FabricPath環境的控制平面故障排除

目錄

簡介

本文檔介紹對FabricPath進行故障排除的基本步驟。

必要條件

需求

Cisco NXOS®建議您瞭解以下主題：

- 交換矩陣路徑
- 中間系統到中間系統(IS-IS)
- 生成樹通訊協定(STP)
- 嵌入式邏輯分析器模組(ELAM)

採用元件

本文檔僅限於特定硬體，如Nexus 7000。

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。如果您的網路運作中，請確保您瞭解任何指令可能造成的影響。

背景資訊

FabricPath是一種思科技術，旨在增強乙太網路功能，特別是在大規模資料中心環境中。

以下是Cisco Nexus 7000系列上FabricPath的主要功能和優勢：

1. 可擴充性：FabricPath設計用於支援大量虛擬埠通道(vPC)，並提供高度可擴展的第2層網路，可處理大量主機，且沒有通常與生成樹協定(STP)相關的限制。

2. 無環路拓撲：FabricPath消除了FabricPath網路域內對STP的需求。這透過使用一種類似於路由的技術來轉發乙太網幀(稱為多鏈路透明互連(TRILL))來實現，該技術可防止環路並允許所有路徑處於活動狀態。

3. 高可用性：使用FabricPath，可以更高效地處理網路拓撲更改，從而縮短收斂時間。這增強了整個網路的穩定性，並提供了更好的網路可用性。

4. 易用性：該技術允許靈活且可擴展的第2層架構，從而簡化了網路設計。這使得網路更易於管理並降低運營複雜性。

5. 等價多路徑(ECMP)：FabricPath支援ECMP，可在網路中的任意兩點之間使用多個並行路徑。這樣可透過在所有可用路徑間對流量進行負載均衡來最佳化頻寬利用率。

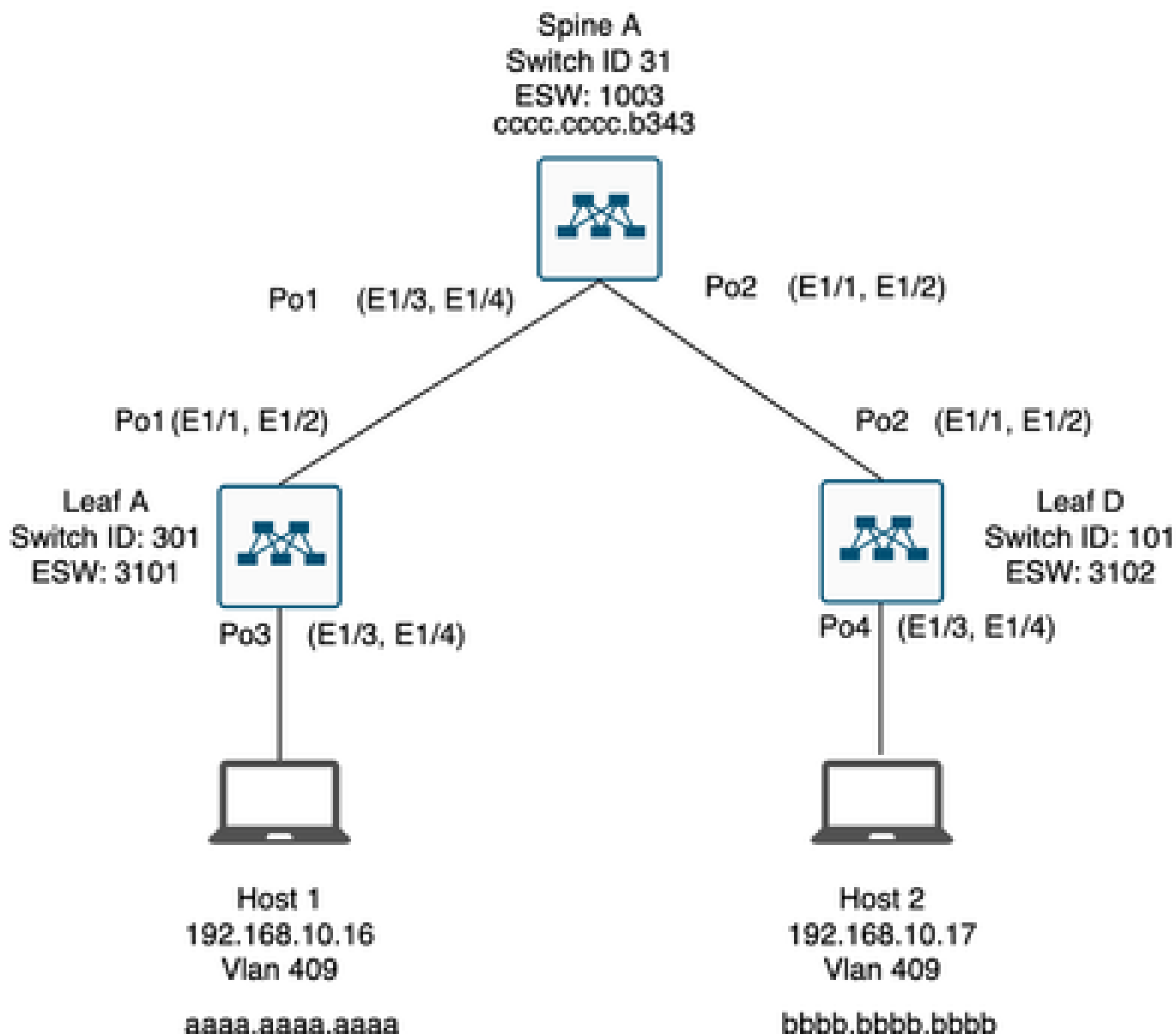6. 虛擬化支援：FabricPath為虛擬化資料中心和私有雲部署提供理想的基礎設施。它能夠處理大量的虛擬環境，因此非常適合這些型別的應用。

