You make **possible**

Cisco DNA Center Maintenance and Troubleshooting - BRKOPS-2826

“Give a man a fish and he will eat for a day. Teach a man to fish, and you feed him for a lifetime.”

Alexandro Carrasquedo, SDA Customer Success Specialist @alecarra
Felix Johnrose, Assurance Escalations @fjohnrose
Muhilan Natarajan, Technical Leader, SDA Customer Delivery @Twitter_handle
Nathan Sowatskey, Principal Engineer Cisco SD-Access @NathanDotTo

BRKOPS-2826

Barcelona | January 27-31, 2020

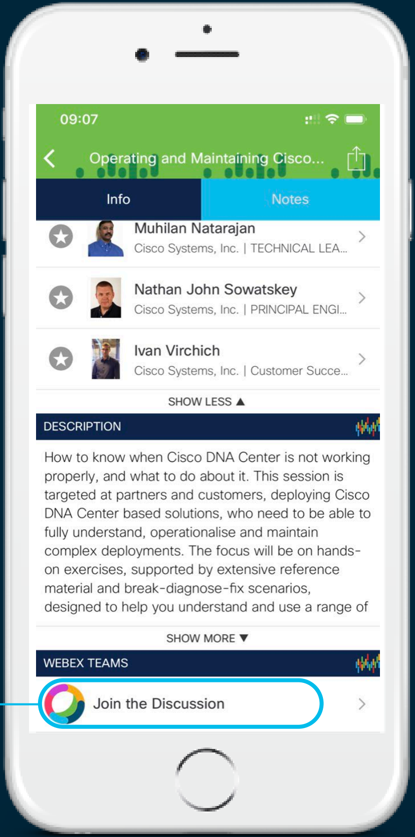
Cisco Webex Teams

Questions?

Use Cisco Webex Teams to chat with the speaker after the session

How

1. Find this session in the Cisco Events Mobile App
2. Click “Join the Discussion”
3. Install Webex Teams or go directly to the team space
4. Enter messages/questions in the team space



09:07

Operating and Maintaining Cisco...

Info | Notes

Muhilan Natarajan
Cisco Systems, Inc. | TECHNICAL LEA...

Nathan John Sowatskey
Cisco Systems, Inc. | PRINCIPAL ENGI...

Ivan Virchich
Cisco Systems, Inc. | Customer Succe...

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DESCRIPTION

How to know when Cisco DNA Center is not working properly, and what to do about it. This session is targeted at partners and customers, deploying Cisco DNA Center based solutions, who need to be able to fully understand, operationalise and maintain complex deployments. The focus will be on hands-on exercises, supported by extensive reference material and break-diagnose-fix scenarios, designed to help you understand and use a range of

SHOW MORE ▼

WEBEX TEAMS

Join the Discussion

Agenda

- Introductions and overview - Nathan
- System 360, System Monitoring, Log Analysis and RCA - Nathan
- Discovery - Muhilan
- Provisioning – Muhilan
- Software Image Management (SWIM) – Alex
- Plug-and-Play and LAN Automation - Alex
- DNA Assurance – Felix

The Team

Nathan Sowatskey

Carlos Moreno

Muhilan Natarajan

Alexandro Carrasquedo

Abhay Kaviya

Felix Johnrose

Ivan Virchich

Resources in Box

- cs.co/brkops-2826
- Videos of lab exercises
  - Discovery, PnP/LAN Automation, Provisioning, SWIM
- Use Box agent to sync
  - Videos are large, so let the agent do the work

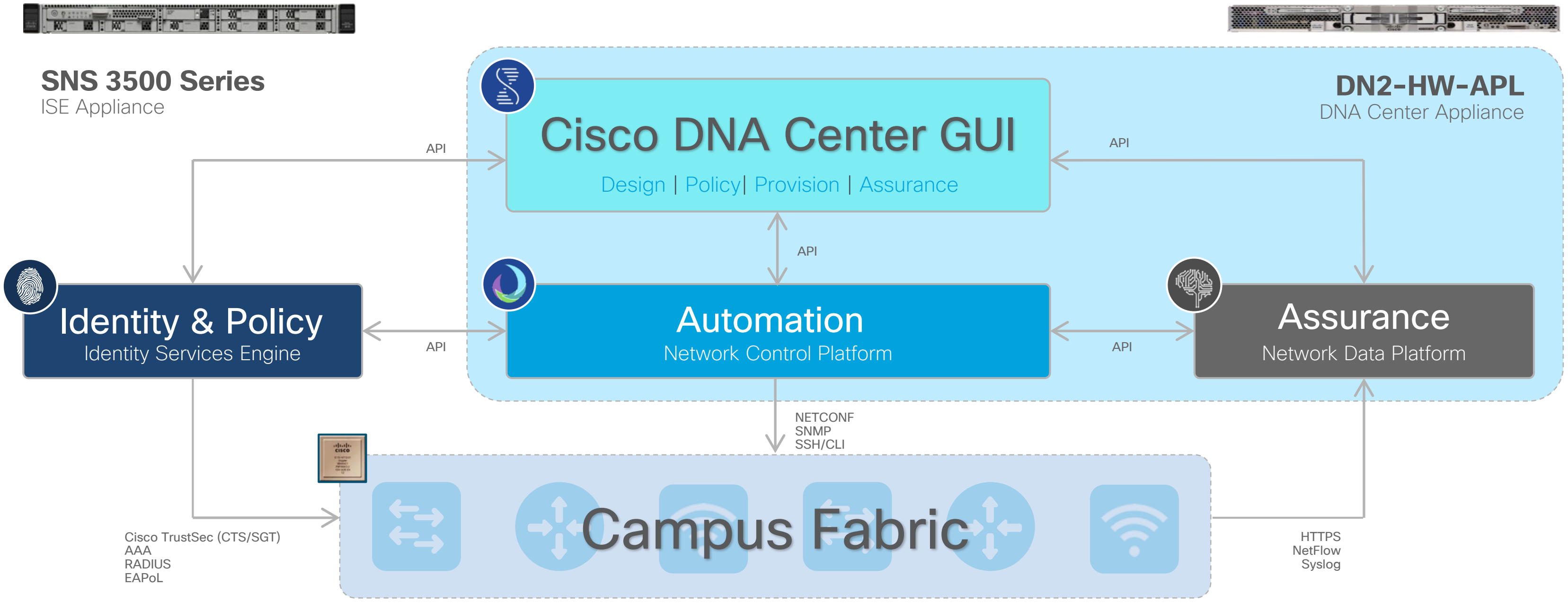
Overview

- These techniques are applicable in complex deployments
  - Brownfield with existing IP underlay
  - Evolving networks, adding multiple devices over time, lots of moves and changes
- Common system level issues
  - Many moving pieces
  - All have their own configs
  - Typos in configuration templates
  - Mismatched interfaces, VLANs, AAA/DNS/NTP settings …
- Techniques for diagnosis using inbuilt tools
  - The platform has integrated tools for monitoring and log analysis – use them
  - Same tools (ELK, Grafana) as in many IT environments

A Brief Introduction to SD-Access and Cisco DNA Center

SD-Access

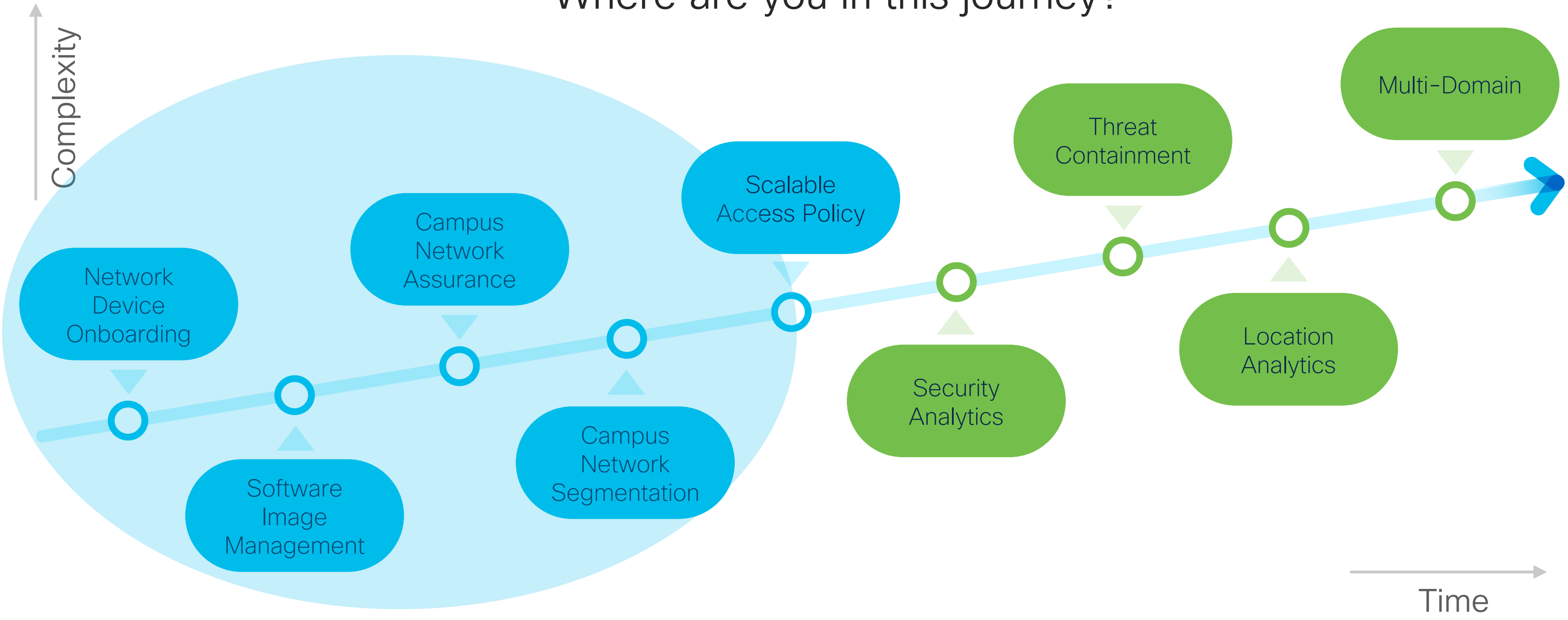
DNA Center – Service Components



Cisco Switches | Cisco Routers | Cisco Wireless

The SDA Adoption Journey

Where are you in this journey?



Cisco SD-Access Resources

cisco.com/go/dna

cisco.com/go/sdaccess

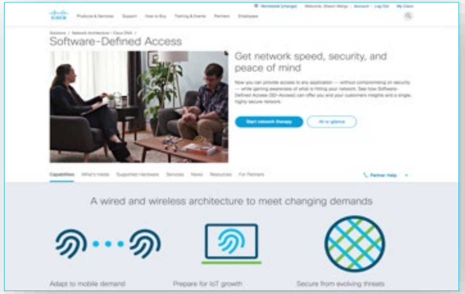
- SD-Access At-A-Glance
- SD-Access Ordering Guide
- SD-Access Solution Data Sheet
- SD-Access Solution White Paper

cisco.com/go/cvd

- SD-Access Design Guide
- SD-Access Deployment Guide
- SD-Access Segmentation Guide

cisco.com/go/dnacenter

- Cisco DNA Center At-A-Glance
- Cisco DNA ROI Calculator
- Cisco DNA Center Data Sheet
- Cisco DNA Center 'How To' Video Resources



Software-Defined Access

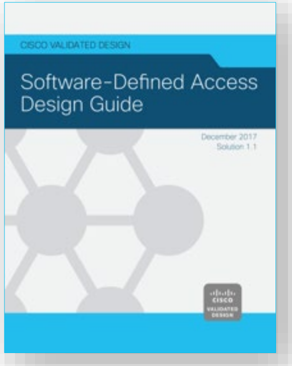
Get network speed, security, and peace of mind

A wired and wireless architecture to meet changing demands

Adapt to mobile demand

Prepare for IoT growth

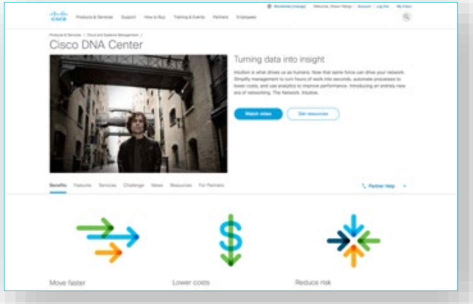
Secure from evolving threats



CISCO VALIDATED DESIGN

Software-Defined Access Design Guide

December 2017
Solution 1.1



Cisco DNA Center

Turning data into insight

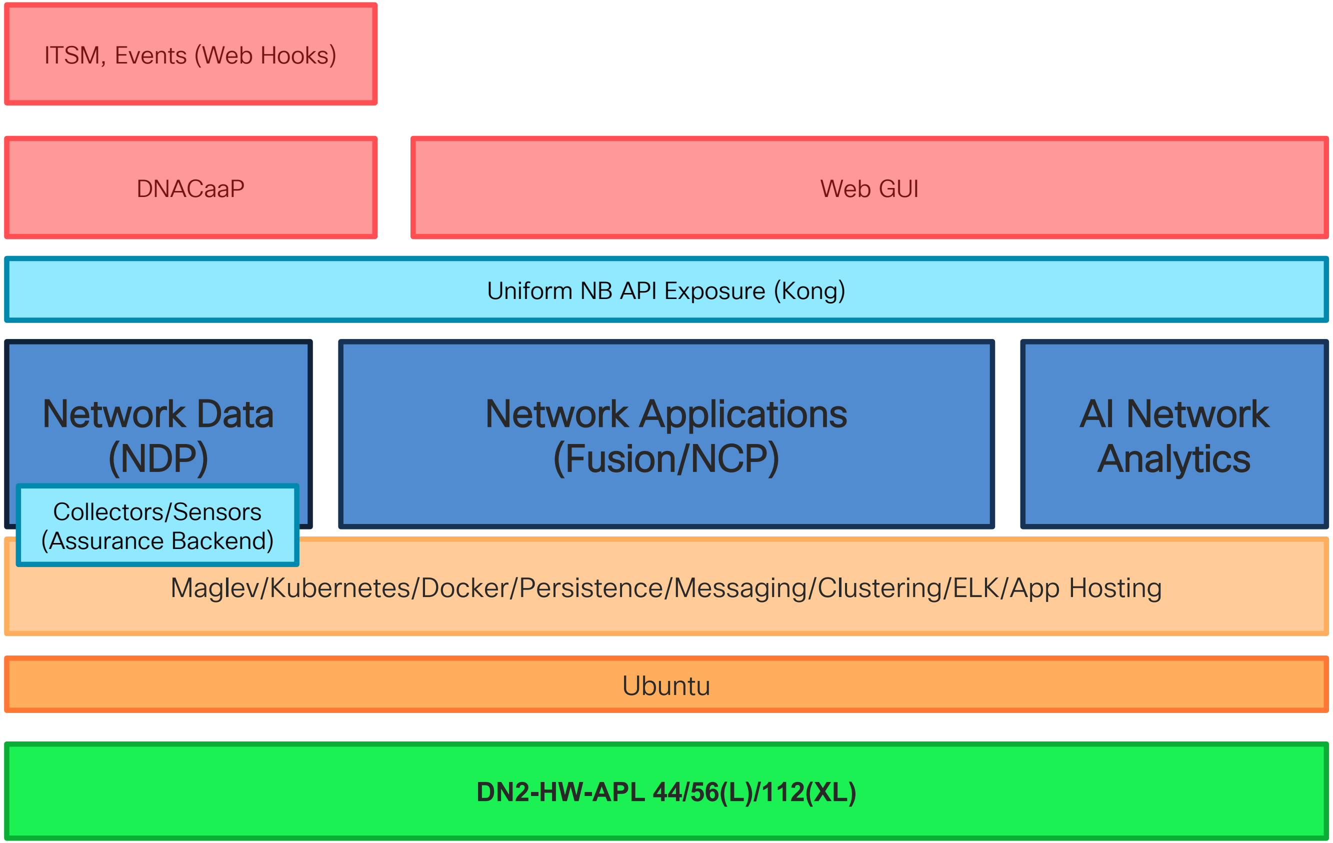
Move faster

Lower costs

Reduce risk

Cisco DNA Center Architecture Basics

Cisco DNA Center Architecture



ITSM, Events (Web Hooks)

DNACaaP

Web GUI

Uniform NB API Exposure (Kong)

Network Data (NDP)

Collectors/Sensors (Assurance Backend)

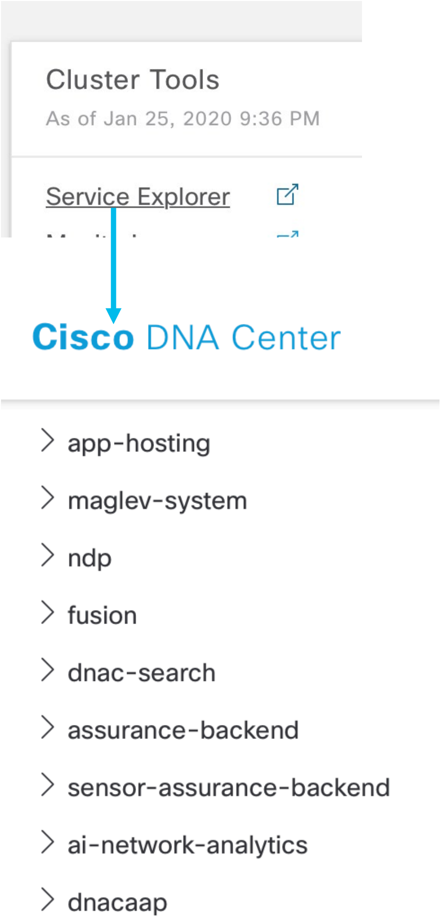
Network Applications (Fusion/NCP)

AI Network Analytics

Maglev/Kubernetes/Docker/Persistence/Messaging/Clustering/ELK/App Hosting

Ubuntu

DN2-HW-APL 44/56(L)/112(XL)



Cluster Tools

As of Jan 25, 2020 9:36 PM

Service Explorer

Cisco DNA Center

- app-hosting
- maglev-system
- ndp
- fusion
- dnac-search
- assurance-backend
- sensor-assurance-backend
- ai-network-analytics
- dnacaap

cisco Live!

Architecture Summary

- Layered Microservices architecture (~130)
  - Maglev is the common framework that binds everything
  - Open source – Docker/K8S, ELK, RabbitMQ, MongoDB, PostgreSQL, GlusterFS …
  - Resilient - services will fail and be restarted
- Network Applications (Fusion ~50)
  - Automation - inventory management, device management, templates, network design, SWIM, provisioning …
- Network Data Platform (NDP ~30)
  - Collects and processes telemetry data in pipelines
  - Also see other assurance backend services
- Kong API proxy – Authentication and Authorisation
  - Web GUI interacts with Kong
- Cisco DNA Center as a Platform (DNACaaP)
  - ITSM and events

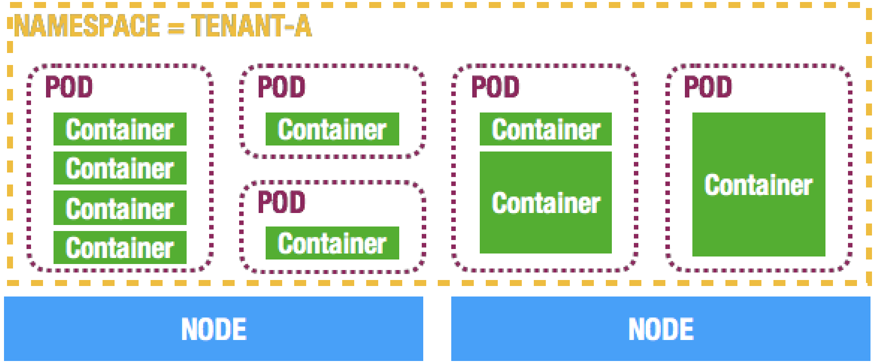
References

- Kubernetes (K8s) is an open-source system for automating deployment, scaling, and management of containerized applications - https://kubernetes.io
- A Docker container image is a lightweight, standalone, executable package of software that includes everything needed to run an application: code, runtime, system tools, system libraries and settings. - https://www.docker.com

Microservices

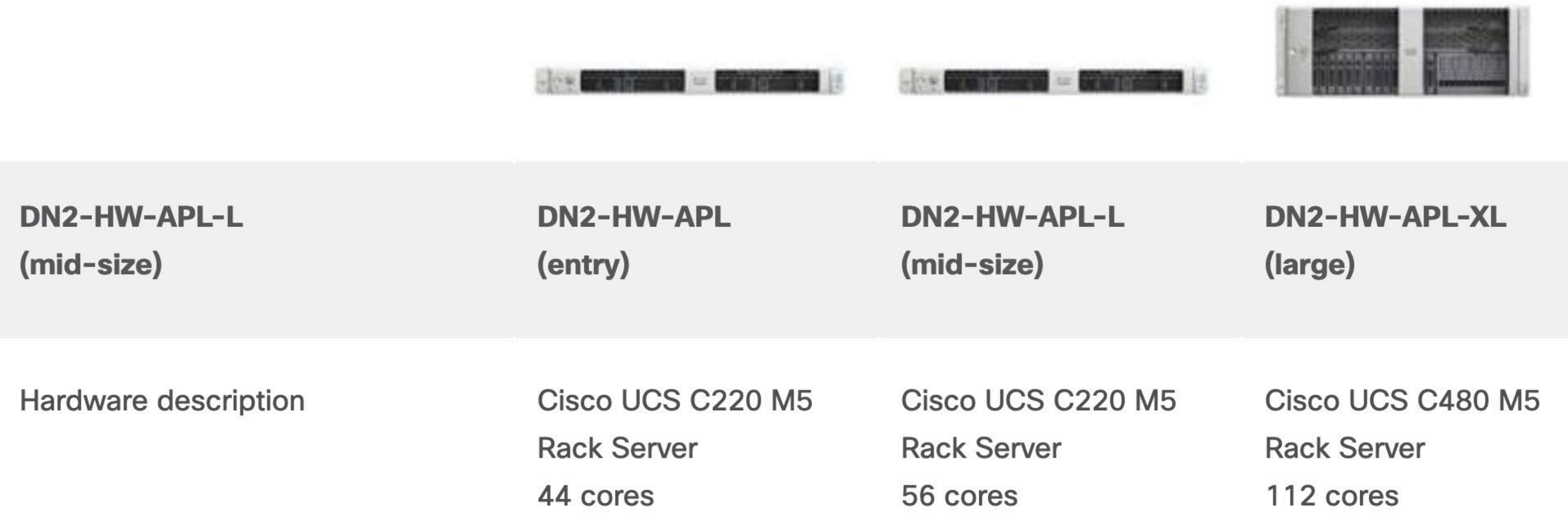
Container	A container image is a lightweight, stand-alone, executable package of a piece of software that includes everything needed to run it: code, runtime, system tools, system libraries, settings.
Docker	Docker is a tool designed to make it easier to create, deploy, and run applications by using containers. https://docs.docker.com/get-started/
Kubernetes	Kubernetes is an open-source system for automating deployment, scaling, and management of containerized applications. https://kubernetes.io/docs/concepts/overview/what-is-kubernetes/
Maglev	Cisco internal developed framework that provides a unified, next-generation, micro-services based application infrastructure addressing the goals of various network related software and platform stack.

Microservices



Pod	A pod is a group of one or more containers (such as Docker containers), with shared storage/network, and a specification for how to run the containers
Namespace	Namespaces are multiple virtual clusters backed by the same physical cluster
Service	A Kubernetes Service is an abstraction which defines a logical set of Pods and a policy by which to access them - sometimes called a micro-service.
Node	A node is a VM or a physical computer that serves as a worker machine in a Kubernetes cluster.

Cisco DNA Center Appliances



DN2-HW-APL-L (mid-size)	DN2-HW-APL (entry)	DN2-HW-APL-L (mid-size)	DN2-HW-APL-XL (large)
Hardware description	Cisco UCS C220 M5 Rack Server 44 cores	Cisco UCS C220 M5 Rack Server 56 cores	Cisco UCS C480 M5 Rack Server 112 cores

Cisco DNA Center System Scale

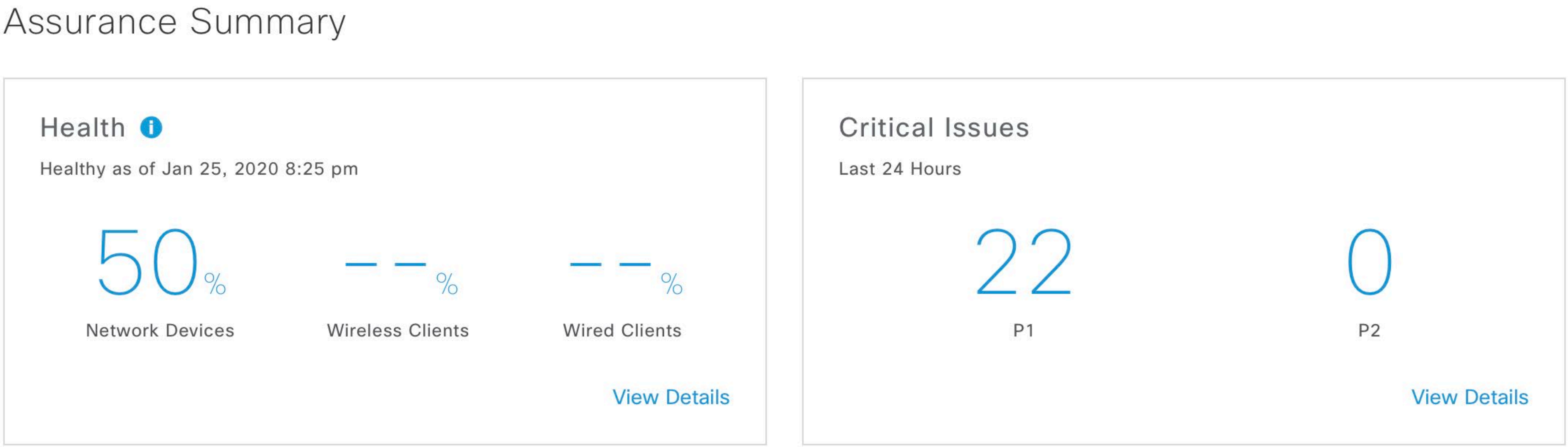
Number of devices (switch, router, wireless controller)	1,000 44	2,000 56	5,000 112
Number of wireless access points	4,000	6,000	13,000
Number of concurrent endpoints	25,000	40,000	100,000
Number of transient endpoints (over 14-day period)	75,000	120,000	250,000
Ratio of Endpoints: Wired/Wireless	Any/Any	Any/Any	40,000/60,000
Number of ports	48,000	192,000	480,000
Number of site elements	500	1,000	2,000
Number of wireless controllers	500	1,000	2,000
API rate limit	50 APIs/min	50 APIs/min	50 APIs/min

Cisco SDA Access Scale

Number of fabric domains	10 44	20 56	20 112
Number of fabric sites	500	1,000	2,000
Number of access points	4,000	6,000	12,000
Cisco DNA Center per fabric site scale			
Number of virtual networks	64/site	64/site	256/site
Fabric devices per fabric site	500/site	600/site	1,200/site

Cisco DNA Center Assurance Basics

The Assurance Summary



Assurance Summary

Health

Healthy as of Jan 25, 2020 8:25 pm

50% Network Devices

--% Wireless Clients

--% Wired Clients

View Details

Critical Issues

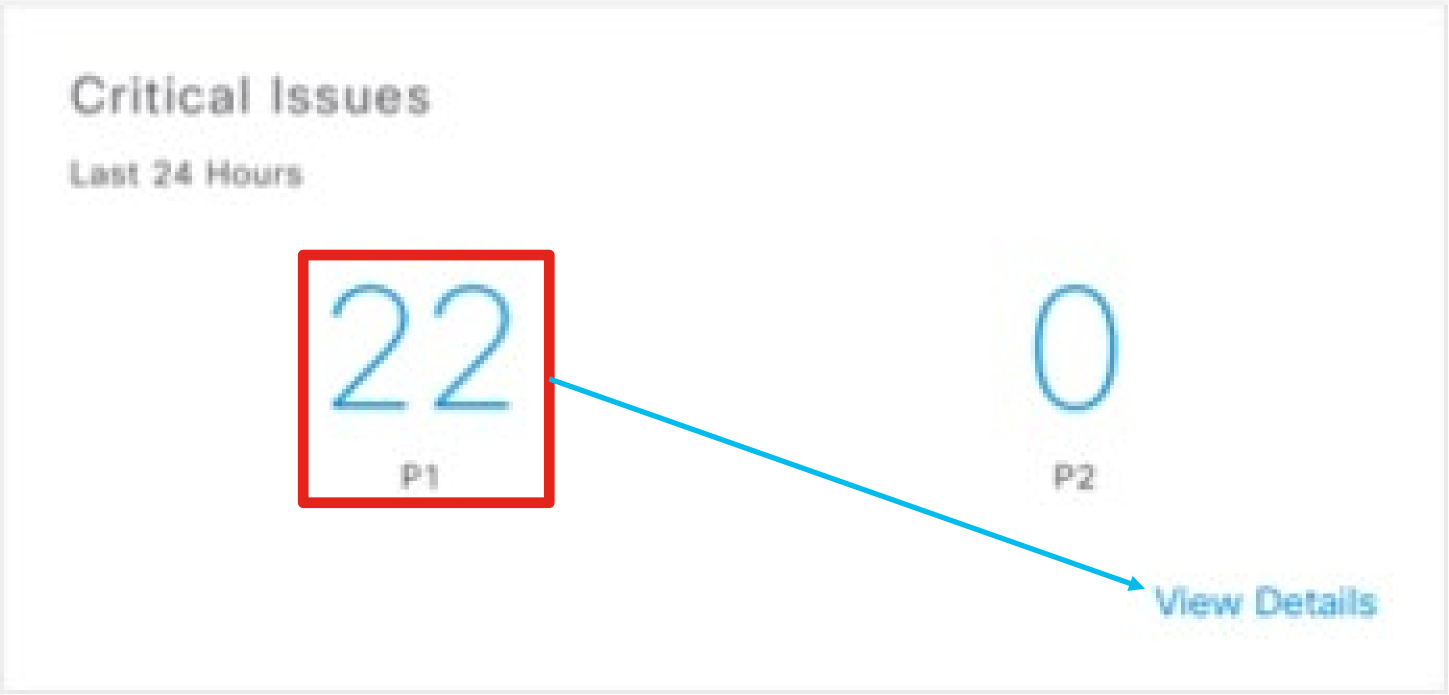
Last 24 Hours

22 P1

0 P2

View Details

Critical Issues – Pay Attention!



