

华为路由交换由浅入深系列（六）三层交换与 VRRP 配置

掌握目标

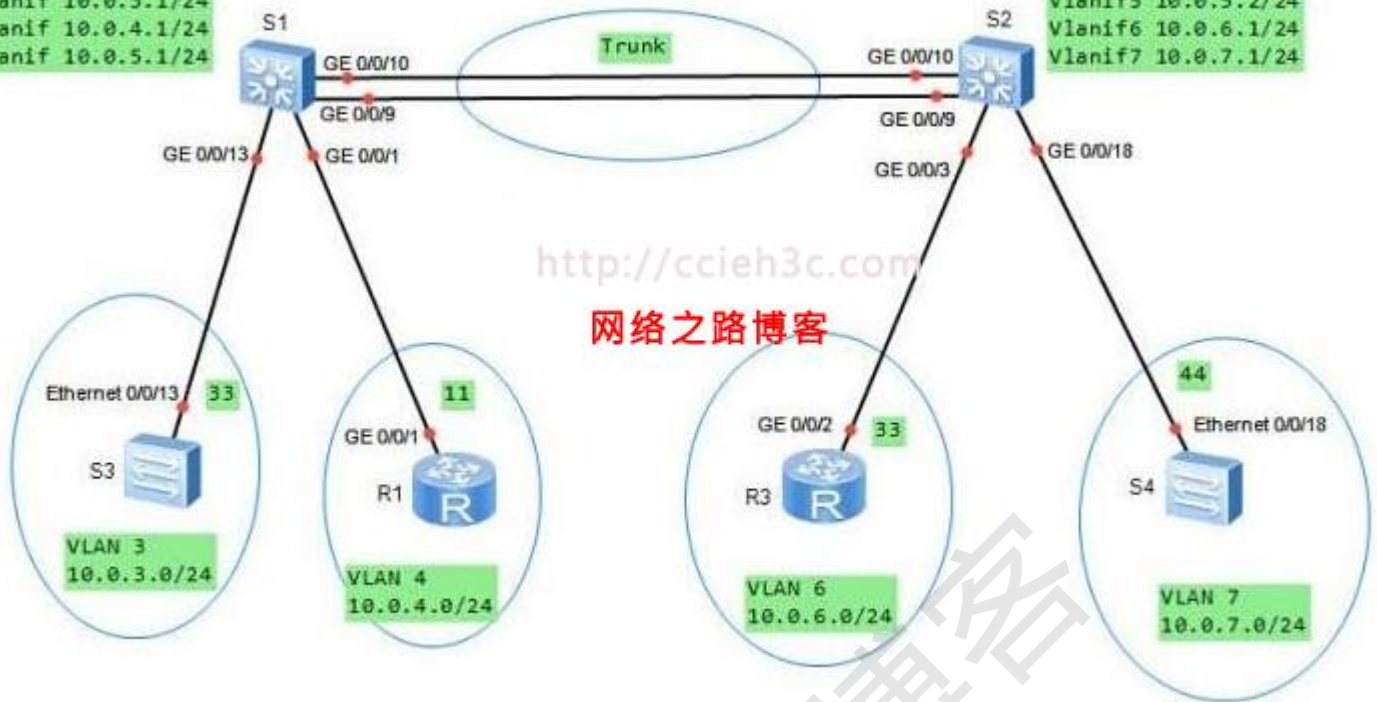
- 一、实验拓扑如下：
- 二、S1 和 S2 E-Trunk 链路配置
- 三、配置 S1 和 S2 VLAN 信息
- 四、相应接口划入 VLAN 中
- 五、配置 Vlanif 地址
- 六、配置路由器相关信息及路由
- 七、配置 OSPF
- 八、配置 VRRP
- 九、配置 vrrp 认证

一、实验拓扑如下

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Vlanif 10.0.3.1/24
Vlanif 10.0.4.1/24
Vlanif 10.0.5.1/24

Vlanif5 10.0.5.2/24
Vlanif6 10.0.6.1/24
Vlanif7 10.0.7.1/24



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二、S1 和 S2 E-Trunk 链路配置

```
[S1]interface Eth-Trunk 1
```

```
[S1-Eth-Trunk1]quit
```

```
[S1]interface g0/0/9
```

```
[S1-GigabitEthernet0/0/9]eth-trunk 1
```

```
[S1]interface g0/0/10
```

```
[S1-GigabitEthernet0/0/10]eth-trunk 1
```

```
[S2]interface Eth-Trunk 1
```

```
[S2-Eth-Trunk1]quit
```

```
[S2]interface g0/0/9
```

```
[S2-GigabitEthernet0/0/9]eth-trunk 1
```

```
[S2]interface g0/0/10
```

```
[S2-GigabitEthernet0/0/10]eth-trunk 1
```

