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Let's go

The bridge to possible

Custom Workflows for the Cisco Catalyst Center Integration with ServiceNow

Gabi Zapodeanu,
Principal Technical Marketing Engineer
@zapodeanu

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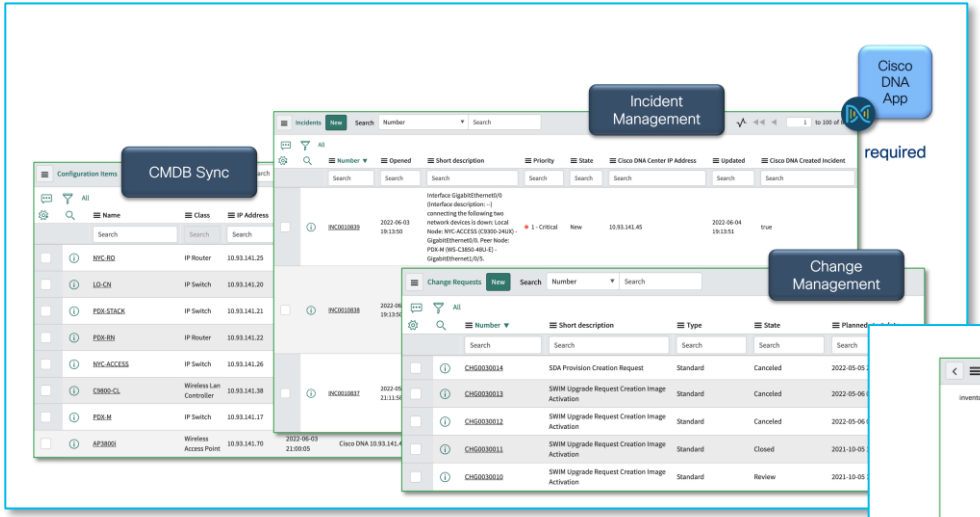
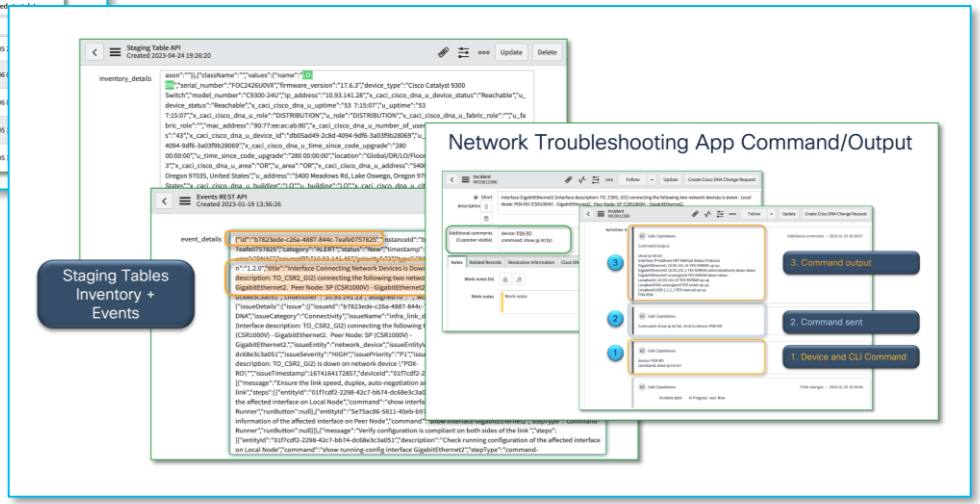
BRKOPS-2471

Cisco Catalyst Center ITSM Integration Sessions



BRKOPS-2471

Custom Workflows for the Cisco Catalyst Center Integration with ServiceNow



BRKOPS-2032

Cisco Catalyst Center and ITSM Workflows: CMDB, Incident Management and Software Image Management

Agenda

- Cisco Catalyst Center Platform
- ITSM (ServiceNow) Integration Overview
- CMDB Sync to Staging Table
- Events Notifications to Generic REST API Endpoint
- Network Troubleshooting Custom Workflow
- Summary

