Catalyst 9000シリーズスイッチでのSPANとERSPANの確認

内容

概要

このドキュメントでは、Catalyst 9000シリーズスイッチでのSPANおよびERSPANの確認方法について説明します。

前提条件

要件

このドキュメントに特有の要件はありません。

使用するコンポーネント

このドキュメントの情報は、次のソフトウェアとハードウェアのバージョンに基づいています。

- Catalyst 9300(Cisco IOS®-XE 17.3.5)
- Catalyst 9500(Cisco IOS®-XE 17.3.5)

このドキュメントの情報は、特定のラボ環境にあるデバイスに基づいて作成されました。このドキュメントで使用するすべてのデバイスは、初期（デフォルト）設定の状態から起動しています。本稼働中のネットワークでは、各コマンドによって起こる可能性がある影響を十分確認してください。

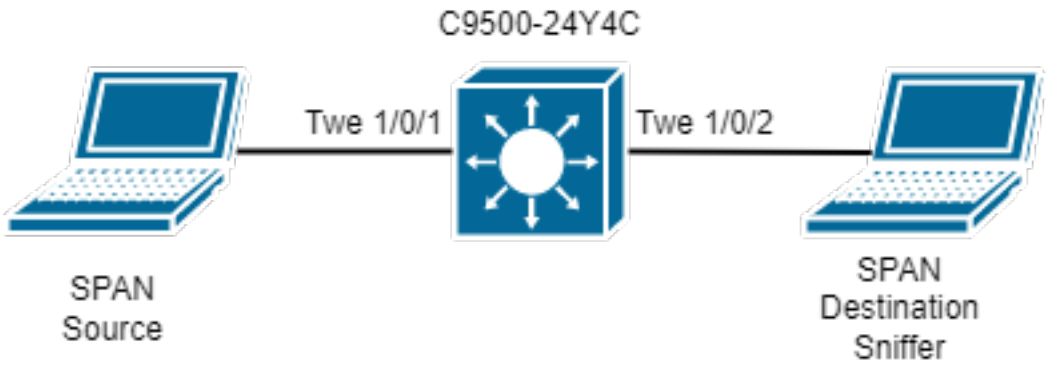
関連製品

このドキュメントは、次のバージョンのハードウェアとソフトウェアにも使用できます。

- Catalyst 9200
- Catalyst 9300
- Catalyst 9500
- Catalyst 9400
- Catalyst 9600

SPANの確認

ネットワーク図



SPAN Configuration

```
monitor session 1 source interface Twe1/0/1
monitor session 1 destination interface Twe1/0/2
```

SPANソフトウェアの設定を確認します。 送信元と宛先のSPANインターフェイス、およびSPANキャプチャの方向を書き留めます。

```
C9500-SPAN#show monitor session all
Session 1
---------
Type                   : Local Session
Source Ports           :
    Both               : Twe1/0/1
Destination Ports      : Twe1/0/2
    Encapsulation      : Native
          Ingress      : Disabled
```

SPANハードウェアエントリを確認します。 **FEDセッションID:SPAN設定ごとに一意です。同時に最大8つのFEDセッションを設定できます (FEDセッション0 ~ 7) 。**

```
C9500-SPAN# show platform software monitor session 1
Span Session 1 (FED Session 0):
  Type:      Local SPAN
  Prev type: Local SPAN
  Ingress Src Ports: Twe1/0/1    <-- Hardware entry for source interface.
  Egress Src Ports:  Twe1/0/1    <-- Hardware entry for source interface.
  Ingress Local Src Ports: (null)
  Egress Local Src Ports: (null)
  Destination Ports:  Twe1/0/2   <-- Hardware entry for destination interface.
```

```
  Ingress Src Vlans:
  Egress Src Vlans:
  Ingress Up Src Vlans: (null)
  Egress Up Src Vlans:  (null)
  Src Trunk filter Vlans:
  RSPAN dst vlan: 0
  RSPAN src vlan: 0
  RSPAN src vlan sav: 0
  Dest port encap = 0x0000
  Dest port ingress encap = 0xFFFFFFFFFFFFFFFF
  Dest port ingress vlan = 0x0
  SrcSess: 1  DstSess: 0 DstPortCfgd: 1  RspnDstCfg: 0  RspnSrcVld: 0
  DstCliCfg: 0  DstPrtInit: 1  PsLclCfgd: 0
  Flags: 0x00000031 PSPAN
  Remote dest port: 0   Dest port group: 0
  FSPAN disabled
FSPAN not notified
```

設定された送信元および宛先SPANポートのASIC、コア、およびポート番号を収集します。ポート番号は、送信元SPANインターフェイスが正しくプログラムされているかどうか、およびSPANが正しい宛先SPANインターフェイスをポイントしているかどうかを確認するために必要です。

> **ヒント**：適切な名称のstandalone device **show platform software/hardware fed active**または stack device **show platform software/hardware fed switch <number>**を使用します。

```
C9500-SPAN# show platform software fed active ifm mappings
Interface                IF_ID    Inst Asic Core Port SubPort Mac  Cntx LPN  GPN  Type Active
TwentyFiveGigE1/0/1      0x8        1   0   1    20     0      16   4    1    101  NIF  Y
TwentyFiveGigE1/0/2      0x9        1   0   1    21     0      17   5    2    102  NIF  Y
```

IlePortLeSpanBitMapTable Dopplerレジスタは、ポートが入力(RX)方向でSPANの対象となるかどうかを定義するために使用されます。設定された送信元SPANポート（ASICポート20）が正しい**FEDセッション（セッション0）**に割り当てられていることを確認するには、次のようにします。

```
C9500-SPAN# show platform hardware fed active fwd-asic register read register-name
IlePortLeSpanBitMapTable-20 asic 0 core 1
For asic 0 core 1

Module 0 - IlePortLeSpanBitMapTable[0][20]

ssbm                     : 0x1     <-- Convert from Hexadecimal to Binary: 0b00000001. Bit 0 is
set.
```

