

INTUITIVE

Cisco *live!*

5-8 March 2019 • Melbourne, Australia

#CLMEL



ACI Troubleshooting

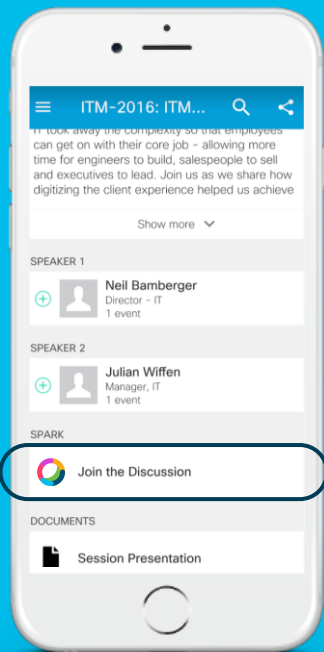
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cs.co/ciscolivebot#BRKACI-2102

Cisco Webex Teams

Questions?

Use Cisco Webex Teams (formerly Cisco Spark) to chat with the speaker after the session

How

- 1 Open the Cisco Events Mobile App
- 2 Find your desired session in the “Session Scheduler”
- 3 Click “Join the Discussion”
- 4 Install Webex Teams or go directly to the team space
- 5 Enter messages/questions in the team space

Agenda

- Intro
- Discovery Troubleshooting
- Understanding Faults & Health
- Tools
- Troubleshooting scenarios
- Conclusion / Q&A

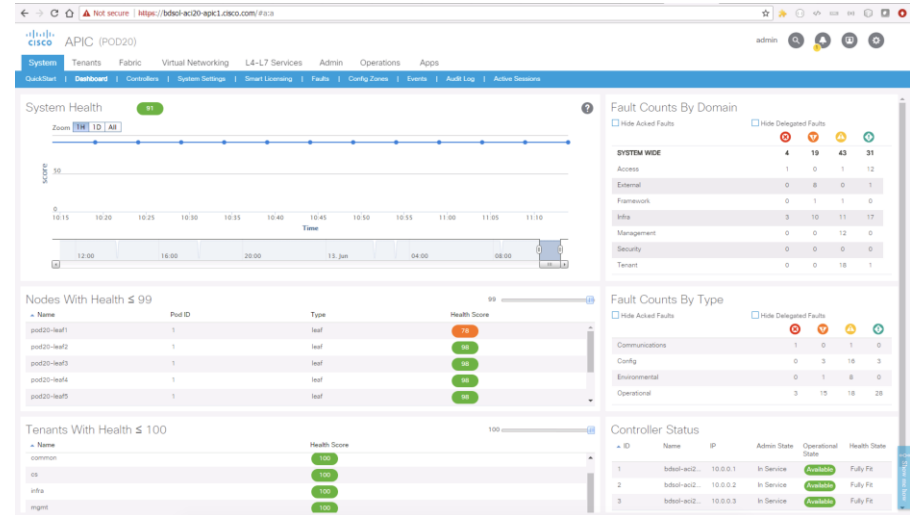
How do we want to troubleshoot the network?

	Switch 1	Switch 2	Switch 3
Hardware	✓	✓	✓
Cabling	✓	✓	✓
Software	✓	✓	✓
Configuration	✓	✓	✓
Operations	✓	✓	✓
Switching	✓	✓	✓
Routing	✓	✓	✓
...	✓	✓	✓

...

OR

The ACI way:
One view for the whole Fabric!



The way we're used to troubleshoot legacy ...

End Point Search

Admin

Operations

Availability & Troubleshooting | Capacity Dashboard | ACI Optimizer | EP Tracker | Visualization

We can search End Point by IPv4, IPv6 or MAC address

172.16.1.0/24

It's very simple to find endpoint (host) in the whole fabric

SEARCH

Learned At	Tenant	Application ▲	EPG	IP
Leaf:101, Port:eth1/33	mio	mioAP1	mioEPG2	172.16.1.0/24

State Transitions

Date ▼	IP	MAC	EPG	Action	Node	Interface	Encap
2015/12/31 10:42...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-102	eth1/33	vlan-3398
2015/11/05 15:54...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-101	eth1/33	vlan-3398
2015/11/05 15:53...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-102	eth1/33	vlan-3398
2015/10/01 16:38...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-101	eth1/33	vlan-3398
2015/10/01 16:38...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-102	eth1/33	vlan-3398
2015/10/01 16:30...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-102	eth1/33	vlan-3398
2015/10/01 16:06...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-101	eth1/33	vlan-3398
2015/10/01 15:46...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-102	eth1/33	vlan-3398
2015/10/01 15:40...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-101	eth1/33	vlan-3398
2015/10/01 15:26...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-102	eth1/33	vlan-3398
2015/10/01 15:25...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-101	eth1/33	vlan-3398
2015/10/01 15:20...	0.0.0.0	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-101	eth1/33	vlan-3398

Page 2 Of 2

Objects Per Page: 15

Visibility and Troubleshooting

Operations

Visibility & Troubleshooting

0 Session Name: Description:

Source ☐ External IP

1

Learned At	Tenant	Application	EPG	IP
101-102, vPC: ESX01-vpc	Services			10.10.10...

Destination ☐ External IP

2

Learned At	Tenant	Application	EPG	IP
Leaf103, Porteth1...	DC	App	EPG2	10.201.1...

3

0 define session name

1 select end point 1

2 select end point 2

3 start

Q: Endpoints unable to communicate to each other? We're unsure where the impacted hosts and what's the data path between them?

A: NP, We select End Points we'd like to troubleshoot visually
The rest is done by Visibility and Troubleshooting tool

Fabric Discovery troubleshooting

Fabric Initial Setup Script

- Fabric Name
- Fabric ID
- Number of Active Controllers
- POD ID
- Standby Controller
- TEP Address Pool
- Infrastructure VLAN
- BD Multicast Addresses
- Out-of-band Information
- Password

Please make sure all data you enter is accurate.
Take time to verify input.
Any mistypes could mean time spent on troubleshooting later on.

```
Cluster configuration ...
Enter the fabric name [ACI Fabric1]: ACI_FAB11
Enter the fabric ID (1-128) [1]:
Enter the number of active controllers in the fabric (1-9) [3]:
Enter the POD ID (1-9) [1]:
Is this a standby controller? [NO]:
Enter the controller ID (1-3) [1]:
Enter the controller name [apic1]: APIC1
Enter address pool for TEP addresses [10.0.0.0/16]: 11.0.0.0/16
Note: The infra VLAN ID should not be used elsewhere in your environment
and should not overlap with any other reserved VLANs on other platforms.
Enter the VLAN ID for infra network (1-4094): 3965
Enter address pool for BD multicast addresses (GIP0) [225.0.0.0/15]:

Out-of-band management configuration ...
Enable IPv6 for Out of Band Mgmt Interface? [N]:
Enter the IPv4 address [192.168.10.1/24]: 10.48.22.44/24
Enter the IPv4 address of the default gateway [None]: 10.48.22.100
Enter the interface speed/duplex mode [autol]:

admin user configuration ...
Enable strong passwords? [Y]:
Enter the password for admin:

Reenter the password for admin: _
```

Fabric Discovery – Usual Sequence of Events

Serial Number	Pod ID	Node ID	Node Name	Rack Name	Model	 System Tenants Fabric		
SAL19069BZC	1	101	LEAF1		N9K-C9396PX	Inventory Fabric Policies Acc		
SAL19069BZJ	1	102	LEAF2		N9K-C9396PX			
FDO20392LAM	1	103	LEAF3		N9K-C93180..			
SAL1925H0MM	1	201	SPINE1		N9K-C9336PC			
SAL1925H0L5	1	202	SPINE2		N9K-C9336PC			

Inventory

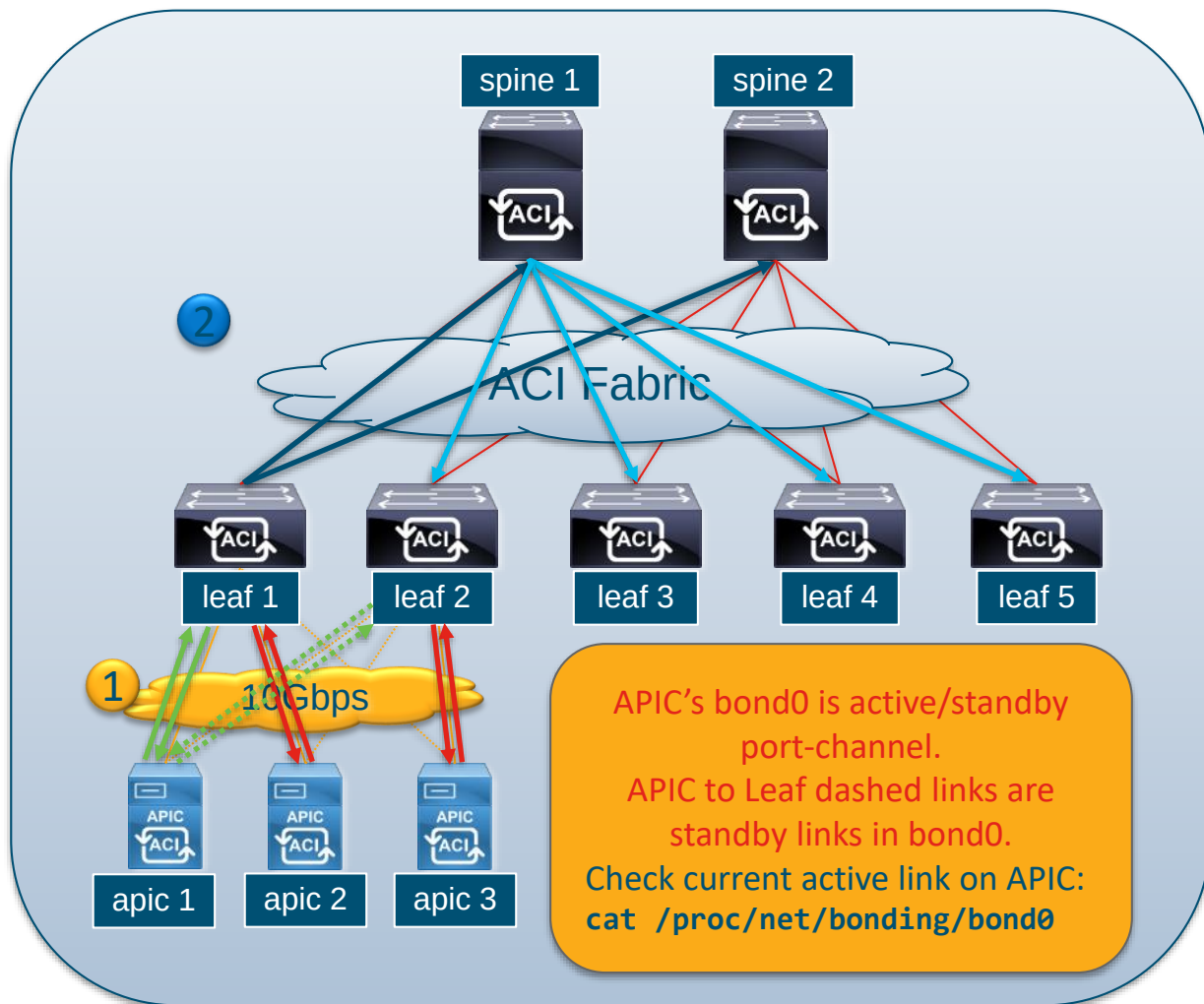
- Quick Start
- Topology

Active Controllers

ID	Name	IP	Admin State	Operational State	Health State	Failover Status	Serial Number	SSL Certificate
1	APIC1	11.0.0.1	In Service	Available	Fully Fit	idle	FCH1906V...	yes
2	APIC2	11.0.0.2	In Service	Available	Fully Fit	idle	FCH1906V...	yes
3	APIC3	11.0.0.3	In Service	Available	Fully Fit	idle	FCH1906V...	yes

Fabric Discovery

- 1 APIC1 => Leaf1 ✓
LLDP, DHCP
- 2 Leaf1 => Spines ✓
LLDP, DHCP, ISIS
- 3 Spines => Leaves ✓
LLDP, DHCP, ISIS
- 4 APIC2, APIC3 ✓
LLDP



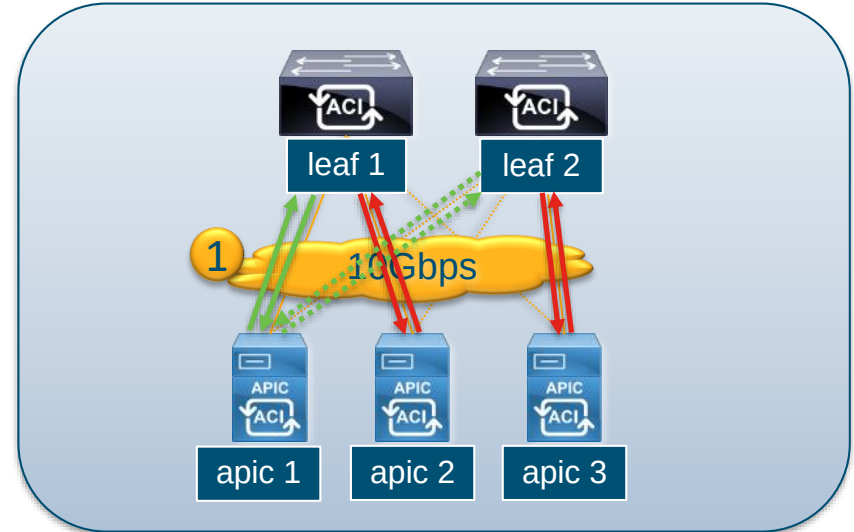
Check which bond0 uplink is active on APIC

```
apic1# cat /proc/net/bonding/bond0
```

```
Bonding Mode: fault-tolerance (active-backup)  
Primary Slave: None  
Currently Active Slave: eth2-2  
MII Status: up  
MII Polling Interval (ms): 60  
Up Delay (ms): 0  
Down Delay (ms): 0
```

```
Slave Interface: eth2-1  
MII Status: up  
Speed: 10000 Mbps  
Duplex: full  
Link Failure Count: 1  
Permanent HW addr: 58:f3:9c:5a:b8:b8  
Slave queue ID: 0
```

```
Slave Interface: eth2-2  
MII Status: up  
Speed: 10000 Mbps  
Duplex: full  
Link Failure Count: 2  
Permanent HW addr: 58:f3:9c:5a:b8:b9  
Slave queue ID: 0
```



APIC's bond0 is active/standby port-channel.
APIC to Leaf dashed links are standby links in bond0.

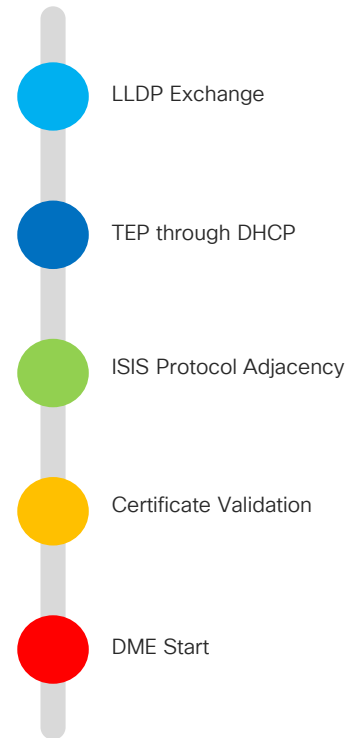
Check current active link on APIC:
`cat /proc/net/bonding/bond0`

Fabric Discovery – Detailed checkup on Sequence of Events

1. LLDP Exchange checking/troubleshooting
APIC: **acidiag run lldptool in eth2-1**
APIC: **acidiag run lldptool out eth2-1**
Leaf: **show lldp neighbour detail**
Leaf: **show lldp traffic**

Advanced LLDP check on leaf:
show system internal lldp
...

2. DHCP Server on APIC1 allocates a TEP address for Leaf1
Logs on APIC, file **/var/log/dme/log/dhcpd.bin.log**
3. ISIS starts and builds neighbour relationship (between Fabric Nodes)
show isis adjacency vrf overlay-1
4. Certificate Validation
Clock between APIC and Switches shouldn't have a high offset
5. DME Process Starts on Switches
ps -ef | egrep svc_if
ls -ltr /var/sysmgr/tmp_logs/



*We registered leaf, assigned
name etc ... but leaf is shown as
inactive in:*
acidiag fnvread

Troubleshooting Scenario

Checking faults on switch – before it joined fabric

```
(none)# moquery -c faultInfo
Total Objects shown: ...
```

```
# fault.Inst
code           : F0454
cause          : wiring-check-failed
changeSet      : wiringIssues (New: infra-vlan-mismatch)
created        : 2017-01-31T14:21:17.329+00:00
descr         : Port eth1/2 is out of service due to Infra vlan mismatch
dn             : sys/lldp/inst/if-[eth1/2]/fault-F0454
domain        : access
highestSeverity : major
lastTransition  : 2017-01-31T14:23:43.183+00:00
lc             : raised
modTs          : never
origSeverity    : major
rn             : fault-F0454
rule           : lldp-if-port-outof-service
severity        : major
subject        : port-out-of-service
type           : config
```

faultInfo is a class containing all faults on the system

This particular case means we're receiving different ACI Infra VLAN from different LLDP neighbours. Probably mixing two Fabrics.

Main takeaway:

We can check faults on ACI switch even before it has been discovered by APIC.

Cause, descr, rule fields in fault give us crucial info to understand what caused the issue.

Code gives us hint where to look in API documentation.

```
(none)#
```

Prompt means switch hasn't been discovered yet

APIC Cluster and Infra scenarios

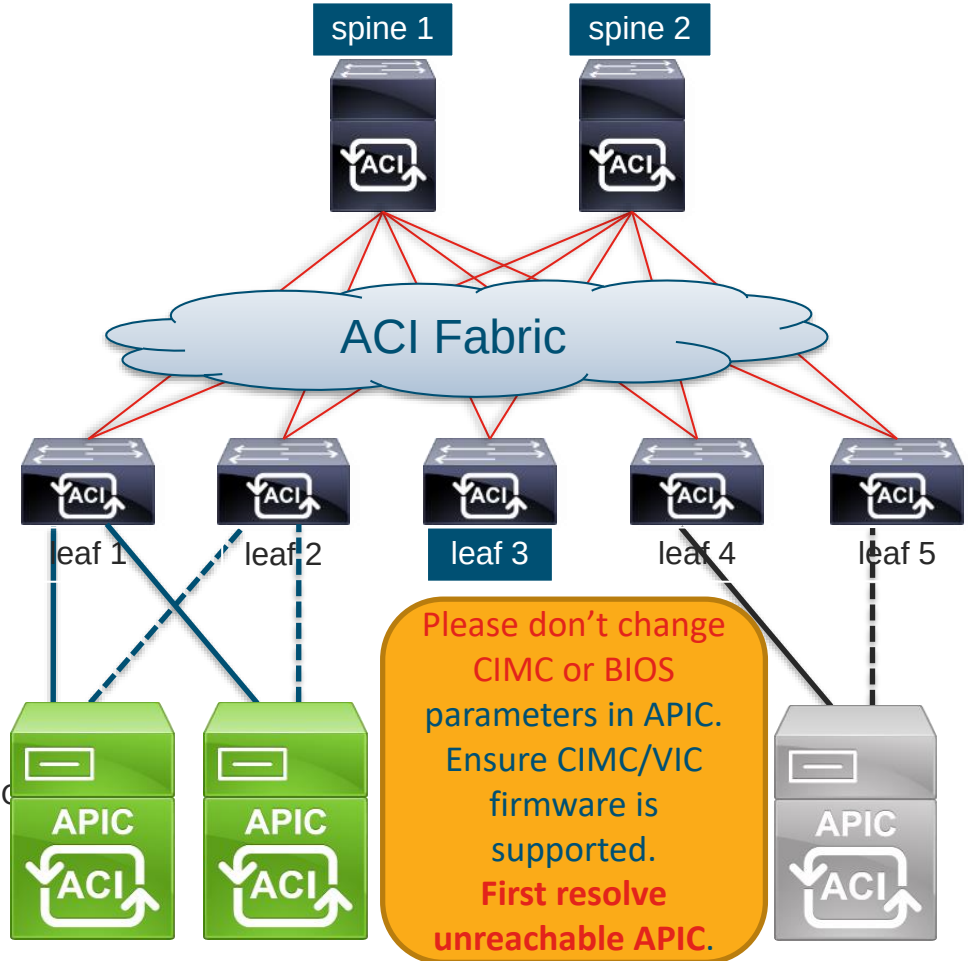
We thought it's great idea to:

- Install Windows or Linux on APIC
- Change CIMC parameters on APIC
- Change BIOS parameters on APIC

... APIC3 is unreachable now, what shall we do?

