# EX Hardware: Unità di profondità inoltro pacchetti ACI.

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# Introduzione

Questo documento descrive i diversi scenari di inoltro usando gli switch ACI "EX" basati su ACI in Application Centric Infrastructure (ACI). Verrà mostrato come verificare che l'hardware sia programmato correttamente e stiamo inoltrando i pacchetti agli endpoint di destinazione corretti (EP) nei Gruppi di endpoint appropriati (EPG).

# Prerequisiti

# Requisiti

Nessun requisito specifico previsto per questo documento.

# Componenti usati

Le informazioni di questo documento si basano sulle seguenti versioni hardware e software:

- Un fabric ACI costituito da due switch Spine e due switch Leaf che utilizzano hardware EX
- Un host ESXi con due uplink diretti a ciascuno degli switch foglia
- Nexus 5000 Dispositivo che opera come router.
- Controller APIC (Application Policy Infrastructure Controller) utilizzato per la configurazione iniziale

Le informazioni discusse in questo documento fanno riferimento a dispositivi usati in uno specifico ambiente di emulazione. Su tutti i dispositivi menzionati nel documento la configurazione è stata ripristinata ai valori predefiniti. Se la rete è operativa, valutare attentamente eventuali conseguenze derivanti dall'uso dei comandi.

# Scenari

# 2 EP nello stesso EPG/Stessa foglia - Frame commutato

Topologia



Data questa topologia, il flusso da EP1 a EP2 è un flusso L2 e deve essere attivato localmente su qualsiasi foglia in cui si trovi il traffico di origine. La prima cosa da controllare con i flussi di layer 2 (L2) è la tabella degli indirizzi MAC per determinare se e dove lo switch ha ricevuto i frame:

leaf4# show mac address-table | grep fccc
\* 30 0050.56a5.fccc dynamic - F F po3
leaf4# show mac address-table | grep 6794
\* 30 0050.56a5.6794 dynamic - F F po4
Per visualizzare la vlan di incapsulamento, è possibile controllare anche il database EP:

leaf4# show endpoint mac 0050.56a5.fccc Legend: 0 - peer-attached H - vtep a - locally-aged S - static V - vpc-attached p - peer-aged L – local M - span B - bounce s – static-arp ---+ MAC Address VLAN/ MAC Info/ Encap Interface IP Address Domain VLAN IP Info ---+ vlan-2268 0050.56a5.fccc LV 30 po3 vlan-2268 192.168.20.2 LV Joey-Tenant:Joey-Internal po3 calo2-leaf4# show endpoint mac 0050.56a5.6794 Legend: 0 - peer-attached H - vtep a - locally-aged S - static V - vpc-attached p - peer-aged L - local M - span B - bounce s - static-arp +----+ VLAN/ Encap MAC Address MAC Info/ Interface VLAN IP Address IP Info Domain ---+ 30 vlan-2268 0050.56a5.6794 LV po4 vlan-2268 192.168.20.3 LV Joey-Tenant: Joey-Internal po4

Sappiamo che la FD\_VLAN 30 corrisponde, ma possiamo sempre convalidare la mappatura nel software:

leaf4# show vlan extended | grep 2268

30 enet CE vlan-2268

E naturalmente, possiamo controllare l'hardware per assicurarci che la VLAN 30 sia mappata alla VLAN 2268 come incapsulamento del pannello anteriore.

```
leaf4# vsh_lc
module-1# show system internal eltmc info vlan 30
```

vlan_id:	30	:::	hw_vlan_id:	22
vlan_type:	FD_VLAN	:::	bd_vlan:	28
access_encap_type:	802.1q	:::	access_encap:	2268
fabric_encap_type:	VXLAN	:::	fabric_encap:	11960
sclass:	32778	:::	scope:	11
untagged:	0			
acess_encap_hex:	0x8dc	:::	fabric_enc_hex:	0x2eb8
pd_vlan_ft_mask:	0x8			
fd_learn_disable:	0			
qos_class_id:	0	:::	qos_pap_id:	0
qq_met_ptr:	25	:::	ipmc_index:	0
ingressBdAclLabel:	0	:::	ingBdAclLblMask:	0
egressBdAclLabel:	0	:::	eqrBdAclLblMask:	0

qos_map_idx:	0	:::	qos_map_pri:	0
qos_map_dscp:	0	:::	qos_map_tc:	0
vlan_ft_mask:	0xe30			
hw_bd_idx:	0	:::	hw_epg_idx:	11267
intf_count:	2	:::	glbl_scp_if_cnt:	2

#### <SNIPPED>

Dato che gli EP vengono appresi nel software, possiamo anche verificare che l'hardware abbia programmato le informazioni L2 di questi EP. Nel nuovo hardware è presente Hardware Abstraction Layer (HAL), che rappresenta lo stato software dell'hardware. Il compito di HAL è di prendere una richiesta di programmazione software e spingerla all'hardware.

Per visualizzare le informazioni sull'hardware L2 relative a un endpoint, è possibile esaminare la tabella L2 in HAL per gli indirizzi mac specificati:

<pre>leaf4# vsh_lc</pre>				-						
module-1# <b>show pla</b> LEGEND:	atform internal hal	lep 12 ma	ac 0050.56a5	.fccc						
BDId:	BD Id					BD	Name:			BD
Name	22 10					22	11011110			22
т:	EP Type (Pl: Phys	sical Vl:	Virtual Xr:	Remot	te	EP	Mac:		:	Mac
L2 IfId:	L2 Interface					L2	IfName	e:		L2
IfName										
FDId:	FD Id					FD	Name:			FD
Name										
S Class:	S Class					Age	e Intvi	1:		Age
Interval										
P A:	Packet Action (F: L:	Forward Log & Fo	, T: Trap to prward, D: Di	CPU, rop, 1	N: None)					
S T:	Static Ep					SI	:			
Secure EP										
L D:	Learn Disable					Bľ	N D:			Bind
Notify Disable										
E N D:	Epg Notify Disabl	le				BB	:			
Bounce Enable										
I D L:	IVxlan Dont Learr	ı				SPI	Ι:			
Source Policy Inco	omplete									
DPI:	Dest Policy Incom	nplete				SPA	<b>∀:</b>			
Source Policy Appl	lied									
DPA:	Dest Policy Appli	led				DSS	5:			Dest
Shared Service										
IT:	Is Local					VUI	3:			Vnid
Use Bd										
SO:	SA Only									
L2 EP Count: 1										
				=====		=====			===	=====
	====									ΒЕ
ISDSDD V BD	FD	т.2	т.2		сīя	S	Age	ΡG	с т.	NN
вррррряти	S				- <i>D</i>	2	1190	1 0	ы	TN TN
BdId Name T	Mac	TfTd	Ifname	FDTA	Name	Class	Tntvl	ΔТ	БIJ	חח
ELIIAASLB	0	1110	TIMME	ibiu	Traine	CIUDD	111011			00
		========	=============	=====	==========	=====		=====	===	=====
lc BD-28 Pl 0 0 0 0 0 0 0 1 0	<b>00:50:56:a5:fc:cc</b> 0	16000002	РоЗ	le	FD-30	800a	29f	F O	0 0	1 0

module-1#	sho	w pla	atform internal ha	l ep 12 ma	ac 0050.56a5.	6794								
=========	====	====:								===	==	===	===	===
==========		====:	=====											
													В	E
ISDSD	D	V												
BD			EP	L2	L2		FD	S	Age	Ρ	S	S I	L N	N
B D P P P	ΡS	I U	S											
BdId Name		Т	Mac	IfId	Ifname	FDId	Name	Class	Intvl	А	Т	ΕI	D	D
ELIIA	A S	LΒ	0											
	====	====:									==	===		===
=========	====	====:	====											
1c BD-28	3	Pl	00:50:56:a5:67:94	16000003	Po4	le	FD-30	800a	29£	F	0	0 (	) 1	0
0 0 0 0 0	0 0	1 0	0											

Ora che abbiamo mappato l'hardware, facciamo un ELAM e vediamo dove dovrebbe andare il pacchetto.

#### ELAM

module-1(DBG-TAH-elam-insel6)# report | grep ovec sug\_elam\_out\_sidebnd\_no\_spare\_vec.ovector\_idx: 0x9E

Perfetto, Leaf4 ha ricevuto il frame su Asic 0 Slice 1. Con ELAM sul nuovo hardware, c'è un nuovo campo che è molto importante per la risoluzione dei problemi: **ovector\_idx**. Questo indice è l'indice delle porte fisiche da cui il frame/pacchetto deve essere inoltrato. Una volta ottenuto ovector\_idx, è possibile utilizzare questo comando per individuare la porta a cui è associato:

module-1(I Legend:	DBG-TAH-elam-insel6)#	show platform	internal h	nal 12	2 port gpd	
IfId:	Interface Id				IfName:	Interface Name
I P:	Is PC Mbr				IfId:	Interface Id
Uc PC Cfg	: UcPcCfg Idx				Uc PC MbrId:	Uc Pc Mbr Id
As:	Asic				AP:	Asic Port
sl:	Slice				Sp:	Slice Port
Ss:	Slice SrcId				Ovec:	Ovector (slice
srcid)						
L S:	Local Slot				Reprogram:	
L3:	Is L3					
P:	PifTable				Xla Idx:	Xlate Idx
RP:	Rw PifTable				Ovx Idx:	OXlate Idx
IP:	If Profile Table				N L3:	Num. of L3 Ifs
RS:	Rw SrcId Table				NI L3:	Num. of Infra L3 Ifs
DP:	DPort Table				Vif Tid:	Vif Tid
SP:	SrcPortState Table				RwV Tid:	RwVif Tid
RSP:	RwSrcPortstate Table				Ing Lbl:	Ingress Acl Label
UC:	UCPcCfg				Egr Lbl:	Egress Acl Label

UM: UCPcMbr Reprogram: PROF ID: Lport Profile Id VS: VifStateTable HI: LportProfile Hw Install RV: Rw VifTable Num. of Sandboxes: 1 Sandbox\_ID: 0, BMP: 0x0 Port Count: 8 \_\_\_\_\_ UC UC Reprogram Rep I PC Pc L | RIRD R UUX | L Xla Ovx N NI Vif RwV Ing Egr | V R | PROF H IfId Ifname P Cfg MbrID As AP Sl Sp Ss Ovec S | P P P S P Sp Sp C M L | 3 Idx Idx L3 L3 Tid Tid Lbl Lbl | SV | ID I \_\_\_\_\_ 1a004000 Eth1/5 1 0 1d 0 d 0 c 18 18 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 - - 800 0 0 1 0 0 la005000 Eth1/6 10 b 0 e 0 d la la 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 - 800 0 0 1 \_ 0 0 1a006000 Eth1/7 0 26 5 0 f 0 e 1c 1c 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 D-256 - 800 0 0 1 e 0 0 10 0 f le le 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1a007000 Eth1/8 02e 7 D-84 - 800 0 0 1 30 0 10 2d 0 37 1 e 1c 9c 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1a01e000 Eth1/31 - 0 0 0 1 0 0 **1a01f000 Eth1/32** 1 0 3d 0 38 1 f 1e **9e** 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 - 0 0 0 1 0 0 1a030000 Eth1/49 0 2 1 0 49 1 20 38 b8 1 0 0 0 0 0 0 0 0 0 0 1 8 6 2 2 D-24d - 400 0 0 0 1 0 1a031000 Eth1/50 03 3 0 29 1 0 0 80 1 0 0 0 0 0 0 0 0 0 1 9 7 2 2 400 0 0 0 D-350 -1 0

Lo switch ritiene che il pacchetto debba essere inoltrato dall'interfaccia Ethernet 1/32. L'indirizzo MAC è stato indicato nell'indirizzo IP4?

leaf4	# show p	ort-channel	summary	
Flags	: D - D I - I s - S S - S U - U M - N	own ndividual uspended witched p (port-cha ot in use.	P - Up in po H - Hot-stan r - Module-r R - Routed annel) Min-links no	rt-channel (members) dby (LACP only) emoved t met
	F - C	onfiguratio	on failed	
Group	Port- Channel	Туре	Protocol	Member Ports
1	Pol(SU)	Eth	LACP	Ethl/5(P)
2	Po2(SU)	Eth	LACP	Eth1/6(P)
3	Po3(SU)	Eth	LACP	Eth1/31(P)
4	Po4 (SU)	Eth	LACP	Eth1/32(P)
-		• • • •	<b>N N N N</b>	

Sì, quindi il pacchetto verrà inoltrato dall'interfaccia 1/32 all'host di destinazione.

# 2 EP in diversi EPG/Same Leaf - Routed Packet

Topologia



In questo esempio, verrà tracciato il flusso di un pacchetto da EP1 a EP2, dove sono presenti sulla stessa coppia di foglia vPC. I due EP sono in differenti EPG utilizzando BD differenti.

