配置附上位集

目录

简介

本文描述Intermediate System to Intermediate System (ISIS)附上位行为。

先决条件

要求

Cisco 建议您了解以下主题：

- ISIS
- 开放最短路径优先 (OSPF)

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。

背景信息

这是一些工作记住的和附上位行为关于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。

4. OSPF有限制Shortest Path First (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路由器分别生成1级和2级标签交换路径(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，然后1级路由器将发送数据包到L1L2路由器为了到达骨干区域。

7. 默认情况下，二级路由器没有漏到1级地区由L1L2路由器，虽然1级路由器总是传播对2级区域。

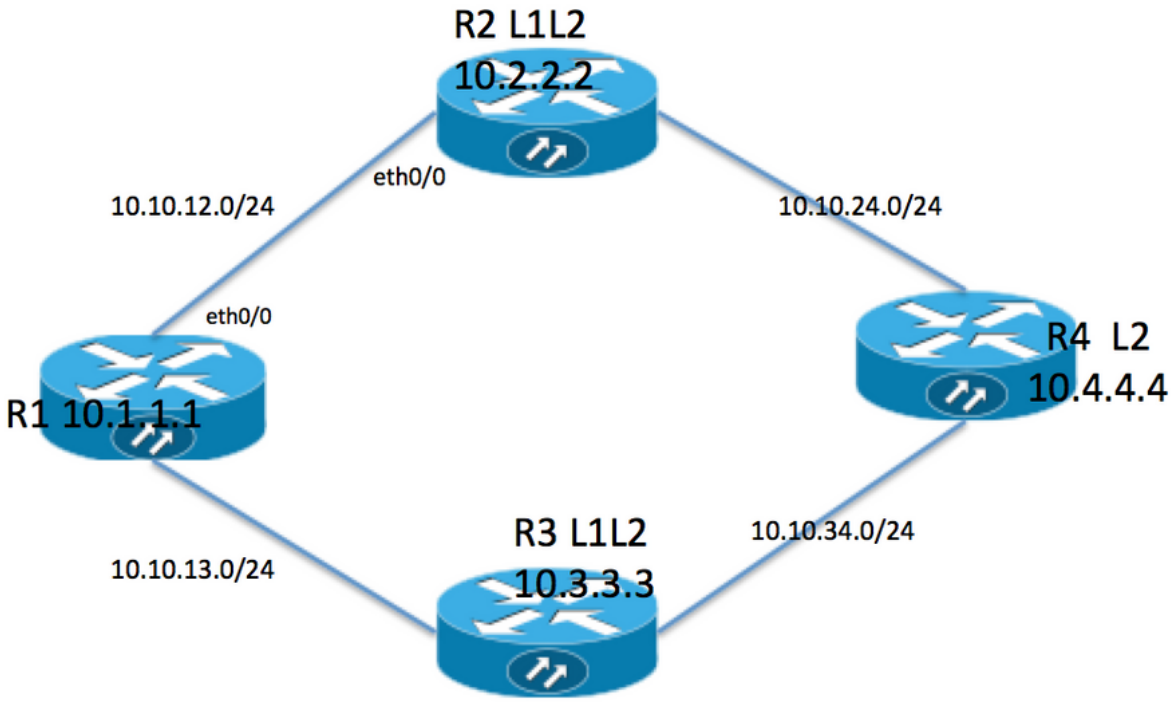
8. 为了到达2级地区， L1L2路由器设置1级LSP的附上位。1级路由器在路由表里安装默认路由，此路由将指向往L1L2路由器。

9. 万一网络有超过连接同一个L1区域的一个L1L2路由器，然后可能导致不最理想的路由，因为2级路由不流到1级区域。1级地区只安装指向往L1L2路由器是最近的默认路由。漏2级路由到1级里可以完成解决这些限制。

配置

网络图

考虑此网络拓扑为了了解环路预防技术。



拓扑信息

- R1是有区域的49.0001 1级路由器
- R2和R3是L1L2有49.0001的路由器
- R4是有区域的49.0002 2级路由器
- R1有一环回地址10.1.1.1
- R2环回地址是10.2.2.2
- R3地址是10.3.3.3
- R4环回地址是10.4.4.4

R1

```
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.
```

> **Note**:两个区别区域之间的路由器总是从2级邻接关系。在我们的情况中， R4区域是49.0002，并且R2和R3区域是49.0001。因此， R4必须有L2与R2和R3的邻接。

验证

使用本部分可确认配置能否正常运行。

```
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 L1

R1#show clns neighbors
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R1#

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

在此拓扑方面， R2和R3是L1L2路由器，因此他们必须设置附上位结果，并且R1必须有两默认路由。

```
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，此处路由表没有R4的任何特定路由。它依靠转发流量的默认表，并且这可能导致不最理想的路由。在上述案件中，因为两个是同样量度，两默认路由被安装了。如果量度的获得增加在R1和R2之间，则路由器必须只安装往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 .
```

在上述论点中，所有流量R4的将转发往R3和链路往R2没有使用。为了使用往R2的链路，再分配需

要执行在R2。为了表示此，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 .
```

Note:在这种情况下，R2在路由表里通告特定路由，但是不通告默认路由。R1看到1级LSP和它的附上位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。