APIC3 Unreachable

- APIC3 unreachable after
 - CIMC config change
 - BIOS change
- Likely cause:
 - TPM Disabled in BIOS
 - LLDP Enabled in CIMC/VIC
 - Incorrect firmware installed
- What to check:
 - Verify CIMC and BIOS settings
- Solution:
 - Revert changes on CIMC/BIOS
 - or call TAC ☺



We just erased APIC2 config using

**acidiag touch clean | setup
acidiag reboot**

*and now APIC2 is stuck as unreachable
... what shall we do?*

Troubleshooting Scenario

APIC2 Unreachable

APIC2 unreachable after

- **acdiag touch clean/setup**
- hardware replacement ...

Likely cause:

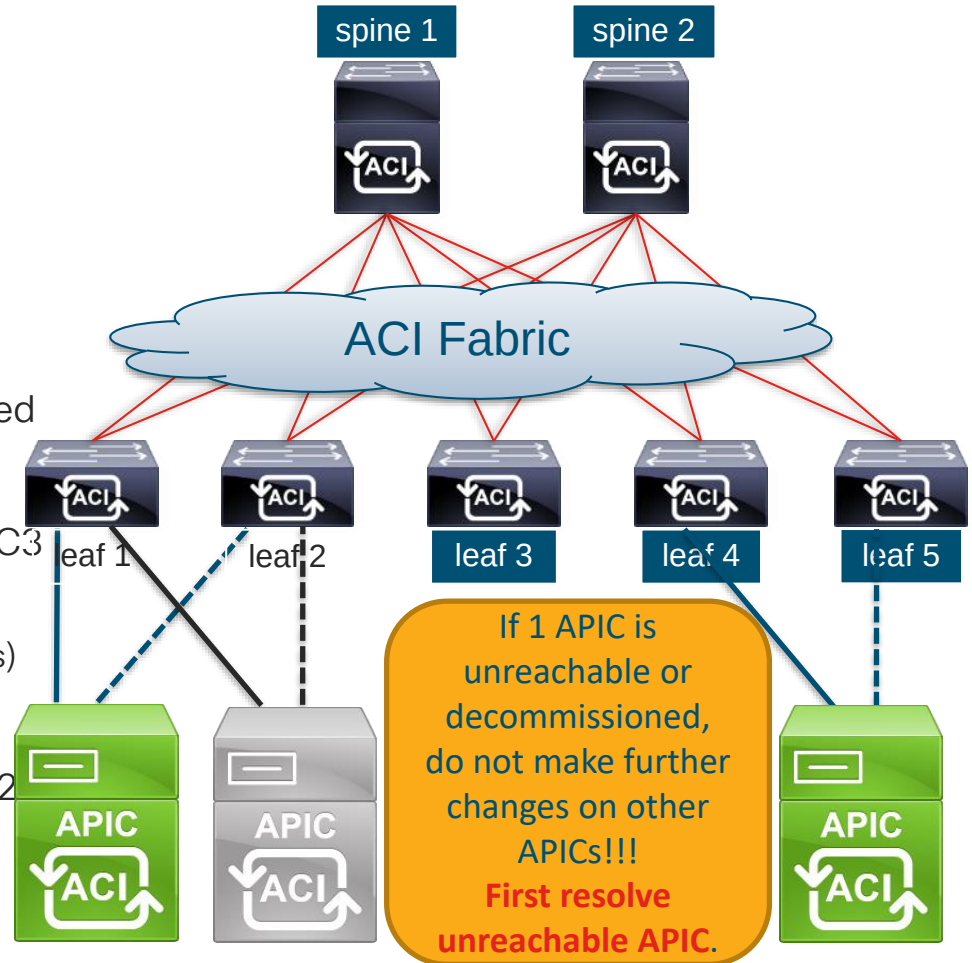
- APIC2 appliance-vector changed

What to check:

- Check faults on APIC1 and APIC3
- Run **acdiag avread**
check UUID on all 3 APICs (or leaves)

Solution:

Decommission/commission APIC2
from APIC1 or APIC3

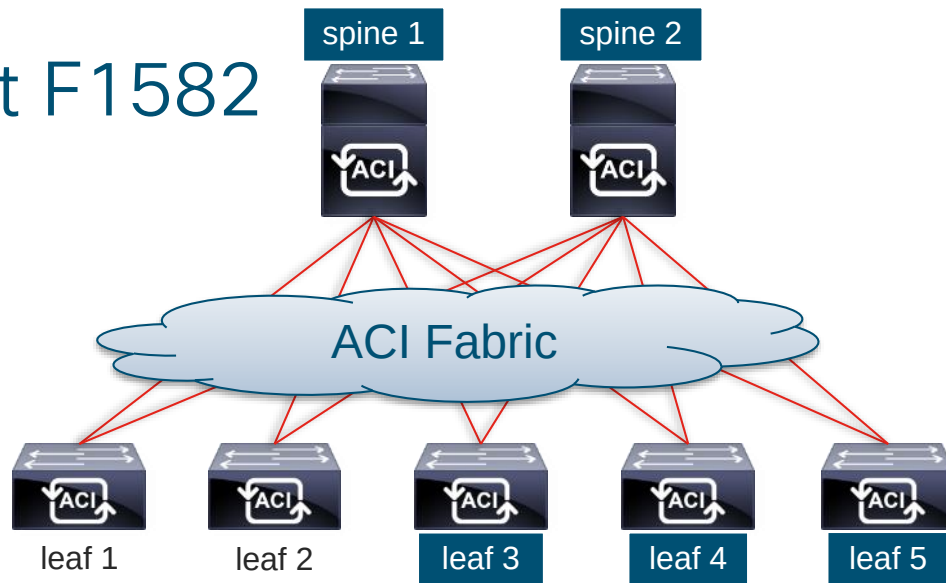


*We installed ACI software on existing Standalone NXOS switch, discovered it in APIC and now we're getting FPGA Mismatch Fault F1582 on that node ...
How to get rid of that annoying Fault?*

Troubleshooting Scenario

FPGA Mismatch Fault F1582

- FPGA fault on switch
 - Following manual software install
- Likely cause:
 - Switch software changed manually
 - without using APIC policy
- What to check:
 - Check fault details
- Solution:
 - Simply upgrade using APIC policy



Always manage your switches software using APIC firmware and maintenance policies as per admin guide. If switch was manually installed, all required firmware and FPGA versions will be updated first time when APIC upgrades it via maintenance policy.

Fabric & Cluster is up –
What next

How we're used to troubleshoot network devices

```
# show int eth 1/1 | grep input  
30 seconds input rate 97064 bits/sec, 66 packets/sec  
input rate 97064 bps, 66 pps; output rate 95008 bps, 57 pps  
20297397 input packets 6494649266 bytes  
0 input error 0 short frame 0 overrun 0 underrun 0 ignored  
0 input with dribble 72 input discard
```

The right way to troubleshoot! Good old CLI!!!

Example: Checking input rate on specific interface

One way we could do it with ACI (for CLI lovers)

```
> moquery -c eqptIngrPkts5min -f 'eqpt.IngrPkts5min.unicastRate>"1000"' | egrep -e  
"^dn|^unicastRate"
```

```
dn          : topology/pod-1/node-101/sys/phys-[eth1/34]/CDeqptIngrPkts5min
```

```
unicastRate : 1742.12
```

example: finding interface with unicast rate > 1000

```
> moquery -c eqptIngrPkts5min -f 'eqpt.IngrPkts5min.unicastRate>"1000"' -o xml  
...<eqptIngrPkts5min childAction="" cnt="18" dn="topology/pod-1/node-101/sys/phys-  
[eth1/34]/CDeqptIngrPkts5min" ... status="" unicastAvg="10833" unicastBase="0"  
unicastCum="2390904" unicastLast="18809" unicastMax="31630" unicastMin="2075"  
unicastPer="194995" unicastRate="1089.254093" unicastSpct="0" unicastThr=""  
unicastTr="0" unicastTrBase="503518"/>  
</imdata>
```

eqptIngrPkts5min => Name of the class
unicastRate => Property which tracks traffic rate for class
eqptIngrPkts5min

Query managed object tree for data we need!

- Q: that's cool, but how do I know which object/class to query ...?
 - Q: it looks cryptic to me ... how do I find meaning of each field?
- check next slide for the answer

APIC Management Information Model Reference

From the WebUI



API Documentation

Python SDK Documentation

welcome_admin

AAA

Show API Inspector

Documentation

Start Remote Logging

Object Store Browser

Show Debug Info

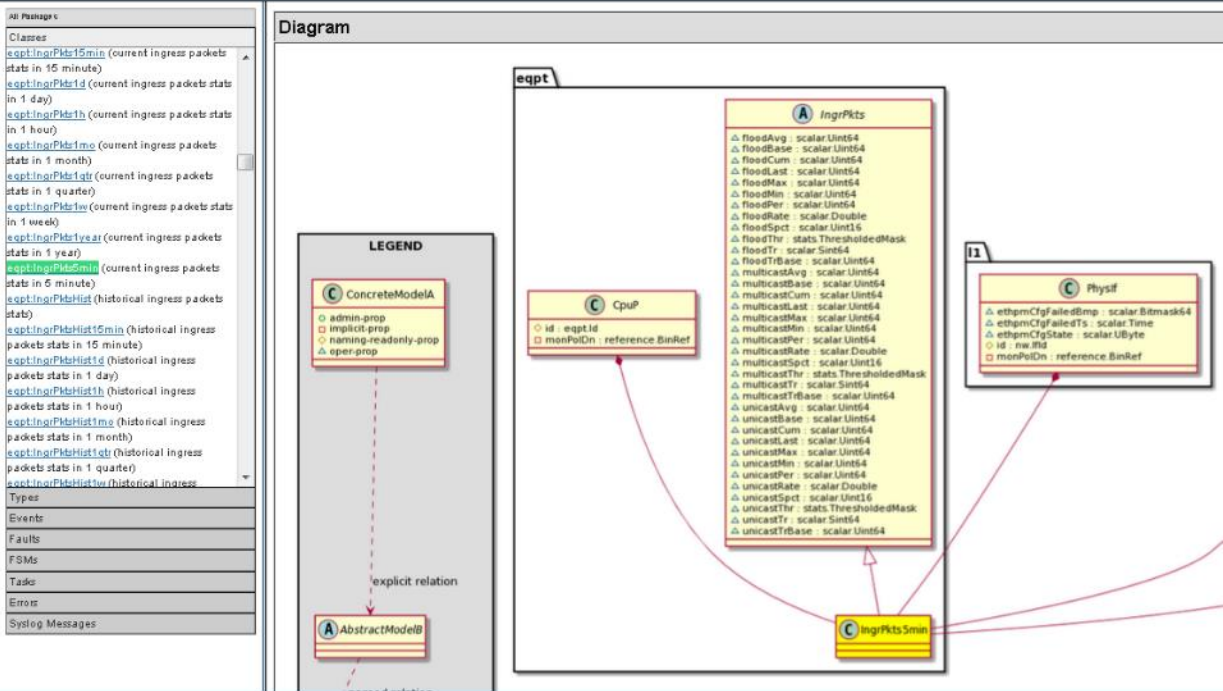
About

Settings

Logout



APIC Management Information Model Reference



direct URL

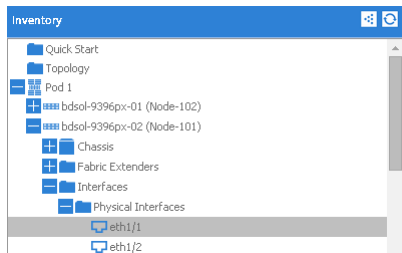
<https://apic/doc/html/>

Another way to check traffic on Fabric level

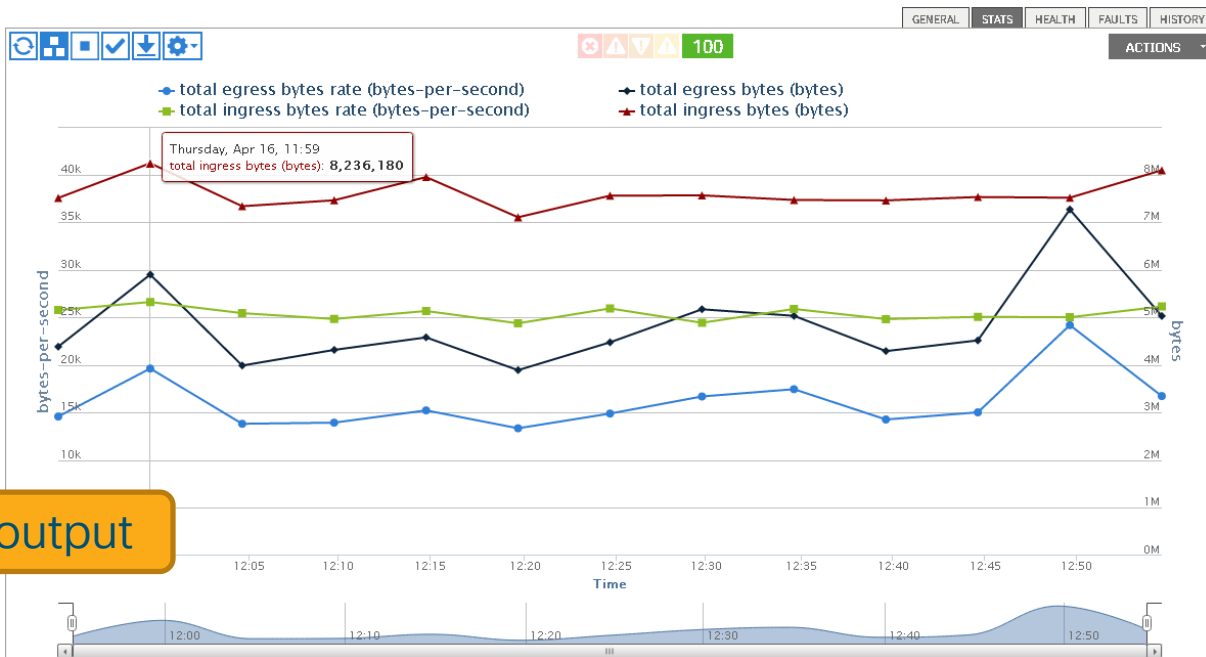
- Visualise utilisation on Fabric level using APIC Apps
- We can monitor different parameters at Fabric Level
- VisuDash App:
 - Top 10 Tenants ranked by number of End-points
 - Top 20 interface by utilisation



If you really prefer checking data on interface level



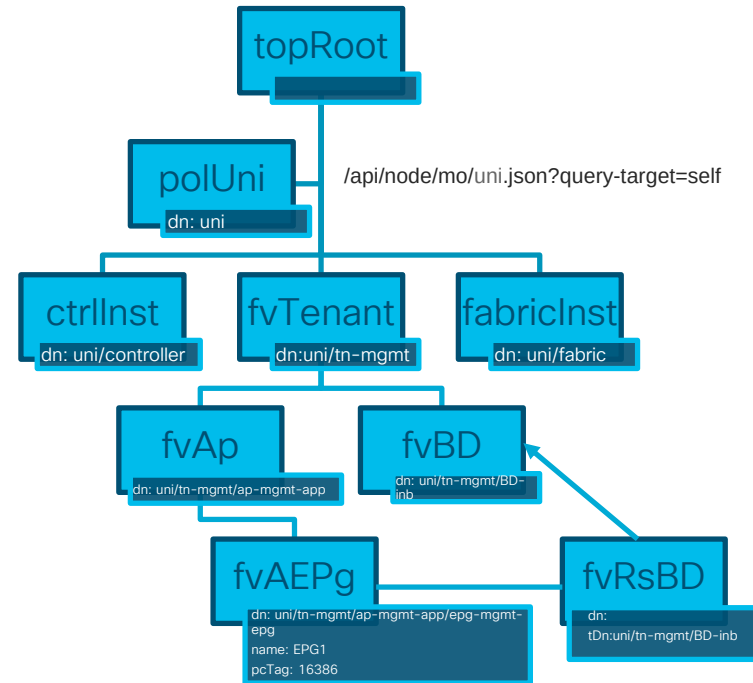
Layer 1 Physical Interface Configuration - eth1/1



Visualise interface input/output

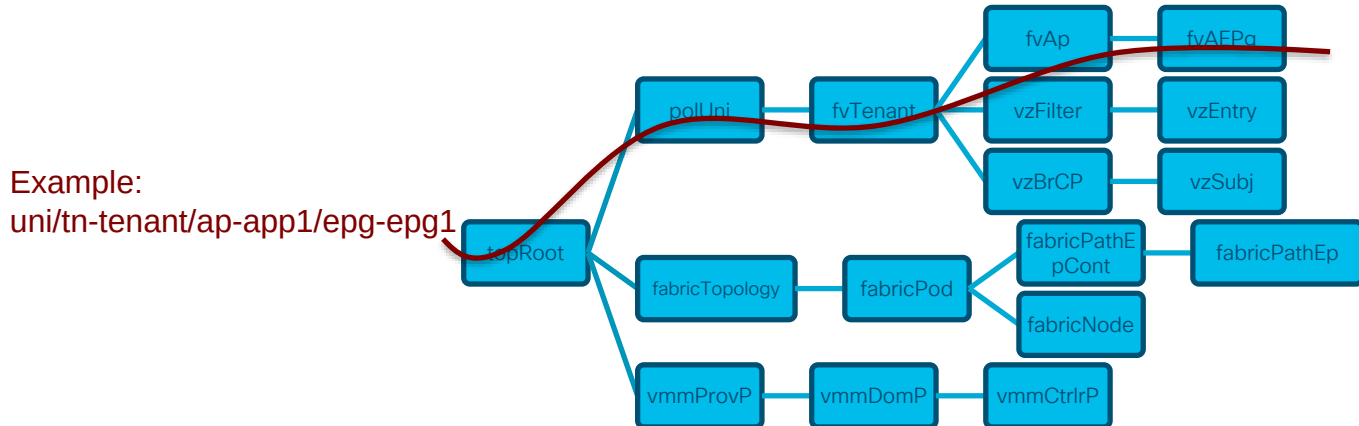
Distributed Management Information Tree (dMIT)

- Objects are structured in a tree-based hierarchy
 - **Everything** is an object
- Objects referred to as “managed objects” (MO)
- Every object has a parent, with exception of Root (top of tree, class: topRoot)
- Objects can be linked through relationships
Ex: fvRsBD links EPG (fvAEPg) to desired BD (fvBD)
- Distributed: Across all Fabric Node devices
Ex: class: fabricNode



Object Naming

- Objects have a Relative Name (RN) and Distinguished Name (DN)
- Similar to file system structure
 - RN = name of object; unique within the context of parent object
 - DN = used a globally unique ID for an object
- DN formed by appending RN to parent RN until root of tree is reached
 - $dn = \{rn\} / \{rn\} / \{rn\} / \{rn\} \dots$



Managed Object (MO) in ACI

- Everything in ACI is represented by a Managed Object (MO)
- Managed object is just an instance of some Class of objects
- MOs are organised in a Managed Information Tree (MIT)
- You can query or view the MIT in many different ways:
 - Visore : <https://apicP/visore.html>
 - Browsing MIT in shell : `cd /mit/...` or `cd /aci`
 - moquery : cli query utility to the DB
 - REST : postman, curl GET and POST
 - icurl (local REST client on apic/leaf)
 - Python SDK (ACI Toolkit, Cobra etc)

Understanding APIC MIT, Managed Objects is highly recommended to improve interactions between APIC component and improve troubleshooting efficiency.

Classes in the real world

Great, but classes/objects are too abstract and difficult
... how do we map classes/objects to the real world?