SPANセッションビットマップは8ビットレジスタです。各ビットはFEDセッションに対応します。最下位ビットはFEDセッション0に対応し、最上位ビットはFEDセッション7に対応します。したがって、サポートされるSPANセッションの最大数は、前述のように8です。

インターフェイスが複数のSPANセッションのSPAN送信元ポートとして設定されている場合、すべてのFEDセッションがSSBMレジスタに表示される必要があります。たとえば、値が0x5(0b00000101)のSSBMは、インターフェイスがFEDセッション0とFEDセッション2の両方のSPANソースであることを意味します。

同様に、ドップラーレジスタの**ElePortLeSpanBitMapTable**レジスタは、ポートが出力(TX)方向でSPANの対象であるかどうかを判別します。この分析は、IlePortLeSpanBitMapTableレジスタと同じです。設定された送信元SPANポート（ASICポート20）が正しい**FEDセッション（セッション0）**に割り当てられていることを確認するには、次のようにします。

```
C9500-SPAN# show platform hardware fed active fwd-asic register read register-name
ElePortLeSpanBitMapTable-20 asic 0 core 1
For asic 0 core 1

Module 0 - ElePortLeSpanBitMapTable[0][20]

ssbm                        : 0x1
```

これにより、送信元SPANインターフェイスがRX方向とTX方向の両方で正しいFEDセッションにマッピングされていることを確認できます。

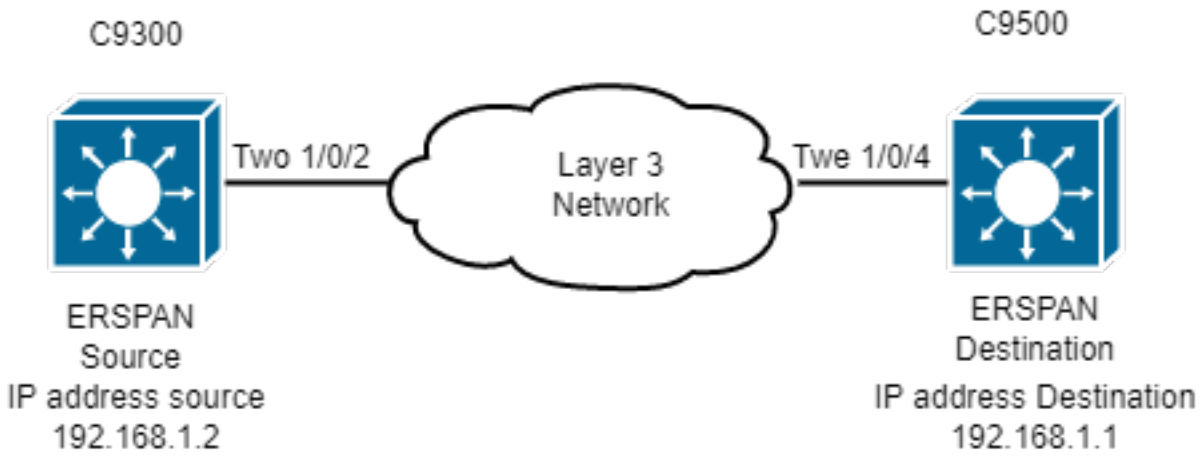
FEDセッションIDを使用すると、**AqmRepSpanPortMap** Dopplerレジスタ内でSPANの宛先ポートを検索できます。FEDセッション0が正しいSPAN宛先ポート（ASICポート21）を指していることを確認するには、次のコマンドを実行します。

```
C9500-SPAN# show platform hardware fed active fwd-asic register read register-name
AqmRepSpanPortMap-0 asic 0 core 1
For asic 0 core 1

Module 0 - AqmRepSpanPortMap[0][0]

cpuQueueNum                 : 0x0
cpuSpanValid                : 0x0
indirectApPortMap           : 0x0
portMap0                    : 0x200000     <-- Convert from Hexadecimal to Binary:
0b00100000000000000000000. Bit 21 is set.
rcpPortMap                  : 0x0
spanCtiLo                   : 0x0
```

これにより、SPANでキャプチャされたパケットは、インターフェイスTw1/0/2（ASICポート21）から複製されたものとして表示する必要があることを確認できます。 SPAN宛先ポートがさらに設定されている場合、それらは**AqmRepSpanPortMap**レジスタに表示されます。

ERSPANの確認

ネットワーク図



注：Catalyst C9200はERSPANをサポートしていません。

注：DNA-Advantageライセンスが必要です。

ERSPANの設定

```
### Source ESRPAN Device ###

C9300-ERSPAN# show run | section monitor
monitor session 1 type erspan-source
 source vlan 10
 destination
  erspan-id 3                    <-- ERSPAN id must be identical on source and destination.
  ip address 192.168.1.1         <-- GRE tunnel destination IP (IP addr configured on ERSPAN
destination switch).
  origin ip address 192.168.1.2  <-- GRE tunnel source IP (IP addr configured on ERSPAN source
switch).

C9300-ERSPAN# show ip interface brief | exclude unassigned
Interface              IP-Address      OK? Method Status                Protocol
<snip>
Loopback0              192.168.1.2     YES NVRAM  up                    up

### Destination ERSPAN Device ###

C9500-ERSPAN# show run | section monitor
monitor session 1 type erspan-destination
destination interface Twe1/0/3
source
erspan-id 3 <-- ERSPAN id must be identical on source and destination.
ip address 192.168.1.1  <-- GRE tunnel destination IP (IP addr configured on ERSPAN destination
switch).

C9500-ERSPAN# show ip interface brief | exclude unassigned
Interface IP-Address OK? Method Status Protocol
<snip>
Loopback0 192.168.1.1 YES NVRAM up up
```

