目录

简介

本文描述Intermediate System to Intermediate System (ISIS)附上位behvaiour。下面附上位一些工作记住的和行为关于ISIS。

1. 在ISIS网络中有3路由器、1级(L1)路由器、2级(L2)路由器和Level1Level2 (L1L2)路由器的类型。

2. 类似开放最短路径优先(OSPF)， ISIS有L2区域作为骨干区域。

3. 连接对区域1级和2级即的路由器呼叫L1L2路由器。

4. OSPF有限制SPF计算范围的多个区域的概念，并且同样是原因有ISIS的不同的区域。

5. 1级和2级ISIS路由器将生成各自Leve1和2级LSP。L1L2路由器

生成两个LSP (即1级和2级)

6. 万一1级路由器需要到达L2网络， 1级路由器将发送数据包到L1L2路由器为了

伸手可及的距离骨干区域

7. 默认情况下2级路由没有被泄漏到1级地区由L1L2路由器，虽然1级路由总是传播对2级区域。

8. 为了到达2级地区， L1L2路由器将设置1级LSP的附上位。1级路由器将安装

默认路由在此路由将指向往L1L2路由器的路由表里。

9.万一网络有超过连接同一个L1区域的一个L1L2路由器，然后可能导致supoptimal

路由作为2级路由不会流到1级区域。1级地区只将安装指向往的默认路由

L1L2是最近的路由器。漏2级路由到1级里可以完成解决这些限制。

先决条件

要求

思科建议您有ISIS和OSPF基础知识。

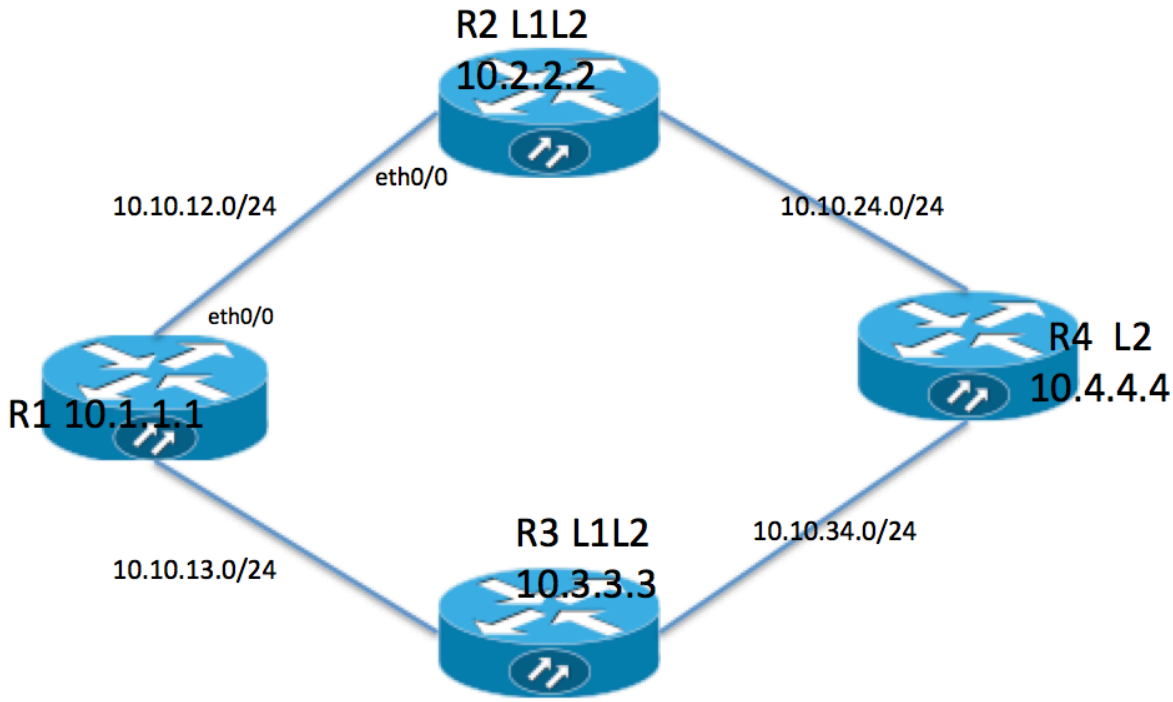
使用的组件

本文档不限于特定的软件和硬件版本。本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

配置

网络图

考虑此网络拓扑为了了解环路预防技术。



关于拓扑的信息

配置

```
R1#sh run int lo 0
Building configuration...

Current configuration : 82 bytes
!
interface Loopback0
 ip address 10.1.1.1 255.255.255.255
 ip router isis 1
end


R1#sh run int ethernet 0/0
Building configuration...

Current configuration : 127 bytes
!
interface Ethernet0/0
 ip address 10.10.12.1 255.255.255.0
 ip router isis 1
 isis circuit-type level-1
end

R1#sh run int ethernet 0/1
Building configuration...

Current configuration : 111 bytes
!
interface Ethernet0/1
 ip address 10.10.13.1 255.255.255.0
 ip router isis 1
 isis circuit-type level-1
end
!

router isis 1
 net 49.0001.0000.0000.0001.00  >>>>> Area is 49.0001
 is-type level-1    >>>>>>>>>> Globally this router belongs to Level1
```

