

©2009



RGOS®10.2(4)

1.

5

注意、说明

Courier New

5

2.

Arial

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

3.

注意:

说明:

说明:

1)

2)

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 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 |

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* | *hh:mm* [*string*]

mmm *hh: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

```

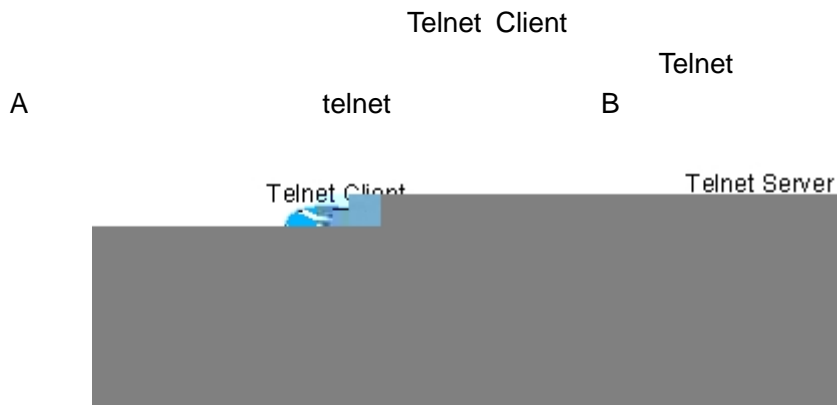
Ruijie# configure terminal //
Ruijie(config)# line console 0 //
Ruijie(config-line)# speed 57600 // 57600
Ruijie(config-line)# end //
Ruijie# show line console 0 //
CON  Type  speed  Overruns
* 0  CON  57600  0
Line 0, Location: "", Type: "vt100"
Length: 25 lines, Width: 80 columns
Special Chars: Escape 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

ip

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: 0022) Evt-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 “

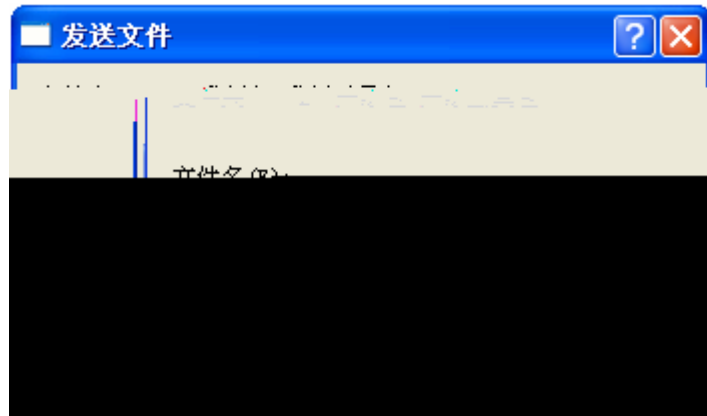


1

“ ” Windows

“Xmodem”

2

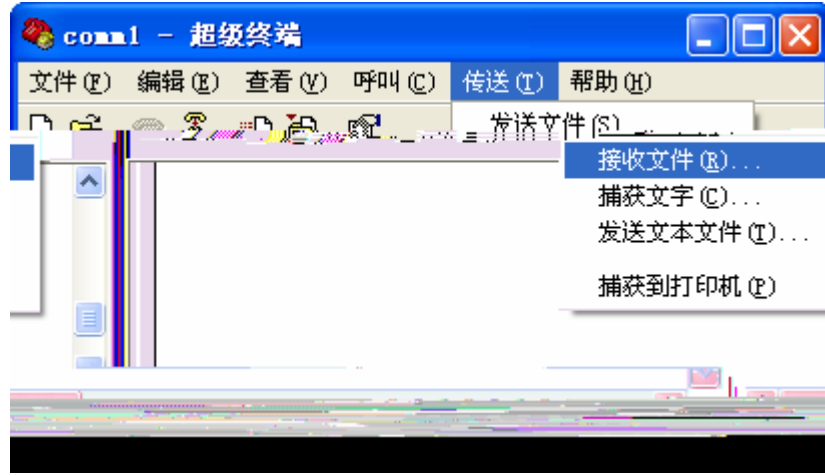


2

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

CLI

Windows



3

“Xmodem”

4



4

| | |
|------------------------------------|----------|
| | |
| Ruijie# copy flash:filename xmodem | filename |

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 5
100Byte IP 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 >
!!!!
Successrate is 100percent (5/5), round-tripmin/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 | TAG | VLAN ID | | | |
| | | | | | |
| Trunk Port | TAG | VID | Trunk port | Native | |
| vlan VID | TAG | 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 |

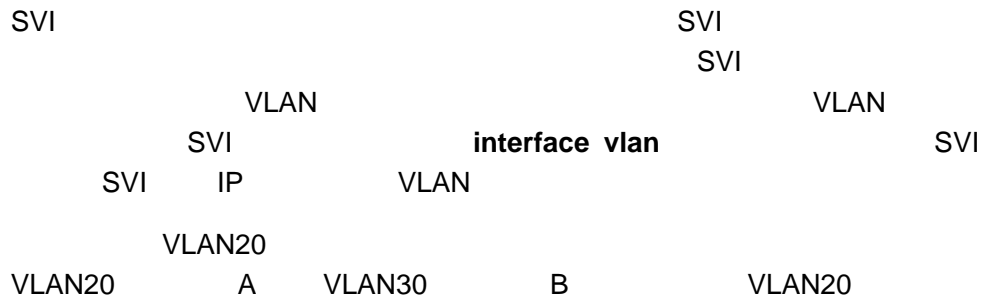
注意:

| | | |
|-------------------|-------------|------------|
| 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</i> <i>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:

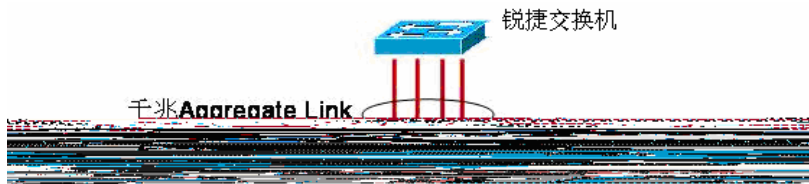
```
Ruijie(config)# interface gigabitEthernet 1/1  
Ruijie(config-if)# no snmp trap link-status
```

Aggregate Port

Aggregate Port

Aggregate Port

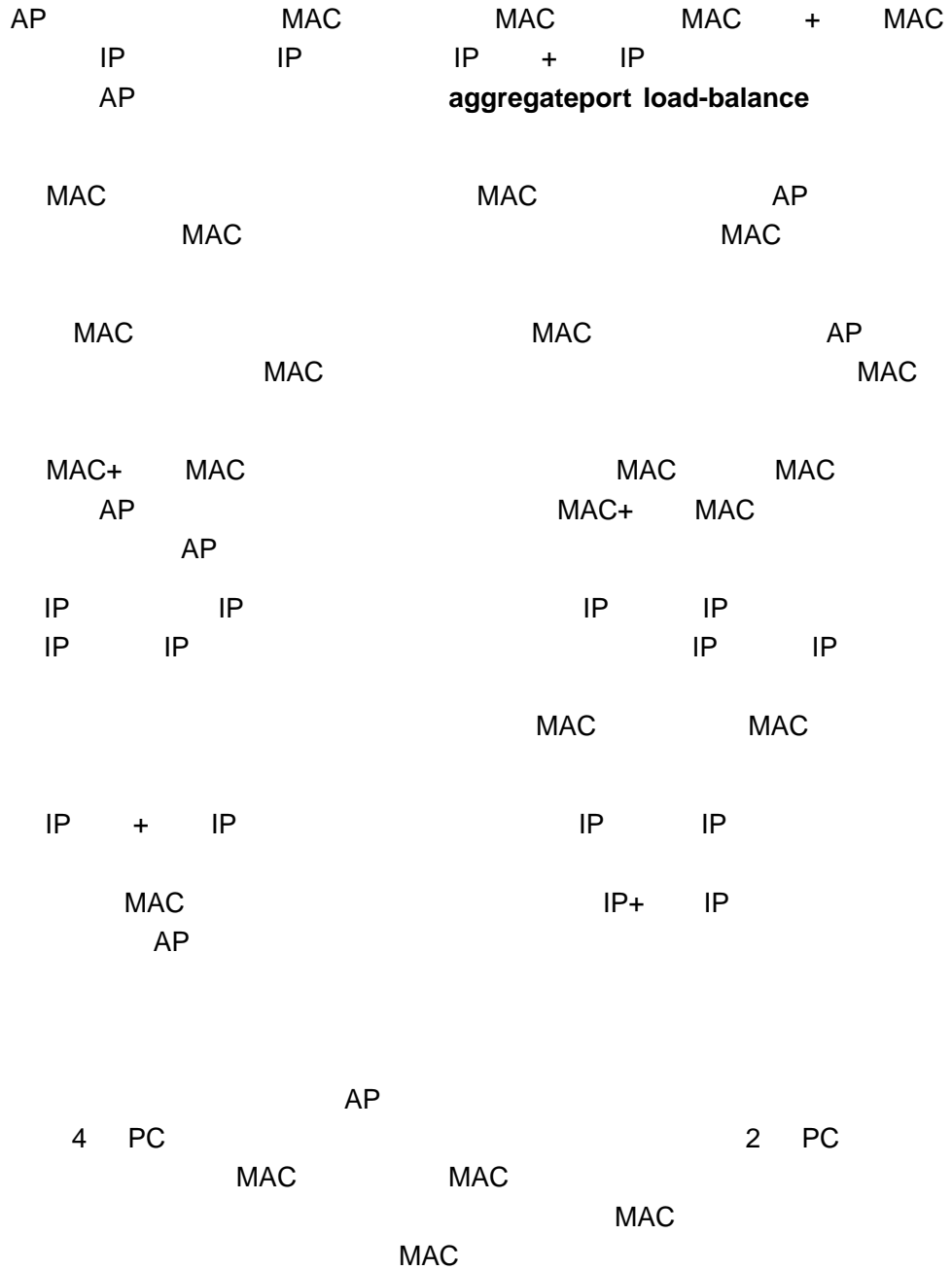
| | | | |
|----------------|----|----|-------------|
| Aggregate Port | AP | AP | IEEE802.3ad |
| AP | | | AP |
| | AP | | |



1 AP

说明:

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



说明:

S2700

IP IP+ IP
AP



2 AP

Aggregate Port

Aggregate Port

AP

| | |
|------|-----|
| | |
| 2 AP | |
| | MAC |

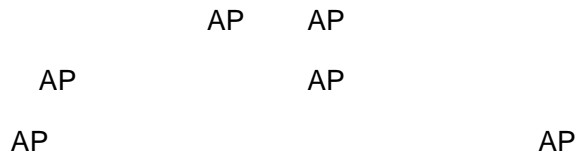
Aggregate Port

AP

AP

AP

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
IP VLAN VLAN
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

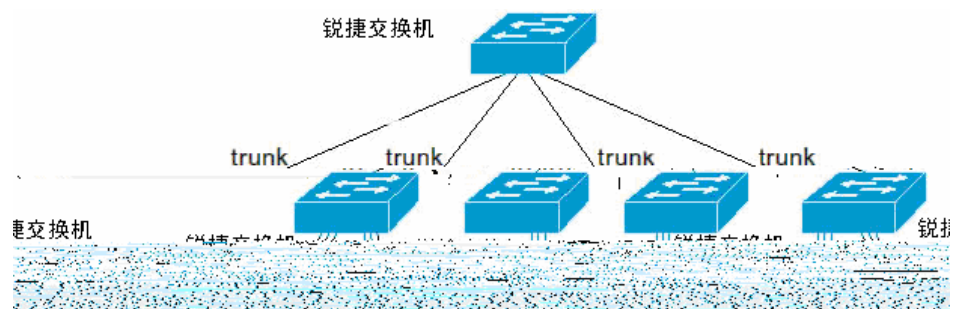
| | | |
|---|--------|------|
| Ruijie(config-if)# switchport mode access | ACCESS | VLAN |
| Ruijie(config-if)# switchport access vlan <i>vlan-id</i> | | VLAN |

Ethernet 1/10

Access

VLAN20

G



2

Aggregate Port Trunk

Aggregate 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 |
| 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

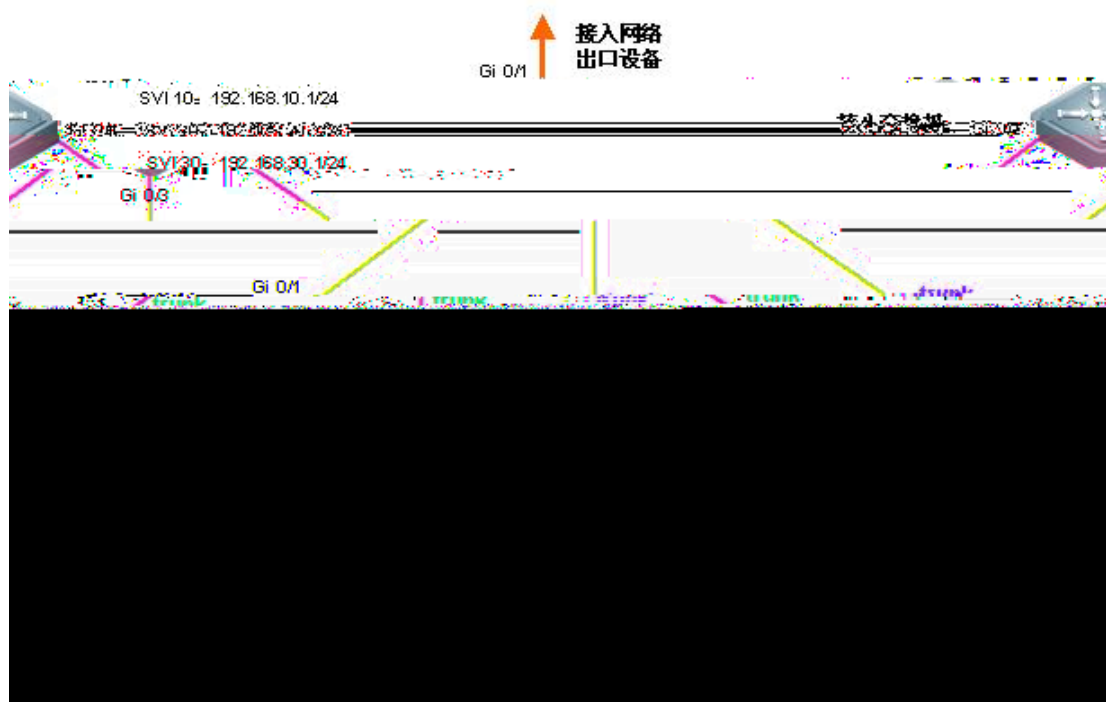
VLAN 2 1/15

```
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.

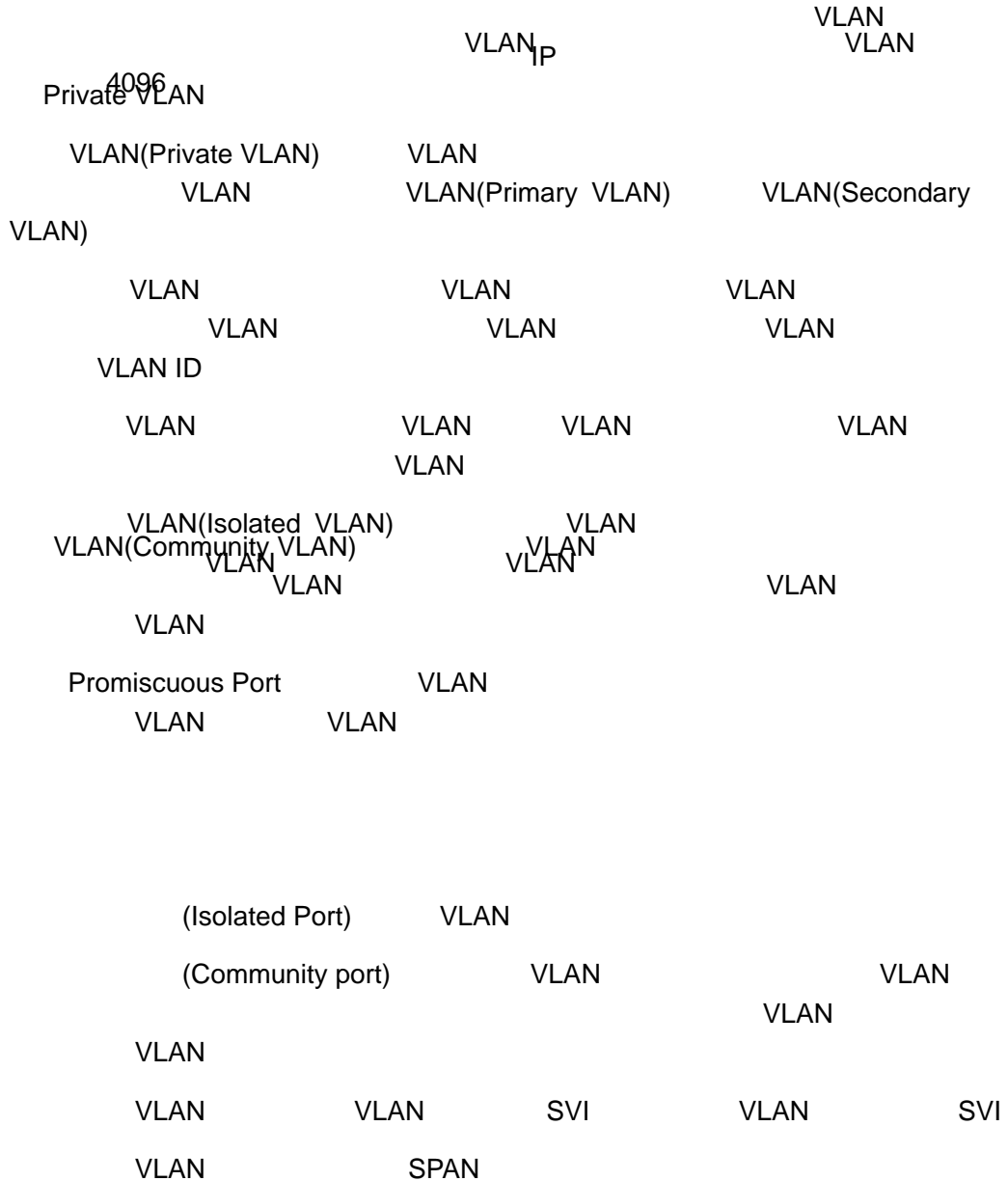
Protocol VLAN

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 |

| | |
|--|------|
| switchport mode private-vlan host | |
| no switchport mode | VLAN |
| End | SVI |
| switchport private-vlan host-association <i>p_vid s_vid</i> | VLAN |
| no switchport private-vlan host-association | |

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

说明:

Primary VLAN Secondary VLAN

VLAN

VLAN

| | |
|---|---|
| | |
| configure terminal | |
| interface <i><interface></i> | , |
| switchport mode private-vlan promiscuous | VLAN |
| no switchport mode | VLAN |
| switchport private-vlan mapping <i>p_vid{svlist add svlist remove svlist}</i> | VLAN VLAN secondary VLAN |
| no switchport private-vlan mapping | VLAN. secondary |

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 value history-size value } | 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 | MAC IPV6 | MAC IPV6 |

