

CISCO *Live!*

Let's go



The bridge to possible

ACI Troubleshooting: Expand your toolset with Nexus Dashboard Insights

Ivan Kovačević, Customer Delivery Engineering Technical Leader

Agenda

- ND and NDI Intro
- Scenario 1: BD enigma
- Scenario 2: Broken backup
- Scenario 3: VM affair
- Scenario 4: Resource trouble
- Instead of Conclusion

ND and NDI Intro

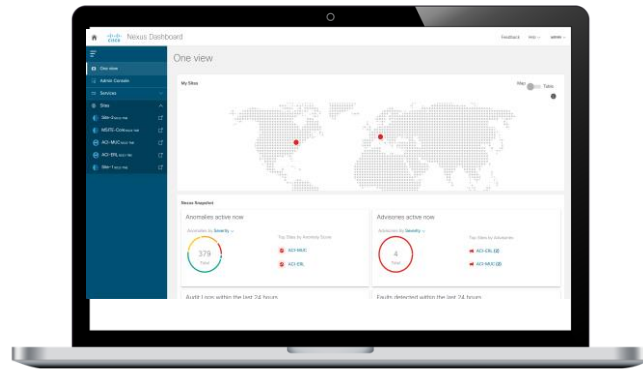
Cisco Nexus Dashboard



Any apps | All site types

Cisco Nexus Dashboard: A unified platform

The operator view



Consume service(s) from single place

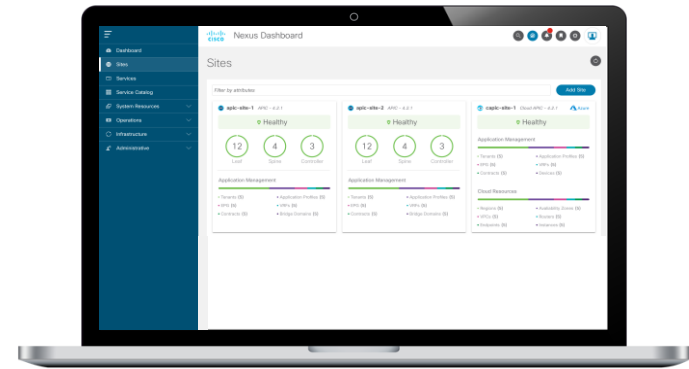


Frictionless navigation across multiple services and sites



Customize views and workflows

The admin view



Single dashboard for lifecycle management of services and ops infra

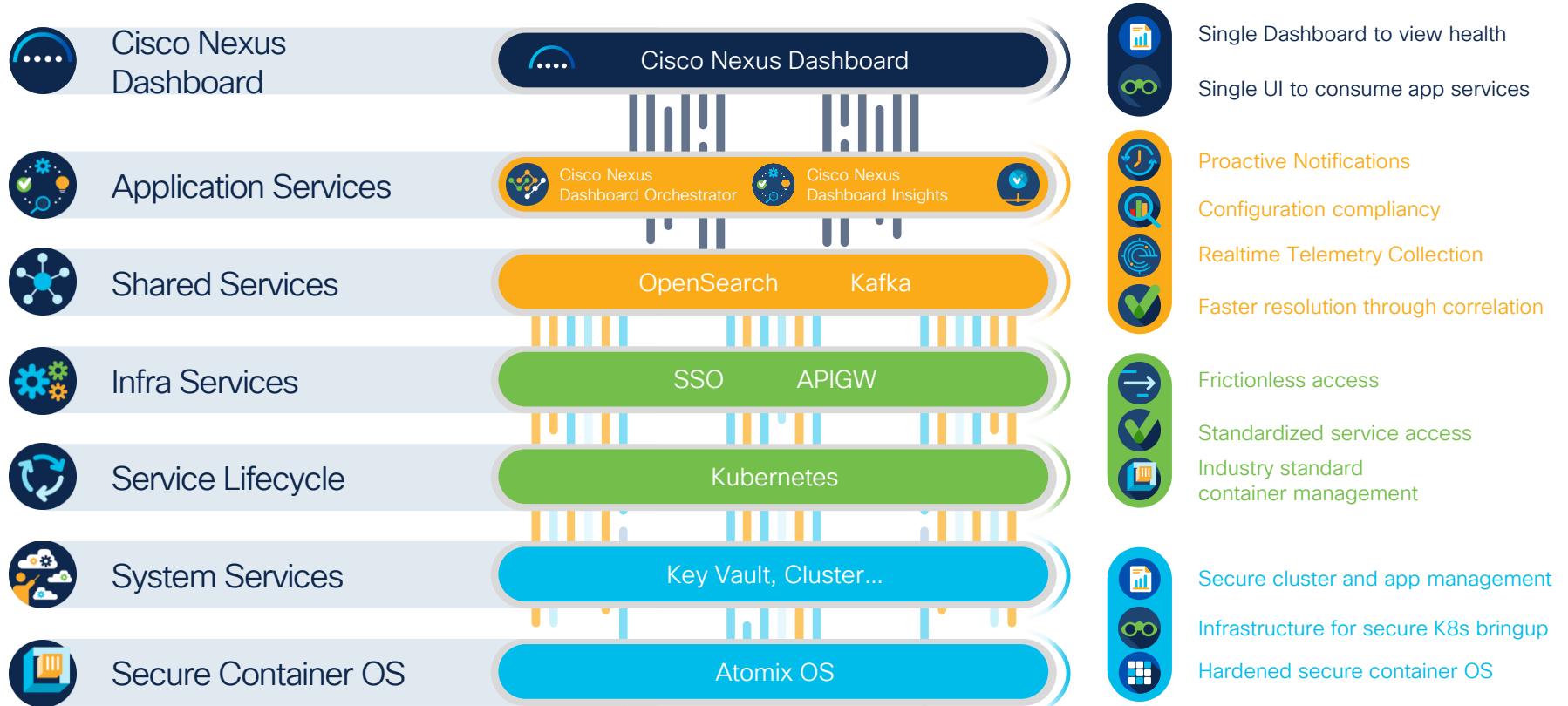


Consistent one-time onboarding of domains and services



Consistent user management and access control

Cisco Nexus Dashboard platform under the hood



Nexus Dashboard Services



Fabric Controller



Orchestrator



Data Broker



Insights

Nexus Dashboard Services



Data Center Operations Challenges

Assurance

Am I doing correct configuration?
Are interdependencies known?
Does the change impact something am not aware of?

Proactive advisories

Was the issue preventable?
Is the network exposed to known vulnerabilities?
Can I get proactive advice?



Troubleshooting

Where is the problem and what's the blast radius?
How do I reduce MTTR?
How do I prove network is healthy?

Single-pane-of-glass

Can I get visibility across datacenters?
Single point for monitor and control?

Nexus Dashboard Insights

Benefits



Keep the network state compliant with your intent.



Avoid outages with precautionary and proactive advisory



Rapidly remediate with automated, correlated insights



Control multiple datacenters with single pane of glass

Nexus Dashboard Insights

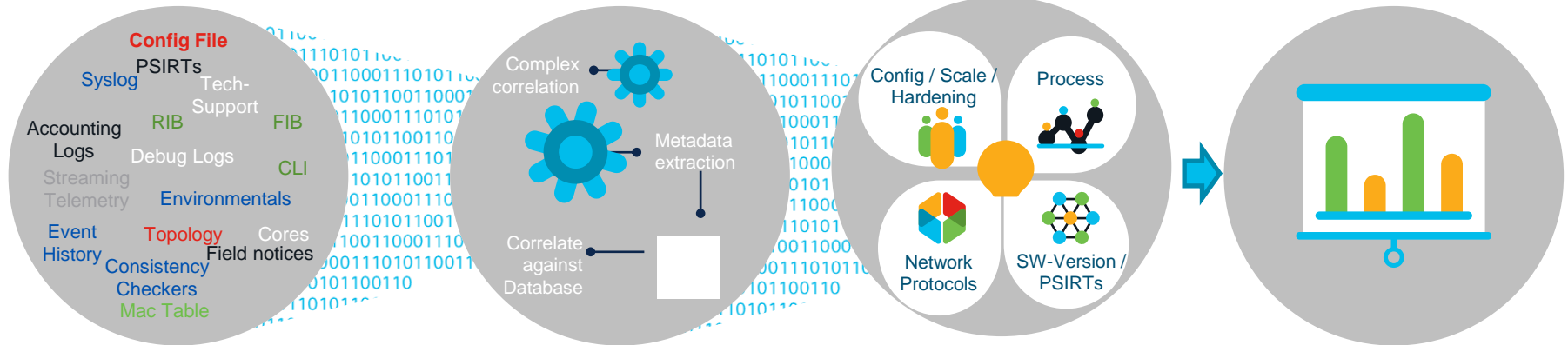
How Does It Work?

Sources of Telemetry Data

Ingest and Process

Derive Insights

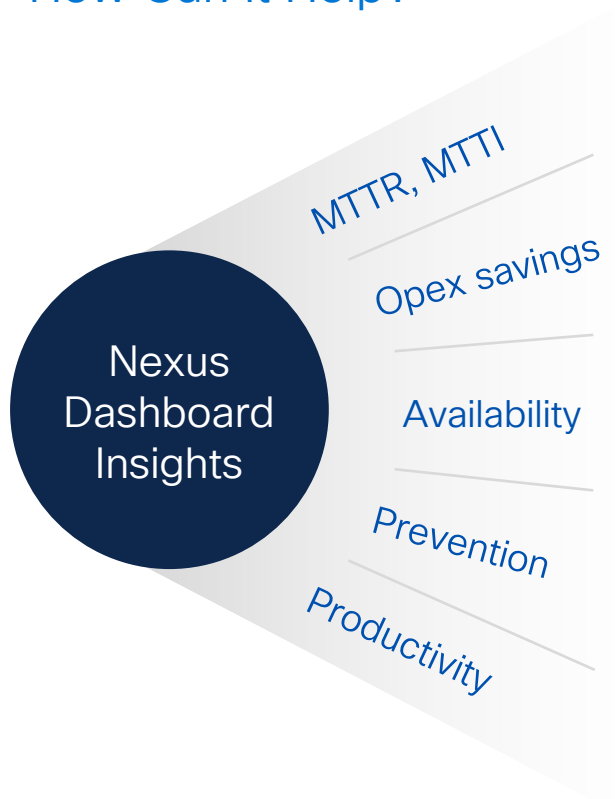
Notify and Recommend Action



Reduce Time to Problem Awareness, Action and Resolution

Nexus Dashboard Insights

How Can It Help?



Identify, locate, root cause, remediate



Upgrade impact advisories



Error detection, latency packet drops
Control plane issue



Mitigate
Prevent outages



Automated alerts
Visibility



Hardening checks
Software hardware recommendations



Pre-change analysis
Compliance alerts



PSIRT notices
EoS/EoL notices



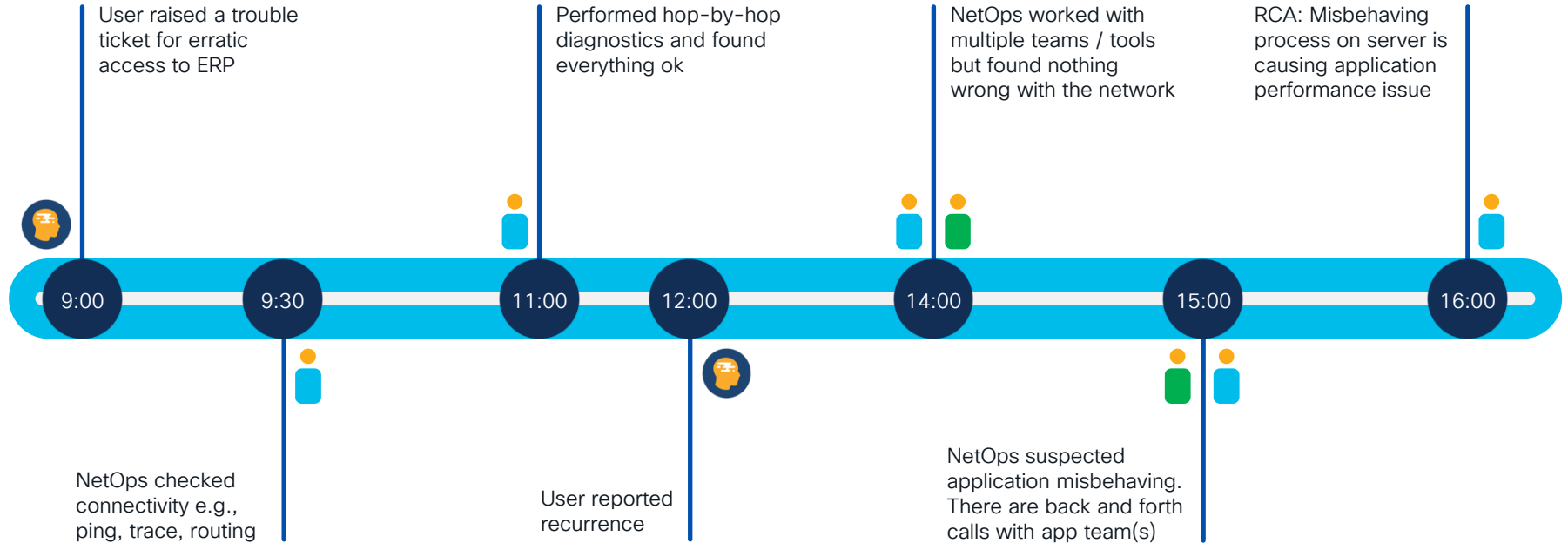
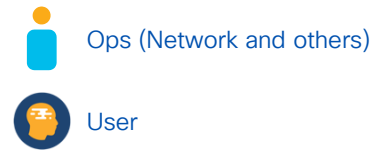
End-to-end workflows
Automated remediation






