ASR 9900系列结构说明和排除故障示例

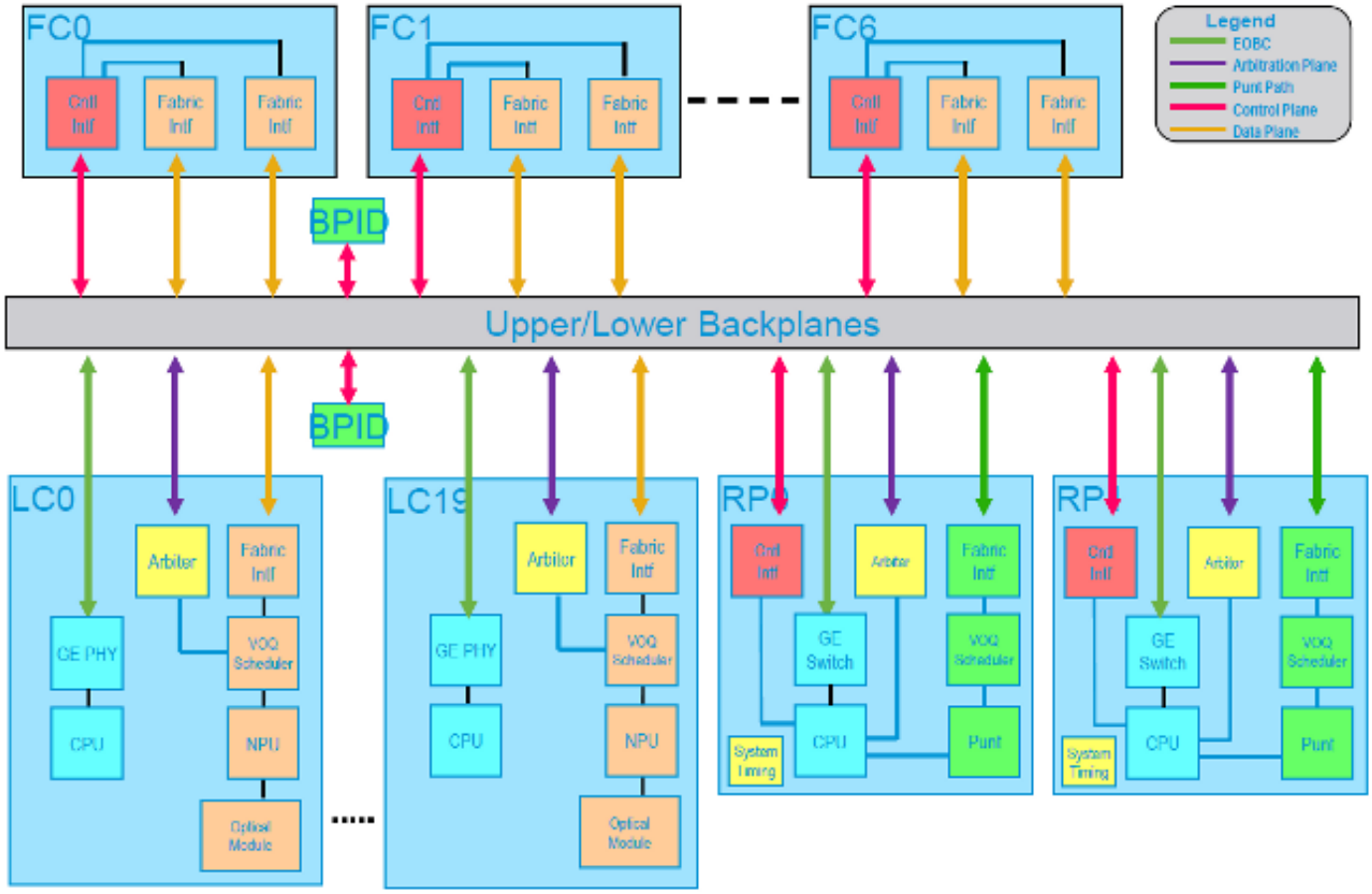
目录

简介

本文描述使用独立的结构卡与ASR 9922和ASR 9912，类似于实现的结构体系结构用思科运营商级路由系统(CRS) (CRS)。

思科的ASR 9000 (ASR9K)使用一个三阶段结构系统。在其他机箱类型(例如， 9006和9010)三阶段结构分开成在线路卡(LCs)的阶段一和第三阶段，并且演出两在路由交换机处理器(RSP)。随着9922和9912的出现，请演出两结构从RSP移动到专用的结构卡，并且路由处理器(RP)卡使用而不是RSP。

