

©2009



RGOS[®]10.2(4)

1.

5

注意、说明

Courier New

5

2.

Arial

```
[] []  
{x|y|...}  
[x|y|...]  
//
```

3.

no default

CLI

CLI

CLI

?

User EXEC		Ruijie>	exit enable	
Privileged EXEC	enable	Ruijie#	disable configure	
Global configuration	configure	Ruijie(co nfig)#	exit end Ctrl+C interface interface VLAN vlan vlan_id	
Interface configuration	interface	Ruijie(co nfig-if)#	end Ctrl+C exit interface	
Config-vlan VLAN	vlan vlan_id	Ruijie(co nfig-vlan)#	end Ctrl+C exit	VLAN

?

Help	
abbreviated-command-entry?	Ruijie# di ? dir disable

abbreviated-command-entry<Tab> Ruijie# **show conf<Tab>**



Ctrl-P

	Space	
--	-------	--

20

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

mac-address-table static

20

20

€

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

Ctrl-A

CLI

Show

show

Ruijie# show <i>any-command</i> begin <i>regular-expression</i>	show

注意:

- 1) **Show**
- 2)

*

alias ?

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

*

**command-alias=original-command*

EXEC

"s"

"show"

CLI

CLI

PC

CLI

Console

Outband

Telnet

telnet

说明:

CLI

TFTP

enable secret

15

Ruijie(config)# enable password [level level] { <i>password</i> <i>encryption-type</i> <i>encrypted-password</i> }	15 15 15
Ruijie(config)# enable secret [level level] { <i>encryption-type</i> <i>encrypted-password</i> }	
Ruijie# enable [<i>level</i>] Ruijie# disable [<i>level</i>]	

level

Ruijie# configure terminal	

mode

CLI

config
exec

M

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

<cr>

reload

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

1

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

line

TELNET

line

line

Ruijie(config-line)# password password	line
Ruijie(config-line)# login	line

说明:

line

line

lock

line

EXEC

lock

Ruijie(config-line)# lockable	line
Ruijie# lock	line

AAA

RADIUS

RADIUS

RADIUS

AAA

AAA

Ruijie(config)# username <i>name</i> [password <i>password</i> password <i>encryption-type encrypted password</i>]	
Ruijie(config)# username <i>name</i>	

说明:

AAA

Radius

AAA

()

()

Ruijie# clock set <i>hh:mm:ss month day year</i>	

2008-1-30 05:54:43

Ruijie# **clock set** 05:54:43 1 30 2008 //

Ruijie# **show clock** //

05:54:43 CHN-BJ Wed 2008-01-30

show clock

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

calendar

clock update-calendar

Ruijie# clock update-calendar	

Ruijie# **clock update-calendar**

reload [modifiers] scheme
(
modifiers **reload**
modifiers **in at cancel**

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

mmm hhh:mm
string

10

reload in 10

test

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

year , 31 1 1
11 30 12

1
1 1
1 string
2005-01-10 14:31
reload at 08:30 11 1 *newday*
2005-12-10 14:31 2006-01-01 12:00
reload at 12:00 1 1 2006 *newyear*

3. I0 Tc 0 Tw 12.166 0 Td<016.6D102C804-6<9J04B11B9901C31BC>4B38>T3049049E4C3

Ruijie# reload in <i>mmm</i> [<i>reload-reason</i>]	<i>mmm</i> reload reload <i>reload-reason</i> ()
Ruijie# reload in <i>hhh:mm</i> [<i>reload-reason</i>]	<i>hhh</i> <i>mm</i> reload reload <i>reload-reason</i> ()

32

32

”S2724G” ”R2692”

Ruijie(config)# **banner**

Ctrl

Boot

Ruijie# show version	

Ruijie# show version devices	
Ruijie# show version slots	

show mainfile

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

Console

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

57600 bps

```

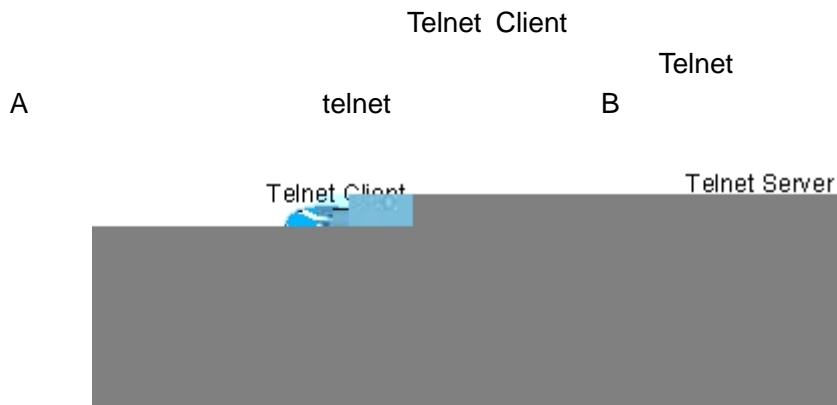
Ruijie# configure terminal //
Ruijie(config)# line console 0 //
Ruijie(config-line)# speed 57600 // 57600
Ruijie(config-line)# end //
Ruijie# show line console 0 //
CON  Type  speed  Overruns
* 0  CON    57600  0
Line 0, Location: "", Type: "vt100"
Length: 25 lines, Width: 80 columns
Special Chars: Escape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

```

telnet

Telnet TCP/IP

Telnet Client



1

Telnet Client

telnet

Ruijie# telnet <i>host-ip-address</i>	telnet IP

```

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

```

LINE

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

LINE

no exec-timeout

LINE

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

LINE

LINE

Ruijie(config-line)# session-timeout 20	LINE

LINE

no exec-timeout

LINE

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

CLI

Ruijie# execute {[flash:] filename}	

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

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

说明:

LINE

LINE

LINE
LINE
/ LINE VTY
LINE

LINE

LINE

LINE LINE LINE
LINE



Ruijie (www.ruijie.com.cn) # 110 (fax: 0021-61111111) -4(y)13(17 Tc 6.63 0 0 1 2.2516/TTINE)3/TT0 173911 T 40(0022-r

configure terminal	
Line vty <i>line number</i>	Line
transport input {all ssh telnet none}	Line
no transport input	LINE
default transport input	LINE

CTRL

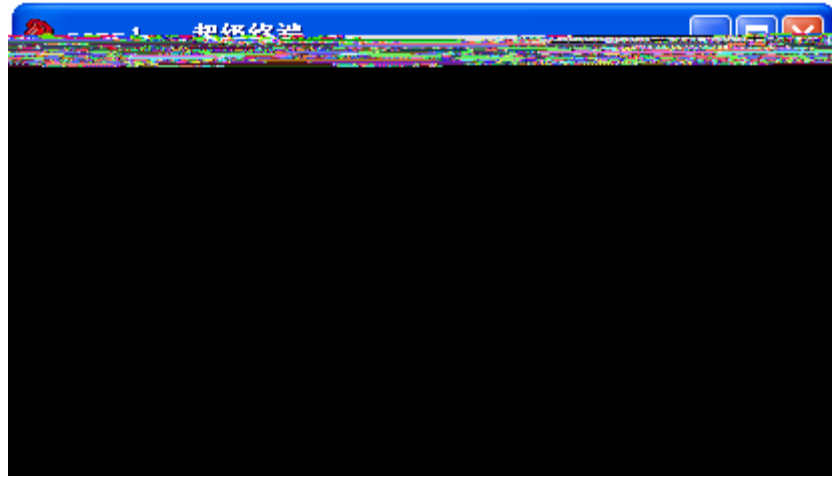
XMODEM

CLI

Windows

Windows

” “ ” 1 “

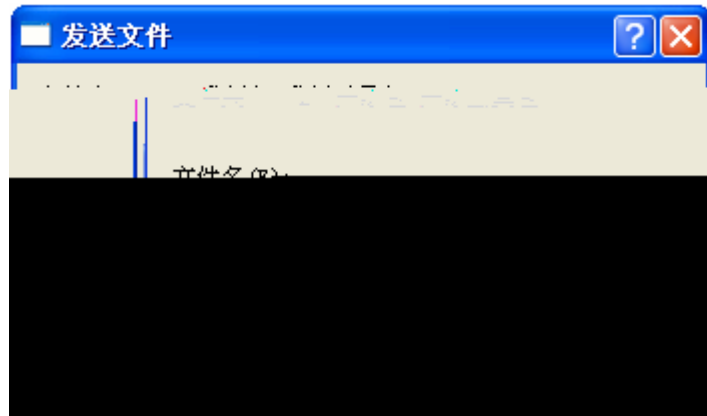


1

“ ” Windows

“Xmodem”

2



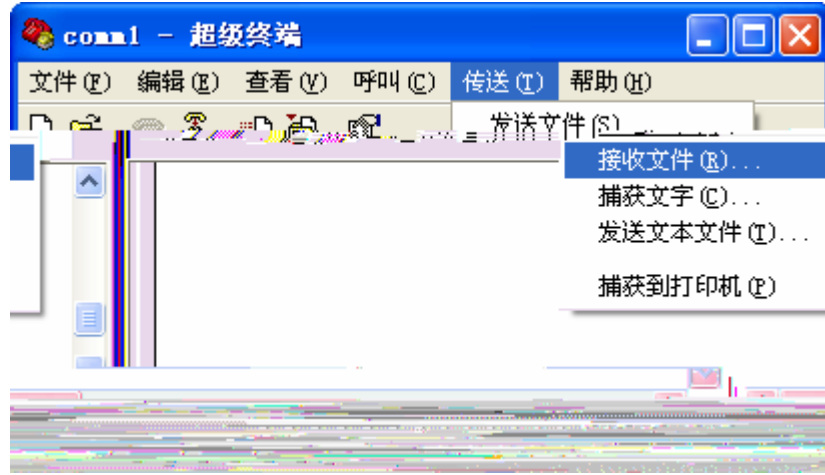
2

Ruijie# copy xmodem flash:filename	<i>filename</i>

CLI

Windows

3



3

“Xmodem”

4



4

Ruijie# copy flash:filename xmodem	<i>filename</i>

ftp xmodem

1

2

注意:

show version

redundancy force-switchover

1 **rgos.bin**

2 **copy**

3

Upgrade Slave CM MAIN successful!!

Upgrade CM MAIN successful!!

1

2

Installing is in process

Do not restart your machine before finish !!!!!!

.....

3

Installing process finished

Restart machine operation is permitted now !!!!!!

4

System restarting, for reason 'Upgrade product !'.

5

5 6

7

System load main program from install package

6

A new card is found in slot [1].

System is doing version synchronization checking

Current software version in slot [1] is synchronous.

System needn't to do version synchronization for this card

System is doing version synchronization checking

Card in slot [3] need to do version synchronization

Version synchronization began

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

Transmission is OK, now, card in slot [3] need restart ...

Software installation of card in slot [3] is in process

!!
!!
!!

Software installation of card in slot [3] has finished successfully

The version synchronization of card in slot [3] get finished successfully.

注意:

说明:

Ping

Echo

Echo

RGOS

Ping

Ping

Ping

Ping

Ruijie# ping [<i>ip</i>] [<i>address</i>] [length <i>length</i>] [ntimes <i>times</i>] [data <i>data</i>] [source <i>source</i>] [timeout <i>seconds</i>]	Ping

Ping
100Byte

IP

5
2

!

C
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

Ping

Ping

Ping

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

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

Traceroute

Traceroute
 Traceroute

```

TTL 0
1 TTL 0
TTL 1
TTL 1
TTL 1
ICMP TTL 1
TTL 1
ICMP TTL
IP
  
```

Traceroute

Ruijie# traceroute [<i>protocol</i>] [<i>destination</i>] [probe <i>probe</i>] [t <i>tl</i> <i>minimum</i> <i>maximum</i>] [s <i>ource</i> <i>source</i>] [t <i>imeout</i> <i>seconds</i>]	

Traceroute

1 Traceroute

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

```

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

IP 61.154.22.36

1 6

2

Traceroute

Ruijie# **traceroute** 202.108.37.42

< press Ctrl+C to break >

Tracing the route to 202.108.37.42

1	192.168.12.1	0 msec	0 msec	0 msec
2	192.168.9.2	0 msec	4 msec	4 msec
3	192.168.110.1	16 msec	12 msec	16 msec
4	* * *			
5	61.154.8.129	12 msec	28 msec	12 msec
6	61.154.8.17	8 msec	12 msec	16 msec
7	61.154.8.250	12 msec	12 msec	12 msec
8	218.85.157.222	12 msec	12 msec	12 msec
9	218.85.157.130	16 msec	16 msec	16 msec
10	218.85.157.77	16 msec	48 msec	16 msec
11	202.97.40.65	76 msec	24 msec	24 msec
12	202.97.37.65	32 msec	24 msec	24 msec
13	202.97.38.162	52 msec	52 msec	224 msec
14	202.96.12.38	84 msec	52 msec	52 msec
15	202.106.192.226	88 msec	52 msec	52 msec
16	202.106.192.174	52 msec	52 msec	88 msec
17	210.74.176.158	100 msec	52 msec	84 msec
18	202.108.37.42	48 msec	48 msec	52 msec

IP 202.108.37.42

1 17

4

(L2 interface)

(L3 interface) ()

(L2 interface)

Switch Port

L2 Aggregate Port

Switch Port

Switch Port

Access Port

Trunk Port

Switch Port

Access Port

Trunk Port

Switch Port

Access Port

Access Port

VLAN,

VLAN

Trunk port	TAG				
Trunk Port	TAG	VID	Trunk port	Native vlan	
			TAG		
Trunk Port	TAG	VID	Trunk port	Native	
vlan VID	VLAN ID				
TAG					
Trunk Port	TAG	VID	Trunk port	Native	
vlan VID	VLAN ID				

说明:

Untagged	Ethernet	PC	
4bytes	TAG	MAC	MAC
	VLAN	VLAN TAG	

Hybrid

Hybrid	VLAN	VLAN	
	Hybrid	VLAN	Hybrid Trunk
Trunk	VLAN		Hybrid

L2 Aggregate Port

Aggregate port		Aggregate
Port	AP	
	AP	Switch port
L2 Aggregate port		L2 Aggregate port
L2 Aggregate port		AP

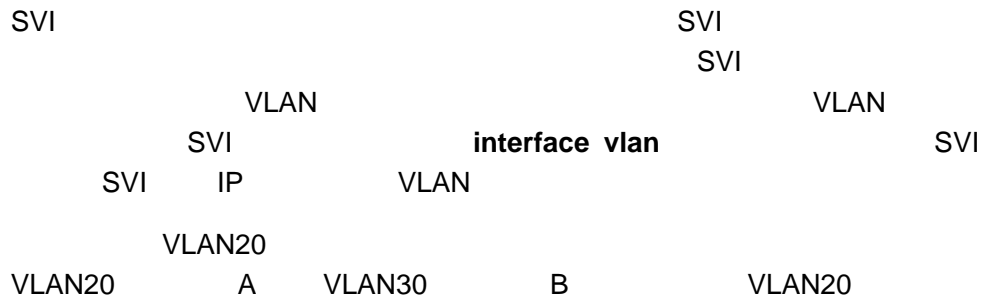
注意:

L2 Aggregate Port	Access port	Trunk Port
AP	Access Port	Trunk port

(L3 interface)

3

SVI(Switch virtual interface)



1

1

show

Aggregate Port

1

Aggregate Port

SVI

SVI

VLAN

VID

注意:

0

()

1

interface

interface range



Ruijie(config)# define interface-range <i>macro_name interface-range</i>	macro_name 32
Ruijie(config)# interface range macro <i>macro_name</i>	interface range

no define interface-range macro_name

define interface-range

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

interface range switch port

Aggregate Port SVI

define interface-range fastethernet1/1-4

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

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

ports1to2N5to7

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

ports1to2N5to7

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

Aggregate Port SVI

Aggregate Port AP
Aggregate Port

Ruijie(config-if)# medium-type { fiber copper }	

Gigabitethernet 1/1

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

(Description)
Gigabitethernet 1/1 A
Port for User A

Ruijie(config-if)# description string	32

Gigabitethernet 1/1

```
Ruijie# config terminal
```

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

```
Ruijie(config)# interface gigabitethernet 1/1  
Ruijie(config-if)# description PortForUser A  
Ruijie(config-if)# end
```

Up Down
down up

Ruijie(config-if)# shutdown	

Gigabitethernet 1/2

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

Switch Port

Ruijie(config-if)# speed {10 100 1000 auto }	auto 1000 1000M
Ruijie(config-if)# duplex {auto full half }	
Ruijie(config-if)# flowcontrol {auto on off }	speed,duplex,flowcontrol auto

no speed no duplex no flowcontrol

Gigabitethernet 1/1 1000M

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

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

注意:

IEEE Master Slave
link up

MTU

jumbo MTU
MTU
MTU MTU
MTU 64~9216 4 1500
SVI MTU

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

Gigabitethernet 1/1 MTU

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

VLAN	VLAN
Switch port	access port
VLAN	VLAN 1 4094
VLAN access port	VLAN 1
Native VLAN trunk port	VLAN 1
	copper
	Up
Aggregate port	

Switch Port

access/trunk port

Switchport (access/trunk port)

switchport

Switch Port

Ruijie(config-if)# switchport mode { access trunk }	

gigabitethernet 1/2 access port

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

Ruijie(config-if)# switchport access vlan <i>vlan-id</i>	access port VLAN

access port gigabitethernet 2/1 vlan 100

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

trunk port native VLAN

Ruijie(config-if)# switchport trunk native vlan <i>vlan-id</i>	trunk port NATIVE VLAN

Trunk Port Gigabitethernet 2/1 Native vlan 10

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

Ruijie(config-if)# switchport port-security	

Gigabitethernet 2/1

```

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

```

Gigabitethernet 2/1 access port VLAN 100

```

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

```

Hybrid

Hybrid

configure terminal	
interface <interface>	,
switchport mode hybrid	hybrid
no switchport mode	
switchport hybrid native vlan id	hybrid VLAN
switchport hybrid allowed vlan [[add] [tagged untagged]] remove] vlist	

```

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

```

Ruijie# **show running interface g 0/1**

L2 Aggregate Port

L2 Aggregate Port L2 Aggregate Port

aggregateport L2 Aggregate Port
Aggregate Port

clear
Switch Port,L2 Aggregate port , **clear**

Ruijie# clear counters [<i>interface-id</i>]	
Ruijie# clear interface <i>interface-id</i>	

show interfaces

clear counters

L2

Gigabitethernet 1/1

Ruijie# **clear counters gigabitethernet 1/1**

3

SVI

SVI SVI
interface vlan *vlan-id* SVI SVI

SVI

Ruijie(config)# interface vlan <i>vlan-id</i>	SVI

SVI

SVI 100 IP

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

注意:

SVI

DHCP DHCP IP SVI

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

DHCP

1 debug

2 DHCP

DHCP

--	--

DHCP



```
Ruijie# show interfaces  
interface-id status
```

```
Ruijie# show interfaces  
[interface-id] switchport
```

```
administrative
```

Enabled All

Gigabitethernet 2/1

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

Ruijie# show interfaces gigabitethernet 1/2 counters

```
Interface : gigabitethernet 1/2
5 minute input rate  9144 bits/sec, 9 packets/sec
5 minute output rate 1280 bits/sec, 1 packets/sec
InOctets             : 17310045
InUcastPkts          : 37488
InMulticastPkts      : 28139
InBroadcastPkts      : 32472
OutOctets             : 1282535
OutUcastPkts         : 17284
OutMulticastPkts     : 249
OutBroadcastPkts     : 336
Undersize packets    : 0
Oversize packets     : 0
collisions           : 0
Fragments            : 0
Jabbers              : 0
CRC alignment errors : 0
AlignmentErrors      : 0
FCSErrors            : 0
dropped packet events (due to lack of resources): 0
packets received of length (in octets):
64:46264, 65-127: 47427, 128-255: 3478,
256-511: 658, 512-1023: 18016, 1024-1518: 125
```

LinkTrap

Link SNMP LinkTrap, LinkTrap

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

Link trap:

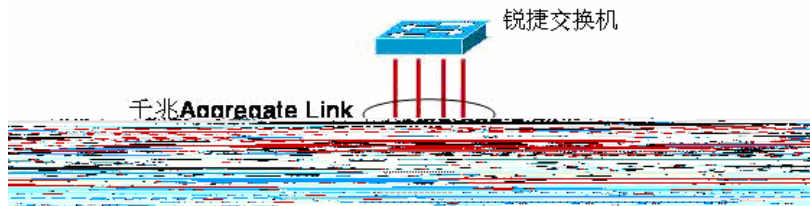
```
Ruijie(config)# interface gigabitEthernet 1/1  
Ruijie(config-if)# no snmp trap link-status
```

Aggregate Port

Aggregate Port

Aggregate Port

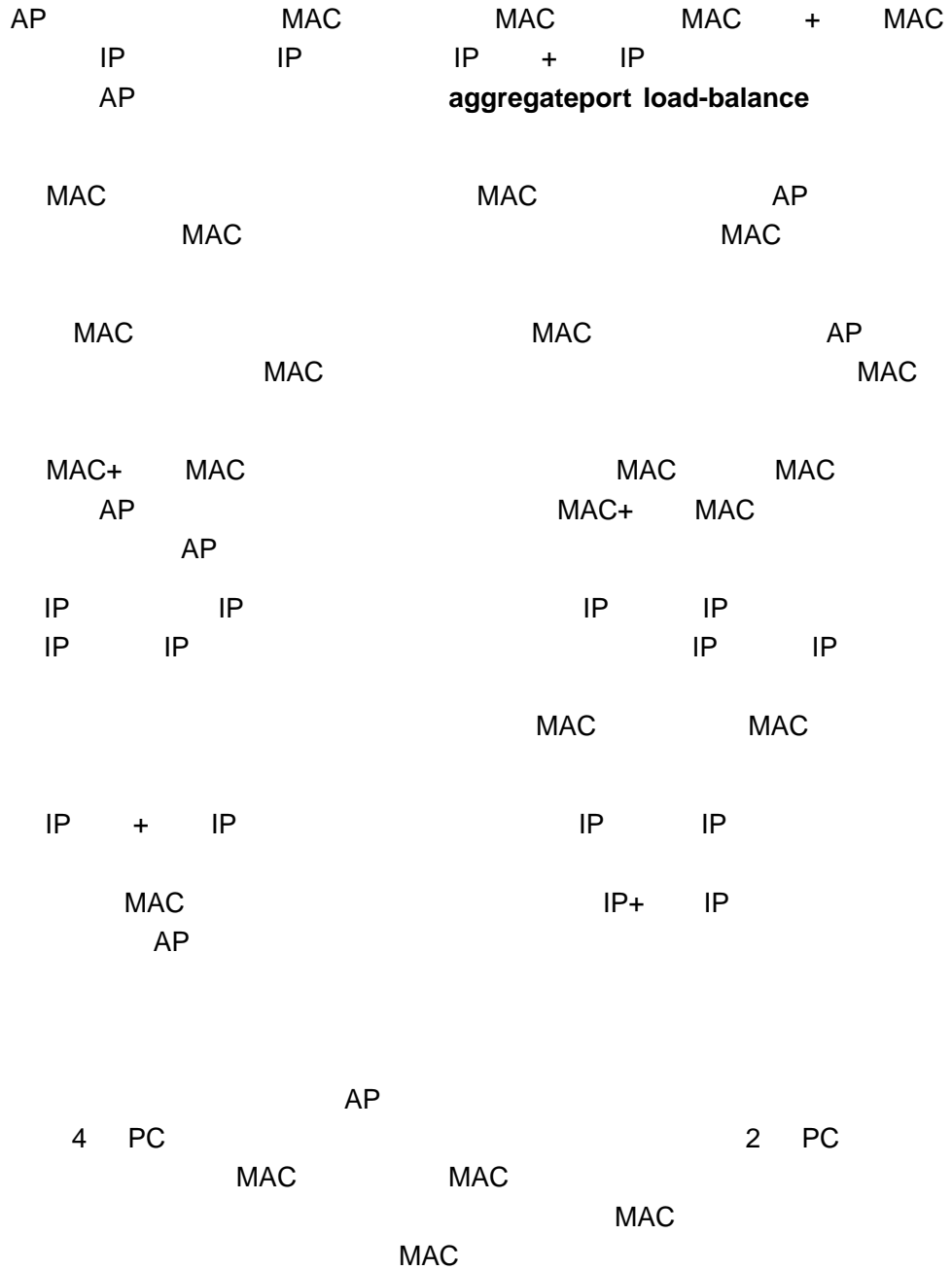
Aggregate Port	AP	AP	IEEE802.3ad
AP			AP
	AP		



1 AP

说明:

S2700	31	AP	AP	8
-------	----	----	----	---

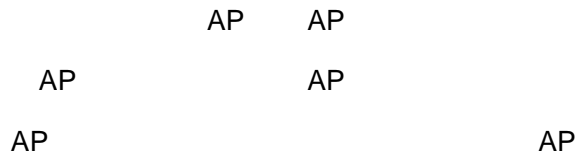


说明:

S2700

IP AP IP+ IP

AP



:

注意:

AP , , AP.

Aggregate Port

AP

Ruijie(config-if-range)# port-group port-group-number	AP(AP) AP

no port-group

AP

0/1

AP 5

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

```
Ruijie(config)# interface aggregateport n (n
AP ) AP( AP n )
```

Aggregate Port

AP

--	--

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

VLAN

IEEE802.1q VLAN

VLAN

Virtual Local Area Network



1

	VLAN	IP		VLAN	VLAN	
	IP			SVI	SVI	Switch Virtual
Interfaces	VLAN	IP	SVI			
IP						

VLAN

1-4094) VLAN IEEE802.1Q 4094 VLAN(VLAN ID
VLAN 1 VLAN VLAN

VLAN

VLAN
VLAN VLAN

VLAN

VLAN State	Active	Active Inactive
------------	--------	-----------------

VLAN

VLAN

Ruijie(config)# vlan <i>vlan-id</i>	VLAN ID VLAN ID VLAN VLAN ID VLAN
Ruijie(config)# name <i>vlan-name</i>	VLAN VLAN xxxx xxxx 0 VLAN ID VLAN 0004 VLAN 4

VLAN

no name

VLAN 888

Test888

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

VLAN

VLAN VLAN 1

VLAN

Ruijie(config)# no vlan <i>vlan-id</i>	VLAN ID

VLAN Access

VLAN VLAN

VLAN

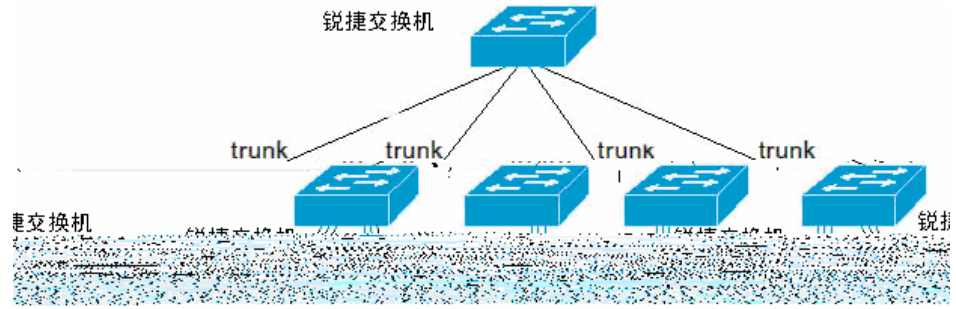
Ruijie(config-if)# switchport mode access	ACCESS	VLAN
Ruijie(config-if)# switchport access vlan <i>vlan-id</i>		VLAN

Ethernet 1/10

Access

VLAN20

G



2

Aggregate Port Trunk

Edge Port

switchport

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

Trunk Native VLAN Native VLAN

UNTAG VLAN

VLAN ID IEEE 802.1Q PVID Native VLAN VLAN ID

Trunk Native VLAN UNTAG Trunk

Native VLAN VLAN 1

Trunk Trunk Native VLAN

Trunk

Trunk

Trunk

--	--

Ruijie(config-if)# switchport mode trunk	Trunk
Ruijie(config-if)# switchport trunk native vlan <i>vlan-id</i>	Native VLAN

Trunk Trunk **no**
switchport trunk

Trunk VLAN

Trunk VLAN 1 4094
 Trunk VLAN VLAN
 Trunk
 Trunk VLAN

Ruijie(config-if)# switchport trunk allowed vlan {all [add remove except] } <i>vlan-list</i>	Trunk <i>vlan-list</i> VLAN VLAN VLAN ID VLAN ID - 10-20 all VLAN add VLAN VLAN remove VLAN VLAN except VLAN VLAN VLAN

Trunk VLAN VLAN **no**
switchport trunk allowed vlan

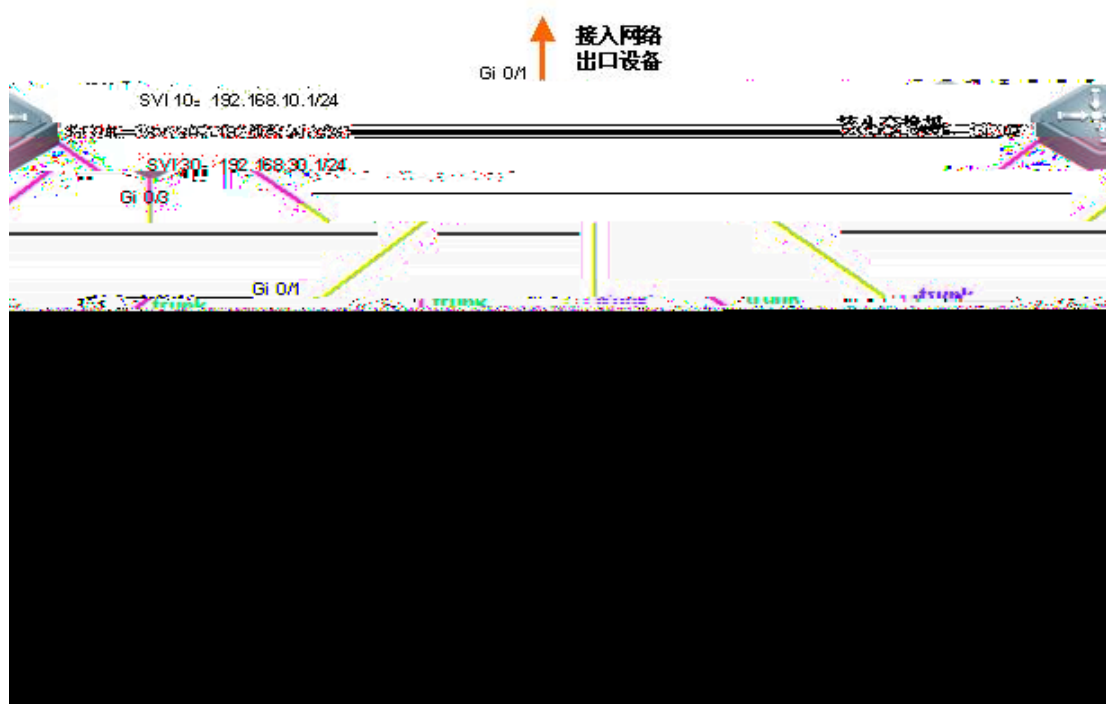
VLAN 2 1/15

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