Class Car

Object Class Car is representing “data model” / template of a Car with all properties we need to create computer model of a car

```
{  
  property => value  
  
  dn => distinguished name - exact location of  
        the car object in our pool of cars  
  
  make => describing the car manufacturer  
  
  model => specific model  
  
  colour => car colour  
  
  coolness => Subjective grade of the actual object  
  
  modTs => Date ... modification TimeStamp  
}
```

Enlisted properties are just selected based on our choice and desired set of information we wanted to know about the cars, for the purpose of this presentation.

Obviously, if we wanted to represent detailed object model of real car we would have added many more properties such as tires, engine etc.

Properties in ACI Classes are obviously predefined as part of ACI Policy Model.

Example object instance of a class Car

```
{  
  dn: "bru-airport/expo-bmw-1"  
  make: "BMW",  
  model: "550i",  
  colour: "gold",  
  coolness: "fancy",  
  price: 50000,  
  modTs: "Jan/09/2016",  
  imgUrl: https://...  
}
```



Another object instance of a Class Car

```
{  
  dn: "carHistory/yugo55-1"  
  make: "Yugo",  
  model: "55",  
  colour: "red",  
  coolness: "NA",  
  price: 3990,  
  modTs: "01/01/1985",  
  imgUrl: "https://..."  
}
```



* photo source: Alden Jewell

Array of objects

```
[  
  { id: 1, make: "BMW", model: "550i", colour: "gold", coolness:  
    "high", price: "50000", modTs: "01/01/2016"},  
  { id: 2, make: "Yugo", model: "55", colour: "red", coolness: "NA",  
    price: "3990", modTs: "01/01/1985" }  
  ...  
]
```

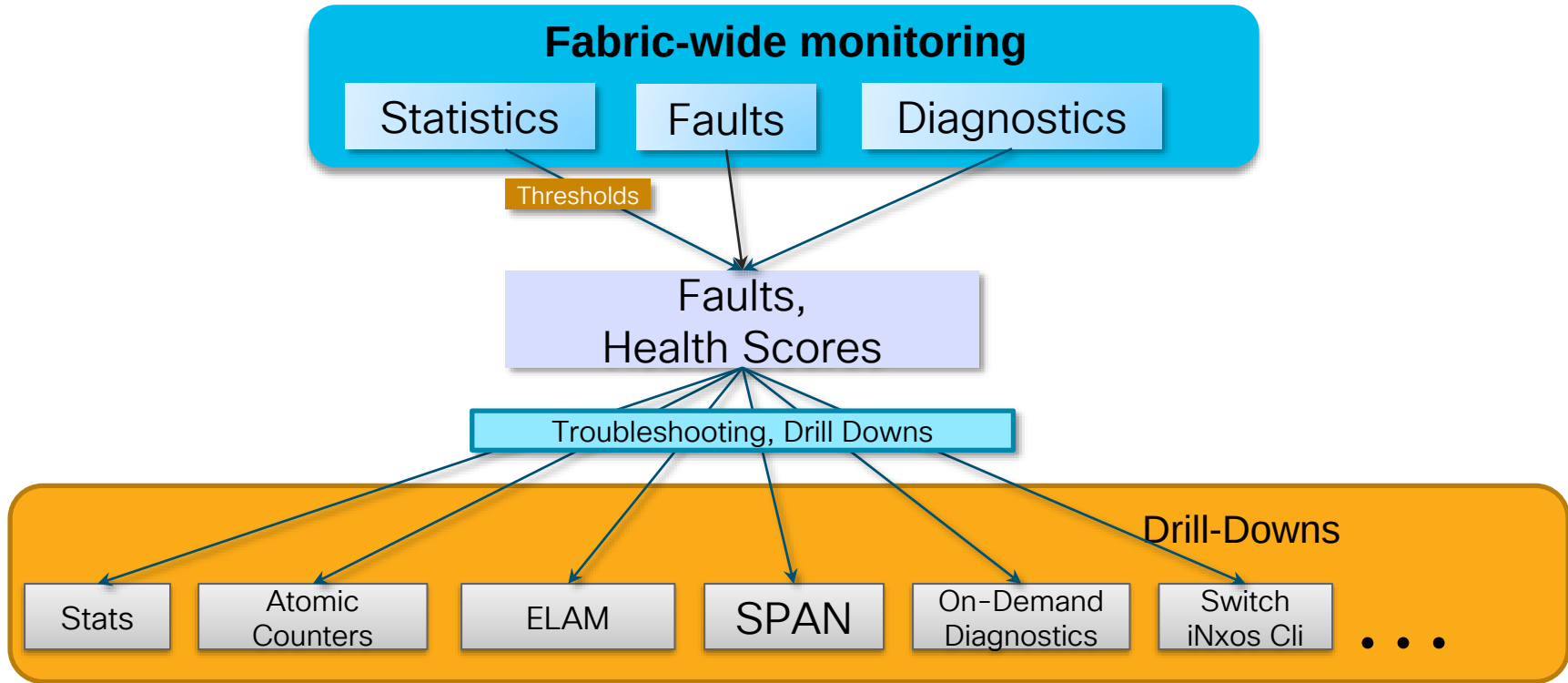
Single object instance is contained within curly braces: { property: value }

Array of objects is contained within square braces, delimited by comma:

```
[ {object 1}, {object 2}, {object 3} ... ]
```

Fabric Health Overview

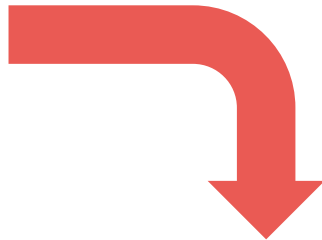
Troubleshooting: Where do we start?



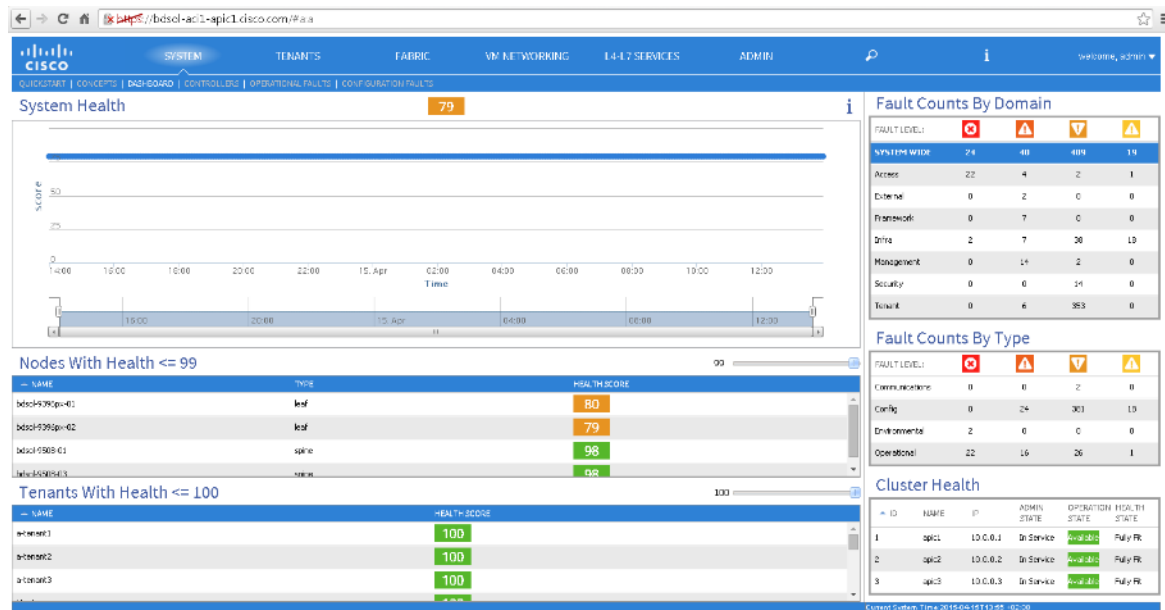
SIGN IN

User ID:
 Password:
 Domain:

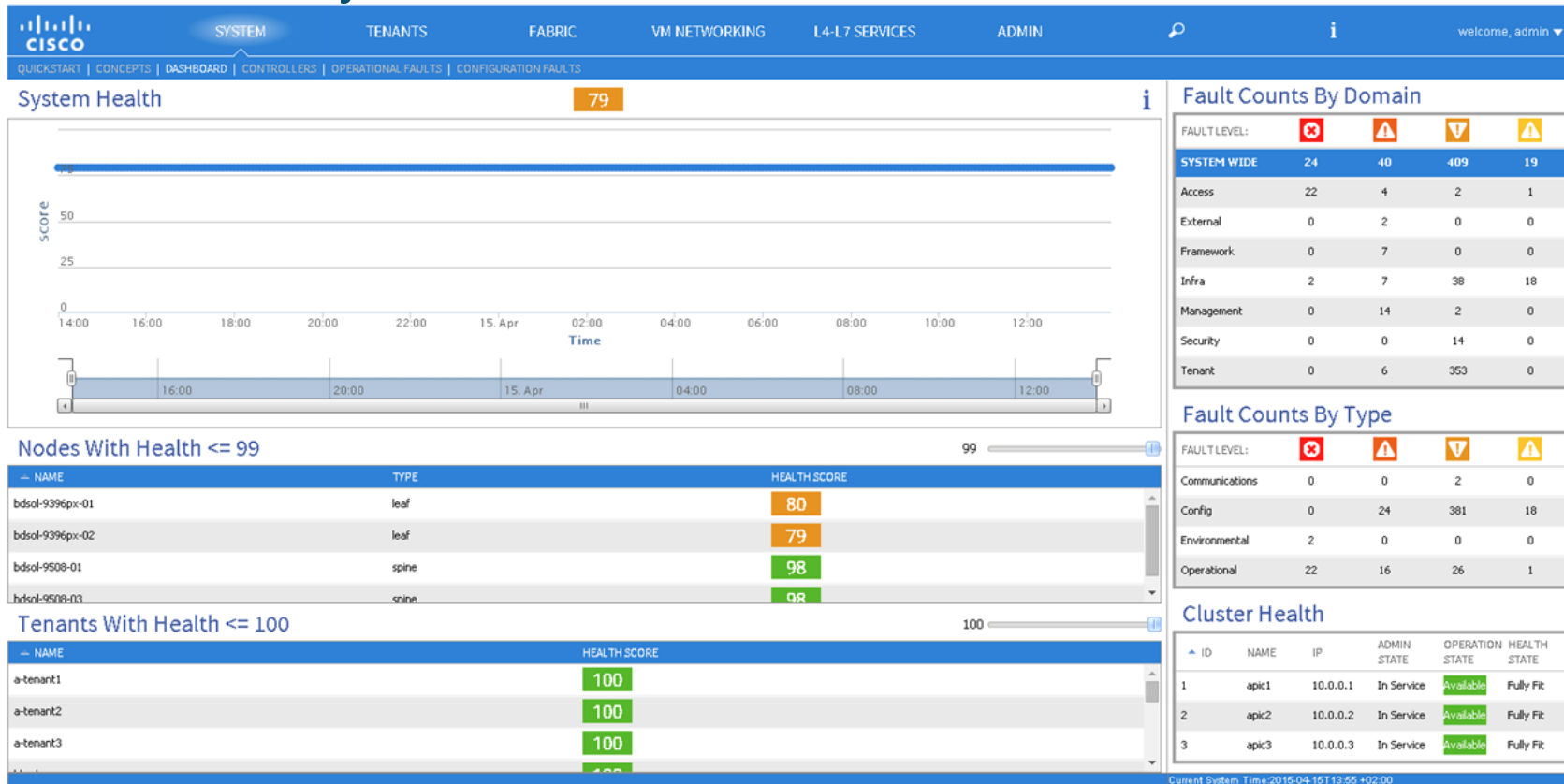
LOGIN



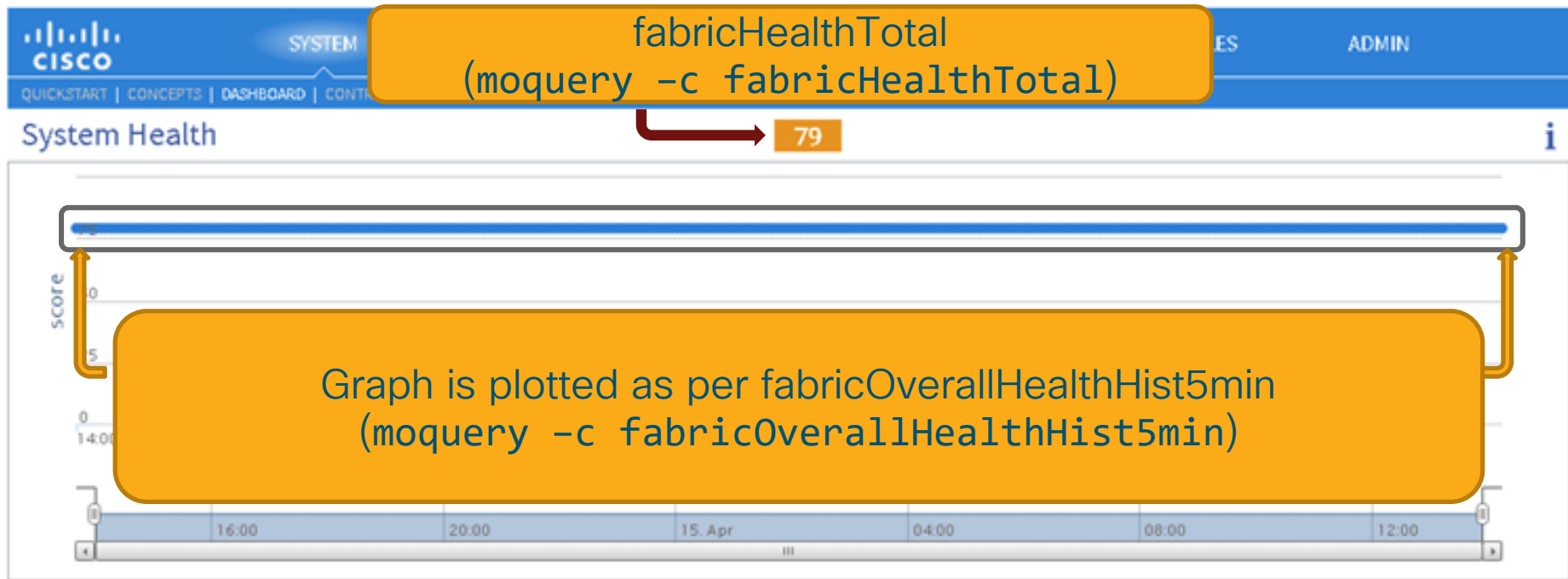
After logging in to the APIC, you'll see the initial 'Dashboard' screen.



The APIC dashboard provides you with an 'at-a-glance' view of the system health and fault counts.



‘System Health’ shows you a view of the **overall health** of the ACI system (all nodes, tenants, etc).



API Inspector enables us to see REST API calls (GET, DELETE, POST) from WebUI to APIC

The screenshot displays the Cisco APIC WebUI interface. The top navigation bar includes tabs for SYSTEM, TENANTS, FABRIC, VM NETWORKING, L4-L7 SERVICES, and ADMIN. The left sidebar shows a navigation menu with options like QUICKSTART, CONCEPTS, DASHBOARD, CONTROLLERS, COMMUNICATIONS/ENVIRONMENTAL/OPERATIONAL FAULTS, and CONFIGURATION FAULTS. The main content area is divided into two sections: System Health and Fault Counts By Domain.

The System Health section features a line graph showing the score over time. The score is currently 82. The Fault Counts By Domain section displays a table of fault counts for various domains.

The terminal window shows the following REST API call and response:

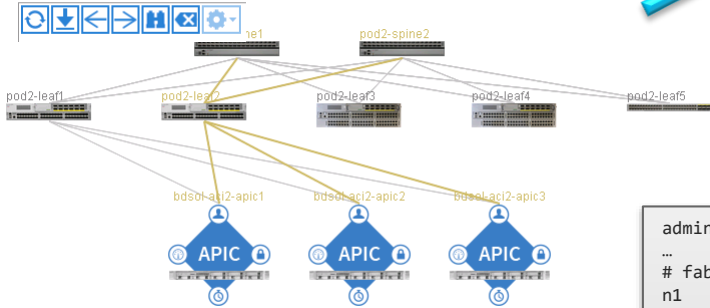
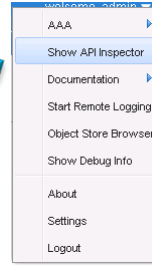
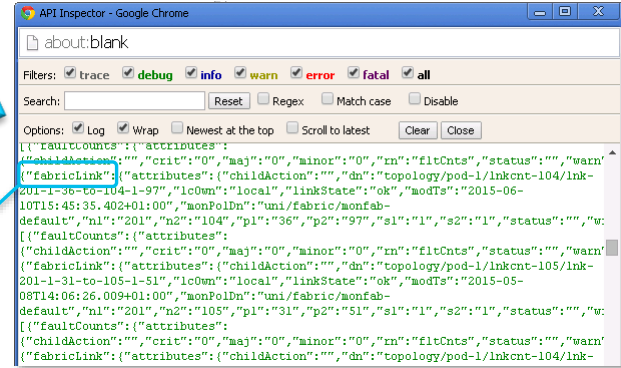
```
admin@apic1> moquery -d "/topology/HDfabricOverallHealth5min-0"
Total Objects shown: 1

# fabric.OverallHealthHist5min
index      : 0
childAction :
cnt        : 31
dn         : /topology/HDfabricOverallHealth5min-0
healthAvg  : 82
healthMax  : 82
healthMin  : 82
healthSpc  : 0
healthThr  :
healthTr   : 0
index      : 0
lastCollOffset : 310
modTs      : never
repIntvEnd : 2015-04-10T19:24:03.530+01:00
repIntvStart : 2015-04-10T19:18:53.442+01:00
rn         : HDfabricOverallHealth5min-0
status     :
```

Prefer JSON or XML instead of text in moquery?
-> no problem
just specify "-o json" or "-o xml" with moquery

How is topology built?

Topology



- APIC WebUI and API inspector
- Identify which objects are used to plot topology
- Re-using fabricLink objects to identify the links
- We could create our own tool for topology, monitoring or troubleshooting

```
admin@apic1:~> moquery -c fabricLink
...
# fabric.Link
n1      : 203
s1      : 1
p1      : 1
n2      : 101
s2      : 1
p2      : 51
dn      : topology/pod-1/lnkcnt-101/lnk-203-1-1-to-101-1-51
lcOwn   : local
linkState : ok
modTs   : 2015-03-13T14:26:39.526+01:00
monPolDn : uni/fabric/monfab-default
rn      : lnk-203-1-1-to-101-1-51
status  :
wiringIssues :

admin@bdsol-aci2-apic1:~> moquery -c fabricLink | egrep -e ^dn | head -5
dn      : topology/pod-1/lnkcnt-1/lnk-102-1-2-to-1-2-2
dn      : topology/pod-1/lnkcnt-2/lnk-102-1-4-to-2-2-2
dn      : topology/pod-1/lnkcnt-3/lnk-102-1-6-to-3-2-2
dn      : topology/pod-1/lnkcnt-201/lnk-102-1-49-to-201-1-34
dn      : topology/pod-1/lnkcnt-202/lnk-102-1-50-to-202-1-34
```

Visore - Web based MO query and browser tool

<https://<IP>/visore.html>

← → ↻ ↺ <https://bdsol-ac11-apic1.cisco.com/visore.html?f=filter&challenge=9f6ddd6332c721dbc4044a05458f1aae954>

APIC Object Store Browser

Filter

Class or DN:

Property: Op: Val1: Val2:

[Display URI of last query](#)

`/api/node/class/fabricNode.xml?query-target-filter=and(eq(fabricNode.id,"101"))`

[Display last response](#)

```
<?xml version="1.0" encoding="UTF-8"?><imdata
totalCount="1"><fabricNode adSt="on" childAction=""
delayedHeartbeat="no" dn="topology/pod-1/node-101"
fabricSt="active" id="101" lcOwn="local" modTs="2015-
04-08T14:38:44.546+02:00" model="N9K-C9396PX"
in ishell "ctrl+V ?"
in bash "?"
monPolDn="uni/fabric/monfab-default" name="bdsol-
leaf" serial="SAL18CLUS15" status=""
```

```
uid="0" vendor="Cisco Systems, Inc"
version=""></imdata>
```

`curl 'http://localhost:7777/api/node/class/fabricNode.xml?query-target-filter=and(eq(fabricNode.id,"101"))'`

[fabricNode](#)

adSt	on
childAction	
delayedHeartbeat	no
dn	topology/pod-1/node-101
fabricSt	active
id	101
lcOwn	local
modTs	2015-04-08T14:38:44.546+02:00
model	N9K-C9396PX
monPolDn	uni/fabric/monfab-default
name	bdsol-9396px-02
role	leaf
serial	SAL18CLUS15
status	
uid	0
vendor	Cisco Systems, Inc
version	

The lower half of the screen shows node and tenant health.