每张结构卡(FC)是其自己的脊椎。可以可互换使用这些术语以及用于CRS术语的用语‘飞机’。下面系统的高级观点用作为‘结构Intf’被标记的纵横制。



结构概述

每个FC有两个交换矩阵ASIC，通常指纵横制ASIC，被映射作为实例0和1，当每个LC和RP有一个纵横制接口时，实例0。

在每个LC有连接对每个FC的两个并串行转换器/串并转换器(SerDes)接口，每FC纵横制一个SerDes接口(0和1)。而阶段一和第三阶段存在作为LC的纵横制，这些FC纵横制作为我们的在三阶段结构的阶段两。另外，每个RP总是有每个FC一个SerDes接口与此连接在FCs纵横制实例0。

结构详细信息

网络处理器(NP)和矩阵接口ASIC (FIAs)是不可知论在纵横制链路的日程安排，流量负载平衡在组成SerDes接口的所有八条链路。如果在SerDes接口内的单条链路安排一个问题然后整个接口请被关闭。当查出此失败时，结构驱动程序发出再培训为了尝试和修理链路。

台风

使用当前台风体系结构，支持五FCs。这些卡提供8x7.5 G链路每个等同于到55 G可用的带宽的SerDes接口，在编码占后。使用所有五FCs每个LC将有2x55x5 =带宽联机550 Gbps。当占4+1个结构冗余440 Gbps时每个LC请是可用的。

> **注意**：在有RSP-440和台风LCs的一个9000系列机箱中，有4x8x7.5 G链路对每RSP加上两条另外的链路。从每RSP的四条链路提供全双工440 Gbps可用每个LC。

印第安战斧

下一代卡支持115 Gbps SerDes连接。使用七张结构卡已添加支持，此提供2x115x7 =带宽1.61 Tbps每slot。占6+1个结构冗余，这提供每slot 1.38 Tbps。

结构卡需求

因为在纵横制的带宽在所有FIAs和NP中共享，一些个计算是需要的为了确定真正的带宽和结构冗余。

为了计算为特定LC需要的FCs最小数量的，请使用此公式：

(num_ports_used*port_bandwidth)/(FC_bandwidth)

一旦36x10 GigE卡用30个端口这是(FCs被舍入的30*10)/(110)=2.72 FCs或者三。

为了计算n+1 redundnacy，请使用此公式：

(num_ports_used*port_bandwidth)/(FC_bandwidth) + 1

一旦36x10 GigE卡，如果使用了，这是五全部36个端口。

此表概述需要的FCs编号满线速的。

LC类型	Min.在机箱要求的FC	为n+1冗余要求的编号FC
A9K-MOD80	1	2
A9K-MOD160	2	3
A9K-2x100GE	2	3
A9K-24x10GE	3	4
A9K-36x10GE	4	5

检查结构卡

纵横制链接状态

检查的第一件事是，如果所有SerDes在所有飞机上连接， FCs，是UP。为了检查此，请输入**show controller结构飞机[全部|[0-6]]**命令。在本例中，因为有两个RP和三个LCs，那里是(1x2)+(2x3) = 8条链路和所有链路是至所有飞机。