```
VLAN[6] "VLAN0006"  
GigabitEthernet 3/1  
  
Ruijie# show vlan id 1  
VLAN[1] "VLAN0001"  
GigabitEthernet 3/1  
GigabitEthernet 3/2  
GigabitEthernet 3/3  
GigabitEthernet 3/4  
GigabitEthernet 3/5  
GigabitEthernet 3/6  
GigabitEthernet 3/7  
GigabitEthernet 3/8  
GigabitEthernet 3/9  
GigabitEthernet 3/10  
GigabitEthernet 3/11  
GigabitEthernet 3/12
```

VLAN



				VLAN 10	VLAN 20	VLAN 30
2	3	VLAN	IP		192.168.10.0/24	192.168.20.0/24
192.168.30.0/24	3	VLAN	3		IP	

```

1)          1
           3  VLAN          trunk
vlan        2
2)          3  SVI          3  VLAN  IP
           IP
3)          3          VLAN  VLAN  Access
           trunk          Switch A

```

1)

```

VLAN

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

          trunk          vlan

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

```

```
#                vlan 10 20
Ruijie(config-if)#switchport trunk allowed vlan add 10,20
#                Gi 0/3
Ruijie(config-if)#interface GigabitEthernet 0/3
#                vlan                vlan
Ruijie(config-if)#switchport trunk allowed vlan remove 1-4094
#                vlan 10 20 30
Ruijie(config-if)#switchport trunk allowed vlan add 10,20,30
#                Gi 0/4
Ruijie(config-if)#interface GigabitEthernet 0/4
#                vlan                vlan
Ruijie(config-if)#switchport trunk allowed vlan remove 1-4094
#                vlan 20 30
Ruijie(config-if)#switchport trunk allowed vlan add 20,30
#
Ruijie(config-if)#exit
```

VLAN

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

```
#          Gi 0/4  vlan
```

```
Ruijie#show interface GigabitEthernet 0/4 switchport
```

```
Interface Switchport Mode  Access Native Protected VLAN lists
```

```
-----  
Gi0/4      enabled  TRUNK  1      1      Disabled  20,30
```

```
          SVI      IP
```

```
#
```

```
Ruijie#configure terminal
```

```
#      SVI 10
```

```
Ruijie(config)#interface vlan 10
```

```
#      SVI 10  IP
```

```
Ruijie(config-if)#ip address 192.168.10.1 255.255.255.0
```

```
#      SVI 20
```

```
Ruijie(config-if)#interface vlan 20
```

```
#      SVI 20  IP
```

```
Ruijie(config-if)#ip address 192.168.20.1 255.255.255.0
```

```
#      SVI 30
```

```
Ruijie(config-if)#interface vlan 30
```

```
#      SVI 30  IP
```

```
Ruijie(config-if)#ip address 192.168.30.1 255.255.255.0
```

```
#
```

```
Ruijie(config-if)#exit
```

2) Switch A

```
VLAN
```

```
#
```

```
Ruijie#configure terminal
```

```
#      VLAN 10
```

```
Ruijie(config)#vlan 10
```

```
#      VLAN 20
```

```
Ruijie(config-vlan)#vlan 20
```

```
#
```

```
Ruijie(config-vlan)#exit
```

```
VLAN      Access
```

```
#          Gi 0/2-12
```

```
Ruijie(config)#interface range GigabitEthernet 0/2-12
```

```
#      Gi 0/2-12      Access
```

```
Ruijie(config-if)#switchport mode access
```

```
#      Gi 0/2-12      VLAN 10
```

```
Ruijie(config-if)#switchport access vlan 10
```

```
#          Gi 0/13-24
```

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

                                trunk

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

Protocol VLAN

Protocol VLAN

VLAN

1. VLAN ID UNTAG Priority
VLAN TAG VLAN ID PVID

2. VLAN ID UNTAG Priority
VLAN TAG VLAN ID
VLAN ID
VLAN VLAN ID

3. TAG VLAN TAG VLAN ID

Protocol VLAN VLAN
VLAN ID VLAN

Protocol VLAN Trunk Access
VLAN IP VLAN
IP VLAN IP VLAN

1. VLAN ID , IP IP
VLAN

2. VLAN ID , 4T 01<07D16.309 0 01 /C2_0 1 Tf 0 Tc 2.749

Protocol VLAN

Protocol VLAN

Protocol VLAN

profile



2.

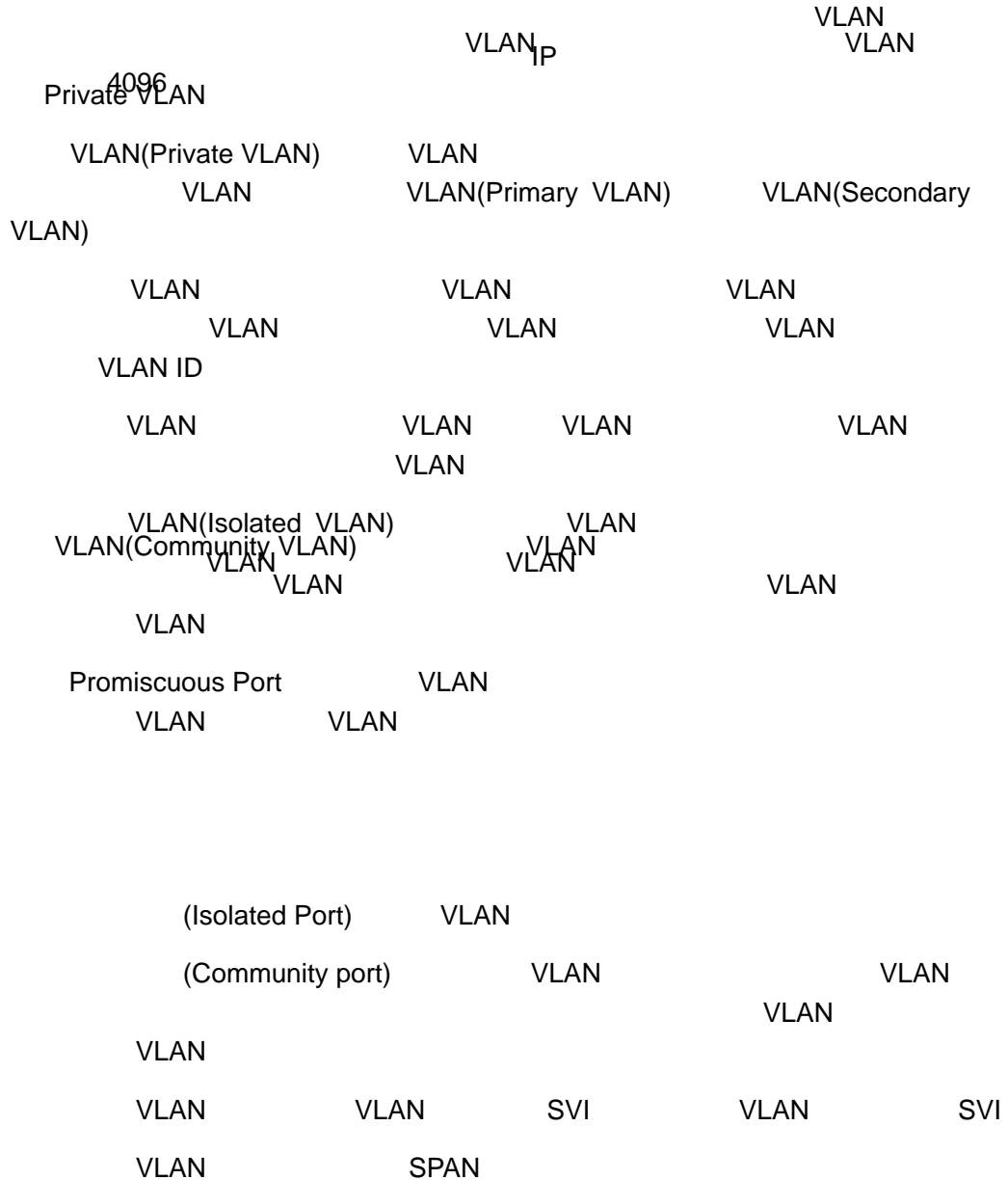
Protocol VLAN

Protocol VLAN

show protocol-vlan	Protocol VLAN

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

Private VLAN



Private VLAN

Private VLAN

Private VLAN

VLAN

VLAN

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

说明:

```

802.1Q Vlan                VLAN  VLAN 1
VLAN            Trunk    Uplink    802.1Q VLAN    VLAN
VLAN                Private VLAN    ACTIVE

```

- 1) Primary VLAN
- 2) Secondary VLAN
- 3) Secondary VLAN Primary VLAN

802.1Q VLAN Private VLAN

```

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

```

```
Ruijie# configure terminal
Ruijie(config)# vlan 404
Ruijie(config-vlan)# private-vlan isolated
Ruijie(config-vlan)# end
Ruijie# show vlan private-vlan
VLAN Type Status Routed Interface Associated VLANs
--- ---- -
303 comm inact1.434 Td[(VLAN )-103(Type Status )-6( )-6( Routed )-6( )-6
300 T(ated )12.6(VLANs )]TJ0 -1.44C(isabl6(----- )----- )---- ated
```

说明:

Primary VLAN VLAN

Secondary VLAN Primary VLAN

configure terminal	
interface vlan <i>p_vid</i>	Primary VLAN
private-vlan mapping { <i>svlist</i> add <i>svlist</i> remove <i>svlist</i> }	Secondary VLAN Primary VLAN SVI

MAC

MAC

MAC

MAC
MAC

MAC

MAC
MAC

()

VLAN

VLAN

mac

mac

注意:

	A	B	A	A	A
mac1			--mac1	A	
			B	B	
	A			mac1	B
A		mac	mac1		B
		B			
B					

MAC ()

MAC

MAC

MAC

MAC

	300

注意:

2

Ruijie(config)# mac-address-table aging-time [0/10-1000000]	10 1000000 300 0

no mac-address-table aging-time

注意:

S2700

10 – 630

```

clear mac-address-table dynamic
clear mac-address-table dynamic address
mac-address MAC clear
mac-address-table dynamic interface interface-id
Aggregate Port clear mac-address-table
dynamic vlan vlan-id VLAN
show mac-address-table dynamic

```

```

) VLAN ) ( ) VLAN(
MAC ( MAC
)

```

--	--	--

mac-addr

MACg/C2.73452 0.96 2Tc 0.00Bf268

```

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

```

Ruijie(config)# mac-address-table filtering <i>mac-addr</i> vlan <i>vlan-id</i>	mac-addr MAC vlan-id VLAN

no mac-address-table filtering *mac-addr*
vlan *vlan-id*
 VLAN 1 VLAN 1

MAC

MAC

MAC

MAC

MAC

Ruijie(config)# snmp-server host <i>host-addr</i> traps [version {1 2c 3 [auth noauth priv]]] <i>community-string</i>	MAC NMS IP. host-addr Version Trap. community-string Trap
Ruijie (config)# snmp-server enable traps	Trap
Ruijie(config)# mac-address-table notification	MAC
Ruijie(config)# mac-address-table notification { interval <i>value</i> history-size <i>value</i> }	interval value MAC () 1 3600 1 history-size value MAC 1 200 50
Ruijie(config-if)# snmp trap mac-notification { added removed }	MAC added removed

```

no snmp-server enable traps
mac-notification MAC Trap no
mac-address-table notification MAC
no snmp trap mac-notification {added |
removed} MAC

```

```

MAC public IP
192.168.12.54 NMS MAC Trap MAC
40 MAC 100
Gigabitethernet 1/3 MAC

```

```

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

```

```

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

```

MAC

MAC

Ruijie# show mac-address-table notification	MAC
Ruijie# show mac-address-table notification interface	MAC
Ruijie# show mac-address-table notification history	MAC

MAC

MAC

```

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

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

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

```

MAC Changed Message :

Operation VLAN MAC Address Interface

 Added 1 00d0.f80d.1083 Gi1/1

IP MAC

 IP MAC
 IP MAC IP
 MAC IP

802.1X

Ruijie(config)# address-bind <i>ip-address mac-address</i>	IP MAC
Ruijie(config)# address-bind install	

no address-bind *ip-address mac-address*

IP MAC

no address-bind install

show address-bind

IP

MAC

Ruijie# **show address-bind**

Total Bind Addresses in System : 2

IP Address Binding MAC Addr

 3.3.3.3 00d0.f811.1112
 3.3.3.4 00d0.f811.1117

show address-bind [ip-address *ip* | mac-address *mac*]

IP/MAC

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

show address-bind summary

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

注意:

System Address bind status	SUCCESS
address-bind install	FAIL
address-bind install	
Uninstall	

IP

	Ipv4	IPV6
	IPV4+MAC	ipv6
	IPV4+MAC	IPV6
	IPV4+MAC	MAC IPV6

IPV6

IPV6

IP

Ruijie# configure terminal	
Ruijie(config)# address-bind ipv6-mode compatible	ipv6
Ruijie(config)# address-bind ipv6-mode loose	ipv6
Ruijie(config)# address-bind ipv6-mode strict	ipv6
Ruijie(config)# no address-bind ipv6-mode	ipv6

IP 192.168.5.2

00d0.f822.33aa

IPV6

Ruijie# **configure t**

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

Ruijie(config)# **address-bind 00d0.f822.33aa ip 192.168.5.2**

Ruijie(config)# **address-bind ipv6-mode compatible**

注意:

IPV6
MAC+IP
IPV6

DHCP Snooping

MAC+IP
IPV6

	IPv4	IPV6	
	IPV4+MAC	IPV6	IPV6
	IPV4+MAC	IPV6	
	IPV4+MAC	IPV6	MAC MAC IPV6

S2700
IPV6

IP+MAC
IP+MAC

IPV6

IP+MAC

IP+MAC
IP+MAC

IP+MAC

DHCP Snooping

DHCP Snooping Trust

DHCP IP
IP

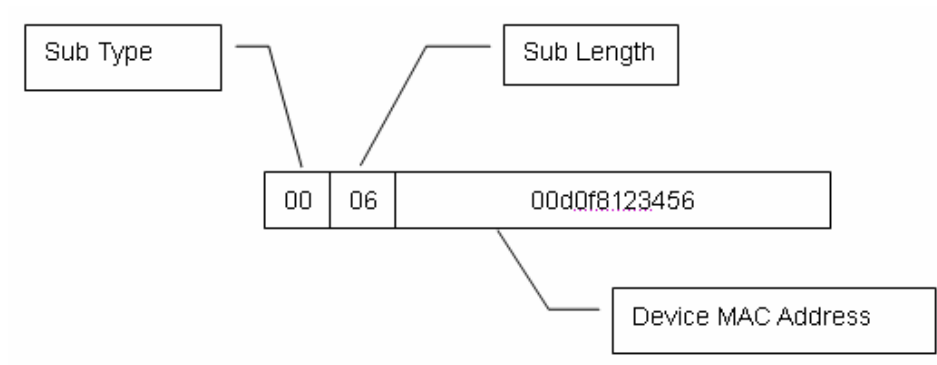
TRUST

UNTRUST

DHCP

2

Agent Remote ID



3

DHCP Snooping

DHCP snooping (IP MAC VLAN PORT) DHCP snooping IP
DHCP snooping IP
rrr"©*óX&54@GMB@ÑJ3G&E1@ÝÁD% ÜÀF\$4¥ n s6Ñ 1fí

ARP ARP ARP
 ARP-CHECK DAI

DHCP Snooping

1 DHCP Snooping DHCP Relay Option 82
 DHCP Snooping DHCP Relay Option82
 2 TRUST
 3 DHCP Snooping DHCP CPU
 1 DHCP
 IP 2 IP IP

DHCP Snooping

DHCP Snooping

DHCP Snooping DHCP Snooping DHCP
 Snooping DHCP

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

DHCP Snooping Bootp

DHCP Snooping Bootp
 DHCP Snooping Bootp
 Bootp DHCP Snooping

Ruijie# configure terminal	


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

注意:

```
1  
2 Bootp IP Bootp
```

DHCP snooping information option

DHCP Snooping

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

DHCP snooping

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

DHCP Snooping

Flash

DHCP Snooping

Flash

Ruijie# configure terminal	

Ruijie(config)# **[no] ip dhcp snooping database write-delay [time]**

Flash

time 600—86400(s)
0

DHCP Snooping

Flash

Flash

DHCP Snooping

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

DHCP Snooping

Flash

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

TRUST

UNTRUST

TRUST DHCP DHCP Snooping TRUST
DHCP UNTRUST DHCP

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

fastethernet 0/1 TRUST

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

DHCP Snooping

DHCP Snooping

Ruijie# clear ip dhcp snooping binding	

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

DHCP snooping

DHCP snooping

DHCP Snooping

Ruijie# show ip dhcp snooping	dhcp snooping

```
Ruijie# show ip dhcp snooping
```

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

DHCP snooping

DHCP Snooping

Ruijie# show ip dhcp snooping binding	DHCP Snooping

```
Ruijie# show ip dhcp snooping binding
```

```
Total number of bindings: 1

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

DHCP snooping

DHCP Snooping

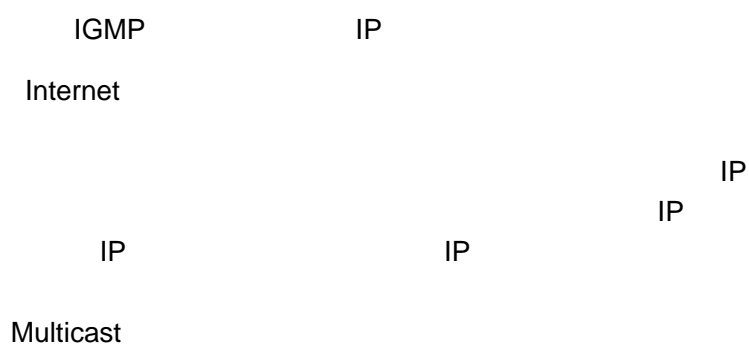
Ruijie# debug ip dhcp snooping {event packet}	/ DHCP Snooping

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

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

IGMP Snooping

IGMP



点对多的传播方式



1

IP

IP
IP

“

”

0

“

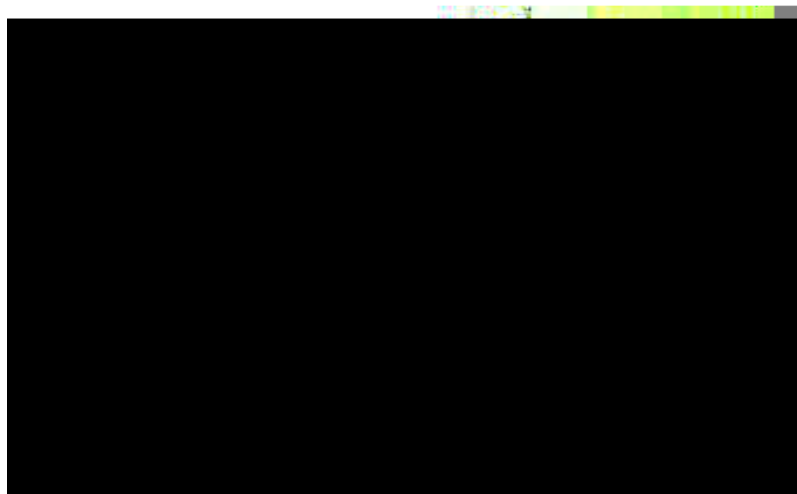
”

D

2

IGMP Report IGMP Leave
IGMP Query
IGMP Query

IGMP snooping



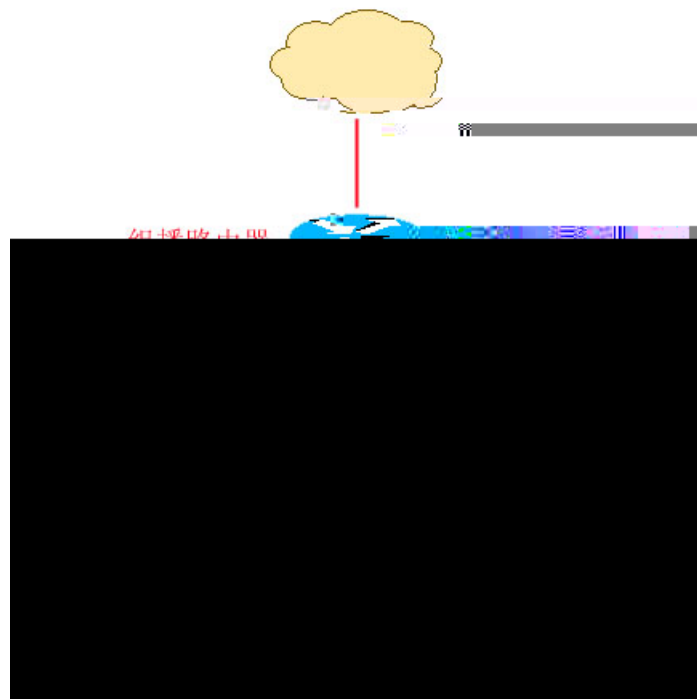
3

PC

IGMP

snooping

VLAN



4

IGMP Snooping

注意:

snooping IGMP

IGMP Snooping

DISABLE		IGMP Snooping	
		IGMP	VLAN
IVGL		VLAN	
	VLAN		
SVGL		VLAN	VLAN

VLAN Multicast VLAN VLAN

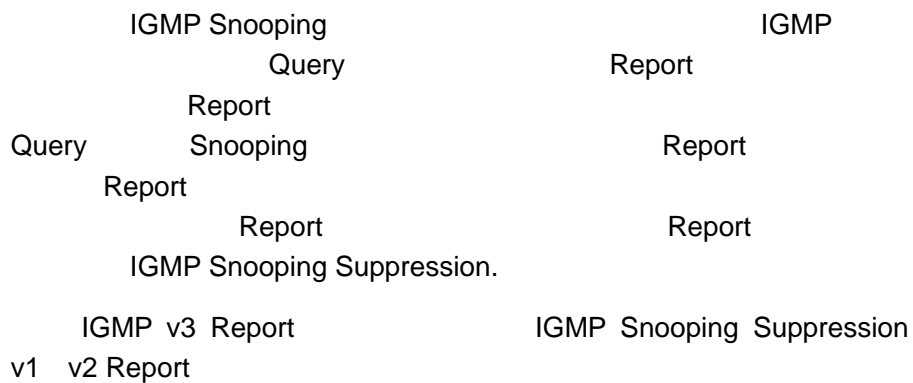
5

VID Multicast VLAN UNTAG
native vlan Multicast VLAN
VLAN SVGL VID Multicast
VLAN SVGL VLAN Multicast
IVGL SVGL GDA VLAN
IVGL IGMP Snooping IVGL SVGL

fast-leave

IGMP Leave “
IGMP Query ”
IGMP Snooping LEAVE
Fast Leave

IGMP snooping suppression



1. IGMP Snooping

2.

1.

2.

IGMP Snooping

IGMP Snooping

IGMP Snooping

IGMP Profiles

IVGL

DISABLE

Query

Fast-leave

IGMP Snooping Suppression

IGMP Snooping

IGMP Filtering

IGMP Snooping

IGMP Snooping	DISABLE
IGMP Profile	Deny
SVGL Multicast Vlan	VLAN 1
IGMP Filtering	
IGMP Snooping	

注意:

VLAN
Access
Trunk
AP
IGMP
 Snooping

```

private vlan          igmp snooping
igmp snooping        Hash
                                Hash
    
```

IGMP Profiles

```

IGMP Profile
permit/deny      SVGL
IGMP Filtering
IGMP Profile
    
```

Profile

Ruijie(config)# ip igmp profile <i>profile-number</i>	IGMP Profile 1 65535
Ruijie (config-profile)# permit deny	(permit deny / deny / range
Ruijie(config-profile)# range ip <i>multicast-address</i>	
Ruijie# end	

IGMP profile **no ip igmp profile profile number**

profile range **no range ip multicast address**

Profile

```

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


Profile



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

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

IVGL

IGMP Snooping IVGL

Ruijie(config)# ip igmp Snooping ivgl	IGMP Snooping IVGL
Ruijie(config)# end	

IGMP Snooping IVGL

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

DISABLE

IGMP Snooping DISABLE

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

Query

IGMP Query

Query

IGMP Report

10

Query

Ruijie(config)# ip igmp snooping query-max-response-time seconds	Query 1-65535 10
Ruijie(config)# end	

no ip igmp Snooping query-max-respone-time

Fast-leave

igmp snooping fast-leave

Ruijie(config)# ip igmp snooping fast-leave enable	fast-leave
Ruijie(config)# end	

no ip igmp snooping fast-leave enable fast-leave

fast-leave

Ruijie# **configure Terminal**

Ruijie(config)# **ip igmp snooping fast-leave enable**

Ruijie(config)# **end**

IGMP Snooping Suppression

igmp snooping suppression igm60 Td<02D6>Tj/TC6q365.42 6

Ruijie(config)# ip igmp snooping ivgl	IGMP Snooping IVGL
Ruijie(config)# ip igmp snooping vlan <i>vlan-id</i> static <i>ip-addr</i> interface <i>interface-id</i>	<ul style="list-style-type: none"> • <i>vlan-id</i> vid • <i>ip-addr</i> • <i>interface-id</i>
Ruijie(config)# end	

¶

IGMP snooping

```

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

Ruijie(config-if)# ip igmp snooping max-groups <i>number</i>	, 0 – 4294967294
Ruijie(config-if)# end	

IGMP Snooping

IGMP snooping

IGMP Snooping

IGMP Profile

IGMP Filtering

IGMP Snooping

Ruijie# show ip igmp snooping	IGMP Snooping

show ip igmp snooping

IGMP Snooping

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

IGMP snooping

IGMP Snooping

Ruijie# show ip igmp snooping statistics [vlan <i>vlan-id</i>]	IGMP Snooping

```
Ruijie# clear ip igmp snooping statistics
```

IGMP Snooping

```
show ip igmp snooping statistics
```

IGMP Snooping

```
Ruijie# show ip igmp snooping statistics
```

GROUP	Interface	Last report time	Last leave time	Last reporter
224.1.1.2	VL1:Gi4/2	0d:0h:0m:7s	----	192.168.9.250
		Report pkts: 1		Leave pkts: 0

MSTP

MSTP

STP RSTP

STP RSTP

STP RSTP IEEE 802.1D IEEE 802.1w

STP

LAN

STP

RSTP 802.1D STP STP

“ ”

RSTP 1 STP 50

注意:

S2700 buffer fc

STP MSTP STP MSTP

buffer qos

buffer QOS buffer

Bridge Protocol Data Units(BPDUs)

ID Bridge ID Mac
Root Path Cost
ID Port ID
BPDU Bridge Protocol Data Units
01-80-C2-00-00-00
BPDU
Root Bridge ID ID
Root Path Cost
Bridge ID ID
Message Age
Port ID ID
Forward-Delay Time Hello Time Max-Age Time
Cost BPDU Bridge ID Root Path
BPDU
BPDU
Root Bridge
Root Port Root
Bridge
Root Bridge
LAN LAN LAN
Root port Designated Bridge LAN
Designated Port Forwarding
Discarding

Bridge ID

IEEE 802.1W
 Priority 6 0
 8 bit
 mac 2
 System ID 4096
 Root Bridge
 Bridge ID 8
 4 bit
 RSTP

Bit	Priority value				System ID											
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
	32	16	81	40	20	10	51	25	12	64	3	1	8	4	2	1
	76	38	92	96	48	24	2	6	8		2	6				
	8	4														

Spanning-Tree Timers

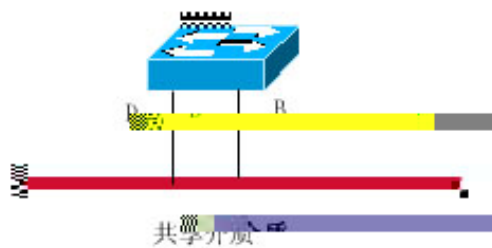
Hello timer BPDUs
 Forward-Delay timer
 Listening Learning RSTP Learning STP
 Forwarding
 Max-Age timer BPDUs

Port Roles and Port States

Port Role
 Root port Root Bridge
 Designated port LAN
 Alternate port
 Backup port Designated Port
 LAN Designated Port Backup
 Port
 Disable port Operation State Down

1 2 3

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



1

2

Root bridge

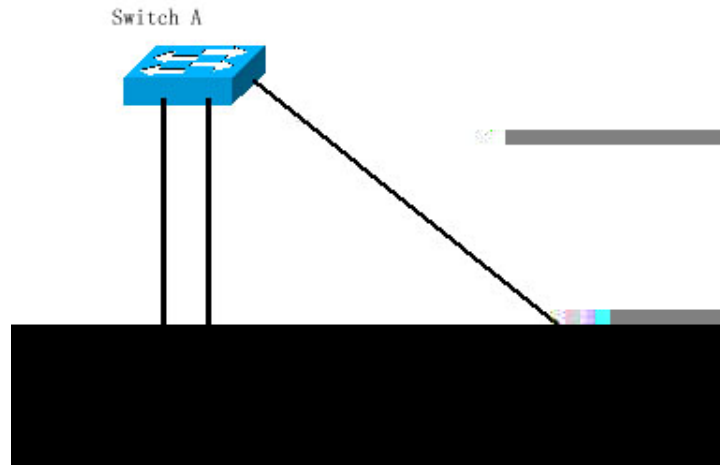


3

Port State

Discarding

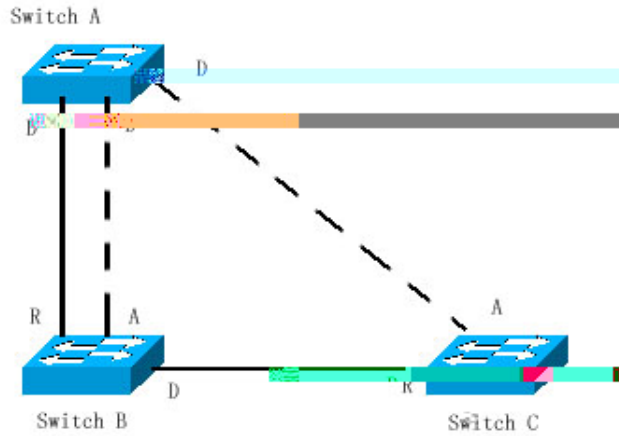
Mac



4

Switch	Spanning Tree	BPDUs
Root Bridge	Switch A	Switch A
	Switch B	Alternate Port
	Root Port	
Switch C	B A	A
	Path Cost	A
	Switch C	B
Alternate port		Root port A
		Port Role

