©2009

ɱń

ŽĄ ˚ ὶ' RGOS®10.2(4) Â

ʌ Ю ˜

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1.

' 5 ʌ Â

注意、说明 ɱń ʌ ╗ б Â

' Courier New ˇ ˇ 5 ʌ ˇ
Â ÿ ˇ ╗ Â

2. Ћυ ϟ

Ћυ ϟ Arial ĭ έ Ћ Ю'

' Ћυ ϟ ^ Ћυ ϟ a ɹ ǂ ˜ ╗ Â

' Ћυ ϟ ϰ ^ Ћυ ϟ ϟ ǂ ˜

[ ] ' [ ] ˇ ћ ъ ч ۷ Â

{ x | y | ... }' ÿ ч ۷ У Â

[x | y | ...]' ÿ ч ۷ У a Â

//' ۷ й Â

3. ۷

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Ю ҳ ˘ ⊣ Л Ю ҳ Â

ў ↑ ЛЮ '

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Ю ҳ

Ю ҳ **no Ո default**

CLI

ℸ ⊣ Ю ҳ

CLI Ո

CLI

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ǂ a ⊣ ˘ ⅿ Ю ҳ ᾱ ⊣ Л Ю Ю ҳ Â

ᵶ Ю ҳ Ю /ǀ ˆ ?˜ ⊣ Л Ю Ю ҳ Ю ҳ Â

Ո У ˘ ″ǀ

ˆ

Ъu ҳ			Ю У	
User EXEC ^ ~	″I Â	Ruijie>	**exit** Ъu ҳ Â ˘ **enable** Ъu ҳ Â	ѕѕ à̀
Privileged EXEC ^ ~	ѥ Ю ˘ **enable** Ъu ҳ Â	Ruijie#	ѕѕ ˘ **disable** Ъu ҳ Â ˘ **configure** Ъu ҳ Â	Ъu ҳ Â ɛ ∧ ҳ Â
Global configuration ^ ~	ѥ Ю ˘ **configure** Ъu ҳ Â	Ruijie(config)#	ѕѕ ˘ **exit** Ъu ҳ **end** Ъu ҳ˘ Ctrl+C ∧ Â ∧ ˘ **interface** Ъu ҳ Â ѥ **interface** Ъu ҳ ف У ∧ Â VLAN ˘ **vlan** vlan_id Ъu ҳ Â	Ъu ҳ ∧ Â
Interface configuration ^ ∧ ~	ѥ Ю˘ **interface** Ъu ҳ Â	Ruijie(config-if)#	ѕѕ ˘ **end** Ъu ҳ˘ Ctrl+C ∧ Â ѕѕ ˘ **exit** Ъu ҳ Â ѥ **interface** Ъu ҳ ف У ∧ Â	∧ ∧ Â
Config-vlan ^ VLAN ~	ѥ Ю˘ **vlan** *vlan_id* Ъu ҳ Â	Ruijie(config-vlan)#	ѕѕ ˘ **end** Ъu ҳ˘ Ctrl+C ∧ Â ѕѕ ˘ **exit** Ъu ҳ Â	VLAN ∧ Â

ɻ ʃƱ ҕ ƕ ҂ ƗO /ǀ ˆ **?˜** ƕ ҂ ƕ ҂ Â ≠
ɻ ʃƱ ɻ ƕ ҂ ƕ ҂ ˥ Â ƗO '

ƕ ҂	
Help	ҕ ƕ ҂ ƗO ⟙ Â
abbreviated-command-entry?	ɻ ƕ ҂ Â ' Ruijie# **di**? dir disable
abbreviated-command-entry<Tab>	ƕ ҂ Â ' Ruijie# **show conf<Tab>**

show configuration Ъυ ϗ ϟ Л∪ '

```
Ruijie# show conf
```

Ъυ ϗ no Ո default

Ъυ ϗ **no** Â ˘ **no** ╖ ˘
б Ъυ ϗ ϟ Â ϰ Ъυ ϗ **no shutdown** ϰ Ъυ ϗ
shutdown ϟ ˘ . ϰ Â a **no**
Â

Ъυ ϗ **default** ˘ Ъυ ϗ **default** Ъυ ϗ ϊ Â
Ъυ ϗ ╖ ˘ ϑ ѫ Ю **default** Ո **no**
ϡ Â ϳ Ъυ ϗ ╖ ˘ ѫ Ю **default**
Ո **no** ϟ Â **default** Ъυ ϗ ╖ ˘ ϟ
ϊ Â

CLI

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Ctrl-P Э
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	Space	╣ У ˘ Ю У ˘ Â

Ђ ѓ ╠ ∧

˩ Л Т ╠ ∧ ˘ ´ Ђ ѓ˘ Ђ ѓ
Л Â ¨І ˩ ˘ Ђ ѓ ˩ ╠ 20
˘ Ў ˩ Л ¨І ѕ ґ ѕ Ђ ѓ Â

Ђ ѓ ¨І ╠ Ю '

Т	
¨І ˩ ѕ У	˩ Ctrl-B
¨І ѕ	Ctrl-A
¨І ˩ ˩ ґ У	˩ ˩ Ctrl-F
¨І ╠	Ctrl-E

Ђ ѓ **mac-address-table static** ˩ У
Â ¨І У ˘ Ђ ѓ ˩ ╠ 20 Â Ђ ѓ ґ
ї ˩ ¨A 20 Â ¬

```
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 ѕ Ђ ѓ Â Ђ ѓ ї

CLI Ո

Show Ъ Ъ Ո

æ **show** Ъ Ъ ˘ Л Л æ ЛЮЪ Ъ'

Ruijie# **show** *any-command* **|** **begin** *regular-expression*	æ show Ъ Ъ ˘ У ↑ Ӥ Л Л Л Л Â

注意:

1) æ Ю **Show** Ъ Ъ

2) Ш˙ ˘ ЛЮ Л Â

Ъυ ҳ ɻ˘ ɻЛυ У ´ *bgp 7801C40559CBB… У ɻ ҳ
У Ъυ ҳ ɱ У ʃ ˘ Ɨ ɻЛυ Ɨ ʃ Â

ɻ ҳ Ъυ ҳ Ъυ ҳ ɱ ҽ Ъυ ҳ ˘ ҽ
Ю˘ **alias ?** ɻЛυ ɱ ɻЛυ ɻ Ъυ ҳ '

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

Ъυ ҳ ɻ ╠ ˘ ҽ ɻ ɱ У Ɨ^ *˜ ˘ з ЛЮ
'

**command-alias=original-command*

˘ ҽ EXEC Ю˘ Ъυ ҳ ɻ ”s” ”show” Â ‡

CLI

ѫ CLI ɱ˘ У PC Ռ Â ŭ ╟ ˘
ѫ ˚ Ռ ˚ У ѵ ⅃ Л CLI Â ѫ ⅃
ⅵˆ Console˜ ˘ ѝ ˆ Outband˜ Â ѫ
ѵ˘ ⅃ Л Telnet Ռ Â ч
⅃ Л Ъυ Ъυ ҳ Â

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Л н ң р У '

Ъυ ҳ ¤

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Ў

Л Ո-Ъυ ҳ

Л ¤

ҽ Э telnet

Ъυ ҳ

Ь

说明：

CLI Ъυ ҳ ч ˘ Ч ê Ъυ ҳ Ì Â

Ъυ ҳ ¤

¤ Э У ´ ╕ ˘ Ч ҳ Ո ǂ Â Ч ҳ Л Ս ¤ ˘ Л Ս ҽ ╖ Л˘ ¤ è Л Ս Ъυ ҳ Â

ÿ ˘ ∧ ϧ ѧ ˚ ˘ ѧ Э ˚ ^
TFTP˜ ˘ ∧ ϧ Â ϱ ∧ ϧ ѧ ∧ ˚ ⁄ ╗
˘ ∧ ϧ ∠ ∧ ϧ Â Ъ ϧ **enable secret**
╗ Â

∧ ϧ Ո

∧ ϧ˘ 15 Â

Ո ∠ ∕ ∧ ϧ

∧ ⁄ ϧ ϱ Ю Ъ ϧ Ո ∠ ∕ ∧ ϧ Â

Ъ ϧ	
Ruijie(config)# **enable password** [**level** *level*] {*password* | *encryption-type encrypted-password*}	∧ ϧ Â ⁄ ∠ 15 ∧ ϧ˘ з ∠ ѧ ∧ ϧ Ю Â 15 ∧ ϧ˘ у ˘ ╟ й ∧ ϧ Â 15 ∧ ϧ Ո 15 ∧ ϧ ∠˘ у ˆ Â
Ruijie(config)# **enable secret** [**level** *level*] {*encryption-type encrypted-password*}	∧ ϧ˘ ╗ б ∧ ϧ ∠˘ ∧ ϧ ╗ Â й ˘ ∧ ϧ Â
Ruijie# **enable** [*level*] Ո Ruijie# **disable** [*level*]	⁋ ˘ ÿ æ ⁋ ∧ ϧ Â

ѧ ∧ ϧ ˘ **level** ˘ ‡ й Ѭ ∧ ϧ Â
⌈ ⁋ ∧ ϧ Â

Ћυ ҳ

У Ћυ ҳ˘ ‡ ⌟Л Ћυ Ћυ ҳ æ
’ Ћυ ҳ تن У ˘ ‡ ⌟Л Ћυ Ћυ ҳ
Â

⌟Л ЮЋυ ҳ Ћυ ҳ '

Ћυ ҳ	
Ruijie# **configure terminal**	

Ћυ ҳ ǂ Â
mode · Ћυ ҳ CLI
Ћυ ҳ ˘ ' **config**
’ **exec** Y

Ruijie(config)# **privilege mode** [**all**] {**level** *level* | **reset**} *command-string*

<cr>

Ю reload ћu ч ┤ è ћu ч и '

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

1 ˘ ћu ч ы'

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

^ line˜ ┤ ч

┤ н ц TELNET˜ ┤ ч ˘ line ┤ ч ˘ ж line Ю ЛьЮћu ч'

ћu ч	
Ruijie(config-line)# **password** *password*	line ┤ ч
Ruijie(config-line)# **login**	Ў line ┤ ч

说明:

˘ line ┤ ч˘ ˘ line ┤ ч

Â ж Ю у ў Â

┤ н ц lock ћu ч в˘ Лu Â в

╖ ˘ ж line Ю ╖ ˘ ж

EXEC Ю˜ lock ћu ч в '

ћu ч	
Ruijie(config-line)# **lockable**	Ў в line ╖
Ruijie# **lock**	в ґ line

ȣ

ɱ У ѫ ʌ ɂ ⁸ Â
ʌ ɂ Ո ѫ ˘ ŭ AAA ˘ ‡ ѥ
˘ ѥ ɻ Л У Ŀ Ɣ ɻ Ո
˘ ɱ RADIUS Ŀ Ɣ ɻ
Ո ⁸ Â

RADIUS Ŀ Ɣ ɻ Ո ⁸˘ a Ạ
ѫ ˘ ╗ ʎ ɻ RADIUS Ŀ
Ɣ Э ˘ Ŀ Ɣ У ɻ à à ɱ Ո
˘ Ո ⁸ ˘ Â

ѫ

ʎ ɳ ɒ ѫ ѫ ˘ ў AAA Ю
ѫ ’ Л ʅ AAA Ю ѫ Â
ɻ ˘ ѥ Ю é ЛЬЮЬ ɂ'

Ь ɂ	
Ruijie(config)# **username** *name* [**password** *password* | **password** *encryption-type encrypted password*]	╗ ʌ ɂ ɻ

Ruijie(config)# **username** *name*

说明：

AAA à Radius

AAA

Ђυ ҳ	
Ruijie# **clock set** *hh:mm:ss month day year*	Ո· Â

2008-1-30 05:54:43

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

show clock Ђυ ҳ

Ю

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

У л ^ calendar~ I a
ь ъ и ь . ў Ю ≠ ж Â
ь Ґ ь a л ь ь ћ ў
Ґ 8 ь Â

ь ь ь ж Ю **clock update-calendar** ћ
ў ь ь Â

ћ ў	
Ruijie# **clock update-calendar**	ь ь

Юћ ў л Л м ь Ґ 8 ь '

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

ў

reload [modifiers]ћ ў 8 ў ^ scheme~ ь Л
ў Â ў ╗ ь ж ж л Ю(è) л Л
и Э Âmodifers **reload** У ћ ў ь л Л
ћ ў ╗ Â л modifiers **in** à **at** à **cancel** Â é Ю

1. **reload in** *mmm* | *hhh:mm* [*string*]

ж У л ў Â *mmm hhh:mm* ā
ь Л ¦ и ´ Æ ь л Л У Â ч *string* У ╠ ь
л Л ж и У ╠ л ь Л ы ч ў ь
ь 10 ¦ л ў ь л Л **reload in** *10*
test Â

2. **reload at** *hh:mm month day year* [*string*]

ж ў Â Â ч
year л , ь ‡ ь
8 a 31 ь Л У ы ь м ж 1 1
11 30 ь ‡ Â ь м и 12

˘ Ъ ┘ з 1 ˘ ♂
Ю˘ Ъ 1 a ё 1
˘ ˘ ‡ и ё 1 ˘ ÿ Âstring
┘ Э Â №̀ 2005-01-10 14:31˘ ♂ Э
Ъ˘ ┘ Л **reload at** *08:30 11 1 newday* Â №̀
2005-12-10 14:31˘ ♂ 2006-01-01 12:00 Ъ˘ ┘ Л
reload at *12:00 1 1 2006 newyear* Â

3. **l0 Tc 0 Tw 12.166 0 Td<016.6D102C804-6<9T04B11B9901C31BC>4B38>T3049049E4C3**

У Л Ў

ѧ Ю Юһu ҳ У Л Ў'

һu ҳ	
Ruijie# **reload in** *mmm* [*reload-reason*]	*mmm*ҵ Л **reload** **reload** Ч ҷ *reload-reason*( )
Ruijie# **reload in** *hhh:mm* [*reload-reason*]	*hhh* *mm* ҵ Л **reload** ˇ **reload** Ч ҷ *reload-reason*( )

32 ˘ ‡ ˇ è ɱ 32 ˜ ˙ Ъ ҷ ˘
ɻ ˩ ע ˩ ע Â Ю˘ Л ɛ ɻ ˙ ɻ ˘
”S2724G” à ”R2692” Â

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Ruijie(config)# **banner**

à

ў ↑ ˘ Э ˘ ˚ ˘ ˚
˘ Ctrl ˚ ˘ Boot ˚ ˘ ҥ ҕ ⁄ˆ
⁄ ˜ Â ˩ Л Â ˩
Лѡ Ю Ю Ћ ҇ '

Ћ ҇	
Ruijie# **show version**	à

˚

˚ ў ↑ ˧ Э Ո ѫ Â ↑
' ˘ ' ' ѡ Э ⁄˘
Э ѫ ˆ ѫ˘ ‡ и ˜ ˘ ѫ ↑
˥ ˘ ˩ ↑ Ӱ ˥ ˆ ѫ ↑ ˥ ˜ ˩ Л
ѡ Ю Ю Ћ ҇ Ո '

Ћ ҇	
Ruijie# **show version devices**	ґ
Ruijie# **show version slots**	ґ Ո ѫ

Ӱ ╟ ў ɻ

˩ Л ѡ Ћ ҇ **show mainfile** Ћ ҇ Ӱ ╟ ў ɻ˘
Ю'

```
Ruijie# show mainfile
MainFile name: rgos.bin.
```

8 ⁄

У 8 ⁄ ˥ˆ Console˜ ˘ 8 ⁄ ˥˘ ˩ Л
Â У ˘ 8 ⁄ ˥ è
Â ˩ Л ˩ ˥ Â ˘

Ո ⁸ ⅄ У Â

⁸ ⅄

ѧ Ю˘ ⅃Л Л ЛЮЋ ⅋ ⁸ ⅄ '

Ћ ⅋	
Ruijie(config-line)# **speed** *speed*	⁸ ⅄ ˘ ´ Æ bps Â ⅄˘ ⅄ ѝ 9600 à 19200 à 38400 à 57600 à 115200 У ˘ 9600 Â

Ю ⅄ ѝ 57600 bps'

```
Ruijie# configure terminal                    //
Ruijie(config)# line console 0          //      ⁸ ⅄
Ruijie(config-line)# speed 57600        //      ⁸ ⅄     ѝ 57600
Ruijie(config-line)# end                          //ѡ
Ruijie# show line console 0                     //      ⁸ ⅄
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
```

ѧ Э telnet

Telnet ѧ TCP/IP ˜ ˜ ˘ Ո

⅂ Â Telnet Client Ь ѝ Э ѫ

Telnet Client Э è

Ь Â Юفي جم Э Telnet б

A Л˘ Л telnet Ъυ ϡ Ą B˘ è Â

1 فى

Telnet Client

Л Л Э **telnet** Ъυ ϡ Э Ы'

Ъυ ϡ	
Ruijie# **telnet** *host-ip-address*	**telnet** ˘ Л Л ў Л IP فخ سم Â

Ю **Telnet** ˘ ip فخ سم

192.168.65.119'

```
Ruijie# telnet 192.168.65.119     //              telnet
Trying 192.168.65.119 ... Open
User Access Verification              //
Password:
```

Л Л ˘ 8 ^ ↑ Л

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Л ң ҏ LINE Ю Ђ ҂ '

Ђ ҂	
Ruijie(config-line)# **exec-timeout** *20*	LINE Э˘ Ы ˘ ˘ ˘ Â

Ы Л Ѣ LINE Ю **no exec-timeout** Ђ ҂˘ Ы LINE Ю Â

```
Ruijie# configure terminal                    //
Ruijie# line vty 0                            //    LINE
Ruijie(config-line)# exec-timeout 20          //          й 20min
```

ґ LINE Э ˘ ѣ ˘ ˘ ґ Â з й Â

Л ң ҏ LINE Ю Ђ ҂ '

Ђ ҂	
Ruijie(config-line)# **session-timeout** *20*	LINE Э˘ ˘ ѣ ˘ Â

Ы Л Ѣ LINE Ю **no exec-timeout** Ђ ҂˘ Ы LINE Ю Â

```
Ruijie# configure terminal                    //
Ruijie(config)# line vty 0                    //    LINE
Ruijie(config-line)# session-timeout 20       //          й 20min
```

˚ **Ђ ҂**

ѣ ˘ Ђ ҂ ҇ ˘
CLI ˘ ≠ Ո Â ҇
Ђ ҂ ѣ У ˚ ˘ ѣ ˘
˚ ˘ Ы Л Â

Ђ ҂	
Ruijie# **execute** {[**flash:**] *filename*}	У ˚ Â

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
```

说明:

LINE

LINE У '

LINE

╕/ LINE VTY

LINE Ю ┘ Л ~

LINE

LINE

LINE ˇ ┘ Л ج LINE Ю Ó é LINE Â
LINE ˇ ЛЮЪ ڑ'

Ъ ڑ	
Ruijie(config)#line [aux 0 | vty 0 4] Ruijie(config-line)#	

line(config-TTINE)3/TT0 173911 T 40[0022-r

˜ Â

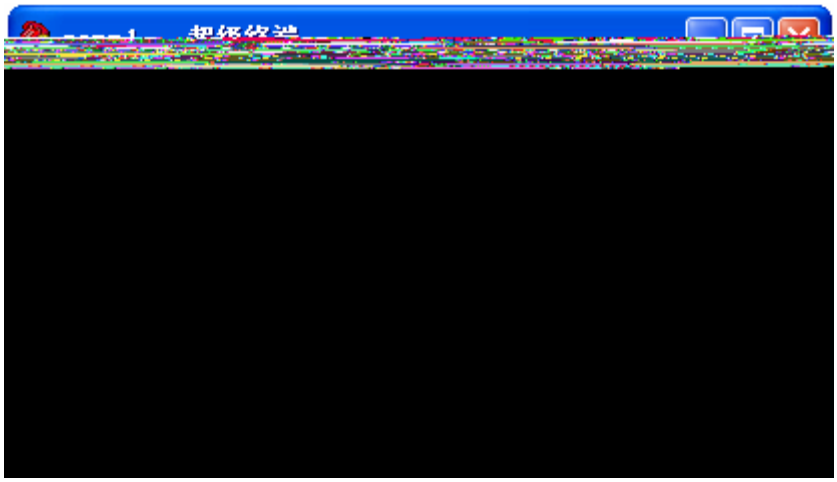
Ьυ ϛ	
configure terminal	
Line vty *line number*	Line
transport input {**all** | **ssh** | **telnet** | **none**}	Line Ю ┘ Лυ ˜
no transport input	LINE Ю a ˜
default transport input	LINE Ю ˜ ѝ

XMODEM

У ÿ ў Ю ˚ ˘ ∧ У ÿ Э ˚ ў Â

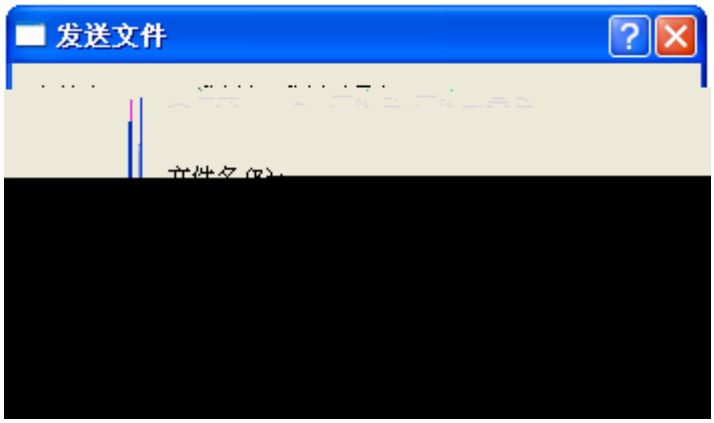
ћ CLI ћu ќ Ю˘ Ю ˚ Ю '

Ю ґґ˘ ”I Windows ’ Л ћ
Ю ЛЬЮћu ќ Ю ˚ ’ Л ћ ѕѕ ў Windows ˘ “
” ´ “ ∟ ˚ ”Ґ ˘ في 1 '



في 1

ћ ˚ Л ѕѕ ў Ю ˚ ˘ ~ “Xmodem”ѫ
“ ∟ ѫ ‡ Windows ∟ ЛЬ ∧ ↑ Â في 2 '



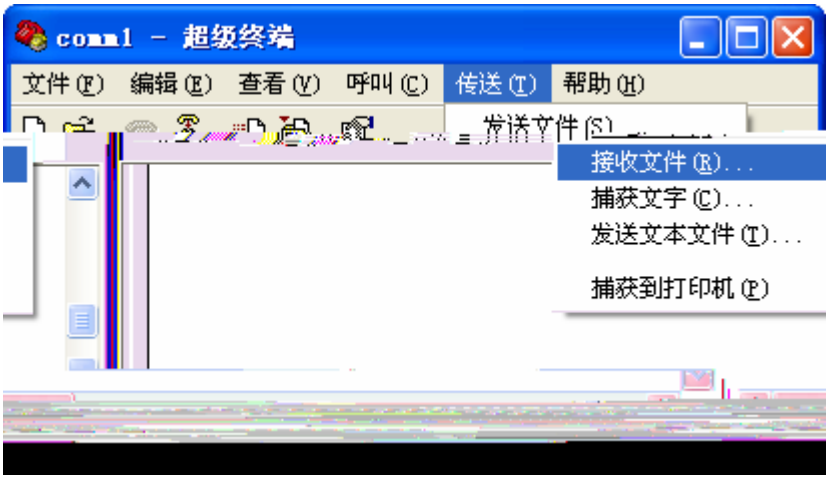
في 2

ћu ќ	
Ruijie# **copy xmodem flash**:*filename*	ÿ ў Ю ˚ ћu Л и *filename* Â

ћ CLI ћu ќ Ю˘ Ю ˚ Э '

Э ґґ˘ ”I Windows ’ Л ћ

Ю ЛьЮЊь ҂ Э ˚ ’ ⁄ ج ѕѕ ў Windows ˘ “
” ´ “ ˚ ”╖ Â في 3 ’



في 3

ج Э ˚ Æ ˘ ~ “Xmodem”˜ “
”˜ у ѕѕ ˚ ⁄ ˘ “ ”⁄
˚ Â في 4 ’

في 4

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

a ˘ ⁄ Л Э tftp xmodem ˘
˚ Э Â ╖ ⁄˘ ů ╟ ˘ ˘ ˚ ╟ ɱ

Ո˘ ˘ a Ո Ў Â

˘ ˚ ҷ Ո Э ˘ ╟ a ⊿'

1˜ ˘ ⊿ ´ ˘ ˘ ˘ ˘ ╟ Æ˘
Ⱶ Ѧ ŭ ╟ Â

2˜ ↑ ŭ ˘ ´ Ո ⊣ Ł´ ˘ У ˘ ˚
˘ Â ˝ ˘ ˘ Æ Â Ⱶ Ѧ ŭ ╟ ˘
╟ ⊿ ╥ ŭ ╟ ˘ ´ Ո Ł´ ˘ Â

╟ ˘ ╥ ' ў У ╥ ˘ ҷ ÿ ˘
´ Ո Ł´ У ˘ ⊿ Ո ў ´
a У ˘ ´ ˘ ˚ Ⱶ˘ ˘ ˘ Ո
У Â

注意:

˘ ў ˘ ⊿ ˘ ÿ ˘ ÿ У
Â ˘ ´ ´ ⊿ ˘ Â ҷ ˘
ᵯ a ⊿ ˘ ї ‡ ⊿ ˘ Â
ҷ ˘ ᵯ˘ ⊿ **show version** ´ Ո ˚
ї б ˘ У ˘ ї ˘ a ў ⁋ ^
' **redundancy force-switchover**˜ ˘ ї ‡ ˘ ھ Ⱶ Â

˘ ˚ ˘ '

1˜ ˘ ˚ ˚ ⊿ и **rgos.bin**

2˜ Э **copy** ћ ʒ˘ ˚ Ю Э

3˜ Э ҷ ÿ ˘ ў ÿ ў ˘ ╥˘ ╥
Ю '

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

1˜ У Æ

2˜ Ѧ ŭ ╟ ⊿˘ ˘ ˚ ˘ Ю '

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

3˜ ҷ ˘ ⊿˘ Ю '

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

4˜ ˘ ˚ ⅄ ╟ Æ˘ Ю '

System restarting, for reason 'Upgrade product !'.

5˜ Ѧ ŭ ╟ ⅄˘ ˘ ˘ ⅄ ╗ ´ ˘
˚ ˘ 5 Ո 6 ˘ a 7 ˘ ⅄
Ɂ '

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

ÿ ˘ ˚ ╗ ў

6˜ ў ⅄˘ ╟ ˘ ╗ ŭ ╟˘ ÿ è
ж Ю '

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 ......

è .

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

è .

Transmission is OK, now, card in slot [3] need restart ...
Software installation of card in slot [3] is in process ......
!!!!!

注意：

a Æ a è Â

说明：

Â

Æ Â

Â

έ

Ping

ὴ ˘ Echo ˜ ˘ ˜ ↑ ↓ У
↑ ↑˘ هى فخ سم ˘فخ سم ⅄
Echo ˜ ˘ ↓⅄υ à Ω· ↓ ˘ RGOS
Ping έ˘ ↓⅄υ ╠ à Æ Â

Ping Ђυ ϟ ج Ω· Ю˘ ج Ю˘ ↓
ѫ Ping ╗ ˘ ج Ю˘ ↓⅄υ Ping ╗ Â

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

Ping ╗ ˘ ↓⅄υج Ω· Ю ˘ 5
ὴ 100Byte ↑ ↓ IP فخ سم˘ ج ^ ὴ 2 ˜ ˘
↑ б ↑ ٦ ^ ǂ a ˘ ↓Ώ ǂ ٦
˜˘ ‡ ļ ! Ľ ⅄' ↑ б ↑ a ٦ ˘ ‡ ļ C Ľ ⅄'
˘ ‡ ļ . Ľ ⅄ Â ⅄ У ÂЛЮ 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 ╗ ˘ ↓ ج Ю Âج Ping ˘ ↓⅄υ ↓
↑ à à Â Ω· Ping ╗ У ˘ ⅄ ≠ У
˘ ЛЮ ὴ У 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#
```

Traceroute

Traceroute Ъυ ϗ˘ ϟ Л∪ ↑ ÿ ƒфż ѕм ƒфż ѕм˘ Â **Traceroute** Ъυ ϗ ў ˘ ϳ ϟ ˘ ѕм Æ ϟ Æ Â

‡ ˘ У ↑ У ˘ ↑ TTL ѓ 1 Â TTL ѓ й 0 ˘ ↑˘ ƒфż ѕм У ћ a ϟ ↑ ƒфż ѕм Â ‡˘ Traceroute Ъυ ϗ ' ″I ƒфż ѕм ϟ У TTL й 1 ↑˘ У ћ У ICMP ˘ Л∪ ↑ a ϟ ˘ ϳ й TTL ˘ Л ↑ TTL ѓ ╗ 1 Л ϟ ˘ ϟ γ ћ TTL ˘ У Ю ↓˘ ƒфż ѕм˘ У ћ ICMP TTL ƒфż ѕм˘ Ю ÿ ƒфż ѕм ƒфż ѕм˘ IP ↑ ϒ Â

Traceroute Ъυ ϗ ϟ Л∪ ϳ Ո Ю ˘ έ Ъυ ϗ Ю'

Ъυ ϗ	╗
Ruijie# **traceroute** [*protocol*] [*destination* [**probe** *probe*] [**ttl** *minimum maximum*] [**source** *source*] [**timeout** *seconds*]]	↑ ϟ

ЛЪЮ й Traceroute ч ˘ У й ˘ У й ϳ a Â

1¨ Traceroute '

```
Ruijie# traceroute 61.154.22.36
  < press Ctrl+C to break >
Tracing the route to 61.154.22.36

1      192.168.12.1       0 msec  0 msec  0 msec
2      192.168.9.2        4 msec  4 msec 4 msec
3      192.168.9.1        8 msec  8 msec  4 msec
4      192.168.0.10       4 msec  28 msec  12 msec
5      202.101.143.130    4 msec  16 msec  8 msec
6      202.101.143.154   12 msec  8 msec  24 msec
7      61.154.22.36       12 msec  8 msec  22 msec
```

ÿ Э ϟ Л∪ ѕм ˘ ÿ ƒфż ѕм IP ƒфż ѕм й 61.154.22.36 ў ˘ ↑ ф ^ 1¨ 6˜ ˘ ϟ ˘ ĵ ˘ Â

2˙ a Traceroute '

```
Ruijie# traceroute 202.108.37.42
< press Ctrl+C to break >
Tracing the route to 202.108.37.42
1     192.168.12.1      0 msec  0 msec  0 msec
2     192.168.9.2       0 msec  4 msec 4 msec
3     192.168.110.1    16 msec  12 msec  16 msec
4     *  *  *
5     61.154.8.129      12 msec  28 msec  12 msec
6     61.154.8.17        8 msec  12 msec  16 msec
7     61.154.8.250      12 msec  12 msec  12 msec
8     218.85.157.222    12 msec  12 msec  12 msec
9     218.85.157.130    16 msec  16 msec  16 msec
10    218.85.157.77     16 msec  48 msec  16 msec
11    202.97.40.65      76 msec  24 msec  24 msec
12    202.97.37.65      32 msec  24 msec  24 msec
13    202.97.38.162     52 msec  52 msec  224 msec
14    202.96.12.38      84 msec  52 msec  52 msec
15    202.106.192.226   88 msec  52 msec  52 msec
16    202.106.192.174   52 msec  52 msec  88 msec
17    210.74.176.158   100 msec  52 msec  84 msec
18    202.108.37.42     48 msec  48 msec  52 msec
```

ÿ Э ل Л ب ˇ ÿ ف س خ IP ف س خ ى 202.108.37.42 ў
ˇ ↑ ف ^ 1˙ 17˜ ˇ з 4 Â

٨

٨ ص

ў ٨ ص ٭ ˘ ٨ ص ЊЖ Â
٨ ص ٦٭ ѝ ЛЬЮ ч '

γ ٨ (L2 interface)

Ь ٨ (L3 interface) (Ь)

γ ٨ (L2 interface)

ў γ ٨ ص ٦ ЊЖ ˝ ٦٭ ѝ ЛЬЮ ص

Switch Port

L2 Aggregate Port

Switch Port

Switch Port Э ´ ٨ ˘ ٧ γ ╗ Â ٨ ٦ Л Ь У
Access Port У Trunk Port ٦ Л Ь Switch Port ٨ Ъ ъ˘ У
٨ ѝ У Access Port Trunk Port Â Switch Port ٨ Ո
б γ ˜ ˘ з а Ո Â

Access Port

Access Port ٧ У VLAN, ٧ VLAN Â У
Â

Trunk port TAG ˘ ЛЬЮ ˚ '

Trunk Port TAG VID Trunk port Native vlan ˘ ' ج ٦ ˘ ٧ TAG ٨ Ą ٦ Â

Trunk Port TAG VID a Trunk port Native vlaň VID ٴ VLAN ID ˘ ' ٦ ˘ ٧ TAG Â

Trunk Port TAG VID a Trunk port Native vlaň ٣ VID ٴ a VLAN ID ˘ Â

说明:

Untagged Ethernet ˘ PC ´ ٦ Л Ь ' TAG ٦ ע ج MAC فخ سم Ո MAC فخ سم ٨˘ ╗ Э 4bytes VLAN ˘ ≠ VLAN TAG Â

Hybrid ٴ

Hybrid ص ٴ ٦ Л Ь VLAN˘ ٦ Л Ь Ո ٦ VLAN ˘ ٦ Л Ь ˘ ≠ ٦ Л Ь Â Hybrid ٴ Ո Trunk ٴ a ٨ ج Hybrid ٴ ٦ Л Ь VLAN ٦ a ˘ Trunk ٴ ٦ VLAN ٦ a , ' Hybrid ٴ ╗ VLAN ج Â

L2 Aggregate Port

Aggregate port ˜ ٴ ٨ Â ٦ Л Ь ج У У ´ ˘ ѝ У Aggregate Port˜ ЛЬЮ AP ˜ Â

γ AP У Switch port˜ ٦ Л Ь ٴ ٨ ╗ ˘ Â ˘ L2 Aggregate port ٦ ج L2 Aggregate port ˜ ٴ Э ˘ AP У ˜ ˘ L2 Aggregate port ╠ Э è ˜ Э˘ ٦ Â

注意:

L2 Aggregate Port ˜ ٴ ص ٦ Л Ь ѝ Access port Trunk Port˜ ٨ У AP ˜ ٴ ѝ ٨ У ص˘ ѫ Access Port˜ ѫ Trunk port Â

Ь ㅓ (L3 interface)

ў 3 ㅓ ㅓ Ⱶ Â

SVI(Switch virtual interface)

SVI ㅓ˘ Ь ㅓ Â SVI ㅓ Л Ù
ㅓ˘ ㅓ ˜ ㅓ Â ≠ ㅓ Л… SVI Ù У ㅓ˘
ㅕ VLAN ㅓ˘ ㅓ Ь VLAN
Â … У SVI ´ ˘ ㅓ **interface vlan** ㅓ Ъ ҳ … SVĭ
ㅕ SVI¦ IP فذ سم VLAN Â

ڤي ˘ VLAN20 ў ㅓ ˘ Ь ˘
VLAN20 ў A Ո VLAN30 ў B VLAN20

ÿ ɱ ٰ˘ ÿ ٰ˘ ÿ Э Ю У ˘ ٰ ÿ 1
╗ Â Э ٰ ٰ ÿ 1˙ Э ٰ ˘ ٰ ÿ ٰ Â
ٰ Л Ū ص ˘ ٰ ↑ ч Ū ˆ ˝ ٰ Ո ٰ ˜ ˘
Ū ˘ ٰ ٰ Â ≠ ٰ Л Ъ ҳ **show** ҳ
Л Ъ ٰ Э ٰ Â

Aggregate Port˝ è ٰ ىن ﻱ 1˙ Aggregate Port Â

SVI˝ è ٰ SVI VLAN VID Â

注意:

Э ٰ ش ﻱ Ơ ╟ (ٰ ﻫ ´) ٰ ÿ 1
Â

ٰ ҳ

ٰ ﺟ Ю interface ҳ ٰ Â

interface range ˘ تن ۸ Â

ԋυ ϥ	

ﻫ ﻉ	
Ruijie(config)# **define interface-range** *macro_name interface-range*	ﻫ ﻫ ﻥ ﻫ macro_name ﻫ ﻝ ˇ a 32 ﻫ ﻝ ﻝ ﻥ ﻫ ﻝ ﻭ ﻫ ﻥ ﻫ ﻝ ﺹ
Ruijie(config)# **interface range macro** *macro_name*	ﻫ ﺝ ˇ **interface range** ﻫ ﻉ ˇ ﻝ ﻝ ﻫ ﻝ ﻫ ﻉ ﻉ ﻥ ﻫ

ﺝ ﻫ **no define interface-range macro_name** ﻫ ﻉ ﻫ

define interface-range ﻫ ﻉ ﻫ ﻫ ﻥ ˇ '

ﻫ ﻥ '

– **vlan** *vlan-ID - vlan-ID*, VLAN ID ﻥ 1 4094'
– **fastethernet** *slot*/{ *port*} - { *port*}'
– **gigabitethernet** *slot*/{ *port*} - { *port*}'
– **Aggregate Port** *Aggregate port* - *Aggregate port* , ﻥ 1 MAX'

ﺝ ﻭ **interface range** ﻫ ﻝ ﺹ ˇ . switch port Aggregate Port SVI

ﻫ **define interface-range** ﻫ ﻉ ﻫ fastethernet1/1-4 ﻫ'

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

ﻫ ﻫ ﻫ ﻥ ﻫ'

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

ﻫ ﻫ ports1to2N5to7 ﻥ ﻫ'

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

Ю ⊮ ports1to2N5to7'

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

ٸ Ӯ ص

ٸˇ ٯ Л Ū ص Â ٯ Л è У Ū Â У Ū ص ˇ ٸ à à ٯ à Ū ص ˇ ٯ Ū ص ˇ ٯ Л Â

Ъ ٶ ٸ ٸ Â Aggregate Port Ո SVI ٸ a Ū ص Â

Ъ ٶ ٸ Ū ٸ Â

ѝ Aggregate Port ˜ ٸ ٸˇ è Ū ص У ˇ ї ‡ ╗ AP Â Aggregate Port ˜ ٸ ٸ ص a ٯ Â

Ъ ٶ	
Ruijie(config-if)# **medium-type** { **fiber** | **copper** }	ٸ Ū ص

Ю ٸ Gigabitethernet 1/1 Ū ص'

```
Ruijie# config terminal
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
```

ٸ Ո

ѝ ╠ в У ٸ ╗ ˇ ٯ Л ѝ У ٸ У ж ɻ ٸˇ ≠ ٸ (Description) Â ٯ Л Ѿ ⊮ ٸ έ ɻ ˇ ˇ Gigabitethernet 1/1ǂ А ж ˇ ٯ Л ٸ ѝ ľ Port for User A Ŀ Â

Ъ ٶ	
Ruijie(config-if)# **description** *string*	ٸ ˇ 32 Â

Ю ٸ 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
```

ㅎ Ю˘ ㅓ ㅓ Â ㅓЛ ㅓ
У ㅓ Â У ㅓ˘ ‡ ㅓ Э a Ո ㅓ ˘
ㅓ ㅓ ℸ Â ≠ ㅓЛ
У ㅓ Â ㅓ ч ' Up Ո Down˘ ㅓ
˘ ㅓ й down˘ ĭ ‡ й up Â

Ћυ ҳ	
Ruijie(config-if)# **shutdown**	У ㅓ

Ю ㅓ Gigabitethernet 1/2'

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

ㅓ ˘ ㅓ ˘

ㅓ à ㅓ Ո Â

ЛЮ Ћυ ҳ ㅓ Switch Port Â

Ћυ ҳ	
Ruijie(config-if)# **speed** {**10** | **100** | **1000** | **auto** }	ㅓ ㅓ ˘ й auto Â ' 1000 ㅓ ¯ ˝I ㅓ ' ˝I ㅓ ⁸ й 1000M Â
Ruijie(config-if)# **duplex** {**auto** | **full** | **half** }	ㅓ ㅓ Â
Ruijie(config-if)# **flowcontrol** {**auto** | **on** | **off** }	ㅓ Â ' speed,duplex,flowcontrol й auto ˘ ㅓ ~ ك

ㅎ ㅓ Ю **no speed** ˘ **no duplex** Ո **no flowcontrol** Ћυ ҳ˘ ㅓ
à ㅓ Ո й ˆ ~ ك~ Â Ю
Gigabitethernet 1/1 й 1000M˘ ㅓ й ㅓ ˘ '

```
Ruijie# configure terminal
Ruijie(config)# interface gigabitethernet 1/1
Ruijie(config-if)# speed 1000
```

```
Ruijie(config-if)# duplex full
Ruijie(config-if)# flowcontrol off
Ruijie(config-if)# end
```

注意:

IEEE ˘ ¯ ”I ㅓ ˜ ك ㅓ Master Slave
Â ң ḡ ”I ㅓ ˜ ك ┣ ˘ б У ˘ ї ‡ ㅓ
ㅓ a link up Â

ㅓ MTU

ㅓ ǎ ㅗ ˘ ㅓ Л∪ ˘
ий jumbo Â ㅓЛ∪ ㅓ MTU ⁸ ㅓ ㅓ
Â

MTU ˘ a ↑ Л∪ Â

ㅓ MTU ㅓ جھ Â a MTU Â ㅓ ˘
MTU Â

MTU تن ий 64~9216 ˘ ий 4 ˘ ий 1500 Â

ћ∪ ҂ ㅓ ㅓ Â SVI ㅓ a MTU Â

ћ∪ ҂	
Ruijie(config-if)# **Mtu** *num*	ㅓ MTU Num' <64-9216>

Ю ㅓ 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
```

2 ٨

γ ٨

ЮO γ ٨ ˘ VLAN -ا ٨ ٨ ا'
VLAN Ŀ Ո ا' ٭٭ ٨ ⁸ Ŀ Â

γ ٨ ЮO '

	γ
Switch port	access port
VLAN تن	VLAN 1 4094
VLAN˜ access port	VLAN 1
Native VLAN˜ trunk port	VLAN 1
ȳ صر	copper
٨	Up
٨	
	~ ك
-ا	~ ك
	~ ك
Aggregate port	
⁸	
٨	
٨	

Switch Port

access/trunk port

ў Switchport (access/trunk port) -ا ЮO
Â

ـا جھ ٨ ЮO **switchport** è Ъu ҳ Switch Port

'

Ъυ ҳ	
Ruijie(config-if)# **switchport mode** {**access** | **trunk** }	ฯ Â

Ю gigabitethernet 1/2 ѝ access port Â

```
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 1/2
Ruijie(config-if)# switchport mode access
Ruijie(config-if)# end
```

Ъυ ҳ	
Ruijie(config-if)# **switchport access vlan** *vlan-id*	access port VLAN Â

Ю access port gigabitethernet 2/1 vlan ѝ 100 Â

```
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 2/1
Ruijie(config-if)# switchport access vlan 100
Ruijie(config-if)# end
```

trunk port native VLAN

Ъυ ҳ	
Ruijie(config-if)# **switchport trunk native vlan** *vlan-id*	trunk port NATIVE VLAN Â

Ю Trunk Port Gigabitethernet 2/1 Native vlan ѝ 10 Â

```
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 2/1
Ruijie(config-if)# switchport trunk native vlan 10
Ruijie(config-if)# end
```

ฯ ฯ ˘ ฯ ฯ Ї ฯ

ᵃ Ŀ'

Ъυ ҳ	
Ruijie(config-if)# **switchport port-security**	ฯ ฯ Â

Ю Gigabitethernet 2/1 ฯ Â Â

```
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 2/1
Ruijie(config-if)# switchport port-security
Ruijie(config-if)# end
```

ฯ ˘ ฯ ˘ ฯ ľ ฯ ˘ ฯ ˘ Ŀ Â

Ю Gigabitethernet 2/1 ѝ access porť VLAN ѝ 100ˇ ˘ ฯ ˘ ѝ ˜ ڷ ˘ ฯ '

```
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 2/1
Ruijie(config-if)# switchport access vlan 100
Ruijie(config-if)# speed auto
Ruijie(config-if)# duplex auto
Ruijie(config-if)# flowcontrol auto
Ruijie(config-if)# switchport port-security
Ruijie(config-if)# end
```

Hybrid ฯ

ฝ Л Л Ю Hybrid ฯ'

ђ ҳ	
configure terminal	
interface <*interface*>	ฯ ˮ ˜ ˮ ˇ ˮ
switchport mode hybrid	ѝ ฯ ѝ hybrid ฯ
no switchport mode	ฯ
switchport hybrid native vlan *id*	hybrid ฯ VLAN
switchport hybrid allowed vlan [[**add**] [**tagged** | **untaged**]] |**remove**] **vlist**	ฯ ‡

```
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
```

L2 Aggregate Port

ў … L2 Aggregate Port ㅓ Ո L2 Aggregate Port У Â

ㅓ Лυ ㅎ ㅓ Ю **aggregateport** … L2 Aggregate Portˇ é ㅓ Ї Aggregate Port Ł Â

ㅓ Æ ㅓ

ㅎ Ю ㅓ **clear** ħυ ϧ ㅓ Æ ㅓ Â ħυ ϧ ㅓ Switch Port,L2 Aggregrate port ˜ ㅓ, ˇ ЛυЮ ѝ **clear** ħυ ϧ'

ħυ ϧ	
Ruijie# **clear counters** [*interface-id*]	ㅓ Â
Ruijie# **clear interrface** *interface-id*	ㅓ ˚ Æ

ㅓ ㅓ Лυ ħυ ϧ **show interfaces** ˇ ㅎ Ю **clear counters** ħυ ϧˇ ㅓ Лυ ㅓ Â a ㅓˇ ‡ L2 ㅓ Ы Â

Ю Gigabitethernet 1/1 Ы'

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

3 ㅅ

SVI

ў … SVI ㅓ Ո SVI У Â

ㅓ ㅎ **interface vlan** *vlan-id* … У SVI У ㅎ SVI Â

SVI '

Ьu ʒ	
Ruijie(config)# **interface vlan** *vlan-id*	SVI ㅅ Â

ㅕ ㅓ SVI Â

Ю ㅅ ˘ з SVI 100ǂ IP ѫ ڂ'