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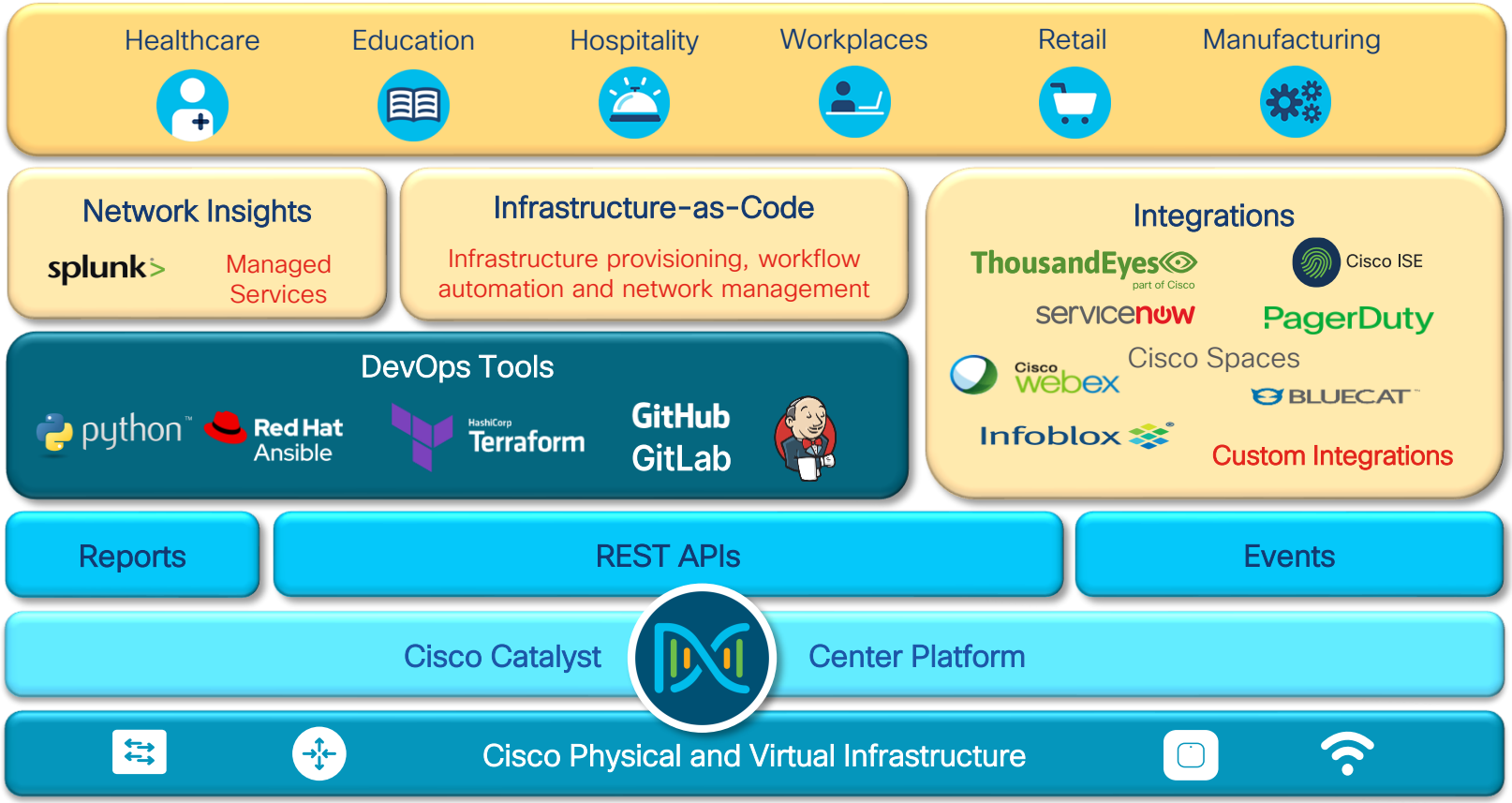
Cisco Catalyst Center Platform



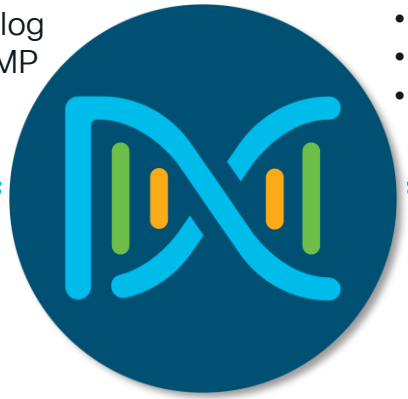
Catalyst Center Platform

Event Notifications

- Assurance Issues
- AI/ML Insights
- System Health
- Integration Connectivity
- License Management
- Webhooks
- PagerDuty
- Webex
- Syslog
- SNMP

Northbound REST APIs

- Network Inventory
- Network Topology
- Network Design
- Provisioning
- SWIM, PnP
- Path Trace
- Assurance
- SDA
- Templates
- RMA
- Config Archive
- Sensors