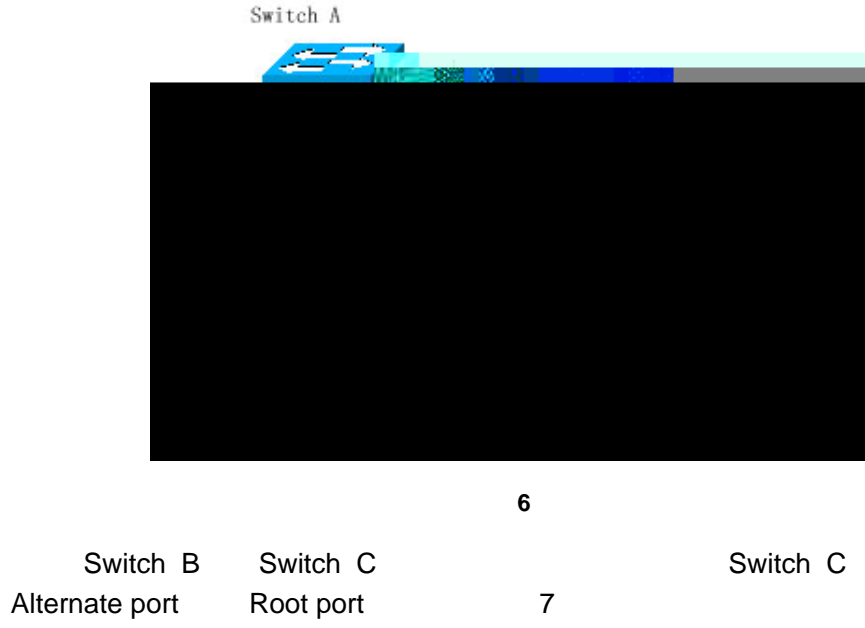
5



5

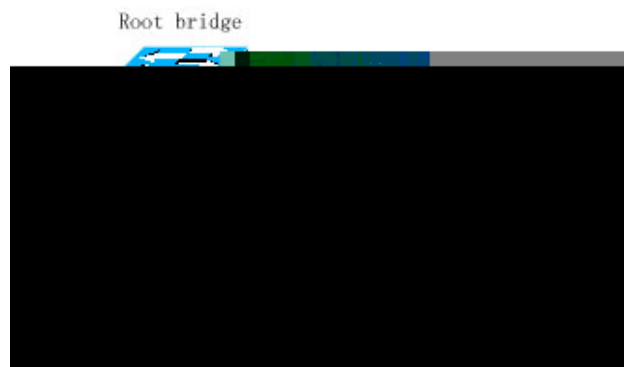
Switch A Switch B

6

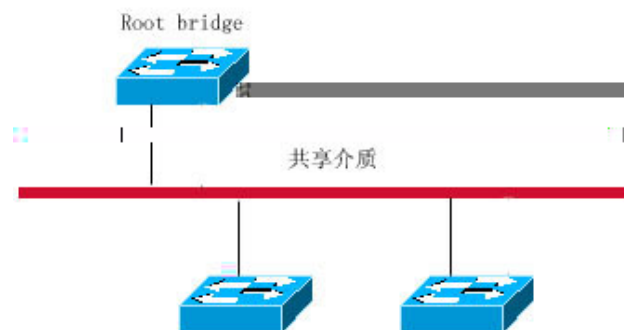


RSTP

	RSTP		“	”	Forwarding
STP		Port Role	30	(Forward-Delay Time
	Forward-Delay Time		15)	Forwarding

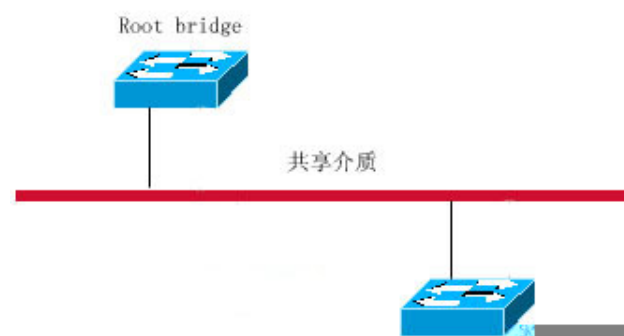


9



10

“ ”



11

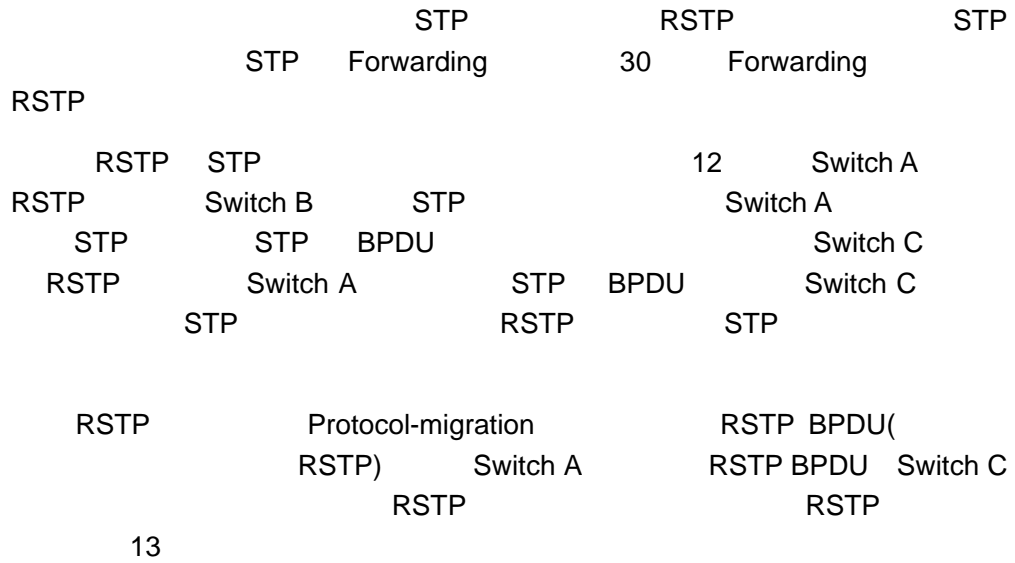
RSTP STP

RSTP

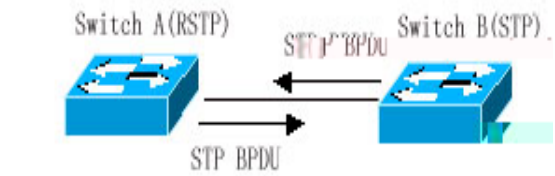
STP

RSTP

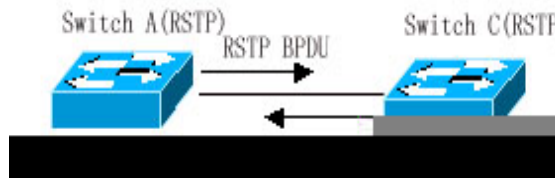
BPDU



Protocol Migration

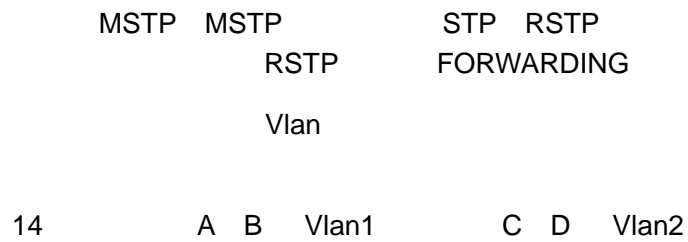


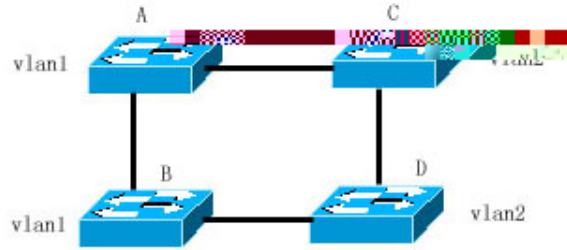
12



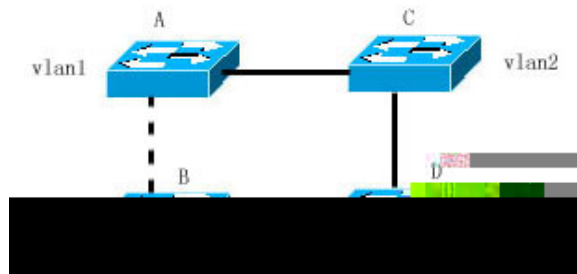
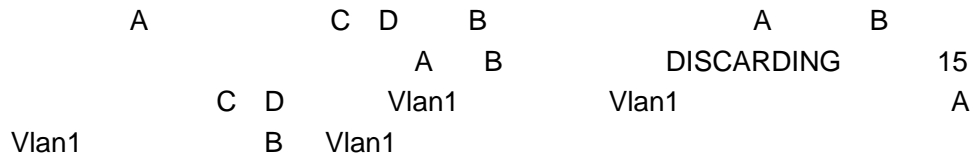
13

MSTP

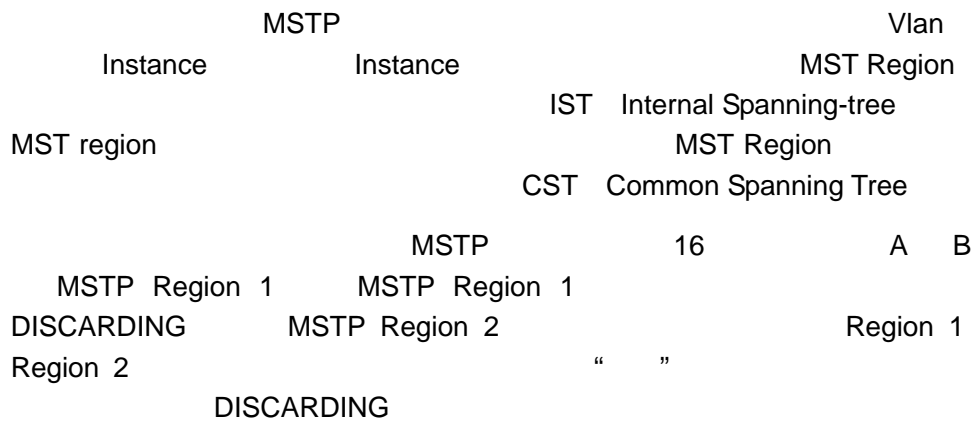


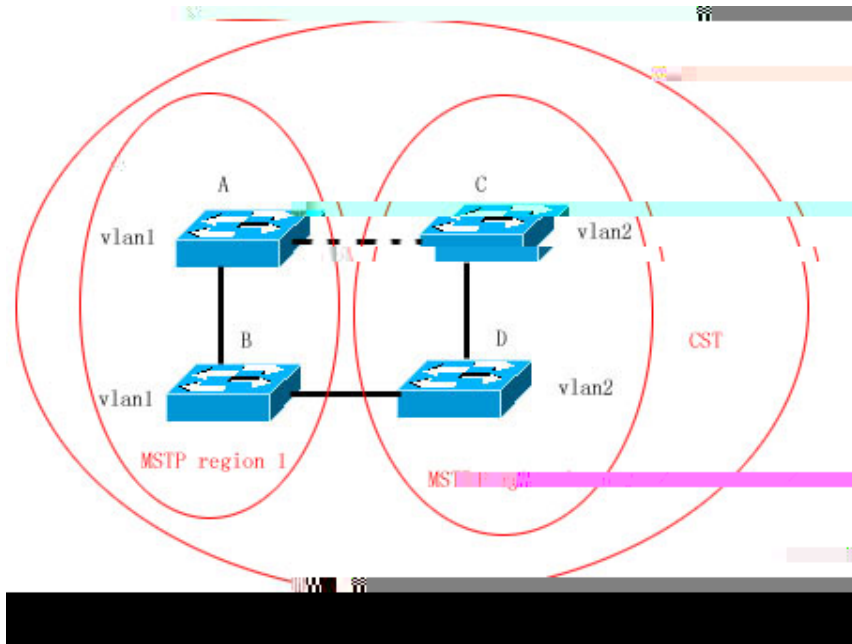


14



15





16

Vlan

MSTP Region

MSTP Region	MSTP Region	MSTP	"MST	"
MST	Name	32		MSTP
MSTP Region	MST Revision Number	16bit		MSTP Region
MST Instance—vlan	MST Instance—vlan	64	Instance id	64
1	64 Instance 0	1-4094	Vlan Instance 0	64
	Instance 0	MSTI	MST Instance	"Vlan "
BPDU	MSTI	MSTI	CIST	MSTI

spanning-tree mst configuration

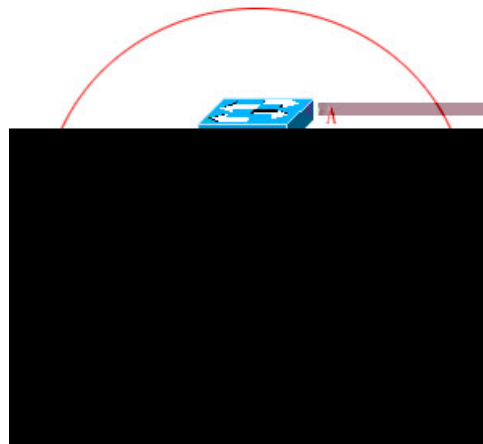
"MST "

MSTP BPDU

BPDU

MST
MST Region

Region

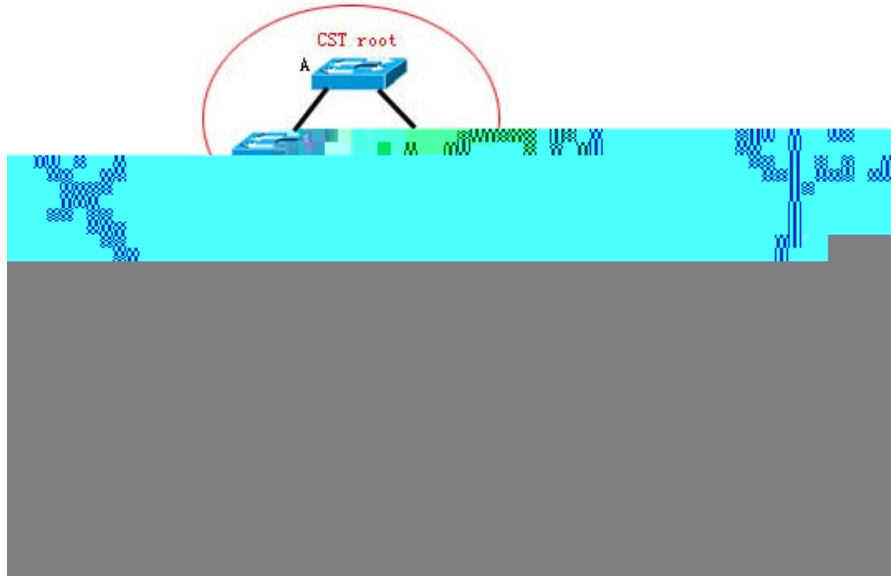


18

MSTI 2 Instance 2	A	B	19 C	Region Root Instance 2	
"Vlan "	B	C	A C	DISCARDING	"Vlan "

19

MSTP	MSTP	MSTP	MSTP	
MSTP	Vlan	MSTP	Vlan	
MSTP region	MSTP	MSTP	Path Cost	Priority
MSTP region	CST	MSTP	MSTP	
Region	MSTP region	CST	ee)MSTon	MSTP



20

CIST Regional Root	Region	Bridge ID
Region	CST Root	Root Path Cost
CIST Regional Root	Root Port	MSTI
"Master port"	Instance	" "
FORWARDING	Region	CST Root
"	Region	!

Hop Count

IST	MSTI	Message Age	Max Age	BPDU
	IP	TTL		Hop Count
spanning-tree max-hops				Region
Region Root Bridge			Hop Count	1 0
BPDU		Hops	0 BPDU	
Age	Region	STP RSTP	MSTP	Message Age Max

MSTP RSTP STP

STP	MSTP	RSTP	STP BPDU
"RSTP	STP	"	
RSTP		MSTP BPDU	CIST
RSTP BPDU			MSTP

STP Region
RSTP Region

Region

MSTP

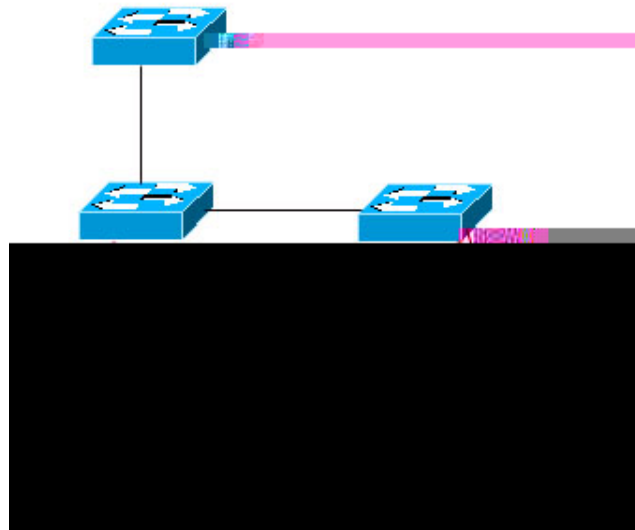
Port Fast

Forwarding 30
Port Fast enable

Forwarding

Forwarding

Port Fast
Port Fast



21

Port Fast Disabled

BPDU STP

Port Fast Operational State Forwarding

(AutoEdge)

AutoEdge

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N

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注意:

- 1) Port Fast
- 2) STP Autoedge
- 3) BPDU Filter Forwarding
- 4)
- 5) AutoEdge IEEE 802.1D 2004 Bridge
Hello Time 1.0-2.0 AutoEdge
Hello Time
Hello Time AutoEdge

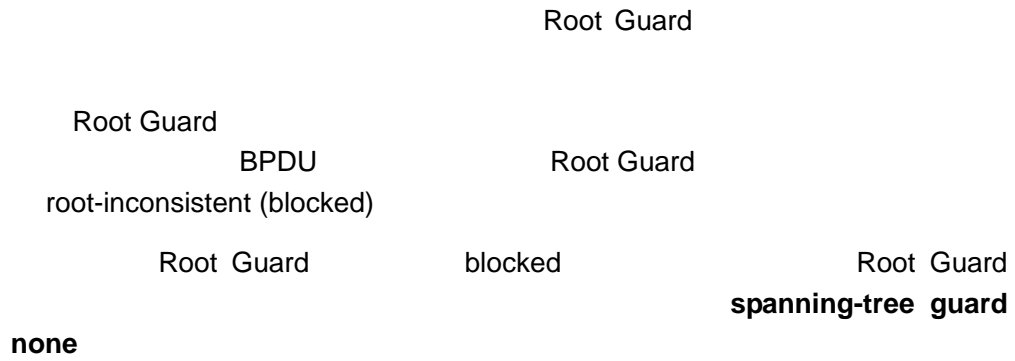
BPDU Guard

BPDU Guard enable Interface enable

```
spanning-tree portfast 30(fudug0011 default Tw 6.006 0 Td<1BB636D
```


BPDU

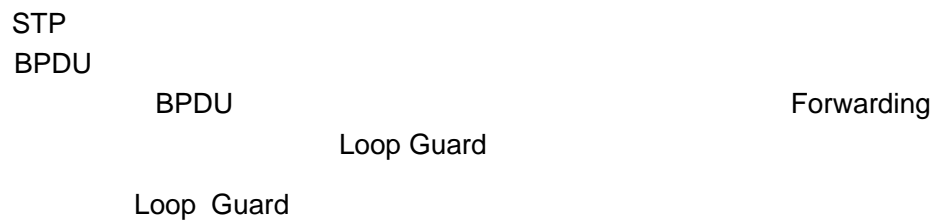
Root Guard



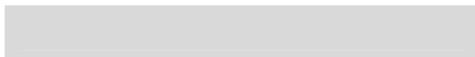
注意:

- 1) Root Guard
- 2) Root Guard
Blocked
- 3) Root Guard MST0 BPDU
Blocked
- 4) Root Guard Loop Guard
- 5) Root Guard

Loop Guard



- 1) Loop Guard



Switch Priority

```

Instance                                Instance
Region
CIST Instance 0
  Bridge ID                            16          4096          0
4096  8192  12288  16384  20480  24576  28672  32768  36864
40960 45056 49152 53248 57344 61440          32768
    
```

Ruijie# configure terminal	

```

instance
instance
Ruijie(config)# spanning-tree instance 0
[mst instance-id] priority instance-id 0 64
priority 0 61440
4096
    
```

(64) (1/1) 1 1f-0.0002 Tc -10.06 533. 0 TdK4Td 0 Td(nstt)10 (10.

Ruijie# configure terminal	
Ruijie(config)# interface <i>interface-id</i>	interface interface Aggregate Link
Ruijie(config-if)# spanning-tree [mst instance-id] port-priority <i>priority</i>	instance instance instance 0 <i>instance-id</i> 0 64 <i>priority</i> interface 0 240 16 128
Ruijie(config-if)# end	
Ruijie# show spanning-tree [mst instance-id] interface <i>interface-id</i>	
Ruijie# copy running-config startup-config	

no spanning-tree mst instance-id port-priority

Path Cost

	Root Bridge	Path Cost	Root Port
Port Path Cost		Root Port	
Interface	The Media Speed	Path Cost	Instance

Ruijie# configure terminal	

Ruijie# show spanning-tree [mst <i>instance-id</i>] interface <i>interface-id</i>	
Ruijie# copy running-config startup-config	

no spanning-tree mst cost

Path Cost

path cost method

Path Cost	IEEE 802.1d	IEEE 802.1t	Path Cost
Cost	802.1d	short 1—65535	802.1t
	long (1—200,000,000)	IEEE 802.1t	Path Cost
		Path Cost	
	Interface	IEEE 802.1d short	

no spanning-tree pathcost method

Hello Time

BPDU

2

Hello Time

Ruijie# configure terminal	
Ruijie(config)# spanning-tree hello-time seconds	hello_time 1 10 2
Ruijie(config)# end	
Ruijie# show running-config	
Ruijie# copy running-config startup-config	

no spanning-tree hello-time

Forward-Delay Time

15

Max-Age Time

BPDU

20

Max-Age Time

Ruijie# configure terminal	
Ruijie(config)# spanning-tree max-age seconds	max age time 6 40 20
Ruijie(config)# end	
Ruijie# show running-config	
Ruijie# copy running-config startup-config	

no spanning-tree max-age

注意:

Hello Time Forward-Delay Time Max-Age Time
 $2 * (\text{Hello Time} + 1.0 \text{ seconds}) \leq \text{Max-Age Time}$
 $\text{Max-Age Time} \leq 2 * (\text{Forward-Delay} - 1.0 \text{ seconds})$

Tx-Hold-Count

BPDU

3

Tx-Hold-Count

Ruijie# configure terminal	
Ruijie(config)# spanning-tree tx-hold-count numbers	BPDU 1 10 3
Ruijie(config)# end	
Ruijie# show running-config	

Ruijie# copy running-config
startup-config

no spanning-tree tx-hold-count

link-type

link-type 6(une)2(int-to-p)-ot

“ ” RSTP

RSTP

“ ”

link type point-to-point

shared

link type

“ ”

MSTP Region

MSTP Region

```

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

```

注意:

vlan	instance		vlan
		vlan	instance

Maximum-Hop Count

Maximum-Hop Count	BPDU	Region
Instance		

Maximum-Hop Count

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

no spanning-tree max-hops

MSTI BPDU

Ruijie# configure terminal	
Ruijie(config)# interface <i>interface-id</i>	
Ruijie(config-if)# spanning-tree compatible enable	
Ruijie(config-if)# end	
Ruijie# show running-config	
Ruijie# copy running-config startup-config	

no spanning-tree compatible enable

MSTP

(AutoEdge)

Port Fast

Port Fast Forwarding BPDU Port Fast
Operational State disabled STP Forwarding

Port Fast

Ruijie# configure terminal	
Ruijie(config)# interface <i>interface-id</i>	interface interface Aggregate Link

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

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

spanning-tree portfast default

Portfast

(3) BPDUs
 BPDUs Port Fast Operational State disabled

Autoedge

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

Autoedge Interface **spanning-tree autoedge**
disabled

BPDU Guard

BPDU Guard BPDUs Error-disabled

BPDU Guard

Ruijie# configure terminal	
Ruijie(config)# spanning-tree portfast Bpduguard default	BPDU guard
Ruijie(config)# interface <i>interface-id</i>	interface interface Aggregate Link
Ruijie(config-if)# spanning-tree portfast	interface portfast bpduguard
Ruijie(config-if)# end	

BU65spE?5sp6AV8HPC

BPDU MAC

BPDU MAC MAC MAC BPDU
 BPDU
 BPDU MAC

Ruijie# configure terminal	
Ruijie(config)# interface <i>Interface-id</i>	interface interface Aggregate Link
Ruijie(config-if)# bpdu src-mac-check <i>H.H.H</i>	bpdu mac
Ruijie(config-if)# end	
Ruijie# show running-config	
Ruijie# copy running-config startup-config	

bpdu mac no bpdu
 src-mac-check

Root Guard

ROOT Guard

Ruijie# configure terminal	
Ruijie(config)# interface Interface-id	interface interface Aggregate Link
Ruijie(config-if)# spanning-tree guard root	ROOT Guard
Ruijie(config-if)# end	
Ruijie# show running-config	
Ruijie# copy running-config startup-config	

Root Guard

Root Guard

Ruijie# configure terminal	
Ruijie(config)# interface Interface-id	Aggregate Link
Ruijie(config-if)# spanning-tree guard root	Root Guard
Ruijie# show running-config	
Ruijie# copy running-config startup-config	

Loop Guard

Loop Guard

Ruijie# configure terminal	
Ruijie(config)# spanning-tree Loopguard default	Loop Guard
Ruijie# show running-config	
Ruijie# copy running-config startup-config	

Loop Guard

Ruijie# configure terminal	
Ruijie(config)# interface <i>Interface-id</i>	Aggregate Link
Ruijie(config-if)# spanning-tree guard loop	Loop Guard
Ruijie# show running-config	
Ruijie# copy running-config startup-config	

Ruijie# configure terminal	
Ruijie(config)# interface <i>Interface-id</i>	Aggregate Link
Ruijie(config-if)# spanning-tree guard none	

Ruijie# show spanning-tree pathcost method

pathcost method

MSTP

```
Ruijie(config-if)# exit
Ruijie(config)# vlan 2
Ruijie(config-vlan)# exit
Ruijie(config)# vlan 3
Ruijie(config-vlan)# exit
#           MSTP           VLAN 2           Instance 1   VLAN 3
Instance 2   MST           ruijie MST Revision Number 1   MST

Ruijie(config)# spanning-tree mode mstp
Ruijie(config)#
```

```
#           MSTP           VLAN 2      Instance 1   VLAN 3
Instance 2   MST           ruijie  MST Revision Number  1
```

```
Ruijie(config)# spanning-tree mode mstp
Ruijie(config)# spanning-tree mst configuration
Ruijie(config-mst)# instance 1 vlan 2
%Warning:you must create vlans before configuring instance-vlan
relationship
Ruijie(config-mst)# instance 2 vlan 3
%Warning:you must create vlans before configuring instance-vlan
relationship
Ruijie(config-mst)# name ruijie
Ruijie(config-mst)# revision 1
Ruijie(config-mst)# exit
Ruijie(config)# spanning-tree
Enable spanning-tree.
#           Instance1           4096
Ruijie(config)# spanning-tree mst 1 priority 4096
```

3) Switch C

```
#           Fa 0/1   Fa 0/2   Trunk      VLAN 2   VLAN 3
Ruijie(config)# interface fastEthernet 0/1
Ruijie(config-if)# switchport mode trunk
Ruijie(config-if)# exit
Ruijie(config)# interface fastEthernet 0/2
Ruijie(config-if)# switchport mode trunk
Ruijie(config-if)# exit
Ruijie(config)# vlan 2
Ruijie(config-vlan)# exit
Ruijie(config)# vlan 3
Ruijie(config-vlan)# exit
#           MSTP           VLAN 2      Instance 1   VLAN 3
Instance 2   MST           ruijie  MST Revision Number  1
```

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

```
Enable spanning-tree.
# Instance 2
Ruijie(config)# spanning-tree mst 2 priority 4096
# BPDU Guard Fa 0/3 Port Fast
Ruijie(config)# spanning-tree portfast bpduguard default
Ruijie(config)# interface fastEthernet 0/3
Ruijie(config-if)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected
to a single host. Connecting hubs, Ruijiees, bridges to this
interface when portfast is enabled,can cause temporary loops.
Ruijie(config-if)# end
#
Ruijie# show spanning-tree
StpVersion : MSTP
SysStpStatus : ENABLED
MaxAge : 20
HelloTime : 2
ForwardDelay : 15
BridgeMaxAge : 20
BridgeHelloTime : 2
BridgeForwardDelay : 15
MaxHops: 20
TxHoldCount : 3
PathCostMethod : Long
BPDUGuard : enabled
BPDUFilter : Disabled
LoopGuardDef : Disabled
##### mst 0 vlans map : 1, 4-4094
BridgeAddr : 00d0.f82a.aa8e
Priority: 32768
TimeSinceTopologyChange : 0d:0h:19m:44s
TopologyChanges : 1
DesignatedRoot : 1000.00d0.f822.33aa
RootCost : 0
RootPort : 1
CistRegionRoot : 1000.00d0.f822.33aa
CistPathCost : 200000
##### mst 1 vlans map : 2
BridgeAddr : 00d0.f82a.aa8e
Priority: 32768
TimeSinceTopologyChange : 0d:0h:1m:46s
TopologyChanges : 7
DesignatedRoot : 1001.00d0.f834.56f0
RootCost : 200000
RootPort : 2
##### mst 2 vlans map : 3
```

```
BridgeAddr : 00d0.f82a.aa8e
Priority: 4096
TimeSinceTopologyChange : 0d:0h:1m:44s
TopologyChanges : 5
DesignatedRoot : 1002.00d0.f82a.aa8e
RootCost : 0
RootPort : 0
# Fa 0/1
Ruijie# show spanning-tree interface fastEthernet 0/1
PortAdminPortFast : Disabled
PortOperPortFast : Disabled
PortAdminAutoEdge : Enabled
PortOperAutoEdge : Disabled
PortAdminLinkType : auto
PortOperLinkType : point-to-point
PortBPDUGuard : Disabled
PortBPDUFilter : Disabled
PortGuardmode : None
##### MST 0 vlans mapped :1, 4-4094
PortState : forwarding
PortPriority : 128
PortDesignatedRoot : 1000.00d0.f822.33aa
PortDesignatedCost : 0
PortDesignatedBridge :1000.00d0.f822.33aa
PortDesignatedPort : 8002
PortForwardTransitions : 1
PortAdminPathCost : 200000
PortOperPathCost : 200000
Inconsistent states : normal
PortRole : rootPort
##### MST 1 vlans mapped :2
PortState : discarding
PortPriority : 128
PortDesignatedRoot : 1001.00d0.f834.56f0
PortDesignatedCost : 0
PortDesignatedBridge :8001.00d0.f822.33aa
PortDesignatedPort : 8002
PortForwardTransitions : 5
PortAdminPathCost : 200000
PortOperPathCost : 200000
Inconsistent states : normal
PortRole : alternatePort
##### MST 2 vlans mapped :3
PortState : forwarding
PortPriority : 128
PortDesignatedRoot : 1002.00d0.f82a.aa8e
```