Nodes With Health <= 99

99 

NAME	TYPE	HEALTH SCORE
bdsol-9396px-01	leaf	80
bdsol-9396px-02	leaf	79
bdsol-9508-01	spine	98
bdsol-9508-03	spine	98

Tenants With Health <= 100

100 

NAME	HEALTH SCORE
a-tenant1	100
a-tenant2	100
a-tenant3	100

The lower half of the screen shows node and tenant health.

Nodes With Health <= 99

NAME	TYPE
bdsol-9396px-01	leaf
bdsol-9396px-02	leaf
bdsol-9508-01	spine
bdsol-9508-03	spine

Move these sliders down to show only nodes / tenants with lower health.

Tenants With Health <= 100

NAME	HEALTH SCORE
a-tenant1	100
a-tenant2	100
a-tenant3	100

On the right, you'll see the fault counts by domain (e.g. access, tenant, security)...

...type
(config, environmental, etc)...

...and APIC cluster health.

Fault Counts By Domain

FAULT LEVEL:				
SYSTEM WIDE	0	0	0	0
Access	0	0	0	0
External	0	0	0	0
Framework	0	0	0	0
Infra	0	0	0	0
Management	0	0	0	0
Security	0	0	0	0
Tenant	0	0	0	0

Fault Counts By Type

FAULT LEVEL:				
Communications	0	0	0	0
Config	0	0	0	0
Environmental	0	0	0	0
Operational	0	0	0	0

Cluster Health

ID	NAME	IP	ADMIN STATE	OPERATION STATE	HEALTH STATE
1	apic1	10.0.0.1	In Service	Available	Fully Fit

Using CLI / moquery to check/sort active faults (faultInst)

```
admin@apic1:~> moquery -c faultInst | egrep -e "^descr" | sort | uniq -c | sort -n
```

quickly sorts all active faults

```
1 descr          : Power supply shutdown. (serial number DCB1936Y3V7)
2 descr          : Address configuration failure. Reason: 1
2 descr          : Configuration is invalid due to VlanInstP ... Allocation mode should be dynamic.
2 descr          : Configuration is invalid due to internal error occurred ...
2 descr          : Failed to form relation to M0 uni/phys-TO_N3K of class physDomP
2 descr          : Service graph for tenant FG-Test could not be instantiated. ...
4 descr          : Deployment of EPG failed on Controller: ...
4 descr          : power supply missing
```

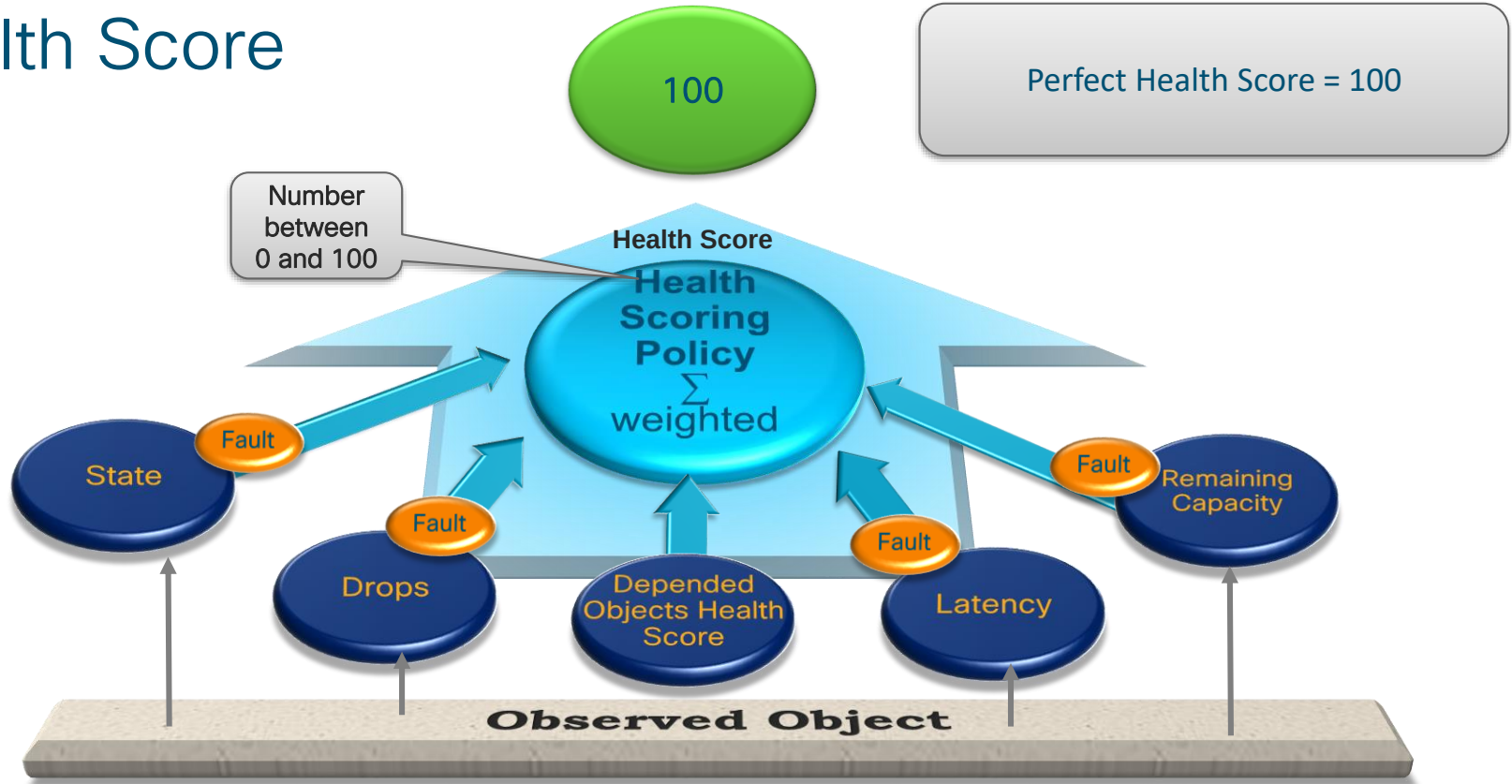
Now we could query all faults details by criteria – such as **fault description**
fault.Inst.descr

```
moquery -c faultInst -f 'fault.Inst.descr=="power supply missing"'
```

```
show faults ?
```

Show commands also available as more user friendly

Health Score



Tools and utilities

Network Monitoring and Troubleshooting Tools

Physical Network

- ping
- traceroute
- show (interface / table / etc)
- syslog
- SPAN
- tcpdump

Abstracted Network

- properties (EP / TEP / contract)
- health scores / faults / events / audit
- iping, itraceroute
- statistics
- diagnostics (on-demand)
- SPAN
- ELAM

Standard UI Tools

Health



Faults

Fault Counts By Domain

Fault Level:	0	0	0	0
SYSTEM WIDE	0	0	0	0
Access	0	0	0	0
External	0	0	0	0
Framework	0	0	0	0
Infra	0	0	0	0
Management	0	0	0	0
Security	0	0	0	0
Tenant	0	0	0	0

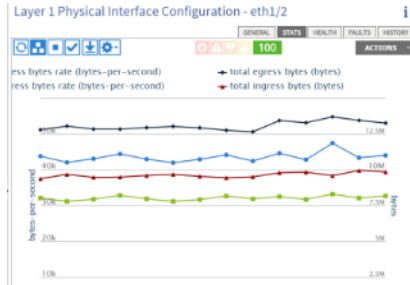
Audits

Audit log record showing a modification log record for a system object. The record includes details such as the affected object, time stamp, and action performed.

Events

Event record showing a record for a system object. The record includes details such as the affected object, time stamp, and action performed.

Statistics



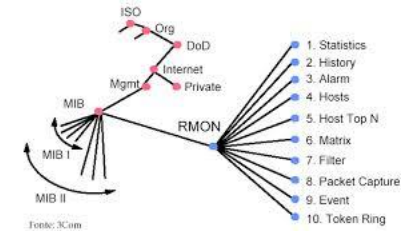
Call-home

Call-home configuration dashboard showing various settings. The dashboard includes sections for policies, settings, and status. The dashboard is labeled 'Call-home'.

Syslogs

Syslog configuration dashboard showing various settings. The dashboard includes sections for policies, settings, and status. The dashboard is labeled 'Syslog'.

SNMP



UI Operations Tools

- Visibility & Troubleshooting (also known as Troubleshooting Wizard – TsW)
- Capacity Dashboard
- ACI Optimiser
- EP Tracker
- Visualisation

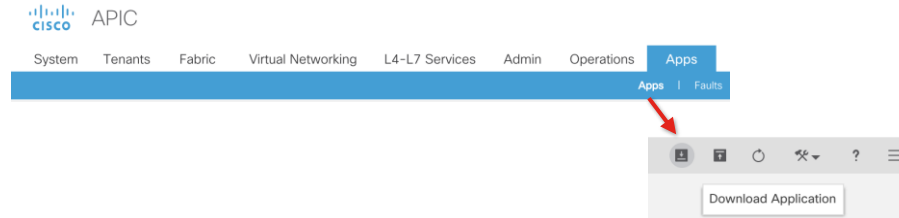
ACI Apps for Troubleshooting and Operations

ACI 2.2

- ELAM Assistant
- Enhanced Endpoint Tracker
- StateChangeChecke
- Ftriage
- Contract Viewer
- VisuDash
- Krowten
- FaultAnalytics

ACI 4.0

- Network Insights - Resources
- Network Insights - Advisor
- Cisco Application Base Package
 - Search
 - APIC Postman
 - Contract Viewer
 - VisuDash



<https://aciappcenter.cisco.com>

moquery – CLI based MO query tool

```
admin@apic1:~> moquery -c fabricNode -f 'fabric.Node.id=="1"'
Total Objects shown: 1
```

```
# fabric.Node
id           : 1
adSt         : on
delayedHeartbeat : no
dn           : topology/pod-1/node-1
fabricSt     : unknown
lcOwn        : local
modTs        : 2015-04-08T14:27:16.290+02:00
model        : APIC
monPolDn     : uni/fabric/monfab-default
name         : apic1
rn           : node-1
role         : controller
serial       : SAL18CLUS15
status       :
uid          : 0
vendor       : Cisco Systems, Inc
version      :
```

Displayed command will fetch all objects of specific class matching provided filter:

class: fabricNode
filter: fabricNode.id == 1

In this case this would mean we're looking for fabricNode object representing APIC1. Since we didn't specify output type, it will show plain text output by default. Try out **"-o json"** to retrieve json

moquery – some examples

... or simply use WebUI 😊

- Find all EPGs with static path access encapsulation VLAN 3399

```
moquery -c fvRsPathAtt -o json -f 'fv.RsPathAtt.encap=="vlan-3399"'
```

- Obtain AAEP based on interface policy group

```
moquery -c "infraAccPortGrp" | egrep "^dn" | awk '{print "moquery -d \"$3\" -x query-target=children \\\| egrep tDn\"}'
```

- Query the actual policy group

```
moquery -d "uni/infra/funcprof/accportgrp-N3k_PG_ddastoli" -x query-target=children
```

Check “**show cli list**” to view all CLI commands available

which sometimes may be simpler than looking for class to check with moquery

APIC Logs

- /var/log/dme/log
- /var/log/dme/oldlog

```
admin@apic1:~> cd /var/log/dme/log
admin@apic1:log> ls -altr *
admin@apic1:log> ls -al svc_ifc_policymgr.*
...
```

Switch Logs

- /var/log/dme/log
- /var/log/dme/oldlog
- /var/sysmgr/tmp_logs/

```
admin@apic1:~> cd /var/log/dme/log
admin@apic1:log> ls -altr *
admin@apic1:log> ls -al svc_ifc_policyelem.*
```

acidiag – your friend at tough times

```
admin@apic1:~> acidiag --help
```

```
...
```

avread	read appliance vector
fnvread	read fabric node vector
fnvreadex	read fabric node vector (extended mode)
rvread	read replica vector
rvreadle	read replica leader summary
crashsuspecttracker	read crash suspect tracker state
validateimage	validate image
version	show ISO version
preservelogs	stash away logs in preparation for hard reboot
platform	show platform
verifyapic	run apic installation verify command
bond0test	run bond0 test
touch	touch special files
run	run specific commands and capture output
installer	installer
start	start a service
stop	stop a service
restart	restart a service
reboot	reboot

icurl – CLI utility for data transfer

We could import this data to Elastic Stack and Visualise using Kibana

We can import and analyze active faults, fault history, events history, accounting log, login history

```
mkdir /tmp/tac-655555555
cd /tmp/tac-655555555
icurl 'http://localhost:7777/api/class/faultInfo.json' -o faultInfo.json
icurl 'http://localhost:7777/api/class/faultRecord.json' -o faultRecord.json
icurl 'http://localhost:7777/api/class/eventRecord.json' -o eventRecord.json
icurl 'http://localhost:7777/api/class/aaaModLR.json' -o aaaModLR.json
icurl 'http://localhost:7777/api/class/aaaSessionLR.json' -o aaaSessionLR.json
cd /tmp
tar zcvf tac-655555555.tgz tac-655555555
cp tac-655555555.tgz /data/techsupport
```

Now you may download file from following URL:
<https://apic/files/1/techsupport/tac-655555555.tgz>

We might want to paginate icurl output to be able to fetch 100K entries or more:

```
icurl "http://localhost:7777/api/class/faultRecord.json?page-size=10000&page=[0-50]&order-by=faultRecord.created|asc" -o "faultRecord-#1.json"
```

Troubleshooting scenarios

EP Learning scenarios

*Server team just connected new server,
gave us only server's MAC or IP and
claim they can't reach default GW in ACI
fabric?!*

Troubleshooting Scenario

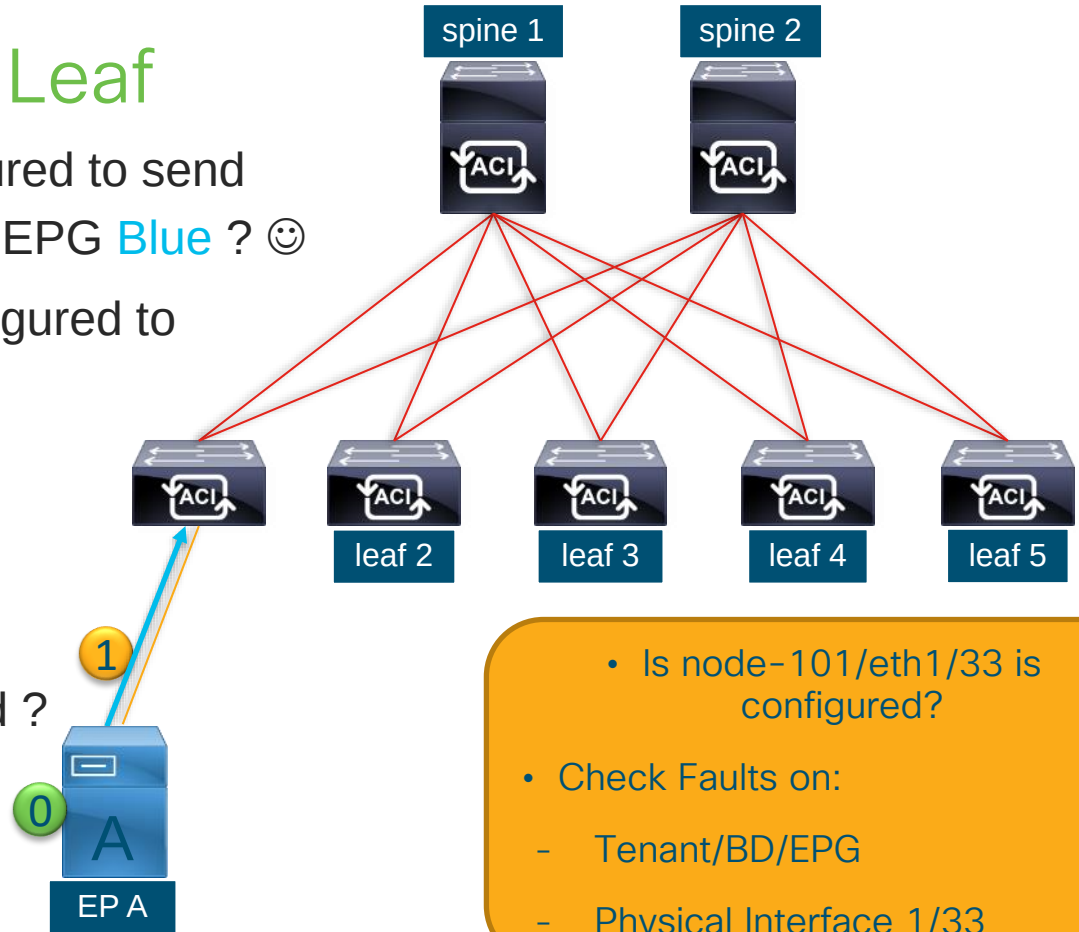
EPG Blue: EP-A to Leaf

0 Assuming Server A is configured to send traffic on encap we expect for EPG Blue ? 😊

1 Is ACI Leaf 1 (node-101) configured to receive traffic from EP-A?

- interface profile/selector ?
- interface policy group ?
- switch profile/selector ?
- VLAN pool ?
- Domain created + assigned ?

During initial config, people usually forget one of the constructs mentioned above

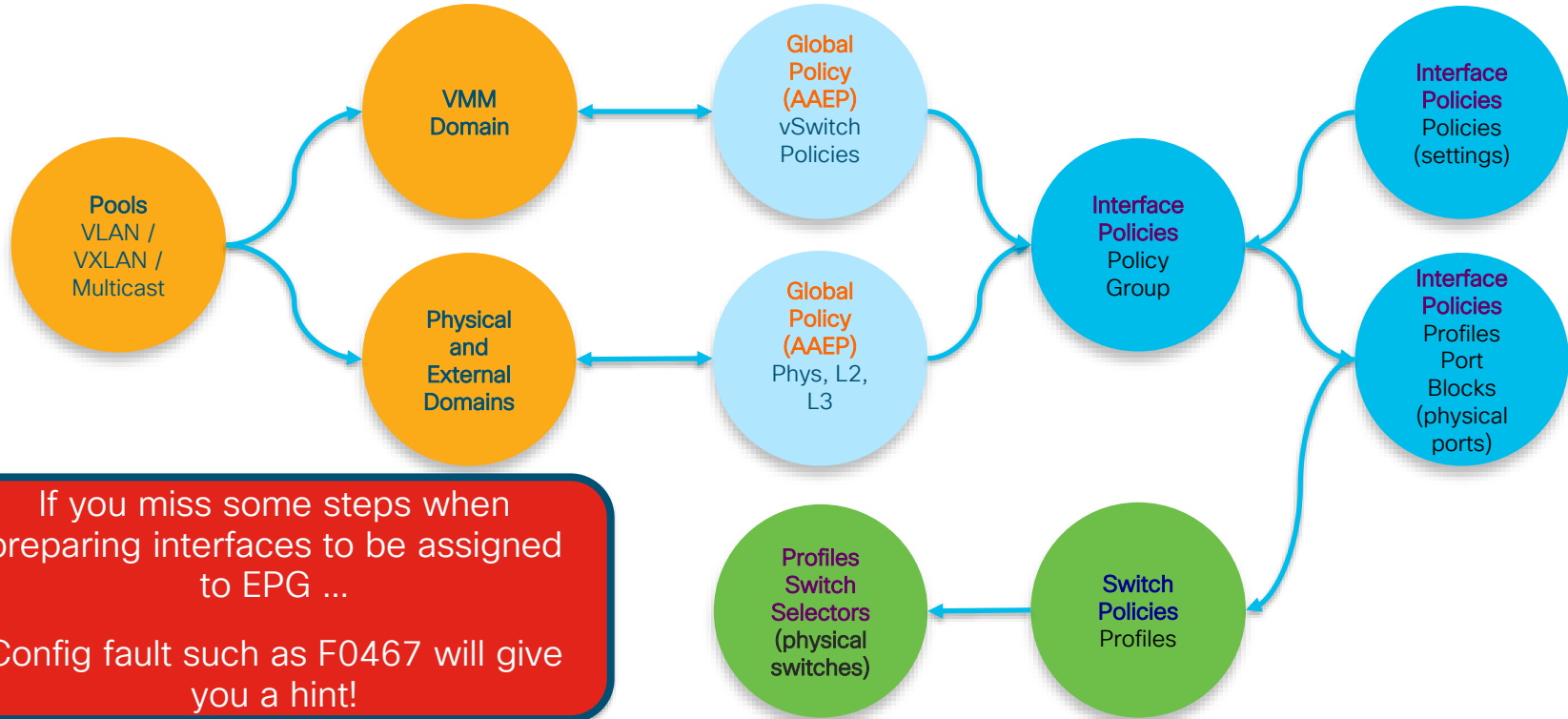


- Is node-101/eth1/33 is configured?