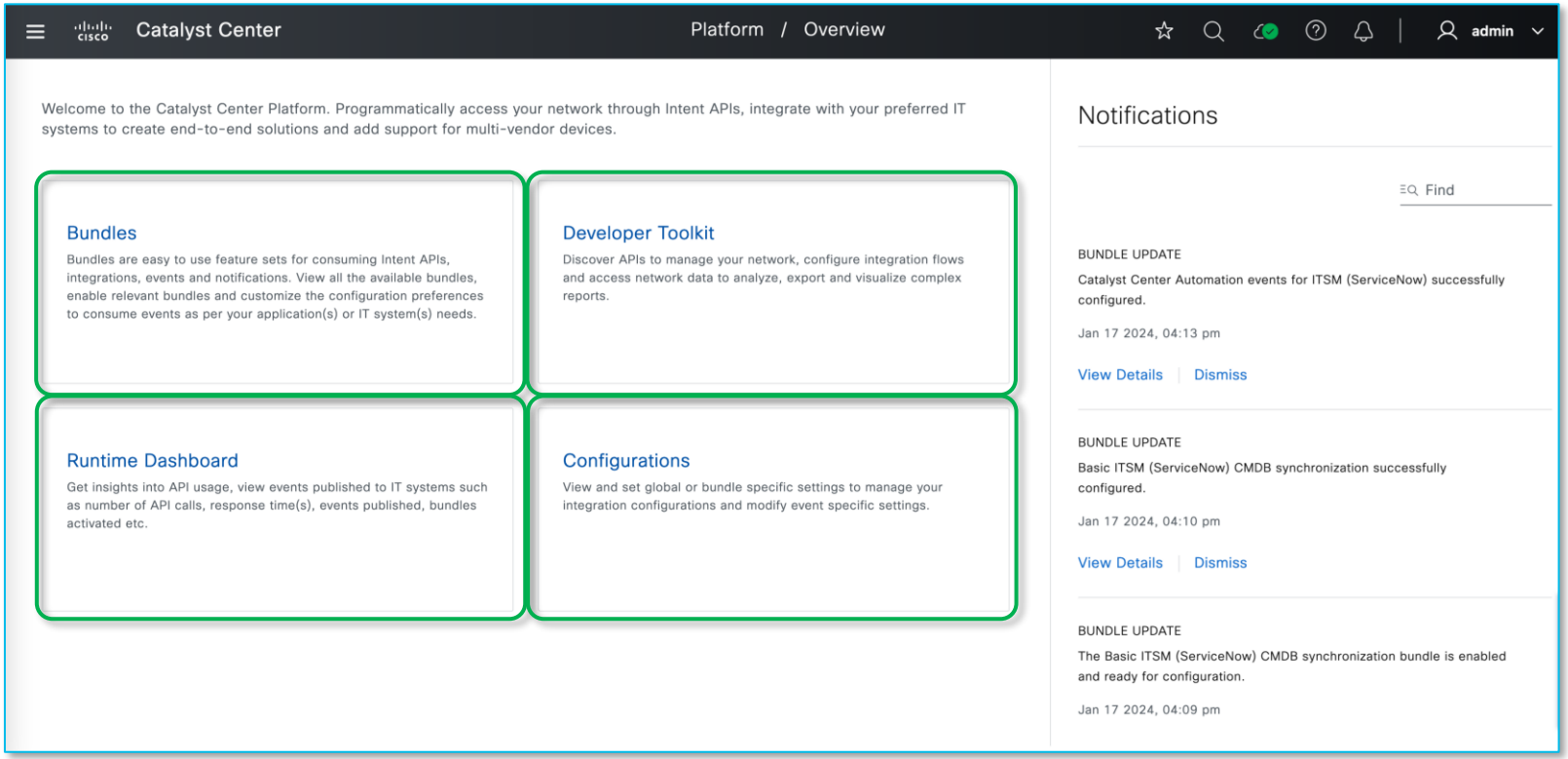
IT Ecosystem Integrations

- IT Service Management
- IP Address Management
- Reporting
- Wireless Planning
- Alerting
- Network Insights