La prima cosa da fare è controllare il database del Parlamento europeo per vedere se abbiamo appreso i dati del Parlamento:

<pre>leaf4# show endpoint</pre>	ip 192.168.20.2				
Legend:					
0 - peer-attached	H - vtep	a - locali	ly-aged S - s	tatic	
V - vpc-attached	p – peer-aged	L - local	M - s	pan	
s - static-arp	B - bounce				
++			+	-++	
VLAN/		Encap	MAC Address	MAC Info/	
Interface					
Domain		VLAN	IP Address	IP Info	
+		+	+	-++	
+					
30		<b>vlan-2268</b>	0050.56a5.fccc	: LV	
роЗ					
Joey-Tenant:Joey-Int	ernal	<b>vlan-2268</b>	192.168.20.2	LV	
ро3					
calo2_leaf4# show er	dnoint in 192 165	2 21 2			
Legend:					
0 - peer-attached	H - vtep	a - locali	ly-aged S - s	static	
V - vpc-attached	p - peer-aged	L - local	M - s	pan	
s - static-arp	B - bounce				
+		+	+	-++	·
+					
VLAN/		Encap	MAC Address	MAC Info/	

Interface				
Domain	VLAN	IP Address	IP Info	
+	+	+	-+	+
8	<b>vlan-2200</b>	0050.56a5.0c11	LV	
p04				
Joey-Tenant:Joey-Internal	<b>vlan-2200</b>	192.168.21.2	LV	
po4				

Dal momento che abbiamo appreso i EP e conosciamo le informazioni IP, dovremmo essere in grado di guardare le informazioni di apprendimento EP in hardware:

<pre>leaf4# vsh_lc module-1# show pla LEGEND:</pre>	tform internal	hal ep 13 al	11															
VrfName:	Vrf Name										Т	:						Type
(Pl: Physical, Vl:	Virtual, Xr: 1	Remote)																
EP IP:	Endpoint IP	,																
S Class:	S Class										A	qe	In	ıtv	1:			Aqe
Interval																		2
S T:	Static Ep										S	Е	:					
Secure EP	_																	
L D:	Learn Disable										В	Ν	D:					Bind
Notify Disable																		
END:	Epg Notify Dis	able									В	Е	:					
Bounce Enable																		
I D L:	IVxlan Dont Le	earn									S	ΡI	:					
Source Policy Inco	mplete																	
DPI:	Dest Policy In	ncomplete									S	PA	:					
Source Policy Appl	ied																	
DPA:	Dest Policy A	pplied									D	SS	:					Dest
Shared Service																		
IL:	Is Local										VI	IJΒ	:					Vnid
Use Bd																		
so:	SA Only										E	P 1	NH	L3	Ifl	Nan	ne:	EP
Next Hop L3 If Nam	e																	
NHT:	Next Hop Type	(L2: L2 Entr	су L3:	L3 1	Next H	Iop	)				B	DI	Nan	ie:				L2 NH
BD Name																		
EP Mac:	EP Mac										L	3	IfN	lam	e:			L3 NH
If Name																		
L2 IfName:	L2 If Name										Fl	DI	Nam	ie:				L2
Entry FD Name																		
ID:	L3 NH IP																	
L3 EP Count: 12																		
			 			:==: :==:		===	: = = : = =	:==: :==:		= = :	===	==	==:		:==:	===== =
								В	Е	]	c s	D	S	D	D	V	7	EP-NH
N																		
Vrf E	P		S	3	Age	S	S L	N	Ν	ΒI	Ρ	Ρ	Ρ	Ρ	S I	τu	JS	L3
H BD EP		L3	L2		FI	)												
Name T I	P		C	lass	Intvl	. Т	ΕD	D	D	ΕI	Ι	Ι	А	A	SI	LE	3 0	
IfName T   :	Name Mac ===============		IfNa =====	ume =====	[ ======	fna	ame ====	===	:==	Nar	ne ===:	= = :		IP ==	===	===	.==:	
						:==:	====	===	:==	:==:	===:	==:	===	==	==:	===	:==:	=
common*rewall Pl 1	0.6.112.1		1	-	0	1	0 0	0	0	0 1	L 1	0	0	0	0 1	L C	0 (	-
L3 - 00:	00:00:00:00:00	-	-		-		_	С	.0	.0.	. 0			_	_	_		
common*rewall Pl 1	0.6.114.1		1	-	0	1	0 0	0	0	0 1	L 1	0	0	0	0 1	L C	0 (	-
L3 – 00:	00:00:00:00:00	-	-		-			С	).(	).0.	. 0							

commo	on*rewall	Pl 10.6.114.129			1	0		1	0	0	0	0	0	1 1	0	0	0	0	1	0	0	-
L3	-	00:00:00:00:00:00	-	-			-				0	.0	.0	.0								
commo	on*efault	Pl 100.100.101.1			1	0		1	0	0	0	0	0	1 1	0	0	0	0	1	0	0	-
L3	-	00:00:00:00:00:00	-	-			-				0	.0	.0	.0								
Joey-	-T*ternal	Pl 192.168.1.1			1	0		1	0	0	0	0	0	1 1	0	0	0	0	1	0	0	-
LЗ	-	00:00:00:00:00:00	-	-			-				0	.0	.0	.0								
Joey-	-T*ternal	Xr 192.168.1.100			8013	128		0	0	0	1	0	0	0 0	0 (	0	0	0	0	1	0	-
L3	-	00:0c:0c:0c:0c:0c	Tunnel2	Tur	nnel2		-				0	.0	.0	.0								
Joey-	T*ernal2	Pl 192.168.3.1			1	0		1	0	0	0	0	0	1 1	0	0	0	0	1	0	0	-
L3	-	00:00:00:00:00:00	-	-			-				0	.0	.0	.0								
Joey-	-T*ternal	Pl 192.168.20.1			1	0		1	0	0	0	0	0	1 1	0	0	0	0	1	0	0	-
L3	-	00:00:00:00:00:00	-	-			-				0	.0	.0	.0								
Joey-	T*ternal	Pl 192.168.20.2			800a	0		0	0	0	0	0	0	0 0	0 (	0	0	0	1	0	0	-
L2	BD-28	00:50:56:a5:fc:cc	-	Po3	3		FD-	30	)		-											
Joey-	-T*ternal	Pl 192.168.21.1			1	0		1	0	0	0	0	0	1 1	0	0	0	0	1	0	0	-
L3	-	00:00:00:00:00:00	-	-			-				0	.0	.0	.0								
Joey-	T*ternal	Pl 192.168.21.2			800c	0		0	0	0	0	0	0	0 0	0 (	0	0	0	1	0	0	-
L2	BD-7	00:50:56:a5:0c:11	-	Po4	1		FD-	8			-											
Joey-	-T*ternal	Pl 2001:0:0:100::1			1	0		1	0	0	0	0	0	1 1	0	0	0	0	1	0	0	-
L3	-	00:00:00:00:00:00	-	-			-				0	.0	.0	.0								

La tabella HAL Layer3 (I3) è molto utile in quanto fornisce informazioni sulla VLAN/porta per gli EP I3 appresi. Poiché la destinazione è un Po4, il pacchetto deve essere inoltrato da qualsiasi porta del Po4.

Facciamo funzionare un ELAM e vediamo cosa otteniamo!

## ELAM

```
leaf4# vsh_lc
module-1# debug platform internal tah elam asic 0 module-1(DBG-TAH-elam)# trigger init in-select
6 out-select 0
module-1(DBG-TAH-elam-insel6)# set outer ipv4 src_ip 192.168.20.2 dst_ip 192.168.21.2
module-1(DBG-TAH-elam-insel6)# start
module-1(DBG-TAH-elam-insel6)# stat
ELAM STATUS
===========
Asic 0 Slice 0 Status Armed
Asic 0 Slice 1 Status Armed
module-1(DBG-TAH-elam-insel6)# stat
ELAM STATUS
_____
Asic 0 Slice 0 Status Armed
Asic 0 Slice 1 Status Triggered
module-1(DBG-TAH-elam-insel6)# report | grep ovec
```

sug\_elam\_out\_sidebnd\_no\_spare\_vec.ovector\_idx: 0x9E

Bene, abbiamo attivato il pacchetto, e abbiamo scoperto che "ovector\_idx" è 0x9E. L'indice ovector è l'indice dell'interfaccia fisica in uscita da cui il pacchetto deve essere inoltrato. Vediamo quale porta ha quell'indice:

module-1(DB	G-TAH-elam-insel6)#	show platform	internal hal	l 12 port gpd	
Legend:					
IfId:	Interface Id			IfName:	Interface Name
I P:	Is PC Mbr			IfId:	Interface Id
Uc PC Cfq:	UcPcCfq Idx			Uc PC MbrId:	Uc Pc Mbr Id

As: Asic AP: Asic Port Slice S1: Slice Port Sp: Ss: Slice SrcId Ovec: Ovector (slice | srcid) L S: Local Slot Reprogram: Ts L3 T.3: P: PifTable Xla Idx: Xlate Idx Rw PifTable Ovx Idx: OXlate Idx RP: If Profile Table IP: N L3: Num. of L3 Ifs Num. of Infra L3 Ifs RS: Rw SrcId Table NT T.3: DP: DPort Table Vif Tid: Vif Tid SP: SrcPortState Table RwV Tid: RwVif Tid RSP: RwSrcPortstate Table Ing Lbl: Ingress Acl Label UC: UCPcCfq Egr Lbl: Egress Acl Label UM: UCPcMbr Reprogram: PROF ID: Lport Profile Id VS: VifStateTable HI: LportProfile Hw Install RV: Rw VifTable Num. of Sandboxes: 1 Sandbox\_ID: 0, BMP: 0x0 Port Count: 8 -----UC UC Reprogram Rep I PC Pc L | RIRD R UUX | L Xla Ovx N NI Vif RwV Ing Egr | V R | PROF H Ifname P Cfg MbrID As AP Sl Sp Ss Ovec S | P P P S P Sp Sp C M L | 3 Idx Idx L3 TfTd L3 Tid Tid Lbl Lbl | SV | ID I \_\_\_\_\_ - - 800 0 0 1 0 0 1a005000 Eth1/6 10 b 0 e 0 d 1a 1a 1 0 0 0 - - 800 0 0 1 0 0 1a006000 Eth1/7 0 26 5 0 f 0 e 1c 1c 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 D-256 - 800 0 0 1 c 0 1a007000 Eth1/8 0 2f 7 0 10 0 f le le 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 D-199 - 800 0 0 1 2e 0 10 2d 0371 e 1c9c 1 0 0 0 0 0 0 0 0 0 1a01e000 Eth1/31 0 0 0 0 0 - - 0 0 0 1 0 0 1a01f000 Eth1/32 1 0 3d 0 38 1 f 1e 9e 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 - - 0 0 010 0 1a030000 Eth1/49 0 2 1 0 49 1 20 38 b8 1 0 0 0 0 0 0 0 0 0 0 16 4 2 2 D-24d - 400 0 0 0 1 0 1a031000 Eth1/50 0 3 3 0 29 1 0 0 80 1 0 0 0 0 0 0 0 0 0 1 5 3 2 2 D-350 -400 0 0 0 1 0 Dovremmo inviarlo alla porta 1/32, giusto? leaf4# show port-channel summary Flags: D - Down P - Up in port-channel (members)

I - Individual H - Hot-standby (LACP only) s - Suspended r - Module-removed

- S Switched R Routed
- U Up (port-channel)
- M Not in use. Min-links not met
- F Configuration failed

3	Po3(SU)	Eth	LACP	Eth1/31(P)	
2	Po2(SU)	Eth Fth	LACP	Eth1/6(P)	
1	Pol(SU)	Eth	LACP	Eth1/5(P)	
	Channel				

# 2 EP in diversi EPG/Foglia diversa - Routed Packet

## Topologia



In questo esempio, seguiremo il flusso di un pacchetto da EP1 a EP2 dove EP1 esiste su una coppia di vPC EX ed EP2 esiste su una coppia di Leaf vPC di generazione 1 remota. I due EP sono in differenti EPG utilizzando BD differenti.