```
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface vlan 100
Ruijie(config-if)# ip address 192.168.1.1 255.255.255.0
Ruijie(config-if)# end
```

注意:

… У SVI ㅅ Â

DHCP ˘ è DHCP ╟ ǂ IP ѫ ڂ˘ ㅎ SVI ㅅ ЛЬЮЬu ʒ'

Ьu ʒ	
Ruijie(config-if)# **ip address dhcp**	DHCP IP ѫ ڂ

Ո DHCP ч Ьu ʒ˘ ㅓ Лu ㅎ Э ЛЬЮ '

1˜ ^ debug˜ Ьu ʒ˘ ˘ ў Ո .

2˜ Ьu ʒ˘ DHCP Â

DHCP ˘ ㅎ Ьu ʒ ЛЬЮЬu ʒ'

Ьu ʒ	

DHCP╗ ˘ ﻉ ƕ ɔ ɻ ЛьЮƕ ɔ ɻ '

Ruijie# **show interfaces** *interface-id* **status**	ㅓ Â
Ruijie# **show interfaces** [*interface-id*] **switchport**	ㄴ ㅓ ˆ ㅓ ˜ administrative Ո

```
Enabled   All
```

ЛЬЮ ὶ ㅓ Gigabitethernet 2/1 ㅓ '

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

ЛЬЮ ὶ ㅓ

```
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
```

LinkTrap

ㅊ ㄱЛъ ㅓ ΐ ㄱ ㅓ LinkTrapˇ ╖ ˇ
ㅓㄱ Link ㄱㅛˇ SNMP ㄱ LinkTrap,ㄱ ‡ a ㄱ Â Юˇ ╖
Â

ЪU ҳ

ЪU ҳ	
Ruijie(config-if)# [**no**] **snmp trap link-status**	ㄣ ㅓ link trap ╖ .

Ю ㅓ ѝ a ㄣ Link trap:

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

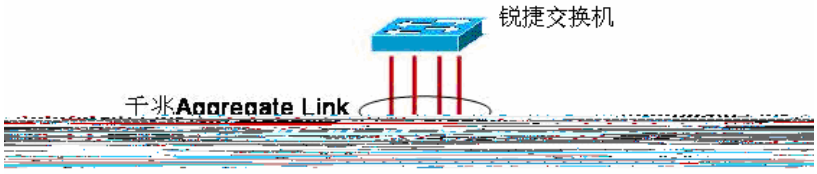
Aggregate Port

جھ Э Aggregate Port Â

Aggregate Port

ٮ Л Ъ جھ У У ˘
ѝ Aggregate Poîrt ЛЪЮ AP˜ Â AP ╖ ﾉ IEEE802.3ad
˘ ٮ Л Ъ ˘ ٮ Â

AP У ˜ ˘ ˜ ╟ AP
è ˜ Э ٮ Â AP У ˜ ˘ a
ٮ è ˜ Э Â



ي 1 ѝ ص AP

说明：

S2700 31 AP˜ AP ↑ ѽ 8 ﾍ Â

AP ㄴ Л∪ MAC ѫ ѣ MAC ˇѫ MAC ѫ + MAC ѫ
ѫ ѣ IP ˇѫ IP ѫ Л∪ ㄱ IP ѫ + IP ѫ ѫ
ѫ ѓ AP ˜ Â ㄴ Л∪ **aggregateport load-balance** ѓ
Â

MAC ѫ MAC ѫ ѓ AP ㅅ ˜
Â a ㅅ MAC ˘ ㄴ ˜ a ㅅˇ ㅅ MAC ˘ ÿ ㅅ У
˜ ㄴ Â

MAC ѫ MAC ѫ ѓ AP ㅅ
˜ Â ㅅ MAC ˘ ÿ ㅅ У ˜ ㄴˇ a ㅅ MAC
˘ ÿ a ㅅ ˜ ㄴ Â

MAC+ MAC ѫ MAC Ո MAC ѫ
ѓ AP ㅅ ˜ Â ɛ a ㅅ MAC+ MAC ѫ ㄴ
ѓ ㅅ У AP ˜ Â

IP ѫ IP ѫ IP IP ѓ Â a ㅅ
IP IP a ㅅ ˜ ㄴˇ ㅅ IP IP ‡
ㅅ ˜ ㄴ Â Ь ˘ ѭ
Ю ɣ ˘ ‡ ╟ ɣ MAC ѫ MAC ѫ
Â

IP ѫ + IP ѫ IP Ո IP ѓ Â
Ь ˘ ѭ Ю ɣ ˘ ‡ ╟
ɣ MAC ѫ Â ɛ a ㅅ IP+ IP ѫ ㄴ ѓ
ㅅ У AP ˜ Â

a ㅅ ㅅ ѓ ˘ Л∪ ѓ ѕ ѫ
ㅅ Э˘ ѵ ѓ Â

ѭ Юѱ ˘ У AP б Ы ˘ ^ ѱ
Э 4 ㅅ PC ˜ Л∪ Ы ѝ ˘ ^ ѱ Ю 2 ㅅ PC ˜
Ы ㄴ MAC MAC ѫ˘ ѝ Ы б ѐ ў
ѐ ѓ ˘ ѝ MAC ѫ ’ ѭ
˘ ‡ ѝ MAC ѫ Â

说明：

S2700 ㅅ ^ ѷ ˜ ѫ
Â ѷ ˘ Л∪ ˜ У Â
˘ IP ˘ ч ɛ a ㅅ IP+ IP ѫ ˘ ㄴ ѷ
ㅅ У AP ˜ Â

AP a ㄴ ╗ Â

ㄴ╗ У a ㅊ AP ˇ AP ╠… Â

У ㄴ╗ APˇ ㄴ AP ㄴ Ҁ Â

У ㄴ ÿ AP ˇ ‡ ㄴ ὶ è ╗ AP ɱ Â

:

注意:

У ㄴ╗ AP ㅅ, a ㅊ ㄴ Э , ㄴ AP.

Aggregate Port

ㅊ ㄴ Ю˘ Ю ㄴ╗ APˈ

Ђu Ҁ	
Ruijie(config-if-range)# **port-group** *port-group-number*	ㄴ╗ У AP(AP a ㅊˇ ‡ ㅅ … AP) Â

ㅊ ㄴ Ю **no port-group** Ђu Ҁ У ㄴ AP Â

Ю γ Л∪ ㄴ 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
```

ㅅЛ∪ㅊ Ю Ђu Ҁ Ruijie(config)# **interface aggregateport** *n* (n ὶ AP ㄲ) … У AP(AP n a ㅊ) Â

Aggregate Port

ㅊ Ю˘ Ю AP '

Ђu Ҁ	

Ruijie(config)#
aggregateport
load-balance
{ **src-dst-mac** | **ip** }

VLAN

IEEE802.1q VLAN

VLAN ﻫﻫ ˆ Virtual Local Area Network˜ ˘ ﺟﻪ У

1 ﻓﻲ

Ռ У У ˘ VLAN Ռ У IP ﺟﻪ У Â У ή ﺻﺮ ˘ ﺟﻪ ﻝ У IP ў ﻝ У VLAN˝ VLAN Ь ˆ Ь ˜ Â Ь ﻝ Ո SVI ﻫˆ Switch Virtual Interfaces˜ VLAN IP Â SVI ˘ ﻫ ﻫ IP ´ Â

VLAN

ң ҕ VLAN IEEE802.1Q ˘ 4094 VLAN(VLAN ID 1-4094) ѐ VLAN 1 a ┘ VLAN Â

VLAN ˜ ص

┘ Л Ъ У ٨ VLAN ˜ ص˘ ٨ ˘ Л Ъ
٦ ٨ ┘ Л Ъ VLAN Â VLAN ˜ ص ˘ Ю

VLAN ˜ ص

VLAN State	Active	Active˘ Inactive

… à У VLAN

ج ЮЎ ┘Л… У VLAN"

ћυ ҂	
Ruijie(config)# **vlan** *vlan-id*	У VLAN ID Â У VLAN ID˘ ‡ … У VLAN˘ ج VLAN ID˘ ‡ VLAN Â
Ruijie(config)# **name** *vlan-name*	^ ┘ ~ и VLAN ┤ У ┘ Â У ˘ ‡ ╠ и У ┘ VLAN xxxx˘ è xxxx 0 نې Æ VLAN ID Л Â ˘ VLAN 0004 VLAN 4 ┘ Â

VLAN ┘ ھ ┘ ˘ ┤ **no name** ћυ ҂ ┘ Â

Ю У … VLAN 888˘ ћυ ┘ и Test888˘ з ˚ '

```
Ruijie# configure terminal
Ruijie(config)# vlan 888
Ruijie(config-vlan)# name test888
Ruijie(config-vlan)# end
```

У VLAN

a VLAN˙ VLAN 1˜ Â

ج Ю У VLAN"

ћυ ҂	
Ruijie(config)# **no vlan** *vlan-id*	У VLAN ID˘ Â

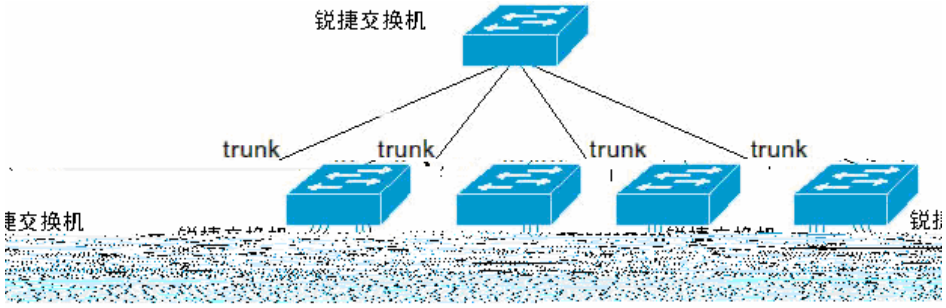
┘ VLAN¶ Access ┤

У ┤¶ У a ج VLAN˘ ѫ VLAN ╠ … Â

ج ЮЎ У ┤¶ У VLAN"

Ruijie(config-if)# **switchport mode access**	ЊЖ ٨ VLAN ˜ صر ˆ ٧ ACCESS ٨˜
Ruijie(config-if)# **switchport access vlan** *vlan-id*	٨† У VLAN

Ю Ethernet 1/10 ѝ Access ٨╗ VLAN20ˌ G Ă ˘ %



2 في

Aggregate Port Trunk

Port Â

switchport

Ruijie(config-if)# **switchport mode access**	Access
Ruijie(config-if)# **switchport mode trunk**	Trunk

Trunk Native VLAN Native VLAN Native VLAN VLAN Â UNTAG VLAN ID IEEE 802.1Q PVID Native VLAN VLAN ID Trunk Native VLAN UNTAG Trunk Native VLAN VLAN 1 Â

Trunk Trunk Native VLAN Â

Trunk

Trunk

Â

Ruijie(config-if)# **switchport mode trunk**	ѭ ٧ صر ѝ γ Trunk ٧
Ruijie(config-if)# **switchport trunk native vlan** *vlan-id*	ѝ ٧ У Native VLAN

У Trunk ٧ Trunk Æ ˘ **no switchport trunk** ٧ Ъυ ҂ Â

ѭ Trunk ٧ ٦ VLAN

У Trunk ٧ ٦ Л Ъ VLAN ˆ 1˙ 4094˜ Â ˘ ≠ ٦ Л Ъ Trunk ٧ ٦ VLAN ⁸ VLAN a Trunk ٧ Â

ѧ Ю˝ ٦ Л Ъ У Trunk ٧ ٦ VLAN Â

Ъυ ҂	
Ruijie(config-if)# **switchport trunk allowed vlan** {**all** | [**add** | **remove** | **except**] } *vlan-list*	ˆ ٦ ˜ Trunk ٧ ٦ VLAN Â ٧ *vlan-list* ٦ Л Ъ У VLAN˝ ≠ ٦ Л Ъ У VLAN˝ Л Ъ VLAN ID ˘ Л Ъ VLAN ID ˘ - ٨ Â ' 10–20 Â **all** ѽ ѭ ٦ VLAN ↑ ѽ VLAN˝ **add** VLAN ╕ ٦ VLAN ' **remove** VLAN ÿ ٦ VLAN ' **except** VLAN VLAN ╕ ٦ VLAN '

Trunk ٦ VLAN ѝ ٦ VLAN ˘ **no switchport trunk allowed vlan** ٧ Ъυ ҂ Â

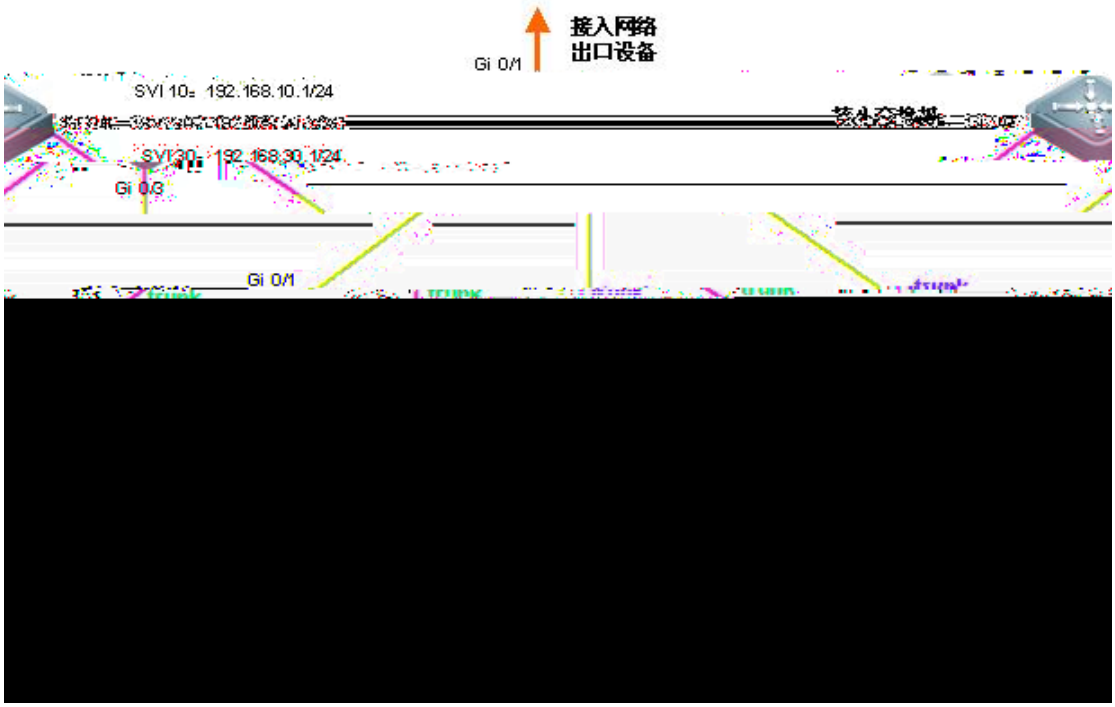
Ю У VLAN 2 ÿ ٧ 1/15 '

```
Ruijie(config)# interface fastethernet 1/15
Ruijie(config-if)# switchport trunk allowed vlan remove 2
Ruijie(config-if)# end
Ruijie# show interfaces fastethernet 1/15 switchport
Switchport is enabled
Mode is trunk port
Acsess vlan is 1,Native vlan is 1
Protected is disabled
Vlan lists is
1,3-4094
```

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

Ruijie# show vlan  id 1
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



Э ڤي ˘ ∫ ѝ VLAN 10 à VLAN 20 à VLAN 30ˇ Л∪
2 ' 3 VLAN IP ∫ ѝ 192.168.10.0/24 à 192.168.20.0/24 à
192.168.30.0/24ˇ 3 VLAN 3 IP ┘ ╒ Â

Л∪ Ո 1 ⅄ ѝ Â Ю'
1) ﺝ 3 VLANˇ Ю ∧ ѝ trunk ∧˘ ┘
vlan ˘ 2 '
2) ﺝ 3 SVI ∧˘ ∫ ѝ 3 VLAN IP ∧˘
IP ﻓﺦ ﺳﻢ'
3) ∫ ﺝ 3 ⅄ … VLANˇ ѝ ⅄ VLAN∫ Access ∧˘ Э
trunk ∧ Â Л∪ Switch A ѝ Â

1) Э

… VLAN

```
#
Ruijie#configure terminal
# … VLAN 10
Ruijie(config)#vlan 10
# … VLAN 20
Ruijie(config-vlan)#vlan 20
# … VLAN 30
Ruijie(config-vlan)#vlan 30
# ﻫﻰ
Ruijie(config-vlan)#exit
```

⅄ Ю trunk ∧˘ ┘ vlan

```
# ∧ ﺗﻦ Gi 0/2-4
Ruijie(config)#interface range GigabitEthernet 0/2-4
# ∧ Gi 0/2-4
```

```
#       ╖     ∧     ┘ vlan ℵ 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 ℵ 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 ℵ 20 à 30
Ruijie(config-if)#switchport trunk allowed vlan add 20,30
#   ھ
Ruijie(config-if)#exit
```

```
Gi0/3     enabled   TRUNK    1      1     Disabled  10,20,30
```

```
#       ٨ Gi 0/4    vlan
Ruijie#show interface GigabitEthernet 0/4 switchport
Interface Switchport Mode  Access Native Protected VLAN lists
--------- ---------- -----  ------ ------ --------- ----------
Gi0/4     enabled   TRUNK    1      1     Disabled  20,30
```

... SVI ٨˘ IP فخسم

```
#
Ruijie#configure terminal
# ...  SVI 10
Ruijie(config)#interface vlan 10
#     SVI 10    IP فخسم
Ruijie(config-if)#ip address 192.168.10.1 255.255.255.0
# ...  SVI 20
Ruijie(config-if)#interface vlan 20
#     SVI 20    IP فخسم
Ruijie(config-if)#ip address 192.168.20.1 255.255.255.0
# ...  SVI 30
Ruijie(config-if)#interface vlan 30
#     SVI 30    IP فخسم
Ruijie(config-if)#ip address 192.168.30.1 255.255.255.0
#   هى
Ruijie(config-if)#exit
```

2) Switch A Э

... VLAN

```
#
Ruijie#configure terminal
# ...  VLAN 10
Ruijie(config)#vlan 10
# ...  VLAN 20
Ruijie(config-vlan)#vlan 20
#   هى
Ruijie(config-vlan)#exit
```

ЬИ ٨ VLAN¦ Access ٨

```
#       ٨   تن Gi 0/2-12
Ruijie(config)#interface range GigabitEthernet 0/2-12
#     ٨ Gi 0/2-12     Ь Access ٨
Ruijie(config-if)#switchport mode access
#     ٨ Gi 0/2-12¦      VLAN 10
Ruijie(config-if)#switchport access vlan 10
#       ٨   تن Gi 0/13-24
```

```
Ruijie(config-if)#interface range GigabitEthernet 0/13-24
#     ٨ Gi 0/13-24     ٭ Access ٨
Ruijie(config-if)#switchport mode access
#     ٨ Gi 0/13-24¦      VLAN 20
Ruijie(config-if)#switchport access vlan 20
#   ھ
Ruijie(config-if)#exit
```

Э trunk ٨

```
#       ٨ Gi 0/1
Ruijie(config)#interface GigabitEthernet 0/1
#         ٨ Gi 0/1    ٭ trunk ٨
Ruijie(config-if)#switchport mode trunk
#   ھ
Ruijie(config-if)#exit
```

Protocol VLAN

Protocol VLAN

ٸ ˘ VLAN ˛ ˘ ر У У
VLAN˘ ЛЬЮ Ь ٶ '

1. VLAN ID ˆ UNTAG Priority ˜ ˘ ﷺ
ٸ VLAN˛ ˘ ╗ TAG VLAN ID ٸ PVID Â

2. VLAN ID ˆ UNTAG Priority ˜ ˘ ﷺ
˜ ص VLAN˛ ˘ ╗ TAG VLAN ID ÿ ٸ Э
˜ VLAN ID ٶ˘ ˜ ص б ٸ Э
˜ a ˘ ﷺ ٸ VLAN˛ ˛ VLAN ID Â

3. TAG ˘ è VLAN˛ TAG VLAN ID ã Â

Protocol VLAN ﷺ ˜ ص VLAN˛ ˘ è ٶ Лъ У ˜
ص VLAN ID ˛ ٶ У VLAN Â

Protocol VLAN ٸ Trunk ٸ ˘ Access ٸ Â

ٸ ң ҏ ﷺ IP فخ سم VLAN˛ Ո ٸ Э ﷺ ص Ո Лъ
ص VLAN˛ ч VLAN˛ Â

ﷺ IP فخ سم VLAN˛ ˘ ﷺ IP فخ سم VLAN˛
˘ è Trunk ٸ Э Â

1. ѝ VLAN ID , з IP فخ سم ך IP فخ سم
˘ ˛ VLAN Â

2. ѝ VLAN ID , з ˛ 4T 01ﷺ07D16.309 0 01 /C2U 0 1 Tf 0 Tc 2ص769

Protocol VLAN

Protocol VLAN

Protocol VLAN

profile

2.

Protocol VLAN

ㄴЛъ ЛъЮ Protocol VLAN

ђυ ҳ	
show protocol-vlan	Protocol VLAN

```
Ruijie# show protocol-vlan
ip              mask            vlan
-------------   -------------   ----
192.168.100.3   255.255.255.0   100
profile          frame-type  ether-type     Interfaces|vid
-------     ---------   ----------     --------------
1           ETHERII     EHTER_AARP     gi3/1|101
2           SNAP         ETHER_APPLETALK  gi3/1|1
```

Private VLAN

[illegible] VLAN [illegible]
[illegible] VLAN [illegible] IP [illegible] VLAN
4096
Private VLAN Â

VLAN(Private VLAN) VLAN [illegible]
VLAN ' VLAN(Primary VLAN) VLAN(Secondary VLAN) Â

VLAN VLAN VLAN VLAN Â VLAN ID Â

VLAN VLAN VLAN
Â
VLAN(Isolated VLAN) VLAN a
VLAN(Community VLAN) VLAN
Â VLAN VLAN
a VLAN
VLAN Â

Promiscuous Port VLAN VLAN Â

(Isolated Port) VLAN Â

(Community port) VLAN VLAN
≠ Â a VLAN
VLAN Â

VLAN VLAN a

VLAN SPAN a Â

Private VLAN

Private VLAN

ЮЎ Private VLAN

VLAN й VLAN

ЮЋu ҷ

Ћu ҷ	
configure terminal	
vlan *vid*	VLAN
private-vlan{community | isolated| primary}	VLAN ص
no private-vlan{community | isolated | primary}	ۍ VLAN
end	VLAN
show vlan private-vlan [*type*]	VLAN

说明:

ج 802.1Q Vlan é ˜ ۍ a й VLANˇ VLAN 1 a й VLANˇ é Trunk ۍ Uplink ۍ 802.1Q VLAN ˇ ˝I VLAN ÿ ۍ VLAN ˇ У Private VLAN ACTIVE ЛЬЮ ˚ '

1) é Priamry VLAN

2) é Secondary VLAN

3) Secondary VLAN б Primary VLAN

ЛЬЮЋu ҷ 802.1Q VLAN й Private VLANˇ

```
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  inacti1.434 Td[(VLAN )-103(Type  Status )-6( )-6(  Routed )-6( )-6
300 T(ated )12.6(VLANs )]TJ0 -1.44C(isabl6(----- )----- )---- ated
```

说明:

 ѝ Primary VLAN VLAN Â

Secondary VLAN Ո Primary VLAN Ь ٨

ٮ Ո Ю

Ьυ ٶ	
configure terminal	
interface vlan *p_vid*	Primary VLAN ٨
private-vlan mapping {*svlist* | **add** *svlist* | **remove** *svlist*}	Secondary VLAN Primary VLAN SVI Ь Â

switchport mode private-vlan host	й γ
no switchport mode	VLAN
End	SVI ٨
switchport private-vlan host-association *p_vid s_vid*	γ ٨ 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#
```

说明:

Primary VLAN Ո Secondary VLAN

γ ٨ й VLAN ٨

γ ٨ й VLAN ٨˘ ЛЬЮ Ьυ ٹ'

Ьυ ٹ	
configure terminal	
interface <*interface*>	٨ ”I¯; ”I˘ ”I
switchport mode private-vlan promiscuous	й VLAN γ
no switchport mode	٨ VLAN
switchport private-vlan mapping *p_vid*{*svlist* | **add** *svlist* | **remove** *svlist*}	VLAN ٨ ھ VLAN˘ ٦ secondary VLAN
no switchport private-vlan mapping	٧ seconary VLAN.

MAC فخ سم

MAC فخ سم

MAC فخ سم ↑ ŭ ٨ ٧ فخ سم Â MAC فخ سم ↑ ŭ ╟ à
à Ь ص فخ سم˘ ÿ ЛЮ MAC فخ سم Â

╟ فخ سم

╟ فخ سم ╟ ˜ MAC فخ سم Â У ٨ У
↑ ˘ ↑ فخ سم Ո ٨ ˘ فخ سم ˘
a ˜ فخ سم Â

У ↑ ˘ ↑ MAC فخ سم ˜ ╟ فخ سم˘ ‡
↑ ٧ б MAC فخ سم ٨ Э˘ ї ‡˘ ↑ ⊥ ٨
٧ Â

˜ فخ سم Ո У a Ą فخ سم a è ╟ فخ سم Â
فخ سم У فخ سم˘ (فخ سم У ā) Л
فخ سم Й فخ سم ↑˘ ‡ فخ سم У Â ٧ Л ٧ ╟ فخ سم
У Â فخ سم У فخ سم ˘ فخ سم سم
فخ У Й فخ سم˘ Ą Л فخ سم Й سم
فخ ↑ ˘ ⊥ VLAN è ٨ ٧ ˘ У a
Â У ˘ ‡ فخ سم У ˘ فخ سم ´ Â فخ سم
╗ Л˘ فخ سم a ˜ ˘ فخ سم جم ˜ فخ سم ɱ˘ سم
فخ У فخ سم ˘ Л فخ سم Й فخ سم ↑ ˘ ⊥
⊥ VLAN è ٨ ٧ ˘ ≠ У a Â

Æ Л˘ ˜ ╟ فخ سم ˘ ˜ سم
فخ Â

جم تجى ٨ Ю˘ ÿ ˜ فخ سم ˆ ў ˘ فخ سم
٨ ÿ ˘ ‡ ÿ a ˜ فخ سم˘ ÿ mac Й
Э mac ˘ ٨ Â

注意:

تجى ٨ Ю Л ˜ فخ سم a ⊥ Â Ю'

A Ո B تجى ٧ˇ A ى ў ’ A ٤ ˇ ѫ A

٧ ˜ فخ سم --mac1ˇ فخ سم A ٧ ˜ فخ سم
mac1’ تجى ٧ ٧ Bˇ يج B Э تجى ٧ ٧ Э ≠
˜ فخ سمˇ a فخ سم Â

A ٧ ˜ فخ سمˇ ѫ فخ سم mac1 ˇ B
تجى ٧ ٧ ˜ فخ سمˇ ў ÿ ° فخ سم a У Â
A è ٧ ٤ mac ى mac1 ˇ ѫ a جم B Э
ˇ يج ى فخ سم B تجى ٧ ٧ ˜ ˇ فخ سم У ٨ˇ
B ٧ Э Â

فخ سم

فخ سم ╗ MAC فخ سم Â فخ سم Ո ╟ فخ سم ╖ ٨ˇ a ╟
فخ سم ˇ فخ سم ٧ Ո (a ˜ Ո У)ˇ فخ سم ٤ Л
جم ° ˇ . Æˇ فخ سم ≠ a Â

فخ سم

فخ سم ╗ MAC فخ سم Â Л فخ سم ى فخ سم ↑
Â فخ سم a Уˇ ٧ Ո ˇ فخ سم ٤ Л
° ˇ . Æˇ فخ سم ≠ a Â

У ˇ ٤ Л MAC فخ سم ى
فخ سمˇ б

MAC فخ سم

MAC فخ سم

Ю فخ سم '

فخ سم لا	300
╠ فخ سم	╠ ¯
فخ سم	فخ سم
فخ سم	فخ سم

注意:

فخ سم لا б جم У ˘ a 2 Â

لا فخ سم

Ю й فخ سم لا '

hu ح	
Ruijie(config)# **mac-address-table aging-time** [*0 |10-1000000*]	У فخ سم ¯ ﻝ جم ╠ فخ سم ˘ ´ Æ ˘ تن 10 1000000 ˘ й 300 Â й 0 ˘ فخ سم لا ╗ ˘ ¯ فخ سم a لا Â

ﻝ Лu جم Ю hu ح **no mac-address-table aging-time** فخ سم لا й Â

注意:

S2700 لا تن й 10 – 630

╟ فخ سم

جم ЮЎ ┘Л Ъч **clear mac-address-table dynamic** Э ╟ فخ سم' ┘Л Ъч **clear mac-address-table dynamic address mac-address** У MAC فخ سم ' ┘Л Ъч **clear mac-address-table dynamic interface** *interface-id* У ∧ Aggregate Port Э ╟ فخ سم' ≠ ┘Л Ъч **clear mac-address-table dynamic vlan** *vlan-id* VLAN Э ╟ فخ سم Â

┘Л Ю Ъч **show mac-address-table dynamic** ╟ فخ سم ĭ Â

╕ Ո فخ سم

╕ У فخ سمў MAC فخ سم(↑ فخ سم)ў VLAN(فخ سم ╕ ف VLAN فخ سم)ў ∧(فخ سم ѝ MAC فخ سم ↑ ┘ ∧) Â

╕ У فخ سم'

Ъч	

mac-addr MACg/C2.73452 0.96 2Tc 0.00Bf268

Ruijie(config)#
mac-address-table static
mac-add **vlan** *vlan-id*
interface *interface-id*

╕ У فخ سم'

ћU ҷ	
Ruijie(config)# **mac-address-table filtering** *mac-addr* **vlan** *vlan-id*	mac-addr' MAC فخ سم vlan-id' فخ سم VLAN

┘ Л∪ جم Ю ћU ҷ **no mac-address-table filtering mac-addr vlan** *vlan-id* У فخ سم Â

Ю VLAN 1

فخ سم MAC فخ سم '

```
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
```

لا فخ سم

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

MAC سم فخ ل لا

ˇ لا ل MAC فخ سم ╖
У Â MAC فخ سم ╖ ЛˇˉУ MAC سم
فخ У ˉ MAC فخ سمˇ У ┤ MAC فخ سم لا ل
ң ˇ Л SNMP Trap ┤ NMS( ) Â
У MAC فخ سم ╕ ң ˇ У (MAC فخ سم
) ˇ У MAC فخ سم (У ˇ جم
لا فخ سم Ω ˇ MAC فخ سم
ÿ فخ سم) ң ˇ ‡ У Â

ˇ ┘ جم MAC فخ سم ل لا ң
(Э)ˇ ╕ Â и ˇ ┘ Л ┤
MAC فخ سم Â فخ سم ╕ Л ˇ
جم فخ سم ˇ ↑ Ü MAC فخ سم ل لا ˇ
سم Â

MAC فخ سم ң ˇ ┘ MAC فخ سم ┐ Л Â
Trap NMS ┤ MAC فخ سم ل لا Trapˇ
┘ Л MAC فخ سم ┐ Л MAC فخ سم ل لا Â

MAC

MAC فخ سم ╟ فخ سم˘ فخ سم ┘ ע a ң
Â

MAC فخ سم ┘ ע ╖

ЮЎ MAC فخ سم ˘ ٨ MAC فخ سم ╖ ≠ كا
Â

MAC فخ سم ╖ '

ћυ ҷ	
Ruijie(config)# **snmp-server host** *host-addr* **traps** [**version** {**1**|**2c** |**3** [**auth** | **noauth** | **priv**]}] *community-string*	MAC فخ سم NMS Â host-addr ' IP. Version' ┘ ف Trap. community-string' ┘ Trap Э ┘
Ruijie (config)#**snmp-server enable traps**	┘ Trap
Ruijie(config)# **mac-address-table notification**	MAC فخ سم ╖
Ruijie(config)# **mac-address-table notification** {**interval** *value* | **history-size** *value*}	interval value ' ң MAC فخ سم (┘) Â ´ Æ ѝ ˘ تن ѝ 1˙ 3600˘ ѝ 1 history-size value ' MAC ٦ ┘ ˘ تن 1˙ 200˘ ѝ 50 Â
Ruijie(config-if)# **snmp trap mac-notification** {**added** | **removed**}	٨ MAC فخ سم ╖ Â added ' فخ سم ╕ removed' فخ سم

┘ Л∪ جم Ю ћυ ҷ **no snmp-server enable traps mac-notification** ┘ MAC فخ سم ┘ ע Trap˘ ћυ ҷ **no mac-address-table notification** MAC فخ سم ˘ ˘ ┘ Л∪ جم ٨ ЮЎ ћυ ҷ **no snmp trap mac-notification** {**added** \| **removed**} ٨ MAC فخ سم ╖ Â

Ю MAC فخ سم ╖ ˘ Л∪ public ѝ ┘ ┘ IP فخ سم ѝ 192.168.12.54 NMS ┘ MAC فخ سم ┘ ע Trap˘ ң MAC فخ سم ┘ ע ѝ 40 ˘ MAC فخ سم ٦ ┘ ѝ 100˘ ٨ Gigabitethernet 1/3 Э MAC فخ سم ╕ Ո ╖ '

```
Ruijie(config)# snmp-server host 192.168.12.54 traps public
Ruijie(config)# snmp-server enable traps
Ruijie(config)# mac-address-table notification
Ruijie(config)# mac-address-table notification interval 40
Ruijie(config)# mac-address-table notification history-siz
```

```
e 100
Ruijie(config)# interface gigabitethernet 1/3
Ruijie(config-if)# snmp trap mac-notification added
Ruijie(config-if)# snmp trap mac-notification removed
```

MAC سم فخ ل لا

جم ЮЎ ل Л Ю ћ ъ MAC سم فخ '

ћ ъ	
Ruijie# **show mac-address-table notification**	MAC سم فخ ل لا ╗
Ruijie# **show mac-address-table notification interface**	∧ MAC سم فخ ل لا
Ruijie# **show mac-address-table notification history**	MAC سم فخ ل لا ٦ ل

Ю MAC سم فخ ل لا У Â

MAC سم فخ ╗ '

```
Ruijie# show mac-address-table notification
MAC Notification Feature : Enabled
Interval(Sec): 2
Maximum History Size : 154
Current History Size : 2
```

```
Ruijie# show mac-address-table notification interface
Interface          MAC Added Trap MAC Removed Trap
------------------- ------------- ---------------
Gi1/1              Disabled      Enabled
Gi1/2              Disabled      Disabled
Gi1/3              Enabled       Enabled
Gi1/4              Disabled      Disabled
Gi1/5              Disabled      Disabled
Gi1/6              Disabled      Disabled
```

```
Ruijie# show mac-address-table notification history
History Index:1
Entry Timestamp: 15091
MAC Changed Message :
Operation   VLAN MAC Address    Interface
----------- ---- -------------- --------------------
Added       1    00d0.f808.3cc9 Gi1/1
Removed     1    00d0.f808.0c0c Gi1/1
History Index:2
Entry Timestamp: 21891
```

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

IP ∩ MAC فخ سم

╟ IP ∩ MAC فخ سم ╗ ˘ ⊣ Л∪ ⁸ Â
У IP سم فخ ∩ У MAC سم فخ ˘ ‡ ⊣ IP سم فخ ∩
MAC سم فخ ک ٦ سم فخ IP ' ĭ ‡ Â

سم فخ ˘ ⊣ Л∪ ш ⁸ ⅄ Â
˘ سم فخ ⁸ ˘ ˙ ″I 802.1X à ∧ Л∪ Â

سم فخ

ج Ю˘ ⊣ Л∪ Л∪Ю سم فخ '

ħυ ʒ	
Ruijie(config)# **address-bind** *ip-address mac-address*	IP سم فخ ∩ MAC سم فخ
Ruijie(config)# **address-bind install**	ŭ ╗

⊣ Л∪ ج Ю **no address-bind** *ip-address mac-address* ⊣
IP سم فخ ∩ MAC سم فخ Â

no address-bind install ħυ ʒ ⊣ ╗ Â

سم فخ

⊣ Л∪ ج Ю **show address-bind** ħυ ʒ IP
سم فخ ∩ MAC سم فخ '

```
Ruijie# show address-bind
Total Bind Addresses in System : 2
IP Address      Binding MAC Addr
----------      ----------------------
3.3.3.3         00d0.f811.1112
3.3.3.4         00d0.f811.1117
```

فخ سم

ل Л ج Ю **show address-bin**d [ip-address *ip* | mac-address *mac*]
Ъ ч IP/MAC فخ سم Â

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

فخ سم ĭ

ل Л ج Ю **show address-bind summary** Ъ ч فخ سم
Л ч فخ سم

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

注意:

System Address bind status ج ج Ь ' SUCCESS˘
Ъ ч address-bind install Ъ ч ╗ فخ سم ' FAIL˘
Ъ ч address-bind install Ъ ч˘ ° a Л فخ سم˘
Л ˘ فخ سم a ˘ ل Л ĭ
فخ سم Ą ' Uninstall˘ فخ سم ˘
فخ سم a Â

IP فخ سم

فخ سم ĭ й' ˘ ˘ ш Ь ˘ й ш Â è
ч ‡˘ Ю

	Ipv4 ч ‡	IPV6 ч ‡
ш	ч л IPV4+MAC ° ч Â	a ipv6 ч˜ ~ Â
	ч л IPV4+MAC ° ч Â	IPV6 ч Â
	ч л IPV4+MAC ° ч Â	ч MAC й فخ سم MAC فخ سم IPV6 ч

IPV6 ¬ IPV6 ¬ : Â

ÿ ˇ ¬ЛЪ ЛЪЮ IP ƒ¤ ¤ '

Ъ ¬	
Ruijie# **configure terminal**	
Ruijie(config)# **address-bind ipv6-mode compatible**	ipv6 й
Ruijie(config)# **address-bind ipv6-mode loose**	ipv6 й
Ruijie(config)# **address-bind ipv6-mode strict**	ipv6 й ш
Ruijie(config)# **no adress-bind ipv6-mode**	ipv6 й ^ ш ~ Â

ˇ IP ƒ¤ ¤ й 192.168.5.2 ƒ¤ ¤ й 00d0.f822.33aaˇ
IPV6 ¬ Â

```
Ruijie# configure t
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)# address-bind 00d0.f822.33aa ip 192.168.5.2
Ruijie(config)# address-bind ipv6-mode compatible
```

注意:

IPV6 **DHCP Snooping** ƒ¤ ¤ ˇ ¬ MAC+IP
MAC+IP ™ ¬ Â ђ ¬ ™ IPV6 ¤
ƒ¤ˇ IPV6 Ю ¬ ‡ˇ Ю '

	Ipv4 ¬ ‡	IPV6 ¬ ‡
ш	¬ ¬ IPV4+MAC ¬ Â	¬ ¬ IPV6 ƒ¤ ¤ IPV6 ¬ Â
	¬ ¬ IPV4+MAC ¬ Â	IPV6 ¬ Â
	¬ ¬ IPV4+MAC ¬ Â	¬ MAC й MAC ƒ¤ ¤ˇ ¬ IPV6 ƒ¤ ¤ IPV6 ¬ Â

S2700 ђ ¬Ю IP+MAC з IPV6 й ˇ Ґ
IPV6 й ш ˇ IP+MAC а У Â

ж IP+MAC Юˇ а ¤Ђ ж ¬Ю
IP+MAC ˇ ц й IP+MAC Ґ ¤І ˇ ¬Ю IP+MAC
а Â

فخ سم ٨

فخ سم ٨ a ˘ ٦ Л٥ ٨ ѝ
٨˘ ÿ ˘ ٦ Л٥ ЛъЮ فخ سم ٨'

ћυ ҙ	
Ruijie# **configure terminal**	
Ruijie(config)# **address-bind uplink** *intf-id*	فخ سم ٨
Ruijie(config)# **address-bind install**	فخ سم ٨

٦ Л٥ جم Ю **no address-bind uplink** *interface-id* ٧ ٨
no address-bind install ٧ ٨ Â

فخ سم ٨

٦ Л٥ جم Ю **show address-bind uplink** ћυ ҙ
فخ سم ٨'

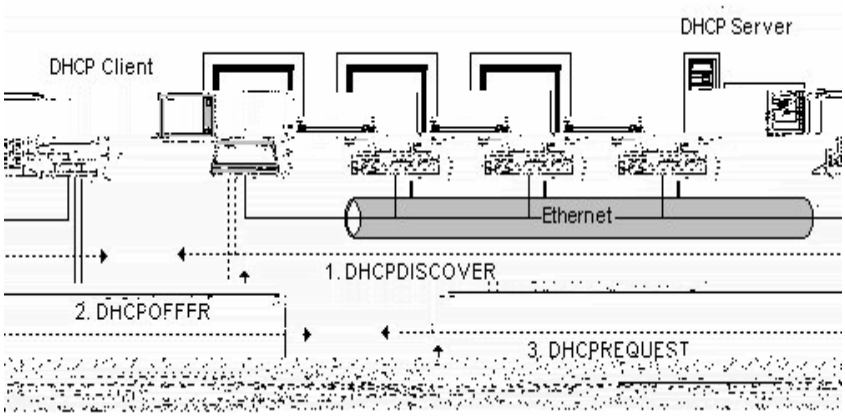
Ö

DHCP Snooping

DHCP Snooping Ӯ

DHCP

DHCP ˜ ╟ ↑ ↵ ˇ IP فخ سم Â У ή صر
DHCP ↵ IP Ю '



1 في

DHCP Client ↵ DHCP DISCOVER DHCP Serverˇ Client جم У
ᒪ ⅄ : ˇ ‡ ↵ DHCP DISCOVER Â

DHCP Server DHCP DISCOVER ⅄ˇ У Client↑
(IP فخ سم)ˇ ⅄ ↵ DHCP OFFER Â

DHCP Client DHCP OFFER ⅄ˇ ↵ DHCP REQUEST ˇ
↵ ᒪ ⅄ ˇ ˆ è ᒪ ⅄ ↵ ᒪ ⅄↑ فخ سم Â

ᒪ ⅄ DHCP REQUEST ˇ ї ↵ Ⅎ↑ ˇ ↵ Ⅎ↑ ˇ ‡
↵ DHCP ACK ' a ↵↑ ˇ ‡ ↵ DHCP NAK Â DHCP Client
DHCP ACK ˇ ᒪ ⅄↑ Â DHCP NAKˇ
‡ ↵ DHCP DISCOVER Â

DHCP Snooping

DHCP Snoopingˆ . DHCP ˜ ↵ Ⅎ ᑎ ᒪ ⅄ DHCP
ˇ ↵ Ⅎ ⅄ DHCP ˇ DHCP ᒪ ⅄ Â Ⅎ Ю

DHCP Snooping

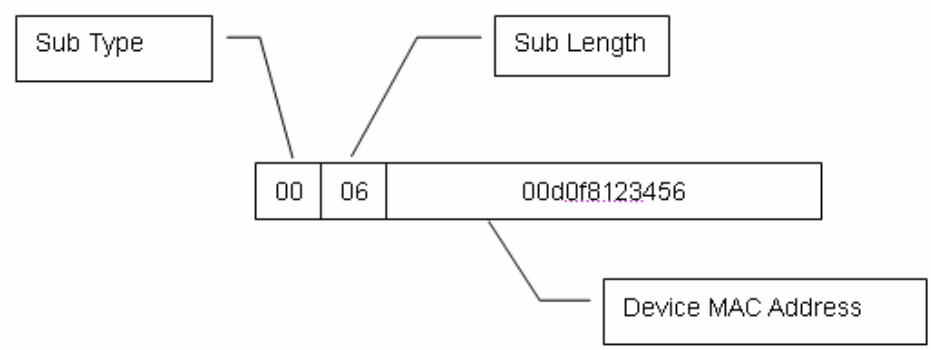
DHCP Snooping Trust DHCP IP

IP

TRUST UNTRUST DHCP

2 في

Agent Remote ID



3 في

DHCP Snooping فذ سم ╖

DHCP snooping فذ سم ╖ DHCP ˘ ⁄
(IP فذ سم à MAC à VLAN à PORT à)˘ DHCP snooping
Â DHCP snooping ╖ IP ˚ ˘ ÿ
⁸ ˩ DHCP snooping ⁄ ˩ IP ˘
rrr''©*ÿ[illegible]E1@ÝÁD‰ ÜÀF$4¥ n s6Ñ 1fÍ

ѝ ╗ ˘ ARP ˘ ARP Â ARP
˘ ⅃ Л∪ ⅂ ARP-CHECK à DAI ˜

DHCP Snooping è Y

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

2¨ ⅂ ѝ TRUST ⅂ ⅄˘ a Ё ⅂ Ю ⁸ Â

3¨ ǔ DHCP Snooping ╗ ⅄˘ DHCP CPU ˘ a ⅃
⁸ ⁝ Â ҷ ҹ ' 1˜ . DHCP a ⅄
˘ ⅃ Л∪ IP ﻓﺨ ﺳﻢ ’ 2˜ ⅃ Л∪ IP ﻓﺨ ﺳﻢ˘ IP
⅃ ҷ ѝ a ˘ Ю Э Â

DHCP Snooping

Ո DHCP Snooping

Ю˘ DHCP Snooping ╗ ѝ Â ╗ ⅄˘ DHCP Snooping DHCP Â

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

DHCP Snooping Bootp

Ю˘ DHCP Snooping ╗ a Bootp Â ╗ ⅄˘ DHCP Snooping Bootp ˘ ⅄ Bootp ╗ DHCP Snooping Â

Ьυ ϟ	
Ruijie# **configure terminal**	

