排除RCM聚合核心的切換問題

目錄

簡介

本文說明在發生網路故障事件時，對冗餘配置管理器(RCM)進行故障排除的基本步驟。

背景資訊

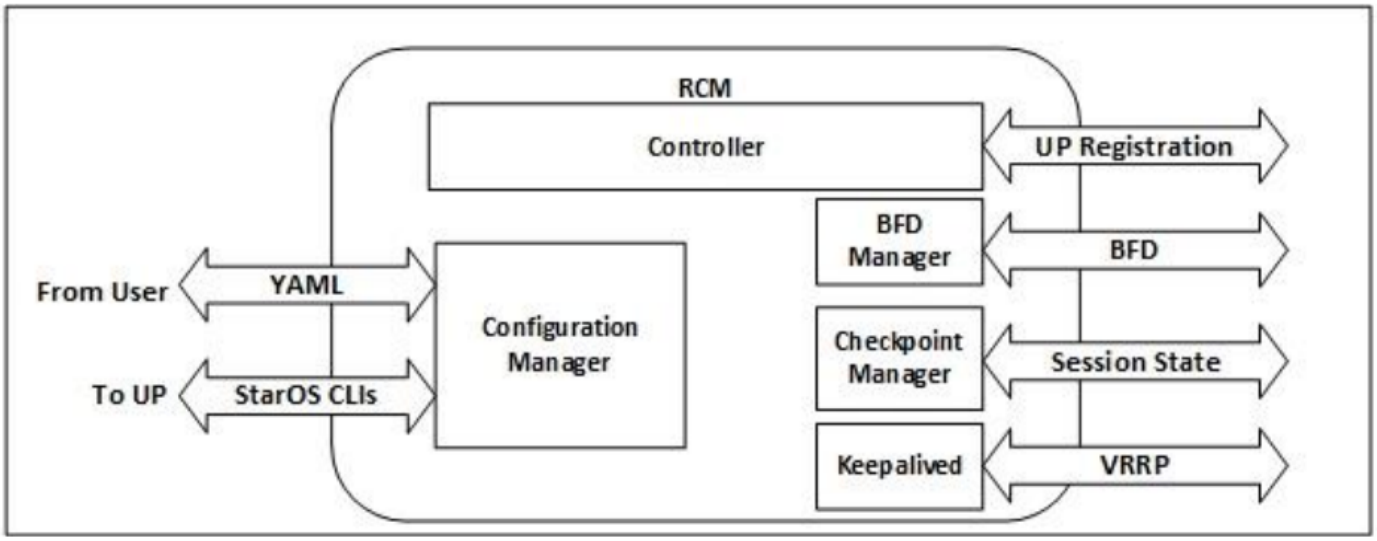
什麼是RCM?