S2700
IPV6

IP+MAC
IP+MAC

IPV6

IP+MAC

IP+MAC
IP+MAC

IP+MAC

| | |
|--|--|
| | |
| Ruijie# configure terminal | |
| Ruijie(config)# address-bind uplink <i>intf-id</i> | |
| Ruijie(config)# address-bind install | |

no address-bind uplink *interface-id*
no address-bind install

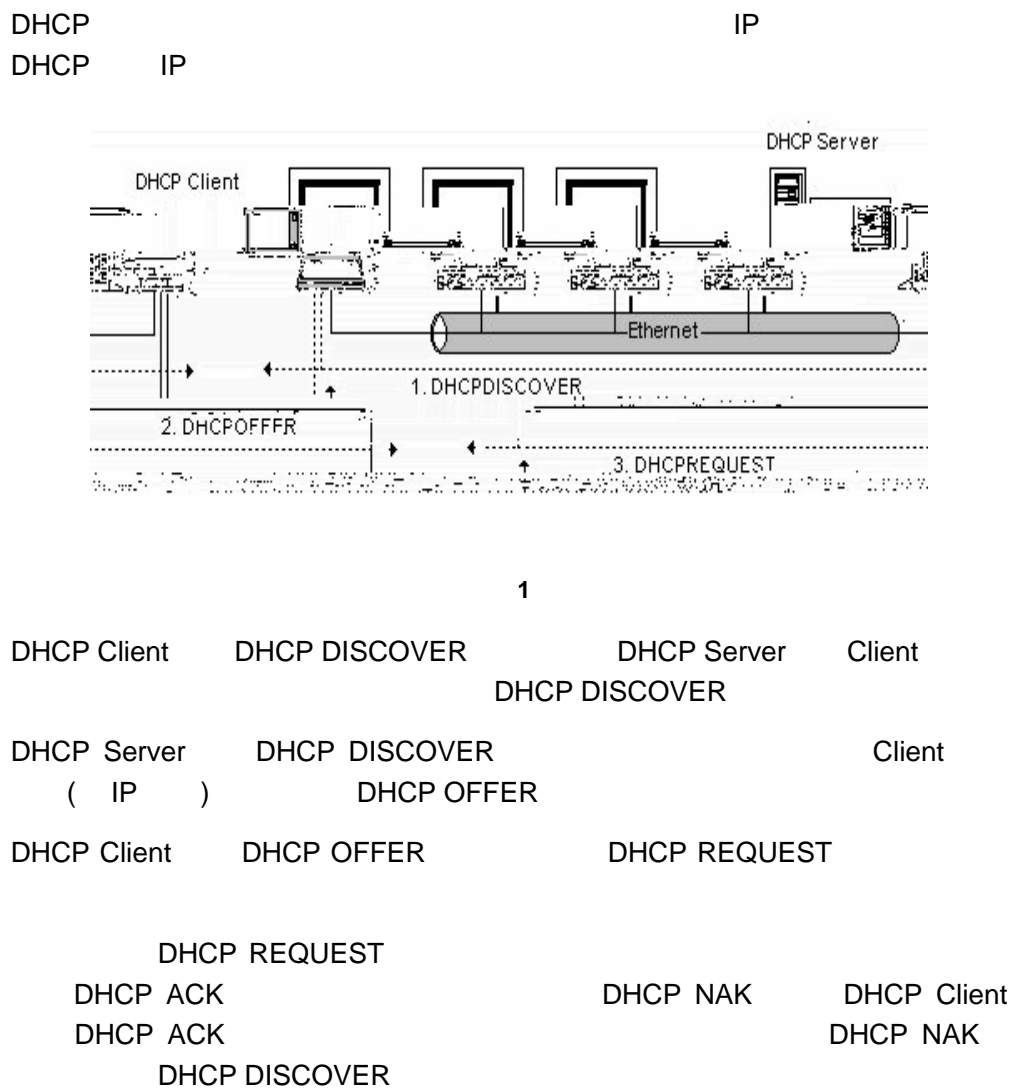
show address-bind uplink

4/4

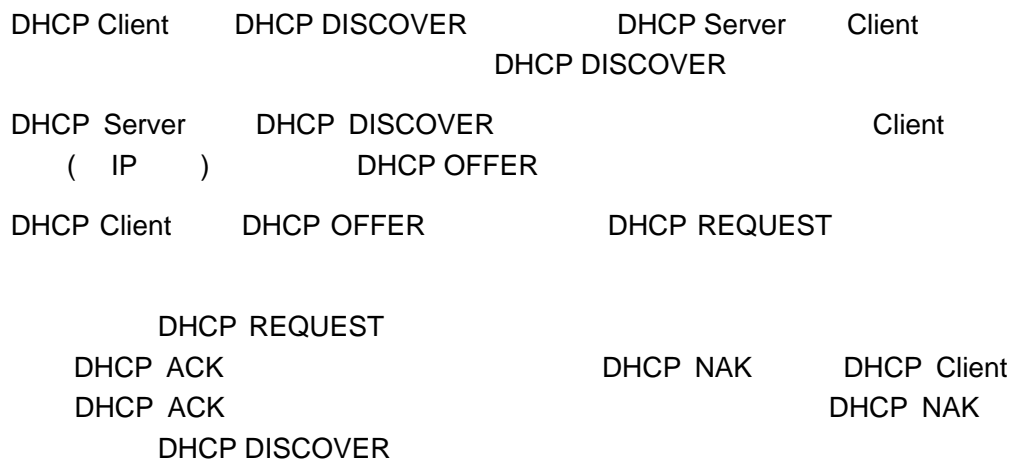
DHCP Snooping

DHCP Snooping

DHCP



1



DHCP Snooping



DHCP Snooping

DHCP Snooping Trust

DHCP IP
IP

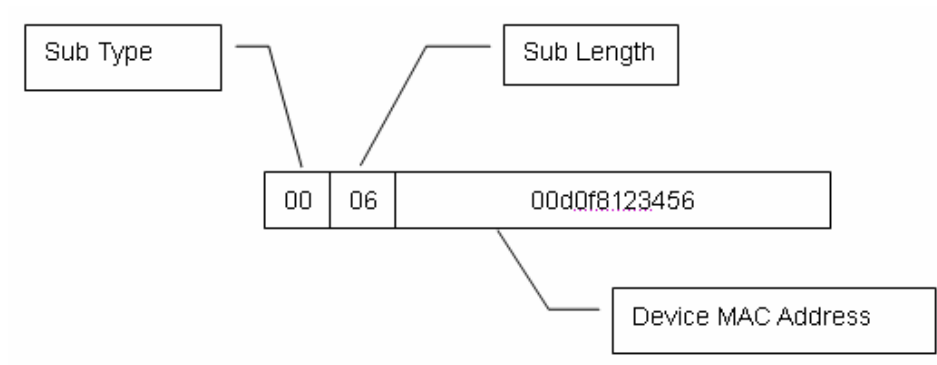
TRUST

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

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

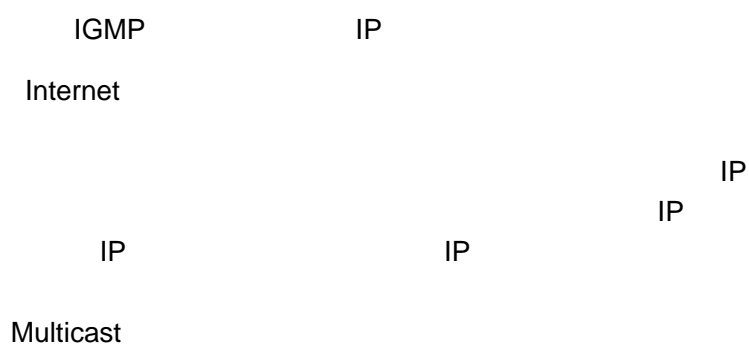
| Ruijie# debug ip dhcp snooping {event packet} | / DHCP Snooping |
|--|-----------------|

```
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

“

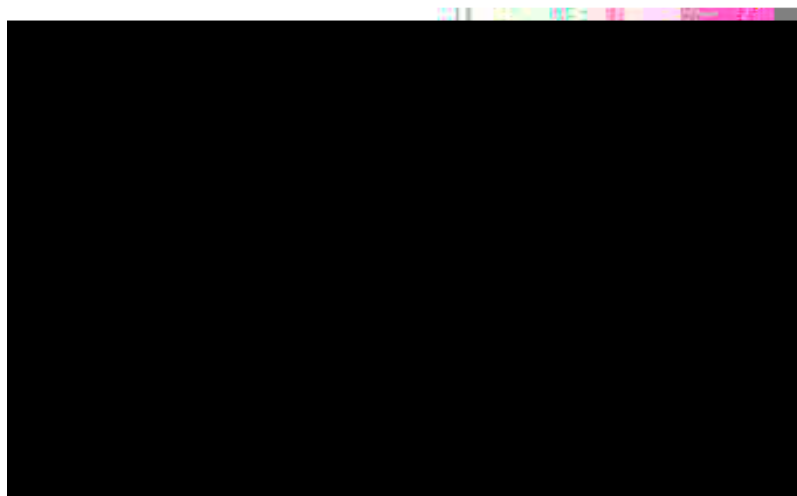
”

D

2

IGMP Report IGMP Leave
IGMP Query
IGMP Query

IGMP snooping



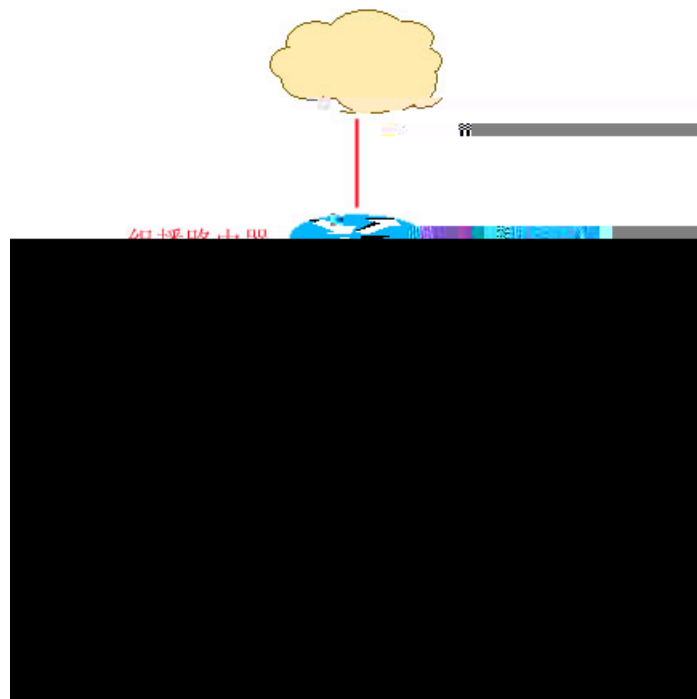
3

PC

IGMP

snooping

VLAN



4

IGMP Snooping

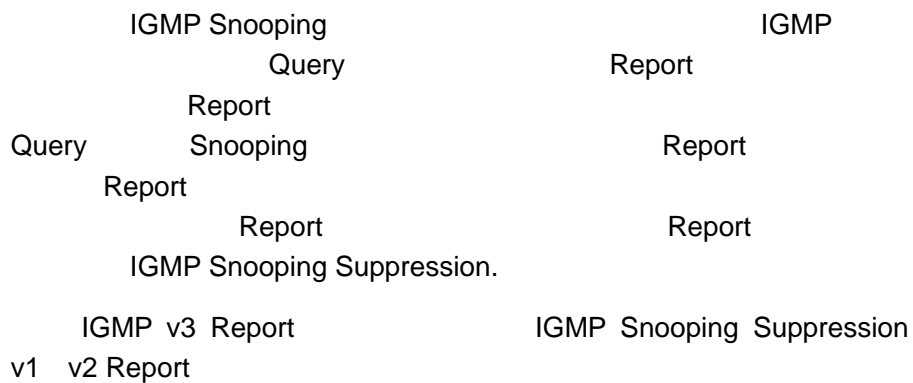
注意:

snooping IGMP

IGMP Snooping

| | | | |
|---------|------|---------------|------|
| DISABLE | | IGMP Snooping | |
| | | IGMP | VLAN |
| IVGL | | VLAN | |
| | VLAN | | |
| SVGL | | VLAN | VLAN |

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:

Snooping VLAN Access Trunk AP IGMP