TAC assist
Topology checker

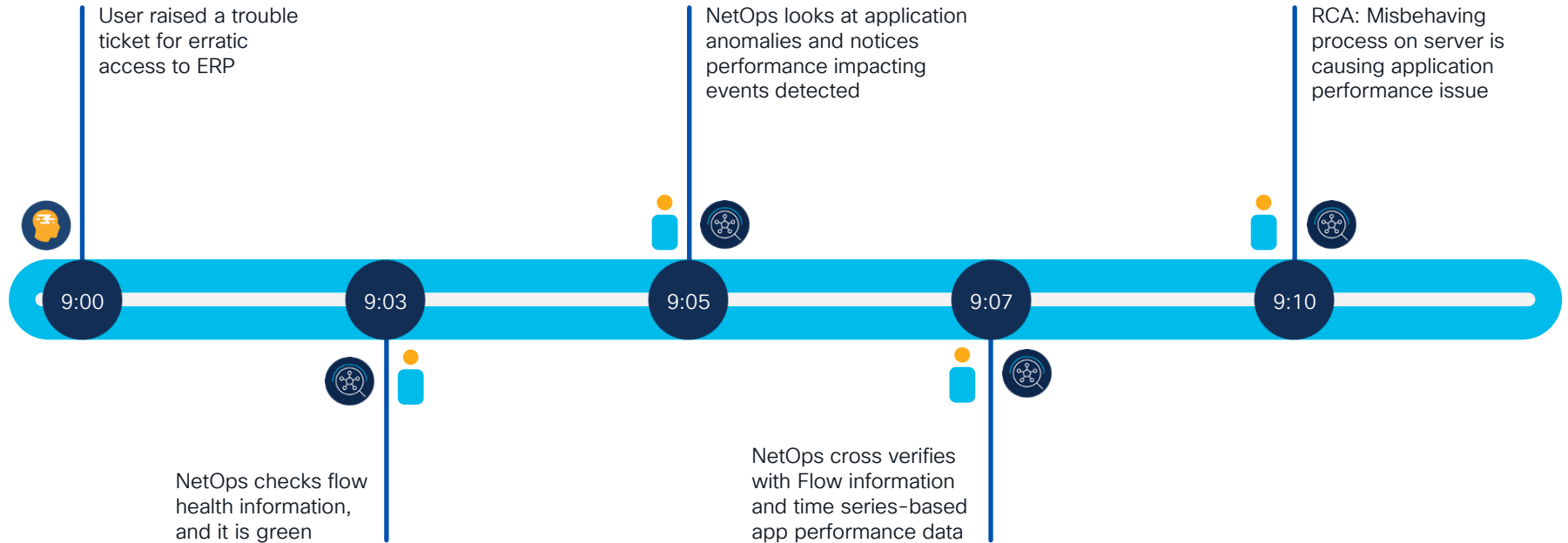


Traditional troubleshooting workflow

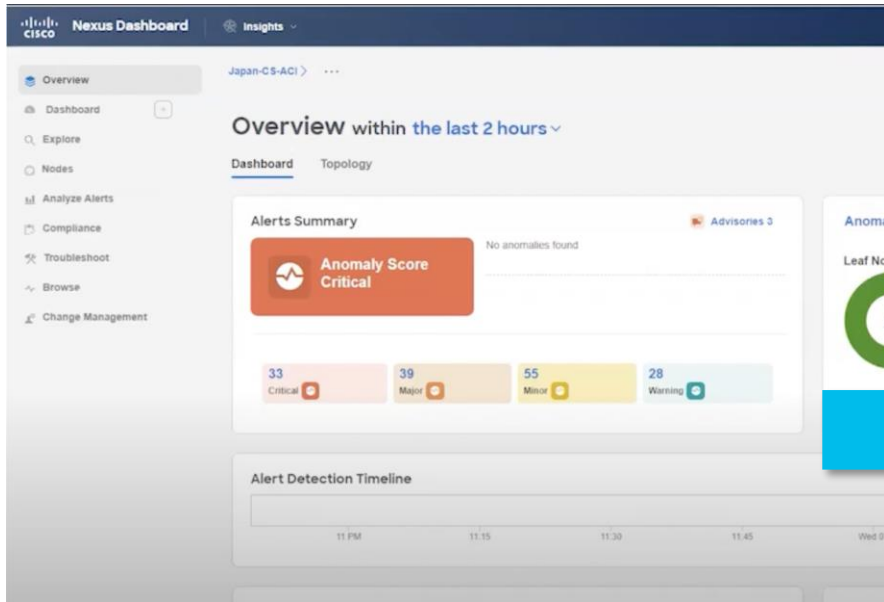


Now with Nexus Dashboard Insights

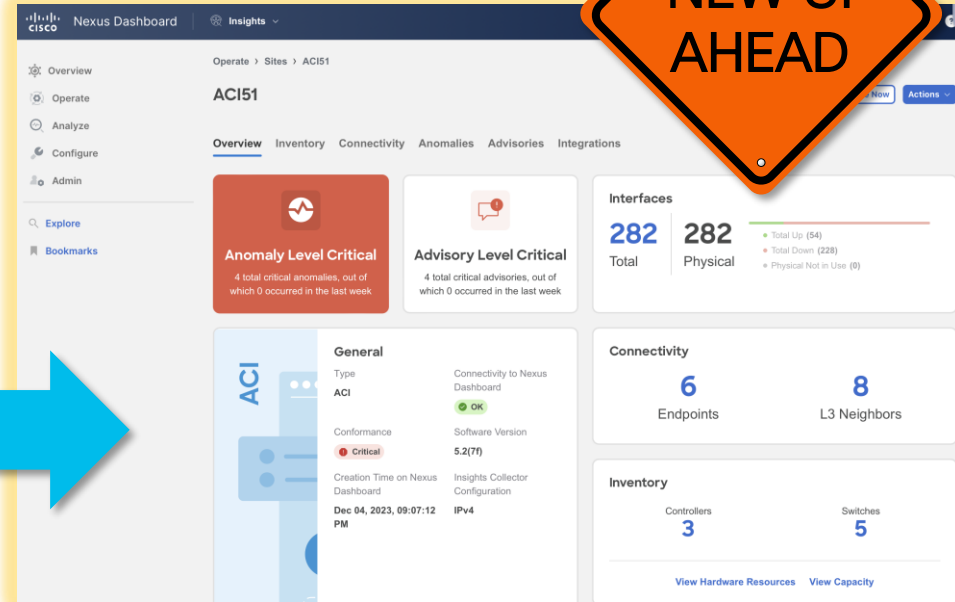
-  Ops (Network and others)
-  User
-  Nexus Dashboard Insights



UI update

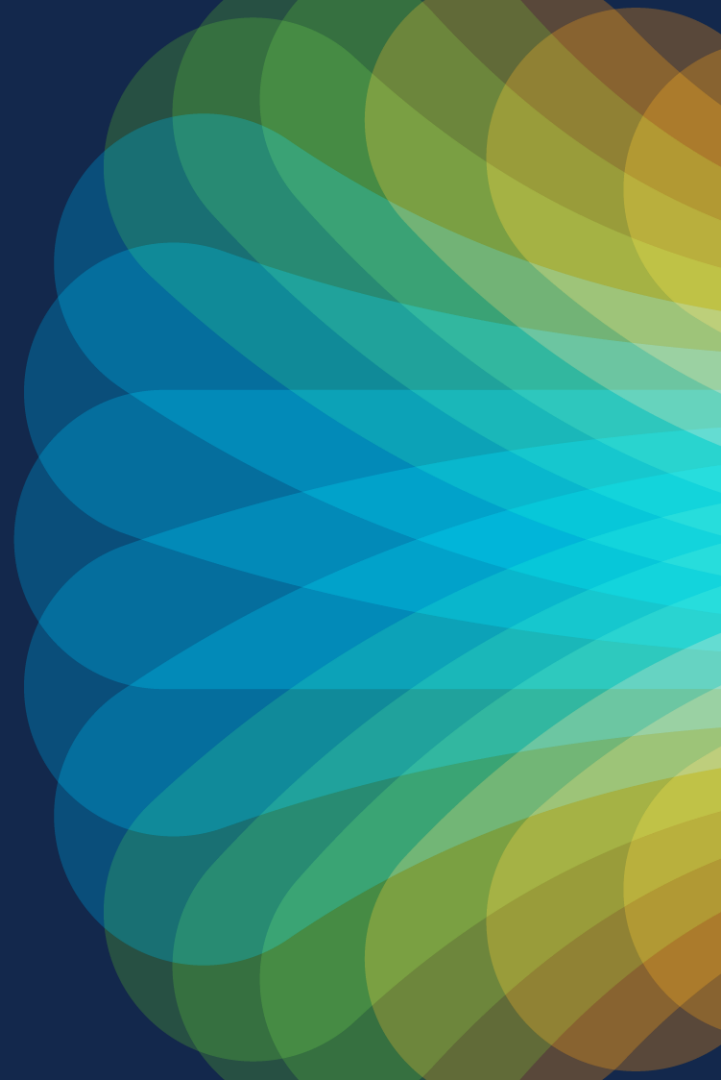


NDI 6.2



NDI 6.3

Scenario 1



“I added a new server to a pre-created EPG and it doesn’t work”

What exactly "doesn't work"?

Let's collect some facts!

- Server needs to talk to a service outside of ACI fabric
- Someone created a new BD+Subnet+EPG earlier
- Server can ping the gateway and connectivity inside ACI seems to be fine
- There is a dynamic routing protocol between ACI and external router

CL



- > Quick Start
- ✓ CL
 - > Application Profiles
 - ✓ Networking
 - ✓ Bridge Domains
 - ✓ **CL-BD**
 - > DHCP Relay Labels
 - > ND Proxy Subnets
 - ✓ Subnets
 - 192.168.10.1/24**
 - > VRFs
 - > L2Outs
 - > L3Outs
 - > SR-MPLS VRF L3Outs
 - > Dot1Q Tunnels
 - > Contracts
 - > Policies

Subnet - 192.168.10.1/24



Policy Operational Faults History



Properties

IP Address: 192.168.10.1/24

Description:

Treat as virtual IP address:

Make this IP address primary:

Scope: Advertised Externally

Shared between VRFs

Subnet Control: No Default SVI Gateway

Querier IP

L3 Out for Route Profile:

Configuration Issues:

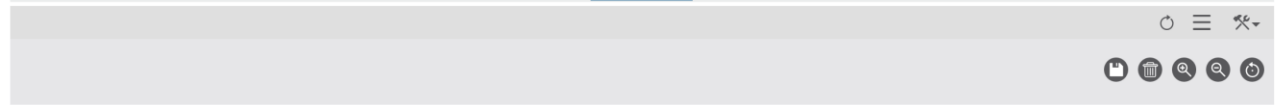
Policy Tags: Click to add a new tag

IP Data-plane Learning:

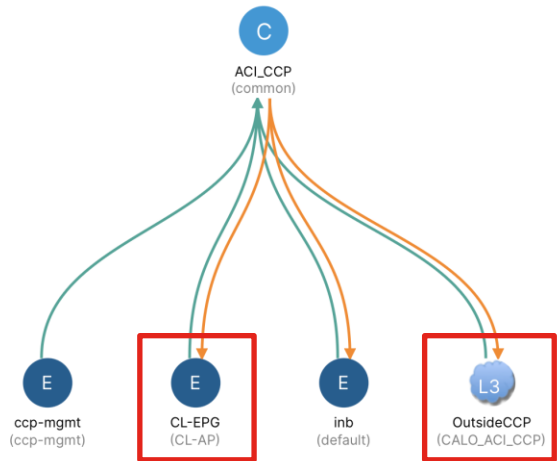
i This object was created by the Nexus Dashboard Orchestrator. It is recommended to only modify this object using the NDO GUI.

- common** 🏠 🔍 🔄
- > Quick Start
 - > common
 - > Application Profiles
 - > Networking
 - > Contracts
 - > Standard
 - > ACI_CCP
 - > BRU_K8s_31075_pod09-l3out-allow-all
 - > BRU_K8s_31075_pod10-l3out-allow-all
 - > BRU_OSPD_16559_EXT-OpenStack (BRU_OSPD_16559)
 - > ccp1_tenant1-l3out-allow-all
 - > ccp2_tenant1-l3out-allow-all
 - > CCP_cp_to_tenant
 - > default
 - > demo-router (rtr_624dd0d1-0a19-43bd-afa5-1ea5a)
 - > ikovacev_k8s_test-l3out-allow-all
 - > ikovacev_k8s_test_svc_guestbook_frontend-lb
 - > NB_DUMMY_Contract
 - > NB_DUMMY_Contract2
 - > ocp45_esx-l3out-allow-all
 - > ocp45_esx_snat_svcgraph
 - > router1 (rtr_45787ca4-a991-4fcc-a776-1e826f3c67d)
 - > router1 (rtr_bad403c3-e4cb-4f29-a466-b519fcd84)
 - > rtr (rtr_0087dc74-2823-4b04-8f5b-2ab15a9b57da)
 - > rtr (rtr_631f167b-3cc2-41fb-8ef3-884697b7b246)

Contract - ACI_CCP 🔖 🗨️



Relation Indicators
 Configured Operational



- Provider**
- Consumer**
- Intra EPG/ESG**
- Provider (from Master)**
- Consumer (From Master)**
- Intra EPG/ESG (from Master)**
- Master EPG/ESG**

Cancel



This object was created by the Nexus Dashboard Orchestrator. It is recommended to only modify this object using the NDO GUI.

common

- > Quick Start
- > common
 - > Application Profiles
 - > Networking
 - > Contracts
 - > Standard
 - > ACI_CCP
 - PermitAll
 - > BRU_K8s_31075_pod09-I3out-allow-all
 - > BRU_K8s_31075_pod10-I3out-allow-all
 - > BRU_OSPD_16559_EXT-OpenStack (BR
 - > ccp1_tenant1-I3out-allow-all
 - > ccp2_tenant1-I3out-allow-all
 - > CCP_cp_to_tenant
 - > default
 - > demo-router (rtr_624dd0d1-0a19-43b
 - > ikovacev_k8s_test-I3out-allow-all

Contract Subject - PermitAll



Policy **Faults** History

General Subject Exception Label

Property

Name: PermitAll
 Alias:
 Description: optional
 Global Alias:

Apply Both Directions: true
 Reverse Filter Ports:

Filters:

Name	Tenant	Action	Priority	Directives	State
default	common	Permit	default level		formed

CL



> Quick Start

> **CL**

> Application Profiles

> Networking

> Contracts

> Policies

> Services

> Security

Tenant - CL

Summary Dashboard Policy Operational Stats Health **Faults** History

Faults Fault Counts Stats

Healthy

Severity	Acked	Cause	Creation Time	Affected Object	Description
----------	-------	-------	---------------	-----------------	-------------

No items have been found.

No faults on the Tenant level!

No faults and internal connectivity is fine
 -> Must be something with external network

A day later... (if you are lucky)

- Net Infra team checks and says everything OK on their side
- Only one Tenant is complaining on a shared L3Out

```
EMEA-STAC-A1K-F1#show ip route 192.168.10.0 255.255.255.0  
% Network not in table  
EMEA-STAC-A1K-F1#
```



-> There is dynamic routing and ACI is not advertising our Subnet!
But we checked our ACI and everything is fine?!?!

Meanwhile on NDI...

- Overview
- Dashboard
- Explore
- Nodes
- Analyze Alerts**
- Compliance
- Troubleshoot
- Browse
- Change Management

BRU-ACI41 > ...

Central Dashboard



Last Updated: 6 minutes ago

Anomalies within the last 2 hours

Acknowledgement == False

Description contains CL-

Anomalies By: Category



Top 1 nodes contributing to Anomalies

apic1 Minor

Anomalies Individually

Actions

<input type="checkbox"/>	Severity	Title	Category	Nodes	Detection Time	Last Seen Time	Description	Status	User State	
<input type="checkbox"/>	Minor	BD With No L3out Has Subnet Marked External	Forwarding Policy Change Analysis	apic1 ACI-BRU41	Apr 07 2023 01:44:54.000 PM	Apr 07 2023 01:44:54.000 PM	Bridge Domain CL-BD which is associated to EPG 192.168.10.0/24 in Tenant CL currentl...	Active		...