ソース デバイス

発信元IPと宛先IP間の到達可能性を確認します。

```
C9300-ERSPAN#ping 192.168.1.1 source 192.168.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.1, timeout is 2 seconds:
Packet sent with a source address of 192.168.1.2
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/2 ms
```

Cisco IOSソフトウェアプログラミング

Cisco IOSソフトウェアで、ERSPANセッションのエントリを確認します。

```
C9300-ERSPAN#show monitor session 1
Session 1
---------
Type                      : ERSPAN Source Session
Status                    : Admin Enabled
```

```
Source VLANs            :
    Both                : 10
Destination IP Address  : 192.168.1.1
Destination ERSPAN ID   : 3
Origin IP Address       : 192.168.1.2
```

SHIMプログラミング

どのソフトウェアがプログラムハードウェア (SHIMオブジェクト) に送信するかを確認します。

```
C9300-ERSPAN#show platform software monitor session 1
Span Session 1 (FED Session 0):
  Type:      ERSPAN Source
  Prev type: Unknown
  Ingress Src Ports:
  Egress Src Ports:
  Ingress Local Src Ports: (null)
  Egress Local Src Ports: (null)
  Destination Ports:
  Ingress Src Vlans: 10     <-- Replicate Traffic.
  Egress Src Vlans:  10     <-- Replicate Traffic.
  Ingress Up Src Vlans: 10
  Egress Up Src Vlans:  10
  Src Trunk filter Vlans:
  RSPAN dst vlan: 0
  RSPAN src vlan: 0
  RSPAN src vlan sav: 0
  Dest port encap = 0x0000
  Dest port ingress encap = 0x0000
  Dest port ingress vlan = 0x0
  SrcSess: 1  DstPortCfgd: 0  RspnDstCfg: 0  RspnSrcVld: 0    <-- Monitor session number.
  DstCliCfg: 0  DstPrtInit: 0  PsLclCfgd: 0
  Flags: 0x00000002 VSPAN
  Remote dest port: 0   Dest port group: 0
  FSPAN disabled
  FSPAN not notified
  ERSPAN Id    : 3           <-- Value match with the software setting.
  ERSPAN Org Ip: 192.168.1.2  <-- Value match with the software setting.
  ERSPAN Dst Ip: 192.168.1.1  <-- Value match with the software setting.
  ERSPAN Ip Ttl: 255
  ERSPAN State : Enabled
  ERSPAN Tun id: 77
```

Forwarding Manager Route Processor

どのソフトウェアがプログラムハードウェア(FMAN RPレイヤ)に送信するかを確認します。

```
C9300-ERSPAN#show platform software swspan switch active R0 source
Showing SPAN source table summary info

Sess-id   IF-type   IF-id   Sess-type   Dir
-------------------------------------------------
0         VLAN      10      ERSPAN SRC  Ingress
0         VLAN      10      ERSPAN SRC  Egress


C9300-ERSPAN#show platform software swspan switch active R0 source sess-id 0
Showing SPAN source detail info
Session ID : 0 Intf Type : VLAN Vlan id : 10 <-- Vlan entry
PD Sess ID : 0
Session Type : ERSPAN SRC
```

```
Direction : Ingress
Filter Enabled : No
ACL Configured : No
ERSPAN Enable : Yes

Session ID : 0
Intf Type : VLAN
Vlan id : 10    <-- Match with the Vlan/Interface SPAN.
PD Sess ID : 0
Session Type : ERSPAN SRC
Direction : Egress
Filter Enabled : No
ACL Configured : No
ERSPAN Enable : Yes
```

Forward Manager-Forwarding Processor

どのソフトウェアがプログラムハードウェア(FMAN FPレイヤ)に送信するかを確認します。

```
C9300-ERSPAN#show platform software swspan switch active F0 source
Showing SPAN source table summary info

Sess-id   IF-type   IF-id   Sess-type   Dir
-------------------------------------------------
0         VLAN      10      ERSPAN SRC  Ingress
0         VLAN      10      ERSPAN SRC  Egress


C9300-ERSPAN#show platform software swspan switch active F0 source sess-id 0
Showing SPAN source detail info

Session ID : 0
Intf Type : VLAN
Vlan id : 10
PD Sess ID : 0
Session Type : ERSPAN SRC   <-- Source Interface.
Direction : Ingress
Filter Enabled : No
ACL Configured : No
AOM Object id : 519
AOM Object Status : Done
Parent AOM object Id : 30
Parent AOM object Status : Done

Session ID : 0
Intf Type : VLAN
Vlan id : 10
PD Sess ID : 0
Session Type : ERSPAN SRC  <-- Source Interface.
Direction : Egress
Filter Enabled : No
ACL Configured : No
AOM Object id : 520
AOM Object Status : Done
Parent AOM object Id : 30
Parent AOM object Status : Done


C9300-ERSPAN#show platform software swspan switch active F0 counters  <-- Check for any err
counters that increment on PI/PD/HW
Dump Switch SPAN FP operation counters  <-- Operational Counters.
```

```
Source SPAN Config Counters

PI: Create 2 (err 0), Modify 0 (err 0), Delete 0 (err 0) <-- PI = platform independent
(Software/IOS).
PD: Create 2 (err 0), Modify 0 (err 0), Delete 0 (err 0) <-- PD = platform dependent
(SHIM/FMAN/FED).
HW: Create 2 (err 0), Modify 0 (err 0), Delete 0 (err 0) <-- HW = hardware (FED/ASIC).

Destination SPAN Config Counters

PI: Create 1 (err 0), Modify 0 (err 0), Delete 0 (err 0)
PD: Create 1 (err 0), Modify 0 (err 0), Delete 0 (err 0)
HW: Create 1 (err 0), Modify 0 (err 0), Delete 0 (err 0)

Filter SPAN Config Counters

PI: Create 0 (err 0), Modify 0 (err 0), Delete 0 (err 0)
PD: Create 0 (err 0), Modify 0 (err 0), Delete 0 (err 0)
HW: Create 0 (err 0), Modify 0 (err 0), Delete 0 (err 0)
```