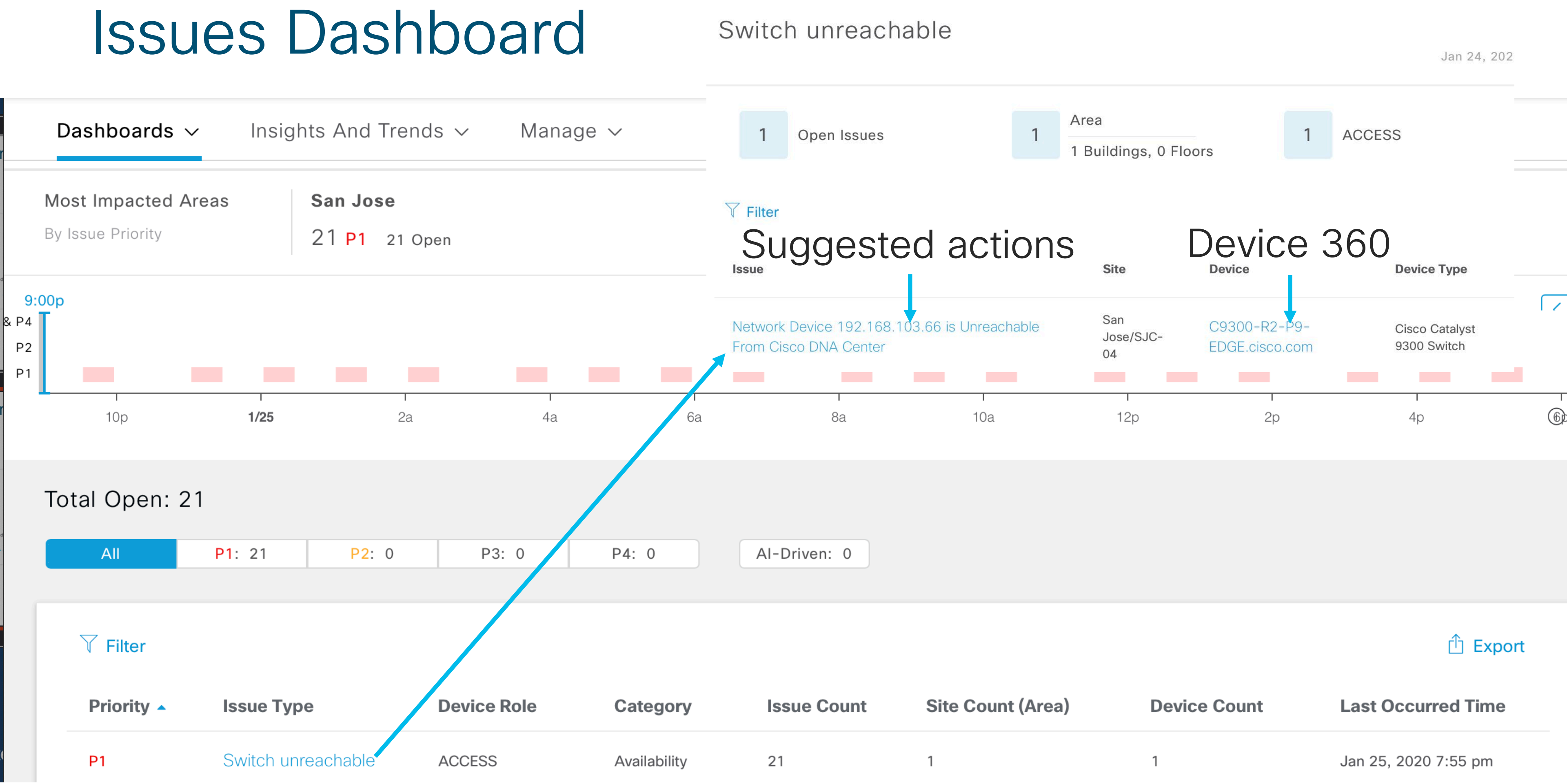
Critical Issues

Last 24 Hours

22	0
P1	P2

View Details

Issues Dashboard



Switch unreachable

Jan 24, 202

1 Open Issues	1 Area 1 Buildings, 0 Floors	1 ACCESS

Filter

Suggested actions

Device 360

Issue	Site	Device	Device Type
Network Device 192.168.103.66 is Unreachable From Cisco DNA Center	San Jose/SJC-04	C9300-R2-P9-EDGE.cisco.com	Cisco Catalyst 9300 Switch

Dashboards | Insights And Trends | Manage

Most Impacted Areas

By Issue Priority

San Jose

21 P1 21 Open

Total Open: 21

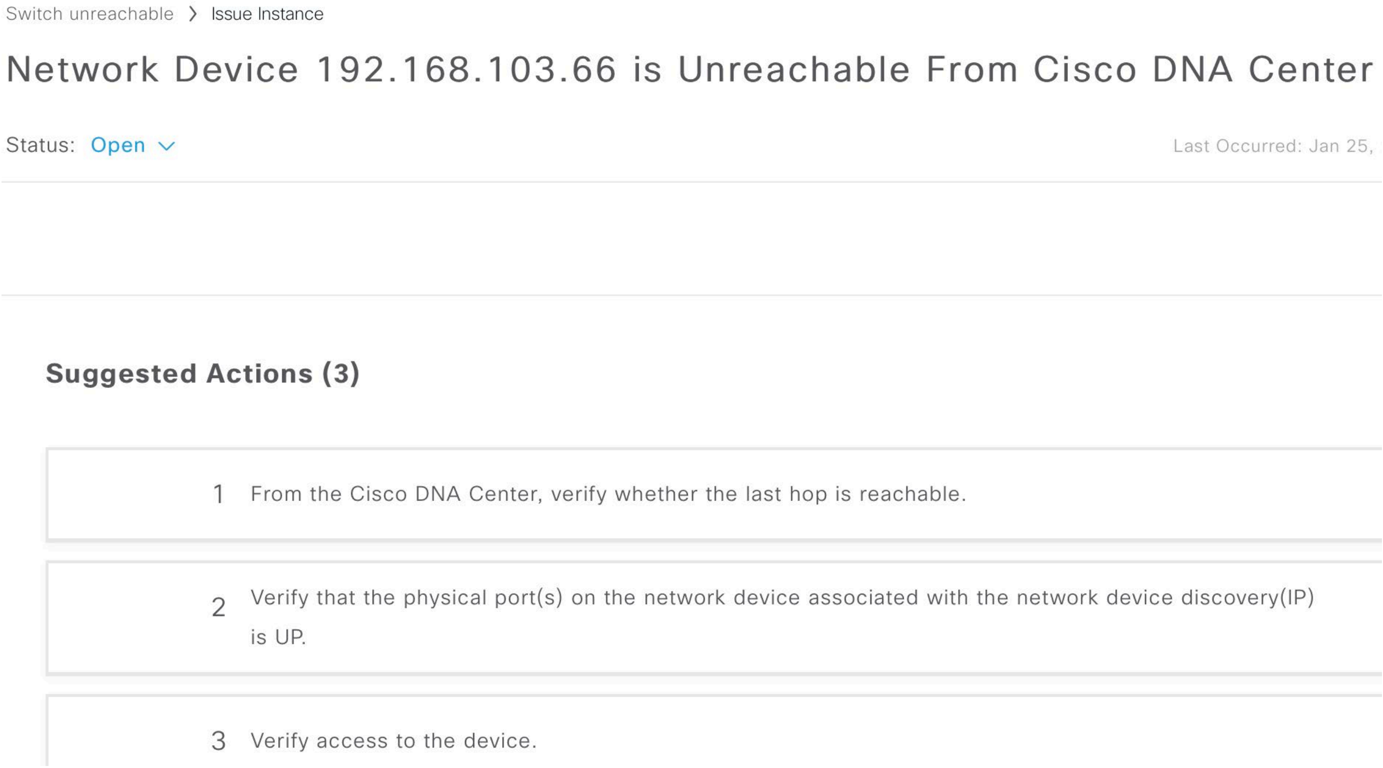
All | P1: 21 | P2: 0 | P3: 0 | P4: 0 | AI-Driven: 0

Filter

Export

Priority	Issue Type	Device Role	Category	Issue Count	Site Count (Area)	Device Count	Last Occurred Time
P1	Switch unreachable	ACCESS	Availability	21	1	1	Jan 25, 2020 7:55 pm

Follow the Suggestions



Switch unreachable 〉 Issue Instance

Network Device 192.168.103.66 is Unreachable From Cisco DNA Center

Status: Open ⌄

Last Occurred: Jan 25,

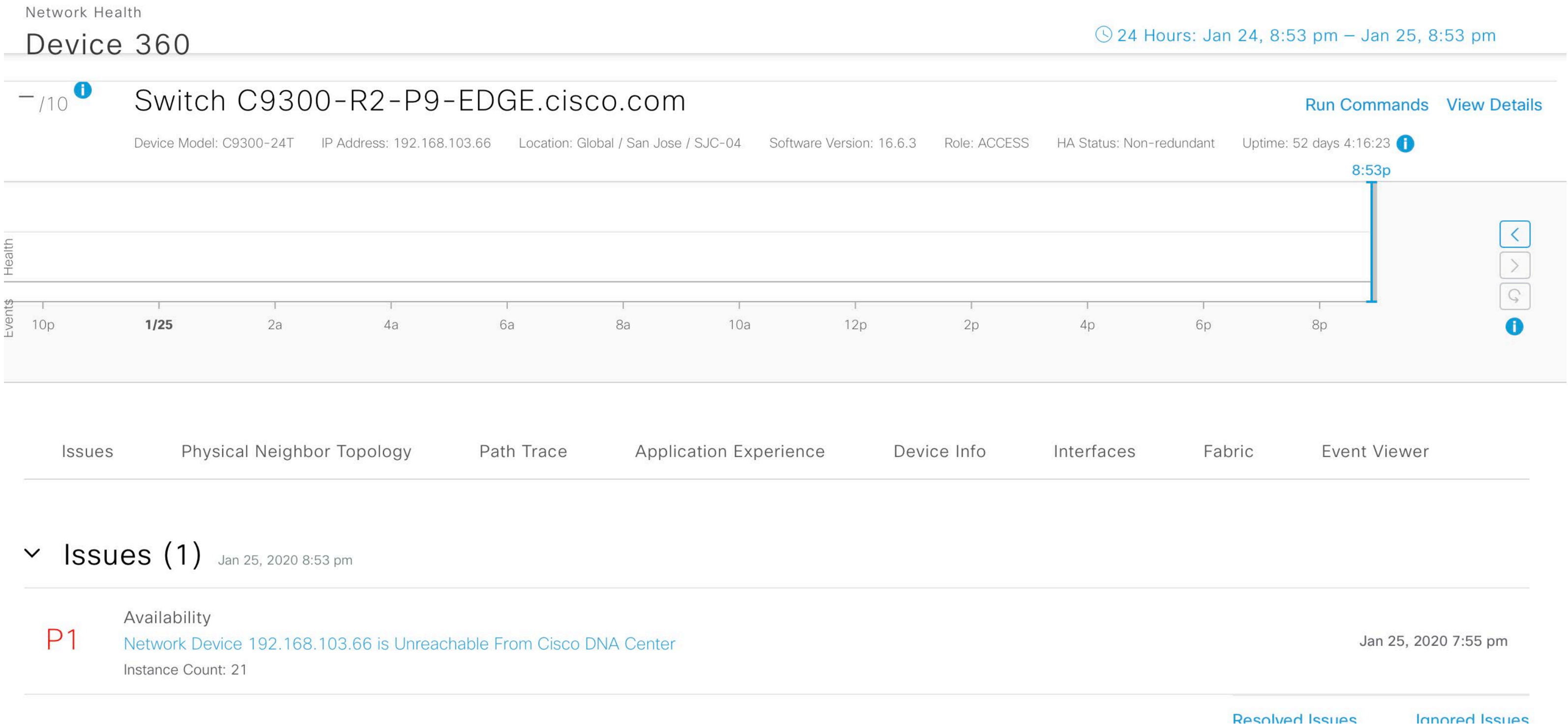
Suggested Actions (3)

1 From the Cisco DNA Center, verify whether the last hop is reachable.

2 Verify that the physical port(s) on the network device associated with the network device discovery(IP) is UP.

3 Verify access to the device.

Device 360



Network Health

Device 360

24 Hours: Jan 24, 8:53 pm – Jan 25, 8:53 pm

– /10

Switch C9300-R2-P9-EDGE.cisco.com

Run Commands View Details

Device Model: C9300-24T IP Address: 192.168.103.66 Location: Global / San Jose / SJC-04 Software Version: 16.6.3 Role: ACCESS HA Status: Non-redundant Uptime: 52 days 4:16:23

Issues (1) Jan 25, 2020 8:53 pm

P1 Availability

Network Device 192.168.103.66 is Unreachable From Cisco DNA Center

Instance Count: 21

Jan 25, 2020 7:55 pm

Resolved Issues Ignored Issues

Basic Assurance Summary

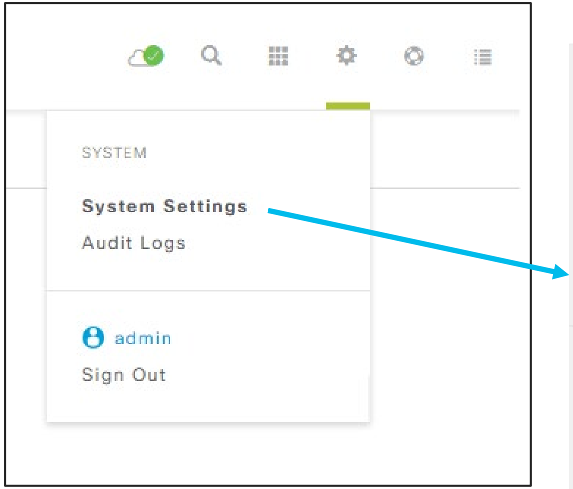
- Look at what Cisco DNA Center is telling you
  - Networks are redundant
  - Services will be maintained, users will be happy
  - But the network might not be healthy
- Focus on simple causes
  - Is the device reachable from Cisco DNA Center?
  - Try to connect with ssh from the Maglev CLI
  - Check TACACS/ISE
  - Are the SNMP strings correct?
  - Check the network path – firewalls, cables
- If devices are unreachable Cisco DNA Center can't do much except tell you that

Cisco DNA Center System 360 Cluster Tools

Introducing System 360

- Hosts
  - Nodes in the cluster and the state of services on those nodes
- High Availability
  - Whether HA is available and active
- Cluster Tools ★
  - Service Explorer (Monitoring/Kibana), Monitoring (aggregated for appstacks), Log Explorer (Kibana), Workflow (end-to-end interactions for upgrade, backup, …)
- Software Updates
- Backups
- Application Health
  - Automation, Assurance

Cisco DNA Center UI – System 360



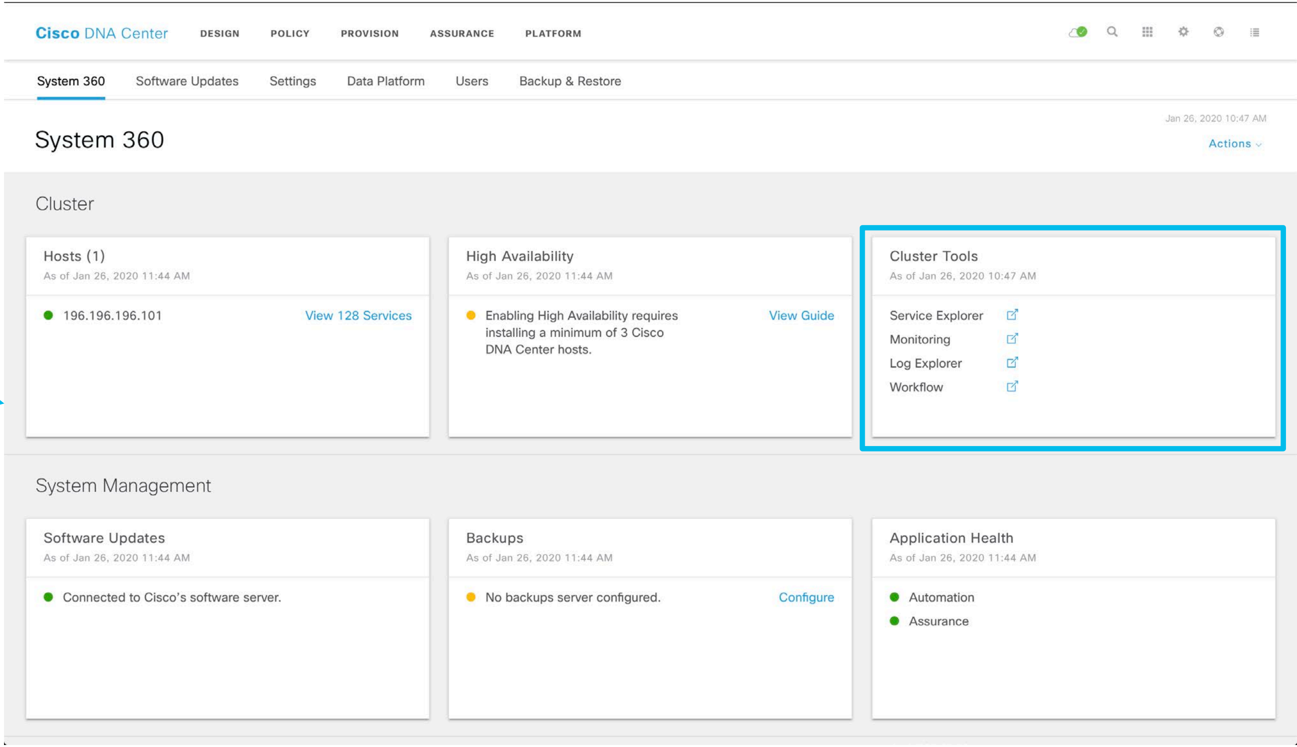
SYSTEM

System Settings

Audit Logs

admin

Sign Out



System 360

Jan 26, 2020 10:47 AM

Actions

Cluster

Hosts (1)
As of Jan 26, 2020 11:44 AM

● 196.196.196.101 View 128 Services

High Availability
As of Jan 26, 2020 11:44 AM

● Enabling High Availability requires installing a minimum of 3 Cisco DNA Center hosts. View Guide

Cluster Tools
As of Jan 26, 2020 10:47 AM

- Service Explorer
- Monitoring
- Log Explorer
- Workflow

System Management

Software Updates
As of Jan 26, 2020 11:44 AM

● Connected to Cisco's software server.

Backups
As of Jan 26, 2020 11:44 AM

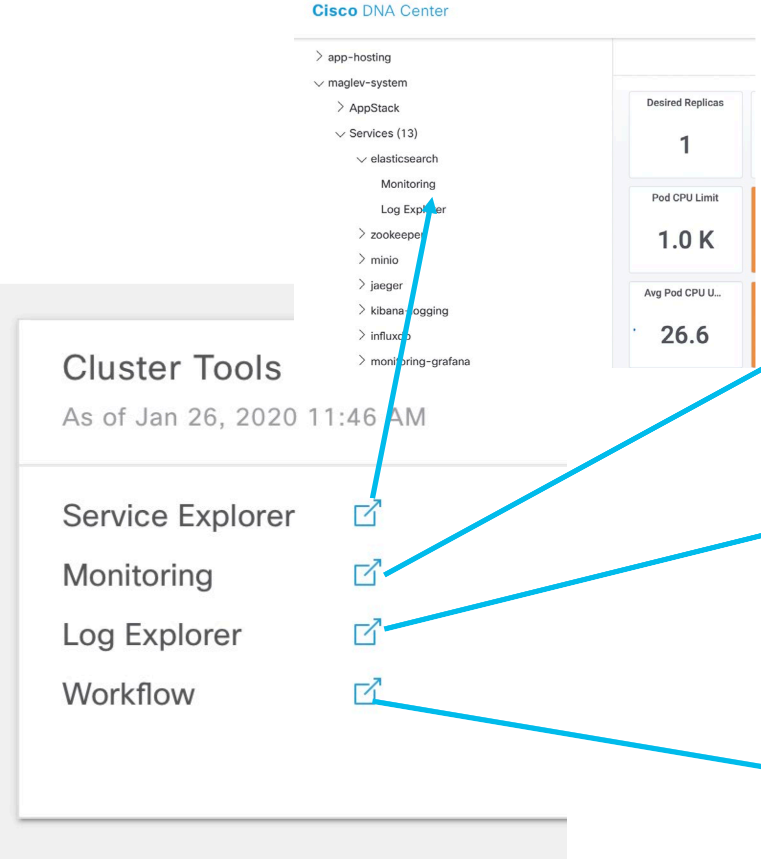
● No backups server configured. Configure

Application Health
As of Jan 26, 2020 11:44 AM

● Automation

● Assurance

Cluster Tools



Cisco DNA Center

- app-hosting
- maglev-system
  - AppStack
  - Services (13)
    - elasticsearch
      - Monitoring
      - Log Explorer
    - zookeeper
    - minio
    - jaeger
    - kibana-logging
    - influxdb
    - monitoring-grafana

Desired Replicas 1

Pod CPU Limit 1.0 K

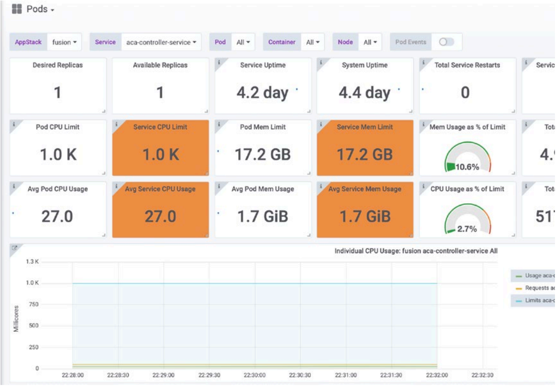
Avg Pod CPU U... 26.6

Cluster Tools

As of Jan 26, 2020 11:46 AM

- Service Explorer
- Monitoring
- Log Explorer
- Workflow

Grafana

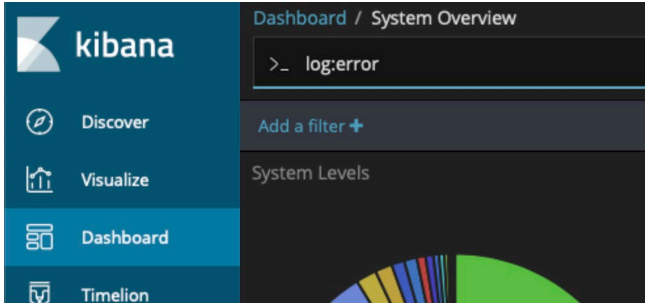


Pods

AppStack: fusion | Service: aca-controller-service | Pod: All | Container: All | Node: All | Pod Events

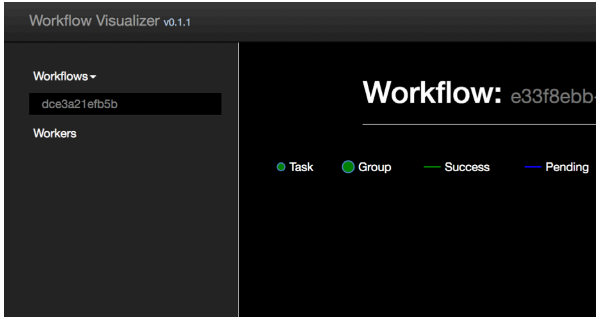
Desired Replicas	Available Replicas	Service Uptime	System Uptime	Total Service Restarts	Servic
1	1	4.2 day	4.4 day	0	
Pod CPU Limit	Service CPU Limit	Pod Mem Limit	Service Mem Limit	Mem Usage as % of Limit	Tot
1.0 K	1.0 K	17.2 GB	17.2 GB	10.6%	4.
Avg Pod CPU Usage	Avg Service CPU Usage	Avg Pod Mem Usage	Avg Service Mem Usage	CPU Usage as % of Limit	Tot
27.0	27.0	1.7 GiB	1.7 GiB	2.7%	51