```

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
    
```

IGMP Profile permit 224.1.1.1 225.1.1.1
 226.1.1.1 deny

IGMP query/dvmrp PIM

| <pre>Ruijie(config)# ip igmp Snooping vlan <i>vlan-id</i> mrouter {interface <i>interface-id</i> learn pim-dvmrp}</pre> | <p>no</p> <p>no</p> |
|---|--|
| <pre>Ruijie(config)# end</pre> | |

1/1

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

VLAN

IGMP

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

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


MSTP

MSTP

STP 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
Designated Bridge LAN
Designated Port
Root port Designated Port Forwarding
Discarding

Bridge ID

IEEE 802.1W
 6 mac 2
 Priority 8 bit System ID
 0 4096

Bridge ID
 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

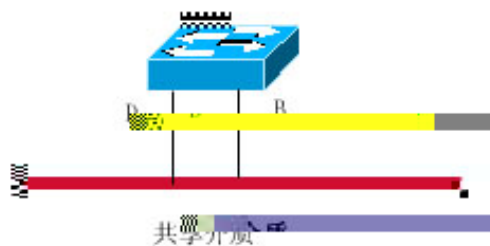
Hello timer BPDUs
 Forward-Delay timer RSTP STP
 Listening Learning Learning
 Forwarding
 Max-Age timer BPDUs

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

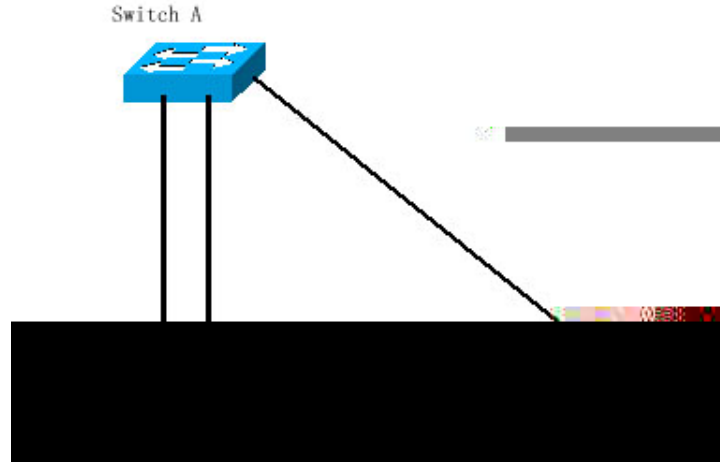


3

Port State

Discarding

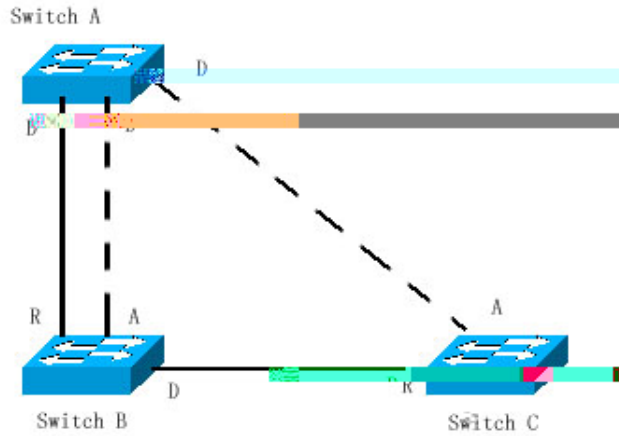
Mac



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 |

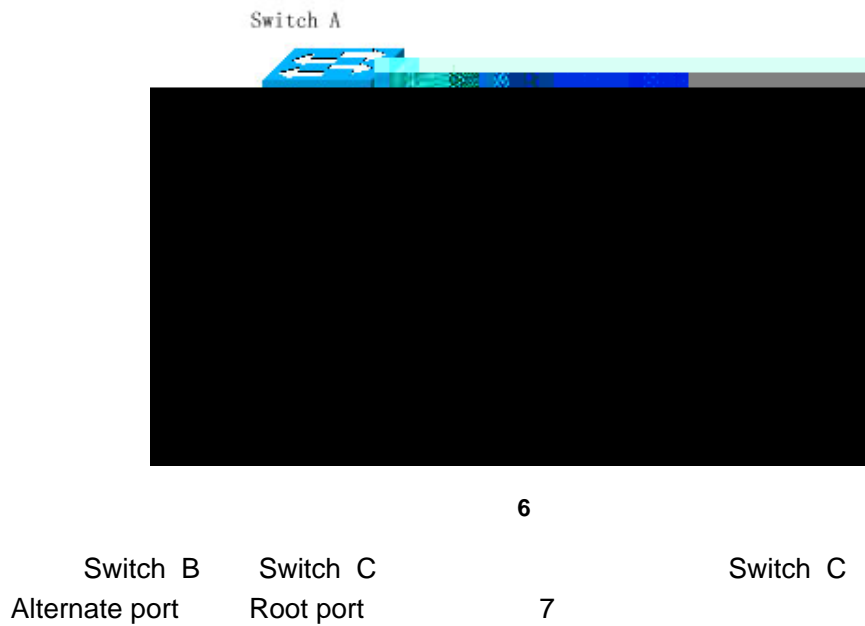
5



5

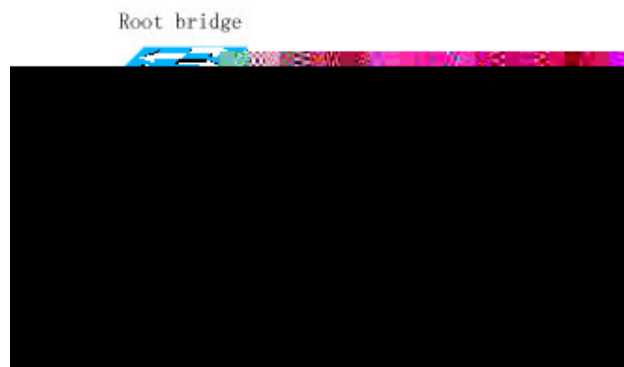
Switch A Switch B

6

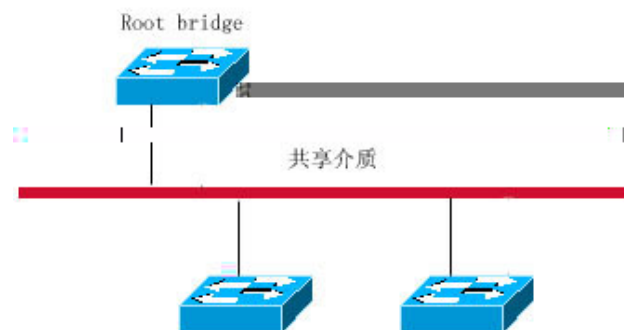


RSTP

| STP | RSTP | Port Role | Forward-Delay Time | Forwarding |
|-----|------|----------------|--------------------|------------|
| 30 | 15 | Alternate port | 30 | Forwarding |
| 15 | 15 | Root port | 15 | Forwarding |

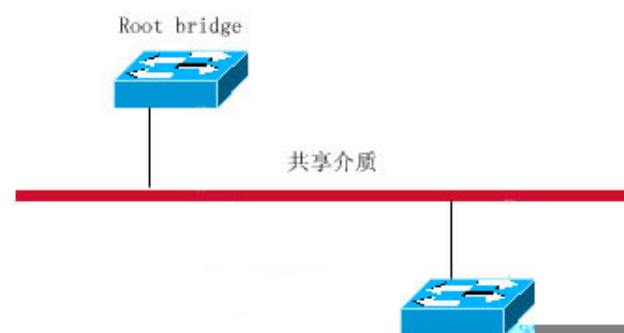


9



10

“ ”



11

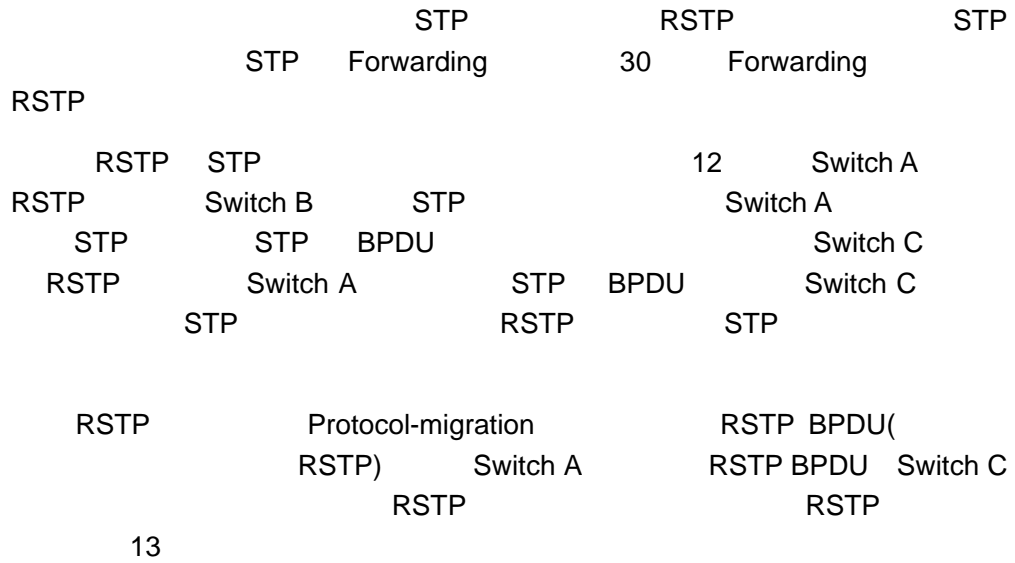
RSTP STP

RSTP

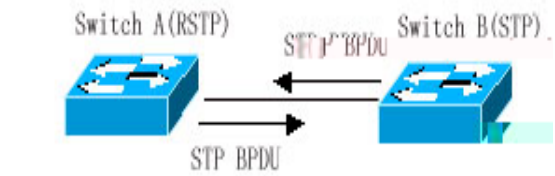
STP

RSTP

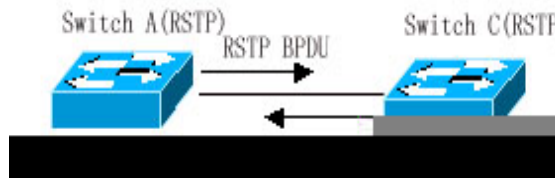
BPDU



Protocol Migration

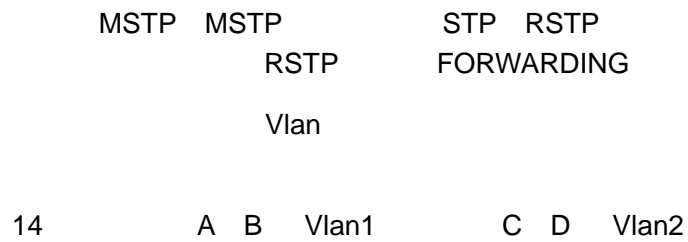


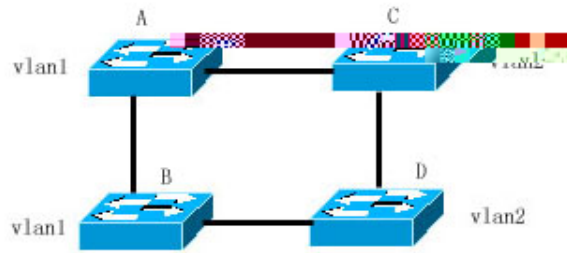
12



13

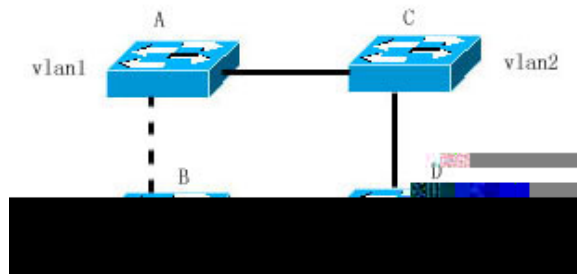
MSTP





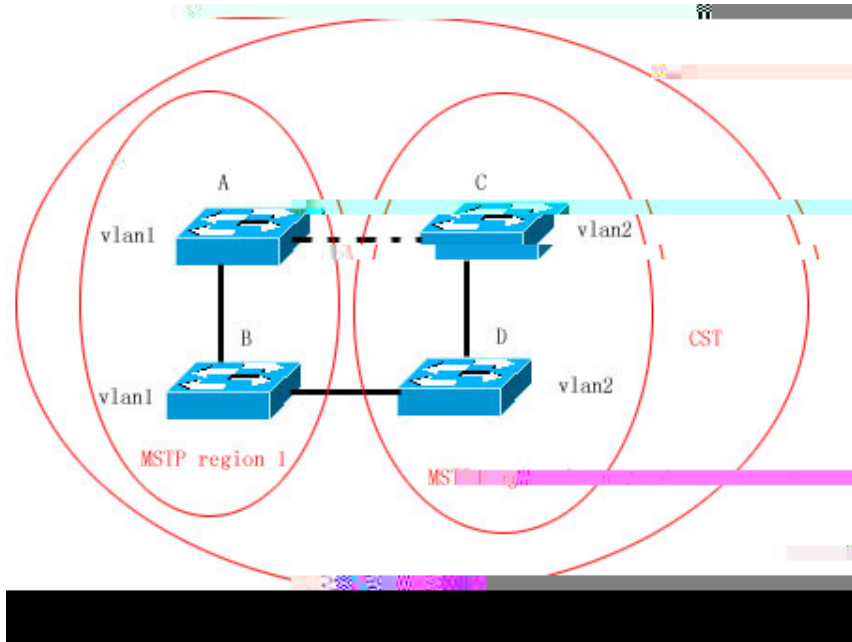
14

| | | | | | | | | |
|-------|---|---|---|-------|---|-------|------------|----|
| | A | | C | D | B | | A | B |
| | | | | A | B | | DISCARDING | 15 |
| Vlan1 | C | D | | Vlan1 | | Vlan1 | | A |
| | | B | | Vlan1 | | | | |



15

| | | | | |
|---------------|----------|---------------|-----|------------------------|
| | | MSTP | | Vlan |
| | Instance | Instance | | MST Region |
| MST region | | | IST | Internal Spanning-tree |
| | | | | MST Region |
| | | | CST | Common Spanning Tree |
| | | MSTP | 16 | A B |
| MSTP Region 1 | | MSTP Region 1 | | |
| DISCARDING | | MSTP Region 2 | | Region 1 |
| Region 2 | | | " " | |
| | | DISCARDING | | |



16

Vlan

MSTP Region

| MSTP Region | MSTP Region | MSTP | MSTP |
|-------------|---------------------|------------|--------------|
| MSTP Region | MSTP Region | "MST | " |
| MST | Name | 32 | MSTP |
| MSTP Region | MST Revision Number | 16bit | MSTP Region |
| MSTP Region | MST Instance—vlan | 64 | Instance id |
| 1 | 64 Instance 0 | 65 | Instance |
| | 1-4094 Vlan | Instance 0 | 64 Vlan |
| | Instance 0 | MSTI | MST Instance |
| BPDU | MSTI | MSTI | CIST MSTI |

spanning-tree mst configuration

"MST "

MSTP BPDU

BPDU

MST
MST Region

Region

建议:

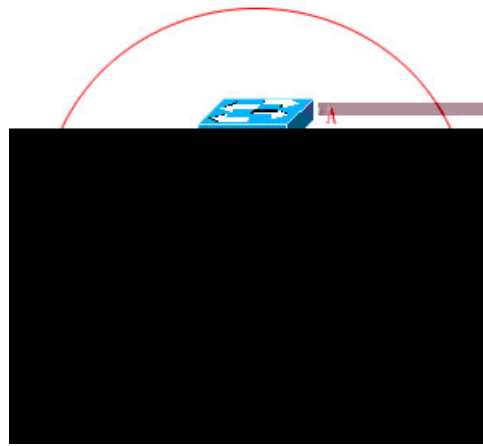
MSTP STP Instance—vlan

MSTP region

IST

| | | | | |
|------------|---------------|-------------------------------|-------------|--------|
| | MSTP Region | Region | Instance | Bridge |
| Priority | Port Priority | Instance | Root Bridge | |
| | Port Role | Port Role | Instance | |
| FORWARDING | DISCARDING | | | |
| | MSTP BPDU | IST(Internal Spanning Tree) | | |
| Instance | | MSTI | Instance 0 | |
| CST | CIST | Common Instance Spanning Tree | | |
| Instance | "vlan " | | | |
| | Region 1 | A B C | | |

0.0- ft 1 0T/ j 12 < d 0 328 0nstacef 0 1 0 2/ JA] 0 era(M d (1) T j / C 2 _ 0

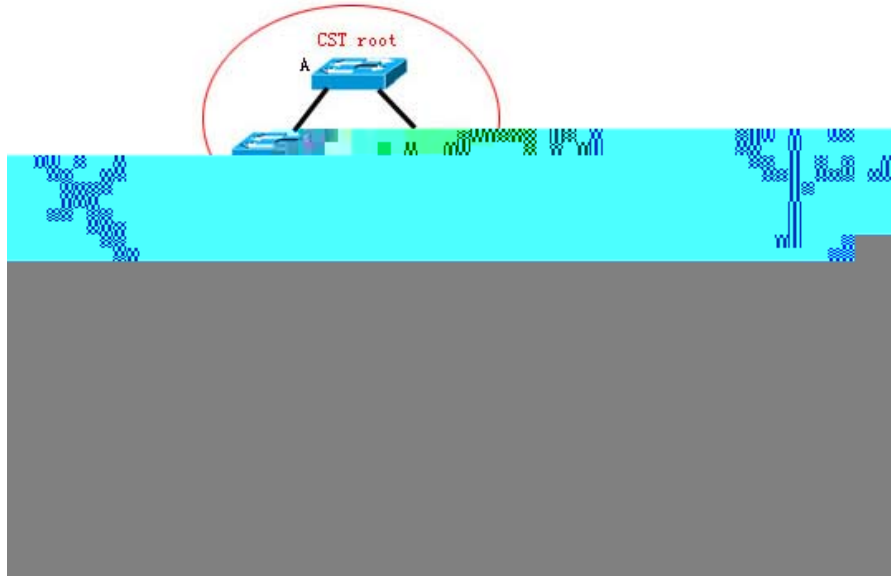


18

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

19

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



20

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

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 MSTP |
| RSTP BPDU | | | |

STP Region
RSTP Region

Region

MSTP

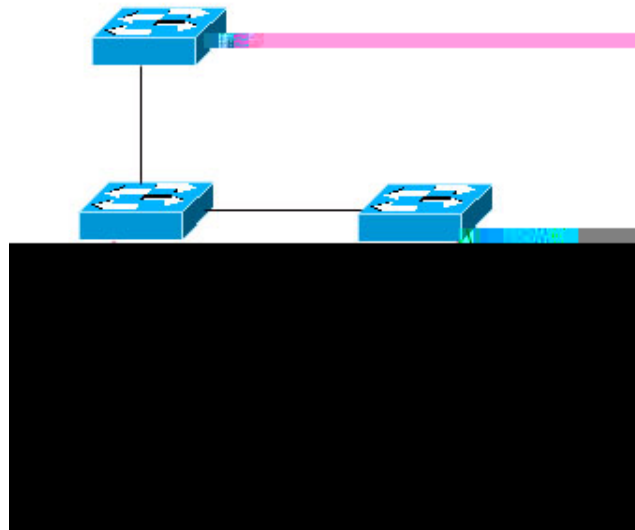
Port Fast

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

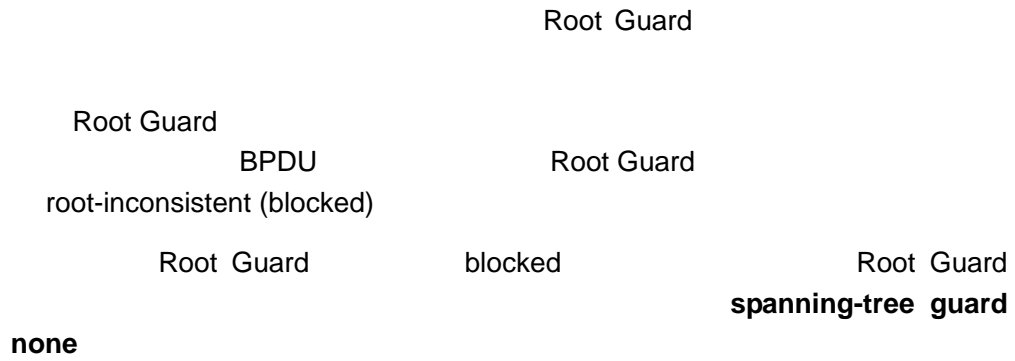
BPDU Guard

BPDU Guard enable Interface enable

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


BPDU

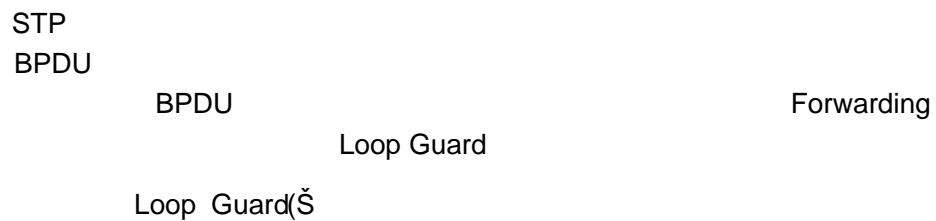
Root Guard



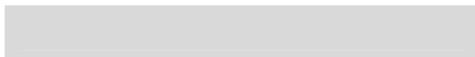
注意:

- 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) 1/1/12 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 instance-id] interface interface-id | |
| Ruijie# copy running-config startup-config | |

no spanning-tree mst cost

Path Cost

path cost method

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

Path Cost

| | Interface | IEEE 802.1d short | IEEE 802.1t long |
|-------|----------------|-------------------|------------------|
| 10M | | 100 | 2000000 |
| | Aggregate Link | 95 | 1900000 |
| 100M | | 19 | 200000 |
| | Aggregate Link | 18 | 190000 |
| 1000M | | 4 | 20000 |
| | Aggregate Link | 3 | 19000 |

| | |
|---|-----------------|
| Ruijie# configure terminal | |
| Ruijie(config)# spanning-tree pathcost method long/short | short long long |
| Ruijie(config)# end | |
| Ruijie# show running-config | |
| Ruijie# copy running-config startup-config | |

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 Link Aggregate |

| | |
|---|--------------------|
| 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 | |

BU6spE?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
# BPDUGuard 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

100Mbps

1000Mbps

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

```

```

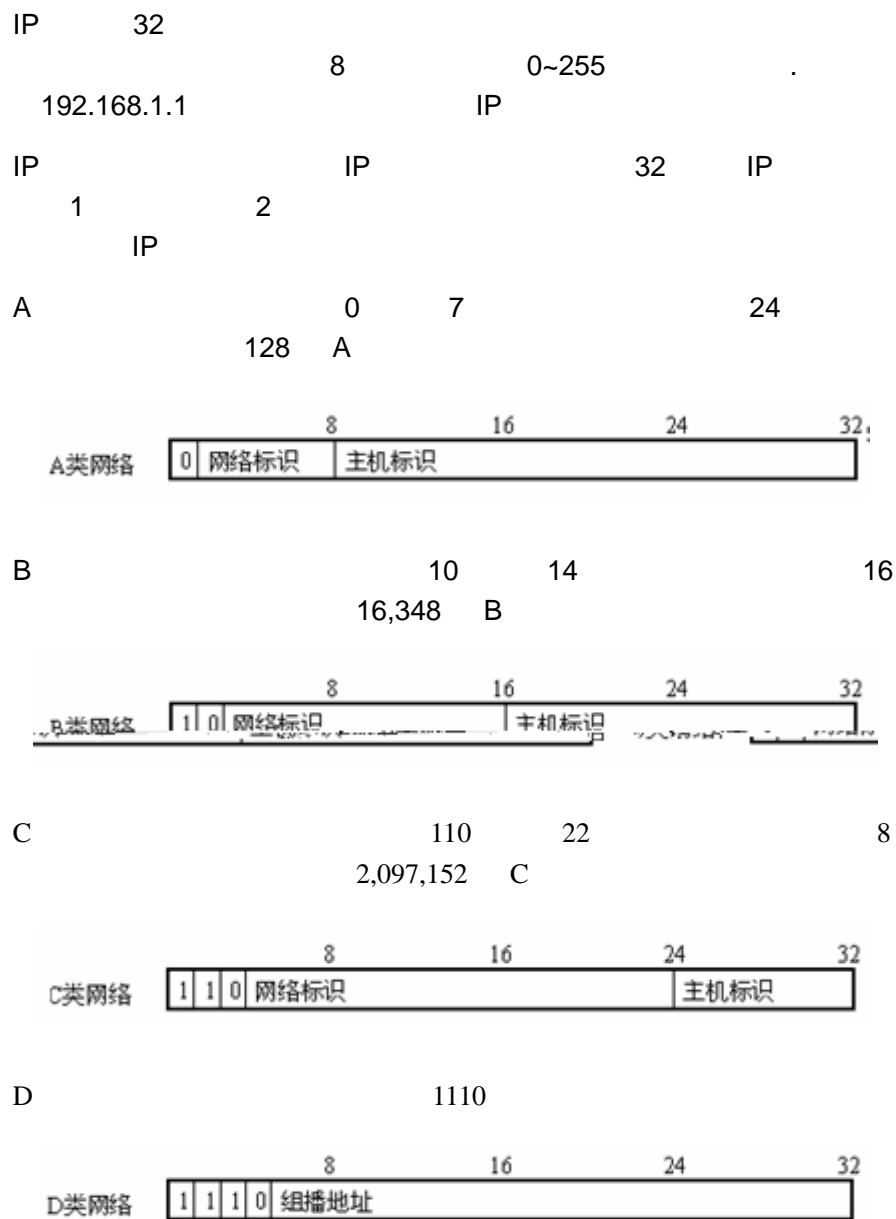
Ruijie# show monitor session 1
sess-num: 1
src-intf:
GigabitEthernet 3/1 frame-type Both
dest-intf:
GigabitEthernet 3/8

```

IP

IP

IP



说明:

1111

IP

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

IP

TCP/UDP

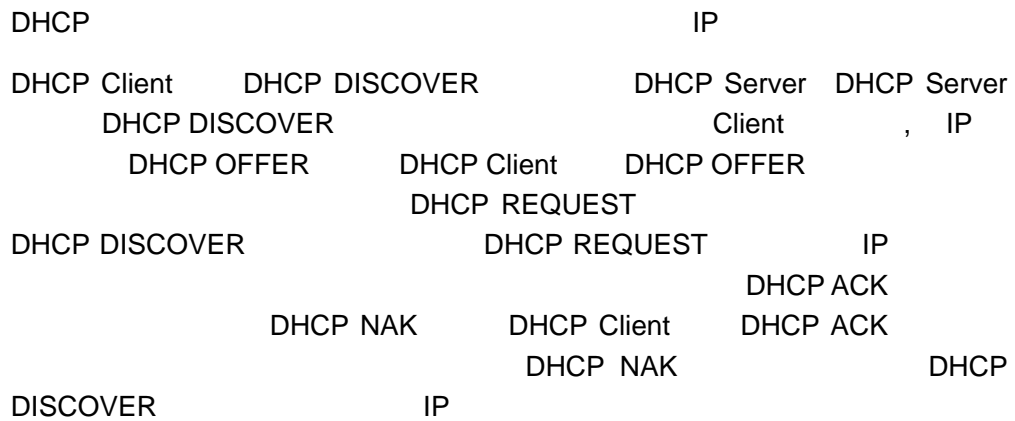
RFC 1166

IP

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

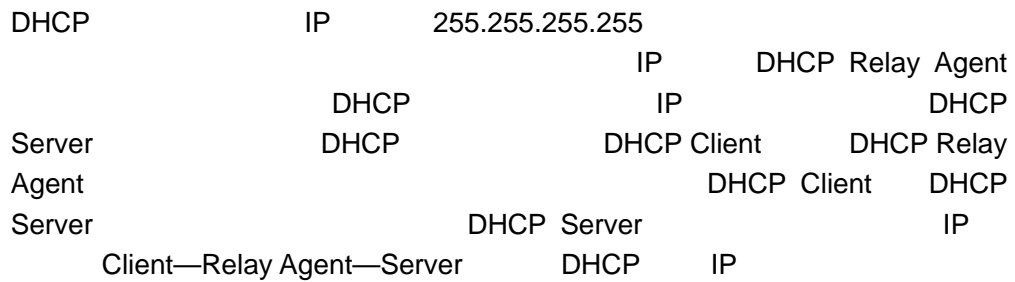
DHCP Relay

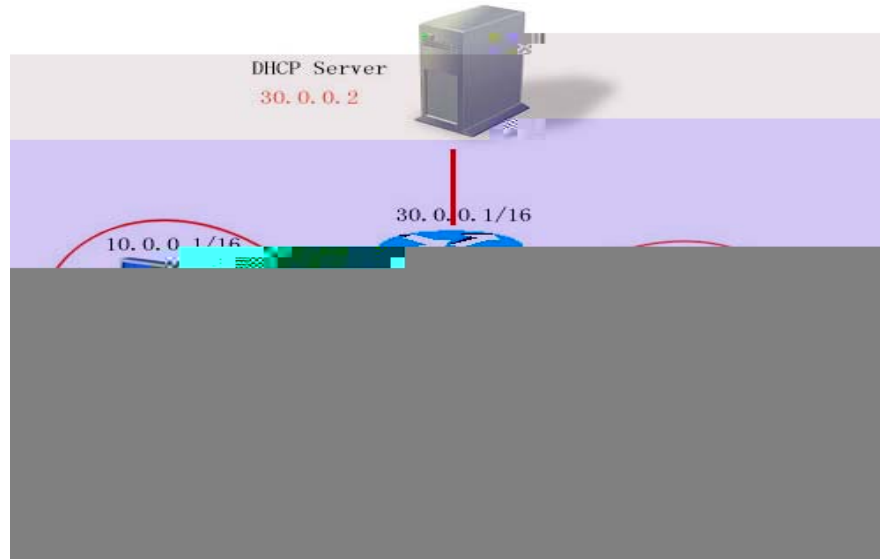
DHCP



DHCP

DHCP Relay Agent



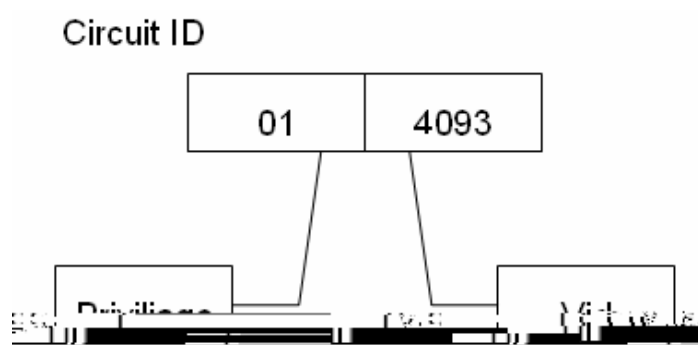


1

| | | | | |
|-------------|----------------|-------------|-------------|-------------|
| 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 relay | option |
| | DHCP client | |
| | IP | option |
| 82 | option82 | |



2

2. relay agent information option82 option

DHCP client DHCP REQUEST
server-id option
relay
server DHCP server DHCP
check server-id

DHCP

DHCP

DHCP

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

DHCP Server IP

DHCP Server IP DHCP DHCP
Server DHCP Client
DHCP server 20 DHCP

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 |

ip dhcp relay suppression DHCP relay suppression
 DHCP relay

| | |
|--|------------------------|
| | |
| Ruijie(config-if)# ip dhcp relay suppression | DHCP relay suppression |
| Ruijie(config-if)# no ip dhcp relay suppression | DHCP relay suppression |

DHCP

```

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

Ruijie(config)# ip helper-address 192.18.100.2 //

Ruijie(config)# interface GigabitEthernet 0/3
Ruijie(config-if)# ip helper-address 192.18.200.1 //

Ruijie(config-if)# ip helper-address 192.18.200.2 //

Ruijie(config-if)# end
    
```

DHCP relay

dot1x option82 vlan relay option
 vlan relay

DHCP option dot1x

1. AAA/802.1x
2. 802.1x DHCP IP
3. **dhcp option82**

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
```

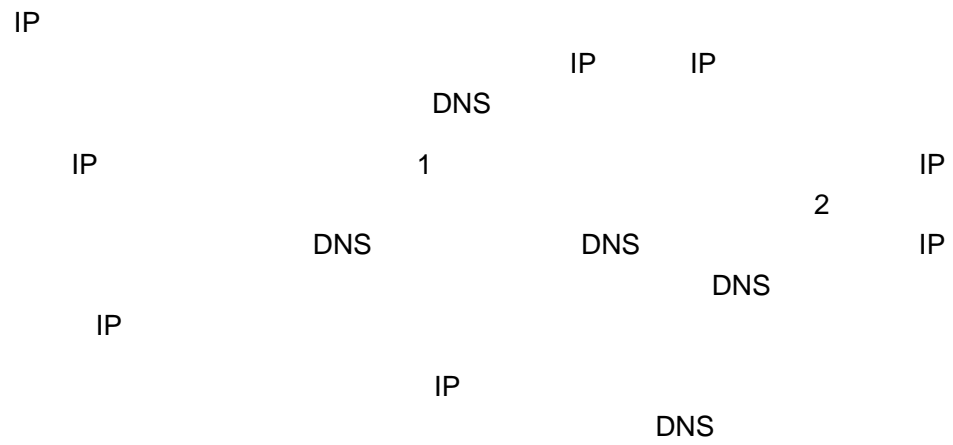
```
#
Ruijie(dhcp-config)# default-router 10.2.1.1

#    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 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

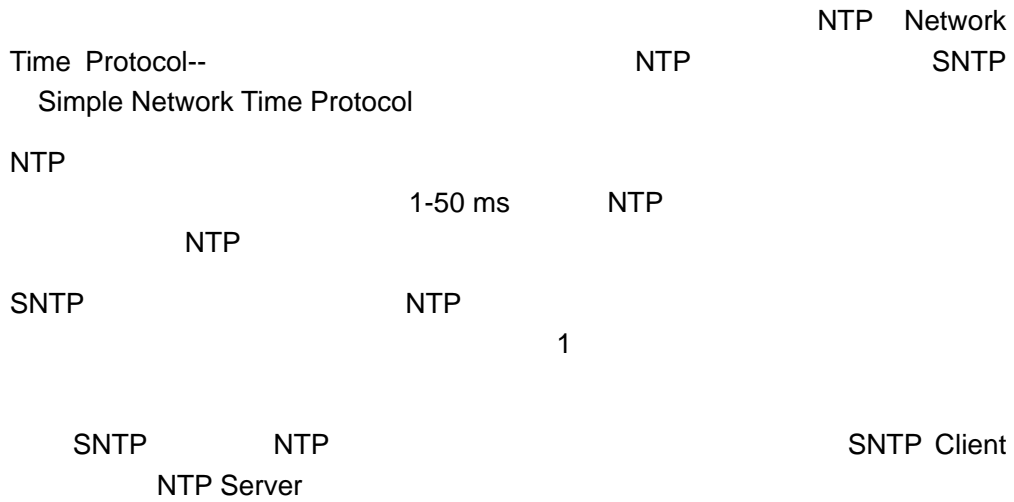
| Ruijie# show hosts | DNS |
|--------------------|-----|

```
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
```

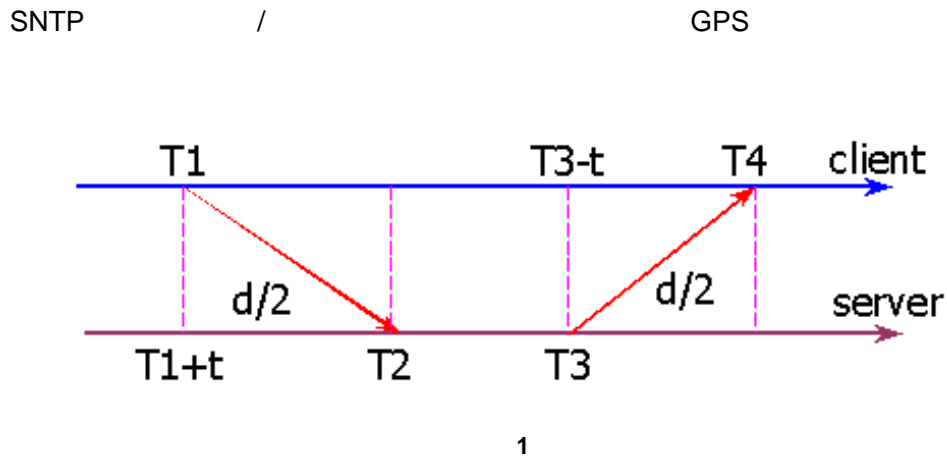
Ping

```
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          frep
  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 /

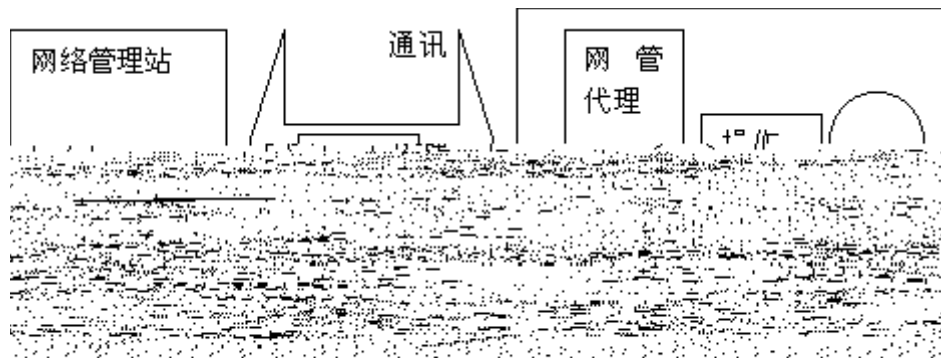
SNMP
SNMP
MIB

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

SNMP SNMP Agent
NMS

NMS

NMS Agent



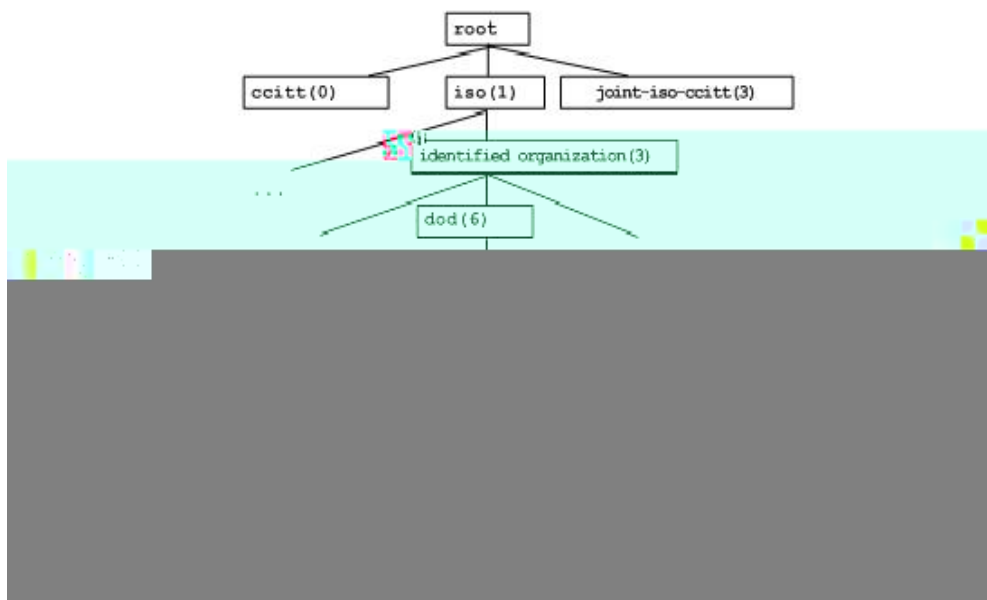
1

NMS

Agent

MIB Management Information Base

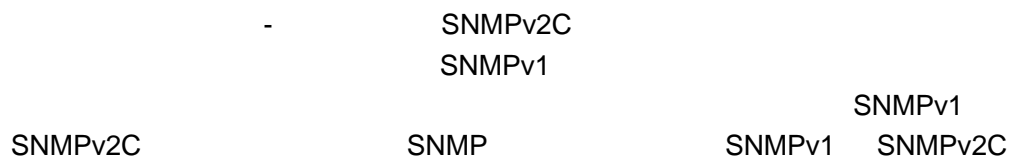
SNMP
MIB
System Object Identifier {1.3.6.1.2.1.1}
MIB



2 MIB

SNMP

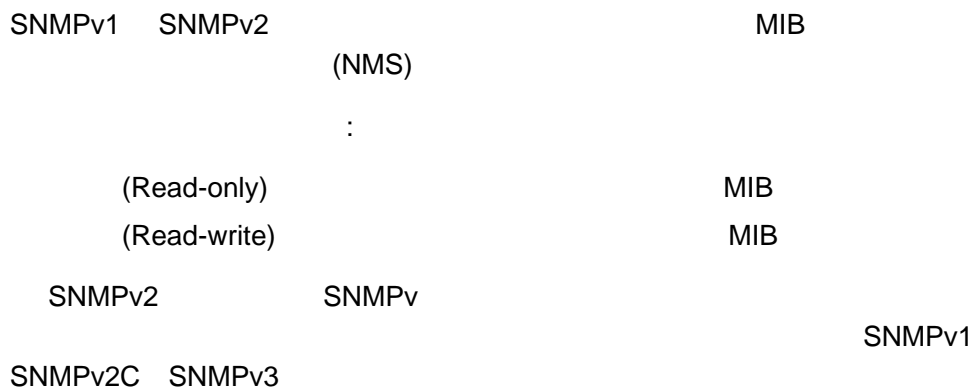
SNMP
SNMPv1 RFC1157
SNMPv2C Community-Based SNMPv2 ,
RFC1901
SNMPv3



SNMP

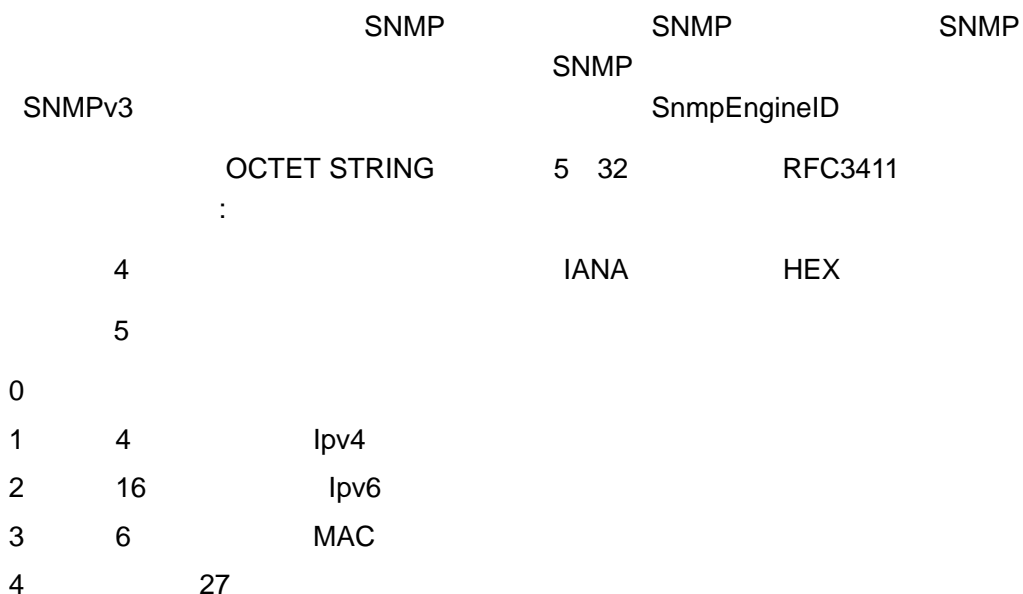
| SNMP | NMS | Agent | 6 |
|---------------------|-----|-------|---|
| 1. Get-request | NMS | Agent | |
| 2. Get-next-request | NMS | Agent | |
| 3. Get-bulk | NMS | Agent | |
| 4. Set-request | NMS | Agent | |

SNMP



| Version | AuthPriv | Auth | Priv | Privacy |
|---------|--------------|------------|------|---------------------------------|
| 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 { <i>num</i> <i>name</i> }] | |

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 { <i>num</i> <i>name</i> }] | |

no snmp-server user *username groupname*

SNMP

Agent

NMS

Agent

NMS

| | |
|--|--------------------------|
| | |
| Ruijie(config)# snmp-server host <i>host-addr</i> traps [version { <i>1</i> <i>2c</i> <i>3</i> [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

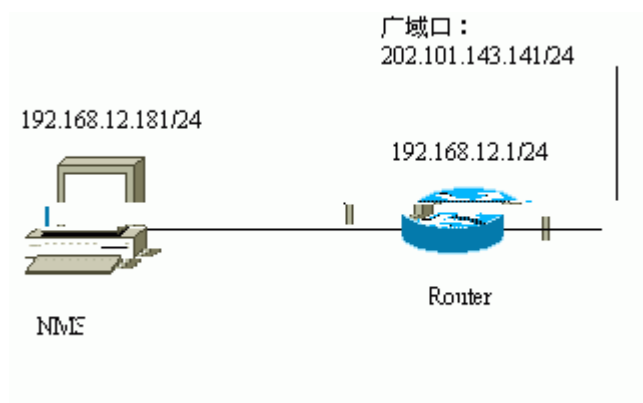
```
Ruijie# show snmp group
```

```
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
 IP 192.168.12.1

HP OpenView



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

6B4Au4~



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
              rmo0 15  Trap      1      (
              much )      zhangsan      ifInNUcastPkts is too

```

```
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
IP
MAC
IP+MAC
MAC
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"20a10-100P0E10,10~~

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

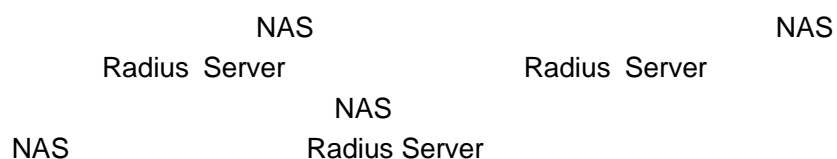
| | |
|-----------------------------------|----------------------------|
| | |
| configure terminal | AAA u |
| | |
| aaa group server radius gs | u |
| | |
| exit | u |

| | | |
|-------------------------|--------|----------------------------------|
| dot1x accounting | 802.1X | |
| end | | no aaa accounting network |

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

注意:

- 1) Radius Server
- 2) AAA
- 3) 802.1X
- 4) 802.1x
- 5) Radius Server
- 6) AAA **aaa domain enable**
dot1x accounting AAA



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

no aaa accounting update

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

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)

