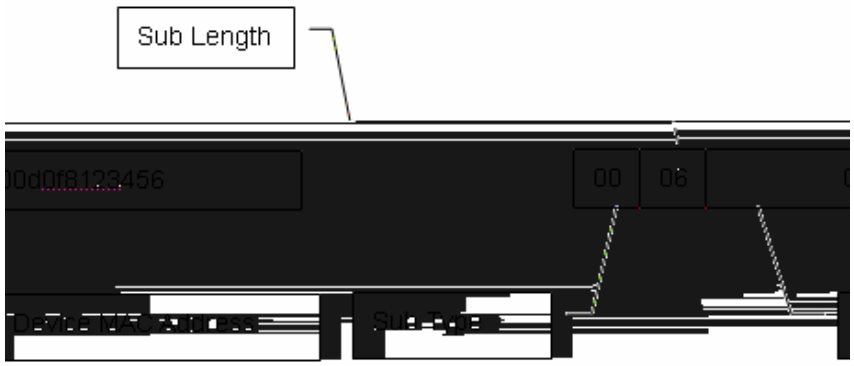
2. relay agent information option82' option a è
ˇ DHCP relay ˇ DHCP ˇ Л
ˇ option82 Э Ь ˇ option
Ю'

Agent Circuit ID



في 3

Agent Remote ID



في 4

16.1.4. DHCP relay Check Server-id ╖

DHCP ˇ й DHCP Ь ˇ ÿ ˇ

ѝ ѵ Ь a Â DHCP ѵ
˘ DHCP client DHCP REQUEST Ь ˘
server-id option ˘ ѝ
Ь ˘ relay ˘ ѵ
serverˇ a DHCP serverˇ Э DHCP
check server-id ╖

16.2. DHCP

16.2.1. DHCP Ҁ

ЮЎ Ю DHCP Ҁ '

Ҁ	
Ruijie (config)# **service dhcp**	DHCP Ҁ
Ruijie(config)# **no service dhcp**	DHCP Ҁ Â

16.2.2. DHCP Server IP

DHCP Server IP ѧˇ DHCP DHCP ґ Ѓ ı Ȯ 4

DHCP Relay

Э˘ з ACL ACE˘ б è ACL ğ
˘ '

ù IP ˘ ù 192.168.3.2-192.168.3.254˘
192.168.4.2-192.168.4.254˘ 192.168.5.2-192.168.5.254’ ˥ 192.168.3.1 à
192.168.4.1 à 192.168.5.1 ù ˘ a¦ Â ‡
192.168.3.x-5.x web portal ЛьЮ ˚ Â
Э Ю'

```
Ruijie# config
Ruijie(config)# ip access-list extended DenyAccessEachOther
OfUnauthrize
Ruijie(config-ext-nacl)# permit ip any host 192.168.3.1

Ruijie(config-ext-nacl)# permit ip any host 192.168.4.1
Ruijie(config-ext-nacl)# permit ip any host 192.168.5.1
Ruijie(config-ext-nacl)# permit ip host 192.168.3.1 any
      IP ù
Ruijie(config-ext-nacl)# permit ip host 192.168.4.1 any
Ruijie(config-ext-nacl)# permit ip host 192.168.5.1 any
Ruijie(config-ext-nacl)# deny ip 192.168.3.0 0.0.0.255 192.1
68.3.0 0.0.0.255

Ruijie(config-ext-nacl)# deny ip 192.168.3.0 0.0.0.255 192.
168.4.0 0.0.0.255
Ruijie(config-ext-nacl)# deny ip 192.168.3.0 0.0.0.255 192.
168.5.0 0.0.0.255
Ruijie(config-ext-nacl)# deny ip 192.168.4.0 0.0.0.255 192.
168.4.0 0.0.0.255
Ruijie(config-ext-nacl)# deny ip 192.168.4.0 0.0.0.255 192.
168.5.0 0.0.0.255
Ruijie(config-ext-nacl)# deny ip 192.168.5.0 0.0.0.255 192.
168.5.0 0.0.0.255
Ruijie(config-ext-nacl)# deny ip 192.168.5.0 0.0.0.255 192.
168.3.0 0.0.0.255
Ruijie(config-ext-nacl)# deny ip 192.168.5.0 0.0.0.255 192.
168.4.0 0.0.0.255
Ruijie(config-ext-nacl)# exit
```

˥ Ą ę **ip dhcp relay information option dot1x access-group**
DenyAccessEachOtherOfUnauthrize ę Э

Ю˘ Ю **DHCP option dot1x access-group**'

ę	

Ruijie(config)# **ip dhcp relay information option dot1x access-group** *acl-name*	DHCP option dot1x acl
Ruijie(config)# **no ip dhcp relay information option dot1x access-group** *acl-name*	↙ DHCP option dot1x acl Â

Ruijie(config-if)# **ip dhcp relay suppresson**	DHCP relay suppresson ╗ Â
Ruijie(config-if)# **no ip dhcp relay suppresson**	DHCP relay suppresson ╗ Â

16.2.8. DHCP

Ю ҳ dhcp relay ╗ à ╗ ч Ь '

```
Ruijie# configure terminal
Ruijie(config)# service dhcp                          dhcp relay ╗
Ruijie(config)# ip helper-address 192.18.100.1  //  ╗        Ь

Ruijie(config)# ip helper-address192.18.100.2      //  ╗
                                                        Ь
Ruijie(config)# interface GigabitEthernet 0/3
Ruijie(config-if)# ip helper-address 192.18.200.1  //  ╗
                                                        Ь
Ruijie(config-if)# ip helper-address 192.18.200.2  //  ╗
                                                        Ь
Ruijie(config-if)# end
```

16.3. DHCP relay è Y

Y ˘ vlan relay ╗ option dot1x à ╠ option82 ╗ ˘ ‡ Y Э ↙ vlan relay ╗ Â

16.3.1. DHCP option dot1x Y

1. ҳ AAA/802.1x Ю Â
2. 802.1x DHCP IP Â
3. ҳ б **dhcp option82** ҳ ˘ a ↙ Â
4. 802.1x DHCP IP Ю ≠ MAC + IP ˘ Лъ a б DHCP ╠ ╗ a ↙ Â

16.3.2. DHCP option82 Y

DHCP option82 ╗ **dhcp option dot1x** ╗ ˘ a ↙

16.4. DHCP

Ю **show running-config** ҄ DHCP Â

```
Ruijie# show running-config
Building configuration...
Current configuration : 1464 bytes
version RGOS 10.1.00(1), Release(11758)(Fri Mar 30 12:53:11 CST
2007 -nprd
hostname Ruijie
vlan 1
ip helper-address 192.18.100.1
ip helper-address 192.18.100.2
ip dhcp relay information option dot1x
interface GigabitEthernet 0/1
interface GigabitEthernet 0/2
interface GigabitEthernet 0/3
no switchport
ip helper-address 192.168.200.1
ip helper-address 192.168.200.2
interface VLAN 1
ip address 192.168.193.91 255.255.255.0
line con 0 exec-timeout 0 0
```

16.5. DHCP ή

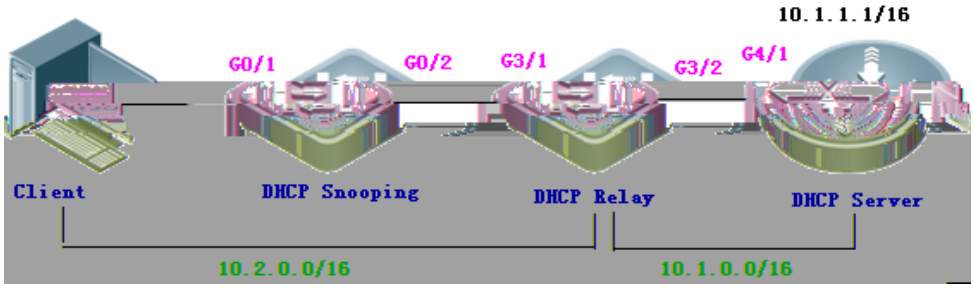
16.5.1. IP Э

16.5.1.1.

1 à ┘Л└ ┘ IP Э '

2 à IP Э Â

16.5.1.2. في



16.5.1.3. ‡

DHCP Snooping б DHCP Relay access ˘
Client ┘Л└ ╠ ┘ IP Э ˘ DHCP Relay
Â IP Э ч ' Ю
DAΓ ╠ ARP ╥ ˜ ˘ ┘ Ю ˘
arp-check ╥ Э Â Â

16.5.1.4.

Э في ˘ Ю '

DHCP Snooping '

```
#       DHCP Snooping ╥
Ruijie(config)# ip dhcp snooping
#       б ┗          Gi0/2 й ┘
```

```
Ruijie(config)# interface gigabitEthernet 0/2
Ruijie(config-if)# ip dhcp snooping trust

#     Gi0/2 й ARP
Ruijie(config-if)# ip arp inspection trust
Ruijie(config-if)# exit

#         VLAN    DAI          ╖
Ruijie(config)# ip arp inspection vlan 1

#           IP     ^  SVI1~
Ruijie(config)# interface vlan 1
Ruijie(config-if)# ip address 10.2.0.1 255.255.0.0

#       ∧         ^  10.1.0.0/16~
Ruijie(config)# ip route 10.1.0.0 255.255.0.0 10.2.1.1
```

DHCP Relay

```
#     DHCP      ?╕
Ruijie(config)# server dhcp

#   ╖            DHCP    ╘
Ruijie(config)# ip helper-address 10.1.1.1

#     б Snooping                  IP
Ruijie(config)# interface gigabitEthernet 3/1
Ruijie(config-if)# no switchport
Ruijie(config-if)# ip address 10.2.1.1 255.255.0.0

#     б Server                  IP
Ruijie(config)# interface gigabitEthernet 3/2
Ruijie(config-if)# no switchport
Ruijie(config-if)# ip address 10.1.0.1 255.255.0.0
```

DHCP Server Э '

```
# й      Relay                IP
Ruijie(config)# interface gigabitEthernet 4/1
Ruijie(config-if)# no switchport
Ruijie(config-if)# ip address 10.1.1.1 255.255.0.0

#     DHCP    ╘
Ruijie(config)# service dhcp

#     DHCP          ˘          a     ╡
Ruijie(config)# ip dhcp excluded-address 10.1.1.1 10.1.1.10

#           ∧
Ruijie(config)# ip dhcp pool star
```

```
#
Ruijie(dhcp-config)# default-router 10.2.1.1
#     DHCP           /
Ruijie(dhcp-config)#          G"WÜWG5B>Q@"DWGR
```

17 DNS

17.1. DNS

IP ˩Л ў ˩˘ ў ˩ ˘
Â ў ˩˘ a ˩ IP IP ˘ ˩ в
Ж ў ˩ Â DNS ╖ Â

ў ˩ IP ч ' 1˜ ˘ ˩ Э ў IP
˘ ˘ з ˩ ' 2˜ ╟
˘ ˩ ^ DNS˜ ˘ ˩ ж DNS ╘ Э ў IP
˘ Э ў ˩ ˘ ˝I DNS ╘ ў
IP Â

ў ˩˘ ў ˩ IP ˩ ˩ ^ ў ˩
˜ Â ў ˩ ˘ ≠ DNS ˩ Â
˩ ˘ ˩Л ˝I ˩ ˘ ˩ a ╖˘ ˝Ą
╟ ˩ Â ˩Л ˩ ˩ ˘
˩Л ˩ Â

17.2. ˩

17.2.1. DNS

DNS Ю '

DNS ˩ ╖	
DNS ╘ IP	

ў

Ruijie(config)# **ip domain-lookup**	DNS ⅄ ╖

no ip domain-lookup ⅋ DNS ⅄ ╖

```
Ruijie(config)# ip domain-lookup
```

17.2.3. DNS Server

DNS ┺ Â ⅄ DNS ┺ ˘ ╟ ⅄
Â

DNS ┺ ˘ ⅄ ⎍ **no ip name-server** [*ip-address*] ⅋ Â ὲ
ip-address ⅄ ┺ ˘ ‡ ⅄ ┺ Â

⅋	
Ruijie(config)# **ip name-server** *ip-address*	╗ DNS Server IP Â ⅋˘ ╗ DNS Server Â ÿ Server ѕ˘ "

17.2.6.

DNS '

Ruijie# **show hosts**	DNS

```
Ruijie# show hosts
DNS name server    :
192.168.5.134    static
    host              type         address
www.163.com           static       192.168.5.243
www.ruijie.com        dynamic      192.168.5.123
```

17.2.7.

Ping ў '

```
Ruijie# ping www.ietf.org
Resolving host[www.ietf.org]Â Â Â Â Â Â
Sending 5,100-byte ICMP Echos to 192.168.5.123,
timeout is 2000 milliseconds.
!!!!!
Success rate is 100 percent(5/5)
Minimum = 1ms Maximum = 1ms, Average = 1ms
```

18 (SNTP)

18.1.

ˇ Э ⅃ ˇ . NTPˆ Network Time Protocol-- ~ ˇ NTP ɣ ˇ . SNTP ˆ Simple Network Time Protocolˈ ~ Â

NTP ⅃Ո ⅄ ˇ ˇ a ⅃ ╟ ˇ ⅃Ո 1-50 ms Â NTP ⅃ ˇ Â NTP ˇ Â

SNTPˆ ~ NTP ɣ ˇ ˇ ˇ Â ≠ 1 ⅃ˇ ≠ Â

SNTP NTP ˇ Ո SNTP Client NTP Server Â

18.1.1. SNTP

SNTP / Ꞗ ˇ Ꞗ GPS ⅄ ѝ ˇ Ꞗ Ꞗ ls ȷ

T2' Ь (Л Ь й)˘ й Receive Timestamp'

T3' Ь (Л Ь й)˘ й Transmit Timestamp'

T4' (Л й)˘ й Destination Timestamp'

T' Ь '

d' ч '

'

й

T2 = T1 + t + d / 2;

Л

T2 - T1 = t + d / 2;

й

T4 = T3 – t + d / 2;

Л

T3 - T4 = t – d / 2;

d = (T4 - T1) - (T3 - T2);

t = ((T2 - T1) + (T3 - T4)) / 2;

t d˘ SNTP Client ˩ Â

. ˘ й T4 + t

18.2. SNTP

Ў SNTP

18.2.1. SNTP

Ю˘ SNTP Ю'

SNTP	Disable˘ SNTP Ь

NTP Server IP	0
SNTP ﻝ	1800s
ш	+ϐ . ѽ ш

18.2.2. SNTP

ˇ ЛЬЮ SNTP

Â

```
Ruijie# config
```

SNTP . ﻝ Â ﻟ ﻍˇ ľ. ﻝ
Ł ˇ a ﻝ Â ѝ ﻝ ˇ ч ľ. ﻝ
Ł ϖ 5 Â

```
Ruijie(config)# sntp enable
```

```
Ruijie(config)# End
```

```
Ruijie# show running-config
```

Â

```
Ruijie# copy running-config startup-config
```

SNT ˇ ﻝЛ **no sntp enable** ﻍ SNTP Â

18.2.3. NTP Server

SNTP NTP ˇ Л SNTP Client
NTP Server Â Э NTP Serverˇ ﻝЛ
ѝ Э NTP Server Â

έ NTP server ﻝЛ http://www.time.edu.cn/ http://www.ntp.org/ Э
ﻝ Â

192.43.244.18(time.nist.gov) Â

ˇ ЛЬЮ SNTP Server IP '

Â

```
Ruijie# config
```

Â

```
Ruijie(config)# sntp server <ip-addr>

Ruijie(config)# End

Ruijie# show running-config
```

Â

```
Ruijie# copy running-config startup-config
```

18.2.4. SNTP ﾉ

SNTP Client NTP Serverˇ Л
ÂЛЬЮ NTP Server ﾉ '

Â

```
Ruijie# config
```

2) ﾉ ˇ Æ й Â й 60 -65535 ˇ й 1800 Â

```
Ruijie(config)# sntp interval <seconds>

Ruijie(config)# End

Ruijie# show running-config
```

Â

```
Ruijie# copy running-config startup-config
```

18.2.5. ш

SNTP Л ﾍ (GMT)ˇ й ﾍ ˇ ш Â

1˜ Â

```
Ruijie# config
```

2˜ шˇ й-23 23˜ шˇ ш Â 8 ѽ шˇ -8 8 шˇ 0 Â й א I ѽ ш Â

```
Ruijie(config)# clock time-zone <time-zone>
3˜
Ruijie(config)# End
4˜
Ruijie# show running-config
5˜
Ruijie# copy running-config startup-config
```

↴Л↻ **no clock time-zone** Â

18.3. 1)SNTP

R

19 NTP

19.1. NTP

Network Time Protocol NTP

LAN

WAN

NTP

UTC NTP UTC

Internet

NTP (Authentication)

SNTP NTP SNTP

SNTP

NTP

19.2. NTP

NTP

NTP ╗ б Ь ╢ ч ' ˘ NTP
Л∪ ' γ˘ Ь '
NTP ˘ б Ь ╗
˘ Ь Â

Ю˘ a Â ‡ a
╗ Â ˘ a Ъ ╗
Ь б ˘ ѐ Ь ╗
┘ Ь ╗ Â

˘ ЛЮ Ъ'

Ъ	
ntp authenticate	NTP Â
no ntp authenticate	NTP Â

ntp authentication-key à ntp trusted-key
Â

19.2.2. NTP

NTP ˘ Ю Â

˘ key-id ˘ ┘ Л∪ **ntp**
trusted-key key-id й Â

˘ ЛЮ Ъ'

Ъ	
ntp authentication-key *key-id* **md5** *key-string* [*enc-type*]	NTP Â key-id' 1-4294967295 key-string' enc-type' 0 7 ч Â
no ntp authentication-key *key-id* **md5** *key-string* [*enc-type*]	NTP Â

a ˘
й Â

~

Л ┘ 1024 ˘ Ь
Â

19.2.3. NTP ID

Â ˘ ˩Л Ъ ╗ Â

˘ ЛЬЮ ⅋'

⅋	
ntp trusted-key *key-id*	NTP ID Â
no ntp trusted-key *key-id*	NTP ID Â

Л Ъ Э Ь ˘ б Ь

╗ Ь Â

~

˘ ‡ ≠ Â

19.2.4. NTP Ь

Ю˘ NTP Ь Â ˩ б 20

NTP Ь ˘ ^ Л Ъ Л˜ ˩Л Ъ й Ь

˘ б Ь ╗ Â

б Ь й NTP З˘ ˩ ˩Л Ъ NTP ˘

˩ Э Ь NTP Â

NTP Ь ˘ Ю ЛЬЮ ⅋'

⅋	
ntp server *ip-addr* [**version** *version*][**source** *if-name number*][**key** *keyid*][**prefer**]	NTP Ь version^ NTP Л˜ ' 1-3 if-name ^ ~ ' Aggregateport à Dialer GigabitEthernet à Loopback à Multilink Loopback

Â

19.2.5. NTP

Э NTP Â

Э NTP Â

Э NTP Â

IP Э Â

interface *interface-type number*	
ntp disable	NTP Â

no ntp disable

19.2.6. NTP

no ntp NTP Â

NTP NTP Â

NTP Â

[redacted]	Â

19.2.7. NTP

ѝ ˘ Ь 8
˘ Ю ⊿ ˘ NTP ⊿ ѝ 1ǂ ˘ . ⊿
╟ Ю ⊿ ˘ ╟ ⊿ ⊿Ћ
ҙ Â

NTP ⊿ ˘ Ю ЛЪЮ ҙ'

ҙ	
ntp synchronize	⊿
no ntp synchronize	⊿

ѝ ⊿ Л 30ǂ Ю ⊿ ˘ ╗
Ь ≠ ⊿ ˘ NTP ⊿ ҙ ≠
⊿ ˘ ⊿ ҙ a Â

⊿ ҙ NTP ҙ ⊿Ћ ⊿ ˆ ⊿ ~
⊿ ╗ ˆ ⊿ ~˘ a ⊿ ˘ NTP ҙ a NTP ⊿
╗ NTP Â

19.3. NTP

19.3.1. NTP

NTP ╗ ˘ ⊿Ћ ҙ ˘
Â

ʕ	
show ntp status	NTP

ɻ ⊧ ɻ ʕ . Â

```
Ruijie# show ntp status
Clock is synchronized, stratum 9, reference is 192.168.217.100
nominal freq is 250.0000 Hz, actual freq is 250.0000 Hz, precision
is 2**18
reference time is AF3CF6AE.3BF8CB56 (20:55:10.000 UTC Mon Mar
1 1993)
clock offset is 32.97540 sec, root delay is 0.00000 sec
root dispersion is 0.00003 msec, peer dispersion is 0.00003 msec
```

' starum ʕ ˘ reference ỳ ɻ ⊧ ˘ frep ˘ precision ỳ ˘ reference time ỳ ɻ ⊧ UTC ˘ clock offset ỳ ˘ root delay ỳ ˘ root dispersion ỳ ⊧ ˘ peer dispersion ỳ ɻ ⊧ Â

19.4.

ЛЪЮ ˘ ỳ master NTP ⊧ ˘ ˘ key-id ỳ 6 ầ key-string ỳ wooooop ˘ ỳ ⊧ ' ỳ ɻЛЪ Э NTP ⊧ ɻ ˘ Ю ˘ ╟ ˘ NTP ⊧ ˘ ɻ ɻ ⊧ ỳ Э NTP ⊧ ˘ ɻ Â

```
Ruijie(config)# no ntp
Ruijie(config)# ntp authentication-key 6 md5
```

20 SNMP

20.1. SNMP

20.1.1.

SNMP Simple Network Manger Protocôl ~ ˘ 1988
8 ŷ RFC1157 Â ˘
˘ SNMP ŷ Y Э ˘ Â
SNMP ˘ ⅃ Л Э à à
Æ à ˘ SNMP ╖ Â

SNMP ˘ ŷ / Ь ˘ Ь ╢ '

SNMP

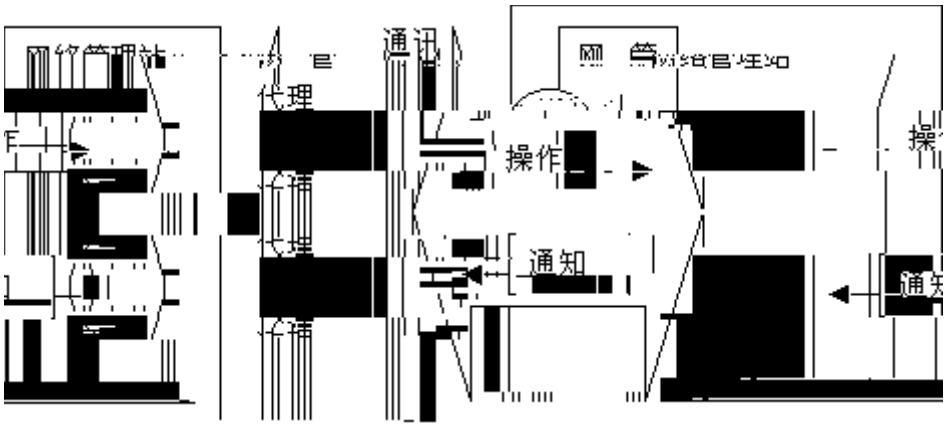
SNMP Ҷ

MIB

SNMP ˘ SNMP ˘ ≠ ŷ NMS
(Network Management System) Â NMS Э ⅄ HP
OpenView à CiscoView à CiscoWorks 2000˘ ˘
˚ · · Star View Â ˚ ⅃ Л
Â

SNMP Ҷ ˆ SNMP Agent˜ Э ˚ ˘ ⅃ à з
NMS ˘ ≠ ⅃ Л ў ╠ NMS Â

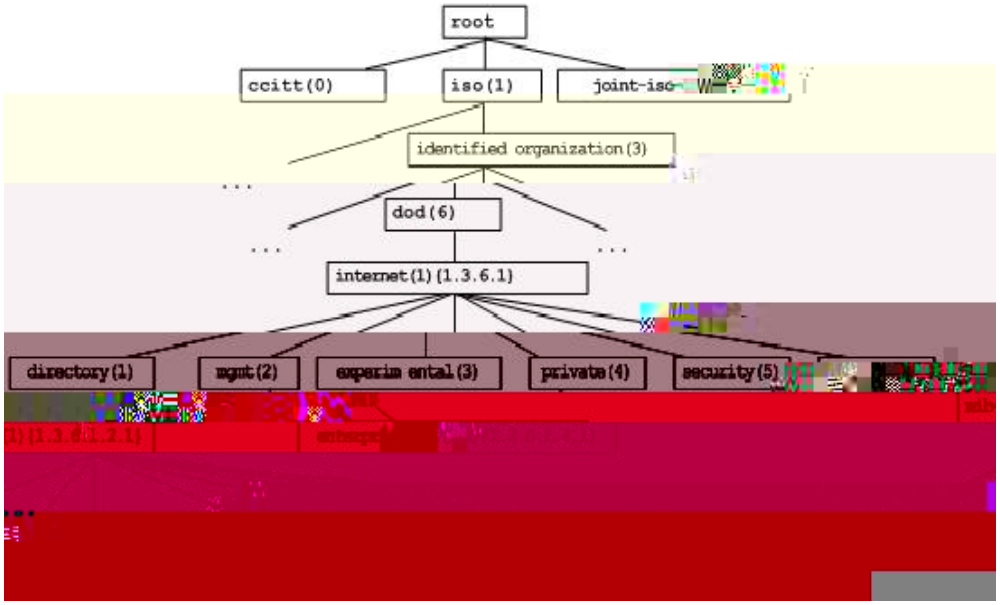
NMS Agent ⅃ Л Ю في



في 1 ˆ NMS˜ б Ҷ ˆ Agent˜ في

MIB˜ Management Information Base˜

ˇ ѝ SNMP
ˇ MIB Â
Â ЮفيMIB ˧ ˇ ѝ
Systemˇ ˧Л∪ ˇ {1.3.6.1.2.1.1} . ѝ
Object Identifierˆ ˜ ˇ MIB ‡
Â



فيMIB 2

20.1.2. SNMP

SNMP Л∪Ю '

SNMPv1 ' ˇ RFC1157 ⅋Â

SNMPv2C' ˧ ˆ Community-Based˜ SNMPv2 ,
RFC1901 ⅋ Â

SNMPv3 ' ╗ ˇ Л∪Ю '

1. a '
2. ÿ '
3. ╗ ˇ '

SNMPv1 SNMPv2C ˧ ˆ Community-based˜ Â
⅋ ў Л∪ ˧ (Community String) Ϛ MIB
Â

SNMPv2C ╗ Get-bulk 3 ╗
Â Get-bulk ↓ ↓

ي ˘ ÿ - Â SNMPv2C 'H
Ϟ ՃѾ a ﻝ ˘ SNMPv1 Ϟ Â
Ϟ ﻝ ՃѾ Â Ɔ ﻝ ﻝ SNMPv1
SNMPv2C ˘ SNMP Ϟ SNMPv1 SNMPv2C
˘ ɜ Â

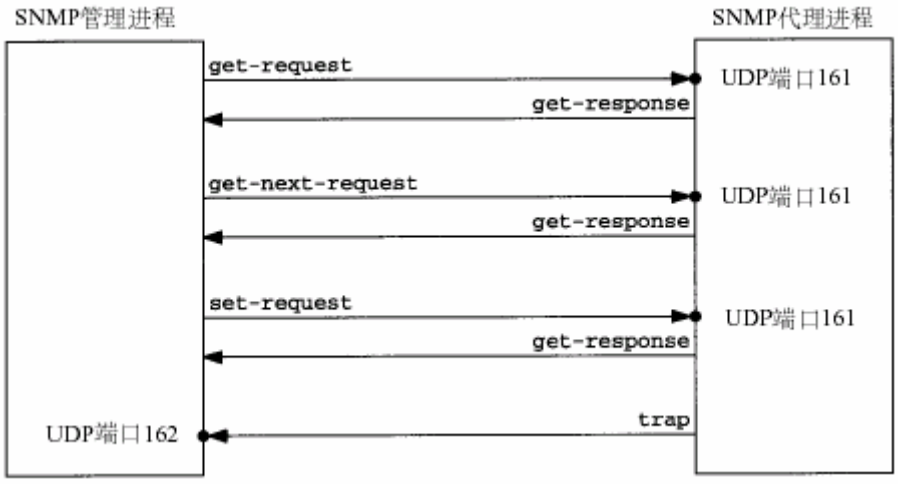
20.1.3. SNMP

SNMP NMS Agent ˘ ⱵѪ 6 '

1. Get-request ' NMS ÿ Agent ﻝ Â
2. Get-next-request ' NMS ÿ Agent ﻝ Ю Â
3. Get-bulk ' NMS ÿ Agent ﻝ '
4. Set-request ' NMS Agent Â
5. Get-response ' Agent ˘ Agent NMS 3 Â

Trap ' Agent ў ╟ ˘ NMS Y Â

4 NMS ﻝ Agent ˘ ﻝ ч Agent NMS ˆ ' SNMPv1 a Get-bulk ˜ Â Юفي Â



فى 3 SNMP

NMS ﻝ Agent 3 Agent UDP 161 Â
Agent Trap UDP 162 Â

20.1.4. SNMP

SNMPv1 SNMPv2 MIB Â ù ˘ (NMS) Ø ˙ Ю Ø Â

Ø ˙ Л Л ЛЮ :

˙ (Read-only)' ù MIB ˙ Â

(Read-write)' ù MIB ˙ Â

SNMPv2 Э˘ SNMPv Л

' ˙ Ь ' SNMPv1 à SNMPv2C à SNMPv3 Â

Ю ù ˙ Л

			₹	
SNMPv1	noAuthNoPriv	Ø		Ø
SNMPv2c	noAuthNoPriv	Ø		Ø
SNMPv3	noAuthNoPriv	Ø		Ø
SNMPv3	authNoPriv	MD5 SHA		HMAC-MD5 HMAC-SHA
SNMPv3	authPriv	MD5 SHA	DES	HMAC-MD5 HMAC-SHA CBC-DES ₹

20.1.5. SNMP

SNMP Â SNMP SNMP ˘ SNMP Â ˘ ù SNMPv3 Ʒ ˘ . SnmpEngineID Â

ù OCTET STRING˘ ù 5 32 Â RFC3411 Ю :

4 Л^ IANA† ~ ˘ HEX Â

5 Ю '

0'

1' Л 4 Ipv4 Â

2' Л 16 Ipv6 Â

3' Л 6 MAC Â

4' ˘ 27 ˘ Ю Â

5' 16 ˘ 27 ˘ Ⱶ Â

6-127' Â

128-255' Â

20.2. SNMP

SNMP Ю ˘ SNMP ˘
"I Â

20.2.1. ⅄

SNMPv1/SNMPv2C ⅄ ^ Community-based˜ ˘ SNMP
Ɂ ↙ ↙ ⅄ ⅄^ Community-String˜ ˘ б
⅄ a SNMP a ˘ Â ⅄ NMS Agent
Â

⅄ Ⅎ ˘ ↙ IP NMS ⅄ Ⅎ '

⅄ Ⅎ ⅄ ˘ ReadOnly ↙ ˜ ReadWrite ˜'

في ⅄ ˘ في Â في˘ .

IP Ã

Ruijie(config)# **snmp-server host** *host-addr* **traps** [**vrf** *vrfname*] [**version** {**1**|**2c** |**3** [**auth**	**noauth**	**priv**]}] *community-string* [**udp-port** *port-num*] [**type**]	SNMP ў ˘ ў ˘ vrf ˘ ˘ ɹˆ SNMPv3 Ю ɹ ˜ à ˆ SNMPv3 ˜

20.2.5. SNMP Ҁ

ɻ Л Ь SNMP Agent ˘ à Æ à
/ ˘ NMS ˘ ɻ Л Ь ˘
Æ Â

SNMP Ҁ ˘ Ю˘ Ю Ҁ'

Ҁ	
Ruijie(config)# **snmp-server contact** *text*	
Ruijie(config)# **snmp-server location** *text*	Æ
Ruijie(config)# **snmp-server chassis-id** *number*	

20.2.6. Ӈ SNMP Ҁ

ѝ ˘ ɻ Л Ь Ӈ SNMP Ҁ Â
Ю˘ Ю Ҁ'

Ҁ	
Ruijie(config)# **snmp-server packetsize** *byte-count*	Ҁ

20.2.7. SNMP Ҁ

SNMP Ҁ Ь / ң Ь˘ ╟ ˘ a Ҁ Ь
˘ ɻ Л Ь Ю snmp Ҁ ╖ Л Ь ' snmp Ҁ
╖ ˘ Ю˘ Ю Ҁ'

Ҁ	
Ruijie(config)# **no snmp-server**	SNMP Ҁ Ь

20.2.8. SNMP ʒ

a ⅄ ʒ˘ Λ ʜ snmp ʒ ʒ˘ ʒ snmp
Ŀ˘ a ʒ ' SNMP ʒ Ŀ˘
Ю˘ Ю ʒ'

ʒ	
Ruijie(config)# **no enable service snmp-agent**	SNMP ʒ Ŀ

20.2.9. Agent ў ╟ ⅄ NMS Trap

Trap Agent a ў ╟ ⅄ NMS ˘ Y
˚ Â a Agent ў ╟ Trap ˘ ˘
Ю˘ Ю ʒ'

ʒ	
Ruijie(config)# **snmp-server enable traps** [*type*] [*option*]	Agent ў ╟ Trap
Ruijie(config)# **no snmp-server enable traps** [*type*] [*option*]	Agent ў ╟ Trap

20.2.10. Link Trap

⅃ Л∪ LinkTrap˘ ╖ ˘
Link ⅃ ע˘ SNMP

20.2.11.