Kibana

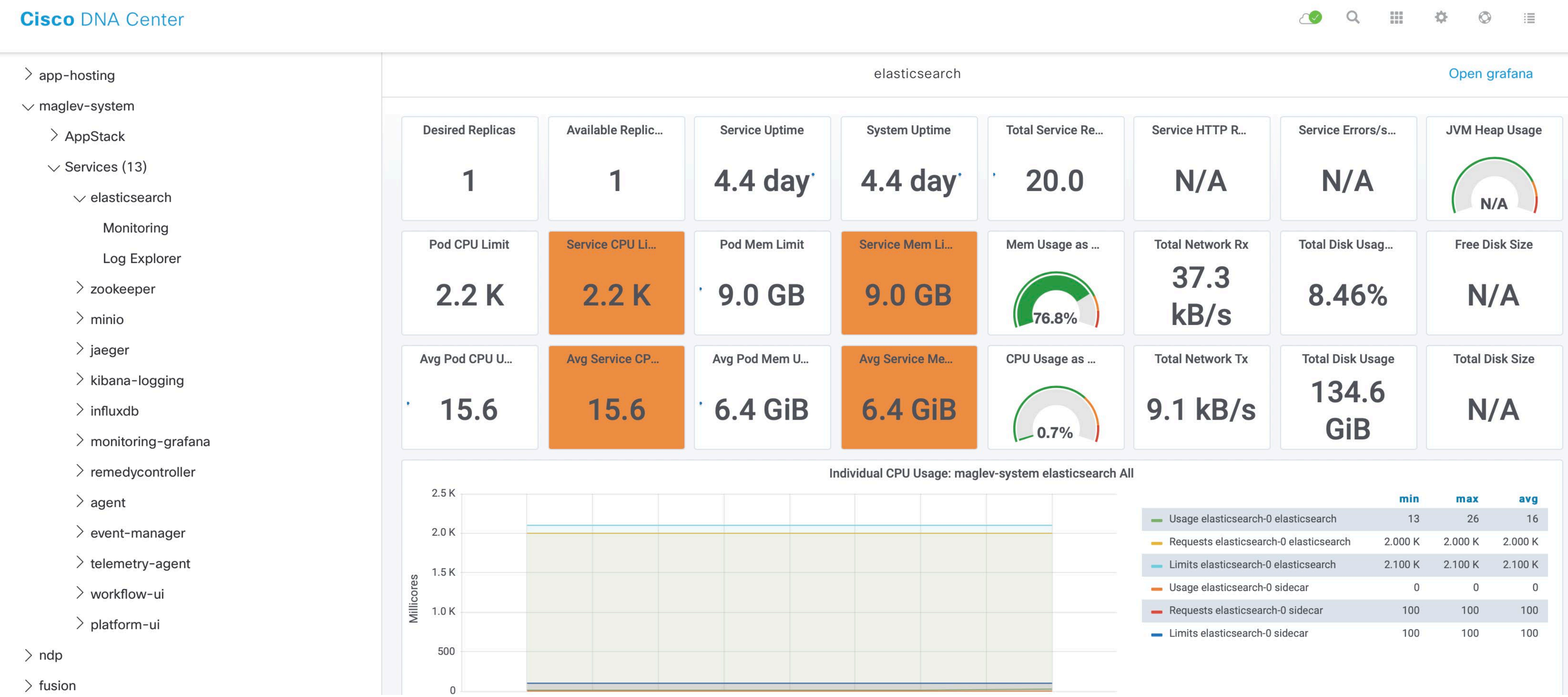


```
>_ log:error
```

Workflow



System 360 – Service Explorer Grafana



Cisco DNA Center

- app-hosting
- maglev-system
  - AppStack
  - Services (13)
    - elasticsearch
      - Monitoring
      - Log Explorer
    - zookeeper
    - minio
    - jaeger
    - kibana-logging
    - influxdb
    - monitoring-grafana
    - remedycontroller
    - agent
    - event-manager
    - telemetry-agent
    - workflow-ui
    - platform-ui
- ndp
- fusion

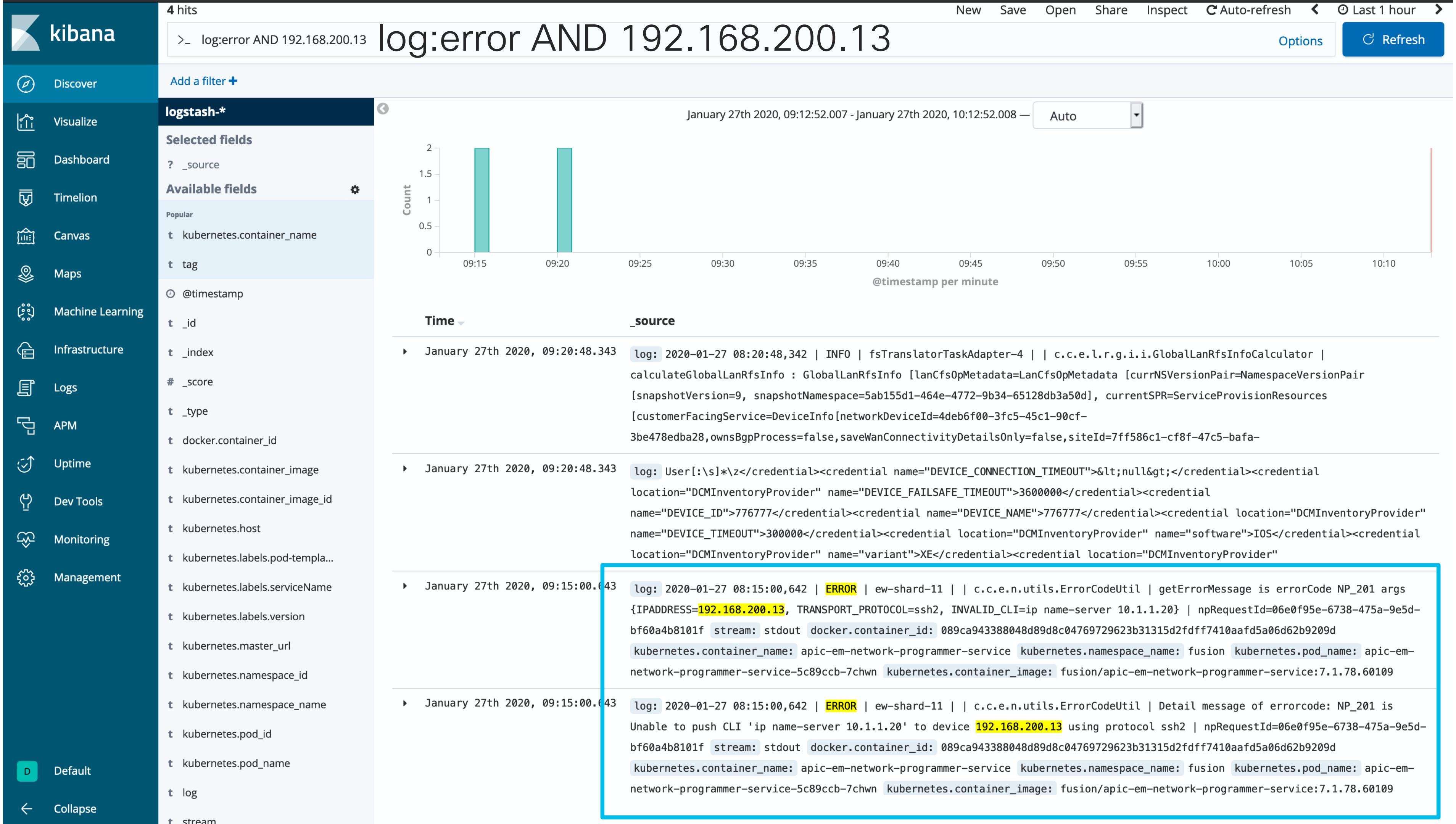
elasticsearch

Open grafana

Desired Replicas 1	Available Replic... 1	Service Uptime 4.4 day	System Uptime 4.4 day	Total Service Re... 20.0	Service HTTP R... N/A	Service Errors/s... N/A	JVM Heap Usage N/A
Pod CPU Limit 2.2 K	Service CPU Li... 2.2 K	Pod Mem Limit 9.0 GB	Service Mem Li... 9.0 GB	Mem Usage as ... 76.8%	Total Network Rx 37.3 kB/s	Total Disk Usag... 8.46%	Free Disk Size N/A
Avg Pod CPU U... 15.6	Avg Service CP... 15.6	Avg Pod Mem U... 6.4 GiB	Avg Service Me... 6.4 GiB	CPU Usage as ... 0.7%	Total Network Tx 9.1 kB/s	Total Disk Usage 134.6 GiB	Total Disk Size N/A

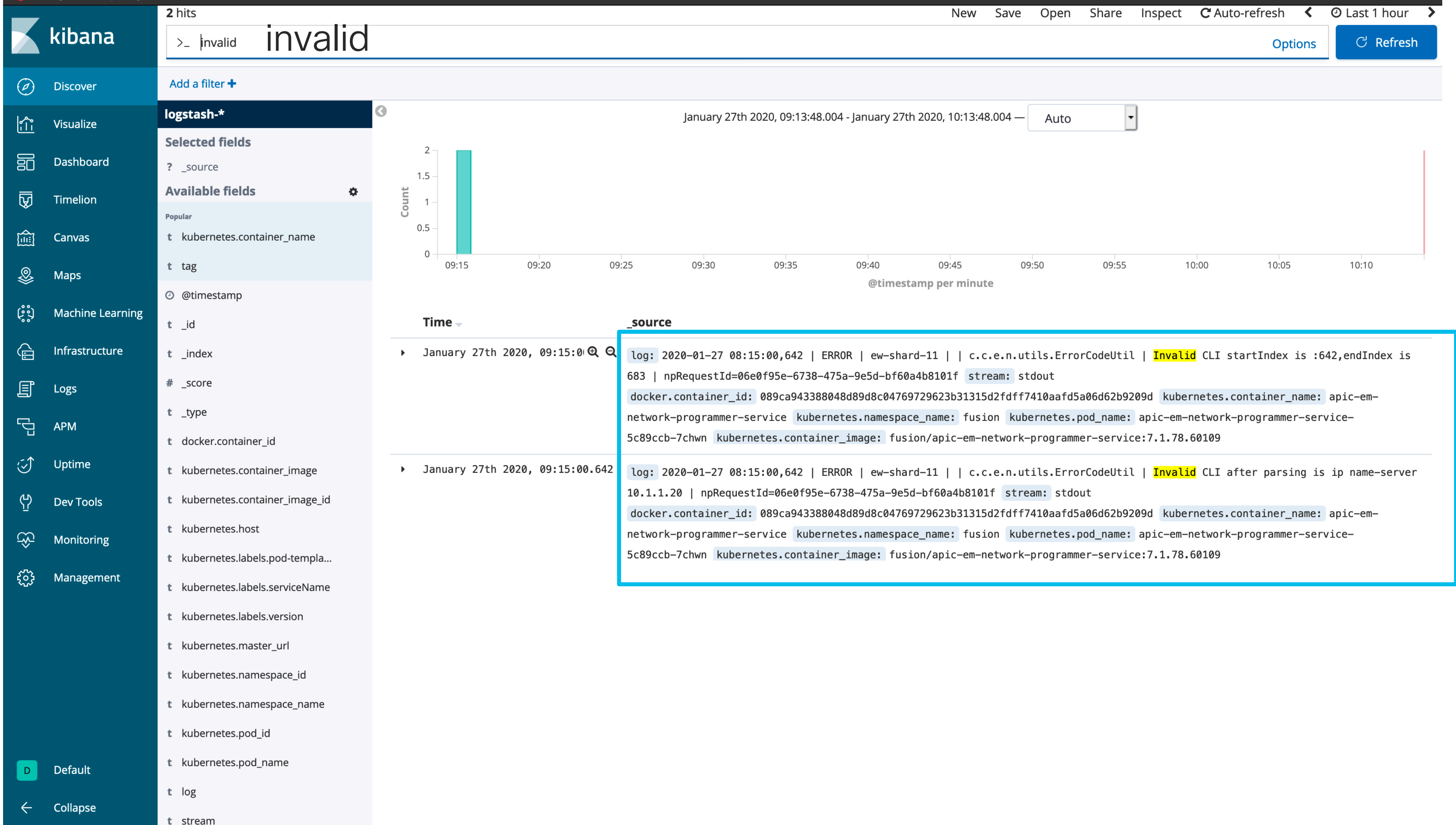
Individual CPU Usage: maglev-system elasticsearch All

	min	max	avg
🟩 Usage elasticsearch-0 elasticsearch	13	26	16
🟨 Requests elasticsearch-0 elasticsearch	2.000 K	2.000 K	2.000 K
🟦 Limits elasticsearch-0 elasticsearch	2.100 K	2.100 K	2.100 K
🟧 Usage elasticsearch-0 sidecar	0	0	0
🟥 Requests elasticsearch-0 sidecar	100	100	100
🟦 Limits elasticsearch-0 sidecar	100	100	100



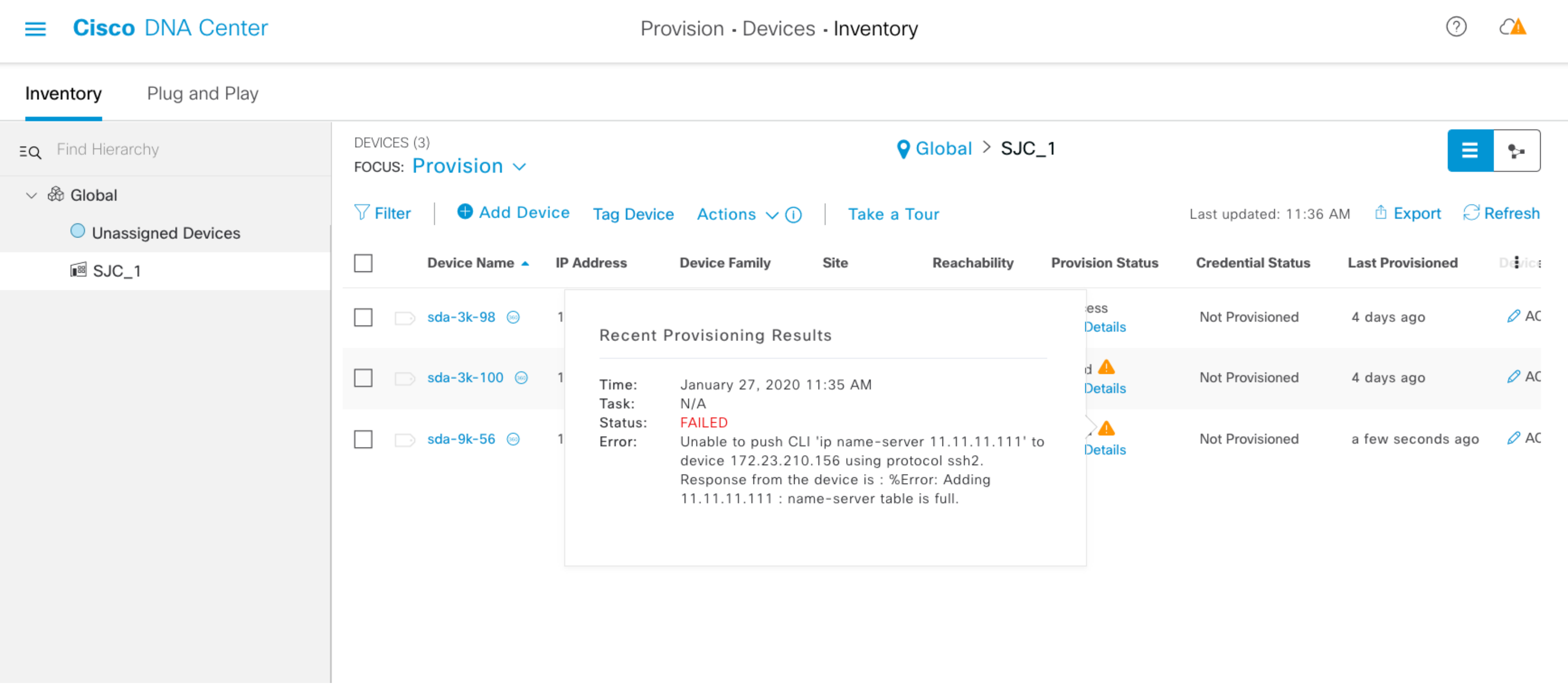
log:error AND 192.168.200.13

```
January 27th 2020, 09:20:48.343   log: 2020-01-27 08:20:48,342 | INFO | fsTranslatorTaskAdapter-4 | | c.c.e.l.r.g.i.i.GlobalLanRfsInfoCalculator |
                                  calculateGlobalLanRfsInfo : GlobalLanRfsInfo [lanCfsOpMetadata=LanCfsOpMetadata [currNSVersionPair=NamespaceVersionPair
                                  [snapshotVersion=9, snapshotNamespace=5ab155d1-464e-4772-9b34-65128db3a50d], currentSPR=ServiceProvisionResources
                                  [customerFacingService=DeviceInfo[networkDeviceId=4deb6f00-3fc5-45c1-90cf-
                                  3be478edba28,ownsBgpProcess=false,saveWanConnectivityDetailsOnly=false,siteId=7ff586c1-cf8f-47c5-bafa-

January 27th 2020, 09:20:48.343   log: User[:\s]*\z</credential><credential name="DEVICE_CONNECTION_TIMEOUT">&lt;null&gt;</credential><credential
                                  location="DCMInventoryProvider" name="DEVICE_FAILSAFE_TIMEOUT">3600000</credential><credential
                                  name="DEVICE_ID">776777</credential><credential name="DEVICE_NAME">776777</credential><credential location="DCMInventoryProvider"
                                  name="DEVICE_TIMEOUT">300000</credential><credential location="DCMInventoryProvider" name="software">IOS</credential><credential
                                  location="DCMInventoryProvider" name="variant">XE</credential><credential location="DCMInventoryProvider"

January 27th 2020, 09:15:00.643   log: 2020-01-27 08:15:00,642 | ERROR | ew-shard-11 | | c.c.e.n.utils.ErrorCodeUtil | getErrorMessage is errorCode NP_201 args
                                  {IPADDRESS=192.168.200.13, TRANSPORT_PROTOCOL=ssh2, INVALID_CLI=ip name-server 10.1.1.20} | npRequestId=06e0f95e-6738-475a-9e5d-
                                  bf60a4b8101f stream: stdout docker.container_id: 089ca943388048d89d8c04769729623b31315d2fdff7410aafd5a06d62b9209d
                                  kubernetes.container_name: apic-em-network-programmer-service kubernetes.namespace_name: fusion kubernetes.pod_name: apic-em-
                                  network-programmer-service-5c89ccb-7chwn kubernetes.container_image: fusion/apic-em-network-programmer-service:7.1.78.60109

January 27th 2020, 09:15:00.643   log: 2020-01-27 08:15:00,642 | ERROR | ew-shard-11 | | c.c.e.n.utils.ErrorCodeUtil | Detail message of errorcode: NP_201 is
                                  Unable to push CLI 'ip name-server 10.1.1.20' to device 192.168.200.13 using protocol ssh2 | npRequestId=06e0f95e-6738-475a-9e5d-
                                  bf60a4b8101f stream: stdout docker.container_id: 089ca943388048d89d8c04769729623b31315d2fdff7410aafd5a06d62b9209d
                                  kubernetes.container_name: apic-em-network-programmer-service kubernetes.namespace_name: fusion kubernetes.pod_name: apic-em-
                                  network-programmer-service-5c89ccb-7chwn kubernetes.container_image: fusion/apic-em-network-programmer-service:7.1.78.60109
```



```
January 27th 2020, 09:15:0
log: 2020-01-27 08:15:00,642 | ERROR | ew-shard-11 | | c.c.e.n.utils.ErrorCodeUtil | Invalid CLI startIndex is :642,endIndex is
683 | npRequestId=06e0f95e-6738-475a-9e5d-bf60a4b8101f stream: stdout
docker.container_id: 089ca943388048d89d8c04769729623b31315d2fdff7410aafd5a06d62b9209d kubernetes.container_name: apic-em-
network-programmer-service kubernetes.namespace_name: fusion kubernetes.pod_name: apic-em-network-programmer-service-
5c89ccb-7chwn kubernetes.container_image: fusion/apic-em-network-programmer-service:7.1.78.60109

January 27th 2020, 09:15:00.642
log: 2020-01-27 08:15:00,642 | ERROR | ew-shard-11 | | c.c.e.n.utils.ErrorCodeUtil | Invalid CLI after parsing is ip name-server
10.1.1.20 | npRequestId=06e0f95e-6738-475a-9e5d-bf60a4b8101f stream: stdout
docker.container_id: 089ca943388048d89d8c04769729623b31315d2fdff7410aafd5a06d62b9209d kubernetes.container_name: apic-em-
network-programmer-service kubernetes.namespace_name: fusion kubernetes.pod_name: apic-em-network-programmer-service-
5c89ccb-7chwn kubernetes.container_image: fusion/apic-em-network-programmer-service:7.1.78.60109
```

Provisioning Status

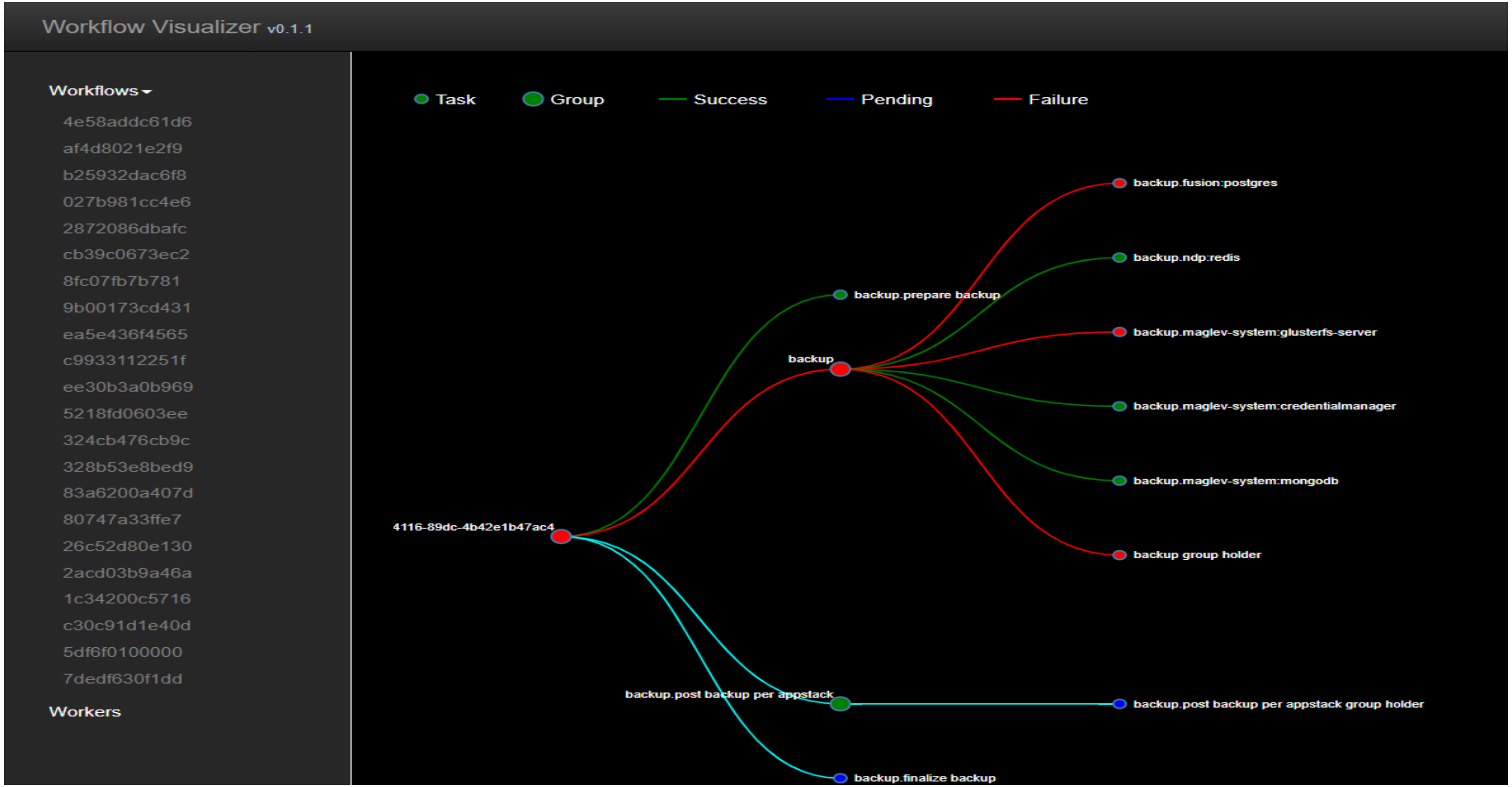


□	Device Name	IP Address	Device Family	Site	Reachability	Provision Status	Credential Status	Last Provisioned	De
□	sda-3k-98	1				ess Details	Not Provisioned	4 days ago	AC
□	sda-3k-100	1				d ⚠ Details	Not Provisioned	4 days ago	AC
□	sda-9k-56	1				⚠ Details	Not Provisioned	a few seconds ago	AC

Recent Provisioning Results

Time: January 27, 2020 11:35 AM
Task: N/A
Status: FAILED
Error: Unable to push CLI 'ip name-server 11.11.11.111' to device 172.23.210.156 using protocol ssh2. Response from the device is : %Error: Adding 11.11.11.111 : name-server table is full.