注意：在版本4.3.0中及以后所有飞机状况可以立即被检查。以前，每一个必须单个指定。

```
RP/0/RP1/CPU0:ASR9922-B#show platform
Tue Apr 15 14:24:00.935 UTC
Node            Type                        State            Config State
------------------------------------------------------------------------------
0/RP0/CPU0      ASR-9922-RP-SE(Standby)   IOS XR RUN       PWR,NSHUT,MON
0/RP1/CPU0      ASR-9922-RP-SE(Active)    IOS XR RUN       PWR,NSHUT,MON
0/0/CPU0        A9K-2x100GE-SE            IOS XR RUN       PWR,NSHUT,MON
```

```
0/2/CPU0         A9K-36x10GE-SE             IOS XR RUN       PWR,NSHUT,MON
0/3/CPU0         A9K-MOD160-TR              IOS XR RUN       PWR,NSHUT,MON
0/3/1            A9K-MPA-4X10GE             OK               PWR,NSHUT,MON


RP/0/RP1/CPU0:ASR9922-B#show controller fabric plane all
Mon Apr 14 14:37:00.116 UTC
Flags: Admin State: 1-Up 2-Down 12-UnPowered 16-Shutdown
       Oper  State: 1-Up 2-Down 3-Admin Down
Summary for All Fabric Planes:
Plane Id Admin State Oper State  Links Up Links Down In Pkt Count  Out Pkt count
================================================================================
0             01             01     08          00       346770          431250
1             01             01     08          00       44397            44397
2             01             01     08          00       44459            44459
3             01             01     08          00       94005            94005
4             01             01     08          00       73814            73814
```

如果链路显示作为下来show controller命令**结构纵横制link-status实例<0-1>脊椎<FC_num>**可以用于正确地识别哪个。在本例中有五条纵横制链路至FC4实例0和三链路至FC4实例1 (从以前的5+3=8)。更有两在实例0由于RP。

注意：请参阅附录关于在逻辑的详细信息对物理插槽映射。

```
RP/0/RP1/CPU0:ASR9922-B#show controllers fabric crossbar link-status instance 0 spine 4
Fri Apr 18 18:08:31.953 UTC
PORT    Remote Slot  Remote Inst    Logical ID  Status
=====================================================
01        05               00             0        Up
04        04               00             0        Up
05        02               00             0        Up
08        00               00             0        Up
09        01               00             0        Up


RP/0/RP1/CPU0:ASR9922-B#show controllers fabric crossbar link-status instance 1 spine 4
Fri Apr 18 18:09:13.637 UTC
PORT    Remote Slot  Remote Inst    Logical ID  Status
=====================================================
00        05               00             0        Up
04        04               00             0        Up
05        02               00             0        Up
```

纵横制统计信息

当link-status收集在上一个输出中作为映射和这些统计信息，缩小有一个流量问题的所有组件是容易的。对于每个纵横制端口， SerDes接口，那里将是入口(从LC)和出口(往LC)统计信息。这些每个FC纵横制实例收集。

```
RP/0/RP1/CPU0:ASR9922-B#show controller fabric crossbar statistics instance 0 spine 4
Tue Apr 22 16:52:23.162 UTC
Port statistics for xbar:0 port:0
==============================
Hi priority stats (unicast)
==========================

Low priority stats (multicast)
==========================

Port statistics for xbar:0 port:1
==============================
```

```
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 14016
   Egress Packet Count Since Last Read        : 24971

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:2
=================================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:4
=================================
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 21056
   Egress Packet Count Since Last Read        : 32195

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:5
=================================
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 7024
   Egress Packet Count Since Last Read        : 10477

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:6
=================================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:7
=================================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:8
=================================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
==============================
   Ingress Packet Count Since Last Read       : 37388
   Egress Packet Count Since Last Read        : 37388

Port statistics for xbar:0 port:9
=================================
```

```
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 72882
   Egress Packet Count Since Last Read        : 47335

Low priority stats (multicast)
==============================
   Ingress Packet Count Since Last Read       : 37386
   Egress Packet Count Since Last Read        : 37386

Port statistics for xbar:0 port:10
==================================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:11
==================================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:12
==================================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:13
==================================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:14
==================================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:15
==================================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
==============================

Port statistics for xbar:0 port:16
==================================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
```

```
============================

Port statistics for xbar:0 port:17
==============================
Hi priority stats (unicast)
============================

Low priority stats (multicast)
============================

Port statistics for xbar:0 port:18
==============================
Hi priority stats (unicast)
============================

Low priority stats (multicast)
============================

Port statistics for xbar:0 port:19
==============================
Hi priority stats (unicast)
============================

Low priority stats (multicast)
============================

Port statistics for xbar:0 port:20
==============================
Hi priority stats (unicast)
============================

Low priority stats (multicast)
============================

Port statistics for xbar:0 port:22
==============================
Hi priority stats (unicast)
============================

Low priority stats (multicast)
============================

Port statistics for xbar:0 port:24
==============================
Hi priority stats (unicast)
============================

Low priority stats (multicast)
============================


Total Unicast In:    114978
Total Unicast Out:   114978
Total Multicast In:  74774
Total Multicast Out: 74774
```