フォワーディングエンジンドライバ

ASIC(FED)をプログラムするレイヤを確認します。

```
C9300-ERSPAN#show platform software fed switch active monitor 0
Session 0
---------
  Session Type         : ERSPAN Source Session
  Source Ports         : RX: None  TX: None
  Destination Ports    : None
  Source VLANs         : VLAN-10
  Destination VLANs    : VLAN-10
  Source RSPAN VLAN    : 0
  DST RSPAN VLAN       : 0
  Encap                : Native
  Ingress Forwarding   : Disabled
  Filter VLANs         : None
  ERSPAN Enable        : 1         <-- 1 = On/Completed.
  ERSPAN Hw Programmed : 1         <-- 1 = On/Completed.
  ERSPAN Mandatory Cfg : 1         <-- 1 = On/Completed.
  ERSPAN Id            : 3
  Gre Prot             : 88be
  MTU                  : 9000
  Ip Tos               : 0
  Ip Ttl               : 255
  Cos                  : 0
  Vrf Id               : 0
  Dst Ip               : 192.168.1.1
Org Ip : 192.168.1.2
Dst Ipv6 : ::
Org Ipv6 : ::
SGT count : 0
SGT Tag(s) :
```

Hardware Tunnel Programming(FED)を確認します。

```
C9300-ERSPAN#show platform software fed switch active ifm interfaces tunnel
Interface                      IF_ID               State
----------------------------------------------------------------------
```

Tunnel1000000000 **0x00000035 READY <-- 0x35 in Hex is 53 in Decimal (tunnel number 53).**

C9300-ERSPAN#**show platform software fed switch active ifm if-id 0x35 <-- Hardware tunnel number 0x35.**
Interface IF_ID : 0x0000000000000035
Interface Name : Tunnel1000000000
Interface Block Pointer : 0x55d0ff5b6c98
Interface Block State : READY
Interface State : Enabled
Interface Status : ADD
Interface Ref-Cnt : 4
Interface Type : TUNNEL
Unit : 0
SNMP IF Index : 0
Encap L3If LE Handle : 0x7f00e0a50a28 **<-- Hardware handle info (used to check final Hardware program state).**
Decap L3If LE Handle : 0x7f00e0a50bd8 **<-- Hardware handle info (used to check final Hardware program state).**
Tunnel Mode : 0 [gre] **<-- Tunnel Protocol Enable.**
Tunnel Sub-mode: 0 [none]
Hw Support : Yes
Tunnel Vrf : 0
IPv4 MTU : 0
IPv6 MTU : 0
IPv4 VRF ID : 0
IPv6 VRF ID : 0
Protocol flags : 0x0001 [ipv4]
Misc flags : 0x0000 [None]
ICMPv4 flags : 0x03 [unreachable redirect]
ICMPv6 flags : 0x03 [unreachable redirect]

Port Information
Handle ..... [0xcf000051]
Type ..... [L3-Tunnel]
Identifier ..... [0x35]
Unit ..... [53]
Port Logical Tunnel Subblock
Encap-L3ifle.....[0x7f00e0a50a28] **<-- Same number as previous highlighted output.**
Decap-L3ifle.....[0x7f00e0a50bd8] **<-- Same number as previous highlighted output.**
decap-portle.....[0x0]
RI-decap.....[0x7f00e0a5a1a8]
SI-decap.....[0x7f00e0a5a678]
Decap-Tcam_handle..[0x7f00e0a5a9a8]
Tunnel_capability..[0x3]
Encap-RCP-PMAP.....[0x0]
GPN.....[0]

C9300-ERSPAN#**show platform software fed switch active ifm mappings l3if-le | include L3IF|Tunnel**
L3IF_LE Interface IF_ID Type
0x00007f00e0a50a28 Tunnel1000000000 0x00000035 ENCAP_L3_LE **<-- L3IF + IF_ID (ENCAP) match here.**
0x00007f00e0a50bd8 Tunnel1000000000 0x00000035 DECAP_L3_LE **<-- L3IF + IF_ID (DECAP) match here.**

Encapsulation LE

C9300-ERSPAN#**show platform hardwware fed switch active fwd-asic abstraction print-resource-handle 0x00007f00e0a50a28 0 <-- ENCAP.**
Handle:0x7f00e0a50a28 Res-Type:ASIC_RSC_L3IF_LE Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_IFM Lkp-ftr-id:LKP_FEAT_INVALID ref_count:1
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: **index0:0x27** mtu_index/l3u_ri_index0:0x5

```
sm handle [ASIC 0]: 0x7f00e0a56d08 index1:0x27 mtu_index/l3u_ri_index1:0x5
============================================================
Decapsulation LE
C9300-ERSPAN#show platform hardware fed switch active fwd-asic abstraction print-resource-handle
0x00007f00e0a50a28 0 <-- DECAP.
Handle:0x7f00e0a50bd8 Res-Type:ASIC_RSC_L3IF_LE Res-Switch-Num:255 Asic-Num:255 Feature-
ID:AL_FID_IFM Lkp-ftr-id:LKP_FEAT_INVALID ref_count:1
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: index0:0x28 mtu_index/l3u_ri_index0:0x0
sm handle [ASIC 0]: 0x7f00e0a559c8 index1:0x28 mtu_index/l3u_ri_index1:0x0
============================================================
```