Double Click

- Overview
- Operate
- Analyze**
- Configure
- Admin
- Explore
- Bookmarks

Anomalies

Online Sites

- Anomalies**
- Advisories
- Analysis Hub

Filter

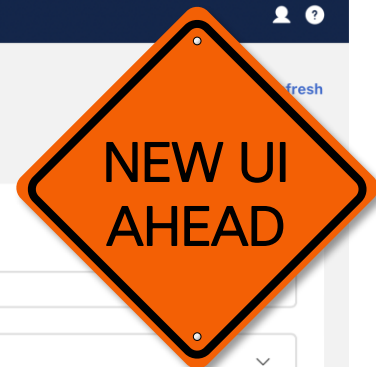
Anomaly Level



Category



Title	Anomaly Level	Category	Count
BD With Subnet Marked External Has L3out But No Contract With External EPG	Major	Configuration	6
Environmental Power Supply Equipment Psu Missing	Warning	Hardware	4
External Routed Network EPG Has No Contract In Enforced VRF	Warning	Configuration	2
Flowevent Fwd Drop	Major	Connectivity	2
Overlapping Subnets Across External Routed Network Configurations Across VRFs	Major	Configuration	2
VPC Down	Critical	Connectivity	2
Bridge Domain Has Invalid VRF	Warning	Configuration	1
Contract Has No Subjects	Warning	Configuration	1
External Routed Network EPG Has Contract In Unenforced VRF	Warning	Configuration	1



Open #/analyze/anomalies on this page in a new tab

Analyze - Anomaly - BD With No L3out Has Subnet M...

ACI-BRU41

Actions



Analyze the anomaly 20 minutes before and after

General

View More Details

Severity	Category	Sub-category	Type	Nodes	Description
Minor	Change Analysis	Forwarding Policy	BD With No L3out Has Subnet Marked External	apic1	Bridge Domain CL-BD which is associated to EPG 192.168.10.0/24 in Tenant CL currently has subnet marked as external but no L3 Out association

State

Show Anomaly Lifespan

Status	Verification Status	Acknowledgement	Assigned To	Duration	Detection Time	Last Seen Time	Cleared Time
Active	New	Unacknowledged	Not Assigned	29 Minutes	Apr 07 2023 01:44:54.000 PM	Apr 07 2023 02:14:51.000 PM	-

Impact Analysis

If L3Out is using dynamic protocols, the subnet may not be reachable from external networks.

Affected objects



Bd Subnet	BD	BD's VRF	VRF's Tenant
[192.168.10.1/24]*	CL-BD*	CL-VRF*	CL*

Scroll Down



Analyze - Anomaly - BD With No L3out Has Subnet M...

ACI-BRU41

Actions



Proactive Diagnostic Report

Code

BD Without L3out Has Subnet Marked External

Description

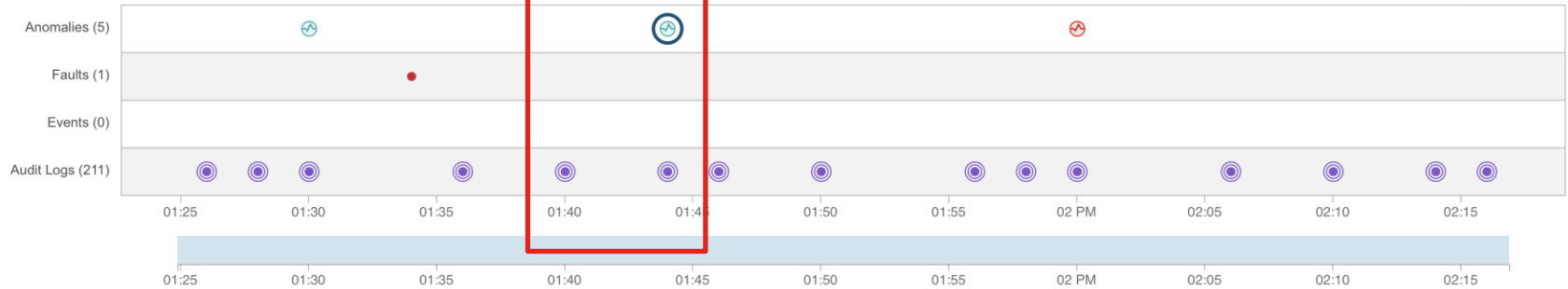
There is no L3Out associated with this BD, and this BD has subnets marked as advertised externally.

Recommendation

Determine if the subnet is required to be advertised externally.

- If yes, associate an intended L3Out with this BD.
 - Verify that the subnet is learnt on the external L3Out peering routers.
- If not required, uncheck the "Advertised Externally" option under the subnet.

Mutual Occurrences





Analyze - Anomaly - BD With No L3out Has Subnet M...

ACI-BRU41

Actions



Proactive Diagnostic Report

Code

BD Without L3out Has Subnet Marked External

Description

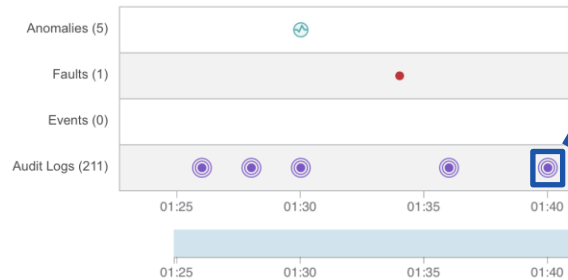
There is no L3Out associated with this BD, and this BD has subnets marked as advertised externally.

Recommendation

Determine if the subnet is required to be advertised externally.

- If yes, associate an intended L3Out with this BD.
 - Verify that the subnet is learnt on the external L3Out peering routers.
- If not required, uncheck the "Advertised Externally" option under the subnet.

Mutual Occurrences



Audit Logs - Apr 07 2023 01:40:00.000 PM

Q CL

apic1
BD CL-BD created

Audit Log

4211945

General Information

Username

admin

Action

Creation

Affected Object

uni/tn-CL/BD-CL-BD

Creation Time

Apr 07 2023
01:40:27.129 PM

Diagnostics

Description

BD CL-BD created

Change Set

CL

- Quick Start
- CL
 - Application Profiles
 - Networking
 - Bridge Domains
 - CL-BD**
 - DHCP Relay Labels
 - ND Proxy Subnets
 - Subnets
 - 192.168.10.1/24
 - VRFs
 - L2Outs
 - L3Outs
 - SR-MPLS VRF L3Outs
 - Dot1Q Tunnels
 - Contracts
 - Policies
 - Services
 - Security

Bridge Domain - CL-BD

Properties

Unicast Routing:

Operational Value for Unicast Routing: true

Custom MAC Address:

Virtual MAC Address:

Subnets:

Gateway Address	Description	Scope	Primary IP Address	Virtual IP	Subnet Control	Matching Tag Selector
192.168.10.1...		Advertised ...	False	False		

EP Move Detection Mode: GARP based detection

Associated L3 Outs:

L3 Out

No items have been found.
Select Actions to create a new item.



Problem fixed!

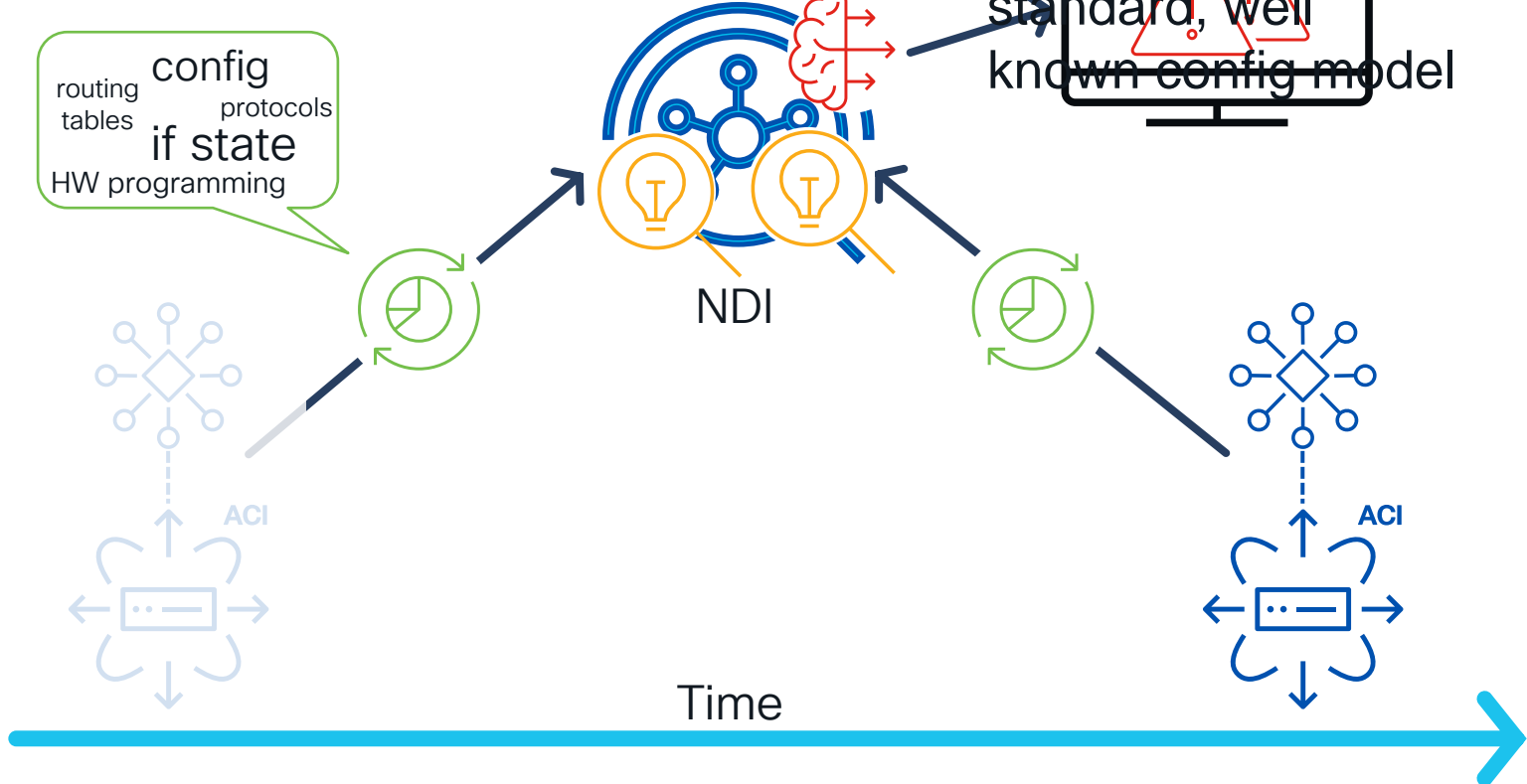
- Our colleague forgot to associate L3Out to the BD



How did NDI pick this up?

config
routing tables
protocols
if state
HW programming

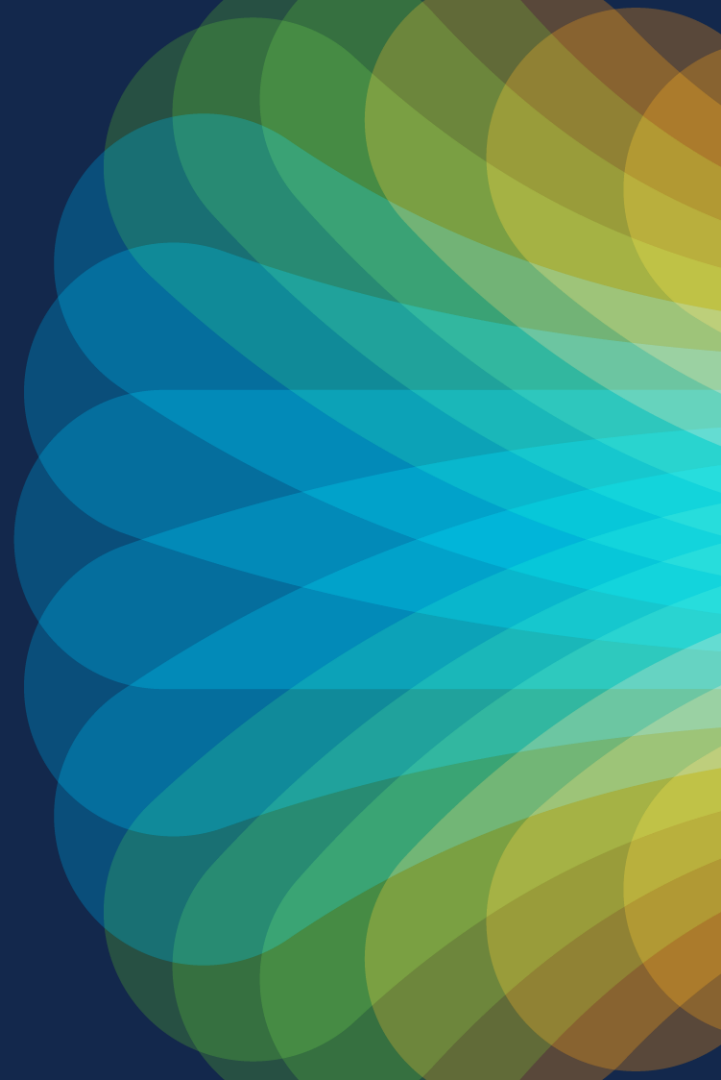
In our case it was a deviation from a standard, well known config model



How did NDI pick this up? (text version)

- NDI collects snapshots (datasets) every X minutes
- Snapshot is a list of CLI and API output from APICs and all switches in the fabric
- It contains config and current state of ports, routing tables, protocols, HW programming, etc
- All this data is processed and analyzed; detected anomalies are presented to the user in the UI
- In our case it was a deviation from standard, well known config model

Scenario 2



*“Our external backup platform
cannot reach servers hosted on
ACI fabric”*

Let's collect some facts!

- This used to work until last week
- Backup platform is on a dedicated subnet outside of ACI
- All servers on ACI are impacted, spanning multiple EPGs
- Connectivity inside ACI fabric is fine and everything else seems to work fine
- There is a dynamic routing protocol between ACI and external router (same fabric as before)

common

- Quick Start
- common
 - Application Profiles
 - Networking
 - Bridge Domains
 - VRFs
 - L2Outs
 - L3Outs
 - CALO_ACI_CCP
 - CL-L3Out**

L3 Outside - CL-L3Out

Summary Policy Stats **Faults** History

Severit Acked Cause Creation Time Affected Object Description Code

No items have been found.

common

- Quick Start
- common
 - Application Profiles
 - Networking
 - Bridge Domains
 - VRFs
 - ACI_CCP
 - CL-VRF**

VRF - CL-VRF

Summary Policy **Policy Control** Operational Stats Health **Faults** History

Healthy Severit Acked Cause Creation Time Affected Object Description Code

No items have been found.



common   


- > Quick Start
- > common
 - > Application Profiles
 - > Networking
 - > Bridge Domains
 - > VRFs
 - > ACI_LCCP
 - > CL-VRF
 - > default
 - > VRF
 - > L2Outs
 - > L3Outs
 - > SR-MPLS VRF L3Outs
 - > Dot1Q Tunnels
 - > Contracts
 - > Policies
 - > Services
 - > Security
 - > IP Address Pools

 VRF - CL-VRF  

Summary Policy Route Control **Operational** Stats Health Faults History

Associated EPGs Associated ESGs Associated L3Outs Client Endpoints **Route Table**

IPv4 Routes IPv6 Routes

This is a snapshot of route table at 2023-04-11T10:51 UTC+02:00.Refresh to see latest results.  