- Check Faults on:

- Tenant/BD/EPG
- Physical Interface 1/33

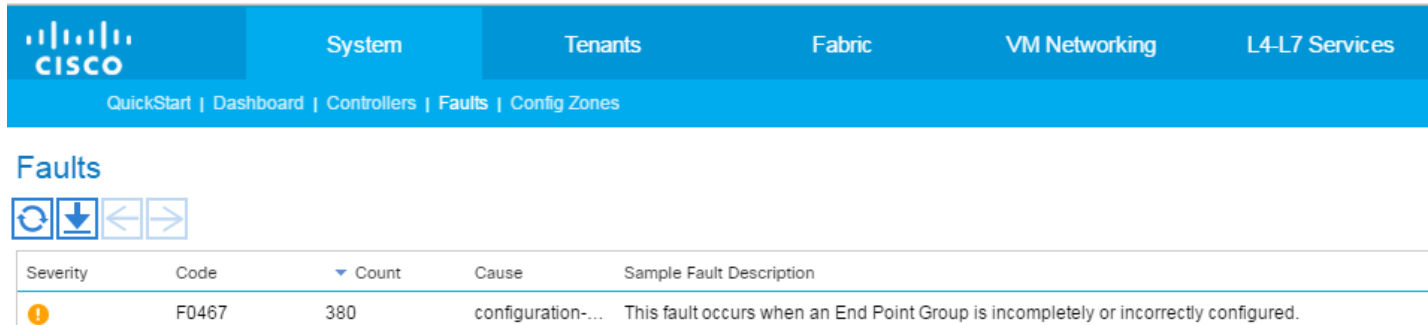
Physical Interface Configuration Workflow



First point to consider

Are you sure config is correct?

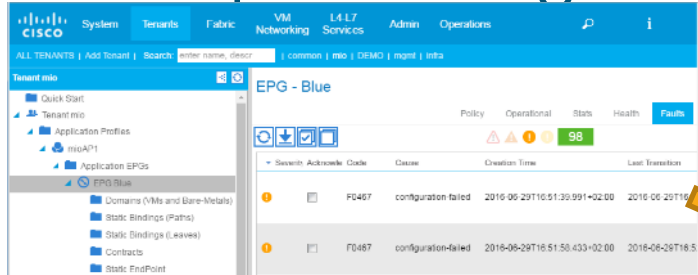
Check System → Faults



The screenshot shows the Cisco SD-WAN management interface. The top navigation bar includes the Cisco logo and tabs for System, Tenants, Fabric, VM Networking, and L4-L7 Services. Below this is a secondary navigation bar with links to QuickStart, Dashboard, Controllers, Faults, and Config Zones. The main content area is titled 'Faults' and contains a set of icons (refresh, download, left arrow, right arrow) and a table of fault data.

Severity	Code	Count	Cause	Sample Fault Description
!	F0467	380	configuration-...	This fault occurs when an End Point Group is incompletely or incorrectly configured.

Example Config fault on EPG



Fault Properties

General History

Severity: minor
Last Transition: 2016-06-29T16:52:36.167+02:00
Lifecycle: Raised

Affected Object: topology/pod-1/node-101/local/svc-policyelem-id-0/uni/epfv-[unit/mio/ap-mioAP1/epg-Blue]node-101/stpathatt-[eth1/34]/mwiisues

Description: Configuration failed for unit/mio/ap-mioAP1/epg-Blue node 101 eth1/34 due to Encap Already Used in Another EPG,Invalid Path Configuration

Explanation:
This fault occurs when an End Point Group is incompletely or incorrectly configured.

Recommended Action:
If you see this fault, take the following actions:

Look at the configuration for issues
For bd-not-present, this could be a temporary issue when the bridge domain has not yet been deployed to the node. If the EPG is associated with the default bridge domain, check the Connectivity Instrumentation Policy
For context-not-present, this could be a temporary issue while the VRF has not yet been deployed to the node. If the EPG is associated with the default VRF, check the Connectivity Instrumentation Policy under Networking / Protocol Policies in common tenant
For vlan-capacity, check that the number of configured EPGs and bridge domains deployed on a node do not exceed the supported number
For vlan-capacity, check that the number of configured EPGs, bridge domains and VRFs deployed on a node do not exceed the supported number
For invalid-path, check that the configured path exists and is valid. Following issues are possible: The path (i.e. portport-channel/Attachable-Profile/Loose-Node) getting referred does not exist on the node. The domain associated with the EPG is not allowed to use the specified path. Check the Attachable Profile configuration associated with the domain. The path (i.e. portport-channel/Attachable-Profile/Loose-Node) is deployed on FEX and is part of I2Out/I3Out I2Out and I3Out are NOT supported on FEX
For port-part-of-port-channel, the configured interface is already configured as a port channel member
For port-configured-as-l3, the configured interface is already configured as L3
For port-configured-as-l2, the configured interface is referring to an interface that is already configured as L2
For port-configured-for-fex, the configured interface is already configured for attaching to a FEX
For port-configured-for-apic, the configured interface is connected to a controller
For port-channel-capacity, check that the number of configured port channels deployed on a node do not exceed the supported number
For native-or-untagged-encap-failure, multiple encaps are configured as native or untagged on the same path. Check the configured mode type
For multiple-external-encap, a bridge domain can be extended outside the fabric using only one external encap per node
For multiple-ctx-configuration, an L3 interface can belong to only 1 VRF at a time
For encap-already-in-use, another EPG is already configured using this encap
For invalid-vlan, this EPG's encap is not valid for the domain on which the EPG is configured

If Fault is in "Raised" state it will not go away on it's own! You need to remedy the cause!

By checking details of the Fault we can already learn a lot!

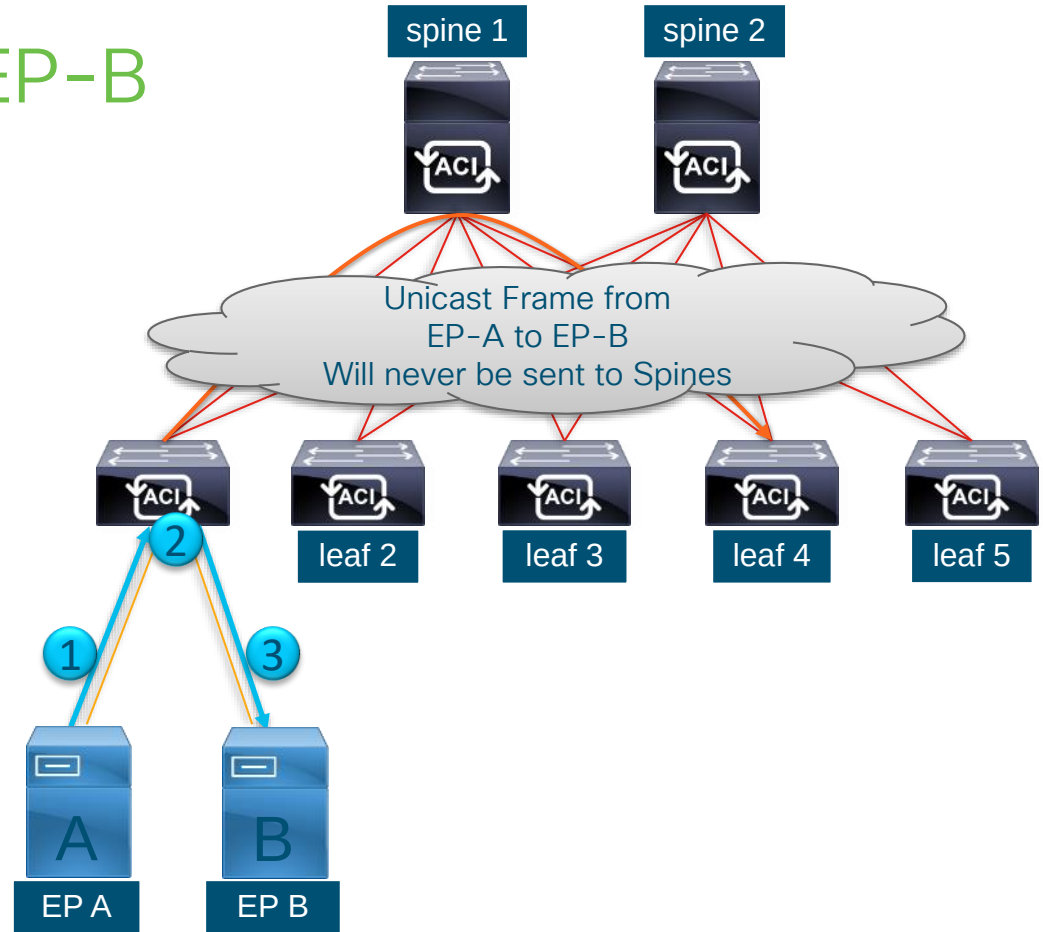
Read carefully recommended actions to resolve the config issue!

EPG Blue: EP-A to EP-B

- 1 Regular L2 packet
- 2 Switched in L2
- 3 Regular L2 packet

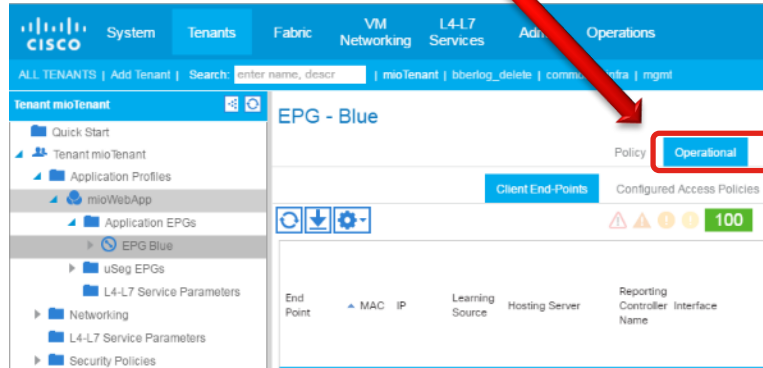
Same VLAN on same Leaf
is switched without going
to Spine

No need to check path to
Spine – Orange line



Check if Leaf 1 knows about EP A from GUI

- Navigate to EPG Blue
- Click on “Operational”



- Known Endpoints will be enlisted

End Point	MAC	IP	Learning Source	Hosting Server	Reporting Controller Name	Interface	Multicast Address	Primary VLAN For Micro-Seg	Port Encap (Or Secondary VLAN For Micro-Seg)
EP-00:50:56:92:A8:48	00:50:56:92:A8:48	172.16.1.11	learned	---	---	Node-101/eth1/33 (learned)	---	---	vlan-3399

Local Endpoints are learned when they start originating traffic



When EP-A sends traffic on the wire in Encap for EPG Blue



Great ... but what if EP is not listed in GUI?

The screenshot displays the Cisco GUI for EPG - Blue configuration. The left sidebar shows the navigation tree with 'EPG Blue' selected under 'Application EPGs'. The main content area shows the 'Operational' tab with a 'Client End-Points' sub-tab. A table header is visible with columns: End Point, MAC, IP, Learnir Source, Hosting Server, Reporting Controller Name, and Interface. A red box highlights the message: 'No items have been found. Select Actions to create a new item.'

• Why is EPG 100% healthy, yet we don't have EP-A enlisted?

This means config is accepted ... but likely we are not receiving any traffic on expected encap.

We can check EPG and encap from GUI or CLI this is just example in APIC CLI

```
apic1# show epg Blue detail
Application EPG Data:
Tenant                : mio
Application            : mioAP1
AEPg                  : Blue
BD                    : mioBD1
Vlan Domains          : mioPD1
Consumed Contracts    :
Provided Contracts    : default
Denied Contracts      :
Qos Class              : unspecified
```

...

Static Paths:

Node	Interface	Encap	Modification Time
-----	-----	-----	-----
101	eth1/33	vlan-3395	2016-06-29T18:01:21.501+02:00
101	eth1/34	vlan-3395	2016-06-29T16:36:41.960+02:00

Check your Encap ... are you expecting traffic on
VLAN 3395 ?

No ... we wanted
VLAN 3399 for EPG Blue on leaf1 eth1/33!
:/ OK, then please fix your config - change EPG Encap to
vlan-3399

OK ... we fixed EPG Encap config in GUI, but still no EP ... ?

The screenshot shows the Cisco GUI for EPG configuration. The left sidebar lists the navigation tree, with 'EPG Blue' selected under 'Application EPGs'. The main content area displays the 'Operational' tab for 'EPG - Blue'. Below the tab, there are icons for refresh, download, and settings. A status bar shows a green '100' indicating 100% health. Below this, a table header is visible with columns: End Point, MAC, IP, Learnir Source, Hosting Server, Reporting Controller Name, and Interface. A message box at the bottom states: 'No items have been found. Select Actions to create a new item.'

Why is EPG 100% healthy, yet we don't have EP-A enlisted?

Again this means config is accepted ... but likely we are not receiving any traffic on that encap.

We could check interface

“fabric 101 ...” command is available as of APIC 1.2
if you’re running older release, just remove “fabric 101” and execute same command on the switch

```
apic1# fabric 101 show int eth 1/33 status
```

```
-----  
Node 101 (leaf1)  
-----
```

link on eth1/33 seems to be Up

```
-----  
Port           Name           Status      Vlan      Duplex  Speed  Type  
-----  
Eth1/33        --            connected   trunk     full    10G    SFP-H10GB-C
```

```
apic1# fabric 101 show int eth 1/33 switchport
```

```
-----  
Node 101 (leaf1)  
-----
```

```
Name: Ethernet1/33
```

```
Switchport: Enabled
```

```
Operational Mode: trunk
```

```
Access Mode Vlan: 13 (default)
```

```
Trunking Native Mode VLAN: unknown (default)
```

```
Trunking VLANs Allowed: 13,15-16,18-19,24-25,28-29,33-36,38-65,67-82,85-86,88,90,96-97,99-101
```

```
...
```

```
Operational private-vlan: none
```

We see many VLANs enabled, but this is not 3399 that we expected?
(don’t get confused – VLAN id is locally significant – per switch)
If you really want to know how VLAN mapped locally ... check next slide

We could check VLANs on leaf1

```
apic1# fabric 101 show vlan extended
```

```
...
```

VLAN	Name	Status	Ports
13	infra:default	active	Eth1/2, Eth1/4, Eth1/6, Eth1/34, Po1

```
...
```

89	mio:mioBD1	active	Eth1/33, Eth1/34
90	mio:mioAP1:Blue	active	Eth1/33, Eth1/34
91	mio:mioAP1:mioEPG2	active	Eth1/33, Eth1/34
92	mio:mioExtL2	active	Eth1/34

VLAN	Type	Vlan-mode	Encap
13	enet	CE	vxlان-16777209, vlan-3953
89	enet	CE	vxlان-15925209
90	enet	CE	vlan-3399
91	enet	CE	vlan-3398
92	enet	CE	vxlان-15564693

```
...
```

Hint: tenant:AP:EPG
mio:mioAP1:Blue

EPG Blue on leaf1 is mapped to VLAN 90

VLAN	Type	Vlan-mode	Encap
90	enet	CE	vlan-3399

We're sure that:

- Config is ok => no Faults
- Interface eth1/33 is ok => Up
- Correct VLAN is enabled => 3399

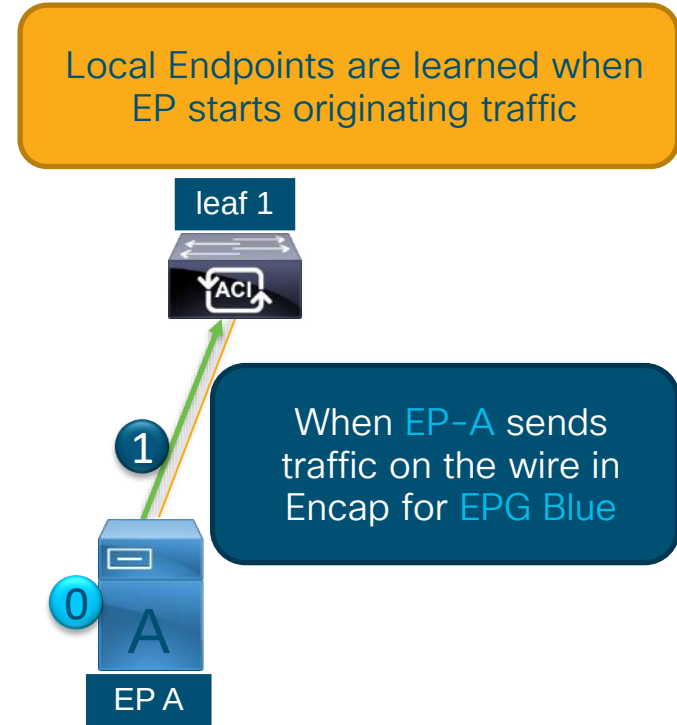
Ok so what next?

- Inform server team they need to check their config!

Is Server A owner sure they are sending traffic?

- Ask Server A admin to:
- check uplink int status on Server A
- check CDP/LLDP (if available)
- check encap VLAN (port-group)
- check teaming

If all is checked we'll learn Endpoint!



We could also check endpoints from APIC CLI

```
apic1# show endpoint ip 172.16.1.11
```

Legends:

(P):Primary VLAN

(S):Secondary VLAN

Dynamic Endpoints:

Tenant : mio

Application : mioAP1

AEPg : Blue

```
# show endpoints ?
```

```
<CR>
```

```
ip      IP address in format i.i.i.i
```

```
ipv6    IPv6 address in format xxxx:xxxx, xxxx::xx
```

```
leaf    Show IP endpoints on a leaf
```

```
mac     MAC address
```

```
type    Endpoint Type
```

```
vlan    Encapsulation Vlan
```

```
vpc     Show IP endpoints on vpc
```

End Point MAC	IP Address	Node	Interface	Encap	Multicast Address
00:50:56:92:A8:48	172.16.1.11	101	eth1/33	vlan-3399	not-applicable

Total Dynamic Endpoints: 1

Total Static Endpoints: 0

don't run **"show endpoint"** without parameters

...

Since you may be listing many, many ... many entries ...