```
Ruijie (config)# end
Ruijie#
```

注意:

1¨ a б ╟ ă Â ˘ Ÿ ┘Л
╟ ┘ IP فذسم Â
2¨ Bootp Â Bootp б ˘
Ћ ҷ ┘ Â

DHCP snooping information option

Ю˘ ╖ Â ╖ Л˘ DHCP Snooping

Ruijie(config)# **interface fastethernet** *0/1*	٨
Ruijie(config-if)# [**no**] **ip dhcp snooping address-bind**	/ ٨ Э DHCP snooping فخ سم ٦

Ю DHCP snooping فخ سم ٦ '

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

DHCP Snooping Flash ▾

Ю˘ ٦ Â ѝ ŭ ╟ ˄˘ DHCP Snooping ╟ ˘ DHCP Snooping ╟ Flash ▾ ٦ Â

ћU ҂	
Ruijie# **configure terminal**	
Ruijie(config)# [**no**] **ip dhcp snooping database write-delay** [*time*]	Flash ▾ ' *time*' 600—86400(s)˘ ѝ 0

╟ DHCP Snooping Flash

ˇ ѫ ǔ ╟ ɱˇ ⊣ Л ╟ ɱ DHCP Snooping
Flash ˚ ˇ ǔ ╟ˇ б ɱ У Â

ћu ҂	
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
```

∧ й TRUST ∧

Юˇ ∧ й UNTRUST Â ћu ҂ˇ У ∧ й й
TRUST ∧ˇ ⅄ DHCP ┗ Ж Â DHCP Snooping ╖ ⊣ TRUST ∧
DHCP ⁝ ˇ UNTRUST ∧ DHCP ⁝ Â

ћu ҂	
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#
```

DHCP Snooping ╟

ћu ҂ DHCP Snooping ╟ Â

ћu ҂	
Ruijie# **clear ip dhcp snooping binding**	ɱ ╟

ЮO ╟ ₥ ╟ '

Ruijie# **clear ip dhcp snooping binding**

DHCP snooping è

DHCP snooping

ћu ҳ DHCP Snooping ╖ ₥ '

ћu ҳ	
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
```

DHCP snooping

ћu ҳ DHCP Snooping '

ћu ҳ	
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
```

DHCP snooping

Ъυ ϡ DHCP Snooping Â

Ъυ ϡ	
Ruijie# **debug ip dhcp snooping {event | packet}**	/ DHCP Snooping

'

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

IGMP Snooping

IGMP

ﻫ IGMP ﻣ ˝I Ȳ IP ﻧ Â

ﻫ Internet Ɔ˘ Ո ˊ ﻟ ﻫ
ﻯ ˊ a У
˘ ﻳ ﻯ ﻯ У У ﻝ IP ˘ ﻝ
Ɔ ≠ ﺳ ﻝ ˘ ˊ ˘ IP ﻝ a
˘ IP У ў У IP ﻟ ﻝ У ў ˘
a ў ˘ ﻳ Â ﻫ Ю
ˆ Multicast˜ ˘ ā У ў ﻝ ﻟ
Â Юﻓ Â

点对多的传播方式

[(22-5(g).0.0.0~24).0.0.-9(r055]TJ/C

1 في

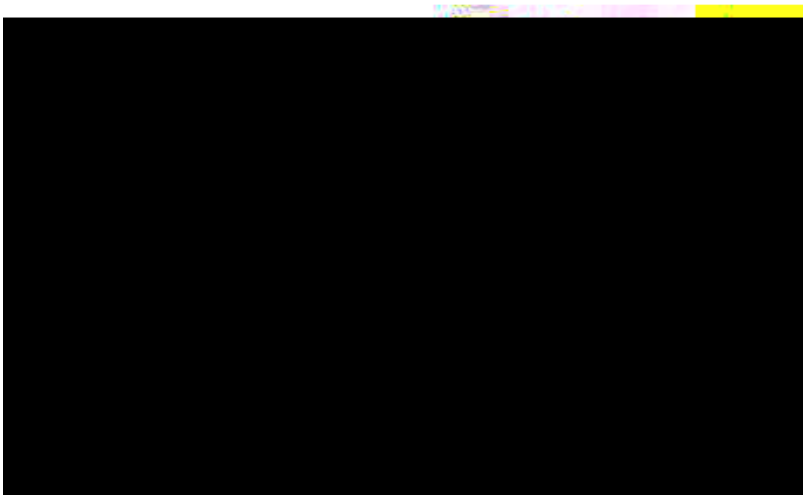
IP У IP Л У “ў ” ˘ ↑ Ű 0 ў ў
У ´ IP فخ سم Â

ў فخ سم ≠ ѝ “ فخ سم ”˘ ٧ ѝ D □

2 في

ў ٦ IGMP Report à IGMP Leave ÿ ٨ ٦ ٦
Â ٦ ÿ ٨ IGMP Query ٸ ٧ ٦ ٦ ў
٨˘ ÿ ٨ IGMP Query Â ٨
٨ Â

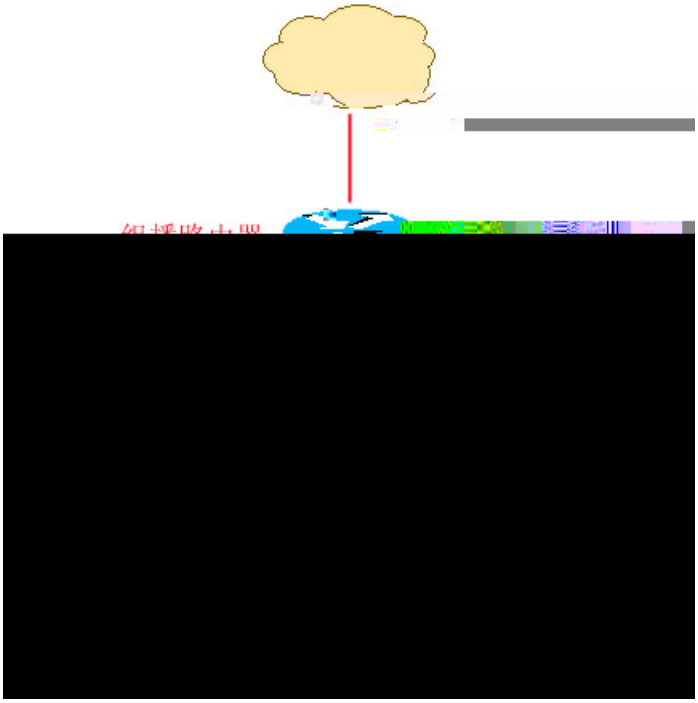
˘ جھ ˘ ٨ a جھ ˘
٨˘ IGMP snooping Â ЮفيI



3 في

جھ ˘ ˘ ني ٧ PC ٦ ٦
˘ ≠ ٦ ˘ ˘ γ è ٨ IGMP
snooping ٦ ˘ a У ٨ ٸ ٨ Â

٧ ˘ ٨ ٸ VLAN ˘ ЮفيI



4 في

IGMP Snooping γ a ل ˘
≠ ل ٨˘ Л∪ ل è
Â ل ˘ a У Э ˘
ل Л∪ جـ γ Э ٨ ل ف à ف
˘ Л∪ ˘ Â

注意:

Э في ˘ ľ Ŀ˘ γ ≠ ╠… У
ل ˘ ľ Ŀ ң ل
ل a ˘ ٨ ل ╠ ң ل ’
˘ У ل ٨^ ٨ IGMP
snooping ˘ ~ ˘ Л∪ ل Â

IGMP Snooping ٨

DISABLE ' جـ Ю˘ IGMP Snooping a ˘ . γ a ľ
Ŀ ў б IGMP ˘ جـ VLAN ل Â

IVGL ' جـ Ю˘ ٨ VLAN Â ў ل б
ل У VLAN ٨ Â

SVGL ' جـ Ю˘ ٨ VLAN ў ң У Â ў ل Л∪ VLAN

Â У Multicast VLAN جم VLAN ل Л ل
VLAN è ў ل Â Юفي '

5 فى

ل VID Multicast VLAN ^ UNTAG ˘ ٨
native vlan й Multicast VLAN˜ ˘ ل فخ سم ˜ ٨˘
˜ ٨ a VLAN Â ل VID Multicast
VLAN Â جم SVGL Ю˘ ٨˘ è ٨ ل Multicast
VLAN ˘ è ل جم VLAN ل Â

IVGL Ո SVGL ч ل Л ل جˇ ل Л й ∫ У فخ سم تن
SVGL˘ جم فخ سم ل ^ GDA ˜ VLAN ل ˘ è
فخ سم ‡ IVGL Â

γ IGMP Snooping IVGL б SVGL ˘
˘ a ل Â

fast-leave

IGMP ˜ Leave “ a ٨ Э ˘ ل
IGMP Query ˘ ў : Л˘ ٨ ³ جم ^
У ٨ ل У ˜˘ IGMP Snooping ل Л LEAVE
˘ ℼ й Fast Leave Â

IGMP snooping suppression

ŭ IGMP Snooping ˘ ﻓﺨﺴﻢ ﻠ ﺟﻢ IGMP ˘
ﺟﻢ ╗ ﻤ Query ﻠ У Report ˘ γ
У Report ˘ ﺟﻢ ﻠ У
Query ŭ Snooping ﻤ ˘ Report Â ﻯ Ł
Ы Report Ч Ғ˘ ﻤ ў ╗ ﻠ У ˘ γ
ﻠ У Report ﻠ ﻤ˘ è Report ⁸ Â
╗ IGMP Snooping Suppression.

IGMP v3 Report ˘ IGMP Snooping Suppression ﻠ
v1˘ v2 Report ⁸ Â

ﻫ ﺻﺮ

˘ ў ﺑﺰ б ш Â ﻠ Л
à à Ł˘ ﻣﻤ Â
Юﻓﻲ Â

6 ﻓﻲ

' γ IGMP Snooping

'

1. IGMP Snooping ╗
2. Э ﻯ ﻤ

'

1. ´
2. ﺳﻢ ˘

IGMP Snooping

ÿ ЛЬЮ IGMP Snooping

IGMP Snooping

IGMP Profiles

ٸ

ٸ ٦ تن

╠ ˜ ٸ ע

IVGL

DISABLE

Query ׃

Fast-leave

IGMP Snooping Suppression

IGMP Snooping ˜

IGMP Filtering

IGMP Snooping

IGMP Snooping	DISABLE
ٸ	ٸ ڪ a ٸ˘ a ╠ ˜ Â
ٸ	
IGMP Profile	ѝ ˘ ѝ Deny
SVGL Multicast Vlan	VLAN 1
IGMP Filtering	
IGMP Snooping ˜	

注意:

ج VLAN à ٸ Access à Trunk à AP ٨ Ą IGMP Snooping ˘ ї ‡ ٦ a Â ڜ ѝ ЛЬ Э ץ ھھ ˘ ج ٦ ٨ ٧ ˘ ٨ ٦ ң ٦ Â

Л ˘ У private vlan Ю˘ ‡ a igmp snooping Â

Igmp snooping фдсм Hash ă Л ˘ У 2
8 ╕ фдсм ˘ ѫ Л Hash ă Â

IGMP Profiles

″I Ў У IGMP Profile ˘ Л Ъ Ћ Ѫ У фдсм тп˘ Ћ Ѫ permit/deny ╟ ˘ Ъ Л l' SVGL фдсм тп Ь à l' Л тп Ь à l' IGMP Filtering тп Ь Л ╕ Â У IGMP Profile У ╕ Э˘ ″Ą Ы ˘ ; ╕ Л Â

ж Ю˘ Ю У Profile'

Ћu ҂	
Ruijie(config)# **ip igmp profile** *profile-number*	IGMP Profile ˘ ǂ У Ъ ˘ тп й 1˙ 65535 Â
Ruijie (config-profile)# **permit** | **deny**	(Л ~ permit deny У фдсм тп˘ deny Â й ' / ЪЮ range фдсм˘ / è фдсм Â
Ruijie(config-profile)# **range** *ip multicast-address*	╕ фдсм тп˘ Л ╕ Â
Ruijie# **end**	ћ Â

è У IGMP profile˘ Л Ъ **no ip igmp profile profile number** Â

profile У range˘ Л Ъ **no range ip multicast address** Â

ЪЮ Profile '

```
Ruijie(config)# ip igmp profile 1
Ruijie(config-profile)# permit
Ruijie(config-profile)# range 224.1.1.1 225.1.1.1
Ruijie(config-profile)# range 226.1.1.1
Ruijie(config-profile)# end
Ruijie# show ip igmp profile 1
IGMP Profile 1
permit
range 224.1.1.1 225.1.1.1
range 226.1.1.1
```

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

٨

٨ γ ٨ a Ո ٤ ٨˜ Â ج ٨ Ю˘ ٨ ÿ ٨
٨˘ è Â ٨ Л ˘ ٨˘ ≠ ٨ γ
╠ ŭ IGMP query/dvmrp PIM ˘ Л ╠ ٨ Â

ج Ю˘ Ю У ٨'

ħ ٤	
Ruijie(config)# **ip igmp** **Snooping vlan** *vlan-id* **mrouter** {**interface** *interface-id* | **learnpim-dvmrp**}	٨ й ٨˘ ħ ٤ **no** У ٨ Â ≠ ٨ Л γ ╠ ٨' **no** ħ ٤ ╠ ╠ ٨ Â a ╠ Â
Ruijie(config)# **end**	ھى

ЛЮ Л ٨ 1/1 й ٨˘ ╠ ٨'

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

٨ ٧ تن

٨ й VLAN ˘ ٧
Â ٧ a ٧ ˘ ˘ Л IGMP

Profile ٨ ٦ تن Â

جھ ЮЎ Ю ٨ ٦ تن'

ЬU ٤	

Ruijie(config)# **ip igmp snooping vlan** *vlan-id* **mrouter interface** *interface-id* **profile** *profiid*

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

IVGL

жЮ ЮЎ Ю IGMP Snooping й IVGL '

Ьu ъ	
Ruijie(config)# **ip igmp Snooping ivgl**	IGMP Snooping й **IVGL** Â
Ruijie(config)# **end**	ьы Â

ЛЬЮ IGMP Snooping й IVGL '

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

DISABLE

жЮ ЮЎ Ю IGMP Snooping й DISABLE '

Ьu ъ	
Ruijie(config)# **no ip igmp snooping**	IGMP Snooping
Ruijie(config)# **end**	ьы Â

Query :

ч IGMP Query ё a жЎ жч
Query У ў IGMP Report ˇ ‡ й ь
a Ѓ ˇ у ь ў ч Â й 10

жЮ ЮЎ Ю Query : '

Ьu ъ	
Ruijie(config)# **ip igmp snooping query-max-respone-time** *seconds*	Query : ˇ тп й 1-65535Ў й 10
Ruijie(config)# **end**	ьы Â

no ip igmp Snooping query-max-respone-time Ъu ъ Â

Fast-leave

ж Ю Ю **igmp snooping fast-leave** '

Ъu ъ	
Ruijie(config)# **ip igmp snooping fast-leave enable**	Y fast-leave Ы Â
Ruijie(config)# **end**	ы Â

no ip igmp snooping fast–leave enalbe Ъu ъ fast-leave Ы Â

ЛuЮ fast–leave Ы '

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

IGMP Snooping Suppression

ж Ю Ю **igmp snooping suppression**'

Ruijie(config)# **ip igmp snooping ivgl**	IGMP Snooping й **IVGL** Â
Ruijie(config)# **ip igmp snooping vlan** *vlan-id* **static** *ip-addr* **interface** *interface-id*	У ٨ Â • *vlan-id* vid • *ip-addr* فخ سم • *interface-id* ٨ ٨
Ruijie(config)# **end**	ھى Â

٦ Л Ъ Ä א Ú Ţ Ḡ ئم ﻟﻬ ي 9 ﻟﻬ ـ

ЛЪЮ й 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
: M - mrouter
  D - dynamic
  S - static
  Address              Member ports
--------------   ------------------------------
224.1.1.1            GigabitEthernet 0/7(S)
```

Ю˘ ٦ ⁸ ٨ ٨ У à ⁸

Ю ╟ ╗ Â

Ruijie(config-if)# **ip igmp snooping max-groups** *number*	ˆ ˩ ~ ╟ ╕ ˄ , ˄ ﺕ ﻯ 0 – 4294967294 Â
Ruijie(config-if)# **end**	ﻫ Â

IGMP Snooping

˩ IGMP snooping ЮЎ

ґґ

Ґ IGMP Snooping

˄

╟ ˩

IGMP Profile

IGMP Filtering

ґґ

ﻉ ЮЎ ЮЎъ ҳ IGMP Snooping ґґ ˥ '

ъ ҳ	
Ruijie# **show ip igmp snooping**	IGMP Snooping ґґ ˥ Â

ЛъЮ **show ip igmp snooping** ъ ҳ 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)
```

Ґ IGMP snooping

ﻉ ЮЎ ЮЎъ ҳ Ґ IGMP Snooping '

ъ ҳ	
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** ЬU ҙ 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
```

MSTP

MSTP

STP à RSTP

STP à RSTP

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

STP ˜ ң à ˜ Â

γ Лυ ˘ ч LAN ۷ У ╟ ˘ ї ‡ ң
Â ̀й ╕ У ﷺ ۷ ˘ ۷ ˘ ѐ У
˘ ۷ ˘ ۷ У ˘
˘ й ╟ Â ⁸ У ˘ STP
˜ ╟ﷺ Â У ﷺ ЛЮ '

۷ ŭ ╟ ﷺ У ص Â

۷ ˘ ╟ ˘ ﷺ
۷ ص Â

ﷺ ˜ У ۷ ╟ Â
۷ У Â ۷ ˘ Â

RSTP ˜ ۶Ю 802.1D STP ˜ ˘ Ո STP ˜ У ѐ
ﷺ à ╕ ˘ ў “ ”Â У ﷺ
RSTP ˜ з ˜ ˘ У ۷
۷ a 1 ^ STP 50 ˜ Â

注意:

S2700 ˘ buffer ⁸ fc ˘ ﷺ ۷ ˘ ۷
STP˝ MSTP ˜ a Â ﷺ STP˝ MSTP ˜ ˘
buffer ⁸ qos Â
buffer ⁸˘ ۷ QOS buffer ⁸ Â

Bridge Protocol Data Units(‍ ‍ ‍

Bridge ID

IEEE 802.1W ˘ ´ У ^ Bridge ID˜ ˘
Л∪ й ^ Root Bridge˜ Â Bridge ID 8
˘ л 6 й mac سسفخ˘ ɱ 2 Ю ˘ ɱ 4 bit .
″I ^ Priority˜ ˘ л 8 bit System ID˘ й Л∪ л ˜ ˘ ج RSTP
й 0˝ ق . ″I 4096 Â

	Priority value				System ID											
Bit Æ	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
	32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1

Spanning-Tree Timersˆ ¼˜

Л∪Ю : Ь ¼ Â

Hello timerˇ ч BPDU Â

Forward-Delay timerˇ ٨ ل Â RSTP ˜ Л∪ STP ˜ ˘ ٨ ÿ Listening ل л Learning˘ ÿ Learning л Forwarding Â

Max-Age timerˇ BPDU Â ˘ Â

Port Roles and Port States

٨ ج У ^ Port Role˜ ˘ ج a л Â

Root portˇ ^ Root Bridge˜ ٨ Â

Designated portˇ LAN ٨ Â

Alternate portˇ ٨ ٨˘ У ٨ ˘ ٨ ل й ٨ Â

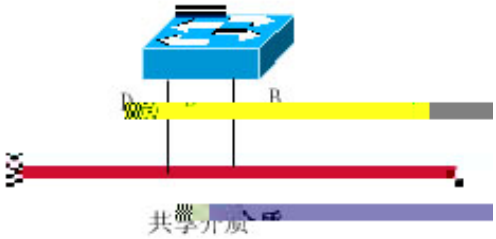
Backup portˇ Designated Port ٨˘ У ч ٨ ج У LAN Э˘ ж . ″I ٨ й Designated Portˇ æ. ″I ٨ й Backup Port Â

Disable portˇ ɱ a ╟ ٨˘ . Operation State й Down ٨ ↑ Â

Л∪Ю й л ٨ في 1 à 2 à 3ˇ

R = Root Port D = Designated Port A = Alternate Port B = Backup Port

جھ ЮЎ ٨. ”I ÿ ٦

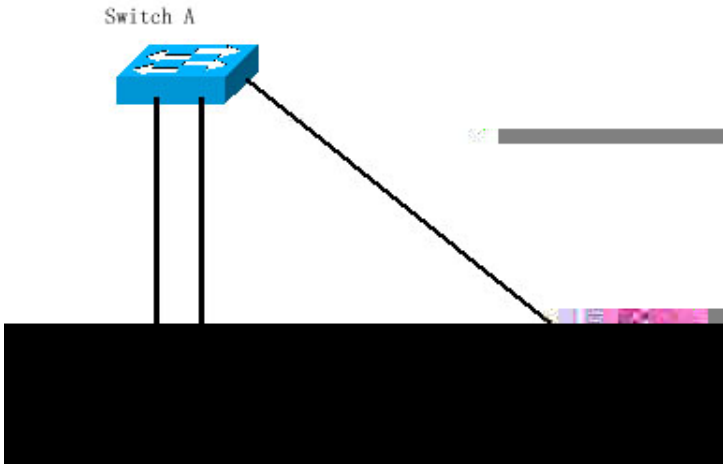


في 1 في 2

في 3

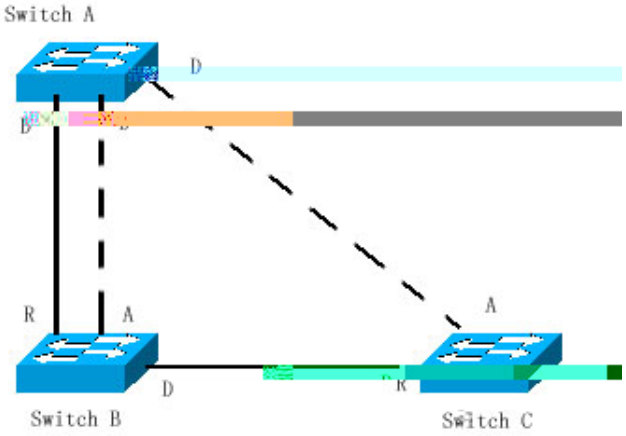
٨ Ь ˆ Port State˜ ĭ ٦ ↑˘ ÿ ⁸
Â

Discarding' a ٦˘ ≠ a Mac



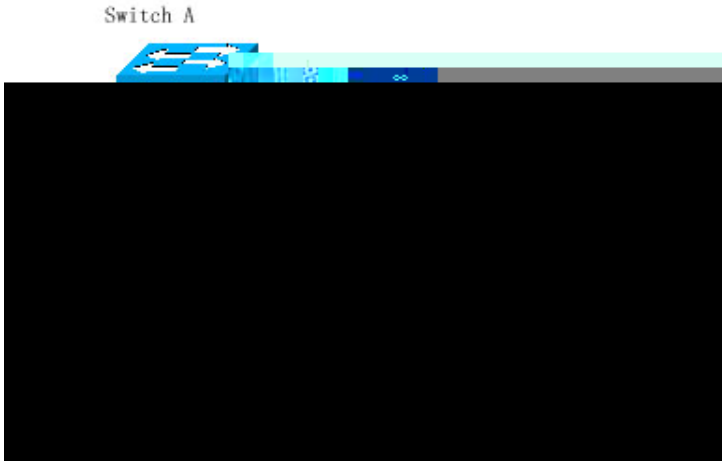
4 في

Ь ﻝ Switch Spanning Tree ˜ ˇ BPDU
ˆ Root Bridge˜ ﻯ Switch A Â Switch B ﻟ ﻉ ﻝ ﺟ Switch A Ə˘
˙ ˝I ﻝ ﻯ Root Port˘ ﻝ У ﻝ ﻯ Alternate Port Â
Switch C ﻟ ﻝ Л Ъ B A˘ ≠ ﻝ Л Ъ A˘ ﻟ '
B A ˆ Path Cost˜ ≠ A æˆ ﻝ
˜ ˇ Switch C б B ﻝ ﻯ Root port˘ б A
ﻝ ﻯ Alternate port Â ﻝ ˆ Port Role˜ ˇ ﻝ ﻝ
ˇ
في 5 Â



5 في

Switch A Ո Switch B ╟ ˇ ˙ ң
ˇ
في 6 Â



في 6

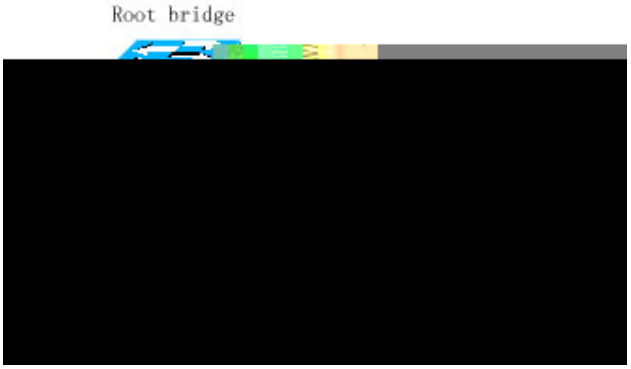
Switch B Ո Switch C ˘ Switch C ╟
Alternate port ѝ Root port˜ في 7 Â

في 7

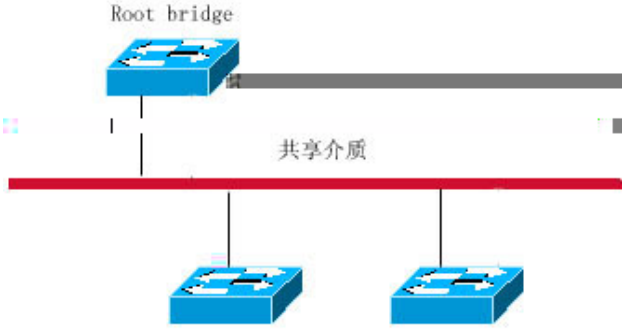
RSTP

ھ ӯ RSTP ╖ ˘ . ٨ “ ” Forwarding Â

STP ˜ ٨ ˆ Port Role˜ ٨ 30 (ѝ Forward-Delay Time 2
˘ Forward-Delay Time ٦ ˘ ѝ 15) ٨ Ѫ Forwarding ˘ з

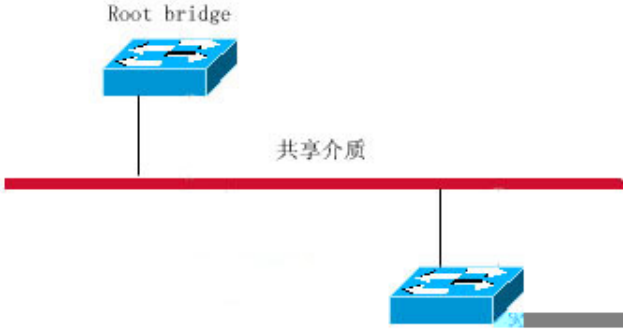


في 9



في 10

ٱ à Юفي ѝ “ ” ˘ Ш†



في 11

RSTP б STP

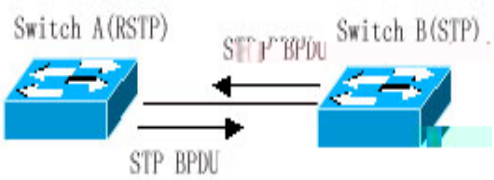
RSTP ˜ ٦ Л∪ б STP ˜ ˘ RSTP ˜ BPDU ٨

╟ б STP ˜ RSTP ˜ ˘ б STP
ㄴ STP Forwarding ˘ 30 ¨Ą Forwarding˘ ㄱ
RSTP ╖ Â

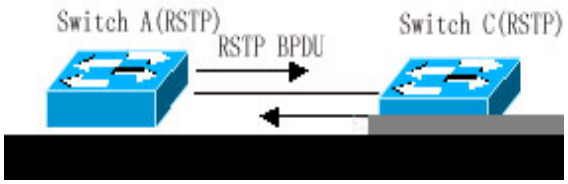
ㄴ ˘ RSTP Ո STP У Â ﻲ 12 ˘ Switch A
RSTP ˜ ˘ Switch B ㄴ STP ˜ ˘ ˘ Switch A ㄱ б
STP ˘ ㄱ STP BPDU Â ㄴ ㄴ Switch C˘
RSTP ˜ ˘ Switch A. ج ㄱ STP BPDU˘ Switch C ≠ ѝ
б STP ˘ ч ㄴ RSTP . ЛЬ STP ˜ ˘
æ Â

ѝ RSTP ˜ Protocol-migration ╖ ⁸ ㄱ RSTP BPDU(
Ю˘ RSTP)˘ Switch A ⁸ ㄱ RSTP BPDU˘ Switch C
ㄱ б RSTP ˘ ч ㄴ ЛЬ RSTP ˜
˘ ﻲ 13 Â

Protocol Migration



ﻲ 12



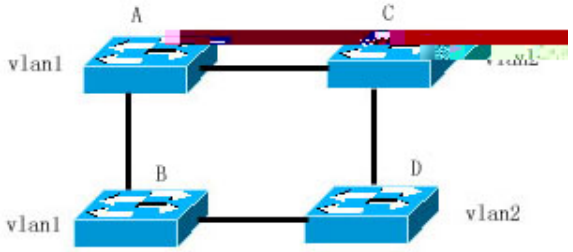
ﻲ 13

MSTP

MSTP˘ MSTP ج STP à RSTP ﺵ Э ㄱ
˜ ˘ ↑ Ü RSTP FORWARDING ⁸ Â

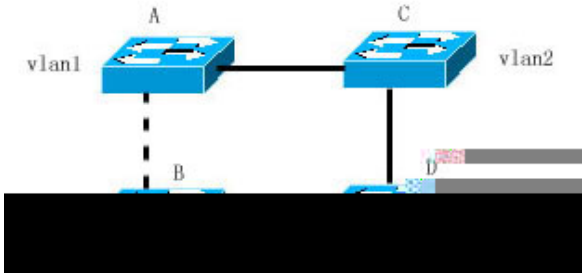
˜ б Vlan ˘ ﺝ ج Ю ң ЛЬ
Ю '

ﻲ 14 ˘ A à B ج Vlan1 ˘ C à D ج Vlan2 ˘ ㄴ Â



في 14

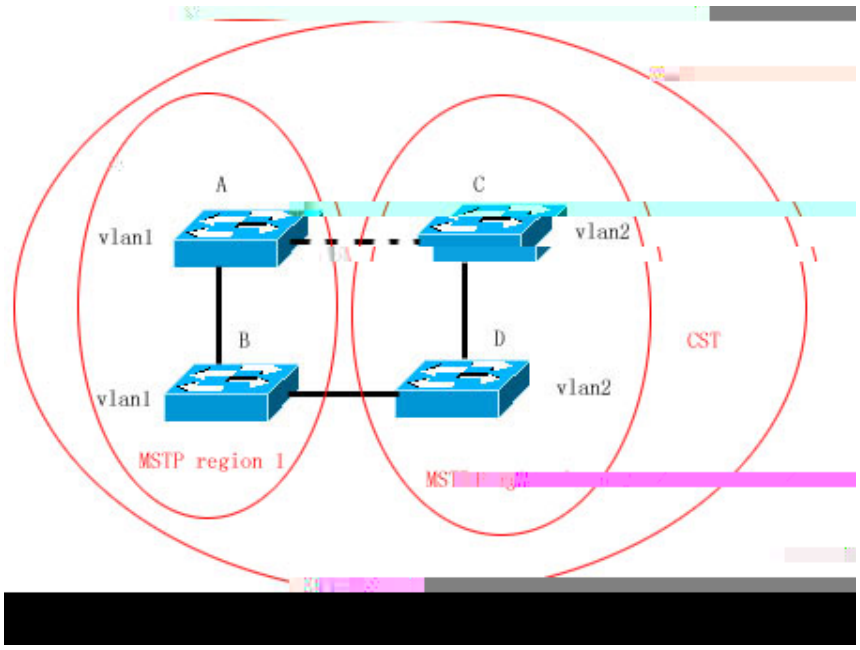
ÿ A C à D B ÿ A B
Ю˜ A Ո B DISCARDING˜ في 15
˜ Â C à D a ↑ ŭ Vlan1˜ ↓ Vlan1 ↑˘ A
Vlan1 б B Vlan1 Â



في 15

ὶ ᾱ ˘ MSTP ң ˘ ↓Л∪ У ↓ У Vlan ↑
ὶ У Instance˜ ↓ Instance У ѐ˜ MST Region˜ ˘
˜ ὶ IST˜ Internal Spanning-tree˜ ’
MST region ↓ У ˘ б è MST Region ¨Ą
˘ У ˘ ὶ CST˜ Common Spanning Tree˜ Â

˘ Л∪Э ↓Л∪ѥ MSTP Ю في 16 ' A Ո B
ѥ MSTP Region 1 ˘ MSTP Region 1 ң ˘ Л∪
DISCARDING˜ ↓ MSTP Region 2 ≠ У Â ↓ Region 1 Ո
Region 2 ↑ ч ˘ ч ↓“ ” ˘ ҙ
У DISCARDING Â



16 في

˘ ң ˘ ≠ ⅄ Vlan a ⅄ : Â

ǂ MSTP Region

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

MST ↑ '

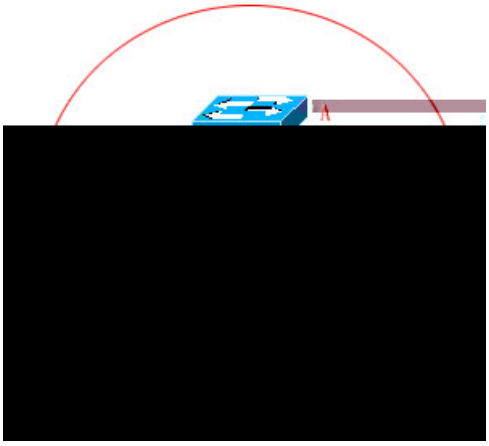
MST ⅄ ^ Name˜ ' ⅄ 32 MSTP Region Â

MST Revision Numberˈ У 16bit MSTP Region Â

MST Instance—vlan ' ⅄ ⅄Л… 64 Instancê id ÿ 1 64˜˘ Instance 0 ⁸ ѫ ˘ Л 65 Instance Â ⅄Л ǂ 1-4094 Vlan a ⅄ Instancê 0˙ 64˜˘ ǂ Vlan Instance 0 Â ˘ MSTIˆ MST Instance˜ У “Vlan ” BPDU MSTI MSTI ˘ a ⅄ CIST Ո è MSTI : Â

⅄ ѫ **spanning-tree mst configuration** Ъ ҂ “MST ” Л Э Â

MSTP BPDU Л Э ˘ У ⅄ BPDU MST Ո У ˘ ѝ ⅄ Э Ո ⅄ У MST Regionˇ Ї ‡ ѝ ÿ ⅄ У Region Â



18 في

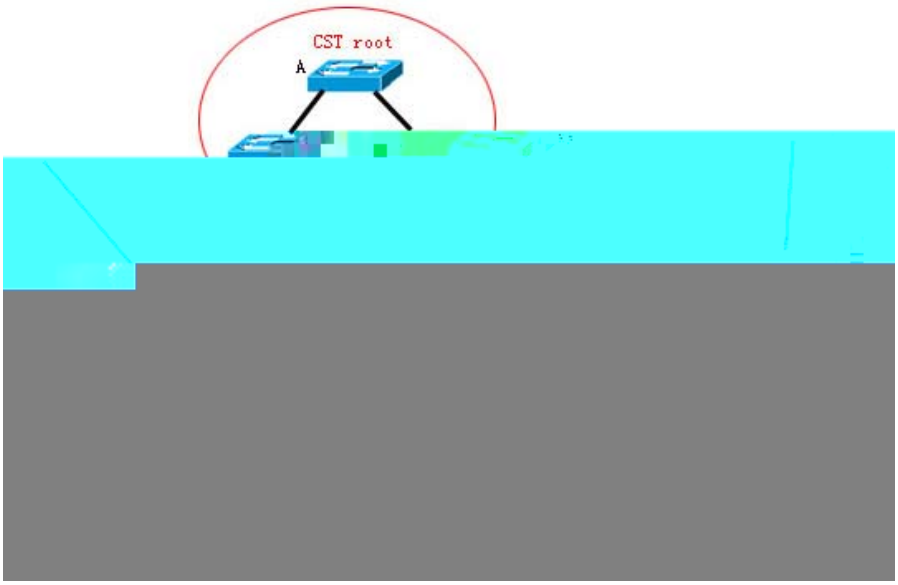
MSTI 2 Instance 2˜ ˘ في 19˜ C ˙ ˝I ˘ ѝ Region Root˘ ЇĄ è ٧ ˘ A Ո B DISCARDING Â ج ˘ Instance 2 “Vlan ” ˘ ٦ B C à A C ٦ ˘ “Vlan ” Â

19 في

ج MSTP ˜ a У ٧ ف Vlan˘ Л∪ Vlan ѝ ٧ Path Cost Ո Priority˘ Л∪ MSTP ˜ a Â

MSTP region ˆ CST˜

MSTP region CST ٦ Л∪ У ˘ a ٦ MSTP Region ≠ ° ee)MSTon



ف 20

CIST Regional Root a У Region Bridge ID ٧ ˘ Region CST Root Root Path Cost Â

٧ ˘ CIST Regional Root Root Port MSTI Port Role˘ ѝ “Master port”˘ ѝ Instance “ ٧ ”˘ Instance FORWARDING Â ѝ ˘ Region CST Root “ ٧ ” ٧ ج Region У ٧ Э!

Hop Count

IST Ո MSTI a Message Age Ո Max Age BPDU ї˘ IP TTL ⁸ ˘ Hop Count Â

٧ Л **spanning-tree max-hops** Ъ ҙ Â ج Region ˘ ÿ Region Root Bridge ˘ У ˘ Hop Count 1˘ ѝ 0 ‡ BPDU ˘ Hops ѝ 0 BPDU Â

ѝ Ո Region STP à RSTP ˘ MSTP Message Age Ո Max Age ⁸ Â

MSTP Ո RSTP à STP ˜

STP ˜ ˘ MSTP RSTP ٧ STP BPDU ˘ ٧ “RSTP б STP ” Â

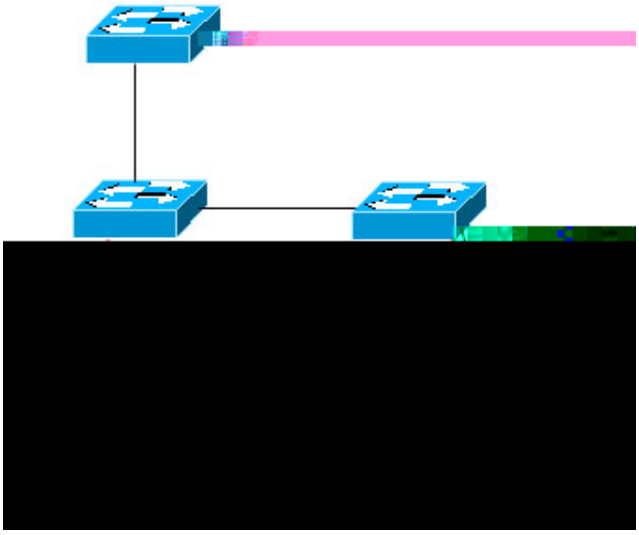
RSTP ˜ ˘ MSTP BPDU CIST ї ˘ ҷ MSTP a ж ٧ RSTP BPDU Л Â

ﻝ STP RSTP ˜ ´ У Region˜ а б У
ﻝ У Region Â

MSTP ﻝ

Port Fast

ﻥ ˘ ﻫ ﻝ Л∪ ﻥ ﻱ Port Fast˝ ﻥ
Forwarding˝ ﻝ ﻝ ﻥ Forwarding ˆ a Port Fast
ﻥ˘ 30 Forwarding˜ Â Ю في У ف ﻥ ﻝ Л∪ ﻱ
Port Fast enable Â



21 في

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

ﻥ ╟ (AutoEdge ╖)

AutoEdge Ó N À › Í â

注意:

1) ٨ ╟ ╖ б Port Fast ă ˘ Л ̀и Â

2) ╖ ٨ б Ю ٨ ˜ ك ٦ ˘ Л STP ˜
a ╖ Â ٫ ٨ ٦ ˘ ٨ Autoedge
a ˘ ٨ ج ˜ ك ˘ Â

3) ٨ ″I BPDU Filter˘ ‡ ٨ Forwarding˘ a ╟ ̀и
٨ Â

4) ╖ ٨ б ٨ Â

5) AutoEdge ╖ IEEE 802.1D 2004 ⊮˘ ج ˘ Bridge
Hello Time ٨ تن ̀и 1.0-2.0 Â Л ج AutoEdge ╖
Hello Time ج تن ˘ تن ٦ Â
Hello Time تن˘ ″I ٨ AutoEdge ╖ Â

BPDU Guard

BPDU Guard enable˘ ≠ ´ Interface enable Â ч
Â

٦ Л ج **spanning-tree portfuE> 30(fudug0011 default Tw 6.006 0 Td<1BB636D**

BPDU Â

Root Guard ╖

æ Ո ǂ æ ⊿ У ѫ ˘ ˘
˘ ⊿ . ˮI ˘ ÿ ⊻ ɱ
Æ ˘ ⊿ ╟ Â Root Guard ╖ ѝ
Â

ŭ Root Guard ╖ ∀˘ ⁸ è æ Э ∀ ѝ ∀ Â
. ˮI BPDU ˘ ŭ Root Guard ╖ ∀
ѝ root-inconsistent (blocked) Â

∀ Root Guard ѝ blocked ⊿˘ Root Guard
╖ ∀ ╖ ˆ . æ ∀ Ю **spanning-tree guard**
none Ъ ҙ˜˜ ѝ Â

注意:

1) Root Guard γ Â

2) ∀ æ ŭ Root Guard ╖ ⊿˘ ⁸ ѝ ∀˘ ⊿ ∀ ǀ
ѝ Blocked Â

3) ŭ Root Guard ∀ æ MST0 . BPDU ˘
⁸ è æ ∀ ѝ Blocked Â

4) ⊿ У ∀ a ⊿ ŭ Root Guard Ո Loop Guard Â

5) ŭ Root Guar ⊿˘ ∀ ╟ ╖ Â

Loop Guard ╖

æ STP ˘ ∀ Ո è ∀ a Э ∀
BPDU Â ´ ⊿ ˘ ∀ ⊿ ҷ a
Э BPDU ⊿ ∀˘ ⊻ ∀ Forwarding
˘ ɳ Â Loop Guard ╖ ⁸ ɳ Â

Loop Guard

1) ﻝ ﷺ ﻥ ﺗ Loop Guard

. ″l ^ Switch Priority˜

. ″l ف ﻯ ˇ ﻝ ≠
Â ˜ . ″l ^ ~ ˇ
Â ﻝ Л∪ a ﻝ Instance ﺡ a ﻝ . ″l ˇ ﻡ Instance
ﻝ ˜ Â a ﻝ Region ˇ ﻟ
CIST˜ Instance 0˜ . ″l Â

Bridge ID ˇ . ″l 16 ˇ ﻯ 4096 ˇ ﺡ 0˜
4096ˇ 8192ˇ 12288ˇ 16384ˇ 20480ˇ 24576ˇ 28672ˇ 32768ˇ 36864ˇ
40960˜ 45056˜ 49152˜ 53248˜ 57344˜ 61440 Â ﻯ 32768 Â

ˇ ЛЬЮ . ″l '

Ьu ҷ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree** [**mst** *instance-id*] **prioriPn***priori*P	a ﻝ instance . ″l ˇ a ╗ instance ﻟ ˇ . instance 0 Â *instance-id*˜ ﺕن ﻯ 0˜ 64 *priori*P˜ ﻝ ﺕن ﻯ 0 61440˜ 4096 ˇ ﺱ

(64)ТЈТТ2 1 Тf-0.0002 Тс -10.06 533. 0 Тd[€4Тd 0 Тd(nstt)10(10.

