Catalyst 9000系列交換器上的連線埠閘板疑難排解

目錄

簡介

本文說明如何識別、收集有用的日誌，並疑難排解Catalyst 9000交換器上連線埠瓣膜可能出現的問題。

作者：萊昂納多·佩納·達維拉

必要條件

需求

本文件沒有特定需求。

採用元件

本檔案中的資訊是根據所有Catalyst 9000系列交換器。

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

連線埠翻動（通常稱為連結翻動）是交換器上的實體介面不斷開啟和關閉的情況。常見原因通常與電纜故障、不受支援或非標準、小型封裝熱插拔(SFP)或其他鏈路同步問題有關。連結翻動的原因可能是間歇性或永久性的。

由於連結翻動往往是實體干擾，因此本文說明診斷、收集有用日誌以及疑難排解Catalyst 9000交換器上連線埠翻動可能發生的問題的步驟。

疑難排解

您可以檢查以下許多事項：如果您擁有交換機的物理訪問許可權，以確保正確安裝了網路模組、電纜和SFP:

網路模組安裝

下表介紹在Catalyst 9000系列交換機中安裝網路模組的最佳實踐：

平台	URL
Catalyst 9200 系列交換器	Catalyst 9200系列交換器硬體安裝指南
Catalyst 9300 系列交換器	Catalyst 9300系列交換器硬體安裝指南
Catalyst 9400 系列交換器	Catalyst 9400系列交換器硬體安裝指南
Catalyst 9500 系列交換器	Catalyst 9500系列交換器硬體安裝指南
Catalyst 9600 系列交換器	Catalyst 9600系列交換器硬體安裝指南

檢驗電纜和連線的兩端

下表介紹一些可能導致連結翻動的可能纜線問題。

原因	恢復操作
纜線故障	用確認工作正常的電纜替換可疑電纜。查詢聯結器上的針腳損壞或丟失
連線鬆動	檢查連線是否鬆動。有時，電纜似乎已正確就位，但並非如此。拔下電纜並重新入
配線面板	消除有故障的配線面板連線。如果可能，請繞過配線面板以將其排除
SFP錯誤或錯誤（特定於光纖）	將可疑的SFP交換為已知良好的SFP。驗證此類SFP的硬體和軟體支援
錯誤的埠或模組埠	將電纜移至已知良好的埠，對可疑埠或模組進行故障排除
終端裝置故障或舊終端裝置	將電話、揚聲器、其他終端與已知良好的裝置或較新的裝置交換
裝置休眠模式	這是一個「預期翻動」。請注意埠擺動的時間戳，以確定它是否快速或間歇發生，以及是否是由睡眠設定引起的

驗證SFP和SFP+的相容性

思科熱插拔介面產品組合可在速度、協定、覆蓋和支援的傳輸介質方面提供豐富的選擇。

您可以使用Catalyst 9000系列交換機裝置支援的SFP或SFP+收發器模組的任意組合。唯一的限制是，每個埠必須與電纜另一端的波長規格相匹配，並且電纜不能超過規定的電纜長度以實現可靠通訊。

在思科裝置上僅使用Cisco SFP收發器模組。每個SFP或SFP+收發器模組均支援思科品質標識(ID)功能，允許思科交換機或路由器識別並驗證收發器模組是否經過思科認證和測試。

> **提示**：請參閱此連結以驗證思科光纖到裝置相容性表

確定埠擺動

使用 show logging命令來識別鏈路擺動事件。此範例顯示介面為TenGigabitEthernet1/0/40的連結翻動事件的部分交換器系統日誌訊息：

```
Switch#show logging | include changed
Aug 17 21:06:08.431 UTC: %LINEPROTO-5-UPDOWN: Line protocol on Interface
TenGigabitEthernet1/0/40, changed state to down
Aug 17 21:06:39.058 UTC: %LINK-3-UPDOWN: Interface TenGigabitEthernet1/0/40, changed state to
down
Aug 17 21:06:41.968 UTC: %LINK-3-UPDOWN: Interface TenGigabitEthernet1/0/40, changed state to up
Aug 17 21:06:42.969 UTC: %LINEPROTO-5-UPDOWN: Line protocol on Interface
TenGigabitEthernet1/0/40, changed state to up
Aug 17 21:07:20.041 UTC: %LINEPROTO-5-UPDOWN: Line protocol on Interface
TenGigabitEthernet1/0/40, changed state to down
Aug 17 21:07:21.041 UTC: %LINK-3-UPDOWN: Interface TenGigabitEthernet1/0/40, changed state to
down
Aug 17 21:07:36.534 UTC: %LINEPROTO-5-UPDOWN: Line protocol on Interface
TenGigabitEthernet1/0/40, changed state to up
Aug 17 21:08:06.598 UTC: %LINK-3-UPDOWN: Interface TenGigabitEthernet1/0/40, changed state to up
Aug 17 21:08:07.628 UTC: %LINEPROTO-5-UPDOWN: Line protocol on Interface
TenGigabitEthernet1/0/40, changed state to down
Aug 17 21:08:08.628 UTC: %LINK-3-UPDOWN: Interface TenGigabitEthernet1/0/40, changed state to
down
Aug 17 21:08:10.943 UTC: %LINK-3-UPDOWN: Interface TenGigabitEthernet1/0/40, changed state to up
Aug 17 21:08:11.944 UTC: %LINEPROTO-5-UPDOWN: Line protocol on Interface
TenGigabitEthernet1/0/40, changed state to up
```