If we know IP/MAC we could also check on the Leaf

```
leaf1# show endpoint
```

```
leaf1# show endpoint mac 0050.5692.a848
```

```
leaf1# show endpoint | egrep a848
```

```
leaf1# show endpoint | egrep 0050.56
```

```
leaf1# show endpoint ip 172.16.1.11
```

Legend:

O - peer-attached	H - vtep	a - locally-aged	S - static
V - vpc-attached	p - peer-aged	L - local	M - span
s - static-arp	B - bounce		

VLAN/ Domain	Encap VLAN	MAC Address IP Address	MAC Info/ IP Info	Interface
90	vlan-3399	0050.5692.a848 L		eth1/33
mio:mioCtx1	vlan-3399	172.16.1.11 L		eth1/33

We could invoke command from APIC to the switch

```
apic1# fabric 101 show endpoint mac 0050.5692.a848
```

```
-----  
Node 101 (bdsol-aci3-leaf1)  
-----
```

Legend:

O - peer-attached	H - vtep	a - locally-aged	S - static
V - vpc-attached	p - peer-aged	L - local	M - span
s - static-arp	B - bounce		

VLAN/ Domain	Encap VLAN	MAC Address IP Address	MAC Info/ IP Info	Interface
90	vlan-3399	0050.5692.a848 L		eth1/33
mio:mioCtx1	vlan-3399	172.16.1.11 L		eth1/33

We're using **"fabric 101"**

to execute command on node 101
from APIC

"fabric 101" command

is introduced as of APIC version 1.2

OK, so we see new server as Endpoint (EP) in EPG Blue, but can we ping it from the leaf ... in Tenant's VRF?

Troubleshooting Scenario

iPing CLI

Hint: To check list of VRF names:

show vrf

usage:

`iping [-V vrf] [-c count] [-S source ip] host`

options:

- `-V` : vrf to use for ping (management/overlay-1/Tenant VRF)
- `-c` : # of requests to send.
- `-i` : interval between ICMP echo packets.
- `-t` : Timeout for responses.
- `-p` : Data pattern in payload.
- `-s` : Size
- `-S` : Source - Interface name/ IP address.

iping from directly connected leaf

```
leaf1# iping -V tenant:vrf01 -S 172.16.1.1 172.16.1.22
```

Recommended: set the source IP address desired GW (BD IP)

- 1 leaf1: iping to Endpoint_A (EP_A)
- 2 EP_A (.22): responds to leaf1

Example above assumes EPG Blue belongs to BD which has IP 172.16.1.1 configured

Endpoint_A IP: 172.16.1.22

Note: iping is initiated from leaf1 since EP_A is learned on leaf1 packet will be sent out directly to ep, not going via spines

*iping looks awesome, but I'm getting
timeouts when pinging EP A ...
why EP-A doesn't respond to iping?*

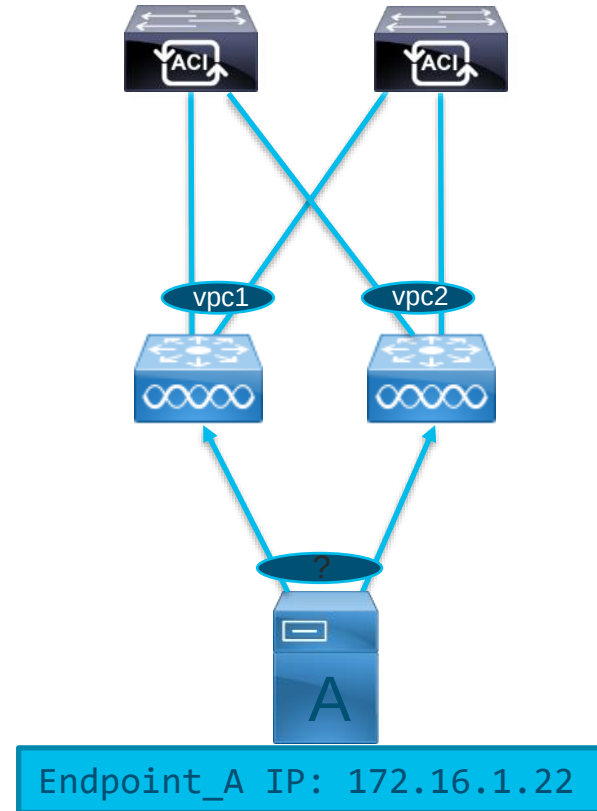
Troubleshooting Scenario

EP doesn't respond to iping

- Did EP-A learn ARP from BD's IP?
- Is EP-A directly connected to leaf1 of we have intermediate device?
- Do we have L2 Disjoint network?
- Is there additional logic in adjacent devices e.g. HP VC?

All of the above mentioned points play very important role in understanding and resolving EP connectivity.

If this is initial deployment, please consult design guidelines.



Check ARP from EP on Leaf/BD

Tcpdump on kpm_inb
Note that for ARP only ARP Rx
By CPU will be seen there

```
leaf2# tcpdump -xxvvi kpm_inb arp
```

```
tcpdump: listening on kpm_inb, link-type EN10MB (Ethernet), capture size 65535 bytes
```

```
14:34:03.289865 ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 10.200.1.1 tell 10.200.1.16,  
length 46
```

```
0x0000:  ffff ffff ffff 0050 568a 5429 0806 0001  
0x0010:  0800 0604 0001 0050 568a 5429 0ac8 0110  
0x0020:  0000 0000 0000 0ac8 0101 0000 0000 0000  
0x0030:  0000 0000 0000 0000 0000 0000
```

Example:
Arp process traces for
Endpoint IP 10.200.1.16

```
leaf2# show ip arp internal eve ev | egrep -B 1 "10.200.1.16"
```

```
10) Event:E_DEBUG_DSF, length:181, at 290447 usecs after Fri Sep 23 14:34:03 2016  
    [116] TID 9842:arp_process_receive_packet_msg:7186: log_collect_arp_pkt; sip = 10.200.1.16; dip  
    = 10.200.1.1;interface = Vlan159; phy_interface = Tunnel13;Info = Received arp request  
11) Event:E_DEBUG_DSF, length:145, at 290271 usecs after Fri Sep 23 14:34:03 2016  
    [116] TID 9842:arp_update_epm_payload:7447: Updating epm ifidx: 1801000d vlan: 162 ip:  
    10.200.1.16, ifMode: 128is_garp: 0, mac:  0 80 86 138 84 41  
12) Event:E_DEBUG_DSF, length:159, at 290241 usecs after Fri Sep 23 14:34:03 2016  
    [116] TID 9842:arp_process_receive_packet_msg:7100: log_collect_arp_pkt; sip = 10.200.1.16; dip  
    = 10.200.1.1;interface = Vlan159; Info = DIP local on interface.  
13) Event:E_DEBUG_DSF, length:156, at 290237 usecs after Fri Sep 23 14:34:03 2016  
    [116] TID 9842:arp_process_receive_packet_msg:6943: log_collect_arp_pkt; sip = 10.200.1.16; dip  
    = 10.200.1.1; interface = Vlan159;info = Garp Check adj:(nil)
```

*Could we be 100% sure if Ethernet frame
is reaching our ACI Switch or not?*

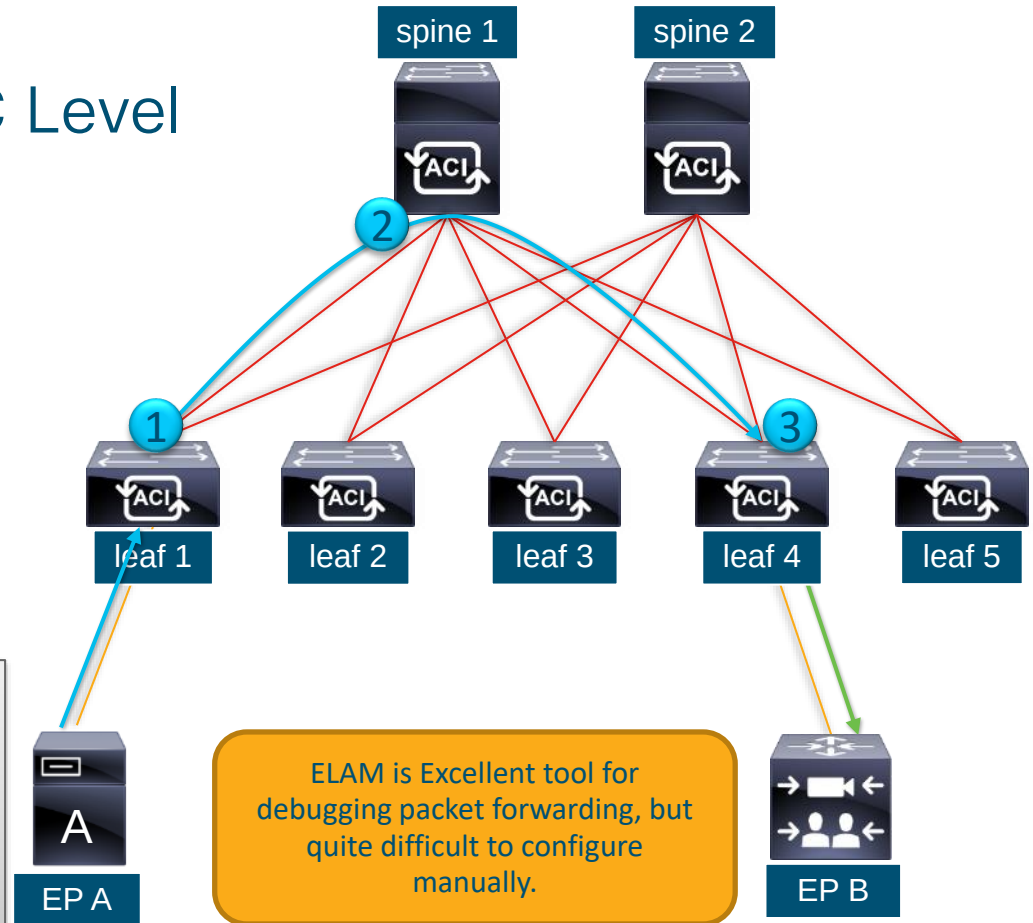
Troubleshooting Scenario

ELAM

Intercepts frame at ASIC Level

- 1 leaf1:
→ outer header
- 2 spine:
→ inner header
- 3 leaf4:
→ inner header

```
leaf1# vsh_1c
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
192.168.4.14 dst_ip 192.168.4.34
module-1(DBG-TAH-elam-insel6)# start
module-1(DBG-TAH-elam-insel6)# stat
module-1(DBG-TAH-elam-insel6)# report
```



ACI App: ELAM Assistant - configure

With ELAM Assistant:
ELAM is easy as 1,2,3,4

Capture a packet with ELAM (Embedded Logic Analyzer Module)

ELAM PARAMETERS + Add Node

name your capture :

Status	Node	Direction	Source I/F ?	Parameters (Outer Header) ?	(Inner Header)
Triggered	node-101	from frontport ▾	any ▾	<div>src_ip ▾ 192.168.4.14</div> <div>dst_ip ▾ 192.168.4.34</div>	<div>+</div> <div>+</div>
Set	node-102	from frontport ▾	any ▾	<div>src_ip ▾ 192.168.4.14</div> <div>dst_ip ▾ 192.168.4.34</div>	<div>+</div> <div>+</div>

▶ Set ELAM(s) ↺ Check Trigger

ACI App: ELAM Assistant – analyse

ELAM REPORT PARSE RESULT

Express Detail Raw

Captured Packet Information --- [node-101_elam_report.txt]

Trigger Information

Packet Direction	Front Panel Port (or CPU) -> LEAF	
Incoming Interface	eth1/9	Slice Source ID(Ss) 0x10 in "show plat int hal l2 port gpd"

Packet Forwarding Information

Destination is another LEAF (or AVS/AVE)

Destination Port	eth1/50	Ovec (0x80) in "show plat int hal l2 port gpd"
Destination TEP	10.0.48.66 (vPC (105_106))	RwEncapIdx (0x80E) in "show plat int hal tunnel rtep apd"

EPG Classification (pcTag)

Destination EPG pcTag (dclass)	0xC002 (49154)	mio:AP1:EPG4
Source EPG pcTag (sclass)	0xC002 (49154)	mio:AP1:EPG4
Policy Applied	1 (Contract was applied)	

Lookup Drop

drop reason	no drop	
-------------	---------	--

Outer L2 Header

Destination MAC	0050.56B4.549A
Source MAC	0050.56B4.AF9D
CoS	0x0 (0)
Access Encap VLAN	0x3EB (1003)

Outer L3 Header

L3 Type	IPv4
DSCP	0x0 (0)
IP Packet Length	0x54 (84) (= IP header(28 bytes) + IP payload)
Don't Fragment Bit	0x1
TTL	0x40 (64)
IP Protocol Number	1 (ICMP)
IP CheckSum	0x6308
Destination IP	192.168.4.34
Source IP	192.168.4.14

ELAM Assistant gives us all info on the received packet!

*Where are our other endpoints?
Do we have moving EPs ... how
do we find out?*

Troubleshooting Scenario

End Point Search

We can search End Point by IPv4, IPv6 or MAC address

172.16.1.0/24

SEARCH

Learned At	Tenant	Application ▲	EPG	IP
Leaf:101, Port:eth1/33	mio	mioAP1	mioEPG2	172.16.1.0/24

State Transitions

Date ▼	IP	MAC	EPG	Action	Node	Interface	Encap
2015/12/31 10:42...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-102	eth1/33	vlan-3398
2015/11/05 15:54...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-101	eth1/33	vlan-3398
2015/11/05 15:53...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-102	eth1/33	vlan-3398
2015/10/01 16:38...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-101	eth1/33	vlan-3398
2015/10/01 16:38...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-102	eth1/33	vlan-3398
2015/10/01 16:30...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-102	eth1/33	vlan-3398
2015/10/01 16:06...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-101	eth1/33	vlan-3398
2015/10/01 15:46...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-102	eth1/33	vlan-3398
2015/10/01 15:40...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-101	eth1/33	vlan-3398
2015/10/01 15:26...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-102	eth1/33	vlan-3398
2015/10/01 15:25...	172.16.1.212	00:50:56:03:02:02	mio/mioAP1/mioEPG2	detached	Node-101	eth1/33	vlan-3398
2015/10/01 15:20...	0.0.0.0	00:50:56:03:02:02	mio/mioAP1/mioEPG2	attached	Node-101	eth1/33	vlan-3398

ACI App: Enhanced Endpoint tracker

Endpoint Moves

- Top Moves
- Latest Moves

Off-Subnet Endpoints

- Historical
- Current

Stale Endpoints

- Historical
- Current

Endpoints encircled in red should be evaluated, why are they having so many moves?

The screenshot displays the ACI App Enhanced Endpoint Tracker interface. The navigation bar includes tabs for System, Tenants, Fabric, Virtual Networking, L4-L7 Services, Admin, Operations, and Apps. The Apps tab is selected, and the EnhancedEndpointTracker app is active. The main content area shows a table of endpoint moves for Fabric POD20. A red circle highlights the top five moves, which are:

Count	Type	Address	VRF/BD
984	mac	00:50:56:B4:3C:14	uni/tn-mio/BD-BD1
982	ip	192.168.3.23	uni/tn-mio/ctx-mio-vrf
718	mac	00:50:56:B4:C0:89	uni/tn-mio/BD-BD1
688	ip	192.168.1.21	uni/tn-mio/ctx-mio-vrf
117	mac	00:50:56:B4:DA:5C	uni/tn-mio/BD-BD1

We resolved one EP,
proceed to the next EP

...

or use Visibility &
Troubleshooting Wizard

*Server team is reporting connectivity issues
between two servers.
How do I check if fabric is in good shape on
data path between two end points?*

Troubleshooting Scenario

Visibility and Troubleshooting

Operations

Visibility & Troubleshooting

0 Session Name: Description:

Source ☐ External IP

1

Learned At	Tenant	Application	EPG	IP
101-102, vPC: ESX01-vpc	Services			10.10.10...

Destination ☐ External IP

2

Learned At	Tenant	Application	EPG	IP
Leaf103, Porteth1...	DC	App	EPG2	10.201.1...