Node	Node Name	Prefix	Next Hop	Next Hop VRF	Destination VRF VNID	Route Tag	Route Type	Route Type Details	Preference	Source Protocol
Pod-1/Node-101	bdsol-aci41-leaf1	192.168.12.1/32	192.168.12.1/32	common:CL-VRF	unknown	0	Local	Local	0	local
Pod-1/Node-102	bdsol-aci41-leaf2	192.168.12.1/32	192.168.12.1/32	common:CL-VRF	unknown	0	0	Attached	0	am
Pod-1/Node-101	bdsol-aci41-leaf1	192.168.12.2/...	192.168.12.2/32	common:CL-VRF	unknown	0	0	Attached	0	am
Pod-1/Node-102	bdsol-aci41-leaf2	192.168.12.2/...	192.168.12.2/32	common:CL-VRF	unknown	0	Local	Attached Local	0	local
Pod-1/Node-101	bdsol-aci41-leaf1	192.168.12.3/...	192.168.12.3/32	common:CL-VRF	unknown	0	Local	Attached Local	0	local
Pod-1/Node-102	bdsol-aci41-leaf2	192.168.12.3/...	192.168.12.3/32	common:CL-VRF	unknown	0	Local	Attached Local	0	local
Pod-1/Node-101	bdsol-aci41-leaf1	192.168.12.4/...	192.168.12.4/32	common:CL-VRF	unknown	0	0	Attached	0	am
Pod-1/Node-102	bdsol-aci41-leaf2	192.168.12.4/...	192.168.12.4/32	common:CL-VRF	unknown	0	0	Attached	0	am
Pod-1/Node-101	bdsol-aci41-leaf1	192.168.12.25/...	192.168.12.255/...	common:CL-VRF	unknown	0	0	Attached Direct Limited or direc...	0	broadcast
Pod-1/Node-102	bdsol-aci41-leaf2	192.168.12.25/...	192.168.12.255/...	common:CL-VRF	unknown	0	0	Attached Direct Limited or direc...	0	broadcast
Pod-1/Node-101	bdsol-aci41-leaf1	192.168.93.0/...	192.168.12.4/32	common:CL-VRF	unknown	0	OSPF Intra		110	ospf-default
Pod-1/Node-102	bdsol-aci41-leaf2	192.168.93.0/...	192.168.12.4/32	common:CL-VRF	unknown	0	OSPF Intra		110	ospf-default
Pod-1/Node-101	bdsol-aci41-leaf1	192.168.94.0/...	192.168.12.4/32	common:CL-VRF	unknown	0	OSPF Intra		110	ospf-default
Pod-1/Node-102	bdsol-aci41-leaf2	192.168.94.0/...	192.168.12.4/32	common:CL-VRF	unknown	0	OSPF Intra		110	ospf-default

common



- Quick Start
- common
 - Application Profiles
 - Networking
 - Bridge Domains
 - VRFs
 - ACL_CCP
 - CL-VRF
 - default
 - VRF
 - L2Outs

VRF - CL-VRF

Summary Policy Route Control **Operational** Stats Health Faults History

Associated EPGs Associated ESGs Associated L3Outs Client Endpoints **Route Table**



IPv4 Routes IPv6 Routes

This is a snapshot of route table at 2023-04-11T11:31 UTC+02:00.Refresh to see latest results.  

Node	Node Name	Prefix	Next Hop	Next Hop VRF	Destination VRF VNID	Route Tag	Route Type	Route Type Details	Preference	Source Protocol
------	-----------	--------	----------	--------------	----------------------	-----------	------------	--------------------	------------	-----------------

No items have been found.

The route is missing!

This is a snapshot of route table at 2023-04-11T11:32 UTC+02:00.Refresh to see latest results.  

Node	Node Name	Prefix	Next Hop	Next Hop VRF	Destination VRF VNID	Route Tag	Route Type	Route Type Details	Preference	Source Protocol
Pod-1/Nod...	bdsol-aci41...	192.168.94.0/...	192.168.12....	common:CL...	unknown	0	OSPF Intra		110	ospf-default
Pod-1/Nod...	bdsol-aci41...	192.168.94.0/...	192.168.12....	common:CL...	unknown	0	OSPF Intra		110	ospf-default

What next?

- We are pretty sure that route should be there
- We cannot find anything wrong on ACI
 - > Lets contact the Net Infra team (again)

Two days later...

- Net Infra team says there was not supposed to be any change
- They don't want to spend time on this, it must be something wrong with ACI

In doubt?
Lets check what NDI has to say!

What is Delta-analysis?

- Shows difference in the policy, run time state, and the health of the network between two snapshots you specify
- **Health Delta** analyses the difference in the health of the fabric across the two snapshots
- **Policy Delta** analyses the differences in the policy between the two snapshots and provides a co-related view of what has changed in the ACI Fabric

Delta Analysis

- Overview
- Dashboard
- Explore
- Nodes
- Analyze Alerts
- Compliance
- Troubleshoot**
- Browse
- Change Management

BRU-ACI41

Central Dashboard



Delta Analysis

Filter by attributes

New Analysis

Analyses by status

Delta Analysis
Log Collector

Failed
0

In Progress
0

Complete
2

Latest Analyses

CL

Completed

CL

Completed

Status	Name	Site	Earlier Snapshot	Later Snapshot	Submission Time	Submitter ID	
Completed	CL	ACI-BRU41	Apr 11, 2023 3:45:05 AM	Apr 11, 2023 10:59:56 AM	Apr 11, 2023 11:15:42 AM	INSTANT	
Completed	CL	ACI-BRU41	Apr 07, 2023 10:00:04 AM	Apr 11, 2023 10:45:23 AM	Apr 11, 2023 11:03:10 AM	INSTANT	

5 Rows

Page 1 of 1





Delta Analysis



This screenshot shows the Cisco Nexus Dashboard Analysis Hub overview page. The left sidebar contains navigation options: Overview, Operate, Analyze, Configure, Admin, Explore, and Bookmarks. The main content area is titled "Analyze > Analysis Hub" and "Analysis Hub". It includes a description: "Analyze and troubleshoot your network with advanced analytics tools optimized for you to gain valuable insights into the performance and health of your network." Below this are several analytics cards: Anomalies, Compliance, Conformance, Policy CAM, Connectivity, Log Collector, Delta Analysis, and Pre-Change. The "Delta Analysis" card is highlighted with a red box and contains the text: "Compare configurations and differences in your site(s) between two points in time". At the bottom, there is a copyright notice for Cisco Systems, Inc. and the current date and time: "Wednesday, January 17, 12:16 PM (CET)".

This screenshot shows the Cisco Nexus Dashboard Delta Analysis page. The left sidebar is identical to the overview page. The main content area is titled "Analyze > Analysis Hub > Delta Analysis" and "Delta Analysis". A "Create Delta Analysis" button is highlighted with a red box. Below the title is a description: "Delta Analysis allows you to identify what changed in your network between two points in time. Visualize anomaly, advisory and configuration changes which result in faster troubleshooting. [Learn more](#)". The main content area is mostly empty, displaying a large blue information icon and the text "No Data Found". At the bottom, there is a copyright notice for Cisco Systems, Inc.

Creating new Analysis

 **Nexus Dashboard** |  Insights ▾ Feedback  

Create Delta Analysis ✕

General

Name*

Site*
ACI-BRU41 ✕

Earlier Snapshot*
Apr 7th 2023, 10:00 AM ✕

Later Snapshot*
Apr 11th 2023, 10:45 AM ✕



Delta Analysis

Filter by attributes


[New Analysis](#)

Analyses by status



Failed
0

In Progress
0

Complete
2

Latest Analyses

CL

 Completed

CL

 Completed

Status	Name	Site	Earlier Snapshot	Later Snapshot	Submission Time	Submitter	⚙️
<input checked="" type="checkbox"/> Completed	CL	ACI-BRU41	Apr 11, 2023 3:45:05 AM	Apr 11, 2023 10:59:56 AM	Apr 11, 2023 11:15:42 AM	INSTANT	
<input checked="" type="checkbox"/> Completed	CL	⌵ ACI-BRU41	Apr 07, 2023 10:00:04 AM	Apr 11, 2023 10:45:23 AM	Apr 11, 2023 11:03:10 AM	INSTANT	



Double
Click

Delta Analysis - CL

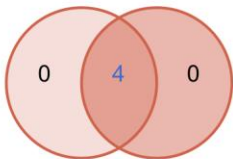


General 04/07/2023 10:00:04 AM Earlier 04/11/2023 10:45:23 AM Later 4d 0hr 45m 19s Time Range

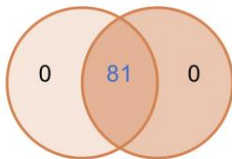
Health Delta Policy Delta

Anomaly Count

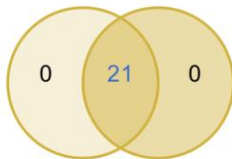
Critical



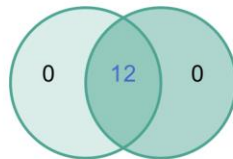
Major



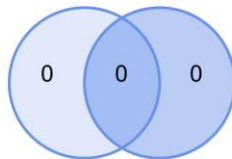
Minor



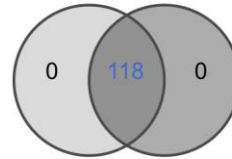
Warning



Info



Total



Health Delta by Resources

Only Show Mismatch



Health Delta by Resources

Only Show Mismatch

Resources	Total			Unhealthy		Total Unhealthy in Earlier Only	Total Unhealthy in Later Only	Total Unhealthy in Both	⚙️
	Earlier	Later		Earlier	Later				
App Profiles	40	40		19	19	0	0	19	
BDS	50	50		26	26	0	0	26	
Contracts	76	76		23	23	0	0	23	
Endpoints	122	123	↗️	0	0	0	0	0	
EPGs	94	94		40	40	0	0	40	
External Routes	15	14	↘️	0	0	0	0	0	
Interfaces	175	175		0	0	0	0	0	
Internal Subnets	137	137		15	15	0	0	15	
L3Outs	11	11		8	8	0	0	8	
Leafs	4	4		4	4	0	0	4	
Tenants	38	38		20	20	0	0	20	
VRFs	34	34		16	16	0	0	16	



L3Outs	11 11	8 8	0	0	8
Leafs	4 4	4 4	0	0	4
	38	20 20	0	0	20
	34	16 16	0	0	16

- Earlier Snapshot
- Later Snapshot
- Earlier Snapshot Only
- Later Snapshot Only
- Both Snapshots
- Consolidated

Filter by attributes X

No new anomalies!

Delta by Resource – Only Mismatch

Health Delta by Resources

Only Show Mismatch

Resources	Total		Unhealthy		Total Unhealthy in Earlier Only	Total Unhealthy in Later Only	Total Unhealthy in Both	⚙️
	Earlier	Later	Earlier	Later				
Endpoints	122	123 ↗	0	0	0	0	0	
External Routes	15	14 ↘	0	0	0	0	0	

It looks like we lost a route!

External Routes

15

14

0 | 0

0

0

0

Total External Routes All Earlier Snapshot

External Routes name

0.0.0.0/0

0.0.0.0/0

0.0.0.0/0

0.0.0.0/0

192.168.109.2/32

192.168.110.3/32

192.168.12.4/32

192.168.93.0/24

192.168.94.0/24

192.168.95.0/24

10

Rows

Page

1

of 2

1-10 of 15

Close

Total External Routes All Later Snapshot

External Routes name

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

192.168.109.2/32

192.168.110.3/32

192.168.12.4/32

192.168.93.0/24

192.168.94.0/24

10.2.2.3/32



10

Rows

Page

1

of 2

1-10 of 14

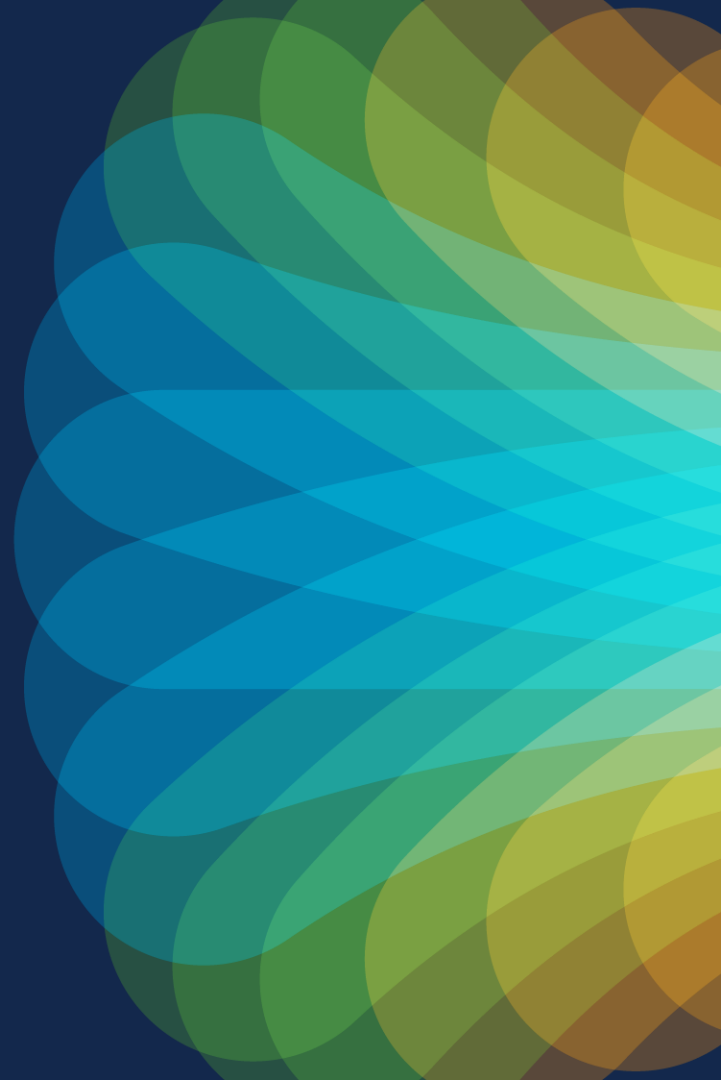
Close

Back to Net Infra team

- "Ah yes... we had a maintenance last week and due to config change error the route got dropped... sorry"



Scenario 3



“My VM doesn’t work”

Let's collect some facts!