> **提示**：如果分析系統消息日誌，您必須注意埠擺動的**時間戳，因為它允許您比較該特定埠上的同時事件並驗證鏈路擺動是否應該發生(例**如：睡眠設定或其他「正常」原因未必是問題)。

Interface Show命令

show interface命令可為您提供許多資訊，協助您識別可能引起連結翻動事件的第1層問題：

```
Switch#show interfaces tenGigabitEthernet 1/0/40
TenGigabitEthernet1/0/40 is up, line protocol is up (connected)
Hardware is Ten Gigabit Ethernet, address is 00a5.bf9c.29a8 (bia 00a5.bf9c.29a8)
  MTU 1500 bytes, BW 10000000 Kbit/sec, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not set
  Full-duplex, 10Gb/s, link type is auto, media type is SFP-10GBase-SR   <-- SFP plugged into
the port
  input flow-control is on, output flow-control is unsupported
```

```
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:03, output 00:00:00, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/2000/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     670 packets input, 78317 bytes, 0 no buffer
     Received 540 broadcasts (540 multicasts)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 540 multicast, 0 pause input
     0 input packets with dribble condition detected
     1766 packets output, 146082 bytes, 0 underruns
0 Output 0 broadcasts (0 multicasts) 0 output errors, 0 collisions, 0 interface resets 0 unknown
protocol drops 0 babbles, 0 late collision, 0 deferred 0 lost carrier, 0 no carrier, 0 pause
output 0 output buffer failures, 0 output buffers swapped out
```

下表列出**show interface**指令中的一些計數器：

計數器	**增加錯誤計數器的問題和常見原因**
CRC	許多CRC通常是衝突的結果，但也可能表示物理問題（如佈線、SFP、介面或NIC）或雙匹配。
輸入錯誤	這包括殘幀、巨型幀、無緩衝區、CRC、幀、溢位和忽略計數。其他與輸入相關的錯誤導致輸入錯誤計數增加。
輸出錯誤	此問題是由於輸出隊列大小過小或存在超訂用所致。
輸出丟棄總數	輸出丟棄通常是由多對一或10Gbps到1Gps傳輸引起的介面超訂用造成的。介面緩衝區是的資源，只能吸收直到資料包開始丟棄之前的突發。可以調整緩衝區以提供一些緩衝，能保證出現零輸出丟包情況。
未知通訊協定捨棄	未知的通訊協定捨棄通常會捨棄，因為接收這些封包的介面沒有設定為此類通訊協定，或交換器無法識別的任何通訊協定。 例如，如果您連線了兩台交換機，並在一個交換機介禁用CDP，則會導致該介面上發生未知協定丟棄。CDP資料包不再被識別，並被丟棄。

history命令允許介面以與CPU歷史記錄類似的圖形格式維護使用率歷史記錄。 此歷史記錄可以維護為每秒位(bps)或每秒資料包數(pps)，如本示例所示：

```
Switch(config-if)#history ?
 bps Maintain history in bits/second
pps Maintain history in packets/second
```

除了速率之外，使用者可以監控各種介面計數器：

```
Switch(config-if)#history [bps|pps] ?
  all                                Include all counters
babbles Include ethernet output babbles - Babbl
crcs Include CRCs - CRCs
deferred Include ethernet output deferred - Defer
dribbles Include dribbles - Dribl
excessive-collisions Include ethernet excessive output collisions -
ExCol
flushes Include flushes - Flush
frame-errors Include frame errors - FrErr
giants Include giants - Giant
ignored Include ignored - Ignor
input-broadcasts Include input broadcasts - iBcst
input-drops Include input drops - iDrop
input-errors Include input errors - iErr
interface-resets Include interface resets - IRset
late-collisions Include ethernet late output collisions - LtCol
lost-carrier Include ethernet output lost carrier - LstCr
multi-collisions Include ethernet multiple output collisions -
MlCol
multicast Include ethernet input multicast - MlCst
no-carrier Include ethernet output no-carrier - NoCarr
output-broadcasts Include output broadcasts - oBcst
output-buffer-failures Include output buffer failures - oBufF
output-buffers-swapped-out Include output buffers swapped out - oBSwO
output-drops Include output drops - oDrop
output-errors Include output errors - oErr
output-no-buffer Include output no buffer - oNoBf
overruns Include overruns - OvrRn
pause-input Include ethernet input pause - PsIn
pause-output Include ethernet output pause - PsOut
runts Include runts - Runts
single-collisions Include ethernet single output collisions - SnCol
throttles Include throttles - Thrtl
underruns Include underruns - UndRn
unknown-protocol-drops Include unknown protocol drops - Unkno
watchdog Include ethernet output watchdog - Wtchdg
<cr> <cr>
SW_1(config-if)#
```