ৰ Л Agent Trap ˇ Ю ҙ '

ҙ	
Ruijie(config)# **snmp-server trap-source** *interface*	Trap
Ruijie(config)# **snmp-server queue-length** *length*	Trap
Ruijie(config)# **snmp-server trap-timeout** *seconds*	Trap

20.3. SNMP б

20.3.1. SNMP

ѝ SNMP SNMP ˇ Л ң SNMP

```
SNMP logging: enabled
SNMP agent: enabled
.
```

Э Ю '

Bad SNMP version errors	SNMP a
Unknown community name	a ⅄
Illegal operation for community name supplied	
Encoding errors	
Get-request PDUs	Get-request
Get-next PDUs	Get-next
Set-request PDUs	Set-request
Too big errors (Maximum packet size 1500)	
No such name errors	a
Bad values errors	
General errors	
Get-response PDUs	Get-response

```
snmpOutPkts
snmpInBadVersions
snmpInBadCommunityNames
snmpInBadCommunityUses
snmpInASNParseErrs
snmpInTooBigs
snmpInNoSuchNames
snmpInBadValues
snmpInReadOnlys
snmpInGenErrs
snmpInTotalReqVars
snmpInTotalSetVars
snmpInGetRequests
snmpInGetNexts
snmpInSetRequests
snmpInGetResponses
snmpInTraps
snmpOutTooBigs
snmpOutNoSuchNames
snmpOutBadValues
snmpOutGenErrs
snmpOutGetRequests
snmpOutGetNexts
snmpOutSetRequests
snmpOutGetResponses
snmpOutTraps
snmpEnableAuthenTraps
snmpSilentDrops
snmpProxyDrops
entPhysicalEntry
entPhysicalEntry.entPhysicalIndex
entPhysicalEntry.entPhysicalDescr
entPhysicalEntry.entPhysicalVendorType
entPhysicalEntry.entPhysicalContainedIn
entPhysicalEntry.entPhysicalClass
entPhysicalEntry.entPhysicalParentRelPos
entPhysicalEntry.entPhysicalName
entPhysicalEntry.entPhysicalHardwareRev
entPhysicalEntry.entPhysicalFirmwareRev
entPhysicalEntry.entPhysicalSoftwareRev
entPhysicalEntry.entPhysicalSerialNum
entPhysicalEntry.entPhysicalMfgName
entPhysicalEntry.entPhysicalModelName
entPhysicalEntry.entPhysicalAlias
entPhysicalEntry.entPhysicalAssetID
entPhysicalEntry.entPhysicalIsFRU
```

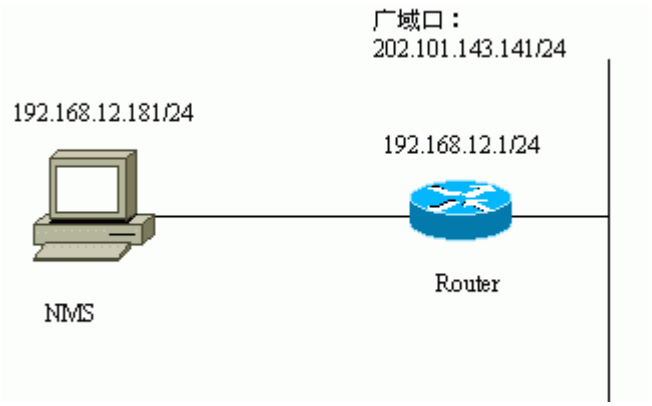
```
entPhysicalContainsC 181PPT0.0try 8.38 s 100  -1.44 TDicalContainsC 181PPT0
```

```
default(include) 1.3.6.1
test-view(include) 1.3.6.1.2.1
```

20.4. SNMP

20.4.1. ή

NMS Л NMS IP й
192.168.12.181 IP й 192.168.12.1 Э
Л HP OpenView й Â



5 SNMP ή

SNMP

```
Ruijie(config)# snmp-server community public RO
```

Ю Л Э SNMP NMS Л Л SNMP a a Â

Л Л Ю

```
Ruijie(config)# snmp-server community private RW
```

ЛЮ SNMP NMS Л Л
й Л

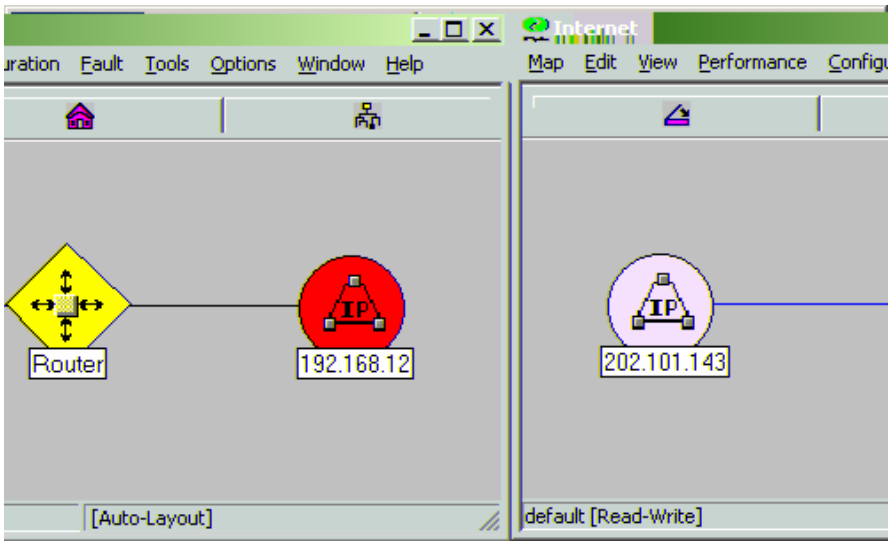
```
Ruijie(config)# snmp-server location fuzhou
Ruijie(config)# snmp-server contact wugb@i-net.com.cn
Ruijie(config)# snmp-server chassis-id 1234567890
0987654321
```

ЛЬЮ ˘ ў ╟ ┘ NMS Trap ˘ ѝ ┤

```
Ruijie(config)# snmp-server enable traps
Ruijie(config)# snmp-server host 192.168.12.181 public
```

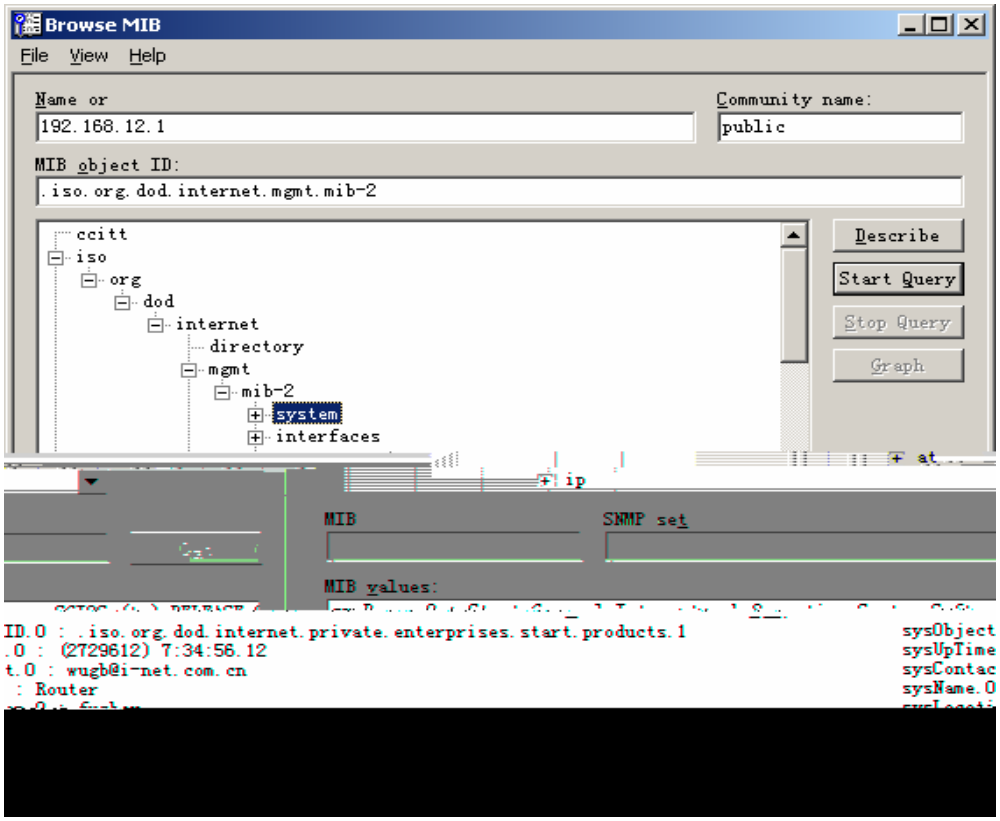
Э ˘ SNMP Ҁ ˘ NMS ┤Л

˘ Л HP OpenView ѝ ˘ ┤Л ң Юفيˇفي



في 6

┤Л ˘ HP OpenView
TOOL->SNMP MIB Brower ˘ Ю ˘ Name IP
192.168.12.1ˇ Community Name Publicˇ MIB ε
˘ Юفي System Â Start Queryˇ MIB
˘ ε MIB Values


Browse MIB
File View Help
Name or
192.168.12.1
Community name:
public
MIB object ID:
.iso.org.dod.internet.mgmt.mib-2
ccitt
iso
org
dod
internet
directory
mgmt
mib-2
system
interfaces
Describe
Start Query
Stop Query
Graph
ip
MIB
SNMP set
MIB values:
ID.0 : .iso.org.dod.internet.private.enterprises.start.products.1
.0 : (2729612) 7:34:56.12
t.0 : wugb@i-net.com.cn
: Router
sysObject
sysUpTime
sysContac
sysName.0

MIB 7 في

Â

Ю

```
Ruijie(config)# access-list 1 permit 192.168.12.181
Ruijie(config)# snmp-server community public RO 1
```

Э ˇ ˩ IP й 192.168.12.181 ў SNMP
Â

20.4.3. SNMPv3

ЛЮ SNMPv3 ¯ ╗ ˩ v3user
MIB-2(1.3.6.1.2.1) Ю ˩ Â й MD5˜
й MD5-Auth˜ DES ╗ ˇ ╗ й DES-Priv Â ˩
˩ 192.168.65.199 Л SNMPv3 Trap Â Trap ˩ й v3user,
¯ ╗ ˇ й MD5˜ й
MD5-Auth˜ DES ╗ ˇ ╗ й DES-Priv Â

```
Ruijie(config)# snmp-server view v3userview 1.3.6.1.2.1 include
Ruijie (config)# snmp-server group v3usergroup v3 priv read
v3userview write v3userview
Ruijie (config)# snmp-server user v3user v3usergroup v3 auth
md5 md5-auth priv des56 des-priv
Ruijie (config)# snmp-server host 192.168.65.199 traps version
3 priv v3user
```

21 RMON

21.1.

RMON Remote Monitoring ~ IETF(Internet Engineering Task Force Internet ж)
Â RMON Э
RMON ╖ ˇ ┘ Л Æ Â

RMON

Э æ Ю ˘ Â Y ˚
˘ Y ˚ ⅃ Л Ъ SNMP Trap Â

21.1.4. Y ˚

Y ˚ (Event) RMON 9 ˘ ¤ ң Y ˚ ˘ и
ң SNMP Trap Â

21.2. RMON Ь

21.2.1.

⅃ Л Ъ Ю ҂ ╗ Â

҂	
Ruijie(config-if)# **rmon collection stats** *index* [**owner** *ownername*]	╗
Ruijie(config-if)# **no rmon collection stats** *index*	

~

Л ң ⅄ Л Ъ Â 1-65535
˘ ⅃ ⅄ 100 Â

21.2.2. ⅄

⅃ Л Ъ Ю ҂ ╗ ⅄ '

҂	
Ruijie(config-if)# **rmon collection history** *index* [**owner** *ownername*] [**buckets** *bucket-number*] [**interval** *seconds*]	╗ ⅄ Q)Ѣ)’ф R2@H

Л ң л Л Â 1-65535 ˘ л Л
10 Â

Bucket-number' à Â ш ˘
Â Ю ˘ Bucket-number
˘ ˘ ‡ Â Bucket-number л
1-65535˘ 10 Â

Interval' Â 1800 ˘ л 1-3600 Â

21.2.3. Y ˚

л Л Ю ҳ '

ҳ	
Ruijie(config)# **rmon alarm** *number variable interval* {**absolute** | **delta**} **rising-threshold** *value* [*event-number*] **falling-threshold** *value* [*event-number*] [**owner** *ownername*]	╕ л
Ruijie(config)# **rmon event** *number* [**log**] [**trap** *community*] [**description** *description-string*]	╕ Y ˚
Ruijie(config)# **no rmon alarm** *number*	
Ruijie(config)# **no rmon event** *number*	Y ˚

number' (Y ˚) ˘ 1-65535 Â

variable' л Â л Â

interval' Â <1-4294967295>

Absolute Э à Ю ˘ Delta
Э Э à Ю Â

value Ьѫ Э à Ю Â

event-number' Э Ю ˘ Y ˚ и Event-number
Y ˚ Â

Log Y ˚ ╟ ' Y ˚

Trap Y ˚ Л ╟ ' Trap Â

community' Trap Л Â

description-string' Y ˚

21.2.4. RMON

?	

```
Ruijie(config)# rmon event 1 log trap rmon description "ifIn
NUcastPkts is too much " owner zhangsan
```

21.3.4. rmon

21.3.4.1. show rmon alarm

```
Ruijie# show rmon alarm
Alarm : 1
Interval : 1
Variable : 1.3.6.1.2.1.4.2.0
Sample type : absolute
Last value : 64
Startup alarm : 3
Rising threshold : 10
Falling threshold : 22
Rising event : 0
Falling event : 0
Owner : zhangsan
```

21.3.4.2. show rmon event

```
Ruijie# show rmon event
Event : 1
Description : firstevent
Event type : log-and-trap
Community : public
Last time sent : 0d:0h:0m:0s
Owner : zhangsan
Log : 1
Log time : 0d:0h:37m:47s
Log description : ipttl
Log : 2
Log time : 0d:0h:38m:56s
Log description : ipttl
```

21.3.4.3. show rmon history

```
Ruijie# show rmon history
Entry : 1
Data source : Gi1/1
Buckets requested : 65535
```

```
Buckets granted : 10
Interval : 1
Owner : zhangsan
Sample : 198
Interval start : 0d:0h:15m:0s
DropEvents : 0
Octets : 67988
Pkts : 726
BroadcastPkts : 502
MulticastPkts : 189
CRCAlignErrors : 0
UndersizePkts : 0
OversizePkts : 0
Fragments : 0
Jabbers : 0
Collisions : 0
Utilization : 0
```

21.3.4.4. show rmon statistics

```
Ruijie# show rmon statistics
Statistics : 1
Data source : Gi1/1
DropEvents : 0
Octets : 1884085
Pkts : 3096
BroadcastPkts : 161
MulticastPkts : 97
CRCAlignErrors : 0
UndersizePkts : 0
OversizePkts : 1200
Fragments : 0
Jabbers : 0
Collisions : 0
Pkts64Octets : 128
Pkts65to127Octets : 336
Pkts128to255Octets : 229
Pkts256to511Octets : 3
Pkts512to1023Octets : 0
Pkts1024to1518Octets : 1200
Owner : zhangsan
```

22

22.1.

22.1.1.

LAN à ˘ ˘

╗ Â ˘ LAN Â

˘ ң Â

˘ Л¶ à ˘ Â

à ˘ ˘

˘ ˘ ˘ ÿ

LAN Â

22.1.2.

Ю Ю ҄ '

҄	
Ruijie(config-if)# **storm-control** {**broadcast** | **multicast** | **unicast**} [{ **level** *percent* | **pps** *packets* | *rate-bps*]	**broadcast** ╗ **multicast** ˘ ╗ **unicast** ˘ ╗ **level** *percent′* Л∪ ¶ 20 и 20% Â **pps** *packet′* Л∪ и Æ . packets per second Â *Rate-bps′* Л∪ bit и Æ ˘ . Kbits per second, Â

˘ Л∪ Ю ҄ **no storm-control broadcast ,no**

Ю GigabitEthernet 0/1 Э ╖ ˘ з
ѝ 4M Â

```
Ruijie# configure terminal
Ruijie(config)# interface GigabitEthernet 0/1
Ruijie(config-if)# storm-control multicast 4096
Ruijie(config-if)# end
```

1. Ю S2300 ң ╖ ˘ S2300
ң ⅃ ╖ ˘ ѝ
ǂ Â

~

1. level ˘
˘ a Â
2. ╖ ˘ storm-control broadcast
˘ ѝ ǂ Â

22.1.3.

'

⅋	
Ruijie# **show storm-control** [*interface-id*]	Â

Ю ѝ Gi0/3 ╖ '

```
Ruijie# show storm-control gigabitEthernet 0/3
Interface   Broadcast Control   Multicast Control   Unicast
Control action
GigabitEthernet 0/3 Disabled  Disabled   Disabled    none
```

≠ ⅃ Л Ъ ╖ '

```
Ruijie# show storm-control
Interface   Broadcast Control   Multicast Control   Unicast
Control Action
---------   ------------------   ------------------   -------
------- ------
GigabitEthernet 0/1   Disabled   Disabled   Disabled   none
GigabitEthernet 0/2   Disabled   Disabled   Disabled   none
```

```
GigabitEthernet 0/3   Disabled   Disabled   Disabled   none
GigabitEthernet 0/4   Disabled   Disabled   Disabled   none
GigabitEthernet 0/5   Disabled   Disabled   Disabled   none
GigabitEthernet 0/6   Disabled   Disabled   Disabled   none
GigabitEthernet 0/7   Disabled   Disabled   Disabled   none
GigabitEthernet 0/8   Disabled   Disabled   Disabled   none
GigabitEthernet 0/9   Disabled   Disabled   Disabled   none
GigabitEthernet 0/10  Disabled   Disabled   Disabled   none
GigabitEthernet 0/11  Disabled   Disabled   Disabled   none
GigabitEthernet 0/12  Disabled   Disabled   Disabled   none
GigabitEthernet 0/13  Disabled   Disabled   Disabled   none
GigabitEthernet 0/14  Disabled   Disabled   Disabled   none
GigabitEthernet 0/15  Disabled   Disabled   Disabled   none
GigabitEthernet 0/16  Disabled   Disabled   Disabled   none
GigabitEthernet 0/17  Disabled   Disabled   Disabled   none
GigabitEthernet 0/18  Disabled   Disabled   Disabled   none
GigabitEthernet 0/19  Disabled   Disabled   Disabled   none
GigabitEthernet 0/20  Disabled   Disabled   Disabled   none
GigabitEthernet 0/21  Disabled   Disabled   Disabled   none
GigabitEthernet 0/22  Disabled   Disabled   Disabled   none
GigabitEthernet 0/23  Disabled   Disabled   Disabled   none
GigabitEthernet 0/24  Disabled   Disabled   Disabled   none
```

22.2. Protected Port

22.2.1.

Ю˘ л Э а Â
Ю˘ ˘ а ˘ ˘ Лъ ˘ а
Â л Лъ ѝ (Protected Port)
Â

ѝ л˘ ˘ б
л Лъ Â

ч ˘ ү ˘
Ь ˘ ү ү Ь ’ ч
Ю˘ ѝ Â

ч ѝ

22.2.2. Protected Port

ѝ '

ҳ	
Ruijie(config-if)# **switchport protected**	ѝ

ᒧЛᑌ ҳ **no switchport protected** ҳ ѝ
Â

Ю Gigabitethernet 0/3 ѝ

```
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 0/3
Ruijie(config-if)# switchport protected
Ruijie(config-if)# end
```

~

S23 ң ╖ a ˘ . Ю ᛏ a ᒧ
Э˘ ӂ a ᒧ Э ᒧЛᑌ ˘ ᒧ Э
a Â

22.2.3. Protected Port

ҳ	
Ruijie(config-if)# **show interfaces switchport**	

ᒧЛᑌ ҳ **show interfaces switchport**

```
Ruijie# show interfaces gigabitethernet 0/3 switchport
Interface   Switchport  Mode   Access Native Protected   VLAN
lists
---------   ----------  ----   ------ -----  --------   ----
GigabitEthernet 0/3  enabled   Trunk  1   1    Enabled    ALL
```

22.3.

22.3.1.

	128
	(protect)

22.3.2.2.

Ю '

a Aggregate Port

a SPAN

ﻝ Access Port

802.1x ╖ ╖ Â 802.1x ╖ ╖ ﻝ
Л‰ ˘ è ﻝ Л‰ Â

ﻝ IP+MAC IP б ACLs м ˚ ˘
Э ACLs˘ ‡ Э IP+MAC
IP Â

Э ˘ . Э ж
IP ˘ ж a IP Â

Ruijie(config-if)# **switchport port-security violation{protect | restrict | shutdown}**	**protect** (a) **restrict** Trap **shutdown** Trap errdisable recovery

no switchport port-security
no switchport port-security maximum
no switchport port-security violation

gigabitethernet 0/3 protect

```
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 0/3
Ruijie(config-if)# switchport mode access
Ruijie(config-if)# switchport port-security
Ruijie(config-if)# switchport port-security maximum 8
Ruijie(config-if)# switchport port-security violation protect
Ruijie(config-if)# end
```

---

1 Ip Ip+Mac Mac a

2 trap log

3 1

22.3.2.4.

Ruijie(config-if)# **switchport port-security mac-address** *mac-address* [**ip-address** *ip-address*]	Э Â **ip-address**(⅃)' ѝ IP Â

ЮЎ ⅃Л ҁ **no switchport port-security mac-address** *mac-address* Â

Ю ѝ gigabitethernet 0/3 ' 00d0.f800.073cў ѝ ѐ IP ' 192.168.12.202 Â

```
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 0/3
Ruijie(config-if)# switchport mode access
Ruijie(config-if)# switchport port-security
Ruijie(config-if)# switchport port-security mac-address 00d0.f800.073c ip-address 192.168.12.202
Ruijie(config-if)# end
```

22.3.2.5. у

⅃Л ѝ Э у Â ╗ ў ў ⅃Л ╟ ╗ Э Â

ЮЎ Ю ҁ у '

ҁ	
Ruijie(config-if)#**switchport port-security aging**{**static** | **time** *time* }	**static**' ╗ Э ў у ⅃ ╟ ⌐ ў ‡ ⅄ ╟ ⌐ Â **Time** ' Э у ў 0 1440ў æ ↑ Â ѝ 0ў ‡ у ╗ Э Â у ў ≠ ѝ ⅄ў Time ⅄ў ╟ Â *Time* ѝ 0 Â

⅃Л Ю ҁ **no switchport port-security aging time** у ╗ ў ҁ **no switchport port-security aging static** у ╟ ⌐ Â

Ю gigabitethernet 0/3 Э у ў у ѝ 8↑ ў у ⅃ '

```
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitthernet 0/3
Ruijie(config-if)# switchport port-security aging time 8
Ruijie(config-if)# switchport port-security aging static
Ruijie(config-if)# end
```

22.3.3.

Ю˘ ⅃Л Ю ҄

҄	
Ruijie#**show port-security interface** [*interface-id*]	Â
Ruijie#**show port-security address**	Â
Ruijie# **show port-security address** [*interface-id*]	Э
Ruijie# **show port-security**	˘ Л Â

Ю Gigabitethernet 0/3 Э

22.4.2. ARP-CHECK

ÿ Ю ARP-CHECK

ϡ	
Ruijie# **configure t**	
Ruijie(config)#**interface** *interface-id*	
Ruijie(config-if)# **arp-check**	arp
Ruijie(config-if)# **no arp-check**	arp
Ruijie(config-if)# **arp-check auto**	

Э ╗ mac 00d0.f822.33abˇ IP й 192.168.2.5
ˇ Э ARP ╠ Â

```
Ruijie#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)# interface fastEthernet 0/5
Ruijie(config-if)# switchport port-security
Ruijie(config-if)# switchport port-security mac-address
00d0.f822.33ab ip-address 192.168.2.5
```

ARP ╠ ˇ ARP Â

```
Ruijie(config-if)# no arp-check
```

---

1. ARP-CHECK ╗ ARP ң a ⊿ a ⊿ˇ
   S23 ң ARP Sender Mac Sender Ip Â

---

23 802.1X

AAA Â802.1x

802.1x

802.1x

802.1x

CLI ê 802.1X

23.1.

IEEE 802 LAN Э a

Y Э Â Â IEEE

802.1x Ю Â

IEEE802.1x Port-Based Network Access Control LAN IEEE IEEE 802 LAN Э

Â

IEEE 802.1x Client-Server

Â

EAPOL Extensible Authentication Protocol over LAN Э Â Э

Â

802.1x Authentication Authorization and Accounting AAA Â

Authentication ˘ ⅃ Л ˘

Authorization ˘ ⅃ Л ⊾˘

Accounting ˘ ˘ й

ÿ ЛЮ 802.1x

س

ُ

ч ' ↓ ^ controlled Port˜ ↓
^ uncontrolled Port˜ Â ↓ ↓
' ↓ ↓Л Â
↓ Э˘ ↓Л ' ↓ ў
Ь ˘ Л Ь б Â

Ь

Ь й RADIUS Ь ˘ б ˘ й
Ь Â Ь ˛ ˘ Л ˘ ∧ Ь ↓Л
∧ Ь˘ ↓Л Â Ь
ÿ Â Ώ ∧ 802.1x
Radius Server˘ MicroSoft win2000 Server Radius Server
Linux Ю Free Radius Server Â

23.1.2.

EAPOL ˘ Ь
RADIUS ˘ Â EAPOL MAC
Э˘ ∧ й 0x888E Â ↓ ˘ й MAC
01-80-C2-00-00-03˝ Â

Юفي ή ˘ Ь

2 فى

ή ^ Ю˝ ≠ ↓ ў
╟ ˘ б فى ˘ ↓ ў ╟ ~ Â

23.1.3.

802.1x ā Э ˘
802.1X ˘ ˘ Л˘ Ю
ā Â ↓ Ю
↓ ˘ ↓ Ю ↓ ^ Authorized˜
Â • ˘
^ unauthorized˜ ˘ a ˘ Л˘ ↓ и
^ authorized˜ ˘ ↓ Л Â

a 802.1x˘ ↓ Ю˘
Л ˘ a Â ÿ
^ unauthorized˜ ˘ a Â

↓ ˘ 802.1x˘ a 802.1x Â
EAPOL-START ˘ EAPOL-START ÿ
Ю˘ и ↓ ˘ Â

802.1x Ю˘ ↓ ˘ ↓ Л
↓ ˘ ÿ Ю Â

^ ÿ RADIUS Server Ь ╗ ˜ ˘
↓ (authorized)˘ ↓ Л Â
Л ÿ ˘ ↓ Л Â б RADIUS
server ˘ ж ÿ ^ unauthorized˜ ˘
ÿ a ↓ Â

EAPOL-LOGOFF Л˘ (authorized) Л
(unauthorized) Â

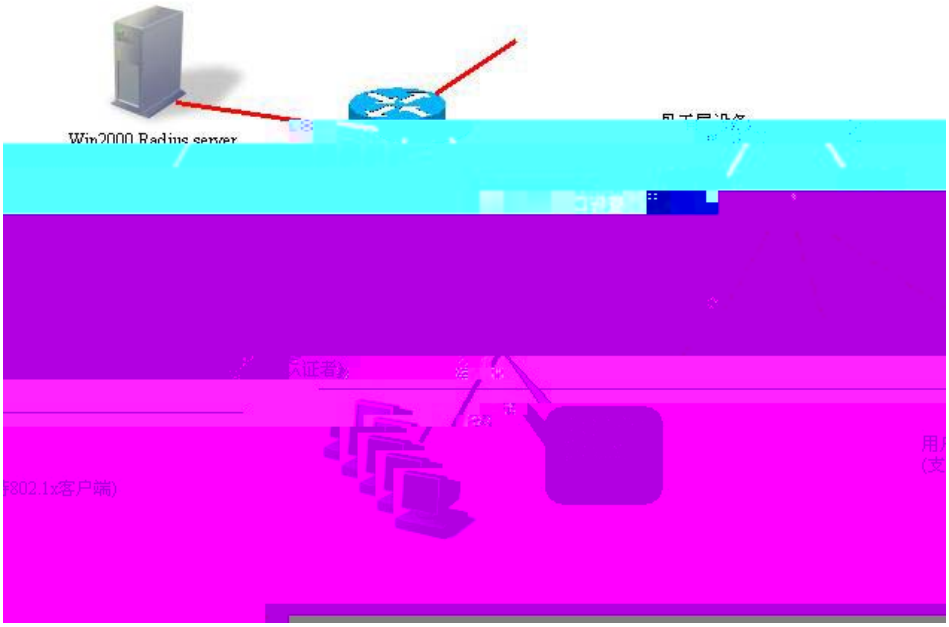
↓ и LINK-DOWN ˘ Э ↓ и
(unauthorized) Â

╠˘ Э ↓ и (unauthorized) Â

˘ ↓ Л ╗ MAC Â

23.1.4. ѝ

A à 802.1x и



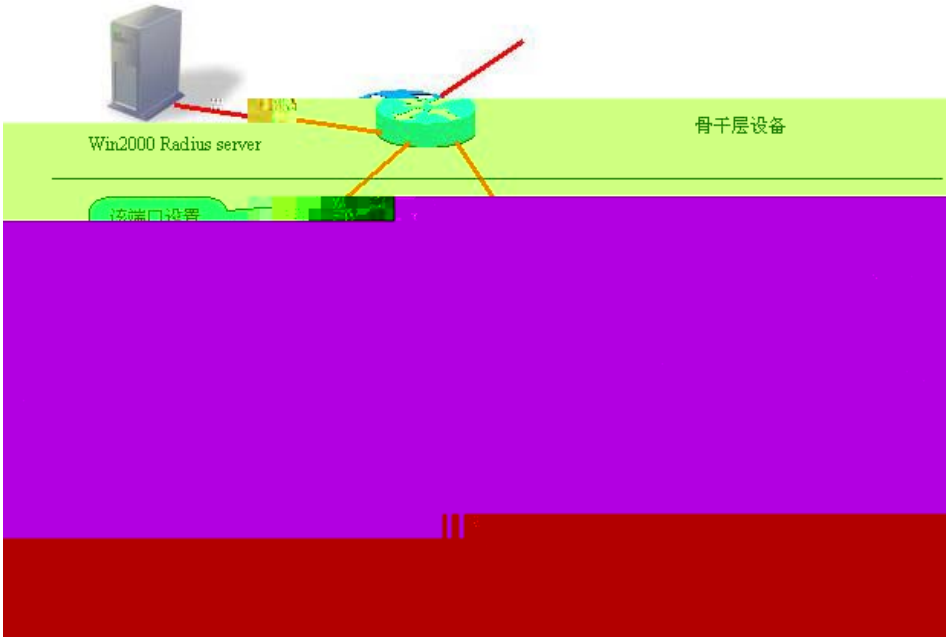
3 في

1. 802.1x˘ . 802.1x ˚ ^ windowXp ˘ Ruijie-supplicant è IEEE802.1x ˚ ~ Â
2. IEEE 802.1x
3. ⅄ˆ ⅄˜ RADIUS Ь ѝ Ь

1. б Radius Server Э ˘ ↓ ˘ Л
   б Ь ˘ Л Э
2. б ѝ ↓ ˘ Л ˘
   Â

1. ⅄ 802.1x ˘ Â ⅄
   ˘ a è Â
2. Radius Server Э˘ a ⅄
   Э˘
3. ↓ Л

B à 802.1x ѝ



4 في

23.2. 802.1X

ЛЪЮ 802.1x

802.1x

802.1x Y

б RADIUS SERVER

802.1X

/

/ Л supplicant ╖

┘ QUIET

Server-timeout

ў ╟ 802.1x

802.1x

IP

Ю ┘ ў

Ы

б IP

VLAN ╟

Ў Ы Л

EAPOL TAG

23.2.3. б RADIUS SERVER

Radius Server ' ɹ à à Л
Â Radius Server ˘ a ↑ ɻ
˘ Â

б RADIUS SERVER ˘ Ю '

Radius Server ' ЎĄ Radius ClientÂ ЎĄ Radius Server
IP à UDP ^ UDP ~ à б Radius
Server ˘ Э Client EAP ~ Â
Radius Server Э ЎĄ Radius Client˝ a ɻ ˚ a ɻ˘
Â

' й б Server ˘ Ю '
Radius Server IP ˘ ^ ~ UDP ˘ б Ł
Â

Ю˝ Ю б Radius Server '

ҳ	
configure terminal	
aaa new-model	AAA
radius-server host *ip-address* [**auth-port** *port*] [**acct-port** *port*]	RADIUS Ł
Radius-server key *string*	RADIUS Key
end	
write	
show radius server	RADIUS Ł

no radius-server host *ip-address* **auth-port** ҳ Radius Server
UDP й Â **no radius-server key** ҳ Radius Server
ÂЛЮ server ip й 192.168.4.12 à Udp й 600 à
Л '

```
Ruijie# configure terminal
Ruijie(config)# radius-server host 192.168.4.12
Ruijie(config)# radius-server host 192.168.4.12 auth-port 600
Ruijie(config)# radius-server key MsdadShaAdasdj878dajL6g6g
a
Ruijie(config)# end
```

UDP й 1812

UDP й 1813

б Radius Server a 16

- Radius Server

```
!
username ruijie password 0 starnet
!
radius-server host 192.168.217.64
radius-server key 7 072d172e071c2211
!
!
!
dot1x authentication authen
!
interface VLAN 1
 ip address 192.168.217.222 255.255.255.0
 no shutdown
!
!
line con 0
line vty 0 4
!
end
```

802.1x RADIUS ˘ ″I Radius Server IP ˘
б Radius Server Â Radius Server ˘
╖ Â Radius Server б Э Â

23.2.5. /

802.1x Ю˝ ˘ ‡ й ↓ ˘
Ю ˘ ˘ ↓ Ю ↓ Л
Â

Ю˝ Ю Â

३	

Л Ъ 1/1 й ↓ '

```
Ruijie# configure terminal
Ruijie(config)# interface f 1/1
Ruijie(config-if)# dot1x port-control auto
Ruijie(config)# end
```

```
Ruijie# show dot1x
802.1X Status:       enable
Authentication Mode:  eap-md5
Total User Number:    0(exclude dynamic user)
Authed User Number:   0(exclude dynamic user)
Dynamic User Number:  0
Re-authen Enabled:    enable
Re-authen Period:     2 sec
Quiet Timer Period:   10 sec
Tx Timer Period:      3 sec
Supplicant Timeout:   3 sec
Server Timeout:       5 sec
Re-authen Max:        3 times
Maximum Request:      3 times
Private supplicant only:   enable
Client Online Probe:  disable
Eapol Tag Enable:     disable
Authorization Mode:   disable
```

no dot1x private-supplicant-only ʒ ╖ Â

23.2.8. ↓ QUIET

˘ ˇ ¨Ą Â Quiet Period ¨Ą Â ↓ Â Quiet Period й 10 ˘

↓ Л↻ Quiet Period ↓ Л↻ ¨Ą Â

Ю˘ Ю Quiet Period

ʒ	
configure terminal	
dot1x timeout quiet-period *seconds*	Quiet Period
end	
write	
show dot1x	dot1x

no dot1x timeout quiet-period ʒ Quiet Period й ÂЛЮ QuietPeriod 500 '

```
Ruijie# configure terminal
Ruijie (config)# dot1x timeout quiet-period 500
Ruijie(config)# end
```

23.2.9.

EAP-request/identity Л˘ ˘
Â ѝ 3 ˘ έ Â

ЮЎ Ю

҂	
configure terminal	
dot1x timeout tx-period *seconds*	
end	
write	
show dot1x	dot1x

no dot1x timeout tx-period ҂ ѝ ÂЛЪЮ
ѝ 100 '

```
Ruijie# configure terminal
Ruijie(config)# dot1x timeout tx-period 100
Ruijie(config)# end
```

23.2.10.