宛先スイッチへの出力ポートでEmbedded Packet Capture(EPC)を実行します。フィルタを適用して、GREトンネルの送信元および宛先IPを使用できます（パケットはカプセル化パケットです）。

```
Frame 1: 110 bytes on wire (880 bits), 110 bytes captured (880 bits) on interface 0
 <snip>
Internet Protocol Version 4, Src: 192.168.1.2, Dst: 192.168.1.1 <-- ERSPAN IP HEADER.
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
        0000 00.. = Differentiated Services Codepoint: Default (0)
        .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
    Total Length: 96
    Identification: 0x1018 (4120)
    Flags: 0x00
        0... .... = Reserved bit: Not set
        .0.. .... = Don't fragment: Not set
        ..0. .... = More fragments: Not set
    Fragment offset: 0
    Time to live: 255
    Protocol: Generic Routing Encapsulation (47)  <-- GRE tunnel encapsulation.
    Header checksum: 0x9c56 [validation disabled]
        [Good: False]
        [Bad: False]
    Source: 192.168.1.2             <-- Source GRE IP tunnel.
    Destination: 192.168.1.1        <-- Destination GRE IP tunnel.
Generic Routing Encapsulation (ERSPAN)
    Flags and Version: 0x1000
        0... .... .... .... = Checksum Bit: No
        .0.. .... .... .... = Routing Bit: No
        ..0. .... .... .... = Key Bit: No
        ...1 .... .... .... = Sequence Number Bit: Yes
        .... 0... .... .... = Strict Source Route Bit: No
        .... .000 .... .... = Recursion control: 0
        .... .... 0000 0... = Flags (Reserved): 0
        .... .... .... .000 = Version: GRE (0)
    Protocol Type: ERSPAN (0x88be)        <--ERSPAN enable.
    Sequence Number: 0
Encapsulated Remote Switch Packet Analysis
    0001 .... .... .... = Version: Type II (1)
    .... 0000 0001 1000 = Vlan: 10
    000. .... .... .... = Priority: 0
    ...1 .... .... .... = Unknown2: 1
    .... 1... .... .... = Direction: Outgoing (1)
    .... .0.. .... .... = Truncated: Not truncated (0)
    .... ..00 0000 0011 = SpanID: 3       <--ERSPAN ID.
    Unknown7: 00000002
Ethernet II, Src: Xerox_00:02:00 (00:00:08:00:02:00), Dst: Cisco_eb:90:68 (00:9e:1e:eb:90:68)
  <snip>
(Internal data packet comes here, output truncated)
```

ERSPAN宛先デバイス

Cisco IOSソフトウェアプログラミング

```
C9500-ERSPAN#show monitor session 1
Session 1
---------
Type                      : ERSPAN Destination Session
Status                    : Admin Enabled
Destination Ports         : Twe1/0/3
Source IP Address         : 192.168.1.1
Source ERSPAN ID          : 3
```

SHIMプログラミング

どのソフトウェアがプログラムハードウェア（SHIMオブジェクト）に送信するのかを確認します。

```
C9500-ERSPAN#show platform software monitor session 1
Span Session 1 (FED Session 0):
  Type:      ERSPAN Destination
  Prev type: Unknown
  Ingress Src Ports:
  Egress Src Ports:
  Ingress Local Src Ports: (null)
  Egress Local Src Ports: (null)
  Destination Ports:  Twe1/0/3
  Ingress Src Vlans:
  Egress Src Vlans:
  Ingress Up Src Vlans: (null)
  Egress Up Src Vlans:  (null)
  Src Trunk filter Vlans:
  RSPAN dst vlan: 0
  RSPAN src vlan: 0
  RSPAN src vlan sav: 0
  Dest port encap = 0x0004
  Dest port ingress encap = 0x0000
  Dest port ingress vlan = 0x0
  SrcSess: 0  DstSess: 1 DstPortCfgd: 1  RspnDstCfg: 0  RspnSrcVld: 0
  DstCliCfg: 0  DstPrtInit: 1  PsLclCfgd: 0
  Flags: 0x00000000
  Remote dest port: 0   Dest port group: 0
  FSPAN disabled
  FSPAN not notified
  ERSPAN Id    : 3
  ERSPAN Dst Ip: 192.168.1.1
  ERSPAN Vrf   : 0
```

Forward Manager-Forwarding Processor

どのソフトウェアがプログラムハードウェア（FMAN FPレイヤ）に送信するかを確認します。

```
C9500-ERSPAN#show platform software swspan switch active r0 destination
Showing SPAN destination table summary info Sess-id IF-type IF-id Sess-type --------------------
------------------ 0 PORT 11  Local        <-- IF-if 0xb maps to Twe1/0/3 (Check under 'show
platform software fed active ifm mapping').
0         ERSPAN    ERSPAN   DST
```

```
C9500-ERSPAN#show platform software swspan R0 destination sess-id 0
Showing SPAN destination detail info

Session ID : 0
Intf Type : PORT
Port dpidx :11         <--Match with IF-id
PD Sess Id : 0
Session Type : Local   <-- Type of monitor session
Ingress Fwd : No
Ingress Encape : Disabled
Ingress Vlan : 0
Encap Value : Replicate
RSPAN Vlan : 0

Session ID : 0
Intf Type : ERSPAN
Vlan id :
PD Sess Id : 0
Session Type : ERSPAN DST
ERSPAN Id : 3
ERSPAN Dst Ip: 192.168.1.1
ERSPAN Src Ip: 0.0.0.0
GRE Prot  : 35006
MTU       : 0
IP Tos    : 0
IP Ttl    : 255
Cos       : 0
Vrf Id    : 0
Tunnel Ifid: 38         <-- 38 in Decimal is 0x26 in Hex which is the IF_ID of Tunnel1
ERSPAN En : TDL_TRUE
```