與CPU歷史記錄一樣，還有過去60秒、過去60分鐘和過去72小時的圖表。為輸入和輸出直方圖維護單獨的圖形：

```
Switch#sh interfaces gigabitEthernet 1/0/2 history ?
 60min    Display 60 minute histograms only
60sec Display 60 second histograms only
72hour Display 72 hour histograms only
all Display all three histogram intervals
both Display both input and output histograms
input Display input histograms only
output Display output histograms only
| Output modifiers
```

```
show interfaces tenGigabitEthernet 1/0/9 history 60sec
```

```
10
9
8
7
6
5
4
3
2
1
0....5....1....1....2....2....3....3....4....4....5....5....6
0 5 0 5 0 5 0 5 0 5 0
TenGigabitEthernet1/0/9 input rate(mbits/sec) (last 60 seconds)
```

```
10
9
8
7
6
5
4
3
2
1
0....5....1....1....2....2....3....3....4....4....5....5....6
0 5 0 5 0 5 0 5 0 5 0
TenGigabitEthernet1/0/9 output rate(mbits/sec) (last 60 seconds)
```

使用show controllers ethernet-controller{interface{*interface-number*}} 顯示從硬體中讀取的每個介面(Transmit和Receive)流量計數器和錯誤計數器統計資訊。使用phy關鍵字顯示介面內部暫存器，或使用port-info關鍵字顯示有關埠ASIC的資訊。

以下是特定介面的show controllers ethernet-controller 輸出範例：

```
Switch#show controllers ethernet-controller tenGigabitEthernet 2/0/1
Transmit                  TenGigabitEthernet2/0/1               Receive
        61572 Total bytes                      282909 Total bytes
            0 Unicast frames                      600 Unicast frames
            0 Unicast bytes                     38400 Unicast bytes
          308 Multicast frames                   3163 Multicast frames
        61572 Multicast bytes                  244509 Multicast bytes
            0 Broadcast frames                      0 Broadcast frames
            0 Broadcast bytes                       0 Broadcast bytes
            0 System FCS error frames               0 IpgViolation frames
            0 MacUnderrun frames                    0 MacOverrun frames
            0 Pause frames                          0 Pause frames
```

```
            0 Cos 0 Pause frames                    0 Cos 0 Pause frames
            0 Cos 1 Pause frames                    0 Cos 1 Pause frames
            0 Cos 2 Pause frames                    0 Cos 2 Pause frames
            0 Cos 3 Pause frames                    0 Cos 3 Pause frames
            0 Cos 4 Pause frames                    0 Cos 4 Pause frames
            0 Cos 5 Pause frames                    0 Cos 5 Pause frames
            0 Cos 6 Pause frames                    0 Cos 6 Pause frames
            0 Cos 7 Pause frames                    0 Cos 7 Pause frames
            0 Oam frames                            0 OamProcessed frames
            0 Oam frames                            0 OamDropped frames
          193 Minimum size frames                3646 Minimum size frames
            0 65 to 127 byte frames                 1 65 to 127 byte frames
            0 128 to 255 byte frames                0 128 to 255 byte frames
          115 256 to 511 byte frames              116 256 to 511 byte frames
            0 512 to 1023 byte frames               0 512 to 1023 byte frames
            0 1024 to 1518 byte frames              0 1024 to 1518 byte frames
            0 1519 to 2047 byte frames              0 1519 to 2047 byte frames
            0 2048 to 4095 byte frames              0 2048 to 4095 byte frames
            0 4096 to 8191 byte frames              0 4096 to 8191 byte frames
            0 8192 to 16383 byte frames             0 8192 to 16383 byte frames
            0 16384 to 32767 byte frame             0 16384 to 32767 byte frame
            0 > 32768 byte frames                   0 > 32768 byte frames
            0 Late collision frames                 0 SymbolErr frames         <-- Usually
indicates Layer 1 issues. Large amounts of symbol errors can indicate a bad device, cable, or
hardware.
            0 Excess Defer frames                   0 Collision fragments      <-- If this
counter increments, this is an indication that the ports are configured at half-duplex.
            0 Good (1 coll) frames                  0 ValidUnderSize frames
            0 Good (>1 coll) frames                 0 InvalidOverSize frames
            0 Deferred frames                       0 ValidOverSize frames
            0 Gold frames dropped                   0 FcsErr frames           <-- Are the result
of collisions at half-duplex, a duplex mismatch, bad hardware (NIC, cable, or port)
            0 Gold frames truncated
            0 Gold frames successful
            0 1 collision frames
            0 2 collision frames
            0 3 collision frames
            0 4 collision frames
            0 5 collision frames
            0 6 collision frames
            0 7 collision frames
            0 8 collision frames
            0 9 collision frames
            0 10 collision frames
            0 11 collision frames
            0 12 collision frames
            0 13 collision frames
            0 14 collision frames
            0 15 collision frames
            0 Excess collision frames

LAST UPDATE 22622 msecs AGO
```

> 提示：您還可以使用**show interfaces {interface{*interface-number*} controller命令顯示從硬體讀取的每個介面Transmit和Receive**統計資訊。

使用**show platform pm interface-flaps{interface{*interface-number*}}** 要顯示介面關閉的次數：