三、配置 S1 和 S2 VLAN 信息

```
[S1]vlan batch 3 to 7
```

```
[S2]vlan batch 3 to 7
```

四、相应接口划入 VLAN 中

```
[S1]interface e1
```

```
[S1-Eth-Trunk1]port link-type access
```

```
[S1-Eth-Trunk1]port default vlan 5
```

```
[S1]int g0/0/13
```

```
[S1-GigabitEthernet0/0/13]port link-type access
```

```
[S1-GigabitEthernet0/0/13]port default vlan 3
```

```
[S1]int g0/0/1
```

```
[S1-GigabitEthernet0/0/1]port link-type access
```

```
[S1-GigabitEthernet0/0/1]port default vlan 4
```

```
[S2]interface e1
```

```
[S2-Eth-Trunk1]port link-type access
```

```
[S2-Eth-Trunk1]port default vlan 5
```

```
[S2]interface g0/0/3
```

```
[S2-GigabitEthernet0/0/3]port link-type access
```

```
[S2-GigabitEthernet0/0/3]port default vlan 6
```

```
[S2]interface g0/0/18
```

```
[S2-GigabitEthernet0/0/3]port link-type access
```

```
[S2-GigabitEthernet0/0/3]port default vlan 7
```

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五、配置 Vlanif 地址

```
[S1]interface Vlanif 3
```

```
[S1-Vlanif3]ip add 10.0.3.1 24
```

```
[S1]interface Vlanif 4
```

```
[S1-Vlanif3]ip add 10.0.4.1 24
```

```
[S1]interface Vlanif 5
```

```
[S1-Vlanif3]ip add 10.0.5.1 24
```

```
[S1]display ip int brief
```

Interface	IP Address/Mask	Physical	Protocol
MEth0/0/1	unassigned	down	down
NULL0	unassigned	up	up(s)
Vlanif1	unassigned	down	down
Vlanif3	10.0.3.1/24	up	up
Vlanif4	10.0.4.1/24	up	up
Vlanif5	10.0.5.1/24	up	up

```
[S2]interface Vlanif 5
```

```
[S2-Vlanif5]ip add 10.0.5.2 24
```

```
[S2]interface Vlanif 6
```

```
[S2-Vlanif6]ip add 10.0.6.1 24
```

```
[S2]interface Vlanif 7
```

```
[S2-Vlanif6]ip add 10.0.7.1 24
```

六、配置路由器相关信息及路由

```
[S3]interface Vlanif 1
```

```
[S3-Vlanif1]ip add 10.0.3.33 24
```

```
[S3]ip route-static 0.0.0.0 0 10.0.3.1
```

```
[R1]int g0/0/1
```

```
[R1-GigabitEthernet0/0/1]ip add 10.0.4.11 24
```

```
[R1]ip route-static 0.0.0.0 0 10.0.4.1
```

```
[R3]int g0/0/2
```

```
[R3-GigabitEthernet0/0/2]ip add 10.0.6.33 24
```

```
[R3]ip route-static 0.0.0.0 0 10.0.6.1
```

```
[S4]interface Vlanif 1
```

```
[S4-Vlanif1]ip add 10.0.7.44 24
```

```
[S4]ip route-static 0.0.0.0 0 10.0.7.1
```

测试

```
<R1>ping 10.0.3.33
```

```
PING 10.0.3.33: 56 data bytes, press CTRL_C to break
```

Reply from 10.0.3.33: bytes=56 Sequence=1 ttl=254 time=50 ms

Reply from 10.0.3.33: bytes=56 Sequence=2 ttl=254 time=70 ms

Reply from 10.0.3.33: bytes=56 Sequence=3 ttl=254 time=50 m

<R1>ping 10.0.6.33

PING 10.0.6.33: 56 data bytes, press CTRL_C to break

Request time out

Request time out

Request time out

<R1>tracert 10.0.6.33

tracert to 10.0.6.33(10.0.6.33), max hops: 30 ,packet length: 40,press CTRL_C to break

