ĵ ЎĄ Ў ˘ ЉЮ ˋ

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4. `
5. HTTP `

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Ƌ ϗ ˇ ʌ ʃ Ƌ ϗ Â

User EXEC ^ ~	″I Â	Ruijie>	exit Ƃ ३ Â ˇ enableƂ ३ Â	ä
Privileged EXEC ^ ~	Ю ˇ enable Ƃ ३ Â	Ruijie#	ˇ disable Ƃ ३ Â ˇ configure Ƃ ३ Â	Ƃ ३ Â ɛ ⊀ ३ Â
Global configuration ^ ~	Ю ˇ configure Ƃ ३ Â	Ruijie(config)#	ˇ exit Ƃ ३ end Ƃ ३ˇ Ctrl+C Â ⊀ ˇ interface Ƃ ३ Â interface Ƃ ३ ⊀ Â VLAN ˇ vlan vlan_id Ƃ ३ Â	Ƃ ३ Â
Interface configuration ^ ⊀ ~	Ю ˇ interface Ƃ ३ Â	Ruijie(config-if)#	ˇ end Ƃ ३ˇ Ctrl+C Â ˇ exit Ƃ ३ Â interface Ƃ ३ ⊀ Â	⊀ Â
Config-vlan ^ VLAN ~	Ю ˇ vlan vlan_id Ƃ ३ Â	Ruijie(config-vlan)#	ˇ end Ƃ ३ˇ Ctrl+C Â ˇ exit Ƃ ३ Â	VLAN Â

╠

⊀ Л Ъ Ƃ ३ Ю ⊀ ^ ?ˇ Ƃ ३ Ƃ ३ Â ≠ ⊀ Л Ъ ˇ
Ƃ ३ Ƃ ३ Â Ю ‘

Ƃ ३	
Help	Ƃ ३ Ю ╠ Â

abbreviated-command-entry?

% Ambiguous command: "show c"	˘ Ъ ҳ Â	Ъ ҳ˘ Ћ ʌ Â ʌ Â
% Incomplete command.	Ъ ҳ ʅ Â	Ъ ҳ˘ Ạ ʌ Â ʌ ʅ Â
% Invalid input detected at ‘^’ marker.	Ъ ҳ ˘ ʌˆ ^˜ Ң Æ Â	Ъ ҳ Ю ʌ˘ Ъ ҳ Â

ʌ Ъ ҳ

Ъ ҳ Â з Ъ ҳ ǂ Â

ÿ ʌ Ъ ҳ Ъ ҳ˘ Ю ˙

Ctrl-P Э ă̈	ʌ Ъ ҳ Ъ ҳ Â ÿ ˘ ʌ Л Ъ Â
Ctrl-N Ю ă̈	Ctrl-P Э ă̈ ɬ˘ ʌ Ъ ҳ Ъ ҳ Â ʌ Л Ъ Â

╟ ″I Â	ӓ Ctrl-B	″I Â
	ʌ ӓ Ctrl-F	″I ʌ Â
	Ctrl-A	″I Ƌ ҳ Â
	Ctrl-E	″I Ƌ ҳ Â
Â	Backspace	″I Â
	Delete	″I Â
╟ Â	Return	ӓ Э ╟ ˘ Ю ˘ Â
	Space	ӓ Э ╟ ˘ Ю ˘ Â

Ƌ ҳ ╟ ʌ

ʌ Ɲ ╖ ╟ ʌ ˘ Ƌ ҳ˘ Ƌ ҳ Ɲ
Â ″I ʌ ˘ Ƌ ҳ ӓ ╟ 20 ˘ Ÿ ʌ Ɲ ″I
Ƌ ҳ Â

Ƌ ҳ ″I ╟ Ю ·

╖	
″I ӓ	ӓ Ctrl-B
″I	Ctrl-A
″I ӓ ʌ	ʌ ӓ Ctrl-F
″I ╟	Ctrl-E

Ƌ ҳ mac-address-table static[0]

CLI Ѣ ҳ ˘ ê Ѣ ҳ Ì Â

Ѣ ҳ 8

8 Э ╕ ˘ ѵ ҳ ǐ Â ѵ ҳ ѵ Л Ъ
8 ˘ ѵ Л Ъ ╖ ł ˘ 8 è ѵ Л Ъ Ѣ ҳ Â
ÿ ˘ ѵ ҳ ˚ ˘ Э ˚ ^ TFTP˜ ˘
ѵ ҳ Â ѵ ҳ ˚ ╕ ˘ ѵ ҳ ѵ
ѵ ҳ Â Ѣ ҳ ╖ Â

ѵ ҳ

ѵ ҳ˘ 15 Â

ѵ ѵ ҳ

ң Ю Ѣ ҳ ѵ ѵ ҳ Â

Ѣ ҳ	
Ruijie(config)# [level] {password | encryption-type encrypted-password}	ѵ ҳ Â ѵ 15 ѵ ҳ˘ з ѵ ѵ ҳ Ю Â 15 ѵ ҳ˘ ˘ ╟ й ѵ ҳ Â 15 ѵ ҳ 15 ѵ ҳ ˚ ˘ Â
Ruijie(config)# [level] {encryption-type encrypted-password}	ѵ ҳ˘ ╖ б ѵ ҳ ˚ ˘ ѵ ҳ ╖ Â й ˘ ѵ ҳ Â

Ƀ ɂ	
Ruijie# filename	ÿ flash ˚ ˘ ˝I flash Э
Ruijie# filename	web flash ˚ Â ʌ web ȁ tftp

˘ ЮЎ é ЛЬЮɃ ɂ˙

Ƀ ɂ	
Ruijie(config-line)#	AAA ˘
Ruijie(config-line)# { | list-name}	AAA ˘ AAA Â AAA ˘ Radius ȁ ȁ Â

AAA ȁ Radius ⊾ Лъ ˘ AAA Â

ʌ ˘ é (ȁ ȁ) (ȁ˦ ȁ)Лъ Â ʌ ˘ ˝I ѝ Â ˘ ˘ ≠ ʌ Лъ Â ў Y ˚ Â

ʌ Лъ Э Â ɬ˘ Лъ ѝ Ю ˘ ˭ Ю ˘ Ÿ Â Лъ ɬ˘ ‡ Э a ̈Ą ˘ Э Â ˚ ˘ Э Э ʌ ˚ ˘ ˘ Ю ɬ˘ Â

Ƀ ɂ	
Ruijie# hh:mm:ss month day year	Â

2003-6-20˝ 10:10:12

Ruijie# clock set 10:10:12 6 20 2003 //

Ruijie# show clock //
clock: 2003-6-20 10:10:54

Л Лъ Ю Ъ ъ ˘ Ю

Ruijie# show clock //
clock: 2003-5-20 11:11:34

Л ˚ ^ calendar˜ ˙I ˚ ˘ ˚ a ˘ ѝ ˚
˘ ¨ Ю ≠ Â
˚ ˚ a ˘ ˚ ˘ Ъ ъ ˚
8 ˚ Â
˚ ˚ ˘ Ю Ъ ъ˘ ˚
˚ Â

Ъ ъ	
Ruijie#	˚ ˚

Ю Ъ ъ Л Лъ ˚ 8 ˚ ‘

Ruijie# clock update-calendar

[modifiers] Ъ ъ 8 ^ scheme˜ ˘ Лъ Â
╗ ˘ Ю(è) Л Лъ ѝ Э Â modifers
Ъ ъ ˘ Л Лъ Ъ ъ ╗ Â Л modifiers à à
Â é Ю

„ mmm | hhh:mm [string]

ł Â mmm hhh:mm ā ˘ Лъ ѝ
Æ˘ Л Лъ Â string ╠ ˘ Л Лъ ѝ ╠
¨ ˘ Лъ Л ˘ ˘ 10 ł ˘ Л
Лъ 10 test Â

„ hh:mm month day year [string]

Â Â year Л ,
˘ ‡ ˘ 8 a 31 ˘
Лъ ˘ 1 1 11 30 ˘ ‡ Â ˘
ѝ 12 ˘ Л з 1 ˘
Ю 1 a ё 1 ˘
˘ ‡ ѝ ё 1 ˘ ÿ Â string ˘ Э Â
2005-01-10 14:31˘ Э ˘ Л Лъ 08:30 11 1

a Ъ ҳ ¨ ˘ ʌ Л Ю Ъ ҳ
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Ю Ю Ъ ҳ ˙

Ъ ҳ	
Ruijie#	

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й ˘ ʌ Л й ʌ ¨ (System Name) Â˚
й CLI Ъ ҳ ˘ ‡ ¨ ^ ¨ 32 ˘ ‡ ʎ è 32 ~
й Ъ ҳ ˘ ¨ ʎ □ ʎ □ Â Ю ¨ й ľ Ruijie Ł Â

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ң Ю Ъ ҳ ¨ ˙

Ъ ҳ	
Ruijie(Config)# name	¨ ˘ ¨ ʌ ˘ a 32 Â

ʌ Л Ю ¨ Æ Â Ю
¨ RGOS˝
Ruijie# configure terminal //
Ruijie(config)# hostname RGOS // ¨ й RGOS
RGOS(config)# // ¨

Ъ ҳ

Ъ ҳ ˘ ‡ ¨ ^ ¨ 32 ˘ ‡ ʎ è 32 ~
й ˘ ¨ ʎ □ ʎ □ Â ʌ Л Ю Ъ
ҳ Ъ ҳ ˘ Ъ ҳ ʌ EXEC Â

Ъ ҳ	
Ruijie# string	Ъ ҳ ˘ ¨ ʌ ˘ 32 ˘ ‡ ʎ è 32 Â

Ruijie(config)# c message c	Â c ˇ ˇ Л Љ ('&') Â ˇ ł ˇ ł ˇ Л Љ ˇ ˇ ˇ ˇ ł Ў ˇ ‡ Â ˇ a йˇ ˇ a 255 Â

Л Љ Ю Â

Ю ˇ (#) йˇ ˇ й “Access for authorized users only. Please enter your password.” Юˈ

```
Ruijie(config)# banner login # //
Enter TEXT message. End with the character '#'.
Access for authorized users only. Please enter your password.
# //
Ruijie(config)#
```

ˇ Ю

```
C:\>telnet 192.168.65.236
 Notice: system will shutdown on July 6th.
 Access for authorized users only. Please enter your password.
 User Access Verification
 Password:
```

è “Noticeˈ system will shutdown on July 6th.” й ˇ

	ʌ ў Э ʌ Лъ Ѣ ҙ ’ show version SYSTEMUPTIME˘ ѝ˙ DD:HH:MM:SS Â
	` ╟ ˘ ʌ ң ˚ ˚ a Â Ѣ ҙ ў Boot/Ctrl ˚ flash Â

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˚ ў Э Â ‘ ˘
’ ‘ Э ʌ˘ Э ^
˘ ‡ ѝ ~ ˘ ʌ ˘ ʌ ʌ ^
ʌ ~ ʌ Лъ Ю Ю Ѣ ҙ ‘

Ѣ ҙ	
Ruijie#	
Ruijie#	

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8 ʌ ʌ^ Console˜ ˘ 8 ʌ ʌ˘ ʌ Лъ Â
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ʌ Â ˘ 8 ʌ
Â

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Ѣ ҙ	
Ruijie(config-line)# speed	8 ʌ ˘ Æ bps Â ʌ˘ ʌ ѝ 9600 ä 19200 ä 38400 ä 57600 ä 115200 ˘ 9600 Â

Ю ʌ ѝ 57600 bps˙

```
Ruijie# configure terminal //
Ruijie(config)# line console 0 //                    8
Ruijie(config-line)# speed 57600 //                  8 ʌ ѝ 7600
Ruijie(config-line)# end //
Ruijie# show line console 0 //
```

```
CON   Type   speed  Overruns
* 0   CON    57600  0
Line 0, Location: "", Type: "vt100"
Length: 25 lines, Width: 80 columns
Special Chars: Escape Disconnect Activation
        ^^x   none     ^M
Timeouts:    Idle EXEC   Idle Session
         never      never
History is enabled, history size is 10.
Total input: 22 bytes
Total output: 115 bytes
Data overflow: 0 bytes
stop rx interrupt: 0 times
Modem: READY
```

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Telnet TCP/IP ˘ ℸ

Â Telnet Client Ь й Э

Telnet Client Э è Ь Â Ю يي Э

Telnet б A ђ˘ Л telnet Ъ ђ Ѫ Ѓ è

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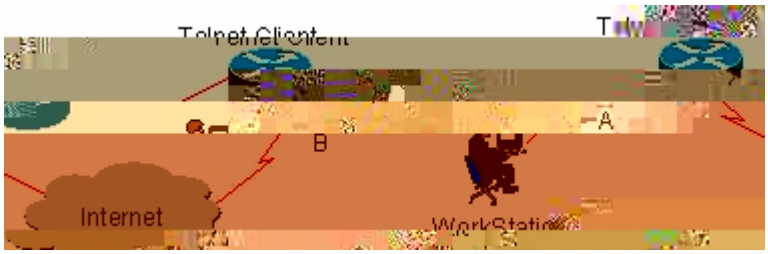

Л Ћъ Э telnet Ъ ђ Э ‘

Ъ ђ	

Ruijie# host [port] [{ A.B.C.D
interface-name}] [vrf-name] ф Ђ Ғ

Л Лъ ЛъЮ Ъ ҳ˘ Telnet Server Ь'

Ъ ҳ	
Ruijie#	Telnet Server Ь' Ъ ҳ IPV4 Ь Â

Л Лъ ˘ 8 ^ Ч ˘ Лъ
~ ˘ ˘ ˘ Â

Ч ˘ ˘ ˘ Ь Â
ң LINE Ю Ъ ҳ '

Ъ ҳ	
Ruijie(config-line)# minutes [seconds]	LINE Э˘ Ч ˘ ˘ Â minutes' Ղ

ˈ USB ˘ flash ˚ Â USB ˚ a
ɜ flash⅓ æ 512K ˘ ╟ ˚ ɨ Ą Â
flash ˆ a flash ˜ ѝ 512M Э˘ ⅓ æ 4M ˘ ѝ
ɨ flash ˚ ˘ ╟ ˚ Â
ˈ USB ˘ flash ˚ Â USB ˚ a
ɜ flash⅓ æ 4M ˘ ╟ ˚ ɨ Ą Â
flash ⅓ æ ˚ 110% ˘ ѝ ╖ ˘ ╟
˚ Â
ˈ 10MB ˚ ˘ ˥ flash ѝ 10MB
˘ flash ⅓ æ 11MB ˘ ╟ ˚ ɨ Ą Â

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Ruijie# cd directroy directory

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˚ ˚ ¨ ˘ ‡ tftp ╗ Э ﾊ˘ Ю˙

copy tftp:”//localtion/filename” flash:filename [vrf vrfname]

˚ ˘ ˚ ¨ ˘ ≠ ˚ ¨ ╗ Э ﾊ˘ Ю˙

copy tftp://localtion/filename flash:”filename” [vrf vrfname]

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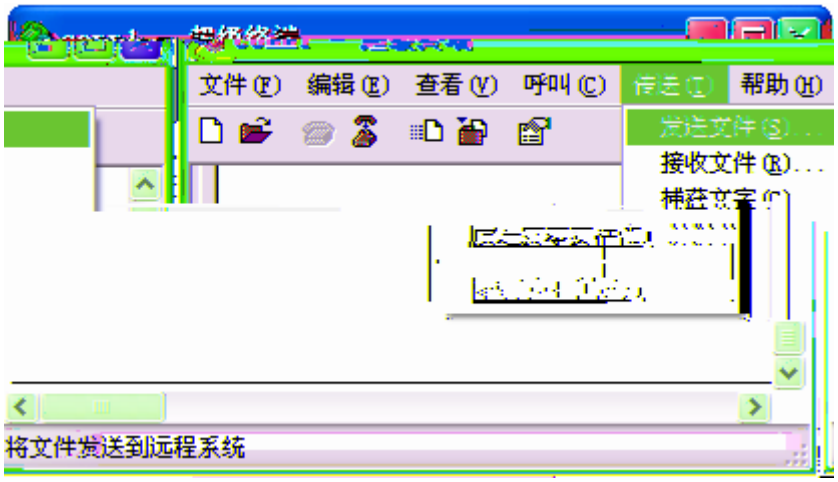
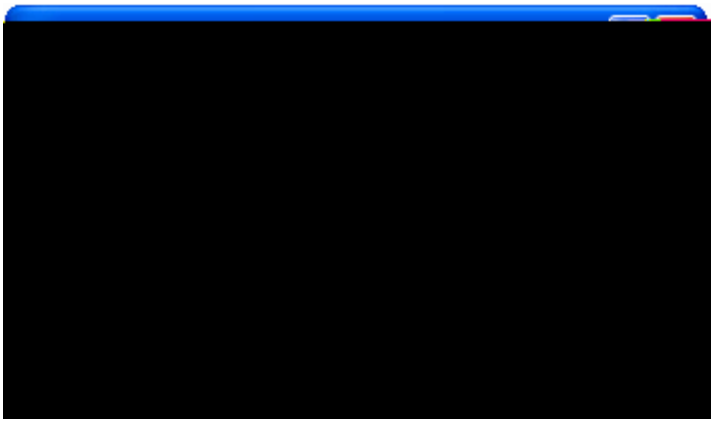
CLI Ъ ҂ Ю˙ Ю ˚ Ю ˙

Ю ˘ ˝I Windows ’ ł Ю ЛъЮ Ъ ҂ Ю ˚ ’ ł ў Windows ˘ “ ” “ ˚ ”╖ ˘ Юﻱ ˙



˚ ¨ ў Ю ˚ ˘ “Xmodem”˜ “ ”˜ ‡ Windows Лъ Â Юﻱ ˙



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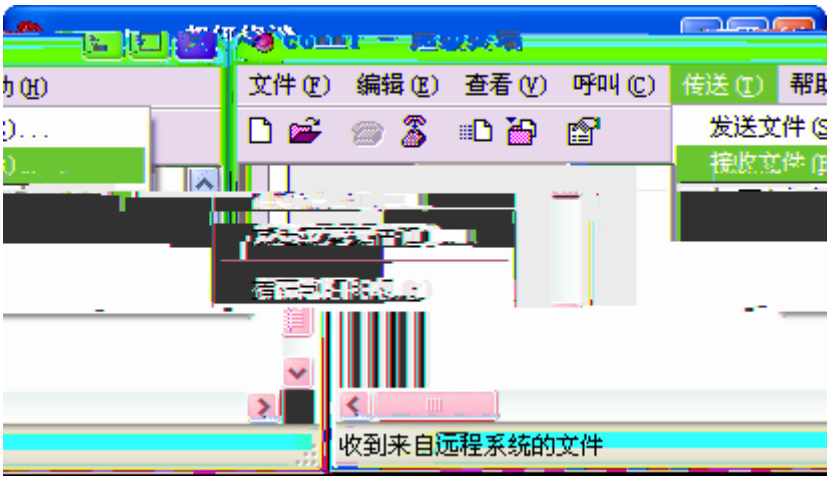
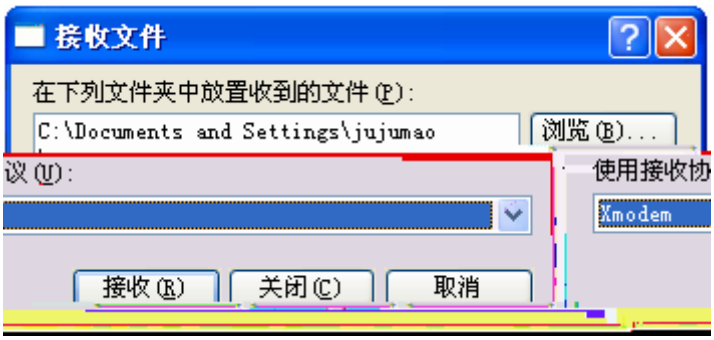
Ruijie# copy xmodem flash:filename	ÿ ў Ю ˚ Ѣ˙ ѝ filenameÂ

CLI Ѣ ҂ Ю˘ Ю ˚ Э ‘

Э ˇ ˝I Windows ’ ł Ю ЛЂЮ Ѣ ҂ Э ˚ ’ ł ў Windows ˇ “ ” “ ˚ ”╖ Â Ю‹ ‘



Э ˚ Æ ˇ “Xmodem”˝ “ ”˝ ˚ ˙ ˇ “ ”ł ˚ Â Ю‹ ‘



Ѣ ҂	
Ruijie# copy flash:filenamexmodem	ÿ Э ˚ filename ў

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copy xmodem flash:”filename” copy flash:”filename” xmodem

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5 6 ˘ a 7 ˘ ∧ Ʒ ‘

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

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6˜ ў ł ˘ ╟ ` ╥ ╟ ˘ ÿ è
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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 .....
Keeppoweron,don'tdrawoutthecardanddon'trestartyourmachinebefore
finished !!!!!!

è

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

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HTTP ` HTTP ` HTTP ` ч Â
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HTTP ` й HTTP Ь ъ WEB ъ Э ъ
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HTTP ` Ь Э ў Ь Э Ю ` ъ Э Â
Л й ЛЬЮ ‘
à Ь Â ъ . ”I CLI Ь ъ ъ ‡
` ъ Ь Â
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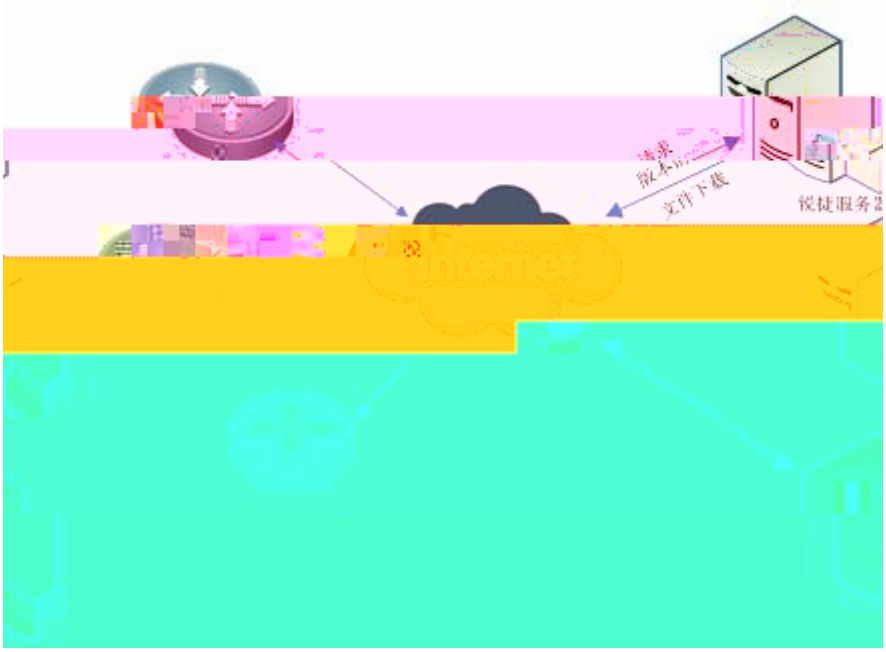
Ь à Ь ь ъ Ю ъ
à



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HTTP ` WEB ` ˚ Э ˘ Э ˚ ` Â

RFC1945 - Hypertext Transfer Protocol -- HTTP/1.0
RFC2616 - Hypertext Transfer Protocol -- HTTP/1.1
RFC1867 - Form-based File Upload in HTML

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HTTP /

RFC1945 - Hypertext Transfer Protocol -- HTTP/1.0
RFC2616 - Hypertext Transfer Protocol -- HTTP/1.1
RFC1867 - Form-based File Upload in HTML
RFC821 - Simple Mail Transfer Protocol -- SMTP
RFC822 – Standard for the format of arpa internet text messages -- MIME

Ю HTTP ` Â

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Ł	0.0.0.0 ` ˚ Ł ~
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HTTP Э ╖ ^ POST˜	
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Ф ҙ	
Ruijie# http check-version	`

Ruijie# http update { all	string}	` ˚

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╟ HTTP `

Ruijie# http check-version
files need to be updated: web, config, character-db, normal.
bin:
support identification of 31 kinds of popular games.
Ruijie# http update web character-db //` WEB ˚
updating files, please wait...
update success!

