# 小型核心网络的 ERPS 配置示例

在中小型企业网或网吧等场景，可以让核心和重要的汇聚交换机形成简单物理环路，通过一个或多个 ERPS 域来实现网络核心的环路保护和流量分担。

以下以三台交换机物理成环时的配置为例，通过两个不同的 ERPS 域形成两个独立的逻辑环路，协议控制 vlan 分别为 vlan10 和 vlan20，实现对 4 个业务 lan（vlan100, vlan101, vlan200, vlan201）的数据分流和环路保护。预期：**在网络无故障时两个 ERPS 域分别阻塞 switch2 的 Eth-0-1 和 switch3 的 Eth-0-2，使 vlan100 和 vlan101 的数据流按照红色虚线所示流向，vlan200 和 vlan201 的数据流按照蓝色虚线所示流向。**

配置时需要特别注意：

- spanning-tree 的模式应配置为 mstp 模式；
- 控制 VLAN 需要关闭 IGMP Snooping；
- 缺省 trunk 端口允许 vlan1 通过，注意避免 vlan1 形成环路引起网络风暴；
- ERPS 端口环需要加入控制 VLAN，允许 ERPS 协议报文发送和接收；
- ERPS 环中的端口必须把 STP 关闭；
- 只有一个节点能配置成 Master；
- 控制 VLAN 不能配置成三层 VLAN 接口。
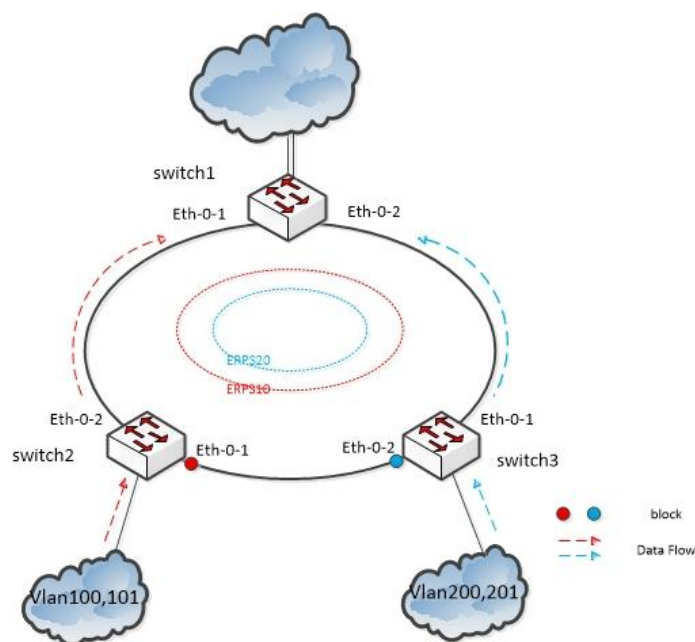
具体配置

配置 ERPS 域时，注意要达到预期的分流目的，需要将 switch2 配置为 ERPS 10 的 Master，eth-0-2 为 primary interface；将 switch3 配置为 ERPS 20 的 Master，eth-0-1 为 primary interface。Switch1 配置为 2 个 ERPS 域的 transit 模式。

#########switch1 上的配置############

创建 vlan，向 vlan 中添加端口

Switch# conf t

Switch(config)# vlan data

Switch(config-vlan)# vlan 10,100,101,20,200,201

Switch(config-vlan)# exit

Switch(config)# interface range eth-0-1 - 2

Switch(config-if-range)# switchport mode trunk

Switch(config-if-range)# switchport trunk allowed vlan add 10,100,101,20,200,201

Switch(config-if-range)# switchport trunk allowed vlan remove 1

Switch(config-if-range)# spanning-tree port disable

Switch(config-if-range)# exit

配置 MSTP 模式，创建实例，加入 VLAN:

Switch(config)# spanning-tree mode mstp

Switch(config)# spanning-tree mst configuration

Switch(config-mst)# instance 1 vlan 10,100,101

Switch(config-mst)# instance 2 vlan 20,200,201

Switch(config-mst)# exit

Switch(config)# no ip igmp snooping vlan 10

Switch(config)# no ip igmp snooping vlan 20

注意：Switch1 配置为 2 个 ERPS 域的 transit 模式。

Switch(config)# erps 10

Switch(config)# erps 10 primary control vlan 10

Switch(config)# erps 10 mstp instance 1

Switch(config)# erps 10 ring 1 level primary

Switch(config)# erps 10 ring 1 mode transit

Switch(config)# erps 10 ring 1 primary interface eth-0-1

Switch(config)# erps 10 ring 1 secondary interface eth-0-2

Switch(config)# erps 10 ring 1 enable

Switch(config)# erps 10 enable

Switch(config)#

Switch(config)# erps 20

Switch(config)# erps 20 primary control vlan 20

Switch(config)# erps 20 mstp instance 2

Switch(config)# erps 20 ring 1 level primary

Switch(config)# erps 20 ring 1 mode transit

Switch(config)# erps 20 ring 1 primary interface eth-0-2

Switch(config)# erps 20 ring 1 secondary interface eth-0-1

Switch(config)# erps 20 ring 1 enable

Switch(config)# erps 20 enable

Switch(config)# end

Switch#

##########switch2 上的配置############

Switch# conf t

Switch(config)# vlan data

Switch(config-vlan)# vlan 10,100,101,20,200,201

Switch(config-vlan)# exit

Switch(config)# interface range eth-0-1 - 2

Switch(config-if-range)# switchport mode trunk

Switch(config-if-range)# switchport trunk allowed vlan add 10,100,101,20,200,201

Switch(config-if-range)# switchport trunk allowed vlan remove 1

Switch(config-if-range)# spanning-tree port disable

Switch(config-if-range)# exit

Switch(config)# spanning-tree mode mstp

Switch(config)# spanning-tree mst configuration

Switch(config-mst)# instance 1 vlan 10,100,101

Switch(config-mst)# instance 2 vlan 20,200,201

Switch(config-mst)# exit

Switch(config)# no ip igmp snooping vlan 10

Switch(config)# no ip igmp snooping vlan 20

注意：Switch2 配置为 ERPS 10 的 Master 模式。

Switch(config)# erps 10

Switch(config)# erps 10 primary control vlan 10

Switch(config)# erps 10 mstp instance 1

Switch(config)# erps 10 ring 1 level primary

Switch(config)# erps 10 ring 1 mode master

Switch(config)# erps 10 ring 1 primary interface eth-0-2

Switch(config)# erps 10 ring 1 secondary interface eth-0-1

Switch(config)# erps 10 ring 1 enable

Switch(config)# erps 10 enable

Switch(config)#

Switch(config)# erps 20

Switch(config)# erps 20 primary control vlan 20

Switch(config)# erps 20 mstp instance 2

Switch(config)# erps 20 ring 1 level primary

Switch(config)# erps 20 ring 1 mode transit

Switch(config)# erps 20 ring 1 primary interface eth-0-2

Switch(config)# erps 20 ring 1 secondary interface eth-0-1

Switch(config)# erps 20 ring 1 enable

Switch(config)# erps 20 enable

Switch(config)# end

Switch#

##########switch3 上的配置############

Switch# conf t

```
Switch(config)# vlan data
Switch(config-vlan)# vlan 10,100,101,20,200,201
Switch(config-vlan)# exit
Switch(config)# interface range eth-0-1 – 2
Switch(config-if-range)# switchport mode trunk
Switch(config-if-range)# switchport trunk allowed vlan add 10,100,101,20,200,201
Switch(config-if-range)# switchport trunk allowed vlan remove 1
Switch(config-if-range)# spanning-tree port disable
Switch(config-if-range)# exit
Switch(config)# spanning-tree mode mstp
Switch(config)# spanning-tree mst configuration
Switch(config-mst)# instance 1 vlan 10,100,101
Switch(config-mst)# instance 2 vlan 20,200,201
Switch(config-mst)# exit
Switch(config)# no ip igmp snooping vlan 10
Switch(config)# no ip igmp snooping vlan 20
```