1 10.0.4.1 20 ms 20 ms 20 ms

2 10.0.4.1 30 ms !N 20 ms !N 10 ms !N ===此处回显肯定是模拟器问题，应该是*****。

解决方法一、

[S1]ospf 1

[S1-ospf-1]area 0

[S1-ospf-1-area-0.0.0.0]network 10.0.0.0 0.255.255.255

[S2]ospf 1

[S2-ospf-1]area 0

[S2-ospf-1-area-0.0.0.0]network 10.0.0.0 0.255.255.255

[S1]display ip ro pr os

OSPF routing table status : <Active>

Destinations : 2 Routes : 2

Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
10.0.6.0/24	OSPF	10	2	D	10.0.5.2	Vlanif5
10.0.7.0/24	OSPF	10	2	D	10.0.5.2	Vlanif5

[S2]dis ip rou pr os

Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
10.0.3.0/24	OSPF	10	2	D	10.0.5.1	Vlanif5
10.0.4.0/24	OSPF	10	2	D	10.0.5.1	Vlanif5

<R1>ping 10.0.6.33

PING 10.0.6.33: 56 data bytes, press CTRL_C to break

Reply from 10.0.6.33: bytes=56 Sequence=1 ttl=253 time=50 ms

Reply from 10.0.6.33: bytes=56 Sequence=2 ttl=253 time=50 ms

<R1>ping 10.0.7.44

PING 10.0.7.44: 56 data bytes, press CTRL_C to break

Reply from 10.0.7.44: bytes=56 Sequence=1 ttl=253 time=80 ms

Reply from 10.0.7.44: bytes=56 Sequence=2 ttl=253 time=60 ms

Reply from 10.0.7.44: bytes=56 Sequence=3 ttl=253 time=60 ms

<R1>tracert 10.0.6.33

tracert to 10.0.6.33(10.0.6.33), max hops: 30 ,packet length: 40,press CTRL_C to break

1 10.0.4.1 40 ms 10 ms 10 ms

2 10.0.5.2 40 ms 30 ms 40 ms

3 10.0.6.33 70 ms 60 ms 60 ms

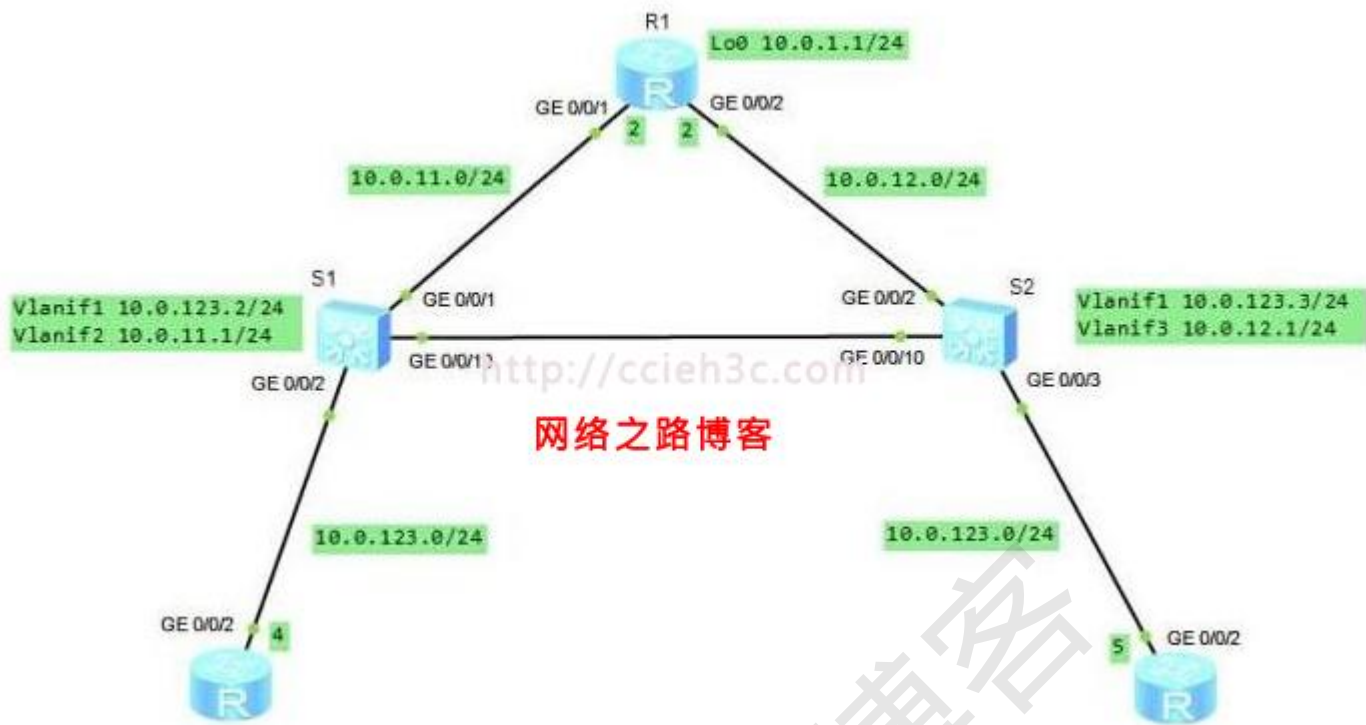
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解决方法二、

```
[S1]ip route-static 0.0.0.0 0 10.0.5.2
```

```
[S2]ip route-static 0.0.0.0 0 10.0.5.1
```