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ЮО HTTP ` Ł 0.0.0.0 ⁄ ⁄ 80 Ł ˘
˘ ЛЬЮ ‘

Ф ₹	
Ruijie# configure terminal	
Ruijie(config)# http update server host [port port-value]	` Ł
Ruijie# show running	

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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# http update server 10.83.132.1
Ruijie(config)# exit

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3. Â `
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ЮО HTTP ` ÿ ⁄ ` Â ÿ ⁄ ` ˘
˘ ЛЬЮ ‘

Ƃ ҳ	
Ruijie# configure terminal	
Ruijie(config)# http update set oob	ÿ ʌ `
Ruijie# show running	

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ÿ ʌ HTTP `
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# http update set oob
Ruijie(config)# exit

` ╟`

ЮЎ HTTP ` ѝ ╟` Â ʌ ЛЪ ѝ ╟` ╟ ˇ ¨ ╟` Â ʌ ЛЪ Ю Ƃ ҳ Â
ˇ ЛЪЮ ‘

Ƃ ҳ	
Ruijie# configure terminal	
Ruijie(config)# http update mode { auto-update | auto-detect | manual }	`
Ruijie(config)# http update auto-update { all | string }	╟` ˚
Ruijie(config)# end	
Ruijie# show running	

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HTTP ╟` URL à
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# http update mode auto-update
Ruijie(config)# http update auto-update url-db character-db route-db
Ruijie(config)# exit

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ЮЎ HTTP ╟` Â ╟` ˇ ˇ
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Ruijie# configure terminal	
Ruijie(config)# [no] feedback enable	Ո ՠ
Ruijie(config)# [no] feedback user enable	Ո ՠ

HTTP

Ruijie(config)#	
Ruijie# show running	

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2 ˚

Ruijie# configure terminal
Ruijie(config)# feedback subscriber test@qq.com
Ruijie(config)# feedback subscriber test@163.com
Ruijie(config)# end
Ruijie# show running

˘ /| ‘

Ð ₹	
Ruijie# configure terminal	

Ruijie(config)#
string1 string2

Ruijie# show running	

‘

#

```
Ruijie#    show feedback items
no. name    ignore
---------------------------------
1, no memory, NO
2, no flash, NO
3, high cpu, NO
Ruijie#      configure terminal
Ruijie(config)#          feedback ignore-item 2
Ruijie(config)#           end
Ruijie#    show feedback items
no. name    ignore
---------------------------------
1, no memory, NO
2, no flash, YES
3, high cpu, NO
```

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Ruijie# configure terminal	
Ruijie(config)# minute	Л
Ruijie(config)#	
Ruijie# show running	

‘

Л ѝ 5ў ‘

```
Ruijie#    config
Ruijie(config)#                              5
Ruijie(config)#
Ruijie#
```

˚ Ь ╖

5. Â ˚ Ь ╖
6. Âˆ Л ~ SMTP Ь

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Ruijie# configure terminal	
Ruijie(config)# no mail-service enable	▫ ┺╖
Ruijie(config)#	
Ruijie# show running	

▫ ┺╖ ▫ Л Лъ Ю Ѣ ҂ Â

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▫ ┺╖

```
Ruijie#      configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)#          no mail-service enable
Ruijie(config)#          end
```

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ЮЎ SMTP ┺ л ѝ Â Л ЛЬЮ ▪

```
Ruijie#
Enter configuration commands, one per line.    End with CNTL/Z.
Ruijie(config)#                                  smtp.qq.com
Ruijie(config)#                                test@qq.com password   test
Ruijie(config)#
Ruijie#
...
!
mail-client smtp-server smtp.qq.com
mail-client username test@qq.com password 093b10013
...
 Ruijie#
 Connect to SMTP server. OK!
 Login to SMTP server. OK!
 Send a test mail. OK!
Check SMTP OK!
```

Ї ЎД Ў Л ˘ ЉЊО ‘

1. Л
2. Л
3. Л
4.
5. ү Ь Л Ї
6. Port VLAN
7. Native VLAN
8. Л
9. ip/mac
10. LINE
11.
12. Л

Л

Л Ӯ

Ruijie ч Л Л Â Л Л Э
à ˚ Л˘ ˋ Лъ Л Â

Л Л Э à ˚ Л˘ Л Л Лъ б Л
˘ ≠ Л Лъ Л Â ˋ Dialer Л à NULL Л à Loopback Л à Л
Â Э ˘ Л Л˘ Â

Ruijie é Л Ю ˋ

Л	Л ▪▪	
Лъ Л	GigabitEthernet tenGigabitEthernet	IEEE802.3 à RFC894
Dialer Л	dialer	—
Loopback Л	Loopback	—
NULL Л	NULL	—
Л	GigabitEthernet 0/0.10( )	—

Л

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NULL ﻝˇ ﻝ Ћъ ѝ ﻝ IP ˇ Ѣ ҙ Ю̆ ℙ

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Ruijie# [interface-type interface-number]

GigabitEthernet 0/0 is DOWN , line protocol is DOWN
Interface address is: 192.168.10.10/24
MTU 1500 bytes, BW 2000 Kbit
Keepalive interval is 10 sec , set
Carrier delay is 2 sec
RXload is 1 ,Txload is 1
Queueing strategy: WFQ
5 minutes input rate 0 bits/sec, 0 packets/sec
5 minutes output rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 abort
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 2 interface resets

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Ruijie(config-if)#	
Ruijie(config-if)#	

Ruijie(config)# interface GigabitEthernet 0/0
Ruijie(config-if)# ip address 192.168.12.1 255.255.255.0

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Ruijie(config)# Interface
Ruijie(config-if)# shutdown

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ЛЬ ʌ ˇ ЛЬ VLAN Â

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ЛЬ ʌ Ь

ЛЬ ʌˇ Ь ў ˙

z ЛЬ ʌ

z IP

z ʌ ˆ Л ~

z ʌ ӯ ˆ Л ~

z ʌ ä ˬ ˆ Л ~

z ʌ MTUˇ Л ~

ЛЬ ʌ

Л Ю interface Ъ ҂ ʌ Â

Ъ ҂	
Ruijie(config)# interface-type interface-number	Ю interface Ъ ҂ˇ ʌ Â ≠ Л Ль Ю interface range interface range macro Ъ ҂ ʌ Â Ьж ʌ ˇ ѐ ˇ

Ю Gigabitethernet 0/1 ʌ ˙

Ruijie(config)# interface gigabitethernet 0/1
Ruijie(config-if)#

ʌ Ю Л ʌ Â

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Л Л Ю Ѣ ҁ˘ Л Â
˘ Л Â

Ѣ ҁ	
Ruijie(config)# {port-range | macro_name}	Л Â Ѣ ҁ Л Л Â macro Л Л Ж˘ Л Ж Â Л Л Л ˆ ,˜ Â ˘ Ѣ ҁ Л ˘ Â

Ѣ ҁ ˘ range ˙

Л ˙

slot/{ port} - { ɨ port}ʾ

slot/{ port} - { ɨ port}ʾ

ʺI Л ˘ TenGigabitethernet Л Л Л Â

Ю Ю Ѣ ҁ˙

```
Ruijie#  configure terminal
Ruijie(config)#  interface range GigabitEthernet  0/1 - 7
Ruijie(config-if-range)#  no shutdown
Ruijie(config-if-range)#
```

Ю ¦ Л ˆ ,˜ rangeʿ

```
Ruijie#  configure terminal
Ruijie(config)#  interface range GigabitEthernet  0/1-5, 0/6-7
Ruijie(config-if-range)#  no shutdown
Ruijie(config-if-range)#
```

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Л Л Ж Ч ҁ Л Â Ѣ ҁ
˘ ʺI Ю Ѣ ҁ Ж Â

Ѣ ҁ	

Ruijie(config)# macro_name interface-range	macro_name: a 32
Ruijie(config)# macro_name	

IO

GigabitEthernet0/1-4

– slot/{ port} - { port}
– slot/{ port} - { port}

IO

```
Ruijie# configure terminal
Ruijie(config)# define interface-range resource
GigabitEthernet 0/1-4
Ruijie(config)# end
```

IO

```
Ruijie# configure terminal
Ruijie(config)# define interface-range ports1to2N5to7
GigabitEthernet 0/1-2, 0/5-7
Ruijie(config)# end
```

IO ports1to2N5to7

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

IO ports1to2N5to7

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

IP

Ruijie (Config-if)# ip-address ip-mask [ ]	IP Лъ è
Ruijie (Config-if)# ip-address ip-mask [ ]	Л Лъ Л IP

Лъ Л IP ˘ Secondary IP è IP
Â

Ю˘ Лъ Л MAC Â ˘ Лъ Л MAC
Л Лъ ˘ ˚ Э MAC Â

Лъ Л MAC ˘ Л ЛъЮ Ъ ҷ˙

Ъ ҷ	
Ruijie (Config-if)# mac-address	MAC
Ruijie (Config-if)#	Л MAC

MAC Л Э ˘ Ю˘ a MAC
Â

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ѝ ╠ в Л ╖ ˘ Л Лъ ѝ Л ж ¨ Л˘ ≠
Л (Description) Â Л Лъ ЬЖ Л é ¨ ˘ ˘
Gigabitethernet 0/1ˆ A ж ˘ Л Лъ Л ѝ ľ Port for User
A Ł Â

Ъ ҷ	
Ruijie(config-if)# string	Л ˘ 32 Â

Ю Л Gigabitethernet 0/1 ˙

Ruijie# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 0/1
Ruijie(config-if)# description PortForUser A
Ruijie(config-if)# end

Ю˘ Л Л Â Л Лъ Л
Л Â Л˘ ‡ Л Э a ˘ Л Л
╖ Â ≠ Л Лъ Л Â Л
ч ˙ Up Down˘ Л ˘ Л ѝ down˘ ŭ ‡ ѝ up Â

Ƃ ₹	
Ruijie(config-if)#	ㅅ
Ruijie(config-if)#	ㅅ

Ю ㅅ Gigabitethernet 0/2

Ruijie# configure terminal
Ruijie(config)# interface

Ruijie(config-if)# { | | }	Â speed,duplex, auto

Ю Gigabitethernet 0/1 100M

```
Ruijie# configure terminal
Ruijie(config)# interface gigabitethernet 0/1
Ruijie(config-if)# speed 100
Ruijie(config-if)# duplex full
Ruijie(config-if)# end
```

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IEEE I

Master Slave ..

MTU

jumbo

Â MTU Â

MTU a Â

MTU MTU Â MTU Â

MTU 64~1500 4 1500 Â

SVI a MTU Â

Ruijie(config-if)# num	MTU Num <64-1500>

Ю Gigabitethernet 0/1 MTU

```
Ruijie# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitethernet 0/1
Ruijie(config-if)# mtu 64
Ruijie(config-if)# end
```

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Л ˘ Â Л Ю

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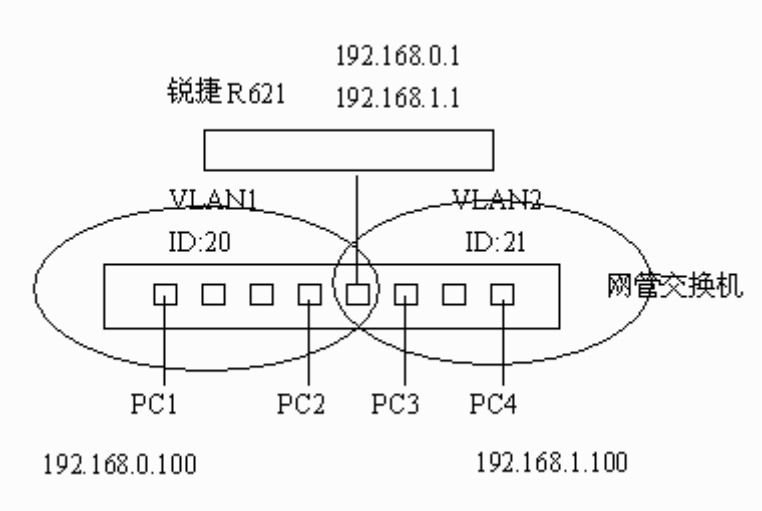
ﾅﾄ ｷ	
Ruijie(config-if)# [ ]	ﾉ link trap



z

é ‘

```
hostname "Ruijie"
!
interface gigabitEthernet 0/0
no ip address
!
interface gigabitEthernet 0/0.20
encapsulation dot1Q 20 // 802.1Q ˇ VlANID й 20
ip addr 192.168.0.1 255.255.255.0 // Л IP 802.1Q ˇ VlANID й
```

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л л ў Э a à
л Â л ц ЛЬЮ ŭ л' Loopback( ) л˘ NULL( ) л˘
Dialer(л) л Лъ л Â

л

Loopback( ) л ˚ л˘ UP Â Loopback
л ˘ Â Loopback л IP л Лъ ѝ
OSPF à ä̆ Telnet Telnet л Â
Loopback л Лъ л˘ л Лъ Лъ л Â

Ф ҳ

5 minutes output rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 abort
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets

ÿ Э Л Љ Loopback Л Љ ˘ Л б ˘ IP ˘
MTU ˘ Bandwidth Â

Л

Л њ NULL( ) Л Â Л Л Â NULL( )
UP з а ў ╠ Л ˘ NULL Л
˘ NULL Л Э ي a ╗ Â NULL Л Э a
Ѣ ђ^ a Л Ѣ ђ б ~ Â

NULL Л Â Л˘ Л Љ a
NULL Л a ˘ Ю Â

Ruijie(config)# ip route 127.0.0.0 255.0.0.0 null 0

Ю NULL Л Ѣ ђ Â

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˘ ㄹ ㅅ ¨ … ㄹ ㅅˇ ㅅㄹ Ф ㅋ

… ㄹ ㅅ Âㄹ ㅅ ㄹ ㅅ ㄹ IP

¦ Â

Ф ㅋ	
Ruijie(config)# slot-number/interface-number.subinterface-number	ㄹ ㅅ
Ruijie(config)# slot-number /interface-number.subinterface-number	… ㄹ ㅅ

è Slot-number/Interface-number ì ㅅ/ ㅅ ㅅˇ Subinterface-number ì ㅅ

⅄ ⍐

NBR ᵑ ˘ ⅄ ɛ́ ˘ ⅄ ˘ ў
Â ˘ ≠ ⍐ Â ⍦ ⅄
⅄˘ ≠ ɛ́ Â
Λ Л Ъ ˘ ⅄ ɛ́
Â ≠ Λ Л Ъ Ƀ ҳ ⅄ Â

a	1 à ⅄ ÿ ⍐ ˘ ÿ ⍐ ˘ ł Â 2 à NBR ᵑ a ˘ è ⅄ ɛ́ ˘ ≠ Λ Л Ъ ⍐ ˘ ł Â

Ю Â

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⅄	a˘ ᵑ a˘ ˘ Λ Л Ъ Ƀ ҳ ⍦ Â

⅄ ⍐

ЛЪЮ ˘ Λ Л Ъ ⅄ ‘

Ƀ ҳ	
Ruijie#	
Ruijie(config)# interface-name { lan | wan}	⅄ ѝ ˘ è ‘ interface-namė ⅄¨ Â lan‘ ѝ ⅄ Â wan‘ ѝ ⅄ Â
Ruijie(config)#	

Ruijie#	

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ɣ Ь ⅄⎡

ɣ Ь ⅄⎡

NBR ң ˇ é ɣ ⅄ Ь ⅄˘ Ь ⅄ ⅄ Л ⅄ ˘ ɣ ⅄
Â ˘ ⅄ ⅄ Ь ⅄ б è ˘ Ь ⅄ ⅄
◘ Ь ⅄ Â ⅄ Л ⅄ ɣ Ь ⅄⎡ ℸ ˘ ɣ ⅄⎡ ѝ Ь
⅄ Â ≠ ⅄ Л ⅄ ⎡ Ь ⅄⎡ ɣ ⅄˘ ╟ Â
ɣ Ь ⅄ ⎡ ˘ ⅄ Л ⅄ ⁸ ⅄ Ъ ҳ ˘ ≠ ⅄ Л ⅄ web Э Â

	⅄ Л ⅄ ÿ Э ɣ ⅄ Ь ⅄ ˘ ⅄ Э Ľ WAN Ł Ь ⅄˘ ⅄ Э Ľ LAN Ł ѝ ɣ ⅄ Â Ľ LANx/WANy Ł ⅄ Л ⅄ ɣ Ь ⎡ Â ˘ ≠ ⅄ Л ⅄ ÿ ң Â Ь ⅄ é ˘ é Ь ⅄ ѝ Ľ LAN ⅄ Ł˘ é Ь ⅄ ѝĽ WAN ⅄ ŁÂѝ ↖⎡ ˘ ɣ ⅄ ѝ ⅄ PORT˜˜ Ь ⅄ é Ľ LAN ⅄ Ł Ľ WAN ⅄ Ł ⎡ ˘ ≠ ↖ Â ɣ ⅄ Ь ⅄ ⎡ ˘ ⎡ Ľ LAN ⅄ Ł Ľ WAN ⅄ ŁÂ

a	ɣ Ь ⅄ ⎡ ˘ ɬ Â

Ь ⅄ ˘ ⅄˘ ⅄ ѝ Ь ⅄ ɬ˘ Э˘ б
◘ Ь ⅄ ’ Ь ⅄⎡ ɣ ⅄˘ è Э Â

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ㇵ ㄏ ㄕ Ь ㇵ (LAN/WAN)˙ num
ㇵ ㄕ lan ㇵ˙ no convert port num

Ф ҳ	

Ruijie#

4 ADSL ˘ ‡ έ 4 Ь ʎ˘ Ю 2 Ь ʎ˘
Â è 2 ɣ ʎ ʎ˘ ʃ Ь ʎ˘ Ь ʎ 4 ˘ ʎ Ћ
Â

Processed with reload? [no]y
Reloading...

γ Ь ⅄

Ruijie(config)#exit
Ruijie#show convert cur-info
PORT0 PORT0
PORT1 PORT1
PORT2 PORT2
PORT3 WAN3
PORT4 WAN2

Port VLAN ɣ ʌ ʈ ˇ 802.1Q

Ƒ ҳ	
Ruijie#	Â
Ruijie(config)# sub-interface-name	… 802.1Q ⊿
Ruijie((config-subif))#encapsulation dot1Q VlanID	802.1Q VLAN ID ⊿
Ruijie(config-subif)# min max [ ]	[min˘ max] ˆ min max˜ lan ⊿ ╗ VLAN Â tag lan ⊿ Э VlanID tag

a	⊿ γ ⊿ ⊿ Э vlan port Ƒ ҳ Â ЮЎ interface gigabitEthernet˝ fastEthernet˜ 0/0 ⊿ Э Â vlan port ˘ ˝I ⊿ Э dot1Q VLAN Â

Ƒ ҳ	
Ruijie# sub-interface-name	⊿ Э vlan port

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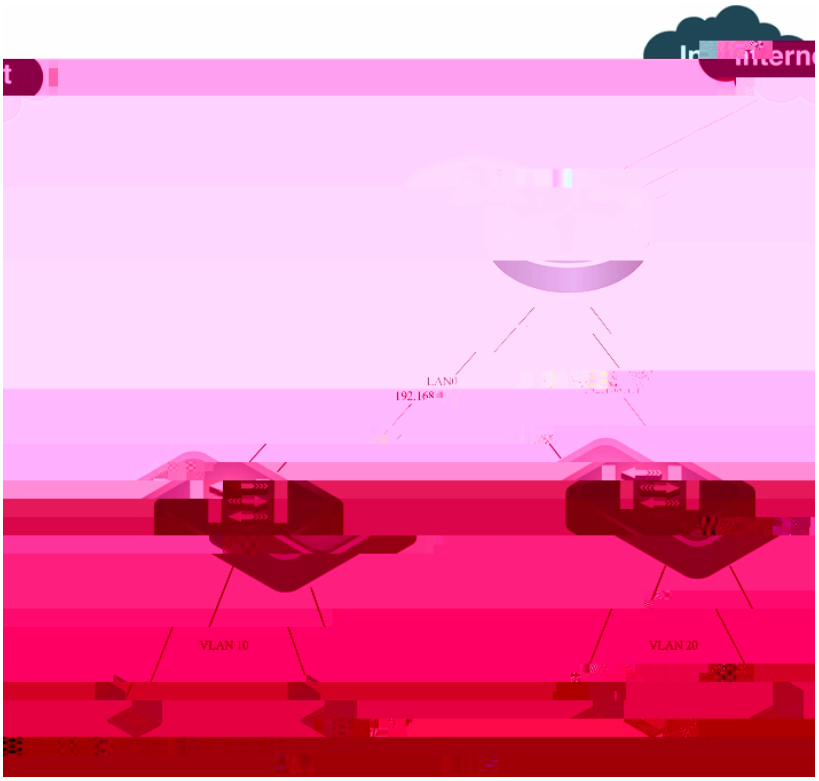
⊿ VLAN Э ƚ ч VLAN˝

1¨ VLAN 192.168.0.0/24 ў ˘ VLAN 192.168.1.0/24 ў Â

2· Лъ ⊿ 802.1Q



1˜ VLAN 10

```
Ruijie(config)#        interface gigabitEthernet              0/0.1
Ruijie(config-subif)#          encapsulation dot1Q        10
Ruijie(config-subif)#          vlan port      0 0 tag
Ruijie(config-subif)#          ip address       192.168.0.1 255.255.255.0
```

2˜ VLAN 20

```
Ruijie(config)#        interface gigabitEthernet              0/0.2
Ruijie(config-subif)#          encapsulation dot1Q        20
Ruijie(config-subif)#          vlan port      1 1 tag
Ruijie(config-subif)#          ip address       192.168.1.1 255.255.255.0
```

Ф ҳ	
Ruijie(config)# Sub_interface_number	… ⅄
Ruijie(config-subif)# vlan_num	802.1Q˜ VLAN ID
Ruijie(config-subif)# min_port max_port	VLAN LAN ⅄ ˘ ѝ
Ruijie(config)#native lan numvid value	LAN ⅄ Native VLAN˜ value ѝ 1-4085

⅄ Л Ъ no native lan num ⅄ lan ⅄ Native VLAN

show running-config ў

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LAN0 Ю ч ⅄ PC˜ PC1 PC2˜ ˘ LAN1 Ю ч ⅄ PC˜ PC3 PC4˜ ˘ PC1 PC2 ⅄ Л Ъ ˘ PC3 PC4 ⅄ Л Ъ ˘ a˚ VLAN ч ⅄ PC a Â

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ى Native VLANˇ LAN0 Native VLAN ù VLAN 10ˇ LAN1 Native VLAN ù VLAN 20ˇ ù a vlan tag Â

1˜ VLAN 10˘ a tag
Ruijie(config)# interface gigabitEthernet 0/0.1
Ruijie(config-subif)# encapsulation dot1Q 10
Ruijie(config-subif)# vlan port 0 0
Ruijie(config-subif)# ip address 192.168.0.1 255.255.255.0
2˜ VLAN 20˘ a tag
Ruijie(config)# interface gigabitEthernet 0/0.2
Ruijie(config-subif)# encapsulation dot1Q 20
Ruijie(config-subif)# vlan port 1 1
Ruijie(config-subif)# ip address 192.168.1.1 255.255.255.0
3) LAN0 Native VLAN ù VLAN 10˘ LAN1 Native VLAN ù VLAN 20
Ruijie(config-subif)#exit
Ruijie(config)#native lan 0 vid 10
Ruijie(config)#native lan 1 vid 20

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Л ǂ ˘ Л й Â

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Л Т Л й Л˘ Л Ль è Л ╕ Л
˘ з Л Ль α̈˘ α̈˘ α̈˘ α̈ Â
Л / 8 Л˘ Л Ль pc Л ˘ ˚ ǂ Â

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Ruijie#	Â
Ruijie(config)# mirror master port port-num slave port port-num [rx | tx | all]	slave Ѧ master Ѧ Э Â

show running-config Ѧ Â

Ѧ

Ѧ ή

lan0 lan1 ã lan2
Ruijie(config)# mirror master port 0 slave port 1 rx
Ruijie(config)# mirror master port 0 slave port 2 rx
Ю lan0 lan1
Ruijie(config)# mirror master port 0 slave port 1 all
Ю lan0 lan1
Ruijie(config)# no mirror master port 0 slave port 1 all

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∧ Л ъ ў ╟ ˇ Â ˇ ╖ ∧ Л ъ ╟
ˇ ў ╟ Â

ip mac ѣ ˇ ˇ ˇ a cpu
Â

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ip/mac ╖	

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Ruijie#	Â

```
Ruijie(config)#showpkt-block
ip : 192.168.1.200
ip : 192.168.1.201 mac: 0000.1111.0001
```

Ruijie(config)# line-number	LINE VTY ╗
Ruijie(config)# line-number	LINE VTY

Ю Л

⁸ LINE Ю Л Љ ˘ Л Љ Ѣ ҂ Â Ю VTY Л Љ ’ è TTY˝ a Â

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line number	Line
{ | | | }	Line Ю Л Љ
	LINE Ю a
	LINE Ю ѝ

Ю ⁸

LINE Ю ⁸˘ Л Љ Ѣ ҂ Â Ю Line Ю ⁸ Â ˘ Â

Ѣ ҂	
line number	Line
access-list-number { }	Line Ю ⁸
access-list-number { }	∧ Line Ю ⁸

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DLDP Лъ Ь à ˘ Ь Â и Лъ Ѳ
˘ Лъ DLDP Э ˘
˘ ˘ з ╕ æ Â

ў Л Лъ╡ Ю ű ˙

◘ ˙

Л Э ╟ ╖ ˘ и ◘˘ arp ˘ Л
mac Â Л a mac ◘ ˘ ╖
˘ и Â Л mac ł˘ и ╖ Â

╖ ˙

Ю Л Лъ ICMP echo Â ‡ Л
и UP Â ˘ ‡ echo ˘ Л ˘ ˘ и
◘ Â ˘ ╖ ˘ и Â

˙

Ю Л a Ą ╖ ╵ ˘ è Â
DLDP Л╵ ў ╟/ ╟ ˘ ╟ a ў ╟ arp icmp echo ˘ Л
icmp echo Â ˘ dldp ˘ ╟ Л
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z Лъ ╖
z Ю ip
z interval
z retry

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ﻩ ң Ћ ﻡ Э PPP(PPPOE˘ PPP over Ethernet)˘ DDR ﻩ Â è
DDR ﻩ˘ ‡ ﻩ˘ Ћ ł˘ ╠ Â
ﻩ ң PPPOE DDR(DDR Profiles)˘ Ћ ﻡ ﻩ ﻡ˘ é
ﻡ Â

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ÿ PPPOE ﻩ Ћ ˘ PPPOE ЋЮ Ь ‘
z Ћ ﻡ
z ﻡ
z

Ћ ﻡ

Ћ ﻡ Ł ЋЮ ¦ ‘
z ﻡ PPPOE
z Ћ ﻡ ﻩ
˘ Ћ ﻡ ˘ ﻡ ^ ~ Â
Ћ ﻡ PPPOE˘ ﻡ Ю ЋЮ Ъ ҳ‘

Ъ ҳ	
Ruijie(config-if)#	PPPOE

ﻩ ң PPPOE DDR Profiles ˘ Ћ ﻡ ﻩ
˘ ﻡ DDR Profiles ﻩ Â Ћ ﻡ ﻩ ˘ ﻡ
Ю ЋЮ Ъ ҳ‘

Ъ ҳ	

Ruijie(config-if)# pool-number	Л Ы ﾉ (ﾉ ╖ , ﾉ pppoe ┗)
Ruijie(config-if)#	Ъ ҙ Э Ъ ҙ ╖ ˇ , ≠ Л Ы ﾉ (╟ ﾉ ╖ , ╟ ﾉ pppoe ┗)

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dail-on-demand no-ddr ˇ dail-on-demand PPPOE DDR ╖ ˇ ў , DDR ╖ Â
no-ddr pppoe ╟ ﾉ ╖ , ╟ ﾉ pppoe ┗ .

ﾉ

PPPOE ﾉ PPP ﾉ Э ˇ ﾉ Э PPPOE ﾉ Â

ﾉˇ Ю ЛЬЮЪ ҙ'

Ъ ҙ	
Ruijie(config)# dialer-number	ﾉ
Ruijie(config-if)#	
Ruijie(config-if)# pool-number	ﾉ ˇ б Л Ы ﾉ Â
Ruijie(config-if)# seconds	^ ﾉ ~ ˇ ѣˇ ╟ Â
Ruijie(config-if)#	PPP˝ PPPOE PPP Э Â
Ruijie(config-if)# 1488	ĩ ѝ 1488 Â
Ruijie(config-if)# dialer-group-number	б dialer-list ˇ ﾉ ‡ Â
Ruijie(config-if)# username password	¨ Â

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Л Э Ъ ҙ Ъ ҙ ѝ ﾉ Ъ ҙ Л Ы ˇ è Ъ ҙ Â Ω MTU ѝ 1488˝ ў ‡ Â

PPPoE Ю ﾉ IP ˇ ‡ Ю Ъ ҙ PPPoE ˇ Л Ы Â

PPPOE ˘ ў Ю

z ЬЖ ﾊ ‡

z ﾊ

PPPOE è ╖ NAT˘ ‡ è Â é
˘ Â

ЬЖ ﾊ ‡˘ Ю ЛЬЮ Ъ ҂

Ъ ҂	
Ruijie(config)# number dialer-group protocol-name { | | access-list-number | access-group}	ЬЖ ﾊ ‡

ﾙ IP Ю ˘ ﾙ ˘ Лъ ѝ
PPPOE ﾙ ˘ ﾙ ѝ PPPOE ﾊ ﾙ ﾊ Â

ﾊ ˘ Ю ЛЬЮ Ъ ҂

Ъ ҂	
Ruijie(config)# 0.0.0.0 0.0.0.0 dialer-number [ ]	Â permanent ˘ ¯ ﾙ ^ enable-timeout˘ ˘ ﾙ down Â

\ !
ﾊ ﾊ Лъ a ˘ ﾊ Лъ Â ж ˘
ﾊ ˘ ў ‡ ﾊ Â

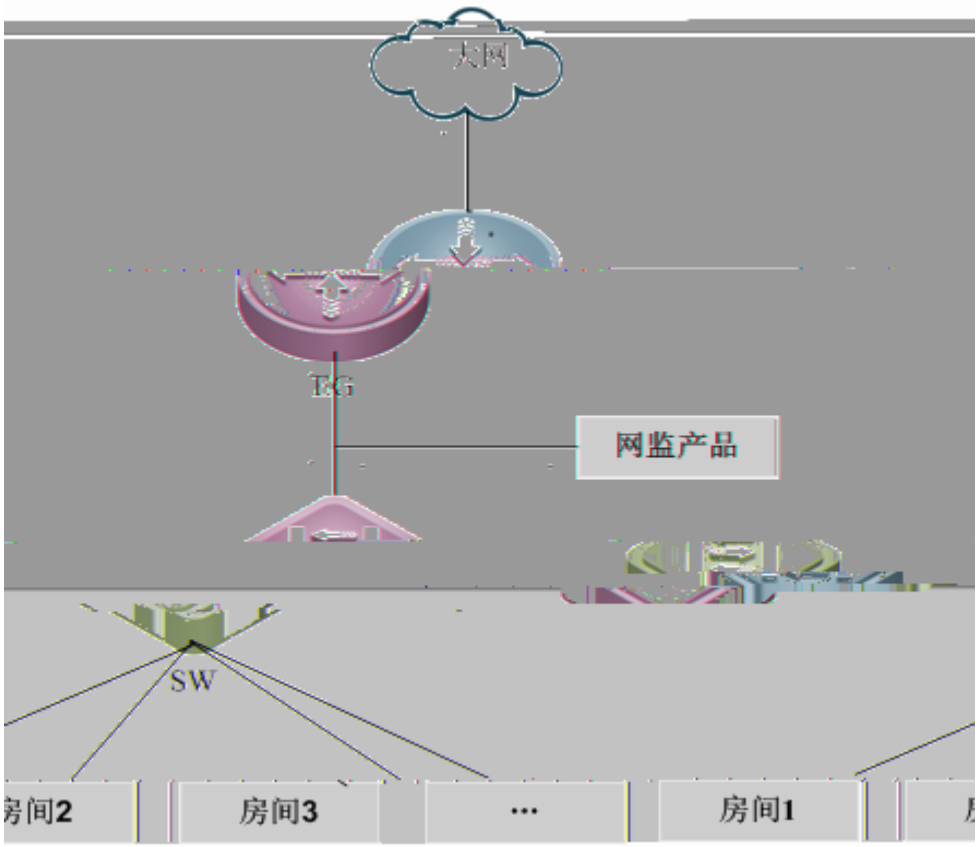
PPPOE,˘ EXEC Ю ЛЬЮ Ъ ҂

Ъ ҂	
Ruijie# { | }	Ъ ҂ ˘ tunnel session Â
Ruijie# dialer-number Ruijie#	ﾙ ˘ ў ¯ IP Â