RadiusServer Л˘ ServerTimeout
Radius Server ˘ Â
˘ ѝ Â ѝ 3 ˘
έ Â

ЮЎ Ю

҂	
configure terminal	
dot1x max-req *count*	
end	
write	
show dot1x	dot1x

```
Ruijie#show dot1x
```

no dot1x max-req ҂ ѝ ÂЛЪЮ
ѝ 5 '

~

radius ѝ 802.1X ˘ ⅄ è
ѝ ˘ aaa authentication dot1x default group radius none
radius Ь a Ю ⅄ Л∪ none ˘ ‡
radius 802.1X Â

802.1X 5 ˘ radius ˘ 3*5˝ ≠ 15
Â Ю 802.1X ″I ˘ ÿ
Â ˘ '

radius * < 802.1X server-timeout Â

23.2.13. ў ╟ 802.1x

802.1x ˘ ˘ ″I ˘
Ю˝ EAPOL-START Â
˘ Ґ Ь Â

Ю˝ . Â Æ à
linkdown ⅄ ѝ linkup˘ ѝ ˘
ў ╟ Â ⅄ ˘ a ў ╟
802.1x ˚ ^ WindowsXP 802.1x
˚ ~ ˘ ў ╟ ˘ EAP-request/identity
Ю Â

Л∪Ю Ў ў ╟ 802.1x ˘ Л∪ a ⅄ Ю
Â

/ ў ╟

╖ ˘ ↙ Æ ⅄ ˘
ѝ ˘ è a ў ╟
Â ╖ ⅄˘ ⅄ Л∪ ў ╟ à
à ⅄ ╖ Â 4Áx2s-aÄ

write	
show dot1x	dot1x

ʒ **no** ˩ Л Ъ ˜ ˩ ˜ Ю˘ Л
˘ ў ╟ ˘ ˩ Л Ъ ў ╟
˘ ˩ Â

˘ ЛЪЮ '

ʒ	
configure terminal	
dot1x auto-req packet-num *num*	ў ╟ num 802.1x , num ѝ Ѓ ‡ Â Ѓ ~
end	
write	
show dot1x auto-req	

ʒ **no** ѝ ˘ Ю

˘ ЛЪЮ ў ╟ '

ʒ	
configure terminal	
dot1x auto-req req-interval *interval*	
end	
write	
show dot1x auto-req	

ʒ **no** ѝ ˘
Ю ˘ Л Ъ a ˘ ‡ Â

Л ˘ Ю(
Ю ˩) ˘ ˩ Л Ъ Л ˘ Л
˘ Ю ˘ ‡ Â

˘ ЛЪЮ '

ʒ	
configure terminal	
dot1x auto-req user-detect	Â ˜

end	
write	
show dot1x auto-req	

ϗ **no** ϖ ˘ ϖ
Â

Л Э Ь ϗ й ˘ ˩ Л ѓ
ϗ Â й ˘ Ю
˘ ˩ '

	1	2	3
Л supplicant й			
ϗ	a dot1x auto-req ϖ	**dot1x auto-req** **dot1x auto-req packet-num** *num* **dot1x auto-req req-interval** *interval* **dot1x auto-req user-detect**	**dot1x auto-req** **dot1x auto-req packet-num** *0* **dot1x auto-req req-interval** *interval* **no dot1x auto-req user-detect**

23.2.14. 802.1x

Ѽ Л 802.1x ϖ Â ˘ ≠
802.1x ў ╟
Â

Л˘ ˩ Ь ˘ ў ╟
˘ ˩ Ь
Â Ь Ь Э Â ˩
Л Â

Ѽ Л 802.1x ϳ ˩ ˘ й Ь
˘ Ь Â Ь a
Ь˘ ╟ Л Л Ь ˘ ˩
Â

ў ╟ Ю˘ ' Ю˘
Л й ^

˜ Â

Ю '

1. Radius Server ЎА Л й Radius Clientў
2. Ь IP
3. UDP
4. 802.1x Юў Ь

Юў Ю Ь

҂	
configure terminal	
aaa new-model	AAA ╖
aaa group server radius *gs*	Ь
server *192.168.4.12* **acct-port** *11*	Л Ь ╖ Ь
exit	
aaa accounting network *acct* **start-stop group** *gs*	
dot1x accounting *acct*	й 802.1X
end	
write	
show running-config	

no aaa accounting network ҂ Â **no dot1x accounting** ҂ dot1x ÂЛЮ Ь IP й 192.168.4.12 à Ь IP й 192.168.4.13 à Ь UDP й 1200 à 802.1x ╖ '

```
Ruijie# configure terminal
Ruijie(config)# aaa new-model
Ruijie(config)# aaa group server radius acct-use
Ruijie(config-gs-radius)# server 192.168.4.12 acct-port 1200
Ruijie(config-gs-radius)# server 192.168.4.13 acct-port 1200
Ruijie(config-gs-radius)# exit
Ruijie(config)# aaa accounting network acct-list start-stop
group acct-use
Ruijie(config)# dot1x accounting acct-list
Ruijie(config)# end
Ruijie# write memory
```

```
Ruijie# show running-config
```

~

1) б Radius Server б ⅄

2) AAA Ю

3) 802.1X ⅄

4) 802.1x ╖ Ю

5) Radius Server

6) ⅄ AAA Ь Ю˘ ≠. ϧ **aaa domain enable** ˘ **dot1x accounting** ϧ a ˘
Â έ Ї ⅄ AAA Ь Ь Â

⅄ ╖ ˘ NAS Э ⅄˘ NAS
. ⅄ Radius Server ˘ Radius Server Э ⅃Ω
Ю˘ ^ ~ NAS
˘ . ὶ NAS a ˘ Radius Server . ⅃ ˘
ÿ è Â

Ю˘ Ю ╖ Ь

ϧ	
configure terminal	
aaa new-model	AAA ╖
aaa accounting update	╖
end	
write	
show running-config	

no aaa accounting update ⅃Ω ╖ Ь

```
Ruijie# configure terminal
Ruijie(config)# aaa accounting update
Ruijie(config)# end
Ruijie# write memory
Ruijie# show running-config
```

ΩЮ ὶ Ң ╖ '

ὶ è ˘ 802.1x ╖

Э ˆ Э˘ б IEEE 802.1x a
˜ Â

23.2.15. IP

802.1x˘ ˩ Л IP Â Ъ

Ю '

DISABLE ' a IP Â ↓ ↓Л
Â

DHCP SERVER ' PC DHCP IP ˘
DHCP RELAY DHCP SERVER˘ ˘ ↓
DHCP SERVER ↑ IP Â

RADIUS SERVER ' PC IP˘ RADIUS SERVER
< —IP>

!
Ruijie# **write memory**

23.2.16.

802.1x Radius Server Reply-Message
802.1x
Star-Supplicant
a
HTML http://XXX.XXX.XX

1) Radius Server Reply Message
2) Ruijie-supplicant
a a
3)

23.2.17.

802.1x a IEEE 802.1x

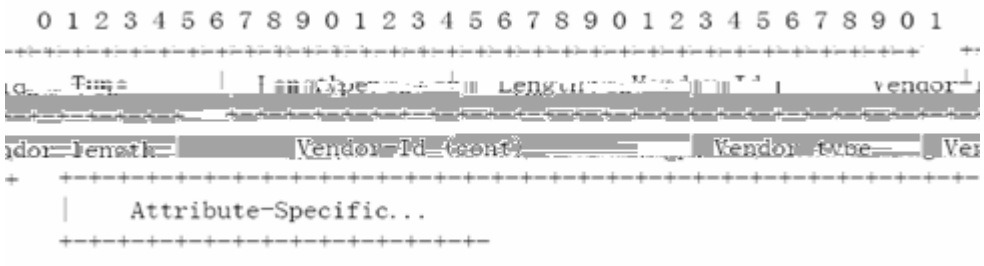
configure terminal	
dot1x auth-address-table address *mac-addr* **interface** *interface*	
end	
write	
show running-config	

23.2.18.

ѝ ˇ ʌ ң ˧ʃʊ a ˧ a ˧ Ꮭˇ '
a ˧ Â Radius Server Ɔˇ a
ʌ Â

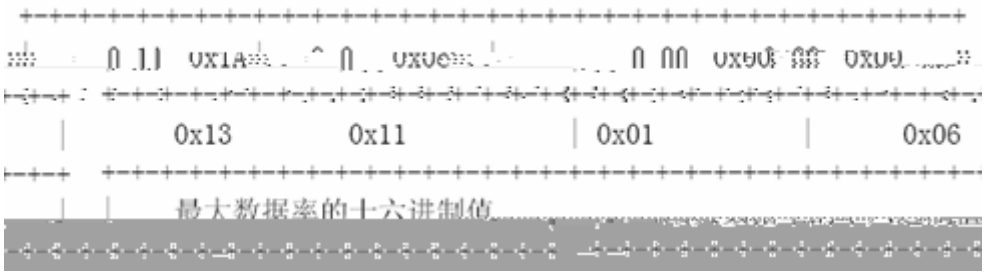
Radius Â ˧ ⱵѪ
Â

ⱵѪ Ю'



في 6

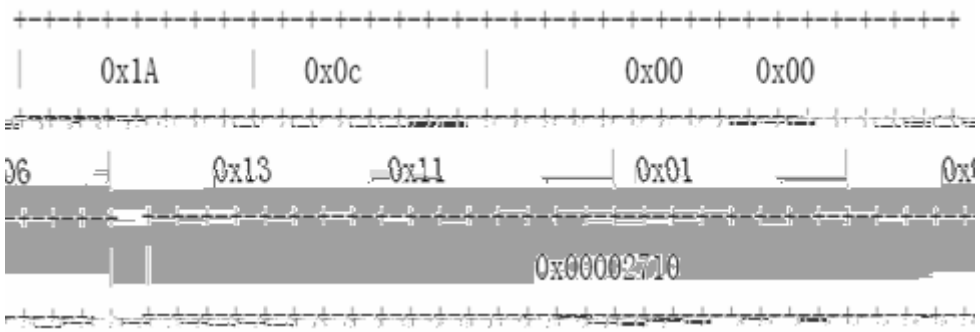
Ю'



في 7

Æ' kbps

ѝ 10M Ю'



8 في

Ⱶ Л Э ˇ ѝ 10M . 10000kbsp 16
‡ 0x00002710 Э ˩ Â

Ⱶ Â ˩ ˩ Â

23.2.19.

ˇ 802.1x EAP-MD5 Â Ὼ ᴎ
802.1X a ˩ Л EAP-MD5 ˆ ˜ ˇ ˩ Л CHAP PAP
Â CHAP

```
Filter Non-RG Supp:   Disabled
Client Oline Probe:   Disabled
Eapol Tag Enable:     Disabled
Authorization Mode:   Group Server
```

23.2.20.

Л 802.1x ˇ ЛЮ Ь Â ў Ь
ЛˇЛ Ь Ю Ь Â
Ь ˇ Ь ў Ь ˇ Л Ь Â

ЮˇЮ Ь Â

ʔ	
configure terminal	
aaa new-model	aaa
aaa group server radius *gs-name*	Ь
server *sever*	Ь
end	
write	
show dot1x	

ЛЮ 192.168.4.12 й Ь '

```
Ruijie# configure terminal
Ruijie# aaa new-model
Ruijie(config)# aaa group server radius auth-ll
Ruijie(config-gs-radius)# server 192.168.4.1
Ruijie(config-gs-radius)# server 192.168.4.12
Ruijie(config-gs-radius)# end
Ruijie#
```

23.2.21.

23.2.22. б IP

Ὼ ʌ ˘ Ʌʊ Radius Server ˘ ɻ Ʌʊ
б IP Â Ʌʊ ɟ IP ˘ ‡ a
ɱ Â

ɱ ˘ Ὼ ʌ ˚ ˘
Radius Server Â

23.2.23.

˘ ɻ
ЮЎ ɻ Ʌʊ ɱ Â

ɱ ˘ Radius server Â

23.2.24. 802.1X ╟ VLAN ╟

╟ ╟ ɱ RADIUS Ł Э Ю
VLAN ˘ RADIUS Ł Ћ RADIUS Ю VLAN Â
RADIUs Ю vlan ˘ ʌ
╟ ╕ Ю VLAN Â

show dot1x summary ʒ ɻ

Tunnel-Medium-Type=802˜ 6˜

Tunnel-Private-Group-ID=VLANID(ѝ)

Ю VLAN Л˘ ˝I Ю VLAN ѝ VLAN Л ˘
Э Л Л VLAN˝ Л Л VLAN˝
╟ VLAN˝ a Л Л VLAN˝ ‡ Ю VLAN ѝ
VLAN ID˘ Tunnel-Private-Group-ID vlan ID ˆ

AAA é ľ AAA Ľ Â

3

configure terminal	
aaa authentication dot1x *list1* **group radius**	AAA dot1x list1
aaa accounting network *list2* **start-stop group radius**	AAA list2

AAA é ľ AAA Ľ Â

4

ℵ ЛЪ Ю ҁ ╟ VLAN ╟

ҁ	
show dot1x user id *session_id*	˘ Л й *session_id* ╟ VLAN ╟ Â
show dot1x summary	VLAN

Y ľ 802.1X è Y Ŀ Â

23.2.25. ҁ Ŀ Л

ҁ Ŀ Лъ Л Ѧ Л Э ˘
ч Â ҁ Ŀ Л ╖ Â

╖ a ˘ ℵ RADIUS Ŀ Â
Radius ˘ ℵ Ⱨ
Â Ⱨ Â

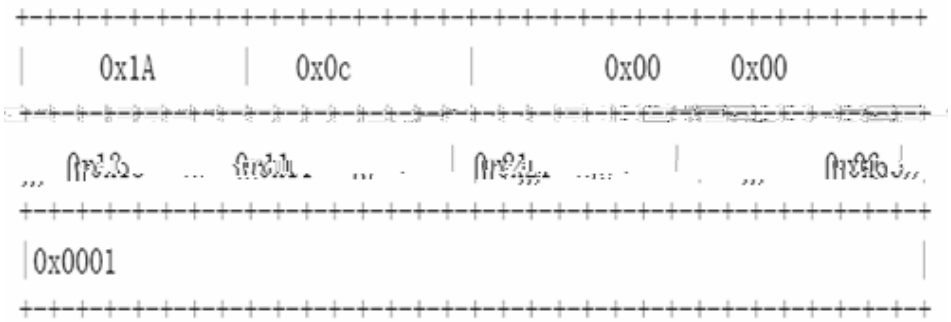
ҁ Ŀ ╖ Ⱨ Vendor Type й 0x20 Л ╖ Ⱨ Vendor Type й 0x21 Â

Attribute-Specific й Ⱨ ˘ Ⱨ ҁ Ŀ
Э Л Э й ℵ ╟ . 0x0000 ˘ a ,
0x0001 Â

ҁ Ŀ Э ˘ Ю '

9 في

Л Э ˘ Ю '



في 10

23.2.26.

ѝ ˘
Â ˘
RADIUS Ь б˘ ´
RADIUS Ь Â ѝ ´ Э
˘ Â ↙
˘ з ´ ˘ ↑ (↓ Л
) Â

~

˚ ╖ Â

ЛЮ ч '

Hello Interval: Â

Alive Interval' Â
˘ ў ╟ ↙ ˘ Ь Â Hello
Interval Â

Ю˘ ↓ Л Л ЛЮ ╖ :

write	
show dot1x	

23.2.27. EAPOL TAG

IEEE 802.1x EAPOL a ╗ VLAN TAG˝ ┘ ˘ ˘ Trunk Port

‡ TAG Â

ђ 802.1x ˘ ľ ђ

Ľ Â

Ю˝ ┘Л Л‗Ю EAPOL TAG Â

₹	
configure terminal	

dot1x eapol-tag EAPOL TAG

dot1x port-control auto	↵ ╖
dot1x default-user-limit *<1-4000>*	
End	

˘ Â

ЮЎ ˘ 1x ˘

show dot1x

23.3.4.

ل Л Ъ ˘ Â

Ю˘ Ю

₹	
show dot1x summary	

ЛЪЮ '

```
Ruijie# show dot1x summary
ID   MAC          Interface  VLAN  Auth-State  Backend-State
Port-Status
---- ------------ --------- ----  ----------  ------------
1    00d0f8000001  Gi3/1         1    Authenticated   IDLE
Authed
```

23.3.5. 1x

Ю˘ Ю 1x

₹	
show dot1x probe-timer	1x

ЛЪЮ 1x :

```
Ruijie# show dot1x probe-timer
Hello Interval: 20 Seconds
Hello Alive: 250 Seconds
```

23.3.6. 802.1x è Y

1. 1X ACL ل

IP Ю˘ 802.1x ╖ ˘
ACL Â ‡ ACL MAC Э Â ≠ ˘ ل
MAC ѝ MAC ACL ˘ è MAC
˘ ACL ل MAC Э Â

˘ MAC ѝ 00d0.f800.0001˘ ‡ MAC ѝ
00d0.f800.0001 ل Л Ъ Â Ї Ą ACL˘ ‡ ACL
Э Â MAC ѝ ICMP 1x

1' mac: 00d0.f800.0001 ip: 192.168.65.100

2' mac: 00d0.f800.0002 ip: 192.168.65.101

Л Э ACL˘ Ю'

ip access-list extended ip_acl:

deny icmp any any

ѝ ˘ з ⅄ ICMP Â ACL ˙ ″I
IP + MAC ˘ ACL Л ACE **deny any any˘**
Л∪ ≠ Â

IP_acl Л ╗ **permit any any˘** ‡ IP
Л Ў ⅄Л∪ ˘ a IP + MAC Â Л∪ a IP
¯ ACL

2. IP Ю ˚ è ˆ ACL à IP
˜ м ˘ è ˚ ˘ ‡ ⅄
IP Ю a ╗˘ ╗ Â
˘ IP Ю ⅄Л∪ Â

3. Э ╗ Ю

a ˘ ҄ **switchport mode trunk**
ACCESS Ю a Access VLAN
TRUNK Ю a Allowed VLAN Native VLAN

4. VLAN ╗ Ю

VLAN a
VLAN a ˘ ҄ private-vlan primary Â

5. ⅄ Ю

Ю VLAN˘ VLAN ѝ Ю
VLAN'
Л Ю VLAN˘ Ю VLAN'
Л Ю VLAN ⅄ ˘ ‡
,

Л Ю VLAN б Э Ю
VLAN ⅄˘ ‡ Â

6. VLAN ╗ 802.1X Л ⁄ ∧ VLAN
˘ ╗ 802.1X Ю
802.1X ⅄ ѝ Â ╗ WEB , ╟ VLAN
a WEB ⅄ Э ⅄ Â

7. 802.1X ⅄ ˘ ≠ 802.1X IP

IP+MAC Â Э ˘
802.1X ╖ ˘ ‡ ┘Л 802.1X ┘ Э Â

23.4. ╟ ┘

802.1x IT й ^ Supplicant ° ˘
ЛЮ SU˘ Â ╟ ┘ ã
˘ IT ˘ ˘
Â

╟ ┘ SU ╖ ˘ ˘
╟ ┘ Ю Ь Э˘ ┘Л ЛЮ ° ˘ ã
Â

ЛЮ ╟ ┘ SU '

Ю ╖

HTTP ┘

┘ HTTP

Ю Ь ў

HTTP

┘

~

╟ ┘ '

┘ ° ˘ tag-support ╖ ^ S23 ARP
CHECK ╖ ҳ˜ IPv6 ACL ╖ Л˘ ╟ ┘ ╖
Ű

23.4.1. Ю ╖

╖ ╟ ╡ ╖ ˘ Ю ╖ Â
Ю˘ Ю ╖ Â Ю ╖ ˘ Ю
'

३	
configure terminal	
dot1x redirect	Ю ╖
end	

configure terminal	
http redirect *ip-address*	⅃
show http redirect	⅃
end	
write	

no http redirect ⅋ HTTP ⅃ ÂЛЪЮ Ь IP й 176.10.0.1'

```
Ruijie# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)# http redirect 176.10.0.1
Ruijie(config)# show http redirect
```

23.4.3. ⅃ HTTP

ˆ Э ~ ˘ HTTP ˘
HTTP ˘ Â
˘ ˘
⅃ Ю Â
Ю˘ Л й 80 HTTP ˘
Â
Л HTTP ˘ Ю '

⅋	
configure terminal	
http redirect port *port-num*	Л ⅃ Â a ⅃ Л˘ Л ≠
show http redirect	⅃
end	
write	

no http redirect port *port-num* ⅋ Л
⅃ ÂЛЪЮ Л й
⅃'

```
Ruijie# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)# http redirect port 8080
```

```
Ruijie(config)# show http redirect
```

23.4.4. Ю Ь ў

╟ ╟ ы ╖ ˘ ″I Ю Ь ў Â
˘ ┘ ˘
Ю Â

˘ Ю Ь ў Â Ю Ь
ў ˘ Ю '

҂	
configure terminal	
http redirect homepage *url-string*	Ю Ь ў й *url-string*˘ Л∪ Ґ Ь Ґ Ь ˘ a Ш¶ , й
show http redirect	┘
end	
write	

no http redirect homepage ҂ Ю ў ÂЛ∪Ю
ў й http://www.su-download.net/

```
Ruijie# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)# http redirect homepage
http://www.su-download.net/
Ruijie(config)# show http redirect
```

23.4.5. HTTP

˘ PC HHTTPP,ôHßwX1ßb!ßxA♦ИЇKÜP
˘ Web Â й
HTTP ˘ TCP ˘ Э
T HTTP PTÂTH HTTP H ℕI

ٹ	
configure terminal	
http redirect session-limit *session-num*	ù *session-num*˘ ↓
show http redirect	⊥
end	
write	

no http redirect session-limit ٹ
ù Â ЛЬЮ HTTP ù 4'

```
Ruijie# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)# http redirect session-limit 4
Ruijie(config)# show http redirect
```

23.4.6. ⊥

⊥ Â ù
˘ è ˘ Э б Â
Л˘ ˘ Л
⊥ Л Â ↓Лъ a ˘
´ Â Ю˘ ⊥ ù Â
⊥ ˘ Ю '

ٹ	
configure terminal	
http redirect timeout *seconds*	⊥ ' *seconds*˘ ↓
show http redirect	⊥
end	
write	

no http redirect timeout ٹ ⊥ ù Â ЛЬЮ

```
Ruijie# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)# http redirect timeout 4
```

```
Ruijie(config)# show http redirect
```

23.4.7.

Э Л˘ ˝I ˘
Â ˘ ≠ Л Л˘ ˘
Ђ Â ˘
˘ ж ^ ~ Л Л˘ Â Ю˘
˘ a Â
˘ Ю '

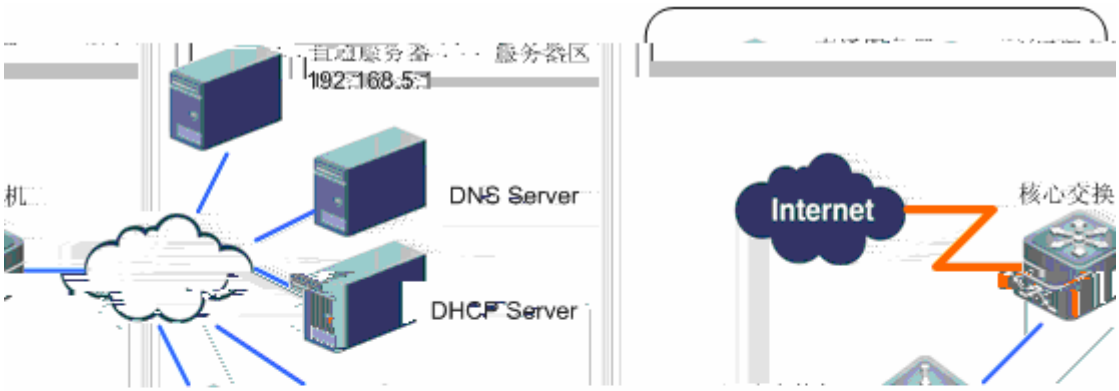
Ђ	
configure terminal	

˘

Â

http redirect direct-site *ip-address* [*ip-mask*] [**arp**]

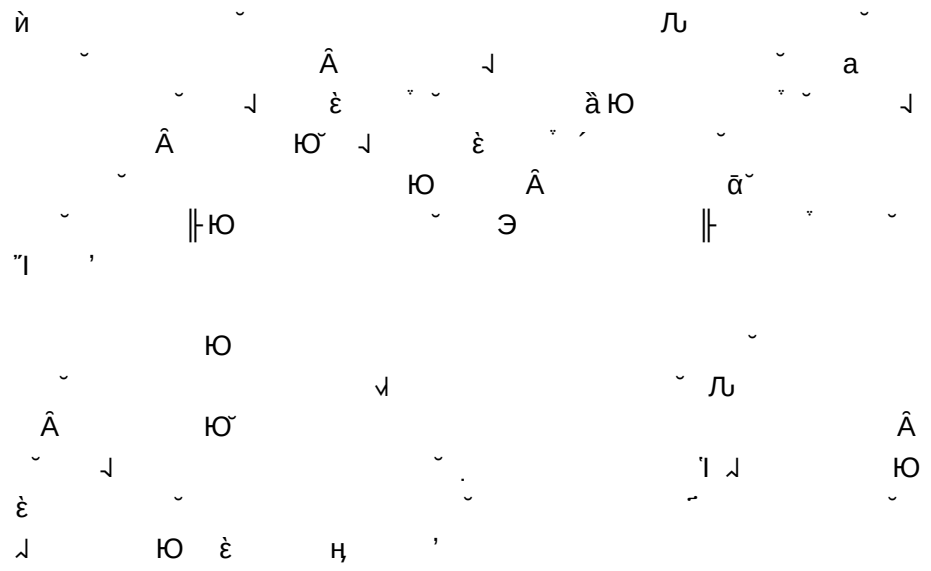
23.5.2.



11 في

Ю˘ Э ˘

PÇá u 9‹ c*ü ˘ ţ - كم я هي ـد ـا ـا



23.5.4.

```
                Ю  ╖
Ruijie# config
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)# dot1x redirect
  S26 Э          Ь      IP
Ruijie(config)# http redirect 192.168.3.1
  S26 Э          Ю      ў
Ruijie(config)# http redirect homepage
http://www.su_download.com/su/index.jsp
  S26 Э    Fa0/2 à Fa0/3  ч        Э      dot1x      ╖
Ruijie(config)# interface range fa0/2-3
Ruijie(config-if-range)# dot1x port-control auto
Ruijie(config-if-range)# exit
  S26 Э                          ˇ    Ѽ     Ь        й
Ruijie(config)# http redirect direct-site 192.168.5.1

          ARP Check ╖   ˇ   ‡      ╖ Э arp      '

Ruijie(config)# http redirect direct-site 192.168.5.1 arp
      ARP ╖   ˇ   ‡              IP          й                    ˇ
 arp     ˇ  Л            ˇ  PC        DNS    ARP      Â
  S26 Э   Ю   PC        192.168.4.1
Ruijie(config)# http redirect direct-site 192.168.4.1 arp

     PC1/PC2                    internet     ″I     ⅄        Ю     Ь   ˇ
          Ю          ⅄ˇ            internet Â
```

HTTP 」 '

```
Ruijie# show http redirect
http redirect settings
 server        : 192.168.3.1
 port          : 80
 homepage      : http://www.su_download.com/su/index.jsp
 session-limit : 3
 timeout       : 3

direct-site
  Address          Mask             ARP Binding
  ---------------- ---------------- -----------
  192.168.4.1      255.255.255.255    On
  192.168.5.1      255.255.255.255    On
```

24 AAA

ل ЛЬ ㄴ ЛЬ Э ل ЛЬ
ㄴ Â à ^ AAA˜ ў Â

24.1. AAA

AAA Authentication Authorization and Accounting à ˜ ˘
à ℸ ˘ ң
AAA Â

AAA Л ЛЮ ㄴ'

' ل ˘ ل RADIUS àTACACS+
ᘐ ɨ ⊥

24.1.1. AAA

AAA ˩ Л Ъ ˆ ˜ Ь ╟ à Л Ъ
Â … Ж à à ˇ ˥
Ь Â

24.1.2.

à

Â R1 ˘ Ь TIMEOUT˘ Л R2
Â Ю Ю ˘
ѣ Â TIMEOUT˘ ‡ ˘
Â

~

REJECT a Л TIMEOUT Â REJECT a Л
˘ ÿ ˘ Â TIMEOUT ‡
Ь ˘ TIMEOUT ˘ AAA
Ѭ Ю Â

˘ б AAA Ь ѣ ˘ Лъ RADIUS й ˘
б TACACS+ Л Ґ TACACS+ ЬÂ

24.2. AAA

¨І ᾱ ᾱ ˘ з
˘ Â ˘ Л Ю˘
AAA Â

24.2.1. AAA

AAA ˘ AAA Â Э
AAA Ю˙

1) AAA˘ ҂ **aaa new-model** Â
2) ᾱ Ь ˘ ˘ RADIUS Â
3) Ѭ ˘ **aaa authentication** ҂ Â
4) ˘ Л Â

~

˘ Л ˘ ‡
Â
˘ a ˘ ‡ Â

ʒ ˘ ʒ Â

24.2.2. AAA

AAA ˘ ˮI AAA Â

AAA˘ Ю ЛЬЮ ʒ'

ʒ	
aaa new-model	AAA

24.2.3. AAA

AAA˘ Ю ЛЬЮ ʒ'

ʒ	
no aaa new-model	AAA

24.2.4. Л

AAA ЛЬ Л˘ ˩ЛЬ б è ˛ ˘ Ю ˩ Ь ЛЬ Â

AAA ᾱ

Ь		
RADIUS	2	RADIUS
(Login)	3	
Ⱨ	4	
	5	
RADIUS	6	
RADIUS	7	

AAA ˘ Ї Ь ˛ Â

24.3.

ЛЬ è ˘ Ю˘

AAA Â ˘ ˩ Ю˘ AAA Â

24.3.1. ЊЖ AAA

AAA ˘ ˝I ЊЖ ⅄ ˘ ⅄
ЊЖ Â ЊЖ Â
ЊЖ ˘ Â
Â Â

ЊЖ à Â
˘

ЮЎ ⅃Л Â ⅄ ң
˘ ˘ Ю Â
Ю ˘ б ℸ Â
ℸ ˘ ‡ Â

~

⅃ ЮЎ ⅄ ң Ю Â
˘ ˘ ‡ ˘ a ˝Ą è
Â

24.3.2.

ђ AAA ˘ 2 Ь ' R1 R2 RADIUS Ь Â
ā ˘ NAS
Telnet ' ˝I R1 ˘ ˘ ‡
R2 ' R1 à R2 ˘ ‡ Ь
˘ Л Э ˘ ЛЮ ҄'

҄	
configure terminal	
aaa authentication login default group radius local	˘ è ľ default Ь ⅄ Â ˘ ⅄ ⅄ Â й Â

Login ˘ …
⅄ ˘ ⅄ Â Ю
2'

҄	

AAA
Ю˘ Нѫ Ј й Ґ test Ь Â

24.3.4. AAA

AAA ˘ ЛЮ Ь'

aaa new-model ҄ AAA Â

Ь ˘ ˘ RADIUS

TACACS+ Â έ Ї' RADIUS Ь Ї' TACACS+ Ь Â

aaa authentication ҄ Ӈ Â

Ы ˘ Â

~

Л Ң DOT1X a TACACS+ Â

24.3.5. AAA Login

έ ӯ Л Ң AAA Loginˆ ~ '

~

Ы Ю **aaa new-model** ҄ AAA˘ AAA

ˆ Ю Ы˜ Â ˘ Ї' AAA Ь Â

Ю˘ Telnet Ь (NAS)˘

˘ Ы Лъ NAS˘ й ˘

Â

AAA Ь Loginˆ ~ Ы Â a

ā Login ˘ Ы **aaa authentication login** ҄

Ӈ ˘ Login

Ы Лъ Â

AAA Login ˘ Ю ЛЪЮ ҄'

҄	
configure	terminal
aaa new-model	AAA Â
aaa authentication login {**default** | *list-name*} *method1* [*method2*...]	Ӈ ˘ Ӈ ˘ ҄ Â

line vty *line-num*	AAA Â
login authentication {**default** | *list-name*}	Â

list-name ⅄ … ˘ ⅃Ⅱ ’
method Â ERROR˘ ~ ˘
⅄ è ’ FAIL( )˘ ‡ a è
Â ѝ ⅄ ╖ ˘ . ˘ ⅃Ⅱ ҷ
none ѝ ⅄ Â

˘ Ю ˘ . RADIUS Ŀ (TIMEOUT)˘ Ÿ
' **aaa authentication login default group radius none**

~

none ⅄ Ŀ Ю
˘ Ⅱ ѝ Â ' Ю˘ a
none ˘ Ю˘ ⅃ ⅄ ⅃ ˘ з
a ˘ ⅃Ⅱ Ŀ
Ю˘ **none** ѝ ⅄ ⅃ ˘ **none** ╖ Э
Â

---

local	⅄
none	a
group radius	RADIUS Ŀ
group tacacs+	TACACS+ Ŀ

Э ⅄ ң AAA Login Â

24.3.5.1. Login

Login ˘ ”I ˘ ⅄ ң
˘ ⅄ ˘ Ю˘
é ⅡЮ ҷ'

ҷ	
configure terminal	
username *name* [**password** *password*]	˘ ҷ

end	
show running-config	

ЊЖ Login ˘ ┘ ЛЬЮ ҂'

҂	
configure terminal	
aaa new-model	AAA
aaa authentication login {**default** | *list-name*} **local**	ЊЖ
end	
show aaa method-list	
configure terminal	
line vty *line-num*	
login authentication {**default** | *list-name*}	
end	
show running-config	

24.3.5.2. RADIUS Login

RADIUS Ь Login ˘ ″I RADIUS Ь Â RADIUS Ь ˘ Ю˘ έ ЛЬЮ ҂'

҂	
configure terminal	
aaa new-model	AAA
radius-server host *ip-address* [**auth-port** *port*] [**acct-port** *port*]	RADIUS Ь
end	
show radius server	RADIUS Ь

RADIUS Ь ˅ RADIUS Лъ ˘ б RADIUS Ь ╖ ˘ RADIUS Ь ˘ ľ RADIUS Ь Â

┘Лъ RADIUS Ь ˘ Ю ЛЬЮ ҂'

҂	

configure terminal	
aaa new-model	AAA

aaa authentication login {**default** | *list-name*} **group radius**

˘ ⁋ ˘ ‡ Â ⁋
˘ ‡ ⁋ ˘ a Â

~

CLI Login ˆ **none** ~~
⸗ Â ˘ Enable ˘ a Ạ ⸗˘
б Login ⸗ ⸗ ˘ ҙ б ˥ Â

CLI Login ˘ Login **none**
˘ a ⸗ Â ˘ Enable ˘
⸗ Â ⸗ a ˘ Enable Â

˘ ⸗ Л Â ˘ ˘
˘ Â Ь
Ⅱ
˘ ‡ Â ⁋
˘ ‡ Enable Ⅱ˘ ⁋ ’
⁋ ˘ ‡ Enable ˘ ˘ a ⸗ Â
Ь a ˘ ‡ a ˘ ⸗ Л⁋ Â

~

⸗ RADIUS ˘ ⸗ ч
˘ è ‡ a Â

24.3.6.1. Enable

Enable ˘ ⸗ Л ˘ й
Â ˘ ‡ й 1 Â Enable

show running-config	

Enable

configure terminal	
aaa new-model	AAA
aaa authentication enable default local	
end	
show aaa method-list	
show running-config	

24.3.6.2. RADIUS Enable

RADIUS Service-Type 6 1 15 RADIUS SAM 42 0~15 RADIUS RADIUS RADIUS

RADIUS Enable RADIUS RADIUS Enable

configure terminal	
aaa new-model	AAA

RADIUS

24.3.7. PPP AAA

PPP Э Â
Ю˘ ISDN Л NAS˘ Ь ~ ˘
˘ ╟ PPP ˘ й ˘ PPP
Л Â

é Ў Л ң AAA PPP ˘ AAA PPP
˘ Ю ЛЪЮ ҳ'

ҳ	
configure terminal	
aaa new-model	AAA Â

aaa authentication ppp {3403 Tm(ĄAA)Tj/C279/331 Tf0.0A 0 0 108ult

	˘ Л∪ Â
dot1x authentication *list-name*	802.1x Â

IEEE802.1x é ľ 802.1x Ł Â

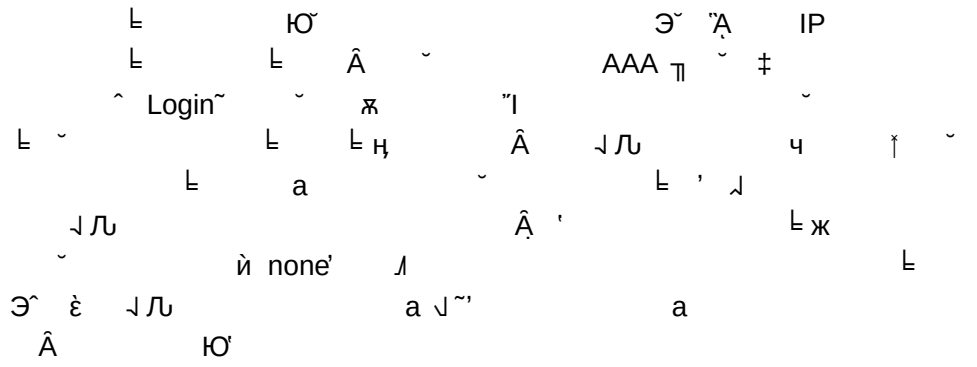
24.3.9.