VRRP 实验



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基本配置

```
[R1-LoopBack0]ip add 10.0.1.1 24
```

```
[R1-LoopBack0]int g0/0/1
```

```
[R1-GigabitEthernet0/0/1]ip add 10.0.11.2 24
```

```
[R1-LoopBack0]int g0/0/2
```

```
[R1-GigabitEthernet0/0/1]ip add 10.0.12.2 24
```

```
[R2]interface g0/0/2
```

```
[R2-GigabitEthernet0/0/2]ip add 10.0.123.4 24
```

```
[R2]ip route-static 0.0.0.0 0 10.0.123.1 ===vrrp 虚拟地址
```

[R3]interface g0/0/2

[R3-GigabitEthernet0/0/2]ip add 10.0.123.5 24

[R3]ip route-static 0.0.0.0 0 10.0.123.1

[S1]vlan batch 1 to 3

[S1-GigabitEthernet0/0/10]int g0/0/10

[S1-GigabitEthernet0/0/10]port link-type trunk

[S1-GigabitEthernet0/0/10]port trunk allow-pass vlan all

[S1-GigabitEthernet0/0/1]int g0/0/1

[S1-GigabitEthernet0/0/1]port link-type access

[S1-GigabitEthernet0/0/1]port default vlan 2

[S1-GigabitEthernet0/0/1]int g0/0/2

[S1-GigabitEthernet0/0/2]port link-type access

[S1-GigabitEthernet0/0/2]port default vlan 1

[S1]interface Vlanif 1

[S1-Vlanif1]ip add 10.0.123.2 24

[S1]interface Vlanif 2

[S1-Vlanif1]ip add 10.0.11.1 24

[S2]vlan batch 1 to 3

[S2-GigabitEthernet0/0/10]int g0/0/10

[S2-GigabitEthernet0/0/10]port link-type trunk

[S2-GigabitEthernet0/0/10]port trunk allow-pass vlan all

[S2-GigabitEthernet0/0/2]int g0/0/2

[S2-GigabitEthernet0/0/2]port link-type access

[S2-GigabitEthernet0/0/2]port default vlan 3

[S2-GigabitEthernet0/0/1]int g0/0/3

[S2-GigabitEthernet0/0/2]port link-type access

[S2-GigabitEthernet0/0/2]port default vlan 1

[S2]interface Vlanif 1

[S2-Vlanif1]ip add 10.0.123.324

[S2]interface Vlanif 3

```
[S2-Vlanif1]ip add 10.0.12.1 24
```

测试

```
<R1>ping -c 2 10.0.11.1
```

```
PING 10.0.11.1: 56 data bytes, press CTRL_C to break
```

```
Reply from 10.0.11.1: bytes=56 Sequence=1 ttl=255 time=50 ms
```

```
Reply from 10.0.11.1: bytes=56 Sequence=2 ttl=255 time=20 ms
```

```
<R1>ping -c 2 10.0.12.1
```

```
PING 10.0.12.1: 56 data bytes, press CTRL_C to break
```

```
Reply from 10.0.12.1: bytes=56 Sequence=1 ttl=255 time=40 ms
```

```
Reply from 10.0.12.1: bytes=56 Sequence=2 ttl=255 time=20 ms
```

```
[S1]ping -c 2 10.0.123.4
```

```
PING 10.0.123.4: 56 data bytes, press CTRL_C to break
```

```
Reply from 10.0.123.4: bytes=56 Sequence=1 ttl=255 time=80 ms
```

```
Reply from 10.0.123.4: bytes=56 Sequence=2 ttl=255 time=50 ms
```

```
[S2]ping -c 2 10.0.123.5
```

```
PING 10.0.123.5: 56 data bytes, press CTRL_C to break
```

```
Reply from 10.0.123.5: bytes=56 Sequence=1 ttl=255 time=60 ms
```

```
Reply from 10.0.123.5: bytes=56 Sequence=2 ttl=255 time=40 ms
```