另外必須指出的是，雖然FabricPath提供了許多好處，但最好用於其特定優勢與網路設計目標相符的環境，例如需要大型、動態和可擴展的第2層域的資料中心。

拓撲

為簡單起見，此拓撲中只顯示一個主幹和兩個枝葉。

模擬交換機ID枝葉A：3101

模擬交換機ID枝葉 D ：3102

Spine A
Switch ID 31
ESW: 1003
cccc.cccc.b343

Po1   (E1/3, E1/4)   Po2   (E1/1, E1/2)

Po1 (E1/1, E1/2)   Po2   (E1/1, E1/2)

Leaf A   Leaf D
Switch ID: 301   Switch ID: 101
ESW: 3101   ESW: 3102

Po3   (E1/3, E1/4)   Po4   (E1/3, E1/4)

Host 1   Host 2
192.168.10.16   192.168.10.17
Vlan 409   Vlan 409

aaaa.aaaa.aaaa   bbbb.bbbb.bbbb

疑難排解

主機1無法與主機2通訊。

<#root>

Leaf_A#

ping 192.168.10.17

PING 192.168.10.17 (192.168.10.17): 56 data bytes
ping: sendto 192.168.10.17 64 chars, No route to host
Request 0 timed out
ping: sendto 192.168.10.17 64 chars, No route to host
^C
--- 192.168.10.17 ping statistics ---
2 packets transmitted, 0 packets received, 100.00% packet loss
Leaf_A#

1)驗證兩台主機的MAC地址表是否已正確填充。

<#root>

Leaf_A#

show mac address-table vlan 409

Note: MAC table entries displayed are getting read from software.
Use the 'hardware-age' keyword to get information related to 'Age'

Legend:
* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen,+ - primary entry using vPC Peer-Link,
(T) - True, (F) - False , ~~~ - use 'hardware-age' keyword to retrieve age info
VLAN MAC Address Type age Secure NTFY Ports/SWID.SSID.LID
---------+-----------------+--------+---------+------+----+------------------
* 409 aaaa.aaaa.aaaa dynamic ~~~ F F Po3
                                                      <------ Leaf A is not learning the mac address of Host

Leaf_A#

<#root>

Leaf_D#

show mac address-table vlan 409

Note: MAC table entries displayed are getting read from software.
Use the 'hardware-age' keyword to get information related to 'Age'

Legend:
* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen,+ - primary entry using vPC Peer-Link,
(T) - True, (F) - False , ~~~ - use 'hardware-age' keyword to retrieve age info
VLAN MAC Address Type age Secure NTFY Ports/SWID.SSID.LID
---------+-----------------+--------+---------+------+----+------------------
* 409 bbbb.bbbb.bbbb dynamic ~~~ F F Po4
409 aaaa.aaaa.aaaa dynamic ~~~ F F 3101.1.65535   <------ Leaf D is correctly learning both Mac Address

```
Leaf_D#
```