PortDesignatedCost : 0
PortDesignatedBridge :1002.00d0.f82a.aa8e
PortDesignatedPort : 8001
PortForwardTransitions : 1
PortAdminPathCost : 200000
PortOperPathCost : 200000
Inconsistent states : normal
PortRole : designatedPort

SPAN

SPAN



1 SPAN

SPAN

SPAN

1000Mbps

100Mbps

SPAN

SPAN

SPAN

SPAN

SPAN

	SPAN	Switched port	AP
SPAN			
	SPAN	disabled port	SPAN
		Show monitor session session number	
SPAN		SPAN	

SPAN

š

š

switched port routed port AP

SPAN

SPAN

SPAN () ()

Ruijie(config)# monitor session <i>session_number</i> source interface <i>interface-id</i> [-] { both rx tx }	<i>interface-id</i>
Ruijie(config)# monitor session <i>session_number</i> destination interface <i>interface-id</i>	<i>interface-id</i>

SPAN **no monitor session** *session_number*
 SPAN **no monitor session all**
no monitor session *session_number* **source interface** *interface-id*
no monitor session *session_number* **destination interface** *interface-id*

```

1          SPAN          1          1
1          MIRROR      8 Show monitor session

```

```

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

```

SPAN

SPAN

--	--

Ruijie(config)# no monitor session <i>session_number</i> source interface <i>interface-id</i> [-] [both rx tx]	<i>interface-id</i>
--	---------------------

```

no monitor session session_number source interface interface-id
SPAN 1
1

```

```

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

```

SPAN

```

show monitor SPAN ,
show monitor SPAN 1

```

```

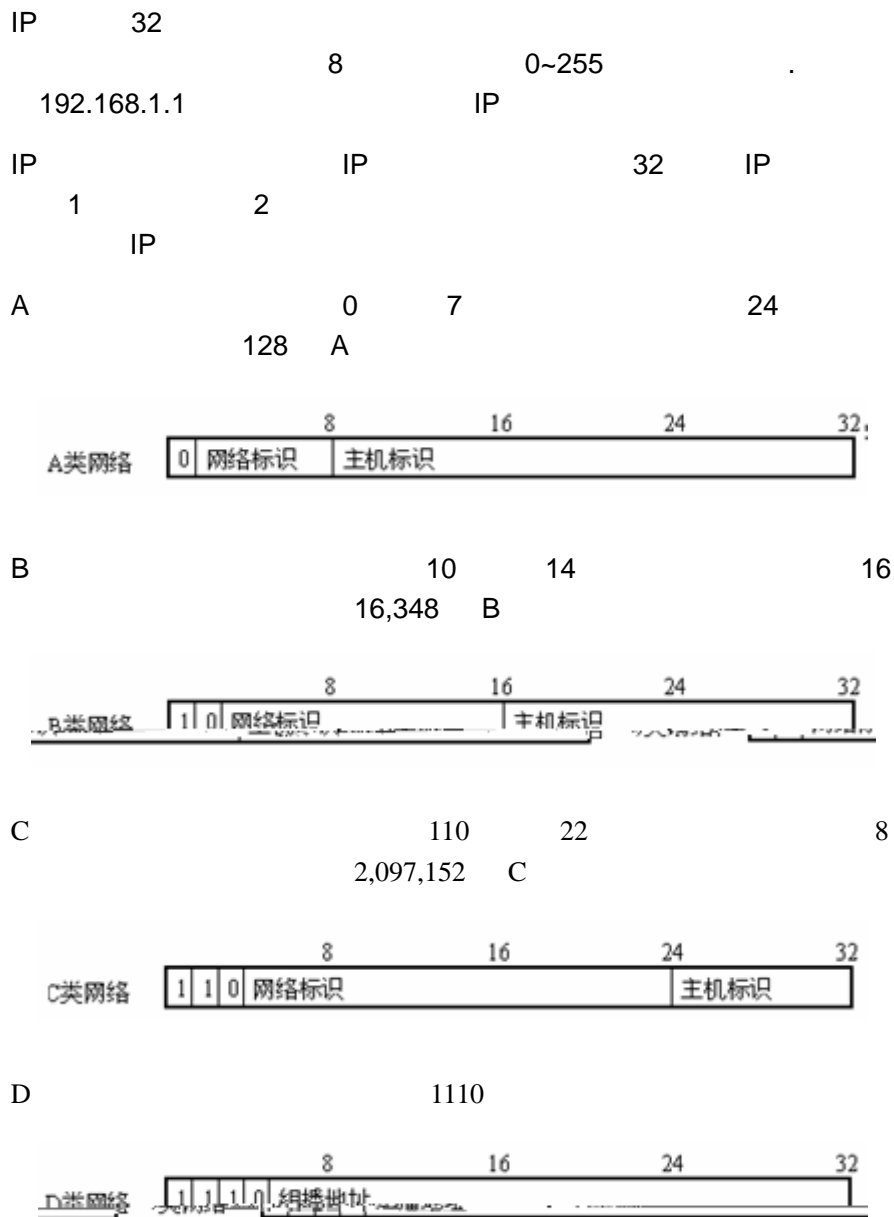
Ruijie# show monitor session 1
sess-num: 1
src-intf:
GigabitEthernet 3/1 frame-type Both
dest-intf:
GigabitEthernet 3/8

```

IP

IP

IP



说明:

1111

IP

C	192.168.0.0~192.168.255.255	256	C
---	-----------------------------	-----	---

IP

TCP/UDP

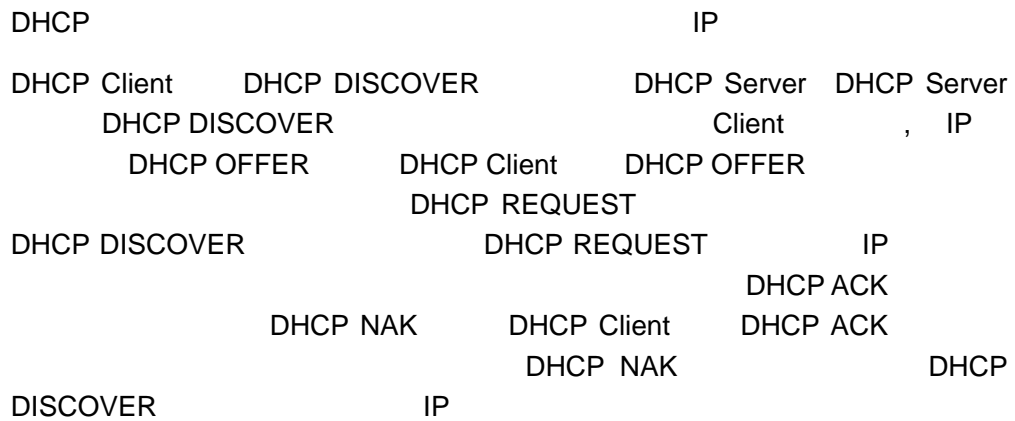
RFC 1166

IP

Ruijie# ping <i>ip-address</i> [length bytes] [ntimes times] [timeout seconds]	
--	--

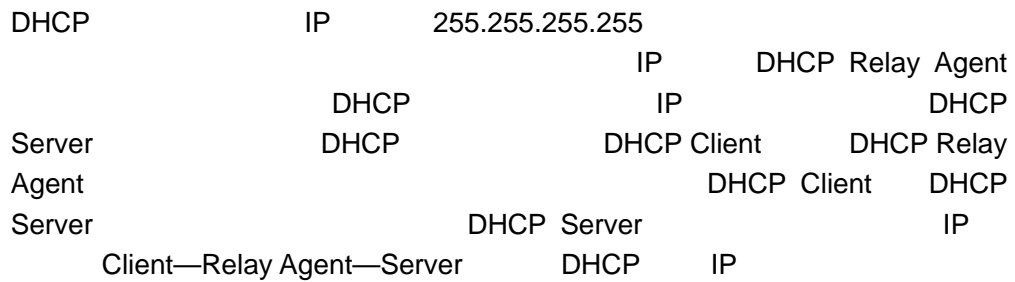
DHCP Relay

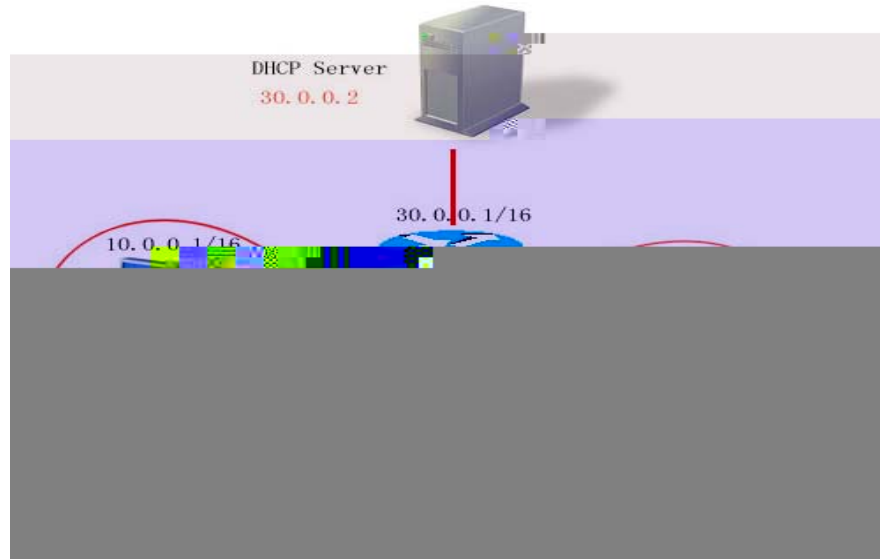
DHCP



DHCP

DHCP Relay Agent



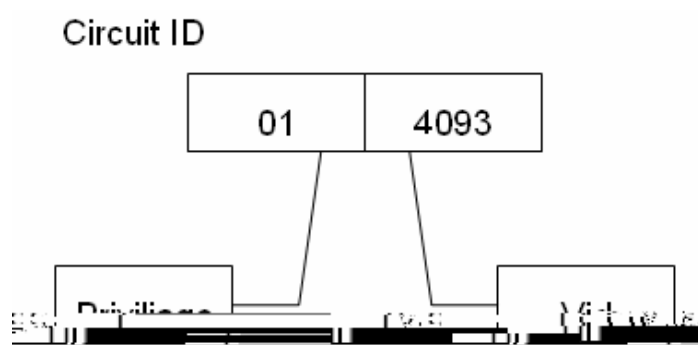


1

VLAN 10	VLAN 20	10.0.0.1/16	20.0.0.1/16	DHCP
Server	30.0.0.1/16	30.0.0.2	DHCP Server	10.0.0.1/16
20.0.0.1/16		IP		DHCP Relay
Agent	DHCP Server IP	30.0.0.2		

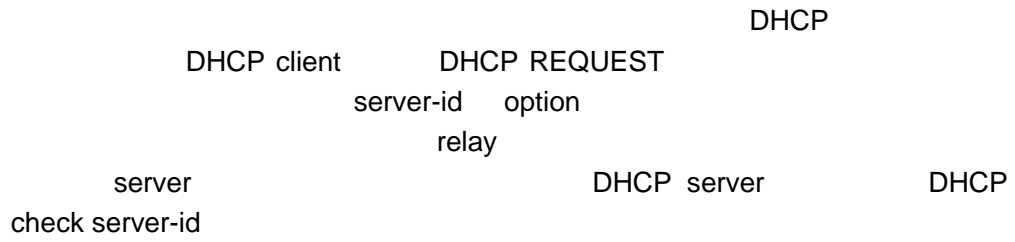
DHCP Relay Agent Information(option 82)

RFC3046	DHCP client	DHCP relay	option
	IP	RFC3046	option
82	option82		



2

2. relay agent information option82 option



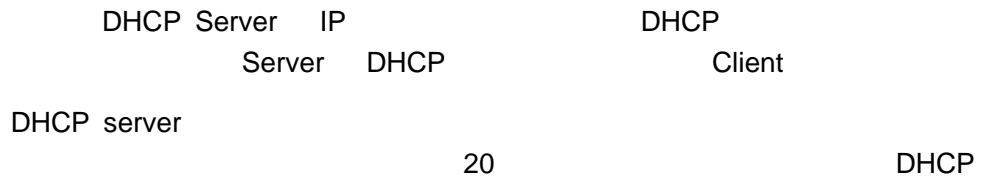
DHCP

DHCP

DHCP

Ruijie (config)# service dhcp	DHCP
Ruijie(config)# no service dhcp	DHCP

DHCP Server IP



DHCP option dot1x

DHCP Relay Agent Information

	IP	ip dhcp relay
information option dot1x	DHCP relay	option dot1x
relay	802.1x	option
dot1x		

DHCP option dot1x

Ruijie(config)# ip dhcp relay information option dot1x	DHCP option dot1x
Ruijie(config)# no ip dhcp relay information option dot1x	DHCP option dot1x

DHCP option 82

	ip dhcp relay information option82	DHCP
relay	DHCP Relay Agent Information	option

DHCP option82

Ruijie(config)# ip dhcp relay information option82	DHCP option82
Ruijie(config)# no ip dhcp relay information option82	DHCP option82

DHCP relay check server-id

ip dhcp relay check server-id	DHCP relay
DHCP SERVER-ID option	server

DHCP relay check server-id

Ruijie(config)# ip dhcp relay check server-id	DHCP relay check server-di
Ruijie(config)# no ip dhcp relay check server-id	DHCP relay check server-id

4.

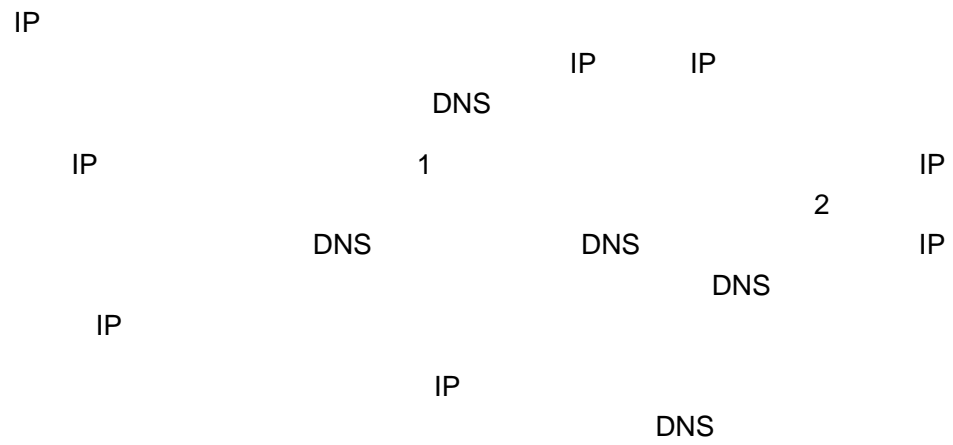
DHCP

```
Ruijie(config)# interface gigabitEthernet 0/2  
Ruijie(config-if)# ip dhcp snooping trust  
  
# Gi0/2 ARP  
Ruijie(config-if)# ip arp inspection trust  
Ruijie(config-if)# exit
```

```
#  
Ruijie(dhcp-config)# default-router 10.2.1.1  
  
#    DHCP  
Ruijie(dhcp-config)# network 10.2.0.0 255.255.0.0  
  
#                10.2.0.0/16  
Ruijie(config)# ip route 10.2.0.0 255.255.0.0 10.1.0.1
```

DNS

DNS



DNS

DNS

DNS	
DNS IP	
DNS	6

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

no ip domain-lookup DNS

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

DNS Server

DNS

DNS

DNS
ip-address

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

Ruijie(config)# ip name-server <i>ip-address</i>	DNS Server IP DNS Server Server Server DNS 6

IP

IP IP

IP IP

Ruijie(config)# ip host <i>host-name ip-address</i>	IP

no

IP

clear host clear host *

Ruijie# clear host [<i>word</i>]	

DNS

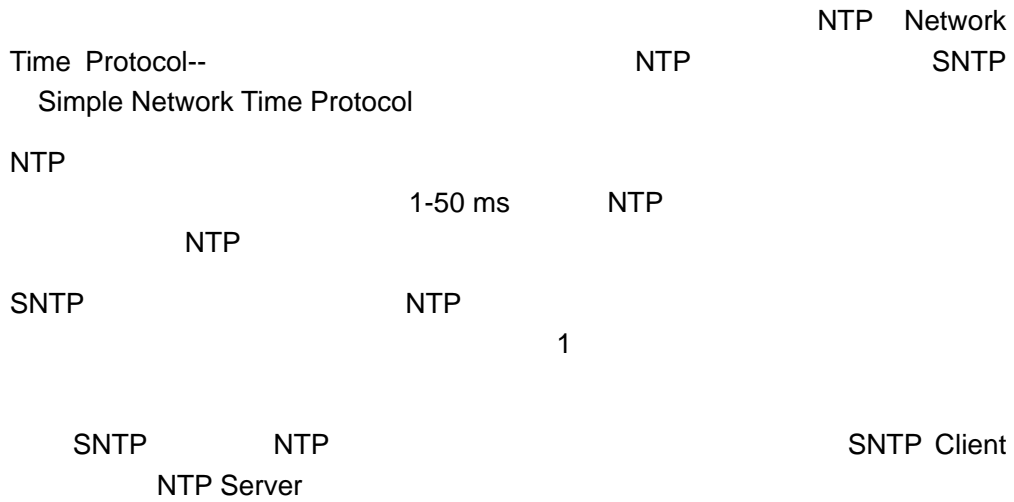
Ruijie# show hosts	DNS

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

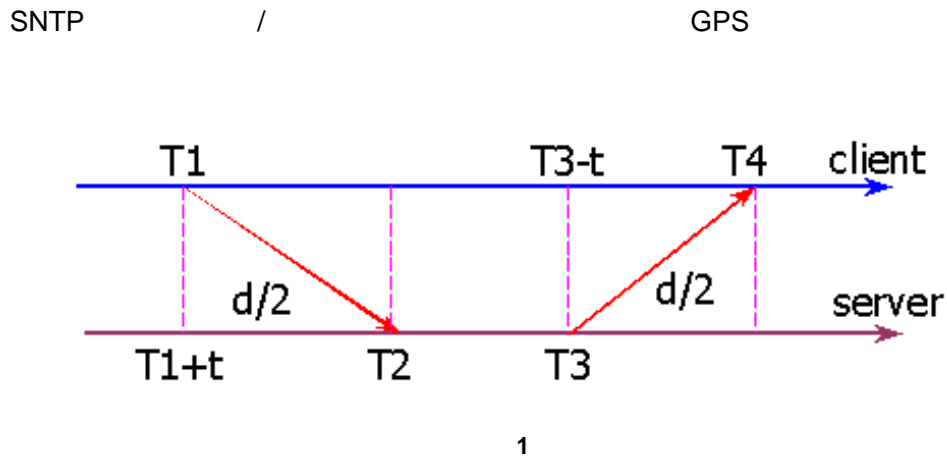
Ping

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

(SNTP)



SNTP



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

T1 () Originate
Timestamp

(SNTP)

T2 () Receive
Timestamp

T3 () Transmit
Timestamp

T4 () Destination
Timestamp

T

d

$$T2 = T1 + t + d / 2;$$

$$T2 - T1 = t + d / 2;$$

$$T4 = T3 - t + d / 2;$$

$$T3 - T4 = t - d / 2;$$

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

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

t d SNTP Client

T4 + t

SNTP

SNTP

SNTP

SNTP

SNTP	Disable SNTP

(SNTP)

NTP Server IP	0
SNTP	1800s
	+8

SNTP

SNTP

1)

```
Ruijie# config
```

2) **SNTP**

```
(  
5 )
```

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

3)

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

4)

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

5)

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

SNTP

no sntp enable

SNTP

NTP Server

SNTP NTP SNTP Client
NTP Server NTP Server
 NTP Server

NTP server <http://www.time.edu.cn/> <http://www.ntp.org/>

192.43.244.18(time.nist.gov)

SNTP Server IP

1)

```
Ruijie# config
```

(SNTP)

```
2)      SNTP Server  IP
Ruijie(config)# sntp server <ip-addr>

3)

Ruijie(config)# End

4)

Ruijie# show running-config

5)

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

SNTP

```
SNTP Client          NTP Server          NTP Server
                    NTP Server

1)

Ruijie# config

2)          60  -65535
1800

Ruijie(config)# sntp interval <seconds>

3)

Ruijie(config)# End

4)

Ruijie# show running-config

5)

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

```
SNTP          (GMT)

1

Ruijie# config

2          -23  23          8
          -8   8   0
```

```
Ruijie(config)# clock time-zone <time-zone>
```

3

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

4

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

5

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

```
no clock time-zone
```

SNTP

1) SNTP

```
Ruijie# show sntp
```

2) **show sntp**

```
Ruijie# show sntp
```

```
SNTP state           : ENABLE           //SNTP
SNTP server          : 192.168.4.12      //NTP Server
SNTP sync interval   : 60              //
Time zone            : +8                //
```

NTP

NTP

Network Time Protocol NTP

LAN

1 WAN

NTP
UTC NTP UTC
Internet

NTP (Authentication)

SNTP NTP

SNTP

NTP SNTP

SNTP
NTP

NTP

NTP

NTP

NTP

NTP ID

NTP

NTP

NTP

NTP

NTP

NTP

NTP

NTP

NTP

NTP

NTP**ID**

ntp trusted-key <i>key-id</i>	NTP	ID
no ntp trusted-key <i>key-id</i>	NTP	ID

注意:

NTP

NTP

NTP

20

NTP

NTP

NTP

NTP

注意:

IP

NTP

interface <i>interface-type number</i>	
ntp disable	NTP

NTP

no ntp disable

NTP

NTP

1

8

NTP



ntp synchronize

show ntp status	NTP

Ruijie# **show ntp status**

Clock is synchronized, stratum 9, reference is 192.168.217.100
nominal freq is 250.0000 Hz, actual freq is 250.0000 Hz, precision
is 2**18

reference time is AF3CF6AE.3BF8CB56 (20:55:10.000 UTC Mon Mar
1 1993)

clock offset is 32.97540 sec, root delay is 0.00000 sec

root dispersion is 0.00003 msec, peer dispersion is 0.00003 msec

```

starum          reference          freq
  precision          reference time
  UTC          clock offset          root delay
root dispersion          peer dispersion

```

```

          master NTP
key-id 6 key-string woooooop
          NTP
          NTP
          NTP

```

Ruijie(config)# **no ntp**

Ruijie(config)# **ntp authentication-key 6 md5 woooooop**

Ruijie(config)# **ntp authenticate**

Ruijie(config)# **ntp trusted-key 6**

Ruijie(config)# **ntp server 192.168.210.222 key 6**

Ruijie(config)# **ntp synchronize**

Ruijie(config)# **interface gigabitEthernet 0/1**

Ruijie(config-if)# **ntp disable**

Ruijie(config-if)# **no ntp disable**

SNMP

SNMP

SNMP Simple Network Manger Protocol 1988
8 RFC1157

SNMP
SNMP

SNMP

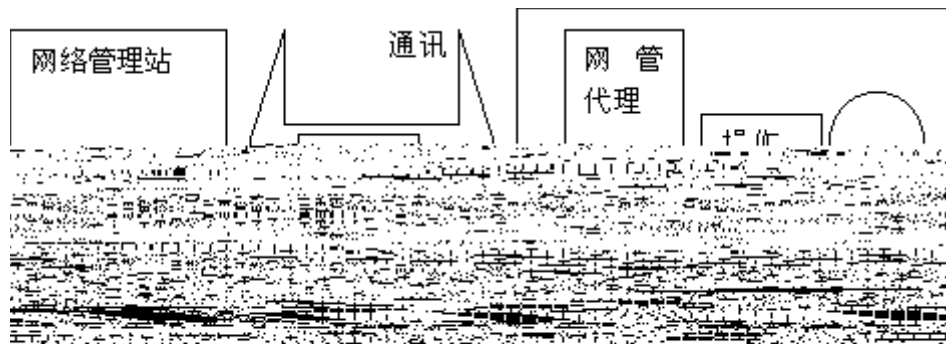
SNMP /

SNMP
SNMP
MIB

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

SNMP SNMP Agent
NMS NMS

NMS Agent

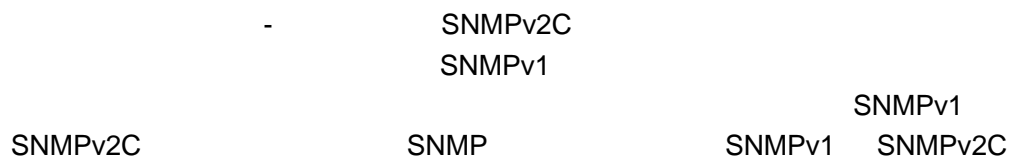


1

NMS

Agent

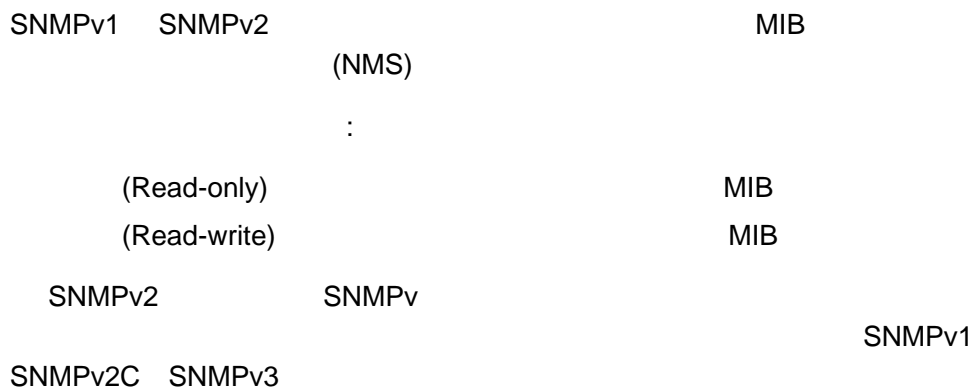
MIB Management Information Base



SNMP

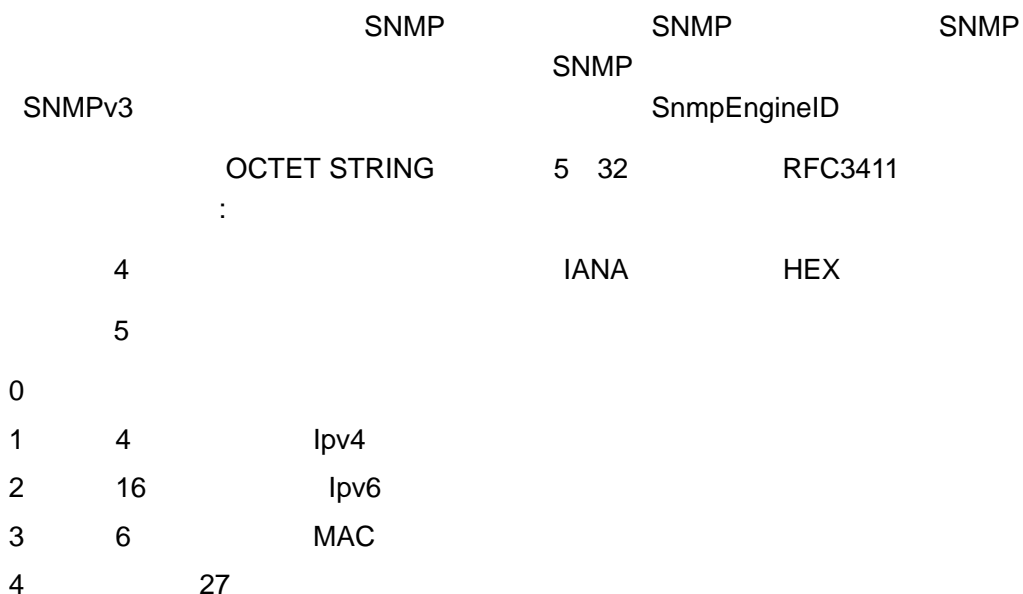
SNMP	NMS	Agent	6
1. Get-request	NMS	Agent	
2. Get-next-request	NMS	Agent	
3. Get-bulk	NMS	Agent	
4. Set-request	NMS	Agent	

SNMP



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

SNMP



5 16 27
 6-127
 128-255

SNMP

SNMP

SNMP

SNMPv1/SNMPv2C

Community-based
 Community-String

SNMP

SNMP

NMS Agent

IP NMS

ReadOnly

ReadWrite

MIB

IP

IP

IP

SNMP

Ruijie(config)# snmp-server community <i>string</i> [view <i>view-name</i>] [ro rw] [host <i>host-ip</i>] [<i>num</i>]	

NMS

no snmp-server community

MIB

SNMPv3

MIB

Ruijie(config)# snmp-server view <i>view-name oid-tree {include exclude}</i>	MIB MIB
Ruijie(config)# snmp-server group <i>groupname {v1 v2c v3 {auth noauth priv}}</i> [read <i>readview</i>] [write <i>writeview</i>] [access {num name}]	

no snmp-server view *view-name* **no**
snmp-server view *view-name oid-tree*
no snmp-server group *groupname*

SNMP

NMS

SNMPv3

MD5 SHA

DES

SNMP

Ruijie(config)# snmp-server user <i>username</i> <i>groupname {v1 v2 v3 [encrypted]}</i> [auth { <i>md5</i> <i>sha</i> } <i>auth-password</i>] [priv <i>des56</i> <i>priv-password</i>] [access {num name}]	

no snmp-server user *username groupname*

SNMP

Agent

NMS

Agent

NMS

Ruijie(config)# snmp-server host <i>host-addr</i> traps [version {1 2c 3 [auth noauth priv]]] <i>community-string</i> [udp-port <i>port-num</i>] [type]	SNMP SNMPv3 SNMPv3



Ruijie(config)#

Ruijie(config)# snmp-server queue-length <i>length</i>	Trap
Ruijie(config)# snmp-server trap-timeout <i>seconds</i>	Trap

SNMP

SNMP

SNMP

SNMP

SNMP

SNMP

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

snmpInNoSuchNames
snmpInBadValues
snmpInReadOnlys
snmpInGenErrs
snmpInTotalReqVars
snmpInTotalSetVars
snmpInGetRequests
snmpInGetNexts
snmpInSetRequests
snmpInGetResponses
snmpInTraps
snmpOutTooBig
snmpOutNoSuchNames
snmpOutBadValues
snmpOutGenErrs
snmpOutGetRequests
snmpOutGetNexts
snmpOutSetRequests
snmpOutGetResponses
snmpOutTraps
snmpEnableAuthenTraps
snmpSilentDrops
snmpProxyDrops
entPhysicalEntry
entPhysicalEntry.entPhysicalIndex
entPhysicalEntry.entPhysicalDescr
entPhysicalEntry.entPhysicalVendorType
entPhysicalEntry.entPhysicalContainedIn
entPhysicalEntry.entPhysicalClass
entPhysicalEntry.entPhysicalParentRelPos
entPhysicalEntry.entPhysicalName
entPhysicalEntry.entPhysicalHarfpM2ievs
entPhysicalEntry.entPhysicaFirmfpM2ievs
entPhysicalEntry.entPhysicaSoftfpM2ievs
entPhysicalEntry.entPhysicaSericalums
entPhysicalEntry.entPhysicaMfglName
entPhysicalEntry.entPhysicaModealName
entPhysicalEntry.entPhysicaAliaos
entPhysicalEntry.entPhysicaAssetIDE
entPhysicalEntry.entPhysicaIsFRUe
entPhysicalContaislEntry
entPhysicalContaislEntry.entPhysicalhildlIndex
enLastChangeTiame

