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Introducción

Este documento describe el mecanismo abierto de la selección de Route del tipo 5 del anuncio del estado del link externo del sistema del trayecto más corto primero versión 3 (OSPFv3) (LSA). Presenta un escenario de red con la configuración para que cómo seleccione la ruta recibida a partir de un Autonomous System Boundary Router (ASBR) sobre otro.

Prerrequisitos

Requisitos

Cisco recomienda que usted tiene conocimiento de rutear OSPFv3 y del IPv6.

Componentes Utilizados

Este documento no tiene restricciones específicas en cuanto a versiones de software y de hardware.

La información que contiene este documento se creó a partir de los dispositivos en un ambiente de laboratorio específico. Todos los dispositivos que se utilizan en este documento se pusieron en funcionamiento con una configuración verificada (predeterminada). Si la red está funcionando, asegúrese de haber comprendido el impacto que puede tener cualquier comando.

Antecedentes

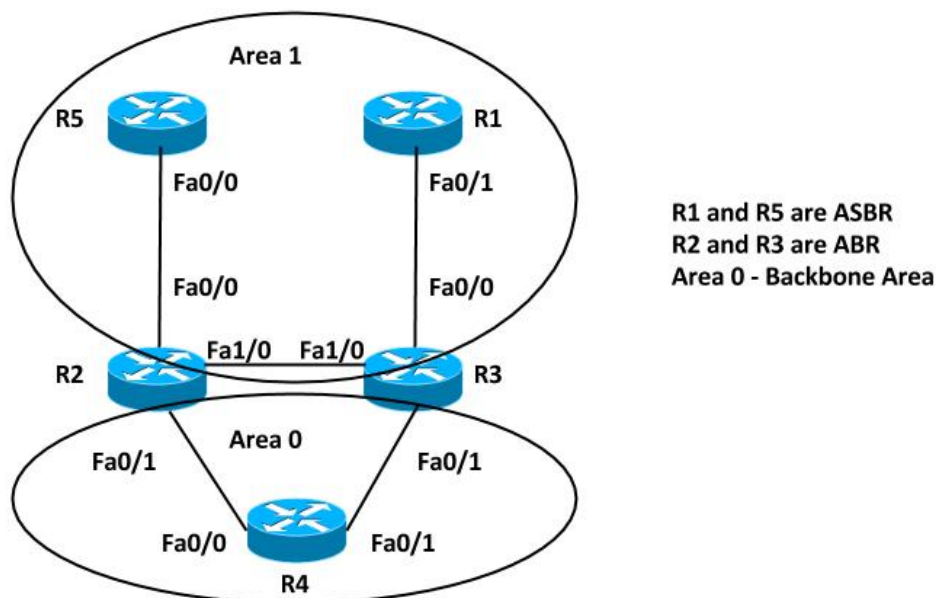
Si las rutas se redistribuyen en OSPFv3 de otros Routing Protocol del IPv6 o de las Static rutas del IPv6, estas rutas se convierten en rutas del Como-externo OSPF por abandono. Estas rutas del Como-externo caen conforme a dos categorías, al tipo 1 externo (e1 O) y al tipo-2 externo (O E2).

La diferencia entre los dos está de la manera que el coste (métrico) de la ruta se calcula. El costo de una ruta tipo 2 es siempre el costo externo sin importar el costo interno para alcanzar esa ruta. es la adición del costo externo y del costo interno usados para alcanzar esa ruta. Una ruta tipo 1 siempre es preferible sobre una ruta tipo 2 para el mismo destino.

Configurar

Diagrama de la red

Considere la topología de red abajo marcar el LSA de AS externo 5 recibido en el R4 en el área 0 que originó de los ASBR en el r2 del área 1. y el R3 es los routers del borde del área (ABR).



Configuraciones

Para la simplicidad, esta configuración redistribuye la Static ruta del IPv6 en los ASBR en el 1 Router R5 del área y el r1.

Nota:

Verificación

Usted puede utilizar estos comandos para verificar la redistribución:

R5#show ipv6 ospf

```
Routing Process "ospfv3 10" with ID 192.168.1.5
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
It is an autonomous system boundary router
Redistributing External Routes from,
  static
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msec
Minimum hold time between two consecutive SPF's 10000 msec
Maximum wait time between two consecutive SPF's 10000 msec
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msec
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msec
Retransmission pacing timer 66 msec
Number of external LSA 2. Checksum Sum 0x0100D4
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
  Area 1
    Number of interfaces in this area is 1
    SPF algorithm executed 5 times
    Number of LSA 16. Checksum Sum 0x08011B
    Number of DCbitless LSA 0
    Number of indication LSA 0
    Number of DoNotAge LSA 0
    Flood list length 0
```