RCM是思科專有節點或網路功能(NF)，可為基於StarOS的使用者平面功能(UPF)提供冗餘。

RCM提供UPF的N:M冗餘，其中N是活動UPF的數量且小於10,M是冗餘組中的備用UP的數量。

RCM的元件

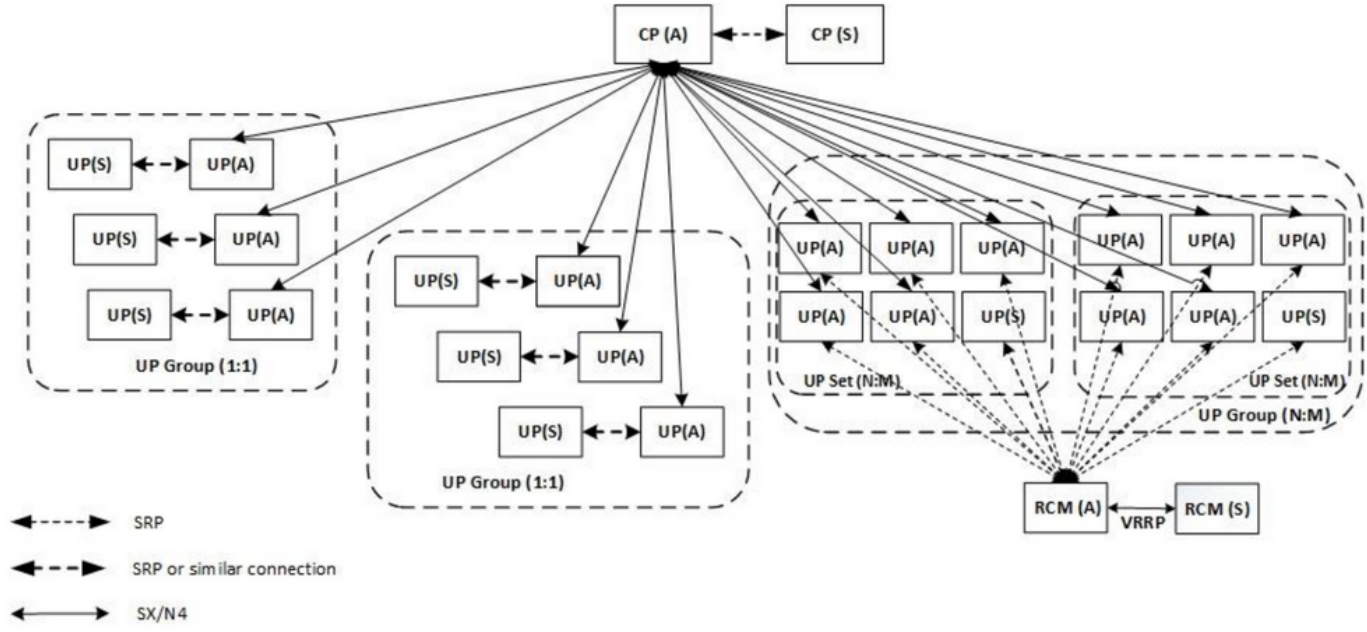
RCM包括作為RCM VM中的Pod運行的元件：



- 控制器：它與RCM中的所有其他Pod通訊特定於事件的決策
- BFD管理器(BFDMgr):它使用BFD協定來識別資料平面的狀態
- Configuration Manager(ConfigMgr):它將請求的配置載入到使用者平面(UP)
- 冗餘管理器(RedMgr):也稱為檢查點管理器。它儲存檢查點資料並將其傳送到備用UPF

- Keepalive:它使用VRRP在活動和備用RCM之間通訊

典型RCM部署模式



RCM CLI概述

在本示例中，有四個RCM OPS中心。為了確認RCM Kubernetes與哪個RCM OPS Center和RCM Common Execution Environment(CEE)對應，您可以登入到RCM Kubernetes並列出名稱空間：

```
cloud-user@up0300-aio-1-primary-1:~$ kubectl get namespace
NAME              STATUS   AGE
cee-rce31       Active   54d
default           Active   57d
```

```
istio-system      Active   57d
kube-node-lease   Active   57d
kube-public       Active   57d
kube-system       Active   57d
nginx-ingress     Active   57d
rcm-rm31       Active   54d
rcm-rm33       Active   54d
registry          Active   57d
smi-certs         Active   57d
smi-node-label    Active   57d
smi-vips          Active   57d

cloud-user@up300-aio-2-primary-1:~$ kubectl get namespace
NAME              STATUS   AGE
cee-rce32         Active   54d
default           Active   57d
istio-system      Active   57d
kube-node-lease   Active   57d
kube-public       Active   57d
kube-system       Active   57d
nginx-ingress     Active   57d
rcm-rm32          Active   54d
rcm-rm34          Active   54d
registry          Active   57d
smi-certs         Active   57d
smi-node-label    Active   57d
smi-vips          Active   57d
```

UPF管理IP地址

此IP是特定的，並且與VM或UPF關聯。它用於UPF和RCM之間的初始通訊，其中UPF註冊到RCM，RCM配置UPF並分配角色。您可以使用此IP從RCM CLI輸出中標識UPF。

UPF裝置角色IP

連結到角色（活動/備用）：

此IP地址會隨著切換的發生而移動。

用於RCM故障排除的有用CLI命令

您可以從RCM OPS Center檢視哪個RCM組是UPF。從雲原生部署平台(CNDP)中查詢示例：

```
[local]UPF317# show rcm info
Redundancy Configuration Module:
--------------------------------------------------------------------------------
Context:                          rcm
Bind Address:                     10.10.9.81
Chassis State:                    Active
Session State:                    SockActive
Route-Modifier:                   32
RCM Controller Address:           10.10.9.179
RCM Controller Port:              9200
RCM Controller Connection State: Connected
Ready To Connect:                 Yes
Management IP Address:            10.10.14.33
Host ID:                          UPF320
SSH IP Address:                   10.10.14.40 (Activated)
```