3

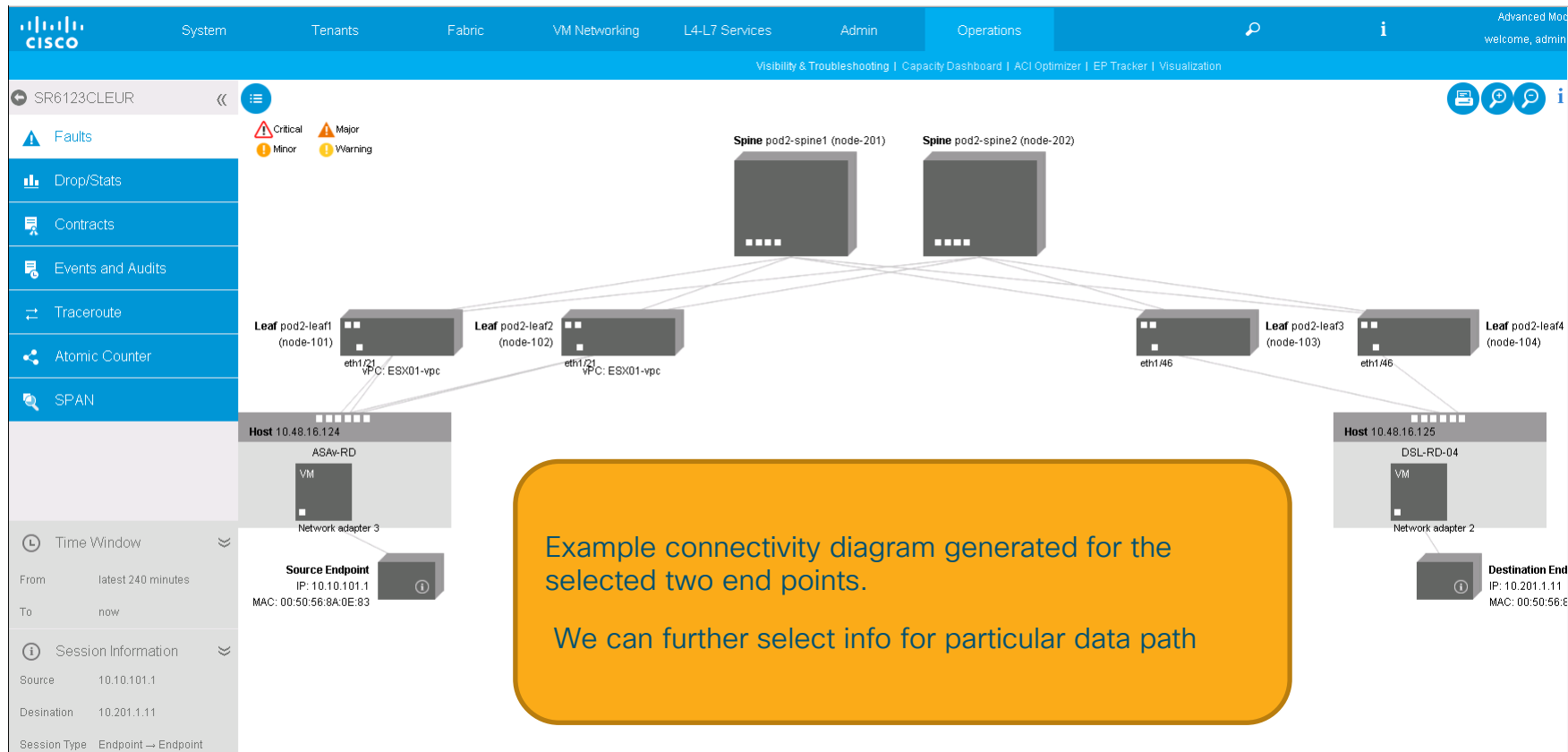
0 define session name

1 select end point 1

2 select end point 2

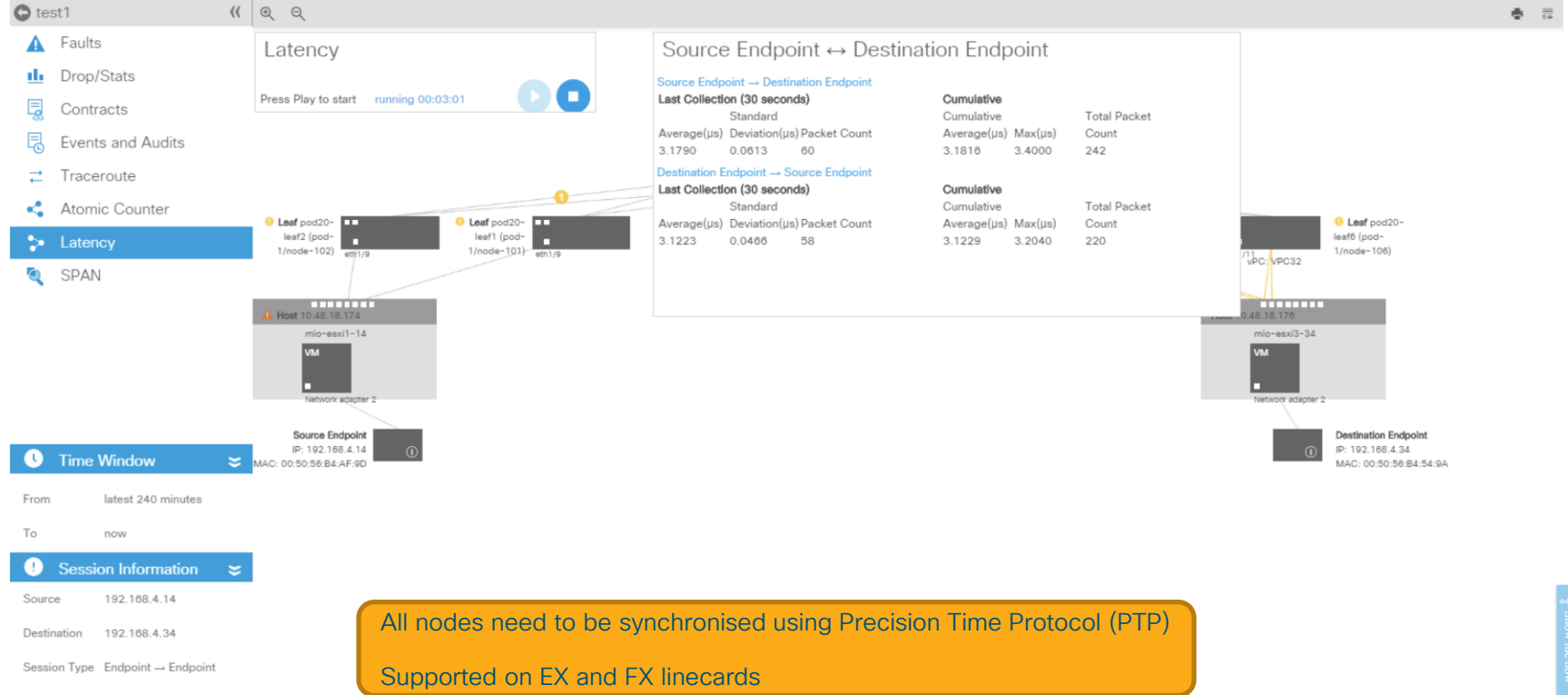
3 start

We define session name and select End Points we'd like to troubleshoot visually



V&T Latency

Visibility & Troubleshooting



SPAN to APIC

Inband mgmt policy must be configured on the relevant leaves and the APIC

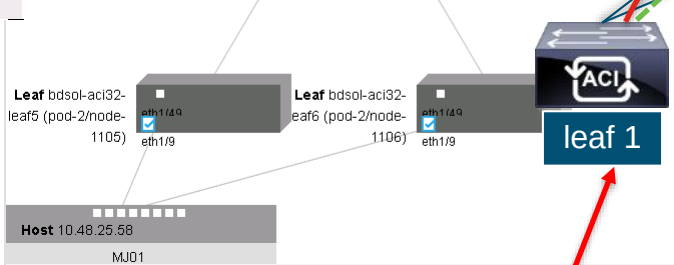
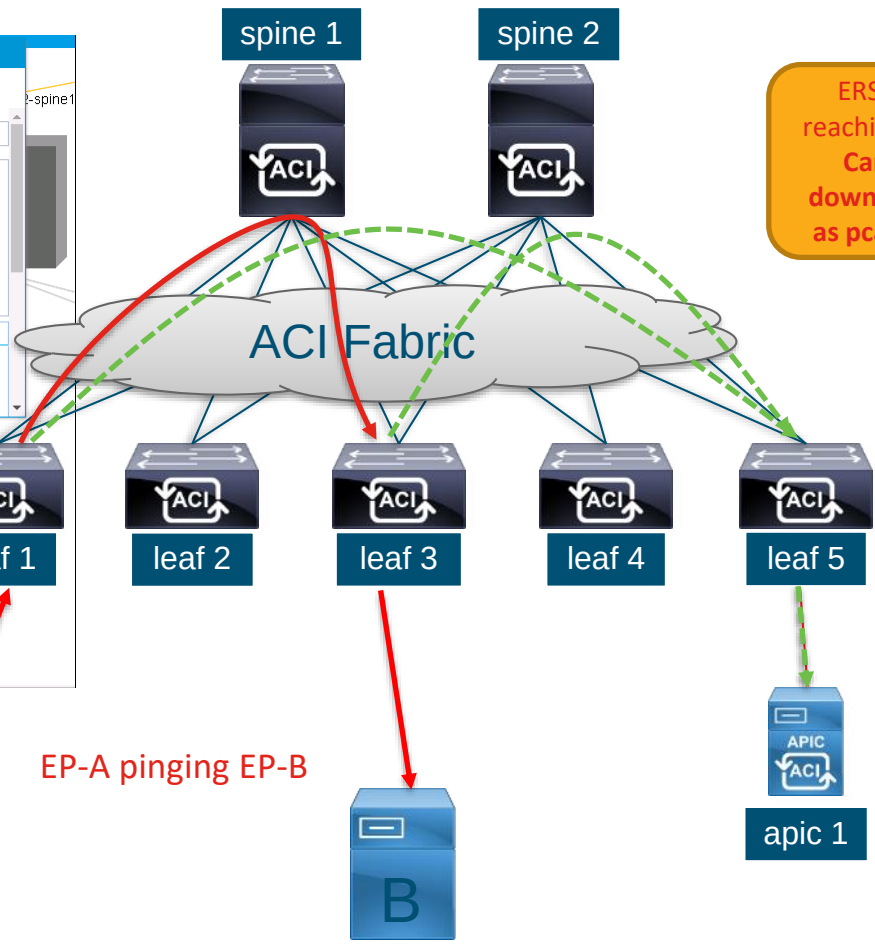
SPAN – Bidirectional ERSPAN

ERSPAN Source
Uncheck the interface that you do not want to span.

ERSPAN Destination
☐ EPG
☒ **APIC**
☐ Host via APIC
☐ Predefined Destination Group

Source IP Prefix: 192.168.0.1
 Flow ID: 1
 Preferred Version: Version 2

Create Time: _____ PCAP File Download: _____
 No PCAP file has been found on APIC.



ERSPAN reaching APIC
Can be downloaded as pcap file.

EP-A is trying to reach EP-B
Leaf intercepts traffic using SPAN and sends ERSPAN encapsulated traffic to APIC!
SPAN settings configured by Visibility and Troubleshooting tool

EP-A pinging EP-B

SPAN to Host via APIC

Inband mgmt policy must be configured on the relevant leaves and the APIC

SPAN – Bidirectional ERSPAN

ERSPAN Source
Uncheck the interface that you do not want to span.

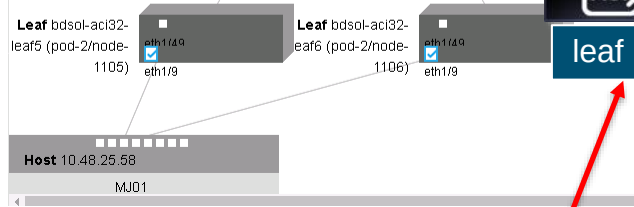
ERSPAN Destination
Destination Type: ☐ EPG ☒ Host via APIC ☐ APIC ☐ Predefined Destination Group

Analyser IP: 172.16.15.15

Source IP Prefix: 192.168.0.1

Flow ID: 1

Preferred Version: Version 2



ERSPAN rate limited and forwarded to laptop via oob

EP-A is trying to reach EP-B
Leaf intercepts traffic using SPAN and sends ERSPAN encapsulated traffic to APIC!
SPAN settings configured by Visibility and Troubleshooting tool

EP-A ping EP-B



APIC WebUI is great, but I'm under impression it's slow ... can you help me confirm if APIC Backend is responsive?

Troubleshooting Scenario

Troubleshooting Web UI performance

- Open Web Browser's Developer Tools → Network tab

Ctrl + Shift + I or F12
or
Cmd + Opt + I

The screenshot displays the Cisco APIC Web UI on the left and the browser's Developer Tools Network tab on the right. The Web UI shows 'System Health' with a score of 82. The Developer Tools Network tab shows a list of HTTP requests with columns for Name, Method, Status, Type, Initiator, Size, Time, and Latency. A large orange overlay is present over the bottom half of the image.

Web Browser's Developer tool → Network tab
Showing latency for each HTTP Request to APIC server

Name	Path	Meth...	Status	Type	Initiator	Size	Time	Latency
subscriptionRefres...	/api	GET	200 OK	appli...	ext-all-debug.js...	407 B	67 ms	
subscriptionRefres...	/api	GET	200 OK	appli...	ext-all-debug.js...	407 B	66 ms	
HDfabricOverallHea...	/api/node/mo/topo...	GET	200 OK	appli...	ext-all-debug.js...	782 B	28 ms	
HDfabricOverallHea...	/api/node/mo/topo...	GET	200 OK	appli...	ext-all-debug.js...	782 B	22 ms	
HDfabricOverallHea...	/api/node/mo/topo...	GET	200 OK	appli...	ext-all-debug.js...	782 B	5 ms	
subscriptionRefres...	/api	GET	200 OK	appli...	ext-all-debug.js...	407 B	7 ms	
subscriptionRefres...	/api	GET	200 OK	appli...	ext-all-debug.js...	407 B	16 ms	
subscriptionRefres...	/api	GET	200 OK	appli...	ext-all-debug.js...	407 B	19 ms	
subscriptionRefres...	/api	GET	200 OK	appli...	ext-all-debug.js...	407 B	19 ms	
subscriptionRefres...	/api	GET	200 OK	appli...	ext-all-debug.js...	407 B	17 ms	
info.json?_dc=1433...	/api/node/mo	GET	200 OK	appli...	ext-all-debug.js...	569 B	5 ms	
HDfabricOverallHea...	/api/node/mo/topo...	GET	200 OK	appli...	ext-all-debug.js...	782 B	5 ms	
HDfabricOverallHea...	/api/node/mo/topo...	GET	200 OK	appli...	ext-all-debug.js...	782 B	15 ms	

19 requests | 147 KB transferred

REST API call without webtoken

Verify if APIC is able to process REST API without Login / APIC-cookie

`https://apic/api/aaaListDomains.xml`

The screenshot shows a web browser with the URL `https://bdsol-aci3-apic1/api/aaaListDomains.xml`. The browser's developer tools are open, displaying the Network tab. A list of requests is shown, with the first request, `aaaListDomains.xml /api`, selected. The details pane on the right shows the response, which is an XML document. The XML content is as follows:

```
<imdata>
  <aaaLoginDomain name="LOCAL" />
  <aaaLoginDomain name="RADIUS" />
  <aaaLoginDomain name="TACACS" />
  <aaaLoginDomain name="DefaultAuth" guiBanner="" />
</imdata>
```

The screenshot shows the Developer Tools Network tab with the Timing details for the selected request. The Timing tab is active, showing a breakdown of the request's performance metrics. The metrics are as follows:

Metric	Time
Connection Setup	TIME
Stalled	0.791 ms
Request/Response	TIME
Request sent	0.123 ms
Waiting (TTFB)	6.800 ms
Content Download	2.456 ms
Total	10.770 ms

Double-click on the specific request to check timing details.

10ms looks good 😊

How does it look from APIC's side?

Note JSON is used by default in APIC WebUI, Provided example uses XML to simplify the search

```
zegrep -A5 "aaaListDomains.xml" /var/log/dme/log/nginx*
```

```
zegrep -A5 "aaaListDomains.xml" /var/log/dme/log/nginx.bin.log.*
```

```
nginx.bin.log.14.gz:
```

```
29701||15-05-10 23:11:05.701+02:00||nginx|DBG4|||Request received  
/api/aaaListDomains.xml|../common/src/rest/./Rest.cc||62 bico 56.827
```

```
29701||15-05-10 23:11:05.701+02:00||nginx|DBG4|||httpmethod=1; from 10.48.16.90;  
url=/api/aaaListDomains.xml; url options=|../common/src/rest/./Request.cc||103
```

```
29720||15-05-10 23:11:05.705+02:00||nginx|DBG4||co=doer:255:127:0xff00000003249f06:1|outCode:  
200|../common/src/rest/./Worker.cc||357
```

```
29720||15-05-10 23:11:05.705+02:00||nginx|DBG4||co=doer:255:127:0xff00000003249f06:1|notifyEvent  
data ready 0x0|../common/src/rest/./Worker.cc||370
```

```
29701||15-05-10 23:11:05.706+02:00||nginx|DBG4|||Reply data (request 831 size 211) <?xml  
version="1.0" encoding="UTF-8"?><imdata totalCount="4"><aaaLoginDomain name="LOCAL"/><aaaLoginDomain  
name="RADIUS"/><aaaLoginDomain name="TACACS"/><aaaLoginDomain name="DefaultAuth"  
guiBanner=""/></imdata> Cookie: NONE|../common/src/rest/./Rest.cc||120
```

You may use any other criteria for grep: IP, time stamp etc

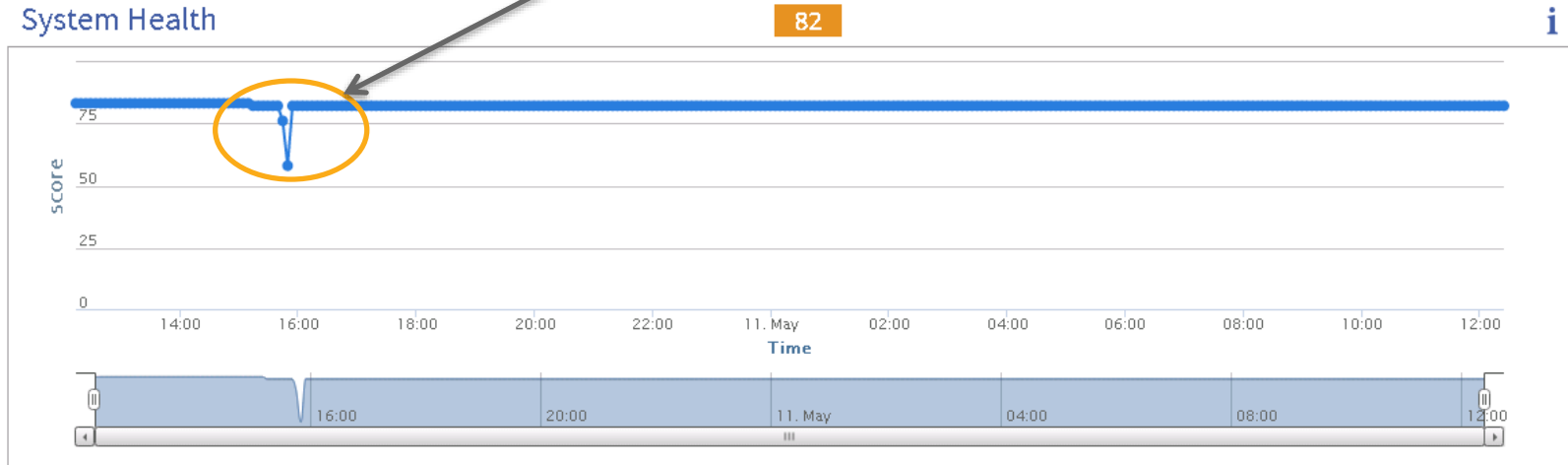
We noticed slight system health decrease few days ago ... could you help us find the root cause?

Troubleshooting Scenario

Finding changes, faults
during certain timeframe

System health change

We noticed slight decrease in System health



Is the cause known?

Do we need to perform Root Cause Analysis?

Were there any known changes, maintenance etc?

... we're not sure ... should we call TAC 😊

Déjà vu?

- We've suddenly experienced connectivity loss ... nothing has been changed ...

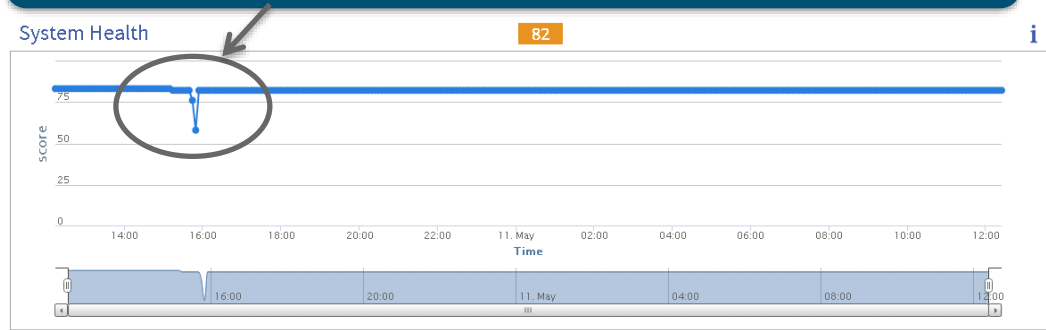
Let's think for a second:
What is the most common cause
of all network incidents?

Change!

aaaModLR

aaaModLR – AAA audit log record, which is automatically generated whenever a user modifies an object.