- VM is on a Hypervisor hosted and intergrated with ACI
- VM is not accessible
- This is a "passwordles" VM accesible via SSH and public key (console login is not possible)
- Other VMs on same EPG are accesible
- Affected VM is also not accessible from other VMs in the same EPG
- VM name is "**ubuntu4.1**" and assigned IP is **192.168.10.14**



Powered On

[Launch Web Console](#)

[Launch Remote Console](#)



Guest OS: Ubuntu Linux (64-bit)
 Compatibility: ESXi 6.7 Update 2 and later (VM version 15)
 VMware Tools: Running, version:11365 (Guest Managed)
[More info](#)
 DNS Name: ubuntu41
 IP Addresses: 192.168.10.14
[View all 2 IP addresses](#)
 Host: 10.48.31.176

VM Hardware

> CPU	2 CPU(s)
> Memory	2 GB, 1.5 GB memo
> Hard disk 1	512 GB
> Network adapter 1	CLICL-APICL-EPG (connected)
CD/DVD drive 1	Disconnected
> Video card	256 MB

```

Ubuntu 22.04 LTS ubuntu41 tty1
-----
                               LINUXVMIMAGE
-----
Host Name: ubuntu41
Time: Tue Apr 25 2023 01:41:50
System IP address: 192.168.10.14

ubuntu41 login: _
  
```

CL

- Quick Start
- CL
 - Application Profiles
 - CL-AP
 - Application EPGs
 - CL-EPG**
 - uSeg EPGs
 - Endpoint Security Groups
 - Networking
 - Contracts
 - Policies
 - Services
 - Security

EPG - CL-EPG

Summary Policy **Operational** Stats Health Faults History

Client Endpoints Configured Access Policies Contracts Controller End-Points Deployed Leaves

Healthy

MAC/IP	Endpoint Name	Learning Source	Hosting Server	Reporting Interface Name	Controller (learned)	Encap	ESG	Policy Tags
00:0C:29:05:91:7E	UbuntuServer_2...	vmm	10.48.31.176	bdsol...	---	vlan-1...		
00:50:56:BD:4F:E1	ubuntu4.1	learned vmm	10.48.31.176	bdsol...	Pod-1/Node-101...	vlan-1...		
192.168.10.14								
00:50:56:BD:10:04	ubuntu2	vmm	10.48.31.176	bdsol...	---	vlan-1...		
00:50:56:BD:49:21	ubuntu22.04-te...	vmm	10.48.31.176	bdsol...	---	vlan-1...		
00:50:56:BD:71:5B	ubuntu3	learned vmm	10.48.31.176	bdsol...	Pod-1/Node-101...	vlan-1...		
192.168.10.13								
00:50:56:BD:A5:CD	ubuntu1	learned vmm	10.48.31.176	bdsol...	Pod-1/Node-101...	vlan-1...		
00:50:56:BD:A8:76	ubuntu4	learned vmm	10.48.31.176	bdsol...	Pod-1/Node-101...	vlan-1...		

IP seems to be there!

CL



- > Quick Start
- > CL
 - > Application Profiles
 - > CL-AP
 - > Application EPGs
 - > **CL-EPG**
 - > uSeg EPGs
 - > Endpoint Security Groups
 - > Networking

EPG - CL-EPG

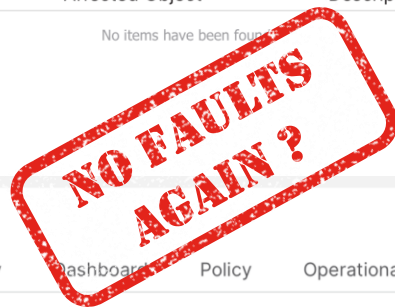
Summary Policy Operational Stats Health **Faults** History

Faults Fault Counts Stats

Healthy

Severity	Acked	Cause	Creation Time	Affected Object	Description	Code	Last Transition
----------	-------	-------	---------------	-----------------	-------------	------	-----------------

No items have been found.



CL



- > Quick Start
- > CL
 - > Application Profiles
 - > CL-AP
 - > Application EPGs
 - > CL-EPG
 - > uSeg EPGs
 - > Endpoint Security Groups
 - > Networking

Tenant - CL

Summary Dashboard Policy Operational Stats Health **Faults** History

Faults Fault Counts Stats

Healthy

Severity	Acked	Cause	Creation Time	Affected Object	Description	Code	Last Transition
----------	-------	-------	---------------	-----------------	-------------	------	-----------------

No items have been found.

What do we do next?

- Restart the VM? (Same result)
- Talk to Server/Virtualization Team? (They are very busy)
- What else?

You know where this
is going 😊

Let's browse some EPs...

The screenshot shows the Cisco Nexus Dashboard interface. The left sidebar contains navigation options: Overview, Dashboard, Explore, Nodes, Analyze Alerts, Compliance, Troubleshoot, Browse, and Change Management. The 'Browse' menu is expanded, showing a list of categories: Resources, Environmental, Flows, Endpoints (highlighted), Interfaces, Protocols, Events, and vCenters. The main content area displays 'Advisories within the last...' for device 'ACI-BRU41'. A filter for 'Acknowledgement == False' is applied. A donut chart titled 'Advisories By: Severity' shows a total of 11 advisories, broken down as follows:

Severity	Count
Critical	4
Major	3
Other	1
Minor	3
Total	11

Below the chart, a table header is visible with columns for 'Severity' and 'Title'.

Overview

Operate > Sites > ACI41

Operate

Sites

Analyze

Inventory

Configure

Topology

Inventory

Connectivity

Anomalies

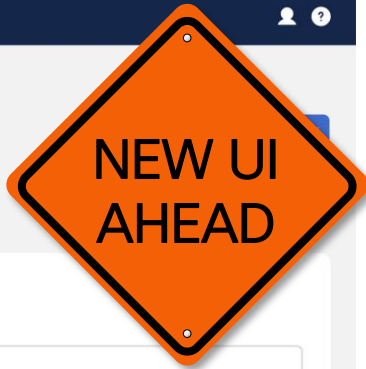
Advisories

Integrations

Admin

Explore

Bookmarks



Interfaces L3 Neighbors Endpoints vPC Domains Flows

Filter

Anomaly Level



- Critical 0
- Major 2
- Warning 0
- Healthy 227

MAC	IP Addresses	Hostnames	Anomaly Level	Connected To	Interface	Status	Tenant	VRF
00:50:56:8D:3F:C2	192.168.10.14	-	Major	bdsol-aci41-leaf3 bdsol-aci41-leaf4	bdsol-aci41-v mware-01	Active	CL	CL-VRF
00:50:56:BD:03:A5	192.168.10.14	-	Major	bdsol-aci41-leaf1 bdsol-aci41-leaf2	bdsol-aci41-v mware-03	Active	CL	CL-VRF
0A:58:0B:02:00:06	11.2.0.6	-	Healthy	bdsol-aci41-leaf3	tunnel13	Active	k8s_rke2_02	ACI_CCP
0A:58:0B:2D:00:20	11.45.0.32	-	Healthy	bdsol-aci41-leaf2	tunnel11	Active	ocp45_esx	ACI_CCP
0A:58:0B:2D:00:8D	11.45.0.141	-	Healthy	bdsol-aci41-leaf2	tunnel18	Active	ocp45_esx	ACI_CCP

Open #/sites on this page in a new tab

- Overview
- Dashboard +
- Explore
- Nodes
- Analyze Alerts
- Compliance
- Troubleshoot
- Browse
- Change Management

ACI-BRU41 > ...

Central Dashboard



Last Updated: [a few seconds ago](#)

Endpoints within the last 2 hours

Dashboard Browse

Tenant == CL

Top 5: Endpoints by Anomaly Score

Anomaly Score	MAC Address	IP Address / Hostname	Nodes	Interface	Time	Status	Tenant	VRF	BD	
Major	00:50:56:BD:4F:E1	192.168.10.14	bdsol-aci41-leaf1 BRU-ACI41 view (1) more	bdsol-aci4 1-vmware-03	Apr 14 2023 11:53:44.372 PM	Active	CL	CL-VRF	CL-BD	
Major	00:50:56:BD:4F:E1	192.168.10.14	bdsol-aci41-leaf1 BRU-ACI41 view (1) more	bdsol-aci4 1-vmware-03	Apr 14 2023 11:53:44.373 PM	Active	CL	CL-VRF	CL-BD	
Healthy	00:50:56:BD:71:5B	192.168.10.13	bdsol-aci41-leaf1 BRU-ACI41 view (1) more	bdsol-aci4 1-vmware-03	Apr 14 2023 11:26:04.047 PM	Active	CL	CL-VRF	CL-BD	



Endpoint Details - 192.168.10.14

Apr 14th 2023, 9:56 PM - Apr 14th 2023, 11:56 PM BRU-ACI41

Overview

Alerts

General Information

Anomaly Score **Major** MAC Address **00:50:56:BD:4F:E1** IP Address / Hostname **192.168.10.14** Last Update Time **Apr 14 2023, 11:53:44.372 PM**

Configuration

Tenant	VRF	BD	EPG/I3out
CL	CL-VRF	CL-BD	CL-EPG

Encap
vlan-1710

Operational

Nodes	Interface	VM Name
bdsol-aci41-leaf1 bdsol-aci41-leaf2	bdsol-aci41-vmware-03	ubuntu4.1
Hypervisor 10.48.31.176	Rogue False	BEHIND vPC True
Peer attached False		
Static False	Learned True	



Endpoint Details - 192.168.10.14

Apr 14th 2023, 9:56 PM - Apr 14th 2023, 11:56 PM BRU-ACI41

Overview **Alerts**

Acknowledgement == False

Actions

Anomalies **Individual**

<input type="checkbox"/>	Severity	Title	Category	Nodes	Detection Time	Last Seen Time	Description	Status	User State	
<input type="checkbox"/>	Major	Endpoint Duplicate IP	Endpoint	bdsol-aci41-leaf1 BRU-ACI41 view (1) more	Apr 14 2023 11:02:00.000 PM	Apr 14 2023 11:56:21.000 PM	Duplicate IP 192.168.10.14 was detected in Tenant CL Vrf CL-VRF on Switch bdsol-aci41-leaf1,b...	Active		...



Double Click

10

Page 1 of 1

Analyze - Anomaly - BRU-ACI41/CL/CL-VRF/192.1...

BRU-ACI41

Actions



Analyze the anomaly **20 minutes** before and after

General

View More Details

Severity	Category	Sub-category	Type	Nodes	Description
Major	Endpoint	Endpoint	duplicate-ip	bdsol-aci41-leaf1 view (1) more	Duplicate IP 192.168.10.14 was detected in Tenant CL Vrf CL-VRF on Switch bdsol-aci41-leaf1,bdsol-aci41-leaf2 Interface bdsol-aci41-vmware-03

State

Show Anomaly Lifespan

Status	Verification Status	Acknowledgement	Assigned To	Duration	Detection Time	Last Seen Time	Cleared Time
Active	New	<input checked="" type="checkbox"/> Unacknowledged	Not Assigned	54 Minutes	Apr 14 2023 11:02:00.000 PM	Apr 14 2023 11:56:21.000 PM	-

Affected Objects

2 Endpoints

Estimated Impact

Endpoints 00:50:56:BD:4F:E1, 00:50:56:BD:A8:76 may not be able to connect to network resources correctly
Endpoints 00:50:56:BD:A8:76, 00:50:56:BD:4F:E1 may not be able to connect to network resources correctly

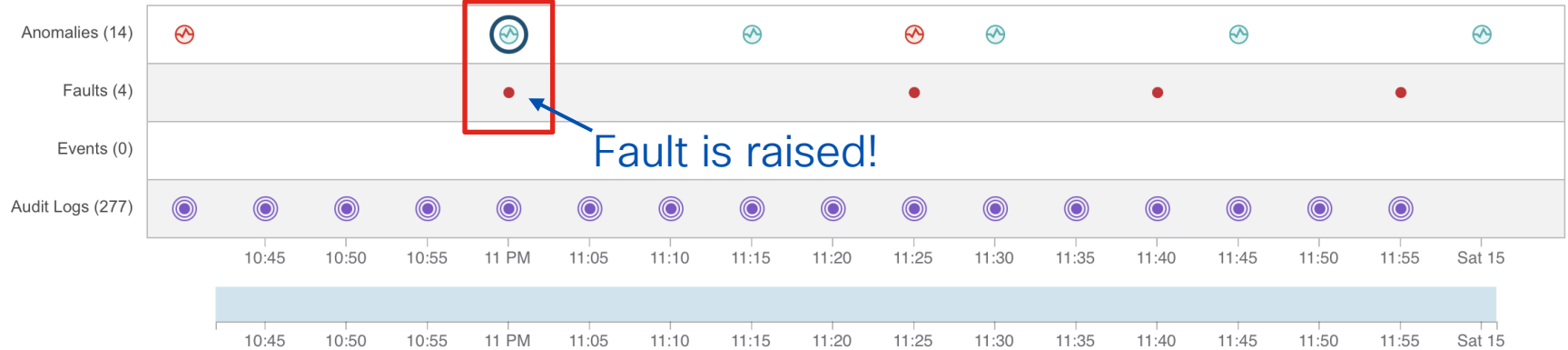
Scroll Down



Recommendations

1. Check which Endpoint (either 00:50:56:BD:A8:76 or 00:50:56:BD:4F:E1) should be assigned to 192.168.10.14
2. If you are using static IP address assignments, simply assign a different IP address to either Endpoint 00:50:56:BD:A8:76 or 00:50:56:BD:4F:E1 to resolve the conflict.
3. If you are using DHCP, you may exclude the conflicting IP address from the DHCP Server Scope.

Mutual Occurrences



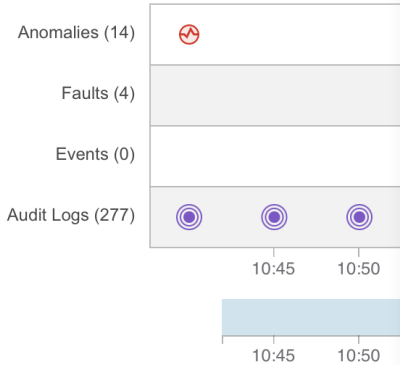
Estimated Impact

Endpoints 00:50:56:BD:4F:E1, 00:50:56:BD:A8:76
Endpoints 00:50:56:BD:A8:76, 00:50:56:BD:4F:E1

Recommendations

1. Check which Endpoint (either 00:50:56:BD:A8:76 or 00:50:56:BD:4F:E1) is causing the issue.
2. If you are using static IP address assignments, you may exclude the endpoint from the DHCP pool.
3. If you are using DHCP, you may exclude the endpoint from the DHCP pool.