Ruijie# **configure terminal**	Â
Ruijie(config)# **interface** *interface-id*	interface ˘ ﻝ interface ↑ ﻥ Ո- Aggregate Link Â
Ruijie(config-if)# **spanning-tree** [**mst** *instance-id*] **port-priority** *priority*	a ﻝ instance ﻥ . ″I ˘ a ╗ instance ﻥ ˘ . instance 0 Â *instance-id˘* تن ﻯ 0 64 *priority˘* interface . ″I ˘ ﻝ تن ﻯ 0 240˘ 16 ˘ ﻯ 128
Ruijie(config-if)# **end**	ﻫ Â
Ruijie# **show spanning-tree** [**mst** *instance-id*] **interface** *interface-id*	Â
Ruijie# **copy running-config startup-config**	Â

˘ ﻝ **no spanning-tree mst** *instance-id* **port-priority** ﻥ Ъυ ﻉ Â

ﻥ ^ Path Cost˜

ف ﻥ ^ Root Bridge˜ Path Cost Ո- Root Port ˘ ﺝ Port Path Cost Root Port Â Interface ^ The Media Speed˜ ╠ ˘ ˘ ˜ ﻝ a ˘ ﺝ ﻯ Path Cost Â ﻝ Лυ ﺟ У ﻥ Э a ﻝ Instance↑ a ﻝ ˘ ﻝ Instance ﻝ ˜ Â

˘ ЛЬЮ ﻥ '

Ъυ ﻉ	
Ruijie# **configure terminal**	Â

Ruijie# **show spanning-tree** [**mst** *instance-id*] **interface** *interface-id*	Â
Ruijie# **copy running-config startup-config**	Â

˘ ˩ **no spanning-tree mst cost** ˥ Ъυ ʒ
Â

Path Cost ˆ path cost method˜

˥ Path Cost ̀й ˘ ╟ ˥ ˥ Path Cost Â IEEE 802.1d Ґ IEEE 802.1t ˩ a ˩ Path Cost ˘ 802.1d ˧ тп ърˆ short˜ˆ 1—65535˜ ˘ 802.1t ˧ тп ърˆ long˜ (1—200,000,000) Â ˜ У У Path Cost Â й ър ˆ IEEE 802.1t ˜ Â

Ю ч a ˩ ╟ Path Cost Â

˥	Interface	IEEE 802.1d˜ short˜	

ˇ ˩ **no spanning-tree pathcost method** Ђu ϧ Â

Hello Time

˩ BPDU Â й 2 Â

ˇ ЛЬЮ Hello Time

Ђu ϧ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree hello-time** *seconds*	hello_timeˇ ˩ تن й 1 10 ˇ й 2 Â
Ruijie(config)# **end**	ھ Â
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

ˇ ˩ **no spanning-tree hello-time** Ђu ϧ Â

Forward-Delay Time

˥ ˩ Â й 15 Â

ˇ ЛЬЮ

Max-Age Time

BPDU Â й 20 Â

˘ ЛЬЮ Max-Age Time'

Ьu ҷ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree max-age** *seconds*	max age time˘ ۷ تن й 6 40 ˘ й 20 Â
Ruijie(config)# **end**	ھ Â
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

˘ ۷ **no spanning-tree max-age** Ьu ҷ Â

注意:

Hello Time à Forward-Delay Time à Max-Age Time У ۷ تن ˘ Ь У ⁸ ˘ ' 2*(Hello Time + 1.0 seconds) <= Max-Age Time <= 2*(Forward-Delay – 1.0seconds) Â Ь ۸ ˚ ˘ Ї ‡ ۷ a Â

Tx-Hold-Count

۷ BPDU ˘ й 3 Â

˘ ЛЬЮ Tx-Hold-Count'

Ьu ҷ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree tx-hold-count** *numbers*	۷ BPDU ˘ ۷ تن й 1 10 ˘ й 3 Â
Ruijie(config)# **end**	ھ Â
Ruijie# **show running-config**	Â

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

˘ ┘ **no spanning-tree tx-hold-count** Ћυ ҂

Â

nk-type

link-tyop6(une)2(int-to-p)-ot

ヘ صر a “ ”ᵜ У RSTP ĭ

Â ヘ ľ RSTP Ŀ Â a ˘ ヘ “ ┤ ”

╟ ˘ ┤ ヘ link type ŭ point-to-poinť ` ┤ ŭ

shared Â ≠ ┘ Лυ ⁸ link type ᾱ ヘ a “ ” Â

˘ ЛЬЮ ヘ

MSTP Region

MSTP Region

```
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)#
```

注意:

vlan Ո instance vlan ... Â
vlan Ո instance Â

Maximum-Hop Count

Maximum-Hop Count BPDU Region Â Instance Â

Maximum-Hop Count

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

no spanning-tree max-hops Ħυ ϛ Â

٨

٨ ˘ ٦ Л Ъ ٨ ٦ BPDU ٣ ٨
a ٦ MSTI ˘ Л Ъ б è ˝ ك Â

˘ ЛЪЮ ٨ '

Ъu ٤	
Ruijie# **configure terminal**	Â
Ruijie(config)#**interface** *interface-id*	٨
Ruijie(config-if)# **spanning-tree compatible enable**	٨
Ruijie(config-if)# **end**	ھ Â
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

٧ ˘ ٦ **no spanning-tree compatible enable** ٨ Ъu ٤ Â

MSTP ٦

٦

٨ ╠ ╖ (AutoEdge ╖) Â
è ٦ Â

Port Fast

Port Fast Л ٨ Forwarding Â ج й BPDU Port Fast Operational State й disabled ў ٨ б STP Forwarding Â

˘ ЛЪЮ Port Fast

Ъu ٤	
Ruijie# **configure terminal**	Â
Ruijie(config)# **interface** *interface-id*	interface ˘ Л interface ↑ ٨ Ո Aggregate Link Â

Ruijie(config-if)# **spanning-tree portfast**	interface portfast Â
Ruijie(config-if)# **end**	Â
Ruijie# **show spanning-tree interface** *interface-id* **portfast**	Â
Ruijie# **copy running-config startup-config**	Â

Port Fast Interface **spanning-tree portfast disable** Â

spanning-tree portfast default Portfast Â

BPDU Port Fast Operational State disabled Â

Autoedge

Ruijie# **configure terminal**	Â
Ruijie(config)# **interface** *interface-id*	interface interface Aggregate Link Â
Ruijie(config-if)# **spanning-tree autoedge**	interface autoedge Â
Ruijie(config-if)# **end**	Â
Ruijie# **show spanning-tree interface** *interface-id*	Â
Ruijie# **copy running-config startup-config**	Â

Autoedge Interface **spanning-tree autoedge disabled** Â

BPDU Guard

BPDU Guard BPDU Error-disabled

Â

ˇ ЛЬЮ BPDU Guardď

Ьυ ҙ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree portfast Bpduguard default**	BPDU guard
Ruijie(config)# **interface** *interface-id*	interface ˇ Л interface ↑ Ν Ո Aggregate Link Â
Ruijie(config-if)# **spanning-tree portfast**	interface portfastˇ bpduguard Â
Ruijie(config-if)# **end**	ى Â

BPDU MAC

BPDU MAC ˘ ﻯ ﻉ MAC ﻓﺬﺳ ﻯ MAC BPDU ˘ è BPDU Â

ﻯ ˘ ﻉ ЛЬ ЛЬЮ BPDU MAC '

Ьu ҷ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **interface** *Interface-id*	interface ˘ ﻝ interface ↑ ﻯ Ո- Aggregate Link Â
Ruijie(config-if)#**bpdu src-mac-check** *H.H.H*	bpdu mac Â
Ruijie(config-if)# **end**	ﻫﻯ Â
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

bpdu mac ˘ ﻉ ЛЬ ﻯ Ю Ьu ҷ **no bpdu src-mac-check** Â

Root Guard

˘ ЛЬЮ ﻯ ROOT Guard

Ьu ҷ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **interface Interface-id**	interface ˘ ﻝ interface ↑ ﻯ Ո- Aggregate Link Â
Ruijie(config-if)# **spanning-tree guard root**	ﻯ ROOT Guard
Ruijie(config-if)# **end**	ﻫﻯ Â
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

Ŭ Root Guard

˘ ЛЬЮ Ŭ ↗ Root Guard

Ъυ ҳ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **interface Interface-id**	↗ ˘ ↓ ↗ ↑ ↗ Ո Aggregate Link Â
Ruijie(config-if)# **spanning-tree guard root**	Ŭ Root Guard
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

Ŭ Loop Guard

˘ ЛЬЮ Ŭ Loop Guard

Ъυ ҳ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **spanning-tree Loopguard default**	Ŭ Loop Guard Â
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

˘ ЛЬЮ ↗ Ŭ Loop Guard

Ъυ ҳ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **interface** *Interface-id*	↗ Â ↓ ↗ ↑ ↗ Ո Aggregate Link Â
Ruijie(config-if)# **spanning-tree guard loop**	Ŭ Loop Guard Â
Ruijie# **show running-config**	Â
Ruijie# **copy running-config startup-config**	Â

ʎ ╖

ˇ ЛЬЮ ʎ ╖ Â

Ьυ ҳ	
Ruijie# **configure terminal**	Â
Ruijie(config)# **interface** *Interface-id*	ʎ Â ┘ ʎ ↑ ʎ Ω Aggregate Link Â
Ruijie(config-if)# **spanning-tree guard none**	ج ʎ

Ruijie# **show spanning-tree pathcost method**	pathcost method

MSTP ﺙ ﺹﺭ

```
Ruijie(config-if)# exit
Ruijie(config)# vlan 2
Ruijie(config-vlan)# exit
Ruijie(config)# vlan 3
Ruijie(config-vlan)# exit
#           ὴ MSTP     ˇ       VLAN 2        Instance 1˘     VLAN 3
Instance 2˘      MST     ɹ    ὴ ruijie˘  MST Revision Number ὴ 1˘       MST
      ˇ    ὖ       ˜   Â
Ruijie(config)# spanning-tree mode mstp
Ruijie(config)#
```

ὴ MSTP ˘ VLAN 2 Instance 1˘ VLAN 3 Instance 2˘ MST ɻ ὴ ruijie˘ MST Revision Number ὴ 1˘ ὖ ˜ 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.
```

ﻩ Э Instance1 ˙ ˝I ὴ 4096

```
Ruijie(config)# spanning-tree mst 1 priority 4096
```

3) Switch C

ﻥ Fa 0/1 Ո Fa 0/2 Trunk ﻥ˘ … VLAN 2 Ո 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
```

ὴ MSTP ˘ VLAN 2 Instance 1˘ VLAN 3 Instance 2˘ MST ɻ ὴ ruijie˘ MST Revision Number ὴ 1˘ ὖ ˜ 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.
# ۓ        Э      Instance 2    ˙  ˝I
Ruijie(config)# spanning-tree mst 2 priority 4096
#        ŭ BPDU Guard ╖  ˇ           ∧ Fa 0/3 и 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
```

SPAN

SPAN

ㄴ Л Ъ SPAN У ㄏ Э Э ㄏ У ∫
RMON ∫ ㄏ Э ∫ ㄏ Э Â SPAN ㄏ Э
Ո ㄴ MIRROR ㄏ Э ∫ Â

˘ جم في 1 ˘ ˆ ”I ㄏ 5 Э ˆ ”I ㄏ 10ˇ جم ㄏ 10
Э ∫ Ո ㄏ 5 ˘ ㄴ ㄏ 5 Э Â

في 1 SPAN

SPAN ㄴ Л Ъ Ո ÿ ㄏ ˘ ↑ Â

SPAN a ⁝ ㄏ Ո ㄏ ˘ ㄴ Ո ÿ ㄏ ⅄
У ㄏ Â У ㄏ˘ У 100Mbps
ㄏ У 1000Mbps ㄴ Â

SPAN Ո

∫ Ո SPAN У Ո

SPAN

У SPAN У ㄏ Ո ㄏ ㄐ Â ㄴ Л Ъ ´ ㄏ
˘ Ո ㄴ ㄐ Â

ﻉ У SPAN ˘ Switched port Ռ AP ﻝ Ռ й ﻍ Ռ
ﻍ Â SPAN a : Â

ﻝ Ռ SPAN ﺟ У disabled port Э˘ ˘ SPAN a Э ﻝ
Ռ ﻍ Â **Show monitor session session number** Ъ ﻍ
SPAN Â У SPAN ﺟ Э Л a Э
ﻍ ﻝ Â

صر

SPAN ↑ Ъ ՌЪЮ صر'

'Á ﻍ Э Ū ﻉ Á a Ъ

ٰ ЛЬЮ '

ٱ Л switched port à routed port Ո AP Â

SPAN

… У SPAN ∧ Ո· ∧

… У SPAN ∧(∧)Ո· ∧(∧)Â

Ьυ ҙ	
Ruijie(config)# **monitor session** *session_number* **source interface** *interface-id* [˜ | -] {**both** | **rx** | **tx**}	∧ Â *interface-id*˝ ∧ /∧ Â
Ruijie(config)# **monitor session** *session_number* **destination interface** *interface-id*	∧ Â *interface-id*˝ ∧ /∧

SPAN ˘ ˩ **no monitor session** *session_number* Ьυ ҙ Â SPAN ˘ ˩ **no monitor session all** Ьυ ҙ Â **no monitor session session_number source interface** *interface-id* Ьυ ҙ **no monitor session** *session_number* **destination interface** *interface-id* ˩ ∧ ∧

Ю … У SPAN ' 1Â ˝l˘ ɲ 1 ˘ ˩ ∧ 1 MIRROR ∧ 8Â **Show monitor session** Ьυ ҙ Â

```
Ruijie(config)# no monitor session 1
Ruijie(config)# monitor session 1 source interface
gigabitEthernet 3/1 both
Ruijie(config)# monitor session 1 destination interface
gigabitEthernet 3/8
Ruijie(config)# end
Ruijie# show monitor session 1
sess-num: 1
src-intf:
GigabitEthernet 3/1 frame-type Both
dest-intf:
GigabitEthernet 3/8
```

ÿ SPAN У ∧

ÿ У SPAN ∧ Â

Ьυ ҙ	

Ruijie(config)# **no monitor session** *session_number* **source interface** *interface-id* [| -] [**both** | **rx** | **tx**]	interface-id

no monitor session *session_number* **source interface** *interface-id*

SPAN 1

```
Ruijie(config)# no monitor session 1 source interface
gigabitethernet 1/1 both
Ruijie(config)# end
Ruijie# show monitor session 1
sess-num: 1
dest-intf:
GigabitEthernet 3/8
```

SPAN

show monitor SPAN

show monitor SPAN 1

```
Ruijie# show monitor session 1
sess-num: 1
src-intf:
GigabitEthernet 3/1 frame-type Both
dest-intf:
GigabitEthernet 3/8
```

IP فخ سم

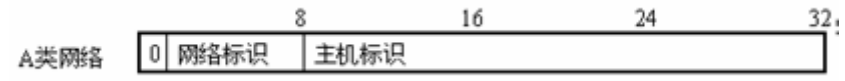
IP فخ سم

IP فخ سم Ȳ

IP سم فخ 32 Æ γ ⁸ ˘ ѝ Ո ˘ У ˊ ⁸ Ấ ⁸
˘ ˆ ѝ ني ˘ 8 Æ˘ تن ÿ 0~255˘ ľ . Ŀ /ľ ˘
ľ 192.168.1.1 Ŀ ˊ ⁸ IP سم فخ Â

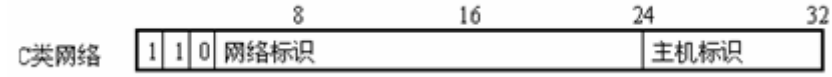
IP سم فخ ɻ ĦЖ˘ IP ˜ سم فخ Â 32 Æ IP سم فخ ч ˆ
' 1˜ ˆ ' 2˜ سم سم فخ ˆ Â ˆ Æ ˘ ɱń
IP سم فخ ɻ Ո ˆ ني Â

A سم فخ˘ Æ ѝ ľ 0 Ŀ˘ 7 Æ /ľ˘ 24 Æ سم
سم فخ Â 128 A Â

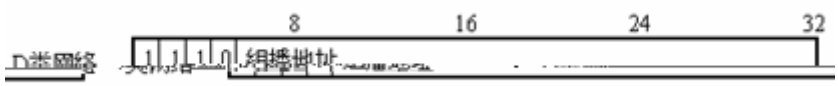


B سم فخ˘ ɱń ч Æ ѝ ľ 10 Ŀ˘ 14 Æ /ľ˘ 16 Æ
سم سم فخ Â 16,348 B Â

C سم فخ˘ ɱń Ь Æ ѝ ľ 110 Ŀ˘ 22 Æ /ľ˘ 8 Æ
سم سم فخ Â 2,097,152 C Â



D سم فخ˘ ɱń ني Æ ѝ ľ 1110 Ŀ˘ è Æ ѝ سم فخ Â



说明：

ɱɳ ني Æ ѝ ǐ 1111

C	192.168.0.0~192.168.255.255	256 C

IP سم فخ à TCP/UDP ٨ ٦ ٤ ¦ ˘ ٨ RFC 1166 Â

IP سم فخ ┗

Ruijie# **ping** *ip-address* [**length** *bytes*] [**ntimes** *times*] [**timeout** *seconds*]	↵

DHCP Relay

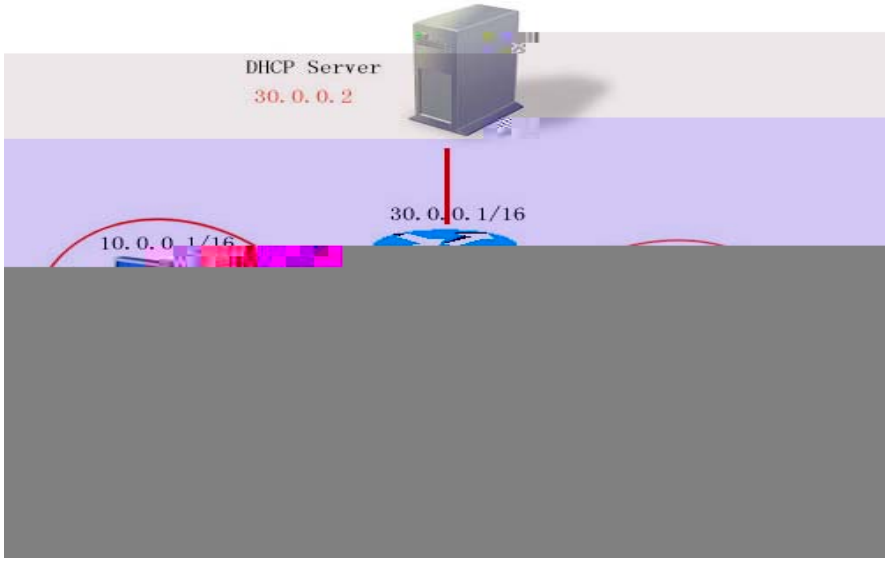
DHCP

DHCP ˜ ╟ ˚ ┘ ˇ IP ﬀ ﬅ Â

DHCP Client ┘ DHCP DISCOVER DHCP Server Â DHCP Server ⁄ DHCP DISCOVER ⁄ˇ У Client˚ , IP ﬅ ﬀˇ ┘ DHCP OFFER Â DHCP Client DHCP OFFER ⁄ˇ ĭ ┘ Â ┘ ┘ DHCP REQUEST ' a ┘ ˇ ┘ DHCP DISCOVER Â ┗ ⅄ DHCP REQUEST ˇ IP ﬅ ﬀ ˆ è ˜ ĭ ┘ Л˚ ˇ ┘ Л˚ ˇ ‡ ┘ DHCP ACK ' a ┘˚ ˇ ‡ ┘ DHCP NAK Â DHCP Client DHCP ACK ˇ ┗ ⅄˚ ' DHCP NAK˜ ‡ ┘ ┘ DHCP DISCOVER Ą ⁄ У IP ﬅ ﬀ Â

DHCP ʒ ˆ DHCP Relay Agent˜

DHCP IP ﬅ ﬀ й 255.255.255.255˜ ┘ ˇ a ┘ Â й ╟ IP˚ ˇ DHCP Relay Agent ң Â DHCP IP ´ ┘ DHCP Server˘ ⁄ ˇ DHCP ⁝ ┘ DHCP Client Â DHCP Relay Agent У ┘ ˇ Æ a ⁄ DHCP Client ∩ DHCP Server Â ⁄ У DHCP Server ┘ ╟ IP ˇ . Client—Relay Agent—Server DHCP ╟ IP Â

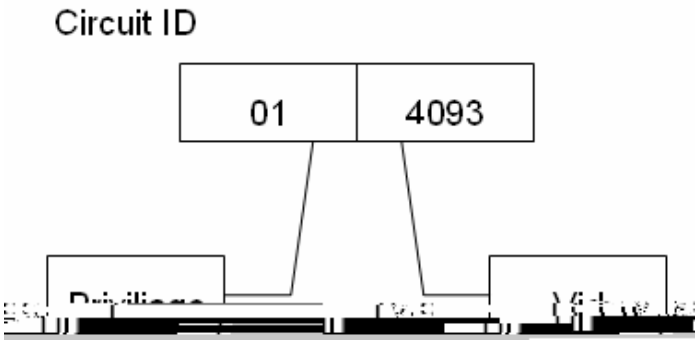


1 ف

VLAN 10 Ո VLAN 20 ׀ 10.0.0.1/16 Ո 20.0.0.1/16 ˘ DHCP Server ج 30.0.0.1/16 Э˘ 30.0.0.2 DHCP Server 10.0.0.1/16 Ո 20.0.0.1/16 ╟ IP ˘ ۷ ج ﻯ Э DHCP Relay Agent˝ DHCP Server IP ﻯ 30.0.0.2 ۷ Л

DHCP Relay Agent Information(option 82)

RFC3046 Ң˝ DHCP relay ˘ ۷ Л ╕ У option DHCP client У ˘ ÿ Ь Ы ۷ Л ׀ a ۷ IP˝ RFC3046 Ң˝ option Л ﻯ 82˝ ≠ option82



2 في

2. relay agent information option82' option

ج ى ي ل ط a : Â ج DHCP ل ني
ˇ DHCP client ج ل DHCP REQUEST ط ˇ
ج ي server-id option ˇ ج ى
ط ل ك ˇ relay ˇ ل ل
serverˇ a ل ي DHCP serverˇ ى DHCP
check server-id ╗

DHCP

DHCP ؟

ج ЮˇЮ DHCP ؟ '

ЬU ؟	
Ruijie (config)# **service dhcp**	ŭ DHCP ؟
Ruijie(config)# **no service dhcp**	DHCP ؟ Â

DHCP Server IP فخ سم

ج DHCP Server IP فخ سم ل ˇ DHCP ل ˇ
ل ˇ Server DHCP : ≠ ل Client Â

DHCP server فخ سم ل Л ˇ ≠ ل Л ج Ь ل ى ˇ ل
Л ط فخ سم لا ل Л 20 ˇفخ سم لا ط Â ج ل DHCP
ˇ ‡ ″I ل DH63FAB1ЙЕ@@B$09C3>]TJ-6.577 -1.44 Td612516/TT Tc 2.989 0 Td<41CB>

DHCP option dot1x

DHCP Relay Agent Information ˙ ˇ æ
a ˙ ˆ a ˙ IP ˇ ˙ Л∪ **ip dhcp relay information option dot1x** DHCP relay option dot1x ╖ ˇ ╖ ˇ æ relay ∧ 802.1x ╕ option ┗ ¥ˇ ╖ Ω dot1x ╖ ∧ Â

æ ЮЎ Ю DHCP option dot1x

ћυ ϟ	
Ruijie(config)# **ip dhcp relay information option dot1x**	ў DHCP option dot1x ╖
Ruijie(config)# **no ip dhcp relay information option dot1x**	DHCP option dot1x ╖ Â

DHCP option 82

ћυ ϟ **ip dhcp relay information option82** ћυ ϟ ˇ æ DHCP relay ╕ **DHCP Relay Agent Information option** ┗ ¥ Â

æ ЮЎ Ю DHCP option82

ћυ ϟ	
Ruijie(config)# **ip dhcp relay information option82**	ў DHCP option82 ╖
Ruijie(config)# **no ip dhcp relay information option82**	DHCP option82 ╖ Â

DHCP relay check server-id

ћυ ϟ **ip dhcp relay check** *server-id* ∧ˇ æ DHCP relay ∨ DHCP SERVER-ID option ˇ a ϖ ˇ ‡ ˬ server ˬ ˇ a è ┗ ¥ ˬ Â

æ ЮЎ Ю **DHCP relay check** *server-id* ╖ '

ћυ ϟ	
Ruijie(config)# **ip dhcp relay check server-id**	ў DHCP relay check server-di ╖
Ruijie(config)# **no ip dhcp relay check server-id**	DHCP relay check server-id ╖

ћυ ϟ **ip dhcp relay suppression** ʌ˘ DHCP realy suppression
ʌ a DHCP ϳ´ relay ʊ˘ ʌ
ʅ a ⁸ Â

ϧ ʌ ЮЎ Ю ╖ '

ћυ ϟ	
Ruijie(config-if)# **ip dhcp relay suppresson**	ΰ DHCP relay suppresson ╖ Â
Ruijie(config-if)# **no ip dhcp relay suppresson**	DHCP relay suppresson ╖ Â

DHCP

Юћυ ϟ dhcp relay ╖ à ╕ ч ┗ ﻑ ﺳ ﻟ '

```
Ruijie# configure terminal
Ruijie(config)# service dhcp                    //  dhcp relay ╖
Ruijie(config)# ip helper-address 192.18.100.1  //  ╕  ┗
                                                    ﻑ ﺳ ﻟ
Ruijie(config)# ip helper-address192.18.100.2   //  ╕
                                                    ┗ ﻑ ﺳ ﻟ
Ruijie(config)# interface GigabitEthernet 0/3
Ruijie(config-if)# ip helper-address 192.18.200.1  //  ╕  ʌ
                                                    ﻑ ﺳ ﻟ ┗
Ruijie(config-if)# ip helper-address 192.18.200.2  //  ╕  ʌ
                                                    ┗ ﻑ ﺳ ﻟ
Ruijie(config-if)# end
```

DHCP relay è Y

γ ˘ vlan relay ╖ option
dot1x à ╟ ﻑ ﺳ Ո option82 У ╖ ˘ ΐ ‡ ϧ γ Э ʌ
vlan relay ╖ Â

DHCP option dot1x Y

1. ћυ ϟ ϧ AAA/802.1x ЮÂ
2. ϧ ΰ 802.1x DHCP IP Â
3. ћυ ϟ б **dhcp option82** ћυ ϟ ˘ a ʃ Â

4.

DHCP ή صر

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

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

```
#
Ruijie(dhcp-config)# default-router 10.2.1.1
#     DHCP فخسم          ﾊ ∩ﾄ
Ruijie(dhcp-config)# network 10.2.0.0  255.255.0.0
#       ﾍ ﾐ      ^  10.2.0.0/16~
Ruijie(config)# ip route 10.2.0.0  255.255.0.0  10.1.0.1
```

DNS

DNS

IP ˇ
Â ˇ a IP IP ˇ в
ˇ Â DNS ˜ Â

ˇ IP ч ' 1˜ ˇ Э ˇ IP
ˇ ˇ з ' 2˜
ˇ ˇ ^ DNS˜ ˇ DNS Э ˇ IP
ˇ Э ˇ ˇ ˝I DNS ˇ
IP Â

ˇ ˇ ˇ IP ˇ ^ ˇ
˜ Â ˇ ≠ DNS Â
ˇ ˇ ˝I ˇ a ˇ ˝Ą
Â ˇ У ˇ ˇ
ˇ Â

DNS

DNS Ю '

DNS ˇ	
DNS IP	
ˇ	
DNS	6

Ruijie(config)# **ip Domain-lookup**	DNS

no ip domain-lookup Ъ DNS

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

DNS Server

DNS DNS

DNS **no ip name-server** [*ip-address*] Ъ **ip-address**

Ъ	
Ruijie(config)# **ip name-server** *ip-address*	DNS Server IP DNS Server Server DNS 6

IP

IP IP IP

Ъ	
Ruijie(config)# **ip host** *host-name ip-address*	IP

Ъ **no** IP

ы

clear host **clear host** *Ъ

Ъ	
Ruijie# **clear host** [*word*]	Ъ a ы

ѽ ɻ

DNS '

ђυ ҂	
Ruijie# **show hosts**	DNS ٧

```
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
```

Ping ѽ ɻ 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
```

´ ˜ (SNTP)

ɱˇ ☡ Э ˜ ⊿ ˇ . NTPˆ Network Time Protocol-- ˜ ˜ ˇ У ˜ NTP ˜ ע ˇ . SNTP ˆ Simple Network Time Protocolˈ ´ ˜ ˜ Â

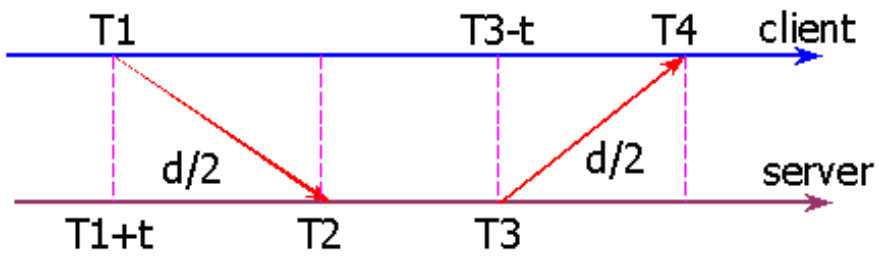
NTP ˜ ⊿Л ⊿ ⊿Ո ˇ ˇ ☡ a ⊿ Ո ╟ :ˇ ⊿Л 1-50 ms Â NTP ⊿ ⁸ˇ Â NTP ˇ Â

SNTPˆ ´ ˜ ˜ NTP ע ˇ ج ˇ ´ ˇ Â У ≠ 1 ⊿ˇ ≠ ﷺ ﷺ ⊿ Â

SNTP Ո NTP У ˇ Л SNTP Client NTP Server Â

SNTP Ⅵ

SNTP ˜ / Ⅼ ⅵ ˇ Ⅼ ⅵ GPS ⅈ Ⅵ ⅳ ﷺ ˇ Ⅼ ⅵ Ⅼ ˇ ˇ ⊿ Â



1 في

Originate Timestamp	T1	time request sent by client
Receive Timestamp	T2	time request received at server
Transmit Timestamp	T3	time reply sent by server
Destination Timestamp	T4	time reply received at client

T1ˈ ⊿ (Л ⅳ ⅵ)ˇ ⅳ Originate Timestampˈ

T2' Ł Ɣ (Ɲ Ł Ɣ ὶ ٩)˘ ὶ Receive Timestamp'

T3' Ł Ɣ ش ↑ (Ɲ Ł Ɣ ὶ ٩)˘ ὶ Transmit Timestamp'

T4' ↑ (Ɲ ὶ ٩)˘ ὶ Destination Timestamp'

T' Ł Ɣ Ո

d' ч '

'

ڈ ὶ

T2 = T1 + t + d / 2;

Ɲ

T2 - T1 = t + d / 2;

٩ ڈ ὶ

T4 = T3 – t + d / 2;

Ɲ

T3 - T4 = t – d / 2;

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

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

t Ո d' SNTP Client ۔ ɱ Â

. ˘ ɱ ὶ T4 + t

SNTP

ӯ SNTP

SNTP

Ю˝ SNTP Ю'

SNTP	Disable˘ SNTP Ł

NTP Server IP فخ سم	0
SNTP ﻝ	1800s
سم ש	+ϐ˝ . ѽ ש

SNTP

ˇ ЛЬЮ SNTP˝

1) Â

```
Ruijie# config
```

2) SNTP˝ . ﻝ У Â ﻝ Ъυ ϧˇ ľ˙ ﻝ Ŀ ˇ a ﻝ Â (ѝ سم ﻝ ˇ ч ľ˙ ﻝ Ŀ ϖ 5) Â

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

3) ھى

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

4) ɱ

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

5) Â

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

SNTP˝ ﻝ Лυ **no sntp enable** Ъυ ϧ SNTP Â

NTP Server فخ سم

SNTP Ո NTP У ˇ Лυ SNTP Client NTP Server Â Э جم NTP Server˘ ﻝ Лυ У У ѝ Э NTP Server Â

έ NTP server فخ سم ﻝ Лυ 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 فخ سم'

1) Â

```
Ruijie# config
```

2) SNTP Server IP فذ سم Â

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

3) ھى

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

4) ɱń

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

5) Â

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

SNTP ﻝ

SNTP Client У NTP Serverˇ Л
Â ЛЬЮ Ո NTP Server ﻝ '

1) Â

```
Ruijie# config
```

2) ﻝ ˇ ´ Æ й Â تن й 60 -65535 ˇ й 1800 Â

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

3) ھى

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

4) ɱń

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

5) Â

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

سم Ш

SNTP ˜ Л ﻉ (GMT)ˇ й
ﻉ سم ˇ سم Ш Â

1˜ Â

```
Ruijie# config
```

2˜ Шˇ تن 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

SNTP

Ю'

1) SNTP ↰

```
Ruijie# show sntp
```

2) **show sntp** ↰ '

```
Ruijie# show sntp
SNTP state              : ENABLE            //SNTP    ĭ
SNTP server             : 192.168.4.12        //NTP Server
SNTP sync interval      : 60           //    ↓
Time zone            : +8                        //  ѕм  Ш
```

NTP

NTP

Network Time Protocol NTP

LAN

WAN

NTP

UTC NTP UTC

Internet

(Authentication)

SNTP NTP SNTP

NTP

NTP

NTP

NTP

NTP

ID

NTP

NTP

NTP

NTP

NTP

NTP

NTP ╗ б Ь Ы ч ' У NTP

Л Ч ' Y Ь Ы '

NTP 8 У Ч б Ь Ы ╗

Ь Ы Â

Ю a 8 Â 8 ‡ a

╗ Â a З У ╗

Ь Ы б è Ь Ы ╗

Ч Ч Ո Ь Ы ╗ Â

8 ЛЮЊ З'

NTP ID

Л У ˘ У

Â ˘ ЛЪЛ ╗ Л Â

˘ ѫ ЛЪЮЪ ʒ'

Ъ ʒ	
ntp trusted-key *key-id*	NTP ID Â
no ntp trusted-key *key-id*	NTP ID Â

ЛЪ Э Ь ⁸ У ˘ Л б Ь Ы

╗ Ь Ы Â

注意:

˘ ‡ ≠ Â

NTP Ь Ы

ѫ Ю NTP Ь Ы Â Л б 20

NTP

˘ ˩ ˩˧ ╗ ˘ ╗ ˩˧ ˩
Â

˄ NTP

ħυ ϟ ╗ ˄ Э NTP Â

ѫ ЮЎ ˄ Э NTP ˩ Л˘ ˘
╗ ˘ ˩ Л˘ ˄ Э NTP Â

注意:

╗ ħυ ϟ ˄ IP ˩ ˄˘ ѫ ѐ ˄
Э ħυ ϟ Â

ѫ ˄ Ю ЛЮħυ ϟ˘ ˄ NTP '

ħυ ϟ	
interface *interface-type number*	˄
ntp disable	˄ NTP ╗ Â

˄ NTP ╗ ˘ ѫ ˄ Ю **no ntp disable** ħυ ϟ

NTP

й ˘ ج У Ո Ь Ы 8
˘ ج Ю ل ˘ NTP ل й 1 ˘ . ل
╟ ل Ю У ل ˘ ╟ ل ل Л Ъ
ٍ Â

NTP ل ˘ ج Ю ЛЪЮЪ ٍ'

Ъ ٍ	

ntp synchronize ل

Ъυ ϛ	
show ntp status	ɱń NTP

ϟ ѫ Ь ϳ Ъυ ϛ . 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 ϛ ɱń ˘ reference ѝ ϳ Ь ﻩﺫﺳ˘ frep ɱń ˘ precision ѝ ɱń ˘ reference time ѝ ϳ Ь ϟ UTC ˘ clock offset ѝ ɱń ˘ root delay ѝ ɱń ˘ root dispersion ѝ Ь ˘ peer dispersion ѝ ϳ Ь Â

ѫ ЛЪЮ ˘ У ѝ master NTP Ь ˘ ⁸˘ У key-id ѝ 6 â key-string ѝ wooooop ˘ ѝ Ь ' ѝ ϳ ЛЪ Ո Э NTP Ь ϳ ˘ Ю ˘ ΰ ╟ ˘ У Ո NTP Ь У ˘ Ⅎ ϳ Ь ѝ Э NTP Ь ˘ ϳ Â

```
Ruijie(config)# no ntp
Ruijie(config)# ntp authentication-key 6 md5 wooooop
Ruijie(config)# ntp authenticate
Ruijie(config)# ntp trusted-key 6
Ruijie(config)# ntp server 192.168.210.222 key 6
Ruijie(config)# ntp synchronize
Ruijie(config)# interface gigabitEthernet 0/1
Ruijie(config-if)# ntp disable
Ruijie(config-if)# no ntp disable
```

SNMP

SNMP

SNMP Simple Network Manger Protocôl 1988
8 RFC1157 Â
SNMP Â
SNMP Â
Æ à Ò SNMP Â

SNMP

SNMP

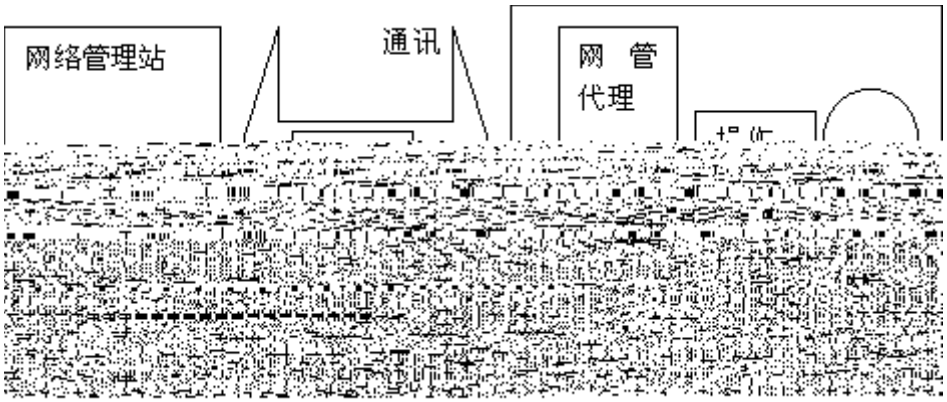
SNMP

MIB

SNMP SNMP NMS
(Network Management System) Â NMS HP
OpenView à CiscoView à CiscoWorks 2000
Star View Â
Ò Â

SNMP SNMP Agent NMS Ò Agent NMS Â

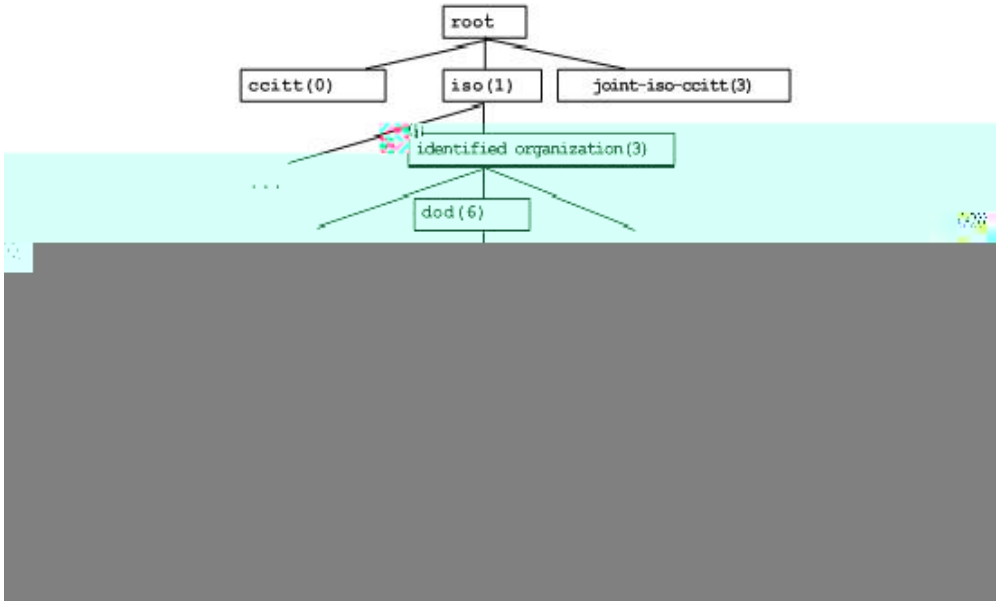
NMS Ò Agent Ю



1 NMS б Agent

MIB Management Information Base Â

↑ Ü ˘ ѝ ج SNMP ر У
´ ˘ MIB ´ Â
´ Â ЮفيMIB Ћ ˘ ѝ ر У
´ System˜ ˩ Л У ˘ {1.3.6.1.2.1.1} У . ѝ
´ Object Identifier´ ´ ˜ ˘ MIB ‡ ´
˩ Â



في 2 MIB

SNMP ˜

ᵯ SNMP ЛЮ '

SNMPv1 ' ´ ˜ У ˘ ج RFC1157 Ⱶ Â

SNMPv2C' ѩ ˩ ˆ Community-Based˜ SNMPv2 , ج RFC1901 Ⱶ У ˜ Â

SNMPv3 ' Ո Ɋ ɓ ɑ

˘ ÿ - ⁝ Â SNMPv2C ╒ ↑ ׀
Ϛ ՌЩ a ۍ صر ˘ ﺝ SNMPv1 У Ϛ Â ﺝ
Ϛ ۍ ՌЩ صر Â Э ۍ ۍ ﺝ SNMPv1 Ո
SNMPv2C ˘ ﭺ SNMP Ϛ SNMPv1 Ո SNMPv2C
˘ 3 ﻫ Â

SNMP

SNMP ˜ NMS Ո Agent ˘ ﺧ 6 صر'

1. Get-request ' NMS ÿ Agent ۍ У ٧ Â
2. Get-next-request ' NMS ÿ Agent ۍ У ٧ Ю У ٧ Â
3. Get-bulk ' NMS ÿ Agent ۍ ٧ '
4. Set-request ' NMS Agent У ٧ Â

SNMP

SNMPv1 Ո SNMPv2 ɻ ĭ MIB Â ŕ
ˇ (NMS) ɻ ɻ Ⱨ ɻ У Â

У ɻ ɻ Л Л Ю :

ɻ (Read-only)' ŕ MIB ɻ Â
(Read-write)' ŕ MIB ɻ Â

ج SNMPv2 ث Э˘ SNMPv ر ص Л Ч
ف 8 ' ɱ ɻ ص Ь ' SNMPv1 à
SNMPv2C à SNMPv3 Â

Ю ŕ ɱ ɻ ر ص Л Ч

ص			╕	
SNMPv1	noAuthNoPriv	ɻ		ɻ ɻ
SNMPv2c	noAuthNoPriv	ɻ		ɻ ɻ
SNMPv3	noAuthNoPriv	ɻ		ɻ ɻ
SNMPv3	authNoPriv	MD5 SHA		ث HMAC-MD5 HMAC-SHA 8
SNMPv3	authPriv	MD5 SHA	DES	ث HMAC-MD5 HMAC-SHA 8 ث CBC-DES ╕ 8

SNMP

ɾ У У SNMP Â SNMP ↑ ŭ У SNMP
˘ ج У ث ɾ У У SNMP Â ج ˘ ŕ У
SNMPv3 ʔ ɻ У ɾ У ˘ . SnmpEngineID Â

ŕ У OCTET STRING˘ ŕ 5 32 Â ج RFC3411 Ⱨ
:

ɱ 4 ˜ ك ⁄ˆ IANA† ˜ ˘ HEX Â

5 ⅓Ю '

0'
1' ⁄ 4 У Ipv4 فخ سم Â
2' ⁄ 16 У Ipv6 فخ سم Â
3' ⁄ 6 У MAC فخ سم Â
4' ˘ 27 ˘ ˜ ك Ⱨ Â

5' 16 ⁸ ˘ 27 ˘ ˝ ك Â

6-127' Â

128-255' ˝ ك Â

SNMP

SNMP جھ Ю ˘ جھ SNMP ⁄ñ˘
˝I Â

⅃ ⅂

SNMPv1/SNMPv2C ⅏ ⅃ ^ Community-based˜ ˘ SNMP
Ⴟ ⅄ ⅄ ⅃ ⅃^ Community-String˜ ˘ б
⅃ a SNMP a : ˘ Â ⅃ NMS ∩ Agent
Â

⅄ Л∪ ˘ ⅄ IP ⅏ فخ NMS ⅄ Л∪ '

⅄ Л∪ ⅃ ˘ ReadOnly ⅄ ˜ ReadWrite ˜'

ˇفي . ˘ ⅃ في ⅏ في Â

MIB '

⅄ Л∪ ⅃ IP Â a ˘ ‡ a ⁸
⅃ IP ⅏ فخ Â ⅈи a ⁸ ⅃ IP ⅏ فخ'

SNMP ⅃˘ جھ Ю ЮЋ∪ Ⴟ'

Ћ∪ Ⴟ	
Ruijie(config)# **snmp-server community** *string* [**view** *view-name*] [**ro** | **rw**] [**host** *host-ip*] [*num*]	⅃ ∩ Â

⅄ Л∪ У ˘ a ⅄ ⅃ ⅃ ˘ ⅄ Л∪
a ⅃ NMS ˘ ⅃ ⅃ ∩ ˘ جھ Ю˘
no snmp-server community Ћ∪ Ⴟ Â

MIB ∩ في

uni-ℓf8ЭЕ1.256 1 Tf0.0005 Tc :(000p62_0 1 190A073C12<519509Ɛ2C583118055319174 13.984

ل ЛЬ и У ل في∩ ل في'

SNMPv3 ˘ ل ЛЬ и è ˘ ĭ
à ĭ ╗ '

MIB في∩ ˘ جـ Ю ЮЬu ع'

Ьu ع	
Ruijie(config)# **snmp-server view** *view-name oid-tree* {**include** | **exclude**}	… У MIB في˘ ↑ Ü MIB Â
Ruijie(config)# **snmp-server group** *groupname* {**v1** | **v2c** |**v3** {**auth** | **noauth** | **priv**}} [**read** *readview*] [**write** *writeview*] [**access** {*num* | *name*}]	… У ˘ ∩ في Â

no snmp-server view *view-name* Ьu ع У في˘ **no snmp-server view** *view-name oid-tree* Ьu ع جـ У في У Â ≠ ل ЛЬ **no snmp-server group** *groupname* Ьu ع У Â

SNMP

ل ЛЬ ـهـ صر ˘ ـهـ Y ″I ˘ NMS ل ⁄ ل ع Â

SNMPv3 ˘ ل ЛЬ à ^ MD5 SHA˜ à ل ع à ╗ ^ ⁄ل DES˜ ∩ ╗ ل ع'

SNMP ˘ جـ Ю ЮЬu ع'

Ьu ع	
Ruijie(config)# **snmp-server user** *username roupname* {**v1** | **v2** | **v3** [**encrypted**] [**auth** { **md5**|**sha** } *auth-password*] [**priv des56** *priv-password*] } [**access** {*num* | *name*}]	Â

no snmp-server user *username groupname* Â

SNMP ў فخ سم

Agent جـ Ю˘ ≠ ў ╟ ⊥ NMS ل ˘ Agent ў ╟ ل NMS ў فخ سم˘ جـ Ю˘ Ю ع'

Ьu ع	
Ruijie(config)# **snmp-server host** *host-addr* **traps** [**version** {**1**|**2c** |**3** [**auth** | **noauth** | **priv**]}] *community-string* [**udp-port** *port-num*] [**type**]	SNMP ў فخ سم˘ ў ل^ جـ ˘صر ˘ل SNMPv3 Ю ˜ à SNMPv3 ˜ ^

ЮЎ ЮО ҳ'

Ъυ ҳ	

Ruijie(config)#

Ruijie(config)# **snmp-server queue-length** *length*	Trap
Ruijie(config)# **snmp-server trap-timeout** *seconds*	ч Trap