检查线路卡

在纵横制和每个FIA之间的LC，有2x8x6.25提供100 G原始带宽每个FIA的链路。在每位NP和FIA之间有给50 G原始带宽每位NP的单个8x6.25链路。

注意：被参考的带宽是原始带宽。在开销考虑后，实际带宽轻微是较少。

纵横制链接状态

纵横制链接状态的收藏LC的类似于那FC，但是从FC纵横制的链路到LC纵横制在这种情况下将被看到以及对FIA链路的LC纵横制。如前所提及，每个FIA连接到纵横制通过两条链路。在本例中，端口00和24两个连接对FIA 2。如同前面的示例，远程slot 22-26是FCs和0/2/CPU0对应于插槽4。

```
RP/0/RP1/CPU0:ASR9922-B#show controller fabric crossbar link-status inst 0 loc 0/2/CPU0
Wed Apr 23 14:22:42.250 UTC
PORT    Remote Slot  Remote Inst    Logical ID  Status
======================================================
00         04               02             1        Up
01         04               01             1        Up
02         04               01             0        Up
03         04               00             0        Up
04         04               00             1        Up
05         04               03             1        Up
06         04               05             1        Up
07         25               01             0        Up
08         04               03             0        Up
09         25               00             0        Up
10         04               05             0        Up
11         26               01             0        Up
12         26               00             0        Up
14         24               00             0        Up
15         24               01             0        Up
16         23               00             0        Up
17         23               01             0        Up
20         22               00             0        Up
22         22               01             0        Up
23         04               04             1        Up
24         04               02             0        Up
25         04               04             0        Up
```