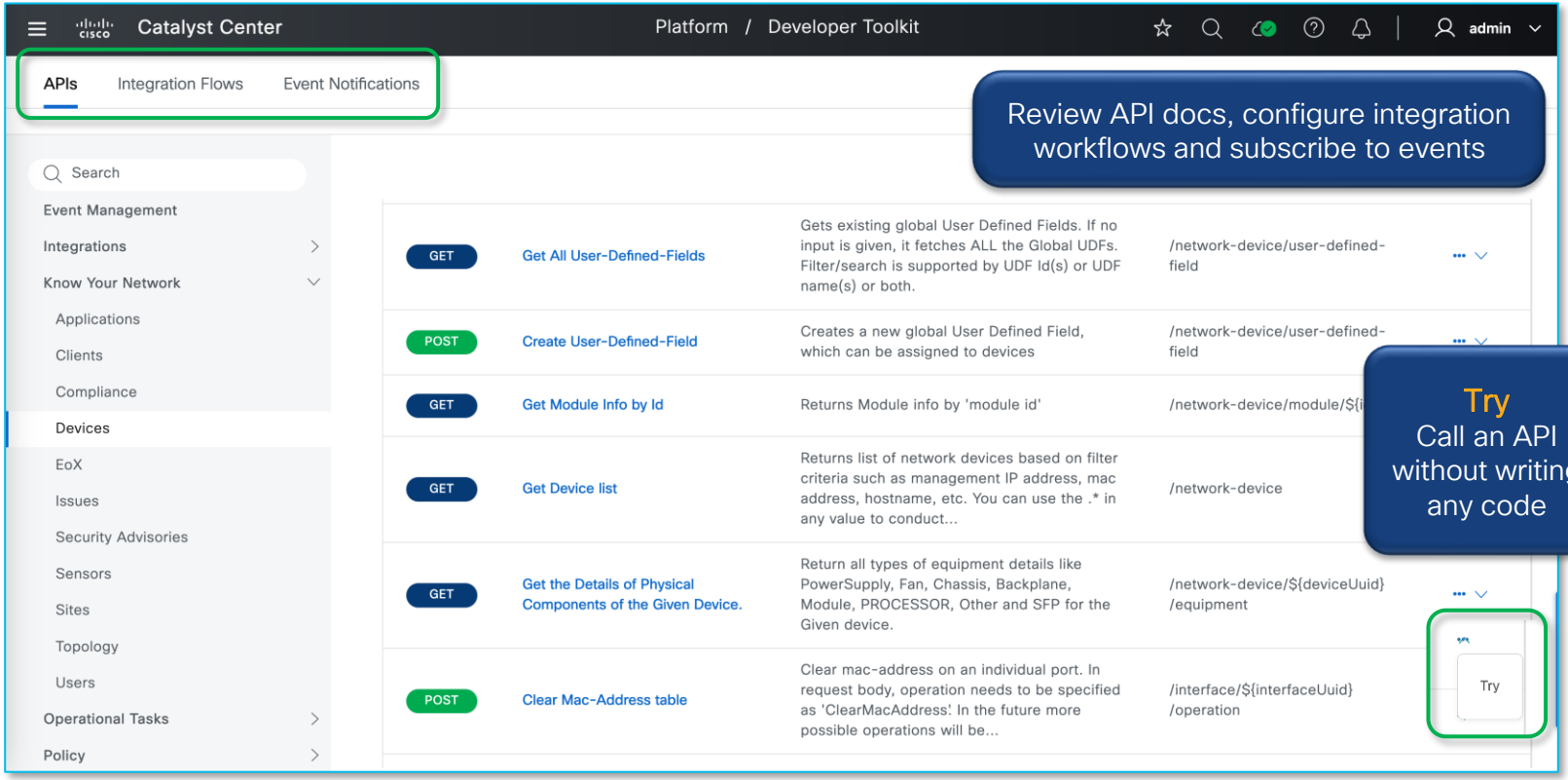
Developer Resources

- Sample Code, Videos
- Python SDK, Ansible, Terraform
- Cisco DevNet
  - Sandboxes, Learning Labs
  - Developer Guides
  - Community