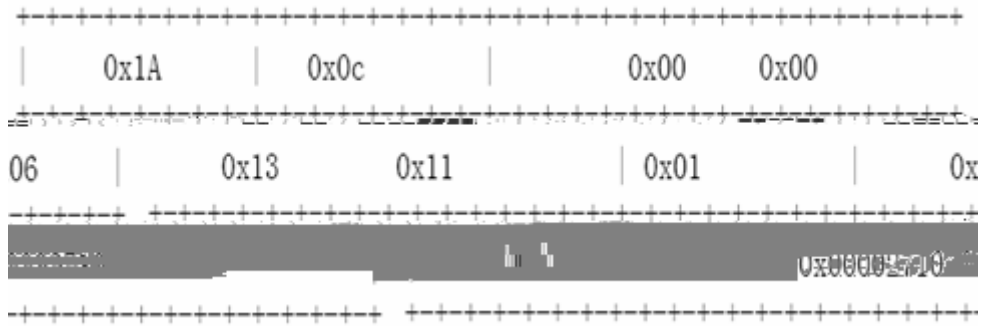
| | |
|--------|-------------|
| 802.1x | IEEE 802.1x |
|--------|-------------|

MAC

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

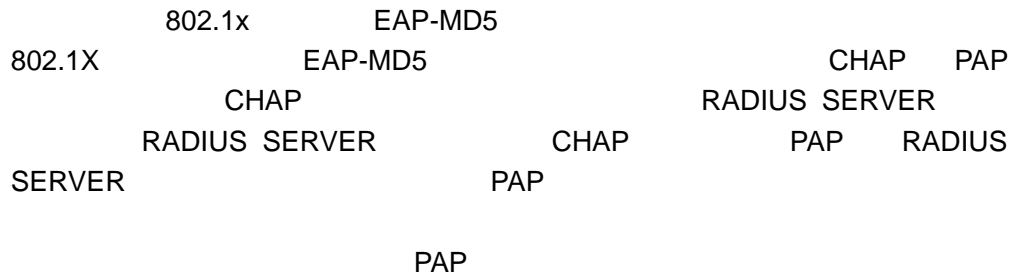
| | |
|----------------------------|--|
| end | |
| write | |
| show running-config | |

10M



8

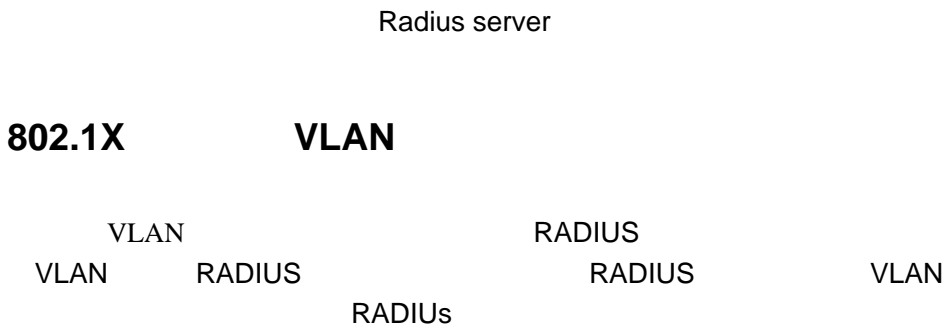
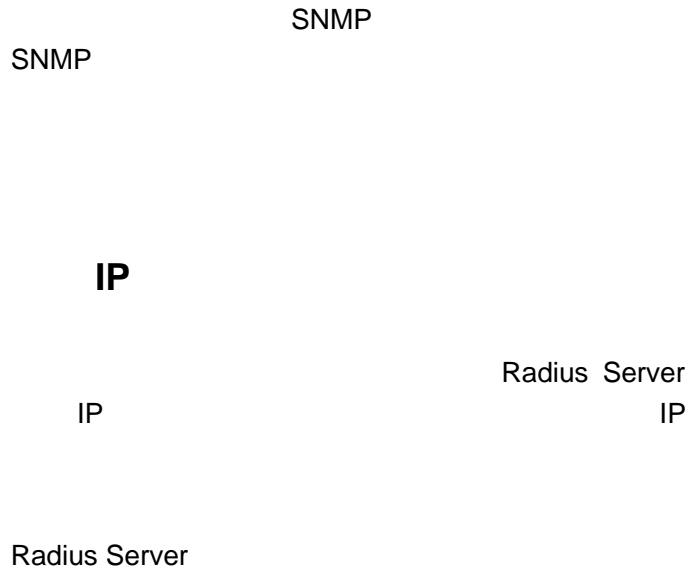
0x00002710 10M 10000kbps 16



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

R1

TIMEOUT

R2

TIMEOUT

注意:

REJECT

TIMEOUT

REJECT

TIMEOUT

TIMEOUT

AAA

说明:

AAA

TACACS+

RADIUS

TACACS+

AAA

AAA

AAA

AAA

AAA

AAA

1) AAA

aaa new-model

2)

RADIUS

3)

aaa authentication

4)

注意:

AAA

```

AAA
  aaa new-model
TACACS+
  aaa authentication
RADIUS
RADIUS
RADIUS
TACACS+
TACACS+

```

注意:

```

DOT1X
TACACS+

```

AAA Login

AAA Login

注意:

```

aaa new-model
AAA AAA
AAA
Telnet
NAS (NAS)
AAA
Login
Login
aaa authentication login
Login

```

AAA Login

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

| | |
|---|-----|
| 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
!
```

```

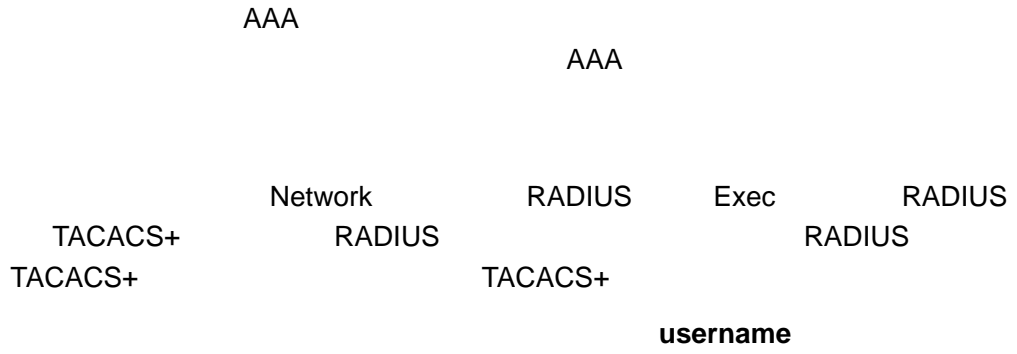
                                RADIUS      IP    192.168.217.64
                                RADIUS
vty          tty 1-4                                tty
```

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 Login CLI

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

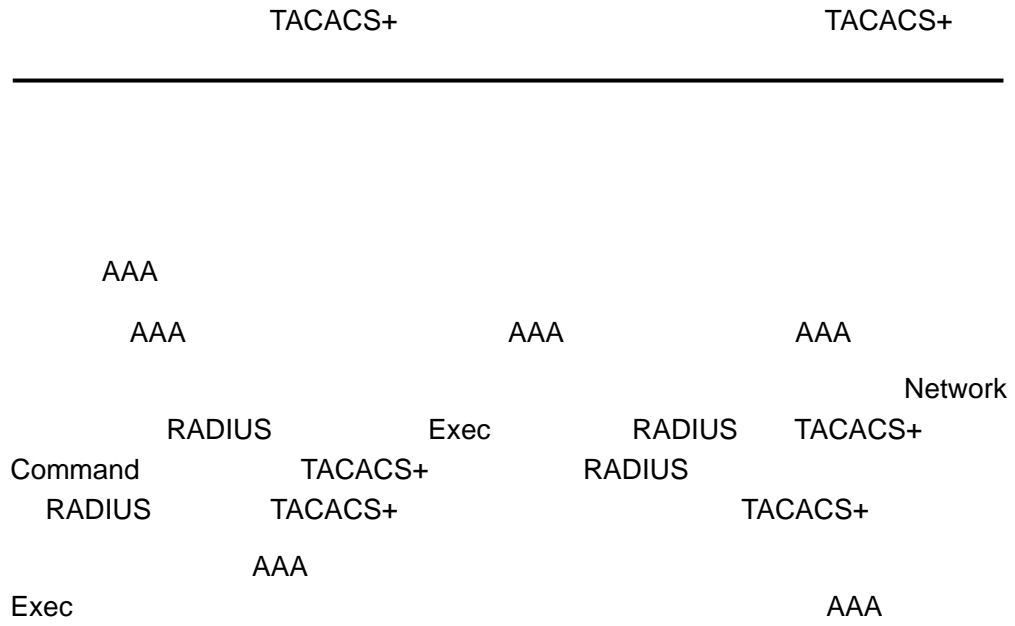
Exec
Command
Network

Exec

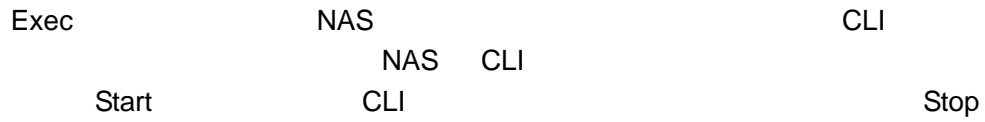
NAS

CLI
NAS CLI

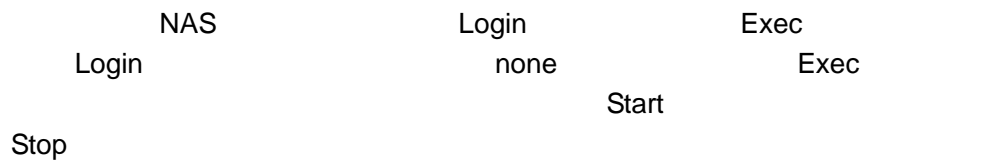
说明:



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

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 [domain-name] | 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

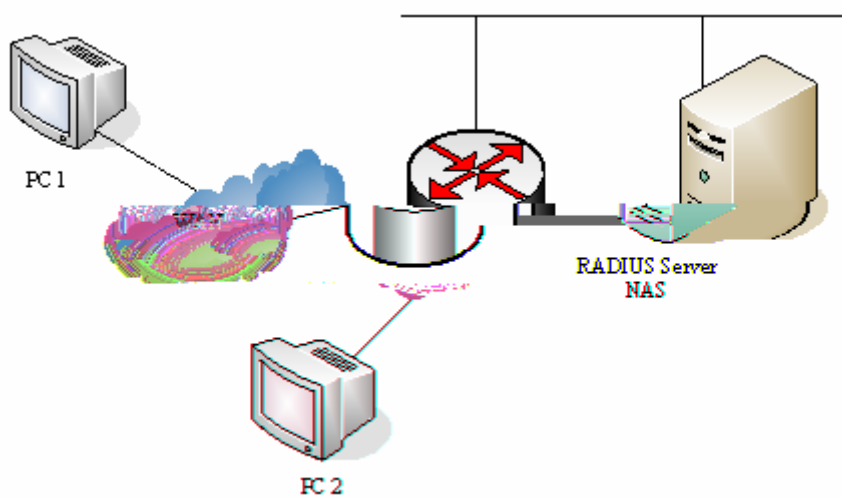
RADIUS

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
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 RADIUS AAA
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  
!
```

TACACS+

TACACS+

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

TACACS+

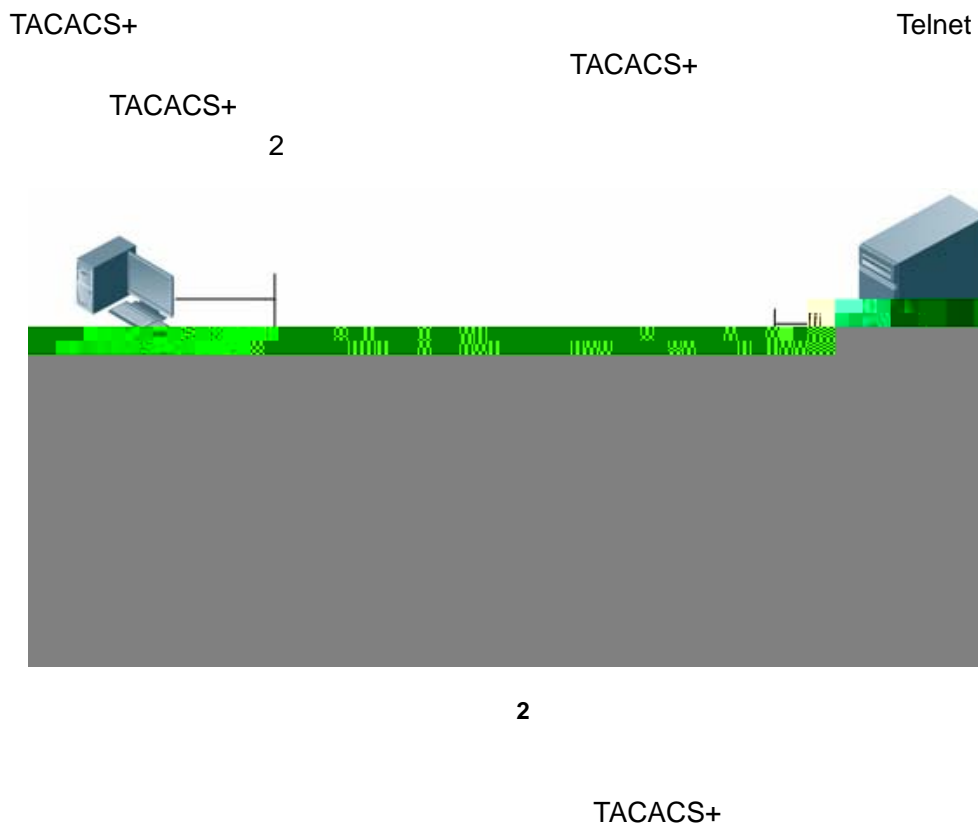
TACACS+

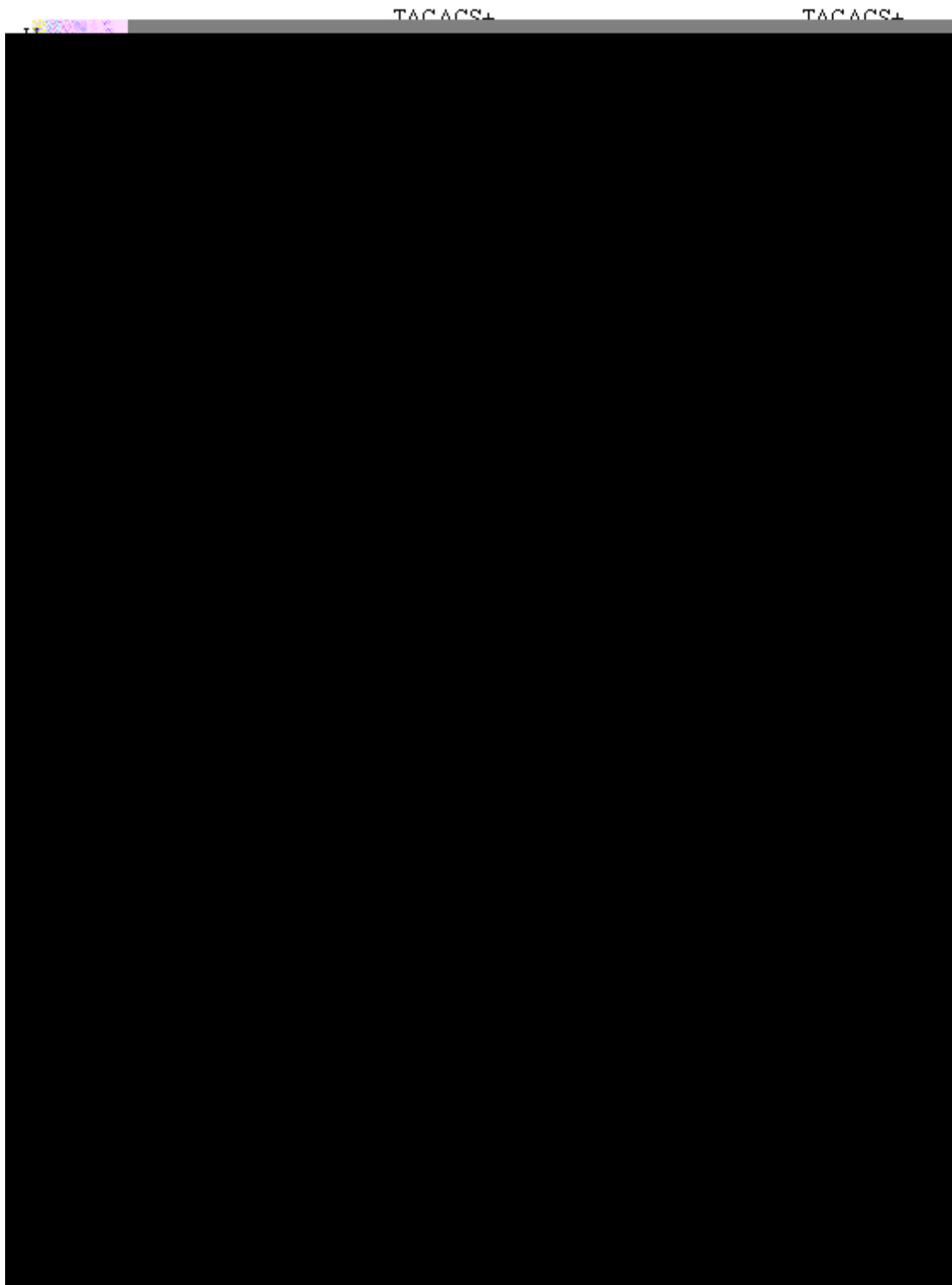
| 4 | 8 | 16 | 24 | 32 bit |
|------------|-------|-------------|--------------|--------|
| Major | Minor | Packet type | Sequence no. | Flags |
| Session ID | | | | |
| Length | | | | |

1

Major Version

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 | |

tacacs-server host

TACACS+
TACACS+

TACACS+

TACACS+

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

注意:

TACACS+

TACACS+

AAA

AAA

Login

AAA

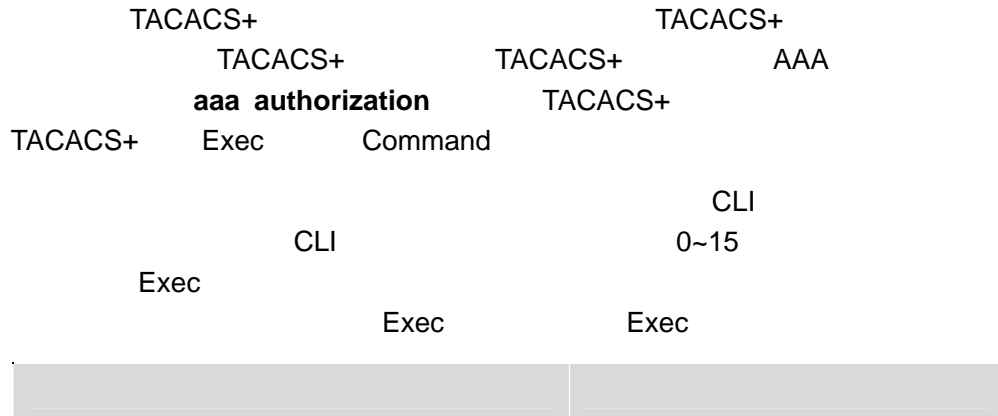
| | |
|--|--------------------|
| | |
| configure terminal | |
| tacacs-server host <i>ip-address</i> [port <i>integer</i>] [timeout <i>integer</i>] [key <i>string</i>] | TACACS+ TACACS+ |

| | |
|---|---|
| <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+



2

2

E

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} | |

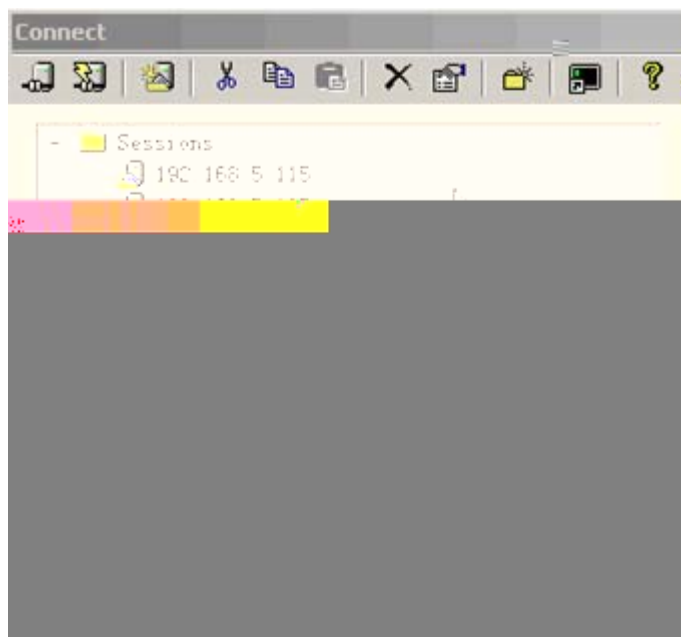
注意:

**[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

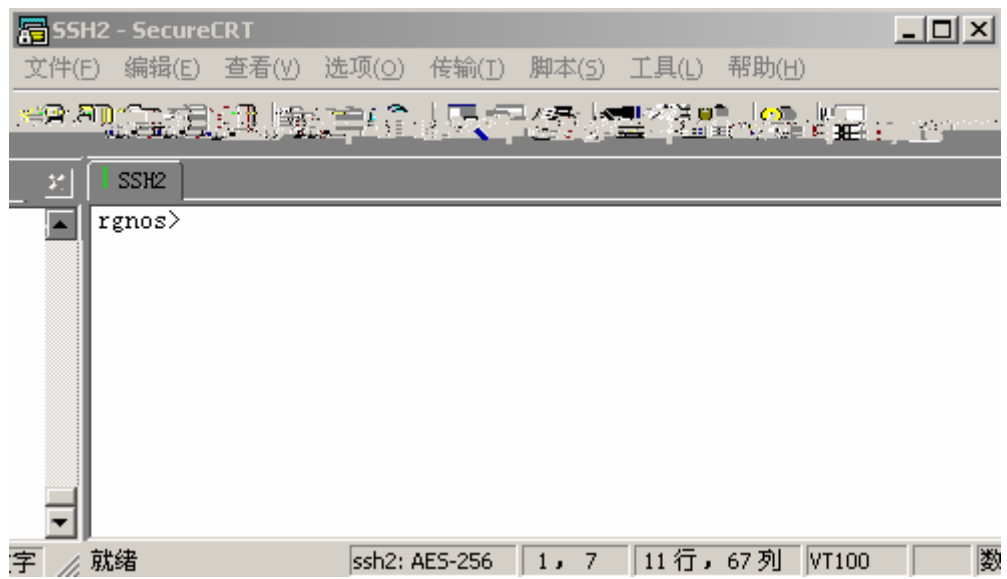
Accept Once()



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 | |

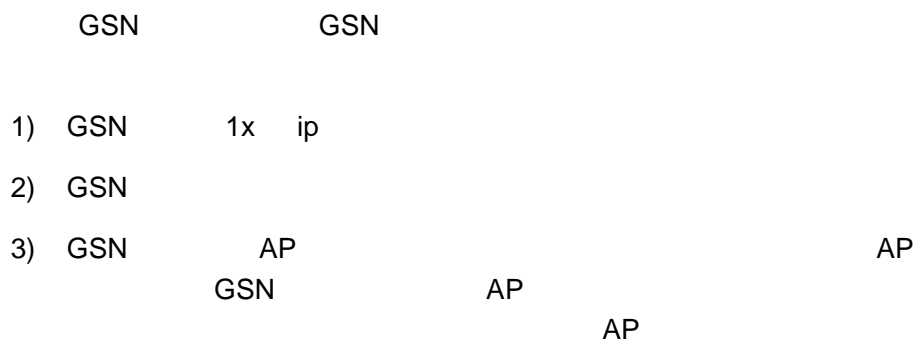
```
Ruijie# show security event interval
Event sending interval(Seconds):5
```

GSN

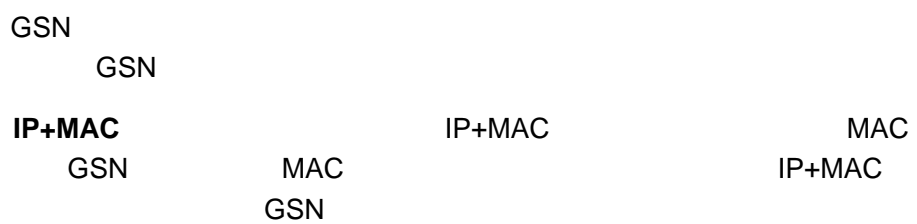
GSN



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

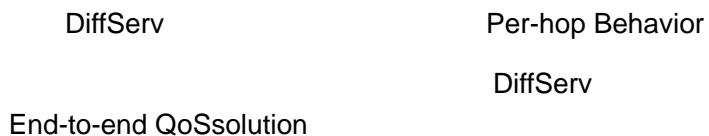
VLAN

ARP

QOS

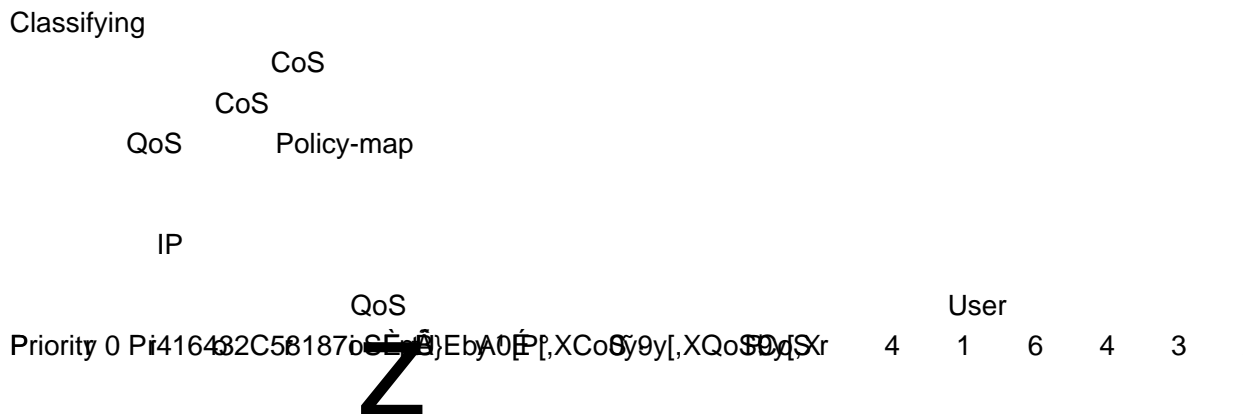
QOS

DiffServ

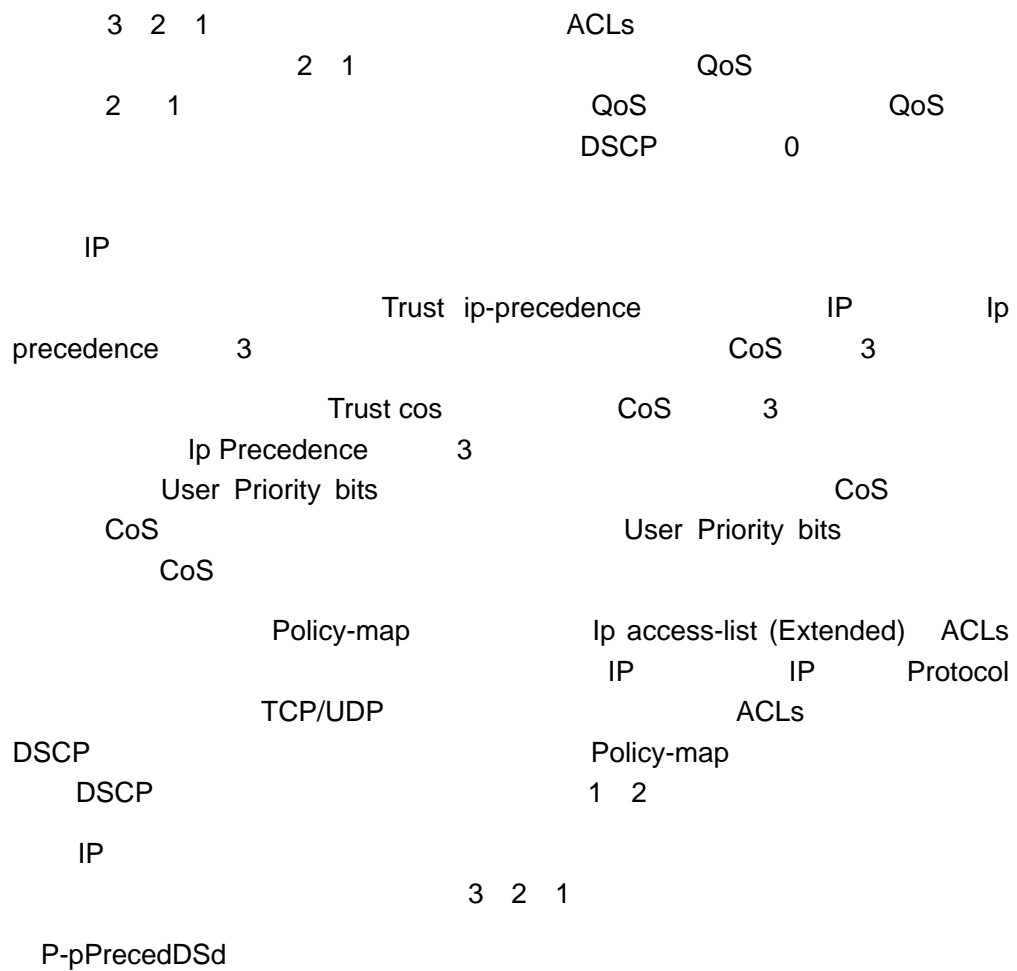


QOS

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

| | |
|------------------------------|--|
| | |
| 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

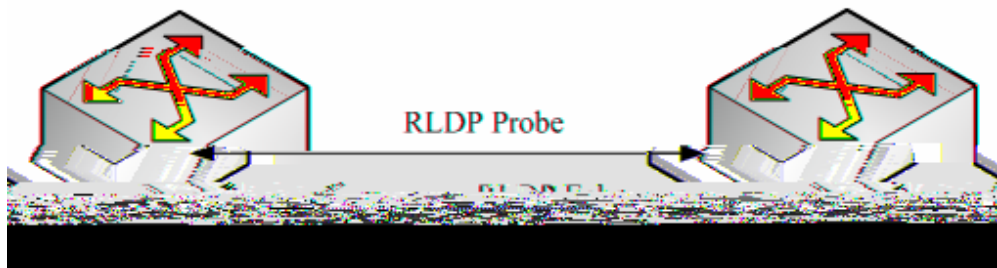
RLDP Rapid Link Detection Protocol

linkup

RLDP

RLDP

RLDP



1

RLDP

RLDP

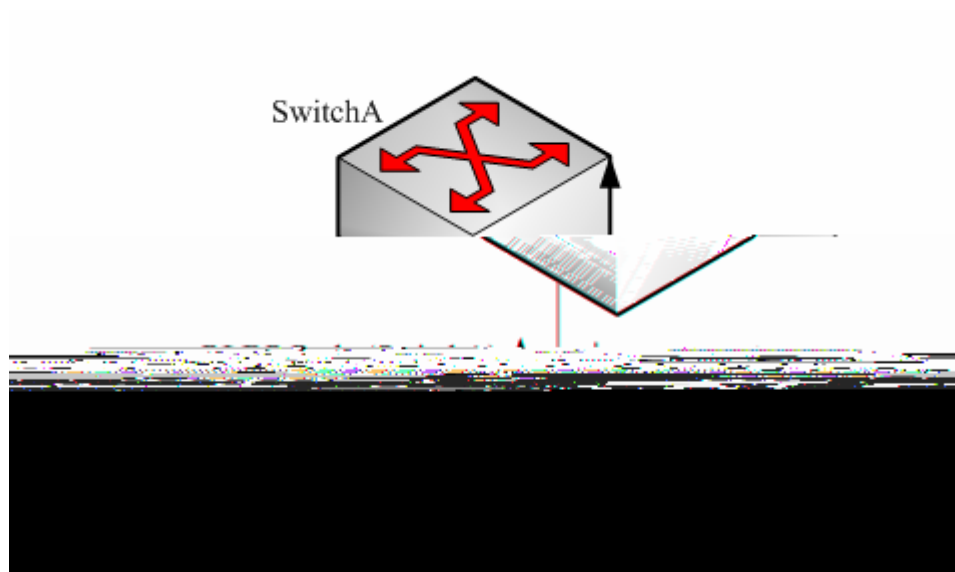
linkup

(Probe)

(Echo).RLDP

说明:

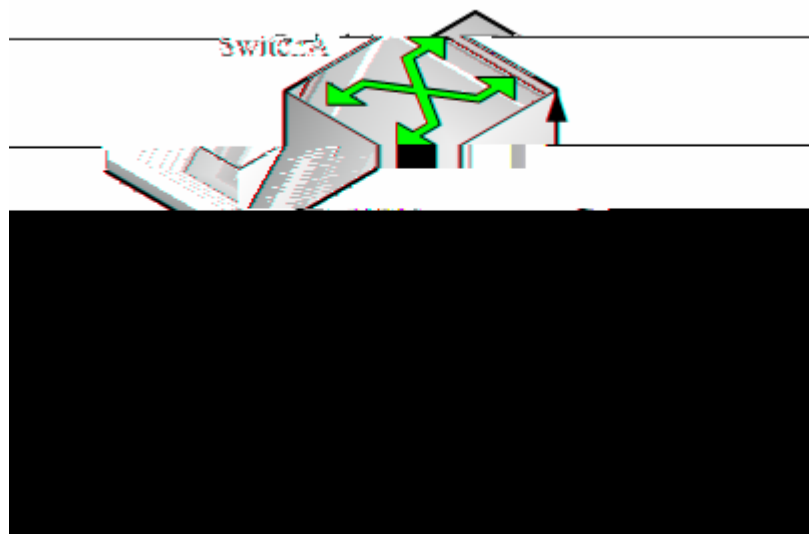
RLDP RLDP RLDP



2

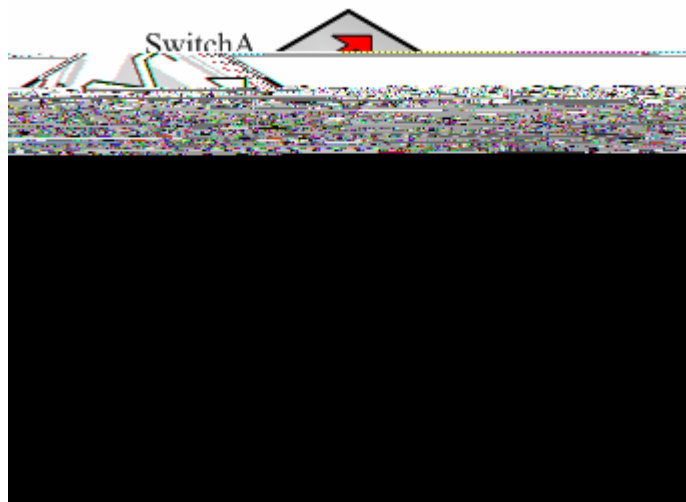
RLDP RLDP RLDP

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

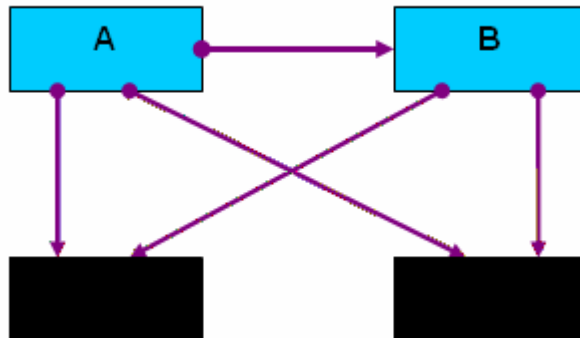
CPU

TPP

MSTP VRRP
MSTP VRRP

CPU

MSTP VRRP



1

MSTP

| | | | |
|-----|-----|------|---|
| A | A B | C D | A |
| A | CPU | BPDU | |
| C D | B | | C |

TPP

D B
B CPU A
C D

TPP

TPP

说明:

TPP cpu topology-limit cup
cpu 50-70, TPP
TPP TPP TPP
no

| | |
|--|--|
| | |
|--|--|

Ruijie> enable

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

no topology guard

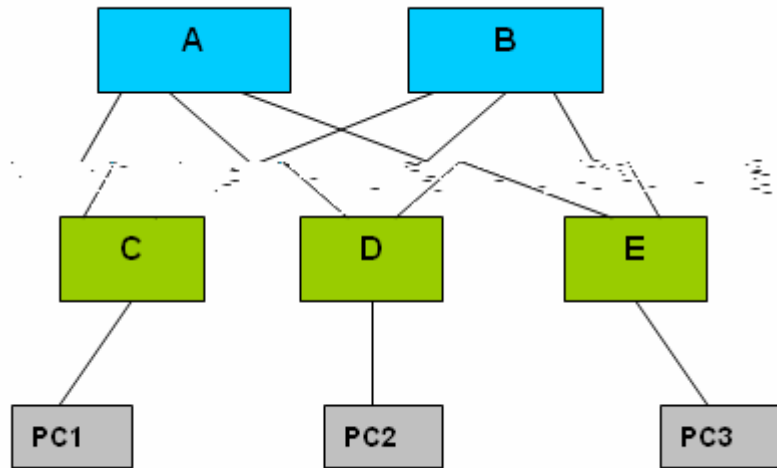
| | |
|--|--|
| | |
| Ruijie> enable | |
| Ruijie# config terminal | |
| Ruijie(config)# interface gi 0/1 | |
| Ruijie(config-if)# tp-guard port enable | |
| Ruijie(config-if)# end | |

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

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

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

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

dev MTD JFFS2
Ruijie# **makefs** **dev/dev/mtd/mtdblock/1** **fs** *jffs2*
JFFS2 MTDBLOCK

| | |
|---|--|
| | |
| Ruijie# mkdir <i>directoryname</i> | |

BAK

Ruijie# **mkdir** *bak*

| | |
|--|--|
| | |
| Ruijie# rename flash: <i>old_filename</i> flash: <i>new_filename</i> | <i>old_filename</i> <i>new_filename</i> |

| | |
|--------------------|--|
| | |
| 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 | |
| WEB | |