2)檢驗路徑中涉及的每個介面和vlan的配置。必須啟用FabricPath。

<#root>

```
Leaf_A#
```

show run fabricpath

```
!Command: show running-config fabricpath
!Time: Mon Apr 22 23:12:40 2024

version 6.2(12)
install feature-set fabricpath
feature-set fabricpath

vlan 409
mode fabricpath
fabricpath domain default

fabricpath switch-id 301

vpc domain 301
fabricpath switch-id 3101

interface port-channel1
switchport mode fabricpath

interface port-channel2
switchport mode fabricpath

interface Ethernet1/1
switchport mode fabricpath

interface Ethernet1/2
switchport mode fabricpath

Leaf_A#
```

<#root>

```
Leaf_D#
```

show run fabricpath

```
!Command: show running-config fabricpath
!Time: Mon Apr 22 23:12:40 2024

version 6.2(12)
install feature-set fabricpath
feature-set fabricpath
```

```
                      <--------- FabricPath is not enabled for VLAN 409


fabricpath switch-id 101

vpc domain 302
fabricpath switch-id 3102

interface port-channel1
switchport mode fabricpath

interface port-channel2
switchport mode fabricpath

interface Ethernet1/1
switchport mode fabricpath

interface Ethernet1/2
switchport mode fabricpath


Leaf_D#
Leaf_D#
```

<#root>

Spine_A#

show run fabricpath

```
!Command: show running-config fabricpath
!Time: Mon Apr 22 23:12:40 2024

version 6.2(12)
install feature-set fabricpath
feature-set fabricpath

vlan 409
mode fabricpath
fabricpath domain default

fabricpath switch-id 31

vpc domain 101
fabricpath switch-id 1003

interface port-channel1
switchport mode fabricpath

interface port-channel2
switchport mode fabricpath

interface Ethernet1/1
switchport mode fabricpath

interface Ethernet1/2
switchport mode fabricpath
```

```
interface Ethernet1/3
switchport mode fabricpath

interface Ethernet1/4
switchport mode fabricpath

Spine_A#
```

3)驗證參與FabricPath的每個裝置的交換機ID。

<#root>

Leaf_A#

show fabricpath switch-id local

```
Switch-Id: 301
System-Id: aaaa.aaaa.b341
Leaf_A#
```

<#root>

Leaf_D#

show fabricpath switch-id local

```
Switch-Id: 101
System-Id: bbbb.bbbb.b342
Leaf_D#
```

<#root>

Spine_A#

show fabricpath switch-id local

```
Switch-Id: 31
System-Id: cccc.cccc.b343
Spine_A#
```

4)檢驗每台裝置的交換機ID是否配置了正確的路由。

<#root>

Leaf_A#

show fabricpath route switchid 101

```
FabricPath Unicast Route Table
'a/b/c' denotes ftag/switch-id/subswitch-id
'[x/y]' denotes [admin distance/metric]
ftag 0 is local ftag
subswitch-id 0 is default subswitch-id


FabricPath Unicast Route Table for Topology-Default

1/101/0, number of next-hops: 1
via Po1, [115/5], 1 day/s 12:21:29, isis_fabricpath-default
```

<------ The route from Leaf A to Leaf D is correctly configured.

```
Leaf_A
```

<#root>

```
Leaf_D#
```

show fabricpath route switchid 301

```
FabricPath Unicast Route Table
'a/b/c' denotes ftag/switch-id/subswitch-id
'[x/y]' denotes [admin distance/metric]
ftag 0 is local ftag
subswitch-id 0 is default subswitch-id


FabricPath Unicast Route Table for Topology-Default

1/301/0, number of next-hops: 1
via Po2, [115/5], 1 day/s 12:21:29, isis_fabricpath-default
```

 <------ The route from Leaf D to Leaf A is correctly configured.

```
Leaf_D
```

<#root>

```
Spine_A#
```

show fabricpath route switchid 301

```
FabricPath Unicast Route Table
'a/b/c' denotes ftag/switch-id/subswitch-id
'[x/y]' denotes [admin distance/metric]
ftag 0 is local ftag
subswitch-id 0 is default subswitch-id


FabricPath Unicast Route Table for Topology-Default

1/301/0, number of next-hops: 1
via Po1, [115/20], 1 day/s 06:13:21, isis_fabricpath-default
```

<------ The route from Spine A to Leaf A is correctly configured.

Spine_A#

Spine_A#

show fabricpath route switchid 101

FabricPath Unicast Route Table
'a/b/c' denotes ftag/switch-id/subswitch-id
'[x/y]' denotes [admin distance/metric]
ftag 0 is local ftag
subswitch-id 0 is default subswitch-id

FabricPath Unicast Route Table for Topology-Default

1/101/0, number of next-hops: 1
via Po2, [115/20], 1 day/s 06:13:21, isis_fabricpath-default

<------ The route from Spine A to Leaf D is correctly configured.