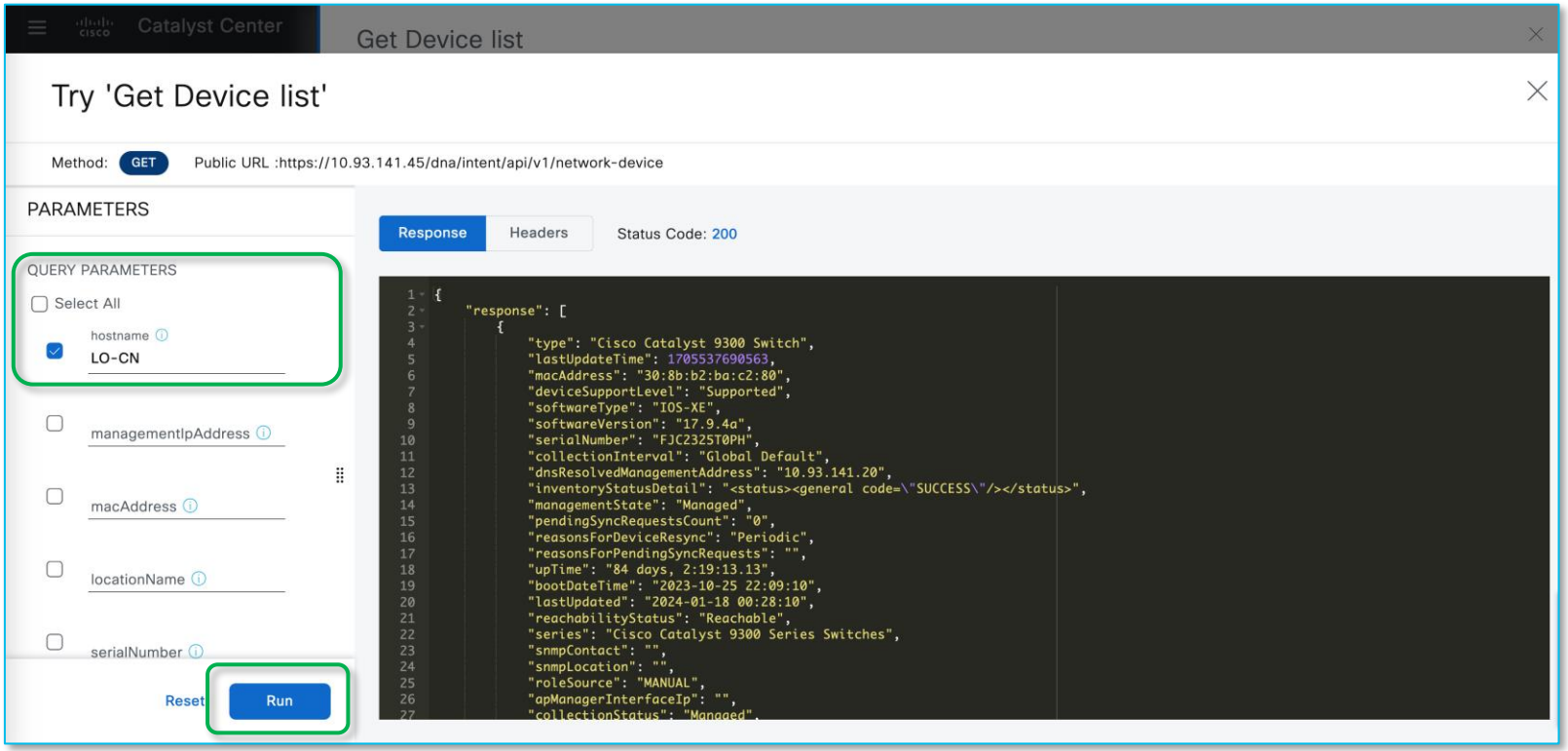
Catalyst Center Platform – Overview



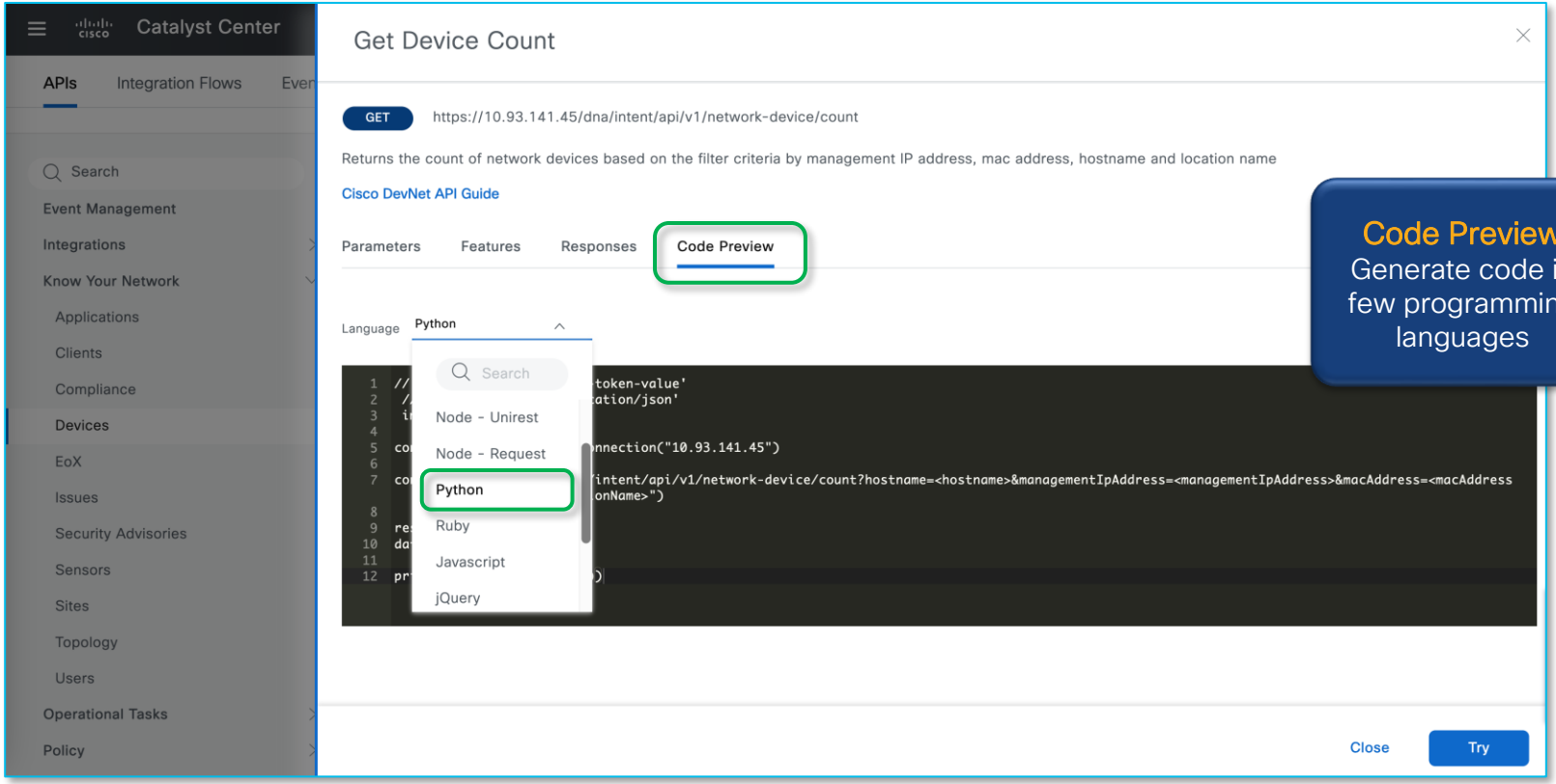
Catalyst Center Platform – Developer Toolkit