ﾊ PPPOE ﾊ Â

1. ѝ 5ǂ ˘ 5ǂ ˘ ╟ Â
2. ǂ ¨ ЖЖ Ȯ ℮ ˊ

Vlan ╖ ˘ ¨ ˘ й vlan, trunk ⅄˘
a ⅄ Ю˙ ⅄Љ vlan ⅄ Â VID
VID ˚ lan ⅄ Â é Ю˙



ǂ ˋ EG ⅄ ⅄^ ⅄˜ б ˘ supervlan ╖ з
⅄ęGerminalEG o ˜ vlanв в ɹ

é Л Ю Â

VLAN-TERMINAL è ╖ ˘ ˘ ¨ a è Ң
Â CLI ˘ ╟ ÿ Э VID ˘ tag Â
˘ TAG ˘ ’ TAG˘ ł
, ˘ ˘ TAG
˘ Ɪ˘ Â

Ю vlan terminal Â

╖	
vlan terminal ╖	
vlan terminal vid Э	200

„ ˆ ˜ vlan terminal ╖
„ ˆ ˜ ⁸ Л VID
„ ˆ Л ˜ VID Э

╖

Ю˘ vlan terminal ╖ ’ vlan terminal˘ Ю ’

Ƌ ҂	

Ruijie# configure terminal	
Ruijie(config)# vlan-terminal enable	vlan terminal ╖
Ruijie(config-if)#	
Ruijie# show vlan-terminal	

vlan-terminal ╖ ˘ Л Љ Ю Ђ ђ

‘

vlan terminal
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# vlan-terminal enable
Ruijie(config)#

Э

Ю˝ VID Э ѝ 100 ˘ a ˘ ˘ a Л Љ
˘ Л Љ ЉЮ Э ‘

Ђ ђ	
Ruijie# configure terminal	
Ruijie(config)# vlan-terminal per-vlan num	vlan Э ˘ num ↰ ѝ 1~1000 Â
Ruijie(config-if)#	
Ruijie# showvlan-terminal	

˘ Л Љ Ю
‘

vlan Э ѝ 15
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# vlan-terminal per-vlan 15
Ruijie(config)# end
Ruijie#

8 ↰

ў ѝ ↰ VID˝ Л Љ ’

Ђ ђ	
Ruijie# configure terminal	
Ruijie(config)# interface interface-name	↰

Ruijie(config-if-interface-name)# vlan-terminal vlan-list vlan-list	8 Л VID˘ vlan-list ѝ : num1˘ num2 ˘ num3-num4˘ num5-num6
Ruijie(config-if-interface-name)#	
Ruijie# showvlan-terminal	

˘ Л Љ Л Ю Ъ Â

‘

Л 0/1 vid ѝ 2˘ 5˘ 30~60˘ 90~200

Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface gigabitEthernet 0/1
Ruijie(config-if-GigabitEthernet 0/1)# vlan-terminal vlan-list 2,5,30-60,90-200

Ruijie(config-if-GigabitEthernet 0/1)# end

VLAN-TERMINAL

Л Љ Ю Ъ vlan terminal

Ъ	
Ruijie# showvlan-terminal	vlan terminal

‘

Ruijie# show vlan-terminal
vlan-terminal: enable
per-vlan: 20
Gi0/1: 1, 2, 60-80
Gi0/2: 4, 100-20

Э

VID Э VID Э IP

Ъ	
Ruijie# show vid-info	VID Э VID Э IP

‘

Ruijie# show vid-info
vid count ip
100 1 192.168.1.2
102 2 192.168.1.10,192.168.1.12

Ł

ĵ ŽĄ Ū IP Ł ˘ ЛЬЮ ˙

1. IP Ł
2. IPv4
3. Л
4. NAT
5. Л

б Ь

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IP 32 Æ ɣ ⁸ ˘ ѝ ˘ ⁸ Â ⁸ ˘ ˦ ѝ ˘ 8 Æ˘ ÿ 0~255˘ ľ . Ь ѧ ˘ ľ 192.168.1.1 Ь ⁸ IP Â

IP ¨ ЂЌ˘ IP Â 32 Æ IP ч ˦ ‘ 1˜ ˦ ’ 2˜ ˦ Â ˦ ŭ Æ ˘ IP ѧ Ѣ ˦ Â

A ˘ Æ ѝ ľ 0 Ь˘ 7 Æ ѧ˘ 24 Æ Â 128 A Â

B ˘ ч Æ ѝ ľ 10 Ь˘ 14 Æ ѧ˘ 16 Æ Â 16,348 B Â

C ˘ Ь Æ ѝ ľ 110 Ь˘ 22 Æ ѧ˘ 8 Æ Â 2,097,152 C Â

D ˘ Æ ѝ ľ 1110 Ь˘ ѐ Æ ѝ Â

æ ù ľ 1111 Ł a ł ˘ ù E ˘
Â

˘ IP ˘ IP ł Â
б ˘ ‡ ł IP Â ﻱ ﻱ Ⴄ Л Ъ ä ﻱ
ˆ CNNIC˜ ˘ IP ł ù ﻱ б л ł Ѽ л
ˆ ICANN,Internet Corporation for Assigned Names and Numbers˜ Â ù
˘ a IP ˘ ≠ a ł ˘ ł ж Â

Ю ù б Л ˙

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

è ж Ь ˘ a ˘ ł
˘ ‡ IP ÂЮ ù
˘ RFC 1918 Ж˙

A	10.0.0.0~10.255.255.255	1 A
B	172.16.0.0~172.31.255.255	16 B
C	192.168.0.0~192.168.255.255	256 C

IP à TCP/UDP Л è ł ˘ RFC 1166 Â

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IP Ł ЛЬЮ ˘ Л ˘ è Ł Л Лъ é
ā ŭ Â

z Л IP ^ ~

z ^ ARP˘ ^ Л ~

z IP ^ Л ~

z IP ^ Л ~

z ^ Л ~

Л

Л IP ˘ Л Лъ IP ˘ Л IP ˘ Л
IP Â

ĵ Л IP ˘ Л ЛЬЮ Ъ ҳ˙

Ъ ҳ	
Ruijie(config-if)# ip-address mask	Л IP
Ruijie(config-if)#	ᴎ Л IP

≠ 32 ˘ IP ŭ ѝ ĵ Â ˘
ѝ “1” IP æ ѝ ĵ ˘ ѝ “0” IP æ ѝ ў
ĵ Â A ѝ “255.0.0.0” Â Л Лъ
ĵ ˘ ĵ ў ĵ æ ≠ ѝ ĵ ˘ ў ˘
╕ ˘ ѝ Â

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Э˘ æ Л Лъ ў ĵ æ Â ᴎ ң Л ÿ
ĵ ÿ ᴎ Â

б Л IP Ю Ł ˘ ЛЬЮ Ł ѝ Л ˘ Л Лъ ā
ŭ ˙

z Л IP

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ᴎ ң Л Лъ Л IP ˘ è ѝ ў IP ˘ è ѝ IP Â
IP Э ⁸˘ IP б ў IP Лъ IP а˘
Â ˘ IP ˘ ЛЬЮ Ю IP ˙

z ў Â ˘ C ˘ Л ĵ 254

л ў Â ў 254 л ˘ C a ˛ ˘ ˛ ˩ C
Â ч ˘ Љ IP Â

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` IP Â ˘ IP Â

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IP ˘ Â a ч ч Љ Э л
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IP ˘ ў IP Â Э л IP ˘
‡ è ≠ ˚ IP Â è ″I ˛ IP ˘ л Љ
й ў Â

IP ˘ л ЉЮ Ƀ ҳ ‘

Ƀ ҳ	
Ruijie(config-if)# ip-address mask	л IP
Ruijie(config-if)# ip-address mask	л л IP

^ ~

˘ IP ч ‘ 1˜ ˘
˘ ˘ Э
MAC ˘ ¯ Э й MAC ˘ MAC Э Ҳ IP ’ 2˜
˘ Э Ҳ IP ˘ ˚ ≠ Â

Э ч л IP ˘ 48 MAC Â IP
MAC й ^ ARP˜ Â MAC IP й л ą̈

ARP Л Ethernet II ˇ л ң ≠ ѝ ARPA Â

ARP Л ╟ ˉ IP MAC Â ˇ ARP
ă ˇ ARP ≠ ˇ Љ Â
ˇ ў ‡ a ARP Â

ARP ˇ Л ЉЮЅ ҂

Ѕ ҂	
Ruijie(config-if)# seconds	ARP ˇ 0-2147483˜ è 0 a ◘
Ruijie(config-if)#	

Ю˜ ѝ 3600 ˇ ¨ 1 Â

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л Л ARP ш ARP ˉ Â л Л arp ╖ ѣˇ ˉ arp
ˇ ˇ ˉ ARP ˇ ў ‡ a ˉ Â ARP
ˇ Л ARP ◘ a ˇ з ARP Â

Ѕ ҂	
Ruijie(config-if)#	╟ л л Л arp ╖
Ruijie(config-if)#	

Ю˜ л л Л arp ╖ Â

a _ É !

ARP ◘ ˇ arp ˇ mac Л
◘ з Л ARP ╖ ˇ ‡ log˜ з a ARP Â

╟ ˉ ╖

л ╟ ARP ˉ ╖ ѣˇ л a Ѧ ˉ ╟ ARP ˇ ў ╟ ARP
Љ ARP Â ˉ ╟ ARP , ◘ ѝ
ARP ˇ ‡ ◘ˇ ◘ ѣˇ ╟ ARP Â

Ѕ ҂	

8 Э Л ARP ˘ Л Ъ clear arp trusted Ъ ҁ Â

Ъ ҁ	
Ruijie(config)# [ip [mask]]	Л ARP

a

Ъ ҁ Э Л ARP ˘ Л a
Э Â Ю ip Ъ ҁ Л ARP Â

Ю˘ Л ARP a □˘ Л ARP □˘

arp trusted aging Ъ ҁ Â

Ъ ҁ	
Ruijie(config)#	Л ARP □

Л ARP ˘ Л Ъ Ю arp trusted number Ъ ҁ
Â

Ъ ҁ	

a 1DxHexl ¶ xEa õ € žÑ y5D ƒ P¶•`eaï (2âÕ28D8À! Ì •áÓÁ 6• { 3.5 87.845 68 3TT/ G0/ j03 1RB

Ruijie(config)# number

ѝ Э ў Â ↙ ң ч ‘ 1˜ ₫
˘ ѝ ў ˘ ў ǂ ѝ ľ 1 Ł’ 2˜
˘ ѝ ў ˘ 32 æ ѝ ľ 1 Ł Â
IP ˘ є ǂ IP Â Љ ⁸
Â

IP ˘ ⁄ ˘ ш ˘
ѝ Â ╕ ⁸ ˘ є Â
Ү ˘ Â

ā ╕ ˘ ₫ ˘
IP ⁄ ₫ а Â

˘ RFC 919 RFC 922 Â

˘ ЉЮ Ł Ł ˘ Â

z ₫

z … IP

₫

IP ₫ ѝ IP IP ˘ ѝ 172.16.16.255
ѝ ₫ Â ң а Â

б IP ₫ ˘ ₫ Â
₫ ł˘ ₫ ѝ ˆ
IP ѝ ľ 1 Ł ˜ ˘ ł Љ Э ў Â

⁄ Љ ↙ Э˘ ╠ ₫ ╗ ˘ ↙ ⁄ Љ
₫ Â Ф ҳ ⁄ ₫ ł ˘ а є
₫ Â

↙ Э˘ ⁄ Љ ЊЖ ⁸ ⁸ ₫ Â ЊЖ ˘ ⁄
ЊЖ ₫ Â

₫ ˘ ↙ ЉЮФ ҳ‘

Ф ҳ	
Ruijie(config-if)# [access-list-number]	↙ Э˘ ╠ ₫
Ruijie(config-if)#	↙

…

ˇ è ù l' 1 Ь ˇ ù 255.255.255.255 Â ﾍ ң ﾉ Л Ъ
ˇ Ю ң è ˇ з ﾉ Л Ъ Â

255.255.255.255 ˇ ﾍ Л Ъ Ю Ъ ҳ '

Ъ ҳ	
Ruijie(config-if)# ip-address	…
Ruijie(config-if)#	ﾍ

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ă

ﾉ Л Ъ ă à à ˇ ў Ь '

1) ARP ă '

2) ў ¨ IP ,

3) Â

Ъ ҳ	
Ruijie#	ARP ă
Ruijie# {network [mask] | *}	IP

ﾉ Л Ъ IP à ă à ˇ ˆ
╠ Â ﾉ ˇ ﾉ Л Ъ ł
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ˇ Л Ъ Ю Ъ ҳ '

Ъ ҳ	

Ruijie#	ARP ă
Ruijie#	IP ARP ă
Ruijie# [interface-type interface-number]	⅄ IP
Ruijie# [network [mask]]	
Ruijie#	
Ruijie# ip-address [bytes] [times] [seconds]	⅄

ЛЬЮ IP

z IP

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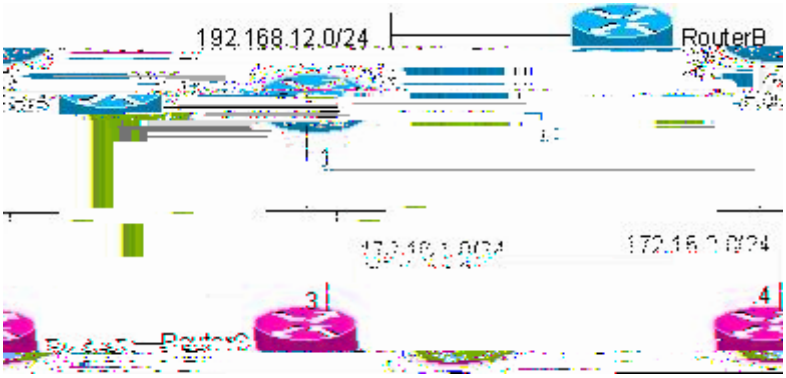
IP ĵ يي ЮيиÂ



RIP ˘ ⅄ ѝ RIPv1˘ C Э ⅄ Лъ 172.16.2.0/24 ˘ D Э ⅄ Лъ 172.16.1.0/24 Â

z ɛ́

RIPv1 a ˘ ¨ a ˘ 172.16.1.0/24 172.16.2.0/24 ч ˘ C 192.168.12.0/24ĵ ˘ ˘ C D Э a ⅄ Â RIP ˘ ⅄ б ˘ ˘ б ⅄ ѝ Â ˘ ⅄ Лъ A B˘ 192.168.12.0/24 Э 172.16.3.0/24˘ ч ĵ Â ЛЬЮ ⅄ A B Â

A ˙

```
interface GigabitEthernet 0/0
ip address 172.16.3.1 255.255.255.0 secondary
ip address 192.168.12.1 255.255.255.0
!
interface GigabitEthernet 0/1
ip address 172.16.1.1 255.255.255.0
!
router rip
network 172.16.0.0
network 192.168.12.0
```

B :

```
interface GigabitEthernet 0/0
ip address 172.16.3.2 255.255.255.0 secondary
ip address 192.168.12.2 255.255.255.0
!
interface GigabitEthernet 0/1
ip address 172.16.2.1 255.255.255.0
!
router rip
network 172.16.0.0
network 192.168.12.0
```

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IP Ь ˘ ЛЬЮ Ь˘ ЛЬЮ Ь Л Ь˘ Л Лъ ˙

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z IP

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Ъ ҳ	
ip-address	

˘ Ю Ъ ҳ Â

Ъ ҳ	

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IP Ь 8 IP ˘ ICMP Ь Â
˘ Ь ICMP ў è Â ICMP Ђ
RFC 792 Â

IP ˘ Л ЛЬЮ Ь·

z ICMP a Л

z ICMP ӗ

z ICMP

z IP MTU

z IP

a Л

Ruijie(config-if)#	ICMP ӑ

Э ˘ ѝ ѧ ˘ ѧ Ъ
ICMP ˘ ICMP Â ѧ ѭ
ѧ Ъ ICMP ˘ Ю Â

ICMP ˘ ѧ ЪЮ Ѣ ҳ'

Ѣ ҳ	
Ruijie(config-if)#	
Ruijie(config-if)#	

ѧ MTU ĩ ~ ˘ MTU ÿ ѧ
ĵ ˘ ŭ ‡ Â

ѧ ѭ ѧ MTU ˘ з MTU ѧ ◘ IP MTU ѧ ◘˘ IP MTU
╠ б ѧ MTU Â ѧ а ˘ IP MTU ˘ ѧ MTU а ѧ Â
Э ѧ˘ ˚ MTU Â

IP MTU ˘ ѧ ЪЮ Ѣ ҳ'

Ѣ ҳ	
Ruijie(config-if)# bytes	MTU ˘ 68~1500
Ruijie(config-if)#	

ѧ ѭ IP Â IP ˘ IP ш ѣ ѣ
˘ RFC 791 Â ѐ
˘ ╠ ' ˘ ICMP
˘ ѣ Â ѧ ѭ Ю IP Â

IP ˘ ЪЮ Ѣ ҳ'

Ѣ ҳ	
Ruijie(config)#	IP

Ruijie(config)#	IP

й ˘ (Prefix Tree+Adjacency) Ruijie Express
Forwarding REF˜ Â REF ˘ a Л
ǂ ˘ a Ą Cache ˘ CPU Ą ╕ Cache ˘ CPU
ă ˘ ≠ Â
REF Ю ч ˚ ‘
„ Prefix Tree

Â Ƀ ‡ IP ˘ Â ˘
Prefix Tree б Radix Tree a ˚ ˘ й M-Tries Tree
Â M-Tries Tree Prefix Tree Radix Tree
˘ Prefix ≠ ˘ ∴ Â
„ Adjacency

Â Л ˘ Ю ˘ Ю ˚ ˘
Â Ƀ ˘ ˘ ł ¯
Л Â й ˘ ’ й
˘ Ю й Â
REF ǂ й Ь ‘
1) REF ’
2) Prefix Tree è ’
3) Ƀ ł˘ Ą Л˘ ł
Л Â

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NBR ң ˘ Л Э ˘ a Â

˘ Ь IP Â REF ˘
IP/MASK Ю ˘ ¯ ˘ ˘

Â IP Ð ˘ IP ˘
è Â é Ь Ю
1. IP IP Â IP ˘
ŭ Â Â
2. IP IP IP ˘ IP IP ˘
Â
3. IP IP ˘ IP ˘ ˘
˘ IP ÿ˘ Â
˘ ЛЬЮЂ ҳ˙

Ђ ҳ	
Ruijie(config)#	ѝ IP + IP
Ruijie(config)#	ѧ IP + IP ˘ ¯
Ruijie(config)#	ѝ IP
Ruijie(config)#	ѧ IP ˘ ¯

б

/ѧ ╟ ˘ a ў ╟ ╕ ˘
ЛЬ Â
˘ ЮЂ ҳ˙
”
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”
”

¯ REF ˘ ˘ ЛЬ
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Ђ ҳ	
Ruijie# [ ]	/ REF

˘ Â /ЛЬ ЛЬЮЂ ҳ ˙

Ђ ҳ	

Ruijie# [| | ip | (interface_type interface_number) |]	/ʌ Лъ à à IP à ˌʌ Â

IP

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˘ Ъ ३ Â

Ъ ३	
Ruijie# [ip_protocol_number urce_ip source_ip_mask_len dest_ip dest_ip_mask_len]	

/

/ ˘ Ъ ३ Â

Ъ ३	
Ruijie#	/

/

/ ˘ Ъ ३ Â

Ъ ३	
Ruijie#	/

/

/ ˘ Ъ ३ Â

Ъ ३	
Ruijie#	/

/

˘ ip session timeout Ъ ३ Â

Ъ ३	
Ruijie# {	a˚ a˚
} num	

/

Ю Ю˙

Ъ ३	
	10s
	10s
	10s
	10s
	300s
	300s
	300s
	60s
	10s
	1800s
	60s
	30s
	10s
	10s
	10s

	10s
	30s
	600s
	60s

ЛЬЮ ‘

”

”

”

˘ Â ˘ Л a

˘ Л Лъ tcp-established udp-established ¯ Л Â Ю

ip session timeout tcp-established 600
ip session timeout udp-established 300

˘ TCP ˘ ѝ ˘ tcp-closed à

tcp-close-wait à tcp-fin-wait à tcp-syn-sent à tcp-time-waiť ѝ Â Ю

ip session timeout tcp-closed 5
ip session timeout tcp-close-wait 10
ip session timeout tcp-fin-wait 10
ip session timeout tcp-syn-sent 5
ip session timeout tcp-time-wait 5

˘ TCP ˘ ѝ ˘

tcp-closed à tcp-close-wait à tcp-fin-wait à tcp-syn-sent à tcp-time-waiť ѝ Â Ю

ip session timeout tcp-closed 5
ip session timeout tcp-close-wait 10
ip session timeout tcp-fin-wait 10
ip session timeout tcp-syn-sent 5
ip session timeout tcp-time-wait 5

UDP ˘ ѝ ˘ udp-connected à udp-closeď

udp-connected Â Ю

ip session timeout udp-closed 5
ip session timeout udp-connected 600

Ruijie(config)# address-pool start-address end-address { mask | prefix-length}	Ня IP ˘ NAPT˘ Ня IP
Ruijie(config)# ccess-list-number ip-address	Ня ˘ Л Ē
Ruijie(config)# access-list-number {[address-pool] | [interface-type interface-number]} [vrf_name]	Ня ╟ ˘ overload ˘ ў Â
Ruijie(config)# interface-type interface-number	Л
Ruijie(config-if)#	Ня Л
Ruijie(config)# interface-type interface-number	Л
Ruijie(config-if)#	Ня Л

NAPT Л Љ IP ˘ ≠ Л Љ Л IP Â Л Љ ˘ Л Љ 64512 NAT Â a ˘ Л Љ Ня ŭ Â

ч ў ˚ IP ˘ ‘Ω ў ˚ IP ˘ й Â ч ў а Л ˘ й й ў Â NAT ж ˘ NAT˘ ў й Л ў ˘ Л Â NAT ˘ è ў й ч ў ‘ 1) ˘ Э ’ 2) ˘ Л б ˘ Л Љ NAT ╟ NAT Â NAT˘ ЉЮФ ę‘

h

Л ў TCP ˇ Л Л ў TCP Ь Â ˇ Л Лъ
NAT TCP Â NAT … Л ў TCP Ьˇ ў
Л ў ˇ ł ˇ ¦ Â
ˇ ЛъЮ Ъ ҳ'

Ъ ҳ	

Ruijie(config)#

„ TCP

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ЛЬЮ ˘ ÿ NAT Net200 ƚ ˘ ЬЖ ѝ
200.168.12.2~200.168.12.100 Â ʌ ƀ 1 NAT Â
!
interface GigabitEthernet 0/0
ip address 192.168.12.1 255.255.255.0
ip nat inside
!
interface GigabitEthernet 0/1
ip address 200.168.12.1 255.255.255.0
ip nat outside
!
ip nat pool net200 200.168.12.2 200.168.12.100 netmask 255.255.255.0
ip nat inside source list 1 pool net200
!
access-list 1 permit 192.168.12.0 0.0.0.255

˘ è NAPT Â ʌ ң 8.1 ЛЬ Э ˚ ╟ NAT ╟
NAPT Â ЛЬЮ ˘ ÿ NAT Net200 ƚ ˘ ʌ ЬЖ
200.168.12.200 IP ˘ Â ʌ ƀ 1
NAT Â
!
interface GigabitEthernet 0/0
ip address 192.168.12.1 255.255.255.0
ip nat inside
!
interface GigabitEthernet 0/1
ip address 200.168.12.200 255.255.255.0
ip nat outside
!
ip nat pool net200 200.168.12.200 200.168.12.200 netmask 255.255.255.0
ip nat inside source list 1 pool net200
access-list 1 permit 192.168.12.0 0.0.0.255
NAT ˘ ʌ ЛЬ ŭ ˙
Ruijie# show ip nat translations
Pro Inside global Inside local Outside local Outside global
tcp 200.168.12.200:2063 192.168.12.65:2063 168.168.12.1:23 168.168.12.1:23

NAPT ʌ ЛЬ Ь Â Ь ˘ NAT Ь ˘
ł NAPT Â ˘ Э Ь ˘
Ь Э Â
Ю ʌ WEB Ь 192.168.12.3 IP200.198.12.1 80 ʌ Â
Ъ ҳ Ю˙
!
interface GigabitEthernet 0/0

```
ip address 192.168.12.1 255.255.255.0
ip nat inside
!
interface GigabitEthernet 0/1
ip address 200.198.12.1 255.255.255.0
ip nat outside
!
ip nat inside source static tcp 192.168.12.3 80 200.198.12.1 80
```

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ЛЬЮ ˘ НЖ ў ˘ ў TCP ˘
ƚ Л ў Э˘ ÿ ƚ Â Realhosts НЖ ў ˘ 1
НЖ ў Â ў ў Â ЛЬЮ ˘ Л TCP ң
˘ è a Л˘ Л NAT Â ACL ѝ ѣ IP ACL Â

```
!
interface GigabitEthernet 0/0
ip address 10.10.10.1 255.255.255.0
ip nat inside
!
interface GigabitEthernet 0/1
ip address 200.198.12.1 255.255.255.0
ip nat outside
!
ipnatpoolrealhosts10.10.10.210.10.10.3netmask255.255.255.0typerotary
ip nat inside destination list 100 pool realhosts
!
access-list 100 permit ip any host 10.10.10.100
!
```

NAT ˘ Л Лъ ў̆ ˛

```
Ruijie# sh ip nat translations  Iglobal  ]TJ Ilocal   ]TJ   ]TJ   O]TJ
global Tw 0 -1.1f 0 T2.1680.100 !
```

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ѝй ╖ ˘ NAT ╖ Â ‘

#

Ruijie> enable

#

Ruijie# config terminal

Enter configuration commands, one per line. End with CNTL/Z.

WAN0 ⊿

Ruijie(config)#interface GigabitEthernet 0/1

WAN ⊿

Ruijie(config-if)# ip address 218.5.19.2 255.255.255.0

WAN ⊿ й м Internet ⊿

Ruijie(config-if)# ip nat outside

WAN ⊿

Ruijie(config-if)# no shut

#

Ruijie(config-if)# end

Ruijie#

˘ WAN ⊿ UP (⊿).

%LINK CHANGED: Interface GigabitEthernet 0/1, changed state to up

%LINEPROTOCOLCHANGE:InterfaceGigabitEthernet0/1,changedstatetoUPRuijie#

config terminal

Enter configuration commands, one per line. End with CNTL/Z.