We noticed slight decrease in System health



Q1: We could check if there were any changes after Jan 25th ?

```
moquery -c aaaModLR -f 'aaa.ModLR.created>"2019-01-25"'
```

Q2: How to check changes audit records between May 7th and May 10th 2015?

```
moquery -c aaaModLR -f 'aaa.ModLR.created>"2015-05-07" and aaa.ModLR.created<"2015-05-10"'
```

```
show audits start-time 2015-05-07T00:00:00 end-time 2015-05-10T00:00:00
```

Easier 😊

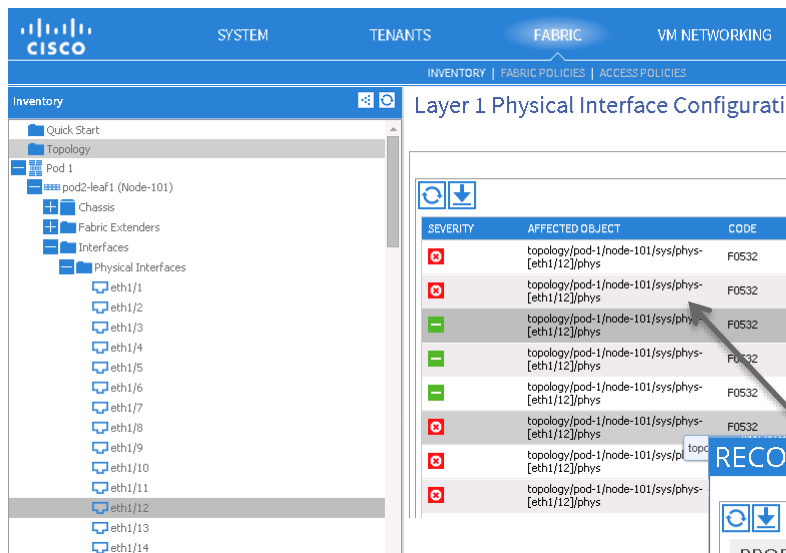
Example looking for audit records by date / time

```
admin@bdsol-aci2-apic1:~> moquery -c aaaModLR -f 'aaa.ModLR.created>"2015-05-07T17:00" and aaa.ModLR.created<"2015-05-11"'
# aaa.ModLR
id          : 8589938110
affected    : uni/fabric/outofsvc/rsoosPath-[topology/pod-1/paths-101/pathep-[eth1/12]]
cause       : transition
changeSet   :
childAction :
code        : E4208269
created     : 2015-05-08T15:22:04.317+01:00
descr       : Interface topology/pod-1/paths-101/pathep-[eth1/12] enabled
dn          : subj-[uni/fabric/outofsvc/rsoosPath-[topology/pod-1/paths-101/pathep-[eth1/12]]]/mod-8589938110
ind         : deletion
modTs       : never
rn          : mod-8589938110
severity    : info
status      :
trig        : config
txId        : 10720396
user        : admin
```

We don't do changes on non-business days and the day before, so let's see who has performed any config between Thursday evening and Monday morning 😊

admin configured interface eth1/12 on node 101

we found there were some admin changes on eth1/12



Layer 1 Physical Interface Configuration - eth1/12

SEVERITY	AFFECTED OBJECT	CODE	CAUSE	CREATION TIME	LIFECYCLE	DESCRIPTION
	topology/pod-1/node-101/sys/phys-[eth1/12]/phys	F0532	port-failure	2015-05-08T15:24:18.958+01:00	Raised	Port is down, reason:sfpAbsent(connected), used by:EPG
	topology/pod-1/node-101/sys/phys-[eth1/12]/phys	F0532	port-failure	2015-05-08T15:22:04.372+01:00	Soaking	Port is down, reason:sfpAbsent(connected), used by:EPG
	topology/pod-1/node-101/sys/phys-[eth1/12]/phys	F0532	port-failure	2015-05-08T15:21:54.478+01:00	Retaining	Port is down, reason:adminCfgChng(connected), used by:EPG
	topology/pod-1/node-101/sys/phys-[eth1/12]/phys	F0532	port-failure	2015-05-08T15:21:48.928+01:00	Retaining	Port is down, reason:adminCfgChng(connected), used by:EPG
	topology/pod-1/node-101/sys/phys-[eth1/12]/phys	F0532	port-failure	2015-05-08T15:19:19.437+01:00	Raised, Clearing	Port is down, reason:adminCfgChng(connected), used by:EPG

double click

PROPERTIES

ID: 8591370657
 Description: Port is down, reason:sfpAbsent(connected), used by:EPG
 Severity: critical
 Affected Object: topology/pod-1/node-101/sys/phys-[eth1/12]/phys
 Delegated From:
 Created: 2015-05-08T15:22:04.372+01:00
 Code: F0532
 Type: Communications
 Cause: port-failure
 Change Set: operBitset (New: 7,19), usage (New: epg)
 Action: creation
 Domain: Access
 Life Cycle: Soaking
 Count Fault Occurred: 1
 Acknowledgement Status: false

faultRecord in GUI
 We could also check:
 eventRecord
 healthRecord

*Call me old-fashioned ...
but I still prefer to use NX-OS CLI*

Troubleshooting Scenario

NX-OS Style CLI

show endpoints

show interface bridge-domain

show health tenant

show health leaf

show faults

show faults last-days 1 history

show events last-hours 8 leaf 102

show audits last-minutes 59 leaf 101

show stats granularity 15min leaf 101 interface ethernet 1/2

```
apic1# show cli manpage ?
```

```
WORD  Command Name
```

```
apic1# show cli manpage show
```

[Cisco APIC NX-OS Style CLI Command Reference](#)

CLI Help and Link to CLI
Reference for your
convenience

Example show stats CLI output

```
apic1# show stats granularity 15min leaf 101 interface ethernet 1/2
```

Start Time	Counter	Value	Unit
2016-01-17 10:59:52	Ingress buffer drop packets	0	packets
2016-01-17 10:59:52	Ingress error drop packets	0	packets
2016-01-17 10:59:52	Ingress forwarding drop packets	0	packets
2016-01-17 10:59:52	Ingress link utilization	0	%
2016-01-17 10:59:52	Ingress load balancer drop packets	0	packets
2016-01-17 10:59:52	Total ingress bytes	35,117,721	bytes
2016-01-17 10:59:52	Total ingress bytes rate	37,331	bytes-per-second
2016-01-17 10:59:52	Total ingress packets	101,816	packets
2016-01-17 10:59:52	Total ingress packets rate	113	packets-per-second
2016-01-17 10:59:40	Egress afc wred packets	0	packets
2016-01-17 10:59:40	Egress buffer drop packets	0	packets
2016-01-17 10:59:40	Egress error drop packets	0	packets
2016-01-17 10:59:40	Egress link utilization	0	%
2016-01-17 10:59:40	Total egress bytes	22,850,916	bytes
2016-01-17 10:59:40	Total egress bytes rate	25,236	bytes-per-second
2016-01-17 10:59:40	Total egress packets	104,837	packets
2016-01-17 10:59:40	Total egress packets rate	117	packets-per-second

*Is my fabric running out of resources?
How can I check that?*

Troubleshooting Scenario

Capacity Dashboard

Admin

Operations

Troubleshooting | Capacity Dashboard | ACI Optimizer | EP Tracker | Visualization

Capacity Dashboard

Endpoints ⓘ

73 of 180000(<1%)

Bridge Domains

64 of 15000(<1%)

L3 Contexts

29 of 3000(<1%)

Endpoint Groups

83 of 15000(<1%)

Usage Overview

Switch	VRF	BD	EPG	Mac (learned)	IPv4 (learned)	IPv6 (learned)	Multicast	Policy CAM	VLAN
node-101	3% 15 of 500	1% 50 of 3500	1% 46 of 3500	<1% 57 of 12288	<1% 23 of 12288	0% 0 of 8192	0% 0 of 8192	95% 3909 of 4096	3% 107 of 3500
node-102	2% 11 of 500	<1% 11 of 3500	<1% 4 of 3500	<1% 16 of 12288	<1% 16 of 12288	0% 0 of 8192	0% 0 of 8192	2% 95 of 4096	<1% 34 of 3500

Capacity Dashboard panel displays your usage by range and percentage.

In the example large number of contracts has been applied, so Policy CAM utilization on Switch 101 is almost depleted

Apps, Monitoring and Telemetry

fTriage - aciappcenter.cisco.com

 **fTriage**
by Cisco

This app helps in troubleshooting the network issues between fabric/remote endpoints

Details

User Name:

 Cisco_fTriage

User Role:

 Cisco_fTriage

Security Domain:

 all

Permission Level:

 read

Permissions:

 admin

App Version:

 1.0

Minimum required controller version:

 2.2(1a)

Apps

fTriage

fTriage

Works only with "admin" user (not "admin" role user). AVS endpoints not supported yet!

Admin Password *****

Source Details

Source IP 11.0.0.11



Source MO topology/pod-1/node-101/sys/ctx-[vxlan-2752512]/bd-[vxlan-15204288]/vlan-[vlan-3399]/db-ep/ip-[11.0.0.11]



Destination Details

Destination IP 12.0.0.12



Destination MO topology/pod-1/node-102/sys/ctx-[vxlan-2752512]/bd-[vxlan-15728622]/vlan-[vlan-3398]/db-ep/ip-[12.0.0.12]



fTriage

Reset

```
ftriage route -ii bdsol-aci3-leaf1:Eth1/33 -ie 3399 -ei bdsol-aci3-leaf2:Eth1/33 -ee 3398 -sip 11.0.0.11 -dip 12.0.0.12
```

```
ftriage: info : Building egress BD(s), Ctx
```

```
ftriage: info : Egress BD(s) {bdsol-aci3-leaf2: 'bd-[vxlan-15728622]'}
```

```
ftriage: info : Egress Ctx ctx-[vxlan-2752512]
```

```
ftriage: info : SIP 11.0.0.11 DIP 12.0.0.12
```

```
ftriage: info : bdsol-aci3-leaf1: RxDMAc DIPo(10.0.144.67) is one of dst TEPs ['10.0.144.67']
```

```
ftriage: info : Computing next set of nodes
```

```
...
```

```
ftriage: info : bdsol-aci3-leaf2: Dst EP is local
```

```
ftriage: info : bdsol-aci3-leaf2: EP if(Eth1/33) same as egr if(Eth1/33)
```

```
ftriage: info : bdsol-aci3-leaf2: EP encap vlan same as egr if encap vlan
```

CiscoLive!

fTri

powerful tool to intercept frame on the actual Datapath by leveraging ELAM in fabric switches

There is ftriage CLI as well on APIC – even without installing the App!

Monitoring and analytics Apps from Ecosystem Partners



ServiceNowConnector

Compatible with 2.2(1n)

☆☆☆☆☆

Version (last updated): 1.0

Company: Cisco



CiscoSplunkConnector

Compatible with 2.2(1n)

Version (last updated): 1.5

Company: Cisco



SevOneAciMonitor

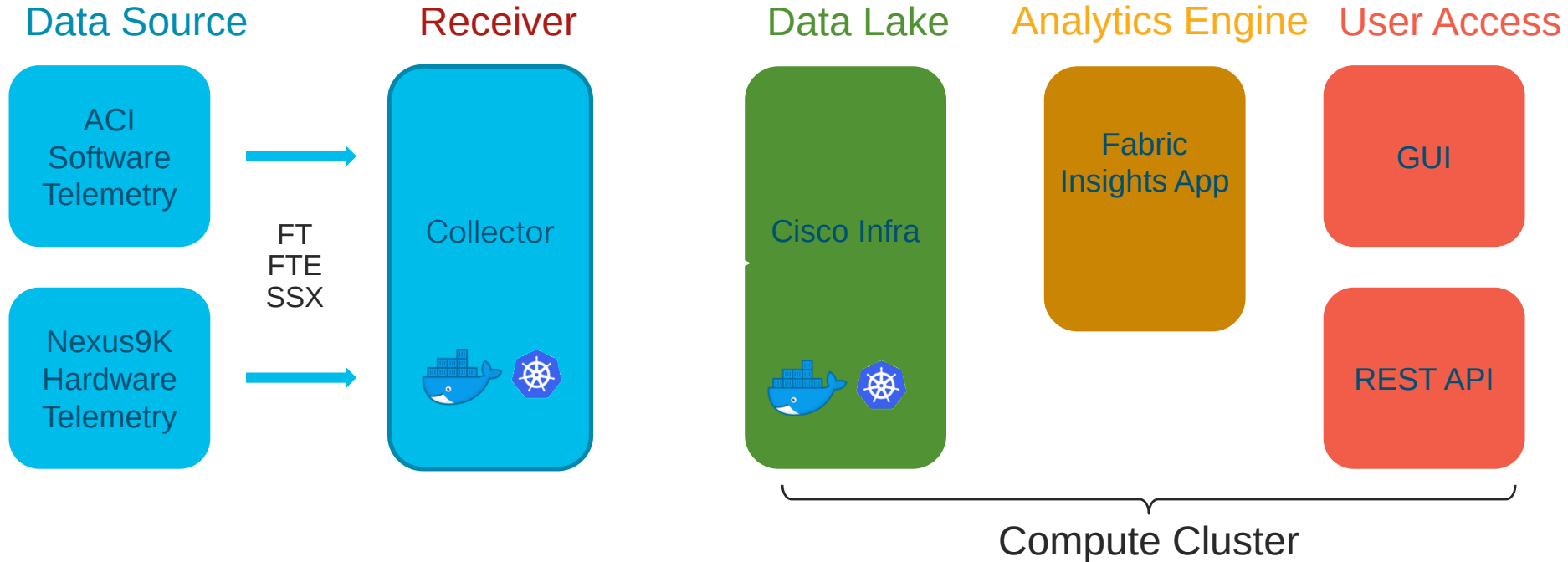
Compatible with 2.2(1n)

☆☆☆☆☆

Version (last updated): 1.0

Company: SevOne

Network Insights - Resources



Data Centre Telemetry Use Cases

Control Plane

- CPU, Memory
- Message Queue
- Protocol State



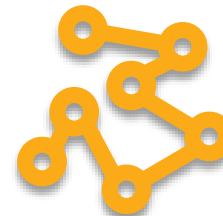
Network Operations

- Congestion Monitoring
- Buffer Utilisation
- Network Loops
- Anomaly Detection



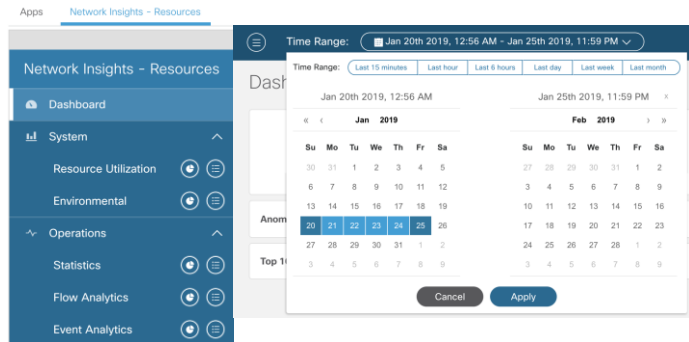
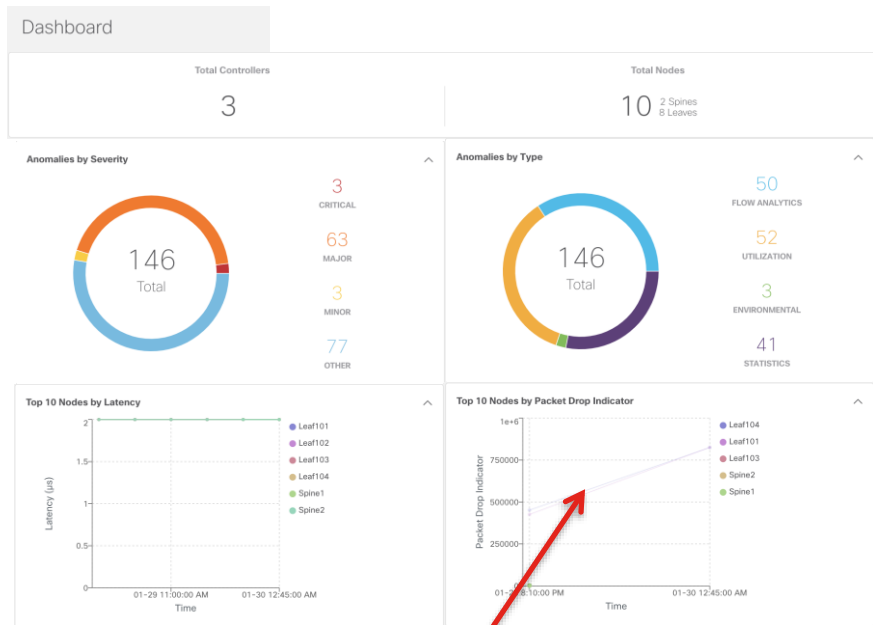
Flow Based Analysis

- Flow Latency Monitoring
- Flow Triage
- Flow-Level Microburst Detection
- Flow Drop Reasons



NIR DEMO Available at ACI Booth

ACI 4.x



Nice overview in the
NIR Dashboard

Click for details

NIR DEMO Available at ACI Booth

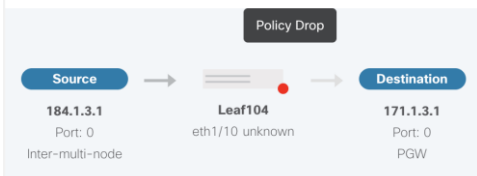
ACI 4.x

Apps Network Insights - Resources

Flow Details

Path Summary

January 29 2019, 10:08 PM



Related Details also available

- Latency
- EP Move Indicator
- Packet drop indicator
- Traffic by Packets and by Bytes
- Burst

Clear indication where packet was lost and why!
Very helpful for troubleshooting!

Anomalies

Start Time	End Time	Severity >	Node	Entity Name	Resource Type	Resource Name	Description
Jan 29 2019 10:08:55pm	Jan 29 2019 10:09:11pm	Major	Leaf104	184.1.3.1,0,171.1.3.1,0,ANY-HOST,VRF,VRF	flow	drop	Packet drop is detected due to Forward Drop.
Jan 29 2019 10:14:50pm	Jan 29 2019 10:15:06pm	Major	Leaf104	184.1.3.1,0,171.1.3.1,0,ANY-HOST,VRF,VRF	flow	drop	Packet drop is detected due to Forward Drop.

Page 1 of 1

Displaying Objects 1 - 2 of 2

Cisco Network Assurance Engine

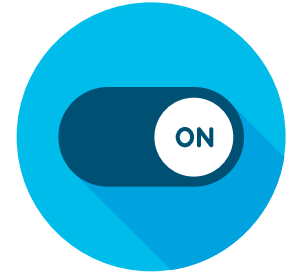
Continuous Network Assurance
for Data-Centre Networks

Introducing Candid / Network Assurance Engine

Is my DC
network
doing what I
intended?

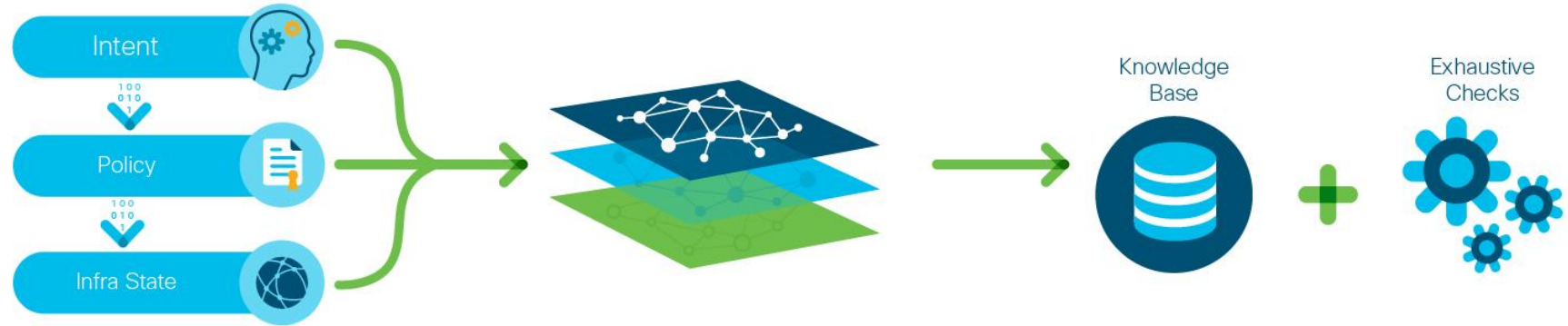


Continuous Network
Verification and Validation



Always-On
Network Assurance

Cisco Network Assurance Engine: How It Works



Data Collection

Captures all non-packet data:
intent, policy, state across data
centre network

Comprehensive Network Modeling

Mathematically accurate models
spanning underlay, overlay and
virtualisation layers

Intelligent Analysis

5000+ domain knowledge-based
error scenarios built-in, codified
remediation steps

Video Overview



Cisco Network
Assurance Engine

Using Candid for Change Management & Policy Audit:

<https://youtu.be/lk0YkhNp3TU>

Using Candid for Security Policy Audit & Analysis:

https://youtu.be/hGX_JAN2BGc

Using Candid for Forwarding State Analysis:

<https://youtu.be/Ts4VXSSnZAg>

Takeaways

Summary

Check Health and Faults in APIC



Verify if you're missing some config steps - use suggested tips



Leverage existing tools and Apps to troubleshoot



Start collecting techsupport for further analysis even before you contact TAC

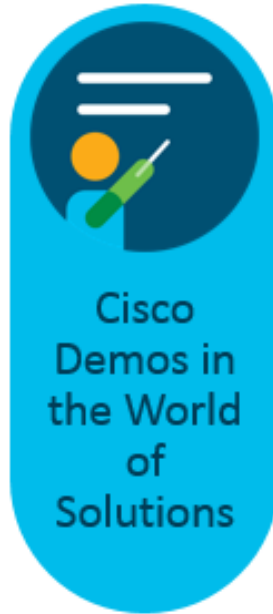
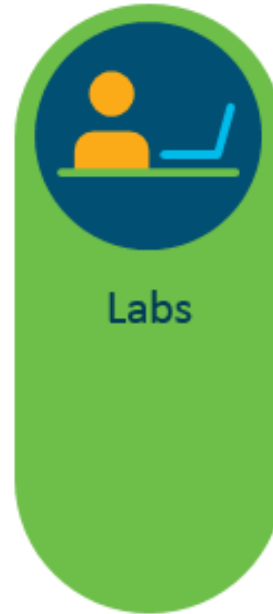
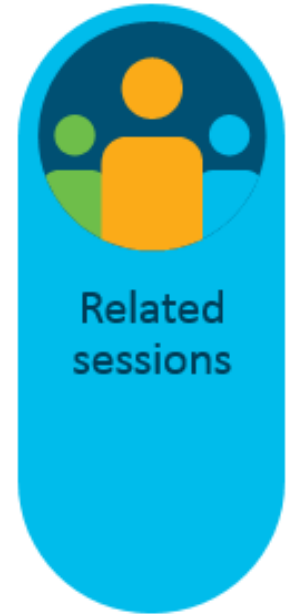


Q & A



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Thank you



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