注意：Switch3 配置为 ERPS 20 的 Master 模式。

```
Switch(config)# erps 10
Switch(config)# erps 10 primary control vlan 10
Switch(config)# erps 10 mstp instance 1
Switch(config)# erps 10 ring 1 level primary
Switch(config)# erps 10 ring 1 mode transit
Switch(config)# erps 10 ring 1 primary interface eth-0-1
Switch(config)# erps 10 ring 1 secondary interface eth-0-2
Switch(config)# erps 10 ring 1 enable
Switch(config)# erps 10 enable
Switch(config)#
Switch(config)# erps 20
Switch(config)# erps 20 primary control vlan 20
Switch(config)# erps 20 mstp instance 2
Switch(config)# erps 20 ring 1 level primary
Switch(config)# erps 20 ring 1 mode master
Switch(config)# erps 20 ring 1 primary interface eth-0-1
Switch(config)# erps 20 ring 1 secondary interface eth-0-2
Switch(config)# erps 20 ring 1 enable
Switch(config)# erps 20 enable
Switch(config)# end
Switch#
```

配置检查和状态确认

配置完成后检查三台交换机上的 ERPS ring 状态是否为 complete，master 上 blcok 的端口是否与预期一致。

########## **Switch1 上 ERPS 状态检查**##########

Switch# show erps 10

ERPS domain ID: 10

ERPS domain name: ERPS010

ERPS domain mode: normal

ERPS domain primary control VLAN ID: 10

ERPS domain sub control VLAN ID: 0

ERPS domain hello timer interval: 1000 millisecond(s)

ERPS domain fail timer interval: 3000 millisecond(s)

ERPS domain protected mstp instance: 1

ERPS ring ID: 1

ERPS ring level: primary

ERPS ring 1 node mode: transit

ERPS ring 1 node state: link up

ERPS ring 1 primary interface name: eth-0-1   state:unblock

ERPS ring 1 secondary interface name: eth-0-2   state:unblock

ERPS ring 1 stats:

Sent:

  total packets:4

  hello packets:0   ring-up-flush-fdb packets:0

  ring-down-flush-fdb packets:0   link-down packets:4

  edge-hello packets:0   major-fault packets:0

Received:

  total packets:11427

  hello packets:11422   ring-up-flush-fdb packets:3

  ring-down-flush-fdb packets:2   link-down packets:0

  edge-hello packets:0   major-fault packets:0

Switch# show erps 20

ERPS domain ID: 20

ERPS domain name: ERPS020

ERPS domain mode: normal

ERPS domain primary control VLAN ID: 20

ERPS domain sub control VLAN ID: 0

ERPS domain hello timer interval: 1000 millisecond(s)

ERPS domain fail timer interval: 3000 millisecond(s)

ERPS domain protected mstp instance: 2

ERPS ring ID: 1

ERPS ring level: primary

ERPS ring 1 node mode: transit

ERPS ring 1 node state: link up

ERPS ring 1 primary interface name: eth-0-2   state:unblock

ERPS ring 1 secondary interface name: eth-0-1   state:unblock

ERPS ring 1 stats:

Sent:

　　total packets:4

　　hello packets:0   ring-up-flush-fdb packets:0

　　ring-down-flush-fdb packets:0   link-down packets:4

　　edge-hello packets:0   major-fault packets:0

Received:

　　total packets:11319

　　hello packets:11314   ring-up-flush-fdb packets:3

　　ring-down-flush-fdb packets:2   link-down packets:0

　　edge-hello packets:0   major-fault packets:0

Switch#

########## **Switch2 上 ERPS 状态检查**##########

Switch# show erps 10

ERPS domain ID: 10

ERPS domain name: ERPS010

ERPS domain mode: normal

ERPS domain primary control VLAN ID: 10

ERPS domain sub control VLAN ID: 0

ERPS domain hello timer interval: 1000 millisecond(s)

ERPS domain fail timer interval: 3000 millisecond(s)

ERPS domain protected mstp instance: 1

ERPS ring ID: 1

ERPS ring level: primary

ERPS ring 1 node mode: master

ERPS ring 1 node state: complete

ERPS ring 1 primary interface name: eth-0-2   state:unblock

ERPS ring 1 secondary interface name: eth-0-1   state:block

ERPS ring 1 stats:

Sent:

　　total packets:11133

　　hello packets:11126   ring-up-flush-fdb packets:3

　　ring-down-flush-fdb packets:4   link-down packets:0

　　edge-hello packets:0   major-fault packets:0

Received:

　　total packets:10984

　　hello packets:10978   ring-up-flush-fdb packets:3

　　ring-down-flush-fdb packets:0   link-down packets:3

　　edge-hello packets:0   major-fault packets:0

Switch# show erps 20

ERPS domain ID: 20

ERPS domain name: ERPS020

ERPS domain mode: normal

ERPS domain primary control VLAN ID: 20

ERPS domain sub control VLAN ID: 0

ERPS domain hello timer interval: 1000 millisecond(s)

ERPS domain fail timer interval: 3000 millisecond(s)

ERPS domain protected mstp instance: 2

ERPS ring ID: 1

ERPS ring level: primary

ERPS ring 1 node mode: transit

ERPS ring 1 node state: link up

ERPS ring 1 primary interface name: eth-0-2   state:unblock

ERPS ring 1 secondary interface name: eth-0-1   state:unblock

ERPS ring 1 stats:

Sent:

   total packets:1

   hello packets:0   ring-up-flush-fdb packets:0

   ring-down-flush-fdb packets:0   link-down packets:1

   edge-hello packets:0   major-fault packets:0

Received:

   total packets:10996

   hello packets:10990   ring-up-flush-fdb packets:3

   ring-down-flush-fdb packets:2   link-down packets:1

   edge-hello packets:0   major-fault packets:0

Switch#

########## **Switch3 上 ERPS 状态检查**##########

Switch# show erps 10

ERPS domain ID: 10

ERPS domain name: ERPS010

ERPS domain mode: normal

ERPS domain primary control VLAN ID: 10

ERPS domain sub control VLAN ID: 0

ERPS domain hello timer interval: 1000 millisecond(s)

ERPS domain fail timer interval: 3000 millisecond(s)

ERPS domain protected mstp instance: 1

ERPS ring ID: 1

ERPS ring level: primary

ERPS ring 1 node mode: transit

ERPS ring 1 node state: link up

ERPS ring 1 primary interface name: eth-0-1   state:unblock

ERPS ring 1 secondary interface name: eth-0-2   state:unblock

ERPS ring 1 stats:

Sent:

   total packets:1

   hello packets:0   ring-up-flush-fdb packets:0

   ring-down-flush-fdb packets:0   link-down packets:1

   edge-hello packets:0   major-fault packets:0

Received:

   total packets:11133

   hello packets:11127　　　　　　　　ring-up-flush-fdb packets:3

   ring-down-flush-fdb packets:2　　　link-down packets:1

   edge-hello packets:0　　　　　　　major-fault packets:0

Switch# show erps 20

ERPS domain ID: 20

ERPS domain name: ERPS020

ERPS domain mode: normal

ERPS domain primary control VLAN ID: 20

ERPS domain sub control VLAN ID: 0

ERPS domain hello timer interval: 1000 millisecond(s)

ERPS domain fail timer interval: 3000 millisecond(s)

ERPS domain protected mstp instance: 2

ERPS ring ID: 1

ERPS ring level: primary

ERPS ring 1 node mode: master

ERPS ring 1 node state: complete

ERPS ring 1 primary interface name: eth-0-1　　　　state:unblock

ERPS ring 1 secondary interface name: eth-0-2　　　state:block

ERPS ring 1 stats:

Sent:

   total packets:11162

   hello packets:11156　　　　　　　　ring-up-flush-fdb packets:3

   ring-down-flush-fdb packets:3　　　link-down packets:0

   edge-hello packets:0　　　　　　　major-fault packets:0

Received:

   total packets:11137

   hello packets:11131　　　　　　　　ring-up-flush-fdb packets:3

   ring-down-flush-fdb packets:0　　　link-down packets:3

   edge-hello packets:0　　　　　　　major-fault packets:0

Switch#