R2

```
R2#sh run int lo 0
Building configuration...

Current configuration : 82 bytes
!
interface Loopback0
 ip address 10.2.2.2 255.255.255.255
 ip router isis 1
end

R2#sh run int eth0/0
Building configuration...

Current configuration : 111 bytes
!
interface Ethernet0/0
 ip address 10.10.12.2 255.255.255.0
 ip router isis 1
 isis circuit-type level-1   >>>>>> Circuit type is L1 towards R1
end

R2#sh run int eth0/1
Building configuration...
```

```
Current configuration : 84 bytes
!
interface Ethernet0/1
 ip address 10.10.24.2 255.255.255.0
 ip router isis 1
end
!

router isis 1
 net 49.0001.0000.0000.0002.00
```

R3

```
R2#sh run int lo 0
Building configuration...

Current configuration : 82 bytes
!
interface Loopback0
 ip address 10.2.2.2 255.255.255.255
 ip router isis 1
end

R2#sh run int eth0/0
Building configuration...

Current configuration : 111 bytes
!
interface Ethernet0/0
 ip address 10.10.12.2 255.255.255.0
 ip router isis 1
 isis circuit-type level-1   >>>>>> Circuit type is L1 towards R1
end

R2#sh run int eth0/1
Building configuration...

Current configuration : 84 bytes
!
interface Ethernet0/1
 ip address 10.10.24.2 255.255.255.0
 ip router isis 1
end
!

router isis 1
 net 49.0001.0000.0000.0002.00
```

R4

```
R4#sh run int lo 0
Building configuration...

Current configuration : 82 bytes
!
interface Loopback0
 ip address 10.4.4.4 255.255.255.255
 ip router isis 1
end

R4#sh run int ethernet 0/0
Building configuration...

Current configuration : 84 bytes
```

```
!
interface Ethernet0/0
 ip address 10.10.24.4 255.255.255.0
 ip router isis 1
end

R4#sh run int ethernet 0/1
Building configuration...

Current configuration : 84 bytes
!
interface Ethernet0/1
 ip address 10.10.34.4 255.255.255.0
 ip router isis 1
end

!

router isis 1
 net 49.0002.0000.0000.0004.00    >>>> Area on R4 is 49.0002.
```

注意： 两个区别区域之间的路由器永远将形成2级邻接关系。在我们的情况R4中区域是49.0002和

R2 & R3区域是49.0001。R4应该所以有L2与R2和R3的adjancey。

验证

```
R1#show clns neighbors
Tag 1:
System Id      Interface   SNPA                State  Holdtime  Type Protocol
R2             Et0/0       aabb.cc01.f600      Up     6         L1   IS-IS
R3             Et0/1       aabb.cc01.f700      Up     9         L1   IS-IS
R1#

R1 neighbor relationship with R2 and R3 is only L1R1#show clns neighbors
Tag 1:
System Id      Interface   SNPA                State  Holdtime  Type Protocol
R2             Et0/0       aabb.cc01.f600      Up     6         L1   IS-IS
R3             Et0/1       aabb.cc01.f700      Up     9         L1   IS-IS
R1#

R1 neighbor relationship with R2 and R3 is only L1R1#show clns neighbors
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R2             Et0/0       aabb.cc01.f600      Up     6         L1   IS-IS
R3             Et0/1       aabb.cc01.f700      Up     9         L1   IS-IS
R1#

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Tag 1:
System Id      Interface   SNPA                State  Holdtime  Type Protocol
R2             Et0/0       aabb.cc01.f600      Up     6         L1   IS-IS
R3             Et0/1       aabb.cc01.f700      Up     9         L1   IS-IS
R1#

R1 neighbor relationship with R2 and R3 is only L1
```