纵横制统计信息

使用在上一个输出中收集的link-status作为参考映射，下面的统计信息输出可以用于作为简单的方法缩小显示数据流损失的所有组件。

```
RP/0/RP1/CPU0:ASR9922-B#show controller fabric crossbar statistics instance 0 loc 0/2/CPU0
Wed Apr 23 15:53:41.955 UTC
Port statistics for xbar:0 port:0
==============================
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 15578
   Egress Packet Count Since Last Read        : 11957

Low priority stats (multicast)
==========================

Port statistics for xbar:0 port:1
==============================
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 15775
   Egress Packet Count Since Last Read        : 11647
```

```
Low priority stats (multicast)
============================

Port statistics for xbar:0 port:2
==============================
Hi priority stats (unicast)
============================
   Ingress Packet Count Since Last Read       : 15646
   Egress Packet Count Since Last Read        : 19774

Low priority stats (multicast)
============================
   Ingress Packet Count Since Last Read       : 31424
   Egress Packet Count Since Last Read        : 188544

Port statistics for xbar:0 port:3
==============================
Hi priority stats (unicast)
============================
   Ingress Packet Count Since Last Read       : 15663
   Egress Packet Count Since Last Read        : 15613

Low priority stats (multicast)
============================
   Ingress Packet Count Since Last Read       : 31424
   Egress Packet Count Since Last Read        : 188547

Port statistics for xbar:0 port:4
==============================
Hi priority stats (unicast)
============================
   Ingress Packet Count Since Last Read       : 15758
   Egress Packet Count Since Last Read        : 15813

Low priority stats (multicast)
============================

Port statistics for xbar:0 port:5
==============================
Hi priority stats (unicast)
============================
   Ingress Packet Count Since Last Read       : 15742
   Egress Packet Count Since Last Read        : 15628

Low priority stats (multicast)
============================

Port statistics for xbar:0 port:6
==============================
Hi priority stats (unicast)
============================
   Ingress Packet Count Since Last Read       : 15773
   Egress Packet Count Since Last Read        : 13687

Low priority stats (multicast)
============================
   Ingress Packet Count Since Last Read       : 78666

Port statistics for xbar:0 port:7
==============================
Hi priority stats (unicast)
============================
```

```
Low priority stats (multicast)
==========================

Port statistics for xbar:0 port:8
==============================
Hi priority stats (unicast)
==========================
   Ingress Packet Count Since Last Read       : 15679
   Egress Packet Count Since Last Read        : 15793

Low priority stats (multicast)
==========================
   Ingress Packet Count Since Last Read       : 31424
   Egress Packet Count Since Last Read        : 188544

Port statistics for xbar:0 port:9
==============================
Hi priority stats (unicast)
==========================
   Ingress Packet Count Since Last Read       : 72826
   Egress Packet Count Since Last Read        : 58810

Low priority stats (multicast)
==========================

Port statistics for xbar:0 port:10
==============================
Hi priority stats (unicast)
==========================
   Ingress Packet Count Since Last Read       : 15653
   Egress Packet Count Since Last Read        : 23041

Low priority stats (multicast)
==========================
   Egress Packet Count Since Last Read        : 188544

Port statistics for xbar:0 port:11
==============================
Hi priority stats (unicast)
==========================

Low priority stats (multicast)
==========================

Port statistics for xbar:0 port:12
==============================
Hi priority stats (unicast)
==========================
   Ingress Packet Count Since Last Read       : 54172
   Egress Packet Count Since Last Read        : 35440

Low priority stats (multicast)
==========================

Port statistics for xbar:0 port:14
==============================
Hi priority stats (unicast)
==========================
   Ingress Packet Count Since Last Read       : 15161
   Egress Packet Count Since Last Read        : 17790

Low priority stats (multicast)
==========================
```

```
Port statistics for xbar:0 port:15
==============================
Hi priority stats (unicast)
===========================

Low priority stats (multicast)
===========================

Port statistics for xbar:0 port:16
==============================
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 15220
   Egress Packet Count Since Last Read        : 17790

Low priority stats (multicast)
===========================

Port statistics for xbar:0 port:17
==============================
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 1
   Egress Packet Count Since Last Read        : 1

Low priority stats (multicast)
===========================

Port statistics for xbar:0 port:20
==============================
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 36457
   Egress Packet Count Since Last Read        : 58699

Low priority stats (multicast)
===========================
   Ingress Packet Count Since Last Read       : 188549
   NULL FPOE Drop Count                       : 2
   Egress Packet Count Since Last Read        : 235786

Port statistics for xbar:0 port:22
==============================
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 1
   Egress Packet Count Since Last Read        : 1

Low priority stats (multicast)
===========================

Port statistics for xbar:0 port:23
==============================
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 15775
   Egress Packet Count Since Last Read        : 15835

Low priority stats (multicast)
===========================
   Ingress Packet Count Since Last Read       : 31424

Port statistics for xbar:0 port:24
==============================
```

```
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 15843
   Egress Packet Count Since Last Read        : 19464

Low priority stats (multicast)
==========================
   Ingress Packet Count Since Last Read       : 31424
   Egress Packet Count Since Last Read        : 188544

Port statistics for xbar:0 port:25
==============================
Hi priority stats (unicast)
===========================
   Ingress Packet Count Since Last Read       : 15646
   Egress Packet Count Since Last Read        : 15586

Low priority stats (multicast)
==========================
   Egress Packet Count Since Last Read        : 188544


Total Unicast In:    382369
Total Unicast Out:   382369
Total Multicast In:  424335
Total Multicast Out: 1367053
```

故障排除

纵横制下来波尔特

第一输出表明有两个RP和两个LCs。第二输出表明从FC4的链路到远程slot0 (RP0)发生故障。

```
RP/0/RP0/CPU0:ASR9k-1#show controllers fabric plane all

Plane Id Admin State  Oper State    Links Up  Links Down  In Pkt Count    Out Pkt count
=============================================================================================
0          01           01            06         00         62266063301    62266209776
1          01           01            06         00          18730254608    18730254616
2          01           01            06         00          18730354183    18730354187
3          01           01            06         00          62257126982    62257127007
4          01           01            05     01          37448788006    37448788023


RP/0/RP0/CPU0:ASR9k-1#show controllers fabric crossbar link-status instance 0 spine 4
PORT    Remote Slot  Remote Inst    Logical ID  Status
=======================================================
04         04               00             0        Up
08         00               00             0        Down
09         01               00             0        Up
10         03               00             0        Up
```