Ю ˘ ľ RADIUS+ Ł Â

```
Ruijie(config)# aaa new-model
Ruijie(config)# username Ruijie password starnet
Ruijie(config)# radius-server host 192.168.217.64
Ruijie(config)# radius-server key test
Ruijie(config)# aaa authentication login test group radius local
Ruijie(config)# line vty 0
Ruijie(config-line)# login authentication test
Ruijie(config-line)# end
Ruijie# show running-config
!
aaa new-model
!
!
aaa authentication login test group radius local
username Ruijie password 0 starnet
!
radius-server host 192.168.217.64
radius-server key 7 093b100133
!
line con 0
line vty 0
login authentication test
line vty 1 4
!
!
```

Э ˘ Ł RADIUS Ł ^ IP й 192.168.217.64˜
˘ RADIUS Ł ˘ ‡
Â

24.3.10.



```
Ruijie(config)# aaa new-model
Ruijie(config)# username Ruijie password starnet
Ruijie(config)# radius-server host 192.168.217.64
Ruijie(config)# radius-server key test
Ruijie(config)# aaa authentication login test group radius local
Ruijie(config)# aaa authentication login terms none
Ruijie(config)# line tty 1 4
Ruijie(config-line)# login authentication terms
Ruijie(config-line)# exit
Ruijie(config)# line tty 5 16
Ruijie(config-line)# login authentication test
Ruijie(config-line)# exit
Ruijie(config)# line vty 0 4
Ruijie(config-line)# login authentication test
Ruijie(config-line)# end
Ruijie# show running-config
!
aaa new-model
!
!
aaa authentication login test group radius local
aaa authentication login terms none
username Ruijie password 0 starnet
!
radius-server host 192.168.217.64
radius-server key 7 093b100133
!
line con 0
line aux 0
line tty 1 4
login authentication terms
line tty 5 16
login authentication test
```

```
line vty 0 4
login authentication test
!
!
```

Э ˘ Ь RADIUS Ь ^ IP ѝ 192.168.217.64˜
˘ RADIUS Ь ˘ ‡
Â tty 1-4 ѝ Ь ˘ a ˘ è tty
vty Â

24.4.

AAA ↵ Ь Â AAA Ь
Л∪ Л˘ Ь ˚
Â Л∪ Л˘ ↵ ˚ Ь ↵ é ↵
Â

24.4.1.

Л ң ЛЮ AAA '

Exec
Command˙ ҄˜
Network^ ˜

è Exec NAS Э CLI ˘
^ ‡ ѝ 0~15 ˜' ҄ NAS Э CLI
Л∪ Л˘ é ҄ ' Э
↵ Ь Â

҄ ℸ TACACS+ ˘ é ľ TACACS+ Ŀ Â

24.4.2.

AAA Л∪ ˘ Ю Ь'

AAA Ь Â AAA Ь˘ ľ AAA Ŀ Â

ˆ ˩ ˜ AAA Â ˊ
Ю˘ ≠ ˩Л Â AAA ˘ Ґ
Ł Â

ˆ ˩ ˜ Â ˘
Â ˊ ҥ Network RADIUS ˘ Exec RADIUS
TACACS+ ˘ RADIUS ˘ Ґ RADIUS Ł
TACACS+ ˘ Ґ TACACS+ Ł Â

ˆ ˩ ˜ ˘ ‡ **username** ҄ ҕ
Â

24.4.3.

AAA ˘ Ю ЛЮ ҄'

҄	
configure terminal	
aaa new-model	AAA
aaa authorization exec {**default** | *list-name*} *method1* [*method2*|…]	ҕ AAA Exec
aaa authorization network{**default** | *list-name*} *method1* [*method2*|…]	ҕ AAA Network

24.4.4. AAA Exec

ˊ ҥ Ł ˆ NAS˜ ˘ è ҄
˘ . Exec Â ѝ NAS CLI ˆ Telnet˜˜
é ˆ ╖ ˊ˘ ˩Л **show privilege** ҄ ˜ Â

a ā Exec ˘ ˩ **aaa authorization exec** ҄
ҕ Exec ˘ Exec
˩Л Â

AAA Exec ˘ Ю ЛЮ ҄'

҄	
configure terminal	
aaa new-model	AAA Â
aaa authorization exec {**default** | *list-name*} *method1* [*method2*...]	ҕ ˘ ҕ ˘ ҄ Â
line vty *line-num*	AAA Exec

	Â
authorization exec {**default** | *list-name*}	Â

list-name ⅃ … ˘ ⅃ Ո ’
method

username *name* [**privilege** *level*]	й ^ ⅃ ~
end	
show running-config	

ЬЖ Exec ˇ ⅃ ЛЬЮ ҄ʼ

҄	
configure terminal	
aaa new-model	AAA
aaa authorization exec {**default** | *list-name*} **local**	ЬЖ
end	
show aaa method-list	
configure terminal	
line vty *line-num*	
authorization exec {**default** | *list-name*}	
end	
show running-config	

24.4.4.2. RADIUS Exec

RADIUS Ь Exec ˇ ″I RADIUS Ь ˇ RADIUS Ь ˇ E1ёе, Ӏʼ

authorization exec {**default** | *list-name*}	
end	
show running-config	

24.4.4.3. Exec

Ю Exec Â VTY 0~4 Э Login ˘ з Exec Â è Login ˘ Exec ″I RADIUS à Л Ъ Â RADIUS Ь й 192.168.217.64″ м й test″ л й ruijie″ ъ й ruijie″ 6 Â Ю″

```
Ruijie# configure terminal
Ruijie(config)# aaa new-model
Ruijie(config)# radius-server host 192.168.217.64
Ruijie(config)# radius-server key test
Ruijie(config)# username ruijie password ruijie
Ruijie(config)# username ruijie privilege 6
Ruijie(config)# aaa authentication login mlist1 local
Ruijie(config)# aaa authorization exec mlist2 group radius local
Ruijie(config)# line vty 0 4
Ruijie(config-line)# login authentication mlist1
Ruijie(config-line)# authorization exec mlist2
Ruijie(config)# end
Ruijie# show running-config
aaa new-model
!
aaa authorization exec mlist2 group radius local
aaa authentication login mlist1 local
!
username ruijie password ruijie
username ruijie privilege 6
!
radius-server host 192.168.217.64
radius-server key 7 093b100133
!
line con 0
line vty 0 4
 authorization exec mlist2
 login authentication mlist1
!
end
```

24.4.5. AAA Network

Л н PPP à SLIP Network˜ ~ ˘
Network ˘ л Л∪ à à Ь Â Network
RADIUS ˘ Ь Ю RADIUS
˘ a л ˘ Ь Ю л a л Â

~

a 802.1X AAA ˘ 802.1X л ҷ ˘ é
ľ 802.1X Ł Â

AAA Network ˘ Ю Л∪Ю ҷ'

ҷ	
configure terminal	
aaa new-model	AAA Â
aaa authorization network {**default** | *list-name*} *method1* [*method2*...]	Ю ˘ Ю ˘ ҷ Â

list-name л … ˘ л Л∪ ’
method Â ERROR˜ ~ ˘
Л è ’ FAIL( )˘ ‡ a è
Â ѝ Л ╖ ˘ . ˘ л Л∪ ҷ
none ѝ Л Â

24.4.5.1. RADIUS Network

RADIUS Ь Network ˘ ”I RADIUS Ь ˘
RADIUS Ь ˘ ľ RADIUS Ł Â

RADIUS Ь Л˘ л Л∪ RADIUS Ь ˘
Ю Л∪Ю ҷ'

ҷ	
configure terminal	
aaa new-model	AAA

aaa authorization network {**default** | *list-name*} **group radius**	RADIUS

24.4.5.2. Network

```
Ruijie# configure terminal
Ruijie(config)# aaa new-model
Ruijie(config)# radius-server host 192.168.217.64
Ruijie(config)# radius-server key test
Ruijie(config)# aaa authorization network test group radius none
Ruijie(config)# end
Ruijie# show running-config
aaa new-model
!
aaa authorization network test group radius none
!
radius-server host 192.168.217.64
radius-server key 7 093b100133
!
```

24.5.

AAA

24.5.1.

Exec
Command
Network

Exec NAS CLI

NAS CLI

ʒ ℸ TACACS+ ˘ έ ľ TACACS+ Ł·Â

24.5.2.

AAA Ƨ ˘ ƧЮ Ł'

AAA Ł Â AAA ˘ ľ AAA Ł· Â

Ⱶ Â ˘ Â ʌ ң Network RADIUS ’ Exec RADIUS TACACS+ ’ Command TACACS+ Â RADIUS ˘ ľ RADIUS Ł· TACACS+ ˘ ľ TACACS+ Ł· Â

ˆ ˩ ˜ AAA Â ʌ ˆ Exec ˜ ˘ è Ю˝ ≠ ˩ Ƨ Â AAA ˘ ľ Ł·Â

24.5.3. AAA Exec

Exec NAS ˘ ˩ Ƨ è CLI Â NAS CLI ˘ ˩ Ł ˆ Start˜ ˘ CLI ˘ ˩ Ł ˆ Stop˜ Â

~

˩ NAS Login ˘ Exec Â Login ˘ none ˘ ‡ a Exec Â ˩ ˘ Start ˘ ≠ a Stop Â

AAA Exec ˘ Ю ƧЮ ʒ'

ʒ	
configure terminal	
aaa new-model	AAA Â

AAA

show running-config	

24.5.3.2. Exec

Ю Exec Â VTY 0~4 Э Login
˘ з Exec Â è Login ˘ Exec
RADIUS Â RADIUS Ł й 192.168.217.64˝ м й test Â
л й ruijie˘ ę й ruijie Â Ю˙

```
Ruijie# config
Ruijie(config)# aaa new-model
Ruijie(config)# radius-server host 192.168.217.64
Ruijie(config)# radius-server key test
Ruijie(config)# username ruijie password ruijie
Ruijie(config)# aaa authentication login auth local
Ruijie(config)# aaa accounting exec acct start-stop group radius
Ruijie(config)# line vty 0 4
Ruijie(config-line)# login authentication auth
Ruijie(config-line)# accounting exec acct
Ruijie(config)# end
Ruijie# show running-config
!
aaa new-model
!
aaa accounting exec acct start-stop group radius
aaa authentication login auth local
!
username ruijie password ruijie
!
radius-server host 192.168.217.64
radius-server key 7 093b100133
!
line con 0
line vty 0 4
 accounting exec acct
 login authentication auth
!
end
```

24.5.4. AAA Network

Network ~ ˘
à IP à ɻ Â Network ɬ RADIUS Â

RADIUS a ɻ RADIUS Ł ɻ ɣ Â
ɻ ʎ ɳ a ɻ ɻ ɣ Â

AAA Network ˘ Ю ЛЬЮ ʒ'

ʒ	
configure terminal	
aaa new-model	AAA Â
aaa accounting network {**default** | *list-name*} **start-stop** *method1* [*method2*...]	ЬѪ ˘ ЬѪ ˘ ʒ Â

list-name ɻ … ˘ ɻ Лъ ’
method Â ERROR ~ ˘
ʎ è ’ FAIL( )˘ ‡ a è
Â ѝ ʎ ℸ ˘ . ˘ ɻ Лъ ʒ
none ѝ ʎ Â

24.5.4.1. RADIUS Network

RADIUS Ł Network ˘ ˮI RADIUS Ł ˘
RADIUS Ł ˘ ľ RADIUS Ł Â

RADIUS Ł ʎ˘ ɻ Лъ RADIUS Ł ˘
Ю ЛЬЮ ʒ'

ʒ	
configure terminal	
aaa new-model	AAA
aaa accounting network {**default** | *list-name*} **start-stop group radius**	ЬѪ RADIUS Â

24.5.4.2. Network

ЛЪЮ RADIUS Network '

```
Ruijie# config
Ruijie(config)# aaa new-model
Ruijie(config)# radius-server host 192.168.217.64
Ruijie(config)# radius-server key test
Ruijie(config)# aaa accounting network acct start-stop group
radius
Ruijie(config)# end
Ruijie# show running-config
!
aaa new-model
!
aaa accounting network acct start-stop group radius
!
username Ruijie password 0 starnet
username Ruijie privilege 6
!
radius-server host 192.168.217.64
radius-server key 7 093b100133
```

24.6. AAA

˘ Ю ҳ'

ҳ	
show aaa user { *id* | **all** }	AAA

24.7. VRF AAA

Virtual Private Networks (VPNs) ѝ ISP Э
ѡ Â VPN. ѡ Â
Ь ˘ VPN ≠ ѧ VPN routing/forwarding (VRF) table˘ AAA ЛЪ
ѝ ЬЖ Ь VRF Â

AAA VRF˘ Ю ЛЪЮ ҳ'

ҳ	

configure terminal	
aaa new-model	AAA
aaa group server radius *gs_name*	RADIUS Ł Ł
ip vrf forwarding *vrf_name*	й vrf

ң vrf ╖

24.8. Login

Login ˘ й Login ˘ ҙ
, ˘ a Â

Login ˘ Ю ЛЪЮ ҙ'

ҙ	
configure terminal	
aaa new-model	AAA
aaa local authentication attempts *num*	login ˘
aaa local authentication lockout-time *num*	login ˘ ˘ ^ ~
end	
show aaa user lockout {**all** | **user-name** *name-string*}	
clear aaa local user lockout {**all** | **user-name** *name-string* }	

Ю Login й 3 ˘ й 15 Â

24.9. ﻝ AAA ﻠ

ﻝ AAA ﻠ ˘ Ю '

ﻝ AAA ﻠ ﻠ
ﻝ AAA ﻠ Y

~

ﻝ AAA ﻠ˘ IEEE802.1x ﻠ˘ IEEE802.1x
ﺉ ﻱ 802.1x ﻠ Â

24.9.1.

:

ﻩ ЛЪЮ ﻝ
1. userid@domain-name
2. domain-name\userid
3. userid.domain-name
4. userid

4 a domain-name ﻝˆ . ЛЪЭ 4 ' userid˜˜ ﻯ ﺋ
ﻝ ﻯ default˝ . ﻯ ﻝ Â

Ю˜ ﻝ ﻝ NAS˜ Network Access Switch˜ ﻝ ﻯ a ﻝ
AAA ﻠ˘ ˆ ﻝ ầ ﻠ ầ ˜ ﻝ
a ﻝ˘ Ш¦ ˘ ﻯ AAA
ﻠ ˆ RADIUS˜ Â

ﻝ AAA ﻠ Ю'

ﻝ

ﻝ

Э AAA ﻠ ﻝ

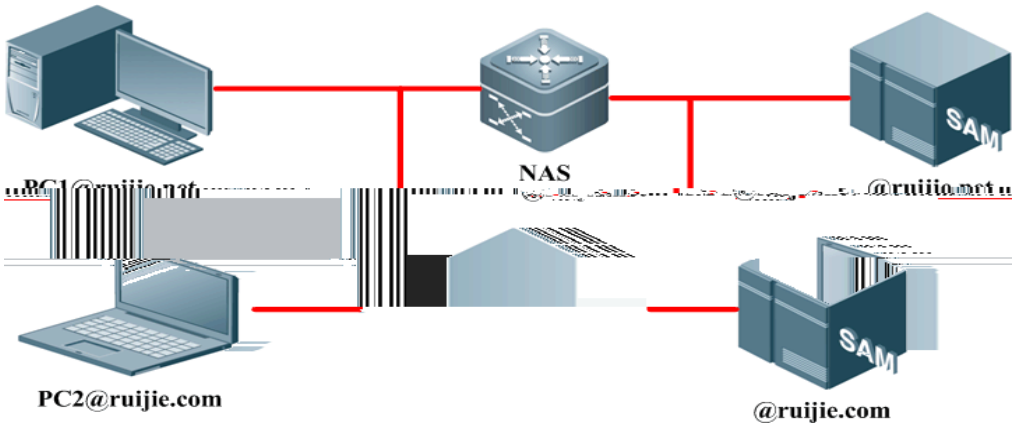
ﻝ

AAA ﻠ

:

Э ˘ AAA Ь

ЛЬЮ ђ في'



في 2 ђ في

24.9.2. ѕ AAA Ь

Ю ѕ AAA Ь'

1. AAA

AAA

configure terminal	
aaa new-model	AAA

ʒ	
configure terminal	
aaa domain *domain-name*	… ˬ ѝ *domain-name* ˘

:

ˬ AAA Ŀ 64 ˬ˘ a Ш† Â

24.9.2.5.

Ю˘ й ˘ AAA Ŀ '

ʒ	
authentication dot1x {**default** | *list-name*}	Ю˘
accounting network {**default** | *list-name*}	Ю˘
authorization network {**default** | *list-name*}	Ю˘

'

ʒ	
state {**block** | **active**}	Ю˘

ˬ ˬ '

ʒ	
username-format {**without-domain** | **with-domain**}	Ю˘ NAS б Ŀ ˬ ˬ

'

ʒ	
access-limit *num*	Ю˘ ˘ a ˆ ˇ 802.1x ˜

:

1. ЮЎ AAA Ь ˘
ЊЖ’ ‡ ЮЎ AAA ⅄˘
a ’
2. ˆ default˜ ' ⅄ AAA Ь ЮЎ
˘ ‡ Â ˘ ‡ ѝ
˘ a AAA Ь’
3. ЮЎ ЮЎ ˛ ’

24.9.2.6.

⅄ AAA Ь ⅄˘ ЛЪЮ ҄ ⅃Л

҄	
show aaa domain [*domain-name*]	⅄ AAA Ь

24.9.3. ⅄ AAA Ь Y

⅄ AAA Ь ЛЪЮ '

1. ⅄ AAA Ь ЮЎ Â
ЮЎ ˆ 802.1x ˜ AAA Ь Â
ЮЎ 802.1X Л҄ **dot1x authentication** *authen-list-name*˘ **dot1x accounting** *acct-list-name* *authen-list-name* *acct-list-name* ѝ ⅄ AAA Ь Â
2. ⅄ AAA Ь ˘ Ю ˘ ╟
Â ⅄ ѝ’ default Ь ⅄˘ a ˘
AAA Ь Â ˘ ‡ a
a AAA Ь Â
3. ˘ Э ˘ a ѝ AAA
Ь Â
4. AAA Ь ⅄ AAA Ь ЊЖ ⅄
Â a ˘ a ѝ AAA Ь Â
5. ⅄ б Э ⅄ ⅂ ⅂ Â '
Э domain.com domain.com.cn ч ˘
ѝ aaa@domain.com Â ‡ ѝ ѝ domain.com
a domain.com.cn Â

24.9.4. ⅄ AAA ⊾

⅄ ⊾ '

```
Ruijie(config)# aaa new-model
Ruijie(config)# radius-server host 192.168.197.154
Ruijie(config)# radius-server key test
Ruijie(config)# aaa authentication dot1x default group radius
Ruijie(config)# aaa domain domain.com
Ruijie(config-aaa-domain)# authentication dot1x default
Ruijie(config-aaa-domain)# username-format without-domain
```

Э ⅄˘ radius ⊾ Э a1˘ 802.1x
˘ ⅄ ѝ a1@domain.com˘ Ѧ ↓ ╖ Â
⅄ Ю'

```
Ruijie#show aaa domain domain.com

=============Domain domain.com=============
State: Active
Username format: Without-domain
Access limit: No limit
802.1X Access statistic: 0

Selected method list:
 authentication dot1x default
```

25 RADIUS

25.1. RADIUS

RADIUS /ا ┗(Remote Authentication Dial-In User Service)
˘ ↑ / ┗ ˘ б AAA في
˘ Â RGOS ˘ RADIUS
┗ ^ NAS˜ Э˘ ┘ RADIUS ┗ RADIUS

25.2. RADIUS

Э RADIUS ”I ЛЬЮ

AAA Â AAA “AAA ”Â

aaa authentication RADIUS Â
aaa authentication “ ”Â

Э ‡ Â
“ ”Â

ЛЬЭ RADIUS Â RADIUS ЛЬЮ

RADIUS

RADIUS

1

Э RADIUS ЛЬЮ

configure terminal	
radius-server host *ip-addr*	IP *ip-addr* RADIUS Â

2

Ю RADIUS a ЛЬЮ

configure terminal	
radius-server host *ip-addr* **auth-port** *port*	IP *ip-addr* *RADIUS* *port* Â
radius-server host *ip-addr* **acct-port** *port*	IP *ip-addr* *RADIUS* *port* Â

3 RADIUS

Э RADIUS RADIUS Â
RADIUS ЛЬЮ

configure terminal	

radius-server retransmit *retries*	RADIUS Л∪ ^ й 3˜ Â
radius-server timeout *seconds* **radius-server deadtime** *minutes*	Л∪ ^ й 2 ˜ Â й Ь ^ й 5minutes˜

4˝ RADIUS Ь м

RADIUS Ь ˘ м Â Э м
RADIUS Ь Э м ˘ м ┘ й 0 7˝ 0
м ˘ 7 ╗ м ˘ а й 0 Â

ҳ **service password-encryption** RADIUS м
й 7 ˘ **show running** RADIUS м й ╗ ˘ è
show running RADIUS м й Â

ЛюЮ й Ь м Â

ҳ	
configure terminal	
radius-server key [**0**|**7**] *text*	м
radius-server host *ip_addr* **key** [**0**|**7**] *text*	й IP й *ip_addr* Ь ж м Â

Э й RADIUS Ь м ˘ ┘Л∪┘ м
Ь ж м ˘ ≠ ┘Л∪ч ┘ Â Ь ж м
м а ┘ ˘ Ь ж м Â

5˝ RADIUS

RADIUS Ь Ня RADIUS м л˘ й RADIUS
Ня Â RADIUS AAA ˘ Л∪
aaa authentication ҳ Ня ˘ й

RADIUS Â ˇ ˩ Л Ъ AAA Â

˘

˩ Л Ъ Â Ю

Л ң '

1	max down-rate	76
2	qos	77
3	user ip	3
4	vlan id	4
5	version to client	5
6	net ip	6
7	user name	7
8	password	8
9	file-diractory	9
10	file-count	10
11	file-name-0	11
12	file-name-1	12
13	file-name-2	13
14	file-name-3	14
15	file-name-4	15
16	max up-rate	75
17	version to server	17
18	flux-max-high32	18
19	flux-max-low32	19

```
3    user ip           3
4    vlan id           4
5    version to client   5
6    net ip            6
7    user name          7
8    password           8
9    file-diractory      9
10   file-count         10
11   file-name-0         11
12   file-name-1         12
13   file-name-2         13
14   file-name-3         14
15   file-name-4         15
16   max up-rate         75
17   version to server    17
18   flux-max-high32     18
19   flux-max-low32      19
20   proxy-avoid         20
21   dailup-avoid        21
22   ip privilige        22
23   login privilige     42
24   limit to user number 50
```

```
Ruijie# configure
Ruijie(config)# radius attribute 24 vendor-type 67
Ruijie(config)# show radius vendor-specific
id    vendor-specific     type-value
----- -------------------- ----------
1    max down-rate       76
2    qos                77
3    user ip            3
4    vlan id            4
5    version to client   5
6    net ip             6
7    user name          7
8    password           8
9    file-diractory      9
10   file-count         10
11   file-name-0         11
12   file-name-1         12
13   file-name-2         13
14   file-name-3         14
15   file-name-4         15
16   max up-rate         75
17   version to server    17
18   flux-max-high32     18
```

```
19    flux-max-low32      19
20    proxy-avoid         20
21    dailup-avoid        21
22    ip privilige        22
23    login privilige      42
24    limit to user number 50
Ruijie(config)#
Ruijie(config)#
```

25.3. RADIUS

RADIUS Y ˘ ЛЬЮ ҄ '

҄	
debug radius event	RADIUS ˘ RADIUS Â

RADIUS ˘ ЛЬЮ ҄ '

҄	
debug radius detail	RADIUS ˘ RADIUS Â

25.4. RADIUS

ѝ RADIUS في ˘ RADIUS Ь ˘ й
Ъ ˘ Ь Â

RADIUS Ь ⊿Л Windows 2000/2003 Serveî IAS˜ à UNIX ˚ ,
≠ ⊿Л ж Ь ˚ Â

ЛЬЮ RADIUS ѓ '

```
Ruijie# configure terminal
Ruijie(config)# aaa new-model
Ruijie(config)# radius-server host 192.168.12.219
auth-port 1645 acct-port 1646
Ruijie(config)# radius-server key aaa
Ruijie(config)# aaa authentication login test group radius
Ruijie(config)# end
Ruijie# show radius server
```

```
Server IP:       192.168.12.219
Accounting Port: 1646
Authen  Port:    1645
Server State:    Ready

Ruijie# configure terminal
```

26 TACACS+

26.1. TACACS+

TACACS+ TACACS RFC 1492 Terminal Access Controller Access Control System˜˜ Э ╖ Â ў Client-Server б TACACS Ь AAA ╖ ˘ ┘ à ˘ TACACS+ Ь ˘ ″I TACACS+ Ь Â

TACACS+ à ˘ . ┘Л ⅄ Ь ˘ ⅄ ⅄ ⅄ Ь ˘ ┘ ┘Л Ь ⅄ Ь ˘ ⅄ Ь ┘Л ˘ ┘Л à Â

TACACS+ Ю′

4	8	16	24	32 bit
Major	Minor	Packet type	Sequence no.	Flags
Session ID				
Length				

1 في

Major Version — ў TACACS+ ⅄ Â

Minor Version — TACACS+ ⅄ Â

Packet Type — ┘ ′

TAC_PLUS_AUTHEN′ = 0x01 ˆ ˜
TAC_PLUS_AUTHOR′ = 0x02 ˆ ˜
TAC_PLUS_ACCT′ = 0x03 ˆ ˜

Sequence Number — ⅄ Â
TACACS+ ⅄ й 1˘ è ⅄ ⅄ ╗ 1 Â
┘ ⅄ سني

26.2. TACACS+

TACACS+ ή й ˇ ˆ Telnet
˜˜ ˆ ˜ й TACACS+ ˇ ل
TACACS+ Ł ˇ ل ل Л
Э Â في 2 '

في 2

Ю Л à TACACS+
'

3 في

ل ل ى ب ا ' '

1. '

1˜ Â

2˜ TACACS+ ل ˜ ل TACACS+ ب Â

3˜ TACACS+ Ł ˘ ˛ Â

4˜ TACACS+ ˘ ˛ ˛ Â

5˜ ˛ Â

6˜ TACACS+ ˛ ˛˘ ˛ TACACS+ Ł ˘ è ˛ Â

7˜ TACACS+ Ł ˘ Â

8˜ TACACS+ ˘ ˛ Â

9˜ Â

10˜ TACACS+ ˛˘ ˛ TACACS+ Ł ˘ è Â

11˜ TACACS+ Ł ˘ Â

2. ˛ '

1˜ TACACS+ ˛ TACACS+ Ł Â

2˜ TACACS+ Ł ˘ Â

3˜ TACACS+ ╖ ˘ ˛ Â

3. ˛˘ ˘ '

1˜ TACACS+ ˛ TACACS+ Ł Â

2˜ TACACS+ Ł ˘ Â

3˜ Â

4˜ TACACS+ ˛ TACACS+ Ł Â

5˜ TACACS+ Ł ˘ Â

26.3. TACACS+ Ł

Э TACACS+˘ ˝I ЛЪЮ Ł'

aaa new-mode ҁ AAA Â TACACS+ ˝I AAA˘ **aaa new-mode** ˘ I' AAA Ł Â

tacacs-server host ҁ TACACS+ Ł Â

tacacs-server key ҁ Ł м key Â

tacacs-server timeout ҁ Ł Â

˘ **aaa authentication** ҁ Нѫ TACACS+ Â **aaa authentication** ҁ Нѫ ˘ I' Ł Â

˘ **aaa authorization** ҁ Нѫ TACACS+

Â **aaa authorization** ʒ Ⱨ ˘ Ⅰ’
Ŀ Â

˘ **aaa accounting** ʒ Ⱨ TACACS+
Â **aaa accounting** ʒ Ⱨ ˘ Ⅰ’
Ŀ Â

Ɔ Ⱨ ˘ ‡ Â
ϒ Ŀ 1lb@yÆ@ UĔ?•B8VÖ

έ TACACS+ ˘ ЛЬЮ ‘

TACACS+ Ŀ ў

TACACS+ м

AAA Ŀ

CAC2F0ETf1Tj/C2_0 1 Tf0 -11 10.5 131.82 5J/C2_0 1 Tf0

TACACS+

TACACS+

TACACS+

TACACS+

TACACS+ Ŀ ʠu

й TACACS+ Ь м ˘ ‡ Ь ˘
TACACS+ м Â

26.3.2. TACACS+ м

TACACS+ м ˘ ЛЮ ҙ'

ҙ	
configure terminal	Â
tacacs-server key *string*	TACACS+ Ь м ˘ ў м ˘ ‡ Â

~

TACACS+˘ м Â з Э м TACACS+
Ь Э м Â

26.3.3. AAA Ь

Э AAA Ь ˘ ┘Л Ь Ь ў ↑
˘ Ь ˘ è Ь
^ Login ~ Â

Ь ┘Л Ь ˘ Ь ў ╗ ″l ˘
Ь ў Â Ь ╗ Ь ˘ ‡ ″l ╗ ˘ ╗
Ь й Ь ˘ Ь ˘ Ю
Ь Â

AAA Ь ˘ ЛЮ ҙ'

ҙ	
configure terminal	Â
tacacs-server host *ip-address* [**port** *integer*] [**timeout** *integer*] [**key** *string*]	TACACS+ Ь ў ˘ Ь TACACS+ Ь ў Ь Â

aaa group server {**radius** | **tacacs+**} *group-name*	Ѭ AAA Ь ˘ ѝ ɻ Â Ь ɳ ˆ RADIUS TACACS+˜ Â ʒ AAA Ь Â ' TACACS+ Ь **tacacs+** Â
server *ip-address*	Ь ╗ TACACS+ Ь ў ˘ ɳ Л∪ ╗ Ь ў Â ' ╗ Ь Ь ў ˘ Y ˝I **tacacs-server host** ʒ Ѭ Â
ip vrf forwarding *vrf-name*	ˆ ɳ ˜ TACACS+ Ь vrf ɻ (VRF ʒ)

26.3.4. TACACS+

TACACS+ Ь м ɻ˘ ѝ TACACS+ Ѭ
˘ TACACS+ Â ѝ TACACS+ AAA ˘
aaa authentication ʒ TACACS+ Ѭ ѝ Â
TACACS+ Login Enable Â

Loginˆ ˜ NAS Â Login
ЛЬЮ ʒ'

configure terminal	Â
aaa authentication enable default group {**tacacs+** | *group-name*}	Enable TACACS+ Â

26.3.5. TACACS+

TACACS+ ┗ м ﾉ˘ й TACACS+ Ⱨ
˘ TACACS+ Â й TACACS+ AAA ˘
aaa authorization ҄ TACACS+ Ⱨ й Â
TACACS+ Exec Command Â

˘ ҄ ^ CLI˜ ˘
҄ Â CLI ÿ æ ⍞ й 0~15 ˘
Â Exec й a ﾉ a ﾉ ˘ ⍞
˘ й Exec Â Exec ˘ ЛЬЮ ҄'

҄	
configure terminal	Â
aaa authorization exec {**default** | *list-name*} **group** {**tacacs+** | *group-name*}	Exec TACACS+ Â
aaa authorization console	^ ﾉ ˜ ﾉ a Exec ˘ Exec ˘ Â
line [**aux** | **console** | **tty** | **vty**] *line-number* [*ending-line-number*]	line ˘ Exec Â
authorization exec {**default** | *list-name*}	Exec Э Â

CLI ˘ ^
Exec ~~ ﾉЛЬ CLI ҄ ˘ a
҄˘ ҄ ﾉ˘ й
Command ҄ ҄˜ Â Command ˘ ЛЬЮ ҄'

҄	
configure terminal	Â
aaa authorization commands *level* {**default** | *list-name*} **group** {**tacacs+** | *group-name*}	Exec TACACS+ Â *level* ҄ Â-ﾉ 0 15 Â

no aaa authorization config-commands	ˆ ˩ ˜ ЮˇЮ ϧ Command ˇ ϧˇ ‡ Ю ϧ a Â
line [**aux** | **console** | **tty** | **vty**] *line-number* [*ending-line-number*]	line ˇ Command Â
authorization commands *level* {**default** | *list-name*}	Command Э Â *level* ϧ Â˩ 0 15 Â

26.3.6. TACACS+

TACACS+ Ь м ˩ˇ й TACACS+ Ня ˇ TACACS+ Â й TACACS+ AAA ˇ **aaa accounting** ϧ TACACS+ Ня й Â TACACS+ Exec Command Â

ˇ ˩Л Ъ è ϧ ˆ CLIˇ Â Exec ╖ ˇ ‡ CLI ˇ ˩ Ь ˆ Startˇ ˇ CLI ˇ ˩ Ь ˆ Stopˇ Â Exec ˇ ЛЪЮ ϧ'

aaa accounting commands *level*
{**default** | *list-name*}

```
Ruijie(config)# tacacs-server key aaa
```

3. Л tacacs+ '

```
Ruijie(config)# aaa authentication login test group tacacs+
```

4. Э :

```
Ruijie(config)# line vty 0 4
Ruijie(config-line)# login authentication test
```

ЛЪЭ login tacacs+ ˘ ЮÂ

```
Ruijie#show running-config
!
aaa new-model
!
aaa authentication login test group tacacs+
!
tacacs-server host 192.168.12.219
tacacs-server key aaa
!
line con 0
line vty 0 4
login authentication test
!
```

26.4.2. Enable TACACS+ '

Л Э enable ¦ tacacs+ Ь ˇ Ю Â

```
Ruijie#show running-config
!
aaa new-model
!
!
aaa group server tacacs+ tacgroup1
server 192.168.12.219
server 192.168.12.218
!
aaa authentication enable default group tacgroup1
!
!
tacacs-server host 192.168.12.219
tacacs-server host 192.168.12.218
tacacs-server host 192.168.12.217
tacacs-server key aaa
!
line con 0
line vty 0 4
!
```

26.4.3. Exec TACACS+ '

1. ″I aaa'

```
Ruijie# configure terminal
Ruijie(config)# aaa new-model
```

2. Л tacacs+ server '

```
Ruijie(config)# tacacs-server host 192.168.12.219
Ruijie(config)# tacacs-server key aaa
```

3. Л tacacs+ '

```
Ruijie(config)# aaa authorization exec test group tacacs+
```

4. Э :

```
Ruijie(config)# line vty 0 4
Ruijie(config-line)#authorization exec test
```

Л Э tacacs+ˇ Ю Â

```
Ruijie#show running-config
!
aaa new-model
```

```
!
!
aaa authorization exec test group tacacs+
!
tacacs-server host 192.168.12.219
tacacs-server key aaa
!
line con 0
line vty 0
authorization exec test
!
```

26.4.4. 15 Commans TACACS+ '

1. ″I aaa'

```
Ruijie# configure terminal
Ruijie(config)# aaa new-model
```

2. ⁄ tacacs+ server '

```
Ruijie(config)# tacacs-server host 192.168.12.219
Ruijie(config)# tacacs-server key aaa
```

3. ⁄ tacacs+ ʒ '

```
Ruijie(config)# aaa accounting commands 15 default start-stop
group tacacs+
```

4. Э :

```
Ruijie(config)# line vty 0 4
Ruijie(config-line)# accounting commands 15 default
```

ЛЪЭ enable ʃ tacacs+ Ł ˘ ЮÂ

```
Ruijie#show running-config
!
aaa new-model
!
aaa accounting commands 15 default group tacacs+
!
!
tacacs-server host 192.168.12.219
tacacs-server key aaa
!
line con 0
line vty 0 4
!
```

27 SSH ┗

27.1. SSH Ў

SSH Secure Shell Â SSH ╖ Telnet
ˇ б Telnet a ┘ ╗ Â a
ˇ SSH ┘ Л
╖ ˇ Л a ┘ IP à ┘ Â

27.2. SSH

	SSH1	SSH2
┘	RSA	RSA à DSA
	RSA Ѽ ╗ Â	KEX_DH_GEX_SHA1 KEX_DH_GRP1_SHA1 KEX_DH_GRP14_SHA1
╖	DES à 3DES à Blowfish	DES à 3DES à AES-128 à AES-192 à AES-256
	҂	҂
	a	MD5 à SHA1 à SHA1-96 à MD5-96
	NONE ~	NONE ~

27.3. SSH

~

ң SSH ┗ ^ SSHv1 б SSHv2˜ ˇ a SSH
Â

27.4. SSH

27.4.1. SSH

SSH ┺	
SSH	ˆ 1 2˜
SSH	120s
SSH	3

27.4.2.