LAN ⊿

Ruijie(config)# interface GigabitEthernet 0/0

LAN ⊿

Ruijie(config-if)# ip address 192.168.0.1 255.255.255.0

LAN ⊿ й м Intranet ⊿

Ruijie(config-if)# ip nat inside

LAN ⊿

Ruijie(config-if)# no shut

Ruijie(config-if)# end

Ruijie#

%LINK CHANGED: Interface GigabitEthernet 0/0, changed state to up

%LINE PROTOCOL CHANGE: Interface GigabitEthernet 0/0, changed state to UP

Ruijie#

```
interface GigabitEthernet 0/1
ip address 218.5.19.2 255.255.255.0
ip nat outside
!
ip nat inside source list 1 interface GigabitEthernet 0/1
ip nat inside source static tcp 192.168.0.4 110 218.5.19.2 110
ip nat inside source static tcp 192.168.0.4 25 218.5.19.2 25
ip nat inside source static tcp 192.168.0.3 80 218.5.19.2 80
ip nat inside source static tcp 192.168.0.2 21 218.5.19.2 21
ip nat inside source static tcp 192.168.0.2 20 218.5.19.2 20
!
ip route 0.0.0.0 0.0.0.0 GigabitEthernet 0/1 218.5.19.1
!
line con 0
line vty 0 4
password remoteuser
login
!
end
RUIJIE#
```

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Ю a ў ╠ arp arp Â

Ю 192.168.12.0 200.198.12.0 Â

```
!
interface GigabitEthernet 0/0
ip address 192.168.12.1 255.255.255.0
ip nat inside
!
interface GigabitEthernet 0/1
ip address 200.198.12.1 255.255.255.0
ip nat outside
!
ipnatinsidesourcestatic192.168.12.0200.198.12.0netmask255.255.255.0
```

NAT dns alg dns DNS ˇ Л

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ˇ ˚ DNS ╗ Â

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1. ftp ┗
2. ¨ ┗ dns ɣ ¨ ┗
3. DNS
4. Л ɨ ˇ Л ˇ DNS

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5. DNS ɨ ┗

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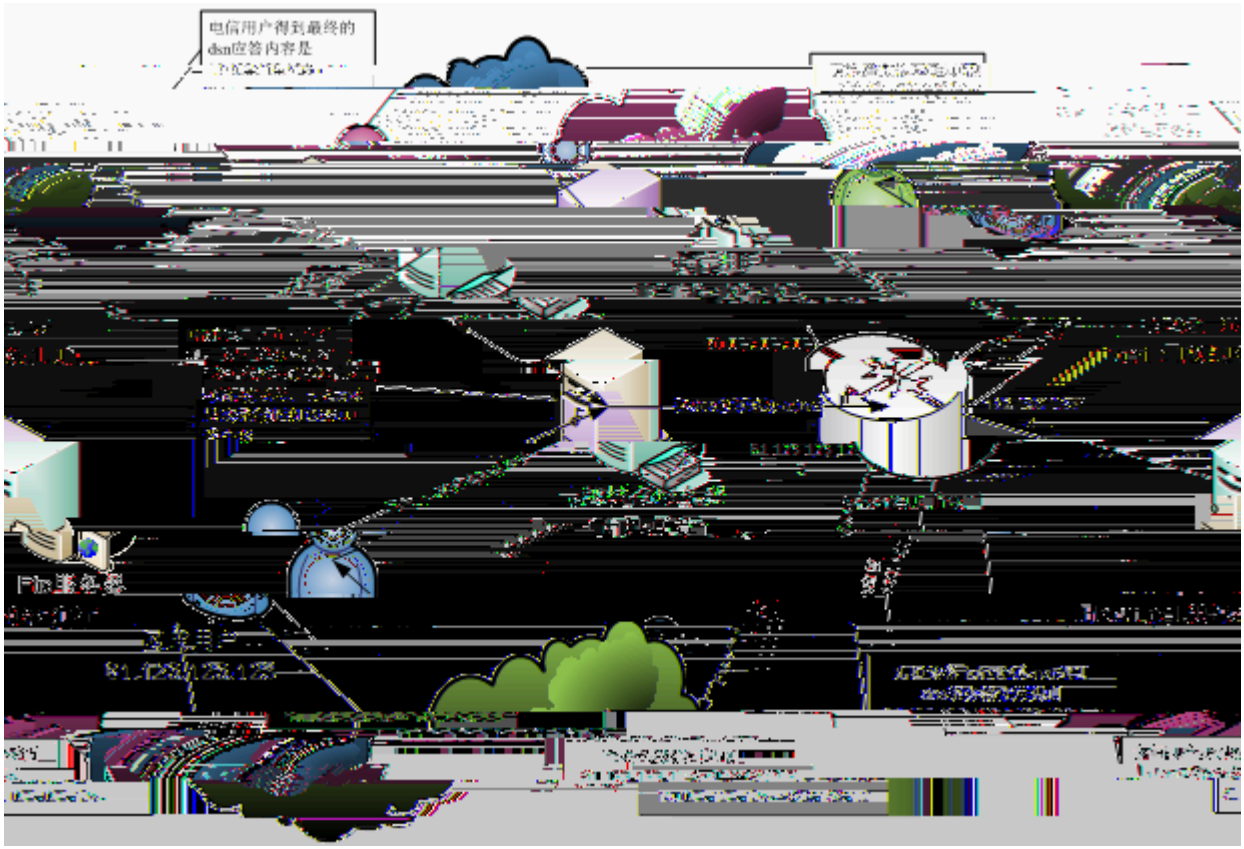

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```
interface GigabitEthernet 0/0
 ip address 10.123.123.123 255.255.255.0
 ip nat outside
 duplex auto
 speed auto
 description
interface GigabitEthernet 0/1
 ip address 61.123.123.123 255.255.255.0
 ip nat outside
 duplex auto
 speed auto
 description
interface GigabitEthernet 0/2
 ip address 192.168.1.254 255.255.255.0
 ip nat inside
 duplex auto
 speed auto
 description
```

/*dns ┗ */

ip nat inside source static 192.168.1.1 61.123.123.123

ip nat inside source static 192.168.1.1 10.123.123.123

/* ↓ ‡ */

ip nat inside source static 192.168.1.2 10.123.123.124 match gigabitEthernet 0/0

/* ‡ */

ﻝ

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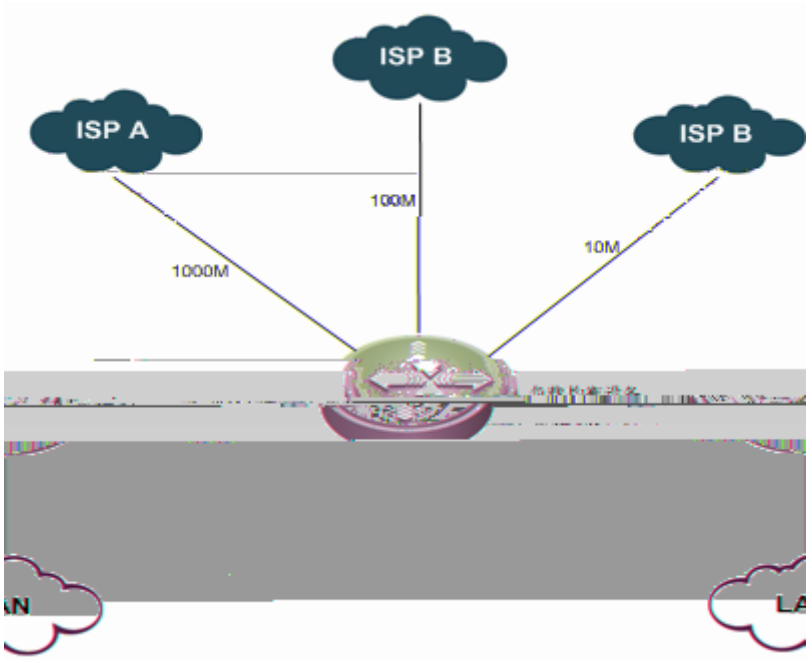

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Ruijie#	Â
Ruijie(config)#	╖
Ruijie(config)#	╖

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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# mllb enable
╖ ╖ Â
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# no mllb enable

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Ruijie#	Â
Ruijie(config)# interface interface-name	ﻝ Â
Ruijie(config-if)# kilobits	
Ruijie(config-if)#	ѝ

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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface fastEthernet 0/1
Ruijie(config-if)# bandwidth 1000
ﻥ
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# interface fastEthernet 0/1
Ruijie(config-if)# no bandwidth

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Ruijie#	Â

Ruijie(config)# mllb threshold percent-upper [lower percent-lower]	ù percent ˆ ˇ 1-100 Â percent-up ù Э ˘ percent-lower ù Ю Â

Ruijie(config)#

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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# load-monitor uplink
∫ ѝ Э Ю
Ruijie(config)# load-monitor mixed-link

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Ruijie#	Â
Ruijie(config)#over-load-protect interface-group	

Ruijie(config)#over-load-protect threshold percent	percent ˘ ù 90
Ruijie(config)#no over-load-protectthreshold	

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ù 80
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# over-load-protect threshold 80

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Ruijie (config)#	˘ è Â

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Ю show running-config Ъ ҳ ‘
Ruijie# show mllb config
multi-link load balance configure:
multi-link load balance state: enabled
multi-link load balance policy: load
multi-link load balance load-interval: 5
multi-link load balance threshold: 90 lower: 90
multi-link load balance load-monitor: down-link
multi-link load balance first-choice set to GigabitEthernet 0/5 is up
multi-link load balance load-sharing original

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Ruijie (config)#	Â

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Ruijie# show over-load-protect configure
>Over-load-protect configure
---
over-load-protect state: disable
interface-group: 1, 2, 19
load-interval: 5

threshold: 90

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Ruijie (config)#	ßß Â

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Ruijie(config)#show load-monitor configure
>Load-monitor: down-link

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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# mllb enable

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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
#

Ruijie(config)#

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Router(config)# interface-group 1

Router(config-intf-group)# interface gi 0/1

Router(config-intf-group)# interface gi 0/2

Router(config-intf-group)# exit

2˜ ╖

Ruijie(config)# over-load-protect enable

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Ruijie(config)# over-load-protect interface-group 1

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ɣ Ь ǀ Ѧ ˇ vlan tag ѣ IP IP
vlan ѣ ˇ a˚
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tag ǀ Â Ю ƀ ľ any Ь˘
Ю ƀ native vlan vlan ˇ native vlan
vlan ˇ ‡ ƀ ľ any Ь Â

ˇ ip mac ѝ ⁸ Â
ip mac ˇ ip mac
ǀ ˇ ł Â mac ip ǀ
ƀ a˚ Љ mac ƀ ѝ ƀ Â ł Ѧ Љ
Ѧ ˇ web ˇ vpn Â

Ю ⁸ Â ɣ Ь ǀ Ѧ Љ
ip ƀ ˇ Ѧ Љ ˇ
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web ˘ ip mac ɒ ˘ IP Л Ћ

„ ˆ ˜ vlan

vlan ˘ ˘ ЛЬЮ vlan ˙

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Ruijie#	
Ruijie(config)# name vid-list	vlan
Ruijie(config)#	
Ruijie#	

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vlan vlan id a ă ˘ vlan id л ˘ vlan id

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vlan ľ any Ł˘ γ Ь ǐ ╗ ˘ vlan id ѣ a è

vlan ˘ ‡ ѣ vlan ľ any Ł Â

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vlan ľ vlan-group1 Ł vlan 1 à vlan 3 à vlan7 à vlan8 à vlan9

Ruijie#

Ruijie(config)# vlan-group vlan-group1 vlan 1,3,7-9

Ruijie(config)# end

Ъ ҳ	
Ruijie# show vlan-group[group name]	show vlan-group vlan ’ ╗ Э έ ¨ Л vlan Â

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vlan

Ruijie#show vlan-group

vlan-group	police_flow	police_url	flow	vlan id
any	9	0	0	
vlan1	0	0	0	1
vlan2	0	0	0	3-5
vlan3	0	0	0	7,9

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Ф ҳ	
Ruijie# configure terminal	
Ruijie(config)# name parent [[ip-addr] [mac-addr] subnet mask start end] [pwd_str { two-way-bind | single-way-bind}]	ˆ ˊ˜
Ruijie(config)#	
Ruijie# show subscriber[all | static | dynamic | parent [name |root]]	

˘ ˊ Лъ Ю name Ф ҳ Â

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Ruijie# configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Ruijie(config)#subscriber static name 1 parent / / 1 ip-host 192.168.196.156

Ruijie(config)# end

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Ruijie# configure terminal	
Ruijie(config)# [ ] name { | }	ˆ Л Љ Л ~ ˘ ˘ vip ˘ ˘
Ruijie(config)#	
Ruijie# show subscriber[all | static | dynamic | parent [name |root]]	

˘ Л Љ Ю [ ] name
{] \| }Ѣ ҁ Â
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Л Љ ˆ flow-monitor˜ Ą 8 ’ Л Ю
˘ Ю˘ ˚ ?

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Ruijie# [|] filename	
Ruijie# [| | | [	

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/ / 1, 1,192.168.197.1

ľ .csv Ł Microsoft Excel ł ɻ ѝ ľ .csv Ł Л Â

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Ю ľ .csv Ł

/group1 xinlang 192.168.196.11-192.168.196.25

/group1 baidu 192.168.197.0/24

/group1 user1 192.168.198.1

/group1 user2

ľ userfile Ł

Ruijie# userfile

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Ъ ɂ	
Ruijie# [|] filename	

ľ userfile Ł

Ruijie# userfile

Ъ ɂ	
Ruijie#Show network-group [all | brief | parent [root | name]]	show network-group ’ ╕ Э έ Л Â

#

Ruijie#show network-group all

network-group police_flow police_url flow ip

/ 9 0 351

network1	0	2	0	192.168.197.3
network2	0	0	0	192.168.197.1
network3	0	0	0	192.168.197.2

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˘ ЛЬЮ Ѣ̈ ˙

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Ruijie# oldname newname	Ѣ̈

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Ruijie# xx yy

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Ruijie#	xx	yy

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Ruijie# xx yy

sam Ł Ю̆ sam˘ ∤ ˙

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Ruijie# sam-online recycletime Ruijie# sam-offline recycle { off |time}	Sam ˘ Sam ˘ ^ ∤ a ~

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Ruijie#config
Ruijie(config)# sam-online recycle 30
Ruijie(config)# sam-offline recycle off

Ъ ҁ	
Ruijie#show auth-subs [all | brief | parent [root| name]]	show auth-subs ’ ╗ Э έ ¨ Л Â

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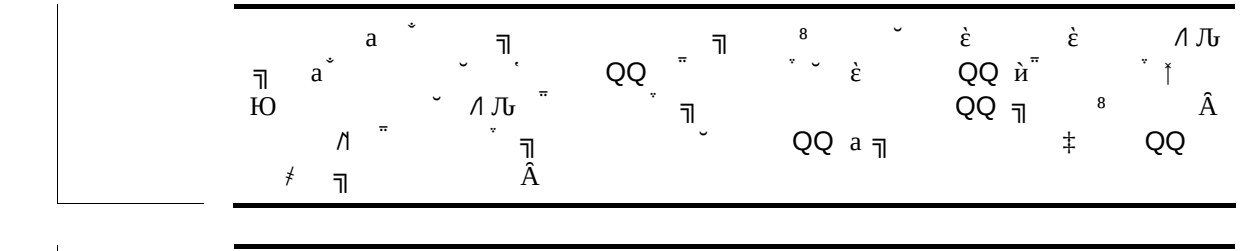
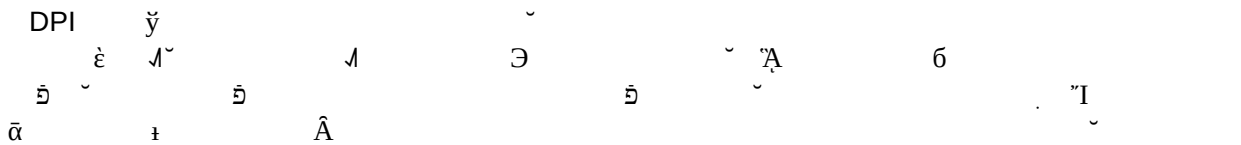
#

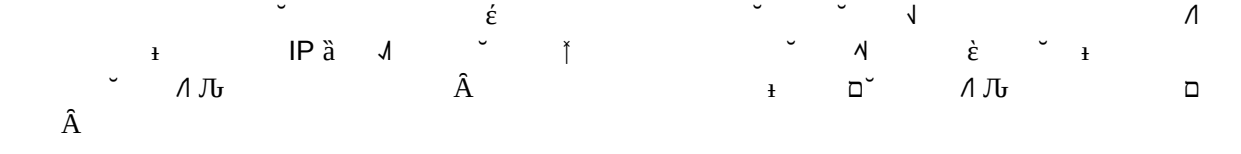
Ruijie#show auth-subs all

name	mac	flow	fc	url	dir	dym ip
/	0000.0000.0000	16	0	1	1	0
smp_root	0000.0000.0000	0	0	0	1	0
webauth_root	0000.0000.0000	0	0	0	1	0

show identify-application group-state







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Ruijie# configure terminal	
Ruijie(config)#	╖
Ruijie(config)#	
Ruijie#show running	

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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# identify-application enable
Ruijie(config)#

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Ruijie# configure terminal	
Ruijie(config)#	╖ ˘ ˘ ˘ ‡ a Â
Ruijie(config)#	
Ruijie#show running	

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Ruijie# configure terminal	
Ruijie(config)#	╖ ˘ ˘ ˘ ‡ a Â
Ruijie(config)# seconds	◘
Ruijie(config)#	
Ruijie# show identify-application proto-expect	

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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# identify-application timeout 300

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Ruijie# configure terminal	
Ruijie(config)#	Ⅱ
Ruijie(config)#	
Ruijie#show running	

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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# identify-application proto-expect gather
Ruijie(config)#

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Ruijie# configure terminal	
Ruijie(config)#	ℸ ˘ ˘ ˘ ‡ a Â

Ruijie(config)#

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Ruijie# configure terminal	
Ruijie(config)#	DFI ╖
Ruijie(config)#	

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Ruijie#

Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# identify-application custom name myqq class udp sport 1 10 dport any any sip 192.168.1.2 192.168.1.2 dip 66.12.11.34 66.12.11.36
Ruijie# end
Ruijie#*Jan1117:25:29:%SYS-5-CONFIG_I:Configuredfromconsolebyconsole
Ruijie# show identify-application custom-rule

TYPE	NAME	CLASS	SPL	SPH	DPL	DPH	SIPL	SIPH	DIPL	DIPH
TCP			1	10	1	100	any	any	100.1.1.1	10.1.1.10
UDP	myqq		1	10	any	any	192.168.1.2	192.168.1.2	66.12.11.34	66.12.11.36

show identify-application class

Ruijie# configure terminal	
Ruijie(config)# app-name	app-name
Ruijie(config)#	
Ruijie#show identity-application key	

app-name

FTP
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# identify-application key FTP
Ruijie(config)#

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Ruijie# configure terminal	
Ruijie(config)# app-name	app-name 8
Ruijie(config)#	
Ruijie#show identity-application inhibitive	

˘ Л Лъ Ю app-name
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QQ ╕ 8
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# identify-application QQ
Ruijie(config)#

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Ruijie# configure terminal	
Ruijie(config)# app-name	app-name ╕
Ruijie(config)#	
Ruijie#show identity-application inhibitive	

˘ Л Лъ Ю app-name
˙

QQ ╕
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# identify-application QQ
Ruijie(config)#

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Ruijie# configure terminal	
Ruijie(config)# group-name	… Ња group-name
Ruijie(config-app-group)# app-name	app-name ╕ Ња group-name
Ruijie(config-app-group)#	
Ruijie# show identify-application custom-group group-name	

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group-name˘ Л Лъ Ња Â
app-group Ѣ ҂ Ю app-name˘ Л Лъ Ња Â
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… ЬЖ MYQQ˘ QQ ╗ MYQQ
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# identify-application MYQQ
Ruijie(config-custom-group)# app-add QQ

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Ruijie# configure terminal	
Ruijie(config)#	╗ ˘ ˘ ˘ ‡ a Â
Step 3 Ruijie(config)#	
S Ruijie# show identify-application route enhance	

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ЛЬЮ HTTP ╗

Ъ ₹	
Ruijie# configure terminal	
Ruijie(config)#	HTTP ╗ ˘ ŗ

Ruijie# show run	

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#

Ruijie# show identity-application group-state

app group state: 1 //1 2

Ruijie#show identity-application disable application

RFC

FTP

Ruijie# show identify-application custom-group myqq

QQ

MSN

#

Ruijie# show identity-application proto-expect

protocol expectation state: on //

protocol expectation timeout: 180 / / 3

#

Ruijie# show identity-application route enhance

identify-application route enhance: on

identify-application http route enhance: on

/

Ruijie# show identify-application route enhance table

..route enhance enable application list..

4-0-0-0

PPFilm 4-14-0-0

PPTV|PP 4-15-0-0

PPSTREAM 4-16-0-0

| Web 4-17-0-0

UUSEE_PC|IPad 4-33-0-0

QVOD 4-48-0-0

4-50-0-0

4-52-0-0

4-71-0-0

4-73-0-0

P2P 5-0-0-0

BITTORRENT 5-3-0-0

5-5-0-0

QQ 5-22-0-0

| 5-28-0-0

FLASHGET 5-34-0-0

P2P-FTP 5-50-0-0

P2P-HTTP 5-51-0-0

5-52-0-0

Ruijie# configure terminal	
Ruijie(config)#	
Ruijie(config)#	
Ruijie#show running	

#

Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# identify-application clear key-inhibitive-block group
Ruijie(config)#

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NBR1300G NBR1500G NBR2000G
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P2P	(all)	(all)	
	(all)	(all)	
	(all)	(all)	
HTTP			
	HTTP	(all)	
	(all)	(all)	
	(all)	(all)	
(IM)	(all)	(all)	

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Ruijie(config)#	
Ruijie(config)#	

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Ruijie>	
Ruijie#	
Ruijie(config)#	
Ruijie(config)# app-name { interface-name | group-name} [time-rang-name]	ÿ ⅄ǂ ˘ ⅄ app-name˘ interface-name˘ ǂ ⅄ group-name˘ ǂ ⅄ time-rang-name˘
Ruijie(config-if)#	⅄ ˘

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Ľ HTTP Ł ˚ ˎ Ľ inhibitive_intf_group Ł ˆ ˘ з Ľ no_midnight Ł

Router(config)#app route HTTP interface-group inhibitive_intf_group time-range no_midnight

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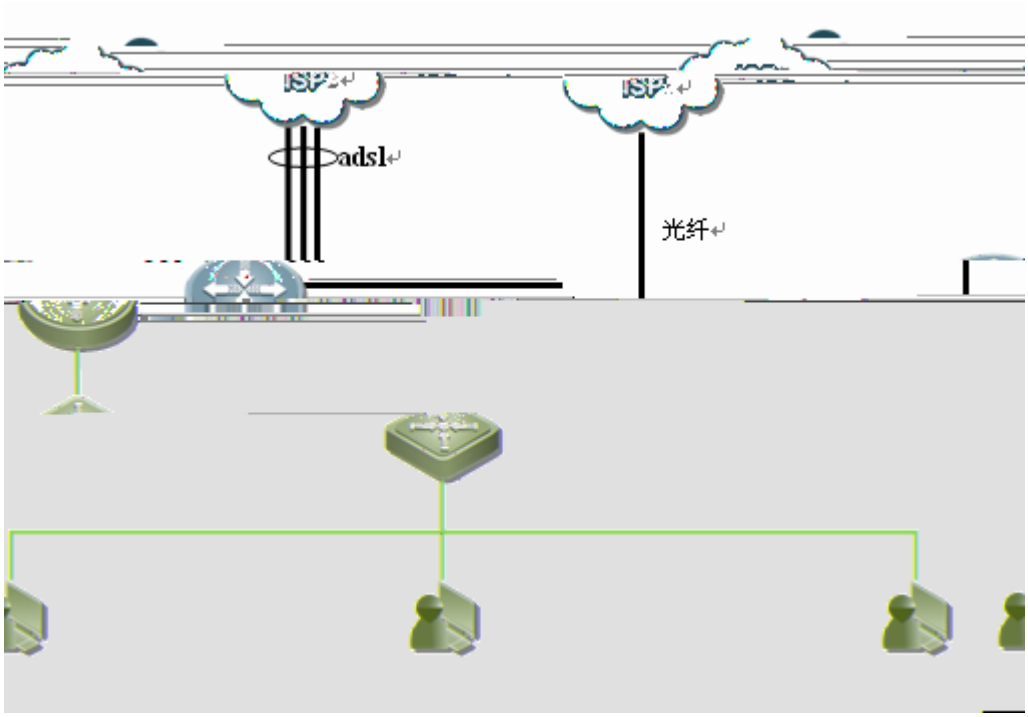
Ruijie#	
Ruijie(config)# type number	ﾉ
Ruijie(config-if)# ip-address	ﾉ
Ruijie(config-if)#	ﾉ ˘

ﾉ ˘ ﾉ IO Ƀ ȝ Â

GigabitEthernet 0/1



˝I + ADSL

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Router(config)#ip route 0.0.0.0 0.0.0.0 202.100.12.5

2˜ ⁄

dialer 1,2,3 ⁄

Router(config)#interface-group inhibitive_intf_group
Router(config-intf-group)# interface-member dialer 1
Router(config-intf-group)# interface-member dialer 2
Router(config-intf-group)# interface-member dialer 3

#

Router(config-intf-group)# load-balance policy load
Router(config-intf-group)#exit

3˜

Router(config)#time-range no_midnight
Router (config-time-range)#periodic daily 9:00 to 23:00
Router (config-time-range)#exit

4˜

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Router(config)#app route enable

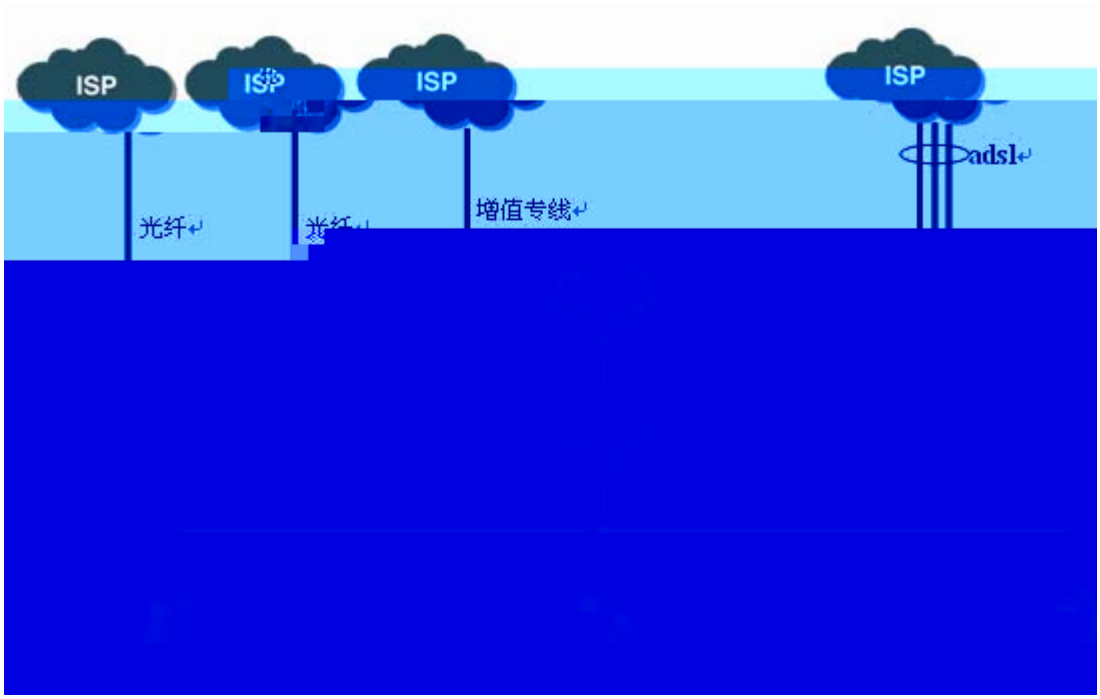
8 8 ⁄ ˘ ˘ http ˘ ´ a 8

Router(config)#app route P2P IO ˚ interface-group inhibitive_intf_group
Router(config)#app route ˚ interface-group inhibitive_intf_group time-range no_midnight
Router(config)#app route HTTP interface-group inhibitive_intf_group time-range no_midnight
Router(config)#app route interface-group inhibitive_intf_group
Router(config)#app route interface-group inhibitive_intf_group
Router(config)#app route ˚ interface-group inhibitive_intf_group

1˜

Router#show app route

CLASS	INTERFACE(GRPUP)	time-range	state
P2P IO ˚	inhibitive_intf_group(group)	NA	UP
˚	inhibitive_intf_group(group)	no_midnight	UP
HTTP	inhibitive_intf_group(group)	no_midnight	UP
	inhibitive_intf_group(group)	NA	UP
	inhibitive_intf_group(group)	NA	UP
˚	inhibitive_intf_group(group)	NA	UP



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dialer 1,2,3 ⅄

```
Router(config)#interface-group inhibitive_intf_group
Router(config-intf-group)# interface-member dialer 1
Router(config-intf-group)# interface-member dialer 2
Router(config-intf-group)# interface-member dialer 3
```

#