SNMP б

ґґ SNMP

й SNMP Ґ- SNMP У ˘ Л ң р SNMP
ҳ˘ ч Л Ґ ґґ SNMP ˘ ѫ
Ю˘

Bad SNMP version errors	SNMP a
Unknown community name	a
Illegal operation for community name supplied	
Encoding errors	

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.entPhysicalHarfpM2ievs
entPhysicalEntry.entPhysicaFirmfpM2ievs
entPhysicalEntry.entPhysicaSoftfpM2ievs
entPhysicalEntry.entPhysicaSericalums
entPhysicalEntry.entPhysicaMfglName
entPhysicalEntry.entPhysicaModealName
entPhysicalEntry.entPhysicaAliaos
entPhysicalEntry.entPhysicaAssetIDe
entPhysicalEntry.entPhysicaIsFRUe
entPhysicalContaislEntry
entPhysicalContaislEntry.entPhysicalhildlIndex
enLastChangeTiame

SNMP

ѫ ЮЎ **show snmp user** ґґ Ҙ SNMP Â

```
Ruijie# show snmp user

User name: test
Engine ID: 800013110300000000000
storage-type: permanent    active
Security level: auth priv
Auth protocol: SHA
Priv protocol: DES
Group-name: g1
```

SNMP ڤ

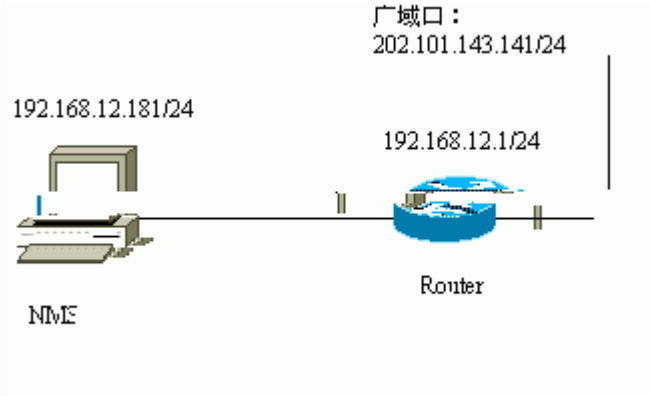
ѫ ЮЎ **show snmp group** ґґ Ҙ Â

```
Ruijie# show snmp group
groupname: g1
securityModel: v3
securityLevel:authPriv
readview: default
writeview: default
notifyview:
groupname: public
securityModel: v1
securityLevel:noAuthNog 1 Tf-0.103 Tc 8.4 0  0  0  y03 T8(sec3-780Tf120 T0
```

SNMP

ή صر

ڧفي˘ Ո NMS Л υ ˘ NMS IP ىسم فخ ى
192.168.12.181˘ IP ىسم فخ ى 192.168.12.1˘ جم Э
˚ ^ Л υ HP OpenView ى ˜ Â



ڧي 5 SNMP ή صر ڧي

έ

ŭ ╟ SNMP Ɂ Ь'

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

ٮ جم Ю˘ Л υ Э Ɂ˘ ŭ ╟ SNMP Ɂ Ь ╖
˘ NMS ٮ Л υ SNMP ˘ a ٮ ٮ
˘ a ˘ ٮ Â ὲ ٮ Â

╖ ˘ ٮ Л υ Ю '

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

Л υ Ю SNMP У Ɂ ىىى ٮ ˘ NMS ٮ Л υ ٮ
У ىىى ˘ ى ٮ '

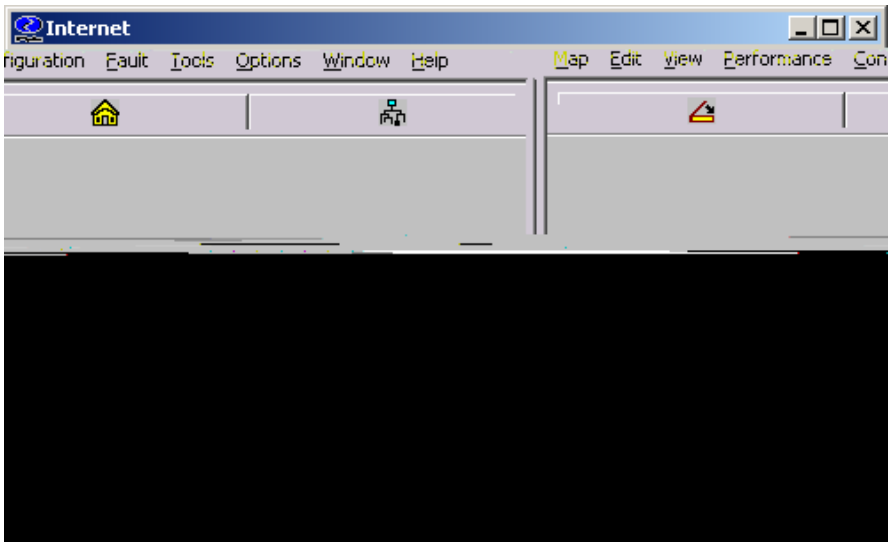
```
Ruijie(config)# snmp-server location fuzhou
Ruijie(config)# snmp-server contact wugb@i-net.com.cn
Ruijie(config)# snmp-server chassis-id 1234567890
0987654321
```

Л υ Ю ˘ ў ╟ ٮ NMS ٮ У Trap ˘ ى ٮ
'

```
Ruijie(config)# snmp-server enable traps
```

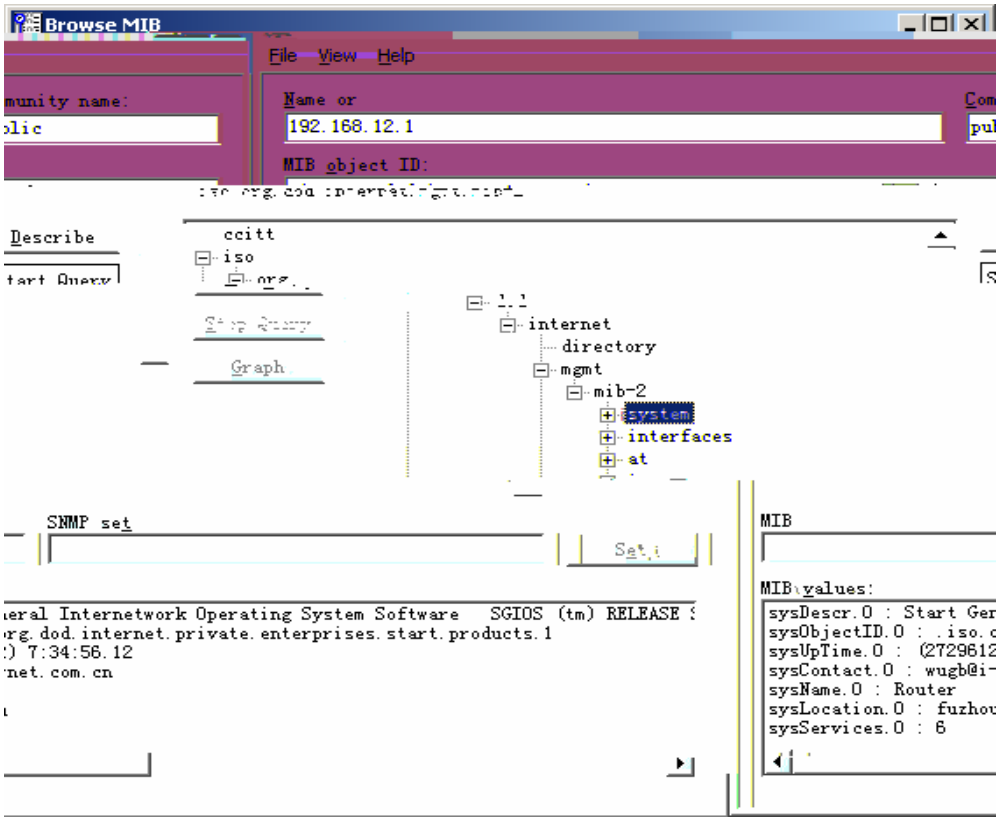
```
Ruijie(config)# snmp-server host 192.168.12.181 public
```

Э ˘ SNMP Ʒ ˘ NMS ˩ Л
Ո ˘ Л HP OpenView ˡ ˘ ˩ Л ң ˘ Ю



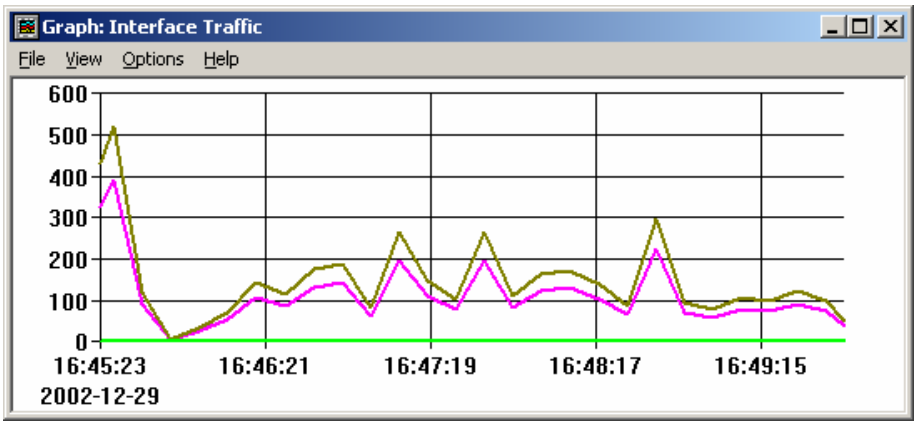
6

˩ Л ´ Ո ˘ HP OpenView
TOOL->SNMP MIB Brower ´ ˘ Ю ˘ Name IP
192.168.12.1˘ Community Name Public˘ MIB é
´ ˘ Ю System Â Start Query˘ MIB
˘ é MIB Values ˀ



في 7 MIB

HP OpenView ╗ ˘ ˘ ┘Л╚ في ∧
ˇفي è é ∧ SNMP ╗ ˘ ° ˘ a جھ



في 8 ∧ في

SNMP 8

∧ ң ҕ ┘Л╚ ˘ ┘ NMS ┘Л╚
SNMP Agent Ո ˘ 8 NMS ˘ SNMP

Â

جھ Ю'

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

Э ˘ ┘ IP فذسھ ѝ 192.168.12.181 ў SNMP
Ո Â

SNMPv3

ЛъЮ SNMPv3 ¯ ╗ ┘ v3user
MIB-2(1.3.6.1.2.1) Ю ┘ Ո Â ѝ MD5˘
ѝ MD5-Auth˘ DES ╗ ˘ ╗ ѝ DES-Priv Â ┘
┘ 192.168.65.199 Л SNMPv3 ┘ Trap Â┘ Trap ┘ ѝ v3user,
¯ ╗ ┘ ˘ ѝ MD5˘ ѝ
MD5-Auth˘ DES ╗ ˘ ╗ ѝ 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
```

RMON

RMON Remote Monitoring IETF(Internet Engineering Task Force Internet)

RMON

RMON

RMON RMON1

RMON 1

(History) RMON 2

1. HistoryControl
2. EthernetHistory

(Alarm) RMON 3 MIB(Management Information Base) MIB

У Э æ У Ю ˘ ┤ Â Ү˚
˘ Ү˚ ┤Л┐ ┤ SNMP Trap Â

Ү˚

Ү˚ (Event) RMON 9 ˘ ¤ ң Ү˚ ˘ ѝ
ң У У SNMP Trap Â

RMON Ь

┤Л┐ Ю┐ ҃ ╗ У Â 9

注意:

Л ң ҕ ґӣ ч Л Â ҽ 1-65535 ˘ ч Л
10 8 Â

Bucket-number

RMON

Ъυ ҳ	
Ruijie(config)# **show rmon alarm**	˜
Ruijie(config)# **show rmon event**	Y ˇ
Ruijie(config)# **show rmon history**	˥ ˩
Ruijie(config)# **show rmon statistics**	

RMON

Л∪ ∧ 3˝ ЮЪυ ҳ'

```
Ruijie(config)# interface gigabitEthernet 0/3
Ruijie(config-if)# rmon collection stats 1 owner zhangsan
```

˥ ˩

10ˆ Л∪ ∧ 3 ˥ ˩ ˘ ЮЪυ ҳ'

```
Ruijie(config)# interface gigabitEthernet 0/3
Ruijie(config-if)# rmon collection history 1 owner zhangsan
interval 600
```

˜ Ո Y ˇ

У ˩ MIB ˩ ╗ Â Ю
MIB-II IfE0 15>ry ifInNUcastPkts.6(∧ 6 Э ´ ˘
й 1.3.6.1.2.1.2.2.1.12.6) ╗ Â έ ╗ й'
30 ∧ 6 Э ´ ˩ У˘ ´
Э (30 ⅿ) ╗ 20 20 Л∪Э˘ Э ∧ ╗ 10
10 Л∪Ю˘ ‡ ∧˘ ˩ ∧ Y ˇ 1 (
˘ ∧ ˩ й Ł rmo0 Ⅱ5 Trap˘ Y ˇ й ľ ifInNUcastPkts is too
much Ł) Â Ո Y ˇ Ѕ й zhangsan Â

```
Ruijie(config)# rmon alarm 10 1.3.6.1.2.1.2.2.1.12.6 30 delta
rising-threshold 20 1 falling-threshold 10 1 owner zhangsan
```

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

rmon

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
```

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
```

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
```

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
```

注意:

æ S2700 ң ҕ ˘ **show rmon statistics** ҍ ҳ ˘
ˆ Ո ч Â

ممم ٨ 8

8

LAN جم à Î b¥K, @ÖÂ ‡Ƥ5€1,@ G@ P7(@1ˬ@ɜr t•. …#r„ „t ØR27 ˜…t• .

≠ ٦ Л Ʊ ٨ ⁸ ╗ '

```
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
```

٨

٨ ╗ MAC ف خ س م MAC+ IP IP

Ї ٦ Л Ʊ ٨ ˘ ٦ Л Ʊ MAC ف خ س م ˘ IP+MAC

IP ˘ ╟ ‾ MAC ف خ س م ⁸ Ї ٦ Л Ʊ

٨ ˘ ٨ ╗ ٨ Ù ٨ Â ٦ MAC ف خ س م Ù ٨ ف خ س م

IP+MAC ف خ س م ˘ IP ف خ س م ˘ ‾

MAC ف خ س م ٦ Л Ʊ ˘ È Â

Ù ˘ ٦ Л Ʊ MAC ف خ س م Ո IP ف خ س م Ù ف خ س م Â

≠ ⊣ Л∪ ∧ MAC ѫ ѣ a IP ѫ ѣ Â

⊣ Л∪ Ю ╕ ∧ Э ѫ ѣ'

∧ Ю Ћ∪ ҷ ∧ ѫ ѣ Â

∧ ╟ ¯ ѫ ѣ ˘ ╟ ¯ ѫ ѣ ⊣ ∧ Э ѫ
ѣ ˘ Â ˘ ╟ ¯ ѫ ѣ кЗ a IP ѫ
ѣ ˘ ⊥ У ∧ Э ˘ IP ѫ ѣ ѫ ѣ ˘ ‡ a Ѷ
╟ ¯ ╕ ѫ ѣ Â

У ∤ ѫ ѣ ˘ ⅓Ю ∤ ¯ Â

У ∧ ѝ У ∧ ˘ Ѐ ѫ ѣ
Л ˘ ∧ У ѫ ѣ a ∧ Э ѫ ѣ ↑ ˘ У
ң Â ң ˘ ⊣ Л∪ Ю '

protect' ѫ ѣ Л ˘ ∧ ⊣ ѫ ѣ ^ a ∧
ѫ ѣ У ~ ↑ Â ѝ Â

restrict' ң ˘ ⊣ У Trap Â

shutdown' ң ˘ ∧ ⊣ У Trap Â

∧

∧

Ю ∧ '

∧	∧ кЗ ∧ ╖
ѫ ѣ	128
ѫ ѣ	
	(protect)

∧

∧ Ю У 8 '

У ∧ a У Aggregate Port

У ∧ a SPAN ∧

说明:

1˘ ٨ Э Ip Ip+Mac ѫ˘ ٨ ˉ Mac ѫ ѫ ˘ a ң Y ˚ Â

2˘ ٨ ج ٨ ң ٦ trap ٦ log Â

3˘ γ ٨ ң ج 1 Â

٨ Э ѫ

ج ٨ Ю˘ ЮЋυ ҂ ѝ ٨ ╗ ѫ'

Ћυ ҂	
Ruijie(config-if)# **switchport port-security mac-address** *mac-address* [**ip-address** *ip-address*]	٨ Э ѫ Â **ip-address**(٦)' ѝ ѫ IP ѫ Â

ج ٨ Ю˘ ٦Л Ћυ ҂ **no switchport port-security mac-address** *mac-address* ٨ ѫ Â

Ю ѝ ٨ gigabitethernet 0/3 У ѫ' 00d0.f800.073c˘ ѝ è У IP ѫ' 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
```

ѫ У

٦Л ѝ У ٨ Э ѫ У Â ╗ ˘ ѫ ˘ ˘ ٦Л ╠ ╗ Ո ٨ Э ѫ Â

ج ٨ Ю˘ ЮЋυ ҂ ѫ У '

Ћυ ҂	

Ruijie(config-if)#**switchport port-security aging**{**static** | **time** *time* }	**static**' ╗ Э ˘ ע ل ﻑ ﺱ ∩ ╟ ˉ ﻑ ﺱ ˘ ï ‡ ٨ ╟ ˉ ﺱ ﻑ Â **Time** ' ٨ Э ﻑ ﺱ ע ˘ تن 0ˉ 1440˘ ´ Æ ǂ Â ﻯ 0˘ ‡ ע ╗ Э Â ע ˘ ≠ У ﻑ ﺱ ﻯ У ٨ ﻑ ﺱ ﻝ˘ Time ﻝ˘ ﻑ ﺱ ╟ Â *Time* ﻯ 0 Â

ل Л ﺝ ٨ Ю ћ ҷ **no switchport port-security aging time**

У ٨ ﻑ ﺱ ע ╗ ˘ ћ ҷ **no switchport port-security aging static** ע ╟ ˉ ﻑ ﺱ Â

Ю У ٨ gigabitethernet 0/3 Э ٨ ע

˘ ע ﻯ 8ǂ ˘ ע ل ﻑ ﺱ'

Ruijie# **Ѫ1"ɣB$ў"oP8a“₸ȣaȣ^1ѫoP0ÉÂѪ„ȷà**

```
Violation mode:Shutdown
Maximum MAC Addresses:8
Total MAC Addresses:0
Configured MAC Addresses:0
Aging time : 8 mins
SecureStatic address aging : Enabled
```

Ю فخ سم

```
Ruijie# show port-security address
Vlan Mac Address IP Address Type Port Remaining Age(mins)
-----------------------------------------------------------
1  00d0.f800.073c   192.168.12.202    Configured   Gi0/3    8
1  00d0.f800.3cc9   192.168.12.5      Configured   Gi0/1    7
```

≠ ٦ Л ъ ٨ У ٨ Э فخ سم˘ Ю ٨ gigabitstethernet 0/3 Э فخ سم

```
Ruijie# show port-security address interface gigabitethernet
0/3
Vlan Mac Address IP Address Type Port Remaining Age(mins)
---- --------------- ---------- ------ -----------------
1    00d0.f800.073c  192.168.12.202 Configured Gi0/3    8
```

Ю ٨

```
Ruijie# show port-security
Secure Port MaxSecureAddr(count) CurrentAddr(count) Security
Action
----------  ------------------  -----------------  -------
Gi0/1       128                 1                  Restrict
Gi0/2       128                 0                  Restrict
Gi0/3       8                    1                  Protect
```

ARP-CHECK

ARP ^ ARP-CHECK˜ ѫ ٨ Э MAC+IP ╖ ˘ DHCP Snooping˘ ٨ فخ سم Â ARP ARP˘ ٬ IP Ь ٪˜ ˘ Â

ARP-CHECK Ь ' ˘ Ո ╟ ˘ ѝ ╟ Â

ج Ю˘ ٨ Э ARP Â ٨ Э ٨ ˘ ‡ ٨ arp Â

ج Ю˘ a ∧ Э ARP Â

ج ╟ Ю˘ ج ∧ Э ⊿ Ю˘ a ARP ' ج ⊿ Ю˘ ARP Â

ARP 8 '

1. ∧ فخ سم ARP ∧ IP فخ سم у ` Â

2. ∧ فخ سم ARP ج فخ سم a Â Л∪ɲń فخ سم ˘ ⊣ Л∪ ˘ ¨Ą ∧ فخ سم Â ∧ ARP ج ϑ˘ Ո ὲ ج ϑ м ˚ Â ˚ a ˘ ⊣ ǂ فخ سم ARP a Â

3. MAC+IP فخ سم ˘ ARP Check Cpu˘ CPU ⁝ , æ CPU Â

ARP-CHECK

ÿ Ю ARP-CHECK

Ћυ ϟ	
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**	\⊣

ج ∧ Э ╕ ⊿ mac فخ سم 00d0.f822.33ab˘ IP فخ سم ѝ 192.168.2.5 ˘ ∧ Э ARP ╟ ŭ 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 ╟ ŭ ˘ ARP Â

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

说明:

1. ARP-CHECK ╖ ARP ң ҏ a ⊿ a ⊿˘
S2700 ң ҏ ARP Л∪ MAC ѕѕѕ فخ Ո Sender Ip Â

802.1X

Authentication'

ч صر ٬ controlled Port Ո

uncontrolled Port Â

’ Â

8 ’ ў

Â

802.1X

3 في

1. 802.1x˘ . 802.1x ˚ ^ windowXp ˘ Star-supplicant è ﺍ IEEE802.1x ˚ ~ Â

2. IEEE 802.1x

3. У ﺍˆ ﺍ˜ RADIUS Ł ﻟ ù Ł ﻟ

1. б Radius Server ﻧ ﻫ Э ﻧ˘ ﻝ ﻧ˘ Л ﺳﻡ б Ł ﻟ ˘ Л ﻫ Э ﻧ

2. б ﻧ ù ﻝ ﻧ˘ Л ˛ ˘ Â

1. ﺍ 802.1x ˘ Â ﺍ ﺍ ˘ ŭ a : è Â

2. Radius Server Э˘ ˜ a ﺍ ف ﺟﻡ Э˘ ˜

3. ˜ ﻝ Л

B à 802.1x ù

802.1X

ЛЬЮ 802.1x

802.1x

802.1x Y

б RADIUS SERVER

802.1X

/ У Л

/ Л supplicant ╖

┘ QUIET

Server-timeout

ў ╟ ┤ 802.1x

802.1x

IP

┤ ˆ

Л Ю ┘ ў

Ь Ы

ж ┤

б IP

ѓ Л

Л VLAN ╟ ┤ 8

Ъ Ь Ы Ґ Л

ж

EAPOL TAG

802.1x

Ю 802.1x У

Authentication	DISABLE
Accounting	DISABLE
Ł Ы (Radius Server) * Ł Ы IP فخ سم (ServerIp) * UDP ٨ * (Key)	* *1812 *
Ł Ы (Accounting Server) * Ł Ы IP فخ سم * UDP ٨	* *1813
٨ صر	٧ ٨^ كا ٨ ٧ ~
re-authentication	
reauth_period	3600
٨ ٬Ą	10
	3
	3
	3 ˇ جم ؛ ى
Ł Ы	5 ˇ جم Ł Ы هى ˇ ى
٨ Ю ٧ ў	

802.1X Y

٧ 802.1x ң ҏˇ ЛЬЮ Â

802.1x ٧ ЛЬ جم γ Ю ٨ ٧ ЛЬ جم Ь Ю Â

˝I Ł Ы IP فخ سمˇ radius server ٧ ЛЬ Â

٨ ٨ a 1X Â

Aggregate Port a 1X Â

٧ У ٨ 1x ╗ ˇ ٨ 1x ˜ cpu Â

б RADIUS SERVER

Radius Server ' ل à à Л Ч
Â Radius Server ˘ a ¦ Л
˘ ˜ Â

سم б RADIUS SERVER ˘ Ю '

Radius Server ' ЎД У Radius Client Â ЎД ˆ Radius Server
IP à UDP Лˆ UDP Л˜ à б Radius
Server ˘ Э Client EAP ˜ Â
جم Radius Server Э ЎД У Radius Client˝ a ل ˚ a ل˘
Â

' й б Server ˘ Ю '
Radius Server IP فذسم˘ ˆ ˜ UDP ₣ ھ

A’ Û? ÄWq’ !]- ïÂ ÊÝ0Ã Ö?U"¼@ ÄA„,X <t

б Radius Server ٨ ٧ ٨

802.1X

802.1x ˘ ў ╟ ٧ ٨ Э ў ˘
ў a Â

ج Ю˘ Ю 1x '

Ъυ ҂	

configure terminal

```
!
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 Server IP RADIUS

Radius Server Radius Server

Radius Server

802.1x

802.1x

configure terminal	

interface *interface*

Л ᴨ 1/1 и ᴌ ᴨ'

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

ᴨ и ᴌ ᴨ ˇ ᴌ EAP ˇ CPU ≠ ج ᴌ
ن Â

注意:

ᴨ и ᴌ ᴨ ˇ mac ˇ ᴌ cpu
icmp Ո igmp , ᴨ ˇ ᴨ ˇ ѫ
ᴌ cpu icmp Ո igmp Â

802.1x ў ╟ ˇ ᴌ Л a è
ˇ ᴌ Л ї ˇ Â ᴌ Л
ˇ ᴌ Л Ҥ Â 3600 Â ج
ѯ ᴧ Ю é ˇ
У ᴨ ᴌ Â

ج Ю Ю / ˇ з Â

Ъυ ҳ	
configure terminal	
dot1x re-authentication	╖
dot1x timeout re-authperiod *seconds*	
End	
Write	
show dot1x	dot1x

no dot1x re-authentication Ъυ ҳ ╖ ˇ **no dot1x timeout re-authperiod** Ъυ ҳ и Â

ЛЮ ╖ ˇ ن ╖ ˇ

```
Ruijie(config)# dot1x timeout re-authperiod 1000
Ruijie(config)# end
Ruijie# show dot1x
802.1X Status:       Disabled
Authentication Mode:  EAP-MD5
Authed User Number:   0
Re-authen Enabled:    Enabled
Re-authen Period:     1000 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
Filter Non-RG Supp:   Disabled
Client Oline Probe:   Disabled
Eapol Tag Enable:     Disabled
Authorization Mode:   Disabled
```

˘ ⁄ Â é Â

/ ⁄ supplicant ╖

⁄ supplicant н ϱ ѝ 802.1x ˘ ⅄ ≠ è У 802.1x (WindowsXP 802.1x ╖) ‡ ⅄ Â

⅄ Л∪ ╖ ˘ ⁄ supplicant ⅄ 802.1x ˘ supplicant a ⅄ è 802.1x : Â Ю ╖ Â

æ Ю Ю à ╖ '

Ћ∪ ҳ	
configure terminal	
dot1x private-supplicant-only	╖
end	
write	
show dot1x	dot1x

ЛЮ ⁄ supplicant ╖ '

```
Ruijie# configure terminal
Ruijie(config)# dot1x private-supplicant-only
```

```
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 ħυ ϡ ╖ Â

↓ QUIET

˘ У Л˘ ¨Ą Â Quiet Period ¨Ą Â ↓ Â Quiet Period й 10 ˘

↓ Лυ Quiet Period ↓ Лυ ѕѕ ¨Ą Â

ѥ Ю˘ Ю Quiet Period

ħυ ϡ	
configure terminal	
dot1x timeout quiet-period *seconds*	Quiet Period
end	
write	

show dot1x dot1x

```
Ruijie(config)# end
```

ٮ EAP-request/identity ٱ ˘ ج У ھ ˘
Â ى ٣ ˘ έ Â

ج Ю˘ Ю

Ьυ ٶ	
configure terminal	
dot1x timeout tx-period *seconds*	
end	
write	
show dot1x	dot1x ŧtkdQ1x@ŇŸ#Q:T!¦5L> $D28%ʁ¦5LÔT &ℿAõ

й 5 '

```
Ruijie# configure terminal
Ruijie(config)# dot1x max-req 5
Ruijie(config)# end
```

Л˘ ЇА б Â ح

Л˘ й ˘ Â

3 ˘ ۓ Л Â

ح Ю˘ Ю '

Ьu ҳ	
configure terminal	
dot1x reauth-max *count*	
end	
write	

show dot1x	dot1x

注意:

radius ѝ 802.1X ˘ ⅄ ∀ è
ѝ ˘ aaa authentication dot1x default group radius none
ㅊ radius ㄴ ⅄ a : Ю ⅃ Л∪ none ˘ ‡
radius Ո 802.1X Â

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

radius * < 802.1X server-timeout Â

ў ╟ ∀ 802.1x

802.1x ѫ ∀ ˘ ˘ ″I ˘
Ю˝ ∀ EAPOL-START ∀ Â
˘ ∀ I' ∀ ∀ Ŀ Â

ㅊ Ю˝ ∀ Â Æ à ∀
linkdown ⅃ ѝ linkup˘ ѝ ˘
ў ╟ ∀ Â ∀ ˘ У a ў ╟ ∀
802.1x ˚ ^ WindowsXP 802.1x
˚ ~ ˘ ў ╟ ∀ ˘ ∀ EAP-request/identity
8 ∀ Ю Â

ЛЮ Ў ў ╟ ∀ 802.1x ˘ Л∪ ∀ ㅊ a ⅄ Ю
∧ ѫ Â

/ ў ╟ ∀

╖ ˘ ∀ ㅊ Æ Ո ∀ ⅃ ∀ У ˘
ѝ ㅊ ˘ è a ў ╟ ∀
Â ╖ ∧˘ ⅃ Л∪ ў ╟ ∀ à ∀
à ∧ ĭ ∀ ╖ Â

˘ ЛЮ ў ╟ ╖ '

Ћ∪ ϟ	
configure terminal	
dot1x auto-req	ў ╟ ╖ Â ╖ Ю

end	
write	
show dot1x	dot1x

Ъυ ҳ **no** ˩ Л∪ ╖ ˘ ˧ ╖ Ю˘ Л
˘ ў ╟ ˧ ˘ ˩ Л∪ ў ╟ ˧
˘ ˩ Â

˘ ЛυЮ ˧ '

Ъυ ҳ	
configure terminal	
dot1x auto-req packet-num *num*	ў ╟ ˧ num 802.1x , num ѝ Ơ ‡ ѕш ˧ Â Ơ ~
end	
write	
show dot1x auto-req	

Ъυ ҳ **no** ѝ ˘ Ю ˧

˘ ЛυЮ ў ╟ ˧ '

Ъυ ҳ	
configure terminal	
dot1x auto-req req-interval *interval*	˧
end	
write	
show dot1x auto-req	

Ъυ ҳ **no** ѝ ˘ ˧ ˀ
Ю ˘ Л∪ ˧ a ˘ ї̋ ‡ ː Â

ѥ ˧ Л ї̋ ˧ ˘ ѥ Ю(У
ˀ Ю ˧ У) ˘ ˩ Л∪ ѥ ˧ Л˘ ˩
ˀ ˧ ˘ Ю ˘ ‡ ˧ Â

˘ ЛυЮ '

Ъυ ҳ	
configure terminal	

dot1x auto-req user-detect	ㄐ ㄣ Â ╗
end	

ج ў ╠ Ю ' ج Ю
Л∪ й ^ У ї
~ Â

Ю '

1. ج Radius Server Ä ∧ й Radius Client
2. ┘ ∟ IP فخ سم
3. UDP ∧
4. ج 802.1x ⁄ή Ю ┘

ج Ю Ю ┘

ћ∪ ≒	
configure terminal	AAA ╖ ¢
aaa group server radius *gs*	¢
exit	ھى ¢

dot1x accounting	й 802.1X	

end **no aaa accounting network** ћ∪ ≒

```
Ruijie(config)# end
Ruijie# write memory
Ruijie# show running-config
```

注意:

1) б Radius Server б ⁄

2) ⁄ AAA ⁄ Ю

3) 802.1X ⁄

4) 802.1x ⁄ ⁄ Ю

5) Radius Server

6) ⁄ ⁄ ⁄ AAA ⁄ Ю ≠ ⁄ **aaa domain enable** ⁄ **dot1x accounting** ⁄ a ⁄ ⁄ ⁄ Â É ⁄ ⁄ AAA ⁄ Â

⁄ ⁄ ⁄ NAS Э ⁄ NAS ⁄ Radius Server ⁄ ⁄ Radius Server Э ⁄ ⁄ NAS

NAS

ЛЬЮ ѝ ӈ ҏ ╖ ˈ

ѝ ڭ ┤ è ﺝ ﻉ ﻝ ˘ 802.1x ╖ ﺝ ﻫ

g Ư ﻍ

SUPPLICANT ' IP ù SUPPLICANT PC IP Â
ﻝ˘ ﻝ IP ˘ a ﻝ IP Â

ﻲﻣ ﻮﻟ ﺮﺻ'

```
aaa authorization ip-auth-mode radius-server
!
Ruijie# write memory
```

注意:

IP+MAC arp-check 499 IP 498 IP

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

1) Radius Server Reply Message

2) r-supplicant a a

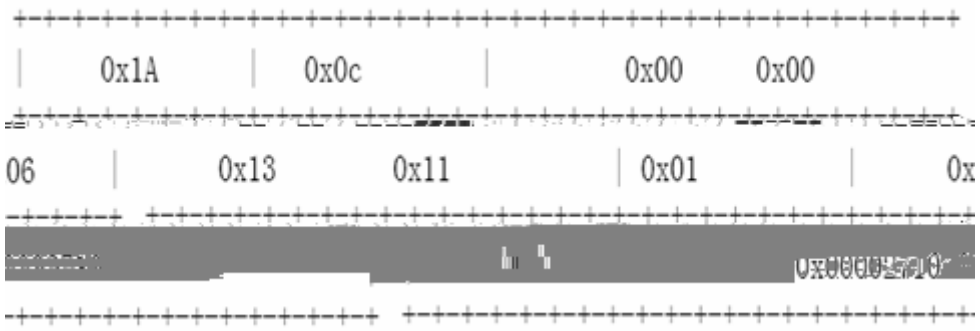
3)

802.1x IEEE 802.1x

configure terminal	
dot1x auth-address-table address *mac-addr* **interface** *interface*	

end	
write	
show running-config	

ù 10M Ю'



8 في

Ⱨ Л Э ˇ ù 10M˙ 10000kbsp˘ 16
⁸ ‡ 0x00002710˝ ج Э ˩ Â

Ⅶ Â ˩ ˩ Â

ج ˇ 802.1x EAP-MD5 Â Ὼ ʌ
802.1X˝ a ˩ Л EAP-MD5 ˆ ˜ ˇ ˩ Л CHAP Ո PAP
Â CHAP ˩ Л У б RADIUS SERVER
ˇ RADIUS SERVER Ꮉ ╒ Â Ո CHAP У ˇ PAP Ո RADIUS
SERVER ≠ ˩ У ˇ PAP è ج ج
ˇ Л a ˇ ج Ю ˩ Л ˇ
Ꮮ ⅄ ˩ PAP ˇ Ȯ Ί ì

```
802.1X Status:       Disabled
Authentication Mode:  CHAP
Authed User Number:   0
Re-authen Enabled:    Disabled
Re-authen Period:     3600 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
Filter Non-RG Supp:   Disabled
Client Oline Probe:   Disabled
Eapol Tag Enable:     Disabled
Authorization Mode:   Group Server
```

Ь ы

ﾊ ﾏ 802.1x ﾞ ﾉ ﾌ ﾄ Ь ы Â ў Ь ы ﾘ ﾄ ﾊ ﾞ ﾉ ﾐ Ь ы ﾘ О У Ь ы Â

ﾓ ﾄ Ю ﾞ Ю Ь ы Â

ћ ђ	
configure terminal	
aaa new-model	aaa
aaa group server radius *gs-name*	Ь ы
server sever	Ь ы
server server-backup	Ь ы
end	
write	servho-B B

SNMP

SNMP

IP

Radius Server

IP

Radius Server

802.1X VLAN

VLAN RADIUS RADIUS VLAN

RADIUs

ң ҏ ⊿ RADIUS ⊨ ⊻ RADIUS Ю VLAN
˘ ↑ ЛЬЮ ⊿'

64 ⊿ Tunnel-Type

65 ⊿ Tunnel-Medium-Type

81 ⊿ Tunnel-Private-Group-ID

⍞ ⊻ Ю'

Tunnel-Type=VLAN (13)

Tunnel-Medium-Type=802ˆ 6˜

Tunnel-Private-Group-ID=VLANID(ѝ)

Ю

802.1X

interface *interface_id*	٨
dot1x dynamic-vlan enable	ŭ VLAN ╟ ╖

注意:

Interval Â

æ ЮЎ ┘Л∪ ЛЮ æ ╗ :

Ьυ ⅓	
configure terminal	
dot1x client-probe enable	æ ╗
dot1x probe-timer interval *interval*	Hello Interval
dot1x probe-timer alive interval	Alive Interval
end	
write	
show dot1x	

EAPOL TAG

IEEE 802.1x EAPOL a ╕ VLAN TAGЎ ▓ ┘ ў
ў æ ў Trunk Port
‡ TAG Â

ђ ѕ æ 802.1x ў ∩ Ґ ђ ѕ
Ь Â

æ ЮЎ ┘Л∪ ЛЮ EAPOL TAG Â

Ьυ ⅓	
configure terminal	
dot1x eapol-tag	EAPOL TAG ╗ Â ╗
end	
write	
show dot1x	

┘Л∪ **no dot1x eapol-tag** Ьυ ⅓ ╗ Â

▓ ∩

802.1x ⁸ Ю ▓ MAC ⁸ ў ┘
ў è æ ┘ У ∩ ў ▓ ∩
⁸ ┤ У ∩ У ў ∩ ┘
∩ў æ ∩Ю Â

ㅅ ⁸ ㅱ ㅅ ⁸ ˘ ㅛ ˘ ㅁ

ㅇ Â

ㅁ ㅋ	
configure terminal	
interface <*interface-id*>	ㅅ
dot1x port-control auto	ㅓ ㅠ
dot1x port-control-mode {*mac-based*|*port-based*}	ㅓ
End	
Write	
show dot1x port-control	ㅅ 802.1X

ㅓ ㅁ **no dot1x port-control-mode** ㅁ ㅋ ㅓ Â

ㅇ ㅅ

```
Ruijie#configure terminal
Ruijie(config)# dot1x port-control-mode port-base
```

注意:

ㅈ ㅅ ㅇˇ ㅅ ㅅ ㅡ

ㅈ ㅅ ㅇˇ ㅓ ㅁ ╟ ㅊ ㅅ

˘ ╟ ㅊ a ㅓ ㅅ ˘ ╟ ˘

ㅛ ˘ ㅁㅇ Â

ㅁ ㅋ	
configure terminal	
dot1x stationarity enable	ㅅ
end	
Write	

ㅅ

ㅓ ㅁ ㅅ ⁸ ㅅ ㅓ Â ㅅ ㅊ ㅈ

802.1X

```
Ruijie# sh radius server
Server IP:       192.168.5.11
Accounting Port:  1813
Authen  Port:    1812
Server State:    Ready
```

ɱń

Ὢ ʎ 802.1X ɻ Ɽʊ ч ɱń ˇ У ɱń ˇ γ
Â ɱń ɱń ˆ ĭ ˜ ’
ˇ Â

ѫ ЮˇЎ ɱń ɻ ˇ 1x ˇ ↑ ɱń
Ո **show dot1x** Â

ɅʊЮ 802.1x '

```
Ruijie# show dot1x
802.1X Status:       Disabled
Authentication Mode:  EAP-MD5
Authed User Number:   0
Re-authen Enabled:    Disabled
Re-authen Period:     3600 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
Filter Non-RG Supp:   Disabled
Client Oline Probe:   Disabled
Eapol Tag Enable:     Disabled
Authorization Mode:   Disabled
```

ɻ ѕѫ ƒ

Ὢ ʎ 802.1xˇ ˜ ˇ ɻ Ɽʊ ѫ ʎ Э ɻ ف ў
ɻ Ɽʊ Â ɻ ў ˜ ˇ ɻ Ɽʊ ˜ ɱń Â

ѫ ЮˇЎ Ю ɻ ў

ƕ ʒ	
configure terminal	
dot1x auth-address-table address *mac-addr* **interface** *interface*	ɻ ў

end	
write	
show dot1x auth-address-table	˩ ў

no dot1x auth-address-table address Ђ ђ ˩ ў Â

ЛЬЮ ˩ ў '

```
Ruijie# show dot1x auth-address-table
interface:g3/1
-----------------------------------
mac addr: 00D0.F800.0001
```

˜ ˩ Л Ь м ˘ Â

ѣ Ю˜ Ю

Ђ ђ	
show dot1x summary	

ЛЬЮ '

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

1x Ы

ѣ Ю˜ Ю 1x Ы

Ђ ђ	
show dot1x probe-timer	1x Ы

ЛЬЮ 1x Ы :

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

802.1x è Y

1. ⁸ ج IP ˘ ⁄ 10000 Â

2. IP Ю ˚ Ո- è ^ ∧ IP ﺳ
ﻓﺬ˜ ﻡ Ո- ﺵ ˘ è ˚ ˘ ‡ ⅃ IP
Ю a ╖˘ ╖ Â ﺵ
˘ IP Ю У ⅃ Л Â

3. ∧ Э ╖ Ю ⁸

∧ a ˘ Ђ ҂ **switchport mode trunk**
∧ ج ACCESS Ю a ∧ Access VLAN
∧ ج TRUNK Ю a ∧ Allowed VLAN ⅂ Native VLAN

4. ج VLAN ج ╖ Ю ⁸

VLAN a
VLAN ﺻ a ˘ Ђ ҂ private-vlan primary Â

5. ⅄ У ∧ Ю ⁸

У Ю ⅃ VLAN˘ ∧ VLAN ﻯ У Ю
⅃ VLAN'
⁄ Ю ⅃ VLAN˘ У Ю ⅃ VLAN'
⁄ Ю ⅃ VLAN ⅄ У У ˘ ĭ ‡
,

У ⁄ Ю ⅃ VLAN б Э Ю ⅃
VLAN ⅄˘ ĭ ‡ Â

7. ŭ ﻡ Ю˘ IPV6 ﻓﺬ ﺳ ﻯ IP ﻯ
DISABLE ˘ ⅄ ŭ GSN˘ ⅄ Ю ⅃ ˚
Â ج Э Ю˘ ج ∧ ╖ ˘ .
Ľ TCAM Ŀ log ˘ a ⁝ ∧ ╖ Ո- è
Â

AAA

[illegible]

AAA [illegible]

AAA

ЮЖ AAA

AAA ˘ ˝I ЮЖ У Ъυ ɻ ˘ ʌ ʌ
ЮЖ Â ЮЖ ص Ո Â
ЮЖ ˘ Â ڑ У
Â ج Â

ЮЖ à У Â
У ~ ˘ ج У
ЮЎ ɻ Л Â ʌ ң ҏ У
˘ ˘ Ю У Â У
Ю ɻ˘ б ℸ ɯɯ Â
ℸ ˘ ‡ ˆ Â

注意:

ɻ ج ɱ У ЮЎ ʌ ң ҏ Ю У Â ج
˘ ˘ ‡ ˘ a ¨Ą è
Â

ج ή ص AAA ف ˘ ↑ ΰ 2 Ь ɭ' R1 Ո R2 RADIUS Ь ɭ Â
˘ У ā ˘ NAS У
Telnet ' ˝I R1 ˘ ˘ ‡
R2 ' R1 à R2 ˘ ‡ Ь ɭ ɯɯ
˘ Л Э ˘ ЛЮЪυ ʒ'

Ъυ ʒ	
configure terminal	
aaa authentication login default group radius local	У ˘ è ľ default Ь ɻ Â ↑ ΰ ~ ˘ ج ɻ ʌ Â й Â

˘ У Login ˘ … У
Ъυ ɻ ˘ ʌ Â Ю
2'

Ъυ ʒ	

configure terminal	
aaa new-model	AAA
aaa authentication login *test* **group radius local**	جم ЮЎ ЊЋ У ل ي ا test Ы Â
line vty *2*	2
login authentication *test*	جم line ЮЎ ل ي ا test Ы Â

PC في Telnet (NAS)ў NAS ¨I ل R1
ў R1 ў R1 ل NAS ك У ACCEPT ў
. Â R1 هى REJECT ў ‡
ў Â R1 ў NAS TIMEOUTЎ ل R2
Â У جم ЮO ЮO ЎЎ
à Â Ы (R1Ы هه Úà,•D žP
ahÖ•hÖ€ eˆ•RpHu# Fƒ ÷‘Rt[ýð!6SYŽŒOqüYGÖTÈQÃ

AAA

AAA ˘ ЛЮ Ь'

aaa new-model Ъυ ϧ ŏ AAA Â

Ь Ы˘ ~ ٧ ˘ RADIUS Ո

TACACS+ Â έ ٧ ľ RADIUS Ь Ո ľ TACACS+ Ь Â

aaa authentication Ъυ ϧ Ѭ Â

ل ˘ ٧ Â

注意:

Ѵ ң ҏ DOT1X ɱ a TACACS+ Â

AAA Login

έ ӯ Ѵ ң ҏ AAA Loginˆ ~ '

注意:

٧ ѫ Ю **aaa new-model** Ъυ ϧ ŏ AAA˘ AAA

ˆ Ю ل˜ Â ˘ ٧ ľ AAA Ь Â

ѫ Ю˘ Telnet Ь Ы (NAS)˘ У

˘ ل Л NAS˘ й ˘

Â

AAA Ь ѓ ѩ Loginˆ ~ ل Â a

ā ف Login ˘ ٧ **aaa authentication login** Ъυ ϧ

Ѭ У ˘ Login

ل Л Â

AAA Login ˘ ѫ Ю ЛЮЪυ ϧ'