R1#show ipv6 ospf

```
Routing Process "ospfv3 10" with ID 192.168.1.1
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
It is an autonomous system boundary router
Redistributing External Routes from,
  static
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msec
Minimum hold time between two consecutive SPF's 10000 msec
Maximum wait time between two consecutive SPF's 10000 msec
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msec
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msec
Retransmission pacing timer 66 msec
Number of external LSA 2. Checksum Sum 0x0100D4
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
  Area 1
    Number of interfaces in this area is 1
    SPF algorithm executed 6 times
    Number of LSA 16. Checksum Sum 0x08AD19
    Number of DCbitless LSA 0
    Number of indication LSA 0
    Number of DoNotAge LSA 0
    Flood list length 0
```

Así pues, los ambos los routers ASBR, R5 y r1 redistribuyen las Static rutas del IPv6. Para marcar la ruta redistribuido en la tabla de ruteo y la base de datos OSPFv3 en el router R4 para el prefijo FD00:AAAA:BBBB:CCCC::/64, ingrese este comando:

Métrico redistribuida

Según lo mencionado anterior, el valor métrico se fija por abandono a 20 cuando las rutas se redistribuyen en OSPFv3. Después, defina el valor 10 mientras que usted redistribuye en ASBR 192.168.1.1 (r1) y marca la salida en el Router4.

Aquí están los cambios implementados en el r1:

R1#show ipv6 ospf

```
Routing Process "ospfv3 10" with ID 192.168.1.1
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
It is an autonomous system boundary router
Redistributing External Routes from,
    static
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msec
Minimum hold time between two consecutive SPF's 10000 msec
Maximum wait time between two consecutive SPF's 10000 msec
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msec
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msec
Retransmission pacing timer 66 msec
Number of external LSA 2. Checksum Sum 0x0100D4
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
  Area 1
    Number of interfaces in this area is 1
    SPF algorithm executed 6 times
    Number of LSA 16. Checksum Sum 0x08AD19
    Number of DCbitless LSA 0
    Number of indication LSA 0
    Number of DoNotAge LSA 0
    Flood list length 0
```

La tabla de ruteo ahora muestra solamente una entrada en la tabla de ruteo del IPv6. Marque la base de datos OSPF más lejos para este LSA de AS externo:

```
R4#show ipv6 route FD00:AAAA:BBBB:CCCC::/64
Routing entry for FD00:AAAA:BBBB:CCCC::/64
  Known via "ospfv3 10", distance 110, metric 10, type extern 2
  Route count is 1/1, share count 0
  Routing paths:
    FE80::C802:BFF:FEB4:6, FastEthernet0/1
    Last updated 00:00:19 ago
  • Only the LSA with lower metric 10 is installed in the Routing Table
```

```
R4#show ipv6 ospf database external FD00:AAAA:BBBB:CCCC::/64
OSPFv3 Router with ID (192.168.1.4) (Process ID 10)
Type-5 AS External Link States
Routing Bit Set on this LSA
LS age: 34
LS Type: AS External Link
Link State ID: 0
Advertising Router: 192.168.1.1
LS Seq Number: 80000002
Checksum: 0x4EA7
Length: 36
Prefix Address: FD00:AAAA:BBBB:CCCC::
Prefix Length: 64, Options: None
Metric Type: 2 (Larger than any link state path)
Metric: 10
  • Advertising Routers are R1 (192.168.1.1) and R5 (192.168.1.5)
  • OSPF External type 2 routes - OE2
LS age: 382
LS Type: AS External Link
Link State ID: 0
Advertising Router: 192.168.1.5
LS Seq Number: 80000001
Checksum: 0x7474
Length: 36
Prefix Address: FD00:AAAA:BBBB:CCCC::
Prefix Length: 64, Options: None
Metric Type: 2 (Larger than any link state path)
Metric: 20
```

Remita métrico

El métrico delantero es el coste para alcanzar el ASBR del router. Esto se puede marcar con estos comandos:

R1#show ipv6 ospf

```
Routing Process "ospfv3 10" with ID 192.168.1.1
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
It is an autonomous system boundary router
Redistributing External Routes from,
  static
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msec
Minimum hold time between two consecutive SPFs 10000 msec
Maximum wait time between two consecutive SPFs 10000 msec
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msec
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msec
Retransmission pacing timer 66 msec
Number of external LSA 2. Checksum Sum 0x0100D4
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
  Area 1
    Number of interfaces in this area is 1
    SPF algorithm executed 6 times
    Number of LSA 16. Checksum Sum 0x08AD19
    Number of DCbitless LSA 0
    Number of indication LSA 0
    Number of DoNotAge LSA 0
    Flood list length 0
```

En esta salida, el coste para alcanzar los ASBR (r1 y R5) es 2 del router R4. Por abandono, el coste para la interfaz FastEthernet en OSPFv3 es 1. Tan en este caso, el coste es 2 del R4 para alcanzar el r1 o el R5: Métrico delantero = coste del router para alcanzar ABR (1) + coste ABR para alcanzar el ASBR (1) = 2.