Di nuovo, controlliamo dove vengono appresi gli EP:

<pre>leaf4# show endpoint ip 192.168.20.2 Legend:</pre>			
0 - peer-attached H - vtep	a - locall	y-aged S-s	tatic
V - vpc-attached p - peer-aged s - static-arp B - bounce	L - local	M - s	pan
++	+		-+
VLAN/	Encap	MAC Address	MAC Info/
Interface			
Domain	VLAN	IP Address	IP Info
++	+		-+
30	<b>vlan-2268</b>	0050.56a5.fccc	LV
ро3			
Joey-Tenant:Joey-Internal po3	vlan-2268	192.168.20.2	LV

Legend:				
<pre>0 - peer-attached V - vpc-attached s - static-arp</pre>	H - vtep p - peer-aged B - bounce	a - locall L - local	Ly-aged S M	- static - span
+		+		+++
VLAN/		Encap	MAC Address	MAC Info/
Interface				
Domain		VLAN	IP Address	IP Info
+		++	+	++
+				
Joey-Tenant:Joey-Inte	ernal		192.168.1	.100
tunnel2				

Verifichiamo ora ciò che l'hardware ha programmato:

VrfName: Vrf Name Vrf Name T: Type (P1: Physical, V1: Virtual, Xr: Remote) EP IP: Endpoint IP S Class: S Class Age Intvl: Age Interval S T: Static Ep S E: Secure FE L D: Learn Disable B N D: Bind Notify Disable B E: Bounce Enable I D L: IVAIan Dont Learn SPI: Source Policy Incomplete DPI: Dest Policy Incomplete SPA: Source Policy Applied DSS: Dest Shared Service L1: I S Local VUB: Vnid Use Ed SA Only EP NH L3IfName: EP Next Hop L3 If Name ED Name EP NAC: EP Mac L3 IfName ED NAC: EP Mac L3 IfName ED ED Name: L2 If Name ED Name ED Name ED Name ED Name ED Name ED Name ED Name ED Name: L2 If Name ED	<pre>leaf4# vsh_lc module-1# show play LEGEND:</pre>	tform internal 1	hal ep 13 all												
(P1: Physical, V1: Virtual, Xr: Remote)         EP IP:       Endpoint IP         S Class:       S Class:         S Class:       S Class:         S T:       Static Ep         S T:       Static Ep         S T:       S tatic Ep         Source Enable       B E:         Source Policy Incomplete       S PA:         Source Policy Applied       DSS:         D E:       D est Policy Incomplete         Shared Service       UUE:       VUB:         IL:       I's Local       VUB:       Vuid         Source Source Source       S A Only       EP NH L3IfName: EP         Next Hop 13 If Name       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       ED Name:       L2 INH         ED Name:       L2 If Name       FD Name:       L2 INH         L3 EP Count:       L2       S Age       S L I S D S	VrfName:	Vrf Name								т:					Туре
EP IP:       Endpoint IP         S Class:       S Class         S Class:       S Class         S T:       S tatic Ep         Secure EP       B N D:         LD:       Learn Disable         B N D:       B N D:         B ND:       B S E:         Bounce Enable       B E:         I D L:       TVXlan Dont Learn       SPI:         Source Policy Incomplete       SPA:         DPA:       Dest Policy Applied       DSS:         Source Policy Applied       DSS:       Dest         Source Policy Incomplete :       DSS:       Dest         Source Policy Applied       DSS:       Dest         Source Policy Incomplete :       DSS:       Dest         Source Policy Incomplete :       DSS:       Dest         Source Policy Incomplete :       DS N D:       DS N D: <td>(Pl: Physical, Vl:</td> <td>Virtual, Xr: R</td> <td>emote)</td> <td></td>	(Pl: Physical, Vl:	Virtual, Xr: R	emote)												
S Class:       S Class       Age Intvl:       Age         Interval       S T:       S tatic Ep       S E:         S T:       S tatic Ep       S E:       B N D:       B ind         Source FD       Earn Disable       B N D:       B ind       B ind         Notify Disable       B P D:       E N D:       B N D:       B ind         Source Fabale       I D L:       TVxlan Dont Learn       SPI:       Source Policy Incomplete       SPA:         Source Policy Incomplete       Dest Policy Applied       DSS:       Dest       Source Policy Applied         Shared Service       I:       Is Local       VUB:       Vufit Name         So:       SA Only       EP NH L3IfName: EP       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       BD Name:       L2 NH         ED Name       EP Mac:       FD Mame:       L2 NH       IfName:       L3 IfName:       L3 NH         If Name       E       I S DS D D V       FD-NH       SI I S D S D D V       FD-NH         L3 EP Count:       12       If Name       I S D S D D V       FD-NH         N         Vrf       EP       S Age S S L N N B D P P P P S I U S L3       I S Age S S L N N B D P P P P S I U S L3       I S Age S S L N N B D P P P P S I U S L3	EP IP:	Endpoint IP													
Interval S T: Static Ep S T: Static	S Class:	S Class								Aq	e Ir	ntv	rl:		Aqe
S T:       Static Ep       S E:         Secure EF       B N D:       C N D:       B N D:       C N D:       D N D:       D N D:	Interval									_					-
Secure EP         L         L         L         A         N         D         N         D         N         D         N         D         N         D         N         D         N         D         N         D         D         N         D         D         N         D         D         D         D         D         TVX1an Dont Learn         SPI:         Source Policy Incomplete         SPA:         Source Policy Applied         DSS:         Dest         Dest         Dest Policy Applied         DSS:         Dest         Dest         Source Policy Applied         DSS:         Dest         De	S T:	Static Ep								S	Е:				
L D: Learn Disable B N D: Bind Notify Disable E N D: Pg Notify Disable B E: Bounce Enable I D L: TVXlan Dont Learn SPA: Source Policy Incomplete DPI: Dest Policy Incomplete SPA: Source Policy Applied DPA: Dest Policy Applied DSS: Dest Shared Service L: I S Local VUB: Vnid Use Bd SO: SA Only EP NH L3IfName: EP Next Hop Type (L2: L2 Entry L3: L3 Next Hop) BD Name: L2 NH ED Name EP Mac: EP Mac L3 IfName: L3 NH HT Name L2 IfName: L2 If Name EP Mac: L2 If Name L2 IfName: L2 If Name L2 IfName: L2 If Name EP Mac: L2 If Name L3 EP Count: 12 SA OP P L3 L2 FO Name T IP Class Intvl T E D D D E L I J A A S L B O Name T IP Class Intvl T E D D D E L I J A A S L B O IfName T IP D D D E L I J O O O O O O O O O O O O O O O O O O	Secure EP	-													
Notify Disable       B g Notify Disable       B E :         E N D:       Fpg Notify Disable       B E :         B Ounce Enable       SPI:       SPI:         I D L:       TVXlan Dont Learn       SPI:         Source Policy Incomplete       SPA:       SPA:         Source Policy Applied       Dest Policy Applied       DSS:       Dest         DPA:       Dest Policy Applied       DSS:       Dest         Shared Service       I:       Is Local       VUB:       Vnid         Use Bd       SA Only       EP NH L3IfName:       EP         NRT:       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       BD Name:       L2 NH         EP Mac:       EP Mac       K1 If Name       K1 If Name:       L3 IfName:       L3 NH         If Name       L2 If Name       FD Name:       L2 NH       SA If Name:       L2 NH         L3 EP Count:       12       If Name       FD Name:       L2 SA IF NH         Vrf       EP       S Age       S S L N N B D P P P S I U S L3       L3         Vrf       EP       S Age       S S L N N B D P P P S I U S L3       L3         If Name       T       N       S Age       S L N N B D P P P S I U S L3         If Name	L D:	Learn Disable								в	N D	:			Bind
E N D: Epg Notify Disable B E: Bounce Enable JD L: IVxlan Dont Learn SPI: Source Policy Incomplete DFI: Dest Policy Incomplete SPA: Source Folicy Applied DSS: Dest Shared Service L: Is Local VUB: Vnid Use Bd SO: SA Only EP NH L3IfName: EP Next Hop L3 If Name NTT: Next Hop Type (L2: L2 Entry L3: L3 Next Hop) BD Name: L2 NH BD Name EP Mac: EP Mac L3 IfName: L3 NH ET Name Entry FD Name I: L3 NH IP L3 EP Count: 12 	Notify Disable														
Bounce Enable       I D L:       IVxlan Dont Learn       SPI:         Source Policy Incomplete       SPA:         Source Policy Applied       Dest Policy Incomplete       SPA:         Source Policy Applied       Dest Policy Applied       DSS:       Dest         Shared Service       IL:       Is Local       VUB:       Vuid:         IL:       Is Local       VUB:       Vuid:       Vuid:         So:       SA Only       EP NH L3IfName:       EP         Next Hop L3 If Name       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       BD Name:       L2 NH         BD Name       EP Mac:       EP Mac       L3 IfName:       L3 NH         If Name       L2 If Name       FD Name:       L2       L2         If Name       L2 If Name       FD Name:       L2       EP         If S P Count:       12       IS IS D S D D V       EP-NH         L3 EP Count:       12       FD       N       I         Vrf       EP       S Age S S L N N B D P P P P S I U S L3       H       BD E       I S L2       FD         Name       T IP       Class Intvl T E D D D E L I I A A S L B O       IfName       IP       IfName       IP       IP         S Age S S L N N	E N D:	Epg Notify Dis	able							в	E:				
I D L:       IVxlan Dont Learn       SPI:         Source Policy Incomplete       SPA:         Source Policy Applied       SPA:         DPA:       Dest Policy Applied       DSS:       Dest         Shared Service       Is Local       VUB:       Vnid         Use Bd       SO:       SA Only       EP NH L3IfName: EP         NAT:       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       BD Name:       L2 NH         BD Name       EP Mac:       EP Mac       L3 IfName:       L3 NH         L2 If Name       FD Name:       L2       NH         L2 If Name       FD Name:       L2       NH         L3 EP Count:       L2       If Name       FD Name:       L2         L3 EP Count:       L3       SA S Age       S S L N N B D P       P P P S I U S L3         H       BD       EP       L3       L2       FD         Mame       T IP       Class Intvl T E D D D E L I I A A S L B O       IfName       IP         Name       T I Name       Mac       IfName       IP       IFName       IP         L3 D       D 0       0 0 0 0 0 1 1 0 0 0 0 0 1 0 0 1 0 0 -       IO 0 0 0 0 0 1 1 0 0 0 0 0 1 0 0 -       IO 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 -   <	Bounce Enable														
Source Policy Incomplete       SPA:         DP1:       Dest Policy Incomplete       SPA:         Source Policy Applied       DSS:       Dest         Shared Service       II:       Is Local       VUB:       Vnid         Use Bd       SO:       SA Only       EP NH L3IfName: EP       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       ED Name:       L2 NH         BD Name       EP Mac:       EP Mac       L3 IfName:       L3 NH         L2 IfName:       L2 If Name       FD Name:       L2 NH         L2 IfName:       L2 If Name       FD Name:       L2 NH         L3 IfName:       L2 If Name       FD Name:       L2 NH         L3 IfName:       L2 If Name       FD Name:       L2 NH         L2 IfName:       L2 If Name       FD Name:       L2 NH         L3 EP Count:       12       FD Name:       L2         L3 EP Count:       12       FD       S Age S S L N N B D P P P P S I U S L3         H       BD       EP       L3       L2       FD         N         Vrf       EP       S Age S S L N N B D P P P P S I U S L3       L3         H       BD       EP       L3       L2       FD         Name       T I Name <td>I D L:</td> <td>IVxlan Dont Lea</td> <td>arn</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>SP</td> <td>Ι:</td> <td></td> <td></td> <td></td> <td></td>	I D L:	IVxlan Dont Lea	arn							SP	Ι:				
DPI:       Dest Policy Incomplete       SPA:         Source Policy Applied       DSS:       Dest         DPA:       Dest Policy Applied       DSS:       Dest         Shared Service       II:       Is Local       VUB:       Vulid         IL:       Is Local       VUB:       Vulid       VUB:       Vulid         Use Bd       SO:       SA Only       EP NH L3IfName:       EP         Next Hop L3 If Name       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       BD Name:       L2 NH         EP Mac:       EP Mac       L3 IfName:       L3 NH         L2 IfName       L2 If Name       FD Name:       L2         L2 IfName:       L2 If Name       FD Name:       L2         L3 EP Count:       L3 NH IP       L3 EP Count:       L3 EP Count:       D         L3 EP Count:       L3       L2       FD       FD       FD         N         Vrf       EP       S Age S S L N N B D P P P P S I U S L3       L3         H       ED       EP       L3       L2       FD         Name       T IP       Class Intvl T E D D D E L I I A A S L B O       IfName         IfName       T   Name       Mame       IP       IN       IN	Source Policy Incom	mplete													
Source Policy Applied DPA: Dest Policy Applied Shared Service II: Is Local VUB: Vnid Use Bd So: SA Only EP NH L3IfName: EP Next Hop L3 If Name Next Hop Type (L2: L2 Entry L3: L3 Next Hop) BD Name: L2 NH BD Name EP Mac: EP Mac L3 IfName: L3 NH If Name L2 IfName: L2 If Name FD Name: L2 Entry FD Name IP: L3 NH IP L3 EP Count: 12 BE I S D S D D V EP-NH N   Vrf EP S Age S S L N N B D P P P S I U S L3 H   BD EP L3 L2 FD Name T   Name Mac IfName Ifname Name IP IfName T   Name Mac IfName Ifname Name IP	DPI:	Dest Policy In	complete							SP.	A:				
DPA:       Dest Policy Applied       DSS:       Dest         Shared Service       II.'       Is Local       VUB:       Vidit         IL:       Is Local       VUB:       Vidit       Vidit         So:       SA Only       EP NH L3IFName:       EP         NHT:       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       BD Name:       L2 NH         DD Name       EP Mac:       EP Mac       L3 IfName:       L3 NH         EP Mac:       EP Mac       FD Name:       L3 NH         If Name       II.'       IS NH IP       II.'       L3 SP Count:       12         L3 EP Count:       12       FD       S Age SS L N N B D P P P S I U S L3       L3 IfName         N         Vrf       EP       S Age SS L N N B D P P P P S I U S L3       L3         Vrf       EP       L3       L2       FD         Name       T IP       Class Intvl T E D D D E L I I A AS L B O       I U S L3         IfName       T IP       Class Intvl T E D D D E L I I A AS L B O       I U S U O U O U O U O U O U O U O U O U O	Source Policy Appl	ied													
Shared Service       IL:       Is Local       VUB:       Vuld:       Vuld:         IL:       Is Local       VUB:       Vuld:	DPA:	Dest Policy Ap	plied							DS	s:				Dest
IL:       Is Local       VUB:       Vnid         Use Ed       SO:       SA Only       EP NH L3IfName:       EP         Next Hop L3 If Name       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       BD Name:       L2 NH         BD Name       EP Mac:       EP Mac       L3 IfName:       L3 NH         L2 IfName       L2 If Name       FD Name:       L2 NH         L2 IfName:       L2 If Name       FD Name:       L2         Entry FD Name       FD Name:       L2       FD Name:       L2         L3 EP Count:       12       FD Name:       L2       FD Name:       L2         L3 EP Count:       12       FD Name:       L2       FD Name:       L2         L3 EP Count:       12       FD Name:       L2       FD Name:       L2         L3 EP Count:       12       FD       FD N       FD N       FD N         L3 EP Count:       12       FD       FD N       FD N       FD N       FD N       FD N         L3 EP Count:       12       FD       FD N	Shared Service														
Use Bd SO: SA Only EP NH L3IfName: EP Next HOp L3 If Name NHT: Next HOp Type (L2: L2 Entry L3: L3 Next HOp) BD Name: L2 NH BD Name EP Mac: EP Mac L3 IfName: L3 NH If Name L2 If Name L2 If Name FD Name: L2 Entry FD Name IP: L3 NH IP L3 EP Count: 12 	IL:	Is Local								VU	B:				Vnid
S0:       SA Only       EP NH L3IfName: EP         Next Hop L3 If Name       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       BD Name:       L2 NH         BD Name       EP Mac:       EP Mac       L3 IfName:       L3 NH         EP Mac:       EP Mac       L3 IfName:       L3 NH         L2 IfName       L2 If Name       FD Name:       L2 NH         L2 IfName:       L2 If Name       FD Name:       L2 NH         L3 EP Count:       12       FD Name:       L2         L3 EP Count:       12       E       E       IS D S D D V       E         Vrf       EP       S Age S S L N N B D P P P P S I U S L3       H       H       BD EP       L3       L2       FD         Name       T IP       Class Intvl T E D D D E L I I A A S L B O       IfName       IP       IfName       IP         Class Intvl T E D D D E L I I A A S L B O       IfName       Ifname       IP       IfName       IP         Class Intvl T E D D D E L I I A A S L B O       IfName       Ifname       IP       II O 0 0 0 0 0 1 1 0 0 0 0 0 1 0 0 -         IfName       T   Name       Mac       IfName       Ifname       IP         IfName       T   Name       Mac       IfName       Ifname	Use Bd														
Next Hop L3 If Name       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       BD Name:       L2 NH         BD Name       EP Mac       EP Mac       L3 IfName:       L3 NH         EP Mac:       EP Mac       FD Name:       L3 NH         If Name       L2 If Name       FD Name:       L2 NH         L2 IfName:       L2 If Name       FD Name:       L3 NH         Entry FD Name       FD Name:       L2         IP:       L3 NH IP       L3 EP Count: 12       E         L3 EP Count:       12       E       FD Name:       S         Vrf       EP       S       Age       S L N N B D P P P S I U S L3       H         Vrf       EP       L3       L2       FD       FD       N H         Name       T IP       Class       Intvl T E D D D E L I I A A S L B O       IfName       IP         IfName       T   Name       Mac       IfName       IP       IP       IN I U O O O O O I 1 0 O O O O O O I O O O O O O O O O O O O	SO:	SA Only								ΕP	NH	Г3	BIÉN	ame:	EP
NHT:       Next Hop Type (L2: L2 Entry L3: L3 Next Hop)       BD Name:       L2 NH         BD Name       EP Mac:       EP Mac       L3 IfName:       L3 NH         EP Mac:       L2 If Name       FD Name:       L2 NH         L2 IfName       L2 If Name       FD Name:       L2 NH         L2 IfName:       L2 If Name       FD Name:       L2         Entry FD Name       IP:       L3 NH IP       IP:       L3 NH IP         L3 EP Count:       12       IP:       L3 NH IP       IP:       IS D S D D V       EP-NH         N       Vrf       EP       S Age S S L N N B D P P P S I U S L3       H       IN S L2       FD         Name       T IP       Class Intvl T E D D D E L I I A A S L B O       IfName       IFName       IP         IfName       T   Name       Mac       IfName       IP       IfName       IP         IfName       T   Name       Mac       IfName       Ifname       IP       I A A S L B O       I         IfName       T   Name       Mac       IfName       IP O       I O O O O O I 1 O O O O O O O O O O O O	Next Hop L3 If Name	e													