Ъυ ϧ	
configure	terminal
aaa new-model	ŏ AAA Â
aaa authentication login {**default** | *list-name*} *method1* [*method2*...]	Ѭ У ˘ Ѭ ˘ Ъυ ϧ Â

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

list-name Ъu ﾉ … ˘ ┘Л ’
method Â ⁄ή ﻫ ERROR˘ ~ ˘
ﾉ è ’ ⁄ή ﻫ FAIL( )˘ ‡ a è
Â ﾍ ﾉ ╖ ﻫ˘ . ˘ ┘Л ﻉ Ъu ﻉ
none ﾍ ﾉ У Â

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

注意:

none ⁄ﾊ ﻉ Ь Ы Ю
˘ Л ﾍ Â ' У Ю˘ a
none ˘ ﻉ Ю˘ ┘ ⁄ﾊ ┘ ˘ з
a ˘ ┘Л ﻉ Ь Ы
Ю˘ **none** ﾍ ﾉ У ┘ ˘

end	
show running-config	

Login

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

RADIUS Login

RADIUS Login RADIUS RADIUS

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

RADIUS RADIUS RADIUS RADIUS RADIUS

RADIUS

configure terminal	

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

AAA Enable

AAA Enable

Telnet (NAS)

CLI 0~15 a **show privilege**

enable Enable

AAA Enable

configure terminal	
aaa new-model	AAA

aaa authentication enable default

˘ ⁋ ɱ ˘ ‡ Â ⁋
ɱ ˘ ‡ ⁋ ˘ a Â

注意:

CLI Login ˆ **none** ˜˜ ɱ
ɻ Â ˘ Enable ˘ a ¨Ą ɻ˘
б Login ɻ ɻ ˘ ∧ ȝ б ˥ Â

CLI Login ˘ جھ Login

show running-config	

Enable

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

RADIUS Enable

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

PPP AAA

PPP ˜ ﺝ Э ↑ У ˜ Â ﺝ
Ю˘ ISDN /ﺍ NAS˘ ﻉ ﻝ˜ ˘ У
˘ ŭ ╟ PPP ˜ ك˘ ﻱ ˘ PPP ﺝ ˜ ك
/ﺍ Â

έ ӯ /ﺍ ң ҏ AAA PPP ˘ AAA PPP
h64 55J []01.48 22 088 M 54503.82 55J []01.48 22 088 M 5402 Tc 24.377 0 Td ((ISDN).1103DAA

	˘ Л υ ⊣ ѕѫ Â
dot1x authentication *list-name*	802.1x Â

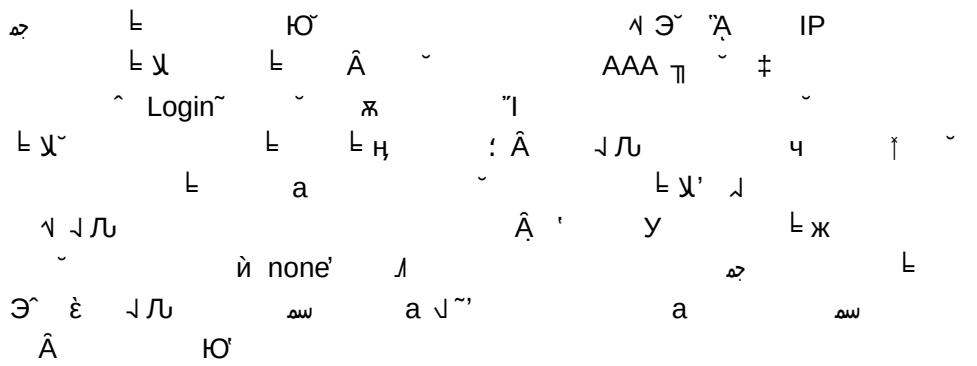
IEEE802.1x ˜ ε ⊣ ľ 802.1x Ł Â

Ю ˘ ľ RADIUS+ ѕѫ 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 ⊻ˆ IP й 192.168.217.64˜
˘ RADIUS Ł ⊻ ˘ ‡ ѕѫ
Â

Ь Ю



```
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 ˘ Ł Ы RADIUS Ł Ыˆ IP й 192.168.217.64˜
˘ RADIUS Ł Ы ˘ ‡ ѕм
Â tty 1-4 й Ł ˘ a ˘ è tty Ո
vty Â

AAA ˚ Л Ł ⁸ Â ŭ AAA Ł
Л Л˘ ѕм Ł Ы ˚
Â Л Л˘ Л ˚ Ł Л é Л
Â

ص

Л н ҷ ҕ ЛЮ AAA صˈ

Exec
Commandˆ Ћ ҳ˜
Networkˆ ˜

c Exec

ˆ ˩ ˜ AAA Â У ѫ ˅ ѫ
Ю˝ ≠ ˩Л´ Â AAA ˇ ˥ Ї
Ŀ Â

ˆ ˩ ˜ ˜ ˥ Â ˜ ˇ
˜ ˥ Â ˅ ҥ ҕ Network RADIUS ˜ ˇ Exec RADIUS
Ո TACACS+ ˜ ˇ RADIUS ˜ ˇ ˥ Ї RADIUS Ŀ
TACACS+ ˜ ˇ ˥ Ї TACACS+ Ŀ Â

ˆ ˩ ˜ ѡ ˇ ‡ **username** Ђ ҁ Ђ
Â

ŭ AAA ˇ ѫ Ю ЛЂЮЂ ҁ'

Ђ ҁ	
configure terminal	
aaa new-model	AAA

aaa authorization exec ‘p*ü

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

list-name Ъυ ⅄ … ˘ ⅃ Л∪ ’
method Â ɱɲ ھ ERROR˘ ~ ˘
⅄ è ’ ɱɲ ھ FAIL( )˘ ‡ a è Â ѝ
⅄ ℸ ھ˘ . ˘ ⅃ Л∪ ﺝ Ъυ ʒ
none ѝ ⅄ У Â

˘ ﺝ Ю ˘ . RADIUS Ь ⅄ (TIMEOUT)˘ Ÿ Exec
’ **aaa authorization exec default group radius none**

local	ﺳ ⅄ Exec
none	a Exec
group radius	RADIUS Ь ⅄ Exec
group tacacs+	TACACS+ Ь ⅄ Exec

Э ⅄ ң ҏ AAA Exec Â

注意:

Exec ⅄ Login У ˘ ⅃ Л∪ ﺝ ⅃ У Э ⅃ Login
Ո Exec Â ˘ Ո ⅃ Л∪ a ⅃ Ո a ⅃
Ь ⅄˘ ﺟ ⅃ ˘ Ո ⅃ a ⅃ Â ˘
Exec

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

Exec

Ю Exec Â VTY 0~4 Э Login ˘ з Exec Â è Login ﺱﻣ ˘ Exec ˝I RADIUS à : ﻝ Л ﺱﻣ Â RADIUS ﻟ ﻻ ﺱﻣ ﻑﺥ ﻯ 192.168.217.64˝ ﻡ ﻯ test ﺱﻣ ﻝ ﻯ ruijie˘ ﻯ ﻍ ﻯ 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
```

AAA Network

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

Network

Ю Â

```
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
!
```

AAA Ц Ь Â ŭ Ц Л˘
Ь Ы ѫЛ ч Ь Ы Â
ч Л У ˚ ˘ ˚ ˘ ╠ à
Л ч Ц Â

ص

Л н ҷ ɱ ЛЮ ص'

Exec
Command Ъ ҳ˜
Network ˜

è Exec NAS Э Ъ ҳ ˆ CLI˜˘ ج Ո
˚ ' Ъ ҳ NAS Э CLI Л Л˘
è é Ъ ҳ' б Э Â

说明：

Ъυ ϧ ╖ ɱ TACACS+ ˜ ˇ έ ٧ ľ TACACS+ Ŀ Â

æ AAA Л υ ɱ ˇ Л υ Ю Ŀ '

ŭ AAA Ŀ Â ŭ AAA ˇ ٧ ľ AAA Ŀ Â

Ъ Ж ˜ ٧ Â ˇ ˜ ٧ Â Л ң ҏ Network RADIUS ˜ ' Exec RADIUS Ո TACACS+ ˜ ' Command TACACS+ ˜ Â RADIUS ˜ ˇ ٧ ľ RADIUS Ŀ TACACS+ ˜ ˇ ٧ ľ TACACS+ Ŀ Â

ˆ ٦ ˜ AAA Â æ Л ˆ Exec ˜ ˇ è Ю ˝ ≠ ٦ Л υ Â AAA ˇ ٧ ľ Ŀ Â

AAA Exec

Exec NAS ˇ ٦ Л υ è Ո CLI Â æ NAS CLI ˇ ٦ Ŀ Ы ٦ У ˆ Start ˜ ˇ æ CLI ˇ ٦ Ŀ Ы ٦ У ˆ Stop ˜ Â

注意：

٧ NAS Login ˇ Exec Â Login ˇ none ˇ ‡ a Exec Â ٦ У ˇ Start ˇ ≠ a Stop Â

AAA Exec ˇ æ Ю Л υ Ю Ъ υ ϧ '

Ъ υ ϧ	
configure terminal	
aaa new-model	ŭ AAA Â

aaa accounting exec {**default** | *list-name*} **start-stop** *method1* [*method2*...]	Ѭ У ˘ Ѭ ˘ Ъυ ҄ Â
line vty *line-num*	AAA Exec Â

accounting exec {**default**

show running-config	

Exec

Ю Exec Â VTY 0~4 Э Login ˘ з Exec Â è Login ѕм ˘ Exec RADIUS Â RADIUS Ь Ы ѕм ф ѝ 192.168.217.64 ˝ ч ѝ test Â ѕм Ј ѝ ruijie ˘ Ѧ ҷ ѝ 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
```

AAA Network

Network ~ ˘ ↑ ⊣
à IP ﻓﺨ ﺳﻪ à ﺇ Â Network ɱɲ ⊣ RADIUS ~ Â

说明:

RADIUS a ﺇ RADIUS Ł ﻟ ﺇ ﻃ Â
ﺇ ﻣ ɲ ɒ a ﺇ ﺇ ﻃ Â

AAA Network ˘ ﺟﻪ Ю ЛЬЮЬ ʒ'

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

list-name Ьυ ﺇ … ˘ ﺇ Лυ '
method Â ɱɲ ﻫﻰ ERROR ~ ˘
ﻣ è ' ɱɲ ﻫﻰ FAIL( )˘ ‡ a è
Â ﻯ ﻣ ╖ ﻫﻰ˘ . ˘ ﺇ Лυ ﺟﻪ Ьυ ʒ
none ﻯ ﻣ ﻃ Â

E#ŧle31m

Network

ЛЬЮ RADIUS Network У '

```
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
```

AAA

ґґ ˘ ѫ Ю Ьu ҳ'

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

VRF AAA

Virtual Private Networks (VPNs) ѝ У ѫ ISP Э
ҷ Â У VPN. ҷ Â У ٧
Ь ڈ ˘ VPN ≠ ٤ VPN routing/forwarding (VRF) table˘ AAA ٬ЛЬ
ѝ ЬЖ Ь Ы VRF Â

AAA VRF˘ ѫ Ю ЛЬЮЬu ҳ'

Ьu ҳ	

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

说明:

vrf

Login

Login Login

Login

AAA

AAA

AAA

AAA

AAA

注意:

IEEE802.1x IEEE802.1x

802.1x

说明:

configure terminal	
aaa new-model	ǔ AAA ┗

说明：

1. æ æ ЮЎ AAA Ь ˘ æ æ
   ŋń ЬЖ’ ĭ ‡ æ æ ЮЎ AAA ɹˇ
   a æ’
2. æ^ default˜ ' æ ææ æ ɹ AAA Ь ЮЎ
   æ ˘ ‡ æ Â æ æ æ ˘ ‡ ѝ
   ˘ a AAA Ь’
3. æ ЮЎ ЮЎ ǂ ’

æ

ææ æ ɹ AAA Ь ɹˇ ЛЬЮЬu ҷ ɻ Лu '

Ьu ҷ	
show aaa domain [*domain-name*]	ŋń ææ æ ɹ AAA Ь æ

ææ æ ɹ AAA Ь Y

ææ æ ɹ AAA Ь ЛЬЮ '

1. ææ æ ɹ AAA Ь ЮЎ æ Â
   ЮЎ ˜ ^ 802.1x ˜ AAA Ь Â
   ЮˇЎ 802.1X Лu Ьu ҷ **dot1x authentication** *authen-list-name*˘ **dot1x accounting** *acct-list-name* *authen-list-name* ɻ
   acct-list-name ѝ Ո ɹ AAA Ь Â
2. ææ æ ɹ AAA Ь ˘ Ю æˇ ╟
   Â æ ɹ ѝľ default Ĕ æ ɻˇ a æ ˘
   æ AAA Ь Â æ ˘ ‡ a æ
   a AAA Ь Â
3. æ ˘ æ æ Э ˘ a ѝ AAA
   Ь Â
4. æ AAA Ь ɹ Ո AAA Ь ЬЖ ɹ
   У Â a У ˘ a ѝ æ ɻ AAA Ь Â
5. æ ɹ б Э æ ɹ ך ך Â '
   Э domain.com Ո domain.com.cn ч æˇ У
   ѝ aaa@domain.com Â ‡ ѝ æ ѝ domain.com
   a æ domain.com.cn Â

AAA

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
```

radius a1 802.1x a1@domain.com

```
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
```

RADIUS

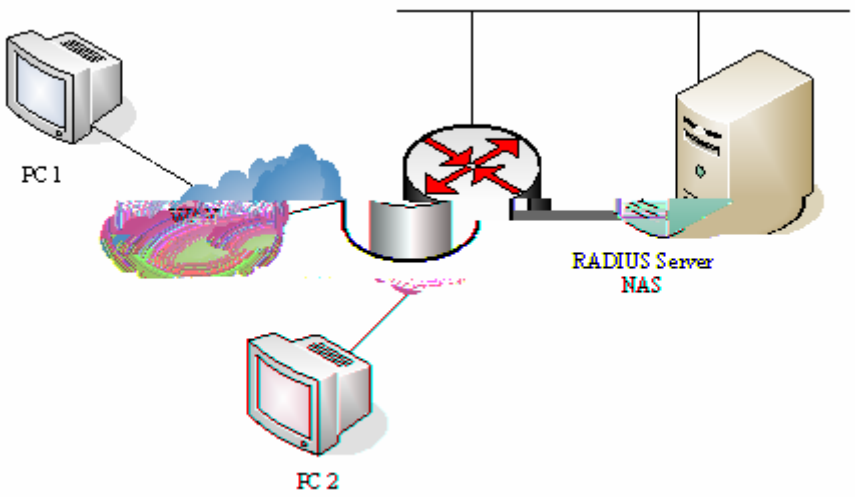
RADIUS

RADIUS /Ո ┗(Remote Authentication Dial-In User Service)
˘ У ┼ / ┗Ы ˘ б AAA Л ف
˘ Â ج RGOS ˘ RADIUS ج
┗Ы NAS˜ Э˘ Л RADIUS ┗Ы ч ˘
┗Ы ↑ Ъ Ո ┗ Â

RADIUS У ˜ ˘ UNIX à WINDOWS 2000 Ы
RADIUS ┗Ы й У ˚ ˘ ц RADIUS ⁄ń
┗Ы Â

RADIUS Ю'
Л Ո Â
Л Ո╕ ч RADIUS ┗Ы Â
RADIUS ىЮ : У'
ACCEPT' Â
REJECT' ˘ Л Ո Â
CHALLENGE' RADIUS ┗Ы ч ˘ ÿ
Â
ج ACCEPT : ↑ Ъ Â

Юف У ή ص RADIUS ف'



ف 1 ή ص RADIUS

RADIUS

æ Э RADIUS ”I ЛЬЮ

ŭ AAA Â ŭ AAA ˇ ٧ “AAA ”Â

aaa authentication Ъυ ٤ ЊЖ RADIUS Â
aaa authentication Ъυ ٤ ЊЖ ˇ ٧ “ ”Â

æ Э ЊЖ ˇ ĭ ‡ Â
ˇ ٧ “ ”Â

ЛЬЭ Ł ٨ˇ ٦ RADIUS Â RADIUS ↑ ЛЬЮ ¦ '
RADIUS ˜ ٧
RADIUS

1ˇ Ł Ы

æ Э RADIUS Ł Ыˇ ЛЬЮ

Ъυ ٤	
configure terminal	
radius-server host *ip-addr*	IP ىف سم ى *ip-addr* RADIUS Ł Ы Â

2ˇ Ł Ы ٧

æ Юˇ RADIUS Ł Ы a ٧ˇ ЛЬЮ Ł Ы ٧

Ъυ ٤	
configure terminal	
radius-server host *ip-addr* **auth-port** *port*	IP سم ىف ى *ip-addr* *RADIUS* Ł Ы ٧ ى *port* Â
radius-server host *ip-addr* **acct-port** *port*	IP سم ىف ى *ip-addr* *RADIUS* Ł Ы ٧ ى *port* Â

3ˇ RADIUS ˜ ٧

æ Э RADIUS ɱˇ RADIUS Ł Ы Â
RADIUS ˜ ٧ ˇ ЛЬЮЪυ ٤'

Ъυ ٤	
configure terminal	

radius-server retransmit *retries*	RADIUS
radius-server timeout *seconds* **radius-server deadtime** *minutes*	2 5minutes

4 RADIUS

RADIUS

RADIUS RADIUS 0 0 7

service password-encryption RADIUS **show running** RADIUS **show running** RADIUS

configure terminal	
radius-server key [**0**|**7**] *text*	
radius-server host *ip_addr* **key** [**0**|**7**] *text*	IP *ip_addr*

说明：

RADIUS

5 RADIUS

RADIUS RADIUS RADIUS AAA **aaa authentication**

RADIUS Â ˘ ˩ Л ˥ AAA Â

б˜ RADIUS ص

˩ Л صر Â Ю'

˥ ң ҕ '

ID	╖	TYPE
1	max down-rate	1
2	qos	2
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	16
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

˝ ك ID '

ID	╖	TYPE

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

说明:

ч ╖ a й У صر Л

ЛЮ صر é '

```
Ruijie# 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# 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
```

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

```
Ruijie# configure terminal
Ruijie(config)# line vty 0
Ruijie(config-line)# login authentication test
Ruijie(config-line)# end
Ruijie# show running-config
!
```

TACACS+

TACACS+

TACACS+ TACACS RFC 1492 Terminal Access Controller Access Control System Client-Server TACACS AAA TACACS+ TACACS+

TACACS+

TACACS+

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

1

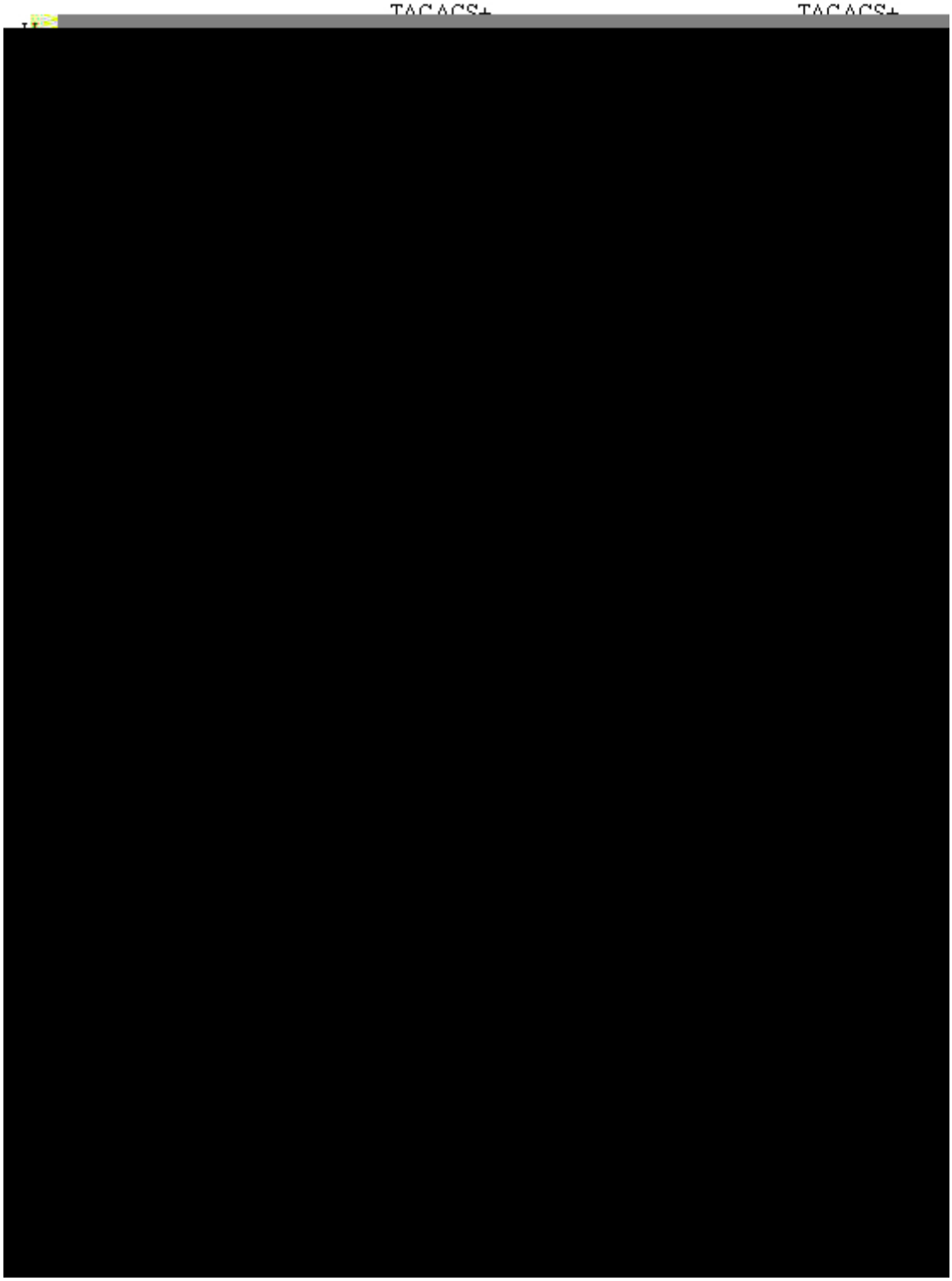
Major Version —

TACACS+

TACACS+ ή صر ϊ ˆ Telnet
˜˜ ˆ ϳ˜ ϊ TACACS+ ˇ ϳ Ո
ϟ TACACS+ ϟ˧ ˇ ϳ ϟ Ո
Э Â في 2 '

في 2

Ю Ո ﷺ à Ո TACACS+
'



3 في

جم ﷺ ٦ Л Ь ' ' '

3˜ TACACS+ Ł ﾙ ﾚ ﾏ ˘ ﾉ Â

4˜ TACACS+ ﾏ ˘ ﾉ ﾉ Â

5˜ ﾉ Â

6˜ TACACS+ ﾉ ﾉ˘ ﾉ TACACS+ Ł ﾙ ﾚ ˘ è ↑ ﾉ Â

7˜ TACACS+ Ł ﾙ ﾚ ﾏ ˘ Â

8˜ TACACS+ ﾏ ˘ ﾉ Â

9˜ Â

10˜ TACACS+ ﾉ˘ ﾉ TACACS+ Ł ﾙ ﾚ ˘ è ↑ Â

11˜ TACACS+ Ł ﾙ ﾚ ﾏ ˘ Â

2. ﾉ '

1˜ TACACS+ ﾉ TACACS+ Ł ﾙ ﾚ Â

2˜ TACACS+ Ł ﾙ ﾚ ﾏ ˘ Â

3˜ TACACS+ ﾏ ╖ ˘ ﾉ Â

3. ﾉ˘ ˘ '

1˜ TACACS+ ﾉ TACACS+ Ł ﾙ ﾚ Â

2˜ TACACS+ Ł ﾙ ﾚ ﾏ ˘ Â

3˜ Â

4˜ TACACS+ ﾉ TACACS+ Ł ﾙ ﾚ Â

5˜ TACACS+ Ł ﾙ ﾚ ﾏ ˘ Â

TACACS+ Ł

ﾓ Э TACACS+˘ ˝I ЛЬЮ Ł'

aaa new-mode ћ ч ў AAA Â ﾓ TACACS+ ﾀ ˝I ў AAA˘ ў **aaa new-mode** ˘ ﾍ ﾞ AAA Ł Â

tacacs-server host ћ ч У TACACS+ Ł ﾙ Â

tacacs-server key ћ ч Ł ﾙ ∩ ﾑ key Â

tacacs-server timeout ћ ч Ł ﾙ : Â

˘ **aaa authentication** ћ ч Ѫ TACACS+ Â **aaa authentication** ћ ч Ѫ ˘ ﾍ ﾞ Ł Â

˘ **aaa authorization** ћ ч Ѫ TACACS+

Â **aaa authorization** Ъυ ϗ ЊЖ ˘ ٧ Ї’
Ь Â

˘ **aaa accounting** Ъυ ϗ ЊЖ TACACS+
Â **aaa accounting** Ъυ ϗ ЊЖ ˘ ٧ Ї’
Ь Â

ѫ Э ЊЖ ˘ ЇЇ ‡ Â

έ TACACS+ ˘ ٧ ЛυЮО '
TACACS+ Ь Ы ў
TACACS+ м
AAA Ь Ы
TACACS+
TACACS+
TACACS+
TACACS+ ˜ ٧

TACACS+ ˘ ٧ ЛυЮО '
TACACS+ à à

TACACS+ Ь Ы ў

tacacs-server host Ъυ ϗ˘ ٫ Лυ ЊЖ Э TACACS+ Ь Ы ў IP فذ سم
Ո Â TACACS+ Ь Ы ў ˘ ЛυЮЪυ ϗ'

Ъυ ϗ	
configure terminal	Â

tacacs-server host ϗQ˜žB*e*D ^%>% ^%>% ^%>% ^%0õ ! ÀAX,S€H"hï± • Oÿ• ETr T

ѝ TACACS+ Ь Ы´ м ˘ ‡ Ь Ы˘
TACACS+ м Â

TACACS+ м

TACACS+ м ˘ ЛЮЋu ч'

Ћu ч	
configure terminal	Â
tacacs-server key *string*	Ո TACACS+ Ь Ы м ˘ ў ´ м ˘ ‡ Â

注意:

TACACS+˘ м Â з Э м Ո TACACS+ Ь Ы Э м У Â

AAA Ь Ы

ж Э AAA Ь Ы ˘ Л Л У Ь Ы ў ‡ ˘ Ь Ы У ˘ è ж У Ь ^ Login ~ Â

Ь Ы Л Л ↑ ΰ Ь Ы˘ Ь Ы ў ╗ ″I л ˘ л Ь Ы ў Â Ь Ы ╗ Ь Ы ˘ ‡ ″I ╗ ж ⁄ń ˘ л ╗ Ь Ы ѝ ⁄ń У Ь Ы ˘ ⁄ń У Ь Ы ˘ Ю У Ь Ы Â

AAA Ь Ы ˘ ЛЮЋu ч'

Ћu ч	
configure terminal	Â
tacacs-server host *ip-address* [**port** *integer*] [**timeout** *integer*] [**key** *string*]	TACACS+ Ь Ы ў ˘ Л ⁄ń Ь TACACS+ Ь Ы ў Ь Â

aaa group server {**radius** | **tacacs+**} *group-name*	˝ AAA ˘ ˙ ˇ ˙ ˇ ˙ ˇ

TACACS+

æ TACACS+ Ь Ж Ո м л˘ й TACACS+ Ж
˘ TACACS+ Â ę й TACACS+ AAA ˘
ę **aaa authorization** Ъ ҳ TACACS+ Ж й Â
TACACS+ Exec Ո Command Â

˘ æ Ъ ҳ ^ CLI˜ ˘ У
Ъ ҳ Â CLI ÿ æ ǂ й 0~15 ˘
Â Exec й a л a л ˘ ǂ
˘ й Exec Â Exec ˘ ЛЮЪ ҳ'

Ъ ҳ	

line [**aux** | **console** | **tty** | **vty**] *line-number* [*ending-line-number*]	line ˘ ف Command Â
authorization commands *level* {**default** | *list-name*}	Command جھ Э Â *level* ђυ ҳ Â┘ تن 0 15 Â

TACACS+

جھ TACACS+ Ь Ж Ո ᴍ Л˘ й TACACS+ Ⱨ
˘ TACACS+ Â ҷ й TACACS+ AAA ˘
ҷ **aaa accounting** ђυ ҳ TACACS+ Ⱨ й Â
TACACS+ Exec Ո Command Â

˘ ┘ Л υ è Ո ђυ ҳ ^ CLI˜
Â Exec ╗ ˘ ‡ جھ CLI
˘ Л Ь Ж ┘ У ^ Start˜ ˘ جھ CLI ˘ Л Ь
Ж ┘ У ^ Stop˜ Â Exec ˘ ЛЬЮђυ ҳ'

ђυ ҳ	
configure terminal	Â
aaa accounting exec {**default** | *list-name*} **start-stop group** {**tacacs+** | *group-name*}	Exec TACACS+ Â
line [**aux** | **console** | **tty** | **vty**] *line-number* [*ending-line-number*]	line ˘ ف Exec Â
accounting exec {**default** | *list-name*}	Exec جھ Э Â

CLI ˘ Command ђυ ҳ˜
╗ ˘ ┘ Л υ è ђυ ҳ ˘ جھ ђυ ҳ ╗ ˘ ђυ ҳ
┘ Ь Ж Э Ы Â Command ˘ ЛЬЮђυ ҳ'

ђυ ҳ	
configure terminal	Â
aaa accounting commands *level* {**default** | *list-name*} **start-stop group** {**tacacs+** | *group-name*}	Exec TACACS+ Â *level* ђυ ҳ Â┘ تن 0 15 Â
line [**aux** | **console** | **tty** | **vty**] *line-number* [*ending-line-number*]	line ˘ ف Exec Â

TACACS+

```
Ruijie(config)# line vty 0 4
Ruijie(config-line)# login authentication test
```

Л Э login tacacs+ ˘ Ю Â

```
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
!
```

Enable TACACS+ '

1. ¨I ů aaa'

```
Ruijie# configure terminal
Ruijie(config)# aaa new-model
```

2. ﾉ tacacs+ server '

```
Ruijie(config)# tacacs-server host 192.168.12.219
Ruijie(config)# tacacs-server host 192.168.12.218
Ruijie(config)# tacacs-server host 192.168.12.217
Ruijie(config)# tacacs-server key aaa
```

3. tacacs+ server group ┗ﾚ У ｢ ┗ﾚ'

```
Ruijie(config)#aaa group server tacacs+ tacgroup1
Ruijie(config-gs-tacacs)#server 192.168.12.219
Ruijie(config-gs-tacacs)#server 192.168.12.218
```

4. ﾉ tacgroup1 '

```
Ruijie(config)# aaa authentication enable default group tacgroup1
```

Л Э enable ｢ tacacs+ ┗ﾚ ˘ 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
!
```

Exec TACACS+

1. 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+

```
Ruijie(config)# aaa authorization exec test group tacacs+
```

4. :

```
Ruijie(config)# line vty 0 4
Ruijie(config-line)#authorization exec test
```

tacacs+

```
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
!
```

15 Commans TACACS+ '

1. ″I Ů 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+ ћυ ҙ '

```
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
```

Л Э enable ∫ tacacs+ ⊾ ⋎ ˘ Ю Â

```
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
!
```

SSH Ł

SSH Ū

SSH Secure Shell Â SSH ╗ У Telnet ˘ б Telnet a ↓ ₥ ╗ Â У a ˘ SSH ↓ Л Ո ╗ ˘ Л a ↓ IP ₥ ₣ à ↓ Â

SSH

	SSH1	SSH2
↓	RSA	RSA à DSA
	₥ RSA Ὼ ╗ 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
ϒ	NONE ˆ ϒ ˜	NONE ˆ ϒ ˜

SSH

注意:

ң ҏ SSH Ł Ⱬ ˆ SSHv1 б SSHv2 ˜ ˘ a SSH Â

SSH

SSH

SSH ┗	
SSH	^ 1 Ո- 2˜
SSH	120s
SSH	3

1. ѫ SSH ˘ Â ҷ ҽ
˘ ' ^ Telnet ┘Л ˜
2. ┘ (Username) б (Password) Â ɱ
a ┘ ˘ ┘ ┘Л ˘ Â

SSH Server

Ю˘ SSH Server Â SSH Server˘ ҽ
Ю˘ **enable service ssh-server** Ћ ҳ˘ ┘ SSH ˘ SSH Server й ENABLE Â

Ћ ҳ	
configure terminal	
enable service ssh-server	SSH Server
crypto key generate {**rsa|dsa**}	

注意:

˘ a ҽ Ћ ҳ [**no**] **crypto key generate**' Ћ ҳ **crypto key zeroize** Ћ ҳ Â

SSH Server

SSH Server **no enable service ssh-server** SSH Server DISABLE

configure terminal	
no enable service ssh-server	SSH Server

SSH server

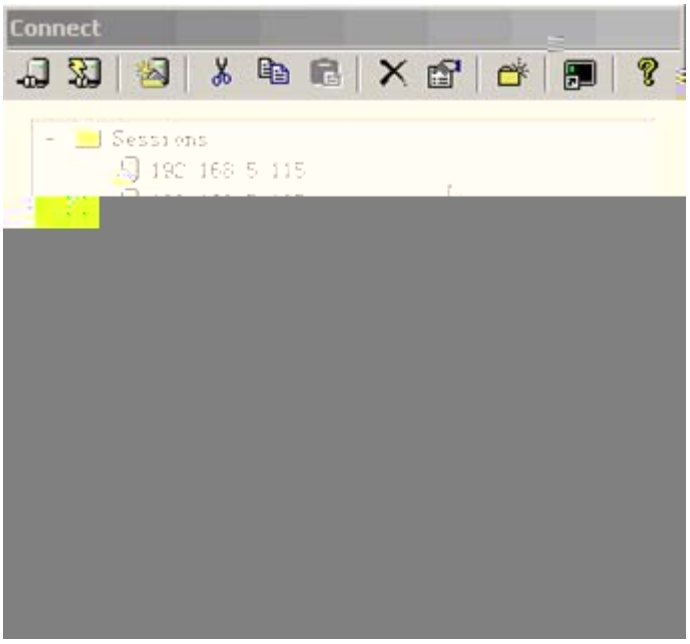
SSH Server 1 2 SSH

configure terminal	
ip ssh version {**1	2**}	SSH
no ip ssh version	SSH SSHv1 SSHv2

ђυ ҂	
configure terminal	
ip ssh authentication-retries *retry times*	SSH ˆ تن 0-5˜
no ip ssh authentication-retries	SSH ѝ 3 ’

’ Э ђυ ҂ έ ٧ [SSH ђυ ҂ ٧ Ą] Â

SSH



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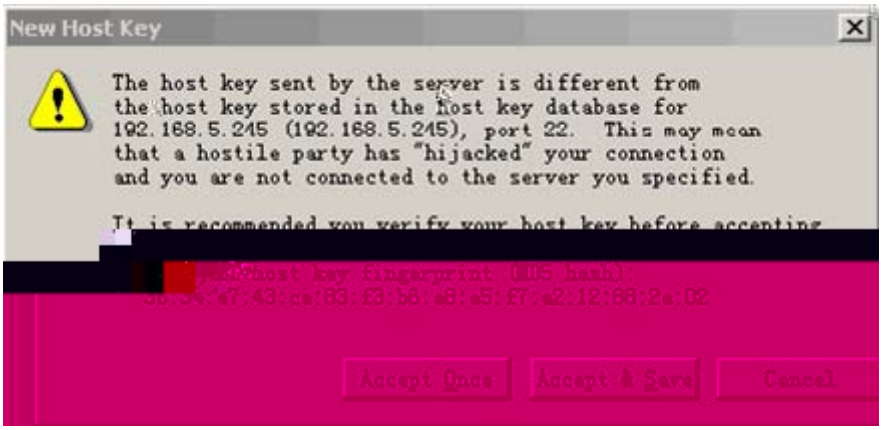


3 في

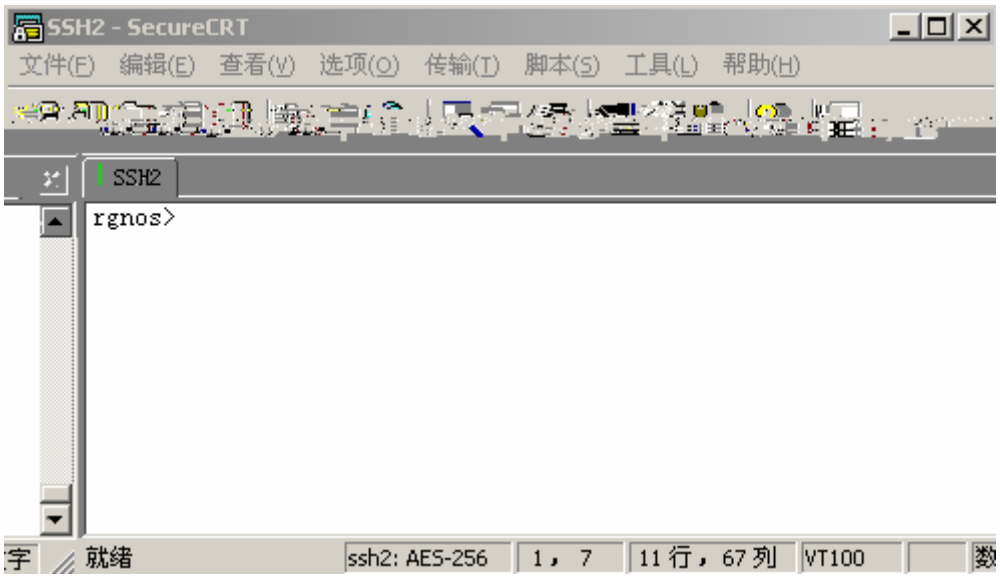
جھ ў 192.168.5.245 لا˘ ĭ ㅏ ل ˘

Accept & Saveˆ ل з ˜ Accept Once(ل ل У)ˇ

Ю ˘ Юفي'

4 في

Telnet ┘Л∪ Ո┣ Telnet У Â Ю في '



5 في

CPU

جھ ˘ ﻝ جھ Э ˘ CPU
˘ ¡ ~ ˘ Â ˘
CPU ˘ . CPU ﻝ ⁸ Ո. ″I
˘ è ┣ Â

CPU Protect صر ﻭ Classifying à Queuing à Scheduling Ո Shaping ني
˘ Ю ني Â

Classifying

Classifying CPU ┼ ˘ ┼ L2 à L3 Л
ﻧ L4 ˘ é Ю '

صر	┼
BPDU	MAC ﻓﺬﺳﻢ ﻭ 01-80-C2-00-00-00
ARP	ARP request
IGMP	IPV4 IGMP V1/V2/V3
802.1X	MAC ﻓﺬﺳﻢ ﻭ 01-80-C2-00-00-03
GVRP	MAC ﻓﺬﺳﻢ ﻭ 01-80-C2-00-00-21
DHCP	DHCP ~
Error_TTL	IPV4 TTL = 0 1
Unicast	MAC ﻓﺬﺳﻢ Ь ﻧ MAC ﻓﺬﺳﻢ ARP reply, ~ ' snmp˘ telnet˘ http
Multicast	IGMP
Broadcast	DHCP
Other	Э ┼ CPU

Queuing

Queuing ╟ ﻝ a ﻝ صر ˘ جھ a ﻝ é a ﻝ . ″I Â

CPU ﻧ 8 . ″I ˘ ﻝ Л صر ˘ Queuing ╟ﺳﻢ صر Â

IGMP	3
dot1x	3
GVRP	3
DHCP	2
Error_TTL	0
Unicast	4
Multicast	1
Broadcast	0
error_ttl	0
co-operate	6
other	0

2)

	(kbps)
7	100000
6	1000
5	1000
4	1000
3	1000
2	1000
1	1000
0	1000
CPU	100000

Ո

Ruijie(config)# **cpu-protect type** { **bpdu** | **arp** | **igmp** | **dot1x** | **gvrp** | **dhcp** | **unicast** | **multicast** | **broadcast** | **error_ttl** | **other** } **traffic-class** *traffic-class-num*	*traffic-class-num*

no cpu-protect type { **bpdu** \| **arp** \| **igmp** \| **dot1x** \| **gvrp** \| **dhcp** \| **unicast** \| **multicast** \| **broadcast** \| **error_ttl** \| **other** } **traffic-class**

ЛЪЮ '

```
Ruijie(config)# cpu-protect type bpdu traffic-class 7
Ruijie(config)# end
Ruijie # show cpu-protect type bpdu
%**********packet type      traffic-class**********
               bpdu            7
```

ЛЪЭ ˘ bpdu 7Â

ج Ю˘ Ю У '

Ъ ҷ	
Ruijie(config)# **cpu-protect traffic-class id** *id_num* **bandwidth** *bandwidth_value*	^ kbps˜ ˘ *id_num* ۷ تن ۶ 0˙ 7˝ *bandwidth-value* ۷ تن ۶ 0˙ 1000000(kbps)
Ruijie(config)# **cpu-protect traffic-class all bandwidth** *bandwidth_value*	^ kbps˜ ˘ *bandwidth-value* ۷ تن ۶ 0˙ 1000000(kbps)

˘ ۷Л **no cpu-protect traffic-class**

ЛЪЮ 7 ۶ 312(kbps)'

```
Ruijie#configure terminal
Ruijie(config)# cpu-protect traffic-class id 7  bandwidth 312
Ruijie(config)#end
Ruijie# show cpu-protect traffic-class id 7
%*********traffic class     bandwidth(kbps)**********
            7                  312
```

CPU ۸

ج Ю˘ Ю CPU ۸ '

Ъ ҷ	
Ruijie(config)# **cpu-protect cpu bandwidth** *bandwidth_value*	CPU ۸ ^ kbps˜ ˘ *bandwidth-value* ۷ تن ۶ 0 · 1000000(kbps) Â

۷Л **no cpu-protect cpu** Ъ ҷ cpu ۸ Â

ЛЬЮ CPU ٨ й 2000 kbps

```
Ruijie#configure terminal
Ruijie(config)#cpu-protect cpu bandwidth 2000
Ruijie(config)#end
Ruijie#show cpu-protect cpu
%cpu port bandwidth: 2000(kpbs)
```

فخسم 8

جم ЮЎ Ю فخسم 8 ٦

ЬU ٦	
Ruijie(config)# **cpu-protect mac-address storm-control enable** *value*	فخسم 8 value ٨ تن й 200 51200(kbps) Â **2** **0** **0**

CPU ٨

جھ ЮО ЮЋu ٤ CPU ٨ '

Ћu ٤	
Ruijie# **show cpu-protect cpu**	CPU ٨ Â

ЛъЮО CPU ٨ '

```
Ruijie# show cpu-protect cpu
%cpu port bandwidth: 100000(kbps)
```

فخ سھ ٮ 8

جھ ЮО ЮЋu ٤ فخ سھ ٮ 8'

Ћu ٤	
Ruijie# **show cpu-protect mac-address storm-control**	فخ سھ ٮ 8 Â

ЛъЮО CPU ٨ '

```
Ruijie# show cpu-protect mac-address storm-control
%MAC address storm control state: enable
%MAC address storm control rate:  2000(address/second)
```

GSN

GSN Ў

ā ЛЮني '

1) ⅄^ RG Security policy Management Platform˜

2) ^ RG Security Agent˜

3) ^ RG Restore System˜

4) ^ RG Security Switch˜

⅄^ RG SMP˜

⅄ ˘ ā ĭ ˚ تن

Â Э˘ .

ÿ Э Â

جھ У ⅄ ў Э У ˚ ˘

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ل ⅄ Л Ъ ˜ سھ 8

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˘ ل “ ” ˚ ˘ ⅄ Ю У

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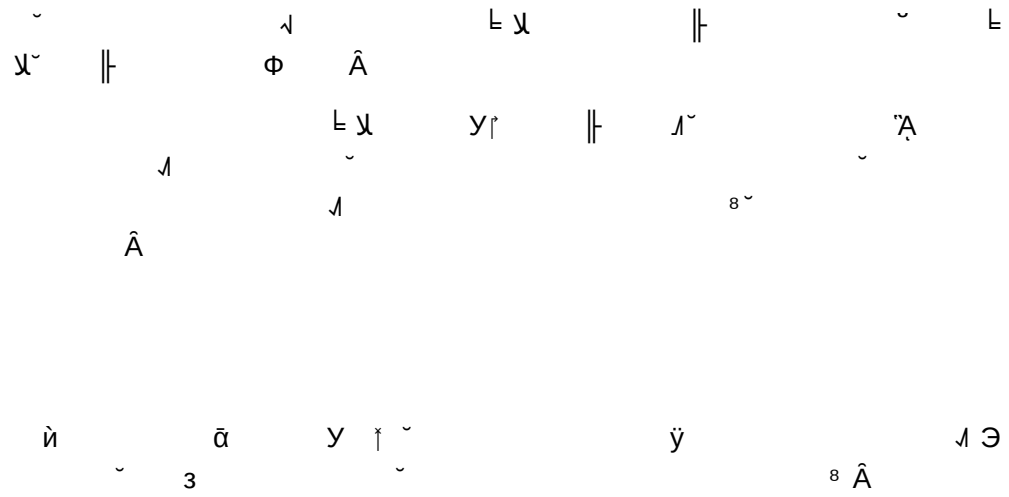
↑ ' Windows Ф ˘ Ł Ы à̀ ˚ ˘ Ł Ы˘

è ˘ Ł Ы Â

جھ a ⅄ ⅄ 8 ⅄˘

Ʒ . Э ⅄˘ ⅄



GSN

ЮЎ GSN

ЂU ҂	
configure terminal	
[**no**] **security gsn enable**	GSN

Ю GSN ╖ '