以下是**show platform pm interface-flaps的輸出示例{interface{*interface-number*}}**對於特定介面：

```
Switch#show platform pm interface-flaps tenGigabitEthernet 2/0/1

  Field                      AdminFields          OperFields
================================================================
  Access Mode                Static               Static
  Access Vlan Id             1                    0
  Voice Vlan Id              4096                 0
  VLAN Unassigned                                 0
  ExAccess Vlan Id           32767
  Native Vlan Id             1
  Port Mode                  dynamic              access
  Encapsulation              802.1Q               Native
  disl                       auto
  Media                      unknown
  DTP Nonegotiate            0                    0
  Port Protected             0                    0
  Unknown Unicast Blocked    0                    0
  Unknown Multicast Blocked  0                    0
  Vepa Enabled               0                    0
  App interface              0                    0
  Span Destination           0

  Duplex                     auto                 full
  Default Duplex             auto
  Speed                      auto                 1000
  Auto Speed Capable         1                    1
  No Negotiate               0                    0
  No Negotiate Capable       1024                 1024
  Flow Control Receive       ON                   ON
  Flow Control Send          Off                  Off
  Jumbo                      0                    0
  saved_holdqueue_out        0
  saved_input_defqcount      2000
  Jumbo Size                 1500

  Forwarding Vlans : none
  Current Pruned Vlans : none
  Previous Pruned Vlans : none


  Sw LinkNeg State : LinkStateUp
  No.of LinkDownEvents :     12                              <--  Number of times the interface
flapped
  XgxsResetOnLinkDown(10GE):
  Time Stamp Last Link Flapped(U) : Aug 19 14:58:00.154    <-- Last time the interface flapped
  LastLinkDownDuration(sec) 192                            <-- Time in seconds the interface
stayed down during the last flap event
  LastLinkUpDuration(sec):  2277                           <-- Time in seconds the interface
stayed up before the last flap event
```

使用**show idprom{interface{*interface-number*}}** 命令而不使用關鍵字來顯示特定介面的IDPROM資訊。與**detail**關鍵字一起使用以顯示詳細的十六進位制IDPROM資訊。

以下是**show idprom**的輸出示例**{interface{*interface-number*}}** 用於特定介面。此命令輸出中列出的**High**和**Low**警告|警報閾值值是正常工作的光纖收發器引數。這些值可以從特定光學器件的資料表中驗證。請參閱思科光纖資料表

```
Switch#show idprom interface Twe1/0/1
```

```
IDPROM for transceiver TwentyFiveGigE1/0/1 :
  Description                            = SFP or SFP+ optics (type 3)
  Transceiver Type:                      = GE CWDM 1550 (107)
  Product Identifier (PID)               = CWDM-SFP-1550  <--
  Vendor Revision                        = A
  Serial Number (SN)                     = XXXXXXXXXX   <-- Cisco Serial Number
  Vendor Name                            = CISCO-FINISAR
  Vendor OUI (IEEE company ID)           = 00.90.65 (36965)
  CLEI code                              = CNTRV14FAB
  Cisco part number                      = 10-1879-03
  Device State                           = Enabled.
  Date code (yy/mm/dd)                   = 14/12/22
  Connector type                         = LC.
  Encoding                               = 8B10B (1)
  Nominal bitrate                        = OTU-1 (2700 Mbits/s)
  Minimum bit rate as % of nominal bit rate = not specified
  Maximum bit rate as % of nominal bit rate = not specified
  The transceiver type is 107
  Link reach for 9u fiber (km)           = LR-2(80km) (80)
                                           LR-3(80km) (80)
                                           ZX(80km) (80)
  Link reach for 9u fiber (m)            = IR-2(40km) (255)
                                           LR-1(40km) (255)
                                           LR-2(80km) (255)
                                           LR-3(80km) (255)
                                           DX(40KM) (255)
                                           HX(40km) (255)
                                           ZX(80km) (255)
                                           VX(100km) (255)
  Link reach for 50u fiber (m)           = SR(2km) (0)
                                           IR-1(15km) (0)
                                           IR-2(40km) (0)
                                           LR-1(40km) (0)
                                           LR-2(80km) (0)
                                           LR-3(80km) (0)
                                           DX(40KM) (0)
                                           HX(40km) (0)
                                           ZX(80km) (0)
                                           VX(100km) (0)
                                           1xFC, 2xFC-SM(10km) (0)
                                           ESCON-SM(20km) (0)
  Link reach for 62.5u fiber (m)         = SR(2km) (0)
                                           IR-1(15km) (0)
                                           IR-2(40km) (0)
                                           LR-1(40km) (0)
                                           LR-2(80km) (0)
                                           LR-3(80km) (0)
                                           DX(40KM) (0)
                                           HX(40km) (0)
                                           ZX(80km) (0)
                                           VX(100km) (0)
                                           1xFC, 2xFC-SM(10km) (0)
                                           ESCON-SM(20km) (0)
  Nominal laser wavelength               = 1550 nm.
  DWDM wavelength fraction               = 1550.0  nm.
  Supported options                      = Tx disable
                                           Tx fault signal
                                           Loss of signal (standard implementation)
  Supported enhanced options             = Alarms for monitored parameters
  Diagnostic monitoring                  = Digital diagnostics supported
                                           Diagnostics are externally calibrated
                                           Rx power measured is "Average power"
  Transceiver temperature operating range  = -5 C to 75 C (commercial)
  Minimum operating temperature          = 0 C
```

```
Maximum operating temperature             = 70 C
High temperature alarm threshold          = +90.000 C
High temperature warning threshold        = +85.000 C
Low temperature warning threshold         = +0.000 C
Low temperature alarm threshold           =  -4.000 C
High voltage alarm threshold              = 3600.0 mVolts
High voltage warning threshold            = 3500.0 mVolts
Low voltage warning threshold             = 3100.0 mVolts
Low voltage alarm threshold               = 3000.0 mVolts
High laser bias current alarm threshold   = 84.000 mAmps
High laser bias current warning threshold = 70.000 mAmps
Low laser bias current warning threshold  = 4.000 mAmps
Low laser bias current alarm threshold    = 2.000 mAmps
High transmit power alarm threshold       =  7.4 dBm
High transmit power warning threshold     =  4.0 dBm
Low transmit power warning threshold      = -1.7 dBm
Low transmit power alarm threshold        = -8.2 dBm
High receive power alarm threshold        = -3.0 dBm
Low receive power alarm threshold        = -33.0 dBm
High receive power warning threshold       = -7.0 dBm
Low receive power warning threshold       = -28.2 dBm
External Calibration: bias current slope  = 1.000
External Calibration: bias current offset = 0
```