BD Name       EP Mac:       EP Mac       L3 IfName:       L3 NH         If Name       L2 If Name       FD Name:       L2         L2 If Name       FD Name:       L2         Entry FD Name       IP:       L3 NH IP       L3 EP Count: 12	NHT:	Next Hop Type	(L2: L2 Entry	- L3: L	3 Next 1	Нор	)			BD	Nar	ne:			L2 NH
EP Mac:       EP Mac       L3 IfName:       L3 NH         If Name       FD Name:       L2         L2 IfName:       L2 If Name       FD Name:       L2         Entry FD Name       IP:       L3 NH IP       IP:       L3 NH IP         L3 EP Count:       12       IP:       BE       I S D S D D       V       EP-NH         N       Vrf       EP       S       Age       S S L N N B D P P P P S I       U S L3         H       BD       EP       L3       L2       FD       III Name       IP         IfName       T       IP       Class       Intvl T E D D D E L I I A A S L B O       IF       IP         IfName       T       Name       Ifname       IP       IP       IP       IP         IfName       T       Name       Mac       IfName       IP       IP       IP       IP         IfName       T       Name       IP       IP       IP       IP       IP       IP       IP         IfName       T       Name       IP       IP </td <td>BD Name</td> <td></td>	BD Name														
If Name       L2 If Name       FD Name:       L2         Entry FD Name       IP:       L3 NH IP       L3 EP Count:       12         L3 EP Count:       12       IP:	EP Mac:	EP Mac								Г3	Ifl	Nam	ne:		L3 NH
L2 If Name: L2 If Name FD Name: L2 Entry FD Name IP: L3 NH IP L3 EP Count: 12 N   Vrf EP L3 L2 FD Name T IP Class Intvl T E D D D E L I I A A S L B O If Name T IP Class Intvl T E D D D E L I I A A S L B O If Name T IP Class Intvl T E D D D E L I I A A S L B O If Name T IP Class Intvl T E D D D E L I I A A S L B O If Name T IP Class Intvl T E D D D E L I I A A S L B O If Name T IP Class Intvl T E D D D E L I I A A S L B O If Name T IP Class Intvl T E D D D E L I I A A S L B O If Name T IP Class Intvl T E D D D E L I I A A S L B O If Name T I Name Mac If Name If name IP	If Name														
Entry FD Name IP: L3 NH IP L3 EP Count: 12 B E I S D S D D V EP-NH N   Vrf EP S Age S S L N N B D P P P S I U S L3 H   BD EP L3 L2 FD Name T IP Class Intvl T E D D D E L I I A A S L B O IfName T IP Class Intvl T E D D D E L I I A A S L B O IfName T   Name Mac IfName Ifname Name IP 	L2 IfName:	L2 If Name								FD	Nar	ne:			L2
IP: L3 NH IP L3 EP Count: 12 B E I S D S D D V EP-NH N   Vrf EP S Age S S L N N B D P P P P S I U S L3 H   BD EP L3 L2 FD Name T IP Class Intvl T E D D D E L I I A A S L B O IfName T   Name Mac IfName Ifname Name IP 	Entry FD Name														
L3 EP Count: 12 B E I S D S D D V EP-NH N   Vrf EP S Age S S L N N B D P P P S I U S L3 H   BD EP L3 L2 FD Name T IP Class Intvl T E D D D E L I I A A S L B O IfName T   Name Mac IfName Ifname Name IP 	ID:	L3 NH IP													
B E       I S D S D D       V       EP-NH         N                 Vrf       EP       S       Age       S S L N N B D P P P S I U S L3         H       BD       EP       L3       L2       FD         Name       T IP       Class       Intvl T E D D D E L I I A A S L B O         IfName       T   Name       Mac       IfName       Ifname       Name         common*rewall Pl 10.6.112.1       1       0       1       0       0       0       1       0       0       0       1       0       -       0.0.0.0	L3 EP Count: 12														
B E       I S D S D D       V       EP-NH         N                 Vrf       EP       S       Age       S S L N N B D P P P S I U S L3         H       BD       EP       L3       L2       FD         Name       T IP       Class       Intvl T E D D D E L I I A A S L B O         IfName       T   Name       Mac       IfName       Ifname       Name         common*rewall Pl 10.6.112.1       1       0       1       0       0       0       1       0       -       0.0.0.0		=======================================				====	====	====	====	===	===:	===		====	=====
BEISDSDDVEP-NH         N          Vrf       EP       S       Age       S S L N N B D P P P P S I U S L3         H   BD       EP       L3       L2       FD         Name       T IP       Class Intvl T E D D D E L I I A A S L B O         IfName       T   Name       Mac       IfName       Ifname         common*rewall Pl 10.6.112.1       1       0       1 0 0 0 0 0 1 1 0 0 0 0 0 1 0 0 -         L3       -       00:00:00:00:00 -       -       -       0.0.0.0						====		====	====	===	====	===	===	====	=
N       Image: Normal Solution       Solution       Age       Solution       <								ΒE	I	S	DS	D	D	V	EP-NH
Vrf       EP       S       Age       S       L N       N N       D       P       P       S       L 3         H       BD       EP       L3       L2       FD       FD         Name       T       IP       Class       Intvl       T       D       D       D       E       L       I       A       A       S       L       D         IfName       T       Name       Mac       IfName       Ifname       Name       IP       IP         common*rewall       Pl       10.6.112.1       1       0       1.0.0.00       0.0.0.0	N														
H       BD       EP       L3       L2       FD         Name       T       IP       Class       Intvl T E D D D E L I I A A S L B O         IfName       T       Name       Mac       IfName       Ifname       Name       IP	Vrf E	P		S	Age	S	SЬ	ΝN	вс	) P	ΡΡ	Ρ	S I	US	L3
Name       T       IP       Class Intvl T E D D D E L I I A A S L B O         IfName       T       Name       Name       IP         IfName       T       IfName       Ifname       Name       IP         IfName       T       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       0       0       0       -       -       0       0       0       0       0       -       -       0       0       0       0       0       0       0       -       -       0       0       0       0       0       -       -       0       0       0       0       -       -       0       0       0       0       -       -       0       0       0       0       -       -       0       0       0       0       -       -       0       0       0       0       -       -       0       0       0       0       0       -       -       0       0       0       0	H BD EP	-	L3	L2	F	D									
IfName       T       Name       Mac       IfName       Ifname       Name       IP	Name T I	P		Cla	ss Intv	lΤ	ΕD	DD	ΕI	, I	ΙA	А	S L	вС	)
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common*rewall Pl 10.6.112.1       1       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0       0       0       1       0						====		====						====	
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nal2 P	1 192.168.3.1			1	0		1	0	0	0	0	0 1	1	0	0	0	0	1	0	0	-
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rnal P	1 192.168.20.1			1	0		1	0	0	0	0	0 1	1	0	0	0	0	1	0	0	-
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rnal P	1 192.168.20.2			800a	0		0	0	0	0	0	0 0	0 (	0	0	0	0	1	0	0	-
8	00:50:56:a5:fc:cc	-	Po3	3		FD-	-30	)		-											
rnal P	1 192.168.21.1			1	0		1	0	0	0	0	0 1	1	0	0	0	0	1	0	0	-
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        ernal Pl 192.168.21.1         00:00:00:00:00:00         oo:00:00:00:00:00         ernal Pl 192.168.21.1         00:50:56:a5:fc:cc -         ernal Pl 192.168.21.1         00:00:00:00:00:00         oo:00:00:00:00:00	wall Pl 10.6.114.1       1         00:00:00:00:00:00       -         wall Pl 10.6.114.129       1         00:00:00:00:00:00       -         Gault Pl 10.6.114.129       1         00:00:00:00:00:00       -         Gault Pl 10.100.101.1       1         00:00:00:00:00       -         ernal Pl 192.168.1.1       1         00:00:00:00:00:00       -         ernal Xr 192.168.1.100       8013         00:00:00:00:00:00       -         ernal Pl 192.168.3.1       1         00:00:00:00:00:00       -         ernal Pl 192.168.20.1       1         00:00:00:00:00:00       -         ernal Pl 192.168.20.2       800a         8       00:50:56:a5:fc:cc -       Po3         ernal Pl 192.168.21.1       1         00:00:00:00:00:00       -         ernal Pl 192.168.21.2       800c         00:50:56:a5:0c:11       Po4         ernal Pl 2001:0:0:100:1       1         00:00:00:00:00:00       -	wall Pl 10.6.114.1       1       0         00:00:00:00:00:00 -       -         wall Pl 10.6.114.129       1       0         00:00:00:00:00:00 -       -       -         Gault Pl 100.100.101.1       1       0         00:00:00:00:00:00 -       -       -         ernal Pl 192.168.1.1       1       0         00:00:00:00:00:00 -       -       -         ernal Xr 192.168.1.100       8013       128         00:00:00:00:00:00 -       -       -         ernal Pl 192.168.3.1       1       0         00:00:00:00:00:00 -       -       -         ernal Pl 192.168.20.1       1       0         00:00:00:00:00:00 -       -       -         ernal Pl 192.168.20.2       800a       0         8       00:50:56:a5:fc:cc -       Po3         ernal Pl 192.168.21.1       1       0         00:00:00:00:00:00 -       -       -         ernal Pl 192.168.21.2       800c       0         00:50:56:a5:0c:11 -       Po4       -         ernal Pl 2001:0:0:00:00:00 -       -       -	wall Pl 10.6.114.1       1       0         00:00:00:00:00:00       -       -       -         wall Pl 10.6.114.129       1       0         00:00:00:00:00:00       -       -       -         Gault Pl 100.100.101.1       1       0       0         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.1.1       1       0       0         00:00:00:00:00:00       -       -       -         ernal Xr 192.168.1.100       8013       128         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.3.1       1       0       -         00:00:00:00:00:00       -       -       -       -         ernal Pl 192.168.20.1       1       0       -       -         00:00:00:00:00:00       -       -       -       -         ernal Pl 192.168.20.2       800a       0       -       -         ernal Pl 192.168.21.1       1       0       -       -         00:00:00:00:00:00       -       -       -       -         ernal Pl 192.168.21.2       800c       0       -       -         ernal Pl 2001:0:0:0:00:00       - <td>wall Pl 10.6.114.1       1       0       1         00:00:00:00:00:00       -       -       -         ewall Pl 10.6.114.129       1       0       1         00:00:00:00:00:00       -       -       -         ewall Pl 100.100.101.1       1       0       1         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.1.1       1       0       1         00:00:00:00:00:00       -       -       -         ernal Xr 192.168.1.100       8013       128       0         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.3.1       1       0       1         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.20.1       1       0       1         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.20.2       800a       0       0         ernal Pl 192.168.21.1       1       0       1         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.21.2       800c       0       0         ernal Pl 192.168.21.2       800c       0       0         ern</td> <td>wall Pl 10.6.114.1       1       0       1       0         wall Pl 10.6.114.129       1       0       1       0         wall Pl 10.0.100.101.1       1       0       1       0         wall Pl 100.100.101.1       1       0       1       0         wall Pl 192.168.1.1       1       0       1       0         wall Pl 192.168.1.100       8013       128       0       0         wall Pl 192.168.1.100       8013       128       0       0         wall Pl 192.168.3.1       1       0       1       0         wall Pl 192.168.20.1       1       0       1       0         wall Pl 192.168.20.2       800a       0       0       0         wall Pl 192.168.21.1       1       0       1       0         wall Pl 192.168.21.2       800a       0       0       0         wall Pl 192.168.21.1</td> <td>awall Pl 10.6.114.1       1       0       1       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0         awalt Pl 100.100.101.1       1       0       1       0       0       0         awalt Pl 192.168.1.1       1       0       1       0       0       0         awalt Pl 192.168.1.100       8013       128       0       0       0       0         awalt Pl 192.168.1.100       1       0       1       0       1       0       0         awalt Pl 192.168.2.1       1       0       1       0       0       0       0         awalt Pl 192.168.21.1       1       0       1       0       0</td> <td>awall Pl 10.6.114.1       1       0       1       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0       0         awalt Pl 10.6.114.129       1       0       1       0       0       0       0         awalt Pl 100.100.101.1       1       0       1       0       0       0       0         awalt Pl 192.168.1.1       1       0       1       0       0       0       0         awalt Pl 192.168.1.100       8013       128       0       0       1       0       0       0         awalt Pl 192.168.1.100       8013       128       0</td> <td>awall Pl 10.6.114.1       1       0       1       0</td> <td>awall Pl 10.6.114.1       1       0       1       0</td> <td>awall Pl 10.6.114.1       1       0       1       0       0       0       0       0       1       1         00:00:00:00:00:00       -       -       -       0.0.0.0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       0       1       1       0       1       0       0       0       0       0       1       0       1       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0</td> <td>awall Pl 10.6.114.1       1       0       1       0</td> <td>awall Pl 10.6.114.1       1       0       1       0</td> <td>awall Pl 10.6.114.1       1       0       1       0</td> <td>awall P1 10.6.114.1       1       0       1       0</td> <td>awall Pl 10.6.114.1       1       0       1       0</td> <td>awall Pl 10.6.114.1       1       0       1       0</td> <td>awall Pl 10.6.114.1       1       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       0       0       0       0</td>	wall Pl 10.6.114.1       1       0       1         00:00:00:00:00:00       -       -       -         ewall Pl 10.6.114.129       1       0       1         00:00:00:00:00:00       -       -       -         ewall Pl 100.100.101.1       1       0       1         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.1.1       1       0       1         00:00:00:00:00:00       -       -       -         ernal Xr 192.168.1.100       8013       128       0         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.3.1       1       0       1         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.20.1       1       0       1         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.20.2       800a       0       0         ernal Pl 192.168.21.1       1       0       1         00:00:00:00:00:00       -       -       -         ernal Pl 192.168.21.2       800c       0       0         ernal Pl 192.168.21.2       800c       0       0         ern	wall Pl 10.6.114.1       1       0       1       0         wall Pl 10.6.114.129       1       0       1       0         wall Pl 10.0.100.101.1       1       0       1       0         wall Pl 100.100.101.1       1       0       1       0         wall Pl 192.168.1.1       1       0       1       0         wall Pl 192.168.1.100       8013       128       0       0         wall Pl 192.168.1.100       8013       128       0       0         wall Pl 192.168.3.1       1       0       1       0         wall Pl 192.168.20.1       1       0       1       0         wall Pl 192.168.20.2       800a       0       0       0         wall Pl 192.168.21.1       1       0       1       0         wall Pl 192.168.21.2       800a       0       0       0         wall Pl 192.168.21.1	awall Pl 10.6.114.1       1       0       1       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0         awalt Pl 100.100.101.1       1       0       1       0       0       0         awalt Pl 192.168.1.1       1       0       1       0       0       0         awalt Pl 192.168.1.100       8013       128       0       0       0       0         awalt Pl 192.168.1.100       1       0       1       0       1       0       0         awalt Pl 192.168.2.1       1       0       1       0       0       0       0         awalt Pl 192.168.21.1       1       0       1       0       0	awall Pl 10.6.114.1       1       0       1       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0       0         awall Pl 10.6.114.129       1       0       1       0       0       0       0         awalt Pl 10.6.114.129       1       0       1       0       0       0       0         awalt Pl 100.100.101.1       1       0       1       0       0       0       0         awalt Pl 192.168.1.1       1       0       1       0       0       0       0         awalt Pl 192.168.1.100       8013       128       0       0       1       0       0       0         awalt Pl 192.168.1.100       8013       128       0	awall Pl 10.6.114.1       1       0       1       0	awall Pl 10.6.114.1       1       0       1       0	awall Pl 10.6.114.1       1       0       1       0       0       0       0       0       1       1         00:00:00:00:00:00       -       -       -       0.0.0.0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       1       1       0       1       0       0       0       0       0       1       1       0       1       0       0       0       0       0       1       0       1       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	awall Pl 10.6.114.1       1       0       1       0	awall Pl 10.6.114.1       1       0       1       0	awall Pl 10.6.114.1       1       0       1       0	awall P1 10.6.114.1       1       0       1       0	awall Pl 10.6.114.1       1       0       1       0	awall Pl 10.6.114.1       1       0       1       0	awall Pl 10.6.114.1       1       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       1       0       0       0       0       0       0       0       0