在上述拓扑R2和R3是L1lL2路由器，因此他们应该设置附上位结果，并且R1应该有两默认路由。

```
R1#show isis database

Tag 1:
IS-IS Level-1 Link State Database:
```

```
LSPID                 LSP Seq Num  LSP Checksum  LSP Holdtime      ATT/P/OL
R1.00-00            * 0x0000002B   0x4269        576               0/0/0
R2.00-00              0x00000033   0xB1CA        997               1/0/0
R2.01-00              0x0000001F   0x42F0        1018              0/0/0
R3.00-00              0x0000002B   0xCA5E        857               1/0/0
R3.01-00              0x0000001B   0x50E4        964               0/0/0

ATT ( which is marked in Bold ) represents attach bit and is set to 1 for both R2 and R3
router in Level 1 LSP . ATT bit is only set in Level1 LSP . R1#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       a - application route
       + - replicated route, % - next hop override

Gateway of last resort is 10.10.13.3 to network 0.0.0.0

i*L1  0.0.0.0/0 [115/10] via 10.10.13.3, 00:00:26, Ethernet0/1
                [115/10] via 10.10.12.2, 00:00:26, Ethernet0/0
     10.0.0.0/8 is variably subnetted, 9 subnets, 2 masks
C        10.1.1.1/32 is directly connected, Loopback0
i L1     10.2.2.2/32 [115/20] via 10.10.12.2, 00:00:26, Ethernet0/0
i L1     10.3.3.3/32 [115/20] via 10.10.13.3, 00:46:55, Ethernet0/1
C        10.10.12.0/24 is directly connected, Ethernet0/0
L        10.10.12.1/32 is directly connected, Ethernet0/0
C        10.10.13.0/24 is directly connected, Ethernet0/1
L        10.10.13.1/32 is directly connected, Ethernet0/1
i L1     10.10.24.0/24 [115/20] via 10.10.12.2, 00:00:26, Ethernet0/0
i L1     10.10.34.0/24 [115/20] via 10.10.13.3, 00:46:55, Ethernet0/1


In route table R1 is installing default route towards R2 and R3 .
```

默认情况下，因为2级路由没有被泄漏到1级地区，以上的路由表有R4的任何特定路由。它依靠forwading的流量的默认表，并且这可能导致不最理想的路由。在两上述的案件中，因为两个是同样量度，默认路由被安装了。如果量度的获得增加在R1和R2之间那么路由器应该只安装往R2的默认路由。

```
R1(config)#int eth0/0
R1(config-if)#isis metric 20 >>>>> Metric is increased by 20

R1#sh ip route 0.0.0.0
Routing entry for 0.0.0.0/0, supernet
 Known via "isis", distance 115, metric 10, candidate default path, type level-1
 Redistributing via isis 1
 Last update from 10.10.13.3 on Ethernet0/1, 00:00:05 ago
 Routing Descriptor Blocks:
 * 10.10.13.3, from 10.3.3.3, 00:00:05 ago, via Ethernet0/1
     Route metric is 10, traffic share count is 1

Now only 1 default route in routing table i.e. towards R3 .
```

在R4的所有流量将转发往R3和链路往R2的上述案件中不会使用。使用往R2再分配需要的链路执行在R2。要表示此，在R4的loopback0漏到R2通过再分配。

```
R1(config)#int eth0/0
R1(config-if)#isis metric 20 >>>>> Metric is increased by 20

R1#sh ip route 0.0.0.0
Routing entry for 0.0.0.0/0, supernet
```

```
 Known via "isis", distance 115, metric 10, candidate default path, type level-1
 Redistributing via isis 1
 Last update from 10.10.13.3 on Ethernet0/1, 00:00:05 ago
 Routing Descriptor Blocks:
 * 10.10.13.3, from 10.3.3.3, 00:00:05 ago, via Ethernet0/1
     Route metric is 10, traffic share count is 1

Now only 1 default route in routing table i.e. towards R3 . R2#

router isis 1
 net 49.0001.0000.0000.0002.00
 redistribute isis ip level-2 into level-1 route-map LEVEL2_into_Level1

R2#show route-map
route-map LEVEL2_into_Level1, permit, sequence 10
 Match clauses:
   ip address (access-lists): 10
 Set clauses:
 Policy routing matches: 0 packets, 0 bytes
!
R2#sh access-lists 10
Standard IP access list 10
   10 permit 10.4.4.4 (22 matches)
```

R1数据库和路由表在再分配以后

```
R1#show isis database R2.00-00 detail

Tag 1:

IS-IS Level-1 LSP R2.00-00
LSPID                 LSP Seq Num  LSP Checksum  LSP Holdtime      ATT/P/OL
R2.00-00              0x00000036   0xABCD        859               1/0/0
 Area Address: 49.0001
 NLPID:        0xCC
 Hostname: R2
 IP Address:   10.2.2.2
 Metric: 10         IP 10.10.12.0 255.255.255.0
 Metric: 10         IP 10.2.2.2 255.255.255.255
 Metric: 10         IP 10.10.24.0 255.255.255.0
 Metric: 10         IS R2.01
  Metric: 148        IP-Interarea 10.4.4.4 255.255.255.255


After redistribution 10.4.4.4/32 route is being seen into R1 database .


R1#sh ip route 10.4.4.4
Routing entry for 10.4.4.4/32
 Known via "isis", distance 115, metric 168, type inter area
 Redistributing via isis 1
 Last update from 10.10.12.2 on Ethernet0/0, 00:06:32 ago
 Routing Descriptor Blocks:
 * 10.10.12.2, from 10.2.2.2, 00:06:32 ago, via Ethernet0/0
     Route metric is 168, traffic share count is 1

After redistribution 10.4.4.4/32 is also present in routing table as well .
```

注意：在上述案件中R2在路由表里通告特定路由，但是不adevrtise默认路由。R1看到附上位1级LSP和它在路由表里安装默认路由。

故障排除

目前没有针对此配置的故障排除信息。