提示：確保裝置的硬體和軟體版本與安裝的SFP/SFP+的Cisco光纖到裝置相容性清單相容

下表列出可用於排除連結翻動問題的各種命令：

指令	目的
show interfaces counters error	顯示介面錯誤計數器
show interfaces功能	顯示特定介面的功能
show interface收發器（**特定於光纖/SFP**）	顯示有關啟用了數字光纖監控(DOM)的光收的資訊
show interface link	顯示連結級別資訊
show interface {interface{*interface-number*}}平台	顯示介面平台資訊
show controllers ethernet-controller {interface{*interface-number*}} port-info	顯示其他埠資訊
show controllers ethernet-controller {interface{*interface-number*}}鏈路狀態詳細資訊	顯示連結狀態
show errdisable flap-values	顯示錯誤停用狀態之前允許發生的翻動數。
清除計數器	使用此命令將流量和錯誤計數器清零，以便視問題是否只是暫時的，或者計數器是否繼增。
clear controllers ethernet-controller	使用此命令清除硬體傳送和接收計數器。

使用時域反射器(TDR)驗證電纜狀態

時域反射計(TDR)功能可讓您判斷纜線發生故障時是處於開啟狀態還是短狀態。 透過TDR，您可以檢查Catalyst 9000系列交換器上連線埠的銅纜狀態。TDR使用通過電纜傳送的訊號檢測電纜故障，並讀取反射回的訊號。由於電纜存在缺陷，因此可以反射回全部或部分訊號

使用test cable-diagnostics tdr {interface{***interface-number***} }啟動TDR測試，然後使用**show cable-diagnostics tdr**{*interfaceinterface-number*}。

提示：有關更多詳細資訊，請參閱檢查埠狀態和連接(Checking Port Status and Connectivity)

該示例顯示了介面Tw2/0/10的TDR測試結果：

```
Switch#show cable-diagnostics tdr interface tw2/0/10
TDR test last run on: November 05 02:28:43
Interface Speed Local pair Pair length Remote pair Pair status
--------- ----- ---------- ----------------- ---------- --------------------
Tw2/0/10 1000M Pair A 1 +/- 5 meters Pair A Impedance Mismatch
Pair B 1 +/- 5 meters Pair B Impedance Mismatch
Pair C 1 +/- 5 meters Pair C Open
Pair D 3 +/- 5 meters Pair D Open
```

> **提示**：在Catalyst 9300系列交換器上，僅偵測到以下纜線故障型別 — **OPEN、SHORT和IMPEDANCE MISMATCH。**在電纜正確端接的情況下，會顯示**Normal**狀態，此過程僅作說明之用。

TDR指南

以下指南適用於TDR的使用：

- 運行TDR測試時，請勿更改埠配置。
- 如果在TDR測試期間將埠連線到啟用自動MDIX的埠，則TDR結果可能無效。
- 如果在TDR測試期間將埠連線到100BASE-T埠（如裝置上的埠），則未使用的對（4-5和7-8）將報告為故障，因為遠端終端不會終止這些對。
- 由於電纜的特性，您必須多次運行TDR測試才能得到準確的結果。
- 請勿更改連線埠狀態（例如，移除近端或遠端的電纜），因為結果可能不準確。
- 如果測試電纜從遠端埠斷開，則TDR的工作效果最佳。否則，您可能無法正確解釋結果。
- TDR在四條線路上運行。根據電纜狀況，狀態可顯示一線對為「OPEN（開啟）」或「SHORT（短路）」，而所有其他線對均顯示為「faulty（故障）」。此操作是可接受的，因為只要有一對電線是OPEN或SHORT，您就可以斷定電纜有故障。
- TDR的目的是確定電纜的運行情況，而不是查詢有故障的電纜。
- 當TDR找到故障電纜時，您仍然可以使用離線電纜診斷工具來更好地診斷問題。
- 由於TDR實施的解析度不同，在Catalyst 9300系列交換機的不同交換機型號上運行的TDR結果可能不同。發生這種情況時，必須參閱離線電纜診斷工具。

數位光纖監控(DOM)

數字光纖監控(DOM)是一種行業標準，旨在定義訪問即時引數的數字介面，例如：

- 溫度
- 收發器電源電壓
- 鐳射偏置電流
- 光纖Tx功率
- 光纖Rx功率

如何啟用DOM

下表列出了可用於為系統中所有型別的收發器開啟/關閉DOM的命令：

步驟	命令或操作	目的

步驟1	**啟用** **範例：** switch>enable	啟用物理EXEC模式 如果系統提示，請輸入密碼
步驟2	configure terminal **範例：** switch#configure terminal	進入全域性配置模式
步驟3	收發器型別all **範例：** switch(config)#transceiver type all	進入收發器型別配置模式
步驟4	監控 **範例：** switch(config)#monitoring	啟用對所有光纖收發器的監控。