Workflow for Backup and Upgrade



Summary of Cluster Tools

- Kibana
  - Search for “log:error AND 192.168.200.13” ASAP after something goes wrong
  - Use filters to narrow down search results
- Grafana
  - Displays measurements of CPU and memory – Constant red is bad
  - Service Uptime should equal System Uptime
  - Do NOT over focus on Grafana
- Workflow
  - Monitor upgrades and backups

References

- Elasticsearch, Kibana, Beats, and Logstash (ELK Stack) - https://www.elastic.co
  - Search, analyze, and visualize data from any source, in any format, in real time
  - Advanced search techniques tutorial - https://logz.io/blog/kibana-advanced/
- Grafana - https://grafana.com
  - Open source analytics and monitoring solution the open source analytics and monitoring solution for every database

Understanding and Using RCA

Collecting DNA Center RCA ~20 min

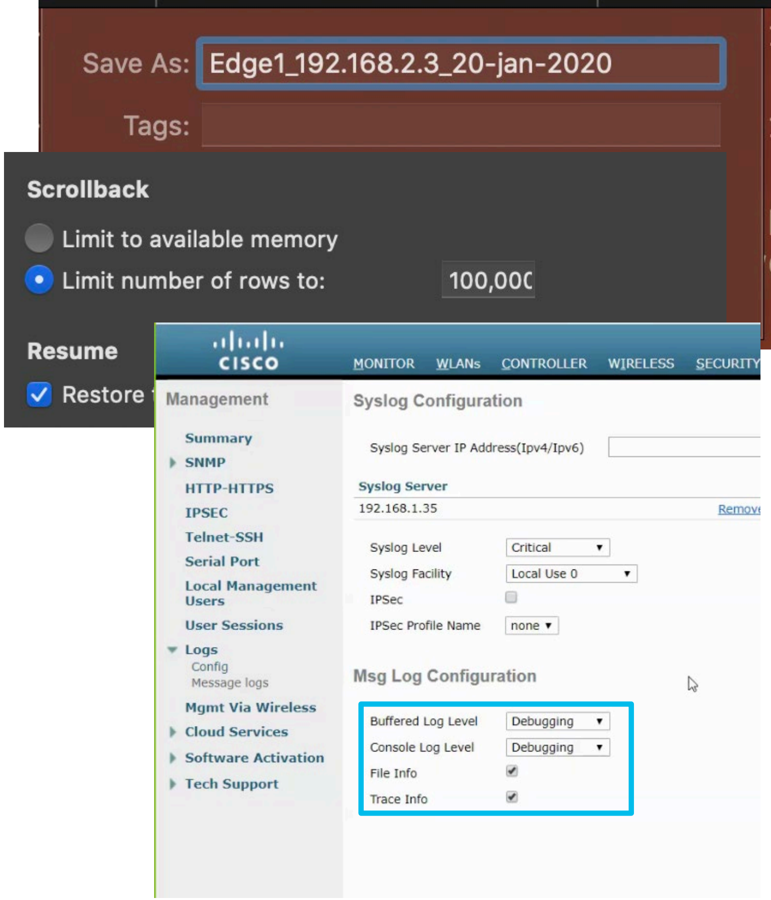
```
ssh maglev@10.23.214.23 -p 2222

Welcome to the Maglev Appliance…

$ sudo rca

[sudo] password for maglev: …

[administration] password for 'admin':

RCA package created on Thu Jan 30 10:52:31 UTC 2020 …

/etc/cron.d/drop_page_cache …

2020-01-30 10:59:18 | INFO | Generating log for 'docker logs
k8s_event-manager_event-manager-cb658c55b-xhxt2_maglev-
system_ea245754-3c44-11ea-abe5-380e4d3825a9_0'...
```

Cisco DNA Center RCA Summary

- `sudo rca –` RCA data for the Cisco DNA Center system
- **Before** you do anything – attach to SR for TAC
- Located in /data/rca
- One per node, 60 to 600M+
- Copy locally and then delete from appliance (save disk space)
- docker_logs_k8s_... Are the application logs

See the Config Being Applied

```
conf t
 event manager applet catchall
 event cli pattern ".*" sync no skip no
 action 1 syslog msg "$_cli_msg"
end
conf t
 no event manager applet catchall
end
```



Save As: Edge1_192.168.2.3_20-jan-2020

Tags:

Scrollback

○ Limit to available memory

● Limit number of rows to: 100,00

Resume

☑ Restore

Syslog Configuration

Syslog Server IP Address(Ipv4/Ipv6)

Syslog Server

192.168.1.35 Remove

Syslog Level: Critical

Syslog Facility: Local Use 0

IPSec: □

IPSec Profile Name: none

Msg Log Configuration

Buffered Log Level: Debugging

Console Log Level: Debugging

File Info: ☑

Trace Info: ☑

```
conf t
  logging monitor debugging
end
term mon
```

Command History

```
Edge1#show history all | begin user: dnac

CMD: 'show history all | begin user: dnac' 09:33:51 UTC Thu Jan 30 2020
…
CMD: 'show wcm-cs interface' 09:34:42 UTC Thu Jan 30 2020
CMD: 'show platform software process list switch active R0 name wncd_0' 09:34:43 UTC
Thu Jan 30 2020
031327: Jan 30 09:34:43.059: %HA_EM-6-LOG: CLIaccounting: show platform software
process list switch active R0 name wncd_0
CMD: 'show running-config' 09:34:44 UTC Thu Jan 30 2020
031328: Jan 30 09:34:44.298: %HA_EM-6-LOG: CLIaccounting: show running-config
CMD: 'show auto qos' 09:34:44 UTC Thu Jan 30 2020031329: Jan 30 09:34:44.640: %HA_EM-6-
LOG: CLIaccounting: show auto qos
CMD: 'show ip nbar protocol-pack loaded' 09:34:44 UTC Thu Jan 30 2020
031330: Jan 30 09:34:44.695: %HA_EM-6-LOG: CLIaccounting: show ip nbar protocol-pack
loaded …
```

Summary of Config Debugging

- CLI via SSH
- NETCONF is the (not very distant) future
- Set up terminal sessions for devices
- Use EEM and/or `logging monitor debugging` and/or `show history all`
- Save the logged data for review after the fact
- Practice in a lab or with single device first
- Make sure you are comfortable with what is happening before provisioning a whole site

Discovery Troubleshooting

What Is Discovery

- Scans Network Devices
- Identified devices are added to Inventory
- Ways to discover
    - CDP
    - Range of IP Address
    - LLDP
- CDP/LLDP needs a seed device and number of hops
- Subnet Filters for 'Range of IP Address'

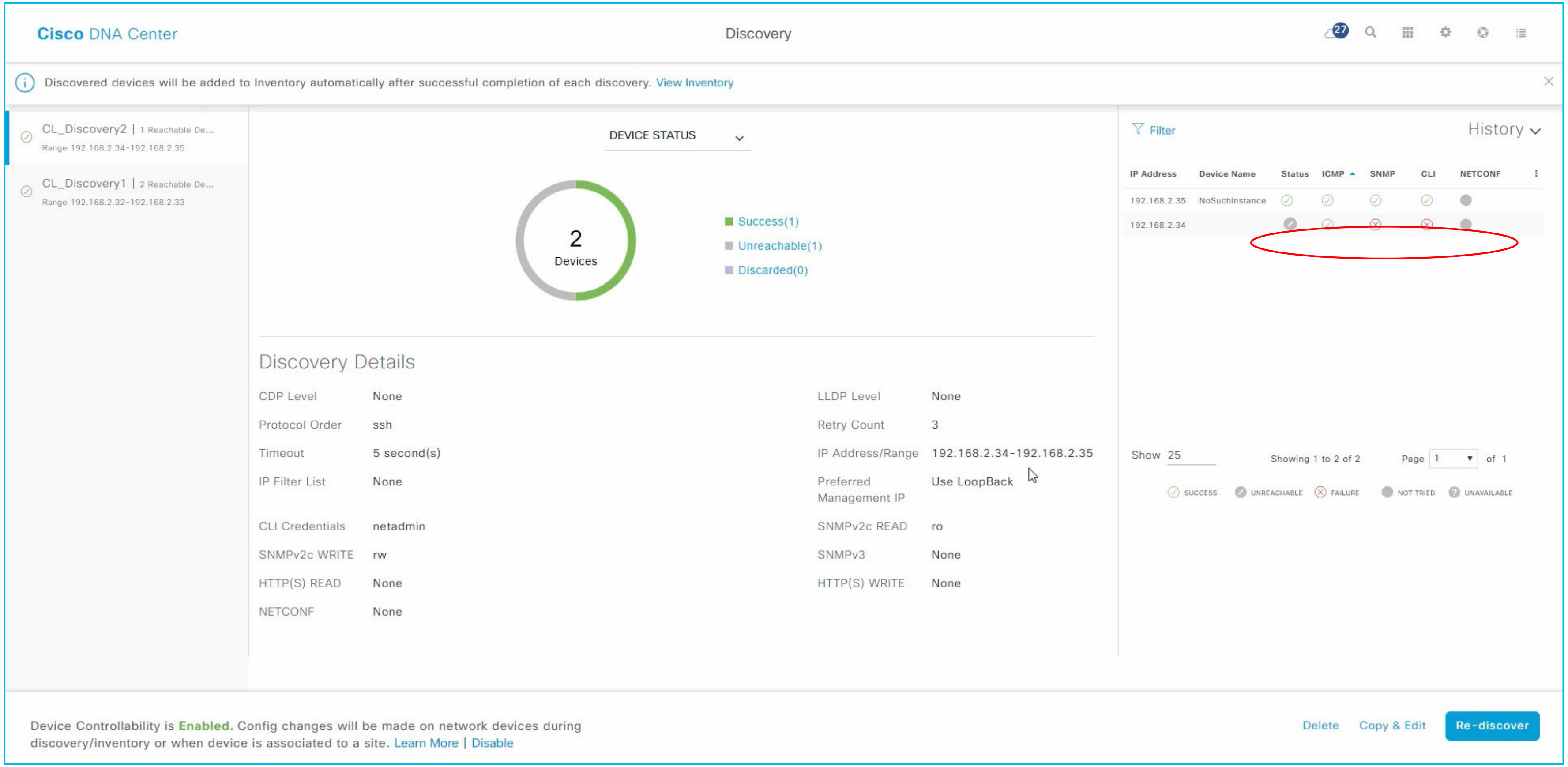
Discovery Prerequisites

- Supported Devices List – http://cs.co/900715IS3
  - Compatibility Information - Cisco DNA Center Supported Devices Excel
- Latency between DNA Center and devices is <= 100msec
  - What happens if it is not?
- At least one SNMP community string configured on device
- SSH Credentials on the devices
  - Credential needs to be privileged EXEC mode
- NFVIS Device – Needs HTTPS Credential
- 9800 WLC – Needs NETCONF configuration and HTTPS Credentials
  - NETCONF will become increasingly mandatory

What Can Go Wrong With Discovery?

- CLI Credentials
- Enable password mismatch
- SNMP Credentials
- Device unreachable – Routing Issue
- Device Connectivity issue – ssh/telnet/snmp port(s) blocked
- Device Tracking Requirement (IPDT)

Discovery – Sample Error message



Discovered devices will be added to Inventory automatically after successful completion of each discovery. View Inventory

CL_Discovery2 | 1 Reachable De...
Range 192.168.2.34-192.168.2.35

CL_Discovery1 | 2 Reachable De...
Range 192.168.2.32-192.168.2.33

🟩 Success(1)
▨ Unreachable(1)
▨ Discarded(0)

Discovery Details

CDP Level	None	LLDP Level	None
Protocol Order	ssh	Retry Count	3
Timeout	5 second(s)	IP Address/Range	192.168.2.34-192.168.2.35
IP Filter List	None	Preferred Management IP	Use LoopBack
CLI Credentials	netadmin	SNMPv2c READ	ro
SNMPv2c WRITE	rw	SNMPv3	None
HTTP(S) READ	None	HTTP(S) WRITE	None
NETCONF	None		

IP Address	Device Name	Status	ICMP	SNMP	CLI	NETCONF
192.168.2.35	NoSuchInstance	✓	✓	✓	✓	●
192.168.2.34		⊘	✓	⊗	⊗	●

Show 25 Showing 1 to 2 of 2 Page 1 of 1

✓ SUCCESS ⊘ UNREACHABLE ⊗ FAILURE ● NOT TRIED ? UNAVAILABLE

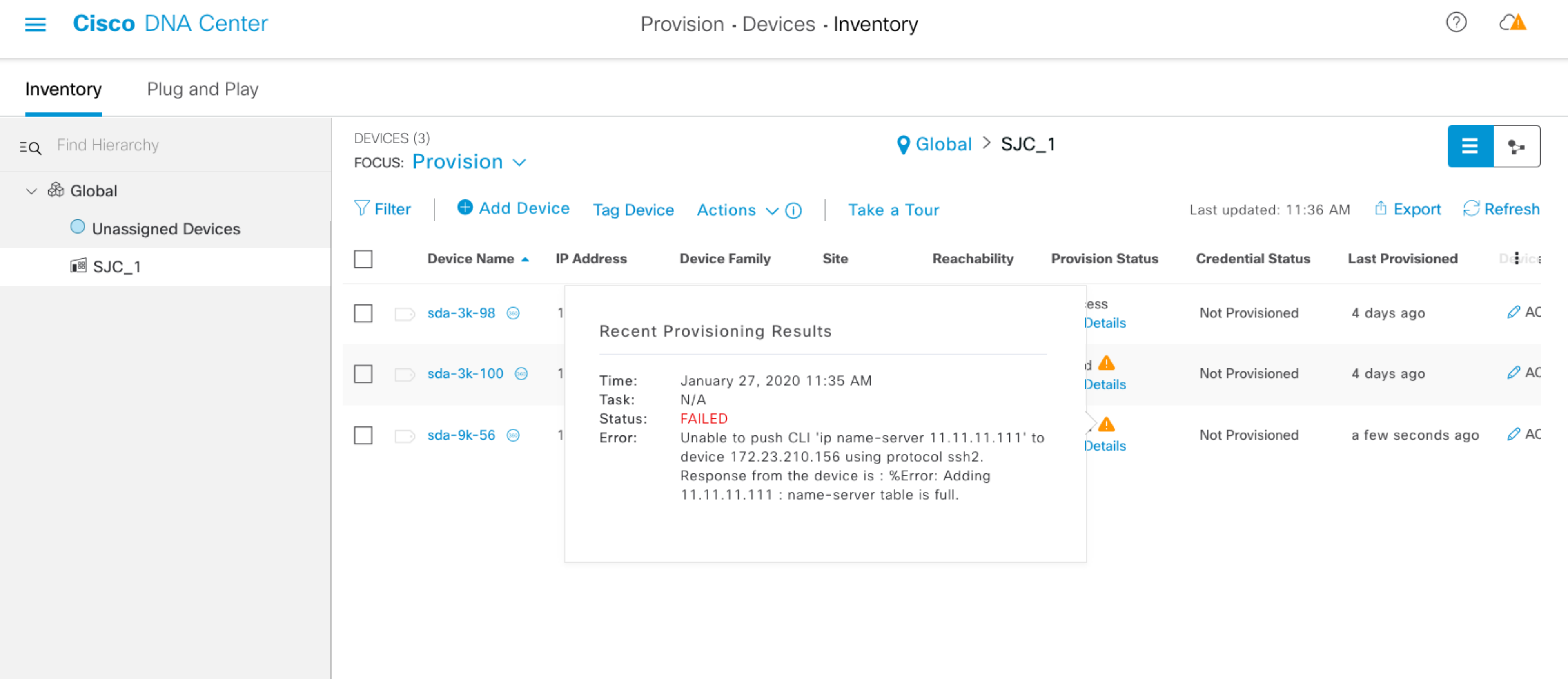
Device Controllability is **Enabled.** Config changes will be made on network devices during discovery/inventory or when device is associated to a site. Learn More | Disable

Discovery Troubleshooting Demonstration Video

Provisioning Troubleshooting

Provisioning

- Onboarding PnP Devices into Inventory
- Deploying Site Settings
- Fabric Sites
  - Fabric Domain
  - Devices to Sites
  - Host Onboarding
- Policy



□	Device Name ▲	IP Address	Device Family	Site	Reachability	Provision Status	Credential Status	Last Provisioned	Device
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Recent Provisioning Results

Time: January 27, 2020 11:35 AM
Task: N/A
Status: FAILED
Error: Unable to push CLI 'ip name-server 11.11.11.111' to device 172.23.210.156 using protocol ssh2. Response from the device is : %Error: Adding 11.11.11.111 : name-server table is full.

What Can Go Wrong With Provisioning

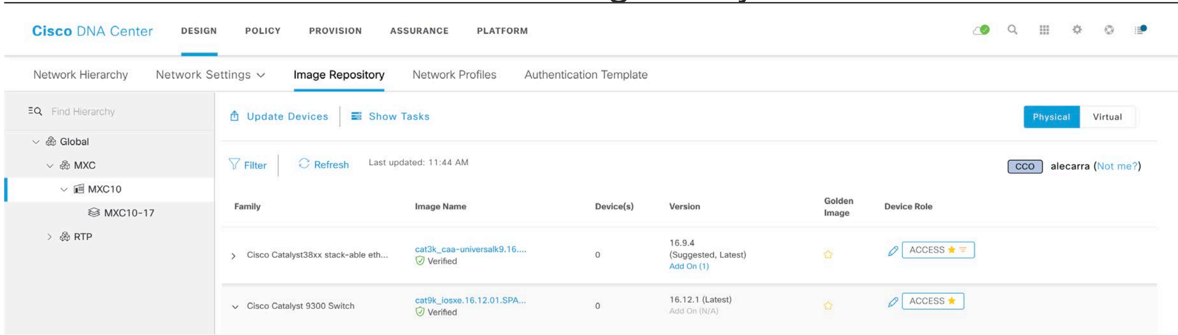
- SNMP
- CLI Credentials
- Invalid CLI Commands
- Device Locks

Provisioning Troubleshooting Demonstration Video

Software Image Management (SWIM)

SWIM overview

- Software Image Management is a friendly way to update your network devices
- Connection to cisco.com is highly recommended.
- Golden image(s) selected to mark what is the desired OS image for your network devices.
  - OS Images
  - Starting 1.3 we Rommon Image
- You can be granular
  - All the network devices
  - Network devices that are part of a site
  - Network devices that are part of a site and have a specific role



Last updated: 11:44 AM

CCO alecarra (Not me?)

Family	Image Name	Device(s)	Version	Golden Image	Device Role
Cisco Catalyst38xx stack-able eth...	cat3k_caa-universalk9.16.... Verified	0	16.9.4 (Suggested, Latest) Add On (1)	☆	ACCESS ★
Cisco Catalyst 9300 Switch	cat9k_iosxe.16.12.01.SPA... Verified	0	16.12.1 (Latest) Add On (N/A)	☆	ACCESS ★

SWIM Troubleshooting Demonstration Video

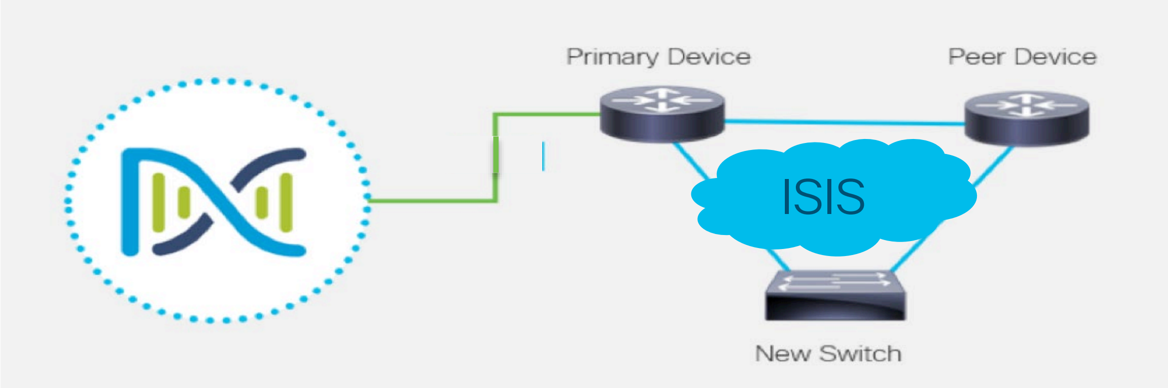
What could go wrong while using SWIM?

- If the CLI protocol selected is wrong, then you may see CONNECTION_ERROR or time out.
- If wrong SNMP Credentials are set, the device will not be reachable.
- Incorrect CLI credentials -> Authentication related errors.
- Certificate problems.
  - SSL3 is not supported by Cisco DNA Center.
- Logs to analyze for troubleshooting:
  - Swim
  - Inventory
  - Network-programmer

Cisco Plug-and-Play and LAN Automation

LAN Automation overview

- Zero Touch Deployment that automates the configuration of the underlay network using ISIS to build the underlay routing protocol.
- Automatically adds your new switches to your Cisco DNA Center inventory.
- Automatically configures username, passwords and other defined servers to the new switches.



LAN Automation Troubleshooting Demonstration Video

Other LAN Automation tips

- SWIM occurs in the background if a golden image is selected
  - Ensure that your network device is running on **install** mode, bundle mode will stop the PnP process/LAN Automation
- Automating an already configured network device
  - Select both devices as primary and secondary device
  - Mark the interface on the primary device that connects to the secondary device
  - Start LAN Automation -> Wait 3 minutes -> Stop
- Useful services logs
  - **Onboarding-service**
  - **Network-orchestration**
  - Connection-manager
  - Network-design

DNA Assurance

Troubleshooting

Operating and maintaining Cisco DNA Assurance is simple and easy, with the right knowledge of troubleshooting tools and techniques

Goals of Session

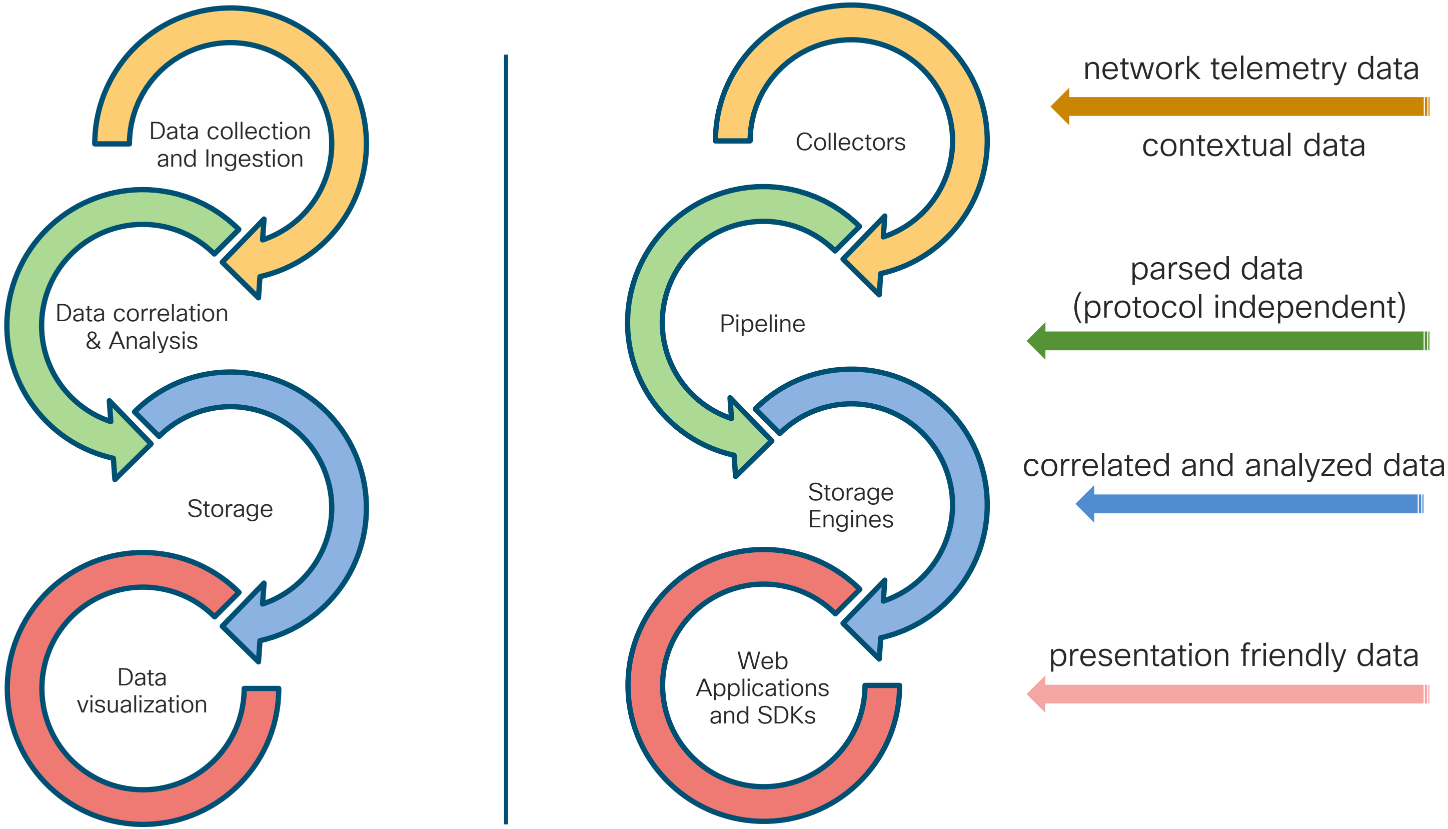
- Get to know about:
  - Conceptual view of Assurance High Level Architecture
  - Troubleshooting tools & techniques
- Understand the data flows and “how to troubleshoot”:
  - No data on assurance pages
  - Network device in unmonitored state
  - Missing assurance data from WLC
  - Missing application health data

Assurance
High Level Architecture

Conceptual view

High Level Architecture

Dataflow



Data collection and Ingestion

Data correlation & Analysis

Storage

Data visualization

Collectors

Pipeline

Storage Engines

Web Applications and SDKs

network telemetry data

contextual data

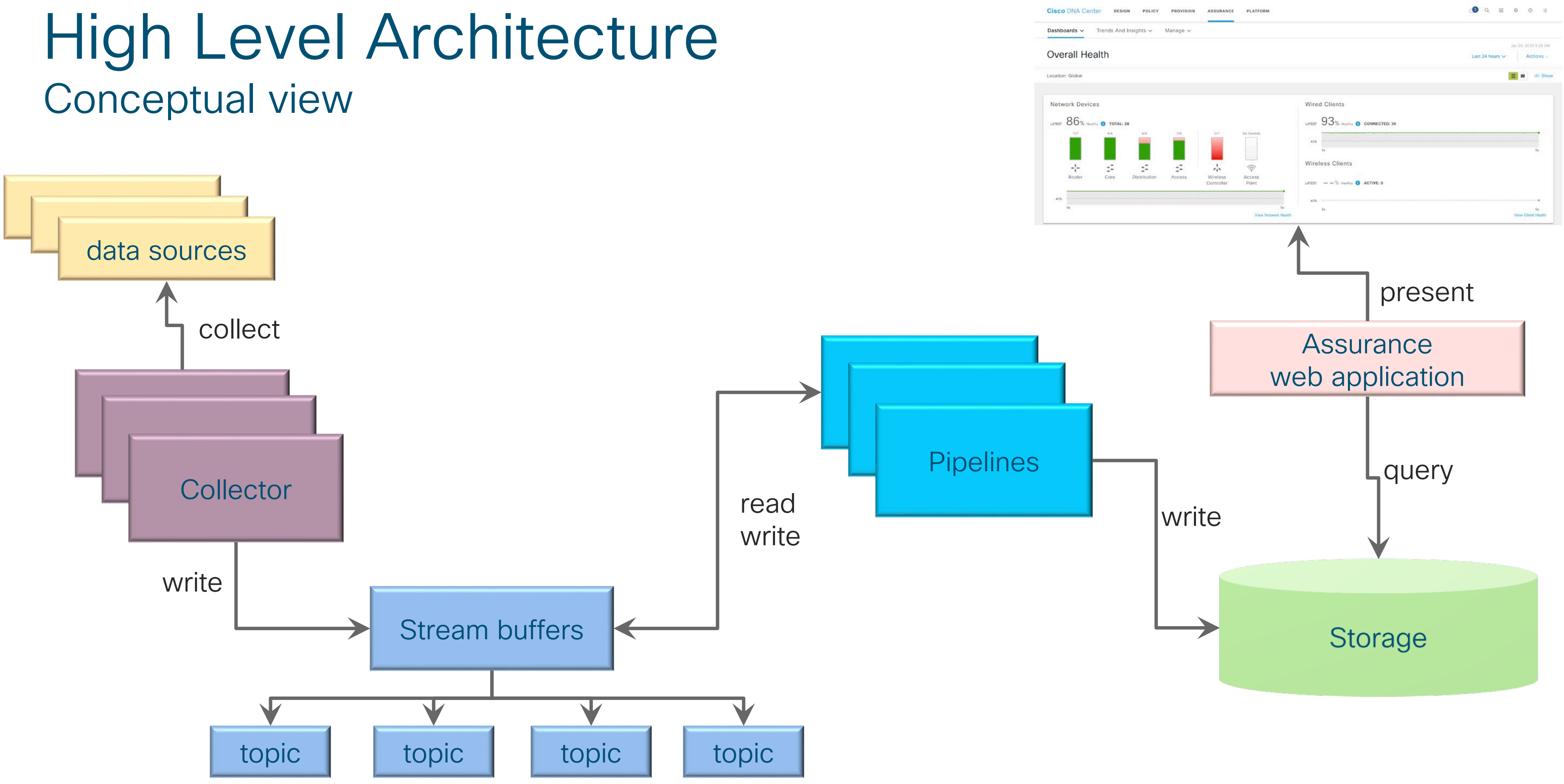
parsed data (protocol independent)

correlated and analyzed data

presentation friendly data

High Level Architecture

Conceptual view



Overall Health

Jan 29, 2020 9:26 AM

Location: Global

Network Devices

LATEST 86% Healthy TOTAL: 28

7/7 4/4 6/8 7/8 0/1 No Devices

Wired Clients

LATEST 93% Healthy CONNECTED: 30

Wireless Clients

LATEST --% Healthy ACTIVE: 0

message buffers or topics

Troubleshooting
Tools and techniques

Troubleshooting

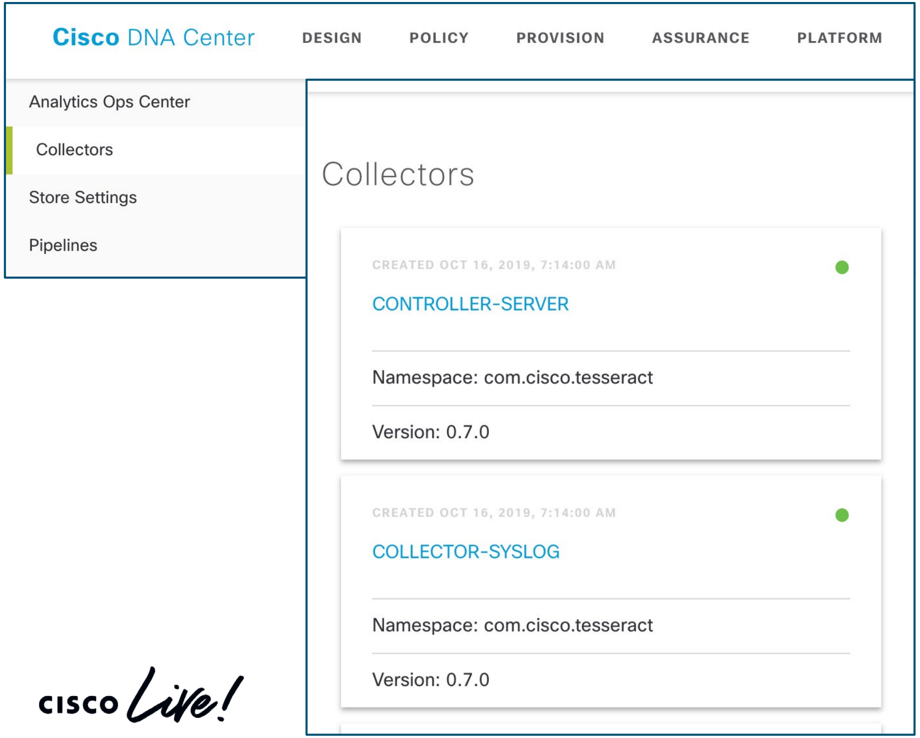
Techniques

- Network Data Platform Health
  - Data Platform
    - Analytics Ops Center
- Data flow troubleshooting using metrics
  - Graphana
- Network capture
- Log Analysis