Forward Manager-Forwarding Processor

どのソフトウェアがプログラムハードウェア（FMAN FPレイヤ）に送信するかを確認します。

```
C9500-ERSPAN#show platform software swspan switch active F0 counters  <-- (check for any error
counters on PI/PD/HW).
Dump Switch SPAN FP operation counters

Source SPAN Config Counters

PI: Create 0 (err 0), Modify 0 (err 0), Delete 0 (err 0)  <-- PI = platform independent
(Software/IOS).
PD: Create 0 (err 0), Modify 0 (err 0), Delete 0 (err 0)  <-- PD = platform dependent
(SHIM/FMAN/FED).
HW: Create 0 (err 0), Modify 0 (err 0), Delete 0 (err 0)  <-- HW = hardware (FED/ASIC).

Destination SPAN Config Counters

PI: Create 10 (err 0), Modify 6 (err 0), Delete 4 (err 0)
PD: Create 4 (err 0), Modify 0 (err 0), Delete 2 (err 0)
HW: Create 4 (err 0), Modify 0 (err 0), Delete 2 (err 0)

Filter SPAN Config Counters

PI: Create 0 (err 0), Modify 0 (err 0), Delete 0 (err 0)
PD: Create 0 (err 0), Modify 0 (err 0), Delete 0 (err 0)
HW: Create 0 (err 0), Modify 0 (err 0), Delete 0 (err 0)
```

```
C9500-ERSPAN#show platform software swspan switch active F0 destination
Showing SPAN destination table summary info

Sess-id   IF-type   IF-id   Sess-type
-------------------------------------
0         PORT      11       Local
0         VLAN      0       ERSPAN DST
```

フォワーディングエンジンドライバ

ASIC(FED)をプログラムするレイヤを確認します。

```
C9500-ERSPAN#show platform software fed switch active monitor 0
Session 0
---------
  Session Type         : ERSPAN Destination Session
Source Ports : RX: None TX: Tunnel1000000000 Destination Ports    : TwentyFiveGigE1/0/3
  Source VLANs         : None
  Destination VLANs    : None
  Source RSPAN VLAN    : 0
  DST RSPAN VLAN       : 0
  Encap                : Replicate
  Ingress Forwarding   : Disabled
  Filter VLANs         : None
  ERSPAN Enable        : 1
  ERSPAN Hw Programmed : 1
  ERSPAN Mandatory Cfg : 1
  ERSPAN Id            : 3
  Ip Tos               : 0 (DSCP:0)
  Ip Ttl               : 0
  Cos                  : 0
  Vrf Id               : 0
  Tunnel IfId          : 38                <-- 38 in Decicmal is 0x26 in Hex which is the IF_ID
of Tunnel1
  Dst Ip               : 192.168.1.1
  Org Ip               : 0.0.0.0
  SGT count            : 0
  SGT Tag(s)           :
```

Hardware Tunnel Programming(FED)を確認します。

```
C9500-ERSPAN#show platform software fed switch active ifm interfaces tunnel
Interface IF_ID State
------------------------------------------------------------------------
Tunnel1000000000  0x00000026   READY

C9500-ERSPAN#show platform software fed switch active ifm if-id 0x00000026
Interface IF_ID : 0x0000000000000026
Interface Name : Tunnel1000000000
Interface Block Pointer : 0x7f2cd48e9958
Interface Block State : READY
Interface State : Enabled
Interface Status : ADD
Interface Ref-Cnt : 5
Interface Type : TUNNEL
Unit : 0 SNMP IF Index : 0 Encap L3If LE Handle : 0x7f2cd4904e08    <-- Hardware handle info
(used to check final Hardware program state).
Decap L3If LE Handle : 0x7f2cd48dabc8    <-- Hardware handle info (used to check final Hardware
```

program state).
Tunnel Mode   : 0 [gre]   **<-- Tunnel Protocol Enable.**
Hw Support   : Yes
Tunnel Vrf   : 0
IPv4 MTU   : 0
IPv6 MTU   : 0
IPv4 VRF ID   : 0
IPv6 VRF ID   : 0
Protocol flags : 0x0001 [ipv4]
Misc flags   : 0x0000 [None]
ICMPv4 flags   : 0x03 [unreachable redirect]
ICMPv6 flags   : 0x03 [unreachable redirect]

Port Information
Handle ..... [0xd4000043]
Type ..... [L3-Tunnel] Identifier ..... [0x26] Unit ..... [38] Port Logical
Tunnel Subblock **Encap-L3ifle.....[0x7f2cd4904e08]   <-- Same number as previous highlighted output.**
Decap-L3ifle.....[0x7f2cd48dabc8]   <-- Same number as previous highlighted output.
decap-portle.....[0x0]
RI-decap.....[0x7f2cd49615d8]   <-- Same number as previous highlighted output.
SI-decap.....[0x7f2cd4958dd8]   <-- Same number as previous highlighted output.
Decap-Tcam_handle..[0x7f2cd46eee08]   <-- Same number as previous highlighted output.
Tunnel_capability..[0x3]
Encap-RCP-PMAP.....[0x0]
GPN.....[0]
<snip>

C9500-ERSPAN#**show platform software fed switch active ifm mappings l3if-le | include L3IF|Tunnel**
L3IF_LE   Interface   IF_ID   Type
0x00007f2cd48dabc8   Tunnel1000000000   0x00000026   DECAP_L3_LE
<-- L3IF + IF_ID (DECAP) match here.
0x00007f2cd4904e08   Tunnel1000000000   0x00000026   ENCAP_L3_LE
<-- L3IF + IF_ID (ENCAP) match here.