使用**show interfaces** {interface{*interface-number*}} transceiver detail命令顯示收發器資訊：

```
Switch#show interfaces hundredGigE 1/0/25 transceiver detail
ITU Channel not available (Wavelength not available),
Transceiver is internally calibrated.
mA: milliamperes, dBm: decibels (milliwatts), NA or N/A: not applicable.
++ : high alarm, + : high warning, - : low warning, -- : low alarm.
A2D readouts (if they differ), are reported in parentheses.
The threshold values are calibrated.

High Alarm  High Warn  Low Warn   Low Alarm
              Temperature        Threshold   Threshold  Threshold  Threshold
Port (Celsius) (Celsius) (Celsius) (Celsius) (Celsius)
--------- ---------------- ---------- --------- --------- ---------
Hu1/0/25 28.8 75.0 70.0 0.0 -5.0

             High Alarm   High Warn  Low Warn   Low Alarm
             Voltage            Threshold    Threshold  Threshold  Threshold
Port (Volts) (Volts) (Volts) (Volts) (Volts)
--------- ---------------- ---------- --------- --------- ---------
Hu1/0/25 3.28 3.63 3.46 3.13 2.97

                High Alarm   High Warn  Low Warn   Low Alarm
               Current          Threshold    Threshold  Threshold  Threshold
Port Lane (milliamperes) (mA) (mA) (mA) (mA)
--------- ---- -------------- ---------- --------- --------- ---------
Hu1/0/25 N/A 6.2 10.0 8.5 3.0 2.6

 Optical         High Alarm   High Warn  Low Warn   Low Alarm
                 Transmit Power  Threshold    Threshold  Threshold  Threshold
Port Lane (dBm) (dBm) (dBm) (dBm) (dBm)
--------- ---- -------------- ---------- --------- --------- ---------
Hu1/0/25 N/A -2.2 1.7 -1.3 -7.3 -11.3

  Optical          High Alarm  High Warn   Low Warn   Low Alarm
                 Receive Power    Threshold   Threshold   Threshold  Threshold
Port Lane (dBm) (dBm) (dBm) (dBm) (dBm)
--------- ---- -------------- ---------- --------- --------- ---------
Hu1/0/25 N/A -16.7 2.0 -1.0 -9.9 -13.9
```

提示：要確定光收發器是否以適當的訊號級別運行，請參閱思科光纖資料表

數字光纖監控系統日誌消息

本節介紹最相關的閾值衝突系統日誌消息：

SFP光纖的溫度水準

- **解釋**：此日誌消息是在溫度低或超過正常光學操作值時生成的：

```
%SFF8472-3-THRESHOLD_VIOLATION: Te7/3: Temperature high alarm; Operating value: 88.7 C,
Threshold value: 74.0 C.
%SFF8472-3-THRESHOLD_VIOLATION: Fo1/1/1: Temperature low alarm; Operating value: 0.0 C,
Threshold value: 35.0 C.
```

SFP光纖的電壓電平

- **解釋**：此日誌消息是在電壓低或超過正常光學操作值時生成的：

```
%SFF8472-3-THRESHOLD_VIOLATION: Gi1/1/3: Voltage high warning; Operating value: 3.50 V,
Threshold value: 3.50 V.
%SFF8472-5-THRESHOLD_VIOLATION: Gi1/1: Voltage low alarm; Operating value: 2.70 V, Threshold
value: 2.97 V.
```

SFP光纖的輕量級

- **解釋**：此日誌消息是在光功率較低或超過光學操作值時生成的：

```
%SFF8472-3-THRESHOLD_VIOLATION: Gi1/0/1: Rx power high warning; Operating value: -2.7 dBm,
Threshold value: -3.0 dBm.
%SFF8472-5-THRESHOLD_VIOLATION: Te1/1: Rx power low warning; Operating value: -13.8 dBm,
Threshold value: -9.9 dBm.
```

> **提示**：有關DOM的詳細資訊，請參閱數字光纖監控

思科光纖和前向糾錯(FEC)

FEC是一種技術，用於檢測並糾正位元流中的一定數量的錯誤，並在傳輸之前將冗餘位元和錯誤檢查代碼附加到消息塊。 作為模組製造商，思科會認真設計收發器以符合規格。當光纖收發器在Cisco主機平台中運行時，根據主機軟體檢測到的光纖模組型別，預設啟用FEC(請參閱此可下載表)。 在絕大多數情況下，FEC的實施取決於光學型別支援的行業標準。

對於某些自定義規範，FEC實施有所不同。 如需詳細資訊，請參閱瞭解Cisco光纖中的FEC及其實作檔案。

該示例展示如何配置FEC和一些可用選項：

```
switch(config-if)#fec?
  auto Enable FEC Auto-Neg
  cl108 Enable clause108 with 25G
  cl74 Enable clause74 with 25G
  off Turn FEC off

Use the show interface command to verify FEC configuration:
```

```
TwentyFiveGigE1/0/13 is up, line protocol is up (connected)
Hardware is Twenty Five Gigabit Ethernet, address is 3473.2d93.bc8d (bia 3473.2d93.bc8d)
MTU 9170 bytes, BW 25000000 Kbit/sec, DLY 10 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
Full-duplex, 25Gb/s, link type is force-up, media type is SFP-25GBase-SR
  Fec is auto     < -- The configured setting for FEC is displayed here
input flow-control is on, output flow-control is off
ARP type: ARPA, ARP Timeout 04:00:00
--snip--
```