Mutual Occurrences



Faults - Apr 14 2023 11:00:00.000 PM



Search

bdsol-aci41-spine1

2 EPs are in freeze state.



Fault

F3696



General Information



Affected Object

topology/pod-1/node-201/sys/coop/inst/dom-overlay-1

Cause

coop-ep-dampening

Fault Code

F3696

Lifecycle

raised

Type

operational

Creation Time

**Apr 14 2023
11:04:15.220 PM**

Number of occurrences

1

But this one would not be that helpful on ACI side

Analyze the anomaly Endpoints



General

Severity

Major

Category

Endpoint

State

Status

Active

Verification Status

New

Affected Objects

2 Endpoints

Search

00:50:56:BD:A8:76

BRU-ACI41 > CL > CL-BD

00:50:56:BD:4F:E1

BRU-ACI41 > CL > CL-BD



Endpoint

00:50:56:BD:A8:76



0

Critical



0

Major



0

Minor



0

Warning



General Information



MAC Address

00:50:56:BD:A8:76

IP Address

-

Hostnames

-

Last Update Time

Apr 14 2023, 11:58:04.466 PM

Endpoint Details - 00:50:56:BD:A8:76

Apr 14th 2023, 10:42 PM - Apr 15th 2023, 12:00 AM



Overview Alerts

General Information

Anomaly Score	MAC Address	IP Address / Hostname	Last Update Time
Major	00:50:56:BD:A8:76	-	Apr 14 2023, 11:58:04.466 PM

Configuration

Tenant	VRF	BD	EPG/I3out
CL	CL-VRF	CL-BD	CL-EPG
Encap			
vlan-1710			

Operational

Nodes	Interface		
bdsol-aci41-leaf1 bdsol-aci41-leaf2	bdsol-aci41-vmware-03		
VM Name	Hypervisor	Rogue	
ubuntu4	10.48.31.176	False	
BEHIND vPC	Peer attached	Static	Learned
True	False	False	True

Endpoint Details - 00:50:56:BD:A8:76

Apr 14th 2023, 10:42 PM - Apr 15th 2023, 12:00 AM



Overview Alerts

General Information

Anomaly Score	MAC Address	IP Address / Hostname	Last Update Time
Major	00:50:56:BD:A8:76	-	Apr 14 2023, 11:58:04.466 PM

Configuration

Tenant	VRF	BD	EPG/I3out	Nodes
CL	CL-VRF	CL-BD	CL-EPG	bdsol-aci41-leaf1 bdsol-aci41-leaf2
Encap				VM Name
vlan-1710				ubuntu4
				Hypervisor
				10.48.31.176
				BEHIND vPC
				True
				Peer a
				False

NDI Integrates with vSphere!



Virtual Machine

ubuntu4



0 Critical	0 Major	0 Minor	0 Warning
---------------	------------	------------	--------------

General Information

State

Powered On

Status

Normal

Guest OS

Ubuntu Linux (64-bit)

DNS Name

ubuntuserver2204

Host

10.48.31.176

VM Details - bdsol-aci41-vc - ubuntu4

Apr 14th 2023, 10:42 PM - Apr 15th 2023, 12:00 AM



Overview Alerts Topology

Anomaly Score

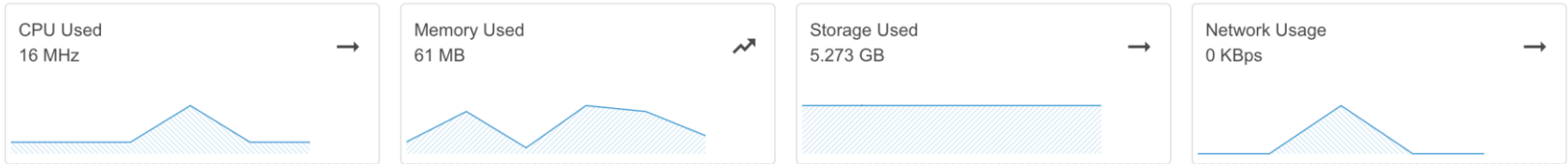
No anomalies found

No anomalies found

General Information

State	Status	Guest OS	DNS Name	Host	IP Addresses
Powered On	Normal	Ubuntu Linux (64-bit)	ubuntuserver2204	10.48.31.176	192.168.10.14
vCenter	Datacenter	Cluster			
bdsol-aci41-vc.cisco.com	POD41	CCP2			

Usage



Endpoint Details - 00:50:56:BD:A8:76

Apr 14th 2023, 10:42 PM - Apr 15th 2023, 12:00 AM



Endpoint History

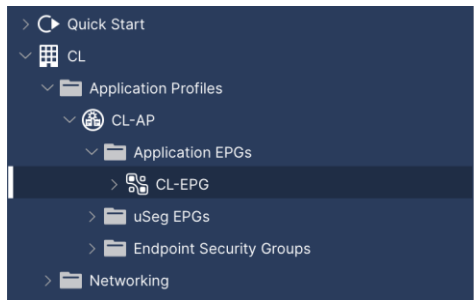
Filter

Anomaly Score	IP Address / Hostname	Nodes	Interface	Time	Status	Tenant	VRF	EPG/I3out	Encap	Changes
Major	-	bdsol-aci41-leaf1, bdsol-aci41-leaf2	bdsol-aci41-vmware-03	Apr 14 2023 11:58:04.466 PM	Active	CL	CL-VRF	CL-EPG	vlan-1710	IP Address, Hostname
Major	192.168.10.14	bdsol-aci41-leaf1, bdsol-aci41-leaf2	bdsol-aci41-vmware-03	Apr 14 2023 11:57:44.451 PM	Active	CL	CL-VRF	CL-EPG	vlan-1710	-
Major	192.168.10.14	bdsol-aci41-leaf1, bdsol-aci41-leaf2	bdsol-aci41-vmware-03	Apr 14 2023 11:57:01.463 PM	Active	CL	CL-VRF	CL-EPG	vlan-1710	-
Major	192.168.10.14	bdsol-aci41-leaf1, bdsol-aci41-leaf2	bdsol-aci41-vmware-03	Apr 14 2023 11:56:21.463 PM	Active	CL	CL-VRF	CL-EPG	vlan-1710	-
Major	192.168.10.14	bdsol-aci41-leaf1, bdsol-aci41-leaf2	bdsol-aci41-vmware-03	Apr 14 2023 11:53:24.358 PM	Active	CL	CL-VRF	CL-EPG	vlan-1710	-
Major	192.168.10.14	bdsol-aci41-leaf1, bdsol-aci41-leaf2	bdsol-aci41-vmware-03	Apr 14 2023 11:52:44.349 PM	Active	CL	CL-VRF	CL-EPG	vlan-1710	-

What actually happened?



- The user that reported the issue just created his VM with duplicate IP
- The other VM with the same IP had SSH on a different port -> this is what created "inaccessible" symptom
- There was an actual fault on EPG but it flaps really fast



										Summary	Policy	Operational	Stats	Health	Faults	History		
										Faults		Fault Counts	Stats					
Healthy																		
Severity	Acked	Cause	Creation Time	Affected Object	Description	Code	Last Transition	Lifecycle										
Warning	<input type="checkbox"/>	config-error	2023-04-15T00:31:4...	uni/tn-CL/ap-CL-AP/epg-CL-EPG/cep-00:50:56:BD:A8:76/ip-[192.168.10.14]	In Tenant CL, 192.168.10.14 is detected on multiple MACs (Context: 3112962. First 3 fvCEps: uni/tn-CL/ap-CL-AP/epg-CL-EPG/cep-	F3083	2023-04-15T00:31:4...	Soaking										

Scenario 4

"Help me, my TCAM is on fire!"

What is TCAM and Policy CAM?

- In ACI policy, contracts and filters are programmed in **Policy CAM** and **TCAM** (**T**ernary **C**ontent **A**dressable **M**emory)
- Specialized and precious local switch HW resources designed for rapid table lookups
- In an environment with many to many EPG contract relationship, multiple filters, and EPGs concentrated on few leaf switches can easily hit the Policy CAM limit and exhaust the hardware resources
- If the resources are exhausted additional policies / contracts won't be programmed on the hardware. As a result system will see unexpected behaviours

One day you wake up to this...



APIC

admin

System | Tenants | Fabric | Virtual Networking | Admin | Operations | Apps | Integrations

QuickStart | Dashboard | Controllers | System Settings | Smart Licensing | **Faults** | History | Config Zones | Active Sessions | Security

Faults

Severity	Acked	Cause	Creation Time	Affected Object	Description	Code	Last Transition	Lifecycle
	<input type="checkbox"/>	threshold-cr...	2023-04-20T20:43:58.703+0...	topology/pod-1/node-106/sys/eqptcapacity	TCA: Policy CAM entries usage current value(eqptcapacityPolEntry5min:normalizedLast) value 92% raised above threshold 90%	F105504	2023-04-20T20:43:58.703+0...	Raised
	<input type="checkbox"/>	threshold-cr...	2023-04-20T20:44:44.453+0...	topology/pod-1/node-105/sys/eqptcapacity	TCA: Policy CAM entries usage current value(eqptcapacityPolEntry5min:normalizedLast) value 92% raised above threshold 90%	F105504	2023-04-20T20:44:44.453+0...	Raised
	<input type="checkbox"/>	threshold-cr...	2023-04-20T20:44:21.656+0...	topology/pod-1/node-101/sys/eqptcapacity	TCA: Policy CAM entries usage current value(eqptcapacityPolEntry5min:normalizedLast) value 87% raised above threshold 85%	F105504	2023-04-20T20:44:21.656+0...	Raised
	<input type="checkbox"/>	threshold-cr...	2023-04-20T20:43:52.757+0...	topology/pod-1/node-102/sys/eqptcapacity	TCA: Policy CAM entries usage current value(eqptcapacityPolEntry5min:normalizedLast) value 76% raised above threshold 75%	F105504	2023-04-20T20:43:52.757+0...	Raised

One day you wake up to this...

The screenshot shows the Cisco APIC (Application Policy Infrastructure Controller) web interface. The top navigation bar includes the Cisco logo, the text 'APIC', and the user 'admin'. Below this is a main navigation menu with categories like System, Tenants, Fabric, Virtual Networking, Admin, Operations, Apps, and Integrations. A secondary menu lists various system components such as QuickStart, Dashboard, Controllers, System Settings, Smart Licensing, Faults, History, Config Zones, Active Sessions, and Security. The 'Faults' section is active, displaying a list of faults. A modal window titled 'Fault Properties' is open, showing details for a specific fault. The modal has tabs for 'General', 'Troubleshooting', and 'History', with 'Troubleshooting' selected. The content of the modal includes an 'Explanation' and a 'Recommended Action'.

Fault Properties

General **Troubleshooting** History

Explanation: This fault is caused by "Policy CAM entries usage current value" statistical property crossing threshold level.

Recommended Action: Check the values of "Policy CAM entries usage" statistical counter and either correct the conditions that cause the counter values to cross certain threshold levels, or adjust the threshold values in monitoring policies.

Capacity Dashboard

Fabric Capacity Leaf Capacity

Switch	VRF	BD	EPG	ESG	Mac (learned)	IPv4 (learned)	IPv6 (learned)	Multicast	Policy CAM
pod-1/node-105 N9K-C93180YC-EX Configure Profile 	1% 9 of 800	3% 106 of 3500	2% 108 of 3960	Mac Selectors 0% 0 of 5000	<1% 114 of 24576	<1% 113 of 24576	0% 0 of 12288	0% 0 of 8192	Rules 93% 61219 of 65536
				IP Selectors 0% 0 of 5000	Local: 110 Remote: 4	Local: 108 Remote: 5	Local: 0 Remote: 0		Labels 0% 0
pod-1/node-106 N9K-C93180YC-EX Configure Profile 	1% 8 of 800	3% 105 of 3500	2% 109 of 3960	Mac Selectors 0% 0 of 5000	<1% 112 of 24576	<1% 113 of 24576	0% 0 of 12288	0% 0 of 8192	Rules 92% 60461 of 65536
				IP Selectors 0% 0 of 5000	Local: 106 Remote: 6	Local: 106 Remote: 7	Local: 0 Remote: 0		Labels 0% 0
pod-1/node-101 N9K-C93360YC-FX2 Configure Profile 	1% 13 of 800	3% 111 of 3500	2% 113 of 3960	Mac Selectors 0% 0 of 5000	<1% 118 of 24576	<1% 116 of 24576	0% 0 of 12288	0% 0 of 8192	Rules 90% 59530 of 65536
				IP Selectors 0% 0 of 5000	Local: 115 Remote: 3	Local: 111 Remote: 5	Local: 0 Remote: 0		Labels 0% 0
pod-1/node-102 N9K-C93360YC-FX2 Configure Profile 	1% 11 of 800	3% 108 of 3500	2% 109 of 3960	Mac Selectors 0% 0 of 5000	<1% 116 of 24576	<1% 111 of 24576	0% 0 of 12288	0% 0 of 8192	Rules 79% 51934 of 65536
				IP Selectors 0% 0 of 5000	Local: 112 Remote: 4	Local: 106 Remote: 5	Local: 0 Remote: 0		Labels 0% 0

What do we do?

- Clearly there is "too much" config! But where?
- Even if we find it, can we remove it?

This is getting old...

- Overview
- Dashboard
- Explore
- Nodes
- Analyze Alerts
- Compliance
- Troubleshoot
- Browse
- Change Management

pod47

Central Dashboard

Anomalies within the last 2 hours

Last Updated: 6 minutes ago

Acknowledgement == False

Category == Utilization

Anomalies By: Category



Top 4 nodes contributing to Anomalies

- bdsol-aci47-leaf1 Critical
- bdsol-aci47-leaf5 Critical
- bdsol-aci47-leaf6 Critical
- bdsol-aci47-leaf2 Critical

Anomalies Aggregated

Highest Severity	Category	Title	Count	Description
Critical	Operational Utilization	Utilization Hardware Policy Team Above Threshold	4	Number of Policy TCAM's are above threshold

10 Rows

Page 1 of 1

Overview

Dashboard

Explore

Nodes

Analyze Alerts

Compliance

Troubleshoot

Browse

Change Management

pod47

Central Dashboard



Resources within the last 2 hours

Last Updated: 1 minute ago

Dashboard Browse

Filter

Sort by: MAC (learned)

- Resources
- Environmental
- Flows
- Endpoints
- Interfaces
- Protocols
- Events
- vCenters

Resources Configuration Resources Interface Resources Policy CAM

Launch Policy CAM Analyzer

Resource	Node	Usage	Provider Tenant	Consumer Tenant	Provider EPG	Consumer EPG	Contract	Filter	
	bdsol-aci47-leaf5 pod47	61.2 K of 65.5 K	8	8	220	113	20	14	
	bdsol-aci47-leaf6 pod47	60.5 K of 65.5 K	8	8	218	111	18	14	
Warning	bdsol-aci47-leaf1 pod47	59.5 K of 65.5 K	10	10	227	120	24	14	
Warning	bdsol-aci47-leaf2 pod47	51.9 K of 65.5 K	10	10	223	118	22	14	
Warning	bdsol-aci47-leaf4 pod47		7	7	21	15	15	8	



Overview

Operate

Analyze

Configure

Admin

Explore

Bookmarks

Analyze > Analysis Hub

Analysis Hub

Analyze and troubleshoot your network with advanced analytics tools optimized for you to gain valuable insights into the performance and health of your network.

Anomalies

Advisories

Analysis Hub

Compliance

Monitor your fabric's compliance with custom anomaly rules



Conformance

Keep track of your hardware and software life cycles



Policy CAM

Monitor your network's policies



Connectivity

Analyze flows from one endpoint to another



Log Collector

Collect and analyze logs from you devices



Sustainability

Explore your site's energy usage, cost, and emissions



Delta Analysis

Compare configurations and differences in your site(s) between two points in time



Pre-Change

View the potential impact of configuration changes

© Cisco Systems, Inc.

