配置連線位設定

目錄

簡介

本檔案介紹中間系統到中間系統(ISIS)連線位元的行為。

必要條件

需求

思科建議您瞭解以下主題：

- ISIS
- 開放最短路徑優先(OSPF)

採用元件

本文件所述內容不限於特定軟體和硬體版本。

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除（預設）的組態來啟動。如果您的網路正在作用，請確保您已瞭解任何指令可能造成的影響。

背景資訊

以下是需要記住的幾件事以及對ISIS的攻擊行為。

1.在ISIS網路中，有3種型別的路由器：Level1(L1)路由器、Level 2(L2)路由器和Level1Level2(L1L2)路由器。

2.與OSPF一樣，ISIS使用L2區域作為主幹區域。

3.連線到兩個區域（即1級和2級）的路由器稱為L1L2路由。

4. OSPF採用多區域的概念，以限制最短路徑優先(SPF)計算範圍，這也是在ISIS中存在不同區域的原因。

5.第1級和第2級ISIS路由器分別生成第1級和第2級鏈路狀態PDU(LSP)。L1L2路由器同時生成LSP（即Level1和Level2）。

6.如果第1級路由器需要到達L2網路，則第1級路由器會將資料包傳送到L1L2路由器以便到達主幹區域。

7.預設情況下，L1L2路由器不會將第2級路由器洩漏到第1級區域，但第1級路由器始終會傳播到第2級區域。

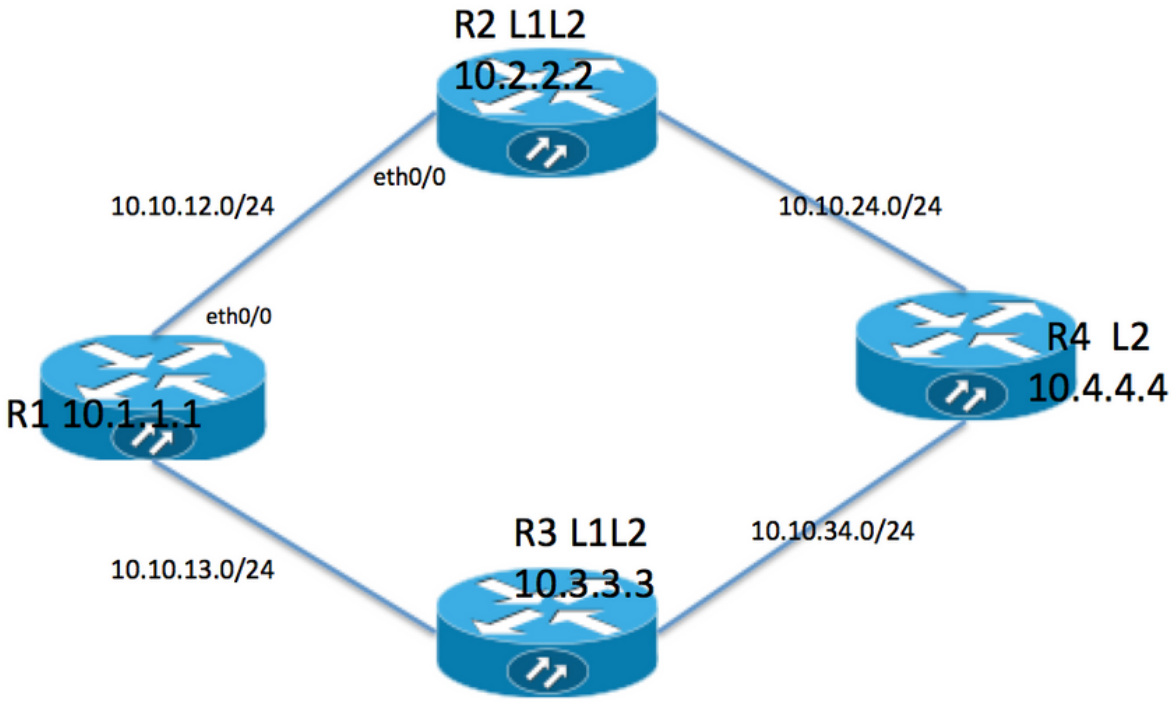
8.為了達到2級區域，L1L2路由器在1級LSP中設定連線位。1級路由器將預設路由安裝到路由表中，該路由將指向L1L2路由器。