註：鏈路的兩端必須具有相同的FEC encoding 已啟用鏈路的演算法。

Debug指令

下表列出可用於調試埠擺動的各種命令

注意:請謹慎使用debug命令。請注意，許多**debug**指令都會對現行網路產生影響，因此只有在重現問題時才建議在實驗室環境中使用。 ;

指令	目的
debug pm	埠管理器調試
debug pm port	連線埠相關事件
debug platform pm	NGWC平台埠管理器調試資訊
debug platform pm l2-control	NGWC L2控制基礎設施調試
debug platform pm link-status	介面鏈路檢測事件
debug platform pm-vectors	埠管理器向量函式
debug condition interface <interface name>	選擇性地啟用特定介面的調試
debug interface state	狀態轉換

以下是d的部分輸出示**例*ebug*** 表中列出的命令：

```
SW_2#sh debugging
PM (platform):
L2 Control Infra debugging is on <-- debug platform pm l2-control
PM Link Status debugging is on <-- debug platform pm link-status
PM Vectors debugging is on <-- debug platform pm pm-vectors
Packet Infra debugs:

Ip Address Port
-------------------------------------------------------|----------

Port Manager:
Port events debugging is on <-- debug pm port

Condition 1: interface Te1/0/2 (1 flags triggered)
Flags: Te1/0/2
```

------ Sample output ---------

***Aug 25 20:01:05.791: link up/down event : link-down on Te1/0/2**
***Aug 25 20:01:05.791: pm_port 1/2: during state access, got event 5(link_down) <-- Link down event (day/time)**
*Aug 25 20:01:05.791: @@@ pm_port 1/2: access -> pagp
*Aug 25 20:01:05.792: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:05.792: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:05.792: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:05.792: IOS-FMAN-PM-DEBUG-PM-VECTORS: Vp Disable: pd=0x7F1E797914B0 dpidx=10 Te1/0/2
*Aug 25 20:01:05.792: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:05.792: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:05.792: Maintains count of VP per Interface:delete, pm_vp_counter[0]: 14, pm_vp_counter[1]: 14
*Aug 25 20:01:05.792: *** port_modechange: 1/2 mode_none(10)
*Aug 25 20:01:05.792: @@@ pm_port 1/2: pagp -> dtp
***Aug 25 20:01:05.792: stop flap timer : Te1/0/2 pagp**
*Aug 25 20:01:05.792: *** port_bndl_stop: 1/2 : inform yes
*Aug 25 20:01:05.792: @@@ pm_port 1/2: dtp -> present
*Aug 25 20:01:05.792: *** port_dtp_stop: 1/2
*Aug 25 20:01:05.792: stop flap timer : Te1/0/2 pagp
*Aug 25 20:01:05.792: stop flap timer : Te1/0/2 dtp
*Aug 25 20:01:05.792: stop flap timer : Te1/0/2 unknown
***Aug 25 20:01:05.792: *** port_linkchange: reason_link_change(3): link_down(0)1/2 <-- State link change**
*Aug 25 20:01:05.792: pm_port 1/2: idle during state present
***Aug 25 20:01:05.792: @@@ pm_port 1/2: present -> link_down <-- State of the link**
*Aug 25 20:01:06.791: %LINEPROTO-5-UPDOWN: Line protocol on Interface TenGigabitEthernet1/0/2, changed state to down
***Aug 25 20:01:07.792: %LINK-3-UPDOWN: Interface TenGigabitEthernet1/0/2, changed state to down**
***Aug 25 20:01:11.098: IOS-FMAN-PM-DEBUG-LINK-STATUS: Received LINKCHANGE in xcvr message, if_id 10 (TenGigabitEthernet1/0/2)**