七、配置 OSPF

```
[S1]ospf 1
```

```
[S1-ospf-1]area 0
```

```
[S1-ospf-1-area-0.0.0.0]net 10.0.0.0 0.255.255.255
```

```
[S1-ospf-1-area-0.0.0.0]silent-interface Vlanif1
```

```
[S2]ospf 1
```

```
[S2-ospf-1]area 0
```

```
[S2-ospf-1-area-0.0.0.0]net 10.0.0.0 0.255.255.255、
```

```
[S2-ospf-1-area-0.0.0.0]silent-interface Vlanif1
```

```
[R1]ospf 1
```

```
[R1-ospf-1]are 0
```

```
[R1-ospf-1-area-0.0.0.0]net 10.0.0.0 0.255.255.255
```

```
[S1]ping -c 2 10.0.1.1
```

```
PING 10.0.1.1: 56 data bytes, press CTRL_C to break
```

Reply from 10.0.1.1: bytes=56 Sequence=1 ttl=255 time=50 ms

Reply from 10.0.1.1: bytes=56 Sequence=2 ttl=255 time=40 ms

[S1]ping -c 2 10.0.12.2

PING 10.0.12.2: 56 data bytes, press CTRL_C to break

Reply from 10.0.12.2: bytes=56 Sequence=1 ttl=255 time=30 ms

Reply from 10.0.12.2: bytes=56 Sequence=2 ttl=255 time=30 ms

八、配置 VRRP

[S1]interface Vlanif 1

[S1-Vlanif1]vrrp vrid 1 virtual-ip 10.0.123.1 =====配置 VRRP Group ID 为 1，虚拟 IP 地址 10.0.123.1