SNMP

show snmp user

SNMP

```
Ruijie# show snmp user
```

```
User name: test  
Engine ID: 8000131103000000000000  
storage-type: permanent    active  
Security level: auth priv  
Auth protocol: SHA  
Priv protocol: DES  
Group-name: g1
```

SNMP

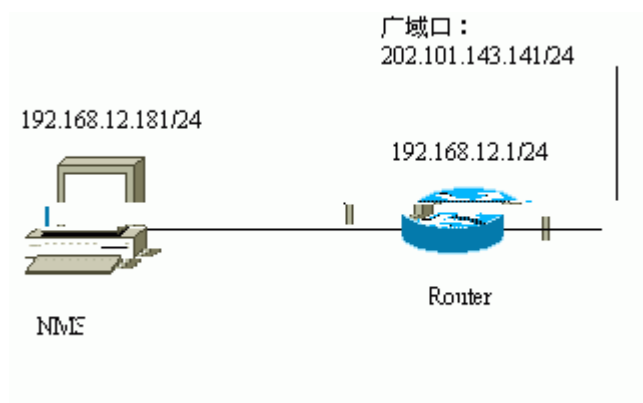
show snmp group

```
Ruijie# show snmp group
```

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

SNMP

192.168.12.181 NMS NMS IP
 HP OpenView IP 192.168.12.1



5 SNMP

SNMP

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

NMS

SNMP

SNMP

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

SNMP

NMS

```
Ruijie(config)# snmp-server location fuzhou
```

```
Ruijie(config)# snmp-server contact wugb@i-net.com.cn
```

```
Ruijie(config)# snmp-server chassis-id 1234567890  
0987654321
```

NMS

Trap

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



```
Ruijie (config)# snmp-server user v3user v3usergroup v3 auth  
md5 md5-auth priv des56 des-priv  
Ruijie (config)# snmp-server host 192.168.65.199 traps version  
3 priv v3user
```

RMON

RMON Remote Monitoring IETF(Internet Engineering Task
Force Internet)

RMON

RMON

RMON

RMON2

RMON

RMON

RMON1

1 2 3 9

RMON

1

CRC

(History)

RMON

2

1. HistoryControl
2. EthernetHistory

(Alarm)

RMON

3

MIB(Management Information Base)

MIB

SNMP Trap

(Event) RMON 9
SNMP Trap

RMON



注意:

1-65535

10

Bucket-number

RMON

Ruijie(config)# show rmon alarm	
Ruijie(config)# show rmon event	
Ruijie(config)# show rmon history	
Ruijie(config)# show rmon statistics	

RMON

3

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

10

3

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

```

MIB-II IfE0 15>ry MIB ifInNUcastPkts.6( 6
1.3.6.1.2.1.2.2.1.12.6)
30 6
(30 ) 20 20 10
10 1 (
rmo0 15 Trap ifInNUcastPkts is too
much ) zhangsan

```

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

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

rmon

show rmon alarm

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

show rmon event

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

show rmon history

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

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

show rmon statistics

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

注意:

RMON

S2700

show rmon statistics

LAN

Î b¥K. @ÖÂ ‡P5€1,@ G@ P7(@1,@lr t•...#r.,.t ØR27 ~...t•.


```

Ruijie# show storm-control
Interface Broadcast Control Multicast Control Unicast
Control Action
-----
-----
GigabitEthernet 0/1 Disabled Disabled Disabled none
GigabitEthernet 0/2 Disabled Disabled Disabled none
GigabitEthernet 0/3 Disabled Disabled Disabled none
GigabitEthernet 0/4 Disabled Disabled Disabled none
GigabitEthernet 0/5 Disabled Disabled Disabled none
GigabitEthernet 0/6 Disabled Disabled Disabled none
GigabitEthernet 0/7 Disabled Disabled Disabled none
GigabitEthernet 0/8 Disabled Disabled Disabled none
GigabitEthernet 0/9 Disabled Disabled Disabled none
GigabitEthernet 0/10 Disabled Disabled Disabled none
GigabitEthernet 0/11 Disabled Disabled Disabled none
GigabitEthernet 0/12 Disabled Disabled Disabled none
GigabitEthernet 0/13 Disabled Disabled Disabled none
GigabitEthernet 0/14 Disabled Disabled Disabled none
GigabitEthernet 0/15 Disabled Disabled Disabled none
GigabitEthernet 0/16 Disabled Disabled Disabled none
GigabitEthernet 0/17 Disabled Disabled Disabled none
GigabitEthernet 0/18 Disabled Disabled Disabled none
GigabitEthernet 0/19 Disabled Disabled Disabled none
GigabitEthernet 0/20 Disabled Disabled Disabled none
GigabitEthernet 0/21 Disabled Disabled Disabled none
GigabitEthernet 0/22 Disabled Disabled Disabled none
GigabitEthernet 0/23 Disabled Disabled Disabled none
GigabitEthernet 0/24 Disabled Disabled Disabled none

```

```

MAC MAC+ IP IP
IP MAC MAC IP+MAC
MAC MAC
IP+MAC IP
MAC IP

```

MAC

IP

IP

IP

protect

restrict

Trap

shutdown

Trap

	128
	(protect)

Aggregate Port
SPAN

说明:

1	Ip	Ip+Mac	
Mac			
2	trap	log	
3			1

Ruijie(config-if)# switchport port-security mac-address <i>mac-address</i> [<i>ip-address ip-address</i>]	ip-address() IP

no switchport port-security mac-address

mac-address

gigabitethernet 0/3
00d0.f800.073c IP 192.168.12.202

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

--	--

<pre>Ruijie(config-if)#switchport port-security aging {static time time }</pre>	<pre>static Time 0 1440 0 Time Time 0</pre>
---	---

no switchport port-security aging time
no switchport port-security aging

static

gigabitethernet 0/3

8

Ruijie# ~~01"GB\$y"oP8a"20a10-100P02101,92~~

```

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

```

```
Ruijie# show port-security address
```

```

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

```

gigabitstethernet
0/3

```
Ruijie# show port-security address interface gigabitstethernet 0/3
```

```

Vlan Mac Address IP Address Type Port Remaining Age(mins)
-----
1 00d0.f800.073c 192.168.12.202 Configured Gi0/3 8

```

```
Ruijie# show port-security
```

```

Secure Port MaxSecureAddr(count) CurrentAddr(count) Security
Action
-----
Gi0/1 128 1 Restrict
Gi0/2 128 0 Restrict
Gi0/3 8 1 Protect

```

ARP-CHECK

```

ARP          ARP-CHECK          MAC+IP
DHCP Snooping
ARP          ARP          IP

ARP-CHECK

ARP
arp

```

ARP

ARP

ARP

ARP

1. ARP IP

2. ARP

ARP

ARP

3. MAC+IP ARP Check Cpu CPU
, CPU

ARP-CHECK

ARP-CHECK

Ruijie# configure t	
Ruijie(config)# interface <i>interface-id</i>	
Ruijie(config-if)# arp-check	arp
Ruijie(config-if)# no arp-check	arp
Ruijie(config-if)# arp-check auto	

mac 00d0.f822.33ab IP 192.168.2.5

ARP

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

ARP ARP

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

说明:

1.	ARP-CHECK	ARP		
	S2700	ARP	MAC	Sender Ip

802.1X

Authentication

uncontrolled Port

controlled Port

802.1X



3

- 1. 802.1x 802.1x windowXp
Star-suppliant IEEE802.1x
- 2. IEEE 802.1x
- 3. RADIUS

- 1. Radius Server
- 2.

- 1. 802.1x
- 2. Radius Server
- 3.
- B 802.1x

802.1X

802.1x

802.1x

802.1x

RADIUS SERVER

802.1X

/

/ supplicant

QUIET

Server-timeout

802.1x

802.1x

IP

IP

VLAN

EAPOL TAG

802.1x

802.1x

Authentication	DISABLE
Accounting	DISABLE
* (Radius Server) * IP (ServerIp) * UDP * (Key)	* *1812 *
* (Accounting Server) * IP * UDP	* *1813
re-authentication	
reauth_period	3600
	10
	3
	3
	3
	5

802.1X

802.1x

802.1x

IP radius server
 1X
 Aggregate Port 1X
 1x 1x
 cpu

RADIUS SERVER

Radius Server

Radius Server

RADIUS SERVER

Radius Server

Radius Client

Radius Server

IP UDP

UDP

Radius

Server

Client

EAP

Radius Server

Radius Client

Server

Radius Server IP

UDP

A' Û? ÄWq' !j- iÂ ÊÝ0Ã Ö?U"¼@ ÄA,,X <t

Radius Server

802.1X

802.1x

1x



configure terminal

```

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

```

```

802.1x      RADIUS      Radius Server  IP
           Radius Server      Radius Server
                   Radius Server

```

/

802.1x

configure terminal	
interface <i>interface</i>	,

-

1/1

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

EAP

CPU

注意:

```
icmp    igmp    mac    cpu
        cpu    icmp    igmp
```

802.1x

3600

/

configure terminal	
dot1x re-authentication	
dot1x timeout re-authperiod <i>seconds</i>	
End	
Write	
show dot1x	dot1x

```
no dot1x re-authentication
timeout re-authperiod
```

no dot1x

```

Ruijie(config)# dot1x timeout re-authperiod 1000
Ruijie(config)# end
Ruijie# show dot1x
802.1X Status:          Disabled
Authentication Mode:    EAP-MD5
Authed User Number:    0
Re-authen Enabled:     Enabled
Re-authen Period:      1000 sec
Quiet Timer Period:    10 sec
Tx Timer Period:       3 sec
Supplicant Timeout:    3 sec
Server Timeout:        5 sec
Re-authen Max:         3 times
Maximum Request:       3 times
Filter Non-RG Supp:    Disabled
Client Oline Probe:    Disabled
Eapol Tag Enable:      Disabled
Authorization Mode:     Disabled

```

/ supplicant

```

      supplicant      802.1x
      802.1x          (      WindowsXP      802.1x
    )
      supplicant      802.1x
supplicant            802.1x

```

configure terminal	
dot1x private-supplicant-only	
end	
write	
show dot1x	dot1x

supplicant

```

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

```

```

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

```

no dot1x private-supplicant-only

QUIET

Quiet Period

Quiet Period 10

Quiet Period

Quiet Period

configure terminal	
dot1x timeout quiet-period <i>seconds</i>	Quiet Period
end	
write	
show dot1x	dot1x

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

EAP-request/identity

3

configure terminal	
dot1x timeout tx-period <i>seconds</i>	
end	
write	
show dot1x	dot1x

5

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

3

configure terminal	
dot1x reauth-max <i>count</i>	
end	
write	

show dot1x	dot1x
-------------------	-------

注意:

```

radius 802.1X
aaa authentication dot1x default group radius none
radius none
radius 802.1X
802.1X 5 radius 3*5 15
802.1X
radius * < 802.1X server-timeout
    
```

802.1x

```

802.1x
EAPOL-START

linkdown linkup

802.1x WindowsXP 802.1x
EAP-request/identity

802.1x

/
    
```

configure terminal	
dot1x auto-req	

end	
write	
show dot1x	dot1x

no

configure terminal	
dot1x auto-req packet-num <i>num</i>	num 802.1x , num 0 0
end	
write	
show dot1x auto-req	

no

configure terminal	
dot1x auto-req req-interval <i>interval</i>	
end	
write	
show dot1x auto-req	

no

) (

configure terminal	

dot1x auto-req user-detect	
end	

- 1. Radius Server Radius Client
- 2. IP
- 3. UDP
- 4. 802.1x

configure terminal	AAA u
aaa group server radius gs	u
exit	u

dot1x accounting	802.1X	
end		no aaa accounting network

802.1x

SUPPLICANT

IP

IP

SUPPLICANT

IP

PC

IP

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

注意:

		IP+MAC		arp-check
499	IP			498 IP

	802.1x	Radius Server	Reply-Message
			802.1x
Star-Supplicant			

	HTML	http://XXX.XXX.XX
--	------	-------------------

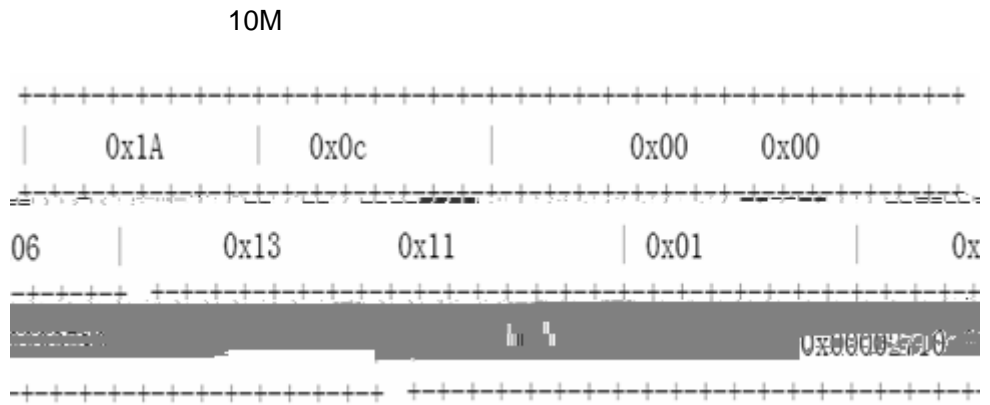
- 1) Radius Server Reply Message
- 2) r-supplicant
- 3)

802.1x	IEEE 802.1x
--------	-------------

MAC

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

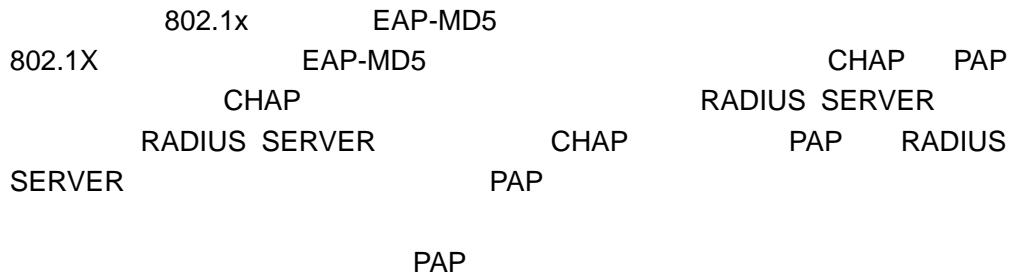
end	
write	
show running-config	



8

10M 10000kbsp 16

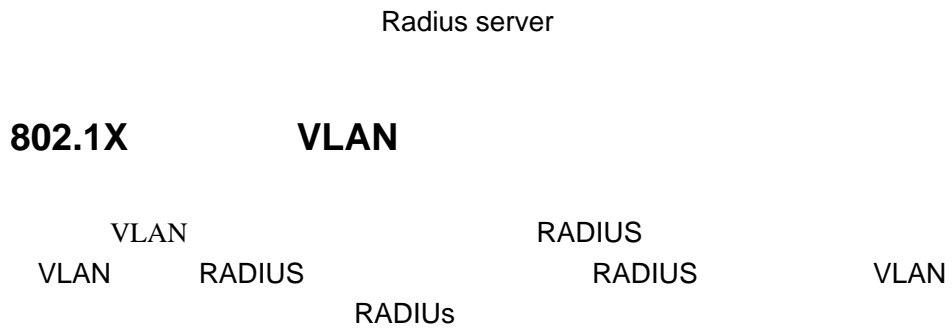
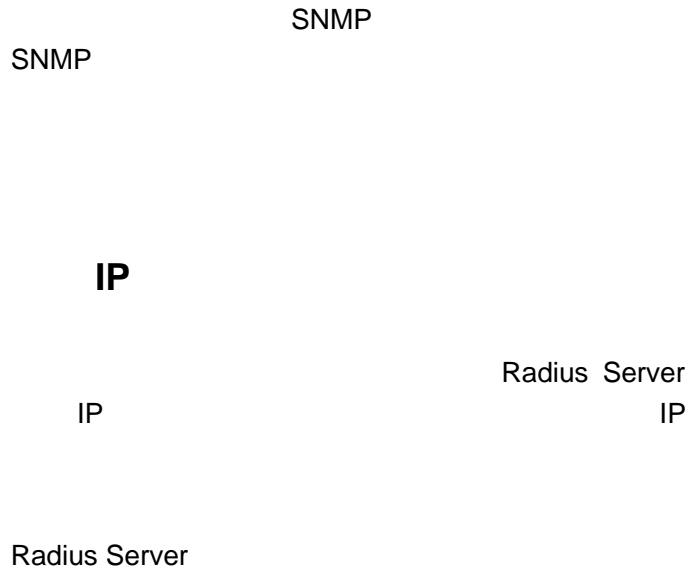
0x00002710



802.1X Status: Disabled
Authentication Mode: CHAP
Authenticated User Number: 0
Re-authen Enabled: Disabled
Re-authen Period: 3600 sec
Quiet Timer Period: 10 sec
Tx Timer Period: 3 sec
Supplicant Timeout: 3 sec
Server Timeout: 5 sec
Re-authen Max: 3 times
Maximum Request: 3 times
Filter Non-RG Supp: Disabled
Client Online Probe: Disabled
Eapol Tag Enable: Disabled
Authorization Mode: Group Server

802.1x

configure terminal	
aaa new-model	aaa
aaa group server radius <i>gs-name</i>	
server sever	
server server-backup	
end	
write	servho-B&B



RADIUS

RADIUS

VLAN

64 Tunnel-Type
65 Tunnel-Medium-Type
81 Tunnel-Private-Group-ID

Tunnel-Type=VLAN (13)

Tunnel-Medium-Type=802 6

Tunnel-Private-Group-ID=VLANID()

802.1X

interface <i>interface_id</i>	
dot1x dynamic-vlan enable	VLAN

注意:

Interval

:

configure terminal	
dot1x client-probe enable	
dot1x probe-timer interval <i>interval</i>	Hello Interval
dot1x probe-timer alive interval	Alive Interval
end	
write	
show dot1x	

EAPOL TAG

IEEE 802.1x

EAPOL

VLAN TAG

Trunk Port

TAG

802.1x

EAPOL

TAG

configure terminal	
dot1x eapol-tag	EAPOL TAG
end	
write	
show dot1x	

no dot1x eapol-tag

802.1x

MAC

configure terminal	
interface <interface-id>	
dot1x port-control auto	
dot1x port-control-mode {mac-based port-based}	
End	
Write	
show dot1x port-control	802.1X

no dot1x port-control-mode

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

注意:

configure terminal	
dot1x stationarity enable	
end	
Write	

802.1X

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

802.1X

1x

show dot1x

802.1x

```
Ruijie# show dot1x
802.1X Status:      Disabled
Authentication Mode: EAP-MD5
Authed User Number: 0
Re-authen Enabled:  Disabled
Re-authen Period:   3600 sec
Quiet Timer Period: 10 sec
Tx Timer Period:    3 sec
Supplicant Timeout: 3 sec
Server Timeout:     5 sec
Re-authen Max:      3 times
Maximum Request:    3 times
Filter Non-RG Supp: Disabled
Client Oline Probe: Disabled
Eapol Tag Enable:   Disabled
Authorization Mode:  Disabled
```

802.1x

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

end	
write	
show dot1x auth-address-table	

no dot1x auth-address-table address

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

show dot1x summary	

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

1x

1x

show dot1x probe-timer	1x

1x :

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

802.1x

1. IP 10000

2. IP IP IP

IP

3.

switchport mode trunk
Access VLAN
Allowed VLAN Native VLAN

4. VLAN
VLAN
VLAN
private-vlan primary

5.

VLAN VLAN
VLAN VLAN
VLAN VLAN

7. VLAN IP
DISABLE GSN

TCAM log

AAA

AAA

AAA

AAA

configure terminal	
aaa new-model	AAA
aaa authentication login test group radius local	test
line vty 2	2
login authentication test	line test

```
PC          Telnet          (NAS) NAS          R1
            R1              R1      NAS          ACCEPT
                    R1      REJECT
            R1      NAS          TIMEOUT          R2
                    (R1
```


line vty <i>line-num</i>	AAA
login authentication { default <i>list-name</i> }	

list-name
method ERROR
FAIL()

none

RADIUS (TIMEOUT)
aaa authentication login default group radius none

注意:

none

none

none

end	
show running-config	

Login

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

RADIUS Login

RADIUS Login RADIUS

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

RADIUS RADIUS RADIUS
RADIUS RADIUS
RADIUS

--	--

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

AAA Enable

AAA Enable
 Telnet (NAS)
 CLI
 CLI 0~15
show privilege
 enable
 Enable
 AAA Enable

configure terminal	
aaa new-model	AAA

aaa authentication enable default

注意:

CLI	Login	none
	Enable	
Login		
CLI	Login	Login

show running-config	
----------------------------	--

Enable

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

RADIUS Enable

RADIUS
1 15

Service-Type
RADIUS
42 0~15

6
SAM
RADIUS

R

AAA

PPP

AAA

PPP

ISDN

NAS

PPP

PPP

AAA PPP

AAA PPP

h64 55J []01.48 22 088 M 54503.82 55J []01.48 22 088 M 5402 Tc 24.377 0 Td ((ISDN).1103DAA

dot1x authentication <i>list-name</i>	802.1x
IEEE802.1x	802.1x

RADIUS+

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

```
                RADIUS      IP    192.168.217.64
RADIUS
```

IP

AAA

Login

none

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

AAA

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

```

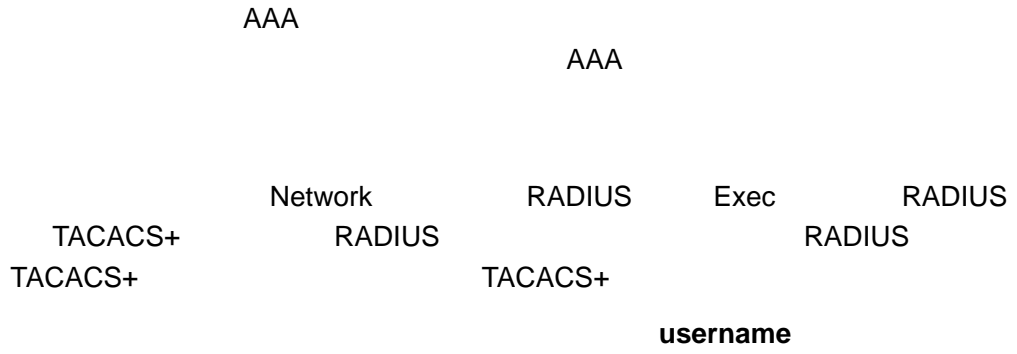
                                RADIUS      IP  192.168.217.64
                                RADIUS
vty          tty 1-4                                tty
```

AAA

AAA

AAA

```
Exec
Command
Network
Exec
```



AAA

configure terminal	
aaa new-model	AAA
aaa authorization exec 'p*ü	

authorization exec {default list-name}	

list-name
 method ERROR
 FAIL()

none
 RADIUS (TIMEOUT) Exec
aaa authorization exec default group radius none

local	Exec
none	Exec
group radius	RADIUS Exec
group tacacs+	TACACS+ Exec

AAA Exec

注意:

Exec Login Login
 Exec
 Exec

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

Exec

```

          Exec          VTY    0~4          Login
          Exec          Login          Exec
RADIUS
192.168.217.64          test          RADIUS
6                          ruijie    ruijie

```

```

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

```

AAA Network

<code>aaa authorization network {default list-name} group radius</code>	RADIUS
---	--------

Network

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

AAA

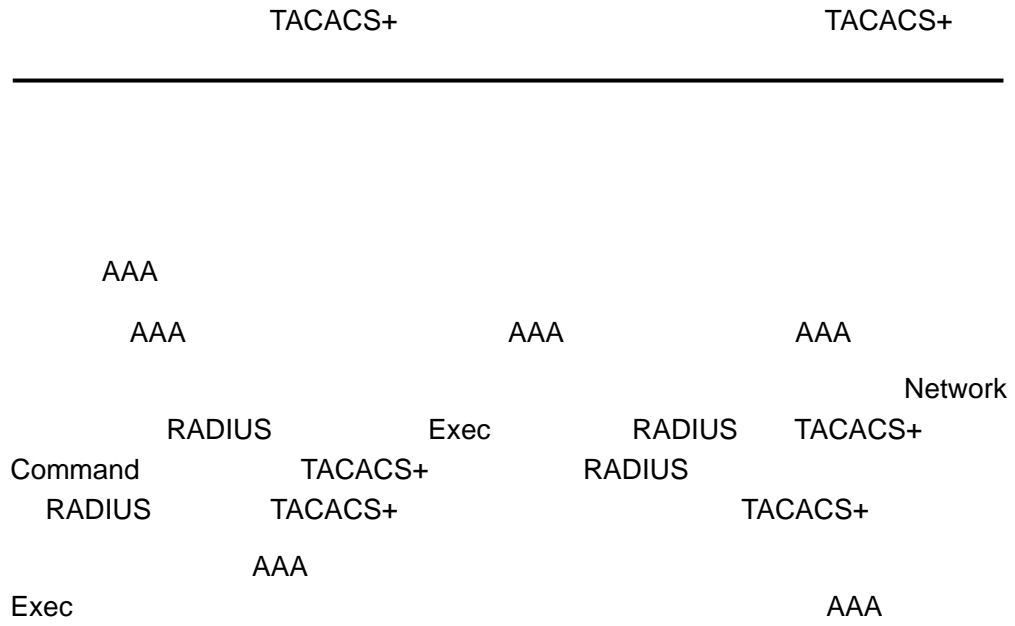
Exec
Command
Network

Exec

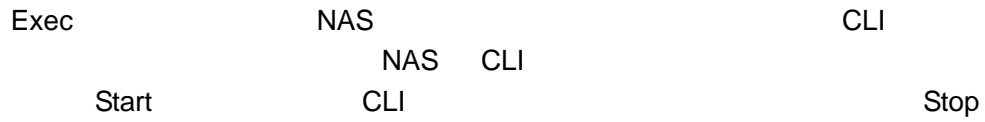
NAS

CLI
NAS CLI

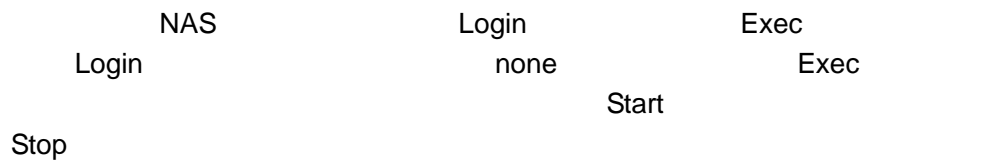
说明:



AAA Exec



注意:



AAA Exec

configure terminal	
aaa new-model	AAA

aaa accounting exec {default | *list-name*}
start-stop *method1* [*method2...*]

line vty *line-num*

AAA Exec

accounting exec {default

show running-config	
----------------------------	--

Exec

	Exec	VTY	0~4	Login
RADIUS	Exec RADIUS	Login	192.168.217.64	Exec test
	ruijie			ruijie

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

AAA Network

Network
IP Network RADIUS

说明:

RADIUS RADIUS

AAA Network

configure terminal	
aaa new-model	AAA
aaa accounting network {default list-name} start-stop method1 [method2...]	

list-name

method

ERROR
FAIL()

none

22A900 CE418A09E24D94-042FD362C52A907 1 Tf2751CD1248 2TT0 1 Tf0.0016 Tc 2.2

Network

RADIUS Network

```

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

```

AAA

show aaa user { id all }	AAA

VRF AAA

Virtual Private Networks (VPNs) ISP

VPN

VPN VPN routing/forwarding (VRF) table AAA

VRF

AAA VRF

--	--

configure terminal	
aaa new-model	AAA
aaa group server radius <i>gs_name</i>	RADIUS
ip vrf forwarding <i>vrf_name</i>	vrf

说明:

vrf

Login

Login

Login

Login

--	--

AAA

AAA

AAA
AAA

注意:

AAA IEEE802.1x IEEE802.1x
 802.1x

说明:

AAA

configure terminal	
aaa new-model	AAA

说明:

1. AAA AAA
 2. default AAA
 3. AAA
-

AAA

show aaa domain <i>[domain-name]</i>	AAA

AAA

1. AAA
 AAA
 802.1x AAA
 802.1X **dot1x authentication**
authen-list-name dot1x accounting acct-list-name authen-list-name
acct-list-name AAA
2. AAA
 default
 AAA
3. AAA AAA
4. AAA AAA AAA
5. domain.com domain.com.cn
 aaa@domain.com domain.com
 domain.com.cn

AAA

AAA

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

```
radius          a1          802.1x
a1@domain.com
```

```
Ruijie#show aaa domain domain.com
```

```
=====Domain domain.com=====
```

```
State: Active
```

```
Username format: Without-domain
```

```
Access limit: No limit
```

```
802.1X Access statistic: 0
```

```
Selected method list:
```

```
authentication dot1x default
```

RADIUS

RADIUS

RADIUS (Remote Authentication Dial-In User Service) / AAA

NAS RGOS RADIUS RADIUS

RADIUS UNIX WINDOWS 2000
RADIUS RADIUS

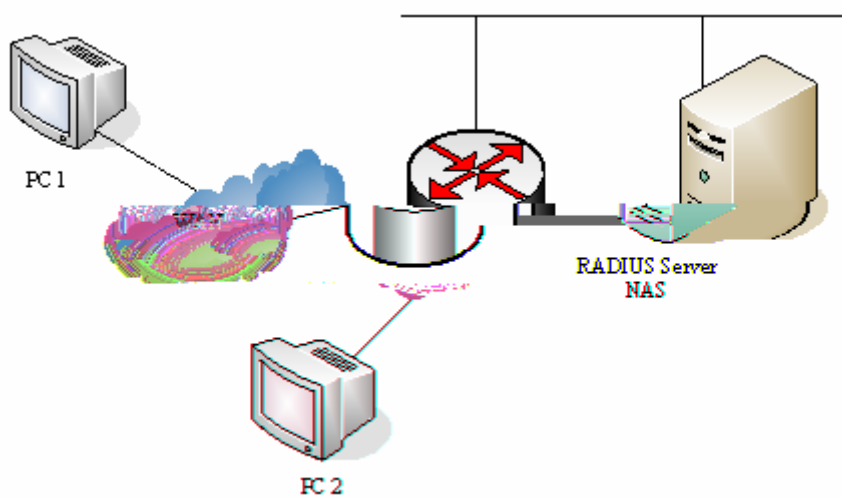
RADIUS

RADIUS

RADIUS
ACCEPT
REJECT
CHALLENGE RADIUS

ACCEPT

RADIUS



1 RADIUS

RADIUS

```

RADIUS
AAA AAA "AAA "
aaa authentication RADIUS
aaa authentication " "
" "
RADIUS RADIUS
RADIUS
RADIUS
  