```
Ruijie# configure terminal
Ruijie(config)# security gsn enable
```

⅄ SMP server

SMP Server IP ⅄U ⅂ ⅃ ⅄ SMP Server

Â

ЂU ҂	
Configure terminal	

[**no**] **security** { [**v1** | **v2**] **community** *community* | **v3 user** *username* }	Ո smp ┗ ⅄ ⅃ . Ъυ ҂ snmp v1 à v2 à v3. community Â security v1 community Ո security community У , v1˘ ㄴ й . v3, ‡ ҷ snmp-server Ъυ ҂ Ю v3 , Ъυ ҂ ㄴ ê SNMP Ì
[**no**] **smp-server host** *ip-address*	SMP ┗ ⅄ ѳ

说明：

ҷ security v3 user , ҷ SNMP ˛ v3 user Â

Y ˚

й Y ˚ ˘ ѳ ㄴ Y ˚ Ո SMP ˘ ㄴ Л Y ˚ ⁸ ˆ Y ˚ Â

˘ ㄴ Л ЛЪЮЪυ ҂ Y ˚ '

Ъυ ҂	
Configure terminal	
[**no**] **security event interval** *interval*	Y ˚ ˘ *interval* 1-65535s Ю й 5 ˘

ㄴ ѳ

ㄴ Л Ъυ Ъυ ҂ ⁸ Ї ҷ ㄴ ҥ ѳ ˘ ㄴ ˘ ㄴ ѳ ' ㄴ ѳ

Ъυ ҂	
Configure terminal	

interface *interface*	٨
[**no**] **security address-bind enable**	٨ Ŭ فخ سم

说明:

٨ GSN ╖ 3 ٨ ٨ ╖ Â ٨
╖ ˘ 802.1x IP ╖ ˘ Ĭ ‡ :
Â

GSN

smp server

٦ Л∪ ЛυЮ smp sverver

Ъυ ҂	
show smp-server	smp server

'

```
Ruijie# show smp-server
SMP-Server IP:192.168.217.220
```

security event interval

٦ Л∪ ЛυЮ policy-map

Ъυ ҂	
show security event interval	Y ˇ

'

```
Ruijie# show security event interval
Event sending interval(Seconds):5
```

GSN Y

GSN

GSN ˚ ˘ ˚ ˘ Л Ъ GSN
л н ҕ a л a л˘ л GSN
˚ л è ж ´ ˘ Л Ъ ў ╖ ˆ л ARP
╖ ~ ≠ л ˘ GSN ≠ Â и
╟ ˘ GSN ⁸ ╒˘ Л Ъ ж ў GSN a ў
è ˚ ╖ Â

б GSN ă У ╖

GSN ˘ GSN б Ю У ╖ ж Э ă ˘ ж
╗ Л Ъ ˘ л ╖ Â

1) GSN a б 1x ip Â
2) GSN a л л Â
3) GSN a ж AP л Э ˘ л a ╗ AP л˘
GSN л ╗ AP л л л ╖
˘ У л ╗ AP л ″I л Э
Â

GSN è Y

GSN ˚ ˘ Л Ъ Ю У
л : GSN '

IP+MAC ' IP+MAC л˘ MAC
˘ GSN л MAC ˘ IP+MAC
˘ ÿ GSN л Â

╟ ARP

DAI

DAI Dynamic ARP Inspection, ˧ ѝ ╟ ARP Â
ARP ˧ Â a ˧ arp Â

ARP

MACC), B ARP (IPA, MACC).

DAI ARP

DAI ARP VLAN ARP

DAI DHCP ARP

DHCP ARP

ARP DHCP snooping binding DHCP snooping

ARP

ARP DAI ARP DAI

ARP **ARP**

∧

Ђυ ϡ æ γ ∧ ˘ з γ ∧ и У SVI ˜ ∧ Â

Ю˘ γ ∧ a ⊣ Â

∧ ⊣ ˘ ARP У ˘ ї ‡˘ DHCP snooping ⁄ń ARP ⁄

∧ ˘ æ ∧ ЛυЮЂυ ϡ'

Ђυ ϡ	
Ruijie(config-if)# **ip arp inspection trust**	∧ ⊣
Ruijie(config-if)# **no ip arp inspection trust**	∧ a ⊣

∧ ARP

Ђυ ϡ æ γ ∧ ˘ з γ ∧ и У SVI ˜ ∧ Â

Ю˘ У ∧ ARP и 15 ARP Â ∧ a ⁸ Â

1 ∧ ARP ⁸ ˘ ⁄ ˘ a У Â

⊣ Лυ **show ip arp inspection interface** Ђυ ϡ ⁄ γ ∧ ⁸ Â

∧ ARP ˘ æ ∧ ЛυЮЂυ ϡ'

Ђυ ϡ	
Ruijie(config-if)# **ip arp inspection limit-rate** { *<1-2048>* **| none**}	∧ ARP ˘ ´ Æ' / **none**' a ⁸
Ruijie(config-if)# **no ip arp inspection limit-rate**	

注意:

S2700 ң ҏ ˘ DAI CPU ⊣ CPP ⁸˘ DAI CPP ⁸˘ Лυ CPP ⁸ и Â

DHCP snooping database

DHCP Snooping

DHCP Snooping database ARP

DAI

VLAN DAI

VLAN

ARP

QOS

QOS

DiffServ

End-to-end QoSsolution

QOS

Classifying

Classifying CoS QoS Policy-map IP

Priority 0 Pr 4 1 6 4 3

″I ∧ . ″I Â

说明:

Э Ь ‡ ⅃ ⅃ У ∧ Э Â ج Ю˘ Э Ь
‡ 3 à 2 à 1 . ″I Â ″I ACLs ˘ ج Ю˘
⅃ ‡ 2 à 1˘ ج ˘ ∧ QoS ˘ ‡
‡ 2 Ո 1 ÿ ÿ ∧ Э QoS ' ∧ QoS
˘ ѫ DSCP 0 Â

IP ˘ ⅃ Л Л Ю ‡ '

∧ ѝ Trust ip-precedence˘ ‡ ÿ IP Ip precedence ^ 3 ~ ⅄ ˘ ′I CoS ^ 3 ~ Â

∧ ѝ Trust cos˘ ‡ CoS ^ 3 ~ ⅄ Ip Precedence ^ 3 ~ Â ч ˘ У γ a ↑ ΰ User Priority bits˘ ѫ ⅃ Л ∧ CoS CoS Â ∧ У γ ↑ ΰ User Priority bits˘ ‡ ÿ ⅄ CoS Â

∧ Policy-map ѭ Ip access-list (Extended) ACLs ˘ ѫ ج ∧ Э˘ ⅄ IP ففسم à IP ففسم à Protocol à Л ∧ ني TCP/UDP ∧ ٦ ACLs˘ Л DSCP Â ˘ ∧ Policy-map˘ ∧ ѝ è DSCP ˘ ‡ ⁄ ‡ 1 à 2 . ″I Â

Ո IP ‡ У ˘ Л Э ‡ ⅃ ⅃ Л ⅃ У ∧ Э Â ج Ю˘ Э ‡ 3 à 2 à 1 . ″I Â

à P-ϕPrecedDSd

æ QoS ˘ Policing ╟ ┘ Â Policing ╟ ˘ ѫ
ϯ DSCP a ˘ ≠ a æ
Marking ╟ ɱ Â

Marking

Marking. ˘ Classifying Ω Policing

Pause

QoS

802.3xflow-controlQoS QoS

QOS

100m QOS

QoS QoS QoS

QoS

QoS

Off QOS

0

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

٨ Qos

ЮЎ ٨ Qos a

Ьu ٶ	
configure terminal	
interface *interface*	٨
mls qos trust {**cos** |**dscp**}	٨ Qos cos˘ dscp
no mls qos trust	٨ Qos

ЛЬЮЬu ٶ ٨ **interface** GigabitEthernet 0/4 ѝ DSCP'

```
Ruijie(config)# interface gigabitEthernet 0/4
Ruijie(config-if)# mls qos trust dscp
Ruijie(config-if)# end
Ruijie# show mls qos interface g0/4
Interface: GigabitEthernet 0/4
Attached input  policy-map:
Default COS: trust dscp
Default COS: 0
Ruijie#
```

٨ CoS

٦ Л Ю У ٨ CoS

Ю ٨ CoS й 0

Ьu ٦	
configure terminal	
interface *interface*	٨
mls qos cos default-cos	٨ CoS , default-cos й CoS , ٨ تن й 0 7
no mls qos cos	CoS

Ю ٨ 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#
```

٦ Л й ٨ ' WRR SP Ո DRR Ю й WRR)

٦ Л ЛЮ ٨ ˝I , ٨ QOS Â

Ьu ٦	
configure terminal	
mls qos scheduler {**sp** |**wrr** |DRR}	٨ ˝I ˘ **sp** й ˝I ˘ **wrr** й ˘ drr
no mls qos scheduler	й **wrr**

˘ ЛЬЮ ٧ SP'

```
Ruijie# configure terminal
Ruijie(config)# mls qos scheduler sp
Ruijie(config)# end
Ruijie# show mls qos scheduler
Global Multi-Layer Switching scheduling
Strict Priority
Ruijie#
```

٦Л ЛЬЮ ٧

ћu ٹ	
configure terminal	
{**wrr-queue** | **drr-queue**} **bandwidth** **weight1...weightn**	weight1...weightn ѝ ˘ ٦ ٧ تن QOS
no {**wrr-queue** | **drr-queue**} **bandwidth**	no

4 5
5 6
6 7
7 8

Cos-Map

ڸ Л Cos-Map ف ˇ Cos-Map
QOS

Ь ҷ	
configure terminal	

```
5   6
6   7
7   8
```

CoS-to-DSCP Map

CoS-to-DSCP Map CoS DSCP , ˩ Л Л Ю CoS-to-DSCP Map ,CoS-to-DSCP Map QOS

Ћ ϧ	
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 ˩ ت ң p 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
```

DSCP-to-CoS Map

DSCP-to-CoS DSCP CoS ˘ Л й

DSCP-to-CoS Map QOS , ˩ Л Л Ю DSCP-to-CoS Map :

Ћ ϧ	

configure terminal	
mls qos map dscp-cos *dscp-list* **to** *cos*	DSCP to COS Map˘ *dscp-list* DSCP ˘ DSCP ǂ ˘ ٧ تن ҥ ḏ a ٧ a ٧’ *cos* ' DSCP CoS ˘ ٧ تن ٸ' 0 7'
no mls qos map dscp-cos	ٸ

˘ ЛЬЮ DSCP 0 à 32 à 56 6'

```
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
---- ---    ---- ---    ---- ---    ---- ---
 0   6      1   0      2   0      3   0
 4   0      5   0      6   0      7   0
 8   1      9   1     10   1     11   1
12   1     13   1     14   1     15   1
16   2     17   2     18   2     19   2
20   2     21   2     22   2     23   2
24   3     25   3     26   3     27   3
28   3     29   3     30   3     31   3
32   6     33   4     34   4     35   4
36   4     37   4     38   4     39   4
40   5     41   5     42   5     43   5
44   5     45   5     46   5     47   5
48   6     49   6     50   6     51   6
52   6     53   6     54   6     55   6
56   6     57   7     58   7     59   7
60   7     61   7     62   7     63   7
```

rate-limit output *bps burst-size*	input output bps (kbps) burst-size (Kbyte)
no rate-limit	

说明:

S2700 a buffer management qos

```
Ruijie# configure terminal
Ruijie(config)# interface gigabitEthernet 0/4
Ruijie(config-if)# rate-limit input 100 100
Ruijie(config-if)# end
Ruijie#
```

buffer

buffer 802.3x flow-control QoS

configure terminal	
buffer management *{ fc | qos }*	buffer FC 802.3xflow-control QoS QoS
no buffer management	

qos

```
Ruijie# configure terminal
Ruijie(config)# buffer management qos
Ruijie(config)# end
Ruijie# show buffer management
%current port's buffer management mode: qos
```

QOS

class-map

ڸ Л Л ЛЬЮ class-map

Ьυ ҳ	
show class-map [*class-name*]	class map

'

```
Ruijie# show class-map
Class Map cc
Match access-group 1
Ruijie#
```

policy-map

ڸ Л Л ЛЬЮ Policy-map

Ьυ ҳ

'

```
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#
```

mls qos queueing

ل Л υ ЛυЮ qos

Ьυ ϧ	
show mls qos queueing	QoS , CoS-to-queue map˘ wrr weight

ЮΌ

```
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
```

mls qos scheduler

ل Л Лю QOS

```
20   2       21   2       22   2       23   2
24   3       25   3       26   3       27   3
28   3       29   3       30   3       31   3
32   6       33   4       34   4       35   4
36   4       37   4       38   4       39   4
40   5       41   5       42   5       43   5
44   5       45   5       46   5       47   5
48   6       49   6       50   6       51   6
52   6       53   6       54   6       55   6
56   6       57   7       58   7       59   7
60   7       61   7       62   7       63   7
```

mls qos rate-limit

ㄴㄩ ㄩㄐ ㄟ 8

ㄏㄩ ㄔ	
show mls qos rate-limit [**interface** *interface*]	[ㄟ] 8

```
Ruijie# show mls qos rate-limit
Interface: GigabitEthernet 0/4
rate limit input bps = 100 burst = 100
```

buffer

ㄴㄩ ㄩㄐ buffer

ㄏㄩ ㄔ	
show buffer management	buffer

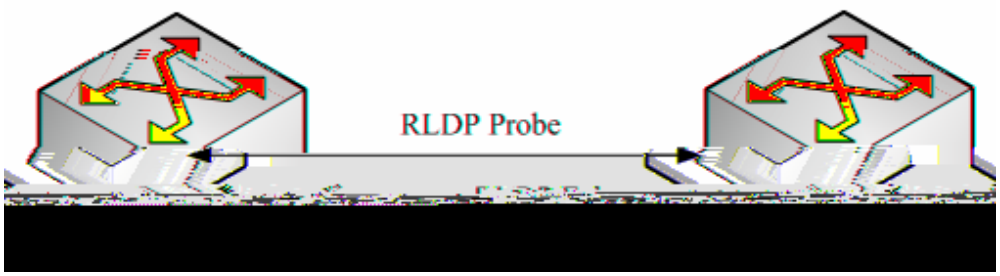
```
Ruijie# show buffer management
%current port's buffer management mode: qos
```

RLDP

RLDP

RLDP

RLDP Rapid Link Detection Protocol



1

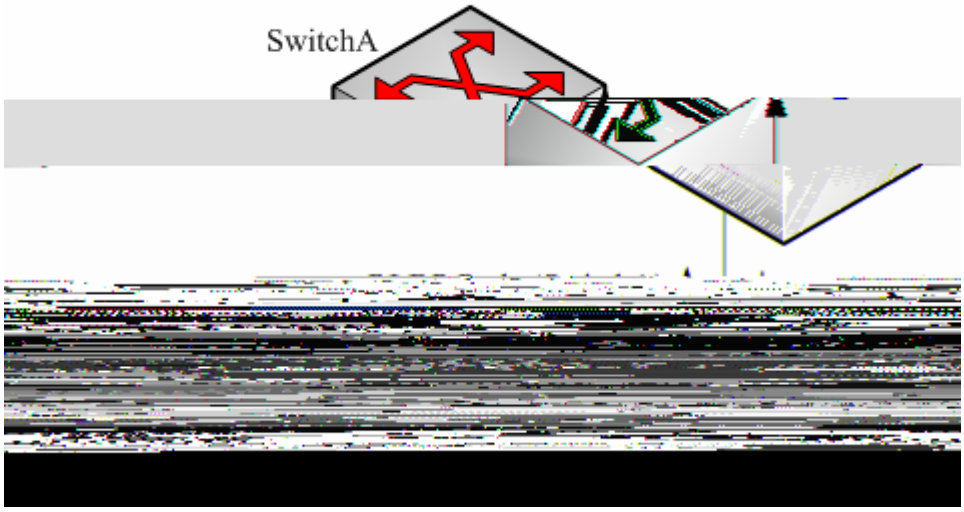
RLDP (Probe) (Echo).RLDP RLDP linkup

说明：

RLDP ´ ˩ Ո ˧ ˩ ╗ ˘ ч ˄
RLDP˝ з a У ŭ RLDP ˄Ю ˄˘ ĭ ‡ RLDP
Â

ѝ ص

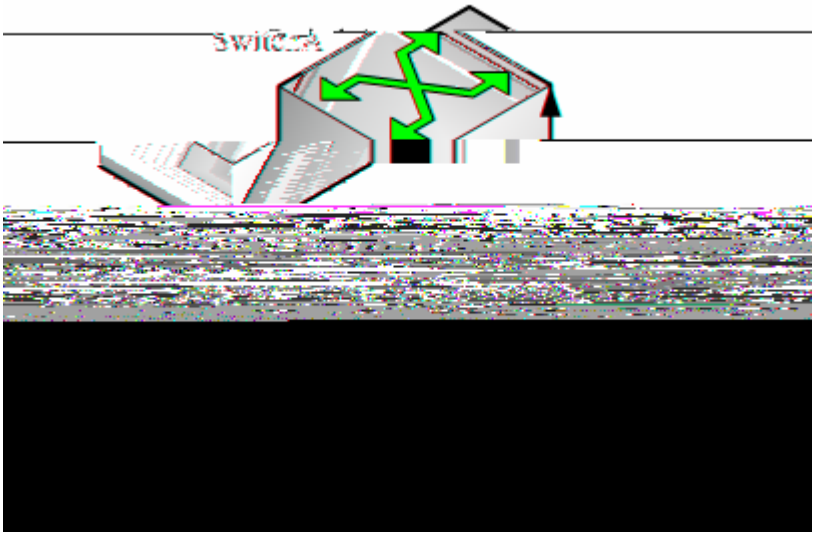
'



2 في

˄ Э Â Эفي ˘ RLDP جه
˄ Э ˩ RLDP ˘ ‡ ˄ й ˘
RLDP ˘ ↑ ˆ à ˄ à
˄ جه svi à ˄ ˝ ˩ Â

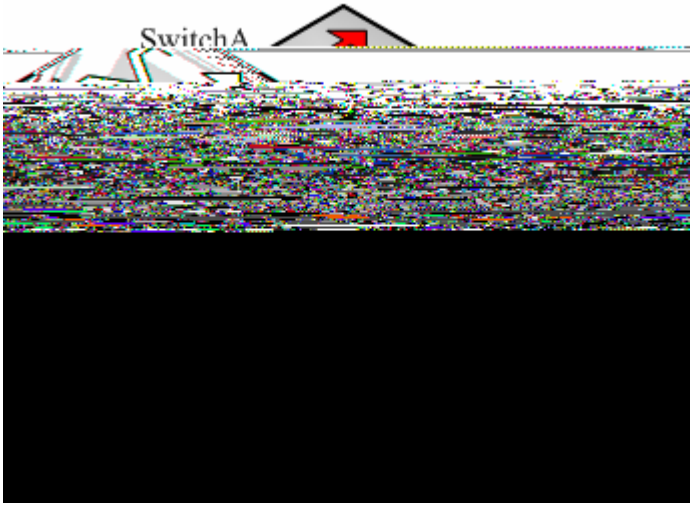
´ ˩ '



ف 3 ´ ل

´ ل ن ن ن ن ^
"I ´ ل ´ ل ن ~ Â Э ف ˇ RLDP ج
ن Э ن ن ‡ ن ‰ ´ ل ˇ RLDP
Â ن ن RLDP
ˇ ≠ ‰ ن ´ ل Â

ن ل '



ف 4 ن ل

ن ل ч ن Â Э ف ˇ
ن ج ن RLDP ˇ У ! ˇ
ж ‰ ن ل Â ÿ Э ˇ ن ل Э ↑ ü ´ ل
Â

说明：

ч У ǔ RLDP ≠ ǐ ㄱ ㄴ ´ ㄴ ˘ ◌ ㄱ ㄴ ´ ㄴ ◌ ч ǔ RLDP ˘ Л∪ Â

RLDP

ÿ ЛЬЮ RLDP

RLDP

RLDP

ㄱ RLDP

RLDP

RLDP

ㄱ RLDP

RLDP

RLDP	DISABLE
ㄱ RLDP	DISABLE
	2S
	3

注意:

RLDP ㄴ ㅎ ㄴ(↑ AP)

Ruijie(config-if)# **rldp port** {**unidirection-detect** | **bidirection-detect** | **loop-detect** } {**warning** | **shutdown-svi** | **shutdown-port** | **block**}	٨ RLDP ٫ صر Ո Â
Ruijie(config-if)# **end**	ھى

٨ RLDP ħυ ʒ **no** У صر Â

ЛЬЮ ج GigabitEthernet 0/5 Э RLDP صر Ո

```
Ruijie# configure terminal
Ruijie(config)# interface gigabitEthernet 0/5
Ruijie(config-if)# rldp port unidirection-detect shutdown-svi
Ruijie(config-if)# rldp port bidirection-detect warning
Ruijie(config-if)# rldp port loop-detect block
Ruijie(config-if)# end
Ruijie# show rldp interface gigabitEthernet 0/5 -28(state TdRЬD.TdRLDT:-ê-2
```

RLDP

RLDP ╖ ∧ □ ﻫﺳ ﻟ RLDP Probe Â

ﺟﻫ ЮЎ Ю RLDP '

æ Ю Ю ∧ RLDP '

Ьu ъ	
Ruijie# **rldp reset**	RLDP ∧ Â

说明:

≠ ⊣ Лu æ Ю **errdisable recover** Ьu ъ . ŭ ╟ rldp ∧ (shutdown-port ∧) RLDP Â ˘ rldp ∧ a ˘ ≠ У ˘ **errdisable revover interval** ˘ rldp **errdisable recover interval** ˘ ≠ detect-interval* detect-max **errdisable recover interval** ,Лu Â

RLDP

⊣ RLDP Ю'

∧ RLDP

∧ RLDP

∧ RLDP

æ Ю ЮЬu ъ RLDP Ո rldp ∧ '

Ьu ъ	
Ruijie# **show rldp**	RLDP Ո rldp ∧ Â

ЛuЮ **show rldp** Ьu ъ rldp ∧ '

```
Ruijie# show rldp
rldp state        : enable
rldp hello interval  : 2
rldp max hello     : 3
rldp local bridge   : 00d0.f8a6.0134
```

```
------------------------------------------------
interface GigabitEthernet 0/1
port state:normal
neighbor bridge : 00d0.f800.41b0
```

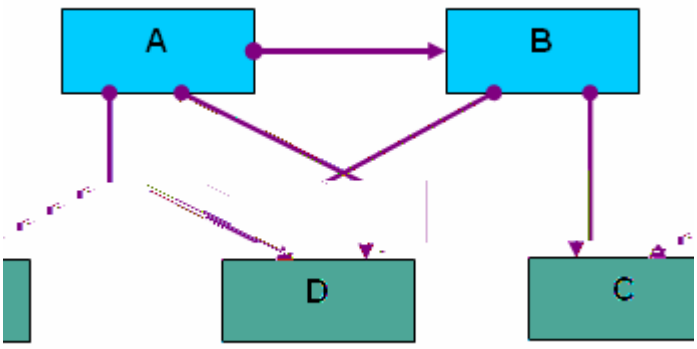
TPP

TPP

TPP(Topology Protection Protocol) CPU

TPP

MSTP VRRP MSTP VRRP CPU



1

A B C D MSTP

A CPU BPDU C D

D Ո B Â

B CPU a A Â Ю у C à D

Â

TPP

TPP Ո Â Ю

Â a a

Â

说明：

3 cpu topology-limit cup

cpu 50-70, TPP

Â TPP a TPP

TPP Â

Â **no** Â

Ъυ ʒ	
Ruijie> **enable**	Ъυ ʒ

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

no topology guard ╗

∧

ћυ ⅋ Ю'

ћυ ⅋	
Ruijie> **enable**	ћυ ⅋
Ruijie# **config terminal**	
Ruijie(config)# **interface gi** *0/1*	∧
Ruijie(config-if)# **tp-guard port enable**	∧ ╗
Ruijie(config-if)# **end**	ھى ћυ ⅋

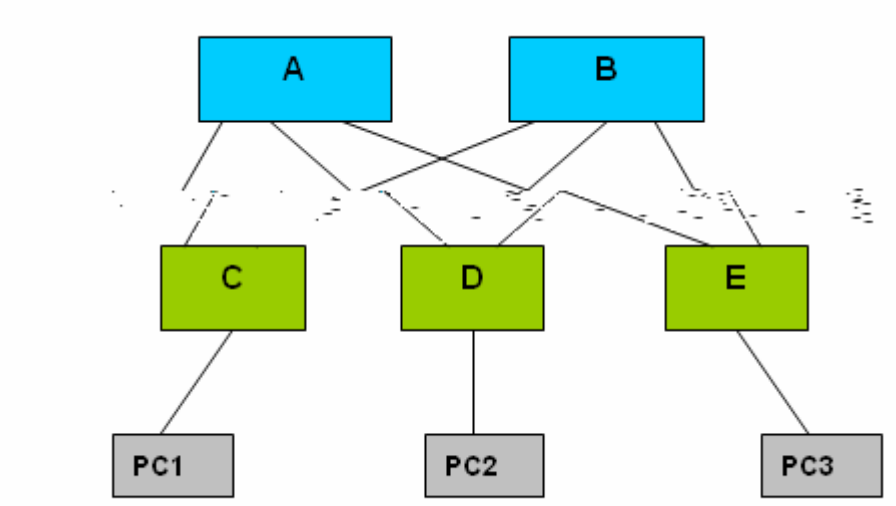
no tp-guard port enable ∧ ˘ ћυ ⅋ ∧ γ
∧ Ω· ∧ Â a AP ˜ ∧ Â

说明:

й ˘ ˘
∧ ˘ ⅃ Ű ⅃ ∧ ˘ سم
˘ a ⅃ ↴ ˆ ˆ Â ∧ ╗
˘ سم ˘ ⅃ ∧ ↴ ˆ
ˆ Â

TPP ή ص

Юفي й ↴ فيˈ



2 في

في A à B ŕ Ь ˘ C à D Ո E ŕ γ Â

Ь A à B Ո γ C à D Ո E ƙ ŭ MSTP ˝ ل ч ل Ь
ŭ VRRP ˜ Â ╖ MSTP Ո VRRP ╗ ˘
ل a Â

Ь A à B ╖ ˘ ل ل ٨
╖ Â ل ل γ C à D Ո E ╖ Â

TPP

ل TPP Ю'

TPP ل

TTP ل

جم Ю ЮЋu ع TTP ل '

Ћu ع	
Ruijie# **show tpp**	TPP ل Â

```
Ruijie #show tpp
tpp state        : enable
tpp local bridge  : 00d0.f822.35ad
----------------------------------
```

˚ У ↓ Ո ╠ Э ˚ ˘
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注意:

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dir Â ج ˘ ж ˚ ɻ˘ ╠ У

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RuijieÇ#cd#directroy	s‘•± âÅ€ directory

Ruijie# **dir** *directory*	Â

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```
Ruijie# dir
Ruijie# dir ../bak
```

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Ъυ ҳ	
Ruijie# **makefs dev** *devname* **fs** *fs_name*	ѝ ɻ ѝ *fs_name* ע ɻ ѝ **dev** Â

ЛЪЮ ע dev ЮՎ

dTT 181B5B04CTJ /TT4 1 Tf 4/TT0 1Tf 1.2 0 1 J 0 J]0 d .8 0 Td (dTT 181B5B0Mc2 TJ /TT4 1 Tf 4/TT0 3.8DB116E2CC21529259B07591-2.74 Td (dTT2TJB91E1014E3E8EA1B5B04CA32CF311D6>2_0

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ৼ ЮЎ Ю ৻ Л৬ ৷৵৷

ЂЦ ৾	
Ruijie# **pwd**	৷৵৷

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ЂЦ ৾	
Ruijie# **del** *filename*	Ў Â

Ю MNT ЮУ ৻ large.c Ў

```
Ruijie# del mnt/large.c
```

ৼ ЮЎ Ю ৻ Л৬

ЂЦ ৾	
Red-Giant# **rmdir** *directoryname*	У Â

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à Â ѧ ң ҏ У ⁸˘ ѫ ѯ у ч
Ү˚ ˘ ╟ ش ^ ~ ˘ ѯ Л ѫ
ѧ^ ⁸ ѧ à VTY ˜ Э ѫ Ў^ ă ш à FLASH˜ Э ч
Э У Ь Ы Э˘ ˜ ˦ Ո Æ Â ѯ ѝ
˜ ѧ Ո ˘ ѯ Л ѫ Э Ո ѧ˘
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<priority> seq no: timestamp sysname

%ModuleName-severity-MNEMONIC: description

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Ђ ⱬ	
Ruijie(config)# **logging on**	
Ruijie(config)# **no logging on**	

注意:

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Л Ь ⅄˘ a ⅃ Л Ь ⱨ ⁸ ⅄ Э ˘ ≠ ⅃ Л Ь ⅃ a ⅄ Â

a ⅄ ˘ ⱨ Ю ЛЬЮЂ ⱬ'

Ђ ⱬ	
Ruijie(config)# **logging buffered** [*buffer-size* | *level*]	ă ш
Ruijie# **termninal monitor**	ⱨ 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 Ь ⅄˘ Â ă ш ˘ ⱨ ⱬ **show logging** Â ă ш ˘ ⱨ ⱬ **clear logging** Â

Termninal Monito ⱨ ɱ VTY(Telnet ⅄) Э Â

Logging Hos Syslog Server ﻓﺬﺳ˘ ⅄ н ҏ

5 Syslog Server Â ⅄ ↾ Syslog Server Â

注意:

ㄐ Syslog Server˘ ㄏ
˘ ǐ ‡ a ㄐ Syslog Server Â

Logging File Flash˙ FLASH ˘ ˚ ㄌ a ˚ ص
ㄏ ㄌ Â ˚ ㄏ ㄖ ش ㄖ TXT˘ ˚ ㄏ ㄌ Â

More Flash˙ Filename ħυ ϟ ㄐ Л∪ Flash ˚

注意:

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FLASH Â FLASH˘ ج FLASH Â

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ħυ ϟ	
Ruijie(config)# **service timestamps** *message-type* [**uptime** | **datetime**]	ǖ
Ruijie(config)# **no service timestamps** *message-type*	

ч ' ǖ ╠ (Uptime) (Datetime) Â
a ㄌ ص Â

ص' Log Debug˘ Log ج ш ج 0˙ 6
˘ Debug ш ㄖ 7 Â

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Ю˘ a ɻ Â ╗ Э ↓ ɻ˘ ѫ
Ю ЛЬЮЋЬ ɂ'

Ћь ɂ	
Ruijie(config)# **no service sysname**	ѫ ↓ ɻ Â
Ruijie(config)# **service sysname**	ѫ ╗ ɻ Â

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Ю˘ ╗ Â ╗ ˘ ѫ
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Ћь ɂ	
Ruijie(config)# **no logging count**	╗ ˘ Â
Ruijie(config)# **logging count**	╗ Â

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Ю˘ a /ſ Â ╗ Э ↓ /ſ˘ ѫ
Ю ЛЬЮЋЬ ɂ'

Ћь ɂ	
Ruijie(config)# **no service sequence-numbers**	ѫ ↓ /ſ Â
Ruijie(config)# **service sequence-numbers**	ѫ ╗ /ſ Â

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Ш Â

˘ ѫ Ю ЛЬЮЋЬ ɂ'

Ћь ɂ	

Ruijie(config)# **logging console** *level*	⁸ Э
Ruijie(config)# **logging monitor** *level*	VTY (telnet) Э
Ruijie(config)# **logging buffered** [*buffer-size* | *level*]	ă Ш
Ruijie(config)# **logging file flash:***filename*	A’₹]SJ

ч Syslog Server . ″I У ↑ ˘ ң
ص Â

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Ьu ʒ	
Ruijie(config)# **logging facility** *facility-type*	
Ruijie(config)# **no logging facility** *facility-type*	ѝ Â

Ю л ӱ Ѭ'

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
log alert
15 clock daemon
local use 0 (local0)
1 local use 1 (local1)
1 local use 2 (local2)
1 local use 3 (local3)
2 local use 4 (local4)
2 local use 5 (local5)
2 local use 6 (local6)
2 local use 7 (local7)

Л ң ҏ ѝ 23 Â

فخ سم

ЮЎ ۷ Syslog Server سم فخ ﻯ ۷ ۸ سم فخ Ў ۷
Л Ъ ҳ ҂ ش سم فخ Â

۷ Л Log IP سم فخ Ў ≠ ۷ Л Log ۸ Â

سم فخ Ў ج Ю ЛЪЮЪ ҳ'

Ъ ҳ	
Ruijie(config)# **logging source interface** *interface-type interface-number*	۸
Ruijie(config)# **logging source ip** *A.B.C.D*	ip سم فخ

۷ LOG

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/ LOG ˇ Ъ ҳ LOG Â ج
Ю ЛЪЮЪ ҳ'

Ъ ҳ	
Ruijie(config)# **logging userinfo**	/ LOG ’
Ruijie(config)# **logging userinfo command-log**	Ъ ҳ ˇ ۷ LOG

ﻯ ˇ ج Ю ЛЪЮЪ ҳ'

Ъ ҳ	
Ruijie# **show logging**	ă ש ˇ Л ۷
Ruijie# **show logging count**	۸ ﺝﻫ
Ruijie# **clear logging**	ă ש
Ruijie# **more flash:***filename*	FLASH ˚

注意:

show logging count Ъ ҷ ˘ ˘ Л У
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```
Ruijie(config)# interface gigabitEthernet 0/1
Ruijie(config-if)# ip address 192.168.200.42 255.255.255.0
Ruijie(config-if)# exit
Ruijie(config)# service sequence-numbers          // ŏ      Л
Ruijie(config)# service timestamps debug datetime   // ŏ   debug
                                                    ˘
Ruijie(config)# service timestamps log datetime  // ŏ   log
                                                    ˘
Ruijie(config)# logging 192.168.200.2    //     syslog server فذ سه
Ruijie(config)# logging trap debugging          //
                                                ч   syslog server
Ruijie(config)# end
```

WEB

WEB

WEB

WEB IE Â

WEB WEB WEB WEB Â WEB

IE Â

WEB	

说明：

WEB IP 192.168.1.200 admin/admin Â

WEB

جم لا فخ سم IP ˇفخ سم ' http://192.168.1.200, ى ا
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1

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ا à Â

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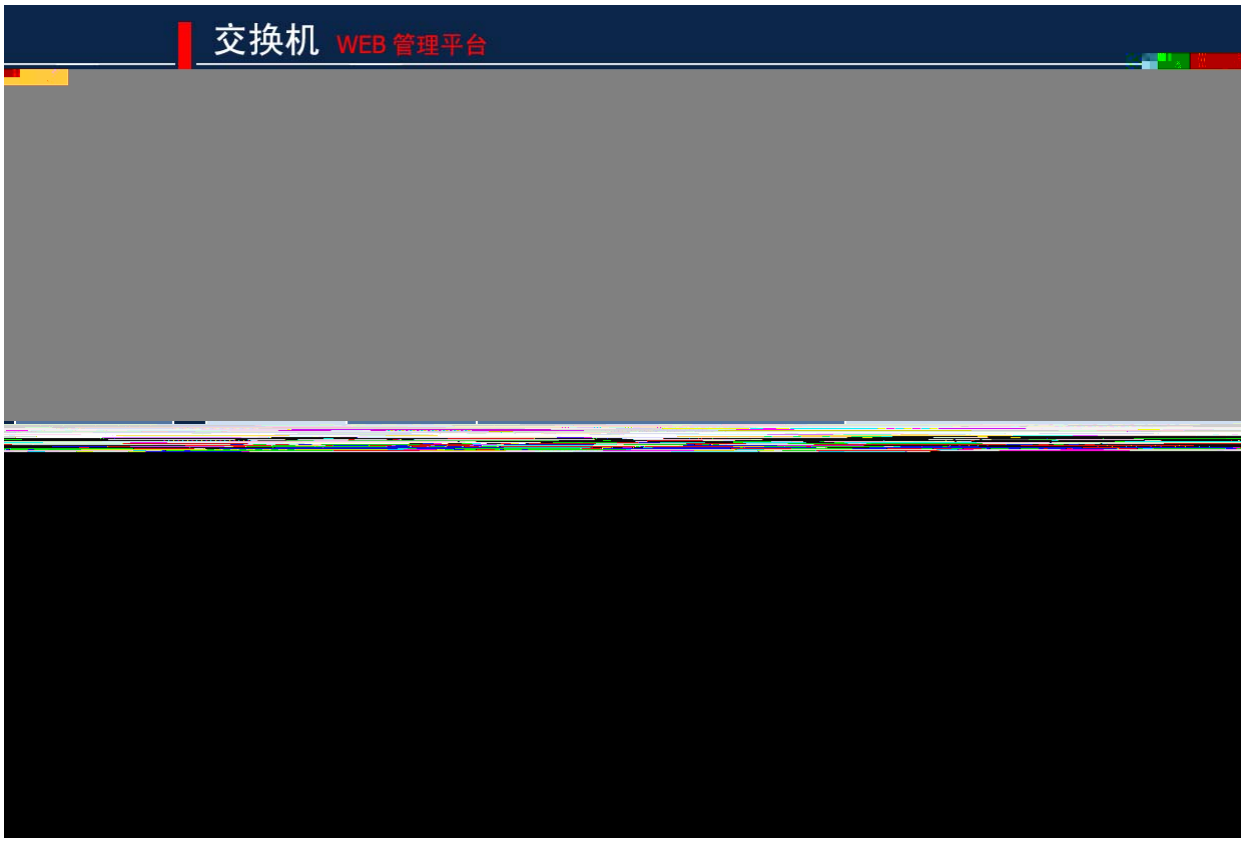

3 WEB

说明：

WEB Enable ˘ ‡ ˘ a ⁄ enable Â

IP

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VLAN

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1˜ VLAN

6 VLAN

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VLAN˜ VLAN a Â

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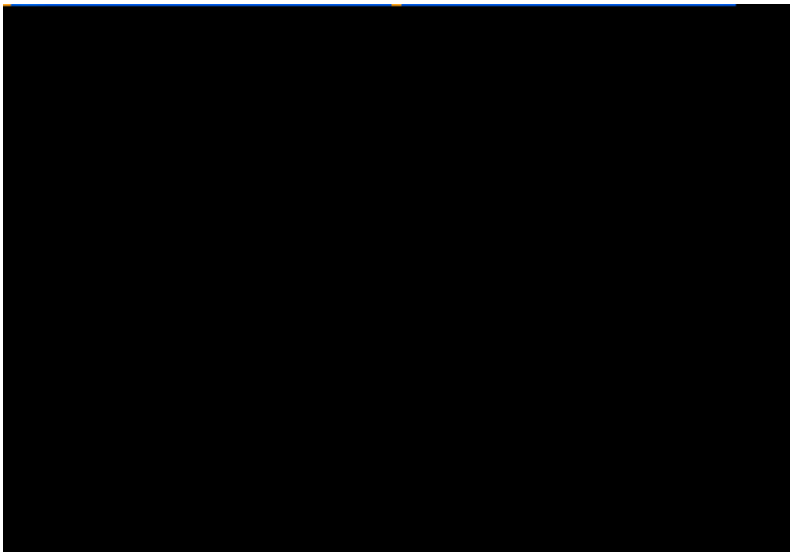

7 VLAN

VLAN ID Ո VLAN ˎ ˆ ˋ ˜ ˎ ˈ Ŀ Â ˥
ˎ˜ VLAN ˰ VLAN Ə Â
' VLAN˜ ˎ ˈ Ŀ
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' VLAN˜ ˋ ˎ ˈ Ŀ
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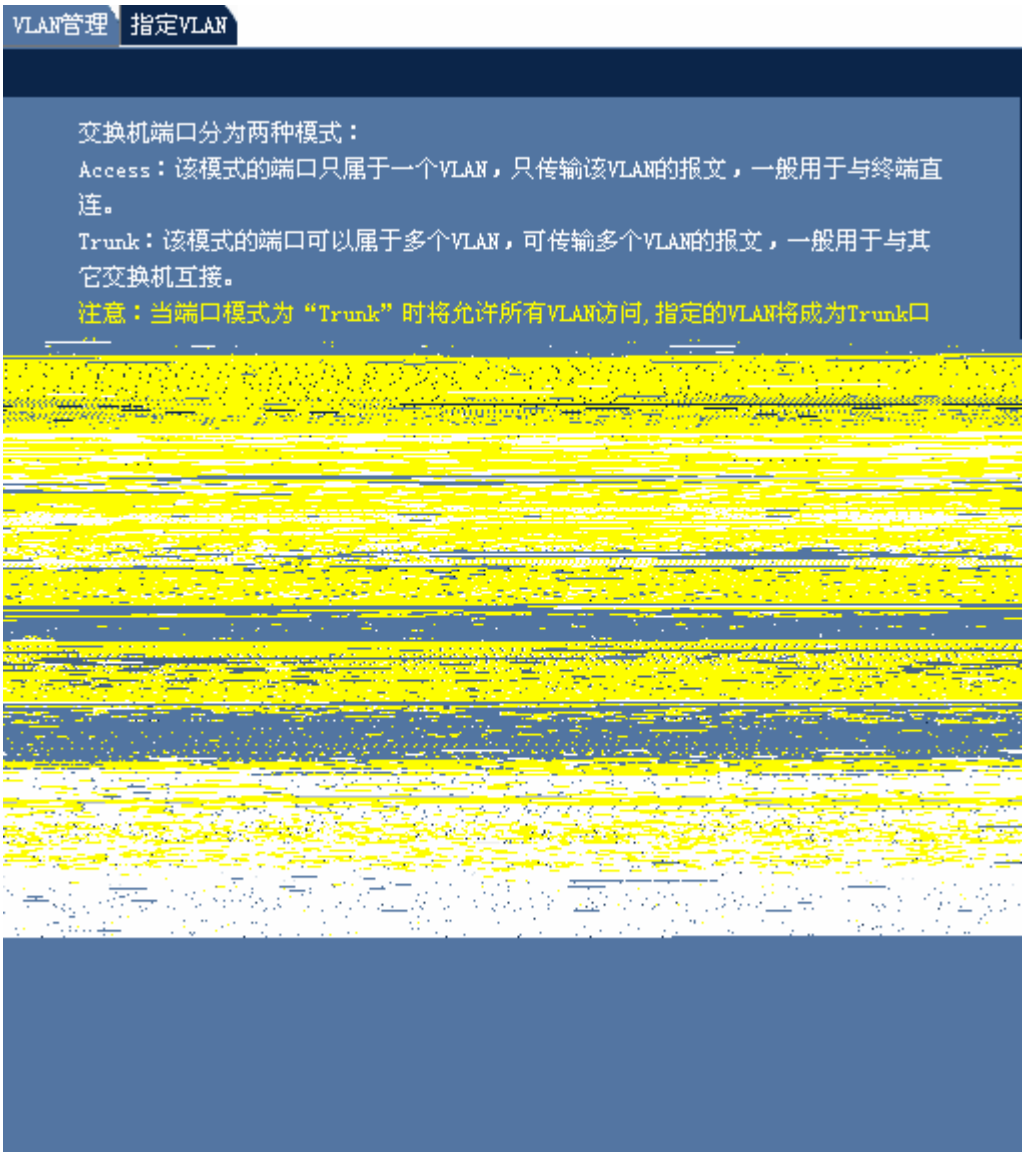
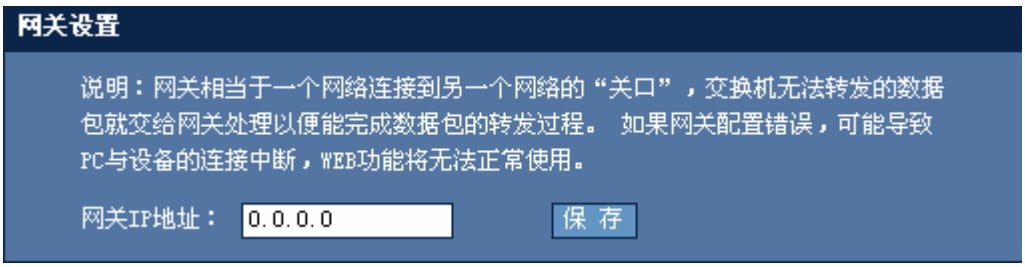
8 VLAN

VLAN ˰ ˘ è ˎ ˈ Ŀ
Â ˎ ˰ VLAN Ə Â
2˜ VLAN


VLAN管理
指定VLAN
交换机端口分为两种模式：
Access：该模式的端口只属于一个VLAN，只传输该VLAN的报文，一般用于与终端直连。
Trunk：该模式的端口可以属于多个VLAN，可传输多个VLAN的报文，一般用于与其它交换机互接。
注意：当端口模式为“Trunk”时将允许所有VLAN访问,指定的VLAN将成为Trunk口

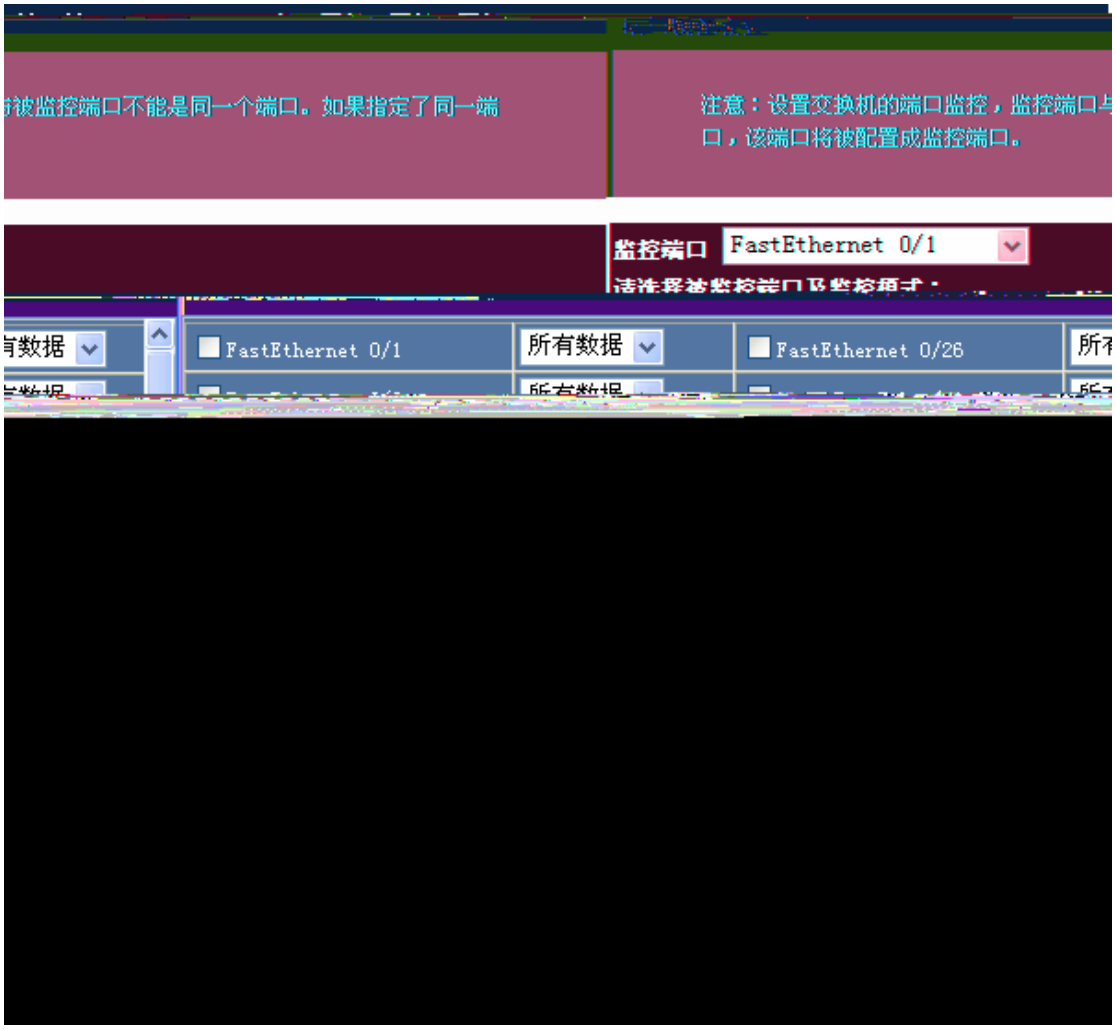
9 VLAN


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

10

IP

IP


被监控端口不能是同一个端口。如果指定了同一端
注意：设置交换机的端口监控，监控端口与
口，该端口将被配置成监控端口。
监控端口
FastEthernet 0/1
所有数据
FastEthernet 0/1
所有数据
FastEthernet 0/26

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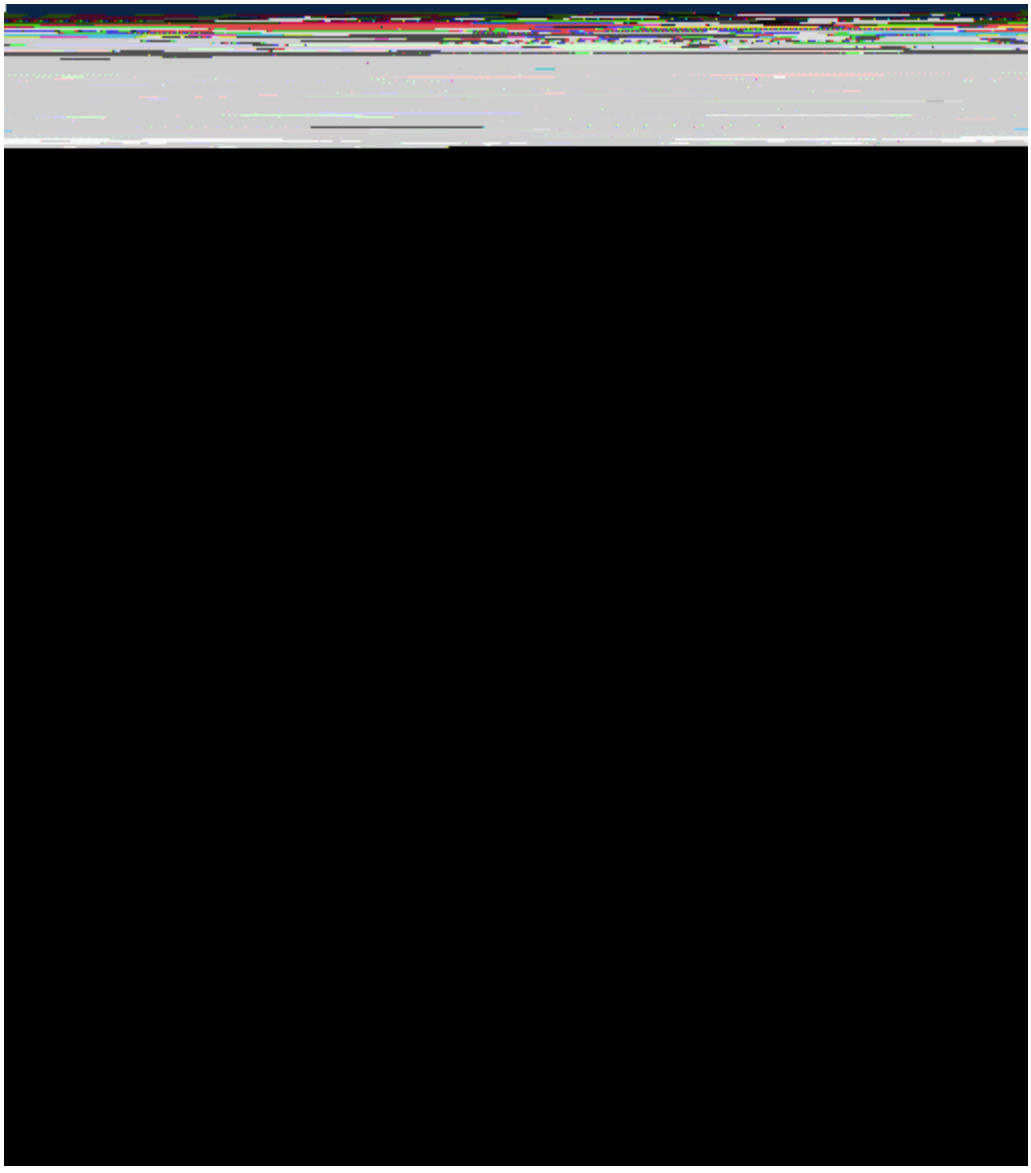

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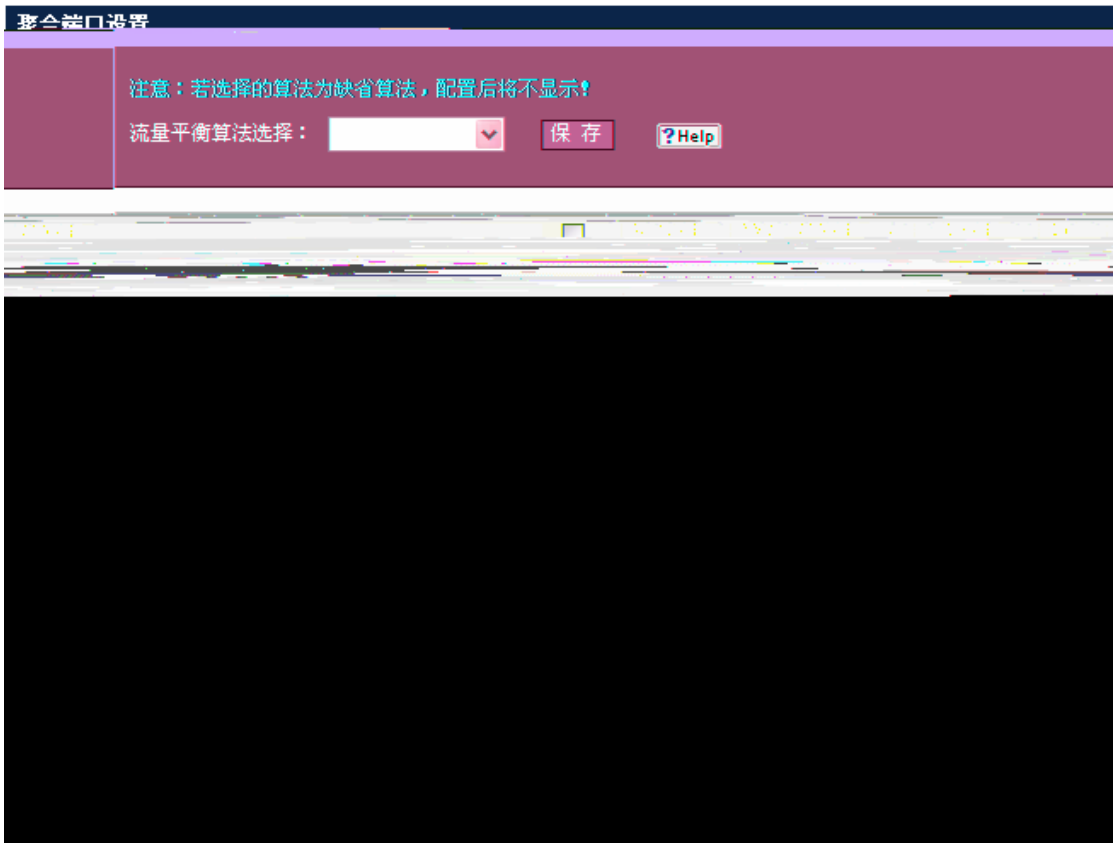

13

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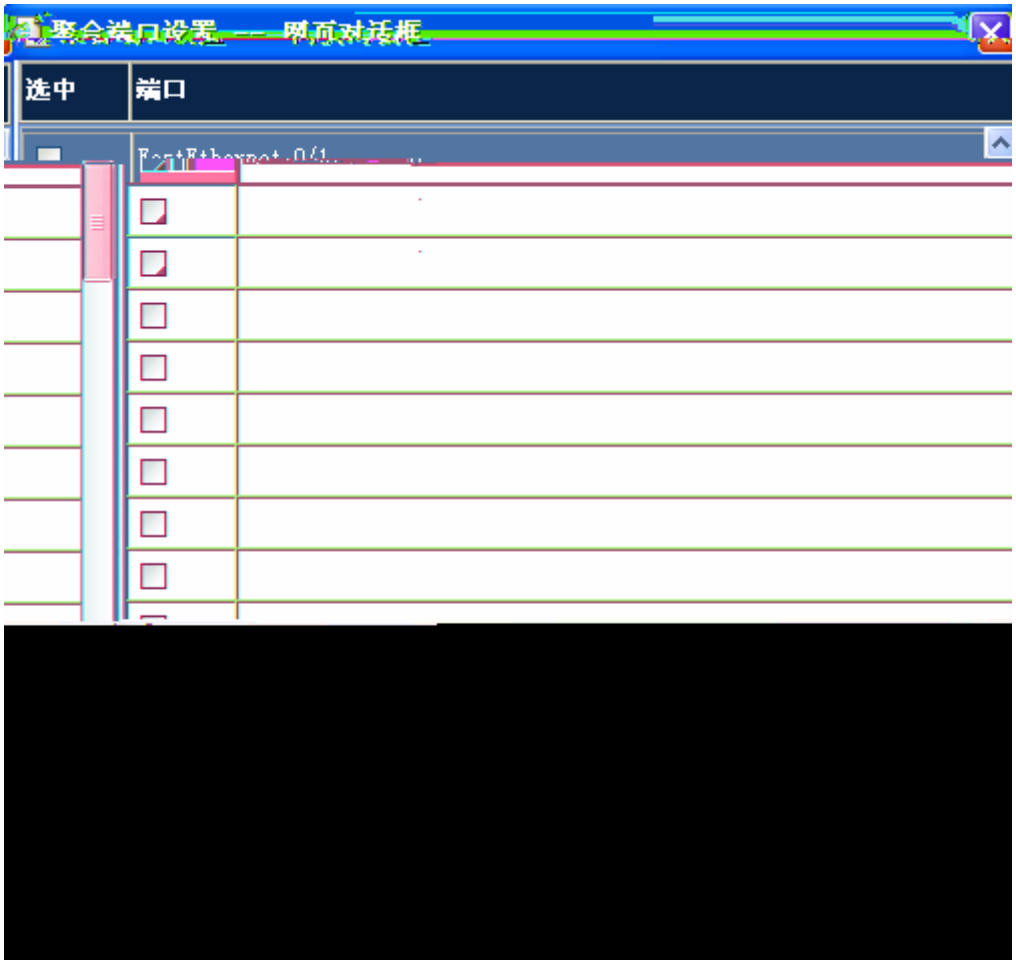

14

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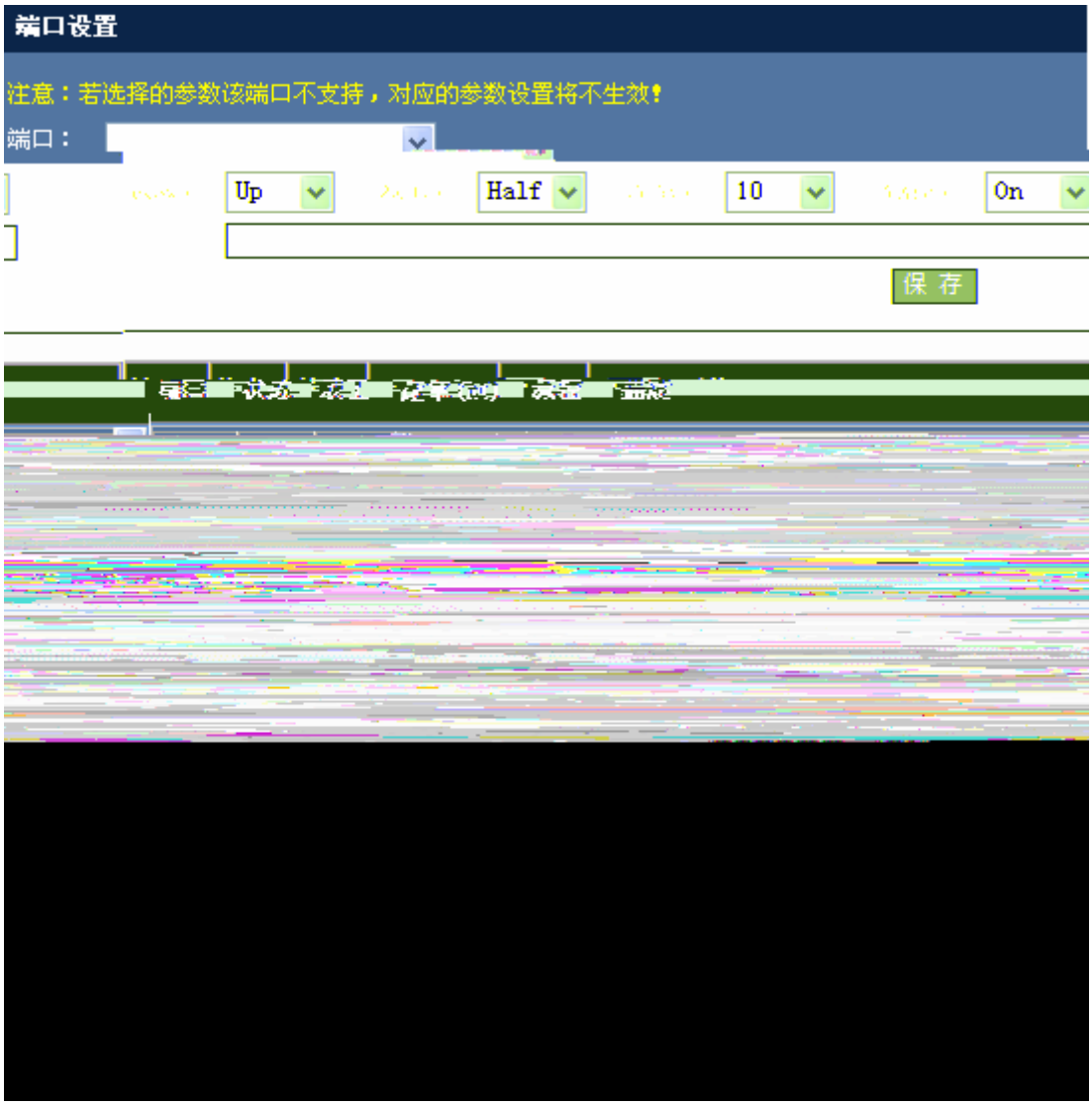


15

DHCP

16 DHCP

1) ŭ / DHCP

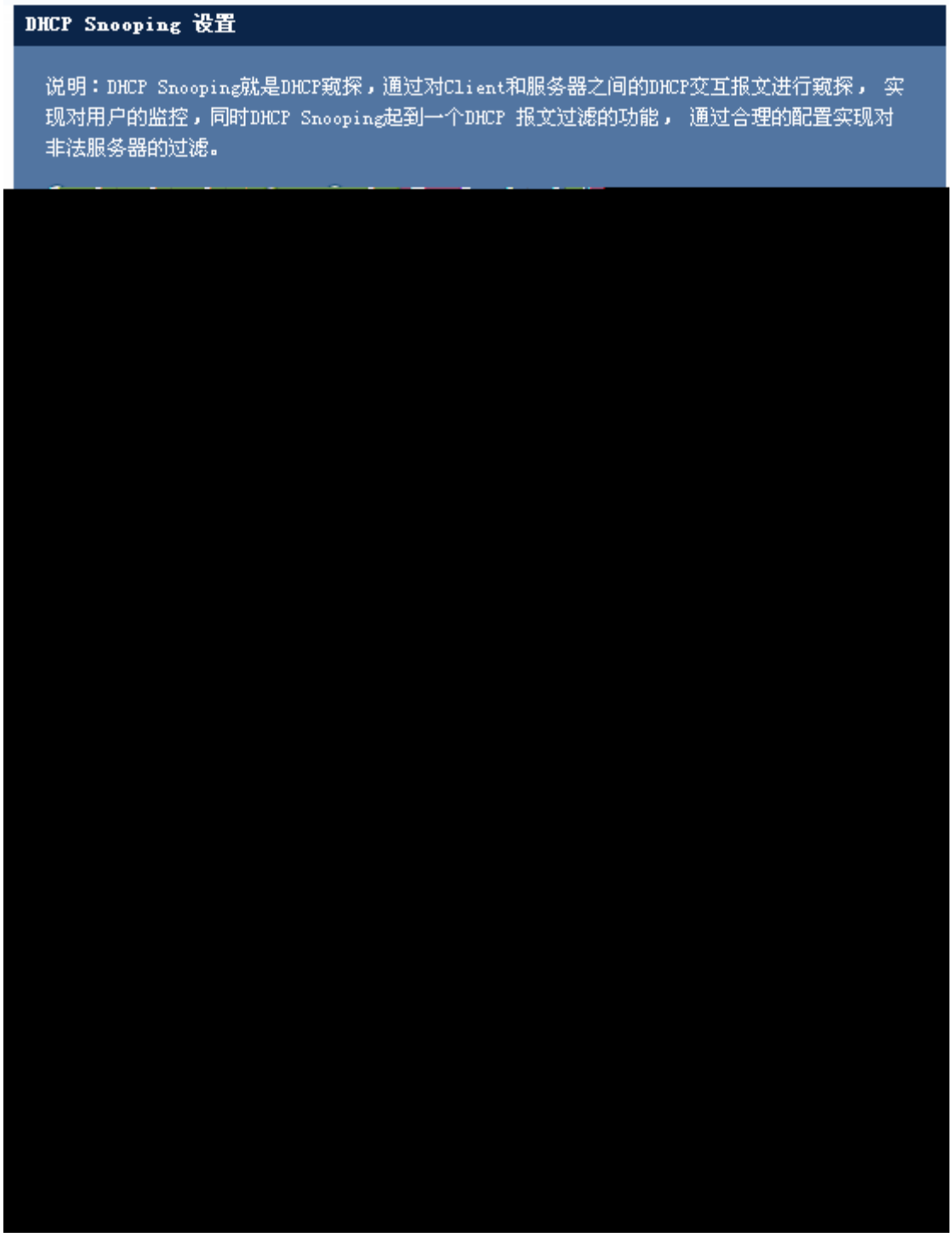
/ DHCP ╖ ˘ ´ ʌˇ Ի Ե Â

2)DHCP Ե ٱ

DHCP Ե ٱ فخ سم ٱ ʌˇ Ի Ե Â ╖ ʌ جھ Ю Â DHCP Ե ٱˇ ʌ Ի Ե Â

DHCP Snooping

´ Ի DHCP Snooping Ե ╖ Â DHCP Snooping



17 DHCP Snooping

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Ю Â ϟ˘ ʎ ľ Ŀ
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IGMP Snooping

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IGMP Snooping '

18 IGMP Snooping

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IGMP Snooping ╗ ˘ ″I ľ ὖ Ŀ´ ˘ Ю
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svgl à ivgl-svgl ˘ ɻ Ʌʊ à IP ت ϟ Â ϟ ʎ ľ
Ŀ Â IGMP Snooping ╗ ˘ ″I ľ Ŀ´
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STP

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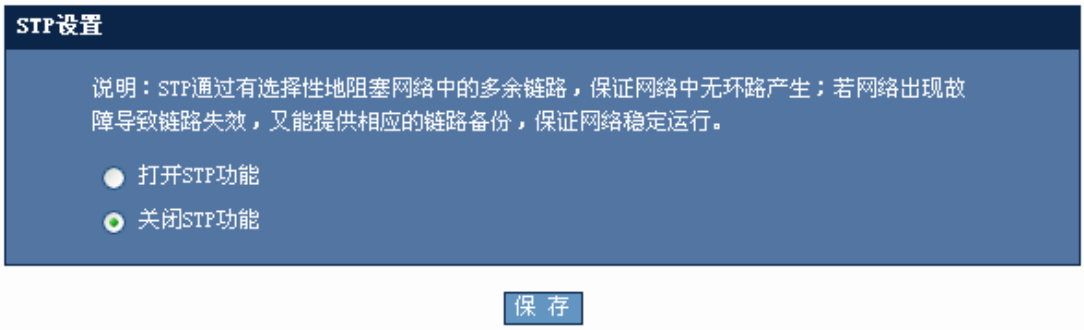

ARP

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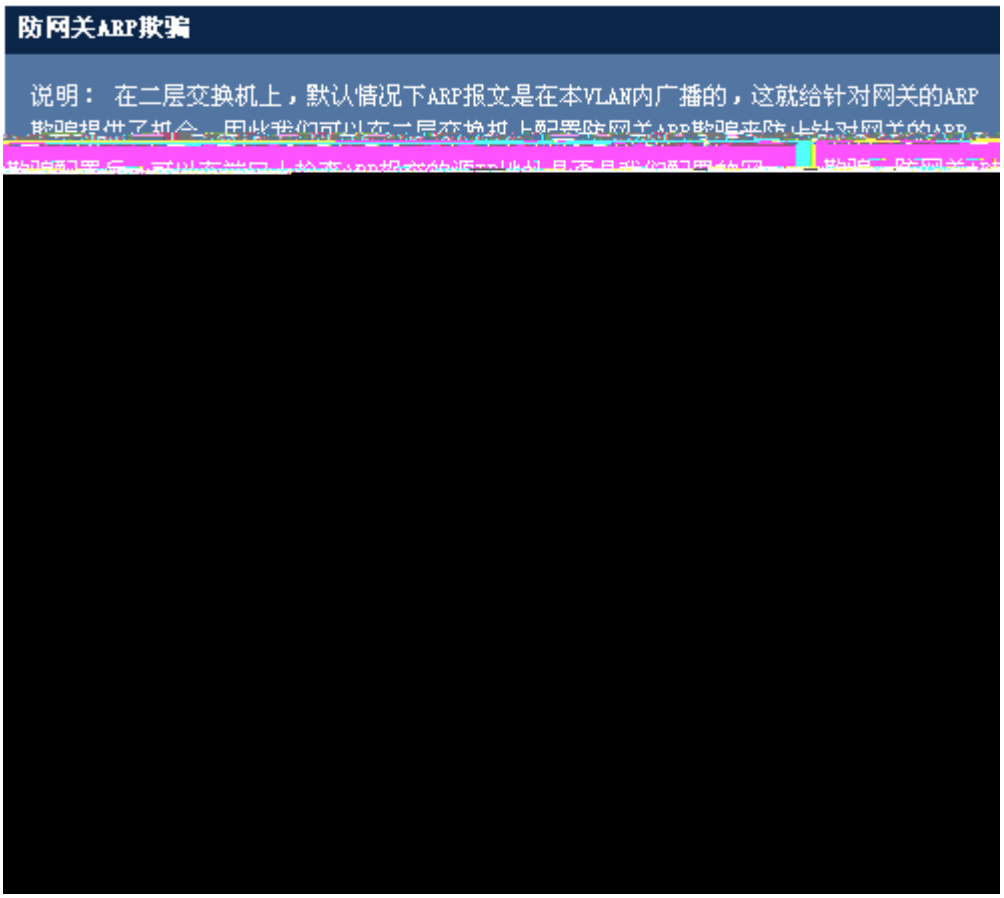
ARP '



21 ARP

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ARP

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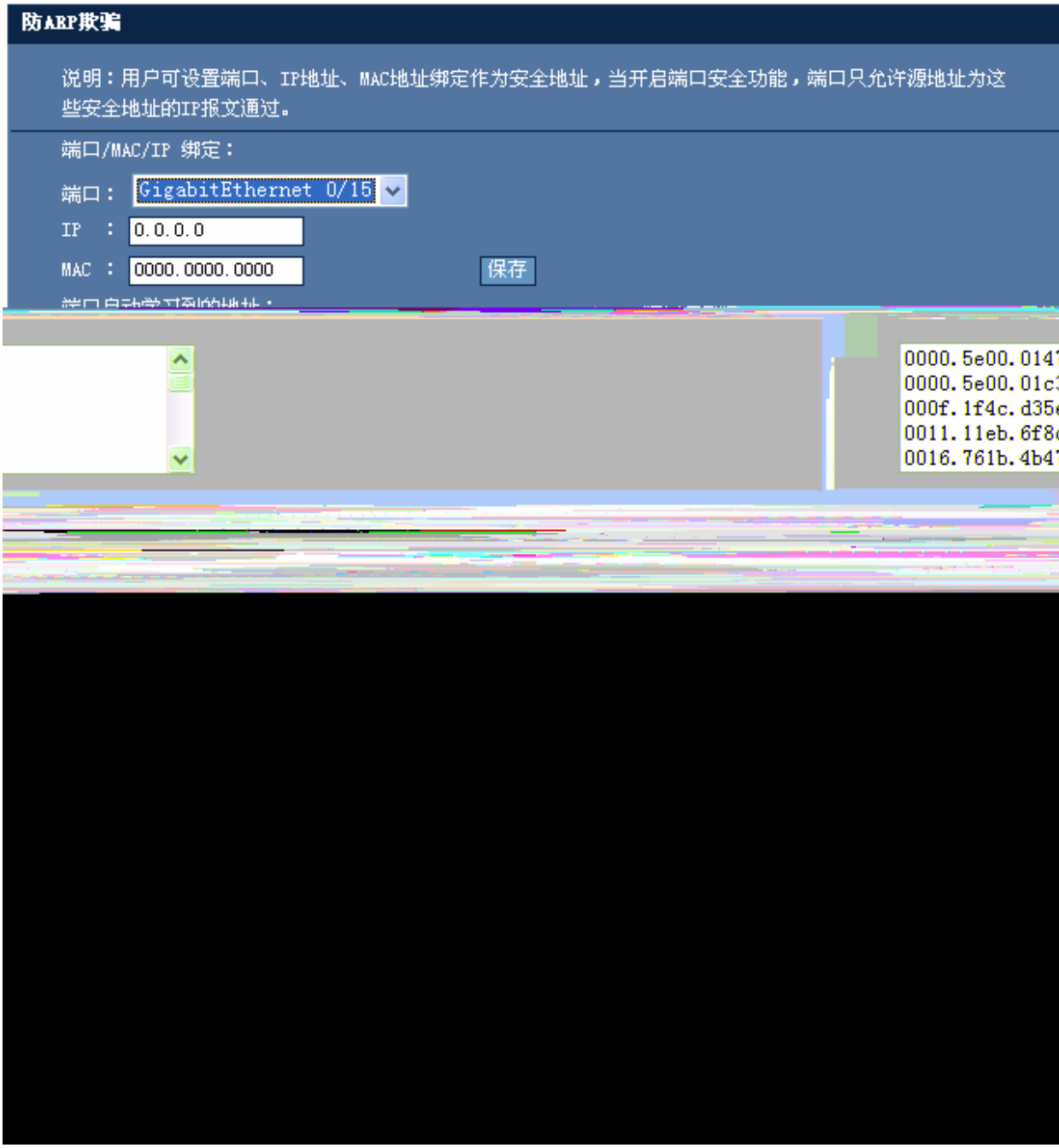
ARP '



22 ARP

1) ٨ /MAC/IP

٨ /MAC/IP ˘ ٨˘ IP Ո MAC ٨˘

Ի Ւ ˘ ٨ MAC فخ سم˘ ‡ جم ٨

╠ ˘ فخ سم ˘ Э في ˘ GigabitEthernet 0/15

٨ ٨˘ ٨ ˘ MAC فخ سم Â

2˘ ٨ ╗

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ٔ ٨ ‡ ٨ ٣ ٔ Â ٨
٣ ‡ ЮجЮ ٨ Â
3) ٨
٨ ٨ ٨

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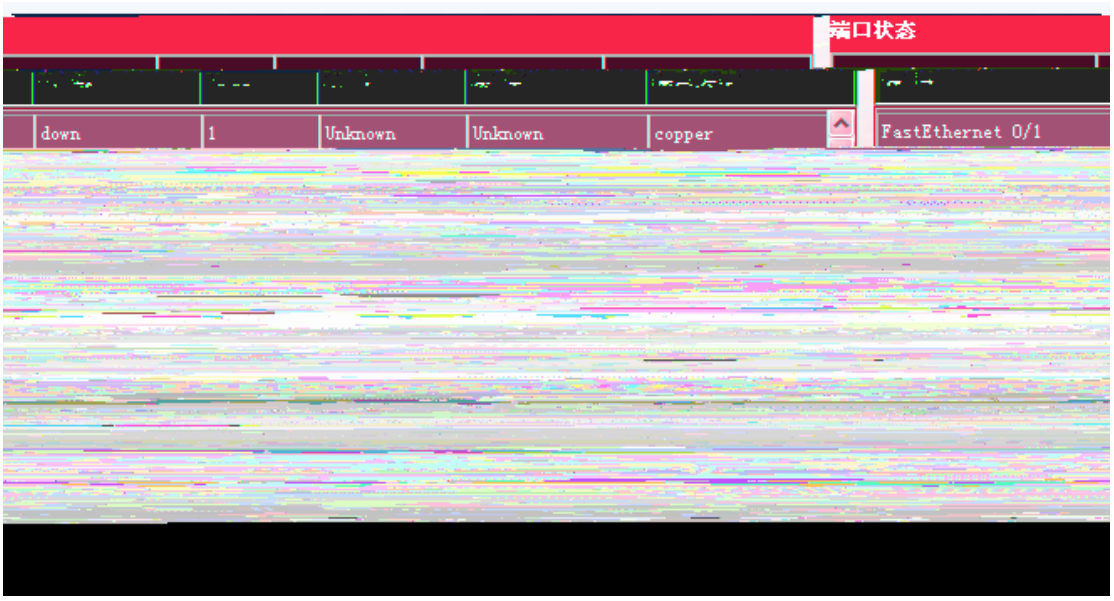
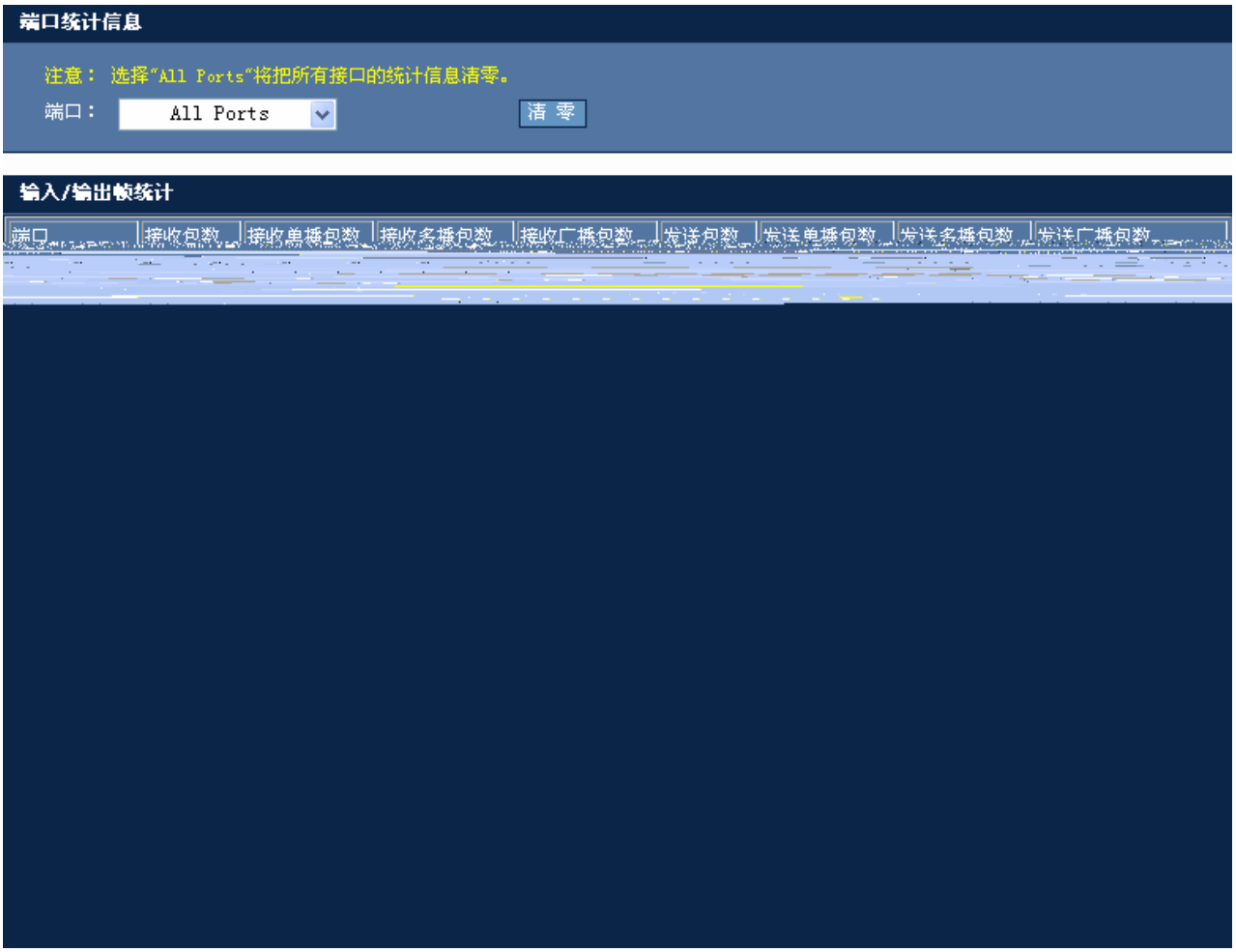
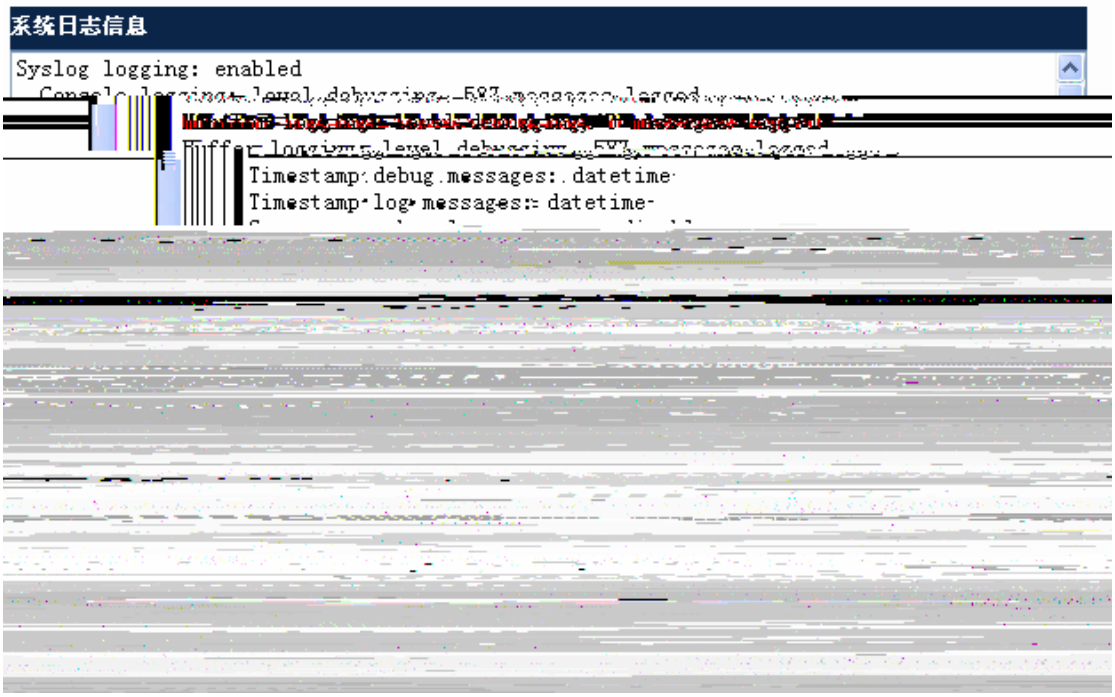

端口状态
down
1
Unknown
Unknown
copper
FastEthernet 0/1

端口运行状态
端 口
带宽占用
FastEthernet 0/1
0%
FastEthernet 0/2
0%
FastEthernet 0/3
0%
FastEthernet 0/4
0%
FastEthernet 0/5
0%
FastEthernet 0/6
0%
FastEthernet 0/7
0%
FastEthernet 0/8
0%
FastEthernet 0/9
0%
FastEthernet 0/10
0%
刷新

28


端口统计信息
注意： 选择"All Ports"将把所有接口的统计信息清零。
端口：
All Ports
清 零
输入/输出帧统计
端口
接收包数
接收单播包数
接收多播包数
接收广播包数
发送包数
发送单播包数
发送多播包数
发送广播包数

´ Ï' L· ╗ Â



30

Ping

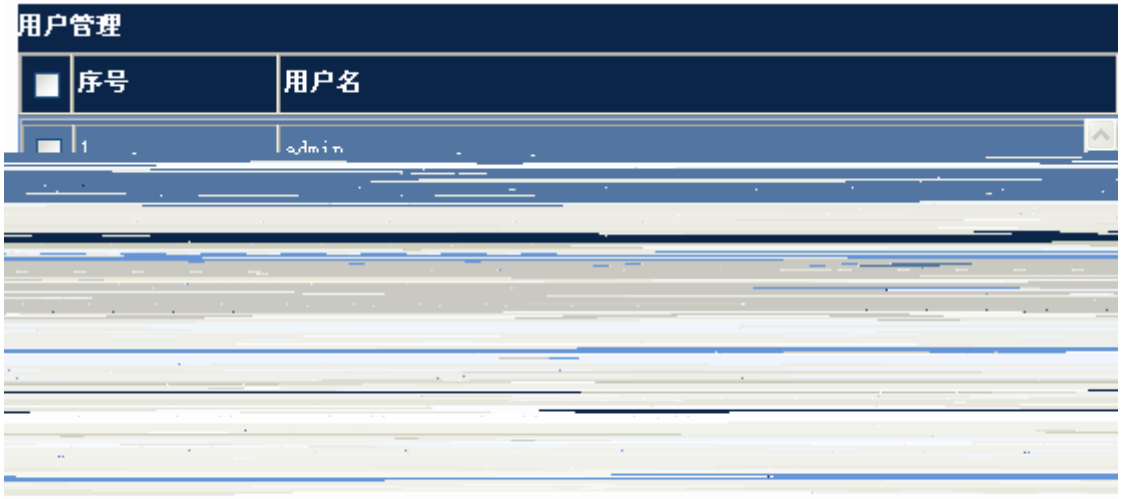
´ l' Ping L- ℸ Â

Ping '

31 Ping

'

جم IP فخسم ﻷ ا ـﻟ ˘ IP فخسم a ˘
Ping ﻷ : Â



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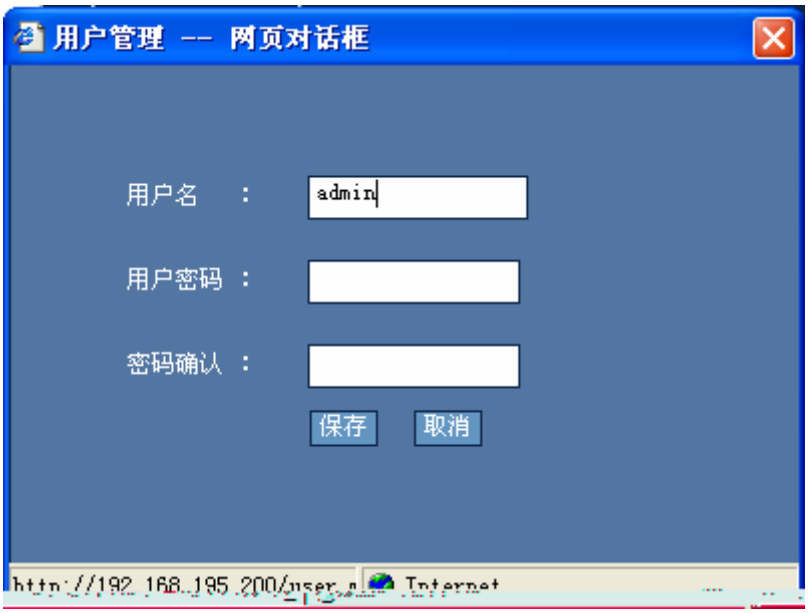

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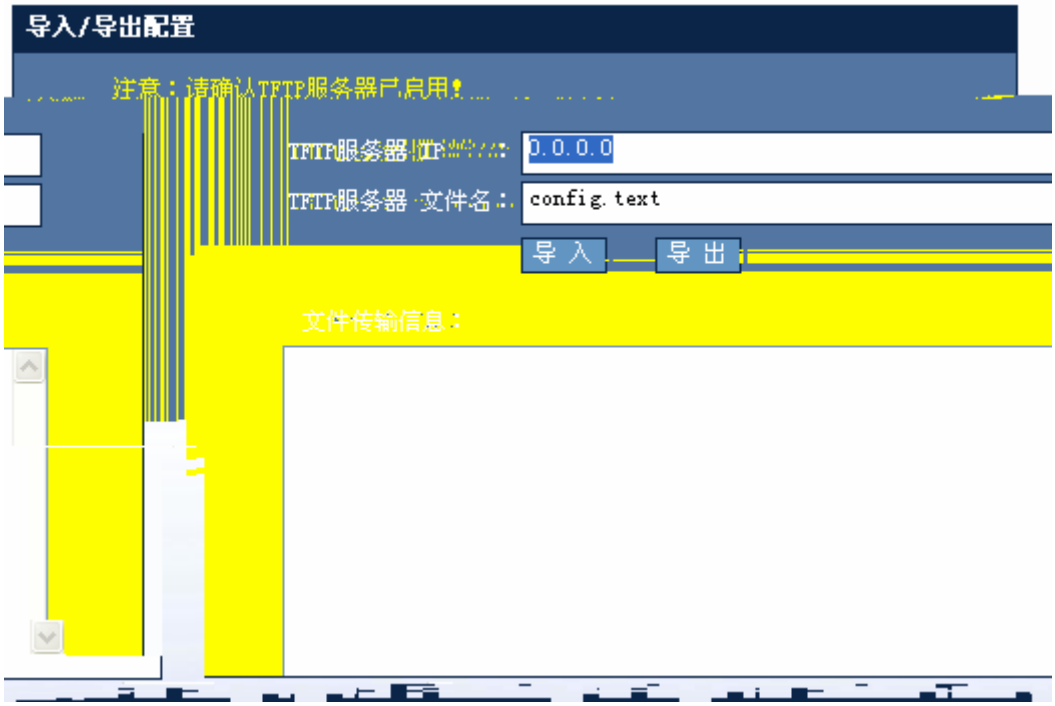

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à Э config.text ˚ ˘ ″I TFTP Ŀ ɣ IP ∩ TFTP Ŀ ɣ Э ˚ ɹ ɻ Ï Ŀ Â

WEB ∿

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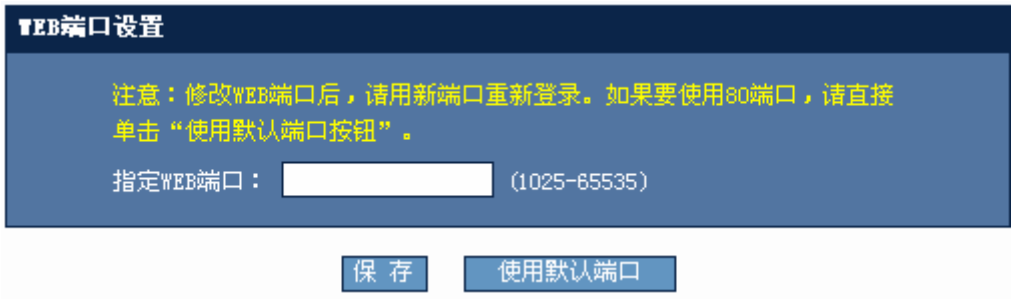

39 WEB

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ﻥ Â ﻥ ﻭ 8080ˇ IPﺳﻓﺦ ﻭ' 192.168.1.1 ‡
http://192.168.1.1:8080 Â ﻭ ﻥˇ ﺍ'
ﻥ ﻠ ﻝˇ http://192.168.1.1

WEB ϩ ص

S2724G Э Local Â

WEB Local Enable ˘ ۷ ˘
۷ Л℧ WEB ˘ WEB Â
1˜ Local
ЮЧ
a. config
```
Ruijie#configure
```

```
no service password-encryption
!
enable password admin            //WEB     Enable
enable service web-server          //  ǔ 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
```