```
Router(config-intf-group)# load-balance policy load
Router(config-intf-group)#exit
```

3~

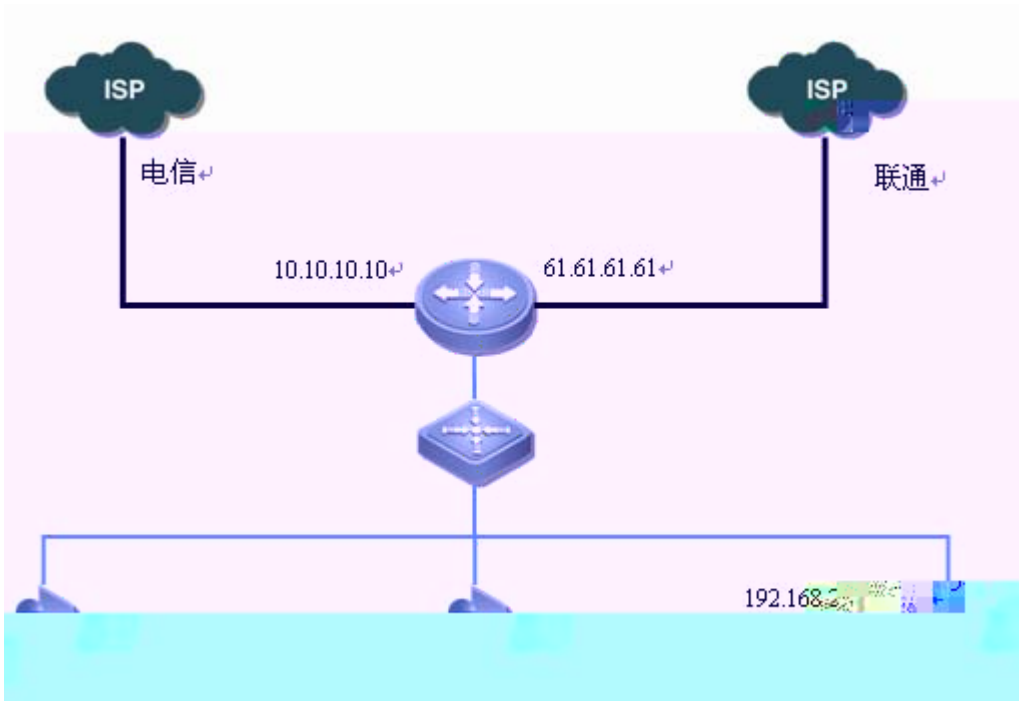
```
Router(config)#time-range no_midnight
Router (config-time-range)#periodic daily 9:00 to 23:00
Router (config-time-range)#exit
```

4~

⅃

```
Router(config)#app route enable
```

#



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#

Router(config)#ip route 0.0.0.0 0.0.0.0 202.100.12.51

2˜

Router(config)#time-range no_midnight
Router (config-time-range)#periodic daily 9:00 to 23:00
Router (config-time-range)#exit

3˜ DNS

˜ DNS

Router(config)#interface gi 0/1
Router(config-if-GigabitEthernet 0/1)#dns 202.96.199.133
Router(config-if-GigabitEthernet 0/1)#exit
Router(config)#interface gi 0/2
Router(config-if-GigabitEthernet 0/2)#dns 58.240.57.33
Router(config-if-GigabitEthernet 0/2)#exit
DNS
Router(config)#dns-proxy enable

4˜

Router(config)#interface gi 0/2
Router(config-if-GigabitEthernet 0/1)#nexthop 61.61.61.1

5˜

#

Router(config)#app route enable

http a

Router(config)#app route P2P GigabitEthernet 0/2

Router(config)#app route GigabitEthernet 0/2 time-range no_midnight

Router(config)#app route HTTP GigabitEthernet 0/2 time-range no_midnight

Router(config)#app route GigabitEthernet 0/2

Router(config)#app route GigabitEthernet 0/2

Router(config)#app route GigabitEthernet 0/2

1˜

Router#show app route

CLASS	INTERFACE(GRPUP)	time-range	state
P2P	GigabitEthernet 0/2(interface)	NA	UP
	GigabitEthernet 0/2(interface)	no_midnight	UP
HTTP	GigabitEthernet 0/2(interface)	no_midnight	UP
	GigabitEthernet 0/2(interface)	NA	UP
	GigabitEthernet 0/2(interface)	NA	UP
	GigabitEthernet 0/2(interface)	NA	UP

2˜

Router#show app route statistics

CLASS	INTERFACE(GROUP)	HIT DATA(byte)	HIT RATE(Mb/s)

20136/40359 0.1/0.98
21031/60594 0.2/2.01

3˜ Ï HTTP Ł Ƒ
Router#show app route HTTP session

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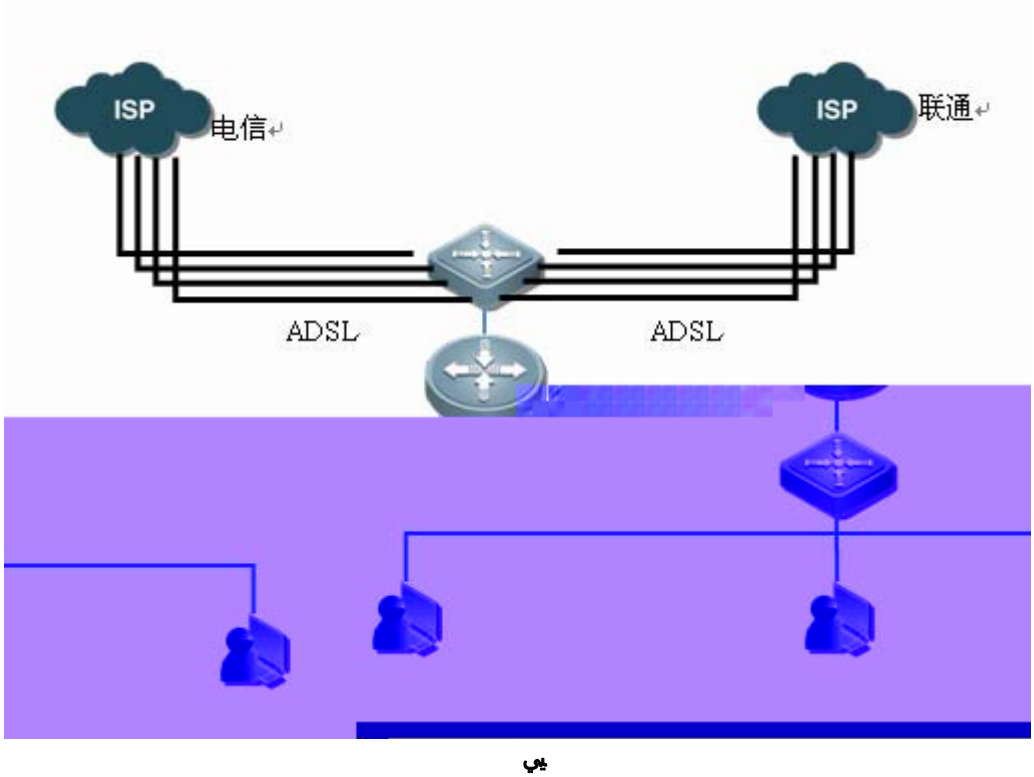

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20 ADSL

```
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 30
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 31
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 32
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 33
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 34
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 35
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 36
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 37
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 38
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 39
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 40
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 41
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 42
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 43
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 44
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 45
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 46
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 47
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 48
Router(config)#ip route 0.0.0.0 0.0.0.0 dialer 49
```

2˜ ⅄

ADSL dialer 1-30 ⅄

```
Router(config)#interface-group inhibitive_intf_group
Router(config-intf-group)# interface-member dialer 1
Router(config-intf-group)# interface-member dialer 2
Router(config-intf-group)# interface-member dialer 3
Router(config-intf-group)# interface-member dialer 4
Router(config-intf-group)# interface-member dialer 5
Router(config-intf-group)# interface-member dialer 6
Router(config-intf-group)# interface-member dialer 7
Router(config-intf-group)# interface-member dialer 8
Router(config-intf-group)# interface-member dialer 9
Router(config-intf-group)# interface-member dialer 10
Router(config-intf-group)# interface-member dialer 11
Router(config-intf-group)# interface-member dialer 12
Router(config-intf-group)# interface-member dialer 13
Router(config-intf-group)# interface-member dialer 14
Router(config-intf-group)# interface-member dialer 15
Router(config-intf-group)# interface-member dialer 16
Router(config-intf-group)# interface-member dialer 17
Router(config-intf-group)# interface-member dialer 18
Router(config-intf-group)# interface-member dialer 19
Router(config-intf-group)# interface-member dialer 20
Router(config-intf-group)# interface-member dialer 21
Router(config-intf-group)# interface-member dialer 22
Router(config-intf-group)# interface-member dialer 23
Router(config-intf-group)# interface-member dialer 24
Router(config-intf-group)# interface-member dialer 25
```

```
Router(config-intf-group)# interface-member dialer 26
Router(config-intf-group)# interface-member dialer 27
Router(config-intf-group)# interface-member dialer 28
Router(config-intf-group)# interface-member dialer 29
Router(config-intf-group)# interface-member dialer 30
#
Router(config-intf-group)# load-balance policy load
Router(config-intf-group)#exit
```

3~

```
Router(config)#time-range no_midnight
Router (config-time-range)#periodic daily 9:00 to 23:00
Router (config-time-range)#exit
```

4~

```
#
Router(config)#app route enable
```

```
#                                                    http                                  a
Router(config)#app route P2P                                interface-group inhibitive_intf_group
Router(config)#app route                                    interface-group inhibitive_intf_group
time-range no_midnight
Router(config)#app routeHTTP                                interface-groupinhibitive_intf_group
time-range no_midnight
Router(config)#app route                                    interface-group inhibitive_intf_group
Router(config)#app route                                    interface-group inhibitive_intf_group
Router(config)#app route                                    interface-group inhibitive_intf_group
```

1~

```
Router#show   app   route
CLASS                    INTERFACE(GRPUP)                          time-range      state
-------------   ---------------------------      -----------     -----
P2P                      inhibitive_intf_group(group)      NA                   UP
                         inhibitive_intf_group(group)      no_midnight     UP
HTTP                     inhibitive_intf_group(group)      no_midnight     UP
                         inhibitive_intf_group(group)      NA                   UP
                         inhibitive_intf_group(group)      NA                   UP
                         inhibitive_intf_group(group)      NA                   UP
```

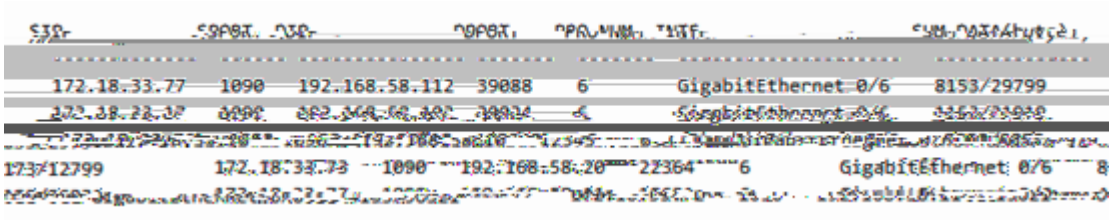
2~

```
Router#show   app   route   statistics
CLASS                  INTERFACE(GROUP)
HIT DATA(byte)   HIT RATE(Mb/s)
SUM DATA(byte)   SUM RATE(Mb/s)
-------------- ---------------------------
--------------   ------------
--------------   --------------
P2P                      inhibitive_intf_group(group)
```

92333/297997 0.6/3.75
202918/342496 0.7/4.68
˚ inhibitive_intf_group(group)
31030/101901 0.2/1.75
401189/212002 0.3/2.61
inhibitive_intf_group(group)
10120/201331 0.1/2.57
100121/204691 0.2/2.98
inhibitive_intf_group(group)
41035/97997 0.3/1.01
60168/91067 0.1/1.41
˚ inhibitive_intf_group(group)
20136/40359 0.1/0.98
21031/60594 0.2/2.01

3˜ Ĭ' HTTP Ł Ꭿ

Router#show app route HTTP session



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à VOIPˇ Voice Over Internet Protocolˇ ~ à ˙ à P2Pˇ Peer-to-Peerˇ ~

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Ruijie(config)#	╖ Â

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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# no flow-pre-mgr enable

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Ruijie(config)# limit-number	⁸ Â limit-number‘ ⁸ ˘ ∧ ˘ è 0 a ⁸ Â

˘ Ю no flow-pre-mgr total-limit¯ Л Â

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Ľ UserGroupA Ł … 5000 ˘ з Ľ UserGroupA Ł Ю IP … ѝ 300 ⁸ ł Â

```
Ruijie# configure terminal
Enter configuration commands, one per line.   End with CNTL/Z.
Ruijie(config)# subscriber static name UserGroupA parent /
Ruijie(config)# subscriber static name UserA parent /UserGroupA ip-host 192.168.5.10
Ruijie(config)# subscriber static name UserB parent /UserGroupA ip-host 192.168.5.11
Ruijie(config)# flow-pre-mgr 1 subscriber User
```

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2 à ACL ⁸ ‡ ˘ a Â ‡ … Ћ ˘ Â
3 à ‡ ACL˘ è ACL IP à ⊿ à IP à ⊿ à ⊿˘ ŭ ‡ ACL Â
4 à Ю Э ˘ a ⁸ Â

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ACL ѣ б IP 220.200.20.20 ˘ ⁸ є ѝ 30 Â

```
Ruijie# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)#ip access-list extended 120
Ruijie(config-ext-nacl)#permit ip any host 220.220.20.20
Ruijie(config-ext-nacl)#deny ip any any
Ruijie(config-ext-nacl)#exit
Ruijie(config)#flow-pre-mgr 2 access-list 120 action trust total-limit 30
```

2˙

IP ѝ 192.168.1.0/24˝ IP … ˘ є by-pass Â

```
Ruijie# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Ruijie(config)#ip access-list standard 2
Ruijie(config-std-nacl)#deny 192.168.1.0 0.0.0.255
Ruijie(config-std-nacl)#permit any
Ruijie(config-ext-nacl)#exit
Ruijie(config)# flow-pre-mgr 1 access-list 1 action by-pass #
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Ruijie#	⁸ ‡ Л ‡ ˘ ŭ ˘ Ƀ Â
Ruijie# [ip-address]	IP ⁸ IP Â ip-address IP ˘ a ˘ IP ˘ ÿ

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Ruijie#show flow-pre-mgr rule-info

flow-pre-mgr total-limit 200000

(active)flow-pre-mgr 1 subscriber UserGroupA action trust total-limit 5000 per-ip-limit 300 (446 flows)

(inactive)flow-pre-mgr 2 access-list 120 action block (0 flows)

Ruijie#

IP ⁸ IP Â

Ruijie#show flow-pre-mgr ip-info

IP-ADDRESS flow-cnt flow-limit

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203 500

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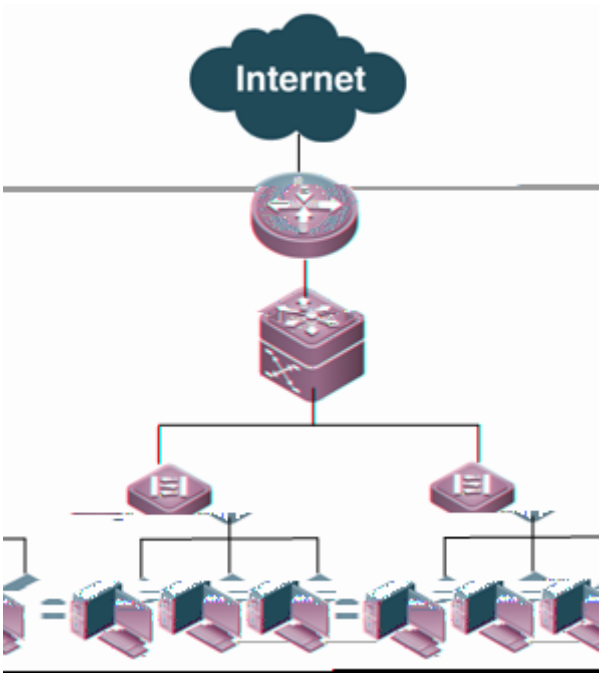

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#

Ruijie# configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

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Ruijie(config)# subscriber static name LeaderGroup parent /

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Ruijie(config)# subscriber static name LeaderA parent /LeaderGroup ip-host 192.168.5.11

Ruijie(config)# subscriber static name LeaderB parent /LeaderGroup ip-host 192.168.5.12

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Ruijie(config)# flow-pre-mgr total-limit 200000

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Ruijie(config)# flow-pre-mgr subscriber any action trust total-limit 0 per-ip-limit 500

Ω ﾍ ⁸

Ruijie(config)#flow-pre-mgrsubscriberLeaderGroupactiontrusttotal-limit 0 per-ip-limit 1000

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Ruijie#show flow-pre-mgr rule-info

flow-pre-mgr total-limit 200000

(active)flow-pre-mgr 1 subscriber LeaderGroup action trust total-limit 0 per-ip-limit 1000 (234 flows)

(active)flow-pre-mgr 2 subscriber any action trust total-limit 0 per-ip-limit 500 (523 flows)

Ruijie#

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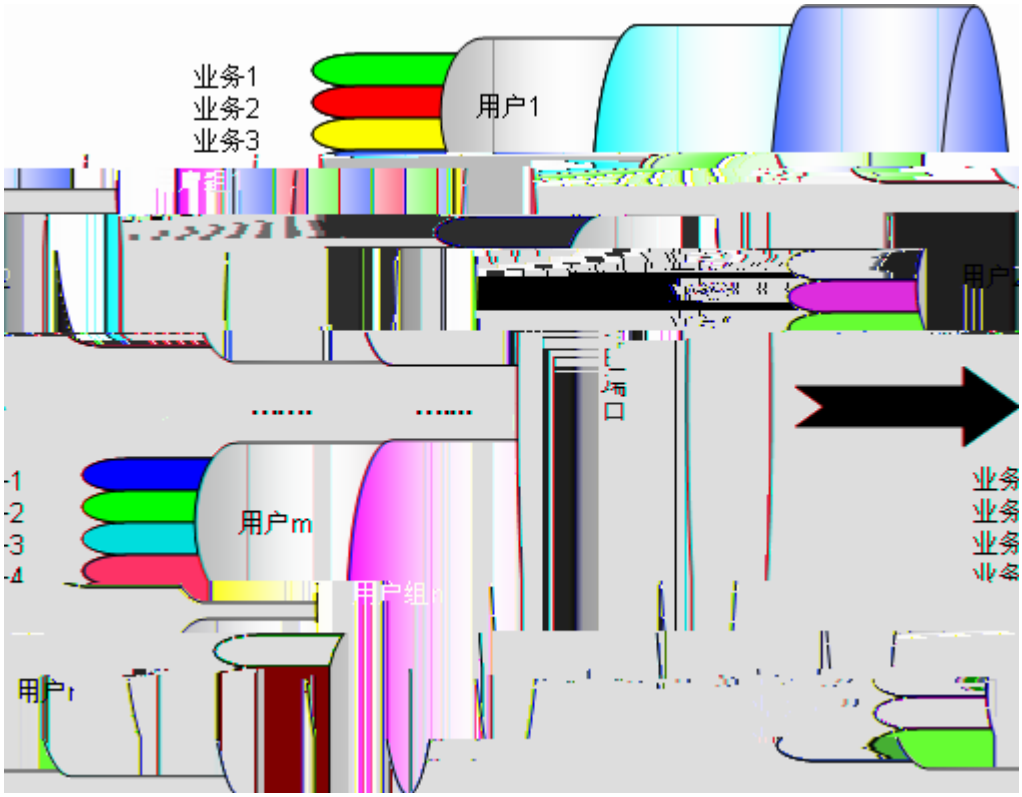

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Flow-control Â ˘ ł a Â

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flow-template copy tpl-ibar Gi0/1 bandwith 8000 8000

2ˈ ∧ Gi0/1 ∧ Gi0/6 ˘ 16Mˈ
flow-template copy Gi0/1 Gi0/6 bandwith 16000 16000

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1ˈ ∧ Gi0/1 ѝ 20Mˈ
flow-control Gi0/1 update bandwith 20000 20000

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Ruijie#	
Ruijie(config)# Name	… 8
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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# flow-control DianXin
Ruijie(config-flow-control))# end

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Ruijie#	
Ruijie(config)# Name	… 8
Ruijie(config-flow-control)#	
Ruijie(config)# 0/1	⊿

Ruijie(config-if-GigabitEthernet 0/1)# Name	Gi 0/1
Ruijie(config-if-GigabitEthernet 0/1)#	
Ruijie#	

	WAN dialer pppoe dialer wan dialer

#

```
Ruijie#      configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)#          flow-control          DianXin
Ruijie(config-flow-control)#                   exit
Ruijie(config)#          interface Gi          0/1
```

Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# flow-control DianXin
Ruijie(config-flow-control)# channel-tree inbound
Ruijie(config-channel-tree)# exit
Ruijie(config-flow-control)# channel-tree outbound
Ruijie(config-channel-tree)# end

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Ruijie#	
Ruijie(config)# Name	… 8
Ruijie(config-flow-control)#	Ю ӑ 8
Ruijie(config-channel-tree)# name { | parent_name} cir_num pir_num [pri_num] [{ | | mask pcir_num ppir_num limit_num [session_limit_num] [ ] [ ]}]	…
Ruijie(config-channel-tree)#	
Ruijie#	

˘ Л Лъ channel-tree Ю no channel-g183421FF514E30386 498.32 443.18.p7p

Ruijie(config-flow-control)# num session-num | | in-channel-name out-channel-name string	8 ‡ ѝ
Ruijie(config-flow-control)#	
Ruijie#	

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Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# flow-control DianXin
Ruijie(config-flow-control)# change-priority rule1 1 rule2 2
Ruijie(config-flow-control)# end

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Ruijie(config)# Name [channel-name]	˘

‘

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Ruijie#show flow-control test inbound channel-group root
group-name cir pir pri schedule
---------- -------- -------- ---- --------
root 1000000 1000000 4 fifo

‘

Ruijie#show flow-control test inbound
group-name cir pir pri schedule
---------- -------- -------- ---- --------
root 1000000 1000000 4 fifo
part1 700000 1000000 4 fifo
part2 200000 1000000 4 fifo
part3 100000 1000000 4 fifo

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Ruijie(config)# group	8

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Ruijie#show flow-control-policy group
group_name group_id apply_ifx policy_entries
group1 0 6 14
group2 1 0 4

8 ‡

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Ruijie(config)# show flow-control-policy rule [group name]	‡ 8 IO ‡

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Ruijie# configure terminal
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Ruijie(config)# flow-control Corp
… Ю ᾰ
Ruijie(config-flow-control)# channel-tree inbound
Ruijie(config-channel-tree)# channel-group root parent null cir 10000 pir 10000 pri 4 schedule-type fifo
Ruijie(config-channel-tree)# channel-group department1 parent root cir 5000 pir 10000 pri 4 schedule-type fifo
Ruijie(config-channel-tree)# channel-group department2 parent root cir3 000 pir 10000 pri 4 schedule-type fifo
Ruijie(config-channel-tree)# channel-group department3 parent root cir 2000 pir 10000 pri 4 schedule-type fifo
Ruijie(config-channel-tree)# exit
… Э ᾰ
Ruijie(config-flow-control)# channel-tree outbound
Ruijie(config-channel-tree)# channel-group root parent null cir 10000 pir 10000 pri 4 schedule-type fifo
Ruijie(config-channel-tree)# channel-group department1 parent root cir 5000 pir 10000 pri 4 schedule-type fifo
Ruijie(config-channel-tree)# channel-group department2 parent root cir3 000 pir 10000 pri 4 schedule-type fifo
Ruijie(config-channel-tree)# channel-group department3 parent root cir 2000 pir 10000 pri 4 schedule-type fifo
Ruijie(config-channel-tree)# exit
Ruijie(config-flow-control)# exit

Ruijie# configure terminal
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Ruijie(config)# identify-application enable
#
Ruijie(config)# subscriber static name department1 parent / ip-subnet 192.168.1.0 255.255.255.0
Ruijie(config)# subscriber static name department2 parent / ip-subnet 192.168.2.0 255.255.255.0
Ruijie(config)# subscriber static name department3 parent / ip-subnet 192.168.3.0 255.255.255.0
a any ˘ Ⱨ any
Ruijie(config)# time-range any
Ruijie(config-time-range)# periodic Daily 0:00 to 23:59

Ruijie# configure terminal
Ruijie(config)# Corp
1 ȁ 2 ȁ 3ⱦ department1 ȁ department2 department3
Ruijie(config-flow-control)# 1 any department1 any any any

Ruijie(config-flow-control)# 1 0 department1
department1
Ruijie(config-flow-control)# 2 any department2
any any any
Ruijie(config-flow-control)# 2 0 department2
department2
Ruijie(config-flow-control)# 3 any department3
any any any
Ruijie(config-flow-control)# 3 0 department3
department3

Ruijie# configure terminal
Ruijie(config)# interface GigabitEthernet 0/1
Ruijie(config-if-GigabitEthernet 0/1)# flow-policy Corp

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department1 department 2

192.168.10.0/24 192.168.20.0/24

5M 10M

BT 1M 5M

BT a 6M

Time-range a any

time-range any
periodic Daily 0:00 to 23:59

#

subscriber static name depart1 parent / ip-subnet 192.168.10.0 255.255.255.0

flow-policy Dianxin

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Time-range а any й
time-range any
periodic Daily 0:00 to 23:59

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flow-control Dianxin
channel-tree inbound
share-pool PER-USER rate 1000 type per-ip limit 500
channel-group root parent null cir 10000 pir 10000 pri 4 schedule-type per-net per-mask 32 per-cir 10 per-pir 1000 limit 500
8 BT а є Ь а 1M
channel-group root pool PER-USER

channel-group BT parent root cir 1000 pir 5000 pri 4 schedule-type per-net per-mask 32 per-cir 1 per-pir 1000 limit 500

channel-group Xunlei parent root cir 1000 pir 7000 pri 4 schedule-type per-net per-mask 32 per-cir 1 per-pir 1000 limit 500

channel-default root

!

channel-tree outbound

share-pool PER-USER rate 1000 type per-ip limit 500

channel-group root parent null cir 10000 pir 10000 pri 4 schedule-type per-net per-mask 32 per-cir 10 per-pir 1000 limit 500

8 ‘ BT root areoas500 451TT0 1 TT0 1 Tf 0 Tc ( )Tj-0.0007 Td8! roup rc

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time-range any
periodic Daily 0:00 to 23:59
subscriber static name DP-test parent / ip-subnet 192.168.10.0 255.255.255.0

flow-control global
flow-rule 1 vlan-group any subscriber any network-group any app-group P2P
time-rang any
flow-rule 1 session-limit 0 action drop
flow-rule 2 vlan-group any subscriber DP-test network-group any app-group any time-rang any
flow-rule 2 session-limit 0 action pass

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Ruijie# show online statistics {global | interface interface-name | bridge bridge-name} [{detail [offset start-record {limit record-num}]} | recent hour | minute_interval begin-year begin-month begin-day begin-hour:begin-minute to end-year end-month end-day end-hour:end-minute [{month | week] time-interval begin-year begin-month begin-day begin-hour to end-year end-month end-day end-hour | day begin-year begin-month begin-day hour-interval begin-hour1 to end-hour1 [begin-hour2 to end-hour2]}]	Ю ˘ hour IP Л , NBR a minute-interval à time-interval à recent à day à month à week à hour-interval Л Â
Ruijie# show online ip {global | interface interface-name | bridge bridge-name} [[subscriber subscriber-name] [subscriber-group subscriber-group] [vip] | {by-auth} [auth-subs-group auth-group-name] [auth-subs auth-name]] [ip ip-address] [{minute-interval begin-year begin-month begin-day begin-hour: begin-minute to end-year end-month end-day end-hour:end-minute [{month | week] day-interval begin-year begin-month begin-day to end-year end-month end-day day begin-year begin-month begin-day [hour-interval begin-hour to end-hour [begin-hour2 to end-hour2]}] [order-by {{pass | drop} {upload | download} | ip | subscriber-group | subscriber | auth-subs-group | auth-subs} {desc | asc} [top n]]	Ю IP Э à IP Э Â NBR a minute-interval à day-interval [illegible]