L'hardware ritiene che l'EP esista sul tunnel 2. Qual è la destinazione del tunnel 2?

IfInfo:	
1111U.	
<pre>interface: Tunnel2 ::: ifindex:</pre>	402718722
iod: 66 ::: state:	up
Mod: 0 ::: Port:	0
Tunnel Index: 0 ::: Tunnel Dst ip: (	0xc0a87843
Tunnel Encap: ivxlan ::: Tunnel VPC Peer:	0
Tunnel Dst ip str: 192.168.120.67 ::: Tunnel ept:	0x1
[SUK INIO]:	
tunni_name:	. 1
vri_id: 2 ::: ii_index: (	0X18010002
nwencapidx: 0 ::: encaptype:	Ţ
mac_proxy: 0 ::: v4_proxy:	0
v6_proxy: 0 ::: ip_addr_type:	0
ipv4_address: 0xc0a87843	
[SDB INFO]:	
iod: 66	
<pre>pc_if_index: 0</pre>	
<pre>fab_if_index: 0</pre>	
sv_if: 0	
<pre>src_idx: 0</pre>	
int_vlan: 0	
encap_vlan: 0	
mod_port_status: 0x41620003	
v6_tbl_id: 0x80000002	
v4_tbl_id: 0x2	
router_mac:00.00.00.00.00	
unnumbered: 0	
trunk_id: 0	
tunnel_mod: 0	
tunnel_port: 0	
tep_ip: 0xc0a87843	
ip_if_mode: 0	
sdk_vrf_id: 2	
mtu: 9366 ::: ipmtu_id:	0
is_fex_fabric: 0	

Poiché la destinazione esiste al di fuori di un vPC, tale IP di destinazione deve essere l'IP virtuale vPC dei fogli di lavoro remoti. Controlliamo una foglia remota e vediamo:

leaf1# show system internal epm vpc

Local TEP IP	:	192.168.160.95
Peer TEP IP	:	192.168.160.93
vPC configured	:	Yes
VPC VIP	:	192.168.120.67
MCT link status	:	Up
Local vPC version bitmap	:	0x7
Peer vPC version bitmap	:	0x7
Negotiated vPC version	:	3
Peer advertisement received	:	Yes
Tunnel to vPC peer	:	Up

Perfetto, così ha imparato l'EP di destinazione dalla coppia di vPC remoti. Vediamo cosa rileva ELAM e verifichiamo che stiamo inoltrando il pacchetto correttamente:

#### ELAM

Ora, con le destinazioni remote su hardware EX, ci sono 2 valori ELAM che sono molto importanti quando si risolvono i problemi di flusso dei pacchetti. L'ovector\_idx come prima e l'encap\_idx:

```
module-1(DBG-TAH-elam-insel6)# report | grep ovec
sug_elam_out_sidebnd_no_spare_vec.ovector_idx: 0xB8
module-1(DBG-TAH-elam-insel6)# report | grep encap
sug_lurw_vec.encap_l2_idx: 0x0
sug_lurw_vec.encap_pcid: 0x0
sug_lurw_vec.encap_idx: 0x6
sug_lurw_vec.encap_vld: 0x1
```

Sull'hardware EX, abbiamo la capacità di guidare la porta di destinazione dalla quale il pacchetto deve essere inoltrato. In precedenza, di solito abbiamo controllato l'Encrypt Ix e verificato che la destinazione Ix fosse il tunnel corretto. Qui possiamo verificare quale porta è mappata a 8B:

module-1(DB Legend:	G-TAH-elam-insel6)#	show platform	internal hal	12 port gpd	
IfId:	Interface Id			IfName:	Interface Name
I P:	Is PC Mbr			IfId:	Interface Id
Uc PC Cfg:	UcPcCfg Idx			Uc PC MbrId:	Uc Pc Mbr Id
As:	Asic			AP:	Asic Port
Sl:	Slice			Sp:	Slice Port
Ss:	Slice SrcId			Ovec:	Ovector (slice
srcid)					

L S: Local Slot Reprogram: τ.3: Ts L3 P: PifTable Xla Idx: Xlate Idx RP: Rw PifTable Ovx Idx: OXlate Idx IP: If Profile Table N L3: Num. of L3 Ifs Num. of Infra L3 Ifs RS: Rw SrcId Table NT L3: DP: DPort Table Vif Tid: Vif Tid SrcPortState Table RwV Tid: RwVif Tid SP: RSP: RwSrcPortstate Table Ing Lbl: Ingress Acl Label UC: UCPcCfg Egr Lbl: Egress Acl Label UM: UCPcMbr Reprogram: PROF ID: Lport Profile Id VS: VifStateTable HT: LportProfile Hw Install RV: Rw VifTable Num. of Sandboxes: 1 Sandbox\_ID: 0, BMP: 0x0 Port Count: 8 \_\_\_\_\_ \_\_\_\_\_ UC UC Reprogram Rep I PC Pc L | RIRD R UUX | L Xla Ovx N NI Vif RwV Ing Egr | V R | PROF H IfId Ifname PCfg MbrID As APSI SpSs Ovec S | PPPSPSpSpCML | 3 Idx Idx L3 L3 Tid Tid Lbl Lbl | S V | ID I \_\_\_\_\_ \_\_\_\_\_ 1a004000 Eth1/5 1 0 1d 0 d 0 c 18 18 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 - - 800 0 0 1 0 0 1a005000 Eth1/6 10 b 0 e 0 d 1a 1a 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 - 800 0 0 1 0 0 1a006000 Eth1/7 0 26 5 0 f 0 e 1c 1c 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 D-256 - 800 0 0 1 С 0 0 2f 7 0 10 0 f 1e 1e 1a007000 Eth1/8 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 D-199 - 800 0 0 1 0 2e 1a01e000 Eth1/31 1 0 2d 0 37 1 e 1c 9c 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 - - 0 0 0 1 0 0 la0lf000 Eth1/32 1 0 3d 0 38 1 f le 9e 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 - 0 0 0 1 0 0 0 49 1 20 38 b8 1 021 0 0 0 0 0 0 0 0 0 1a030000 Eth1/49 164 2 2 D-24d - 400 0 001 0 0 29 1 0 0 80 1 3 1a031000 Eth1/50 03 3 0 0 0 0 0 0 0 0 0 15 2 2 D-350 -400 0 0 0 1 0

L'interruttore pensa di doverlo inoltrare al dorso sull'interfaccia Eth1/49. Ma come possiamo verificare che l'encap sia corretto?