Troubleshooting

Data Platform: Collector and pipeline health check

System Settings > Data Platform -> Collectors



Cisco DNA Center DESIGN POLICY PROVISION ASSURANCE PLATFORM

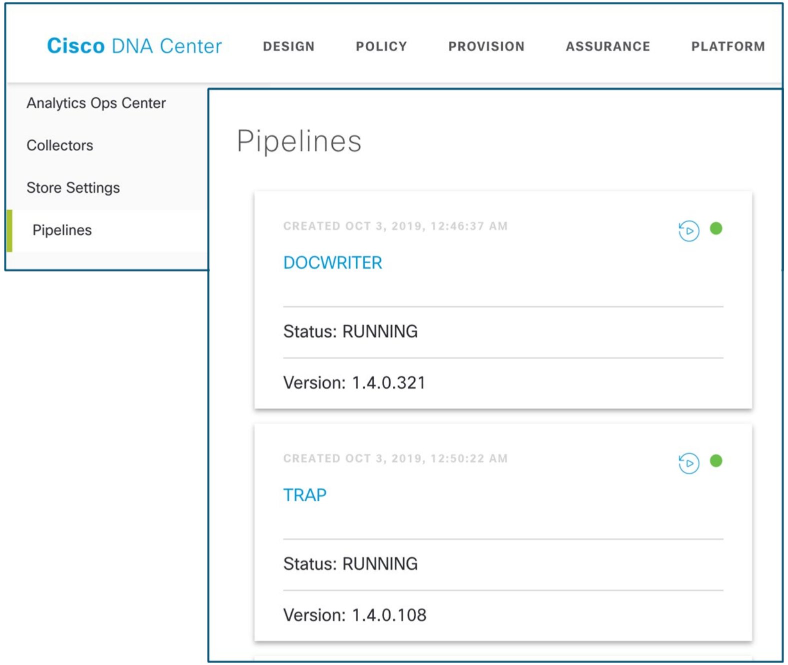
- Analytics Ops Center
- Collectors
- Store Settings
- Pipelines

Collectors

CREATED OCT 16, 2019, 7:14:00 AM ●
CONTROLLER-SERVER
Namespace: com.cisco.tesseract
Version: 0.7.0

CREATED OCT 16, 2019, 7:14:00 AM ●
COLLECTOR-SYSLOG
Namespace: com.cisco.tesseract
Version: 0.7.0

System Settings > Data Platform -> Pipelines



Cisco DNA Center DESIGN POLICY PROVISION ASSURANCE PLATFORM

- Analytics Ops Center
- Collectors
- Store Settings
- Pipelines

Pipelines

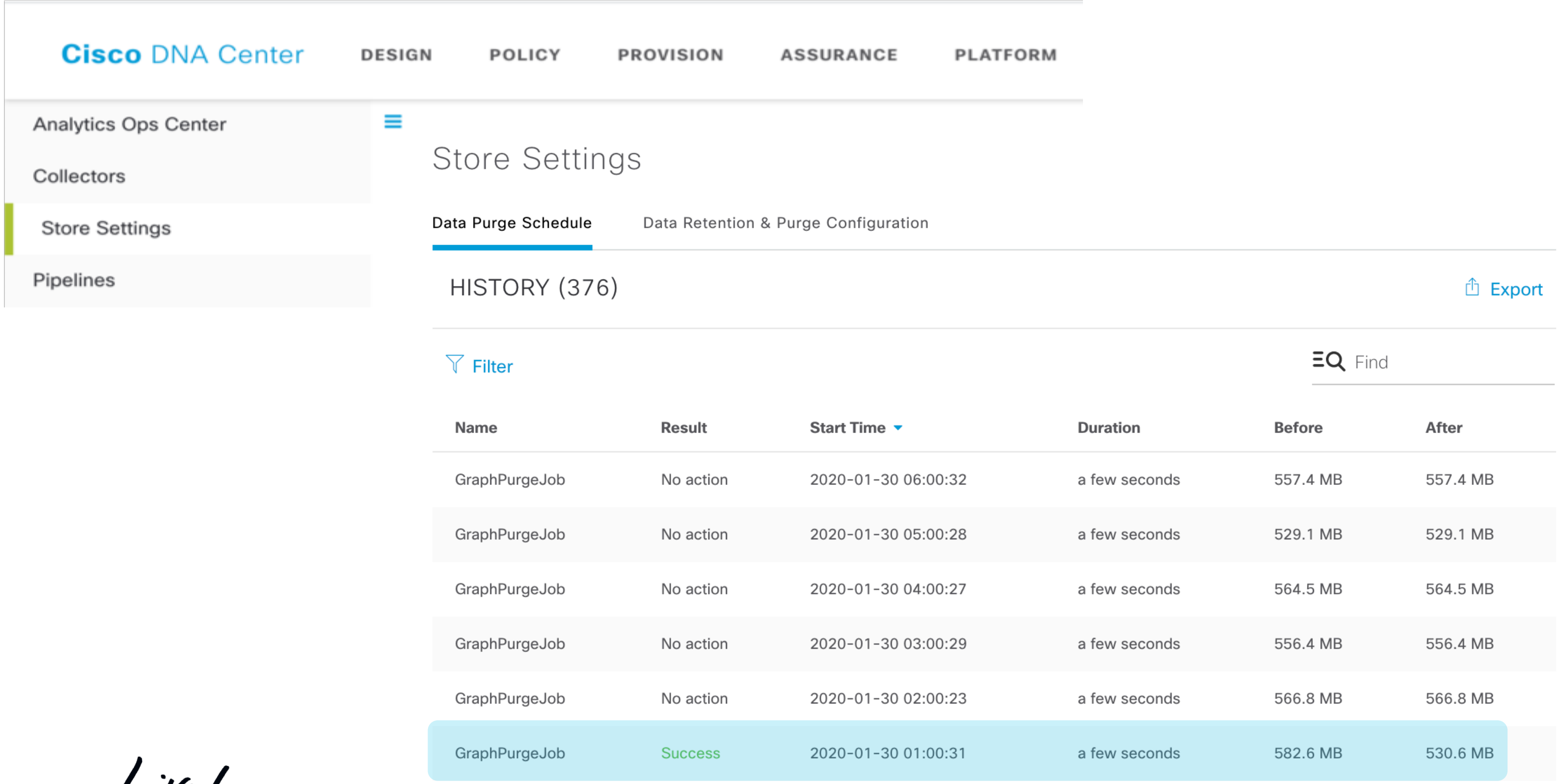
CREATED OCT 3, 2019, 12:46:37 AM ●
DOCWRITER
Status: RUNNING
Version: 1.4.0.321

CREATED OCT 3, 2019, 12:50:22 AM ●
TRAP
Status: RUNNING
Version: 1.4.0.108

Basic assurance pre-checks

Data Platform: Store health check

System Settings > Data Platform -> Store Settings



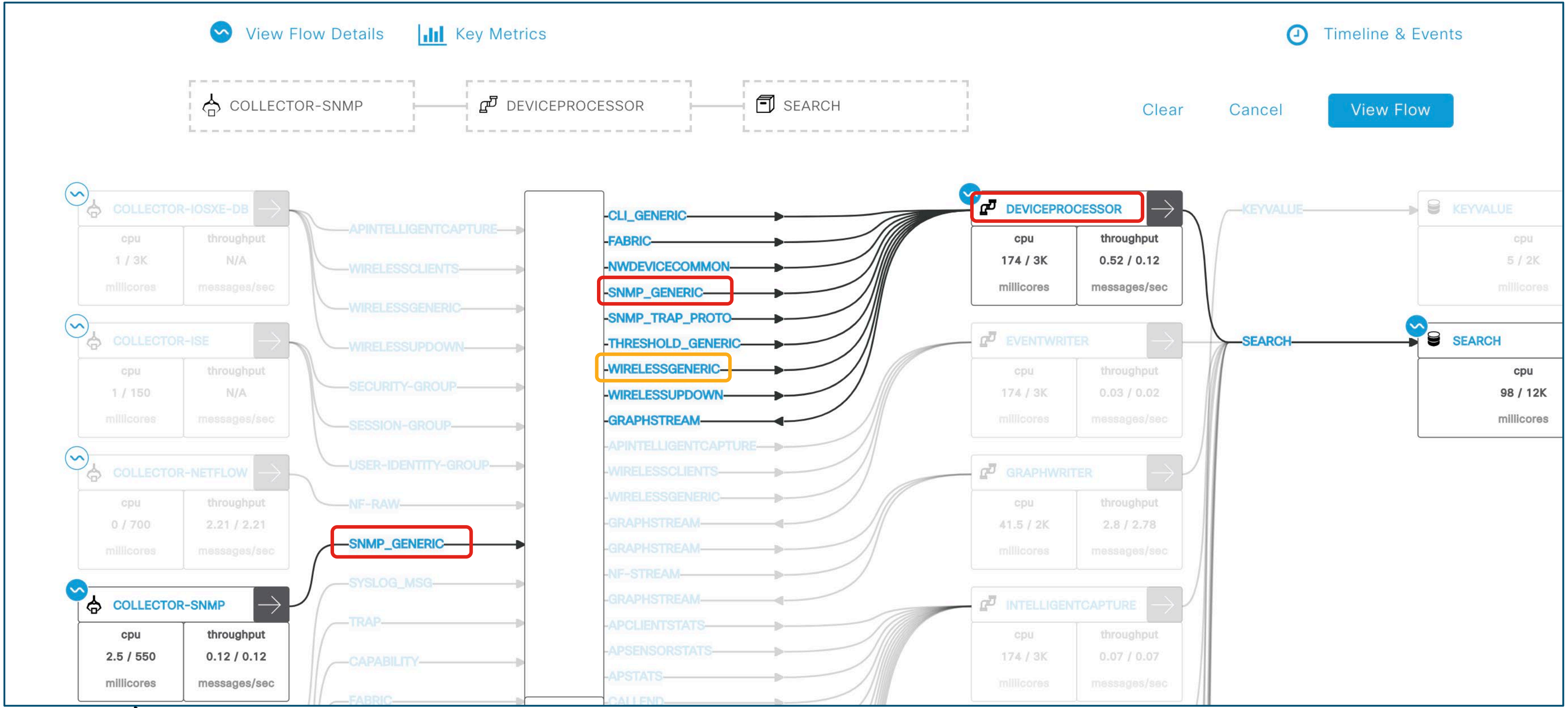
HISTORY (376)

Name	Result	Start Time	Duration	Before	After
GraphPurgeJob	No action	2020-01-30 06:00:32	a few seconds	557.4 MB	557.4 MB
GraphPurgeJob	No action	2020-01-30 05:00:28	a few seconds	529.1 MB	529.1 MB
GraphPurgeJob	No action	2020-01-30 04:00:27	a few seconds	564.5 MB	564.5 MB
GraphPurgeJob	No action	2020-01-30 03:00:29	a few seconds	556.4 MB	556.4 MB
GraphPurgeJob	No action	2020-01-30 02:00:23	a few seconds	566.8 MB	566.8 MB
GraphPurgeJob	Success	2020-01-30 01:00:31	a few seconds	582.6 MB	530.6 MB

Troubleshooting

Analytics Ops Center

System Settings > Data Platform -> Ops Center -> Assurance

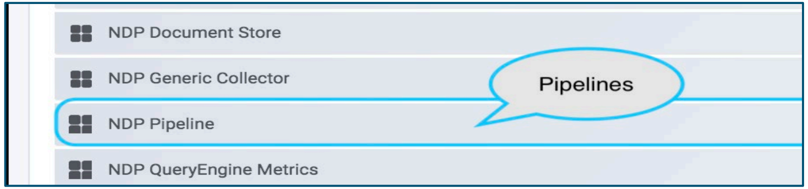


cisco Live!

Troubleshooting

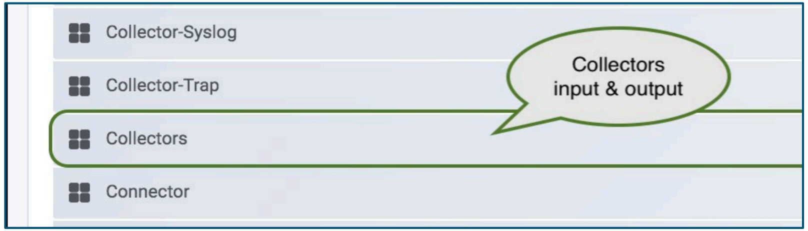
Graphana: NDP and Assurance dashboards

System Settings > Monitoring



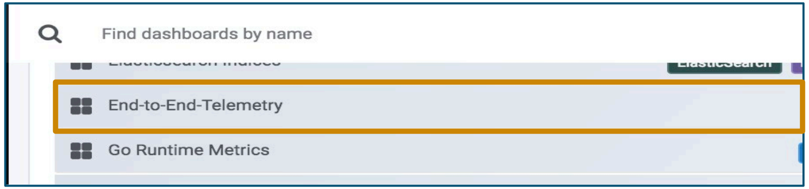
- NDP Document Store
- NDP Generic Collector
- NDP Pipeline
- NDP QueryEngine Metrics

Pipelines



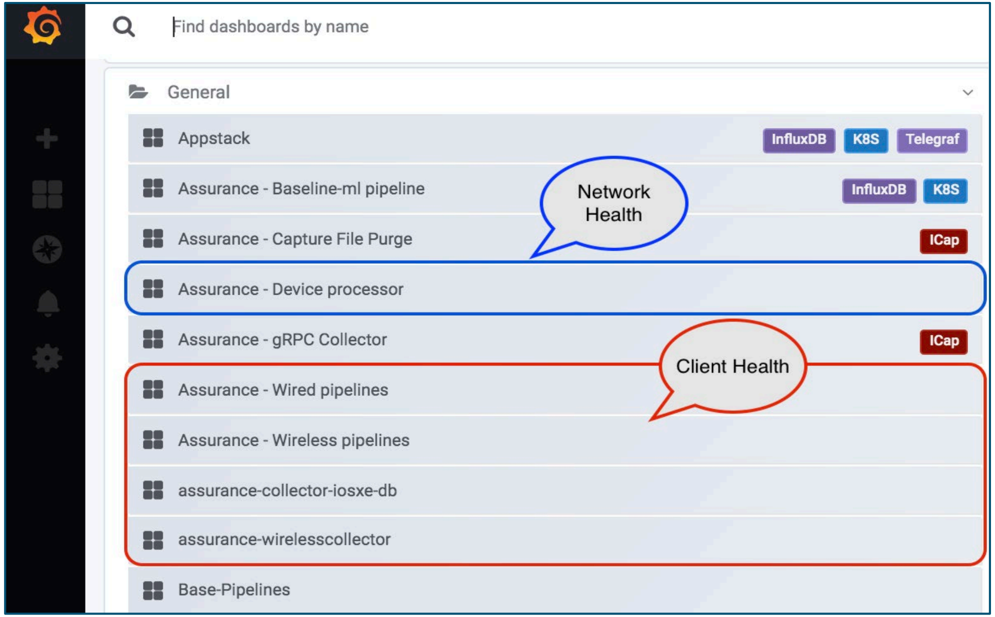
- Collector-Syslog
- Collector-Trap
- Collectors
- Connector

Collectors input & output



Find dashboards by name

- Elasticsearch Indices ElasticSearch
- End-to-End-Telemetry
- Go Runtime Metrics



Find dashboards by name

General

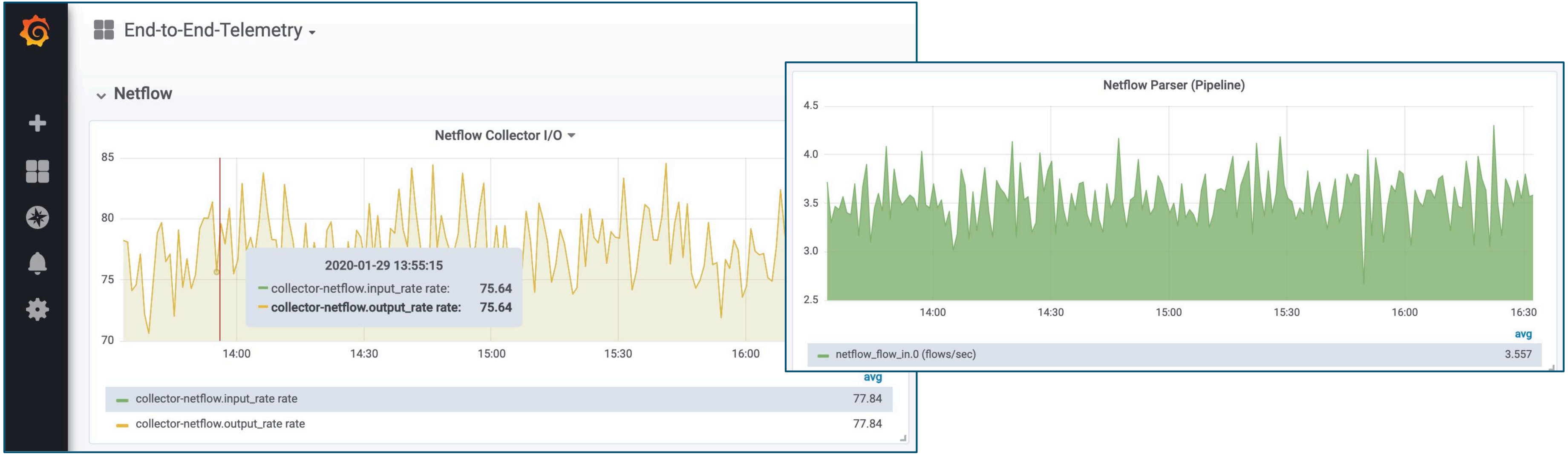
- Appstack InfluxDB K8S Telegraf
- Assurance - Baseline-ml pipeline InfluxDB K8S
- Assurance - Capture File Purge ICap
- Assurance - Device processor
- Assurance - gRPC Collector ICap
- Assurance - Wired pipelines
- Assurance - Wireless pipelines
- assurance-collector-iosxe-db
- assurance-wirelesscollector
- Base-Pipelines

Network Health

Client Health

Troubleshooting

Graphana: Collectors and Pipeline dashboard



End-to-End-Telemetry

Netflow

Netflow Collector I/O

2020-01-29 13:55:15
- collector-netflow.input_rate rate: 75.64
- **collector-netflow.output_rate rate: 75.64**

	avg
collector-netflow.input_rate rate	77.84
collector-netflow.output_rate rate	77.84

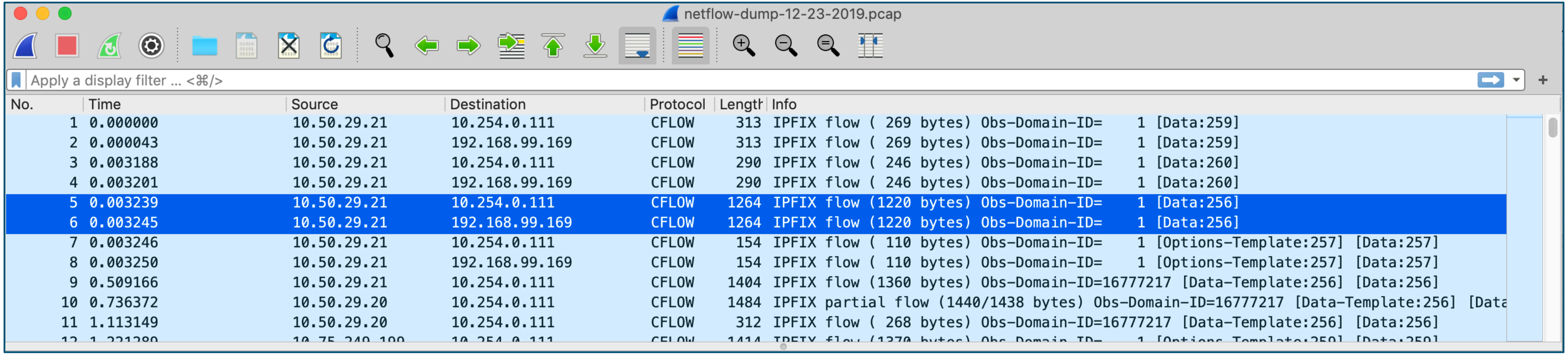
Netflow Parser (Pipeline)

	avg
netflow_flow_in.0 (flows/sec)	3.557

Troubleshooting

Network Capture

- tcpdump available on DNA Center on maglev root
- tcpdump inside collector-netflow, collector-snmp etc. "*-i eth0*"
  - magctl service attach <collector-service-name>
- Packet capture on "*-i any*" shows the packets received on the DNAC IP address and the packet rewrite destined to the pod handling the packet

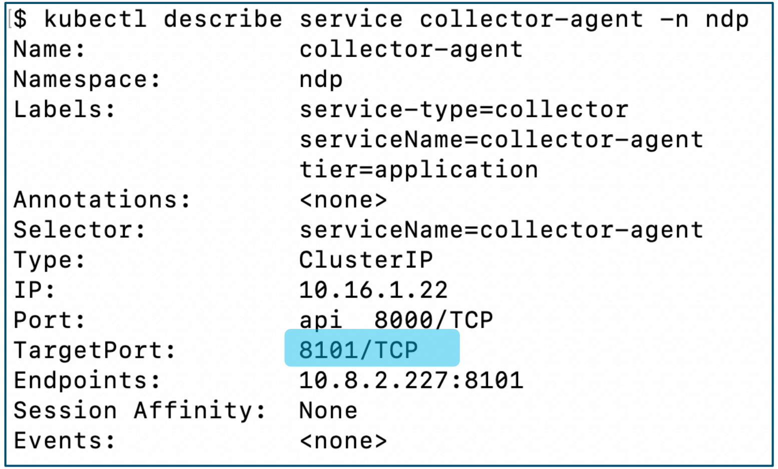


```
No.  Time       Source          Destination     Protocol Length Info
   1 0.000000   10.50.29.21     10.254.0.111    CFLOW     313 IPFIX flow ( 269 bytes) Obs-Domain-ID=    1 [Data:259]
   2 0.000043   10.50.29.21     192.168.99.169  CFLOW     313 IPFIX flow ( 269 bytes) Obs-Domain-ID=    1 [Data:259]
   3 0.003188   10.50.29.21     10.254.0.111    CFLOW     290 IPFIX flow ( 246 bytes) Obs-Domain-ID=    1 [Data:260]
   4 0.003201   10.50.29.21     192.168.99.169  CFLOW     290 IPFIX flow ( 246 bytes) Obs-Domain-ID=    1 [Data:260]
   5 0.003239   10.50.29.21     10.254.0.111    CFLOW    1264 IPFIX flow (1220 bytes) Obs-Domain-ID=    1 [Data:256]
   6 0.003245   10.50.29.21     192.168.99.169  CFLOW    1264 IPFIX flow (1220 bytes) Obs-Domain-ID=    1 [Data:256]
   7 0.003246   10.50.29.21     10.254.0.111    CFLOW     154 IPFIX flow ( 110 bytes) Obs-Domain-ID=    1 [Options-Template:257] [Data:257]
   8 0.003250   10.50.29.21     192.168.99.169  CFLOW     154 IPFIX flow ( 110 bytes) Obs-Domain-ID=    1 [Options-Template:257] [Data:257]
   9 0.509166   10.50.29.21     10.254.0.111    CFLOW    1404 IPFIX flow (1360 bytes) Obs-Domain-ID=16777217 [Data-Template:256] [Data:256]
  10 0.736372   10.50.29.20     10.254.0.111    CFLOW    1484 IPFIX partial flow (1440/1438 bytes) Obs-Domain-ID=16777217 [Data-Template:256] [Data
  11 1.113149   10.50.29.20     10.254.0.111    CFLOW     312 IPFIX flow ( 268 bytes) Obs-Domain-ID=16777217 [Data-Template:256] [Data:256]
  12 1.221289   10.75.249.199   10.254.0.111    CFLOW    1414 IPFIX flow (1370 bytes) Obs-Domain-ID=    1 [Options-Template:259] [Data:259]
```

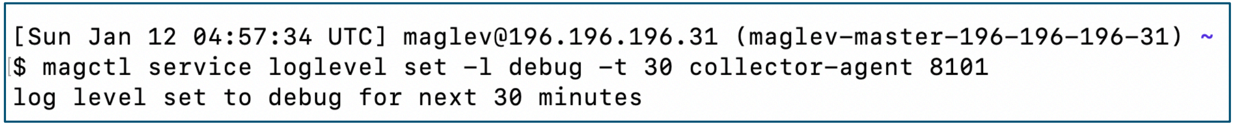
Troubleshooting

Log Analysis: Set log level for service

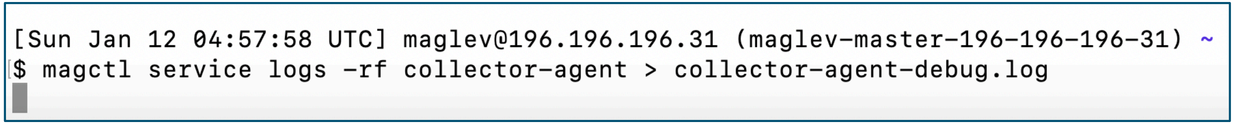
- Get list of kubernetes services
  - Run command: kubernetes get services –n <appstack-name>
- Viewing logs in Kibana
  - To filter logs for a service, use filter kubectl.labels.serviceName:<service-name> in the display filter
- Viewing raw log files
  - magctl service logs –rf <service-name>
  - magctl service logs –r <service-name> > <file>



```
[$ kubectl describe service collector-agent -n ndp
Name:              collector-agent
Namespace:         ndp
Labels:            service-type=collector
                   serviceName=collector-agent
                   tier=application
Annotations:       <none>
Selector:          serviceName=collector-agent
Type:              ClusterIP
IP:                10.16.1.22
Port:              api  8000/TCP
TargetPort:        8101/TCP
Endpoints:         10.8.2.227:8101
Session Affinity:  None
Events:            <none>
```



```
[Sun Jan 12 04:57:34 UTC] maglev@196.196.196.31 (maglev-master-196-196-196-31) ~
[$ magctl service loglevel set -l debug -t 30 collector-agent 8101
log level set to debug for next 30 minutes
```



```
[Sun Jan 12 04:57:58 UTC] maglev@196.196.196.31 (maglev-master-196-196-196-31) ~
[$ magctl service logs -rf collector-agent > collector-agent-debug.log
```