因为从FCs的带宽在所有FIA's和NP中共享在LC，当纵横制链路发生故障， LC的将减少净带宽55 G在台风系统。系统以下来给的链路运行系统的冗余，但是应该立即调查。

当纵横制链路断开时，一简要流量丢弃也许被看到，并且结构驱动程序再培训链路为了尝试自动恢复。如果这发生故障在线插拔也许然后恢复问题。对于其中任一请促进问题请与技术支持中心(TAC)联系。

脊椎不可用Syslog

这些消息表明系统在推荐五FCs之下运行。当推荐总是运行五FCs时，这不一定含义LCs的所有带宽损耗在系统。请参阅部分结构卡需求欲知更多信息。

```
RP/0/RP1/CPU0:May 13 14:42:22.810 : pfm_node_rp[353]:
%PLATFORM-FABMGR-1-SPINE_UNAVAILABLE : Set|fabmgr[303204]|Fabric Manager(0x1032000)|
Number of active spines has dropped below the recommended number 5

RP/0/RP1/CPU0:May 13 14:53:18.897 : pfm_node_rp[353]:
%PLATFORM-FABMGR-1-SPINE_UNAVAILABLE : Clear|fabmgr[303204]|Fabric Manager(0x1032000)|
Number of active spines has dropped below the recommended number 5
```

FC非激活Syslog

当执行那里FC的OIR是必须按的两个机械按钮，在的卡要求OIR恢复部分地剥夺权利前。这些按钮的原因是允许FC的从容关机。

在9922路由器上，而更低按钮发送信号到系统温文地关闭卡，顶部按钮是纯粹地机械的。在此格式的一Syslog被看到。如果按钮未按，并且OIR不恢复问题，请与TAC联系。

```
RP/0/RP0/CPU0:Dec 24 10:45:27.108 MST: fab_xbar_sp3[220]: FC3 Inactive due to
Front Panel Switch Press. Please OIR to recover.
```

相关信息

- ASR9000/XR了解和故障排除在A9K的结构问题
- 技术支持和文档 - Cisco Systems

附录

逻辑对物理插槽映射

这些输出是逻辑对9922和9912路由器的物理插槽映射。此信息是需要的，当查看结构时显示命令。

9922

```
slot 00 -> 0/RP0/CPU0 (0x1)
slot 01 -> 0/RP1/CPU0 (0x11)
slot 02 -> 0/0/CPU0 (0x821)
slot 03 -> 0/1/CPU0 (0x831)
slot 04 -> 0/2/CPU0 (0x841)
slot 05 -> 0/3/CPU0 (0x851)
slot 06 -> 0/4/CPU0 (0x861)
slot 07 -> 0/5/CPU0 (0x871)
slot 08 -> 0/6/CPU0 (0x881)
slot 09 -> 0/7/CPU0 (0x891)
slot 10 -> 0/8/CPU0 (0x8a1)
slot 11 -> 0/9/CPU0 (0x8b1)
slot 12 -> 0/10/CPU0 (0x8c1)
slot 13 -> 0/11/CPU0 (0x8d1)
```

```
slot 14 -> 0/12/CPU0 (0x8e1)
slot 15 -> 0/13/CPU0 (0x8f1)
slot 16 -> 0/14/CPU0 (0x901)
slot 17 -> 0/15/CPU0 (0x911)
slot 18 -> 0/16/CPU0 (0x921)
slot 19 -> 0/17/CPU0 (0x931)
slot 20 -> 0/18/CPU0 (0x941)
slot 21 -> 0/19/CPU0 (0x951)
slot 22 -> 0/FC0/SP (0x1960)
slot 23 -> 0/FC1/SP (0x1970)
slot 24 -> 0/FC2/SP (0x1980)
slot 25 -> 0/FC3/SP (0x1990)
slot 26 -> 0/FC4/SP (0x19a0)
slot 27 -> 0/FC5/SP (0x19b0)
slot 28 -> 0/FC6/SP (0x19c0)
slot 34 -> 0/BPID0/SP (0x1220)
slot 35 -> 0/BPID1/SP (0x1230)
slot 36 -> 0/FT0/SP (0x640)
slot 37 -> 0/FT1/SP (0x650)
slot 38 -> 0/FT2/SP (0x660)
slot 39 -> 0/FT3/SP (0x670)
slot 40 -> 0/PM0/SP (0xe80)
slot 41 -> 0/PM1/SP (0xe90)
slot 42 -> 0/PM2/SP (0xea0)
slot 43 -> 0/PM3/SP (0xeb0)
slot 44 -> 0/PM4/SP (0xec0)
slot 45 -> 0/PM5/SP (0xed0)
slot 46 -> 0/PM6/SP (0xee0)
slot 47 -> 0/PM7/SP (0xef0)
slot 48 -> 0/PM8/SP (0xf00)
slot 49 -> 0/PM9/SP (0xf10)
slot 50 -> 0/PM10/SP (0xf20)
slot 51 -> 0/PM11/SP (0xf30)
slot 52 -> 0/PM12/SP (0xf40)
slot 53 -> 0/PM13/SP (0xf50)
slot 54 -> 0/PM14/SP (0xf60)
slot 55 -> 0/PM15/SP (0xf70)
```