Cambie la redistribución métrica a 10 en el R5 también, así que ambas rutas están instaladas otra vez en la tabla de ruteo del IPv6.

Aquí están los cambios implementados en el R5:

R1#show ipv6 ospf

```
Routing Process "ospfv3 10" with ID 192.168.1.1
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
It is an autonomous system boundary router
Redistributing External Routes from,
  static
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msec
Minimum hold time between two consecutive SPFs 10000 msec
Maximum wait time between two consecutive SPFs 10000 msec
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msec
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msec
Retransmission pacing timer 66 msec
Number of external LSA 2. Checksum Sum 0x0100D4
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
```

```
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
Area 1
  Number of interfaces in this area is 1
  SPF algorithm executed 6 times
  Number of LSA 16. Checksum Sum 0x08AD19
  Number of DCbitless LSA 0
  Number of indication LSA 0
  Number of DoNotAge LSA 0
  Flood list length 0
```

La tabla de ruteo del IPv6 y el RIB OSPFv3 en el R4 muestra:

R1#show ipv6 ospf

```
Routing Process "ospfv3 10" with ID 192.168.1.1
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
It is an autonomous system boundary router
Redistributing External Routes from,
  static
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msec
Minimum hold time between two consecutive SPFs 10000 msec
Maximum wait time between two consecutive SPFs 10000 msec
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msec
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msec
Retransmission pacing timer 66 msec
Number of external LSA 2. Checksum Sum 0x0100D4
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
Area 1
  Number of interfaces in this area is 1
  SPF algorithm executed 6 times
  Number of LSA 16. Checksum Sum 0x08AD19
  Number of DCbitless LSA 0
  Number of indication LSA 0
  Number of DoNotAge LSA 0
  Flood list length 0
```

Ahora deja el cambio el coste alcanzar uno de los ASBR pero con la misma redistribución métrica y marcar la misma salida.

Aumente el OSPFv3 costado en fa0/1 para el router R4:

R1#show ipv6 ospf

```
Routing Process "ospfv3 10" with ID 192.168.1.1
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
It is an autonomous system boundary router
Redistributing External Routes from,
  static
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msec
Minimum hold time between two consecutive SPFs 10000 msec
Maximum wait time between two consecutive SPFs 10000 msec
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msec
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msec
Retransmission pacing timer 66 msec
Number of external LSA 2. Checksum Sum 0x0100D4
```

```
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
Area 1
  Number of interfaces in this area is 1
  SPF algorithm executed 6 times
  Number of LSA 16. Checksum Sum 0x08AD19
  Number of DCbitless LSA 0
  Number of indication LSA 0
  Number of DoNotAge LSA 0
  Flood list length 0
```

Marque el métrico delantero. Muestra que ahora el coste para alcanzar el r1 ASBR es 11 de la interfaz del Fa0/1:

R1#show ipv6 ospf

```
Routing Process "ospfv3 10" with ID 192.168.1.1
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
It is an autonomous system boundary router
Redistributing External Routes from,
  static
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msec
Minimum hold time between two consecutive SPF's 10000 msec
Maximum wait time between two consecutive SPF's 10000 msec
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msec
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msec
Retransmission pacing timer 66 msec
Number of external LSA 2. Checksum Sum 0x0100D4
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
Area 1
  Number of interfaces in this area is 1
  SPF algorithm executed 6 times
  Number of LSA 16. Checksum Sum 0x08AD19
  Number of DCbitless LSA 0
  Number of indication LSA 0
  Number of DoNotAge LSA 0
  Flood list length 0
```

Ahora la tabla de ruteo del IPv6 y el RIB OSPFv3 en el R4 muestra:

R1#show ipv6 ospf

```
Routing Process "ospfv3 10" with ID 192.168.1.1
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
It is an autonomous system boundary router
Redistributing External Routes from,
  static
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 5000 msec
Minimum hold time between two consecutive SPF's 10000 msec
Maximum wait time between two consecutive SPF's 10000 msec
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msec
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msec
Retransmission pacing timer 66 msec
Number of external LSA 2. Checksum Sum 0x0100D4
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
```

```
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
Area 1
  Number of interfaces in this area is 1
  SPF algorithm executed 6 times
  Number of LSA 16. Checksum Sum 0x08AD19
  Number of DCbitless LSA 0
  Number of indication LSA 0
  Number of DoNotAge LSA 0
  Flood list length 0
```

La ruta con el métrico delantero más bajo está instalada tan en la tabla de ruteo del IPv6.

En resumen, cuando usted tiene entradas múltiples para el LSA de AS externo, la primera preferencia se da al métrico (métrico redistribuida). La ruta con el métrico más bajo está instalada en la tabla de ruteo del IPv6. La segunda preferencia se da al métrico delantero, si el métrico redistribuida es lo mismo. La ruta con el métrico delantero más bajo está instalada en la tabla de ruteo del IPv6.