Per prima cosa dobbiamo esaminare le informazioni hardware sul tunnel. A tale scopo, eseguire il comando HAL seguente:

module-1(DBG-TAH-elam-ins	el6)# show platform	n internal hal	tunnel rtep pi	
Non-Sandbox Mode				
LEGEND:				
Tun Ifid: Tunnel Ifid			IfName:	Tunnel If Name
Lid: Logical Id			ET:	Encap Type V:
Vxlan I: IVxlan N: NVGRE				
VrfId: Vrf Id			Vrf Name	: Vrf Name
IP: Tunnel's IP				

Is VPC Peer Hw Enc: Hw Encap Idx IVP: Is Local P4: Proxy for v4 TT.: P6: Proxy for V6 PM: Proxy for Mac Is Ingress Only Is Copy Service II: IC: C OBd: Copy Service Outer Bd U D: Use DF Next Base Type E: ECMP N: Next-Hop NB Id: Next Base Id NBT: NH cnt: Next Hop Count Vrf Id VrfId: Vrf Name: Vrf Name IP Address TP: L3 IfId: L3 IfId Mac: Mac L2 IfId: L3IfName: L3 If Name L2 IfId L2IfName: L2 If Name Num. of Sandboxes: 1 Sandbox\_ID: 0, BMP: 0x0 Remote Tep Count: 15 \_\_\_\_\_ \_\_\_\_\_ ======= Т N N E Vrf HW VIPPPIIC UBB NH Vrf LЗ LЗ L2 L2 Enc PL46MICOBdDTId IfId Ifname T Lid VrfId Name IP Cnt | VrfId Name IfId ΤP TfTd TfName TfName Mac \_\_\_\_\_ \_\_\_\_\_ ======= **18010002 Tunnel2** I 3005 2 overlay-1 **192.168.120.67**0 0 0 0 0 0 0 1 0 E 2 0d:0d:0d:0d:0d:00 1a030001 Eth1/49.1 1a030000 Eth1/4 2 2 overlay-1 0.0.0.0 9 0d:0d:0d:0d:0d:00 1a031002 Eth1/50.2 1a031000 Eth1/5 2 overlay-1 0.0.0.0 0

Questo output ci dà alcuni valori che ci interessano:

IfId: ID interfaccia allocato al tunnel

IP - L'IP della destinazione. Deve corrispondere a ELTMC.

L3 IfId: le interfacce di layer 3 che lo switch può utilizzare per inoltrare alla destinazione appropriata.

Una volta conosciuto l'IfId, possiamo verificare che l'encap ricevuto nell'elam corrisponda alla destinazione del tunnel:

module-1(DBG	-TAH-elam-insel9)#	show platform	internal hal	tunnel rtep apd	
Non-Sandbox	Mode				
LEGEND:					
ifId:	Interface Id			IP:	IP address
HwVrfId:	Hardware Vrf Id			SrcTepIdx:	Source Tep Index
BDXlate:	Egress BDXlate			DstInfoIdx:	Destination info index
RwEncapIdx:	Rw Encap Index			ECMPIdx:	ECMP Index
Num:	Number of hops			ECMPMbrIdx:	ECMP member Index
L2 Index:	L2 Index			RwDmacIdx:	Rw Dmax Index

```
Num, of Sandboxes: 1
Sandbox_ID: 0, BMP: 0x0
Remote Tep Count: 15
IP
ifTd
            HwVrfId BDXlate SrcTepIdx DstInfoIdx RwEncapIdx ECMPIdx ECMPMbrIdx Num
L2Index RwDmacIdx
_____
18010002 192.168.120.67 2
                1
                    3a9a
                         3005
                               6
                                      0
                                          0
                                                2
1a030000 0
         <---- RwEncapIdx is 6! Same as the "encap_idx" in the ELAM Report.
```

#### 1a031000 1

Questo tunnel ha un RwEncapIdx (Re-Write Encap Index) di 6, che è quello che è stato visualizzato nel flusso.

# 1 EP ---> L3 in uscita - Flusso indirizzato

## Topologia



In questo esempio, verrà tracciato il flusso di un pacchetto da EP1 che invia un messaggio ICMP a un loopback su un N5K che esegue OSPF. N5K è connesso tramite un L3Out sulla stessa coppia di switch EX.

Poiché all'inizio di questo documento è stata verificata la programmazione EP locale, supponiamo che tale programmazione sia stata appresa correttamente nell'hardware e proseguiamo con la verifica del percorso.

Per prima cosa, controllare lo stato OSPF e la tabella di routing:

```
leaf6# show ip ospf neighbors vrf jr:sb
OSPF Process ID default VRF jr:sb
Total number of neighbors: 2
Neighbor ID Pri State Up Time Address Interface
27.27.27.1 1 FULL/BDR 00:22:39 10.10.27.1 Vlan28 <---- Leaf5
27.27.27.3 1 FULL/DROTHER 00:22:37 10.10.27.3 Vlan28 <---- N5K
leaf6# show ip route vrf jr:sb 100.100.100
```

```
IP Route Table for VRF "jr:sb"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>
```

#### 100.100.100.100/32, ubest/mbest: 1/0

\*via 10.10.27.3, vlan28, [110/5], 00:16:58, ospf-default, intra

Sappiamo quindi che la tabella di routing mostra l'hop successivo come il 5K alle 10.10.27.3. Buon inizio, ma come possiamo verificare quale hardware ha?

Controlliamo prima la tabella di adiacenza nell'hardware per assicurarci che ARP sia risolto a 10.10.27.3 e che sia programmato con l'interfaccia corretta:

leaf6# vsh\_lc
module-1# show forwarding adjacency
IPv4 adjacency information, adjacency count 20
next-hop rewrite info interface phy i/f
10.10.27.1 0022.bdf8.19ff Vlan28 Tunnel3
10.10.27.3 8c60.4f02.88fc Vlan28 port-channel5
Gli indirizzi MAC corrispondono a quelli dei 5K:

ACI-5548-B# show interface vlan 3117 Vlan3117 is up, line protocol is up Hardware is EtherSVI, address is 8c60.4f02.88fc Internet Address is 10.10.27.3/29 MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec

Sulle piattaforme EX, esiste un "hw\_vrf\_idx" assegnato a un VRF. Questo indice verrà utilizzato come riferimento quando si verifica la programmazione hardware. Ecco l'indice:

internal eltmc	info v	vrf jr:sb	
tenant	:::	context_id:	б
0	:::	vnid:	2129921
5	:::	sclass:	16386
0x5	:::	v6_table_id:	0x8000005
5	:::	intrn_vlan_id:	0
Vlan11	:::	<pre>src_plcy_incomp:</pre>	0
0x208001	:::	ingress_policy:	0x1
Vlan28,Vlan16,V	/lan9,	Vlan11,loopback2,	
4612	:::	<pre>nb_egr_outer_bd:</pre>	0
0			
28,16,11,9,			
	<pre>internal eltmc</pre>	<pre>internal eltmc info *     tenant :::     0 :::     5 :::     0x5 :::     Vlan11 :::     0x208001 ::: Vlan28,Vlan16,Vlan9,V     4612 :::     0 28,16,11,9,</pre>	<pre>internal eltmc info vrf jr:sb      tenant ::: context_id:         0 ::: vnid:         5 ::: sclass:         0x5 ::: v6_table_id:         5 ::: intrn_vlan_id:         Vlan11 ::: src_plcy_incomp:         0x208001 ::: ingress_policy: Vlan28,Vlan16,Vlan9,Vlan11,loopback2,         4612 ::: nb_egr_outer_bd:         0 28,16,11,9,</pre>

<pre>sb_egr_outer_bd:</pre>	0	:::	sdk_vrf_id:	5
[SDK Info]:				
vrf_name:	jr:sb			
vrf_id:	5	:::	hw_vrf_idx:	4612
vrf_vnid:	2129921	:::	is_infra:	0
tornbinfrahwbd:	0	:::	torsbinfrahwbd:	0
ingressBdAclLabel:	0	:::	ingBdAclLblMask:	0
egressBdAclLabel:	0	:::	egrBdAclLblMask:	0
sg_label:	5	:::	sclass:	16386
<pre>sp_incomplete:</pre>	1	:::	sclassprio:	3
[SDB INFO]:				
v4 table				
vrf type:	1			
vrf id:	5			
vnid:	2129921			
internal infra vlan:	0			
external router mac:00:	22:bd:f8:19:ff			
v6 table				
vrf type:	1			
vrf id:	5			
vnid:	2129921			
internal infra vlan:	0			
external router mac:00:	22:bd:f8:19:ff			

```
::::
```

Dopo aver rilevato l'adiacenza, HAL dovrebbe programmare una rotta. Per verificarlo, usare il comando seguente:

```
module-1# show platform internal hal 13 routes | head
_____
_____
LEGEND:
_____
_____
                              PID: Physical ID NB-ID:Next-Base ID
LID: Logical ID
              RID: Route ID
HIT IDX: Next-Hop HitIndexCLP : Class PriorityTBI: Trie Base Index|SC : Sup-CopySSR: Src Sup-RedirectDSR: Dst Sup-RedirectTDD :TTL Disable
NB: NextBaseType
                SDC : Src Direct Connect TRO: Trie Offset
              DPI: Dst Policy Inc DR : Default Route LE :Learn Enable
SPI: Src Policy Inc
              ILL : Is Link Local
FWD: Forwarding
[E:Ecmp/A:Adj]
                               ISS: Is Shared Services
                                                HR : Host Routes EP :Ext Prefixes
RT : Route Type
DLR: Default Lpm Route
              CLSS: Class Id
                               RDEL: Route in Deletion
                                                   BNE: Bind Notify Enable SNE: Sclass Notify Enable BE : Bounce Enable IDL : Ivxlan
DoNotLearn DL : Dest Local
                   SA : Src Only
                                      AI : Age Interval
SF : Static Flag
          SH : Src Hit
                              DH: Dest Hit
module-1# show platform internal hal 13 routes
_____
_____
LEGEND:
_____
_____
                              PID: Physical ID
LID: Logical ID
              RID: Route ID
                                            NB-ID:Next-Base ID
HIT IDX: Next-Hop HitIndex CLP : Class Priority
                              TBI: Trie Base Index
                                                   SC : Sup-Copy SSR: Src Sup-Redirect DSR: Dst Sup-Redirect TDD : TTL Disable
NB: NextBaseType
                SDC : Src Direct Connect TRO: Trie Offset
```

SPI: Src Policy IncDPI: Dst Policy IncDR : Default RouteLE:Learn Enable[E:Ecmp/A:Adj]ILL : Is Link LocalISS: Is Shared Services|RT : Route TypeFWD: ForwardingHR : Host RoutesEP:Ext PrefixesDLR: Default Lpm RouteCLSS: Class IdRDEL: Route in Deletion| BNE: Bind Notify Enable SNE: Sclass Notify Enable BE : Bounce Enable IDL : Ivxlan SA : Src Only DoNotLearn DL : Dest Local AI : Age Interval SF : Static Flag SH : Src Hit DH: Dest Hit \_\_\_\_\_ | | - Trie ----->|<Dleft Trie>| - Prefix/Len | RT| RID | LID | Type| PID | FPID/| HIT - ---- | SH|DH| Flags | | | | LID |<-----|-----|-----|---|---| | TID | IDX | | | | | PID | FPID/| HIT | PID | FPID/| HIT N NB-ID NB Hw | | | | |B| | **Idx** | | | | | | <------ TCAM ----->| | | | PID | TCAM | HIT N NB-ID NB Hw | | | | | | | | ID | IDX |B| | **Idx** | | | | | \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ Sandbox\_ID: 0 Asic Bitmap: 0x0 \_\_\_\_\_ \_\_\_\_\_ module-1# show platform internal hal 13 routes | egrep 100.100.100.100

4612100.100.100.100/32UCe44a04TRIE105/06010 |A|7567802e186a1/2100f3009; dpiQuesto output ci fornisce informazioni sul percorso dell'hop successivo.4612 è l'hw\_vrf\_idx deljr:sb VRF. Per poter verificare l'hop successivo, il "NB Hw Idx" in TCAM verrà utilizzato in basealla tabella seguente:

module-1# <b>sh</b>	101	w platform internal hal 13	nexthops				
Non-Sandbox	Mo	ode					
LEGEND:							
NHOP ID		: Nhop Identifier (Hex)		CONS	5	:	H/W S/W info Consistency
TYPE		: Nexthop Type		ACTI	J	:	Nexthop Action
Vrf		: L3 Vrf of the Nhop		L3 ]	INTF	:	L3 interface index (Hex)
L2 INTF		: L2 interface index (Hex)	)	BDII	O Or RwVRF	:	Bridge Domain Id Or Rewrite
Vrfid (Hex)							
INFR		: ACI Infra valid		PVRE	<u>,</u>	:	Preserve VRF
LRN		: Learn Enabled		VRFI	ર	:	VRF Rewrite
PID		: Physical ID		FPII	)	:	FP of this nexthop
TLID		: Tile Id within FP		HIT	IDX	:	Location of this Nhop (Hex)
Mac Entry:							
TYP	:	Туре	INTF	:	Interface	re	elated Info (Hex)
LRN	:	Learn Info	DL	:	Destinatio	n	Local
MLD	:	Unused	VNB	:	Vnid use E	D	
DFL	:	Default Entry	VLD	:	MacKey Val	ić	1
FT	:	FID Type	FV	:	FID Valid		