1. SSH ˘ Â
˘ ’ ˆ Telnet ┘Л ˜
2. ┘ (Username) б (Password) Â
a ┘ ˘ ┘ ┘Л ˘ Â

27.4.3. SSH Server

Ю˘ SSH Server Â SSH Server˘
Ю˘ **enable service ssh-server** ⅋˘ ┘ SSH ˘ SSH Server й ENABLE Â

⅋	
configure terminal	
enable service ssh-server	SSH Server
crypto key generate {**rsa**|**dsa**}	

~

˘ a ⅋ [**no**] **crypto key generate**’ ⅋ **crypto key zeroize** ⅋ Â

27.4.4. SSH Server

SSH Server Ю **no enable service ssh-server**
SSH Server й DISABLE

configure terminal	
no enable service ssh-server	SSH Server

27.4.5. SSH server

Ю SSH Server 1 2 ЛЬЮ SSH

configure terminal	
ip ssh version {**1	2**}	SSH
no ip ssh version	SSH й SSHv1 б SSHv2

27.4.6. SSH

Ю SSH Server й 120 ЛЬЮ SSH

configure terminal	
ip ssh time-out *time*	SSH 1-120sec
no ip ssh time-out	SSH й 120

27.4.7. SSH

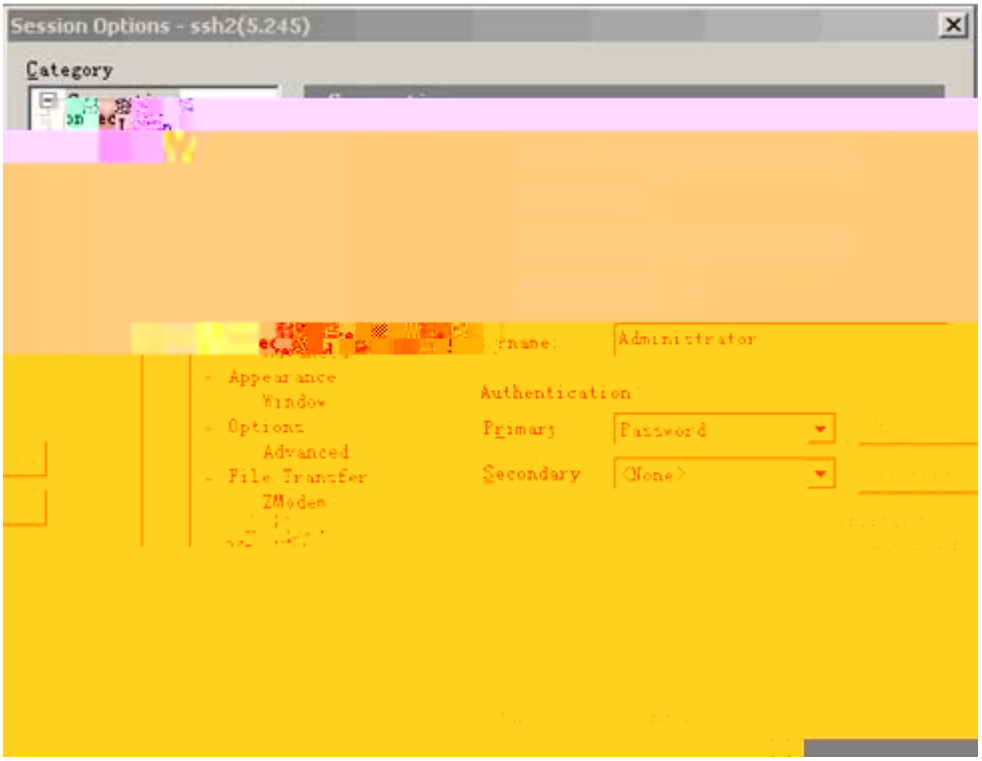
SSH
й Ю SSH Server й 3 Л Ь
б ЛЬЮ SSH

ٹ	
configure terminal	
ip ssh authentication-retries *retry times*	SSH ^ 0-5˜
no ip ssh authentication-retries	SSH ‰ 3 '

' Э ٹ é [SSH ٹ ¨Ą] Â

27.5. SSH

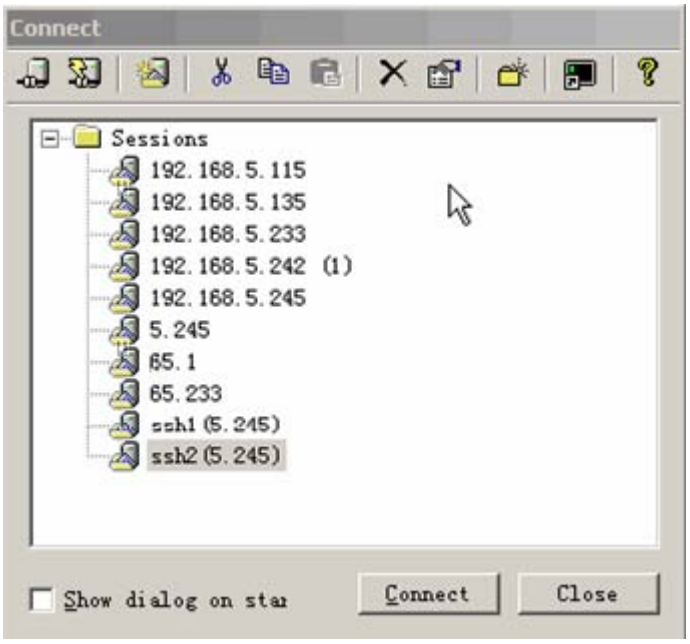
┘Л SSH ˘ SSH Server ╖ ˘ Ю ╖ Â Windows Telnet ˚ a SSH˝ Ь ˚ ˘ ' Putty˘ Linux˘ SecureCRT Â Ю Л ˚ SecureCRT ‰ Ў SSH ˘ Юفي'



في 1

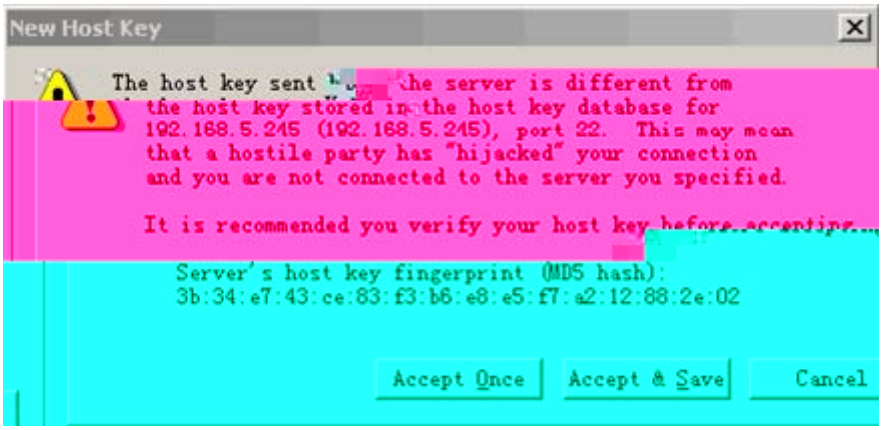
في 1 2 ˘ Protocol SSH2˝ Hostname ў IP ˘ ‰ 192.168.5.245˝ ‰ 22 . SSH Л˘ Username ‰ ┘˘ ┘ ˘ ┘ a ˘ Authentication ‰ ˘ ┘ ┘ Â Telnet Â

┘ OK˝ ЛЮ '



2 في

Connectˇ • ў ˘ Юفي'

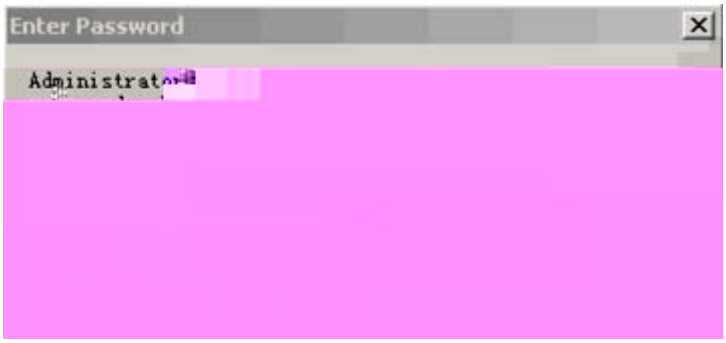


3 في

ў 192.168.5.245 ˘ ㄴ ˘

Accept & Saveˆ ٧ 3 ~ Accept Once(٧ ٧)ˇ

Ю ˘ Юفي'



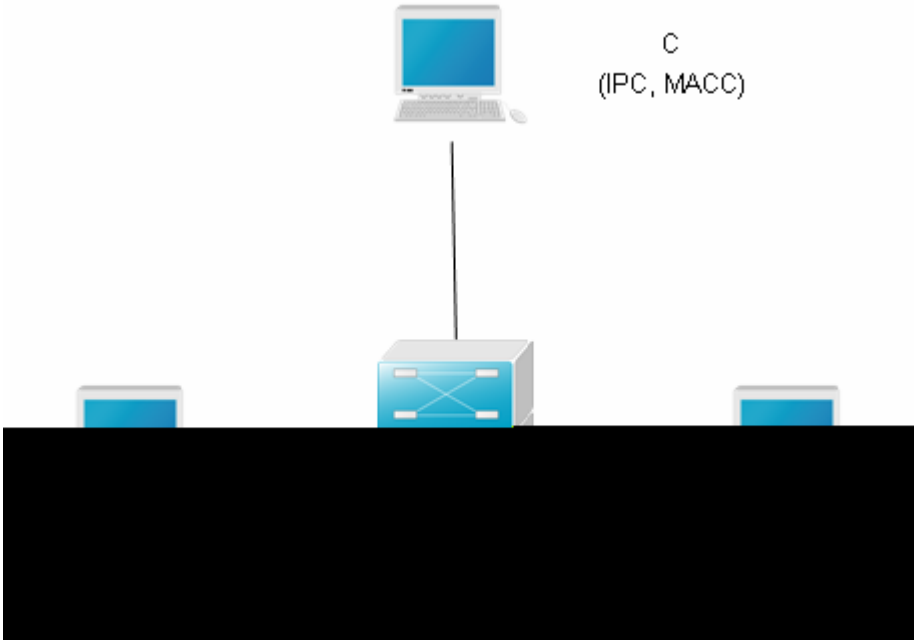
28 ╟ ARP

28.1. DAI

DAI Dynamic ARP Inspection, ɹ ŭ ╟ ARP Â.
ARP Â a arp Â

28.1.1. ARP

ARP ˘ ARP a ARP
Â ARP Â è ˘ ŋ
Â Ю'



في 1

في ' A,B,C Э˘ з Æ ɻ ˘
IP MAC† ŭˆ IPA, MACA˜ (IPB, MACB) (IPC, MACC), A
B ˘ A ARP ˘
B MAC Â B ARP ˘ ARP ˘
IPA MACA, ARP Â ÿ

MACC), B ARP (IPA, MACC). ˘ A B
⅃ C ˘ A à B Â C ¨I
˘ ⅄ ˘ ⅄ . ⅃ Â
⅄ Â

28.1.2. DAI ARP

DAI ⅄ ARP Â ў ЛЮ '
DAI ╖ VLAN Э в ARP

˘ DHCP ˘ в ARP
Â

Â

˘ Â

ARP DHCP snooping binding ˘ έ
ê DHCP snooping Ì Â

28.1.3.

Э ˘ ARP ˘ ÿ ⅄
DAI ˘ й ARP ' ÿ
ARP ˘ ш DAI Â

ђ ˘ γ й ⅄
˘ ў γ й Â

~

γ ⅃ Â

έ ҳ ip arp inspection trust, show ip arp inspection interface Â

28.1.4. ARP

DAI ˘ CPU ˘ Лυ ARP
˘ . ARP ˘ ⅃Лυ DAI ╖ ң
Ь Â Ю ARP 15 Â
a ⅄ Â ⅃Лυ γ Ю ip arp inspection limit-rate

ip arp inspection limit-rate show ip arp inspection interface

28.2. DAI

DAI **ARP**

ARP

DAI VLAN DAI

VLAN vid DAI vlan-id = vid ARP

DAI a ARP

show ip arp inspection vlan VLAN DAI

VLAN DAI

Ruijie(config)# **ip arp inspection vlan** *vlan-id*	VLAN *vlan-id* DAI
Ruijie(config)# **no ip arp inspection vlan** [*vlan-id*]	VLAN *vlan-id* DAI *vlan-id* VLAN DAI

28.2.1. VLAN DAI

28.2.2.

SVI

ARP DHCP snooping ARP

˘ ЛЬЮ ҳ'

ҳ	
Ruijie(config-if)# **ip arp inspection trust**	┘
Ruijie(config-if)# **no ip arp inspection trust**	a ┘

28.2.3. ARP

NFPP ˘ NFPP ╟ ╖ ˘ a ҳ Â

ҳ γ ˘ з γ ѝ SVI Â

Ю˘ ARP ѝ 15 ARP
Â a Â

1 ARP ˘ Л ˘ a
Â

┘Л **show ip arp inspection interface** ҳ γ Â

ARP ˘ ЛЬЮ ҳ'

ҳ	

Ruijie(config)# **show ip arp inspection vlan**	VLAN

28.3.2. γ DAI

γ DAI ˘ ЛьЮ ҙ'

ҙ	
Ruijie(config)# **show ip arp inspection interface**	γ DAI ˆ ˘ ~

28.4. ARP Y

~

S23 ң Э( )ˇ ARP ˚ ˘
CPU Ю˘ ˩ a ˘ ˘ ў ÿ
CPU Ю˘ ≠ ˩ a Â ε й˘ CPU
˘ ARP 150PPS~380PPS˘ Ѧ ˘
˘ ≠ 150PPS~380PPS˘ ˩ a
˩˘ Э ˩ ' ÿ CPU ˘ ÿ
˥˘ ARP

29 arp

29.1.

γ Э˘ Ю arp vlan ˘
arp Â

arp A arp mac ˘ ﻉ
vlan B ≠ arp ˘ B ﻉ Л∪ arp ˘
ip й ip˘ mac й mac Â A arp
Л˘ й B ˘ A
B˘ A Э ﻉ ˘ arp Â

ﻉ Л∪ γ Э arp arp Â
arp Л˘ ﻉ Л∪ Э arp ip
ip˘ ˘ ‡ ˘ arp Â ﻉ
Э Ю ARP ˘ ε pc a arp
Â

29.2. arp

29.2.1. arp

Â

29.2.2. arp

arp '

Ruijie(config-if)#**anti-arp-spoofing ip** *ip-address*	Ю arp ˘ ip й ip Â

ﻉ Л∪ Ю ҂ **no anti-arp-spoofing ip** *ip-address*
arp Â

29.3. arp

arp '

३	
Ruijie #**show anti-arp-spoofing**	Ю arp

30

30.1.

ѝ Ѧ ң ā ǂ ˘
ℸ Â Ѧ ң ЛЮ '

IP

IP

MAC

MAC

Expert

IPV6

ɻ Лυ é a ɻ Â

30.1.1. ӯ

ACLs ѝ (Access Control Lists)˘ ≠ ѝ ˆ Access Lists˜ ˘ ѝ ˘ ѝ Â ACLs Ⱨ Ѫ ‡ Э ' Â è ˘ ɻ Лυǂ ѝ ACLs QoS ACLs Â

ɻ Лυ ˘
Â ACLs è ǂ ˘ ÿ
˘ ך ˝ (Conditions) ā è
(Permit) (Deny) Â

˘ ACLs ÿ ˘ Qos
. ˝I ǂ Â

ACLs ˘ ѝ (Access Control Entry˙ ACE) Â ך ˝ ѝ Â

‡ ɻ Лυ à à Э ˘ ѡ
Â

30.1.2. ѝ Ѫ

˘ ў ЛЮ '

' Ѫ ˘ ɻ Ѫ

Â

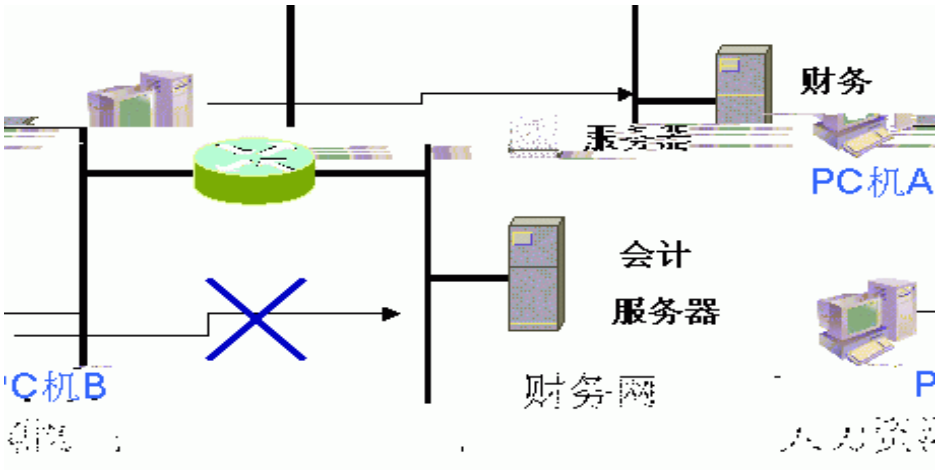
' ŕ ˘ Ю ‡˘ ⅃Л

Ь ⅃ WWW ˚ Ь˘ è Ь TELNET ‡ ~ ˘

˘ ⅃ ў Â

ي 1 ˘ ˘ ⅃ ў A Ь ˘ ў B

Â ЮЧ 1 Â



ي 1

30.1.3. Ю

⅃Л ╟ Â Ю˘

Â ⅃

˘ Л Â ╟ Л ˘

˘ Л ˘ Л ш ⅃Л ╟

Â

˘ ╟

≠ ' ⅃ ˘

Â ā ч ˘

˘ ⅃Л Л ˘ ⅄ IPSEC ╗

╗ ˘ ˘ ╗ Â

ЛЮÆ Э'

ˆ INTERNET˜

ч ĭ

.

ㅓ ш ㅓ ˇ ÿ ㅓ
ˇ ˚ ㅓ ㄱ ˇ ㅍ ㅕ ㅓ
ˇ a Ą Â

30.1.4. / ACL ầ ‡

ACL ˇ б ACL
ACE ㄱ ’ ACL ÿ ˇ б
ACL ACE ㄱ Â

a ㅖ ‡ ˇ ‡ ㅓ ㅖ ˇ ≠ ㅓ ㅓ è Â
ㅓ ACE˝ ACE ㅐ (Permit Deny) Â ACL
ACE ᄂ ᄂ ˇ '

γ (Layer 2 Fields)ʼ

48 Æ MAC (48 Æ)

48 Æ MAC (48 Æ)

16 Æ γ

Ь (Layer 3 Fields)ʼ

IP (ㅓ ᄂ IP ˇ ㅐ ㅐ
)

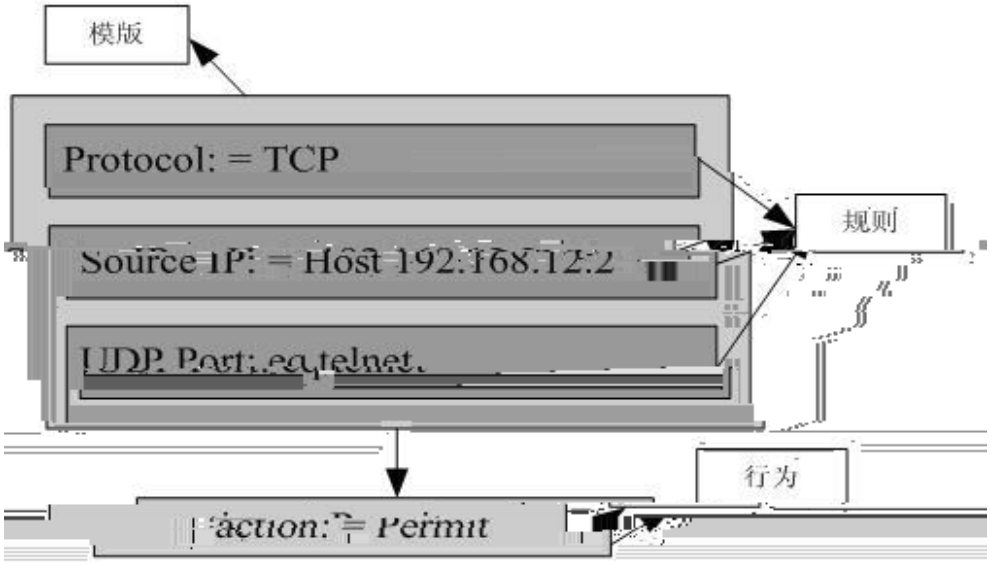
IP (ㅓ ᄂ IP ˇ ㅐ
ㅐ)

(Layer 4 Fields)ʼ

ㅓ ᄂ TCP ầ

ㅓ ᄂ UDP ầ

ACE ˇ ᄂ
ầ¦ Â ㅐ Â ˇ ACE
ÐFð,Â,X ACE y TM0}£) •ð €õ5à0} ,•gÀÏ"Ê‘ â¯1~@=AÓP



في 2 ACE' permit tcp host 192.168.12.2 any eq telnet ¦

ل ∩ ь (Layer 3 Field) (Layer 4 Field)
ˇ ≠ ل ∩ γ (Layer 2 Field) ˇ б ACL
a γ ь à γ à γ ь à Â
γ à ь à ˇ ل ∩

б ‡ ٦ ā ĭ Â

˘ Ⱶ ὴ ‡ ў

ЛЬЮ

Э

ѡ

IP ˆ Л ѝ 1 - 99 1300 - 1999 ў IP

ĭ ˘ IP ˆ Л ѝ 100 – 199 2000 - 2699 ЛЬЭ

ĭ Â è Ҷ

ĭ Â

˘ ⅃Л Л ⱶ ‡

è Л ⅃ Л ⅄ ˘ Л Л ⅃

Â a ˘ Л ˘ Â

30.2.1.1. Ĭ Ŀ ‡ Л

“ ” ‡ Л ĭ б

‡ a ٦ ˘ Â

Ю '

```
access-list 1 permit host 192.168.4.12
```

⅄ ў ѝ 192.168.4.12 ˘ è ў Â ѝ

Л ‡ Л' access-list 1 deny any Â

'

```
Access-list 1 deny host 192.168.4.12
```

⅄ ЛЭ Л˘ ‡ ў Â

~

Ⱶ ˘ Â “

” ⅄ Â

30.2.1.2. ‡ Л

╗ ‡ ╗ ⅄˘ Л … Л ⅄˘

ˇ ↙ Â Л υ ↿ Â ā
ǂ ˇ ↿ … ǂ б ↿ ˇ ↰
↿ Л ˇ a Ą è ‡ ↿ Â

… ↿ ˇ ˇ ‡ Л ↿ a Â

Ю '

```
access-list 101 deny ip any any
access-list 101 permit tcp 192.168.12.0 0.0.0.255 eq telnet
any
```

‡ ↿ IP ˇ Л υ 192.168.12.0/24 ў
Telnet ˇ й ‡ ↿ ↰ ˇ a Ą
Л ‡ ↿ Â

30.2.2. IP

ЛυЮ ч '

1. Ю

2.

ˇ ЛυЮ ч '

Ю ЛυЮ ҳ'

ҳ	ҵ
Ruijie(config)# **access-list** *id* {**deny** | **permit**} {src *src-wildcard* | **host** *src* | **any** } [**time-range** *tm-rng-name*]	Ю
Ruijie(config)# **interface** *interface*	
Ruijie(config-if)# **ip access-group** *id* { **in** | **out** }	

γ ACL Ю ЛυЮ ҳ'

ҳ	ҵ
Ruijie(config)# **ip access-list** { **standard** | **extended** } { *id* | *name* }	
Ruijie (config-xxx-nacl)# [*sn*] { **permit** | **deny** } {src	

Ruijie(config-if)# **ip access-group** *id* **in**	

ٸ ACL ˘ γ ٸ Л ٸ ACL ˘ ٸ Л
. ″I (ACE . ″I) Â

30.2.3. IP

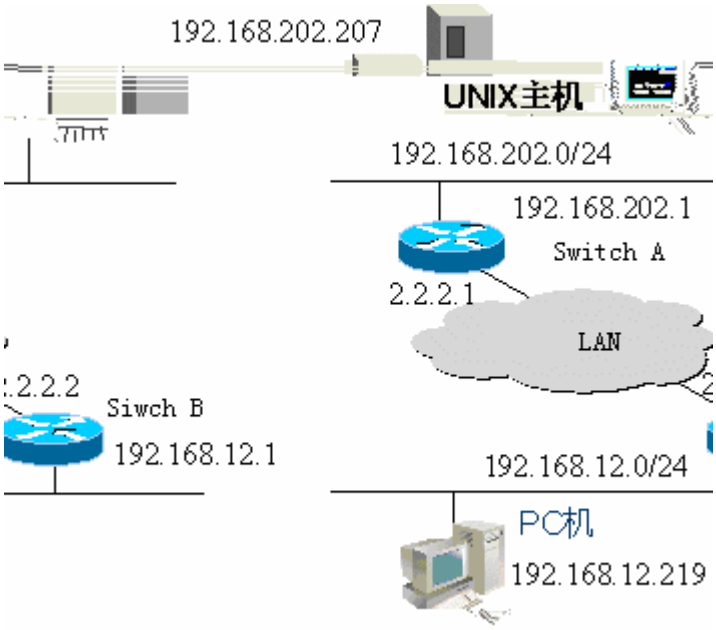
˘ ЛЮ ٶ'

```
Ruijie# show access-lists [ id | name ]
```

ٶ ٸ Л

30.2.4. IP

ч ٸ Switch A Switch B˝ في 1-3



في 3

Switch B Э ˘ ЛЮ ٦ '

192.168.12.0/24 ў ٸ Э UNIX ў TELNET

Switch B ⅄ Э a 192.168.202.0/24 ў ⊾Â

ЛЪЭ ᵴ˘ . ⅄ ⍞ Э ў
ў ˘ a Э ў Â

Switch B '

```
Ruijie(config)# interface GigabitEthernet 0/1
Ruijie(config-if)# ip address 192.168.12.1 255.255.255.0
Ruijie(config-if)# exit
Ruijie(config)# interface GigabitEthernet 0/2
Ruijie(config-if)# ip address 2.2.2.2 255.255.255.0
Ruijie(config-if)# ip access-group 101 in
Ruijie(config-if)# ip access-group 101 out
```

˘ ⅄ и 101 Ruij69(config)#

30.3. MAC

Э MAC ˘ ɻ
ʃ˘ Ɲ Â Ю ɻ Ɲ ʃ
MAC ʃ Â

	ʃ
MAC	700-799

30.3.1. MAC

… MAC ˘ Ⱶ ‡ ɻ Ɲ ɬ ˘ ɬ
б ‡ ɿ ɑ ɬ Â

MAC Ⱶ ɳ ‡ ў ƝЮ'

MAC

MAC

Ɲ

ɯ

MAC ˆ ʃ 700 -799˜ ў MAC
ɬ , ≠ ɻ Ɲ Ɲ ɿ Â

MAC ˘ ɻ Ɲ ɻ Ⱶ
‡˘ è ɻ ɻ ʃ ɻ ˘ Ɲ ɻ ɻ
Â

30.3.2. MAC

MAC ƝЮ ч '

1. Ⱶ MAC

2.

MAC ˘ ƝЮ ч '

Ю ƝЮ ʒ'

ʒ	ℸ
Ruijie(config)# **access-list** *id* {**deny** | **permit**}{**any** | **host** *src-mac-addr*} {**any** | **host** *dst-mac-addr*} [*ethernet-type*] [**cos** *cos*]	Ⱶ , ʒ é ʒ

Ruijie(config)# **interface** *interface*	
Ruijie(config-if)# **mac access-group** *id* **in**	

γ˘ ACL Ю ЛЬЮ ҳ'

ҳ	╗
Ruijie(config)# **mac access-list extended** {*id* | *name*}	
Ruijie (config-mac-nacl)# [*sn*] { **permit** | **deny** }{**any** | **host** *src-mac-addr*} {**any** | **host** *dst-mac-addr*} [*ethernet-type*] [**cos** *cos*]	ѝ ACL ╗ , ҳ ѐ ҳ
Ruijie(config-mac-nacl)# **exit** Ruijie(config)# **interface** *interface*	˘
Ruijie(config-if)# **mac access-group** {*id* | *name*} **in**	

ч ACL ' γ ┘Л ┘ ACL ˘ ┘Л
. ″I (. ″I ACE ң)

~

S23 *ethernet-type = 0x0600)* *Â*

30.3.3. MAC

˘ ЛЬЮ ҳ'

```
Ruijie# show access-lists [ id | name]
```

┘Л

30.3.4. MAC

MAC ˘ ЛЬЮ ╗ '

IPX ў 0013.2049.8272 a giga 0/1 Â

è ┘Л

Л ˇ Л Э 101, Л Э

```
Ruijie> enable
Ruijie# configure terminal
Ruijie(config)# mac access-list extended mac-list
Ruijie(config-mac-nacl)# deny host 0013.2049.8272 any ipx
Ruijie(config-mac-nacl)# permit any any
Ruijie(config-mac-nacl)# exit
Ruijie(config)# interface gigabitEthernet 0/1
Ruijie(config-if)# mac access-group mac-list in
Ruijie(config-if)# end
Ruijie# show access-lists
mac access-list extended mac-list
deny host 0013.2049.8272 any ipx
permit any 3519A6/TT1E941DB9>E201>]TJ?@"Yb3•b‘ŽÂ@qÆ]Æ=)ÆE…ADÆE–QVxaDÆ56 PE<Æ
Ruijie#
```

1 permit any any

Ruijie(config-if)# **ipv6 traffic-filter** *name* {**in** | **out**}	

30.4.2. IPv6

ˇ ЛЬЮ ҂'

```
Ruijie# show access-lists [name]
```

҂ ˩Л

30.4.3. IPv6

ˇ ЛЬЮ ╖ '

192.168.4.12 ў gi 0/1 Â

è a

```
Ruijie> enable
Ruijie# config terminal
Ruijie(config)# ipv6 access-list v6-list
Ruijie(config-ipv6-nacl)# permit ipv6 ::192:68:4:12/24 any
Ruijie(config-ipv6-nacl)# deny ipv6 any any
Ruijie(config-ipv6-nacl)# exit
Ruijie(config)# interface gigabitEthernet 0/1
Ruijie(config-if)# ipv6 traffic-filter v6-list in
Ruijie(config-if)# end
Ruijie# show access-lists
ipv6 access-list e{ÿÊâ¶m-èKÉõ0Aj/TT1 1 Tf-0.000406-22.02607C08336D02D
```

ل ЛЪ ا ACL˘ ACL ٨ ѝ TCP Ю ل Â
MAC IP ╗ Â

Ю TCP Flag

ٹ	╗
Ruijie(config)# **ip access-list extended** { *id* | *name* }	
Ruijie(config-ext-nacl)# [*sn*] [**permit** | **deny**] **tcp** *source source-wildcard* [**operator port** [*port*]] *destination destination-wildcard* [**operator port** [*port*]] [**match-all** *flag-name*][**precedence** *precedence*]	ѝ ╗ ٹ έ ٹ
Ruijie(config-exp-nacl)# **exit** Ruijie(config)# **interface** *interface*	˘
Ruijie(config-if)# **ip access-group** {*id* | *name*} {**in** | **out**}	

Ю TCP Flag

1) enable

```
Ruijie> enable
Ruijie#
```

2)

```
Ruijie# configure terminal
Ruijie(config)#
```

3) ACL

```
Ruijie(config)# ip access-list extended test-tcp-flag
Ruijie(config-ext-nacl)#
```

4) ╗ ACL

```
Ruijie(config-ext-nacl)# permit tcp any any match-all rst
```

5) ╗ deny

```
Ruijie(config-ext-nacl)# deny tcp any any match-all fin
```

6) ╗ ˘

7) end

```
Ruijie(config-ext-nacl)# end
```

8)

```
Ruijie# show access-list test-tcp-flag
ip access-lists extended test-tcp-flag
10 permit tcp any any match-all rst
20 deny tcp any any match-all fin
```

30.6. . ″l ACL

ὴ ACE . ″l ˇ ACL ˇ Л ACL Ю ACE ˇ Л - ˇ έ Ю'

ACE Л Л '

Л Л ˇ a Л Л ACE Л ὴ Л Â

Л ACE Л ˇ ч ACE ACE Â

ACL Л Л Â

ip access-list resequence {*acl-id*| *acl-name*} *sn-start sn-inc* ϟˇ ϟ ϟ Â

Л Э ϟˇ ACL list Ю ace ˇ ɻ ὴ tst_acl ACL Ю ace Л ὴ'

```
ace1: 10
ace2: 20
ace3: 30
```

ip access-list resequence *tst_acl 100 3*, ACE Л Ю

```
Ruijie(config)# ip access-list resequence tst_acl 100 3
ace1: 100
ace2: 103
ace3: 106
```

a sn-num ╗ ace4 ˇ Л Ю

```
Ruijie(config-std-nacl)# permit Â Â Â
ace1: 100
ace2: 103
ace3: 106
ace4: 109
```

seq-num = 105 ╗ ace5 ˇ Л Ю

```
Ruijie(config-std-nacl)# 105 permit Â Â Â
ace1: 100
ace2: 103
ace5: 105
```

```
ace3: 106
```

Ш

ЛЛ Â ѝ Time Range

Ш ˇ ‡ Ш

Ю ЛЛ Ш ACL ѝ ˇ HTTP

```
Ruijie(config)# time-range no-http
Ruijie(config-time-range)# periodic weekdays 8:00 to 18:00
Ruijie(config)# end
Ruijie(config)# ip access-list extended limit-udp
Ruijie(config-ext-nacl)# deny tcp any any eq www time-range
no-http
Ruijie(config-ext-nacl)# exit
Ruijie(config)# interface gigabitEthernet 0/1
Ruijie(config-if)# ip access-group no-http in
Ruijie(config)# end
```

Ю ѝ Time Range :

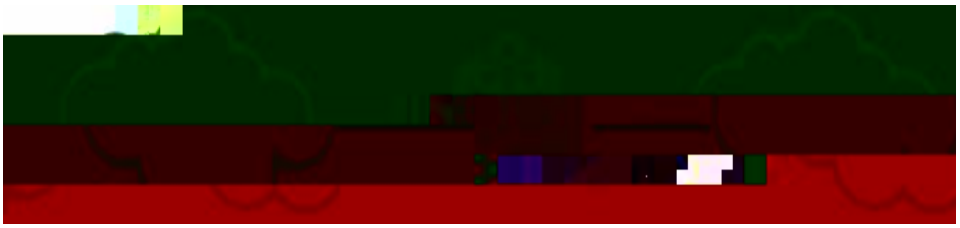
```
Ruijie# show time-range
time-range entry: no-http(inactive)
periodic Weekdays 8:00 to 18:00
time-range entry: no-udp
periodic Tuesday 15:30 to 16:30
```

30.8.