Spine_A#

5)驗證枝葉和主幹之間的IS-IS鄰接關係。

<#root>

Leaf_A#

show fabricpath isis adjacency

Fabricpath IS-IS domain: default Fabricpath IS-IS adjacency database:
System ID SNPA Level State Hold Time Interface
cccc.cccc.b343 N/A 1 UP 00:00:27 port-channel1

Leaf_A#

<#root>

Leaf_D#

show fabricpath isis adjacency

Fabricpath IS-IS domain: default Fabricpath IS-IS adjacency database:
System ID SNPA Level State Hold Time Interface
cccc.cccc.b343 N/A 1 UP 00:00:27 port-channel2

Leaf_D#

6)驗證當前部署中不存在衝突。

<#root>

Leaf_A#

show fabricpath conflict all

No Fabricpath ports in a state of resource conflict.

No Switch id Conflicts

No transitions in progress

Leaf_A#

<#root>

Leaf_D#

show fabricpath conflict all

No Fabricpath ports in a state of resource conflict.

No Switch id Conflicts

No transitions in progress

Leaf_D#

<#root>

Spine_A#

show fabricpath conflict all

No Fabricpath ports in a state of resource conflict.

No Switch id Conflicts

No transitions in progress

Spine_A#

7)驗證是否已將VLAN增加到IS-IS VLAN範圍。

<#root>

```
Leaf_A#
```

show fabricpath isis vlan-range

```
Fabricpath IS-IS domain: default
MT-0
Vlans configured:1,409
Leaf_A#
```

<#root>

```
Leaf_D#
```

show fabricpath isis vlan-range

```
Fabricpath IS-IS domain: default
MT-0
Vlans configured:1              <------ VLAN 409 is not present
Leaf_D
```

<#root>

```
Spine_A#
```

show fabricpath isis vlan-range

```
Fabricpath IS-IS domain: default
MT-0
Vlans configured:1, 409
Spine_A#
```

8)驗證是否在Spine A中觸發了ELAM。

<#root>

```
module-1# show hardware internal dev-port-map       <------ Determine the
```

F4

```
 ASIC that is used for the FE on port
```

Eth1/2

```
. Enter this command in order to verify this.
----------------------------------------------------------------
CARD_TYPE: 48 port 10G
>Front Panel ports:48
----------------------------------------------------------------
Device name Dev role Abbr num_inst:
----------------------------------------------------------------
> Flanker Eth Mac Driver DEV_ETHERNET_MAC MAC_0 6
> Flanker Fwd Driver DEV_LAYER_2_LOOKUP L2LKP 6
> Flanker Xbar Driver DEV_XBAR_INTF XBAR_INTF 6
```

```
> Flanker Queue Driver DEV_QUEUEING QUEUE 6
> Sacramento Xbar ASIC DEV_SWITCH_FABRIC SWICHF 2
> Flanker L3 Driver DEV_LAYER_3_LOOKUP L3LKP 6
> EDC DEV_PHY PHYS 7
+----------------------------------------------------------------------+
+----------------+++FRONT PANEL PORT TO ASIC INSTANCE MAP+++------------+
+----------------------------------------------------------------------+
FP port | PHYS | MAC_0 |

L2LKP

 | L3LKP | QUEUE |SWICHF
    1        0       0       0       0       0      0,1

    2        0       0       0       0       0      0,1


...
module-1#
module-1#
module-1# elam asic flanker instance 0
module-1(fln-elam)#
module-1(fln-elam)# elam asic flanker instance 0
module-1(fln-elam)# layer3
module-1(fln-l2-elam)#
module-1(fln-l2-elam)# trigger dbus ipv4 ingress if source-ipv4-address 192.168.10.17
module-1(fln-l2-elam)#
module-1(fln-l2-elam)# trigger rbus ingress if trig
module-1(fln-l2-elam)# start
module-1(fln-l2-elam)#
module-1(fln-l2-elam)#
module-1(fln-l2-elam)# status
ELAM Slot 1 instance 0: L2 DBUS Configuration: trigger dbus ipv4 ingress if source-ipv4-address 192.168
L2 DBUS: Armed
ELAM Slot 1 instance 0: L2 RBUS Configuration: trigger rbus ingress if trig
L2 RBUS: Armed
module-1(fln-l2-elam)# status
ELAM Slot 1 instance 0: L2 DBUS Configuration: trigger dbus ipv4 ingress if source-ipv4-address 192.168
L2 DBUS: Armed
ELAM Slot 1 instance 0: L2 RBUS Configuration: trigger rbus ingress if trig
L2 RBUS: Armed
module-1(fln-l2-elam)#
```