***Aug 25 20:01:11.098: IOS-FMAN-PM-DEBUG-LINK-STATUS: if_id 0xA, if_name Te1/0/2, link up <-- Link became up**
***Aug 25 20:01:11.098: link up/down event: link-up on Te1/0/2**
*Aug 25 20:01:11.098: pm_port 1/2: during state link_down, got event 4(link_up)
*Aug 25 20:01:11.098: @@@ pm_port 1/2: link_down -> link_up
*Aug 25 20:01:11.098: flap count for link type : Te1/0/2 Linkcnt = 0
*Aug 25 20:01:11.099: pm_port 1/2: idle during state link_up
*Aug 25 20:01:11.099: @@@ pm_port 1/2: link_up -> link_authentication
*Aug 25 20:01:11.099: pm_port 1/2: during state link_authentication, got event 8(authen_disable)
*Aug 25 20:01:11.099: @@@ pm_port 1/2: link_authentication -> link_ready
*Aug 25 20:01:11.099: *** port_linkchange: reason_link_change(3): link_up(1)1/2
*Aug 25 20:01:11.099: pm_port 1/2: idle during state link_ready
*Aug 25 20:01:11.099: @@@ pm_port 1/2: link_ready -> dtp
*Aug 25 20:01:11.099: IOS-FMAN-PM-DEBUG-PM-VECTORS: Set pm vp mode attributes for Te1/0/2 vlan 1
*Aug 25 20:01:11.099: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.099: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.099: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.099: pm_port 1/2: during state dtp, got event 13(dtp_complete)
*Aug 25 20:01:11.099: @@@ pm_port 1/2: dtp -> dtp
*Aug 25 20:01:11.099: IOS-FMAN-PM-DEBUG-PM-VECTORS: Set pm vp mode attributes for Te1/0/2 vlan 1
*Aug 25 20:01:11.099: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.099: DTP flapping: flap count for dtp type: Te1/0/2 Dtpcnt = 0
*Aug 25 20:01:11.099: pm_port 1/2: during state dtp, got event 110(dtp_done)
*Aug 25 20:01:11.099: @@@ pm_port 1/2: dtp -> pre_pagp_may_suspend
*Aug 25 20:01:11.099: pm_port 1/2: idle during state pre_pagp_may_suspend
*Aug 25 20:01:11.099: @@@ pm_port 1/2: pre_pagp_may_suspend -> pagp_may_suspend
*Aug 25 20:01:11.099: pm_port 1/2: during state pagp_may_suspend, got event 33(pagp_continue)
*Aug 25 20:01:11.099: @@@ pm_port 1/2: pagp_may_suspend -> start_pagp
*Aug 25 20:01:11.099: pm_port 1/2: idle during state start_pagp
*Aug 25 20:01:11.099: @@@ pm_port 1/2: start_pagp -> pagp

```
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Set pm vp mode attributes for Te1/0/2 vlan 1
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.100: *** port_bndl_start: 1/2
*Aug 25 20:01:11.100: stop flap timer : Te1/0/2 pagp
*Aug 25 20:01:11.100: pm_port 1/2: during state pagp, got event 34(dont_bundle)
*Aug 25 20:01:11.100: @@@ pm_port 1/2: pagp -> pre_post_pagp
*Aug 25 20:01:11.100: pm_port 1/2: idle during state pre_post_pagp
*Aug 25 20:01:11.100: @@@ pm_port 1/2: pre_post_pagp -> post_pagp
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.100: pm_port 1/2: during state post_pagp, got event 14(dtp_access)
*Aug 25 20:01:11.100: @@@ pm_port 1/2: post_pagp -> access
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Set pm vp mode attributes for Te1/0/2 vlan 1
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.100: Maintains count of VP per Interface:add, pm_vp_counter[0]: 15,
pm_vp_counter[1]: 15
*Aug 25 20:01:11.100: IOS-FMAN-PM-DEBUG-PM-VECTORS: vlan vp enable for port(Te1/0/2) and vlan:1
*Aug 25 20:01:11.101: IOS-FMAN-PM-DEBUG-PM-VECTORS: VP ENABLE: vp_pvlan_port_mode:access for
Te1/0/2
*Aug 25 20:01:11.101: IOS-FMAN-PM-DEBUG-PM-VECTORS: VP Enable: vp_pvlan_native_vlanId:1 for
Te1/0/2
*Aug 25 20:01:11.101: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.101: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.101: *** port_modechange: 1/2 mode_access(1)
*Aug 25 20:01:11.101: IOS-FMAN-PM-DEBUG-PM-VECTORS: The operational mode of Te1/0/2 in set all
vlans is 1
*Aug 25 20:01:11.101: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:11.101: IOS-FMAN-PM-DEBUG-PM-VECTORS: vp_pvlan port_mode:access vlan:1 for Te1/0/2
*Aug 25 20:01:11.101: IOS-FMAN-PM-DEBUG-PM-VECTORS: vp_pvlan port_mode:access native_vlan:1 for
Te1/0/2
*Aug 25 20:01:11.102: IOS-FMAN-PM-DEBUG-PM-VECTORS: Success sending PM tdl message
*Aug 25 20:01:13.098: %LINK-3-UPDOWN: Interface TenGigabitEthernet1/0/2, changed state to up
*Aug 25 20:01:14.098: %LINEPROTO-5-UPDOWN: Line protocol on Interface TenGigabitEthernet1/0/2,
changed state to up
```

相關資訊

[思科光纖到裝置相容性矩陣]

[適用於千兆乙太網應用的Cisco SFP模組產品手冊]

[25GE和100GE — 通過投資保護實現企業內更高的速度]

[Cisco CWDM SFP解決方案產品手冊]

[支援創新：Cisco TAC如何轉變文檔和簡化自助服務]

[技術支援與文件 - Cisco Systems]

思科錯誤 ID	說明
思科錯誤ID CSCvu13029	mGig Cat9300交換機上的間歇性鏈路擺動到支援mGig的終端
思科錯誤ID CSCvt50788	其他mGig裝置的Cat9400 mGig互操作問題會導致鏈路抖動

思科錯誤ID CSCvu92432	CAT9400：具有Mgig AP的Mgig介面擺動
思科錯誤ID CSCve65787	適用於100G/40G/25G Cu轉換器的自動支援

關於此翻譯

思科已使用電腦和人工技術翻譯本文件，讓全世界的使用者能夠以自己的語言理解支援內容。請注意，即使是最佳機器翻譯，也不如專業譯者翻譯的內容準確。Cisco Systems, Inc. 對這些翻譯的準確度概不負責，並建議一律查看原始英文文件（提供連結）。