30.8.1. TCP Л

TCP Flag Л ACL

30.8.1.2. في



في 4

Э في ˘ Ь ч ˘ А б G3/1 ˘
В б G3/2 Â

30.8.1.3. ĵ

B ў A TCP ˘ ↓ ÿ B
G3/2 TCP . ↓ Â¦ TCP ↓
˘ TCP TCP SYN Æ з ACK Æ й 0 Â
˘ ↓ Л↻ Match-all ˘ G3/2
↓˘ TCP SYN Æ 1 з ACK Æ й 0 ˘ . ↓
A ↓ B Â

30.8.1.4.

1) ⅋

```
#
Ruijie# configure terminal
#          Ю…              ACL101
Ruijie(config)# ip access-list extended 101
#     TCP Flag  SYN=1˘ з è ˆ      ACK     Æ˜      Æ й 0
Ruijie(config-ext-nacl)# deny tcp any any match-all syn
#     è  IP
Ruijie(config-ext-nacl)# permit ip any any
```

2) **Э**

```
#
Ruijie(config-ext-nacl)# exit
```

G3/2

```
Ruijie(config)# interface gigabitEthernet 3/2
```

ACL 101 G3/2 ⅃

```
Ruijie(config-if)# ip access-group 101 in
```

3)

Ю˜ **show** ⅋ ACL

```
Ruijie# show access-lists 101
```

```
ip access-list extended 101
10 deny tcp any any match-all syn
20 permit ip any any
```

31 QOS

31.1. QOS

Internet Internet Э
a a “ й”
a Â QOS Â

QOS Quality of Service
й QOS QOS
Â QOS й à ╟ à
Â

31.1.1. QoS

a QoS a
a Â
Â
QoS Â
Â

QoS Лu IETF Internet Engineering Task Force DiffServ
Differentiated Servece Mode й Â DiffServ
a IP
DiffServ IPv4 TOS Type Of Service Ipv6
Traffic Class 6

DiffServ ˘ ⅄ǂ ⅄ ⅄
Ŀ ˘ a ⅄ǂ ⅄ a ⅄ Ŀ Â ǂ
⅄ Л Э ў à è Â ⅄ Л a ⅄
a ⅄ и Â Л и
˘ и
˘ Â
˘ и a ⅄ ˝I ˘ и
˘ ˝I æ à ⅄ è Â
и DiffServ иˆ Per-hop Behavior˜ Â

Э иˇ ж DiffServ ˘
⅄ Л End-to-end QoSsolution Â

31.1.2. QOS

31.1.2.1. Classifying

Classifying ǂ ˘ è ǂ
Л CoS ˘ ǂ ╟ Ŀ
CoS Âǂ ˘
QoS Policy-map ⅄ˇ ǂ Э ˘ ÿ
Â

IP ˘ ЛЮ ‡ '

a QoS ˘ γ a User Priority bitsˇ ж ⅄ Л CoS QoS Â
CoS User Priority bits ˘ ⅄ и 0 7 Â

QoS ˘ γ User Priority bitsˇ ж ⅄ Л ÿ CoS Â

Л Э ч ‡ ⅄ QoS Â
QoS

″I . ″I Â

Э Ь ‡ ⅃ ⅃ Э Â Ю˘ Э Ь
‡ 3 à 2 à 1 . ″I Â. ″I ACLs ˘ Ю˘
⅃ ‡ 2 à 1˘ ˘ QoS ˘ ‡
‡ 2 1 ÿ ÿ Э QoS ' QoS
˘ ж DSCP 0 Â

IP ˘ ⅃ Л Л Ю ‡ '

ù Trust ip-precedence˘ ‡ ÿ IP Ip precedence ^ 3 ~ ⅄ ˘ ′I CoS ^ 3 ~ Â

ù Trust cos˘ ‡ CoS ^ 3 ~ ⅄ Ip Precedence ^ 3 ~ Â ч ˘ γ a User Priority bits˘ ж ⅃ Л CoS CoS Â ⅄ γ User Priority bits˘ ‡ ÿ ⅃ CoS Â

Policy-map Ip access-list (Extended) ACLs ˘ ж Э˘ ⅄ IP à IP à Protocol à Л TCP/UDP ٦ ACLs˘ Л DSCP Â ˘ Policy-map˘ ù è DSCP ˘ ‡ ‡ 1 à 2 . ″I Â

IP ‡ ˘ Л Э ‡ ⅃ ⅃ Л ⅃ Э Â Ю˘ Э ‡ 3 à 2 à 1 . ″I Â

Э CoS-to-DSCP map à IP-precedence-to-DSCP map ⅄ Â

31.1.2.2. Policing

Policing . ˘ ↑ ⅄˘ ↑ ´ Â Policing ╟ ˘ Police ˘ ж ˘ ˘ ⅄ DSCP Â

QoS ˘ Policing ╟ ⅃ Â Policing ╟ ˘ ж ↑ DSCP a ˘ ≠ a Marking ╟ Â

31.1.2.3. Marking

Marking˛ ˘ Classifying Policing ╟ Л˘ ѝ ѓ
DSCP Э Ю ˘ Marking ╟ ѝ
QoS ˘ ↓Л Ъ QoS ACLs ↓ QoS ˘ ≠ ↓Л Ъ
Trust QoS ˘ ˘ Trust DSCP ÿ IP
DSCP Â

31.1.2.4. Queueing

Queueing˛ ˘ DSCP | ²*•¤ ñtz Ñ T"Å€ ˘
a ↓ a ↓ Ь Â

Э 8 ˘ Э DSCP-to-CoS Map
Cos-to-Queue Map ч ò

╖ . Â QoS ╖ ˘ ┘Л Policy Map ˘ й Off . ┘ ÂЛЮ й QOS '

CoS	0
	8
	WRR
QueueWeight	1:1:1:1:1:1:1:1
WRR Weight Range	1:15
DRR Weight Range	1:15
	No Trust

Cos

CoS	0	1	2	3	4	5	6	7
	1	2	3	4	5	6	7	8

CoS to DSCP

CoS	0	1	2	3	4	5	6	7
DSCP	0	8	16	24	32	40	48	56

IP-Precedence to DSCP

IP-Precedence	0	1	2	3	4	5	6	7
DSCP	0	8	16	24	32	40	48	56

DSCP to CoS

DSCP	0	8	16	24	32	40	48	56
CoS	0	1	2	3	4	5	6	7

31.2.2. CoS

┘Л Ю CoS

Ю˘ CoS й 0

٩	
configure terminal	
interface *interface*	
mls qos cos default-cos	CoS , default-cos й CoS , ٧ й 0 7

no mls qos cos	CoS

Ю Interface g0/4 CoS й 6

```
Ruijie# configure terminal
Ruijie(config)# interface g 0/4
Ruijie(config-if)# mls qos cos 6
Ruijie(config-if)# end
Ruijie# show mls qos interface g 0/4
Interface: GigabitEthernet 0/4
Attached input  policy-map:
Default COS: trust dscp
Default COS: 6
Ruijie#
```

31.2.3. Class Maps

ы Л Ю … Class Maps

ъ	
configure terminal	
ip access-list extended {*id* | *name*} **…** **ip access-list standard** {*id* | *name*} **…** **mac access-list extended** {*id* | *name*} **…** **ipv6 access-list extended** *name* **…** **access-list** *id* [**…**]	… ACL ACL
[**no**] **class-map class-map-name**	… class map ,class-map-name … class map ы no class map
[**no**] **match access-group** {*acl-num* | *acl-name* }	ъ ACL, acl-name й … ACL ы ў acl-num й … ACL id no ъ

ў Л Ю … ы й Class1 Class-map ў
ACL:acl_1 Â Class-map ї й 80 TCP

```
Ruijie(config)# ip access-list extended acl_1
Ruijie(config-ext-nacl)# permit tcp any any eq 80
Ruijie(config-ext-nacl)# exit
Ruijie(config)# class-map class1
```

```
Ruijie(config-cmap)# match access-group acl_1
Ruijie(config-cmap)# end
```

31.2.4. Policy Maps

ل Л Ю … Policy Maps

٩	
configure terminal	
[**no**] **policy-map policy-map-name**	… policymap ˘ policy-map-name … policymap ل no policy map
[**no**] **class class-map-name**	… ˚ ˘ class-map-name … class map ل no ˚
[**no**]**set ip dscp new-dscp**	ѝ IP ip dscp ’ IP ˘ a ’ new-dscp DSCP ˘ ل ң a ل a ل
police rate-bps burst-byte [**exceed-action** {**drop** | **dscp dscp-value**}] **no police**	ѝ ˚ ╟ ˘ rate-bps (kbps)˘ burst-byte (Kbyte)˘ drop ˚ ˘ dscp dscp-value ˚ DSCP ˘ dscp-value ل ң a ل a ل

ل Policy Maps Э˘ ‡ è police м Â ´ Policy Maps police ˘ ل Policy Maps˜ ل Policy Maps ل б è a ˘ è Class ل Л è ~ Â

˘ Л Ю … ل ѝ Policy1 Policy-map˘ Policy-map Gigabitethernet 1/1

```
Ruijie(config)# policy-map policy1
```

```
Ruijie(config-pmap)# class class1
Ruijie(config-pmap-c)# set ip dscp 48
Ruijie(config-pmap-c)# exit
Ruijie(config-pmap)# exit
Ruijie(config)# interface gigabitethernet 1/1
Ruijie(config-if)# switchport mode trunk
Ruijie(config-if)# mls qos trust cos
Ruijie(config-if)# service-policy input policy1
```

31.2.5. Policy Maps

ل Л Ю Policy Maps Э

٩	
configure terminal	
interface *interface*	
[**no**] **service-policy input policy-map-name**	… Policy Map Э' policy-map-name … policy map ل ˘ input ѝ

31.2.6.

Ю˝ ѝ WRR˝)

ل Л ЛЮ . ˝I , QOS Â

٩	
configure terminal	
mls qos scheduler wrr	**wrr** ѝ
no mls qos scheduler	ѝ **wrr**

31.2.7.

ل Л ЛЮ

٩	
configure terminal	

wrr-queue bandwidth weight1...weightn	weight1...weightn ὶй ˇ ઘ QOS
no wrr-queue bandwidth	no

Ю wrr ὶй 1:2:3:4

```
Ruijie# configure terminal
Ruijie(config)# wrr-queue bandwidth 1 2 3 4
Ruijie(config)# end
Ruijie# show mls qos queueing
Cos-queue map:
cos qid
--- ---
0   1
1   2
2   3
3   4
4   5
5   6
6   7
7   8
wrr bandwidth weights:
qid weights
--- -------
0   1
1   2
2   3
3   4
4   5
5   6
6   7
7   8
Ruijie(config)#
```

31.2.8. Cos-Map

ઘЛ Cos-Map ˇ Cos-Map QOS

૧	
configure terminal	

priority-queue cos-map *qid cos0* [*cos1* [*cos2* [*cos3* [*cos4* [*cos5* [*cos6* [*cos7*]]]]]]]	qid ѝ id,cos0..cos7 ѝ CoS Â
no priority-queue cos-map	Cos-Map

Ю CoS Map

```
Ruijie# configure terminal
Ruijie(config)# priority-queue Cos-Map 1 2 4 6 7 5
Ruijie(config)# end
Ruijie# show mls qos queueing
Cos-queue map:
cos qid
--- ---
0   1
1   2
2   1
3   4
4   1
5   1
6   1
7   1

wrr bandwidth weights:
qid weights
--- -------
0   1
1   2
2   3
3   4
4   5
5   6
6   7
7   8
```

31.2.9. CoS-to-DSCP Map

CoS-to-DSCP Map CoS DSCP , ٦ Л Лю CoS-to-DSCP Map ,CoS-to-DSCP Map QOS

٣	
configure terminal	

mls qos map cos-dscp *dscp1...dscp8* **no mls qos map cos-dscp**	CoS-to-DSCP Map ,dscp1...dscp8 CoS 0 7 DSCP ,DSCP ң a ⅄ a ⅄

Ю '

```
Ruijie# configure terminal
Ruijie(config)# mls qos map cos-dscp 56 48 46 40 34 32 26 24
Ruijie(config)# end
Ruijie# show mls qos maps cos-dscp
cos dscp
--- ----
0   56
1   48
2   46
3   40
4   34
5   32
6   26
7   24
```

31.2.10. DSCP-to-CoS Map

DSCP-to-CoS DSCP CoS ˘ Л∪ и

DSCP-to-CoS Map QOS , ⅄ Л∪ ЛUЮ
DSCP-to-CoS Map :

٩	
configure terminal	
mls qos map dscp-cos *dscp-list* **to** *cos*	DSCP to COS Map˘ *dscp-list* DSCP ˘ DSCP ĵ ˘ ң a ⅄ a ⅄' *cos* ' DSCP CoS ˘ и' 0 7'
no mls qos map dscp-cos	и

˘ ЛUЮ DSCP 0 à 32 à 56 б'

```
Ruijie# configure terminal
Ruijie(config)# mls qos map dscp-cos 0 32 56 to 6
Ruijie(config)# show mls qos maps dscp-cos
dscp cos    dscp cos    dscp cos    dscp cos
```

31.3. QOS

31.3.1. class-map

ـلЛ ЛЬЮ class-map

ٹ	
show class-map [*class-name*]	class map

'

```
Ruijie# show class-map
Class Map cc
Match access-group 1
Ruijie#
```

31.3.2. policy-map

ـلЛ ЛЬЮ Policy-map

ٹ	
show policy-map [*policy-name* [**class** *class-name*]]	QoS policy map˘ policy-name ѝ policy map ـ˘ class class-name policy map class map Â

'

```
Ruijie# show policy-map
Policy Map pp
Class cc
Ruijie#
```

31.3.3. mls qos interface

ـلЛ ЛЬЮ qos

ٹ	
show mls qos interface [*interface* | *policers*]	QoS ˘ Policers Policy map Â

'

```
Ruijie# show mls qos interface gigabitEthernet 0/4
Interface: GigabitEthernet 0/4
Attached input  policy-map: pp
Default COS: trust dscp
Default COS: 6
Ruijie#show mls qos interface policers
Interface: GigabitEthernet 0/4
Attached input  policy-map: pp
Ruijie#
```

31.3.4. mls qos queueing

ٸ Л Ъ ЛЪЮ qos

٣	
show mls qos queueing	QoS ˘ CoS-to-queue mapˇ wrr weight drr weightˇ

Юՙՙՙ

6 7
7 8

31.3.5. mls qos scheduler

┘Л ЛЮ

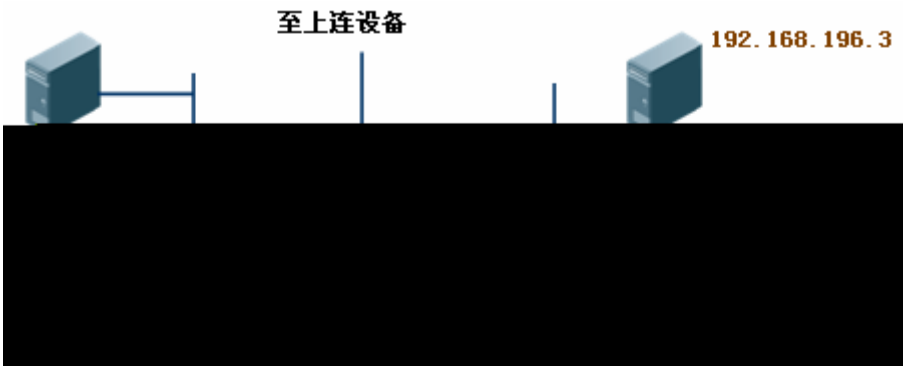
31.4. QOS

31.4.1.

31.4.1.1.

Ὢ ᛘ Ⱶ ˇ ὲ Ⱡ
G0/2 Â Ⱡ ⱶ a
512Kbpsˇ ɜ Â

31.4.1.2. في



31.4.1.3.

ⱰЪЮ ᛎ б QOS ACL ⱬ

```
#
Ruijie#configure
Enter configuration commands, one per line.  End with CNTL/Z.
#  Ⱶ ⱶ ѝ salary_acl        ACL
Ruijie(config)#ip access-list standard salary_acl
#  Ⱶ  ‡ˇ             Ⱡ
```

```
Ruijie(config-std-nacl)#permit host 192.168.217.223
#
Ruijie(config-std-nacl)#exit
#... ɹ ѝ salaryclass  class mapˇ  class-map
Ruijie(config)#class-map salaryclass
#  Ьѫɿɹ  ‡
Ruijie(config-cmap)#match access-group salary_acl
#
Ruijie(config-cmap)#exit
#... ɹ ѝ salarypolicy  ˇ  policy-map
Ruijie(config)#policy-map salarypolicy
#  ɬ  ‡ ѝ salaryclass
Ruijie(config-pmap)#class salaryclass
#  Ь ɹ  a  512Kbpsˇ  ѝ
32 Kbyteˇ  з  Â
Ruijie(config-pmap-c)#police 512 32  exceed-action drop
#  class-map
Ruijie(config-pmap-c)#exit
#
Ruijie(config-pmap)#exit
#  G0/2
Ruijie(config)#interface gigabitEthernet 0/2
#  salarypolicy  G0/2  ɹ
Ruijie(config-if)#service-policy input salarypolicy
#
Ruijie(config-if)#end
#  Ю  show  ҁ
a m - y c i l o p # w o h s # R u i j i e # s h o w  m l s  q o s  i n t e r f a c e  p o l i c e r s t A
```

```
     police 512 32 exceed-action drop

Ruijie#show class-map salaryclass
 Class Map salaryclass
   Match access-group salary_acl

Ruijie#show access-lists salary_acl
ip access-list standard salary_acl
 10 permit host 192.168.217.223
```

32 RLDP

32.1. RLDP

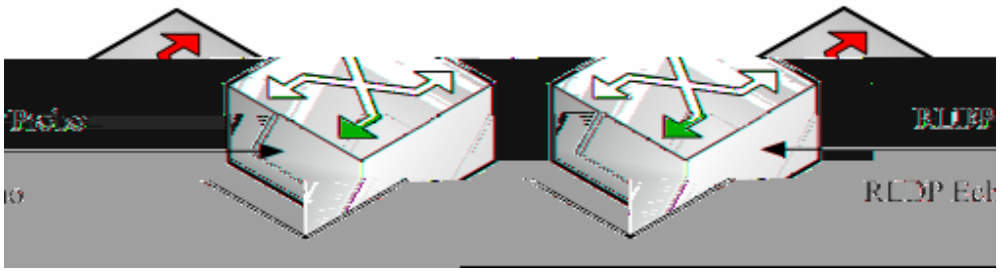
32.1.1. RLDP

RLDP Rapid Link Detection Protocol ˇ Л ў
Л Â

Л Л ˘ ╟
Â ˘ Ю
Й Л ˘ ″I Э ″I ˘ ″I
˘ Э linkup ˘ У .
Â Ą ч Л Л ˘
˘ Л Â

RLDP Л Л Л ˘ Л
à Л Л à Â

RLDP ч RLDP ˘ Юفي '

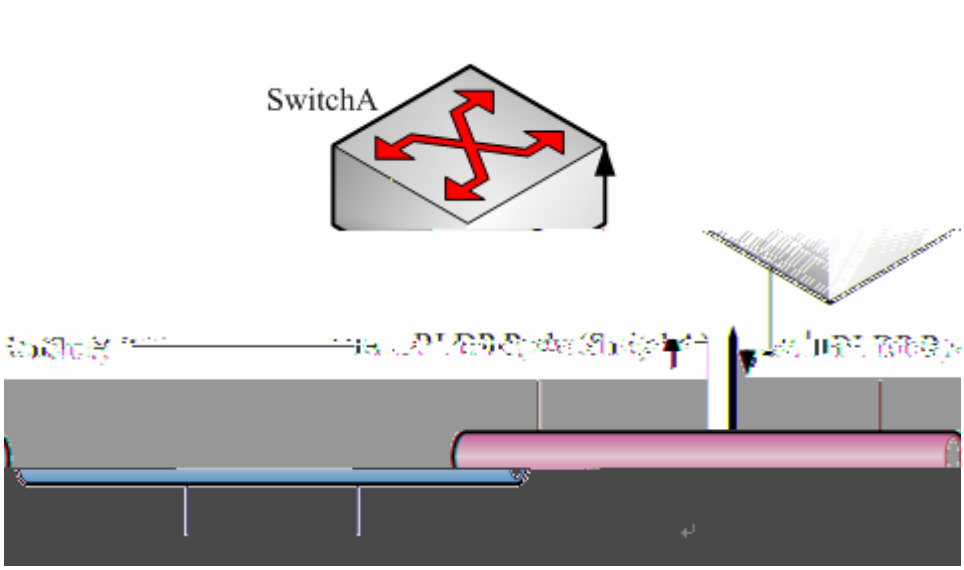


1 في

RLDP Ђ ч ' (Probe) (Echo).RLDP
RLDP з linkup Probe ˘
˘ Л ≠ ≠ Probe Â
Э ˘ Ж
Л Â ‡ Â

RLDP ل ل ˘ ч
RLDP з a RLDP Ю ˘ ‡ RLDP
Â

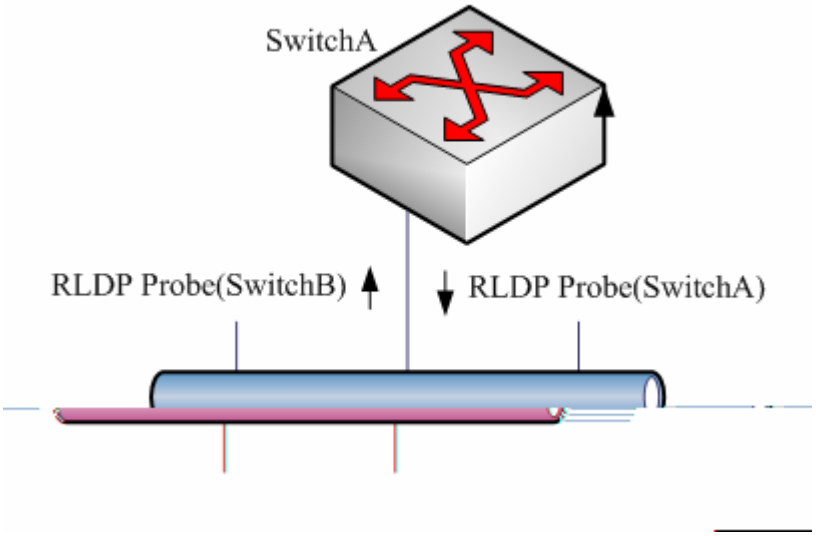
32.1.2. ή



2 في

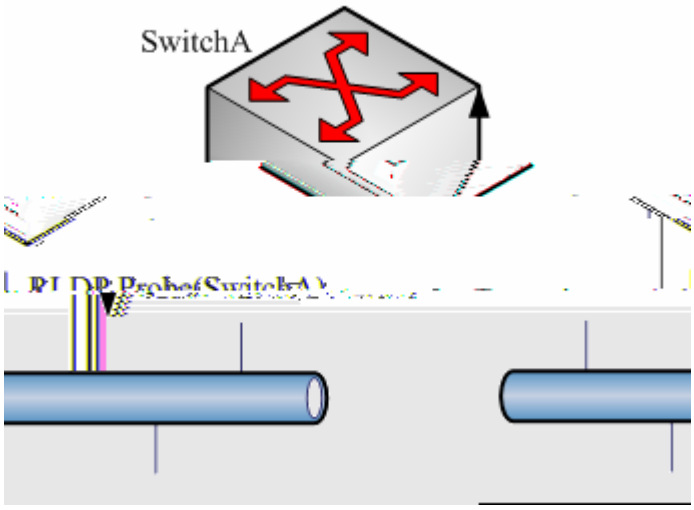
Э Â Э في ˘ RLDP
Э RLDP ˘ ‡ й ˘
RLDP ˘ à à
svi à ˗ Â

ل '



في 3 ل

ل ن ن ^
"I ل ل ~ Â Э في ˇ RLDP
Э ن ‡ ﻯ ل ˇ RLDP
Â ﻝ RLDP
ˇ ≠ ﻯ ل Â
ن ل '



في 4 ن ل

ن ل ч Â Э في ˇ
RLDP ﻝˇ ˇ
ﻫ ﻯ ن ل Â ÿ Э ˇ ن ل Э ل
Â

ч RLDP ≠ ѝ ↰ ⅄ ⅄ ˘
↰ ⅄ ⅄ ч RLDP˘ ЛЬ
Â

32.2. RLDP

ÿ ЛЬЮ

RLDP

RLDP

RLDP

RLDP

RLDP

RLDP

32.2.1. RLDP

RLDP	DISABLE
RLDP	DISABLE
	2S
	3

~

RLDP ↰ (AP) Â

RLDP untag Â

RLDP block ╗ STP Â ≠
ѝ blcok˘ ‡ stp˘ ‡ STP ⅄
˘ ↰ STP ˘ RLDP. block Â

32.2.2.

```
Ruijie# show rldp interface gigabitEthernet 0/5
port state     : normal
local bridge   : 00d0.f822.33ac
neighbor bridge : 0000.0000.0000
neighbor port   :
unidirection detect information:
action : shutdown svi
state  :  normal
bidirection detect information :
action : warnning
state  :  normal
loop detect  information    :
action : block
state  :  normal
```

'

a shutdown-svi ˘
a Â

Ю a RLDP ˘ ‡
Â

aggregate port Э block з ˘ ‡
a ↓ aggregate port ˘ ‡
a Â

RLDP ˘ ‡ Â ↓Л log ╖
log Ь ˘ log ↓Л 3 Â

↓ ˚ ˘ ң block Ў cpu,
ѝ block ˘ block ˘ Ў
cpu, ˘ Л
shutdown-port Â

32.2.4. RLDP

RLDP ╖ RLDP Probe Â

Ю˘ Ю RLDP ' RLDPRLDPRLDP

32.2.5. RLDP

RLDP ╖ ˆ × ˜ ÿ
ˇ ‡ ѝ ˇ έ
Â

ЮЎ Ю RLDP '

҂	
Ruijie(config)# **rldp detect-max** *Num*	ˇ num ↓ 2-10, 2 Â
Ruijie(config)# **end**	Â

ˇ ҂ **no** Â

↓ ┘ ↑ ┘ Ю ˇ
↓ ˇ Â

32.2.6. RLDP

shutdown-port ⁄ ў ╟ RLDP ˇ
ā ˇ ‡ ↓ Л҃ ҂ ╟ shutdown
RLDP Â ҂ ≠ è Â

ЮЎ Ю RLDP '

҂	

ˇ rldp **errdisable recover interval**
ˇ ≠ detect-interval* detect-max **errdisable recover**
interval ,Л∪ Â

32.3. [1] Ä

```
state  : error
```

ÿ Э ч Л Ъ ˇ GigabitEthernet 0/1 Л ˇ з ˇ й (normal) Â GigabitEthernet 0/24 ч Л ˇ з ч Л Â

32.3.2. RLDP

Ю Ю ҙ RLDP '

D B ˘ Â

B ↓ CPU ˘ a ˘
Л˘ Л Â A Л˘
˘ è ˘ a Â Ю γ C à D
Л˘ è ˘ ˘ ÿ
Â

33.3. TPP

TPP ╖ ╖ Â ╖
╖ ˘ Ю˘ ╖ ˘
˘ ң Â a a ┘
Â ╖ ╖ ˘ ╖
˘ ˘
˘ Пђ

Ruijie# **copy running-config startup-config**	

no topology guard ℸ

33.3.2.

ʒ Ю'

ʒ	
Ruijie> **enable**	ʒ
Ruijie# **config terminal**	
Ruijie(config) **interface gi** *0/1*	
Ruijie(config-if)# **tp-guard port enable**	ℸ
Ruijie(config-if)# **end**	ʒ

no tp-guard port enable ˘ ʒ ˧ γ

Â a AP Â

й ˘

˘ ˩ ˘

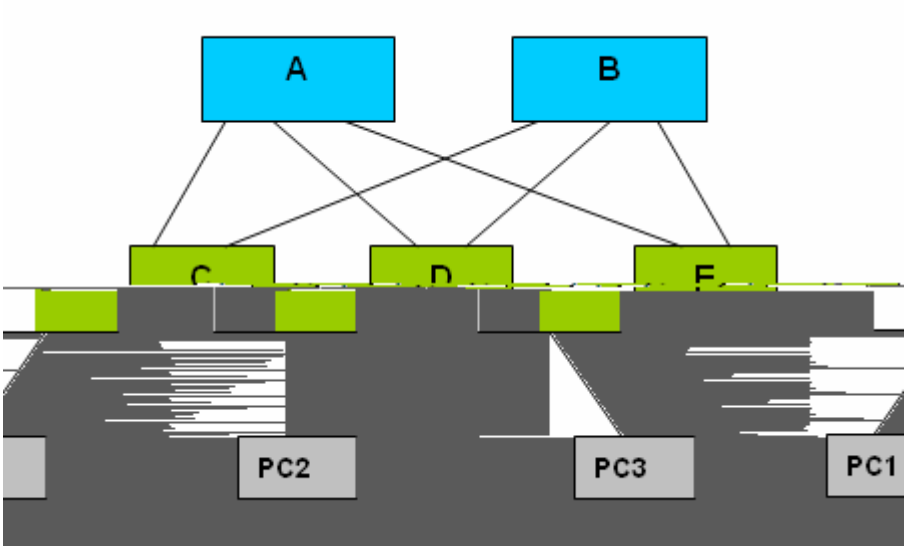
a ˩ Â ℸ

ˏ

Â

33.4. TPP ή

Юفي й ˧ في'



في 2

34

34.1.

Flash

Â

34.2.2. ⁋

ÿ ⁋ Â

ЮЎ Ю ⧵'

⧵	
Ruijie# **cd** *directroy*	directory Â
Ruijie# **cd** *../*	Э
Ruijie# **cd** *./*	

ЛЪЮ Ю MNT Document '

`Ruijie# cd mnt/document`

Л Ї̣ MNT/Document Ю

34.2.3.

Â

ЮЎ Ю **copy** ⧵ Л Л

⧵	
Ruijie# **copy flash:** *filename* **flash:** *directoryname*	

Ruijie# **dir** *directory*	Â

ЛЬЮ

```
Ruijie# dir
Ruijie# dir ../bak
```

34.2.5. У

Ю˘ Ю ҳ ⅃Л У

34.2.8.

Ю Ю Л

Ruijie# **pwd**	

34.2.9.

Ю Ю

Ruijie# **del** *filename*	Â

Ю MNT Ю large.c

```
Ruijie# del mnt/large.c
```

34.2.10.

Ю Ю Л

Red-Giant# **rmdir** *directoryname*	Â

ЛЮ MNT

```
Ruijie# rmdir mnt
```

35

35.1.

˘ ↓ У UP à DOWN ˘ Y ˚
à Â Л ң ˘ ↓ У
Y ˚ ˘ ╟ ^ ~ ˘ ↓ Л Ъ
^ Л à VTY ~ Э Ў^ ŭ ш à FLASH˜ Э
Э Ь Э˘ ↑ Æ Â ↓ ѝ
Л ˘ ↓ Л Ъ Э Л˘
. ˝I ↑ Â

35.1.1.

Л ң Ю'
<priority> seq no: timestamp sysname
%ModuleName-severity-MNEMONIC: description
' < ˝I > Л ↓ ↓ -ш - '
. ˝I ¯ 8¯ ш
'

```
<189> 226:Mar  5 02:09:10 S3250 %SYS-5-CONFIG_I: Configured from console
by console
```

~

. a . ˝I ˘ . ˝I ↓
Syslog Server Â

35.2.

35.2.1.

Ю ˘ ˘ a .
˘ a Syslog Ь ˘ ≠ a
Ў^ ŭ ш à FLASH˜ Э Â

˘ Ю ЛЪЮ ⅋'

⅋	
Ruijie(config)# **logging on**	
Ruijie(config)# **no logging on**	

~

Ю˘ a ˘ . ˘ ‡ ⅃ Л Ъ a ⅄ . Â

35.2.2.

Л Ъ ⅄˘ a ⅃ Л Ъ ⅄ Э ˘ ≠ ⅃ Л Ъ a ⅄ Â

a ⅄ ˘ Ю ЛЪЮ ⅋'

⅋	
Ruijie(config)# **logging buffered** [*buffer-size* | *level*]	ă ш
Ruijie# **termninal monitor**	VTY Э
Ruijie(config)# **logging** *host*	Э Syslog Sever
Ruijie(config)# **logging file flash:***filename* [*max-file-size*] [*level*]	FLASH Э

Logging Buffere ă ш Â ă ш ˘ . ă ш Л Ъ ⅄˘ Â ă ш ˘ ⅋ **show logging** Â ă ш ˘ ⅋ **clear logging** Â

Termninal Monitor VTY(Telnet)Э Â Logging Host Syslog Server ˘ ⅄ ⅊ 5 Syslog Server Â ⅄ ⅅ Syslog Server Â

~

Syslog Server˘ ⅄

˘ ‡ a Syslog Server Â

Logging File Flashˈ FLASH ˘ ˚ ˩ a ˚
˩ ˩ Â ˚ ˩ ѝ ѝ TXTˇ ˚ ˩ ˩ Â

More Flashˈ Filename ҄ ˧ Л Flash ˚

~

ˆ FLASHˇ FLASHˇ
FLASH Â FLASHˇ FLASH Â

35.2.3.