Ruijie# show flowrate channel [channel-group channel-group] [minute_interval begin-year begin-month begin-day begin-hour:begin-minute to end-year end-month end-day end-hour:end-minute {[month | week] day-interval begin-year begin-month begin-day to end-year end-month end-day}day

Ruijie# show flowrate ip {global | {interface interface-name} | bridge bridge-name} [by-vpn]} [subscriber-group subscriber-group by-group | [[subscriber-group subscriber-group] [subscriber subscriber-name] [vip] | {by-auth} [auth-subs-group auth-group-name] [auth-subs auth-name]] [ip ip-address] [application application-name] [application-group application-group] [application-type application-type]] [{recent hour | minute-interval begin-year begin-month begin-day begin-hour:begin-minute to end-year end-month end-day end-hour: end-minute} {[month | week] day-interval begin-year begin-month begin-day to end-year end-month end-day [day begin-year begin-month begin-day] [hour-interval begin-hour1 to end-hour1 [begin-hour2 to end-hour2]]}] [order-by {{pass | drop} {upload | download} | ip | subscriber-group | subscriber | auth-subs-group | auth-subs } {desc | asc}] [top n [detail]]] [{detail | by-user}]	Ю ú ˘ , ‘ application à application-group à application-type è ú Ю˘ a ʌ (recent à month à week à day à day-interval à minute-interval Ў ¯ ʌ ’ NBR a minute-interval à day-interval à recent à day à month à week à hour-interval ʌ Â
Ruijie# show flowrate application {global | interface interface-name | bridge bridge-name} [[subscriber subscriber-name] [subscriber-group subscriber-group] | {by-auth} [auth-subs-group auth-group-name] [auth-subs auth-name]] [ip ip-address] [application-group application-group] [{[by-group] | [application-type application-type] [{by-type | application application-name}]}] [{recent hour | minute-interval begin-year begin-month begin-day begin-hour:begin-minute to end-year end-month end-day end-hour:end-minute} {[month | week] day-interval begin-year begin-month begin-day to end-year end-month end-day [day begin-year begin-month begin-day} [hour-interval begin-hour1 to end-hour1 [begin-hour2 to end-hour2]}] [order-by {{pass | drop } {upload | download} | application} {desc | asc} [top n]] [detail] Ruijie# show flowrate ip-application {global | {interface interface-name | bridge bridge-name} [by-vpn]} [[subscriber subscriber-name] [subscriber-group subscriber-group] [vip] | {by-auth} [auth-subs-group auth-group-name] [auth-subs auth-name]] [ip ip-address] [application application-name] [application-group application-group] [application-type application-type] [order-by {{pass | drop} {upload | download} | ip | application | subscriber-group | subscriber | auth-subs-group | } / H ê Û nEîCÃ ß ' ! Ã h*ü# z0[Qd0-p	Ю à à ’ ‘ subscriber à subscriber-group à auth-subs-group à auth-subs à ip è ú Ю˘ a ʌ (recent à month à week à day à day-interval à minute-interval Ў ¯ ʌ ’ NBR a minute-interval à day-interval à day à month à week à hour-interval ʌ Â

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3. DHCP

4. DHCP Relay

5. DNS

6. NTP

7. ˆ SNTP˜

8. UDP-Helper

9. DDNS

10. DDNS

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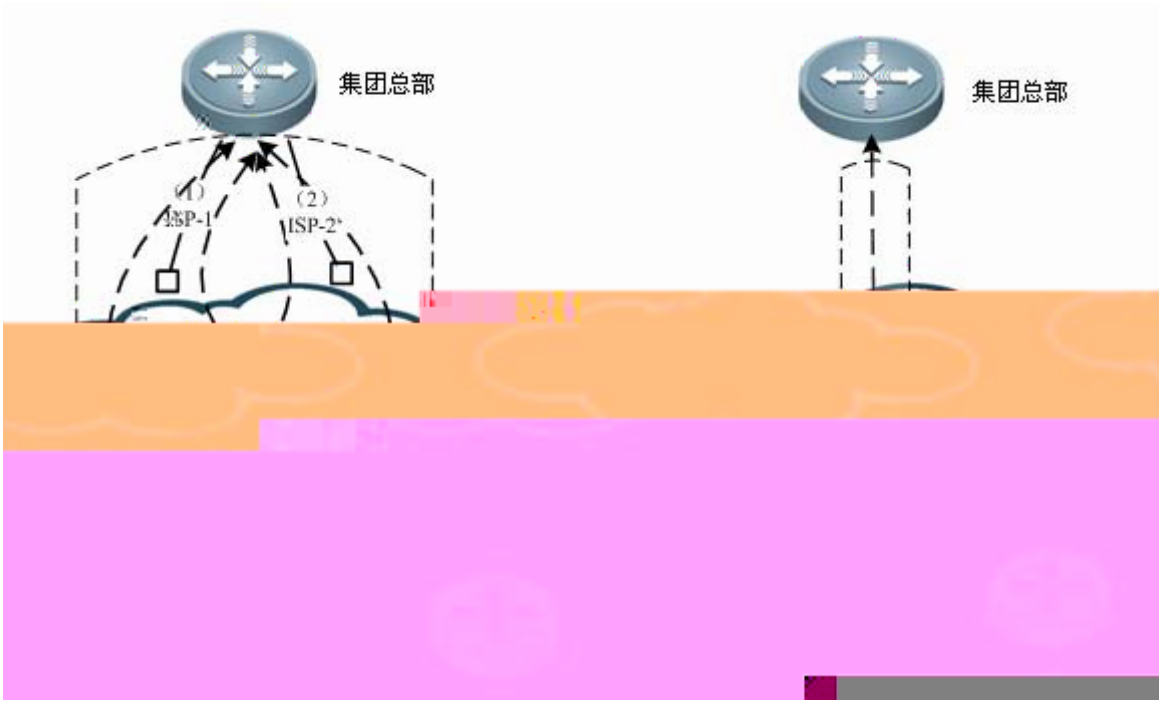

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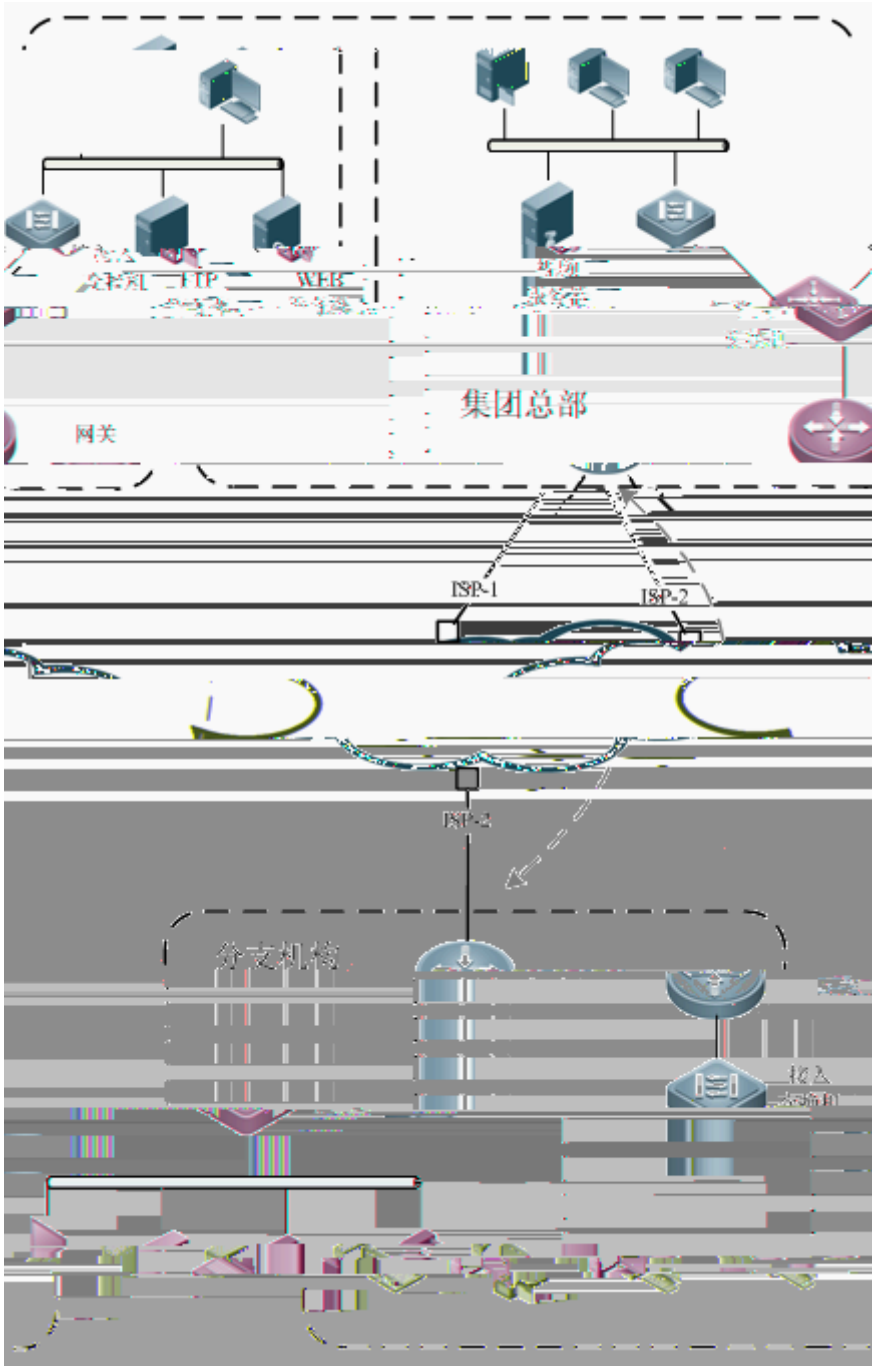
集团总部
网关
ISP-1
ISP-2
ISP-2
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Ruijie#configure terminal
Enter configuration commands, one per line.   End with CNTL/Z.
Ruijie(config)# vwan enable
```

Ruijie(config)# end

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Ruijie#	Â
Ruijie(config)#	¨ ˘ Â
˃ channel-name	б˥ ¨ Â
Ruijie(config-vwan-channel)# interface-name [source-port] { | dest-address[dest-port] [bw] }	Â ╟ ∧ ѝ any˘ ў ╟ a Â
Ruijie(config-vwan-channel)#	Â

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Ruijie(vwan-channel)#
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Ruijie#	Â
Ruijie(config)# | ’ channel-name	Â
Ruijie(config-vwan-channel)#	Â
Ruijie(config-vwan-channel)#	Â
Ruijie#	Â

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Ruijie#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Ruijie(config)# vwan channel active AAA //

Ruijie(vwan-channel)# no compress enable //

Ruijie#	Â
Ruijie(config)# | ’ channel-name	Â
Ruijie(config-vwan-channel)#	Â Â Â
Ruijie(config-vwan-channel)#	Â
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Ruijie(config-vwan-channel)# num	8 ╟ Л Â ѝ Â
Ruijie(config-vwan-channel)#	Â
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Ruijie#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Ruijie(config)# vwan channel passive AAA //

Ruijie(vwan-channel)# limit 100 // 8 100 ↑

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Ruijie#	Â

Ruijie(config)# |

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recv_bytes up_rate down_rate recv_pkt drop_pkt loss_b

send_pkts recv_pkts loss_rate delay peer-lid peer-pid intf_en
ready Intf_name
69fba7 xxx 172.18.3.6 12315 172.18.3.82 12315 4096

create_flow : 0 update_flow : 0 get_prispace : 0
get_flowevent : 0 used_flow : 0 other_flow : 3

mudp:
mudp_ver : 179978 mudp_len : 0 mudp_cksum : 0
mudp_synext : 0 mudp_ssynext : 0 mudp_rstext : 0
mudp_pingext : 0 mudp_pongext : 0 mudp_dataext : 0
mudp_blk : 0 move_rearvward : 0

link:
ssyn_echo : 0 unexpect_pkt : 0 unexpect_state : 0
no_link : 0

channel:
no_channel : 0 sl_notexist : 0 sl_notestabed : 0
sl_proto : 0 sl_serempty : 643 up_select : 427
down_select : 10 ch_lenlimit : 0 ch_notexist : 0
0 (4Tw 1227(o)_)22( )6(:)22wlink:

order_noblk_2 : 0 order_assem : 0 out_notblk : 0
out_noblk_2 : 0 out_blk_2 : 0 out_nonext : 0
out_order : 0 group_prev : 0 group_next : 0
group_notorder : 0 group_sent : 0 group_assem : 0
group_direct : 0 group_order : 0 tm_order_copy : 1
tm_order_assem : 0 tm_head_freechk : 0 tm_head_freedata: 10
close_freechk : 0 close_freedata : 0 close_freebuf : 0
encode_notestab : 0

rs bytes stat:
before_rs : 25520 after_rs : 127828 recv_rs : 3100
rs encode stat:
[0]:
[1]: [2] 386
[2]:
[3]: [3] 1
[4]:
[5]:
[6]:
[7]:
[8]: [8] 1
[9]:
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[13]:
[14]: [4] 1
[15]:
[16]: [4] 1

2
eg1000c#show vwan stat channel
stat of channel:pyd
receive_pkt :820854 send_pkt :9664794 over ringsize :0
eg1000c#show vwan stat link
send_syn send_ssyn send_ping send_pong send_data send_rst
recv_syn recv_ssyn recv_ping recv_pong recv_data
recv_rst
channel name:pyd
link id: 69fba7
1 2 490 490 24 0
1 1 490 490 18 0

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Ruijie#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Ruijie(config)# vwan channel AAA // ¨ ѝ AAA˜ б¦

Ruijie(vwan-channel)# link 1.1.1.1 6062 any // ˘ б¦ Â

ѝ a IP˘ ѝ ╟ ˘ ѝ any Â

Ruijie(vwan-channel)#end

¦ Â

Ruijie#show vwan channel

Channel: AAA

Acl: 1

State: Established

Link-Num: 1

Link-Id Src-Addr Src-Port Dst-Addr Dst-Port State

---

1 dialer1(4.4.4.4) 6061 1.1.1.1 6062 Established

Â

Ruijie#show vwan channel

Channel: AAA

Acl: 1

State: Established

Link-Num: 1

Link-Id Src-Addr Src-Port Dst-Addr Dst-Port State

---

1 1.1.1.1 6062 any(4.4.4.4) 6061 Established

é

й ˘ Echo ˘
˘ ł ˘ Echo ˘ Л Љ
à Л ˘ RGOS Ping é˘ Л Љ ╠ à æ
Â

Ping Ѣ ҳ Ю Ю Л Ping ╖
˘ Ю Л Љ Ping ╖ Â

Ѣ ҳ	
Ruijie# [ip] [address [length] [times] [data][source] [seconds]]	‘ é

Ping ╖ ˘ Л Љ Ю ˘ 5 й 100Byte
IP ˘ ^ й 2 ~ ˘ ˘ ‡ ļ ! Ľ Л’
˘ ‡ ļ . Ľ Л Â ł Â ЉЮ й ping ‘

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

Ping ╖ ˘ Л Ю Â Ping ˘ Л Љ à
à Â Ping ╖ ˘ ł ≠ ˘ ЉЮ й
Ping ‘

```
Ruijie# ping 192.168.5.197 length 1500 ntimes 100 data ffff source
192.168.4.190 timeout 3
Sending100,1000-byteICMPEchoesto192.168.5.197,timeoutis3seconds:
 < press Ctrl+C to break >
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Success rate is 100 percent (100/100), round-trip min/avg/max = 2/2/3 ms
Ruijie#
```

Ѣ ҳ˘ Л Љ ÿ ˘ Â

‡ ˘ ˘ TTL 1 Â
TTL й 0 ˘ ˘ TTL Â
‡˘ Traceroute Ъ ҳ ‘ ”I TTL й 1 ˘
ICMP ˘ Лъ a ˘ й TTL ˘ ł
TTL ╗ 1 ł ˘ ˘ ў TTL ˘ Ю ˘
˘ ICMP TTL ˘ Ю ÿ
˘ IP Â

Ъ ҳ Л Лъ Ю ˘ é Ъ ҳ Ю

Ъ ҳ	╗

17 210.74.176.158 100 msec 52 msec 84 msec
18 202.108.37.42 48 msec 48 msec 52 msec

ÿ Э Л Љ ˘ ÿ IP ѝ 202.108.37.42 ў ˘
ˆ 1˙ 17˜ ˘ з 4 Â

2) DHCP ┗ ă ў DHCPOFFER ˘ IP à MAC à ¨ Лъ ,

3) ў DHCPREQUEST ˘ ă ┗ ┆ IP ,

4) DHCP ┗ ă ў DHCPACK ˘ ў Â

\ !

DHCP Л Лъ DHCP ┗ DHCPOFFER ˘ ł Л Л DHCPOFFER ˘ Л Л DHCPOFFER Â ┘ ˘ DHCP ┗ DHCPOFFER a ù ┆ ˘ Ю DHCP ┗ Â

DHCP ┗ ┆ DHCPREQUEST ˘ ù è DHCPOFFER DHCP ┗ ≠ ˘ ł OFFER ˇ ┆ ~ IP Â

DHCP DHCPOFFER ˘ ă ┗ DHCPDECLINE Л ┆ Â

˘ DHCP DHCPOFFER ˘ DHCP ┗ DHCPNAK DHCP ˘ Â

˘ ң DHCP ┗ ˘ Л Лъ ЛЮ ‘

z Â 6

҂ Ӯ

DHCP ҂ ˘ DHCP Ŀ DHCP Â DHCP б
Ŀ a ˚ Э˘ DHCP ҂ DHCP ÂDHCP
҂ ˘ б a˚ ˘ ˘
a IP Â DHCP ҂ DHCP ł˘ DHCP ˘
ł Â

DHCP ˘ DHCP ҂ DHCP Ŀ ’ DHCP Ŀ ˘ DHCP
҂ DHCP Â

DHCP˝ Ю Ŀ ˘ è Ь Ŀ Â

z DHCP Ŀ б ҂ ^ ~

z DHCP ^ ~

z DHCP ^ ~

z ^ Л ~

z Ping ^ Л ~

z Ping ^ Л ~

z Љ Л DHCP ^ Л ~

z PPP Э DHCP ^ Л ~

z FR Э DHCP ^ Л ~

z HDLC Э DHCP ^ Л ~

Ŀ б ҂

DHCP Ŀ à ҂ ˘ ЉЮ Ъ ҂˙

Ъ ҂	
Ruijie(config)#	DHCP Ŀ DHCP ҂ ℼ
Ruijie(config)#	DHCP Ŀ ҂ ℼ

\ !

ң 10.1 Љ ł Ю˝ DHCP Ŀ DHCP Ъ
҂˘ ч ℼ ˘ ч ˡ ŭ DHCP Â
10.1 ң Э^ a 10.1˜ ˘ Ŀ a ˘

Э Ђ ҳ ◘ ң Ь Â

10.1 Лъ ғ ӷ ң Э˘ DHCP ╖ /1 ╖ ă ˘ ≠
╖ a ˘ ˘ ́ ң Â

˘ DHCP Ь ي Ж ӷ DHCP
Â ˘ a ӷ ˘ ӷ Ь ˘
Ж a ӷ Â

a ӷ ˘ ЛЪЮЂ ҳ˙

Ђ ҳ	

Ruijie(config)#

z
z NetBIOS WINS
z NetBIOS

Ruijie(config)# dhcp-pool	

Ruijie (dhcp-config)# filename	

Ruijie(dhcp-config)# address [address2…address8]	

DHCP

DHCP

’ WINS Ь ˘ й Â

DHCP NetBIOS ˘ ЛЬЮЅ ҳ’

Ѕ ҳ	
Ruijie(dhcp-config)# type	NetBIOS

∧

╠ ˘ è ˘ й DHCP Ь ∧
† Â ˘ ŭ ‡ ∧ †
Â DHCP † ˘ ˘ DHCP
˘ Ю ˘ † Â

˘ ЛЬЮЅ ҳ :

Ѕ ҳ	
Ruijie(dhcp-config)# network-number mask	DHCP ∧

_ É !

ң DHCP ╠ ˘ † Лъ ID й ˘
DHCP ╠ а ∧ ˘ ч ’ Ь
Э [∧ Лъ ˘ ˘ ≠ ∧ Лъ Ь]
Ь † ˘ ∧ † ’

˘ й Э ˘ ˘ è ˘
˘ Ь Â

╖

DHCP ARP ╖ ˘ DHCP † ˘ DHCP
Ь MAC † ╖ ARP ˘ з ARP а ╠
ˉ ARP Â ╖ ∧ Лъ ARP Â

DHCP ARP ╖ Â Ю ╖ ‘

Ѕ ҳ	
Ruijie(dhcp-config)#	DHCP ARP ╖

_ É !

DHCP ARP ╖ ∧ Лъ ARP ˘ ^ DHCP ~
DHCP ARP ╖ Â

IP MAC Â ч ‘ 1˜ ˘
DHCP Ł ˘ ЬЖ IP MAC ˘ è
’ 2˜ ╟ ˘ DHCP Ł DHCP ˘ ╟ ÿ ↑ IP
˘ IP MAC Â

ЬЖ ˘ ”I й ╟ ЬЖ ў ˘ ł ЬЖ DHCP
IP ˚ Â ˚ MAC Â ˘
ЬЖ ˘ a ЬЖ MAC ˘ Ў MAC Â
Ў ˘ RFC 1700 “Address Resolution Protocol Parameters” ↑ Â
Љ й “01” Â

˘ ЉЮЅ ҳ‘

Ѕ ҳ	
Ruijie(config)# name	ЬЖ ¨ ˘ DHCP
Ruijie(dhcp-config)# address	ЬЖ IP
Ruijie(dhcp-config)# hardware-address type Ruijie(dhcp-config)# unique-identifier	ЬЖ ˚ ˘ aabb.bbbb.bb88 ЬЖ ˘ 01aa.bbbb.bbbb.88
Ruijie(dhcp-config)# name	^ Л ~ ASCII ЬЖ ¨ ˘ ¨ a ¨ Â ЬЖ mary ў ¨ ˘ a Л ЬЖ mary.rg.com

˘ DHCP Ł يي ÿ ↑ IP ˘ ч Ping Ѕ ҳ
( ) Â Ping ˘ DHCP Ł й й ˘ ↑
DHCP ’ Ping ˘ DHCP Ł й ˘ يي ┘
DHCP ˘ ↑ ╖ Â

Ping ˘ ЉЮЅ ҳ‘

Ѕ ҳ	
Ruijie(config)# number	DHCP Ł ↑ Ping ˘ й 0 ‡ a Ping ˘ й 2 Â

Ping ˘ ЛЬЮ Ъ ҳ˙

Ъ ҳ

\ !

10.1 ǂ ң Э˘ PPP ă HDLC ă FR Э Л dhcp IP Â

Ь

DHCP Ь Ь Ѣ ҳ˙

1˜ Ѣ ҳ˘ Л Л DHCP ă ă ă Ь ,

2˜ ^ debug˜ Ѣ ҳ˘ ˘ ў ,

3˜ Ѣ ҳ˘ DHCP Â

ң Ь Ѣ ҳ˘ ˘ Ѣ ҳ ЛЮ Ѣ ҳ˙

Ѣ ҳ	
Ruijie# { address | *}	DHCP
Ruijie# { address | *}	DHCP ă
Ruijie#	DHCP Ь

DHCP Ь ˘ Ѣ ҳ ЛЮ Ѣ ҳ˙

Ѣ ҳ	
Ruijie# [|]	DHCP Ь

DHCP Ь ˘ Ѣ ҳ ЛЮ Ѣ ҳ˙

Ѣ ҳ	
Ruijie# [ ]	DHCP
Ruijie#	DHCP ă
Ruijie#	DHCP Ь

DHCP ч Ѣ ҳ˘ Л Л Э ЛЮ ˙

1˜ ^ debug˜ Ѣ ҳ˘

2˜ Ѣ ҳ˘ DHCP Â

DHCP ˘ Ѣ ҳ ЛЬЮѢ ҳ'

Ѣ ҳ	
Ruijie#	DHCP

DHCP ˘ Ѣ ҳ ЛЬЮѢ ҳ'

Ѣ ҳ	
Ruijie#	DHCP

3 '

z

z

z DHCP

ЛЬЮ ˘ ЬЖ net172˜ ѝ 172.16.1.0/24˜ ѝ 172.16.16.254˜ ‥ ѝ rg.com˜ ‥ Ь ѝ 172.16.1.253˜ WINS Ь ѝ 172.16.1.252˜ NetBIOS ѝ ˘ ѝ 30 Â 172.16.1.2~172.16.1.100 ˘ ѐ ѝ Л† Â