[S1-Vlanif1]vrrp vrid 1 priority 105 =====配置 VRRP 优先级为 105，默认为 100

[S2]int vlanif 1

[S2-Vlanif1]vrrp vrid 1 virtual-ip 10.0.123.1

测试

[S1]display vrrp 1

Vlanif1 | Virtual Router 1

State : Master

Virtual IP : 10.0.123.1

Master IP : 10.0.123.2

PriorityRun : 105

PriorityConfig : 105

MasterPriority : 105

Preempt : YES Delay Time : 0 s

TimerRun : 1 s

TimerConfig : 1 s

Auth type : NONE

Virtual MAC : 0000-5e00-0101

Check TTL : YES

Config type : normal-vrrp

Create time : 2014-05-21 18:11:32 UTC-08:00

Last change time : 2014-05-21 18:11:35 UTC-08:00

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[S2]display vrrp

Vlanif1 | Virtual Router 1

State : Backup

Virtual IP : 10.0.123.1

Master IP : 10.0.123.2

PriorityRun : 100

PriorityConfig : 100

MasterPriority : 105

Preempt : YES Delay Time : 0 s

TimerRun : 1 s

TimerConfig : 1 s

Auth type : NONE

Virtual MAC : 0000-5e00-0101

Check TTL : YES

Config type : normal-vrrp

Create time : 2014-05-21 18:13:47 UTC-08:00

Last change time : 2014-05-21 18:13:47 UTC-08:00

<R2>ping -c 1 10.0.1.1

PING 10.0.1.1: 56 data bytes, press CTRL_C to break

Reply from 10.0.1.1: bytes=56 Sequence=1 ttl=254 time=120 ms

<R3>ping -c 1 10.0.1.1

PING 10.0.1.1: 56 data bytes, press CTRL_C to break

Reply from 10.0.1.1: bytes=56 Sequence=1 ttl=254 time=90 ms

[S1]interface Vlanif 1

[S1-Vlanif1]shutdown

<R2>ping -c 10000 10.0.1.1

PING 10.0.1.1: 56 data bytes, press CTRL_C to break

Reply from 10.0.1.1: bytes=56 Sequence=1 ttl=254 time=70 ms

Request time out

Reply from 10.0.1.1: bytes=56 Sequence=3 ttl=254 time=50 ms

Reply from 10.0.1.1: bytes=56 Sequence=4 ttl=254 time=40 ms

[S1]display vrrp

Vlanif1 | Virtual Router 1

State : Initialize

Virtual IP : 10.0.123.1

Master IP : 0.0.0.0

PriorityRun : 105

PriorityConfig : 105

MasterPriority : 0

Preempt : YES Delay Time : 0 s

TimerRun : 1 s

TimerConfig : 1 s

Auth type : NONE

Virtual MAC : 0000-5e00-0101

Check TTL : YES

Config type : normal-vrrp

Create time : 2014-05-21 18:11:32 UTC-08:00

Last change time : 2014-05-21 18:22:38 UTC-08:00

```
[S2]display vrrp
```

```
Vlanif1 | Virtual Router 1
```

```
State : Master
```

```
Virtual IP : 10.0.123.1
```

```
Master IP : 10.0.123.3
```

```
PriorityRun : 100
```

```
PriorityConfig : 100
```

```
MasterPriority : 100
```

```
[S1]int Vlanif 1
```

```
[S1-Vlanif1]undo shutdown
```

此时 R2 与 R3 通过 S1 发送数据给 10.0.1.1。如果关闭 S1 的 G0/0/1 接口，或关闭 R1 的 G0/0/1 接口，网络将无法自动切换到

通过 S2 发送数据给 10.0.1.1

关闭 S1 的 G0/0/1 接口

```
[S1]int g0/0/1
```

```
[S1-GigabitEthernet0/0/1]shut
```

```
[S1]display vrrp brief
```

VRID	State	Interface	Type	Virtual IP
1	Master	Vlanif1	Normal	10.0.123.1

Total:1 Master:1 Backup:0 Non-active:0

<R2>ping -c 2 10.0.1.1

PING 10.0.1.1: 56 data bytes, press CTRL_C to break

Request time out

Request time out

[S1]int g0/0/1

[S1-GigabitEthernet0/0/1]undo shut

S1 和 S2 上配置 VRRP 的接口跟踪，定义跟踪 G0/0/1 接口，如果接口被关闭，则优先级降低 10，这样的情况下，S2 将抢占 S1 的 VRRP 主角色。

[S1]int Vlanif 1

[S1-Vlanif1]vrrp vrid 1 track interface g0/0/1 reduced 10

[S2]int Vlanif 1

[S2-Vlanif1]vrrp vrid 1 track interface g0/0/1 reduced 10

```
[S1]int g0/0/1
```

```
[S1-GigabitEthernet0/0/1]shut
```

```
[S2]display vrrp
```

```
Vlanif1 | Virtual Router 1
```

```
State : Backup
```

```
Virtual IP : 10.0.123.1
```

```
Master IP : 10.0.123.2
```

```
PriorityRun : 90
```

```
PriorityConfig : 100
```

```
MasterPriority : 95
```

```
Preempt : YES Delay Time : 0 s
```

```
TimerRun : 1 s
```

```
TimerConfig : 1 s
```

```
Auth type : NONE
```

```
Virtual MAC : 0000-5e00-0101
```

```
Check TTL : YES
```

```
Config type : normal-vrrp
```

```
Track IF : GigabitEthernet0/0/1 Priority reduced : 10
```

```
IF state : DOWN
```

Create time : 2014-05-21 18:13:47 UTC-08:00

Last change time : 2014-05-21 18:26:12 UTC-08:00

九、配置 vrrp 认证

```
[S1]int Vlanif 1
```

```
[S1-Vlanif1]vrrp vrid 1 authentication-mode md5 cisco
```

```
[S1]display vrrp
```

Vlanif1 | Virtual Router 1

State : Master

Virtual IP : 10.0.123.1

Master IP : 10.0.123.2

PriorityRun : 105

PriorityConfig : 105

MasterPriority : 105

Preempt : YES Delay Time : 0 s

TimerRun : 1 s

TimerConfig : 1 s

Auth type : MD5 Auth key : *hPH!nZ_`9P4p;tsqP+i@o#

Virtual MAC : 0000-5e00-0101

Check TTL : YES

Config type : normal-vrrp

Track IF : GigabitEthernet0/0/1 Priority reduced : 10

IF state : UP

Create time : 2014-05-21 18:11:32 UTC-08:00

Last change time : 2014-05-21 18:26:12 UTC-08:00

```
[S2]interface Vlanif 1
```

```
[S2-Vlanif1]vrrp vrid 1 authentication-mode md5 cisco
```

博主也只是业余时间写写技术文档，请大家见谅，大家觉得不错的话，可以推荐给朋友哦，博主会努力推出更好的系列文档的。如果大家有任何疑问或者文中有错误跟疏忽的地方，欢迎大家留言指出，博主看到后会第一时间修改，谢谢大家的支持，更多技术文章尽在网络之路博客，<http://ccieh3c.com>。

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