Э ╗ ˬ ˘ Ю ЛЮ ҄ˈ

҄	
Ruijie(config)# **service timestamps** *message-type* [**uptime** | **datetime**]	
Ruijie(config)# **no service timestamps** *message-type*	

ч ˈ ╟ (Uptime) (Datetime) Â
a ˩ Â

ˈ Log Debugˇ Log ш 0ˇ 6
˘ Debug ш ѝ 7 Â

~

a RTCˇ Â ╟ ѝ
Â

35.2.4. ˩

Юˇ a ˩ Â ╗ Э ˬ ˩˘
Ю ЛЮ ҄ˈ

҄	

Ruijie(config)# **no service sysname**	↙ ↓ Â
Ruijie(config)# **service sysname**	╗ ↓ Â

35.2.5. ╗

Ю˘ ╗ Â ╗ ˘
Ю ЛЬЮ ⅋'

⅋	
Ruijie(config)# **no logging count**	╗ ˘ Â
Ruijie(config)# **logging count**	╗ Â

35.2.6. /!

Ю˘ a /! Â ╗ Э ↙ /!˘
Ю ЛЬЮ ⅋'

⅋	
Ruijie(config)# **no service sequence-numbers**	↙ /! Â
Ruijie(config)# **service sequence-numbers**	╗ /! Â

35.2.7.

a ↓ Э ˘ ↓ Л Ь a ↓ Э
ш Â

˘ Ю ЛЬЮ ⅋'

⅋	
Ruijie(config)# **logging console** *level*	↓ Э
Ruijie(config)# **logging monitor** *level*	VTY (telnet) Э
Ruijie(config)# **logging buffered** [*buffer-size* | *level*]	ă ш

Ruijie(config)# **logging file flash:***filename* [*max-file-size*] [*level*]	FLASH Э
Ruijie(config)# **logging trap** *level*	Syslog Server

Л ң ї ѝ ЛЪЮ 8 '

Emergencies	0	˘ a

ʒ	
Ruijie(config)# **logging facility** *facility-type*	
Ruijie(config)# **no logging facility** *facility-type*	ѝ Â

Ю ЊЖ'

Numerical Code	Facility
0	kernel messages
1	user-level messages
2	mail system
3	system daemons
4	security/authorization messages
5	messages generated internally by syslogd
6	line printer subsystem
7	network news subsystem
8	UUCP subsystem
9	clock daemon
10	security/authorization messages
11	FTP daemon
12	NTP subsystem
13	log audit
14	log alert
15	clock daemon
16	local use 0 (local0)
17	local use 1 (local1)
18	local use 2 (local2)
19	local use 3 (local3)
20	local use 4 (local4)
21	local use 5 (local5)
22	local use 6 (local6)
23	local use 7 (local7)

Л ң ѝ 23 Â

35.2.9.

Ю Syslog Server ѝ ˘ ˩ Л ʒ Â

˩ Л Log IP ˘ ≠ ˩ Л Log Â

˘ Ю ЛЮ ʒ'

ʒ	

Ruijie(config)# **logging source interface** *interface-type interface-number*	
Ruijie(config)# **logging source ip** *A.B.C.D*	ip

35.2.10. LOG

Ю б Лu a LOG Â
/ LOG LOG Â
Ю ЛuЮ

Ruijie(config)# **logging userinfo**	/ LOG '
Ruijie(config)# **logging userinfo command-log**	LOG

35.3.

й Ю ЛuЮ

```
Ruijie(config-if)# ip address 192.168.200.42 255.255.255.0
Ruijie(config-if)# exit
Ruijie(config)# service sequence-numbers                    /
Ruijie(config)# service timestamps debug datetime          debug
                                                            ˘
Ruijie(config)# service timestamps log datetime            log
                                                           ˘
Ruijie(config)# logging 192.168.200.2          syslog server
Ruijie(config)# logging trap debugging
                                                  syslog server
Ruijie(config)# end
```

36

36.1.

36.1.1.

Â ⅃Л
⅄ ˘ έ ЛЮ ˈ
Â ╗

˘ ˘

˘ ‡ Ю˘ ÿ

˘ ‡ Ю Â

˘ ˘

,

'

STACKMODULE-LINKSTATUS-CHANGED: Link loss is detected in the stack loop.

Device [2] loss has been detected, system will reset.

10 ˘ ‡ ⅃Л , '

STACKMODULE-LINKSTATUS-CHANGED: Link recover is detected in the stack loop.

10 ˘ ˘ ╟˘ Â

Ю˘ ˘ a ╟ ˘ ⅄˘ ⅃ Â

a ˘ ≠ a à à Â

ѫ ˘ ‡ ╟˘ Â

˘ ⅄ Ю Э ˘ è ╟ Æ ˘ Â

~

à à ˘ ‡ Æ˘ ˘ Â

36.2.

36.2.1.

Ю '

˝I	1
	SWITCH

36.2.2. Л

ў . ″I ˘ . ″I й
ў ˘ . ″I ˘ ‡ MAC ˘ MAC
й ў Â . ″I Л Â

Л˘ ∢ ў ˘ Ћ
″I Л ў ˘ Ю è. ″I й . ″I ˘ è
й ў Â . ″I ÿ æ й 1-10˝ й 1˝
. ″I Â ╟ **show member** ҳ ˘ ∢
Ћ MAC Ћ Â

ÿ N ‰ ă

36.2.4.

ѝ ˘ ˩Л Ю Ю, Ю

ҁ :

ҁ	
Ruijie(config)# **device-description** [**member** *member*] *description*	*member*: ˩ 1-MAX, . *description*: ѝ 31, Ю ѝ 1

: 2 ѝ red-giant

```
Ruijie(config)# device-description member 2 red-giant
```

36.2.5.

ЛЮ ҁ

device-priority [*member*] *priority*
device-description [**member** *member*] *description*
stack on

╟ ╟˘ ѐ ˩ ў ˘ ў ╟ ╟

36.3.

Ю˘ ˩Л Ю

ҁ	
Ruijie# **show version devices**	
Ruijie# **show version slots**	
Ruijie# **show version**	
Ruijie# **show member** [*member*]	*member*: ˩ 1-MAX,

ЛЮ ˩ ѐ ң ˘ ѓ ˆ ң Л ѣ ˜ Л ѝ

:

```
Ruijie# show version devices
                Device  Slots  Description
          ------  -----  --------------------
```

```
  8                    0               48              48
   M5750-48GT/4SFP_Static_Module
  8       1     1     1          M5700_STACK_IB4X
  8       2     1     1          M5700_STACK_IB4X
```

```
Ruijie# show version

System description             : Red-Giant 10G Routing
Switch(RG-S5750-24GT/12SFP) By Ruijie Network
System start time       : 2007-4-23 17:39:11
System hardware version : 1.0
System software version : RGOS 10.1.00(2), Release(12889)
System BOOT version     : 10.1.11330
System CTRL version     : 10.1.11330
System Serial Number    : 1234942570002
Device information:
 Device-1
  Hardware version : 1.0
  Software version : RGOS 10.1.00(2), Release(12889)
  BOOT version     : 10.1.11330
  CTRL version     : 10.1.11330
  Serial Number    : 1234942570002
 Device-2
  Hardware version : 1.0
  Software version : RGOS 10.1.00(2), Release(12889)
  BOOT version     : 10.1.11330
```

```
 Device-6
  Hardware version : 1.0
  Software version : RGOS 10.1.00(2), Release(12889)
  BOOT version     : 10.1.11330
  CTRL version     : 10.1.11330
  Serial Number    : 1234942570006
 Device-7
  Hardware version : 1.0
  Software version : RGOS 10.1.00(2), Release(12889)
  BOOT version     : 10.1.11330
  CTRL version     : 10.1.11330
  Serial Number    : 1234942570007
 Device-8
  Hardware version : 1.0
  Software version : RGOS 10.1.00(2), Release(12889)
  BOOT version     : 10.1.11330
  CTRL version     : 10.1.11330
  Serial Number    : 1234942570008
```

```
Ruijie# show member

Member     Mac  Address          Priority  Software  Version
Hardware Version   Description
------              ------------              ----------------------
---------------------------
1             00d0.f810.3323   1             RGOS  10.1.00(2),
Release(12889)   1.0        SWITCH
2             00d0.f822.33aa   1             RGOS  10.1.00(2),
Release(12889)   1.0        SWITCH
3             00d0.f822.33ae   1             RGOS  10.1.00(2),
Release(12889)   1.0        SWITCH
4             00d0.f822.33b0   1             RGOS  10.1.00(2),
Release(12889)   1.0        SWITCH
5             00d0.f822.33b2   1             RGOS  10.1.00(2),
Release(12889)   1.0        SWITCH
6             00d0.f824.23b4   1             RGOS  10.1.00(2),
Release(12889)   1.0        SWITCH
7                  00d0.f833.44b4    1                   RGOS
10.1.00(2),Release(12889)   1.0       SWITCH
8             00d0.f855.33ae   1             RGOS  10.1.00(2),
Release(12889)   1.0        SWITCH
```

37 WEB

37.1. WEB

37.1.1. WEB

WEB IE ˘ Â

37.1.2.

WEB WEB Ł WEB ч ˛ Â WEB Ł
Э˘ ˆ ↙ WEB ˚ ҃ ~˘
˘ WEB ˘ IE Â

37.2.

Ю WEB Â

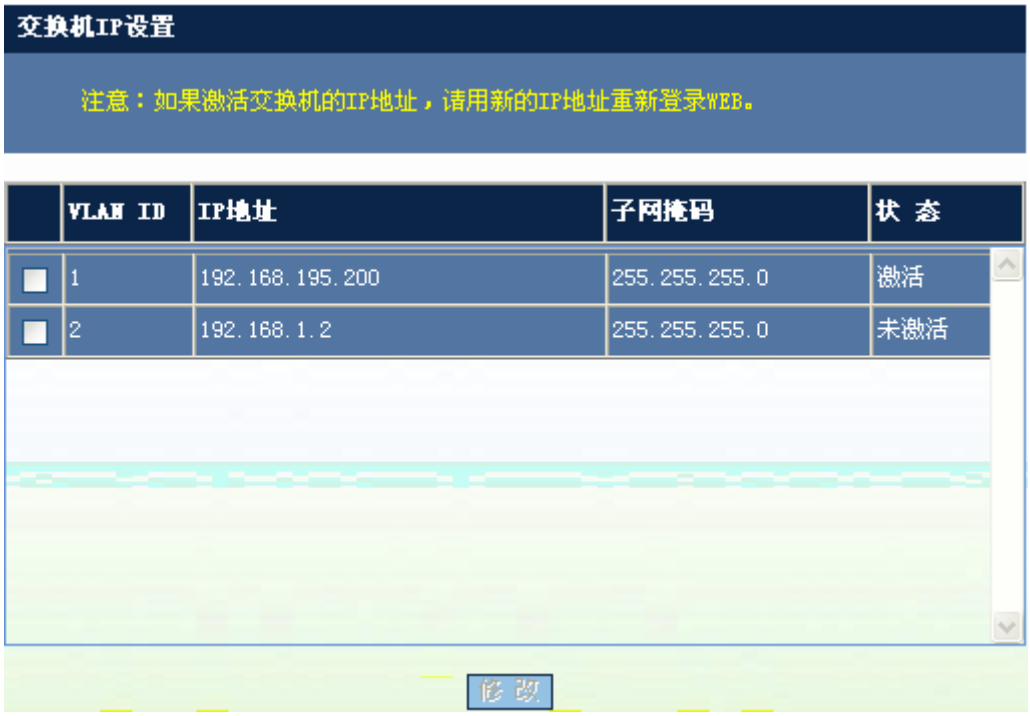
╖	
WEB Ł	

WEB Ł˘ Ю Ґ WEB ѝ
Ł Â WEB Enable ˘ ‡ a ↓
Enable Â

37.3. WEB

IP ˘ ' http://192.168.1.200,
↓ Ю '

1 في


交换机IP设置
注意：如果激活交换机的IP地址，请用新的IP地址重新登录WEB。
VLAN ID
IP地址
子网掩码
状 态
1
192.168.195.200
255.255.255.0
激活
2
192.168.1.2
255.255.255.0
未激活
修 改

37.3.1.2. VLAN

Ľ VLAN Ŀ ╖ Â

1˜ VLAN

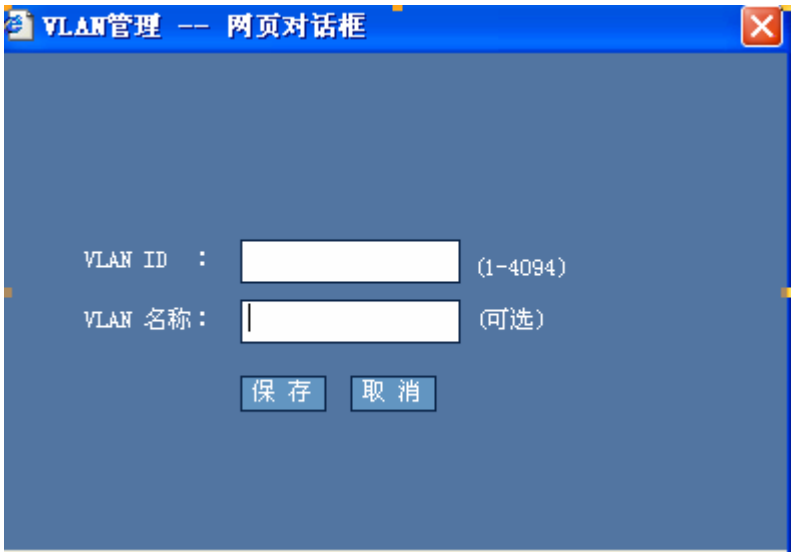
في **6 VLAN**

'

ʌ˘ ˝I VLAN Â ˩ ɅU à à

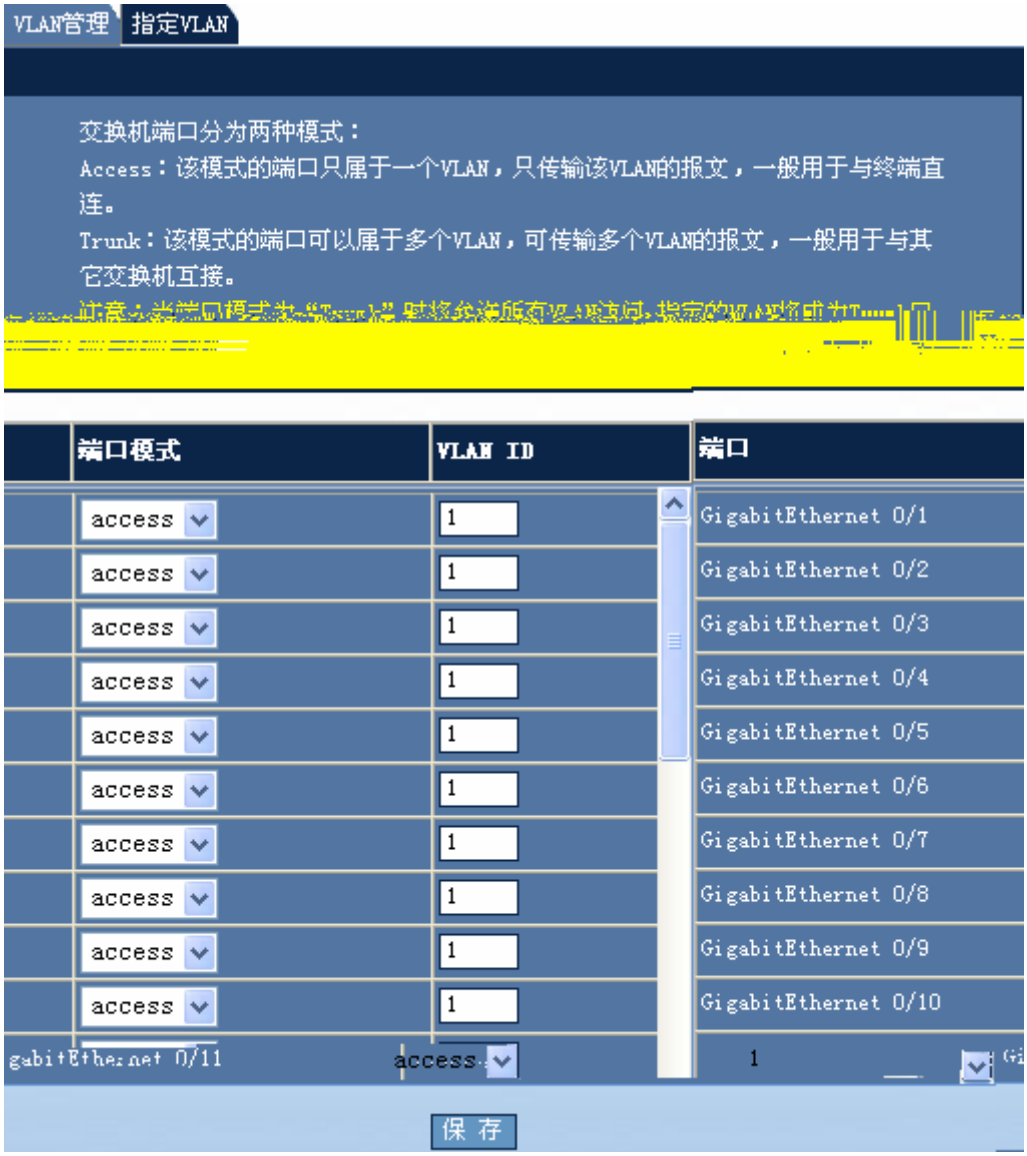
VLAN˝ VLAN a Â

' Ľ Ŀ ʌ˘ ЮO '



7 VLAN

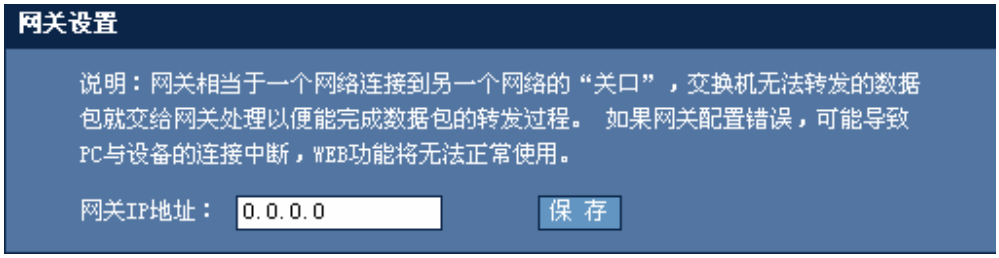
VLAN ID VLAN VLA



في 9 VLAN

VLAN ID

37.3.1.3.


网关设置
说明：网关相当于一个网络连接到另一个网络的“关口”，交换机无法转发的数据包就交给网关处理以便能完成数据包的转发过程。 如果网关配置错误，可能导致PC与设备的连接中断，WEB功能将无法正常使用。
网关IP地址：
0.0.0.0
保 存

في 10 Ω

37.3.1.5.

端口限速设置
注意：不限速的端口，保持对应文本框为空（1byte=8bit）。S2900系列设备不支持对端口输入速率限制的设置。
端口
输出速率限制 (312-1000000 KBit/s)
输入速率限制 (312-1000000 KBit/s)
GigabitEthernet 0/2
GigabitEthernet 0/3
GigabitEthernet 0/4
GigabitEthernet 0/5
GigabitEthernet 0/6
GigabitEthernet 0/7
GigabitEthernet 0/8
GigabitEthernet 0/9
GigabitEthernet 0/10
GigabitEthernet 0/11
GigabitEthernet 0/12
GigabitEthernet 0/13
GigabitEthernet 0/15
保 存

37.3.1.6.

Ľ Ľ ╗ Â

في 13 ٨ ٨

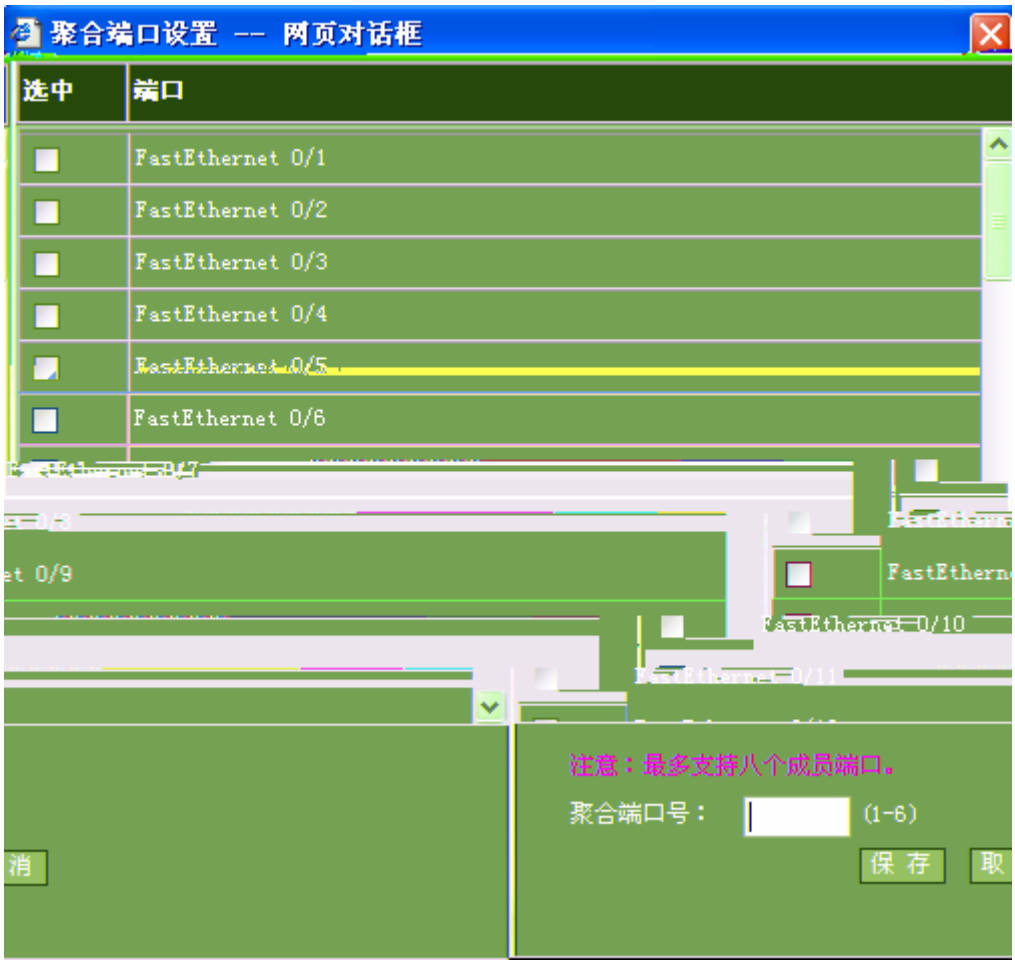
1˜

˘ ٨ Ľ Ľ

Â

2˜

˘ Ľ Ľ ˘ Ю



في 14

˘ ˘

è ˘ ‡ a

Â

3˜

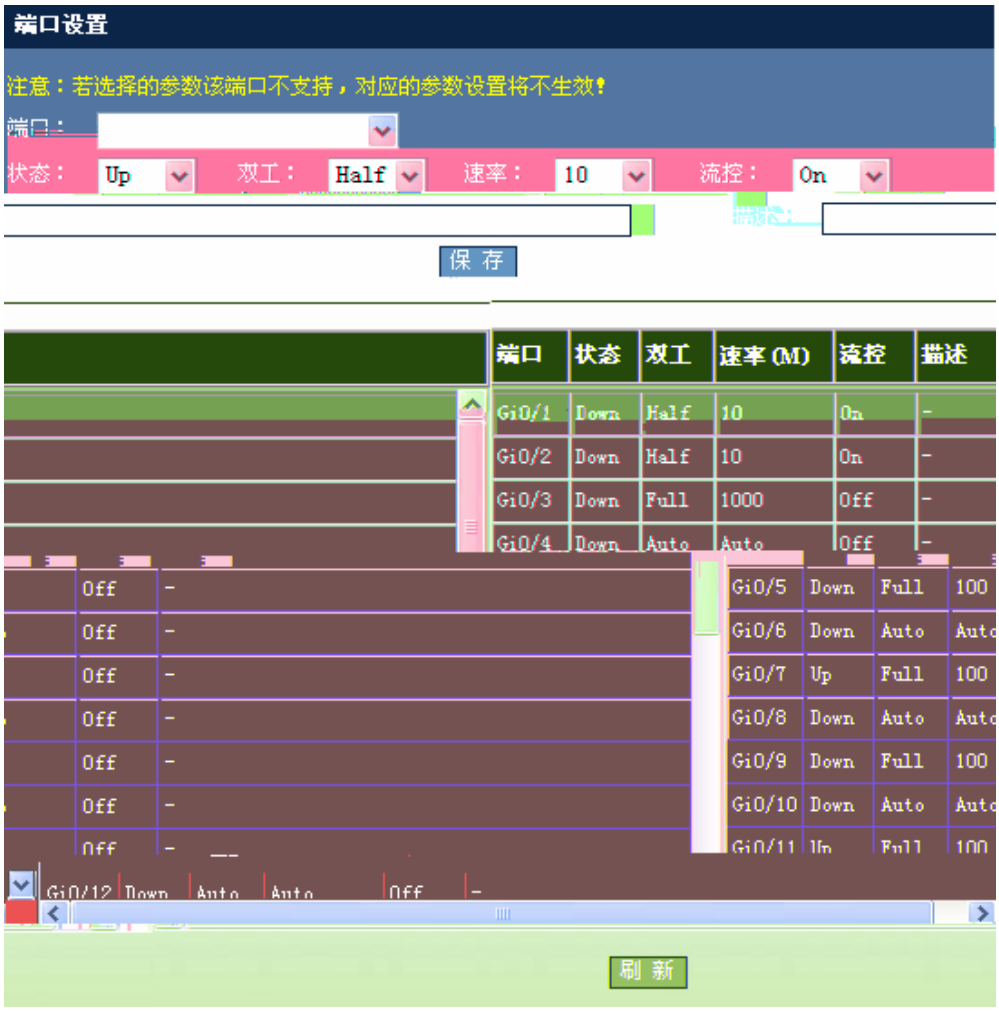
˘ Ľ

Â

37.3.1.7.

Ľ Ľ ╖ Â

‘



في 15 ٨

'

ʌ è ˘ ʌ Ľ

Â a ˘ a Â

37.3.1.8. DHCP

Ľ DHCP Ľ ℸ Â

DHCP '

16 DHCP è

1) / DHCP

/ DHCP ╖ ˘ Л˘ Ґ Ŀ

Â

2)DHCP Ŀ

DHCP Ŀ Л˘ Ґ Ŀ Â ╖ Л

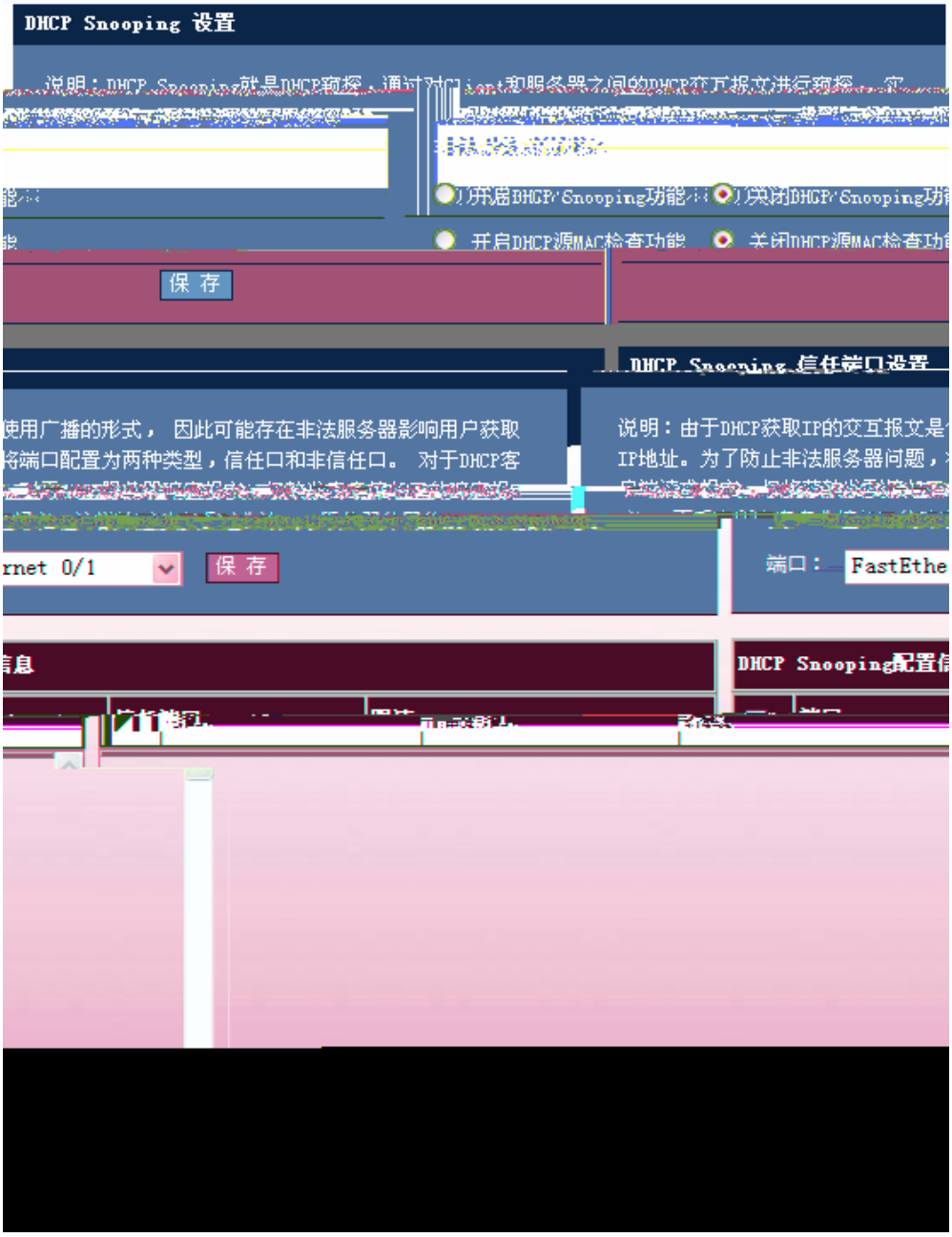
Ю Â DHCP Ŀ ˘

Л Ґ Ŀ Â

37.3.1.9. DHCP Snooping

Ґ DHCP Snooping Ŀ ╖ Â

DHCP Snooping



في 17 DHCP Snooping

1)DHCP Snooping

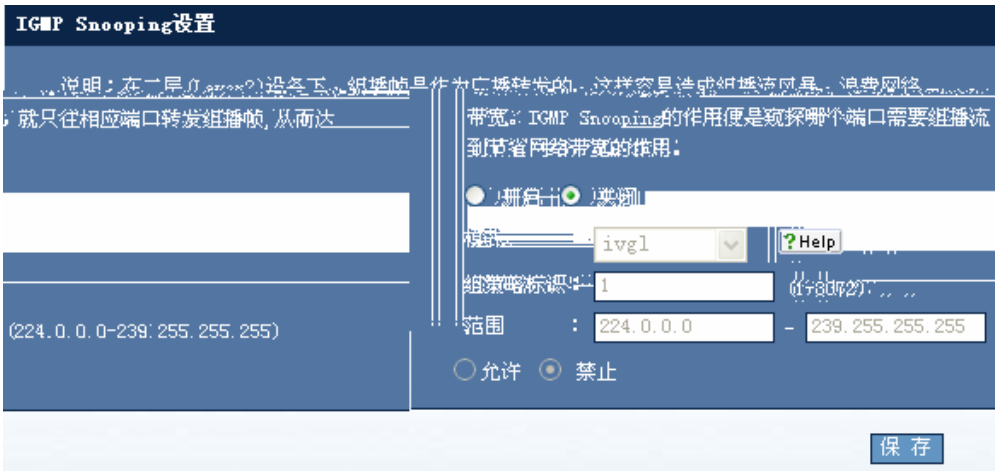
DHCP Snooping DHCP Snooping MAC

2)DHCP Snooping

37.3.1.10. IGMP Snooping

ľ IGMP Snooping Ł ╖ Â

IGMP Snooping '



ف **18 IGMP Snooping**

'

IGMP Snooping ╖ ˘ ″I ľ Ł ˘

Ю ┘ и ┘ ˘ ┘ Л υ ÿ ivgl à svgl à ivgl-svgl Ь ˘

svgl à ivgl-svgl ˘ ┘ Л υ à IP ŧ

37.3.1.12. SNMP

Ľ SNMP Ł ╖ Â

SNMP '

في 20 SNMP

'

SNMP ╖ ˘ Ľ SNMP Ł ˘ ┘Л

┘ à ˘ ⁄ˇ Ľ Ł Â

SNMP ╖ ˘ Ľ SNMP Ł ⁄ˇ

Ľ Ł Â ┘ ˘

⁄ Ľ Ł Â

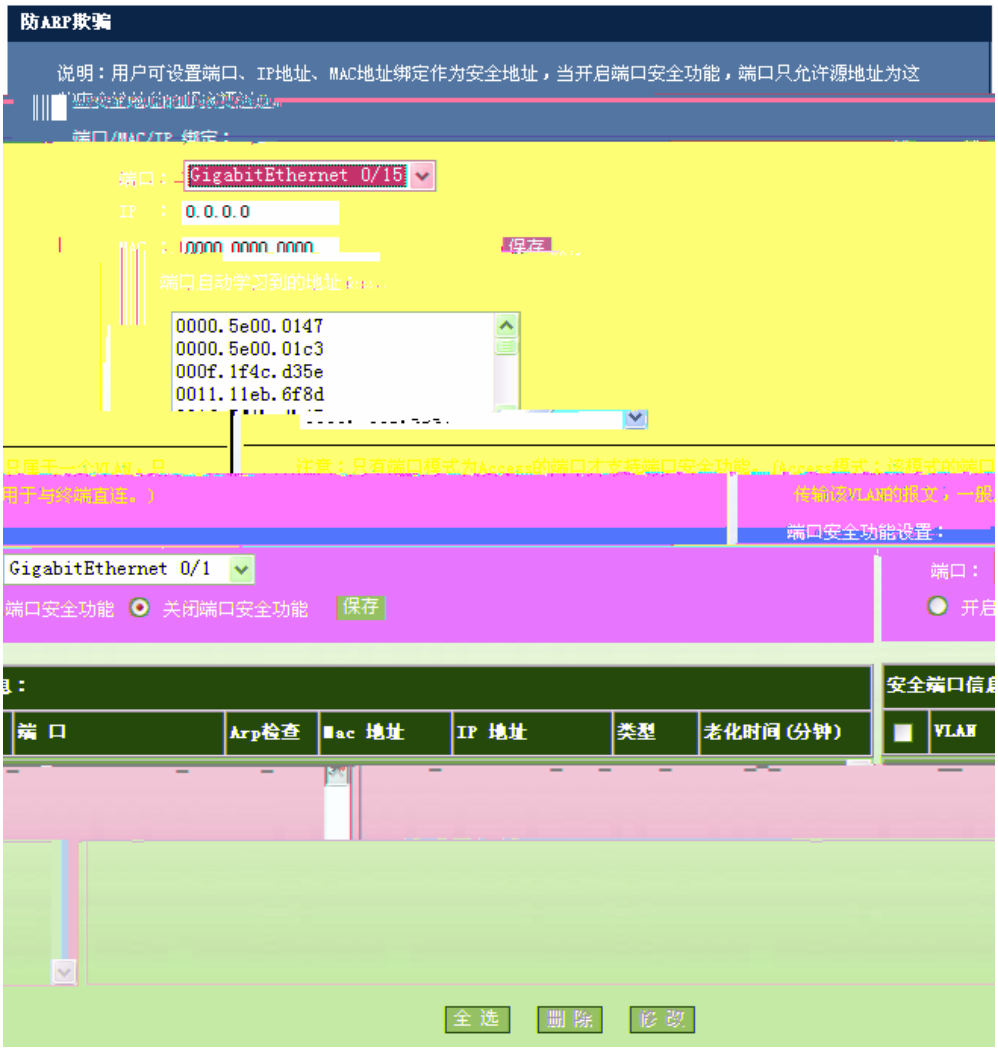
37.3.2.