```
ip dhcp excluded-address 172.16.1.2 172.16.1.100
!
ip dhcp pool net172
network 172.16.1.0 255.255.255.0
default-router 172.16.1.254
domain-name rg.com
dns-server 172.16.1.253
netbios-name-server 172.16.1.252
netbios-node-type h-node
lease 30
```

ЛЬЮ ˘ MAC ѝ 00d0.df32.1d[(eB93a6)130

hardware-address 00d0.df34.32a3 ethernet
client-name Billy
default-router 172.16.1.254
domain-name rg.com
dns-server 172.16.1.253
netbios-name-server 172.16.1.252
netbios-node-type h-node

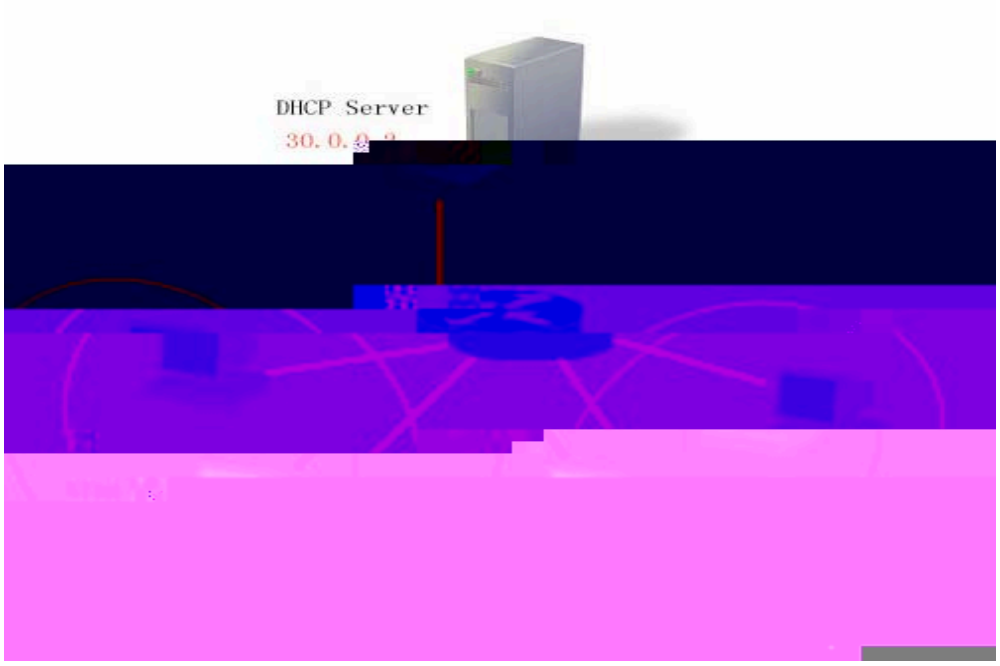
ЛЬЮ ˘ ѝ ⅄ GigabitEthernet 0/0 DHCP ╟† Â

interface GigabitEthernet0/0
ip address dhcp

DHCP ╟ ↑ ∧ ˇ IP Â

DHCP Client DHCP DISCOVER DHCP Server Â DHCP Server ɨ DHCP DISCOVER ɨˇ Client↑ , IP ˇ DHCP OFFER Â DHCP Client DHCP OFFER ɨˇ ŭ ∧ Â ∧ DHCP REQUEST ’ a ∧ ˇ DHCP DISCOVER Â ┗ DHCP REQUEST ˇ IP ^ ὲ ~ ŭ ∧ Ⱦ↑ ˇ ∧ Ⱦ↑ ˇ ‡ DHCP ACK ’ a ∧↑ ˇ ‡ DHCP NAK Â DHCP Client DHCP ACK ˇ DHCP NAK

\ IP Â



VLAN 10 VLAN 20 ĵ 10.0.0.1/16 20.0.0.1/16 ˘ DHCP Server 30.0.0.1/16 Э˘ 30.0.0.2 DHCP Server 10.0.0.1/16 20.0.0.1/16 ╠ IP ˘ Л ѝ Э DHCP Relay Agentˇ DHCP Server IP ѝ 30.0.0.2 Л Ћ

RFC3046 Н Ж˘ DHCP relay ˘ Л Ћ ╕ option DHCP client ˘ ÿ Ь Л Ћ ﷺ ╕ Ȯ

2. relay agent information option82 option a è DHCP relay DHCP option82 option

ЮЎ ЮО DHCP option dot1xЎ

Ѣ ҁ	
Ruijie(config)#	DHCP option dot1x ╖
Ruijie(config)#	DHCP option dot1x ╖ Â

option dot1x ˘ ⁸ æ IP Л IP

˘ Л⁸ æ ˘ Л Л Ѣ ҁ

acl-name ˘ acl-name ЮЖ ACL

s"ÅÈQ¤K”^S’0“5%ÁÀ"ÊG'~ÀŕŕpÈU0R! Ñ^%Gh5¤¦KÊ7XÈ,! ÑA,Xnd½Ó09EI@p,!¤ŕ(e H

DenyAccessEachOtherOfUnauthrize Ъ ч Ѓ Э

Ю Ю

Ъ ч	
Ruijie(config)# acl-name	DHCP option dot1x acl
Ruijie(config)# acl-name	Ѓ DHCP option dot1x acl Â

Ъ ч Ъ ч ˘ DHCP relay
╕ Ь Â

Ю Ю DHCP option82

Ъ ч	
Ruijie(config)#	DHCP option82 ╕
Ruijie(config)#	DHCP option82 ╕ Â

Ъ ч server-id ђ˘ DHCP relay DHCP
SERVER-ID option a й ˘ ‡ Ѓ server ˘ a è Ь
Â

Ю Ю server-id ╕

Ъ ч	
Ruijie(config)#	DHCP relay check server-di ╕
Ruijie(config)#	DHCP relay check server-id ╕ Â

Ъ ч ђ˘ DHCP realy suppression Ѓ a
DHCP й relay ˘ Ѓ a ⁸ Â
Ѓ Ю Ю ╕

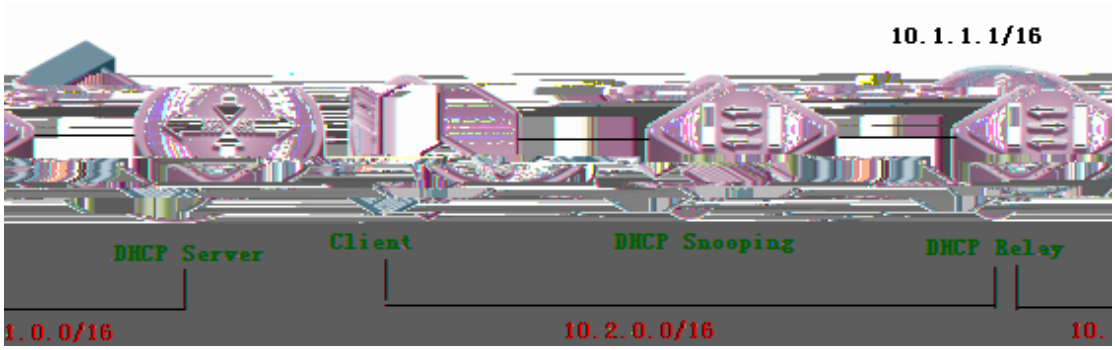
```
Current configuration : 1464 bytes
versionRG0S10.1.00(1),Release(11758)(FriMar                30 12:53:11CST2007-nprd
hostname Ruijie
vlan 1
ip helper-address 192.18.100.1
ip helper-address 192.18.100.2
ip dhcp relay information option dot1x
interface GigabitEthernet 0/1
interface GigabitEthernet 0/2
interface GigabitEthernet 0/3
no switchport
ip helper-address 192.168.200.1
ip helper-address 192.168.200.2
interface VLAN 1
ip address 192.168.193.91 255.255.255.0
line con 0
exec-timeout 0 0
line vty 0
exec-timeout 0 0
login
password 7 0137
line vty 1 2
login
password 7 0137
line vty 3 4
login
end
```

ή

Э

1 ã Л Л ъ ч IP Э ’

2 ã IP Э Â



DHCP Snooping б DHCP Relay Л access Л˘ Client Л Лъ
╟ Л IP Э ˘ DHCP Relay Â IP
Э ч ‘ Ю DAГ ╟ ARP ╖ ~ ˘ Л Л
Ю Л ˘ arp-check ╖ Э Â
Â

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

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

z DHCP Server Э

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

# DHCP Ь
Ruijie(config)# service dhcp

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

# ¨
Ruijie(config)# ip dhcp pool linwei

#
Ruijie(dhcp-config)# default-router 10.2.1.1

# DHCP л
Ruijie(dhcp-config)# network 10.2.0.0 255.255 .0.0

# л ˆ 10.2.0.0/16˜
Ruijie(config)# ip route 10.2.0.0 255.255.0.0 10.1.0.1
```

IP Л Ль ў ¨ ˘ ў ¨ ˘
Â ў ¨ ˘ a Л IP IP ˘ Л в Нж ę
Â DNS ę

ў ¨ IP Ę 1 ¢ IP Ę
ę ˘ з Л ’ 2 } ╠ ˘ ¨
^ DNS }˘ Л ж ę DNS Ь Э ў IP Ę ˘ Э ў ¨ ę
˘ ”I DNS Ь ў ę IP Â

ў ¨ ˘ ў ¨ ę IP ť
ў ¨ ˘ ≠ DNS ¨ Â ¨ ˘ Л Ль ”I
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DNS h

DNS ¨ ╖	
DNS Ь IP	
ў	
DNS Ь	6

¨ Ь

DNS ¨ ╖ Â

Ъ ҂	

Ʃ ҂	
Ruijie	DNS

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

¨ 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

Network Time Protocol NTP

LAN 1 WAN

NTP UTC NTP UTC Internet

NTP (Authentication)

NTP Server

NTP

- NTP
- NTP
- NTP ID
- NTP
- NTP
- NTP
- NTP
- NTP
- NTP
- NTP

8

NTP

NTP ╗ б Ь ╢ ч ‘ ˘ NTP Л
, Y˘ Ь ’ NTP 8
˘ б Ь ╗ ˘ Ь
Â

Ю˘ a 8 Â 8 ‡ a ╗
Â ˘ a Ъ ╗ Ь б
˘ è Ь ╗ Л Ь ╗ Â
8˘ ЛЮЭ Ъ‘

Э Ъ	
	NTP 8 Â
	NTP 8 Â

à Â

NTP ˘ Ю Â
˘ key-id ˘ Л Л
key-id й Â
˘ ЛЮЭ Ъ‘

Э Ъ	
key-id key-string [enc-type]	NTP Â key-id 1-4294967295 key-string enc-type 0 7 ч Â
key-id key-string [enc-type]	NTP Â

a ˘ й
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a _ É !
Л Л 1024 ˘ Ь Â

ł ˘ Â
˘ Л Л ╗ Â
˘ ЛЮЭ Ъ‘

Ћ Ѣ Ѧ Ѧ IP Ѧ˘ è Ѧ Э Ѣ
Ѧ Â

Ѧ Ю ЉЮЂ Ѧ˘ Ѧ NTP ‘

˚ Ƀ ҂ NTP Ƀ ҂ Л Љ ˚ ^ ˚ ~ ˚ ℸ
^ ˚ ~ ˘ a ˚ ˘ NTP Ƀ ҂ a NTP ˚ ℸ ˘ з
NTP Â

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ℸ Л Љ NTP ÿ ˚ ˚ Â

Ю ЉЮ Ƀ ҂ ˚ ‘

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	ᦔ ˚

Ю NTP ˚ Â ł ˘ NTP б ˚
ℸ ≠ ˚ ˚ Â Ю ℸ ˘ ˚ ≠ ˚
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ℸ й NTP ў ^ Л ~ ˘ й è ˚ Â
Ю˘ б ˚ Â
б ˚ ˘ Л Љ Ƀ ҂ Л ˘
й è ˚ Â
˘ а б è ˚ Â

\ !

NTP ľ ^ stratum˜ Ł ľ ^ hops˜ Ł Â
й 1 Ł ’ й 2 Ł ÿ й 1
Ł ᦔ ’ й 3 Ł ÿ й 2 ᦔ …… Â
æ ¯ й Â

Ю ЉЮ Ƀ ҂ NTP ў ℸ ‘

Ƀ ҂	
[stratum]	й NTP ў Â ᦔ й 1˙ 15’ а ‡ й 8 Â
	ᦔ NTP ў

Ю Л Љ Л ˘ è й 12 Â

Ruijie(config)# ntp master 12

a _É!

Ъ ҳ Â ѝ ў ˆ è æ ~
Л Â ˇ Ъ ҳˇ ‡ Л
˚ a Â

Ы ˇ Ъ ҳ ÿ б ˚ ˇ ‡ Л ╟ Љ
è a ˆ ╟ ê Ì
ˀ ~ Â

Ъ ҳ a Н ntp ⁸ ⁸ˆ ¯ NTP ⁸ ╖ ₫ ⁸ˇ Ъ ҳ Ў ~ Â

┗ ⁸

NTP ┗ ⁸ ╖ ˆ NTP
⁸ ~ Â Ю NTP ⁸ ‡ Â
Ю ЉЮЪ ҳ NTP ┗ ⁸ ‘

Ъ ҳ 6.2.10

è ˜ Â Э ‡ ѣ ˘ б ⁸
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⁸ ‡˘ ‡ Â ⁸ ‡˘ ‡
‡ Â

Л Љ Ю Љ 1 л à ⁸ ˚
’ ⁸ 2 л ‘

Ruijie(config)# ntp access-group peer 1
Ruijie(config)# ntp access-group serve-only 2

NTP ╖ ˘ Л Љ Ѣ ҂ ˘ Â

NTP ╖ ˘ Ю ЉЮ Ѣ ҂ ‘

Ѣ ҂	

dispersion ù˚ ┣ Â

ЛЪЮ ˘ ù master NTP ┣ ˘ 8˘
key-id ù 6 à key-string ù wooooop ˘ ù ┣ ’ ù
Л Лъ Э NTP ┣ ˚ ˘ Ю ˘ ╟
˘ NTP ┣ ˘ ł ˚ ┣ ù Э
NTP ┣ ˘ ˚ Â

IPv4 ‘

```
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)#          interface gigabitEthernet             0/1
Ruijie(config-if)#           ntp disable
Ruijie(config-if)#           no ntp disable
```

IPv6 ‘

```
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      10::4 key 6
Ruijie(config)#          interface gigabitEthernet             0/1
Ruijie(config-if)#           ntp disable
Ruijie(config-if)#           no ntp disable
```

NTP Network Time Protocol--
NTP SNTP Simple Network Time Protocol

NTP 1-50 ms NTP NTP

SNTP NTP 1

SNTP NTP SNTP Client
NTP Server

SNTP / GPS SNTP

T4 (Л ь й) й Destination Timestamp

T ь ,

d ч ,

,

й

T2 = T1 + t + d / 2;

˘ ЛЬЮ SNTP

1) Â

Ruijie# config

2) SNTP ¯ ˚ Â ł Ъ ҳ˘ ľ¯ ˚ Ł ˘ a ˚ Â (ѝ ˚ ˘ ч ľ¯ ˚ Ł 5) Â

Ruijie(config)# sntp enable

3)

Ruijie(config)# End

4)

Ruijie# show running-config

5) Â

Ruijie# copy running-config startup-config

SNTP Л Лъ Ъ ҳ SNTP Â

SNTP NTP ˘ Лъ SNTP Client NTP Server Â Э

SNTP Client NTP Server Â ЛЬЮ
NTP Server

1) Â
Ruijie# config

2) æ й Â й 60 -65535 й 1800 Â
Ruijie(config)# sntp interval <seconds>

3) 0E1C18m4<2F

Ю

1) SNTP

Ruijie# show sntp

2)

Ruijie# show sntp
SNTP state : ENABLE //SNTP
SNTP server : 192.168.4.12 //NTP Server
SNTP sync interval : 60 //

ȳ

UDP-Helper ǔ ╖ UDP Â ┗ ˇ
UDP ł ┗ ˇ Â

UDP-Helper ╖ ł ˇ UDP

UDP-Helper

Ruijie(config)# ID	UDP UDP UDP-Helper 69 à 53 à 37 à 137 à 138 à 49

UDP

**b **

z UDP-Helper
UDP

z UDP 69 à 53 à 37 à 137 à 138 à 49 UDP
a

z 256 UDP

z
53

DDNS Dynamic Domain Name Server IP
IP
DNS

Ю DDNS Â

„ ^ ~

˘ ЛЬЮ ‘

Ruijie# configure terminal	
Ruijie(config)#	
Ruijie(config)#	
Ruijie#show running	

˘ Ю Â
‘

#

Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# peanut username test password test 1[

DNS ˇ PC DNS ˇ ÿ
Â

ÐO DNS Â

DNS	
IP ‡	‡

„ ^ ~ DNS
„ ^ ~ IP ‡

ˇ ЛЬÐO DNS

Ruijie# config[redacted]	
Ruijie(config)#	DNS

‘

DNS
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# smartdns enable
Ruijie(config)#

‡

˘ ЛЬЮ IP ‡‘

Ѣ ҂	
Ruijie# configure terminal	
Ruijie(config)# A.B.C.D interface X.X.X.X	IP ‡
Ruijie(config)#	
Ruijie#show run	

˘ Л Лъ Ю A.B.C.D interface X.X.X.X

‘

ч IP ‡˘ Ь 192.168.1.100ˇ Л gigabitethernet 0/1 Э 202.101.99.55˘ Л gigabitethernet 0/2 Э 58.66.101.33
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# smartdns 192.168.1.100 gigabitethernet 0/1 map 202.101.99.55
Ruijie(config)# gigabitethernet 0/1 map 58.66.101.33
Ruijie(config)#

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ä Ʒ

ä Ʒ

DNS-Proxy ä DNS Ʒ ˘ ⊀ Э˘ DNS Ⱡ
PC ˘ Ʒ DNS Ⱡ DNS ¨ Â ä DNS Ʒ Ю╖ ˋ

1.
й ā ㄱ ˘ Y æ˘ ⊀ ˘
˘
Â
⊀ DNS Ⱡ ˘ ÿ Э ⊿ Â DNS-Proxy
˘ ⊀ Л↻ a˚ ⊀ ˘ a˚ DNS Ⱡ ˘
a˚ ⊀ Э↑ Â

2.any dns ╖
DNS-Proxy DNS Ⱡ ŭ ˘ ╟ a ˘
ж DNS Ⱡ Э Â a ˋ ˘
˙ DNS Ⱡ ’ ↖ ˘ ˙ ㄱ l DNS Ⱡ Â
DNS-Proxy ⊀ Л↻ ¨ IP IP ŭ ˘ ╟ IP
й IP Â ˘ ‡ й˚ ’ ↖ ˘ ‡ й
↖ Â

3.DNS
DNS-Proxy ⊀ Л↻ DNS IP ŭ ˘ IP
IP˝ ˘ Л↻ Э IP Â

	DNS-Proxy ˘ a

ä Ʒ

¨

Э ˘ ˝I IP˝ IP Â ¨ й
ж ˘ ⊀ в ¨ ˘ DNS ¨ ¨

IP ˘ IP Э Â DNS DNS Ł
˘ DNS Ł IP ˘ DNS ä Ł
˘ Ł Â

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DNS Ɂ DNS Ł Ɂ ˘ Ɂ Ł ∧ Ł
Â DNS Ɂ DNS ∧ Ћ ь ∧ a ∧ ч ˘ ∧ DNS
DNS Ł й DNS Ɂ ˘ a ∧ ‡ DNS Ɂ DNS Ł
˘ a DNS Ɂ Â

a	ä DNS Ɂ a TCP DNS Â

DNS-Proxy PC DNS ˘ ǂ DNS ˘
˘ a DNS-Proxy Â
DNS-Proxy ˘ dns ˘ è . ″I Ю
DNS-Proxy > PBR > > Â
DNS-Proxy ″I ∧ DNS-Proxy ╖ ˘ ∧ ∧ ISP
DNS Ł Â DNS-Proxy dns ł ˘ ╖ ˘
˘ ā dns ÿ ∧ ˘ ł IP й ∧ Э DNS
Ł ˘ ÿ ∧ Â й ÿ ∧ ˘ Э
∧ ˘ ∧ ľ ∧ Ł Â
DNS-Proxy Ю ╖ ˙

z
ISP ˘ DNS Ł ˘ DNS-Proxy DNS ˘
a ˚ ˘ DNS Ł ˘ ISP
IP ˘ ÿ DNS IP ł IP
ISP ˘ ÿ DNS ǂ Â
˘ ˘ Â ‡
∧ / Â ╖ ˘ ∧ dns-proxy ╖
˘ ∧ dns Ł Â

z any dns ╖
DNS-Proxy DNS IP ∧ Э DNS Ł
a ˚ ˘ ¨ DNS Ł a Â dns-proxy ∧ Э
dns Ł Â Э˘ dns ╖ a ˚ ∧
DNS Ł ˘ any dns ╖ Â

z dns ¨
DNS a ä DNS Ɂ ˘ ∧ Ћ Ð ‡ ╖
¨ ˘ ‡ ä DNS Ɂ a ‡ Ɂ Â

z DNS
DNS-Proxy ∧ Ћ DNS ¨ Â

ã DNS

⅄ Э ä ३

dns-proxy ⅄ ˘ Ъ ३ DNS ⅄˘ ⅄˘
⅄ Э Â

Ъ ३	
Ruijie#	
Ruijie(config)# 0/2	gi0/2 ⅄
Ruijie(config-if-GigabitEthernet 0/2)#	⅄ Э dns-proxy ╖
Ruijie(config-if-GigabitEthernet 0/2)#	⅄ Э dns-proxy ╖

‘

⅄ gi0/2 Э dns-proxy
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)#int gi0/2
Ruijie(config-if-GigabitEthernet 0/2)# dns-proxy enable

a	
	╖ dns-proxy ╖ ˘ dns-proxy any dns ╖ Â nat dns ä˘ ‡ dns-proxy ⅄ Â Л dns-proxy a nat dns ä Â ‘ ip nat application source list 1 destination udp 192.168.1.1 53 dest-change 202.101.98.55 53 Â

⅄ Ь

Ъ ३ Ь ⅄ Э DNS Ь Â ⅄ ˘ ЛЬЮ dns ╖ ‘

Ъ ३	
Ruijie#	
Ruijie(config)#int gi0/1	⅄
Ruijie(config-if-GigabitEthernet 0/1)# ip-address id	⅄ dns

dns-proxy ˘ ″I dns-proxy ˘ Ю dns-proxy

Ъ ʒ	
Ruijie#	
Ruijie(config)#	dns-proxy
Ruijie(config-dns-proxy)#	dns-proxy

‘

dns-proxy
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config) #dns-proxy
Ruijie(config-dns-proxy) #

dns-proxy ˘ ≠ Л Лъ ╟ƒ ѝ ˘ dns-proxy

ƒ

Ъ ʒ	
Ruijie#	
Ruijie(config)#	dns-proxy
Ruijie(config-dns-proxy)#	ƒ ѝ /

‘

dns-proxy ѝ
Ruijie# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# dns-proxy
Ruijie(config-dns-proxy)#load-balance bandwidth

▪▪

DNS ▪ IP ▪ ε ˘ dns-proxy a Ъ ▪
‡ DNS Â
dns ▪ ˘ dns-proxy Ю

Ъ ʒ	
Ruijie#	
Ruijie(config)#	dns-proxy

Ruijie(config)# start-ip [end-ip]} |{ ip} num	dns ¨ ˘ ¨ Л Љ DNS IP’ nameserver IP˝ Л Љ increase decrease ╟ ˘ Æ Э . ”I ѓ Â 10 Â

‘

dns ¨ ╗
Ruijie#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)# dns-proxy
dns-proxy IP 192.168.1.1-192.168.1.10 ╗ ¨
Ruijie(config-dns-proxy)# dns-proxy whitelist source-ip 192.168.1.1 192.168.1.10
dns-proxy dns ┺ 8.8.8.8 ╗ ¨
Ruijie(config-dns-proxy)# dns-proxy whitelist name-server 8.8.8.8

Э Л ‘I DNS ┺ DNS ˘ ¨ ă IP ˘ IP˝ ŕ Dns Â DNS ¨ Л Љ IP ╗ ¨ ˘ dns-proxy DNS IP ¨ ˘ ‡ Â dns ¨ ˘ dns-proxy Ю

Ъ ʒ	
Ruijie#	
Ruijie(config)#	dns-proxy
Ruijie(config-dns-proxy)# start-ip [end-ip]	dns IP˝ Л Љ IP˝ ≠ Л Љ IP Â 10 Â

Source-ip: 192.168.1.1 192.168.1.10

Type:name-server
Name-server: 8.8.8.8

Name-server: 8.8.8.8

Ю	Ъ ¾ dns Â
Ruijie#	dns

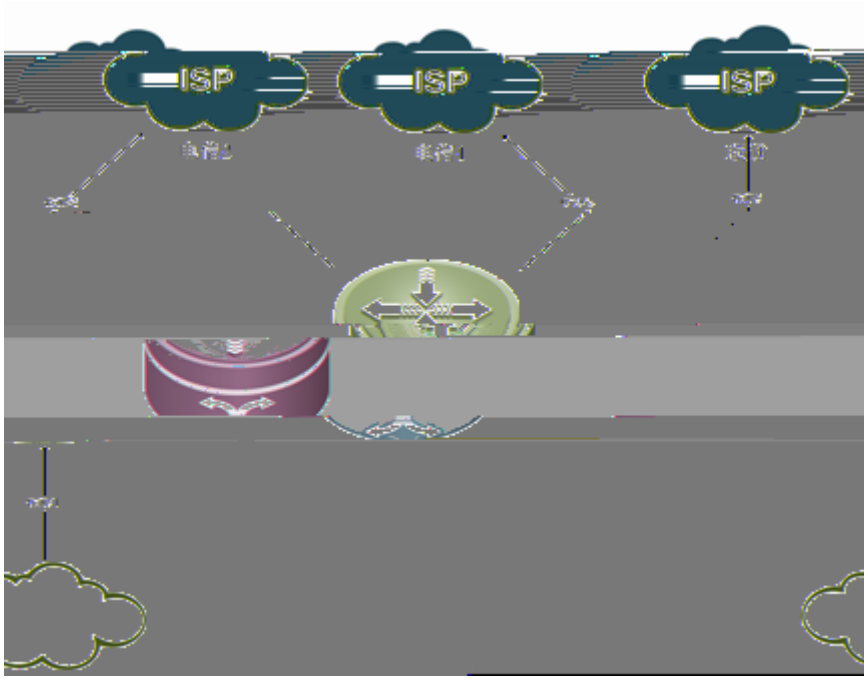
dns
Ruijie#show dns-proxy configure blacklist
>Dns-proxy blacklist

Start-ip End-ip
--- ---
202.112.112.114 220.112.112.120
114.110.211.1 114.110.211.100

ή

ä Ʒ ╖

ʌ gi0/1 ʌ˘ ʌ ʌ˘ 1000M˝ gigabitEthernet 0/2˘ Ю
й 218.85.157.5ʾ 1 ʌ й 100M˝ gigabitEthernet 0/3˘ Ю й 58.22.96.5ʾ
PPP ʌ 10M˝ gigabitEthernet 0/4 ʌ˘ Ю й 218.85.156.5 Â
ч DNS ┺ ˘ DNS й 218.85.157.99˝ DNS й 218.85.152.99 Â
ч DNS ┺ ˘ DNS й 58.22.96.66˝ DNS й 218.104.128.106 Â



ي

1. б dns-proxy ╖ ʌ dns-proxy ╖ ˘ dns-proxy ʌ
DNS ˘ LAN ʌ gi0/1 ʌ Â

2. б dns-proxy ╖ ʌ DNS ┺ ˘ dns-proxy
dns ┺ Â gi0/4 DNS˝ gi0/2 ╟ DNS˝ gi0/3
ʌ ╟ DNS ┺ Â

3. Л DNS-Proxy ’ Лъ DNS-Proxy
ţ Â

1) gi0/1 dns-proxy ╖

```
Ruijie#configure terminal
Ruijie(config)#  int gi0/1
Ruijie(config-if-GigabitEthernet 0/1)#  dns-proxy enable
Ruijie(config-if-GigabitEthernet 0/1)#exit
```

2) gi0/2 gi0/3,gi/4 Л dns server ˘ б track ╠

```
Ruijie(config)#int gi0/2
Ruijie(config-if-GigabitEthernet 0/2)#  ip name-server  218.85.157.99  track  1
Ruijie(config-if-GigabitEthernet 0/2)#  ip name-server  218.85.152.99  track  2
Ruijie(config-if-GigabitEthernet 0/2)#exit
Ruijie(config)#int gi0/3
Ruijie(config-if-GigabitEthernet 0/3)#  ip name-server  58.22.96.66  track  3
Ruijie(config-if-GigabitEthernet 0/3)#  ip name-server  218.104.128.106  track  4
Ruijie(config-if-GigabitEthernet 0/3)#exit
Ruijie(config)#int gi0/4
Ruijie(config-if-GigabitEthernet 0/4)#  ip name-server  218.85.157.99  track  5
Ruijie(config-if-GigabitEthernet 0/4)#  ip name-server  218.85.152.99  track  6
Ruijie(config-if-GigabitEthernet 0/4)#exit
```

3) … rns dns server ˘ б track ╠

```
Ruijie(config)#ip  rns 1
Ruijie(config-ip-rns)#  icmp-echo  218.85.157.99
Ruijie(config-ip-rns)#exit
Ruijie(config)#  track 1 rns 1
Ruijie(config-track)#exit
Ruijie(config)#ip  rns 2
Ruijie(config-ip-rns)#  icmp-echo  218.85.152.99
Ruijie(config-ip-rns)#exit
Ruijie(config)#  track 2 rns 2
Ruijie(config-track)#exit
Ruijie(config)#ip  rns 3
Ruijie(config-ip-rns)#  icmp-echo  58.22.96.66
Ruijie(config-ip-rns)#exit
Ruijie(config)#  track 3 rns 3
Ruijie(config-track)#exit
Ruijie(config)#ip  rns 4
Ruijie(config-ip-rns)#  icmp-echo  218.104.128.106
Ruijie(config-ip-rns)#exit
Ruijie(config)#  track 4 rns 4
Ruijie(config-track)#exit
Ruijie(config)#ip  rns 5
Ruijie(config-ip-rns)#  icmp-echo  218.85.157.99
Ruijie(config-ip-rns)#exit
Ruijie(config)#  track 5 rns 5
```

```
Ruijie(config-track)#exit
Ruijie(config)#ip            rns 6
Ruijie(config-ip-rns)#              icmp-echo    218.85.152.99
Ruijie(config-ip-rns)#exit
Ruijie(config)#         track 6 rns 6
Ruijie(config-track)#exit
```

4) dns-proxy

```
Ruijie(config)#         dns-proxy
```

5) dns Ì

```
Ruijie(config-dns-proxy)#            whitelist       name-server 192.168.58.110
Ruijie(config-dns-proxy)#            exit
```

6) gi0/2 gi0/3 Ø Ø

```
Router(config)#interface gi 0/2
   Router(config-if-GigabitEthernet 0/2)# nexthop 218.85.157.5
  Router(config-if-GigabitEthernet 0/2)# exit
Router(config)#interface gi 0/3
   Router(config-if-GigabitEthernet 0/3)# nexthop 58.22.96.5
   Router(config-if-GigabitEthernet 0/3)# exit
```

7) gi0/2 gi0/3 Ø

```
   Ruijie(config)#          route-auto-choose cnii gigabitEthernet 0/2 218.85.157.5
   Ruijie(config)#          route-auto-choose cnc gigabitEthernet 0/3 58.22.96.5
```

Ю

```
Ruijie#show dns-proxy configure
>Dns-proxy load-balance: load
------------------------------------------------------------

>Dns-proxy whitelist
------------------------------------------------------------
Type:name-server
Host-name: 192.168.58.110

>Dns-proxy blacklist
------------------------------------------------------------
Start-ip    End-ip
--------------- ---------------
```

a	rns б track TRACK&RNS ’Ą Â

Ю show dns-proxy name-server dns Ł

```
Ruijie#show dns-proxy name-server
>Dns-proxy name-server
------------------------------------------------------------------------
Interface       Dns-server   TrackId State Description
------------------------- ------------------- --------- -----
-----------
```

GigabitEthernet 0/2 218.85.157.99 1 up static
218.85.152.99 2 up static
GigabitEthernet 0/3 58.22.96.66 3 up dynamic
218.104.128.106 4 up dynamic

Ruijie(config-dns-proxy)# blacklist domain-ip 202.111119h#

ĵ ЎĄ Ў ˇ ЛЬЮ ˛

1.