Encapsulation LE

C9500-ERSPAN#**show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f2cd4904e08 0 <--ENCAP**
Handle:0x7f2cd4904e08 Res-Type:ASIC_RSC_L3IF_LE Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_IFM Lkp-ftr-id:LKP_FEAT_INVALID ref_count:1
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: **index0:0x27** mtu_index/l3u_ri_index0:0x2
sm handle [ASIC 0]: 0x7f2cd46ece38 index1:0x27 mtu_index/l3u_ri_index1:0x4

==========

Decapsulation LE

C9500-ERSPAN#**show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f2cd48dabc8 0 <--DECAP**
Handle:0x7f2cd48dabc8 Res-Type:ASIC_RSC_L3IF_LE Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_IFM Lkp-ftr-id:LKP_FEAT_INVALID ref_count:1
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: **index0:0x28** mtu_index/l3u_ri_index0:0x0
sm handle [ASIC 0]: 0x7f2cd46d91c8 index1:0x28 mtu_index/l3u_ri_index1:0x0

Rewrite Index (decapsulation)

C9500-ERSPAN#**show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f2cd49615d8 1   <-- RI-decap**
Handle:0x7f2cd49615d8 Res-Type:ASIC_RSC_RI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_GRE Lkp-ftr-id:LKP_FEAT_INVALID ref_count:1
priv_ri/priv_si Handle: 0x7f2cd48daf28Hardware Indices/Handles: index0:0x16

```
mtu_index/l3u_ri_index0:0x0 index1:0x16 mtu_index/l3u_ri_index1:0x0
Features sharing this resource:107 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 28 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 01 6b 33 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Detailed Resource Information (ASIC# 0) ------------------------------------
Rewrite Data Table Entry, ASIC#:0 RI:22 Rewrite_type:AL_RRM_REWRITE_IPV4_ERSPAN2_DECAP(61)
Mapped_rii:TUNNEL_IPv4Erspan_DECAP(83)   L3IF LE Index: 40          <-- 64 in Decimal is 0x40
in Hex which matches Decap LE index seen above

Detailed Resource Information (ASIC# 1)
---------------------------------------

Rewrite Data Table Entry,
ASIC#:1 RI:22 Rewrite_type:AL_RRM_REWRITE_IPV4_ERSPAN2_DECAP(61)
Mapped_rii:TUNNEL_IPv4Erspan_DECAP(83)

L3IF LE Index: 40 ============================================================

### Station Index (decapsulation) ###

C9500-ERSPAN#show platform hardware fed switch active fwd-asic abstraction print-resource-handle
0x7f2cd4958dd8 1  <-- SI-decap
Handle:0x7f2cd4958dd8 Res-Type:ASIC_RSC_SI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_GRE
Lkp-ftr-id:LKP_FEAT_INVALID ref_count:1
priv_ri/priv_si Handle: 0x7f2cd49615d8Hardware Indices/Handles: index0:0xae
mtu_index/l3u_ri_index0:0x0 index1:0xae mtu_index/l3u_ri_index1:0x0
Features sharing this resource:107 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 28 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 01 6b 36 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Detailed Resource Information (ASIC# 0) ------------------------------------ Station Index
(SI) [0xae]
RI = 0x16 DI = 0x5012 stationTableGenericLabel = 0 stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0x15 rcpServiceId = 0 dejaVuPreCheckEn = 0 Replication Bitmap: LD Detailed
Resource Information (ASIC# 1) ------------------------------------ Station Index (SI)
[0xae]
RI = 0x16 DI = 0x5012 stationTableGenericLabel = 0 stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0x15 rcpServiceId = 0 dejaVuPreCheckEn = 0 Replication Bitmap: CD
============================================================

### Tunnel Decap (TCAM) ###

C9500-ERSPAN#show platform hardware fed switch active fwd-asic abstraction print-resource-handle
0x7f2cd46eee08 1  <-- Decap-Tcam_handle.
Handle:0x7f2cd46eee08 Res-Type:ASIC_RSC_HASH_TCAM Res-Switch-Num:0 Asic-Num:255 Feature-
ID:AL_FID_GRE Lkp-ftr-id:LKP_FEAT_TT_IPV4_GRE ref_count:1
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: handle [ASIC: 0]: 0x7f2cd48db018
Detailed Resource Information (ASIC# 0) ------------------------------------ Number of HTM
Entries: 3 Entry 0: (handle 0x7f2cd48db018)
Labels  Port   Vlan   L3If   Group
M:      0000   0000   0000   0000
V:      0000   0000   0000   0000

M: ffffffff 00000000 00000000 000003ff 00000000 00000100 01000000 00000fff
3f000000 V: c0a80101 00000000 00000000 00000003 00000000 00000100 01000000 00000000      <--
c0a80101 in Hex maps to 192.168.1.1
        00000000

GREv4 Dst       Src     Key     C S R D E F VRF Fl L3P GreP Misc RCPSVCId
  M: ffffffff 00000000 00000000 0 0 0 0 0 1 000 0  00  0000 00 3f              <-- F=1
Forwarding
  V: c0a80101 00000000 00000000 0 0 0 0 0 1 000 0  00  0000 00 00