9.如果網路有多台連線同一L1區域的L1L2路由器，那麼由於level2路由不流入level1區域，它可能導致不理想的路由。1級區域只安裝指向最近的L1L2路由器的預設路由。可以將2級路由洩漏到1級以克服這些限制。

設定

網路圖表

請考慮使用以下網路拓撲，以瞭解環路預防技術。



拓撲資訊

- R1是區域49.0001的1級路由器
- R2和R3是具有49.0001的L1L2路由器
- R4是區域49.0002的2級路由器
- R1的環回地址為10.1.1.1
- R2環回地址為10.2.2.2
- R3地址為10.3.3.3
- R4環回地址為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

```
R3#sh run int lo 0
Building configuration...

Current configuration : 82 bytes
!
interface Loopback0
 ip address 10.3.3.3 255.255.255.255
 ip router isis 1
end

R3#sh run int eth0/0
Building configuration...

Current configuration : 84 bytes
!
interface Ethernet0/0
 ip address 10.10.13.3 255.255.255.0
 ip router isis 1
end

R3#sh run int eth0/1
Building configuration...

Current configuration : 84 bytes
!
interface Ethernet0/1
 ip address 10.10.34.3 255.255.255.0
 ip router isis 1
end
!

router isis 1
 net 49.0001.0000.0000.0003.00
```

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.
```

附註：兩個不同區域之間的路由器始終來自2級鄰居關係。在本例中，R4區域為49.0002,R2和R3區域為49.0001。因此，R4必須與R2和R3具有L2鄰接關係。

驗證

使用本節內容，確認您的組態是否正常運作。

```
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

R2#sh clns neighbors
Tag 1:
System Id      Interface   SNPA            State  Holdtime  Type Protocol
R1             Et0/0       aabb.cc01.f500      Up     24        L1   IS-IS
R4             Et0/1       aabb.cc01.f800      Up     9         L2   IS-IS

R2 neighbor relationship with R1 is L1
R2 neighbor relationship with R4 is L2

So R2 is L1L2 router as it is building both adjanceny i.e. L1 and L2 neighbor

R3#sh clns neighbors
Tag 1:
System Id      Interface   SNPA            State  Holdtime  Type Protocol
R1             Et0/0       aabb.cc01.f510      Up     25        L1   IS-IS
R4             Et0/1       aabb.cc01.f810      Up     7         L2   IS-IS

R3 neighbor relatioship with R1 is L1
R3 neighbor relationship with R4 is L2

So R3 is L1L2 router as it is building both adjanceny i.e. L1 and L2 neighbor

R4#sh clns neighbors
Tag 1:
System Id      Interface   SNPA            State  Holdtime  Type Protocol
R2             Et0/0       aabb.cc01.f610      Up     29        L2   IS-IS
R3             Et0/1       aabb.cc01.f710      Up     23        L2   IS-IS

R4 neighbor relationship with R2 and R3 is L2 only .
```

在此拓撲中，R2和R3是L1L2路由器，因此它們必須設定連線位，因此R1必須具有兩條預設路由。

```
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 .
```

此處的路由表沒有用於R4的任何特定路由，因為預設情況下第2級路由不會洩漏到第1級區域。它依賴預設表來轉發流量，這可能會導致不理想的路由。在上述情況下，由於兩個路由的度量相同，因此安裝了兩個預設路由。如果R1和R2之間的度量增加，則路由器必須僅安裝通向R2的預設路由。

```
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 .
```

在上述情況下，R4的所有流量都將轉發到R3，而不使用指向R2的鏈路。為了利用指向R2的鏈路，需要在R2上進行重分發。為了描述這一點，R4上的環回0通過重分發洩漏到R2。

```
R4#sh run int lo 1
Building configuration...

Current configuration : 85 bytes
!
interface Loopback1
 ip address 10.44.44.44 255.255.255.255
 ip router isis 1
end
```

```
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)
```

重分發後的R1資料庫和路由表：

```
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 .
```

附註：在這種情況下，R2會通告路由表中的特定路由，但不會通告預設路由。R1在級別1 LSP中看到連線位，並在路由表中安裝預設路由。

疑難排解

目前尚無適用於此組態的具體疑難排解資訊。