Troubleshoot problems Examples

Troubleshoot problems

Examples

- How to go about troubleshooting problems?
  - Basic assurance pre-checks
  - Understand Assurance provisioning
  - Understand Assurance telemetry data flows
  - Focus your troubleshooting on telemetry data collection
  - Data processing and storage, presentation issues are better dealt with by the Cisco support team
- Troubleshooting use cases
  - Network Health
    - No data on assurance pages
    - Device in unmonitored state
  - Assurance data missing for WLC
  - Application Health
    - Application experience data missing

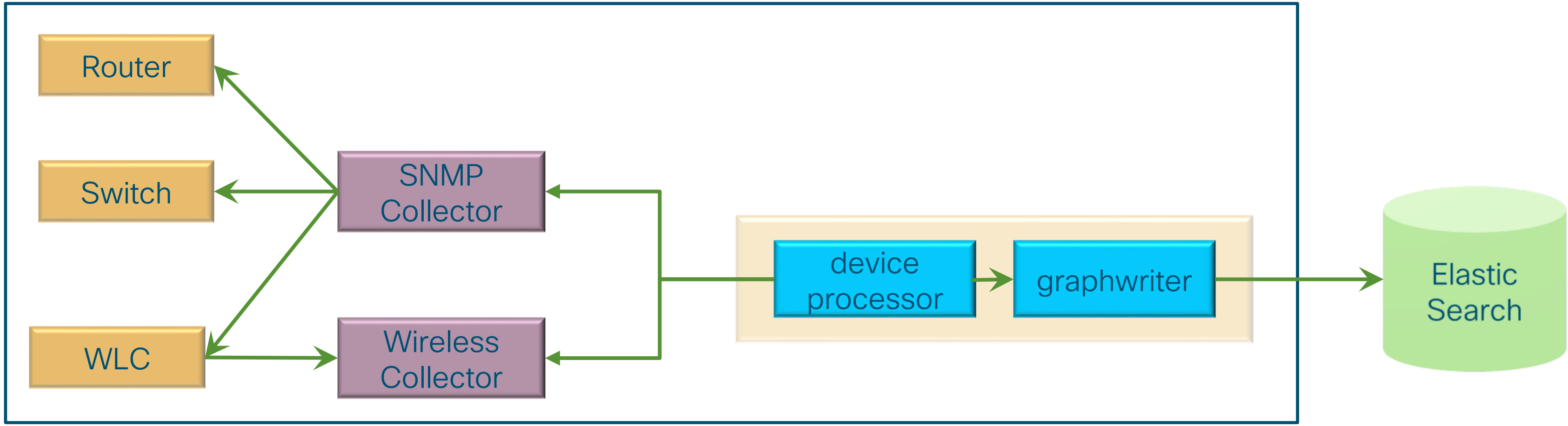
Basic assurance pre-checks

Pre-checks

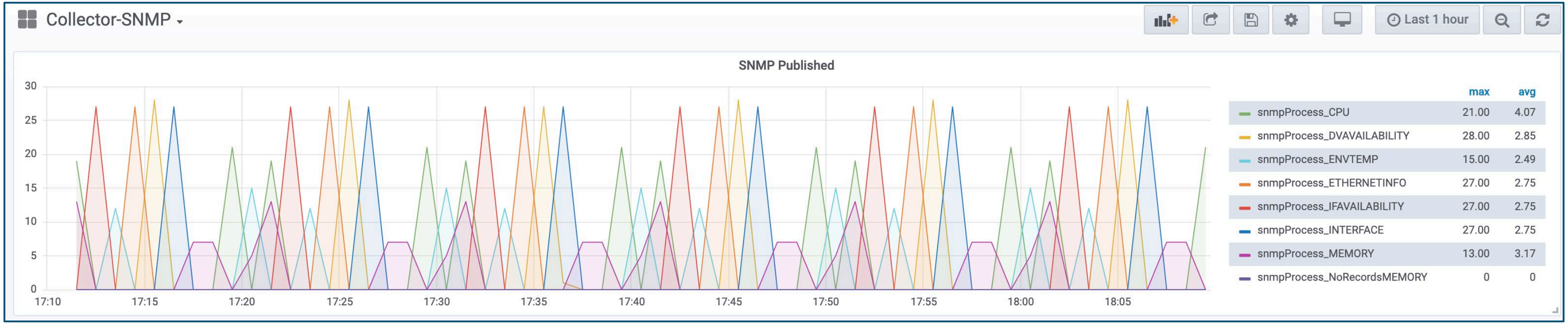
1. Verify packages and versions
2. Verify pod/container running status
3. Verify purge job running status
4. Verify pipeline running status
5. Verify devices inventory collection
6. Verify device controllability settings

Telemetry data flow

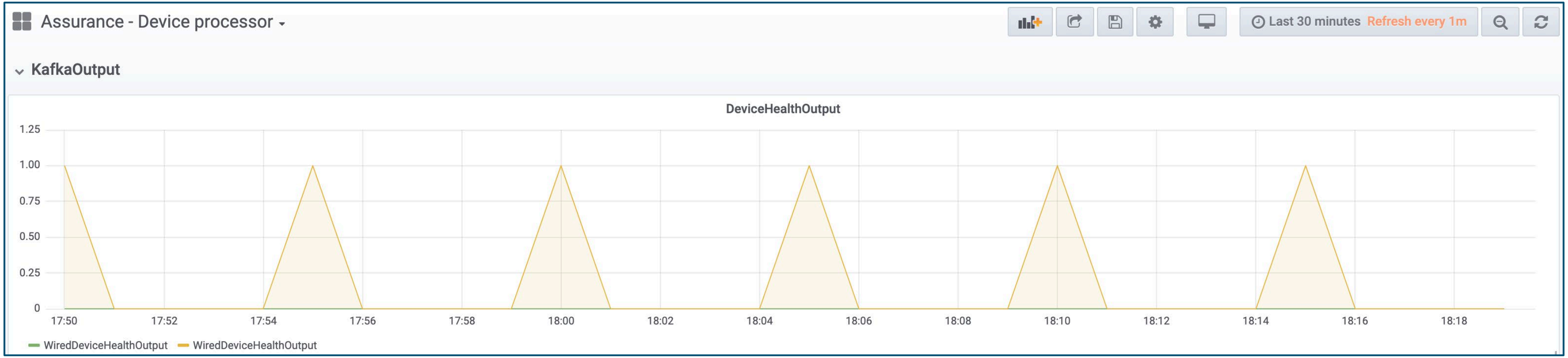
Network Health



Problem: No data on assurance pages



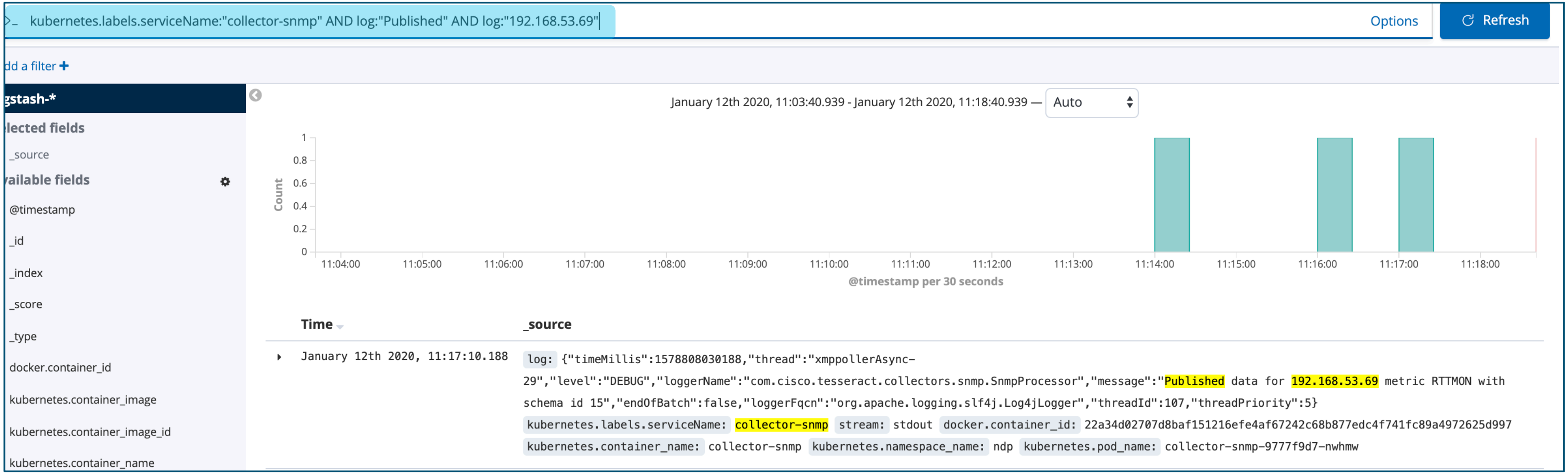
	max	avg
snmpProcess_CPU	21.00	4.07
snmpProcess_DVAVAILABILITY	28.00	2.85
snmpProcess_ENVTEMP	15.00	2.49
snmpProcess_ETHERNETINFO	27.00	2.75
snmpProcess_IFAVAILABILITY	27.00	2.75
snmpProcess_INTERFACE	27.00	2.75
snmpProcess_MEMORY	13.00	3.17
snmpProcess_NoRecordsMEMORY	0	0



Problem: Network device in unmonitored state

Network Health

- Set log level for SNMP collector service to debug
  - magctl service loglevel set -l debug -t 30 collector-snmp 8076
- Check Kibana for data publish status to Kafka and the time of publish
- Search Kibana for “DeviceUnreachableException” or the below filter

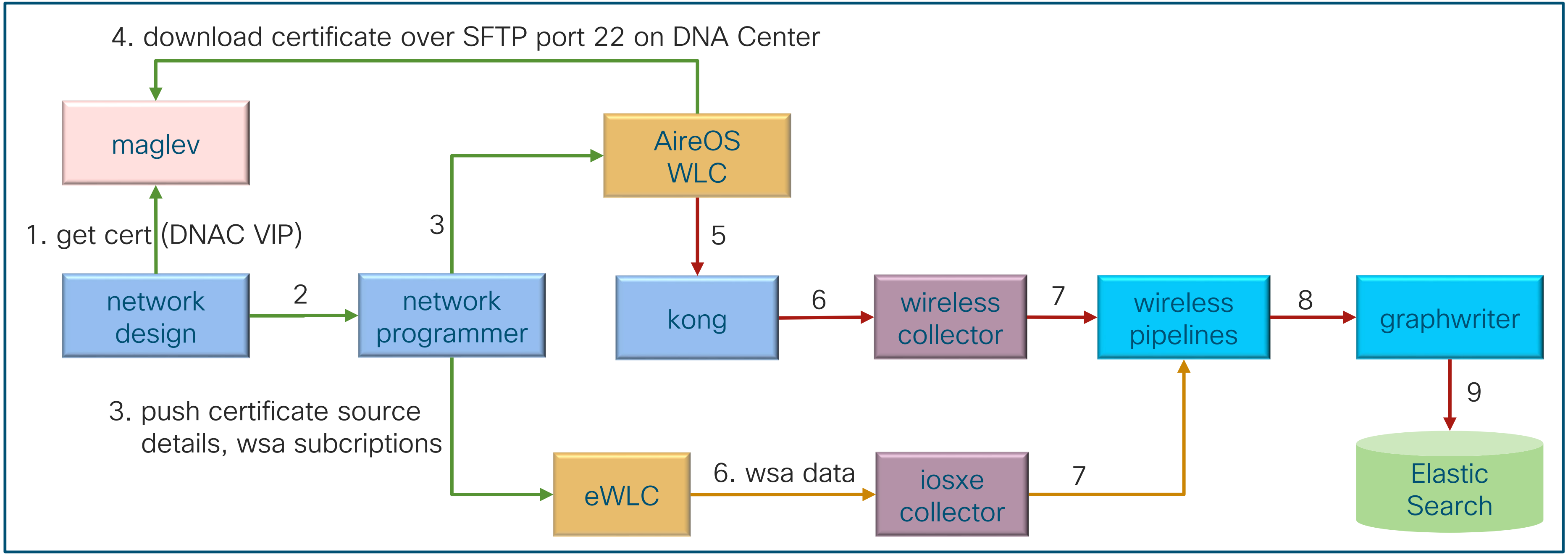


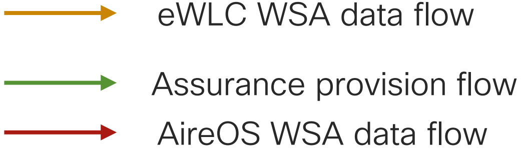
```
kubernetes.labels.serviceName:"collector-snmp" AND log:"Published" AND log:"192.168.53.69"
```

```
January 12th 2020, 11:17:10.188   log: {"timeMillis":1578808030188,"thread":"xmppollerAsync-
29","level":"DEBUG","loggerName":"com.cisco.tesseract.collectors.snmp.SnmpProcessor","message":"Published data for 192.168.53.69 metric RTTMON with
schema id 15","endOfBatch":false,"loggerFqcn":"org.apache.logging.slf4j.Log4jLogger","threadId":107,"threadPriority":5}
kubernetes.labels.serviceName: collector-snmp stream: stdout docker.container_id: 22a34d02707d8baf151216efe4af67242c68b877edc4f741fc89a4972625d997
kubernetes.container_name: collector-snmp kubernetes.namespace_name: ndp kubernetes.pod_name: collector-snmp-9777f9d7-nwhmw
```

Assurance provisioning workflow

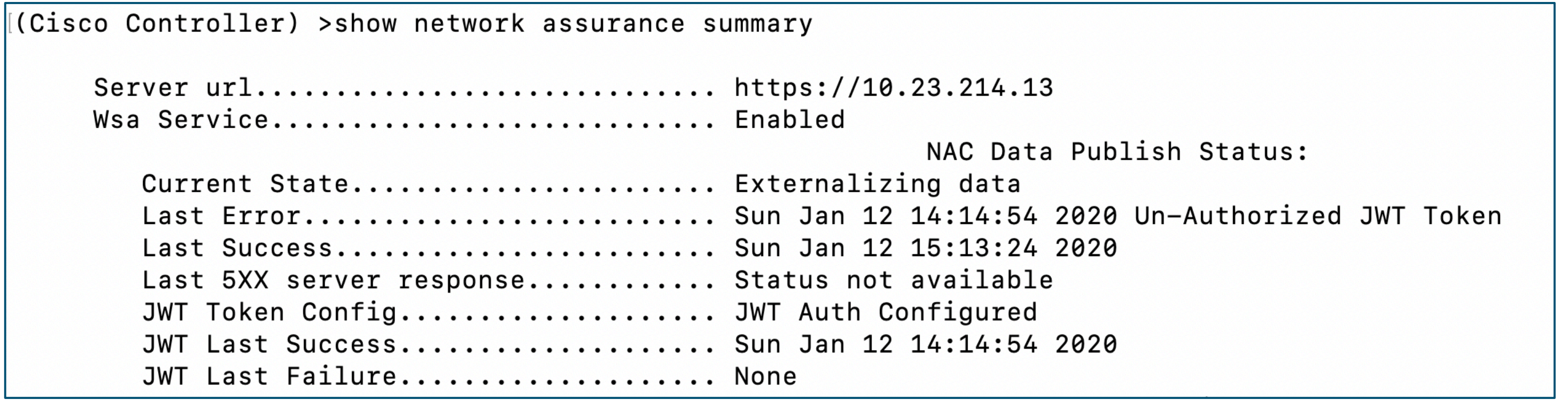
Wireless Controller



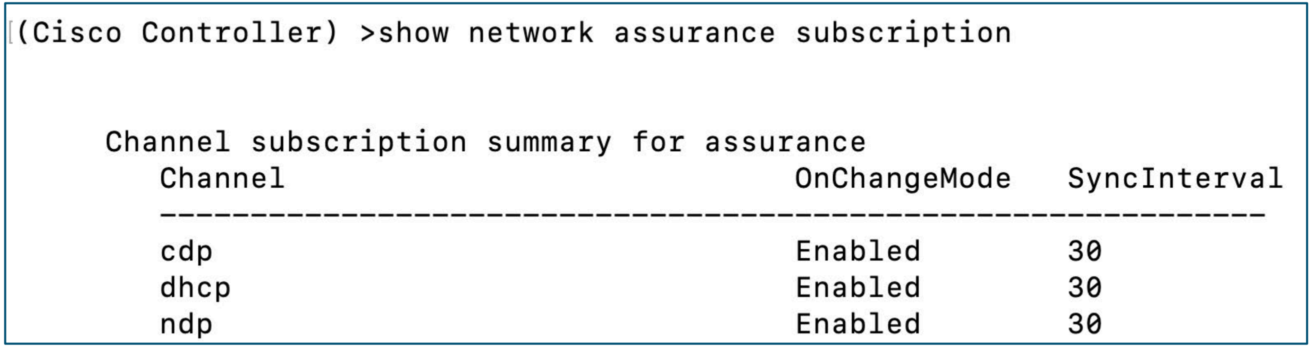


Problem: Missing assurance data for WLC

Verify assurance status on AireOS WLC



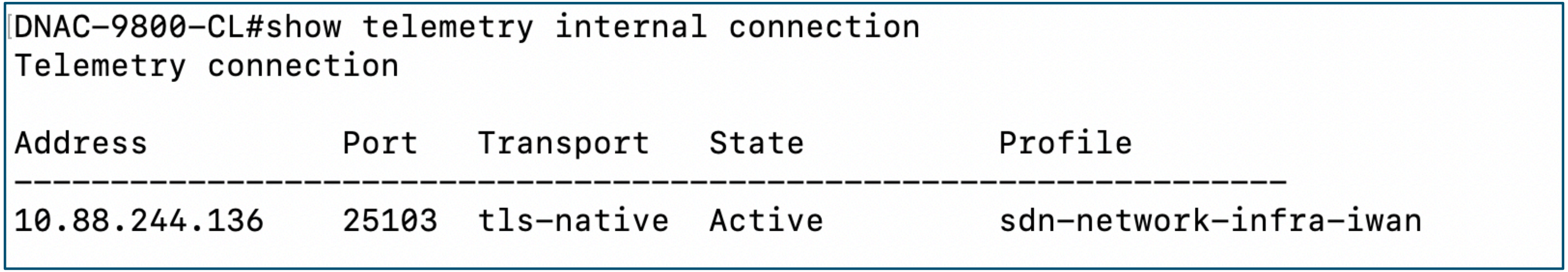
```
[(Cisco Controller) >show network assurance summary

     Server url............................. https://10.23.214.13
     Wsa Service............................ Enabled
                                                         NAC Data Publish Status:
        Current State....................... Externalizing data
        Last Error.......................... Sun Jan 12 14:14:54 2020 Un-Authorized JWT Token
        Last Success........................ Sun Jan 12 15:13:24 2020
        Last 5XX server response............ Status not available
        JWT Token Config.................... JWT Auth Configured
        JWT Last Success.................... Sun Jan 12 14:14:54 2020
        JWT Last Failure.................... None
```



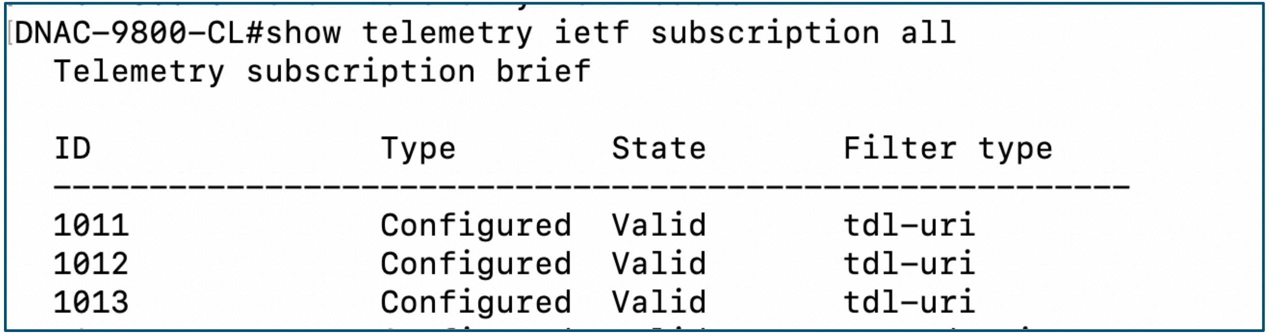
```
[(Cisco Controller) >show network assurance subscription


     Channel subscription summary for assurance
        Channel                                   OnChangeMode   SyncInterval
        -------------------------------------------------------------
        cdp                                       Enabled        30
        dhcp                                      Enabled        30
        ndp                                       Enabled        30
```

Problem: Missing assurance data for WLC

Verify assurance status on eWLC



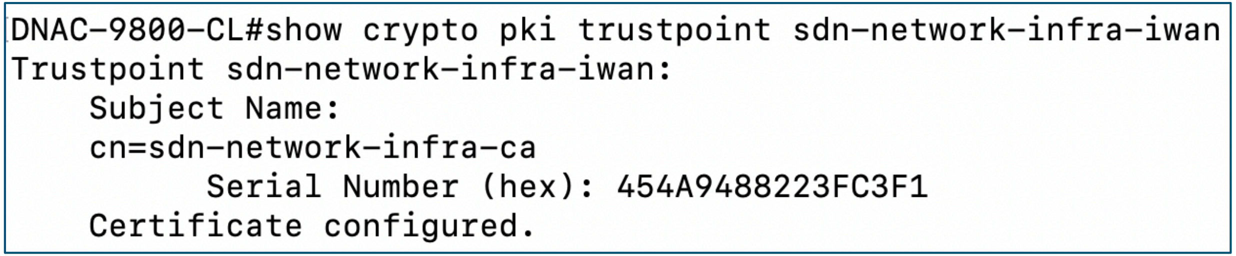
```
[DNAC-9800-CL#show telemetry internal connection
Telemetry connection

Address           Port   Transport   State          Profile
------------------------------------------------------------------
10.88.244.136     25103  tls-native  Active         sdn-network-infra-iwan
```



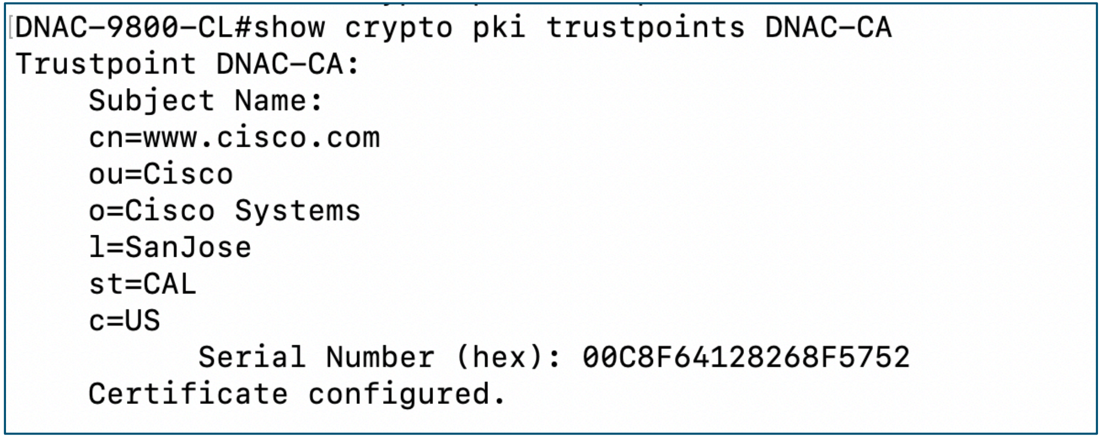
```
[DNAC-9800-CL#show telemetry ietf subscription all
  Telemetry subscription brief

  ID                Type        State       Filter type
  --------------------------------------------------------
  1011              Configured  Valid       tdl-uri
  1012              Configured  Valid       tdl-uri
  1013              Configured  Valid       tdl-uri
```

Problem: Missing assurance data for WLC

Verify certificate status on eWLC



```
DNAC-9800-CL#show crypto pki trustpoint sdn-network-infra-iwan
Trustpoint sdn-network-infra-iwan:
    Subject Name:
    cn=sdn-network-infra-ca
          Serial Number (hex): 454A9488223FC3F1
    Certificate configured.
```



```
DNAC-9800-CL#show crypto pki trustpoints DNAC-CA
Trustpoint DNAC-CA:
    Subject Name:
    cn=www.cisco.com
    ou=Cisco
    o=Cisco Systems
    l=SanJose
    st=CAL
    c=US
          Serial Number (hex): 00C8F64128268F5752
    Certificate configured.
```

Problem: Missing assurance data for WLC

Possible certificate causes (AireOS)

- show telemetry internal connection
  - Status: Connecting
- show crypto pki trustpoints
  - DNAC-CA (the DNA Center trustpoint i.e. TLS Server)
    - curl 'http://collector-iosxe-db.assurance-backend.svc.cluster.local:8077/api/internal/pki/server/certificate'
  - sdn-infra-iwan (the device trustpoint i.e. TLS client)
    - curl 'http://collector-iosxe-db.assurance-backend.svc.cluster.local:8077/api/internal/pki/device/truststore’
  - Certificate signatures should match on DNA Center and eWLC

- show network assurance summary
  - Error: “Peer certificate cannot be authenticated with given CA certificate”
- show certificates all
  - Verify DNA Center certificate signature from browser GUI against NA Server cert from “show certificates all” output