附註：主機ID與UPF主機名不同。

在這裡，您可以檢視RCM OPS Center的狀態：

```
[up300-aio-2/rm34] rcm# rcm show-status
message :
{"status":[" Thu Oct 21 10:45:21 UTC 2021 : State is primary"]}


[up300-aio-2/rm34] rcm# rcm show-statistics controller
message :
{
 "keepalive_version": "65820a54450f930458c01e4049bd01f207bc6204e598f0ad3184c401174fd448",
 "keepalive_timeout": "2s",
 "num_groups": 2,
 "groups": [
   {
     "groupid": 2,
     "endpoints_configured": 7,
     "standby_configured": 1,
     "pause_switchover": false,
     "active": 6,
     "standby": 1,
     "endpoints": [
       {
         "endpoint": "10.10.9.85",
         "bfd_status": "STATE_UP",
         "upf_registered": true,
         "upf_connected": true,
         "upf_state_received": "UpfMsgState_Active",
         "bfd_state": "BFDState_UP",
         "upf_state": "UPFState_Active",
         "route_modifier": 32,
         "pool_received": true,
         "echo_received": 45359,
         "management_ip": "10.10.14.41",
         "host_id": "UPF322",
         "ssh_ip": "10.10.14.44"
       },
       {
         "endpoint": "10.10.9.86",
         "bfd_status": "STATE_UP",
         "upf_registered": true,
         "upf_connected": true,
         "upf_state_received": "UpfMsgState_Active",
         "bfd_state": "BFDState_UP",
         "upf_state": "UPFState_Active",
         "route_modifier": 32,
         "pool_received": true,
         "echo_received": 4518,
         "management_ip": "10.10.14.43",
         "host_id": "UPF317",
         "ssh_ip": "10.10.14.34"
       },
       {
         "endpoint": "10.10.9.94",
         "bfd_status": "STATE_UP",
         "upf_registered": true,
         "upf_connected": true,
         "upf_state_received": "UpfMsgState_Active",
         "bfd_state": "BFDState_UP",
```

```
    "upf_state": "UPFState_Active",
    "route_modifier": 32,
    "pool_received": true,
    "echo_received": 4518,
    "management_ip": "10.10.14.59",
    "host_id": "UPF318",
    "ssh_ip": "10.10.14.36"
  },
  {
    "endpoint": "10.10.9.81",
    "bfd_status": "STATE_UP",
    "upf_registered": true,
    "upf_connected": true,
    "upf_state_received": "UpfMsgState_Active",
    "bfd_state": "BFDState_UP",
    "upf_state": "UPFState_Active",
    "route_modifier": 32,
    "pool_received": true,
    "echo_received": 45359,
    "management_ip": "10.10.14.33",
    "host_id": "UPF320",
    "ssh_ip": "10.10.14.40"
  },
  {
    "endpoint": "10.10.9.82",
    "bfd_status": "STATE_UP",
    "upf_registered": true,
    "upf_connected": true,
    "upf_state_received": "UpfMsgState_Standby",
    "bfd_state": "BFDState_UP",
    "upf_state": "UPFState_Standby",
    "route_modifier": 50,
    "pool_received": false,
    "echo_received": 4505,
    "management_ip": "10.10.14.35",
    "host_id": "",
    "ssh_ip": "10.10.14.60"
  },
  {
    "endpoint": "10.10.9.83",
    "bfd_status": "STATE_UP",
    "upf_registered": true,
    "upf_connected": true,
    "upf_state_received": "UpfMsgState_Active",
    "bfd_state": "BFDState_UP",
    "upf_state": "UPFState_Active",
    "route_modifier": 30,
    "pool_received": true,
    "echo_received": 4518,
    "management_ip": "10.10.14.37",
    "host_id": "UPF319",
    "ssh_ip": "10.10.14.38"
  },
  {
    "endpoint": "10.10.9.84",
    "bfd_status": "STATE_UP",
    "upf_registered": true,
    "upf_connected": true,
    "upf_state_received": "UpfMsgState_Active",
    "bfd_state": "BFDState_UP",
    "upf_state": "UPFState_Active",
    "route_modifier": 32,
    "pool_received": true,
    "echo_received": 4518,
```

```
        "management_ip": "10.10.14.39",
        "host_id": "UPF321",
        "ssh_ip": "10.10.14.42"
      }
    ]
  },
```