Current date and time is Wednesday, January 17, 12:16 PM (CET)

Open #/analyze/analyzeHub on this page in a new tab



Select site and snapshot



Policy CAM Analyzer

Analyze Site **pod47** ▾ on **Core-1**

Mode

Latest

Last...

Date Range

Time Window

Selected: Apr 23rd 2023, 5:27 PM

Cancel

Apply

Policy CAM Analyzer



Analyze Site **pod47** on **Apr 20th 2023, 11:01 PM**

Associated Policies

Selecting any combination of objects or policies will update the tables below

T Provider Tenant
 T Consumer Tenant
 EPC Provider EPG
 EPC Consumer EPG
 C Contract
 F Filter
 N Node

net_centric_tcam 201.3 K of 201.7 K Entries	net_centric_tcam 201.3 K of 201.7 K Entries	epg_log 2.4 K of 201.7 K Entries	epg_0098 2.4 K of 201.7 K Entries	prod_con 193.7 K of 201.7 K Entries	telnet 77.6 K of 201.7 K Entries
systemdefault 156 of 201.7 K Entries	systemdefault 156 of 201.7 K Entries	epg_0000 2.4 K of 201.7 K Entries	epg_0097 2.4 K of 201.7 K Entries	log_con 2.4 K of 201.7 K Entries	overload 77.3 K of 201.7 K Entries
mgmt 90 of 201.7 K Entries	mgmt 81 of 201.7 K Entries	epg_0001 2.4 K of 201.7 K Entries	epg_0096 2.4 K of 201.7 K Entries	mon_con 2.4 K of 201.7 K Entries	any 38.8 K of 201.7 K Entries

View All (14)

View All (14)

View All (246)

View All (131)

View All (33)

View All (15)



No data to display

Policy CAM Analyzer

Analyze Site **pod47** on **Apr 20th 2023, 11:01 PM**

Associated Policies

Provider Tenant - net_centric_tcam × Consumer Tenant - net_centric_tcam ×

T Provider Tenant

T Consumer Tenant

EPG Provider EPG

EPG Consumer EPG

C Contract

F Filter

N Node

net_centric_tcam

201.3 K of 201.7 K Entries

net_centric_tcam

201.3 K of 201.3 K Entries

epg_log

2.4 K of 201.3 K Entries

epg_0098

2.4 K of 201.3 K Entries

prod_con

193.7 K of 201.3 K Entries

telnet

77.6 K of 201.3 K Entries

bdsol-aci47-leaf1

50.4 K of 201.3 K Entries

systemdefault

156 of 201.7 K Entries

epg_0000

2.4 K of 201.3 K Entries

epg_0097

2.4 K of 201.3 K Entries

mon_con

2.4 K of 201.3 K Entries

overload

77.3 K of 201.3 K Entries

bdsol-aci47-leaf5

50.4 K of 201.3 K Entries

mgmt

90 of 201.7 K Entries

epg_0001

2.4 K of 201.3 K Entries

epg_0096

2.4 K of 201.3 K Entries

log_con

2.4 K of 201.3 K Entries

any

38.8 K of 201.3 K Entries

bdsol-aci47-leaf6

50.4 K of 201.3 K Entries

[View All \(14\)](#)

[View All \(1\)](#)

[View All \(202\)](#)

[View All \(101\)](#)

[View All \(6\)](#)

[View All \(9\)](#)

[View All \(4\)](#)

Scroll Down




Policy CAM Analyzer



Policy CAM Statistics

All Policy CAM Rules by Hit Count by EPGs, Contracts, Filters

- All Policy CAM Rules by Hit Count by EPGs
- All Policy CAM Rules by Hit Count by EPGs, Contracts
- All Policy CAM Rules by Hit Count by EPGs, Contracts, Filters ✓
- All Policy CAM Rules by Hit Count by EPGs, Tenants
- All Policy CAM Rules by Hit Count by Tenants
- All Policy CAM Rules by Hit Count by EPGs, Leafs
- All Policy CAM Rules by Hit Count by EPGs, Leafs, Contracts
- All Policy CAM Rules by Hit Count by EPGs, Leafs, Contracts, Filters
- All Policy CAM Rules by Hit Count by EPGs, Leafs, Tenants
- All Policy CAM Rules by Hit Count by Tenants, Leafs

			Filter	Consumer VRF	Action	1 Month	1 W 
epg_0011	epg_mon	mon_con	mon	main_vrf	PERMIT	0	0
epg_log	epg_0083	log_con	log	main_vrf	PERMIT	0	0
epg_0068	epg_mon	mon_con	log	main_vrf	PERMIT	0	0
epg_0065	epg_mon	mon_con	log	main_vrf	PERMIT	0	0
epg_0068	epg_mon	mon_con	mon	main_vrf	PERMIT	0	0
epg_0065	epg_mon	mon_con	mon	main_vrf	PERMIT	0	0

10 Rows

Scroll Right 

Page 1 of 2476 << < 1-10 of 24752 > >>

Policy CAM Analyzer



Policy CAM Statistics

All Policy CAM Rules by Hit Count by EPGs, Contracts, Filters ▼

Filter by attributes

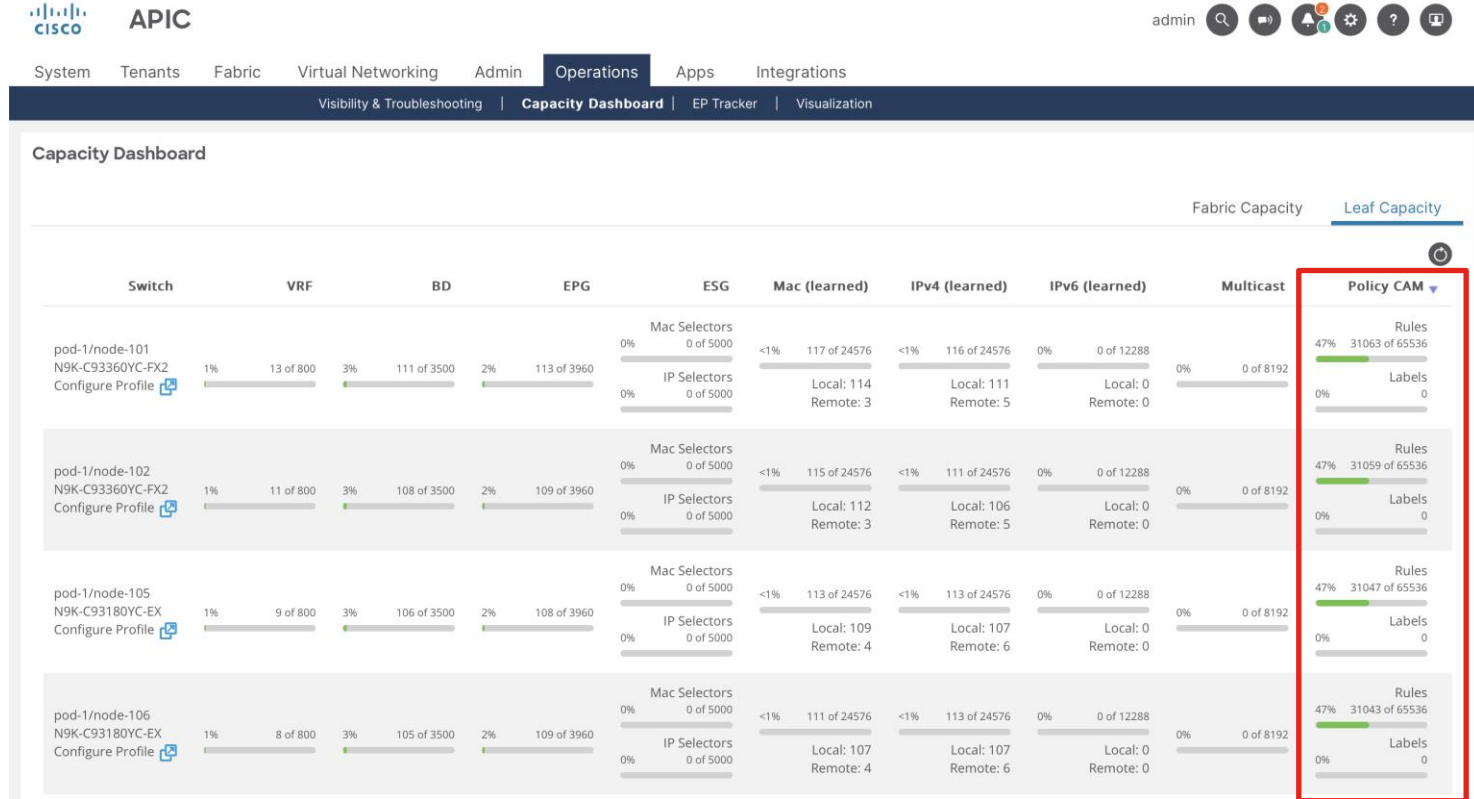
Filter	Consumer VRF	Action	1 Month	1 Week	1 Day	1 Hour	Cumulative	Policy Cam Count	⚙
mon	main_vrf	PERMIT	0	0	0	0	0	24	
log	main_vrf	PERMIT	0	0	0	0	0	24	
log	main_vrf	PERMIT	0	0	0	0	0	24	
log	main_vrf	PERMIT	0	0	0	0	0	24	
mon	main_vrf	PERMIT	0	0	0	0	0	24	
log	main_vrf	⚙ PERMIT	0	0	0	0	0	24	
mon	main_vrf	PERMIT	0	0	0	0	0	24	
log	main_vrf	PERMIT	0	0	0	0	0	24	
mon	main_vrf	PERMIT	0	0	0	0	0	24	
mon	main_vrf	PERMIT	0	0	0	0	0	24	

10 ▼ Rows

Page 1 of 2476 ⏪ ⏩ 1-10 of 24752 ⏪ ⏩

How did it get to
this?

Previous stable situation



Delta Analysis - TCAM

General

04/13/2023 12:10:17 AM Earlier

04/20/2023 12:56:06 AM Later

7d 0hr 45m 49s Time Range

Health Delta Policy Delta

Changed Policy Objects

uni/tn-net_centric_tcam

Tenants (2)

- net_centric_tcam (2) ^
- prod_con (2) ^
- overload2 (1)
- overload (1)

Fabric

L4 - L7 Services

VM Networking

Other (1)

Policy Viewer

Changed Search in Policy Viewer

Earlier	Later	
1	1	<polUni annotation="" nameAlias="" dn="uni" userdom="all" >
2	2	<fvTenant annotation="" descr="" nameAlias="" ownerTag="" name="mgmt" dn="uni/tn-mgmt" userdom="all" ownerKey="" >
3	3	<mgmtMgmtP annotation="" descr="" nameAlias="" ownerTag="" name="default" dn="" userdom="all" ownerKey="" >
4	4	<mgmtOoB annotation="" descr="" nameAlias="" name="default" dn="" prio="unspecified" userdom="all" >
^ Show more code above		
v Show more code below		
3025	3025	</fvSubnet>
3026	3026	</fvBD>
3027	3027	<vzBrCP annotation="orchestrator:terraform" descr="" nameAlias="" targetDscp="unspecified" ownerTag="" scope="tenant" n
3028	3028	<vzRsSubjFiltAtt annotation="orchestrator:terraform" descr="" connMatchT="AllOfOne" nameAlias="" targetDscp="unspecified" prou
3028	3029	</vzRsSubjFiltAtt>
3028	3030	</vzRsSubjFiltAtt>
3029	3031	<vzRsSubjFiltAtt annotation="orchestrator:terraform" tnVzFilterName="any" directives="" priorityOverride="default" action="pe
3030	3032	</vzRsSubjFiltAtt>
3030	3033	<vzRsSubjFiltAtt annotation="" tnVzFilterName="overload" directives="" priorityOverride="default" action="permit" dn="" userd
3030	3034	</vzRsSubjFiltAtt>
3031	3035	<vzRsSubjFiltAtt annotation="orchestrator:terraform" tnVzFilterName="teinet" directives="" priorityOverride="default" action="c
3032	3036	</vzRsSubjFiltAtt>
3033	3037	</vzSubj>

Audit Log

DN uni/tn-net_centric_tcam

- Created by admin
12:40:52 AM CET
RsSubjFiltAtt overload2 created
[View More](#)
- Created by admin
12:40:52 AM CET
RsSubjFiltAtt overload2 created
[View More](#)
- Created by admin
12:40:52 AM CET
RsSubjFiltAtt overload2 created
[View More](#)
- Created by admin
12:40:43 AM CET
RsSubjFiltAtt overload created
[View More](#)



But I added just two more filters to an existing contract!

The screenshot shows the Cisco SD-WAN configuration interface. On the left is a navigation pane for 'net_centric_tcam'. The main area displays the configuration for 'Contract Subject - prod'. The 'General' tab is active, showing the contract's name, alias, description, and global alias. Below this, the 'Filters' table lists the contract's filters. Two filters, 'overload' and 'overload2', are highlighted with a red box.

Contract Subject - prod

Policy | Faults | History

General | Subject Exception | Label

Property

Name: prod
Alias:
Description: optional
Global Alias:

Apply Both Directions: true
Reverse Filter Ports:

Filters:

Name	Tenant	Action	Priority	Directives	State
any	net_centric_tcam	Permit	default level		formed
overload	net_centric_tcam	Permit	default level		formed
overload2	net_centric_tcam	Permit	default level		formed
telnet	net_centric_tcam	Deny	default level		formed

Two innocent looking filters

Name	Alias	EtherType	ARP Flag	IP Protocol	Match Only Fragme	Statefu	Source Port / Range		Destination Port / Range	
							From	To	From	To
1		IP		tcp	False	False	unspecified	unspecified	1000	2000

Name	Alias	EtherType	ARP Flag	IP Protocol	Match Only Fragme	Statefu	Source Port / Range		Destination Port / Range	
							From	To	From	To
1		IP		tcp	False	False	unspecified	unspecified	3000	3200

Instead of
Conclusion:
What else can
NDI do?



Explore connectivity

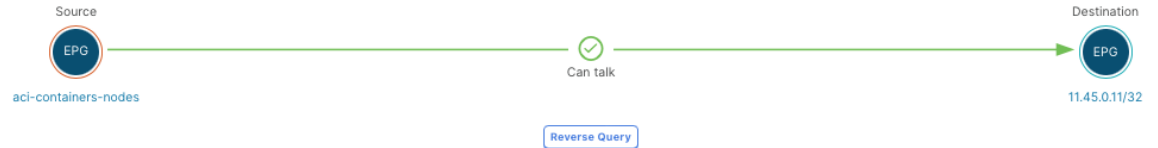
Explore

Explore for on

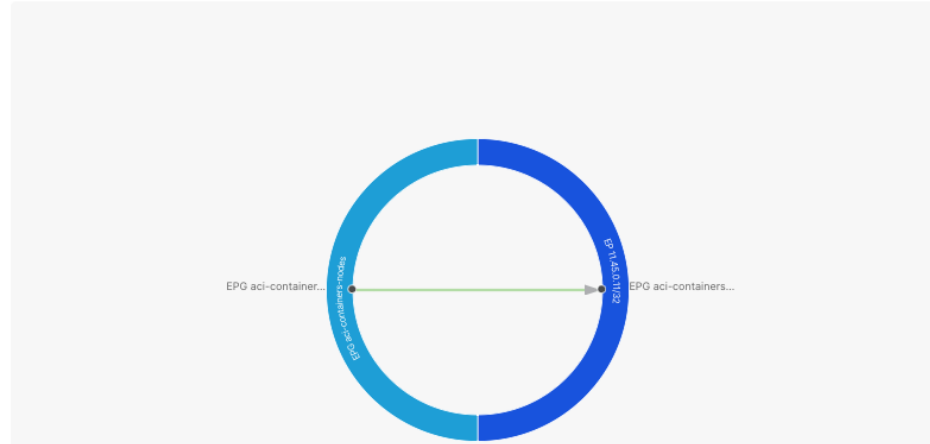
Can EPG:uni/tn-ocp45_esx/ap-aci-containers-ocp45_esx/epg-aci-containers-nodes talk to EP:11.45.0.11/32|0A:58:0B:2D:00:0B

Query Results

Can source talk to destination?