Problem: Missing assurance data for WLC

Possible certificate provisioning failures

DNA Center and WLC certificate mismatch

CRL fetch failure

Certificate missing key fields

VIP not set – absence of carrier in intra-cluster link

certificate chain size less than 8K

http source interface

Proxy settings on WLC

certificate chain should be less than 3

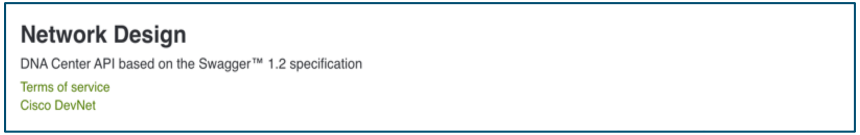
WLC unable to SFTP to port 22

Problem: Missing assurance data for WLC

Fix certificate, assurance config issues

https://<dnac-ip>/dna/apitester

AireOS

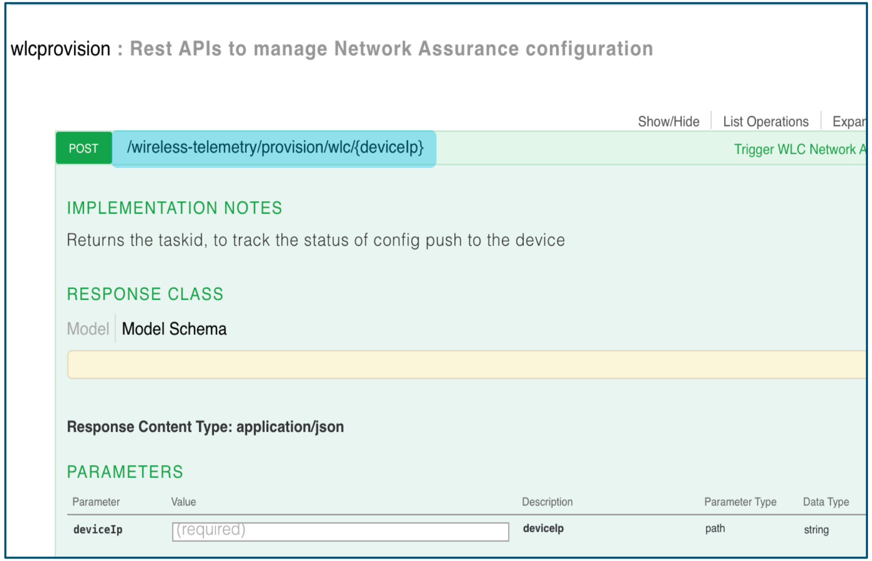


Network Design

DNA Center API based on the Swagger™ 1.2 specification

Terms of service

Cisco DevNet



wlcprovision : Rest APIs to manage Network Assurance configuration

POST /wireless-telemetry/provision/wlc/{deviceIp} Trigger WLC Network A

IMPLEMENTATION NOTES

Returns the taskid, to track the status of config push to the device

RESPONSE CLASS

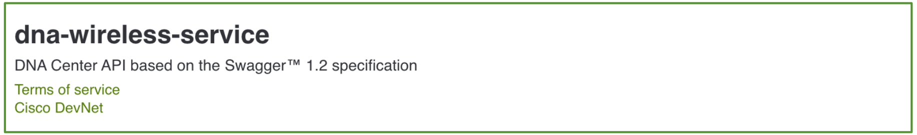
Response Content Type: application/json

PARAMETERS

Parameter	Value	Description	Parameter Type	Data Type
deviceIp	(required)	deviceIp	path	string

https://<dnac-ip>/dna/apitester

eWLC

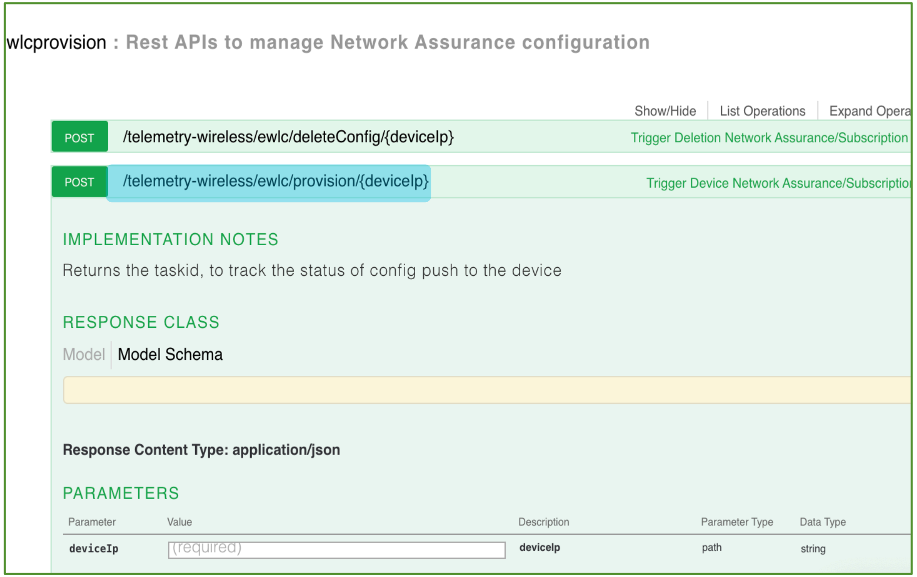


dna-wireless-service

DNA Center API based on the Swagger™ 1.2 specification

Terms of service

Cisco DevNet



wlcprovision : Rest APIs to manage Network Assurance configuration

POST /telemetry-wireless/ewlc/deleteConfig/{deviceIp} Trigger Deletion Network Assurance/Subscription

POST /telemetry-wireless/ewlc/provision/{deviceIp} Trigger Device Network Assurance/Subscriptio

IMPLEMENTATION NOTES

Returns the taskid, to track the status of config push to the device

RESPONSE CLASS

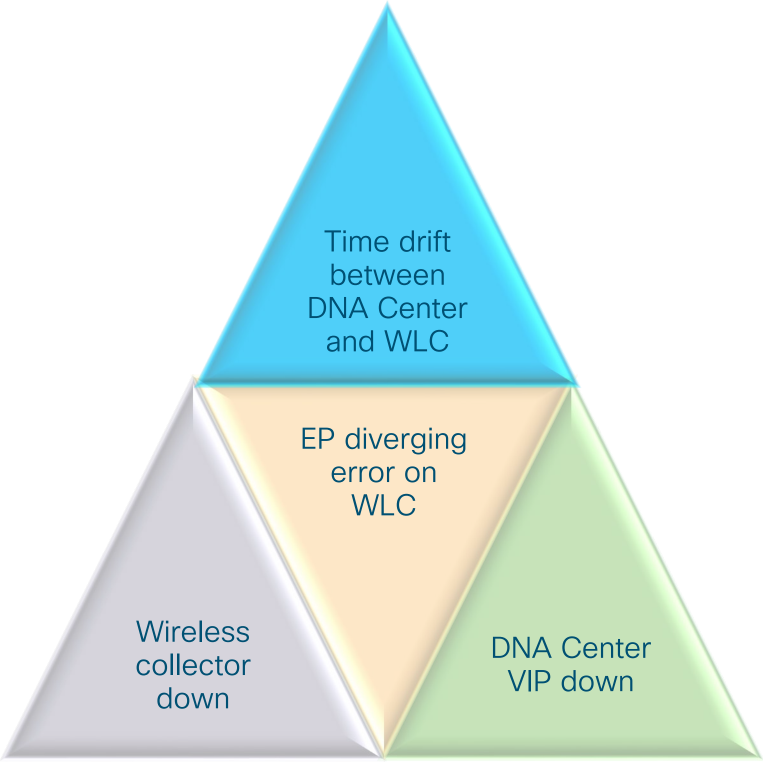
Response Content Type: application/json

PARAMETERS

Parameter	Value	Description	Parameter Type	Data Type
deviceIp	(required)	deviceIp	path	string

Problem: Missing assurance data for WLC

Possible data collection and processing failures



Time drift between DNA Center and WLC

EP diverging error on WLC

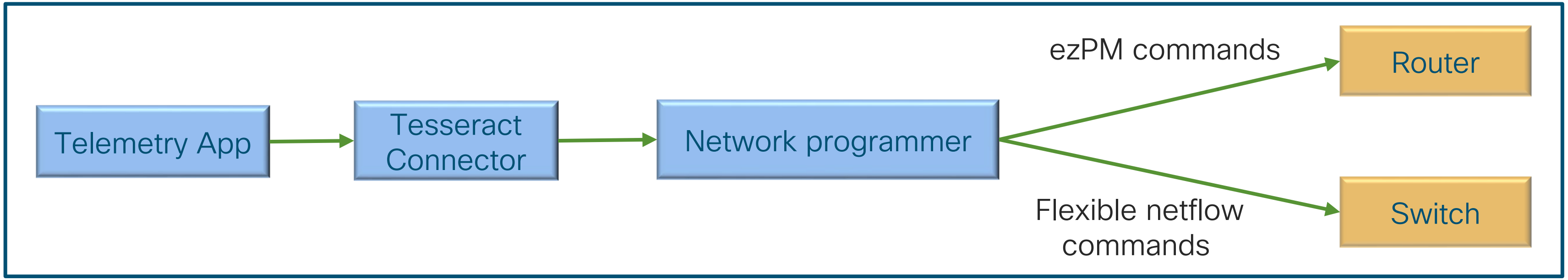
Wireless collector down

DNA Center VIP down

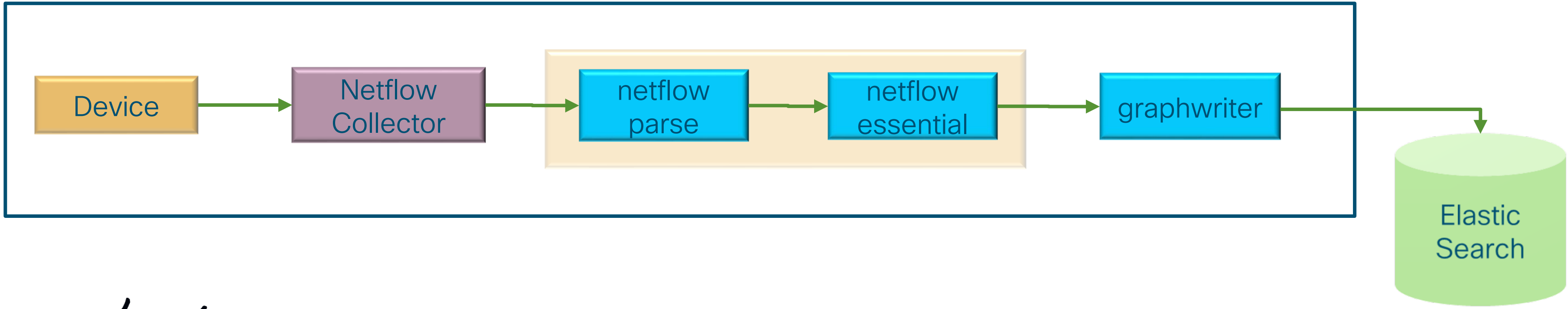
Problem: Missing application health data

Data flow

Set telemetry profile



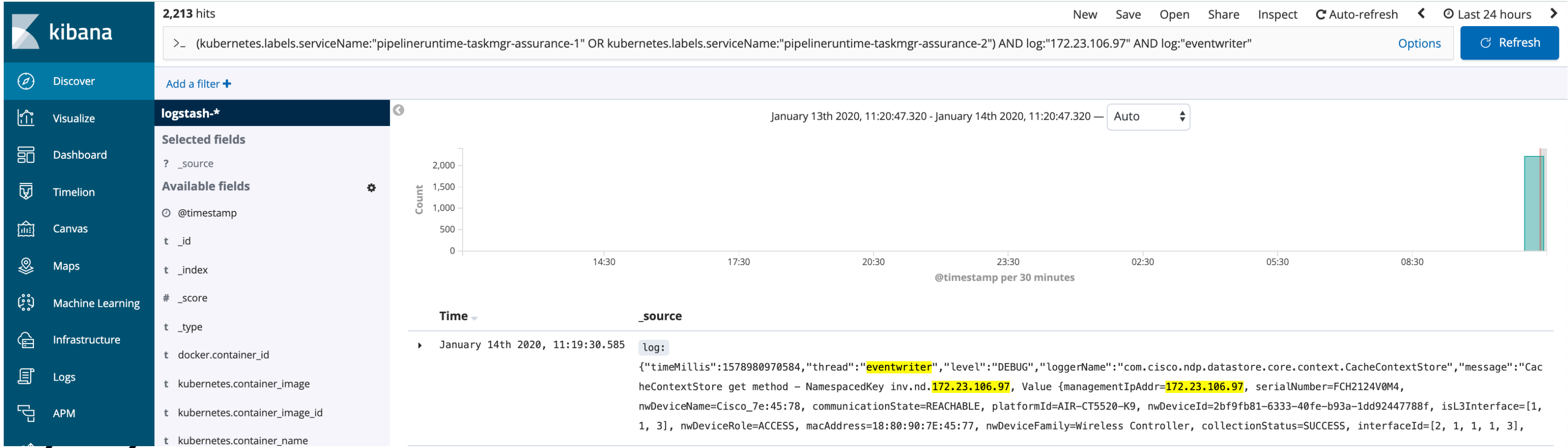
IPFix data flow



Problem: Missing assurance data for WLC

Check for collection and data processing issues

- Look for errors in the wirelesspipelines and eventwriter pipeline, which run on one of the assurance task managers below
- Set log level for both assurance task manager services to debug
  - magctl service loglevel set -l debug -t 30 pipelineruntime-taskmgr-assurance-1 8060
  - magctl service loglevel set -l debug -t 30 pipelineruntime-taskmglr-assurance-2 8060
- Use kibana to filter for errors, for the WLC by IP address



2,213 hits

```
>_ (kubernetes.labels.serviceName:"pipelineruntime-taskmgr-assurance-1" OR kubernetes.labels.serviceName:"pipelineruntime-taskmgr-assurance-2") AND log:"172.23.106.97" AND log:"eventwriter"
```

January 13th 2020, 11:20:47.320 - January 14th 2020, 11:20:47.320 —

```
January 14th 2020, 11:19:30.585   log:
{"timeMillis":1578980970584,"thread":"eventwriter","level":"DEBUG","loggerName":"com.cisco.ndp.datastore.core.context.CacheContextStore","message":"Cac
heContextStore get method - NamespacedKey inv.nd.172.23.106.97, Value {managementIpAddr=172.23.106.97, serialNumber=FCH2124V0M4,
nwDeviceName=Cisco_7e:45:78, communicationState=REACHABLE, platformId=AIR-CT5520-K9, nwDeviceId=2bf9fb81-6333-40fe-b93a-1dd92447788f, isL3Interface=[1,
1, 3], nwDeviceRole=ACCESS, macAddress=18:80:90:7E:45:77, nwDeviceFamily=Wireless Controller, collectionStatus=SUCCESS, interfaceId=[2, 1, 1, 1, 3],
```

Problem: Missing application health data

Verify AVC commands push to device

- Follow tesseract-connector and network-programmer logs, when you enable "Maximal Visibility" profile
  - magctl service logs -rf tesseract
  - magctl service logs -rf network-programmer
- Cat 9K switches
  - Flow monitor commands are pushed "show run | section flow"
    - Flow exporter dnacexporter and flow monitor dnacmonitor are expected
- Routers
  - Performance monitor commands are pushed ""
    - performance monitor context tesseract profile application-performance
    - exporter destination <CLUSTER_IP> source <NON_MGMT_IP> transport udp port 6007
- After adding the keywork "lan" to the description, resync the device from inventory, before applying the Maximal Visibility profile

Problem: Missing application health data

Verify flows data export at device

- Routers
  - show performance monitor context tesseract configuration
  - show performance monitor cache monitor tesseract-art_ipv4 detail format table
  - show flow exporter statistics
  - Packet capture
- Cat 9K switches
  - Flow monitor commands are pushed
    - show flow exporter dnacexporter statistics
    - show flow monitor dnacmonitor cache table
    - Packet capture

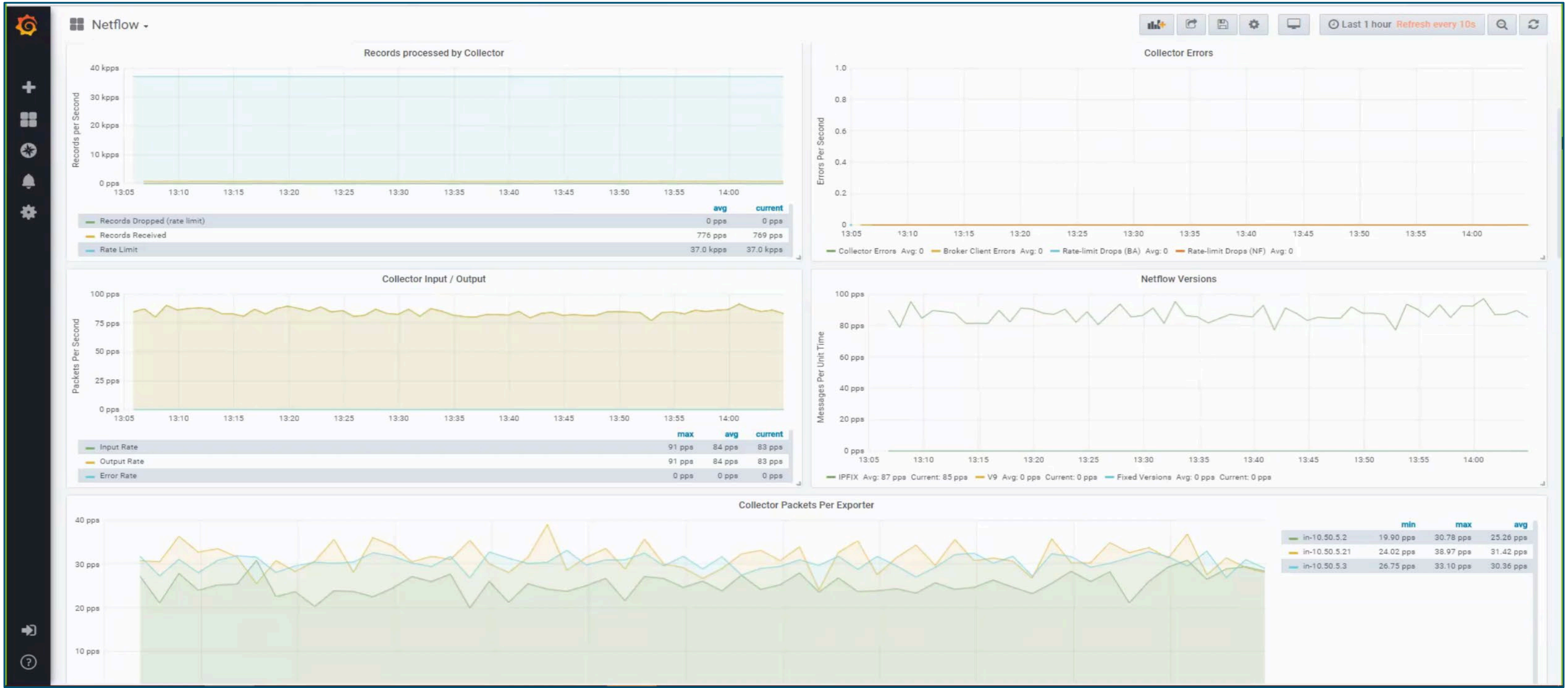
Problem: Missing application health data

Verify IPFIX data collected at DNA Center

- tcpdump on DNA Center on the host and within the netflow collector pod
- Capture Analysis on Wireshark
  - Decode packets destined to port 6007 as CFLOW
  - Apply display filter ”cflow.flowset_id==2” to verify the flow data sets export
  - Apply display filter “cflow.flowset_id==3” for option templates
  - Enable UDP checksum failure detection
- Graphana charts
  - Provide metrics for netflow collector, netflow_essential and netflow_parse pipelines
  - End to End Telemetry dashboard
  - Netflow dashboard
  - Look for lags, packet drop charts
- Check logs of “pipelineruntime-taskmgr-large” for data processing errors

Problem: Missing application health data

Verify IPFIX data collected at DNA Center



	avg	current
Records Dropped (rate limit)	0 pps	0 pps
Records Received	776 pps	769 pps
Rate Limit	37.0 kpps	37.0 kpps

Collector Errors Avg: 0 — Broker Client Errors Avg: 0 — Rate-limit Drops (BA) Avg: 0 — Rate-limit Drops (NF) Avg: 0

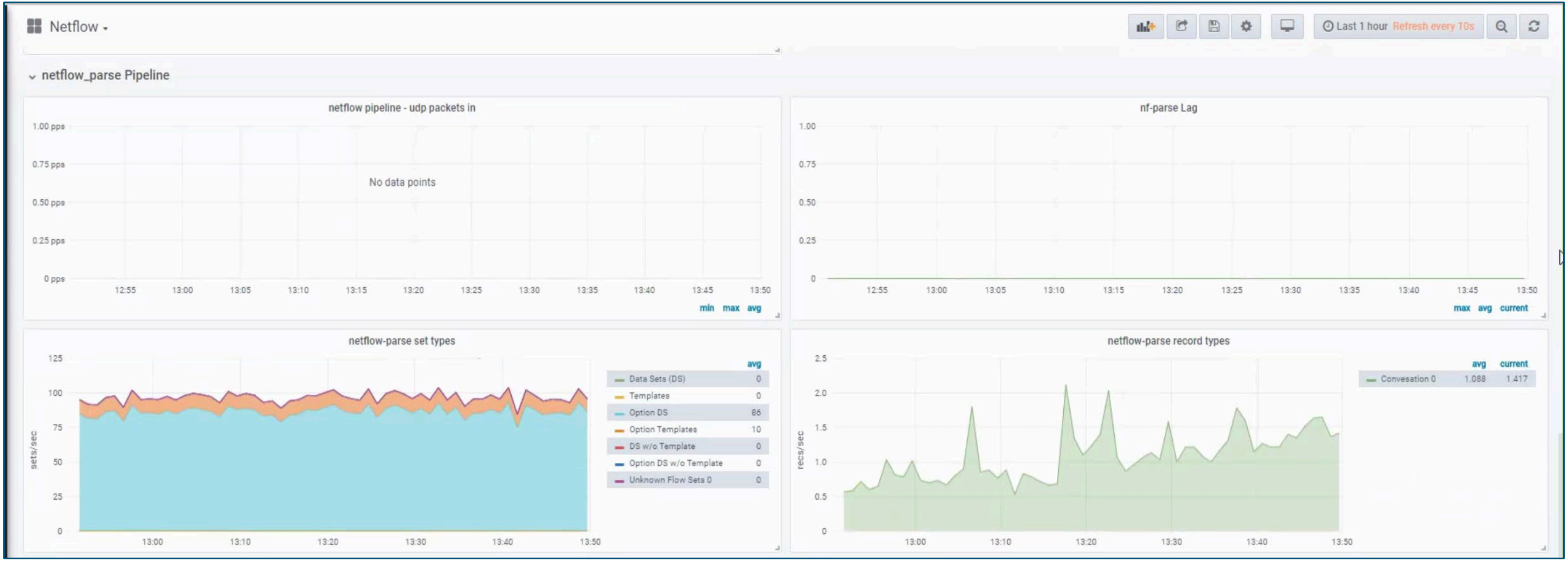
	max	avg	current
Input Rate	91 pps	84 pps	83 pps
Output Rate	91 pps	84 pps	83 pps
Error Rate	0 pps	0 pps	0 pps

IPFIX Avg: 87 pps Current: 85 pps — V9 Avg: 0 pps Current: 0 pps — Fixed Versions Avg: 0 pps Current: 0 pps

	min	max	avg
in-10.50.5.2	19.90 pps	30.78 pps	25.26 pps
in-10.50.5.21	24.02 pps	38.97 pps	31.42 pps
in-10.50.5.3	26.75 pps	33.10 pps	30.36 pps

Problem: Missing application health data

Verify IPFIX data processing at DNA Center



	avg
Data Sets (DS)	0
Templates	0
Option DS	86
Option Templates	10
DS w/o Template	0
Option DS w/o Template	0
Unknown Flow Sets 0	0

	avg	current
Convesation 0	1.088	1.417

Summary of Failures

Failure: No data on Assurance pages

Most common causes

- Package versions not up-to-date across NDP and assurance
- Disk space availability issues, due to purge jobs not running
- CPU, Memory overruns on services
- Services down during upgrade typically
- Pipeline install failures during upgrade

Failure: No assurance data for WLC

Most common causes

- Certificate mismatch
- On single node, VIP not set, because of carrier down on intra-cluster link
- Certificate missing key fields
- WLC unable to download certificate over SFTP on port 22 from the DNA Center
- WLC and DNA Center time not in sync
- WSA subscriptions not enabled on WLC
- Slow response from DNA Center to WLC on WLC data send causing time lagged data to be sent from WLC to DNA Center
- Kong or wireless collector services not responding to requests from WLC
- WLC not sending all WSA information within 5 minutes
- Certificate sync failures between active and standby WLC HA pair

Failure: No application health data

Most common causes

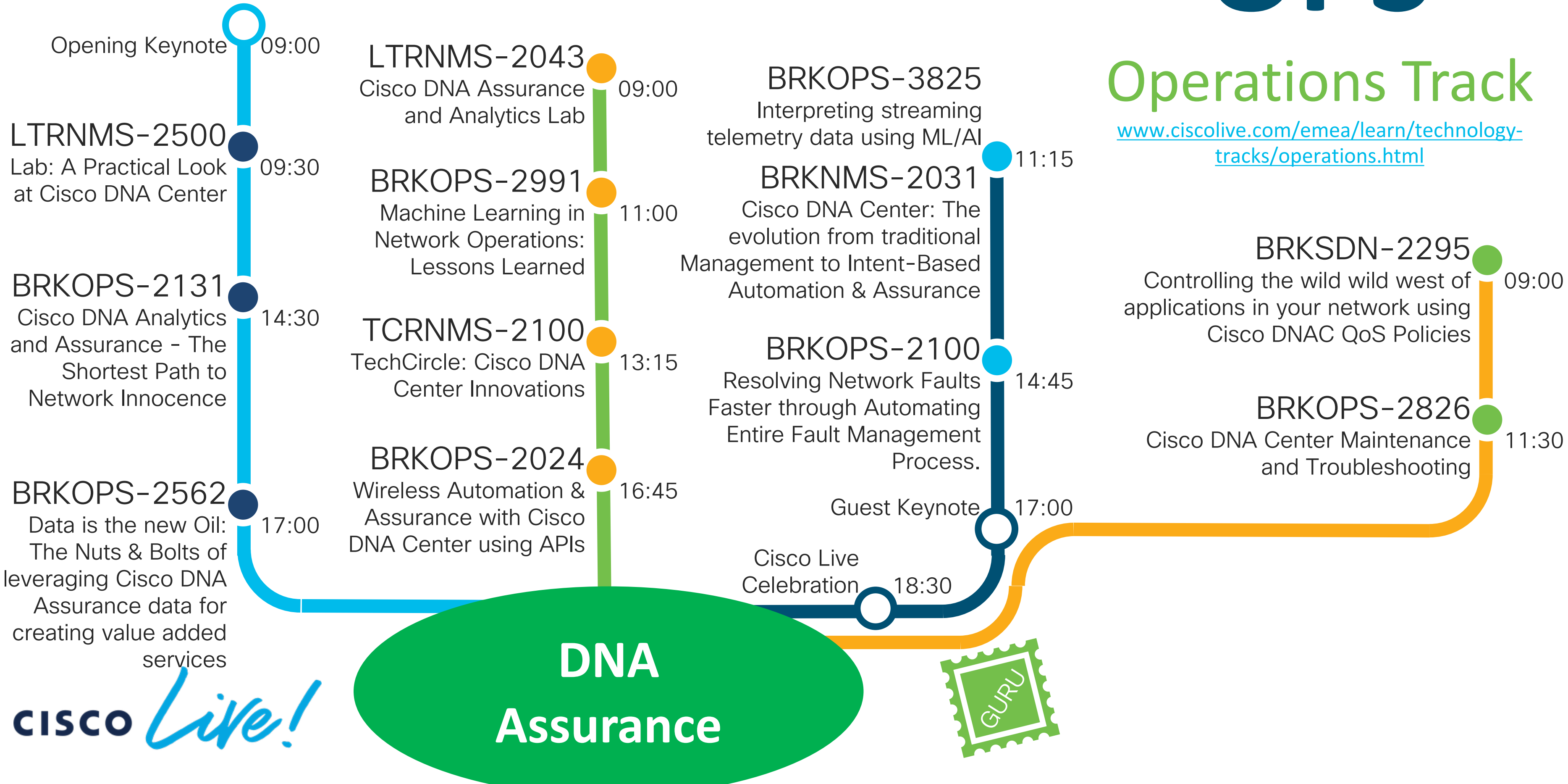
- AVC commands push failure to exporter source interface missing requirements
- Unsupported Interface configurations
- Packet checksum issues
- Missing keyword lan on interface descriptions to enable export of Netflow data from that interface
- Firewall, NAT and Fabric device problems
- Device time and DNA Center time not in sync
- No active connections or flows

Survey and Follow Up

OPS

Operations Track

www.ciscolive.com/emea/learn/technology-tracks/operations.html



Opening Keynote 09:00

LTRNMS-2500
Lab: A Practical Look at Cisco DNA Center 09:30

BRKOPS-2131
Cisco DNA Analytics and Assurance - The Shortest Path to Network Innocence 14:30

BRKOPS-2562
Data is the new Oil: The Nuts & Bolts of leveraging Cisco DNA Assurance data for creating value added services 17:00

LTRNMS-2043
Cisco DNA Assurance and Analytics Lab 09:00

BRKOPS-2991
Machine Learning in Network Operations: Lessons Learned 11:00

TCRNMS-2100
TechCircle: Cisco DNA Center Innovations 13:15

BRKOPS-2024
Wireless Automation & Assurance with Cisco DNA Center using APIs 16:45

BRKOPS-3825
Interpreting streaming telemetry data using ML/AI 11:15

BRKNMS-2031
Cisco DNA Center: The evolution from traditional Management to Intent-Based Automation & Assurance