```

1

RADIUS

configure terminal	
radius-server host <i>ip-addr</i>	IP <i>ip-addr</i> RADIUS

2

RADIUS

configure terminal	
radius-server host <i>ip-addr</i> auth-port <i>port</i>	IP <i>ip-addr</i> RADIUS <i>port</i>
radius-server host <i>ip-addr</i> acct-port <i>port</i>	IP <i>ip-addr</i> RADIUS <i>port</i>

3

RADIUS

RADIUS

RADIUS

RADIUS

configure terminal	

radius-server retransmit <i>retries</i>	3	RADIUS
radius-server timeout <i>seconds</i>	2	
radius-server deadtime <i>minutes</i>	5minutes	

4 RADIUS

RADIUS
RADIUS 0 7 0
7 0
service password-encryption RADIUS
7 show running RADIUS
show running RADIUS

configure terminal	
radius-server key [0 7] <i>text</i>	
radius-server host <i>ip_addr</i> key [0 7] <i>text</i>	IP <i>ip_addr</i>

说明:

RADIUS

5 RADIUS

RADIUS RADIUS RADIUS
RADIUS AAA RADIUS
aaa authentication

RADIUS

AAA

6 RADIUS

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

ID

ID		TYPE
----	--	------

1	max down-rate	76
2	qos	77
3	user ip	3
4	vlan id	4
5	version to client	5
6	net ip	6
7	user name	7
8	password	8
9	file-diractory	9
10	file-count	10
11	file-name-0	11
12	file-name-1	12
13	file-name-2	13
14	file-name-3	14
15	file-name-4	15
16	max up-rate	75
17	version to server	17
18	flux-max-high32	18
19	flux-max-low32	19
20	proxy-avoid	20
21	dailup-avoid	21
22	ip privilige	22
23	login privilige	42
24	limit to user number	50

说明:

```
Ruijie# show radius vendor-specific
id   vendor-specific   type-value
-----
1    max down-rate      76
2    qos                 77
```

RADIUS

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

Ruijie# **configure**

Ruijie(config)# **radius attribute 24 vendor-type 67**

Ruijie(config)# **show radius vendor-specific**

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



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

```
Ruijie# configure terminal
Ruijie(config)# line vty 0
Ruijie(config-line)# login authentication test
Ruijie(config-line)# end
Ruijie# show running-config
!
aaa new-modepen12.6 0 Td( )Tj/TT4 e)#
```

TACACS+

TACACS+

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

TACACS+

TACACS+

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

1

Major Version T,Xy[C]

TACACS+

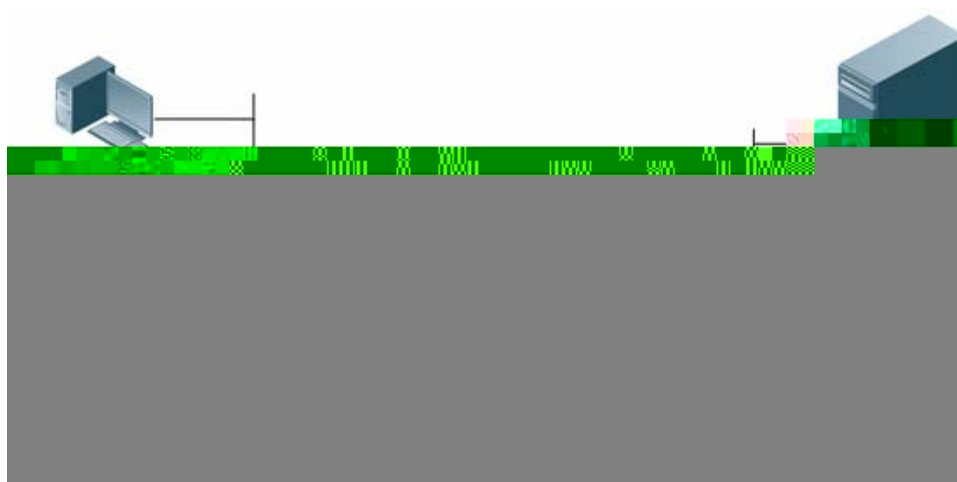
TACACS+

TACACS+

Telnet

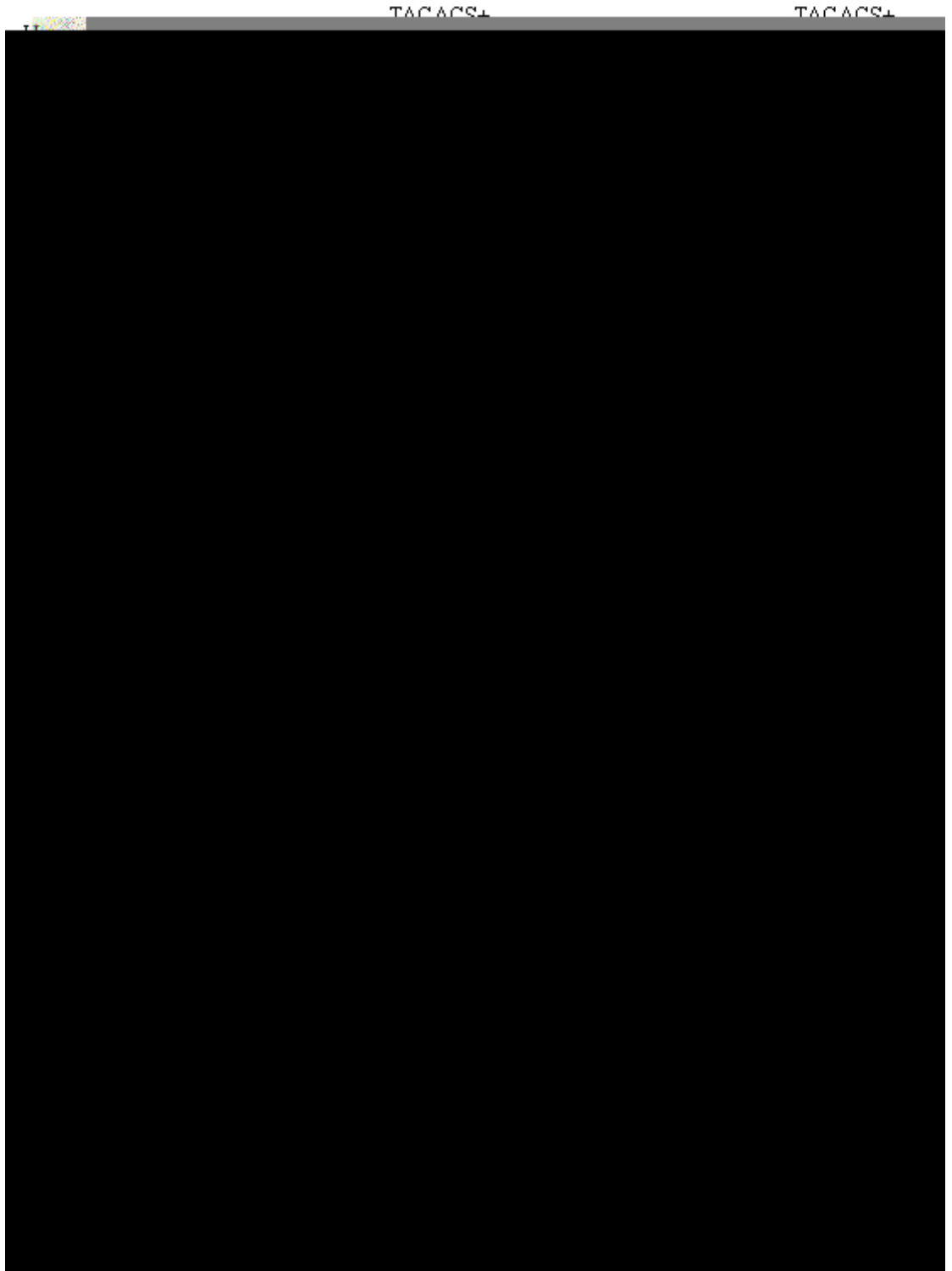
TACACS+

2



2

TACACS+



1.

1

2 TACACS+

TACACS+

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

TACACS+

TACACS+

```
aaa new-mode AAA TACACS+ AAA
aaa new-mode AAA
tacacs-server host TACACS+
tacacs-server key key
tacacs-server timeout

aaa authentication TACACS+
aaa authentication

aaa authorization TACACS+
```

aaa authorization

aaa accounting
aaa accounting

TACACS+

TACACS+
TACACS+
TACACS+
AAA
TACACS+
TACACS+
TACACS+
TACACS+

TACACS+
TACACS+

TACACS+

tacacs-server host

TACACS+

IP

TACACS+

configure terminal	

6914179c20ef745121b10100T20.02916Tf 2FA10.36r 1

TACACS+
TACACS+

TACACS+

TACACS+

configure terminal	
tacacs-server key <i>string</i>	TACACS+

注意:

TACACS+

TACACS+

AAA

AAA

Login

AAA

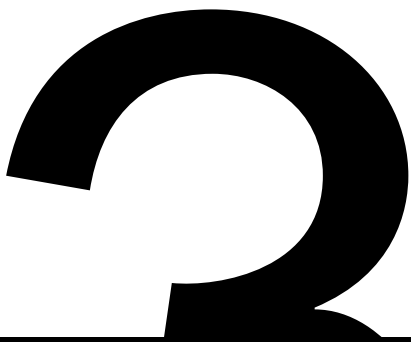
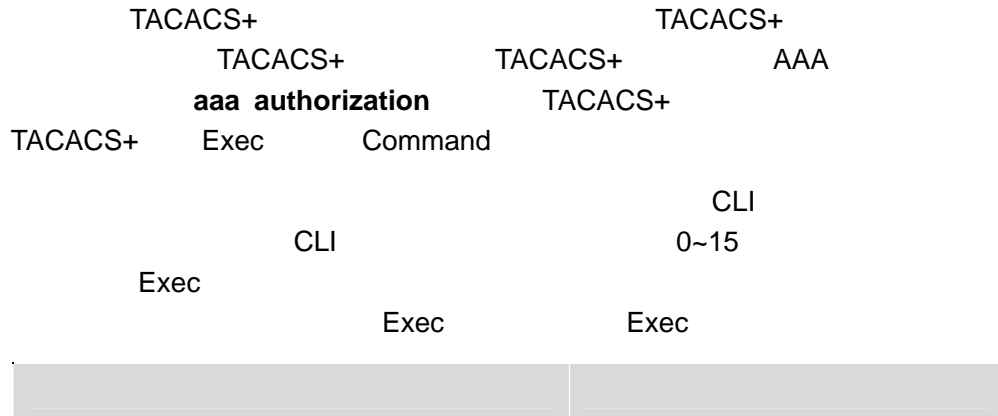
configure terminal	
tacacs-server host <i>ip-address</i> [port <i>integer</i>] [timeout <i>integer</i>] [key <i>string</i>]	TACACS+ TACACS+

<pre>aaa group server {radius tacacs+} group-name</pre>	<pre>AAA RADIUS TACACS+ AAA TACACS+ tacacs+ TACACS+</pre>
---	---

server *ip-address*

tacacs-server host

TACACS+



TACACS+

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

Ruijie#show running-config
!
aaa new-model
!
aaa authentication login test group tacacs+
!
tacacs-server host 192.168.12.219
tacacs-server key aaa
!
line con 0
line vty 0 4
login authentication test
!
```

Enable TACACS+

```
1.          aaa

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

2.          tacacs+ server

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

3.          tacacs+ server group

Ruijie(config)#aaa group server tacacs+ tacgroup1
Ruijie(config-gs-tacacs)#server 192.168.12.219
Ruijie(config-gs-tacacs)#server 192.168.12.218

4.          tacgroup1

Ruijie(config)# aaa authentication enable default group
tacgroup1
                        enable tacacs+

Ruijie#show running-config
!
aaa new-model
!
```

```
!  
aaa group server tacacs+ tacgroup1  
server 192.168.12.219  
server 192.168.12.218  
!  
aaa authentication enable default group tacgroup1  
!  
!  
tacacs-server host 192.168.12.219  
tacacs-server host 192.168.12.218  
tacacs-server host 192.168.12.217  
tacacs-server key aaa  
!  
line con 0  
line vty 0 4  
!
```

Exec TACACS+

```
1.          aaa  
Ruijie# configure terminal  
Ruijie(config)# aaa new-model  
  
2.          tacacs+ server  
Ruijie(config)# tacacs-server host 192.168.12.219  
Ruijie(config)# tacacs-server key aaa  
  
3.          tacacs+  
Ruijie(config)# aaa authorization exec test group tacacs+  
  
4.          :  
Ruijie(config)# line vty 0 4  
Ruijie(config-line)#authorization exec test  
  
tacacs+  
  
Ruijie#show running-config  
!  
aaa new-model  
!  
!  
aaa authorization exec test group tacacs+  
!  
tacacs-server host 192.168.12.219  
tacacs-server key aaa
```

```
!  
line con 0  
line vty 0  
authorization exec test  
!
```

15 Commans TACACS+

```
1.          aaa  
Ruijie# configure terminal  
Ruijie(config)# aaa new-model  
  
2.          tacacs+ server  
Ruijie(config)# tacacs-server host 192.168.12.219  
Ruijie(config)# tacacs-server key aaa  
  
3.          tacacs+  
Ruijie(config)# aaa accounting commands 15 default start-stop  
group tacacs+  
  
4.          :  
Ruijie(config)# line vty 0 4  
Ruijie(config-line)# accounting commands 15 default  
  
enable     tacacs+  
  
Ruijie#show running-config  
!  
aaa new-model  
!  
aaa accounting commands 15 default group tacacs+  
!  
!  
tacacs-server host 192.168.12.219  
tacacs-server key aaa  
!  
line con 0  
line vty 0 4  
!
```

SSH

SSH

SSH Secure Shell SSH Telnet
 Telnet
 SSH
 IP

SSH

	SSH1	SSH2
	RSA	RSA DSA
	RSA	KEX_DH_GEX_SHA1 KEX_DH_GRP1_SHA1 KEX_DH_GRP14_SHA1
	DES 3DES Blowfish	DES 3DES AES-128 AES-192 AES-256
		MD5 SHA1 SHA1-96 MD5-96
	NONE	NONE

SSH

注意:

SSH SSHv1 SSHv2 SSH

SSH

SSH

SSH	
SSH	1 2
SSH	120s
SSH	3

- SSH
Telnet
- (Username) (Password)

SSH Server

SSH Server SSH Server
enable service ssh-server SSH SSH
 Server ENABLE

configure terminal	
enable service ssh-server	SSH Server
crypto key generate {rsa dsa}	

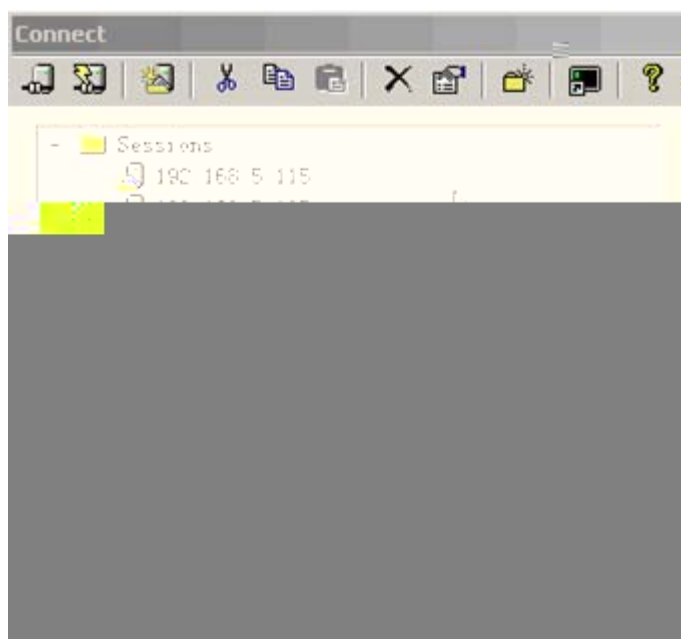
注意:

**[no] crypto key generate crypto key
 zeroize**

configure terminal	
ip ssh authentication-retries <i>retry times</i>	SSH 0-5
no ip ssh authentication-retries	SSH 3

[SSH]

SSH



2

Connect



3

192.168.5.245

Accept & Save

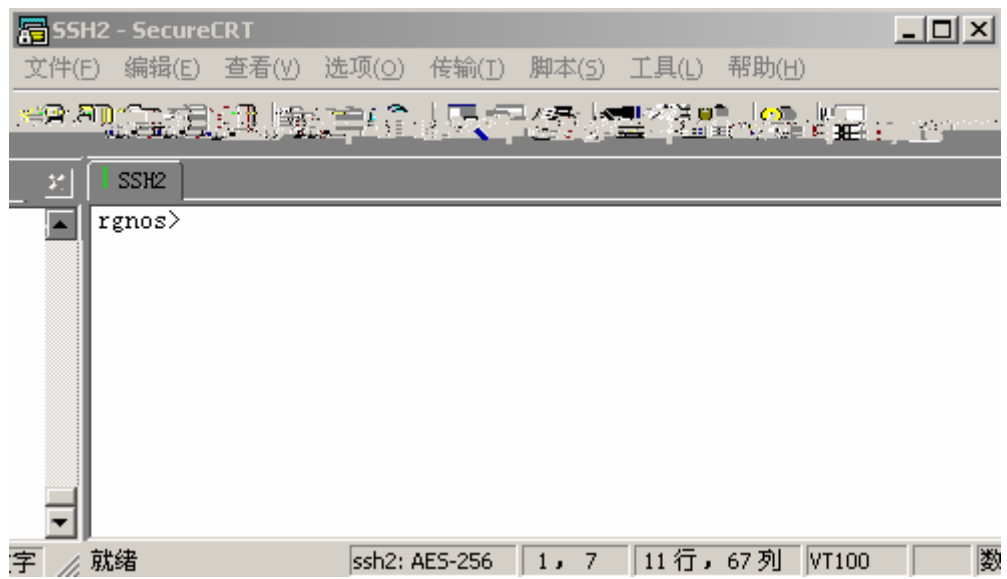
Accept Once()



4

Telnet

Telnet



5

CPU

CPU

CPU

CPU

CPU Protect

Classifying Queuing Scheduling Shaping

Classifying

Classifying
L4

CPU

L2 L3

BPDU	MAC 01-80-C2-00-00-00
ARP	ARP request
IGMP	IPV4 IGMP V1/V2/V3
802.1X	MAC 01-80-C2-00-00-03
GVRP	MAC 01-80-C2-00-00-21
DHCP	DHCP
Error_TTL	IPV4 TTL = 0 1
Unicast	MAC ARP reply, http MAC snmp telnet
Multicast	IGMP
Broadcast	DHCP
Other	CPU

Queuing

Queuing

CPU

8

Queuing

IGMP	3
dot1x	3
GVRP	3
DHCP	2
Error_TTL	0
Unicast	4
Multicast	1
Broadcast	0
error_ttl	0
co-operate	6
other	0

2)

	(kbps)
7	100000
6	1000
5	1000
4	1000
3	1000
2	1000
1	1000
0	1000
CPU	100000

Ruijie(config)# cpu-protect type { bpdu arp igmp dot1x gvrp dhcp unicast multicast broadcast error_ttl other } traffic-class traffic-class-num	<i>traffic-class-num</i> 0 7

no cpu-protect type { bpdu | arp | igmp | dot1x | gvrp | dhcp | unicast | multicast | broadcast | error_ttl | other } traffic-class

```

Ruijie(config)# cpu-protect type bpdu traffic-class 7
Ruijie(config)# end
Ruijie # show cpu-protect type bpdu
%*****packet type      traffic-class*****
                bpdu          7
                bpdu          7

```

Ruijie(config)# cpu-protect traffic-class id <i>id_num bandwidth bandwidth_value</i>	kbps <i>id_num</i> 0 7 <i>bandwidth-value</i> 0 1000000(kbps)
Ruijie(config)# cpu-protect traffic-class all bandwidth bandwidth_value	kbps <i>bandwidth-value</i> 0 1000000(kbps)

no cpu-protect traffic-class

7 312(kbps)

```

Ruijie#configure terminal
Ruijie(config)# cpu-protect traffic-class id 7 bandwidth 312
Ruijie(config)#end
Ruijie# show cpu-protect traffic-class id 7
%*****traffic class      bandwidth(kbps)*****
                7          312

```

CPU

CPU

Ruijie(config)# cpu-protect cpu bandwidth bandwidth_value	CPU kbps <i>bandwidth-value</i> 0 1000000(kbps)
--	---

no cpu-protect cpu cpu

CPU 2000 kbps

```
Ruijie#configure terminal
Ruijie(config)#cpu-protect cpu bandwidth 2000
Ruijie(config)#end
Ruijie#show cpu-protect cpu
%cpu port bandwidth: 2000(kpbs)
```

Ruijie(config)# cpu-protect mac-address storm-control enable <i>value</i>	value	200			
	51200(kbps)	2	0	0	0

CPU

CPU

Ruijie# show cpu-protect cpu	CPU

CPU

```
Ruijie# show cpu-protect cpu  
%cpu port bandwidth: 100000(kbps)
```

Ruijie# show cpu-protect mac-address storm-control	

CPU

```
Ruijie# show cpu-protect mac-address storm-control  
%MAC address storm control state: enable  
%MAC address storm control rate: 2000(address/second)
```

GSN

GSN

- 1) RG Security policy Management Platform
- 2) RG Security Agent
- 3) RG Restore System
- 4) RG Security Switch

RG SMP

“ ”

Windows

GSN

GSN

configure terminal	
[no] security gsn enable	GSN

GSN

```
Ruijie# configure terminal
Ruijie(config)# security gsn enable
```

SMP server

SMP Server IP

SMP Server

Configure terminal	

<p>[no] security { [v1 v2] community community v3 user username }</p>	<pre>smp snmp v1 v2 v3. community security v1 community security community , v1 v3, snmp-server v3 , SNMP</pre>
<p>[no] smp-server host ip-address</p>	<p>SMP</p>

说明:

security v3 user , SNMP v3 user

SMP

<p>Configure terminal</p>	
<p>[no] security event interval interval</p>	<p>interval 1-65535s 5</p>

<p>Configure terminal</p>	

interface <i>interface</i>	
[no] security address-bind enable	

说明:

GSN

802.1x IP

GSN

smp server

smp sverver

show smp-server	smp server

```
Ruijie# show smp-server
SMP-Server IP:192.168.217.220
```

security event interval

policy-map

show security event interval	

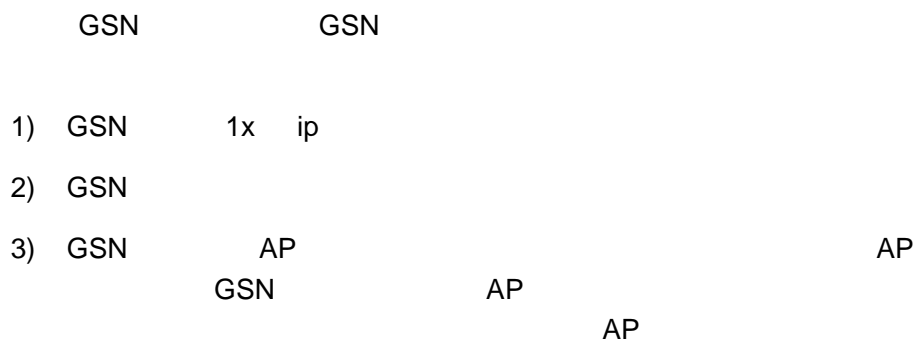
```
Ruijie# show security event interval
Event sending interval(Seconds):5
```

GSN

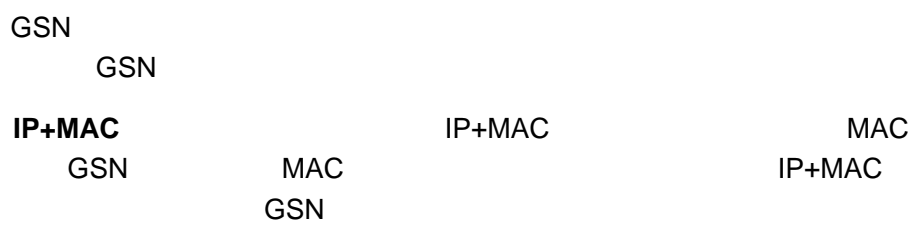
GSN



GSN



GSN



ARP

DAI

DAI
ARP

Dynamic ARP Inspection,
arp

ARP

ARP

MACC), B ARP (IPA, MACC). A B
C A B C

DAI ARP

DAI ARP
DAI VLAN ARP
DHCP ARP

ARP DHCP snooping binding
DHCP snooping

ARP DAI ARP
DAI ARP

yU!m{AEBE-5x, AÖABt ARP

SVI

snooping ARP ARP DHCP

Ruijie(config-if)# ip arp inspection trust	
Ruijie(config-if)# no ip arp inspection trust	

ARP

SVI

ARP 15 ARP

1 ARP

show ip arp inspection interface

ARP

Ruijie(config-if)# ip arp inspection limit-rate { <1-2048> none}	ARP / none
Ruijie(config-if)# no ip arp inspection limit-rate	

注意:

S2700 DAI CPU CPP DAI
CPP CPP

DHCP snooping database

DHCP Snooping

DHCP Snooping database

ARP

DAI

VLAN

DAI

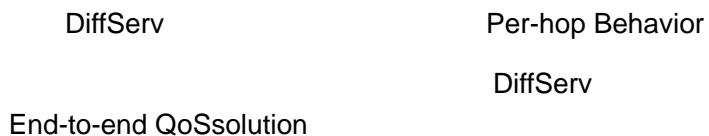
VLAN

ARP

QOS

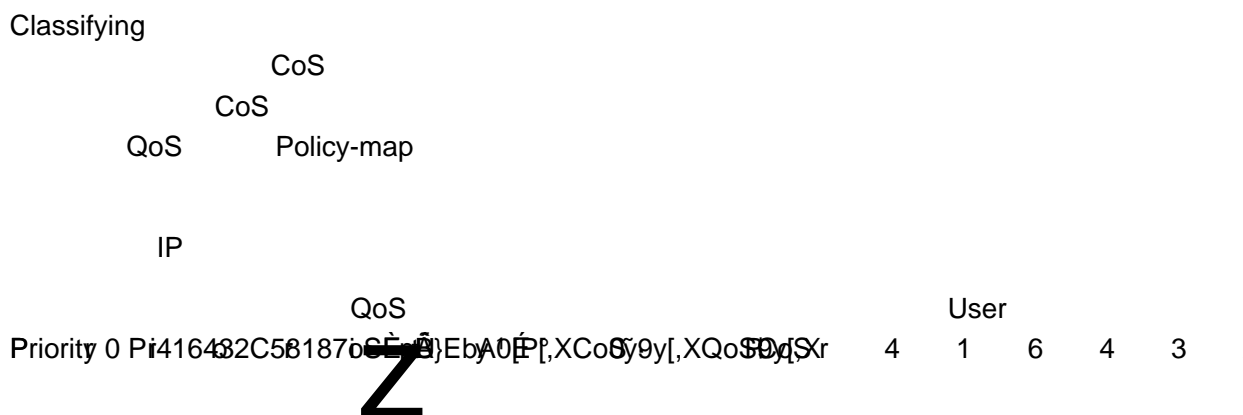
QOS

DiffServ

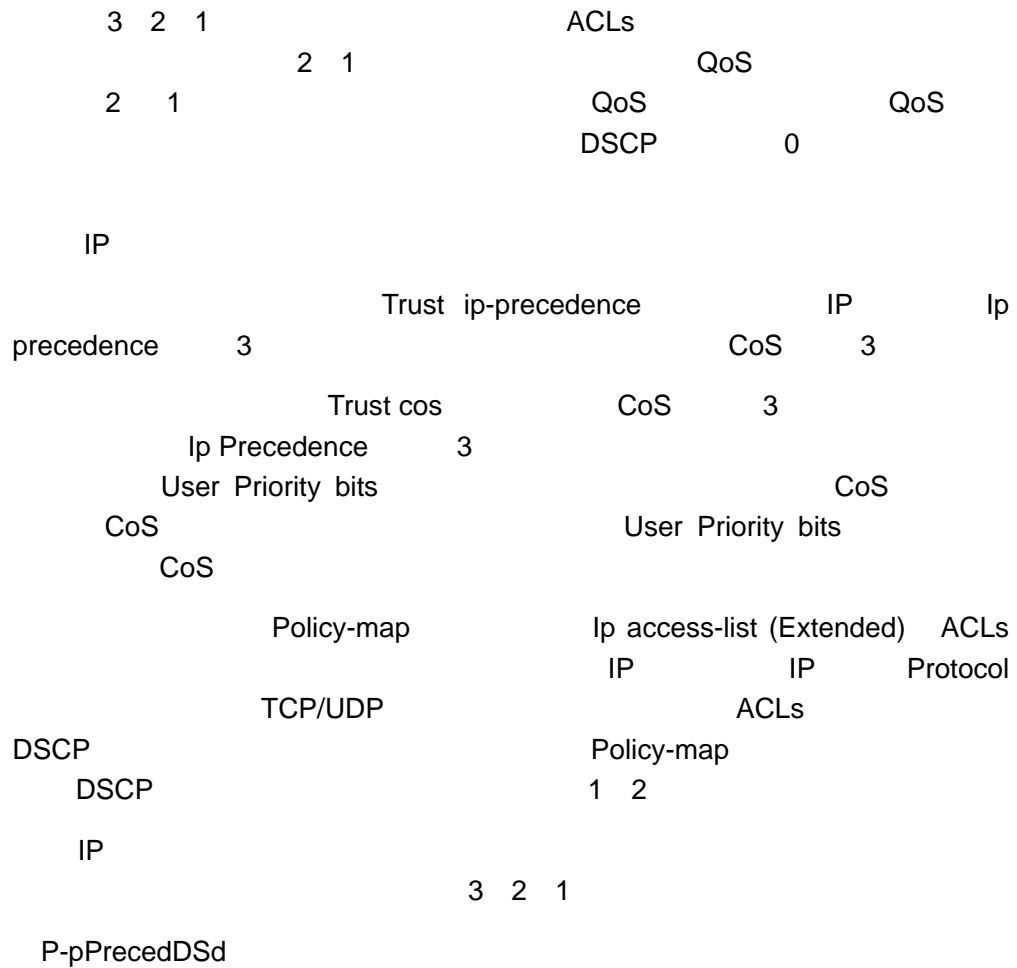


QOS

Classifying



说明:



QoS

)

Pause

QoS

Pause

QoS

302.3xflow-controlQoS

QoS

QoS

100m

QoS

FC

QoS

QoS

QoS

QoS

QoS

Off

QoS

QoS
Policy

0

Cos

CoS	0	1	2	3	4	5	6	7
	1	2	3	4	5	6	7	8

CoS to DSCP

CoS	0	1	2	3	4	5	6	7
DSCP	0	8	16	24	32	40	48	56

IP-Precedence to DSCP

IP-Precedence	0	1	2	3	4	5	6	7
DSCP	0	8	16	24	32	40	48	56

DSCP to CoS

DSCP	0	8	16	24	32	40	48	56
CoS	0	1	2	3	4	5	6	7

Qos

Qos

configure terminal	
interface interface	
mls qos trust {cos dscp}	Qos cos dscp
no mls qos trust	Qos

interface GigabitEthernet 0/4

DSCP