從RCM OPS Center確定當前備用UPF

在RCM OPS中，中心使用**rcm show-statistics controller**命令識別待機中的UPF:

```
  {
        "endpoint": "10.10.9.82",
        "bfd_status": "STATE_UP",
        "upf_registered": true,
        "upf_connected": true,
        "upf_state_received": "UpfMsgState_Standby",
        "bfd_state": "BFDState_UP",
        "upf_state": "UPFState_Standby",
        "route_modifier": 50,
        "pool_received": false,
        "echo_received": 4505,
        "management_ip": "10.10.14.35",
        "host_id": "",
       "ssh_ip": "10.10.14.60"
      },
```

登入到UPF並檢查RCM資訊：

```
[local]UPF318# show rcm info
Saturday November 06 13:29:59 UTC 2021
Redundancy Configuration Module:
------------------------------------------------------------------------------
Context:                          rcm
Bind Address:                     10.10.9.82
Chassis State:                    Standby
Session State:                    SockStandby
Route-Modifier:                   50
RCM Controller Address:           10.10.9.179
RCM Controller Port:              9200
RCM Controller Connection State: Connected
Ready To Connect:                 Yes
Management IP Address:            10.10.14.35
Host ID:
SSH IP Address:                   10.10.14.60 (Activated)
```

以下是RCM OPS Center提供的其他有用資訊：

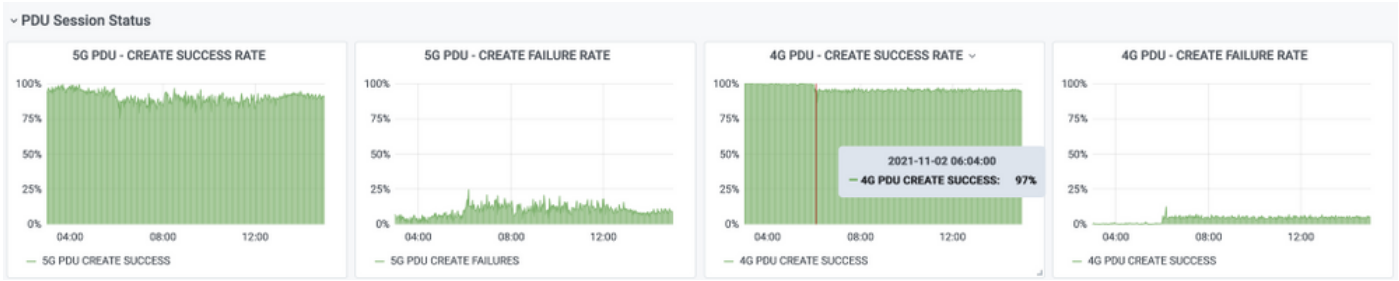
```
[up300-aio-2/rm34] rcm# rcm show-statistics
Possible completions:
 bfdmgr          Show RCM BFDMgr Statistics information
 checkpointmgr   Show RCM Checkpointmgr Statistics information
 configmgr       Show RCM Configmgr Statistics information
 controller      Show RCM Controller Statistics information
 |               Output modifiers
 <cr>
```

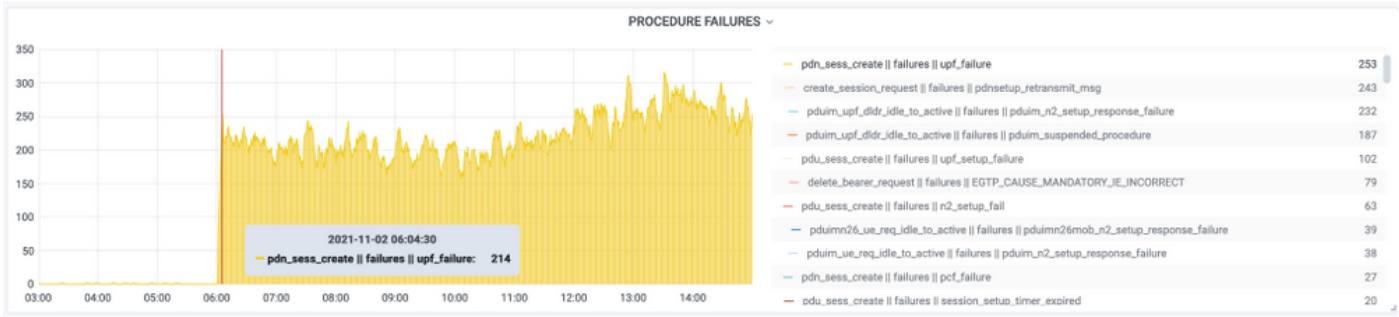
下載21.24版的RCM指南。

CNDP POD上的RCM故障報告的問題

在與警報UP_SX_SESS_ESTABLISHMENT_SR有關的某個UPF上報告了此問題。此警報表示SX介面上的會話建立成功率低於配置的閾值。

如果您檢視Grafana統計資訊，則由於斷開原因**pdn_sess_create**而觀察到5G/4G效能下降 **||失敗 || upf_failure**:





這確認**pdn_sess_create ||失敗 || upf_failure**由UPF419引起：

```
[local]UPF419# show rcm info
Saturday November 06 14:01:30 UTC 2021
Redundancy Configuration Module:
-------------------------------------------------------------------------------
Context:                          rcm
Bind Address:                     10.10.11.83
Chassis State:                    Active
Session State:                    SockActive
Route-Modifier:                   30
RCM Controller Address:           10.10.11.179
RCM Controller Port:              9200
RCM Controller Connection State: Connected
Ready To Connect:                 Yes
Management IP Address:            10.10.14.165
Host ID:                          DNUD0417
SSH IP Address:                   10.10.14.162 (Activated)
```

在SMF上，您可以檢查UPF配置。在這種情況下，您必須查詢UPF N4 IP地址：

```
[smf/smf2] smf# show running-config profile network-element upf node-id n4-peer-UPF417
profile network-element upf upf19
 node-id           n4-peer-UPF417
 n4-peer-address ipv4 10.10.10.17
 n4-peer-port      8805
 upf-group-profile upf-group1
 dnn-list          [ internet ]
 capacity          10
 priority          1
exit
```

然後，您可以執行Grafana查詢以確定出現最多故障的UPF N4地址：

Grafana查詢：
sum(increase(proto_udp_res_msg_total{namespace=~"$namespace", message_name="session_establishment_res", status="no_rsp_received_tx"} [15m]))，作者：message_name、status、peer_info

標籤：{{message_name}} || {{status}} || {{peer_info}}

格拉法納必須指出失敗發生的地點。在本示例中，它與UPF419相關。

連線到系統時，可以確認RCM切換後未正確設定sessmgr，因為許多會話管理器未處於預期的「Actv就緒」狀態。

```
[local]UPF419# show srp checkpoint statistics verbose
Tuesday November 02 17:24:01 UTC 2021
 smgr     state  peer    recovery  pre-alloc  chk-point rcvd   chk-point sent
 inst            conn    records   calls      full     micro   full     micro
 ----   -------  -----   -------   --------   -----    -----   -----     ----
    1      Actv Ready         0          0    1108    34001   14721   1200158
    2      Actv Ready         0          0    1086    33879   17563   1347298
    3      Actv Ready         0          0    1114    34491   15622   1222592
     4      Actv  Conn         0          0       5      923       0         0
    5      Actv Ready         0          0    1106    34406   13872   1134403
     6      Actv  Conn         0          0       5      917       0         0
     7      Actv  Conn         0          0       5      920       0         0
     8      Actv  Conn         0          0       1      905       0         0
     9      Actv  Conn         0          0       5      916       0         0
    10      Actv  Conn         0          0       5      917       0         0
   11      Actv Ready         0          0    1099    34442   13821   1167011
    12      Actv  Conn         0          0       5      916       0         0
    13      Actv  Conn         0          0       5      917       0         0
   14      Actv Ready         0          0    1085    33831   13910   1162759
   15      Actv Ready         0          0    1085    33360   13367   1081370
    16      Actv  Conn         0          0       4      921       0         0
   17      Actv Ready         0          0    1100    35009   13789   1138089
   18      Actv Ready         0          0    1092    33953   13980   1126028
    19      Actv  Conn         0          0       5      916       0         0
    20      Actv  Conn         0          0       5      918       0         0
   21      Actv Ready         0          0    1098    33521   13636   1108875
   22      Actv Ready         0          0    1090    34464   14529   1263419
```