37.3.2.1. ARP

Ľ ARP Ł ╖ Â

ARP '

WEB


防ARP欺骗
说明：用户可设置端口、IP地址、MAC地址绑定作为安全地址，当开启端口安全功能，端口只允许源地址为这
端口：
GigabitEthernet 0/15
IP ：
0.0.0.0
保存
端口自动学习到的地址：
0000.5e00.0147
0000.5e00.01c3
000f.1f4c.d35e
0011.11eb.6f8d
端口安全功能设置：
GigabitEthernet 0/1
端口安全功能
关闭端口安全功能
保存
端口：
端 口
Arp检查
Mac 地址
IP 地址
类型
老化时间(分钟)
VLAN
全 选
删 除
修 改

22 ARP

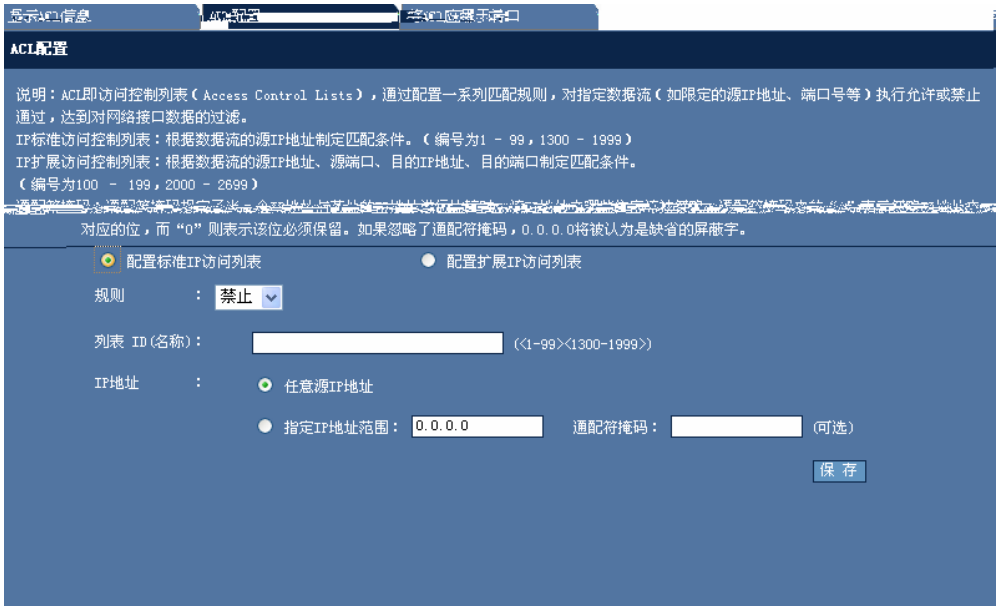
في 25 ACL

1˜ ACL

ACL في ˘ ACL ˘ ÿ ACL
ACL ˅˘ ACL ACE Â
ACE˜ ˅ Ľ Â
ACL˘ Ľ ˅˘ ACE˜ Ľ
Â

2˜ ACL

IP ˘ Ľ IP Ľ ˘
Ю في Й IP



في 26 ñ IP "

'

‡' ÿ Ю ‡ˇ ↙ ľ Ŀ ľ Ŀ ч ‡ Â

IDˆ ɹ ~ ' /ˇ ≠ ↙ Л∪ ɹ

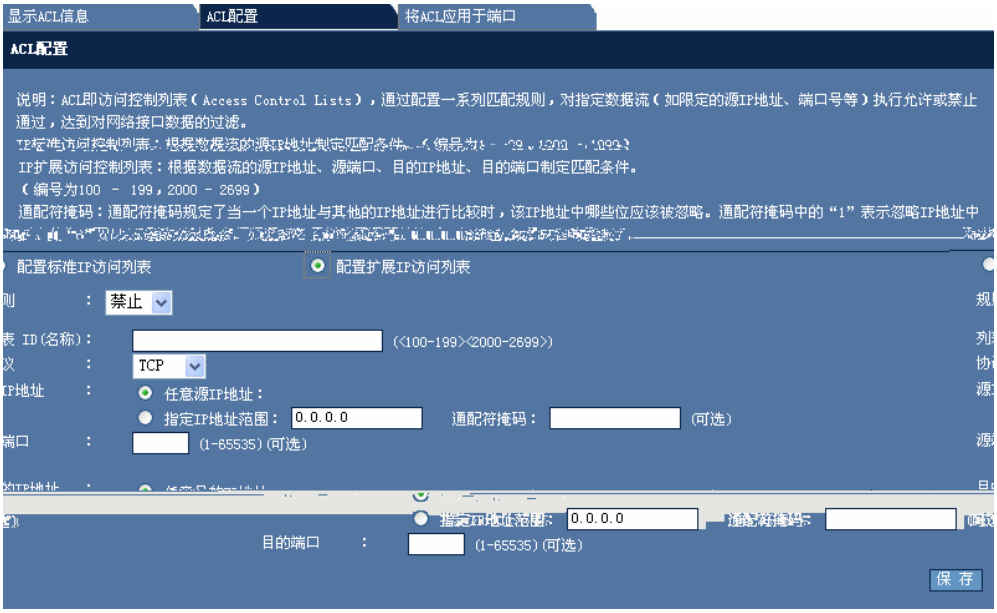
Â

IP ' IP , IP ˇ

a ˇ ↙ Л∪ a ˇ ɹ ľ Ŀ Â

IP ˇ ľ IP Ŀ ˇ

Юفي й IP '



في 27 IP "

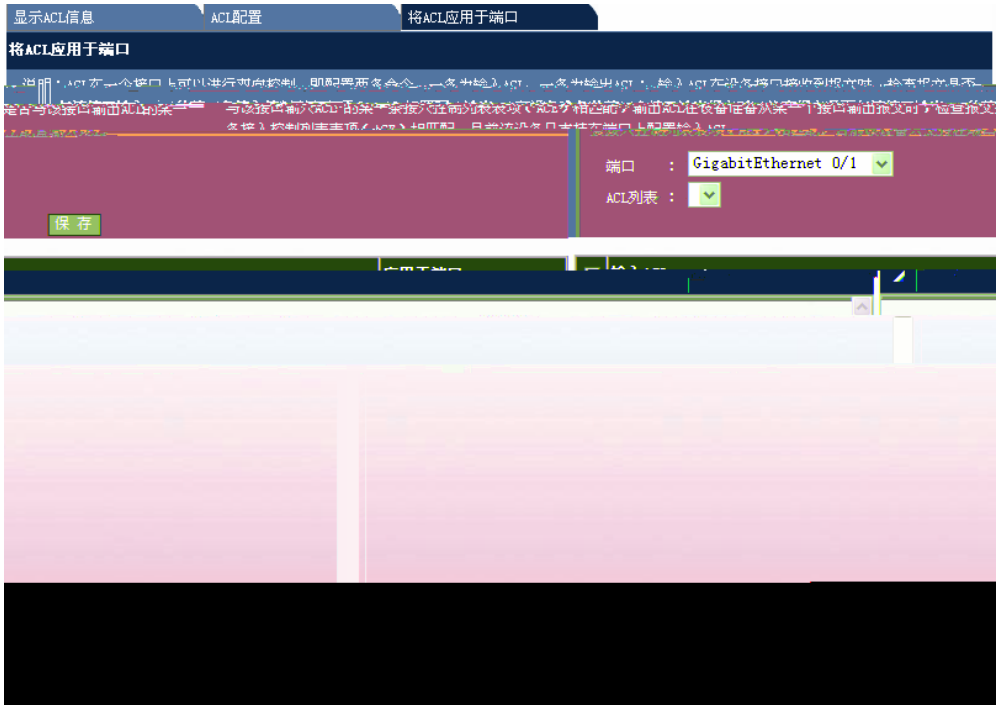
'

‡' ÿ Ю ‡ˇ ↙ ľ Ŀ ľ Ŀ ч ‡ Â

IDˆ ɹ ~ ' /ˇ ≠ ↙ Л∪ ɹ

Â

' TCPŤĆŃP ÃCMP 27ŕP/ÄP ÝCHŒP>< ŭd صˇ غ IP



في 28 ACL ¥ ٨

ACL ' ACL Â

Л Ї Ŀ Â

˘ Л Ї Ŀ

Â

~

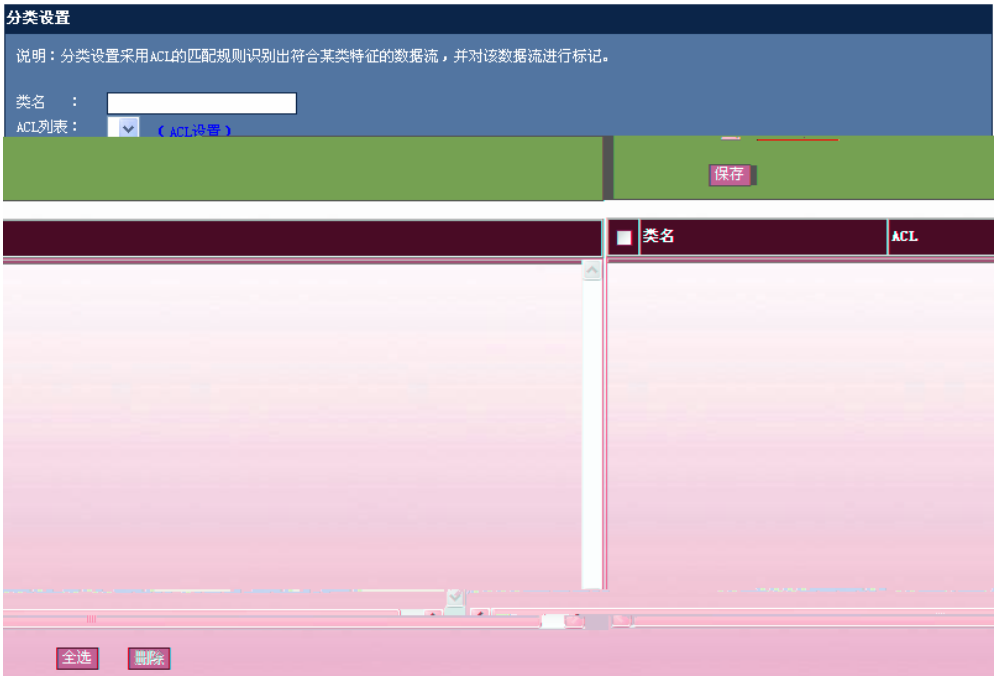
б PC ˘ ACL PC б

Â ˘ WEB Â

37.3.3. QOS

37.3.3.1. ǂ

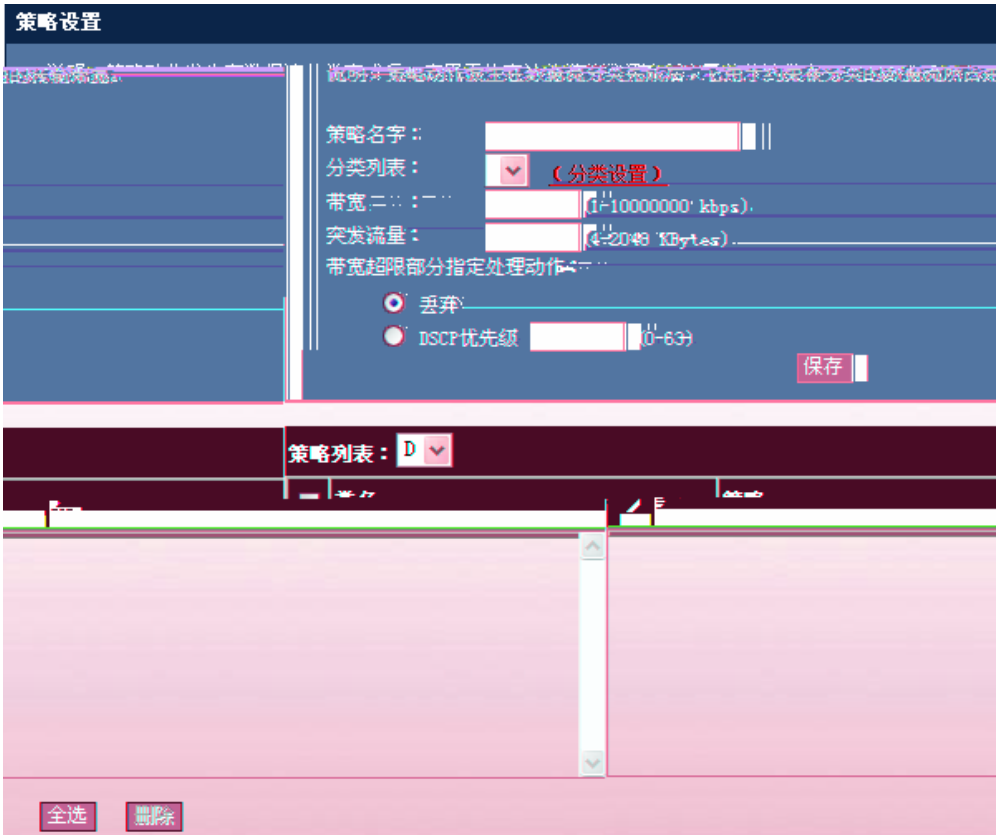
Ї ǂ Ŀ ℸ Â ЛЪЮ ǂ ў '


分类设置
说明：分类设置采用ACL的匹配规则识别出符合某类特征的数据流，并对该数据流进行标记。
类名 ：
ACL列表：
（ ACL设置 ）
保存
类名
ACL
全选
删除

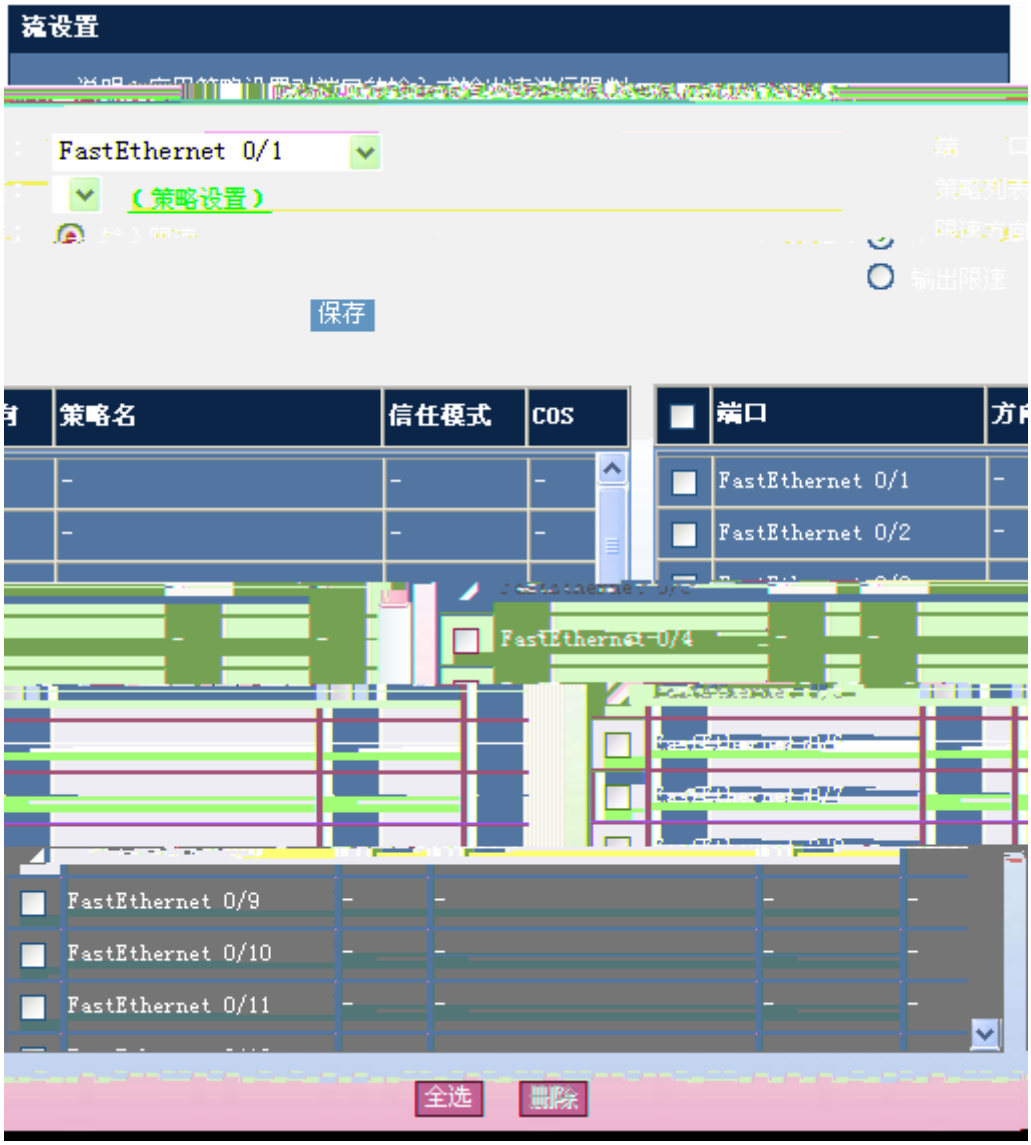
29

ACL

37.3.3.2.


策略设置
策略名字：
分类列表：
（分类设置）
带宽：
突发流量：
带宽超限部分指定处理动作：
丢弃
DSCP优先级
保存
策略列表：
全选
删除

30


流设置
FastEthernet 0/1
（策略设置）
保存
策略名
信任模式
COS
端口
FastEthernet 0/1
FastEthernet 0/2
FastEthernet 0/4
FastEthernet 0/9
FastEthernet 0/10
FastEthernet 0/11
全选
删除

في 31

37.3.4.

37.3.4.1.

Ì' Ĺ ╖ Â

'

系统信息	
设备型号：	S2924G
主机名 ：	Ruijie
软件版本：	RGOS 10.2(4), Release(55222),Web Version:10.2.55222
硬件版本：	1.0
MAC地址 ：	00d0f8f80fc4

في 32 ٩

37.3.4.2.

Ì' Ĺ ╖ Â

'

当前配置

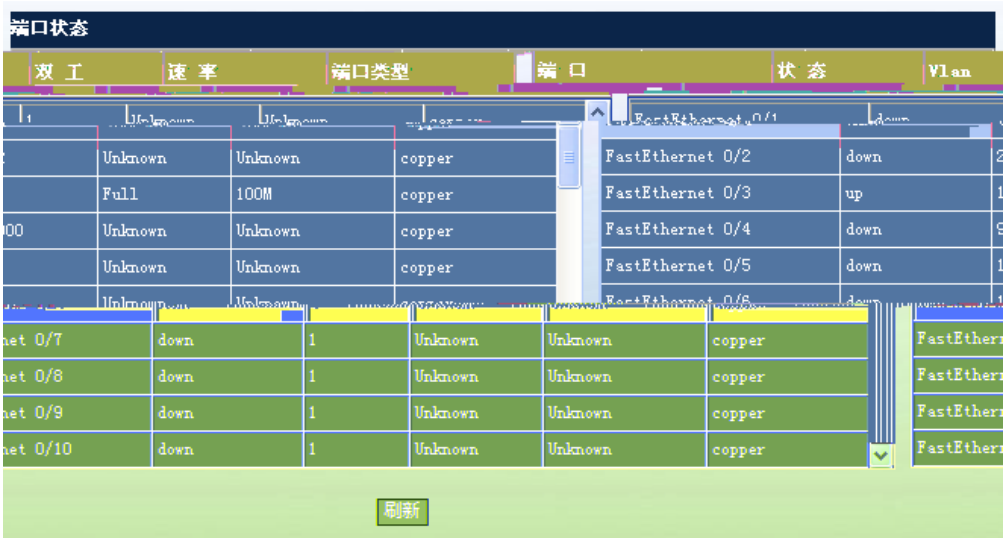
```
Building configuration...
Current configuration : 12931 bytes

!
version RGNOS 10.2.00(3), Release(30355)(Tue Mar 11 19:23:04     2008 -
23195A44470348C)
!
!
!
vlan 1
```

```
!
vlan 2
!
vlan 3
!
vlan 4
!
vlan 5
!
vlan 6
!
vlan 7
!
```

في 33 ฑ

37.3.4.3.

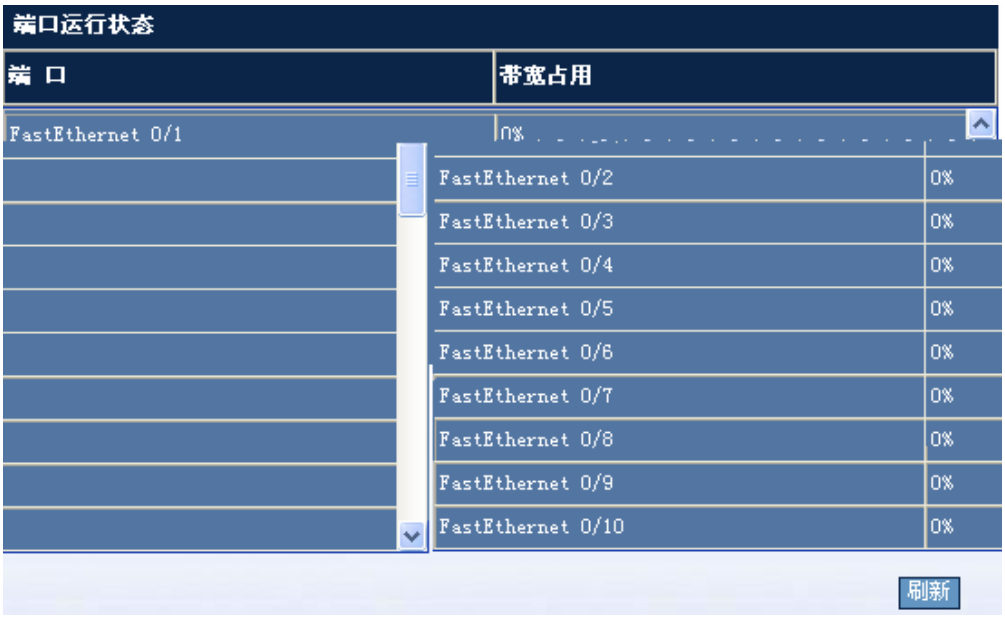
Ì' Ĺ ╖ Â



في 34 ٨

37.3.4.4.

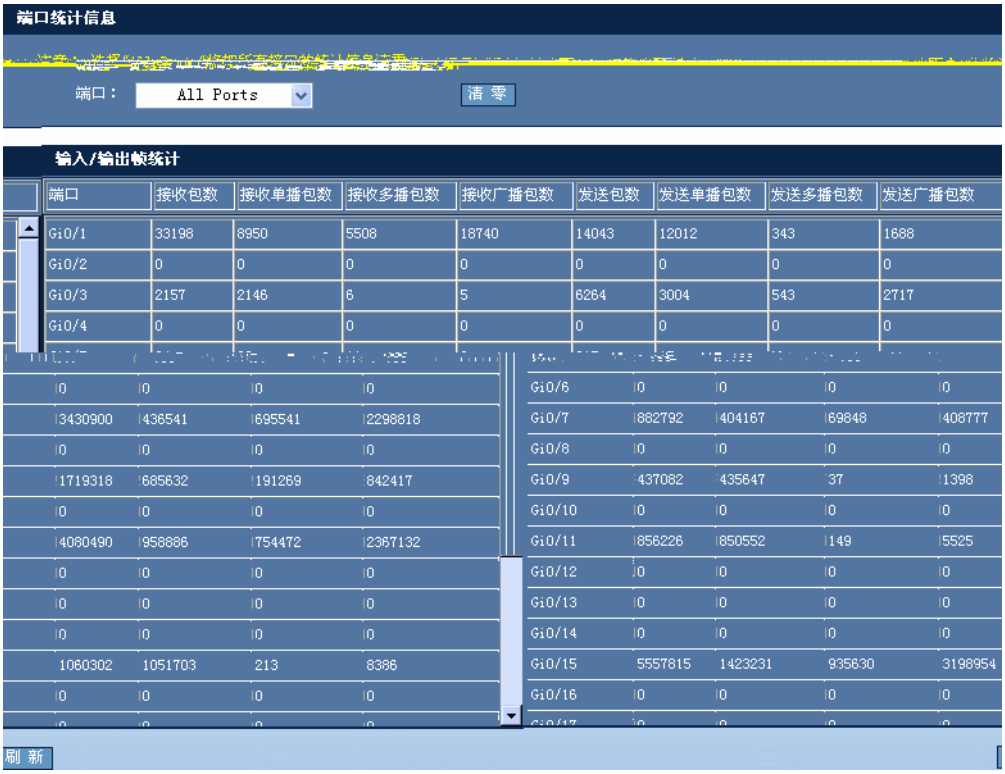
Ì' Ĺ ╖ Â



في 35 ٨

37.3.4.5.

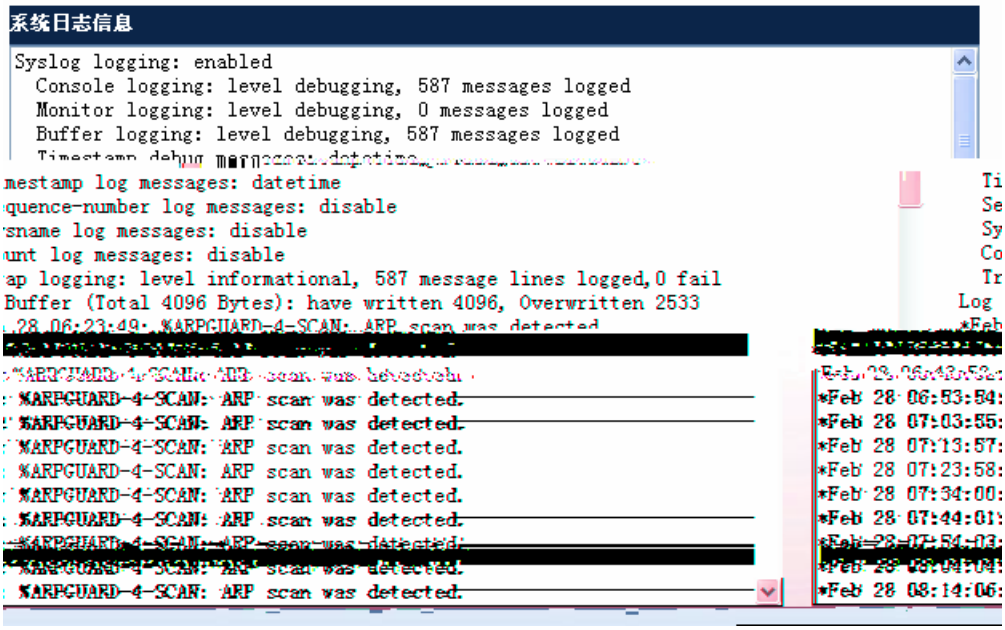
Ì' Ĺ ╗ Â



في 36 ٨ ق

37.3.4.6.

Ì' Ĺ ╗ Â



في 37 ق

37.3.5.

37.3.5.1. Ping

ا Ping ا ٦ Â

Ping '

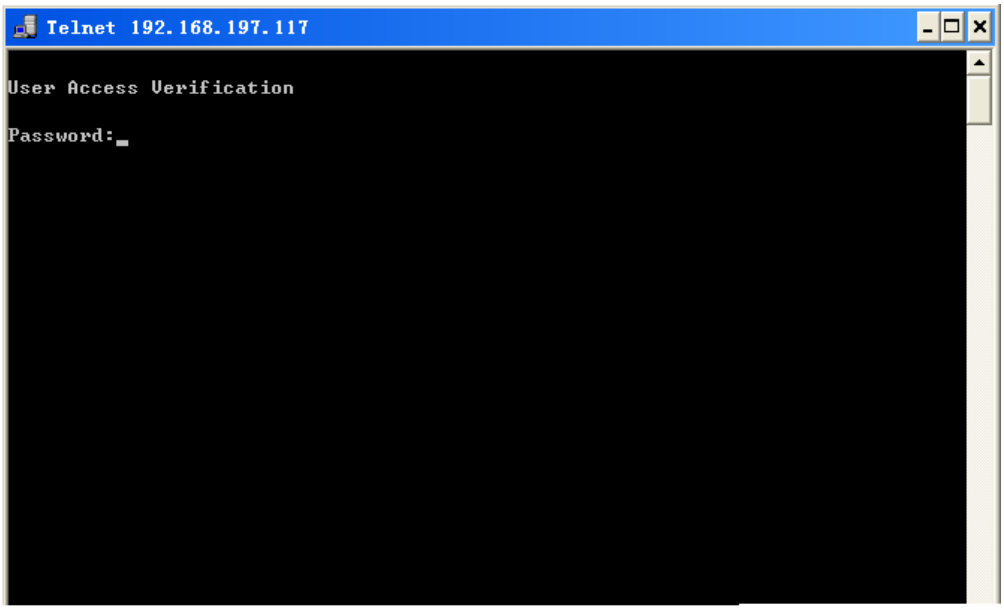
في 38 Ping

'

IP ˇ ľ Ľ ˇ IP a ˇ
Ping Â

37.3.5.2. Telnet

ľ Telnet Ľ ╖ Â
Telnet '



39 Telnet في

'

ľ Telnet Ľ ˇ Telnet ╖ Â PC
Telnet ˇ "I PC Telnet Ľ Â

37.3.5.3.

ľ Ľ ╖ Â
'

40 في

41 في ╗

في 42 g

ﻝ ﻝ ﻱ Ŀ Â ╖ ﻝˇ ﻝ

Э Â

~

à ﻝ ﻝˇ ‡

ō ﻱ

图 43

1) Enable 设置

Enable 设置页面如下图所示：

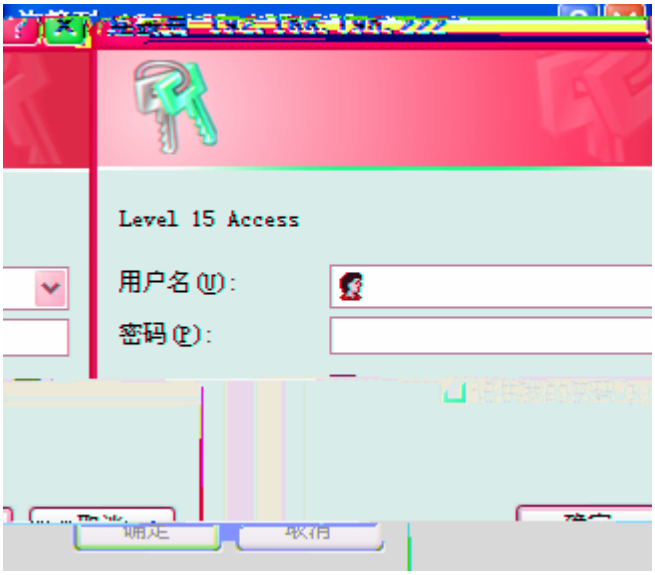


图 44

设置完成后，点击保存按钮。

2) Telnet 设置

Telnet 设置页面如下图所示：

37.3.5.5. /

Ի / Ŀ ╗ Â

/ '

ف 45 ώ/

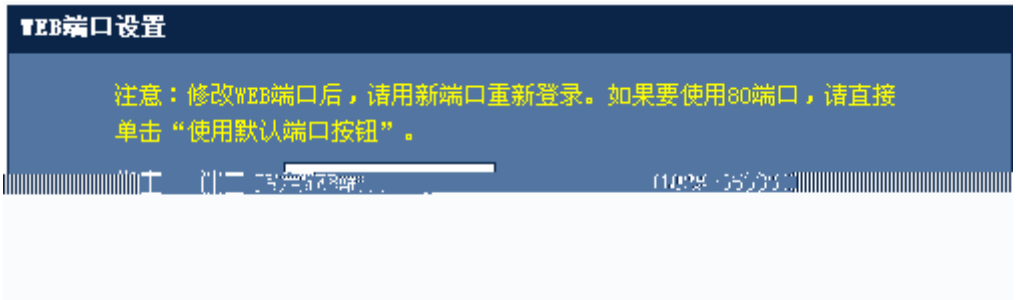
'

à Э config.text ˚ ˘ ″I TFTP Ł IP TFTP Ł Э ˚ ﻝ ﻝ Ի Ŀ Â

37.3.5.6. WEB

Ի WEB Ŀ ╗ Â

WEB '



ف 46 WEB ﻫ

'

37.3.6.

37.4. WEB ή

37.4.1.

WEB WEB ┺ ˇ enable Â

37.4.2.

WEB Local Enable ˇ ˇ
ˉ ˇ WEB ˇ WEB Â

1˜ Local
Ю'

a. config

```
Ruijie#configure
Enter configuration commands, one per line.  End with CNTL/Z.
```

b. WEB ┺

```
Ruijie(config)#enable service web-server
```

c. WEB й Local

```
Ruijie(config)#ip http authentication local
```

d. ˆ й 15 ˜

```
Ruijie(config)#username admin password admin
Ruijie(config)#username admin privilege 15
```

e. IP

```
Ruijie(config)#interface vlan 1
Ruijie(config-if-VLAN 1)#ip address 192.168.100.1
255.255.255.0
```

2˜ Enable
Ю'

a. config

```
Ruijie#configure
Enter configuration commands, one per line.  End with CNTL/Z.
```

b. WEB ┺

```
Ruijie(config)#enable service web-server
```

c. WEB й Enable ˆ ҙ Л a ˜

```
Ruijie(config)#ip http authentication enable
```

d. Enable

```
Ruijie(config)#enable password admin
```

e. IP

```
Ruijie(config)#interface vlan 1
Ruijie(config-if-VLAN 1)#ip address 192.168.100.1
255.255.255.0
```

37.4.3.

1˜ Local

```
Ruijie(config)#show running-config
Building configuration...
Current configuration : 2014 bytes
!
version RGOS 10.2(4), Release(55435)(Wed May 13 11:50:07 CST
2009 -ngcf32)
vlan 1

username admin password admin      //WEB            Л б
username admin privilege 15         //WEB              15

no service password-encryption
ip http authentication local          //WEB       local

!
enable service web-server          //    WEB   Ь
!
…..
    ……
!
interface VLAN 1
 ip address 192.168.100.1 255.255.255.0   //        IP
 no shutdown
!
!
line con 0
line vty 0 4
 login
!
```

```
!
end
```

2˜ Enable

```
Ruijie(config)#show running-config

Building configuration...
Current configuration : 2014 bytes

!
version RGOS 10.2(4), Release(55435)(Wed May 13 11:50:07 CST
2009 -ngcf32)
vlan 1

no service password-encryption
!
enable password admin            //WEB     Enable
enable service web-server          //    WEB   ┗
!
…..
    ……
!
interface VLAN 1
 ip address 192.168.100.1 255.255.255.0   //        IP
 no shutdown
!
!
line con 0
line vty 0 4
 login
!
!
end
```