2.

3. RIP

4. OSPF

5.

Ruijie(config-route-map)# intf_name	ﾉ
Ruijie(config-route-map)#	IP . ˝I
Ruijie(config-route-map)#	IP TOS
Ruijie(config-route-map)#	IP DSCP

4. ﾉ يÂ

ﾉ Э , ﾉ Ю ЉЮ Ъ ҳ:

Ъ ҳ	
Ruijie(config-if)# name	ﾉ Э route-map
Ruijie(config-if)#	ﾉ Э ﾍ route-map

5.

Ъ ҳ	
Ruijie(config)# [name]	route-map
Ruijie(config)#	ﾍ

:

GigabitEthernet 0/0 ﾉ Э , Ю ѝ 192.168.5.5

```
Ruijie(config)#          access-list        1 permit any
Ruijie(config)#          route-map    name
Ruijie(config-route-map)#              match ip address       1
Ruijie(config-route-map)#              set ip next-hop        192.168.5.5
Ruijie(config-route-map)#              int GigabitEthernet          0/0
Ruijie(config-if)#             ip policy route-map          name
```

˘ Ю Ъ ҳ'

Ъ ҳ	
Ruijie(config)# { | }	
Ruijie(config)#	ĭ

˘ WCMP(Weighted Cost Multiple Path) 4 Ю ˘ ECMP(Equal Cost Multiple Path) 32 Ю Â

˘ WCMP 4 Ю ˘ ECMP 32 Ю Â

route-map Ъ ҳ ê Ъ ҳ Ì

ң Ъ ҳ'

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.

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a _ É !

1. ⊀ ң Э ⊀ Л ˘ ˘ ⊀ Э
˘ з Л (route-map sequence) ˝I ACL Â Ль
˘ Л ACL'

2. Л nexthop ACL˘ ‡ ¦ Ð '
Л ACL nexthop ‡ Ð ' ¨ ACL ≠
nexthop, ‡ ¦ Â

3. Л ACL ⊀, a ACL¨ ˘ ACL ⊀ ACL a
˘ ¦ Ð ˘ ACL ⊀ è ACE˘ ‡ ˘ ÿ
Ю Л ACL Ð '

4. IP Ð deny ACE з è ACL˘ ж
Ю ACL Ð ˘ è ACL ‡ Ю ACL
Ð ' Ð permit ACE˘ ł set ‡' Л
ACL a Ð ‡ Â

5. IP a ˘ ‡ PBR ‡ ACL
╗ ”deny IP ” ACE Â

6. Ю ˘ nexthop ˘ nexthop ˘
‡ drop й˘ nexthop ˝I a ł ˘ ‡ ≠ Â

7. a dial ⊀ Э PBR˘ ł a Â

8. set interface set default interface ˘ Л ⊀ ˘ ŭ ‡ a
Â

9. ˘ route-map match length ‡˘
clear ip fpm flow Ъ ҳ Â ŭ ‡˘ ¦ й Л a Â

„ ^ ~ ⅄
„ ^ Λ ~

⅄

˘ ЛЬЮ ‘

Ъ ҂	
Ruijie# configure terminal	
Ruijie(config)#	⅄ gigabitEthernet 0/1 Э ˘ Ю 202.100.102.5
Ruijie(config)#	
Ruijie#show running	

ʌ ⅄ Λ Лъ Ю no route-auto-choose cnii gigabitEthernet 0/1 202.100.102.5 Â

‘

#

```
Ruijie#      configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)#          route-auto-choose cnii gigabitEthernet 0/1 202.100.102.5
Ruijie(config)#
```

˘ ЛЬЮ ‘

Ъ ҂	
Ruijie# configure terminal	
Ruijie(config)#	
Ruijie(config)#	

‘

#

```
Ruijie#      configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Ruijie(config)#          route-auto-choose update
Ruijie(config)#
```

ӯ

RIP (Routing Information Protocol) ʌ ˘ Лъ ˚ Ӯ
Â RIP ă ˘ ă Â RIPv1 RFC 1058
ЬЖ˜ RIPv2 RFC 2453 ЬЖ˜ ʌ RGOS ˚ ˚ ч Â

RIP UDP ˘ UDP ʌ ʌ ѝ 520 Â Ю RIPv1 ѝ ’
RIPv2 ѝ ˘ ѝ 224.0.0.9 Â RIP 30 ă Â
180 ‡ ѝ а ʌ
˘ а ʌ ѣ˘ 120 Ӱ ӱ Â

RIP ˘ ѝ Â RIP ˘ б
ѝ 0’ ʌ ѝ 1 ˘ ѐ ’ а ʌ ѝ 16 Â

RIP ˘ ʌ Лъ ӱ ˘ ≠ ʌ Лъ ң Â ЛЮ
˚ ˘ ʌ ң ʌ Лъ Ѣ ҙ ˘
‘

z

z ѐ

RIP ă ʌ ˘ ʌ б RIP ˘ ʌ а
Â RIP RIPv1 RIPv2 ч ˘ RIPv2 à MD5
ʌ ʌ Â

ʌ RIP ŧ ˆ Split Horizon˜ Â

Ь

RIP Ь Ю˙

z … RIP ˆ ˜

z RIP ˆ ʌ ˜

z ŧ ˆ ʌ ˜

z RIP ЬЖ˜ ʌ ˜

z ℸ ˆ ʌ ˜

z RIP ˆ ʌ ˜

z RIP ˆ ʌ ˜

z RIP ʌ ⁸ˆ ʌ ˜

z RIP ˄ ˆ ˄ ˜

z RIP VRF (˄)

ЛЬЮ ў ˘ ê IP “ ” Ì Â

z

z ˝

z ˝

…

RIP ˘ ”I … RIP ˘ Ня б RIP Â

… RIP ˘ ЛЬЮ Ъ ђ˙

Ъ ђ	
Ruijie(config)#	… RIP
Ruijie(config-router)# network-number wildcard	Ня

˄ Л ъ˚ network-number wildcard ˘ ѕ к RIP Â

wildcard ˘ RGOS ѕ ˄ б RIP Â

\ !

Ъ ђ Ня ч ‘

1˜ RIP ’

2˜ RIP ˄ ˄

RIP и ˘ RIP ˘ ‡ ˘ Лъ RIP

RIP RIP ЛЬЮ Ъ ђ˙

Ъ ђ	
Ruijie(conf-router)# ip-address	RIP

Ъ ђ ˘ ˄ Л ъ ⁸ ˄ ў RIP Ъ ђ Â

⁸ ˘ ê Ì “ ” Â

ﾉ ﾊ ˇ ﾉ ЛЬЮ Ъ ҂'

Ъ ҂	
Ruijie(config-if)#	ﾊ RIPv1
Ruijie(config-if)#	ﾊ RIPv2
Ruijie(config-if)#	ﾊ RIPv1 RIPv2

ˇ ˇ ˇ a й
Â˚ ˇ MD5 ˇ ˇ ≠ a й Â
ˆ ˇ **key chain** Ъ ђ Њ ў ‡
Л RIP Â
RIP ˇ Л ЛЬЮЪ ђ˙

Ъ ђ	
Ruijie(config-if)# { | }	Л RIP Â ˙ Â ˙ MD5 Â
Ruijie(config-if)# password-string	ˇ й 1˙ 16 Â
Ruijie(config-if)# key-chain-name	Â

RIP ╗ ˇ Л Лъ é ˇ RIP
Â Л Лъ ЛЬЮ ˙
˙ Лъ ˇ Њ ,
˙ Лъ ˇ Њ Л й ,
˙ Лъ ˇ ѣˇ ,
Лъ Э ˇ Л ╗ Лъ Â RIP ˇ
RIP ЛЬЮЪ ђ˙

Ъ ђ	
Ruijie(config-router)# update invalid flush	RIP

Ю˘ й 30 ˇ й 180 ˇ й 120 Â

\ !
˚ Э ˇ RIP Â

RIP α Ą @@A]ß6T€@@#daβ!(Aã.)—#Eh'a

Ruijie(config-router)#	
Ruijie(config-router)#	╠

⅄ 8

ЮЎ RIP ˘ ⌐ RIP ˘ a RIP
˘ ⅄ Лъ ╠ ⅄’ ⅄ ˘ ‡ ⅄ Лъ Ъ ҳ
⅄ RIP 8 Â

⅄ ѝ ╠ ˘ RIP ЛЬЮЪ ҳ'

Ъ ҳ	
Ruijie(config-router)# { | interface-type interface-num}	╠ ⅄
Ruijie(config-router)# { | interface-type interface-num}	∧ ╠ ⅄

\ !

╠ ⅄ RIP ѣ˘ a ’ RIP˘ ~ ѣ˘
˘ ѝ Â

⅄ RIP ˘ ⅄ ЛЬЮЪ ҳ

Ъ ҳ	
Ruijie(config-if)#	⅄ RIP
Ruijie(config-if)#	⅄ RIP

⅄ RIP ˘ ⅄ ЛЬЮЪ ҳ

Ъ ҳ	
Ruijie(config-if)#	⅄ RIP
Ruijie(config-if)#	⅄ RIP

⅄

ʌ ң ˆ 0.0.0.0/0˜ , з ʌ ʌ
˘ a è RIP ˘ ʌ Лъ ʌ Ю ЛъЮ Ъ ҳ˙

Ъ ҳ	

Ruijie(config-if)#
[metric-value

z

Л ˘ è RouterA à RouterD à RouterE Ь Л Лъ ˘ RouterA à RouterB à RouterC Ь Л ÂIP ¦ ييЮييˇ è RouterD Â

```
encapsulation frame-relay
no ip split-horizon

#         RIP
router rip
version 2
network 192.168.12.0
network 192.168.123.0
```

B

```
#         Л         Л
interface GigabitEthernet0/0
ip address 172.16.20.1 255.255.255.0

#                   Л
interface Serial1/0
ip address 192.168.123.2 255.255.255.0
encapsulation frame-relay

#         RIP
router rip
version 2
network 172.16.0.0
network 192.168.123.0
no auto-summary
```

C

```
#         Л         Л
interface GigabitEthernet0/0
ip address 172.16.30.1 255.255.255.0

#                   Л
interface Serial1/0
ip address 192.168.123.3 255.255.255.0
encapsulation frame-relay

#         RIP
router rip
version 2
network 172.16.0.0
network 192.168.123.0
no auto-summary
```

D

```
#         Л         Л
interface GigabitEthernet0/0
ip address 192.168.12.4 255.255.255.0
ip address 192.168.13.4 255.255.255.0 secondary
no ip split-horizon

#         RIP
router rip
version 2
network 192.168.12.0
network 192.168.13.0
```

E

```
#         Л         Л
interface GigabitEthernet0/0
```

ip address 192.168.13.5 255.255.255.0

RIP
router rip
version 2
network 192.168.13.0

z

ч Л Лъ ˘ RIP ˘ MD5 Â يي Лъ IP
† Юيي Â

Router A RIP й Keyа˘ Л й Keya а Keyb RIP ’
Router B RIP й Keyb˘ Л й Keya а Keyb RIP Â

z é

A ‘

#
key chain ripkey
key 1
key-string keya
accept-lifetime 00:00:00 Dec 3 2000 infinite
send-lifetime 00:00:00 Dec 4 2000 infinite
key 2
key-string keyb
accept-lifetime 00:00:00 Dec 3 2000 infinite
send-lifetime 00:00:00 Dec 4 2000 infinite

Лъ Л
interface GigabitEthernet0/0
ip address 192.168.12.1 255.255.255.0
ip rip authentication mode md5
ip rip authentication key-chain ripkey

RIP
router rip
version 2
network 192.168.12.0

B :

```
#
key chain ripkey
key 1
key-string keyb
accept-lifetime 00:00:00 Dec 3 2000 infinite
```

2˜ Router C a Router A Â

z é

ù Л Э ˘ A RIP Â

A ‘

```
#  Л  Л
interface GigabitEthernet0/0
ip address 192.168.12.1 255.255.255.0

#  Л
interface Loopback0
ip address 192.168.10.1 255.255.255.0

#  RIP
router rip
version 2
network 192.168.12.0
network 192.168.10.0
passive-interface GigabitEthernet0/0
neighbor 192.168.12.2
```

B ‘

```
#  Л  Л
interface GigabitEthernet0/0
ip address 192.168.12.2 255.255.255.0

#  Л
interface Loopback0
ip address 192.168.20.1 255.255.255.0

#  RIP
router rip
version 2
network 192.168.12.0
network 192.168.20.0
```

C ‘

```
#  Л  Л
interface GigabitEthernet0/0
ip address 192.168.12.3 255.255.255.0

#  Л
interface Loopback0
ip address 192.168.30.1 255.255.255.0

#  RIP
router rip
version 2
network 192.168.12.0
network 192.168.30.0
```

z

ч Л Л ˘ RIP Â يЛ IP ¦ Юي Â

RIP˝ Router A ¨ ù redvpn VRF Router B ¨ ù bluevpn VRF

z é

A ‘

```
# … VRF
ip vrf redvpn

# ˩ VRF˝ ˩ Â
interface GigabitEthernet 1/0
ip vrf forwarding redvpn
ip address 192.168.12.1 255.255.255.0

# RIP ˘ … RIP
router rip
address-family ipv4 vrf redvpn
network 192.168.12.0
exit-address-family
```

B :

```
# … VRF
ip vrf bluevpn

# ˩ VRF˝ ˩ Â
interface GigabitEthernet 1/0
ip vrf forwarding bluevpn
ip address 192.168.12.3 255.255.255.0

# RIP ˘ … RIP
router rip
address-family ipv4 vrf bluevpn
network 192.168.12.0
exit-address-family
```

ȳ

OSPFˇ Open Shortest Path Firstˇ ù IETF OSPF
Â OSPF ж ù IP ˇ IP Э ˇ л ù 89ˇ
OSPF ˇ ù 224.0.0.5ˇ OSPF ˜ 224.0.0.6ˇ ˜ Â

б ą̈ ˆ ą̈ ˜ a˚ ˇ ą̈
ù ŔIP [(V LSM QSs(0 C2_0 1 Tf0 Tc 4.1233 05Td<02C49C352CG 4B6B21C320 74945D2D

‵ (network area)	
ID	Ж, ospf
(summary-address)	Ж
	240
. ″I	⁄ Ю SPF : 5 . ч : 10 .
. ‡	RFC1583 ‡
а Ю OSPF й	OVERFLOW GR restarter GR helper
OSPFv2 MIB	⁄ OSPFv2 Э
OSPFv2 TRAP	

…

… OSPF ˘ Ж б OSPF IP ˘ Лъ IP OSPF ‵ Â OSPF ⁄ IP ⁄ à OSPF ˘ з ⁄ Â 64 OSPF Â

… OSPF ˘ ⁄ Лъ Ю ‘

Ѣ ҳ	Ж
Ruijie #	Â
Ruijie (config)#	╖ (й)
Ruijie (config)# process_id [vrf-name]	OSPF˝ OSPF
Ruijie (config-router)# address wildcard-mask area-id	Ж ‵ ’
Ruijie (config-router)#	Â
Ruijie #	Â
Ruijie #	Â

\ !

⁄ ң ⁄ vrf-name˘ OSPF vrf˝ … OSPF VRF ˘ ‡ OSPF VRF’ k Ѣ ҳ 32 “ ” б ⁄ ⁄˘ ⁄ “1” ҳ а æ˘ “0” ҳ æ Â а Ж˝ ⁄ ң ≠ ╟ Â ⁄ ⁄ б network Ѣ ҳ Ж IP ѣ ˘ ⁄

Â Ë б OSPF Ъ ъ Ы IP ъ
Ъ . ъ Ъ Ë б OSPF Â

Ъ ъ process-id OSPF Â Л Ю й OSPF

```
Ruijie(config)# router ospf 1
Ruijie(config-router)# network 192.168.0.0 0.0.0.255 area 0
Ruijie(config-router)# end
```

Ë

OSPF Ë Ъ Ë Л Л Ъ Â
Ъ б Ë Ъ ip
ospf hello-interval, ip ospf dead-interval, ip ospf authentication Ъ ip ospf authentication-key ip
ospf message-digest-key Ë Ъ Ъ Ъ Ъ Ъ
Â

OSPF Ë Ъ Ë Л Ю Ъ ъ

Ъ ъ	Ы
Ruijie #	Â
Ruijie (config)#	╗ (й)
Ruijie (config)# interface-id	Ë Â
Ruijie (config-if)# cost-value	^ Л ~ Ы Ë Ъ
Ruijie (config-if)# seconds	^ Л ~ ,
Ruijie (config-if)# seconds	^ Л ~ ,
Ruijie (config-if)# seconds	^ Л ~ hello Ъ Ъ ,
Ruijie (config-if)# seconds	^ Л ~ Ъ Ъ ,
Ruijie (config-if)# number	^ Л ~ . ″I Ъ ^ DR˜ ^ BDR˜
Ruijie (config-if)# [|]	^ Л ~ Ë
Ruijie (config-if)# key	^ Л ~ Ë Ъ
Ruijie (config-if)# keyid key	^ Л ~ Ë MD5 ╗

Ruijie (config-if)#	ˆ Л ˜ Л ’ Ю˙ OSPF LSA ÿ ˚ Ъ Л Э ˘ LSA Л’
Ruijie (config-if)#	Â
Ruijie # [process-id] [interface-id]	Â
Ruijie #	ˆ Л ˜ Â

ЛЬ Э Ф ҳ no ˘ Л Лъ Ч Â

Лъ a˚

a˚ Ӯ ˘ OSPF ∤ ѝ Ь ‘

z ˆ Лъ ˘ ҳ ˘ FDDI˜

z ˆ ˘ X.25˜

z ˆ HDLC˙ PPP˙ SLIP˜

è ˘ OSPF a˚ ∤ ѝ ч ‘

1. (NBMA) Â NBMA ˘ Л
˘ SVC˙ X.25˜ ˘ PVC˙
˜ Â OSPF NBMA Э б Э ˘
ˆ Designated Router˜ ˘ NBMA Â

2. Â a ˘ OSPF Л
Â ˘ OSPF
˘ Лъ Â

a Л жˇ Л Лъ ѝ Â Л Лъ
ˆ ˘ X.25˜ ˘ OSPF ˘
Â X.25 map Frame-relay map Ф ҳ˘ Л Лъ X.25 é ˘
OSPF Л Лъ X.25 Â

Л Л Лъ Л˘ OSPF
˘ ў Â б NBMA ЛЬЮ
‘

z ˘ a ˘ ≠ ’
z ҳ’ ˘ a Â
˘ Л ЛЬЮ Ф ҳ‘

Ф ҳ	
Ruijie(config-if)#	{

PPP à SLIP à Л à X.25 Л

z NBMA (non-broadcast)

à X.25 ^ Л ~

z

Лъ

z й

ч ˘ ŭ ‡ Л FULL˘

,

X.25 à ˘ a a ˘

Л Лъ OSPF Л й ˘

˘ ң ў Â Л ˘

˘ a˚ ˘ Л Лъ neighbor Ѣ ҳ Â

˘ Л ЛЬЮ Ѣ ҳ˙

Ѣ ҳ

˘ . ˝I Л й Â

NBMA ˘ Л ЛЬЮЂ ђ:

Ђ ђ	
Ruijie (config-if)#	Л й NBMA
Ruijie (config-if)#	
Ruijie (config)# 1	
Ruijie(config-router)# ip-address [priority number] [poll-interval seconds]	, з . ˝I hello

˘ a ч Л Л ˘ ā ospf й Â

˘ ˘

ip ospf cost . Э Л a˚ , ≠ a˚ Â Л Лъ neighbor Ђ ђ й , Л ^ ˜ Л Â

, Л ˘ Л ЛЬЮЂ ђ˙

Ƀ ҳ	
Ruijie (config-if)#	⁄ ỳ
Ruijie (config-if)# priority	⁄ ˘ ⁄ . ˝I

ϰ

ϰ à à ˘ ϰ Ƀ ҳ Â

ϰ ỳ à ˘ Лъ ˘

˘ ϰ ⁄ Лъ ỳ ⁄ ˘

Â

ϰ ỳ OSPF ⁄ ϰ ˘ ¯ ϰ a ỳ ϰ ˘ ≠ a ä̈ OSPF

˘ ⁄ Лъ ϰ ỳ ^ Stub Area˜ Â ⁄ Ь ‘ 1˜

’ 2˜ ѐ ϰ ’ 3˜ Â ˘

Лъ ˘ ⁄ Лъ ˘ ⁄ Лъ ỳ æ Â ỳ

Stub ϰ ^ LSA˜ ⁄ Лъ ϰ ỳ (

no-summary) ⁄ ч ‘ 1˜ ’ 2˜

Â ˘ OSPF ◘˘ Â

⁄ Лъ ˘ (area

default-cost) ⁄ Лъ ⁸ . ˝I Â

STUB ϰ ЛЮ ŭ ‘

z ϰ a STUB ϰ ˘ a STUB ϰ ỳ ϰ Â

z ϰ STUB ϰ ˘ ‡ ϰ Â

z Stub ϰ a ASBR˜ ¯ a ϰ Â

OSPF ϰ ˘ Ю ЛЮ Ƀ ҳ‘

Л ˘ “ OSPF Л ” ¦ Â
Ъ Э ’ ˘ Э˘ Л
Э ˘ è a Â

NSSA(Not-So-Stubby Area) OSPF STUB Ъ ,NSSA ≠ 5
LSA(AS-external-LSA) ð NSSA æ , STUB a˚ NSSA
Л Љ OSPF .

¦ ˘ NSSA 7 NSSA Ъ , 7 LSA
NSSA Ъ Э 5 LSA з ˘
Л Љ Â

NSSA ЉЮ ŭ ‘

z Ъ a NSSA˘ a NSSA ù Ъ Â

z Ъ NSSA˘ NSSA Ъ area nssa Ъ ę
Ъ NSSA Â

Ъ й NSSA Ъ ˘ ЉЮ Ъ ę‘

Ъ ę	

Ruijie (config-router)# area-id -B Tc 3.38Fa o-summary2.337 0 Td( )Tji0 Tc -25>Tj2FE08044]

(Area Border Routers) OSPF

Ruijie (config-router)# area-id

Ruijie (config-router)# { | }	discard ╗

Ю discard ╗ Â

…

OSPF ˘ Ҝ OSPF Ҝ , Ҝ
б ˘ ˘ ˘ ў ‡
Â ⁸ Л Э ˘ ≠ Л Љ …
Â

ч Ҝ ^ ABR˜ … ˘ ч ABR ˚ Ҝ й Ҝ Â
^ Stub Area˜ NSSA Ҝ а й Ҝ Â Л Љ ч Л ABR
Ҝ Э , ч ABR˝ з ч ˚ Л
Â router-id Л Â й ч Ҝ
Ҝ й Ҝ ^ Transit Area˜ ˘ è Ҝ Л ≠ Â

Ҝ ł ( ) ˘ Л Љ
˘ Э˘ Л Л Љ Л ˘
hello-interval,dead-interval Â

“ ” ч Л ABR Л OSPF ˘ Л ^
а ˘ Љ ˘ Л IP
˜ ˘ ч Л ABR Â ABR type3
LSA˘ Ҝ ˚ Л Â

˘ ЉЮ Ъ ҳ

Ъ ҳ	
Ruijie (config-router) area-id router-id [[seconds]| [seconds] |[seconds]|[seconds]| [[ ] |[[key | keyid key]]]	…

‘ ¦ Љ Э Ҝ ˘ ‡ Ҝ Ҝ ˘ з
è Ҝ б Ҝ Э ˘ з Ҝ ≠ Â

\ !

router-id й OSPF ˘ а router-id ˘ Ъ ҳ
Ъ ҳ router-id Â router-id˝
“ Loopback ” ¦ Â

Ң

(ASBR)˘ Л Љ è ң OSPF Â
⁸ ң ˘ ╠ ѝ ASBR Â ASBR а ╠ ң Â

⁸ ASBR ң ˘ Ю ЉЮ Ѣ ҳ'

Ѣ ҳ	
Ruijie (config-router)# [ ] [metric-value] [type-value] [map-name]	ң

\ !
˘ ‹ ╠ ң ˘ ѣ Â

OSPF Л IP ѝ ˘ Л IP а
,OSPF Â

Loopback˚ ˜ ˘ ‡ Loopback Л IP ѝ
Â Loopback Л˘ ‡ IP ѝ Â
Loopback ˘ Â

Loopback ˘ Ю˘ ЉЮ Ѣ ҳ'

Ѣ ҳ	
Ruijie (config)# 1	… Loopback Л
Ruijie (config-if)# ip-address mask	Loopback IP

\ !
OSPF Л IP ѝ ˘ loopback Л а
OSPF Â

˘ ҳ Л Â 0~255 ˘
˘ Л æ Â

Л ң OSPF Ь ˘ ѝ 110˘ ‹ ˘ ‹ ˘ Â

Ъ й Ъ ˘ Л Ъ й Ъ ˘ è ^
ˆ ~ й Â

OSPF ˘ Ю ЛЬЮ Ъ ъ'

Ъ ъ	
Ruijie(config-router)# {distance { distance distance distance }}	OSPF

OSPF Л ◘ ь˘ ˘ ь SPF
Â Л Лъ ˘ Л Л Лъ ч SPF Â

OSPF ˘ Ю ЛЬЮ Ъ ъ'

Ъ ъ	
Ruijie (config-router)# spf-delay spf-holdtime	

LSA ◘ (LSA age)˘ LSA LSA
◘ ˘ CPU Â й CPU ˘ LSA
◘ Â

◘ й 4ˆ ˘ Л Лъ Ъ ъ Â а Â
б LSA Л Â ˘ 10000 LSA˘
æ Н ' Л 40~100 ˘ ‡ 10~20ˆ Л Â

Ю ЛЬЮ Ъ ъ'

Ъ ъ	

Ruijie #

ʌ

OSPF ^ Cost˜ ˘ Cost ¯ ù Â
Â OSPF ʌ ˘ à Э ˘
Â ˘ ‡ ù ʌ Â ˘ ‡
ù Â

ч ǂ Â ″I ʌ Лъ ң ˘ б ʌ
Â è ˘ ʌ Лъ ʌ Ъ ҳ ip ospf cost ʌ ˘
ʌ а ң Â ˘ ù 100Mbps˘ Лъ ʌ ù
10Mbps˘ ‡ ʌ ù 100/10 + 0.5 § 10Â

ʌ ҳ˙ ˘ ʌ ҳ˙ ″I ˘ ʌ
ҳ˙ ˘ ‡ ʎ ù ʌ ҳ˙ ˘ ╟ ҳ˙ ╖ ‡ ╟ ҳ˙
ù ʌ ҳ˙ ˘ ╟ ҳ˙ ╖ ≠ ‡ 10 ù ʌ ҳ
˙ Â

Ю˙

Ъ ҳ	Ик
Ruijie #	Â
Ruijie (config)# 1	OSPF˘ OSPF
Ruijie(config-router)# ref-bw	^ ʌ ˜ ʌ ˘ ref-bw ’
Ruijie (config-router)#	Â
Ruijie #	Â
Ruijie #	^ ʌ ˜ Â

Ъ ҳ б ʎ Â

ʌ ў

OSPF ʌ MTU ʌ MTU ў ˘ ˘
ʌ MTU ʌ MTU, ж a ,
ʌ Лъ MTU ā. ʌ MTU ʌ Лъ ʌ Ю Ю Ъ
ҳ˙

Ъ ҳ	Ик
Ruijie (config-if)#	ʌ MTU

Ю˙ ʌ MTU ╖ .

Л

ù è ╟ ¯ ˘ Л Љ Л
ù ╟ Л˘ Ф ҙ Л Э OSPF Â