Which entities can talk?



View

Type Objects Tenants VRFs

Health Status
Healthy
Unhealthy

[Advanced Filter](#) ▾

Browse flows

CISCO Nexus Dashboard

- Overview
- Operate
- Analyze
- Configure
- Admin

Explore

Bookmarks

Flow Record detail for 33.145.2.1 to 10.48.31.109



General

Record Time	Flow Type	Protocol	Latency	Packet Drop Indicator
Feb 07 2024 10:49:18.117 AM	IPv4	TCP	0 μs	0

Aggregated Flow Information

Record Count	Start Time	End time	Flow Type	Protocol	Latency	Packet Drop Indicator
1	Feb 07 2024 10:49:18.117 AM	Feb 07 2024 10:49:47.764 AM	IPv4	6	0 μs	0

Ingress

IP Address	TCP PORT	Last Updated	Tenant
33.145.2.1	19851	Feb 07 2024 10:49:47.764 AM	common

VRF	EPG	Packets	Bytes	Burst max (Bytes)	Protocol
ACI_CCP	-	4	327	0	6

Switches	Interface
bdsol-aci41-leaf1	po2

Egress

IP Address	TCP PORT	Last Updated	Tenant	VRF
10.48.31.109	443	Feb 07 2024 10:49:47.764 AM	-	-

EPG	Packets	Bytes	Burst max (Bytes)	Protocol
-	4	327	0	6

Switches	Interface
bdsol-aci41-leaf1	

Path



Offline sites

Operate > Sites

Add site to Insights

1 Add Site

2 Details

3 Summary

Ready To Add

Manually Add

Add Site Snapshot

Add Site Snapshot

No internet connectivity on your controllers or switches? No problem! You can still add a Snapshot for your Controller and Switches. [Learn how this works](#)



Download snapshot script, which will generate a .tar.gz file. Once done, simply upload such file below.

Download Snapshot Script



Choose a file or drag and drop to upload

Accepted Files: .tar.gz



Cancel

Back

Next

- Device Connector >
- device_connector_versions_info >
- Configuration >
- Advisories >
- Anomalies ▾
 - Return the anomalies buckets GET
 - Get Anomalies details list GET
 - Get the list of default resources GET
 - Get the list of related objects GET
 - Get the summary of anomalies GET
 - Get Top Fabrics based on Anomaly Score GET
 - Get top flow records by anomalies GET
 - Get the top flows by anomalies GET
 - Get top nodes list based on anomaly score GET
 - Get the aggregate affected objects for an anomaly GET
 - Get the affected objects for an anomaly GET
 - Given an anomaly, show the impact GET

Get Anomalies details list

Get the list of anomalies for a given IG or site

Get `/sedgeapi/v1/cisco-nir/api/v1/anomalies/details`

query Parameters

siteGroupName	string Example: <code>siteGroupName=DC-WEST-IG</code> Name of the Site Group - limit the records pertaining to the sites in this site group. One out of siteName / siteGroupName is mandatory.
siteName	string Example: <code>siteName=DC-WEST</code> Name of the Site - limit the records pertaining to the site. One out of siteName / siteGroupName is mandatory.
siteNameList	string Example: <code>siteNameList=DC-WEST,Candid5,FabricName</code> Name of the sites - limit the records pertaining to given siteNames. One out of siteName / siteGroupName / siteNameList is mandatory.
filter	string Example: <code>filter=acknowledged:false</code> Lucene format filter - Filter the response based on this filter field. For example, <code>cleared:true</code> to get cleared anomalies or <code>acknowledged:true</code> to get acknowledged anomalies. We also support and, or operations
nodeName	string Default: <code>"None"</code> Example: <code>nodeName=ifav-leaf1</code> Name of the fabric node, limit the anomaly score to given nodeName

Run Example

Query params

siteGroupName

siteName

siteNameList

filter

nodeName

offset

count

Pre-change analysis

Analyze > Analysis Hub > Pre-Change Analysis > Create Pre-Change Analysis

Create Pre-Change Analysis

- 1 General
- 2 Change Simulation
- 3 Summary

Change Simulation

Manually provide each change you want to simulate or upload a .json/.xml file with the corresponding configuration.

Manual Changes Import JSON/XML File

Change Type

Add

Object Type

Application EPG (fvAEPg)

Application EPG's Parent

uni/tn-k8s_rke2_01/ap-aci-containers-k8s_rke2_01

Application EPG (epg-)

test

Bridge Domain for the EPG

Bridge Domain for the EPG

Description

Description



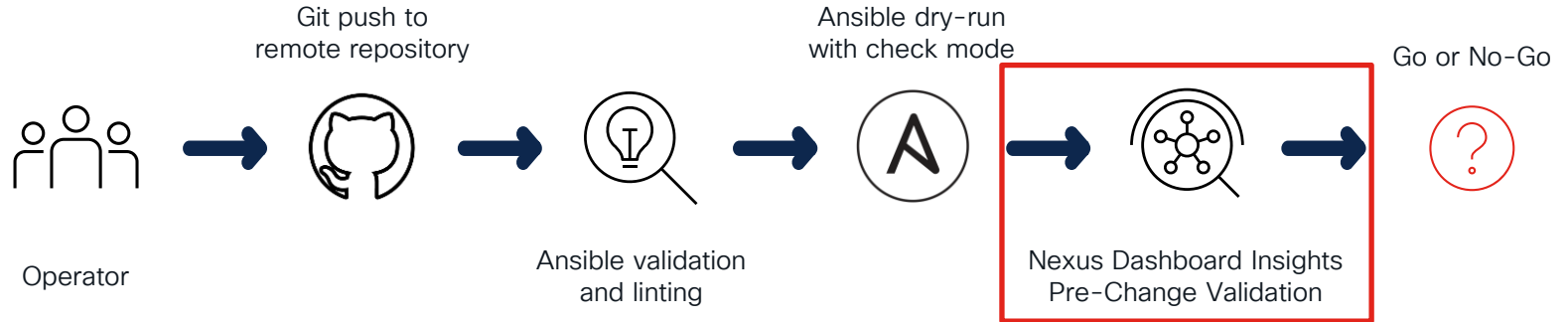
Cancel All changes saved

Back

Next

IaC CI/CD Pipeline featuring NDI

Validation

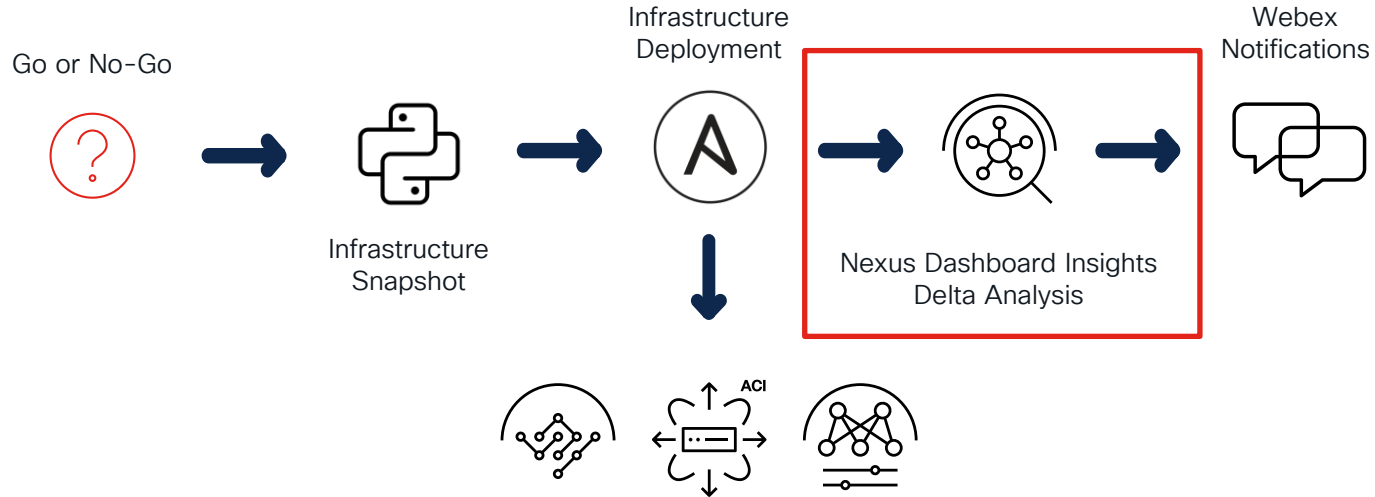


IaC CI/CD Pipeline featuring NDI

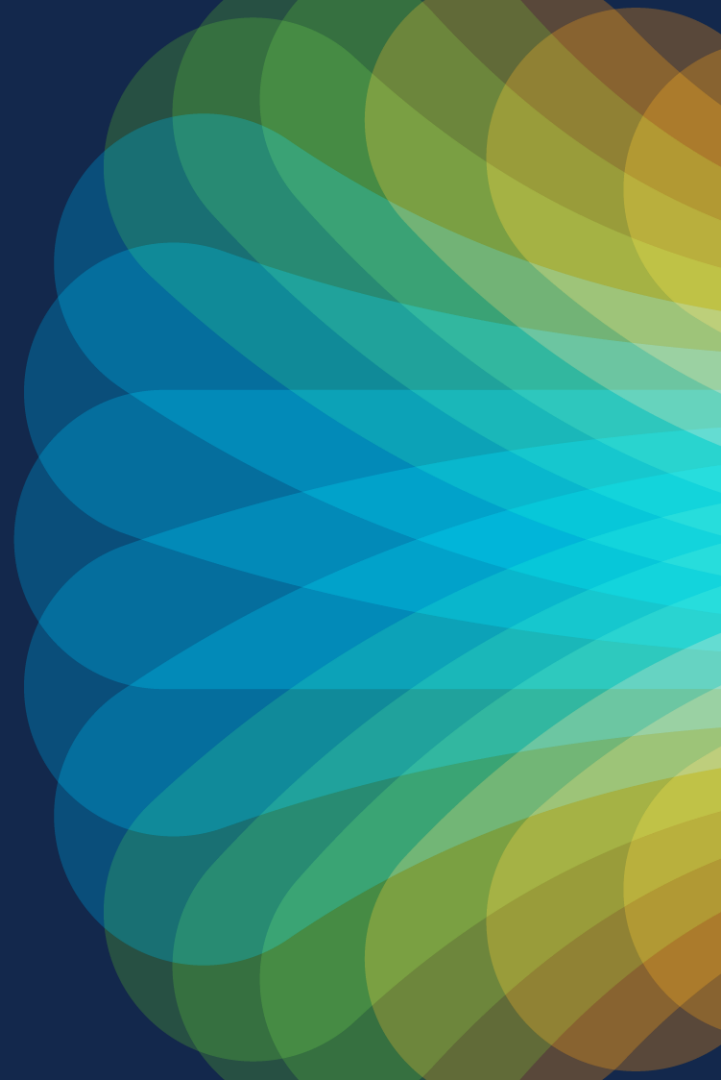
Deployment

Reference:

- [cisco.nd Ansible Collection](#)
- [DEVNET-2473 on GitHub](#)



Wrapping it up...



Test Drive?

Walk-in Lab:

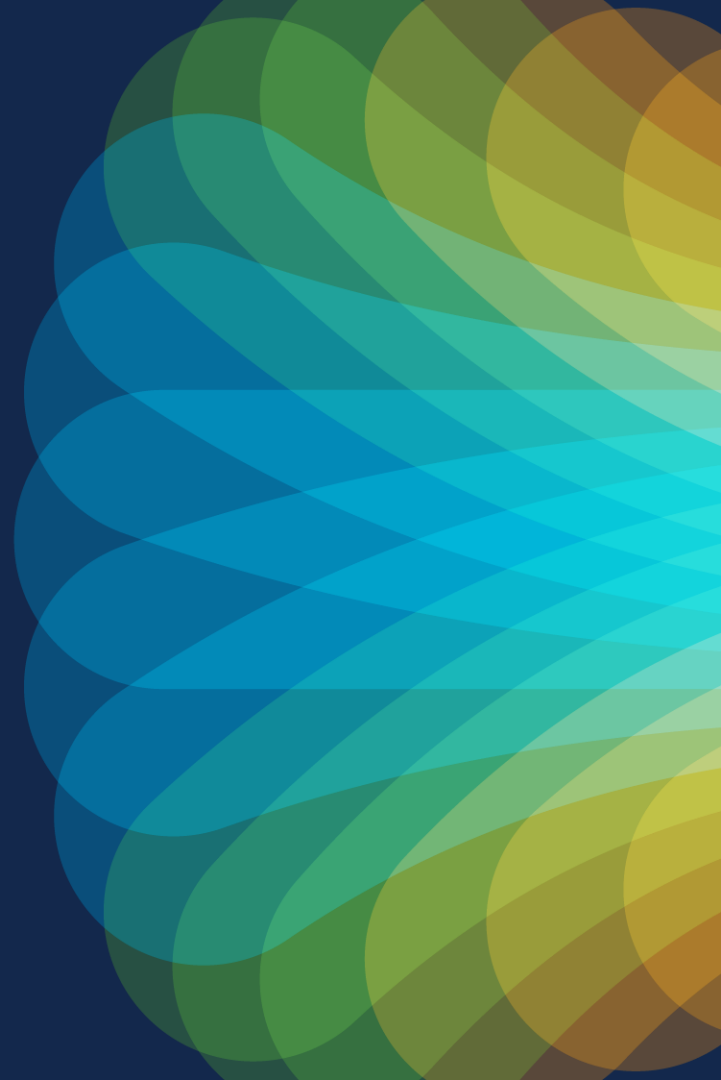
LABDCN-2215
Nexus Dashboards
Insights Hands-on lab



The bridge to possible

Thank you

CISCO *Live!*



The Cisco Live! logo features the word "CISCO" in a bold, black, sans-serif font, followed by "Live!" in a black, cursive script font. The background of the entire image is a vibrant, multi-colored abstract pattern of overlapping, wavy bands in shades of red, orange, yellow, green, and blue, creating a sense of motion and energy.

CISCO *Live!*

Let's go