```

Ruijie(config)# interface gigabitEthernet 0/4
Ruijie(config-if)# mls qos trust dscp
Ruijie(config-if)# end
Ruijie# show mls qos interface g0/4
Interface: GigabitEthernet 0/4
Attached input policy-map:
Default COS: trust dscp
Default COS: 0
Ruijie#

```

CoS

CoS

CoS 0

configure terminal	
interface <i>interface</i>	
mls qos cos default-cos	CoS , default-cos CoS , 0 7
no mls qos cos	CoS

Interface g0/4 CoS 6

```
Ruijie# configure terminal
Ruijie(config)# interface g 0/4
Ruijie(config-if)# mls qos cos 6
Ruijie(config-if)# end
Ruijie# show mls qos interface g 0/4
Interface: GigabitEthernet 0/4
Attached input policy-map:
Default COS: trust dscp
Default COS: 6
Ruijie#
```

WRR) WRR SP DRR

, QOS

configure terminal	
mls qos scheduler {sp wrr DRR}	sp wrr drr
no mls qos scheduler	wrr

```
Ruijie# configure terminal
Ruijie(config)# mls qos scheduler sp
Ruijie(config)# end
Ruijie# show mls qos scheduler
Global Multi-Layer Switching scheduling
Strict Priority
Ruijie#
```

configure terminal	
{wrr-queue drr-queue} bandwidth weight1...weightn	weight1...weightn QOS
no {wrr-queue drr-queue} bandwidth	no

4 5
5 6
6 7
7 8

Cos-Map

Cos-Map
QOS

Cos-Map

configure terminal	

configure terminal													
mls qos map dscp-cos dscp-list to cos	<p style="text-align: center;">DSCP to COS Map</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;"><i>dscp-list</i></td> <td style="width: 33%; text-align: center;">DSCP</td> <td style="width: 33%;"></td> </tr> <tr> <td>DSCP</td> <td></td> <td style="text-align: right;">cos</td> </tr> <tr> <td>DSCP</td> <td style="text-align: center;">CoS</td> <td></td> </tr> <tr> <td>0 7</td> <td></td> <td></td> </tr> </table>	<i>dscp-list</i>	DSCP		DSCP		cos	DSCP	CoS		0 7		
<i>dscp-list</i>	DSCP												
DSCP		cos											
DSCP	CoS												
0 7													
no mls qos map dscp-cos													

DSCP 0 32 56 6

```

Ruijie# configure terminal
Ruijie(config)# mls qos map dscp-cos 0 32 56 to 6
Ruijie(config)# show mls qos maps dscp-cos
dscp cos      dscp cos      dscp cos      dscp cos
-----
0 6           1 0           2 0           3 0
4 0           5 0           6 0           7 0
8 1           9 1           10 1          11 1
12 1          13 1          14 1          15 1
16 2          17 2          18 2          19 2
20 2          21 2          22 2          23 2
24 3          25 3          26 3          27 3
28 3          29 3          30 3          31 3
32 6          33 4          34 4          35 4
36 4          37 4          38 4          39 4
40 5          41 5          42 5          43 5
44 5          45 5          46 5          47 5
48 6          49 6          50 6          51 6
52 6          53 6          54 6          55 6
56 6          57 7          58 7          59 7
60 7          61 7          62 7          63 7
    
```

rate-limit output <i>bps burst-size</i>	output input bps (kbps) burst-size (Kbyte)
no rate-limit	

说明:

S2700

buffer management qos

```
Ruijie# configure terminal
Ruijie(config)# interface gigabitEthernet 0/4
Ruijie(config-if)# rate-limit input 100 100
Ruijie(config-if)# end
Ruijie#
```

buffer

buffer

802.3x flow-control

QoS

configure terminal	
buffer management { fc qos }	buffer FC 802.3xflow-control QoS QoS
no buffer management	

qos

```
Ruijie# configure terminal
Ruijie(config)# buffer management qos
Ruijie(config)# end
Ruijie# show buffer management
%current port's buffer management mode: qos
```

QOS

class-map

class-map

show class-map [<i>class-name</i>]	class map

```
Ruijie# show class-map  
Class Map cc  
Match access-group 1  
Ruijie#
```

policy-map

Policy-map



```
Ruijie# show mls qos interface gigabitEthernet 0/4
Interface: GigabitEthernet 0/4
Attached input policy-map: pp
Default COS: trust dscp
Default COS: 6
Ruijie#show mls qos interface policers
Interface: GigabitEthernet 0/4
Attached input policy-map: pp
Ruijie#
```

mls qos queueing

qos

qos	
show mls qos queueing	QoS , CoS-to-queue map wrr weight

```
Ruijie# show mls qos queueing
Cos-queue map:
cos qid
--- ---
0 1
1 2
2 1
3 4
4 1
5 1
6 1
7 1
wrr bandwidth weights:
qid weights
--- -----
0 1
1 2
2 3
3 4
4 5
5 6
6 7
7 8
```

mls qos scheduler

QOS

```

20 2      21 2      22 2      23 2
24 3      25 3      26 3      27 3
28 3      29 3      30 3      31 3
32 6      33 4      34 4      35 4
36 4      37 4      38 4      39 4
40 5      41 5      42 5      43 5
44 5      45 5      46 5      47 5
48 6      49 6      50 6      51 6
52 6      53 6      54 6      55 6
56 6      57 7      58 7      59 7
60 7      61 7      62 7      63 7
    
```

mls qos rate-limit

show mls qos rate-limit [interface interface]	[]

```

Ruijie# show mls qos rate-limit
Interface: GigabitEthernet 0/4
rate limit input bps = 100 burst = 100
    
```

buffer

buffer

show buffer management	buffer

```

Ruijie# show buffer management
%current port's buffer management mode: qos
    
```

RLDP

RLDP

RLDP

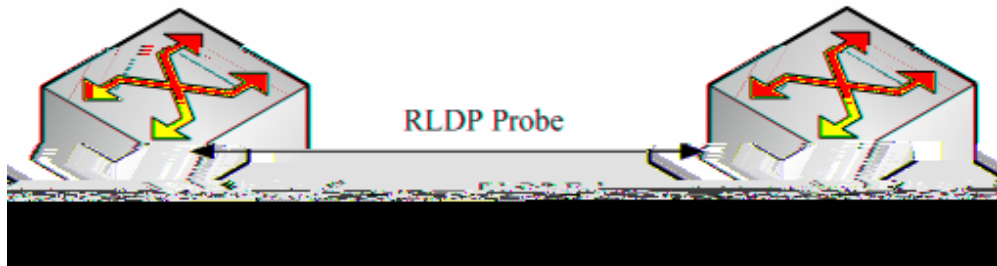
RLDP Rapid Link Detection Protocol

linkup

RLDP

RLDP

RLDP



1

RLDP

RLDP

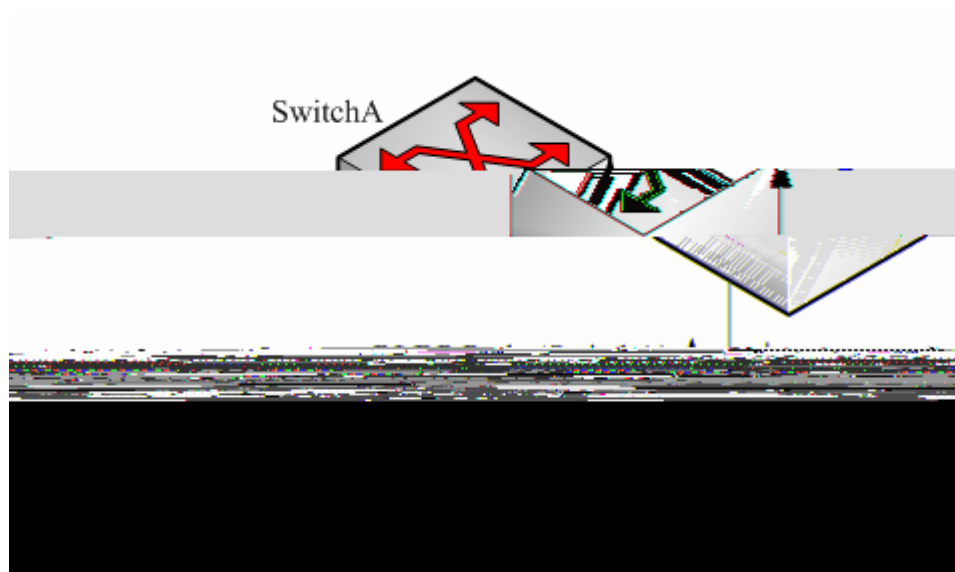
linkup

(Probe)

(Echo).RLDP

说明:

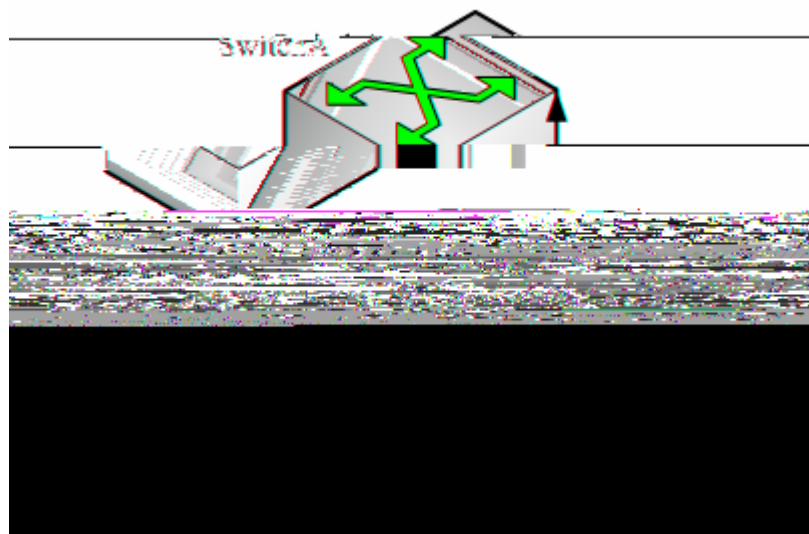
RLDP RLDP RLDP



2

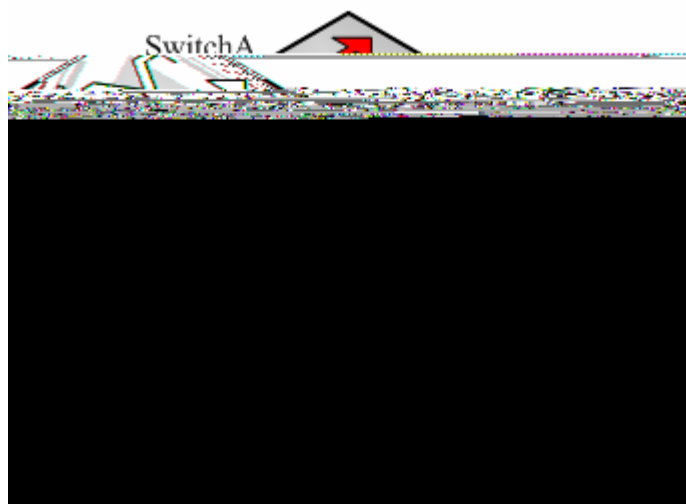
RLDP RLDP RLDP

svi



3

RLDP
RLDP
RLDP



4

RLDP

说明:

RLDP

RLDP

RLDP

RLDP

RLDP

RLDP

RLDP

RLDP

RLDP

RLDP

RLDP

RLDP	DISABLE
RLDP	DISABLE
	2S
	3

注意:

RLDP (AP)

Ruijie(config-if)# rldp port { unidirection-detect bidirection-detect loop-detect } { warning shutdown-svi shutdown-port block }	RLDP
Ruijie(config-if)# end	

```
RLDP          no
GigabitEthernet 0/5    RLDP
```

```
Ruijie# configure terminal
Ruijie(config)# interface gigabitEthernet 0/5
Ruijie(config-if)# rldp port unidirection-detect shutdown-svi
Ruijie(config-if)# rldp port bidirection-detect warning
Ruijie(config-if)# rldp port loop-detect block
Ruijie(config-if)# end
Ruijie# show rldp interface gigabitEthernet 0/5 -28(state TdR&DTdRLDT:-&-2
```

RLDP

RLDP

RLDP Probe

RLDP

RLDP

Ruijie# rldp reset	RLDP

说明:

```

errdisable recover
rldp fl shutdown-port
RLDP rldp
errdisable reover interval
errdisable recover interval
detect-interval* detect-max
errdisable recover
interval ,
    
```

RLDP

RLDP

RLDP

RLDP

RLDP

RLDP

rldp

Ruijie# show rldp	RLDP rldp

show rldp rldp

```

Ruijie# show rldp
rldp state : enable
rldp hello interval : 2
rldp max hello : 3
rldp local bridge : 00d0.f8a6.0134
    
```

```
-----  
interface GigabitEthernet 0/1  
port state:normal  
neighbor bridge : 00d0.f800.41b0
```


TPP

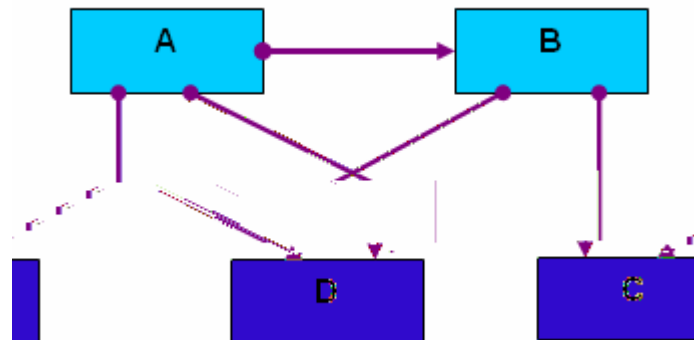
TPP

TPP(Topology Protection Protocol) CPU CPU

TPP

MSTP VRRP
MSTP VRRP
CPU

MSTP VRRP



1
A B C D A
MSTP
A CPU BPDU
C D B C

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

no topology guard

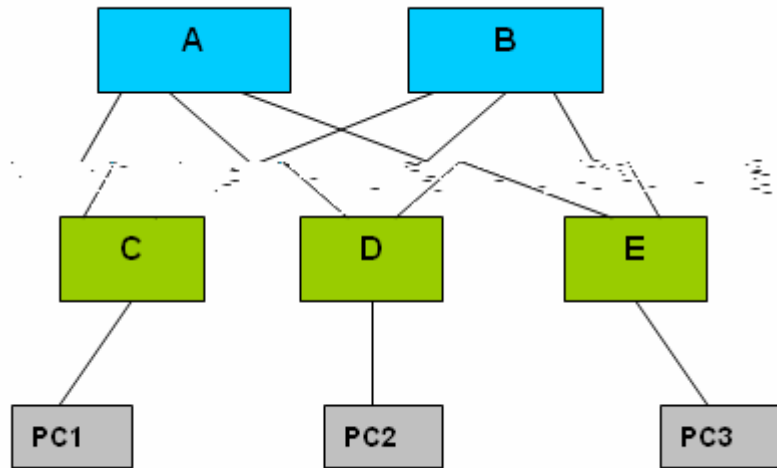
Ruijie> enable	
Ruijie# config terminal	
Ruijie(config)# interface gi 0/1	
Ruijie(config-if)# tp-guard port enable	
Ruijie(config-if)# end	

no tp-guard port enable

AP

说明:

TPP



2

A B	C D E	
A B	C D E	MSTP
VRRP	MSTP	VRRP
A B		
	C D E	

TPP

TPP

TPP

TTP

TTP

Ruijie# show tpp	TTP

```
Ruijie #show tpp
tpp state      : enable
tpp local bridge : 00d0.f822.35ad
-----
```

Flash

Flash

4096

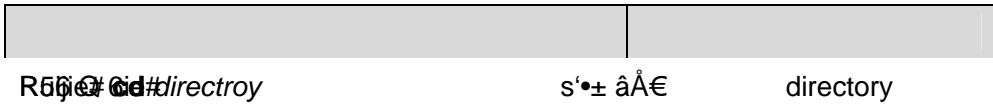
注意:

flash

128M

dir

h



Ruijie# dir <i>directory</i>	
-------------------------------------	--

Ruijie# **dir**

Ruijie# **dir** *../bak*

Ruijie# makefs dev <i>devname fs fs_name</i>	<i>fs_name</i> dev

dev

Ruijie# pwd	

Ruijie# del filename	

MNT

large.c

Ruijie# **del mnt/large.c**

Red-Giant# rmdir directoryname	

MNT

UP DOWN

VTY

FLASH

Gp

<priority> seq no: timestamp sysname

%ModuleName-severity-MNEMONIC: description

< >

- -

Ruijie(config)# logging on	
Ruijie(config)# no logging on	

注意:

Ruijie(config)# logging buffered [<i>buffer-size</i> <i>level</i>]	
Ruijie# terminal monitor	VTY
Ruijie(config)# logging host	Sever Syslog
Ruijie(config)# logging file flash:filename [<i>max-file-size</i>] [<i>level</i>]	FLASH

Logging Buffere

show logging
clear logging

Terminal Monitor

VTY(Telnet)

Logging Host

Syslog Server

5 Syslog Server

Syslog Server

Ruijie(config)# no service sysname	
Ruijie(config)# service sysname	

Ruijie(config)# no logging count	
Ruijie(config)# logging count	

Ruijie(config)# no service sequence-numbers	
Ruijie(config)# service sequence-numbers	

|--|--|

Ruijie(config)# logging console <i>level</i>	
Ruijie(config)# logging monitor <i>level</i>	VTY (telnet)
Ruijie(config)# logging buffered [<i>buffer-size</i> <i>level</i>]	
Ruijie(config)# logging file flash:filename	A'3]SJ6

Syslog Server

Ruijie(config)# logging facility <i>facility-type</i>	
Ruijie(config)# no logging facility <i>facility-type</i>	

Numerical Code	Facility
0	kernel messages
1	user-level messages
2	mail system
3	system daemons
4	security/authorization messages
5	messages generated internally by syslogd
6	line printer subsystem
7	network news subsystem
8	UUCP subsystem
9	clock daemon
10	security/authorization messages
11	FTP daemon
12	NTP subsystem
13	log audit
	log alert
15	clock daemon
	local use 0 (local0)
1	local use 1 (local1)
1	local use 2 (local2)
1	local use 3 (local3)
2	local use 4 (local4)
2	local use 5 (local5)
2	local use 6 (local6)
2	local use 7 (local7)

Syslog Server

Log IP Log

Ruijie(config)# logging source interface <i>interface-type interface-number</i>	
Ruijie(config)# logging source ip <i>A.B.C.D</i>	ip

LOG

/ LOG LOG LOG

Ruijie(config)# logging userinfo	/ LOG
Ruijie(config)# logging userinfo command-log	LOG

Ruijie# show logging	
Ruijie# show logging count	
Ruijie# clear logging	
Ruijie# more flash:filename	FLASH

注意:

show logging count

```
Ruijie(config)# interface gigabitEthernet 0/1
Ruijie(config-if)# ip address 192.168.200.42 255.255.255.0
Ruijie(config-if)# exit
Ruijie(config)# service sequence-numbers //
Ruijie(config)# service timestamps debug datetime // debug

Ruijie(config)# service timestamps log datetime // log

Ruijie(config)# logging 192.168.200.2 // syslog server
Ruijie(config)# logging trap debugging //
// syslog server