解決方案

此修復程式與思科缺陷跟蹤系統(CDETS)CSCvz9749相關。此修復程式已整合到21.22.ua4.82694及更新版本中。

因應措施

在UPF419上，必須使用隱藏命令**task kill facility sessmgr例項<>**重新啟動不在**Actv Ready**中的會話管理器例項，這樣可以解決此問題。

```
[local]UPF419# show srp checkpoint statistics verbose
Wednesday November 03 16:44:57 UTC 2021
 smgr     state  peer    recovery  pre-alloc  chk-point rcvd   chk-point sent
 inst            conn    records   calls      full     micro   full     micro
 ----   -------  -----   -------   --------   -----    -----   -----     ----
```

```
 1      Actv Ready         0          0    1108    34001   38319   2267162
 2      Actv Ready         0          0    1086    33879   40524   2428315
 3      Actv Ready         0          0    1114    34491   39893   2335889
 4      Actv Ready         0          0       0        0   12275   1049616
 5      Actv Ready         0          0    1106    34406   37240   2172748
 6      Actv Ready         0          0       0        0   13302   1040480
 7      Actv Ready         0          0       0        0   12636   1062146
 8      Actv Ready         0          0       0        0   11446   976169
 9      Actv Ready         0          0       0        0   11647   972715
10      Actv Ready         0          0       0        0   11131   950436
11      Actv Ready         0          0    1099    34442   36696   2225847
12      Actv Ready         0          0       0        0   10739   919316
13      Actv Ready         0          0       0        0   11140   970384
14      Actv Ready         0          0    1085    33831   37206   2226049
15      Actv Ready         0          0    1085    33360   38135   2225816
16      Actv Ready         0          0       0        0   11159   946364
17      Actv Ready         0          0    1100    35009   37775   2242427
18      Actv Ready         0          0    1092    33953   37469   2181043
19      Actv Ready         0          0       0        0   13066   1055662
20      Actv Ready         0          0       0        0   10441   938350
21      Actv Ready         0          0    1098    33521   37238   2165185
22      Actv Ready         0          0    1090    34464   38227   2399415
```

UPF故障導致切換時收集日誌

附註：確保在RCM中啟用調試日誌（在啟用任何調試日誌之前請求批准）。請參閱日誌記錄建議。

RCM運營中心日誌記錄級別

```
logging level application debug
logging level transaction debug
logging level tracing off
logging name infra.config.core level application warn
logging name infra.config.core level transaction warn
logging name infra.resource_monitor.core level application warn
logging name infra.resource_monitor.core level transaction warn
```

逐步資料收集

1. 問題摘要：問題陳述必須清晰。指示有問題的**節點名稱/ip**，以便更容易從日誌中查詢必要的資訊。例如，在出現切換問題時，如果提到IP x.x.x.x是源UPF，x.x.x.y是目標UPF，則會有所幫助。
2. 如果有多種方法重現問題，請提到它們。
3. RCM版本資訊：在從RCM VM部署RCM VM的情況下，cat/**etc/smi/rcm-image-versionshow helm** from the ops-center。在RCM CN部署中，從運**營中**心展現出領導力。
4. RCM Tac在發生問題時調試CN或RCM日誌。在某些情況下，您也可以從剛出現POD時開始要求日誌。
5. 指出哪個RCM是主用還是備用。對於CN，共用兩個RCM對的資訊。
6. 從所有例項共用RCM ops-center中的運行配置。
7. 收集RCM SNMP陷阱。
8. 無論切換失敗與否，最好收集一個活動UP SSD和一個備用UP SSD。
9. RCM controller 、 configmgr 、 checkpoint manager 、 switchover和switchover-verbose statistics命令用於提及確切的CLI。

rcm show-statistics controller
rcm show-statistics configmgr
rcm show-statistics checkpointmgr
rcm show-statistics switchover
rcm show-statistics switchover-verbose

10. UPF或RCM的系統日誌。
11. 如果問題與切換故障有關，則需要新的活動UPF SSD和舊的UPF活動SSD。在某些情況下，舊活動因切換而重新啟動。在這種情況下，您必須重現問題，在此之前，您需要收集舊的活動式UP SSD。
12. 在切換失敗的情況下，在問題重現時從新舊活動收集vpn、sessmgr、sess-gr和sxdemux調試日誌也非常有用。
    logging filter active facility sxdemux level debug
    logging filter active facility sessmgr level debug
    logging filter active facility sess-gr level debug
    logging filter active facility vpn level debug
13. 如果sessmgr/vpnmgr中存在錯誤/問題，則需要VPNMGR/Sessmgr核心。sessmgr_instance_id是發現問題的例項。**vpnmgr_instance_id**是RCM上下文的上下文編號。
    任務核心裝置sessmgr例項<sessmgr_instance_id>
    任務核心裝置vpnmgr例項<vpnmgr_instance_id>
14. 在發生RCM HA問題時，從兩個例項共用RCM TAC調試/pod日誌。

相關資訊

- https://www.cisco.com/c/en/us/support/wireless/ultra-cloud-core-user-plane-function/products-installation-and-configuration-guides-list.html
- 技術支援與文件 - Cisco Systems