9)將VLAN 409增加到FabricPath。

```
Leaf_D(config)# vlan 409
Leaf_D(config-vlan)# mode fabricpath
Leaf_D(config-vlan)# show run vlan

!Command: show running-config vlan
!Time: Wed Apr 24 20:27:29 2024

version 6.2(12)
vlan 1,409
vlan 409
mode fabricpath


Leaf_D(config-vlan)#
```

驗證

1)檢驗mac地址表。

<#root>

Leaf_A#

show mac address-table vlan 409

Note: MAC table entries displayed are getting read from software.
Use the 'hardware-age' keyword to get information related to 'Age'

Legend:
* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen,+ - primary entry using vPC Peer-Link,
(T) - True, (F) - False , ~~~ - use 'hardware-age' keyword to retrieve age info
VLAN MAC Address Type age Secure NTFY Ports/SWID.SSID.LID
---------+-----------------+-------+---------+------+----+-----------------
* 409 aaaa.aaaa.aaaa dynamic ~~~ F F Po3
409 bbbb.bbbb.bbbb dynamic ~~~ F F 3102.1.65535

Leaf_A#

<#root>

Leaf_D#

show mac address-table vlan 409

Note: MAC table entries displayed are getting read from software.
Use the 'hardware-age' keyword to get information related to 'Age'

Legend:
* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen,+ - primary entry using vPC Peer-Link,
(T) - True, (F) - False , ~~~ - use 'hardware-age' keyword to retrieve age info
VLAN MAC Address Type age Secure NTFY Ports/SWID.SSID.LID
---------+-----------------+-------+---------+------+----+-----------------
* 409 bbbb.bbbb.bbbb dynamic ~~~ F F Po4
409 aaaa.aaaa.aaaa dynamic ~~~ F F 3101.1.65535

Leaf_D#

2)驗 證ELAM是否在骨幹A中觸發。

<#root>

module-1# elam asic flanker instance 0
module-1(fln-elam)#

```
module-1(fln-elam)# elam asic flanker instance 0
module-1(fln-elam)# layer2
module-1(fln-l2-elam)#
module-1(fln-l2-elam)# trigger dbus ipv4 ingress if source-ipv4-address 192.168.10.17
module-1(fln-l2-elam)#
module-1(fln-l2-elam)# trigger rbus ingress if trig
module-1(fln-l2-elam)# start
module-1(fln-l2-elam)#
module-1(fln-l2-elam)# status
ELAM Slot 1 instance 0: L2 DBUS Configuration: trigger dbus ipv4 ingress if source-ipv4-address 192.168
L2 DBUS: Armed
ELAM Slot 1 instance 0: L2 RBUS Configuration: trigger rbus ingress if trig
L2 RBUS: Armed
module-1(fln-l2-elam)# status
ELAM Slot 1 instance 0: L2 DBUS Configuration: trigger dbus ipv4 ingress if source-ipv4-address 192.168

L2 DBUS: Triggered              <-------- ELAM triggered


ELAM Slot 1 instance 0: L2 RBUS Configuration: trigger rbus ingress if trig

L2 RBUS: Triggered              <-------- ELAM triggered


module-1(fln-l2-elam)#
```

3)驗證從枝葉A到主機A的連線。


```
<#root>

Leaf_A#

ping 192.168.10.17


PING 192.168.10.17 (192.168.10.17): 56 data bytes
64 bytes from 192.168.10.17: icmp_seq=0 ttl=254 time=1.703 ms
64 bytes from 192.168.10.17: icmp_seq=1 ttl=254 time=1.235 ms
64 bytes from 192.168.10.17: icmp_seq=2 ttl=254 time=1.197 ms
64 bytes from 192.168.10.17: icmp_seq=3 ttl=254 time=3.442 ms
64 bytes from 192.168.10.17: icmp_seq=4 ttl=254 time=1.331 ms

--- 192.168.10.17 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 1.197/1.781/3.442 ms
Leaf_A#
```


相關資訊

Cisco FabricPath

Cisco Nexus 7000系列NX-OS FabricPath命令參考

Nexus 7000 M3模組ELAM流程