```

```
Action: 00000100 06000000 00000000 00000000 00000000 00000000 000000ad 00000000
        00000000 00000000
RL2 RL3 ACF SPK CLPC LKV PRI STL LPC ADC LKI   SI

0   1   0   0    0   0   6   0   0   0   0    ad                                  <-- Hexadecimal
value for Station Index.
Start/Skip Word: 0x00000003
Start Feature, Terminate

Entry 1: (handle 0x7f2cd495c3f8)
Labels  Port   Vlan   L3If   Group
M:      0000   0000   0000   0000
V:      0000   0000   0000   0000

M: ffffffff 00000000 00000000 000003ff 00000000 00000100 00000000 000a0000
        3f000000
V: c0a80101 00000000 00000000 00000003 00000000 00000100 00000000 00080000
        00000000

GREv4 Dst       Src     Key     C S R D E F VRF Fl L3P GreP Misc RCPSVCId
  M: ffffffff 00000000 00000000 0 0 0 0 0 0 000 a  00  0000 00 3f
  V: c0a80101 00000000 00000000 0 0 0 0 0 0 000 8  00  0000 00 00
Action: 00000100 06000000 00000000 00000000 00000000 00000000 000000ad 00000000
        00000000 00000000
RL2 RL3 ACF SPK CLPC LKV PRI STL LPC ADC LKI   SI

0   1   0   0    0   0   6   0   0   0   0   ad
Start/Skip Word: 0x00000000
No Start, Terminate


Entry 2: (handle 0x7f2cd46ef568)
Labels  Port   Vlan   L3If   Group
M:      0000   0000   0000   0000
V:      0000   0000   0000   0000

M: ffffffff 00000000 00000000 000003ff 00000000 00000100 00000000 00020fff
        00000000
V: c0a80101 00000000 00000000 00000003 00000000 00000100 00000000 00000000
        00000000

GREv4 Dst       Src     Key     C S R D E F VRF Fl L3P GreP Misc RCPSVCId
  M: ffffffff 00000000 00000000 0 0 0 0 0 0 000 2  00  0000 00 00
  V: c0a80101 00000000 00000000 0 0 0 0 0 0 000 0  00  0000 00 00
Action: 00000100 06000000 00000000 00000000 00000000 00000000 000000ae 00000000
        00000000 00000000
RL2 RL3 ACF SPK CLPC LKV PRI STL LPC ADC LKI   SI

0   1   0   0    0   0   6   0   0   0   0   ae                                  <-- Hexadecimal
value for Station Index.
Start/Skip Word: 0x00000000
No Start, Terminate
============================================================


C9500-ERSPAN#show platform hardware fed switch active fwd-asic resource asic 0 station-index
range 0xab 0xab
ASIC#0:
Station Index (SI) [0xad]
RI = 0x14
DI = 0x505a                  <-- Destination Index
stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
```

```
lookupSkipIdIndex = 0x15
rcpServiceId = 0xd
dejaVuPreCheckEn = 0
Replication Bitmap: LD

C9500-ERSPAN#show platform hardware fed switch active fwd-asic resource asic 0 station-index
range 0xae 0xae

Station Index (SI) [0xae]
RI = 0x16
DI = 0x5012                 <-- Destination Index
stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0x15
rcpServiceId = 0
dejaVuPreCheckEn = 0
Replication Bitmap: LD

C9500-ERSPAN#show platform hardware fed switch active fwd-asic resource asic 0 destination-index
range 0x505a 0x505a
Destination index = 0x505a DI_RCP_PORT2
pmap = 0x00000000 0x00000000
cmi = 0x0
rcp_pmap = 0x2
al_rsc_cmi
CPU Map Index (CMI) [0]
ctiLo0 = 0
ctiLo1 = 0
ctiLo2 = 0
cpuQNum0 = 0
cpuQNum1 = 0
cpuQNum2 = 0
npuIndex = 0
stripSeg = 0
copySeg = 0
C9500-ERSPAN#show platform hardware fed switch active fwd-asic resource asic 0 destination-index
range 0x5012 0x5012
ASIC#0:
Destination Index (DI) [0x5012]
portMap = 0x00000000 00000000
cmi1 = 0
rcpPortMap = 0x1

CPU Map Index (CMI) [0]
ctiLo0 = 0
ctiLo1 = 0
ctiLo2 = 0
cpuQNum0 = 0
cpuQNum1 = 0
cpuQNum2 = 0
npuIndex = 0
stripSeg = 0
copySeg = 0
```

関連するデバッグとトレース

Cisco IOS XE

```
debug monitor all
debug platform monitor
```

FMAN-RP

```
set platform software trace forwarding-manager switch <> R0 switch-span  verbose
show platform software trace message forwarding-manager switch <> R0
```

FMAN-FP

```
set platform software trace forwarding-manager switch <> F0 switch-span verbose
show platform software trace message forwarding-manager switch <> F0
```

FED

```
set platform software trace fed switch <> swspan verbose
set platform software trace fed switch <> asic_spn verbose
set platform software trace fed switch <> acl verbose  (Useful when ip/ipv6 filter is
configured)
show platform software trace message fed switch <>
```

関連情報

- テクニカル サポートとドキュメント – Cisco Systems
- 『Network Management Configuration Guide, Cisco IOS XE Amsterdam 17.3.x (Catalyst 9500 Switches) ERSPAN』
- 『Network Management Configuration Guide, Cisco IOS XE Amsterdam 17.3.x (Catalyst 9500 Switches) SPAN』
- ブログ：Cisco TACがドキュメントを変革し、セルフサービスを簡素化する方法

翻訳について
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