Ruijie(config)# end
```

WEB

WEB

WEB

WEB

IE

WEB

WEB

WEB

WEB

WEB

WEB

IE

WEB

WEB	

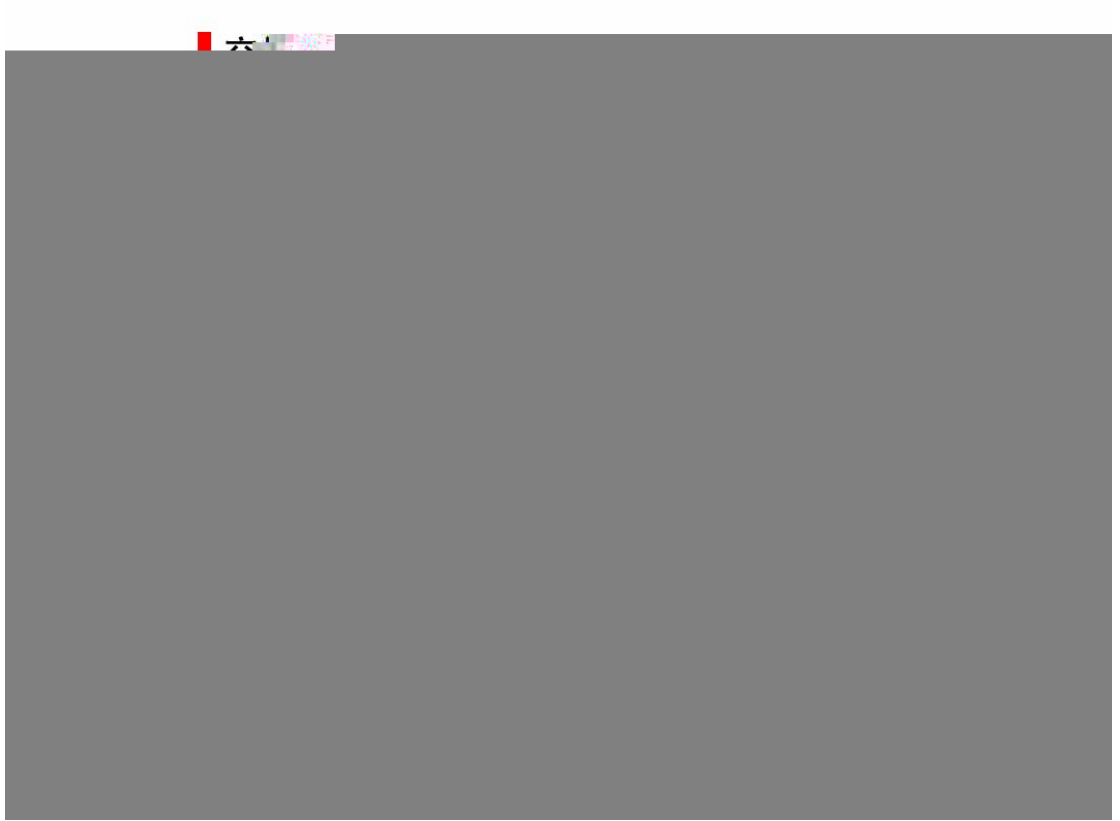
说明:

WEB	WEB
WEB	Enable
Enable	
S2724G WEB	IP 192.168.1.200 /
admin/admin	

WEB

IP

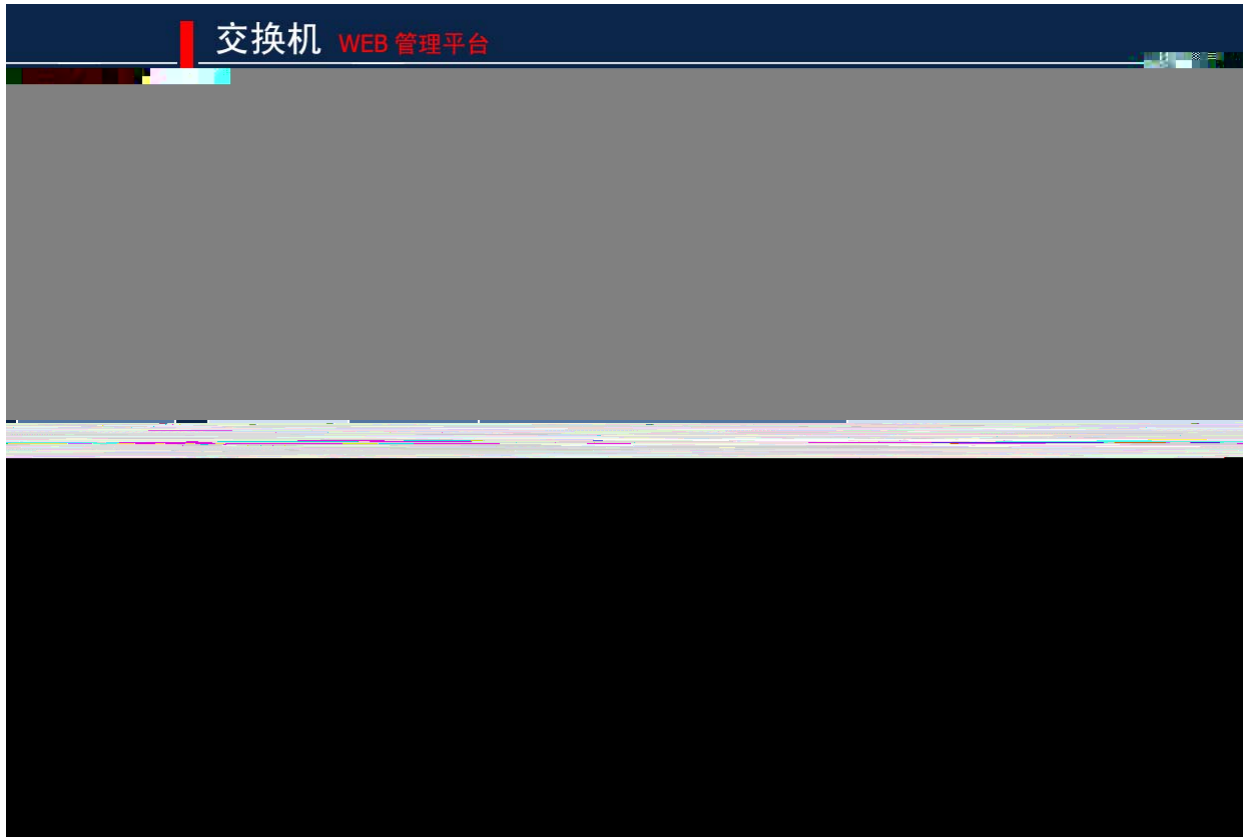
http://192.168.1.200,



1



WEB



3 WEB

说明:

WEB	Enable
enable	

IP

	IP
IP	

VLAN

VLAN

1 VLAN

VLAN管理 指定VLAN

说明：VLAN是虚拟局域网（Virtual Local Area Network）的简称，它是在一个物理网络上划分出来的逻辑网络，实现同VLAN下的用户可以进行二层通讯，不同VLAN下的用户无法进行二层通讯。

<input type="checkbox"/>	VLAN ID	VLAN 名称	状态
<input type="checkbox"/>	1	VLAN0001	STATIC
<input type="checkbox"/>	2	VLAN0002	STATIC

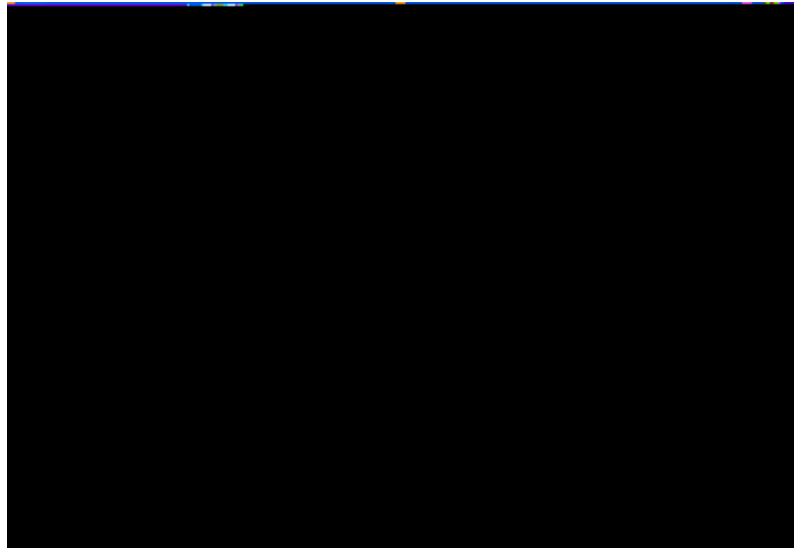
新建 全选 删除 修改

6 VLAN

VLAN

VLAN

VLAN



7 VLAN

VLAN ID VLAN
 VLAN VLAN
 VLAN

 VLAN



8 VLAN

VLAN
 VLAN
2 VLAN

交换机端口分为两种模式：

Access：该模式的端口只属于一个VLAN，只传输该VLAN的报文，一般用于与终端直连。

Trunk：该模式的端口可以属于多个VLAN，可传输多个VLAN的报文，一般用于与其它交换机互连。

注意：当端口模式为“Trunk”时将允许所有VLAN访问,指定的VLAN将成为Trunk口

9 VLAN

VLAN ID

网关设置

说明：网关相当于一个网络连接到另一个网络的“关口”，交换机无法转发的数据包就交给网关处理以便能完成数据包的转发过程。如果网关配置错误，可能导致PC与设备的连接中断，WEB功能将无法正常使用。

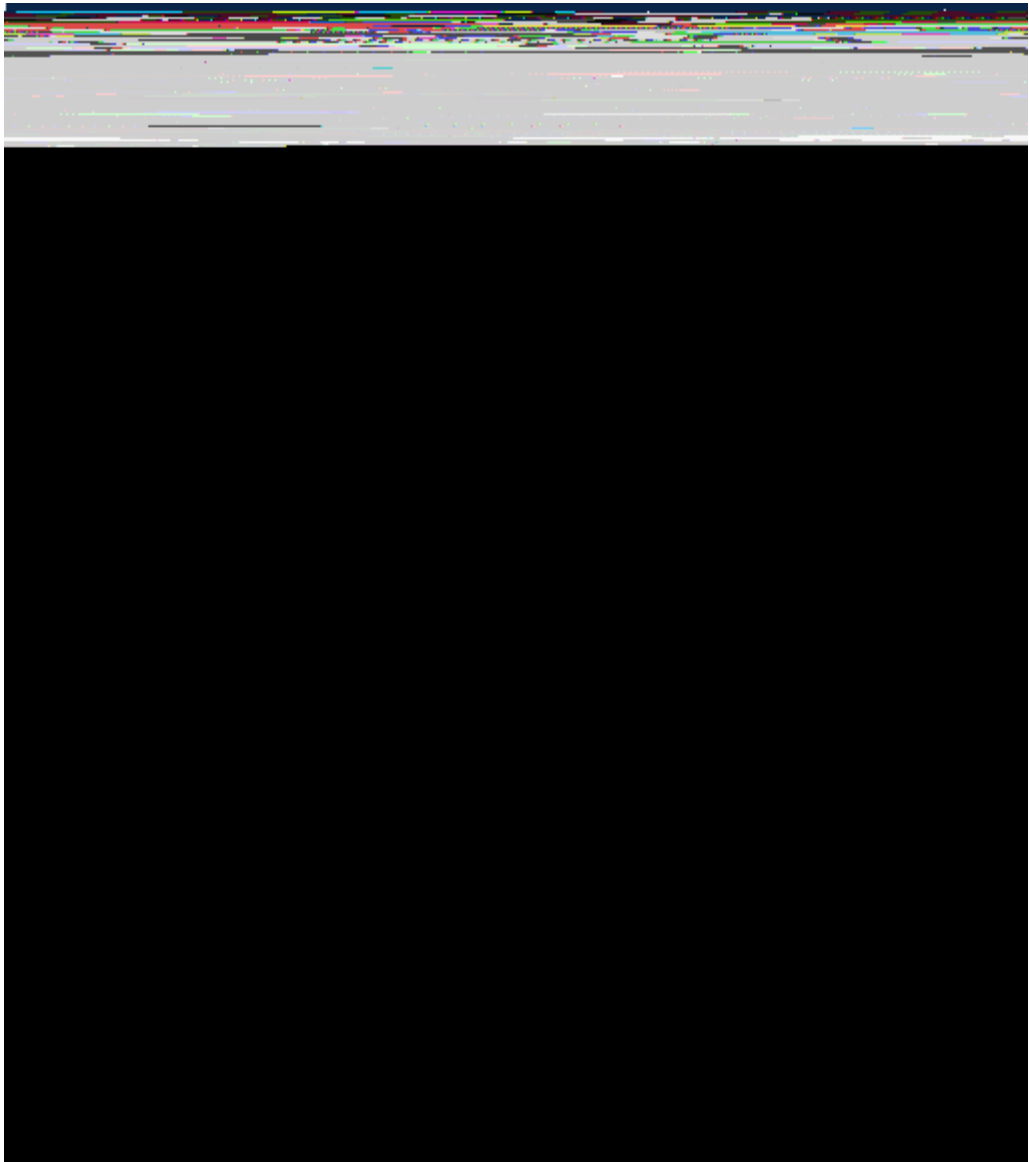
网关IP地址：

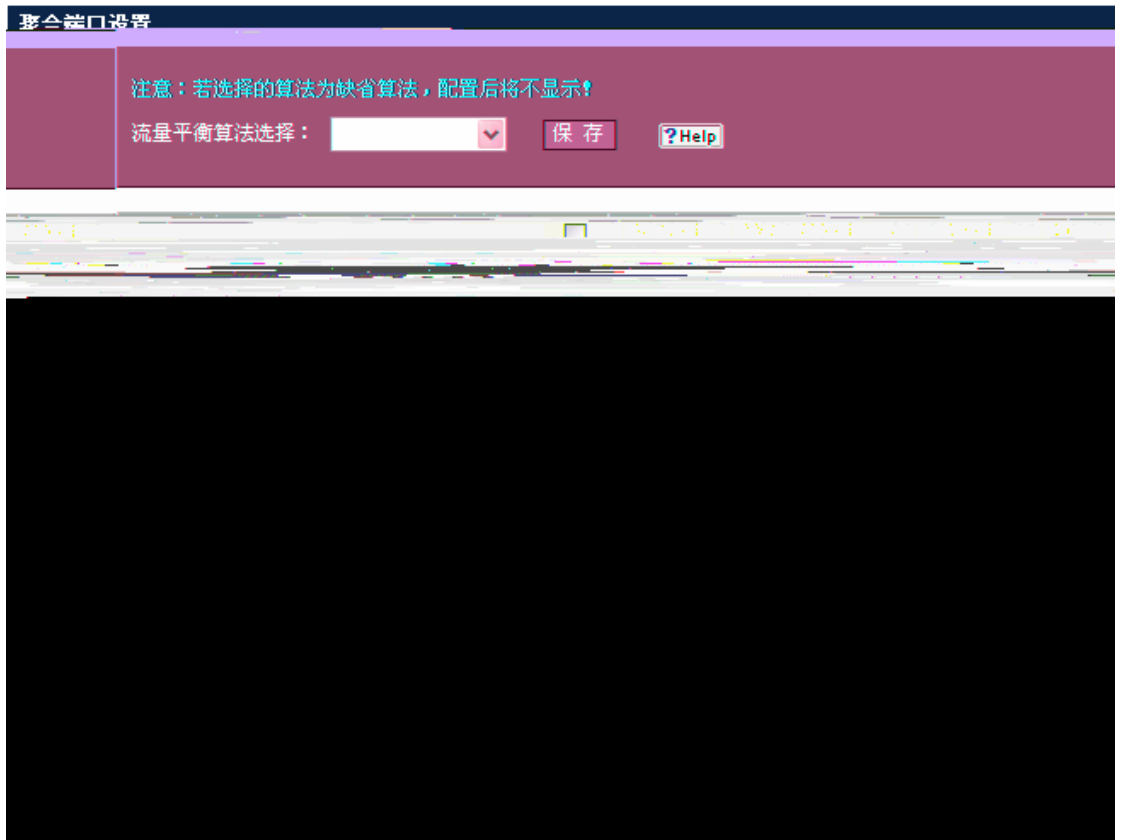
10

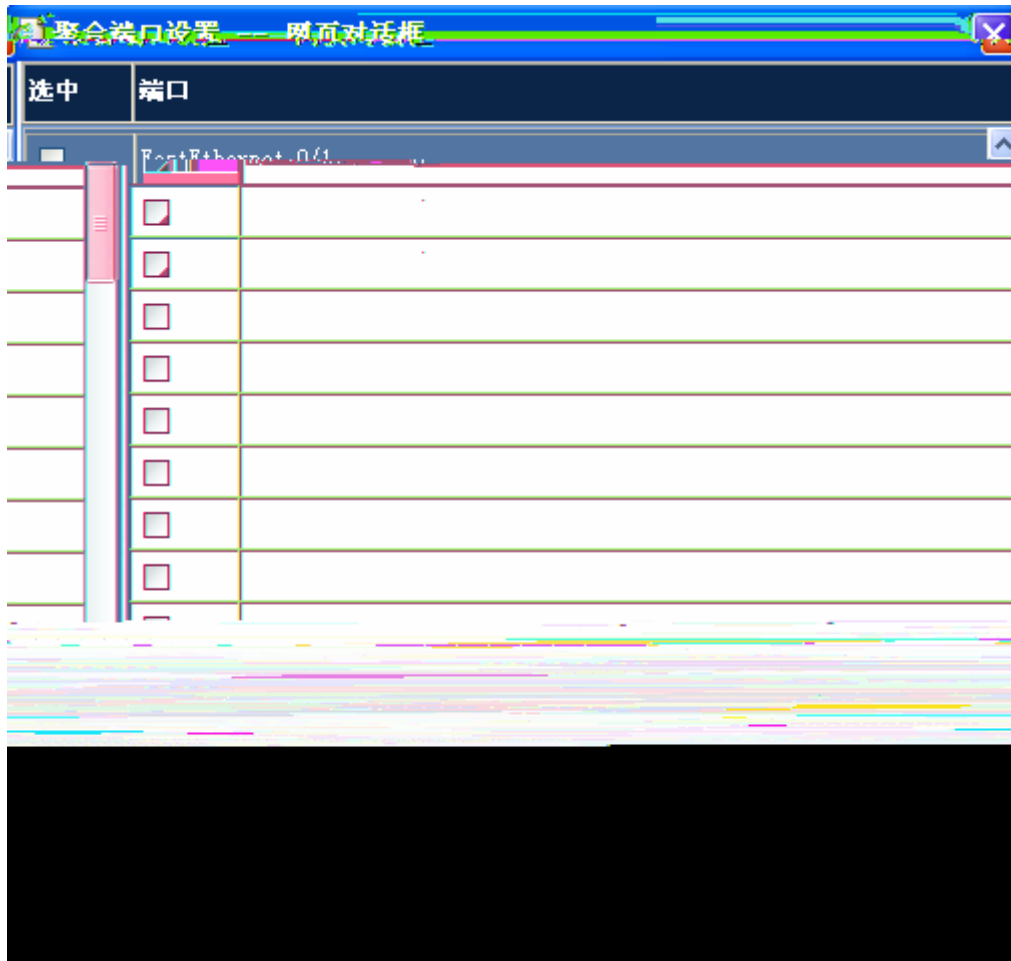
IP

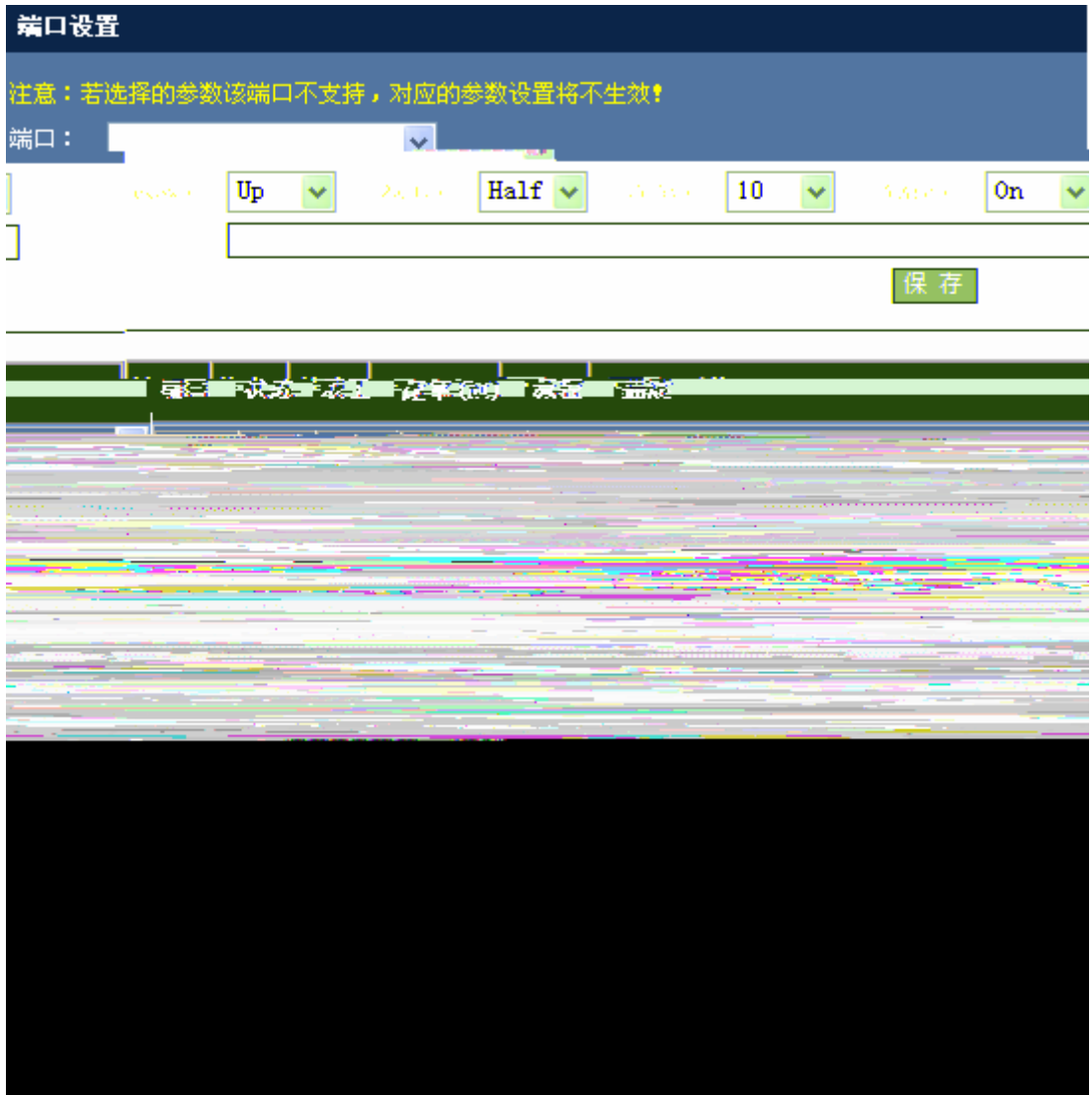
IP











DHCP

DHCP

DHCP

DHCP 中继设置

说明：DHCP中继可以实现不同子网之间的IP分配，相当于一个中转站，它将收到的客户端请求报文转发给指定的DHCP服务器，并将收到的服务器响应报文转发给DHCP客户端。

开启DHCP中继

关闭DHCP中继

保存

DHCP服务器设置

DHCP服务器： 0.0.0.0

保存



16 DHCP

1) / DHCP
/ DHCP

2)DHCP
DHCP

DHCP

DHCP Snooping

DHCP Snooping
DHCP Snooping

DHCP Snooping 设置

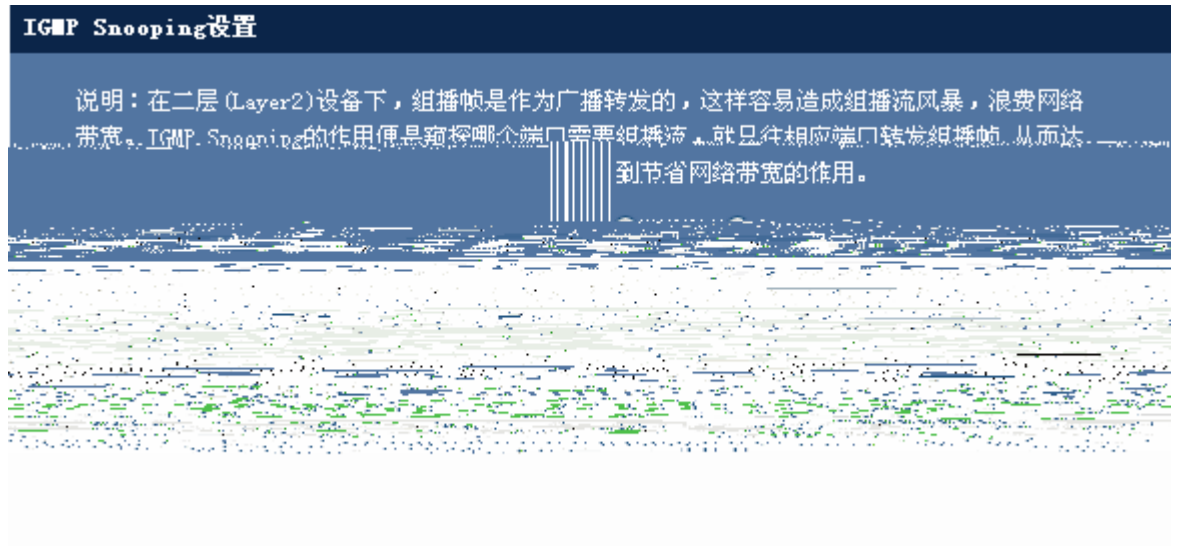
说明：DHCP Snooping就是DHCP窥探，通过对Client和服务器之间的DHCP交互报文进行窥探，实现对用户的监控，同时DHCP Snooping起到一个DHCP 报文过滤的功能，通过合理的配置实现对非法服务器的过滤。

17 DHCP Snooping

IGMP Snooping

IGMP Snooping

IGMP Snooping



18 IGMP Snooping

IGMP Snooping

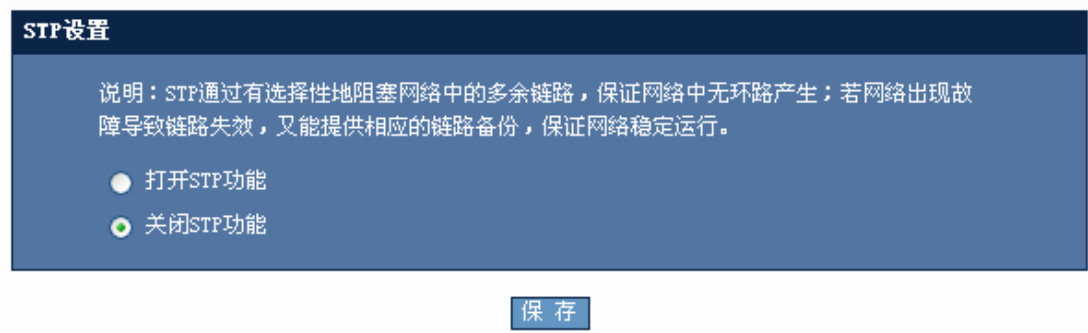
svgl ivgl-svgl

ivgl svgl ivgl-svgl
IP
IGMP Snooping

STP

STP

STP



ARP

ARP

ARP



21 ARP

ARP

ARP

ARP

防ARP欺骗

说明：用户可设置端口、IP地址、MAC地址绑定作为安全地址，当开启端口安全功能，端口只允许源地址为这些安全地址的IP报文通过。

端口/MAC/IP 绑定：

端口： GigabitEthernet 0/15

IP： 0.0.0.0

MAC： 0000.0000.0000

保存

端口自动学习到的地址：



22 ARP

- 1) /MAC/IP
/MAC/IP
IP MAC
MAC
GigabitEthernet 0/15
MAC
- 2

3)



23

APR

ARP

ARP

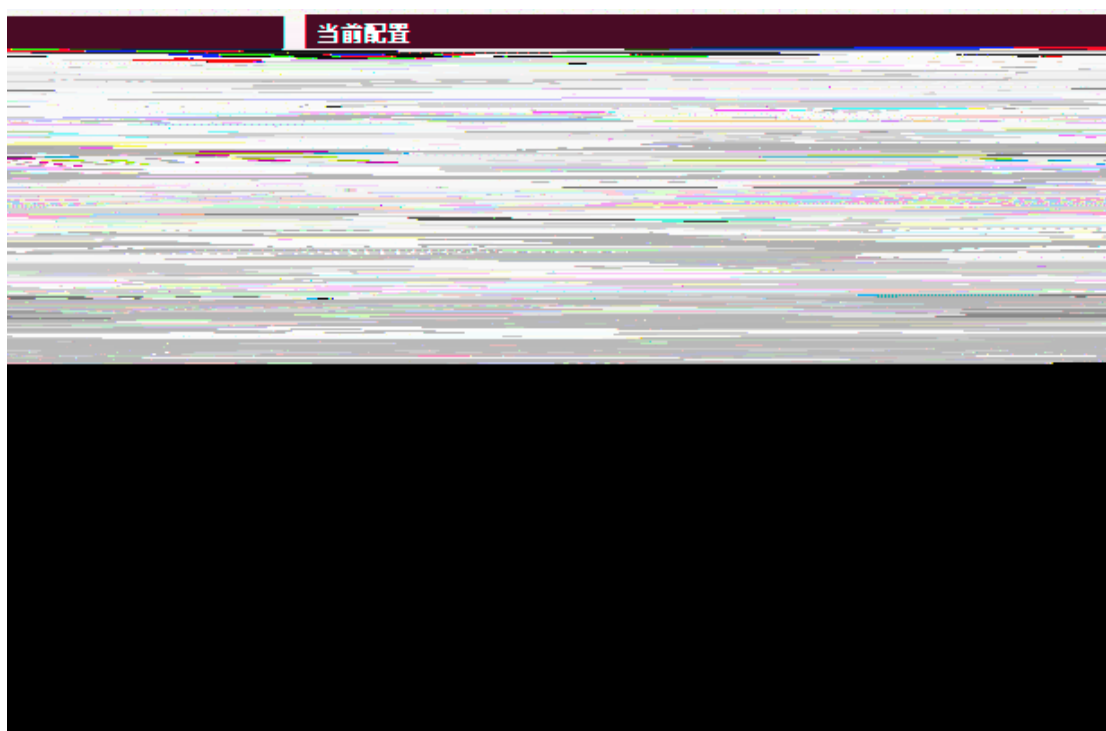
24 ARP

ARP

ARP

系统信息	
设备型号：	S2924G
主机名：	Ruijie
软件版本：	RGOS 10.2(4), Release (55222), Web Version: 10.2.55222
硬件版本：	1.0
MAC地址：	00d0f8f80fc4

25



端口状态

down	1	Unknown	Unknown	copper	FastEthernet 0/1
------	---	---------	---------	--------	------------------

The screenshot shows a network management interface with a red header bar containing the text '端口状态'. Below the header is a table with six columns. The first row of data contains the following values: 'down', '1', 'Unknown', 'Unknown', 'copper', and 'FastEthernet 0/1'. The rest of the page is obscured by heavy digital noise.

端口运行状态	
端口	带宽占用
FastEthernet 0/1	0%
FastEthernet 0/2	0%
FastEthernet 0/3	0%
FastEthernet 0/4	0%
FastEthernet 0/5	0%
FastEthernet 0/6	0%
FastEthernet 0/7	0%
FastEthernet 0/8	0%
FastEthernet 0/9	0%
FastEthernet 0/10	0%

刷新

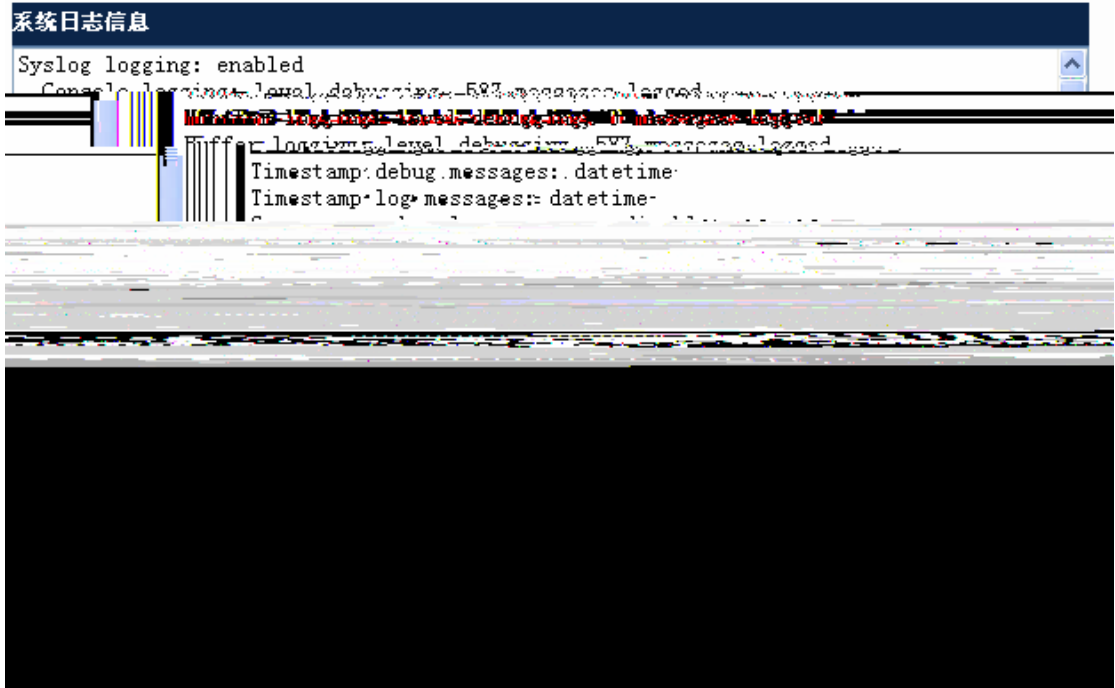
端口统计信息

注意：选择“All Ports”将把所有接口的统计信息清零。

端口：

输入/输出帧统计

端口	接收包数	接收单播包数	接收多播包数	接收广播包数	发送包数	发送单播包数	发送多播包数	发送广播包数
----	------	--------	--------	--------	------	--------	--------	--------

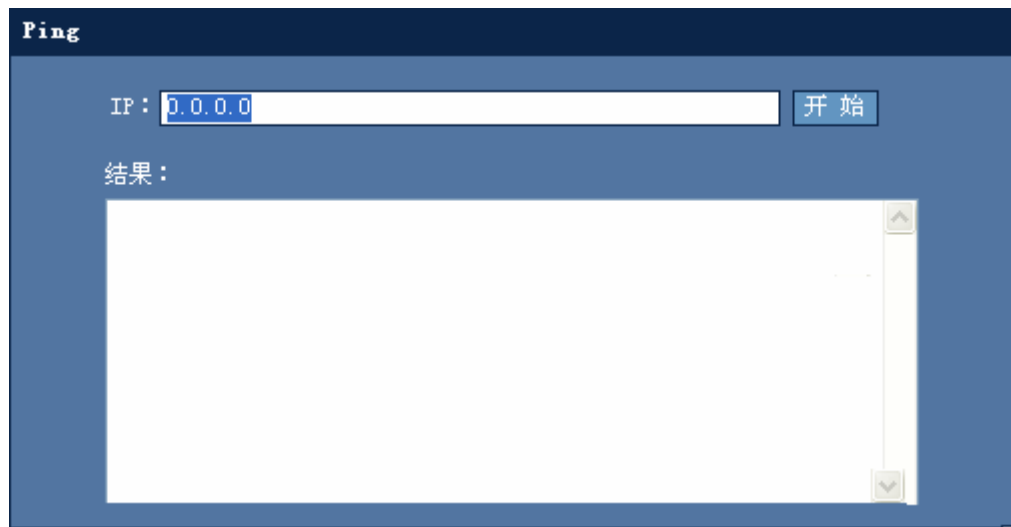


30

Ping

Ping

Ping



31 Ping

Ping

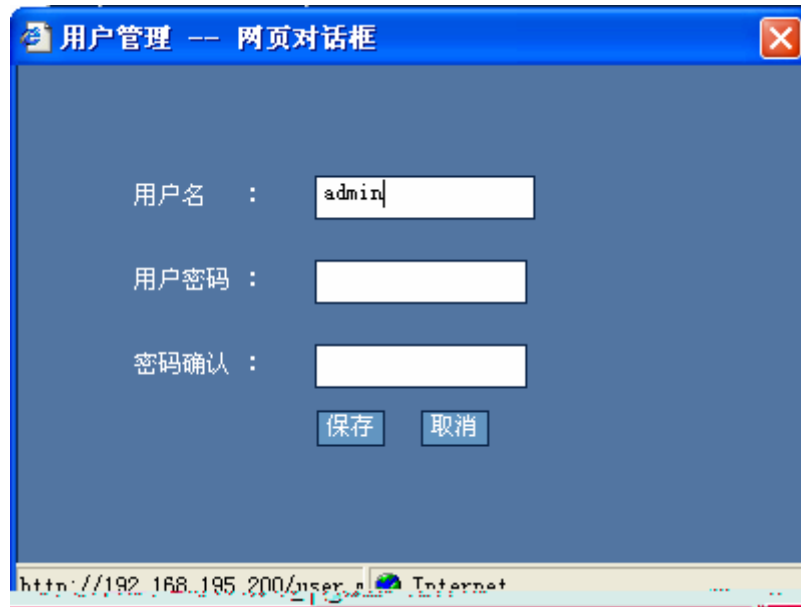
IP

IP

用户管理	
序号	用户名
1	admin

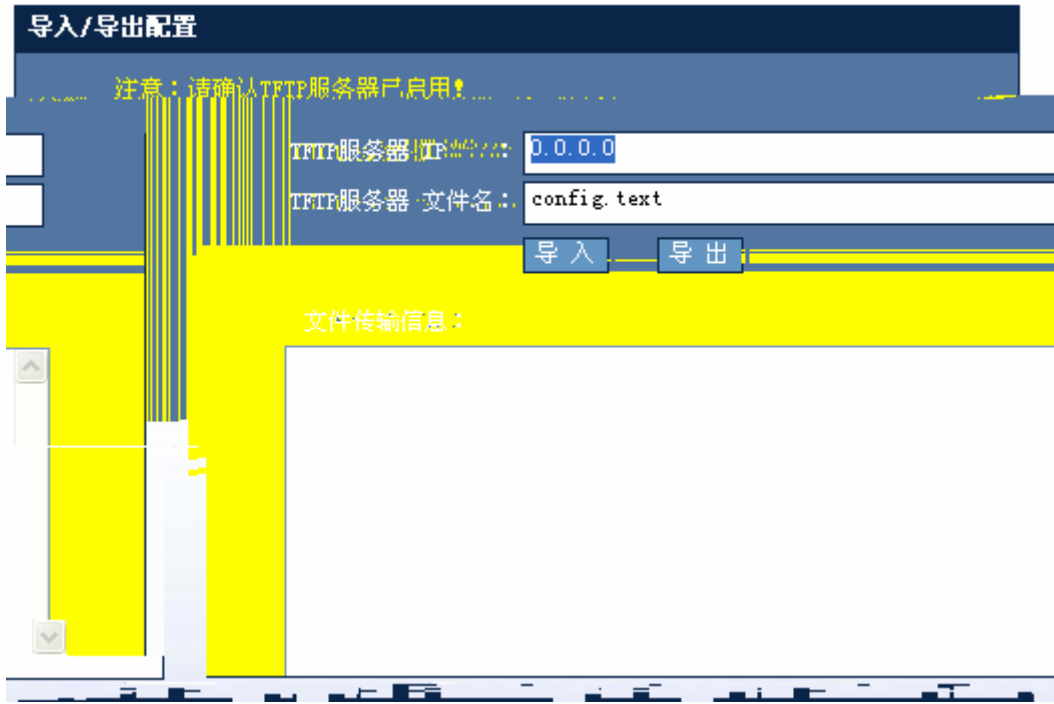
33

#!G!Vp?U;!G&#!A;G!B%FM6G!5BAE



35

注意:



38 /

config.text

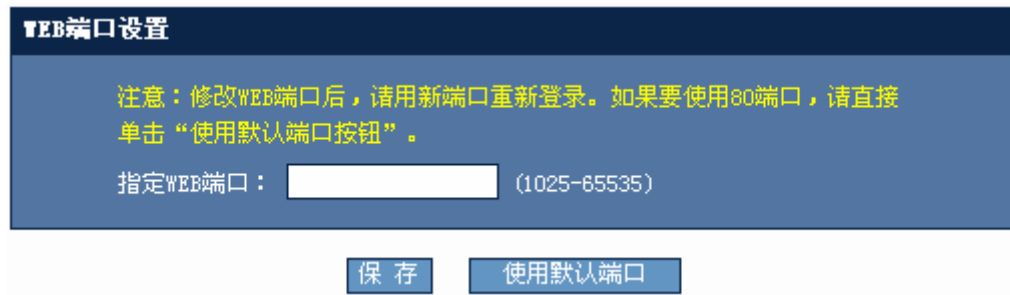
TFTP

IP TFTP

WEB

WEB

WEB



39 WEB

http://192.168.1.1:8080	8080	IP	192.168.1.1
http://192.168.1.1			

WEB

S2724G

Local

WEB	Local	Enable
	WEB	WEB

1 Local

a. config
Ruijie#configure

```
no service password-encryption
!
enable password admin //WEB Enable
enable service web-server // WEB
!
....
.....
!
interface VLAN 1
 ip address 192.168.100.1 255.255.255.0 // IP
 no shutdown
!
!
line con 0
line vty 0 4
 login
!
!
end
```