Mac : FID value (Hex) : L2 MAC Address FTD L2 Ifabric Info: CLSS : Source Class CLP : Source Class Priority : Bind Notification Enabled EPG : EndPoint Group BNE SNE : Source Address Notification Enabled CNE : Source class Notification Enabled SPI : Source Policy Incomplete DL : iVxlan DL : Dest Policy Incomplete DPT IP Address : IP address Sandbox\_ID: 0 Asic Bitmap: 0x0 Summary info for 31 L3 Nexthop objects BDID I P V T |-----Mac Entry-СТА -----L2 Ifabric Info----| L3 L2 Or NVLR L HIT L M V D V ------NHOP OYC ----Mac Key-----| C BSC SD| INTF INTF RWVRFFRRF FPI IDX|Y INTF RDLNFL|FF FID ID NPT L NNNDPP (H) (H) R F N R PID ID D (H) P (H) N L D B L D T V (H) (Hex) S E N Vrf (H) CLSS P EPG E E E L I I IP Address Mac 

module-1# show platform internal hal 13 nexthops | grep 802e
7567 N I F 5 901001c 16000004 1c 0 0 0 0 2e 9 0 802e 0 22 0 0 0 0 1 1 1
1214 8c:60:4f:02:88:fc 0 0 2c0d 0 0 0 0 0 0 10.10.27.3

In questo caso, prendiamo il "NB Hw Idx" e lo mappiamo al "HIT IDX". Questa mostra la voce corrispondente al Next Hop MAC/IP. Questo è l'equivalente di guardare "I3 def show" e "I3 uscita show" in Broadcom on Generation 1 ACI Leaf Switches.

Come si può vedere, la tabella ha le informazioni corrette:

INTF L2: 0x16000004 -> IfIndex del canale porta 5

HIT IDX: L'indice deriva dall'Idx Hw Nb nei percorsi hal I3

MAC: 8c:60:4f:02:88:fc -> MAC di SVI HOP successivo su 5K

EPG SCLASS di L3 EPG

Indirizzo IP: 10.10.27.3 -> Next Hop IP della SVI su 5K

ELAM

# 1 EP ---> EP remoto o SVI - Verifica della colonna vertebrale

## Topologia



#### Logica

In questo esempio, verrà tenuta traccia del flusso di un pacchetto da EP1 destinato a un'interfaccia virtuale commutata BD remota (SVI). Lo scopo di questo esempio è verificare Spine Forwarding per assicurarsi che il pacchetto venga inviato alla foglia corretta. Supponiamo che il pacchetto sia stato inviato al Proxy della colonna vertebrale in entrata.

Sul dorso, verifichiamo prima il protocollo COOP (Council of Oracles Protocol) per l'IP di destinazione, poiché il pacchetto viene inviato al proxy dorso per una ricerca:

Vrf : 2129921 Flags : 0 EP vrf vnid : 2129921 EP IP : 192.168.20.1 Publisher Id : 10.0.224.88 Record timestamp : 11 04 2016 16:41:16 422062712 Publish timestamp : 11 04 2016 16:41:16 424633605 Seq No: 0 Remote publish timestamp: 01 01 1970 00:00:00 0 URIB Tunnel Info Num tunnels : 1 Tunnel address : 10.0.224.88 <---- REMOTE LEAF Tunnel ref count : 1 Verifica dell'indirizzo TEP della foglia:

spine1# acidiag fnvread | grep 10.0.224.88 105 1 calo1-leaf5 FDO20160TPS 10.0.224.88/32 leaf active 0

Poiché sappiamo che il pacchetto sta entrando nel dorso sul modulo 2, porta 6, possiamo collegarci al modulo 2 e vedere il layout della porta.

spine1# **vsh** Cisco iNX-OS Debug Shell This shell should only be used for internal commands and exists for legacy reasons. User should use ibash infrastructure as this will be deprecated. calo1-spine1# attach module 2 Attaching to module 2 ... To exit type 'exit', to abort type '\$.' No directory, logging in with HOME=/ Bad terminal type: "xterm-256color". Will assume vt100. Cisco iNX-OS Debug Shell This shell should only be used for internal commands and exists for legacy reasons. User should use ibash infrastructure as this will be deprecated. Loading parse tree (LC). Please be patient... module-2#

module-2# show platform internal hal 12 port gpd Legend: \_\_\_\_\_ IfId: Interface Id **DA M** ΙE

I P:	Is PC Mbr	IfId:	Interface Id
Uc PC Cfg	: UcPcCfg Idx	Uc PC MbrId:	Uc Pc Mbr Id
As:	Asic	AP:	Asic Port
sl:	Slice	Sp:	Slice Port
Ss:	Slice SrcId	Ovec:	Ovector (slice
srcid)			
L S:	Local Slot	Reprogram:	
L3:	Is L3		
P:	PifTable	Xla Idx:	Xlate Idx
RP:	Rw PifTable	Ovx Idx:	OXlate Idx
IP:	If Profile Table	N L3:	Num. of L3 Ifs
RS:	Rw SrcId Table	NI L3:	Num. of Infra L3 Ifs
DP:	DPort Table	Vif Tid:	Vif Tid
SP:	SrcPortState Table	RwV Tid:	RwVif Tid
RSP:	RwSrcPortstate Table	Ing Lbl:	Ingress Acl Label
UC:	UCPcCfg	Egr Lbl:	Egress Acl Label
UM:	UCPcMbr	Reprogram:	
PROF ID:	Lport Profile Id		

IfName:

Interface Name

VS	: 1	VifS	State	eTal	bl	е												Η	:1						ΓĒ	por	t₽	'rc	file	e Hw		
Instal	1																															
RV	: 1	Rw V	/ifTa	able	е																											
Num. o	f Sai	ndbo	xes	: 1																												
Sandbo Port	x_ID Count	: 0, t: 7	BMI	<u>?</u> : (	0x	0																										
=====	====:	====	====	===:	==:	===:			===	===:	===:	===:	===:	===:	=====	===:	===	==	==	==:	===						==	:==			===:	==
=====	====:	====	====	===:	==:	UC	==:	==== UC	===	===:	===:	===:	==				I			Re	epr	roqi	cam				I					
Rep																					-											
					I	PC		Pc								L		R	I	R	D		R	U	U	Х		L	Xla	0vx	Ν	
NI Vif	]	RwV	]	Ing	]	Egr		V	R	PI	ROF	Н																				
IfId	I	fnam	ie		Ρ	Cf	3	Mbr	ID	As	AP	Sl	Sp	Ss	Ovec	S	F	P	P	S	Ρ	Sp	Sp	С	М	L		3	Idx	Idx	г3	
L3 Tid	r	Гid	I	bl	1	Lbl		S	V	II	D	I																				
=====	====:	====	====	===:	==:	===:	===		===	===:	===	===	===:	===:	=====	===:	===	==	==	==:	===		====				==	:==	====			==
===== 1f5	:==== S۱	==== oTnF	s==== RndMc	===: amt	==: 0	==== 9De	-=:	==== 1a	===	===:	===: 0	===: 0	0	0	0	0	C	0	0	0	0	0	0	0	0	0		0	0	0	0	0
D-2d4	D-3	 e1	0	0	-		0	0	1	•	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	•	-
1a0800	00 E	th2/	1		0	9a		1c		0	11	0	10	20	20	1	C	0	0	0	0	0	0	0	0	0		1	b	b	1	1
D-f3	D-6	1	100	0			0	0	1		0																					
1a0810	00 E	th2/	2		0	9b		22		0	d	0	С	18	18	1	C	0	0	0	0	0	0	0	0	0		1	С	С	1	1
D-lee	D-3	Ob	100	0			0	0	1		0																					
1a0840	00 E	th2/	5		0	9e		1e		0	3d	1	14	28	a8	1	С	0	0	0	0	0	0	0	0	0		1	1	1	1	1
D-19a	D-26	ee	100	0			0	0	1		0																					
1a0850	00 <b>E</b>	th2/	6		0	9f		24		0	39	1	10	20	a0	1	C	0	0	0	0	0	0	0	0	0		1	е	е	1	1
D-87	D-18	84	100	0			0	0	1		0																					
1a0860	00 E	th2/	7		0	a0		26		0	35	1	С	18	98	1	С	0	0	0	0	0	0	0	0	0		1	d	d	1	1
D-1d0	D-3	57	100	0			0	0	1		0																					
1a0880	00 E	th2/	9		0	a2		20		1	d	0	С	18	18	1	C	0	0	0	0	0	0	0	0	0		0	0	0	0	0
D-3ea	D-1;	a9	100	0			0	0	1		0																					

Ethernet 2/6 è l'interfaccia che si connette a Leaf 6 su ASIC 0 SLICE 1

Ora sappiamo su quale ASIC far funzionare il nostro ELAM. ASIC 0

```
module-2# debug platform internal tah elam asic 0
module-2(DBG-TAH-elam)# trigger reset
module-2(DBG-TAH-elam)# trigger init in-select 13 out-select 0
module-2(DBG-TAH-elam-insel13)# set inner ipv4 src_ip 10.100.17.11 dst_ip 192.168.20.1
module-2(DBG-TAH-elam-insel13)# start
stat
module-2(DBG-TAH-elam-insel13)# stat
ELAM STATUS
_____
Asic 0 Slice 0 Status Armed
Asic 0 Slice 1 Status Armed
module-2(DBG-TAH-elam-insel13)# stat
ELAM STATUS
===========
Asic 0 Slice 0 Status Triggered <---- Packet triggered from FM
Asic 0 Slice 1 Status Triggered
                                  <---- Packet triggered from Front Panel</pre>
Guardando l'ELAM, possiamo trovare l'indice ovettoriale:
```

Front Panel ELAM drove sug\_elam\_out\_sidebnd\_no\_spare\_vec.ovector\_idx: 0xB8 Come si esegue il mapping di 0xb8 a una porta? Poiché sappiamo che il pacchetto deve essere inviato a un modulo fabric (FM) per una ricerca, possiamo esaminare la mappatura delle porte interne per trovare il FM di destinazione:

module-2# show platform internal hal 12 internal-port pi Num. of Sandboxes: 1 Legend: \_\_\_\_\_ IfId: Interface Id IfName: Interface Name AP: As: Asic Asic Port Sl: Slice SP: Slice Port SP: Slice P Ovec: Ovector Ss: Slice SrcId

Lb Mbrid: LB MbrId

Sandbox\_ID: 0, BMP: 0x0 Internal Port Count: 32

UcPcCfgId: Uc Pc CfgId

Internal Port Count: 32

======		===:	====			====			
T. E. T. J	T ENT-	7	<b>7</b> D	<b>a</b> 1		<b>G</b>	0	UcPc	Lb
		AS 	АР 	ST	SP 		ovec	CIGIA	Mbria
 7d		0	21	0	20	38	38	0	4
7e	-	0	29	1	0	0	80	0	8
7f	-	1	21	0	20	38	38	0	С
80	-	1	29	1	0	0	80	0	10
81	-	2	21	0	20	38	38	0	14
82	-	2	29	1	0	0	80	0	18
83	-	3	21	0	20	38	38	0	lc
84	-	3	29	1	0	0	80	0	20
95	-	0	19	0	18	30	30	0	3
96	-	0	<b>49</b> 1	1	20 3	38 1	58 (	<b>7</b>	
97	-	1	19	0	18	30	30	0	b
98	-	1	49	1	20	38	b8	0	f
99	-	2	19	0	18	30	30	0	13
9a	-	2	49	1	20	38	b8	0	17
9b	-	3	19	0	18	30	30	0	1b
9c	-	3	49	1	20	38	b8	0	1f
ad	-	0	25	0	24	40	40	0	1
ae	-	0	41	1	18	30	b0	0	б
af	-	1	25	0	24	40	40	0	9
b0	-	1	41	1	18	30	b0	0	е
b1	-	2	25	0	24	40	40	0	11
b2	-	2	41	1	18	30	b0	0	16
b3	-	3	25	0	24	40	40	0	19
b4	-	3	41	1	18	30	b0	0	le
dd	-	0	15	0	14	28	28	0	2
de	-	0	4d	1	24	40	с0	0	5
df	-	1	15	0	14	28	28	0	a
e0	-	1	4d	1	24	40	с0	0	d
el	-	2	15	0	14	28	28	0	12
e2	-	2	4d	1	24	40	с0	0	15
e3	-	3	15	0	14	28	28	0	1a
e4	-	3	4d	1	24	40	с0	0	1d

Utilizzando ASIC0 / Ovec B8, otteniamo MbrId 0x7, Slice non importa.

Questo MbrId è l'interfaccia dell'USD che viene mappata a un'interfaccia su un FM. Tenere presente che MbrId è in formato esadecimale e deve essere convertito in decimale.