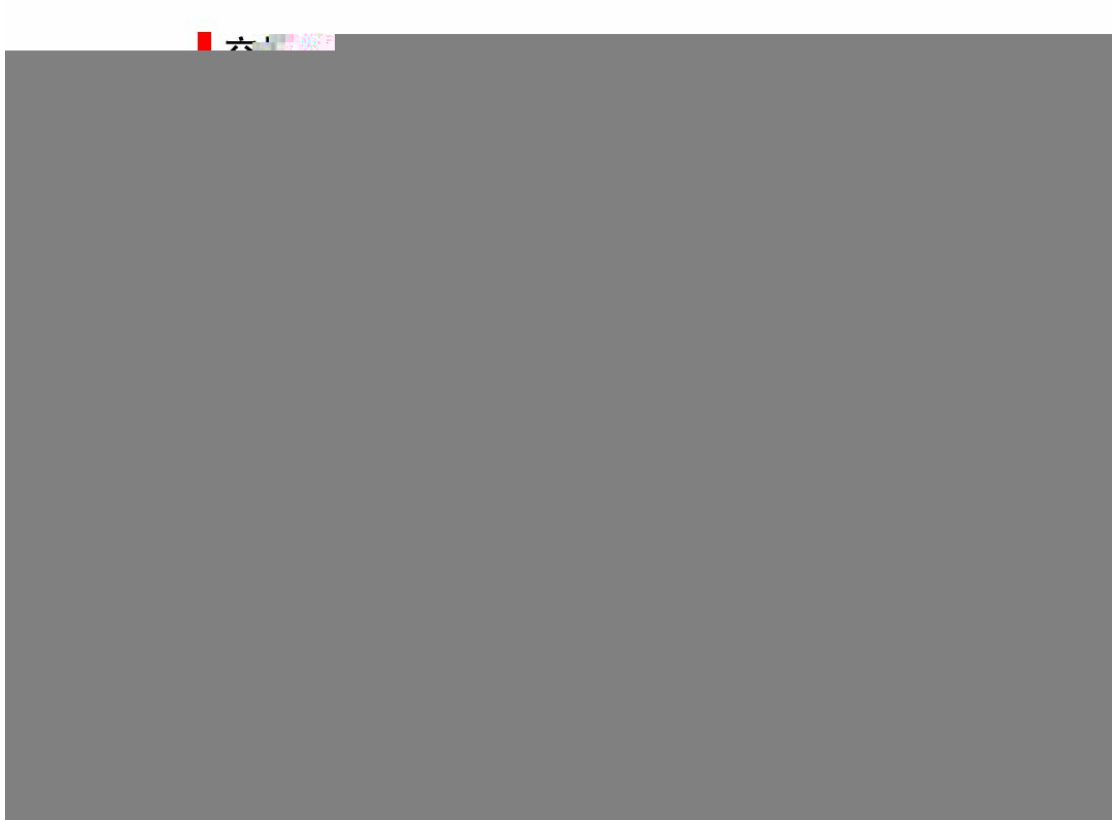
说明:

| | |
|-------------|--------------------|
| WEB | WEB |
| WEB | Enable |
| Enable | |
| S2724G WEB | IP 192.168.1.200 / |
| admin/admin | |