BRKOPS-2100
Resolving Network Faults Faster through Automating Entire Fault Management Process. 14:45

Guest Keynote 17:00

Cisco Live Celebration 18:30

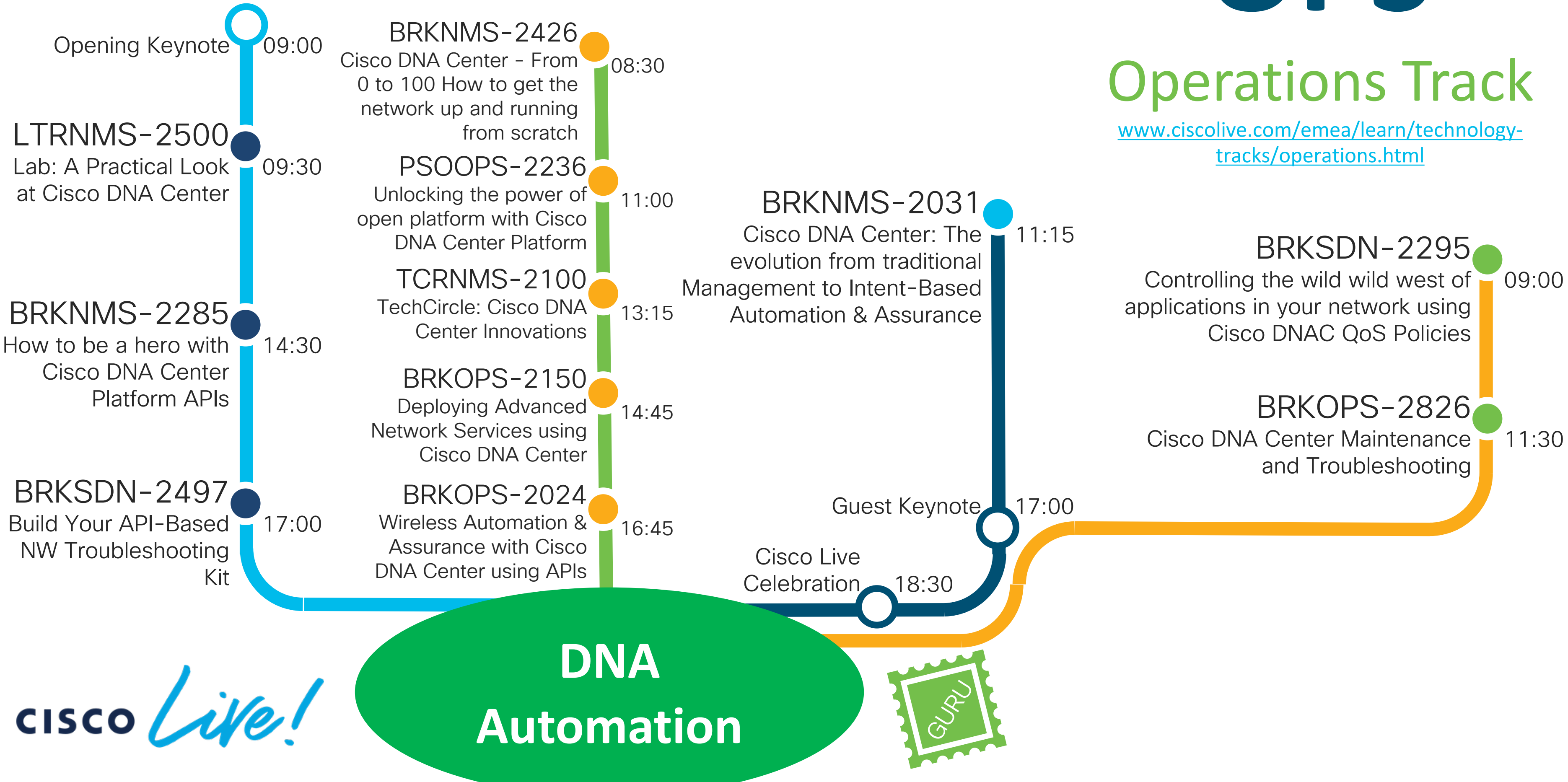
BRKSDN-2295
Controlling the wild wild west of applications in your network using Cisco DNAC QoS Policies 09:00

BRKOPS-2826
Cisco DNA Center Maintenance and Troubleshooting 11:30

OPS

Operations Track

www.ciscolive.com/emea/learn/technology-tracks/operations.html



Opening Keynote 09:00

LTRNMS-2500
Lab: A Practical Look at Cisco DNA Center
09:30

BRKNMS-2285
How to be a hero with Cisco DNA Center Platform APIs
14:30

BRKSDN-2497
Build Your API-Based NW Troubleshooting Kit
17:00

BRKNMS-2426
Cisco DNA Center - From 0 to 100 How to get the network up and running from scratch
08:30

PSOOPS-2236
Unlocking the power of open platform with Cisco DNA Center Platform
11:00

TCRNMS-2100
TechCircle: Cisco DNA Center Innovations
13:15

BRKOPS-2150
Deploying Advanced Network Services using Cisco DNA Center
14:45

BRKOPS-2024
Wireless Automation & Assurance with Cisco DNA Center using APIs
16:45

BRKNMS-2031
Cisco DNA Center: The evolution from traditional Management to Intent-Based Automation & Assurance
11:15

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11:30

DNA Automation

cisco Live!

OPS

Operations Track

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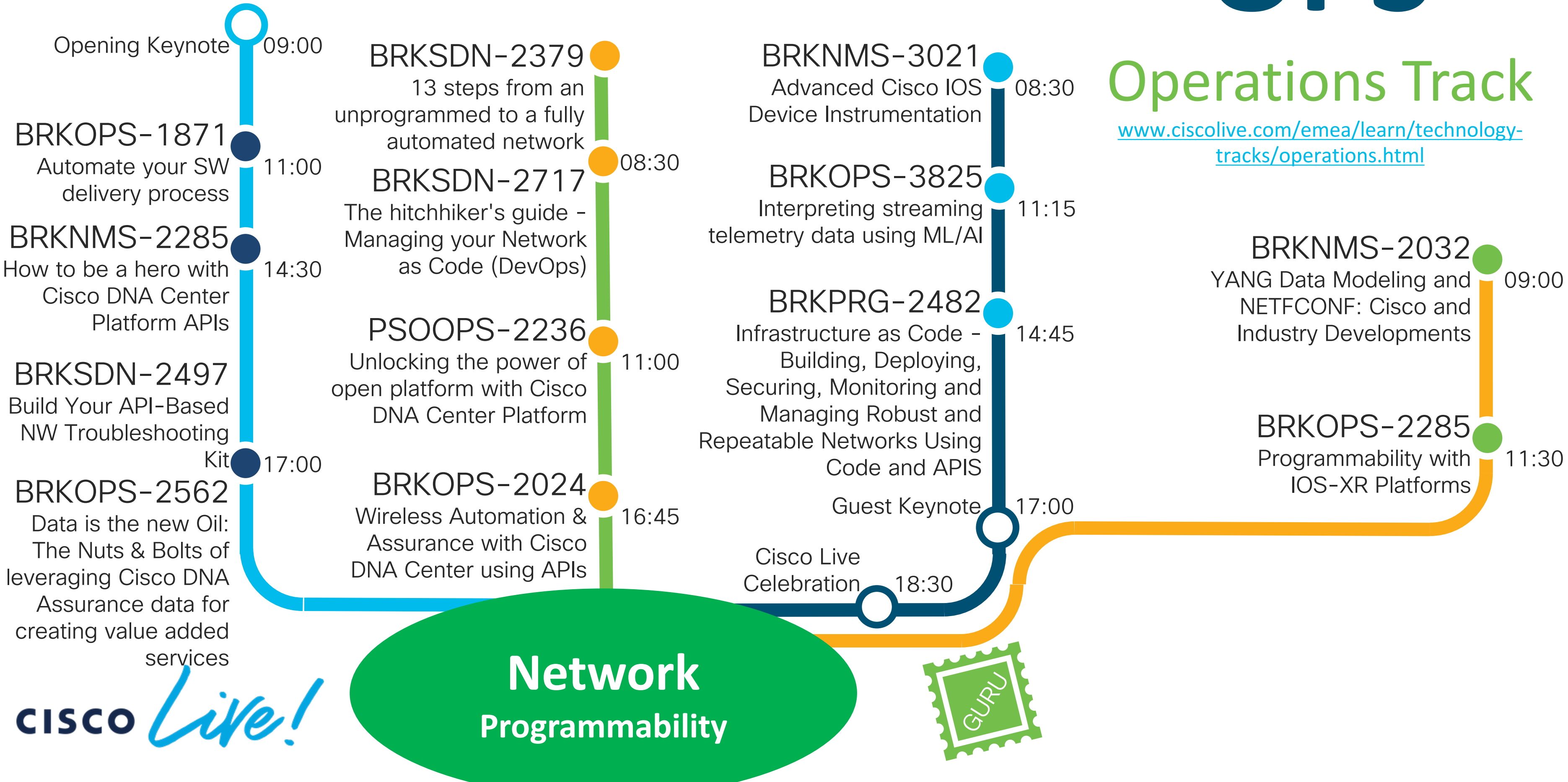

Opening Keynote 09:00

BRKOPS-1871
Automate your SW delivery process 11:00

BRKNMS-2285
How to be a hero with Cisco DNA Center Platform APIs 14:30

BRKSDN-2497
Build Your API-Based NW Troubleshooting Kit 17:00

BRKOPS-2562
Data is the new Oil: The Nuts & Bolts of leveraging Cisco DNA Assurance data for creating value added services

BRKSDN-2379
13 steps from an unprogrammed to a fully automated network 08:30

BRKSDN-2717
The hitchhiker's guide – Managing your Network as Code (DevOps)

PSOOPS-2236
Unlocking the power of open platform with Cisco DNA Center Platform 11:00

BRKOPS-2024
Wireless Automation & Assurance with Cisco DNA Center using APIs 16:45

BRKNMS-3021
Advanced Cisco IOS Device Instrumentation 08:30

BRKOPS-3825
Interpreting streaming telemetry data using ML/AI 11:15

BRKPRG-2482
Infrastructure as Code – Building, Deploying, Securing, Monitoring and Managing Robust and Repeatable Networks Using Code and APIS 14:45

Guest Keynote 17:00

Cisco Live Celebration 18:30

BRKNMS-2032
YANG Data Modeling and NETFCONF: Cisco and Industry Developments 09:00

BRKOPS-2285
Programmability with IOS-XR Platforms 11:30

Network Programmability

GURU

cisco Live!

OPS

Operations Track

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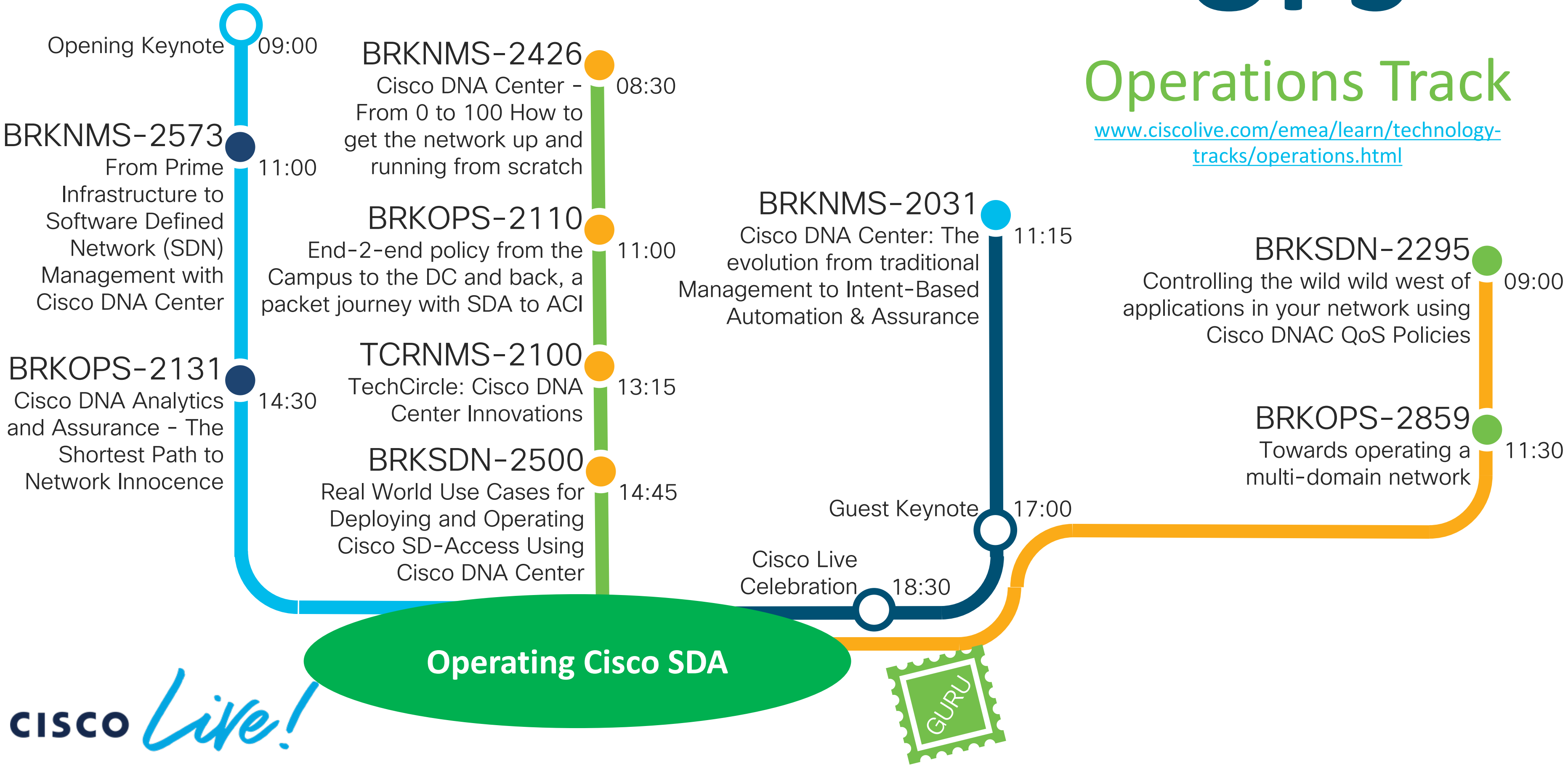

Opening Keynote 09:00

BRKNMS-2573 11:00
From Prime Infrastructure to Software Defined Network (SDN) Management with Cisco DNA Center

BRKOPS-2131 14:30
Cisco DNA Analytics and Assurance - The Shortest Path to Network Innocence

BRKNMS-2426 08:30
Cisco DNA Center - From 0 to 100 How to get the network up and running from scratch

BRKOPS-2110 11:00
End-2-end policy from the Campus to the DC and back, a packet journey with SDA to ACI

TCRNMS-2100 13:15
TechCircle: Cisco DNA Center Innovations

BRKSDN-2500 14:45
Real World Use Cases for Deploying and Operating Cisco SD-Access Using Cisco DNA Center

BRKNMS-2031 11:15
Cisco DNA Center: The evolution from traditional Management to Intent-Based Automation & Assurance

Guest Keynote 17:00

Cisco Live Celebration 18:30

BRKSDN-2295 09:00
Controlling the wild wild west of applications in your network using Cisco DNAC QoS Policies

BRKOPS-2859 11:30
Towards operating a multi-domain network

Operating Cisco SDA

cisco Live!

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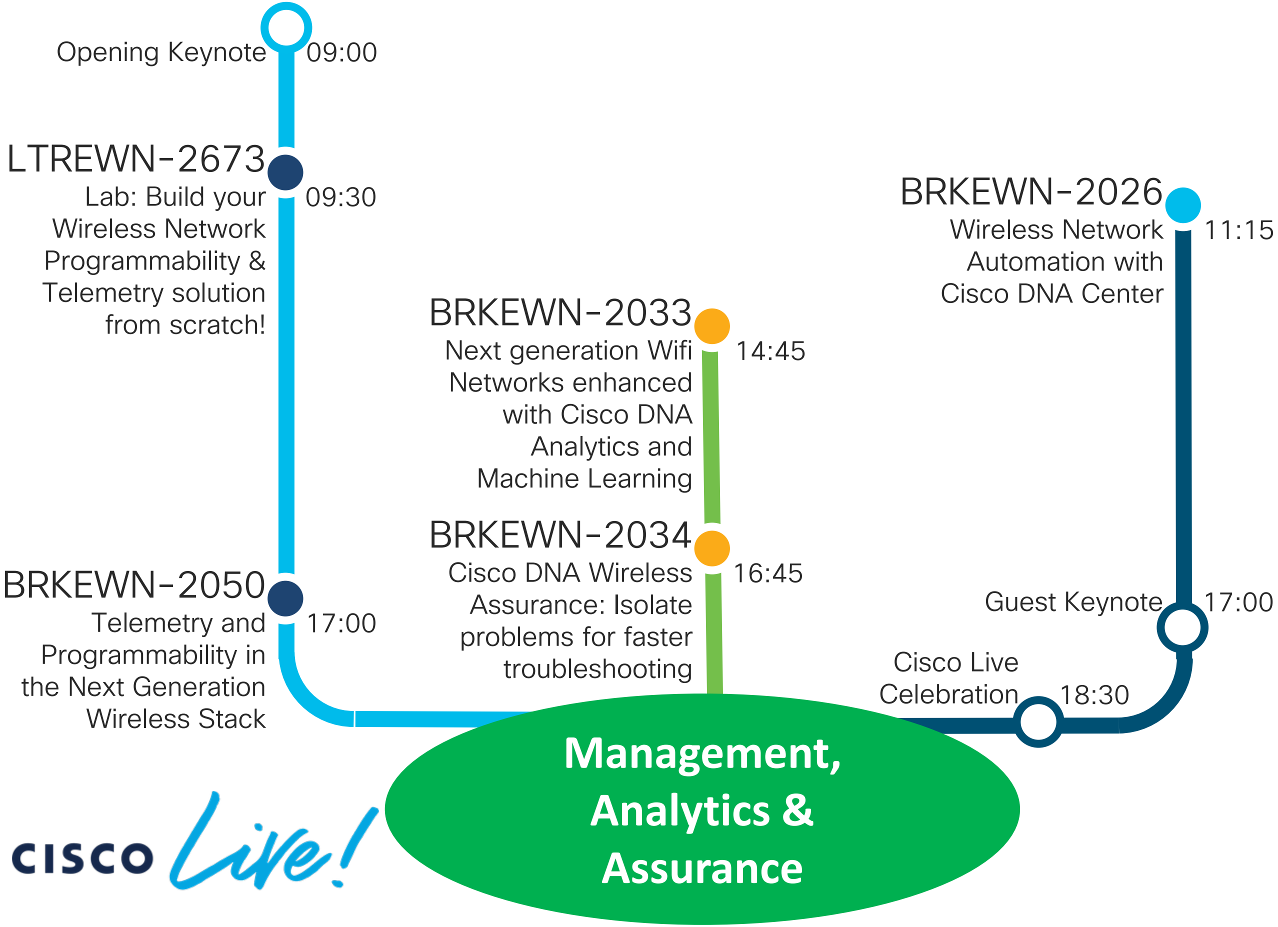
Mobility Track

GURU



Opening Keynote 09:00

LTREWN-2673 09:30
Lab: Build your Wireless Network Programmability & Telemetry solution from scratch!

BRKEWN-2050 17:00
Telemetry and Programmability in the Next Generation Wireless Stack

BRKEWN-2033 14:45
Next generation Wifi Networks enhanced with Cisco DNA Analytics and Machine Learning

BRKEWN-2034 16:45
Cisco DNA Wireless Assurance: Isolate problems for faster troubleshooting

BRKEWN-2026 11:15
Wireless Network Automation with Cisco DNA Center

Guest Keynote 17:00

Cisco Live Celebration 18:30

Management, Analytics & Assurance

MOB

Mobility Track

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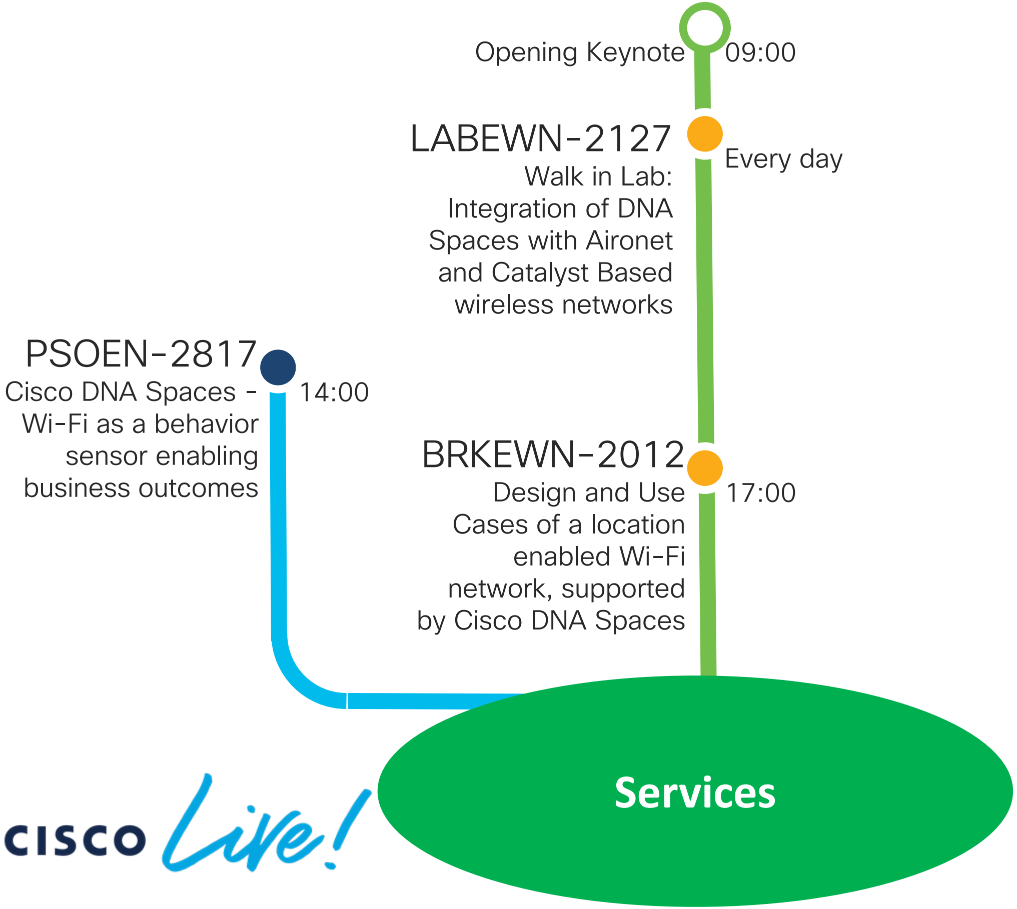


Opening Keynote 09:00

LABEWN-2127 Every day

Walk in Lab: Integration of DNA Spaces with Aironet and Catalyst Based wireless networks

PSOEN-2817 14:00

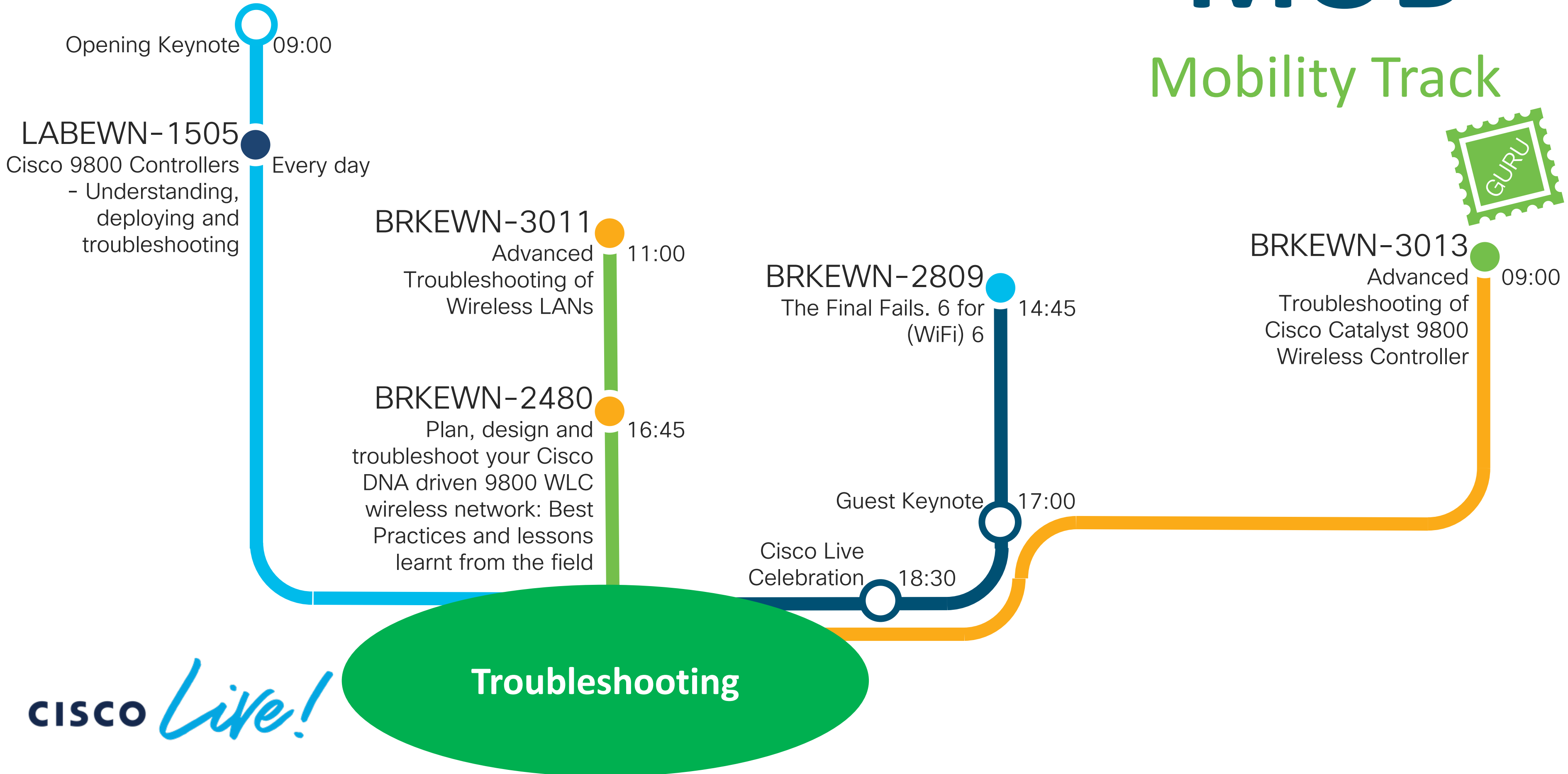
Cisco DNA Spaces - Wi-Fi as a behavior sensor enabling business outcomes

BRKEWN-2012 17:00

Design and Use Cases of a location enabled Wi-Fi network, supported by Cisco DNA Spaces

MOB

Mobility Track



Opening Keynote 09:00

LABEWN-1505
Cisco 9800 Controllers - Understanding, deploying and troubleshooting
Every day

BRKEWN-3011
Advanced Troubleshooting of Wireless LANs
11:00

BRKEWN-2480
Plan, design and troubleshoot your Cisco DNA driven 9800 WLC wireless network: Best Practices and lessons learnt from the field
16:45

BRKEWN-2809
The Final Fails. 6 for (WiFi) 6
14:45

Guest Keynote 17:00

Cisco Live Celebration 18:30

BRKEWN-3013
Advanced Troubleshooting of Cisco Catalyst 9800 Wireless Controller
09:00

Troubleshooting

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