Possiamo scoprire quale FM guardando le interfacce USD e ispezionando Port 7:

module-2# show platform internal usd port info | grep -A 3 "Int 7"(if the interface has multiple digits, will be "Int##" with no space) La base dello "slot" è 0, mentre la numerazione FM è 1, quindi è necessario aggiungere 1 al numero indicato. Ciò significa che il pacchetto deve essere inviato alla FM 23.

#### **IP** sintetico

Come in Alpine, esiste un IP sintetico usato come indirizzo IP esterno per determinare l'hash per la ricerca COOP. Per risolvere questo problema, è necessario eseguire questo comando e utilizzare il comando grep per l'indirizzo IP DST interno:

module-2(DBG-TAH-elam-insel7)#show forwarding route synthetic vrf all | grep 192.168.20.1SYNTH-881.203.211.185/320x208001Inostro IP sintetico.Sulla base di questo, possiamo ancheimpostare "Outer DST IP" sul nostro elam FM per essere questo.Dovremmo attivare la radio FM:

## Fabric Module ELAM

module-23(DBG-TAH-elam-insel7)# trigger reset module-23(DBG-TAH-elam)# trigger init in-select 13 out-select 0 module-23 (DBG-TAH-elam-insel13) # set outer ipv4 dst\_ip 1.203.211.185 <---- DST IP IS THE SYNTHETIC IP module-23(DBG-TAH-elam-insel13)# set inner ipv4 src\_ip 10.100.17.11 dst\_ip 192.168.20.1 module-23(DBG-TAH-elam-insel13)# start stat module-23(DBG-TAH-elam-insel13)# stat ELAM STATUS ============ Asic 0 Slice 0 Status Armed Asic 0 Slice 1 Status Armed Asic 0 Slice 2 Status Armed Asic 0 Slice 3 Status Armed Asic 0 Slice 4 Status Armed Asic 0 Slice 5 Status Armed module-23(DBG-TAH-elam-insel13)# stat ELAM STATUS \_\_\_\_\_ Asic 0 Slice 0 Status Armed Asic 0 Slice 1 Status Armed Asic 0 Slice 2 Status Triggered <---- Triggered on SLICE 2 Asic 0 Slice 3 Status Armed Asic 0 Slice 4 Status Armed Asic 0 Slice 5 Status Armed

Èovvio che è necessario eseguire il dump del report completo, ma esaminiamo l'ovector\_idx per il pacchetto che è stato attivato:

lac\_elam\_out\_sidebnd\_no\_spare\_vec.ovector\_idx: 0x20 <--- Indice del settore utilizzato nel comando seguente

Come facciamo a capire quale interfaccia ha questo ovettore? In FM, eseguire quanto segue:

\*\* A causa del bug <u>CSCvf42796</u>, aggiungere tutti i comandi FM con "| no-more". In caso contrario, alcune voci potrebbero non essere visualizzate nell'output finale.

module-23(DBG-TAH-elam-insel13)# show platform internal hal 12 port gpd | no-more Legend: \_\_\_\_\_ Interface Id IfName: Interface Name IfId: I P: Is PC Mbr IfId: Interface Id Uc PC Cfg: UcPcCfg Idx Uc PC MbrId: Uc Pc Mbr Id As: Asic AP: Asic Port Slice Port S1: Slice Sp: Ss: Slice SrcId Ovec: Ovector (slice | srcid) L S: Local Slot Reprogram: LЗ: Is L3 P: PifTable Xla Idx: Xlate Idx RP: Rw PifTable Ovx Idx: OXlate Idx IP: If Profile Table N L3: Num. of L3 Ifs RS: Rw SrcId Table NI L3: Num. of Infra L3 Ifs DP: DPort Table Vif Tid: Vif Tid RwVif Tid SP: SrcPortState Table RwV Tid: RSP: RwSrcPortstate Table Ing Lbl: Ingress Acl Label UC: UCPcCfq Egr Lbl: Egress Acl Label UM: UCPcMbr Reprogram: PROF ID: Lport Profile Id vs: VifStateTable HI: LportProfile Hw Install RV: Rw VifTable Num. of Sandboxes: 1 Sandbox\_ID: 1, BMP: 0x1 Port Count: 8 \_\_\_\_\_ Uc Uc Reprogram | Rep | I PC Pc L | RIRD R UUX | L Xla Ovx N NI Vif RwV Ing Egr | V R | PROF H P Cfg MbrID As AP Sl Sp Ss Ovec S | P P P S P Sp Sp C M L | 3 Idx Idx L3 IfId Ifname Lbl Lbl | SV | ID I Tid L3 Tid \_\_\_\_\_ fc0-lc1:0-0 1 0 3 ae 0 fc0-lc1:0-1 1 0 4 0 3d 2 c 18 98 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 af \_ 0 0 0 0 0 0 fc0-lc1:1-0 1 0 13 0 d 0 c 18 18 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 b0 0 0 \_ 0 0 0 0 fc0-lc1:1-1 1 0 14 0 39 2 8 10 90 0 0 0 0 0 0 0 0 0 0 b1 1 0 0 0 0 0 0 0 0 0 0 0 \_ b2 fc0-lc1:2-0 1 0 23 0 5d 3 14 28 e8 1 0 \_ 0 0 0 0 0 0 0 0 0 0 b3 fc0-lc1:2-1 1 0 24 0 21 1 8 10 50 1 0 0 0 0 0 0 0 0 0 0 \_ 0 0 51 3 8 10 d0 1 0 0 0 0 0 0 0 0 0 fc0-lc1:3-0 1 0 33 0 0 0 0 0 b4 0 0 0 0 0 0

Questo vettore è mappato su LC1 (scheda di linea nello slot 2, poiché è basato su 0), su ASIC 0 / SLICE 0. Come sappiamo dall'esecuzione ELAM originariamente sul LC, abbiamo attivato su questa slice:

module-2(DBG-TAH-elam)# trigger init in-select 13 out-select 0 module-2(DBG-TAH-elam-insel13)# set inner ipv4 src\_ip 10.100.17.11 dst\_ip 192.168.20.1 module-2(DBG-TAH-elam-insel13)# start stat module-2(DBG-TAH-elam-insel13)# stat ELAM STATUS \_\_\_\_\_ Asic 0 Slice 0 Status Armed Asic 0 Slice 1 Status Armed module-2(DBG-TAH-elam-insel13)# stat ELAM STATUS \_\_\_\_\_ Asic 0 Slice 0 Status Triggered <---- Packet triggered from FM Asic 0 Slice 1 Status Triggered <---- Packet triggered from Front Panel L'ovettore su questo ELAM è sug\_elam\_out\_sidebnd\_no\_spare\_vec.ovector\_idx: 0x98, che si conosce dal "hal l2 port gpd", è mappato all'interfaccia corretta sul LC:

\_\_\_\_\_ UC UC Reprogram Rep I PC Pc L | RIRD R UUX | L Xla Ovx N NI Vif RwV Ing Egr | V R | PROF H IfId Ifname P Cfg MbrID As AP Sl Sp Ss Ovec S | P P P S P Sp Sp C M L | 3 Idx Idx L3 L3 Tid Tid Lbl Lbl | S V | ID I \_\_\_\_\_ \_\_\_\_\_ 1f5 D-2d4 D-3e1 0 0 0 0 1 0 1a080000 Eth2/1 0 9a 1c 0 11 0 10 20 20 1 0 0 0 0 0 0 0 0 0 1 b b 1 1 D-f3 D-61 100 0 0 0 1 0 1a081000 Eth2/2 0 9b 22 0 d 0 c 18 18 1 0 0 0 0 0 0 0 0 0 1 c c 1 1 D-lee D-30b 100 0 0 0 1 Ο 1a084000 Eth2/5 0 9e 1e 0 3d 1 14 28 a8 1 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 D-19a D-2ee 100 0 0 0 1 0 1a085000 Eth2/6 0 9f 24 0 39 1 10 20 a0 1 0 0 0 0 0 0 0 0 0 0 1 e e 1 1 D-87 D-184 100 0 0 0 1 Ο 1a086000 Eth2/7 0 a0 26 0 35 1 c 18 98 1 0 0 0 0 0 0 0 0 0 1 d d 1 1 D-1d0 D-357 100 0 0010 1a088000 Eth2/9 D-3ea D-1a9 100 0 0 0 1 Ethernet 2/7 è l'interfaccia che si connette a Leaf 5.

Scenario aggiuntivo: Recupero di un ovettore non presente nell'output "hal internal-port pi"

Topologia



#### Logica

In alcuni scenari viene intercettato un pacchetto che non contiene un ovector nella tabella "**show platform internal hal l2 internal-port pi**". Nello scenario seguente, stiamo effettivamente catturando il pacchetto che torna dalla FM, quindi dobbiamo esaminare una tabella diversa per vedere quale porta del pannello anteriore il pacchetto sta selezionando.

Si noti che la topologia riportata sopra è un ambiente completamente diverso in cui viene appreso il traffico di transito (senza routing proxy). Il modulo è un N9K-X9732C-EX.

@module-1(DBG-elam-insel13)# report | grep ovector sug\_elam\_out\_sidebnd\_no\_spare\_vec.ovector\_idx: 0xA0 <<<<<<<< > now we look for this in the "hal internal-port pi" command @module-1# show platform internal hal 12 internal-port pi No sandboxes exist Num. of Sandboxes: 1 Legend: \_\_\_\_\_ Interface Name IfId: Interface Id IfName: As: Asic AP: Asic Port sl: Slice SP: Slice Port Slice SrcId Ovec: Ss: Ovector UcPcCfgId: Uc Pc CfgId Lb Mbrid: LB MbrId Sandbox\_ID: 0, BMP: 0x0 Internal Port Count: 24 UcPc Lb As AP Sl SP Ss Ovec CfgId MbrId IfId IfName \_\_\_\_\_ 0 21 0 20 38 38 0 7d \_ 4 7e 0 29 1 0 0 80 0 8 1 21 0 20 38 38 0 7f \_ С 1 29 1 0 0 80 0 80 \_ 10 81 2 21 0 20 38 38 0 14 82 2 29 1 0 0 80 0 18 \_ 3 21 0 20 38 38 0 83 \_ 1c 84 3 29 1 0 0 80 0 \_ 20 ad 0 25 0 24 40 40 0 1 0 41 1 18 30 b0 0 \_ 6 ae 1 25 0 24 40 40 0 af \_ 9 1 41 1 18 30 b0 b0 0 \_ е b1 2 25 0 24 40 40 0 11 \_ 2 41 1 18 30 b0 0 b2 \_ 16 b3 \_ 3 25 0 24 40 40 0 19 3 41 1 18 30 b0 0 b4 1e 0 15 0 14 28 28 0 dd 2 0 4d 1 24 40 c0 0 de \_ 5 1 15 0 14 28 28 df 0 а e0 1 4d 1 24 40 c0 0 d 2 15 0 14 28 28 0 12 e1 \_ e2 \_ 2 4d 1 24 40 c0 0 15 3 15 0 14 28 28 0 e3 1a 3 4d 1 24 40 c0 0 ld <<<<<< we cant find an e4 entry that matches 0xA0 @module-1# show platform internal hal 12 port gpd Legend: \_\_\_\_\_ <snip> Sandbox\_ID: 0, BMP: 0x0 Port Count: 6 \_\_\_\_\_ UC UC Reprogram | Rep |

Asic 3 Slice 1 Status Triggered

		-	I PC	Pc						]	G	F	l I	R	2 D		F	ετ	Jι	JZ	к	L	Х	la (	Jvx 1	N NI
Vif R	wV Ing	g Eg	gr   V	/ R	PROF	Н																				
IfId	Ifname		P Cfg	MbrI	D As	AP	Sl	Sp	Ss	Ovec	S	Ρ	Ρ	Ρ	S	Ρ	Sp	Sp	С	М	L	:	3	Idx	Idx	L3
L3 Tid	Tid	Lbl	Lbl	s v	I 	D	I																			
		====:			====	===:	===	===																		
1f5	SpInBndl	Mgmt	0 9de	1a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(	0	0	0	0
0 D-2d4	D-3el	0	0	0 0	1		0																			
1a000000	Eth1/1		0 1b	lc	0	11	0	10	20	20	1	0	0	0	0	0	0	0	0	0	0		1	1	1	1
1 D-13b	D-33b	500	0	1 0	3		0																			
1a01c000	Eth1/29		0 37	le	3	3d	1	14	28	a8	1	0	0	0	0	0	0	0	0	0	0		1	8	8	1
1 D-3f2	D-7a	100	0	0 0	2		0																			
1a01d000	Eth1/30		0 38	20	3	39	1	10	20	a0	1	0	0	0	0	0	0	0	0	0	0		1	5	5	1
1 D-36e	D-362	100	0	0 0	2		0																			
1a01e000	Eth1/31		0 39	22	3	35	1	С	18	98	1	0	0	0	0	0	0	0	0	0	0	:	1	9	9	1
1 D-273	D-8	100	0	0 0	2		0																			
1a01f000	Eth1/32		0 3a	24	3	31	1	8	10	90	1	0	0	0	0	0	0	0	0	0	0		1	a	а	1
1 D-154	D-5d	100	0	0 0	2		0																			

1/30 è l'interfaccia phys che si connette alla foglia 102, verificata dalla topologia, ASIC 3, Slice 1