WEB

IP

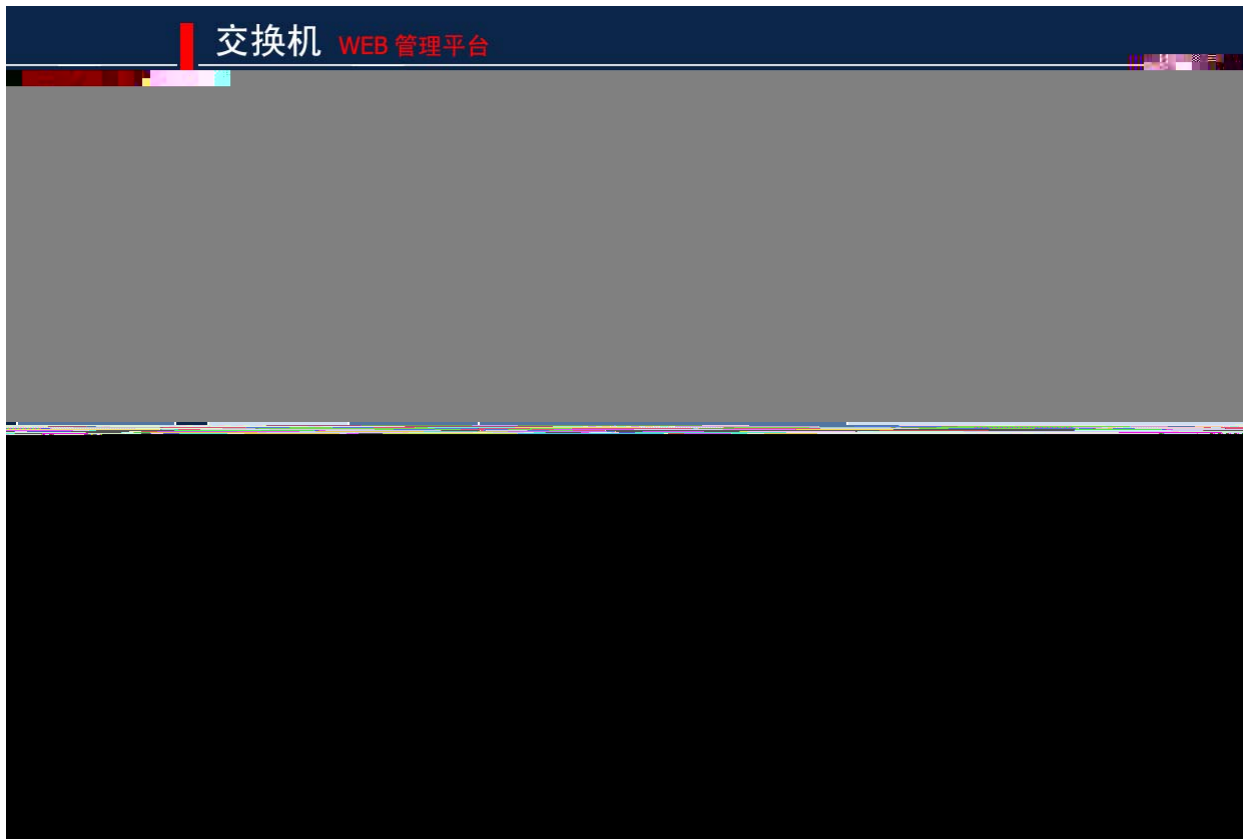
http://192.168.1.200,



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 |

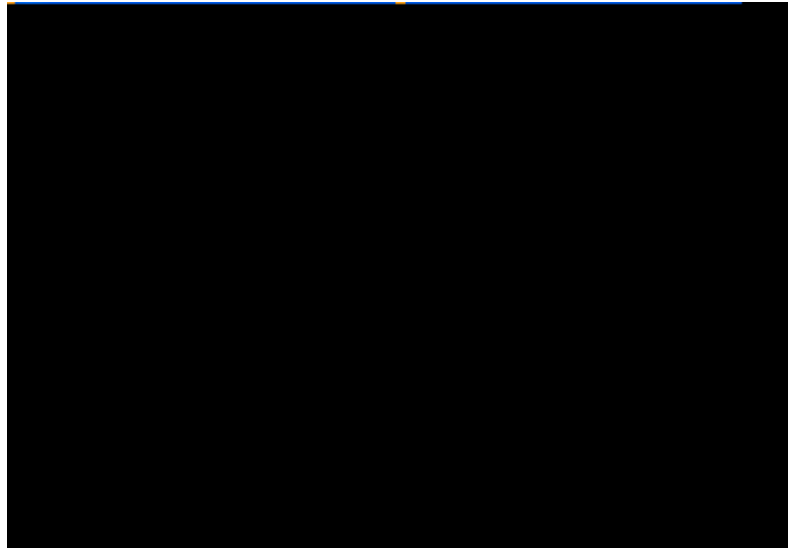
新建 全选 删除 修改

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。

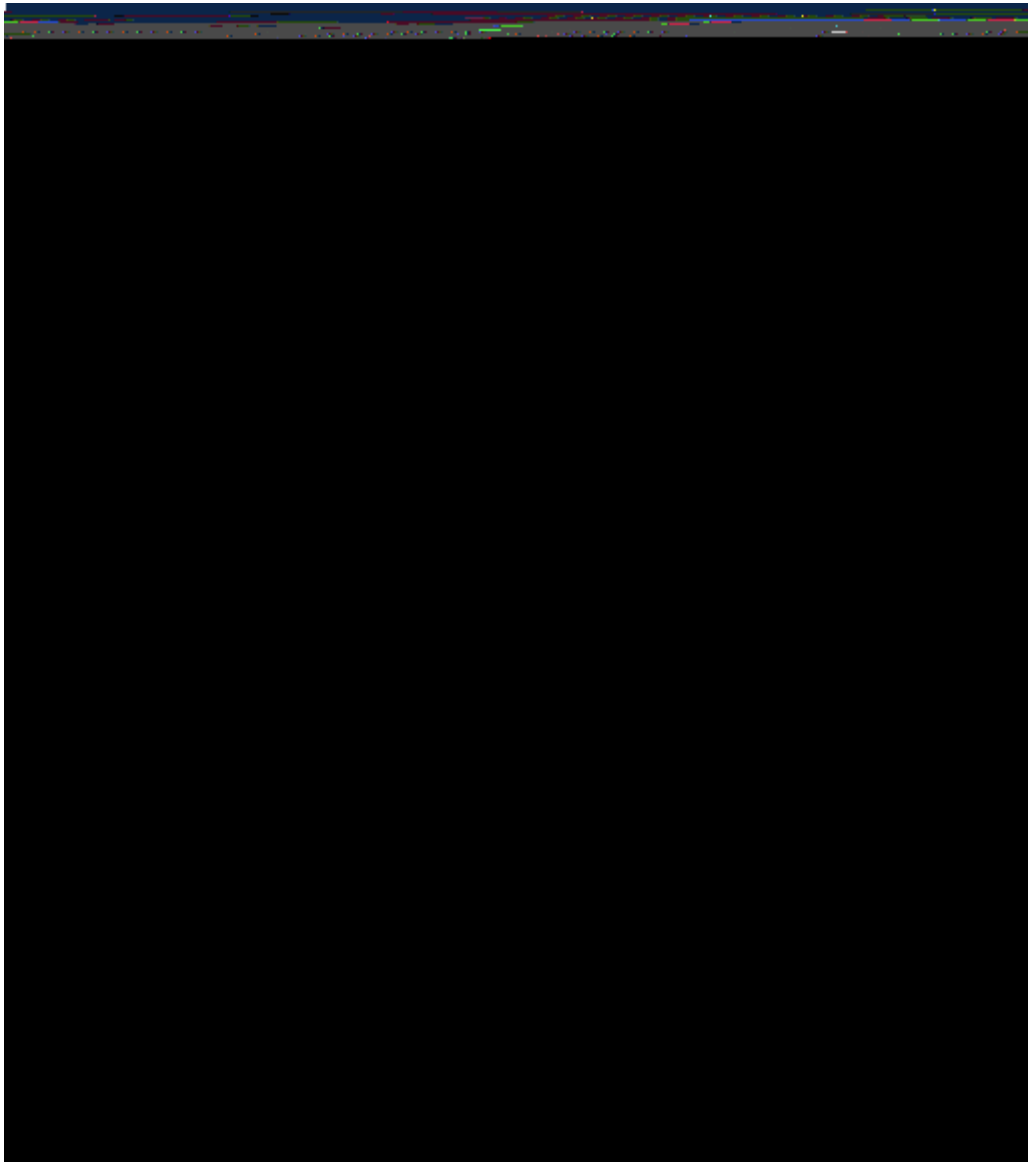
网关IP地址：

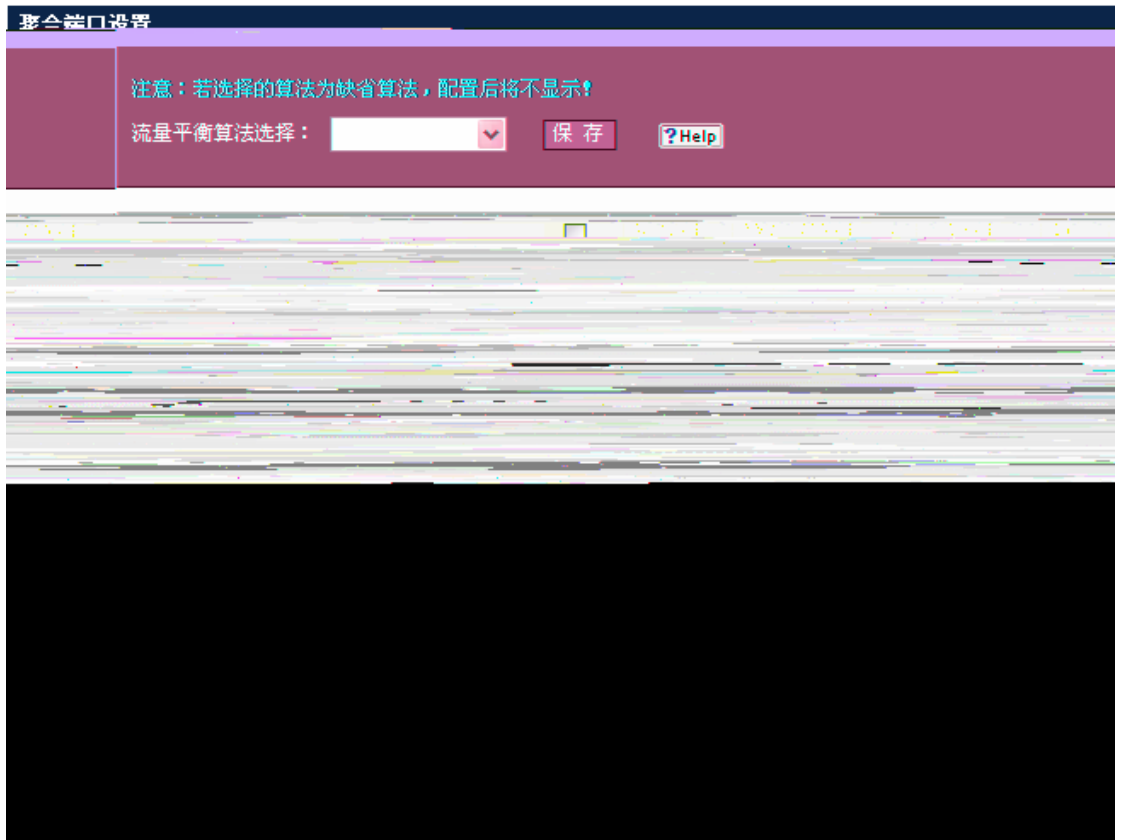
10

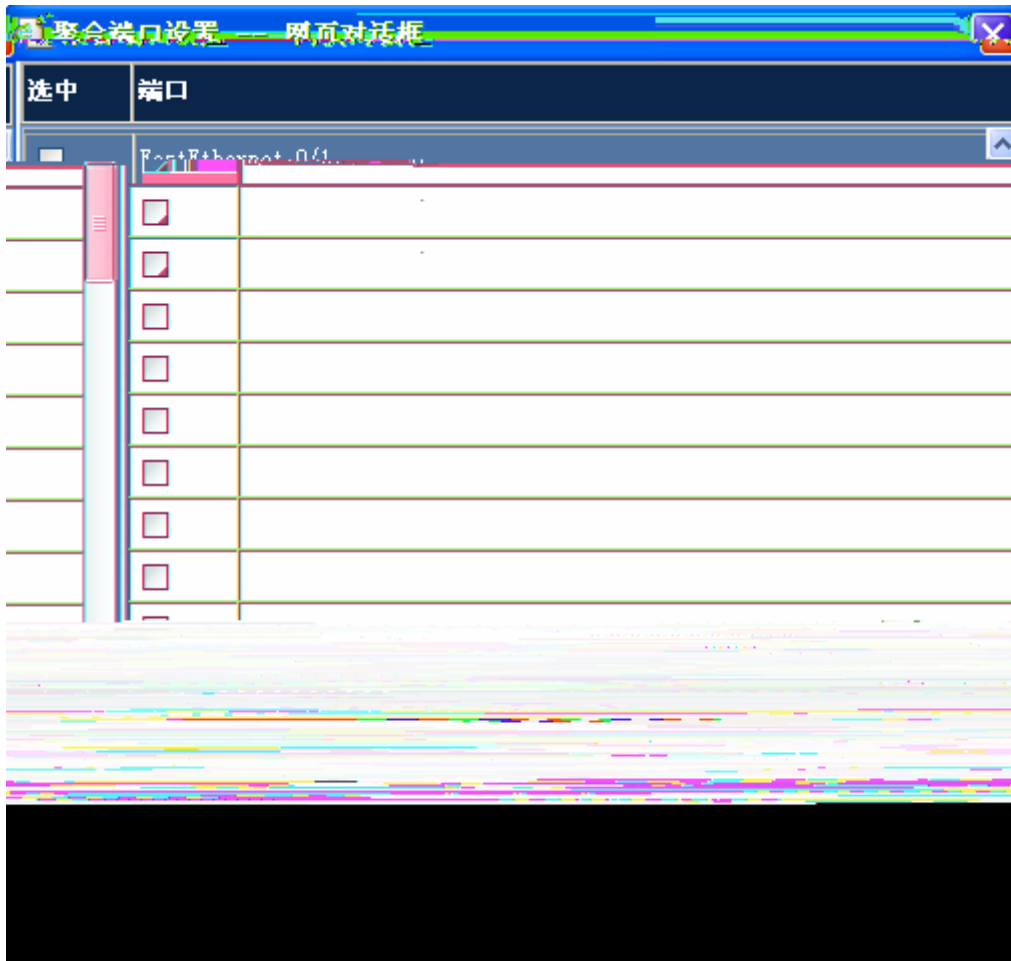
IP

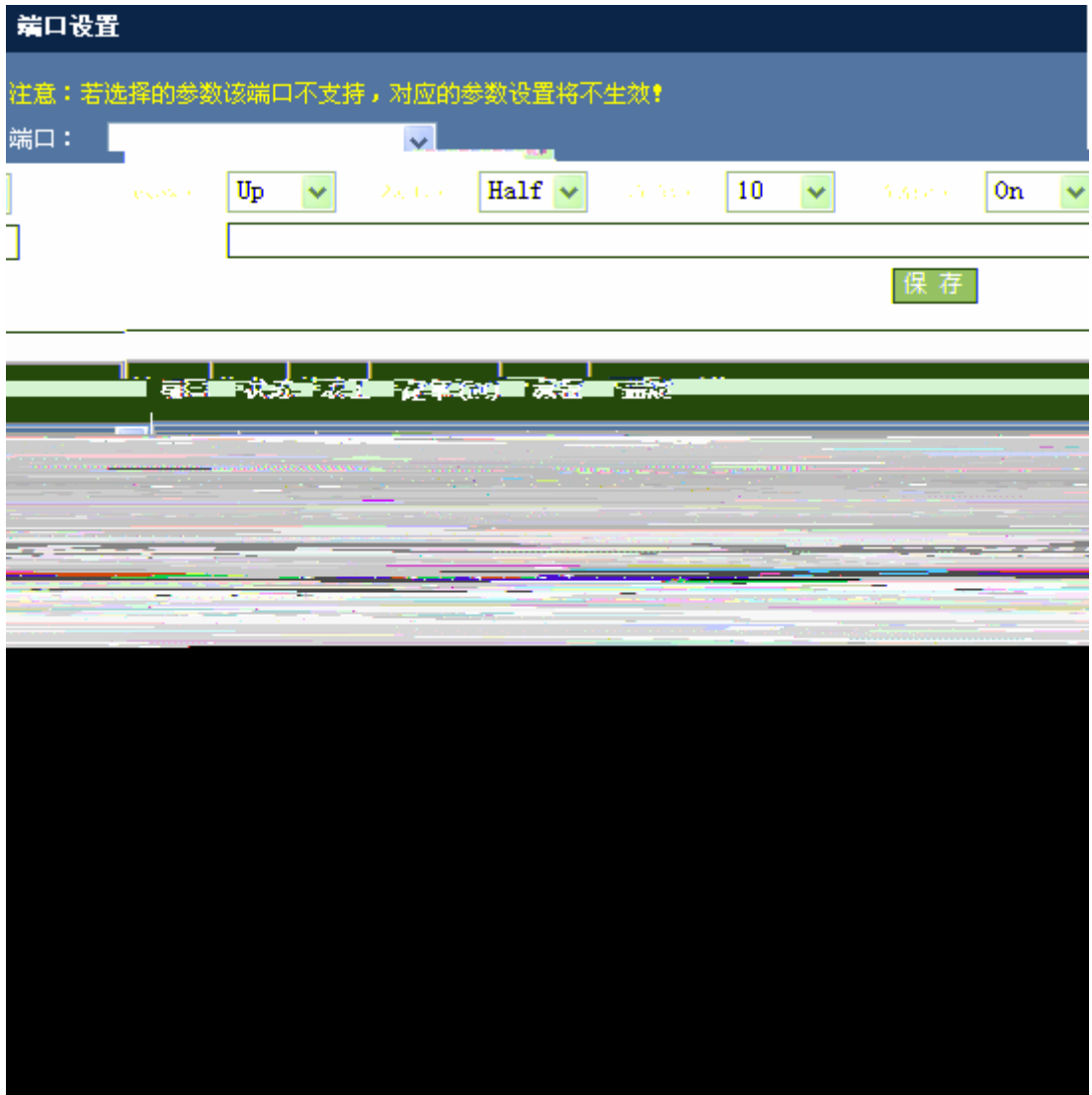
IP











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

DHCP服务器

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

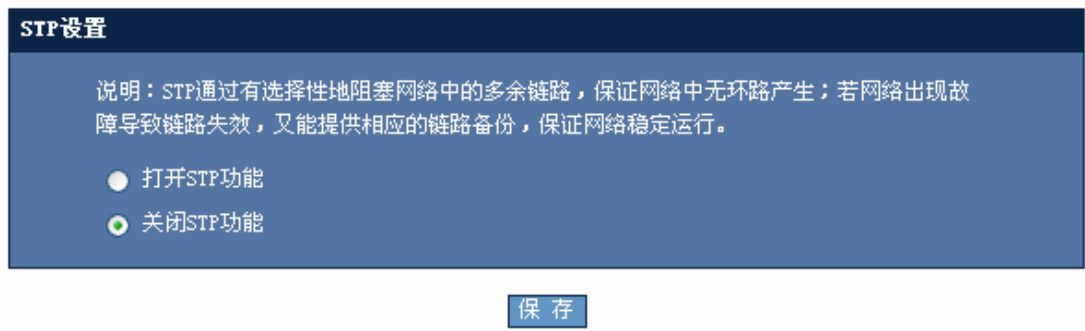
svgl ivgl-svgl

ivgl svgl ivgl-svgl
IP
IGMP Snooping

STP

STP

STP



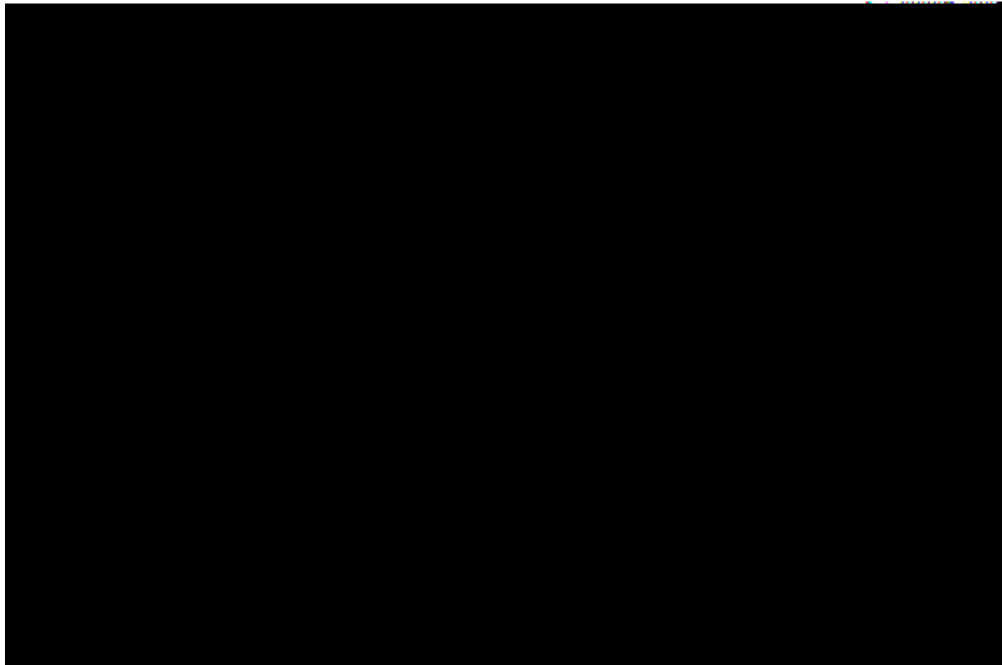
ARP

ARP

ARP

防网关ARP欺骗

说明：在二层交换机上，默认情况下ARP报文是在本VLAN内广播的，这就给针对网关的ARP欺骗提供了机会。因此我们可以在二层交换机上配置防网关ARP欺骗来防止针对网关的ARP欺骗配置后，可以在端网上检查arp报文的源ip地址是否为我们配置的网关。防网关欺



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)



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APR

ARP

ARP

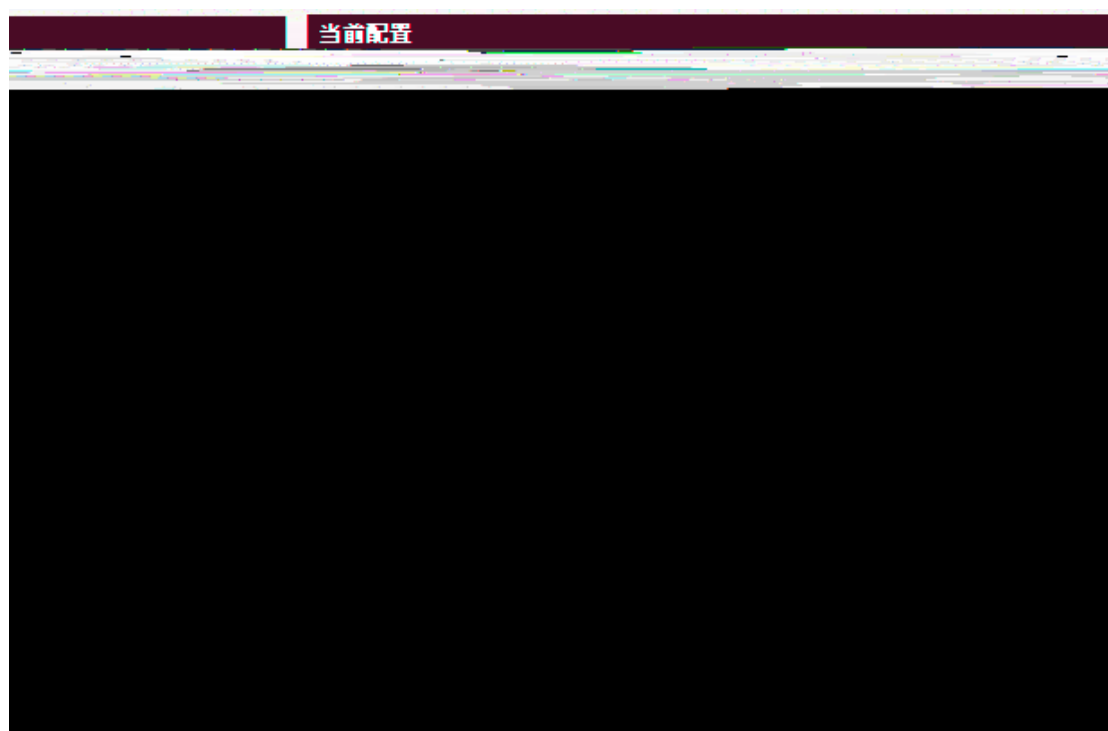
24 ARP

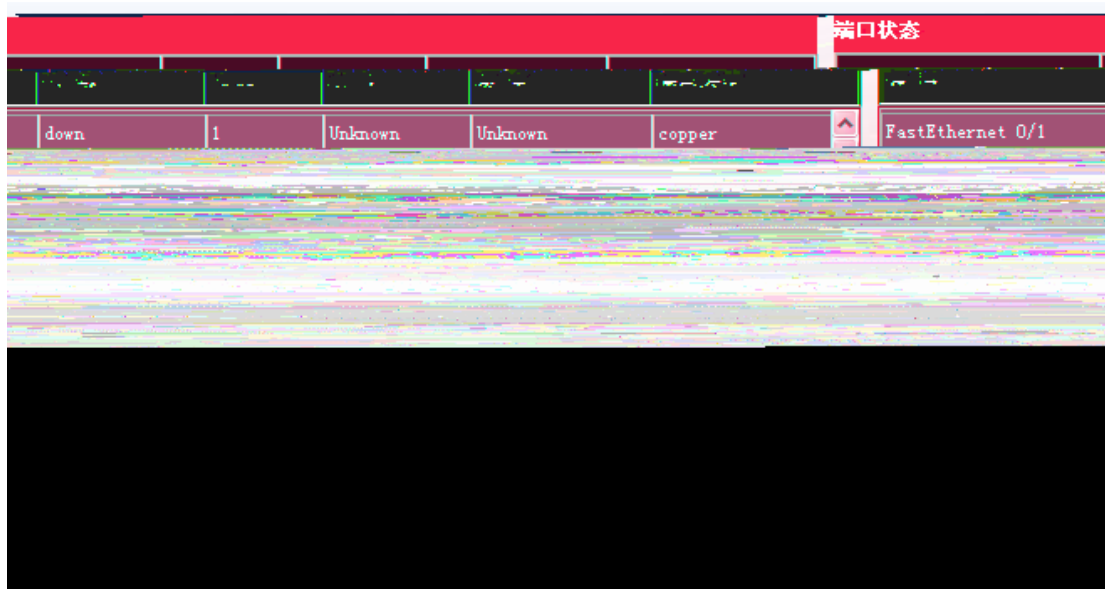
ARP

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 |

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| 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

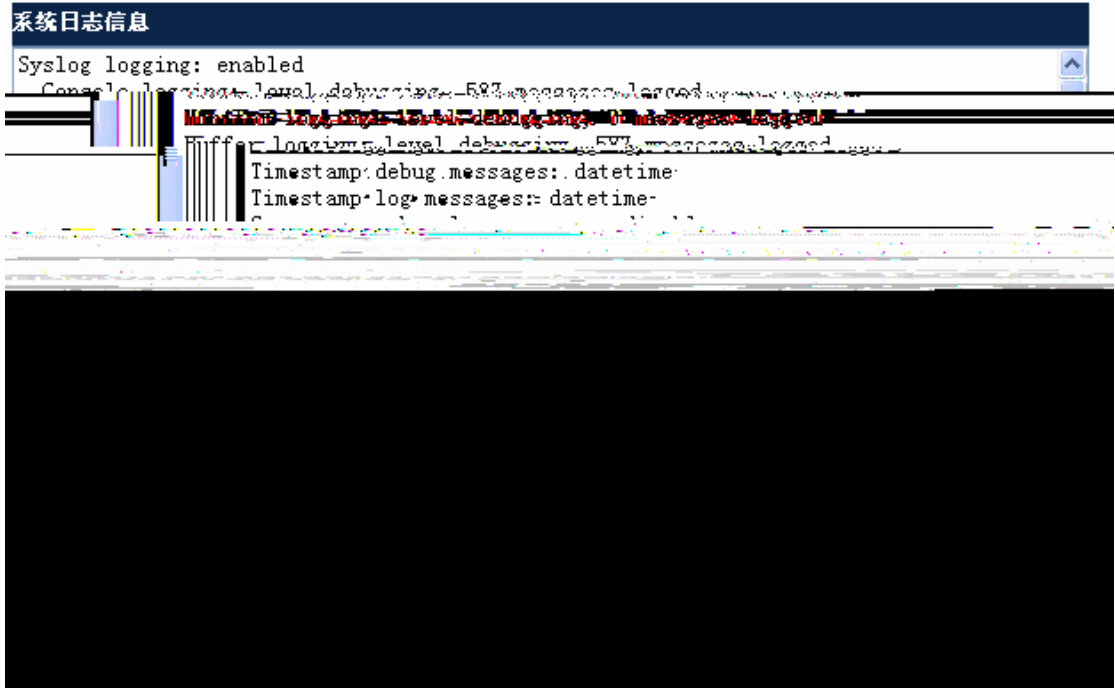
端口统计信息

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 |
|----|------|--------|--------|--------|------|--------|--------|--------|
|----|------|--------|--------|--------|------|--------|--------|--------|

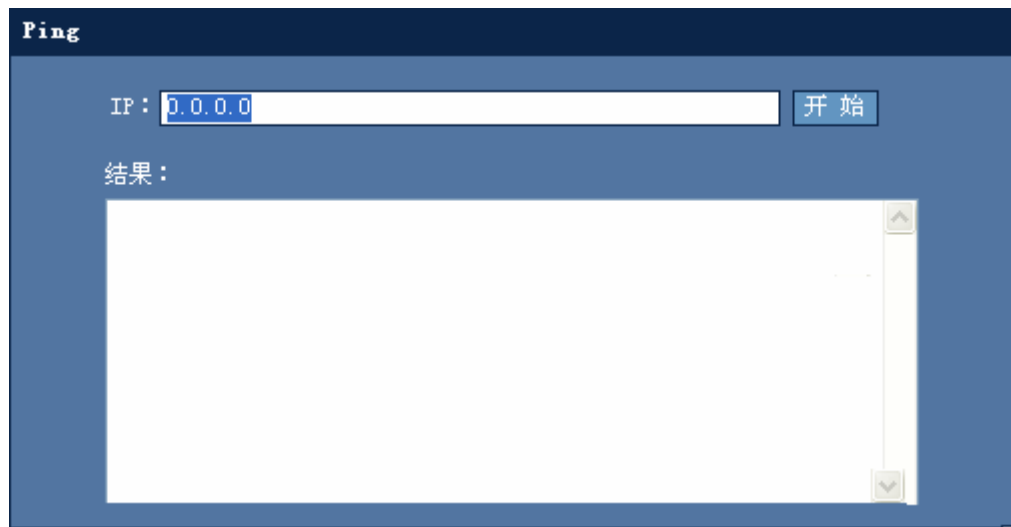


30

Ping

Ping

Ping



31 Ping

Ping

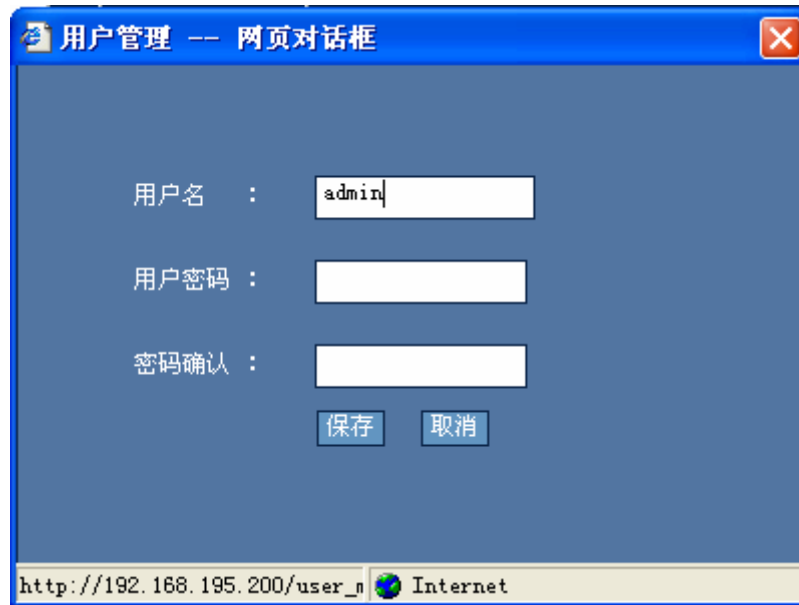
IP

IP

| 用户管理 | |
|------|-------|
| 序号 | 用户名 |
| 1 | admin |

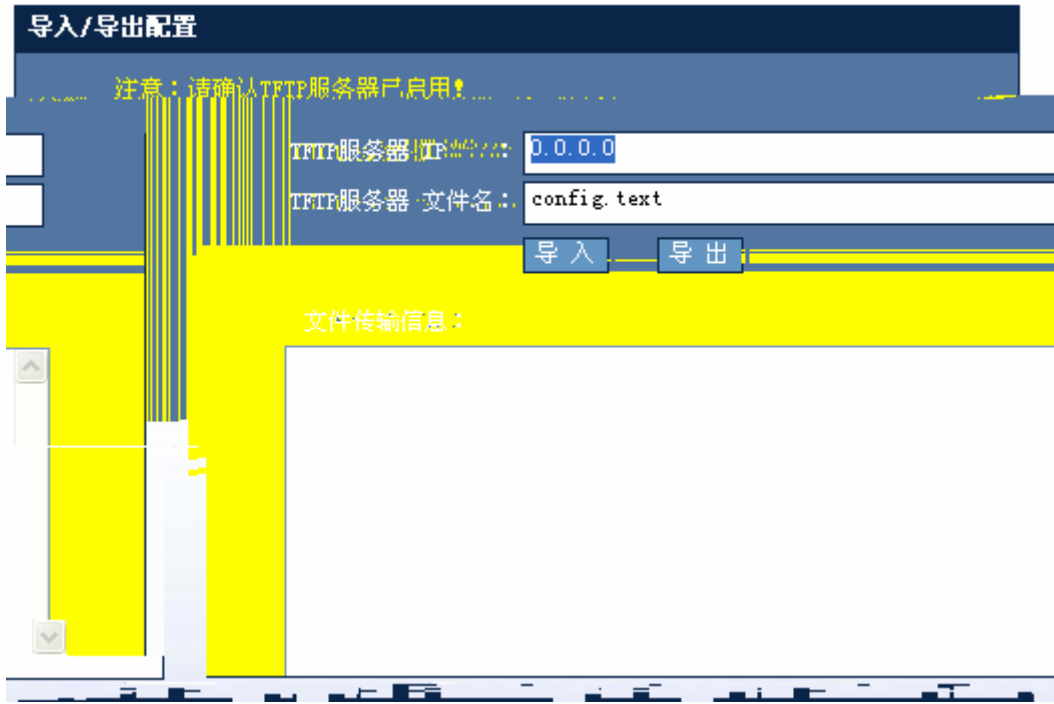
33

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



35

注意:



38 /

config.text

TFTP

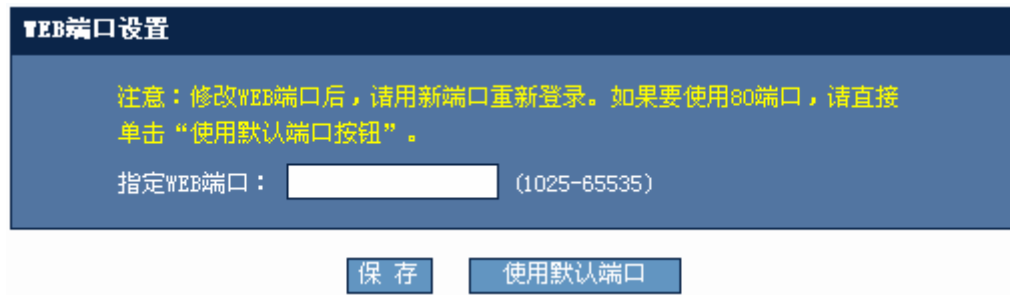
IP

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
```