9912

```
slot 00 -> 0/RP0/CPU0 (0x1)
slot 01 -> 0/RP1/CPU0 (0x11)
slot 02 -> 0/0/CPU0 (0x821)
slot 03 -> 0/1/CPU0 (0x831)
slot 04 -> 0/2/CPU0 (0x841)
slot 05 -> 0/3/CPU0 (0x851)
slot 06 -> 0/4/CPU0 (0x861)
slot 07 -> 0/5/CPU0 (0x871)
slot 08 -> 0/6/CPU0 (0x881)
slot 09 -> 0/7/CPU0 (0x891)
slot 10 -> 0/8/CPU0 (0x8a1)
slot 11 -> 0/9/CPU0 (0x8b1)
slot 12 -> 0/FC0/SP (0x18c0)
slot 13 -> 0/FC1/SP (0x18d0)
slot 14 -> 0/FC2/SP (0x18e0)
slot 15 -> 0/FC3/SP (0x18f0)
slot 16 -> 0/FC4/SP (0x1900)
slot 17 -> 0/FC5/SP (0x1910)
slot 18 -> 0/FC6/SP (0x1920)
slot 25 -> 0/BPID0/SP (0x1190)
slot 26 -> 0/FT0/SP (0x5a0)
slot 27 -> 0/FT1/SP (0x5b0)
```

```
slot 40 -> 0/PM0/SP (0xe80)
slot 41 -> 0/PM1/SP (0xe90)
slot 42 -> 0/PM2/SP (0xea0)
slot 43 -> 0/PM3/SP (0xeb0)
slot 44 -> 0/PM4/SP (0xec0)
slot 45 -> 0/PM5/SP (0xed0)
slot 46 -> 0/PM6/SP (0xee0)
slot 47 -> 0/PM7/SP (0xef0)
slot 48 -> 0/PM8/SP (0xf00)
slot 49 -> 0/PM9/SP (0xf10)
slot 50 -> 0/PM10/SP (0xf20)
slot 51 -> 0/PM11/SP (0xf30)
```

组播

LCs使用在根据哈希的结构的一个已修复路径计算在来源和组(S， G)组播流。因此，对于在LC的更高的组播吞吐量，有流较高的值与变化为了均匀地传播在所有活动结构飞机的流量的来源和组的是重要的。如果选定FC删除或禁用，链路选择算法选择在可用的活动结构飞机中的一条不同的链路。

组播转发使用一12位结构报头字段呼叫的Fabric Group ID (FGID)。位0和1为RP0/1保留。依然存在，从2到11的10个位，用于寻址20个LCs。因为1个位对address2 LCs是可用的，有冗余组播信息包复制(supercast)在配对的LC [(LC0、LC10)， (LC1， LC11)， (LC2， LC12)之间，等等]。如果在该LC的接口未加入该组播组，在配对的LC的本地纵横制降低冗余组播数据流。

FGID位	0	1	2	3	4	5	6	7	8	9	10	11
Slot	RP0	RP1	LC0	LC1	LC2	LC3	LC4	LC5	LC6	LC7	LC8	LC
配对的Slot	X	X	LC10	LC11	LC12	LC13	LC14	LC15	LC16	LC17	LC18	LC