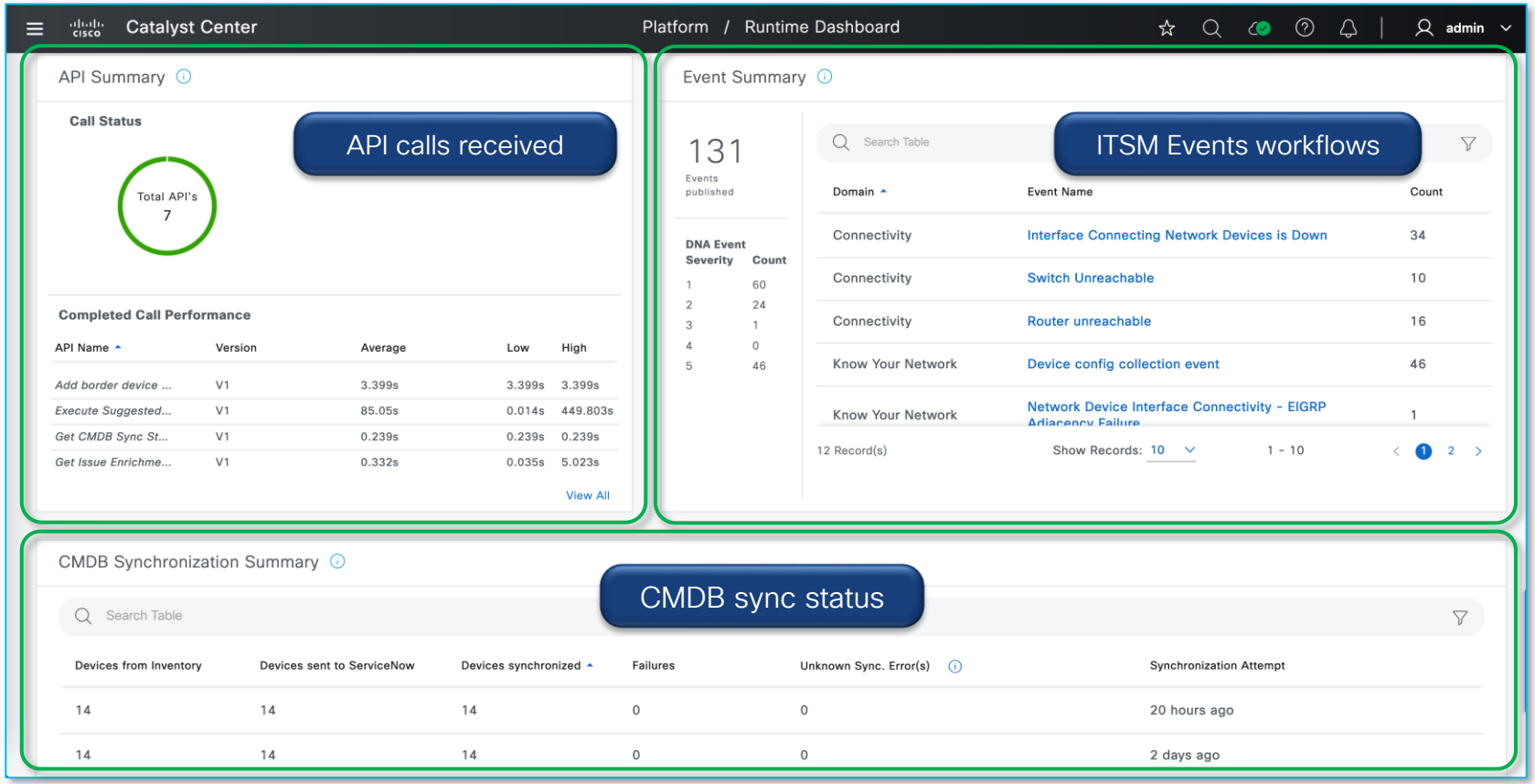
Try an API Call



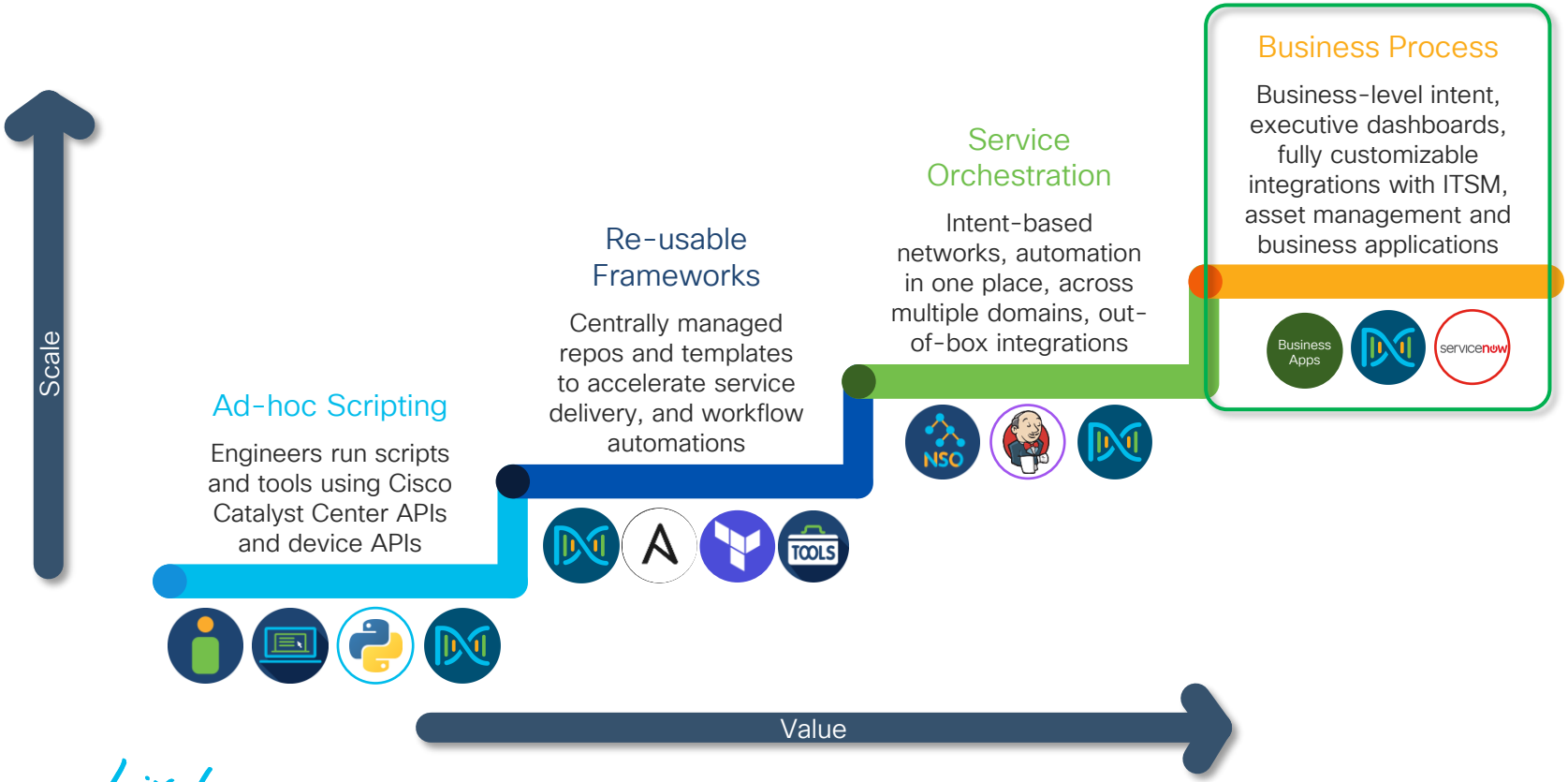
Code Preview



Platform Runtime Dashboard



Cisco Catalyst Center and DevOps Journey



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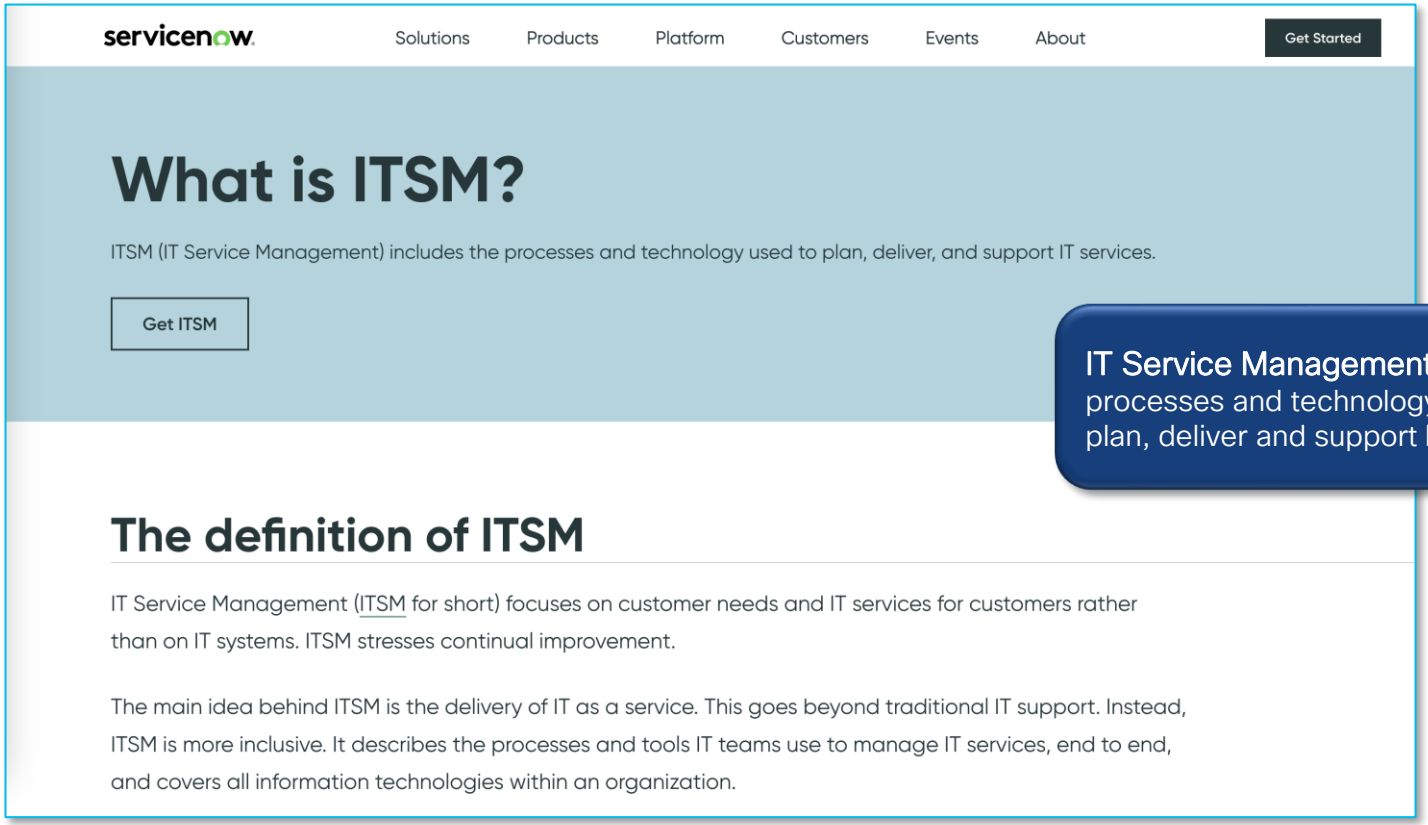
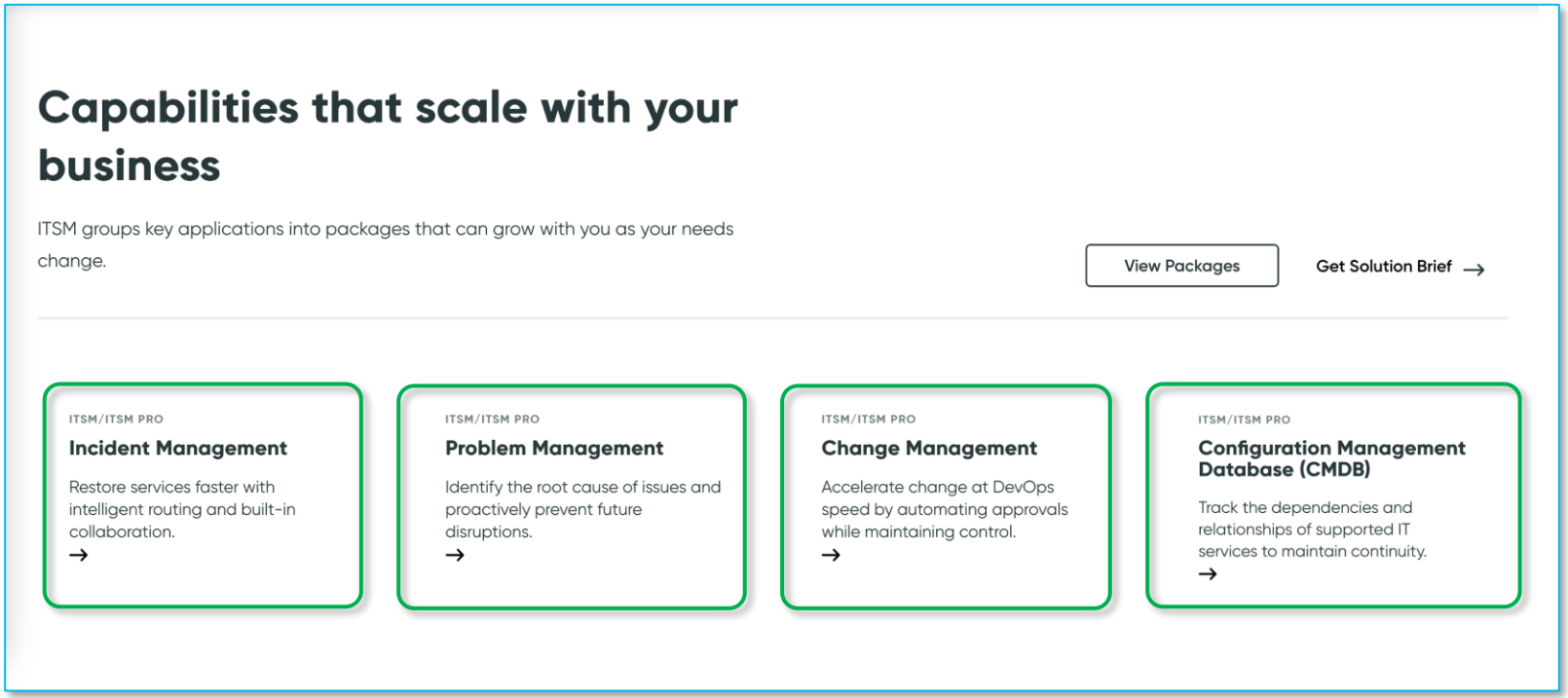
ServiceNow IT Service Management (ITSM)



IT Service Management includes processes and technology used to plan, deliver and support IT Services

ServiceNow ITSM Capabilities



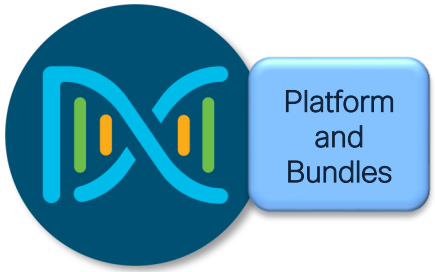
Why Cisco Catalyst Center and ServiceNow?

Cisco Catalyst Center ServiceNow Integration:

- Increased IT efficiency by streamlining processes
- Automated ServiceNow CMDB population with rich asset data
- Enhanced incident management with enriched issue data
- Simplified change management with closed loop functionality
- Endpoint attribute synchronization for client profiling

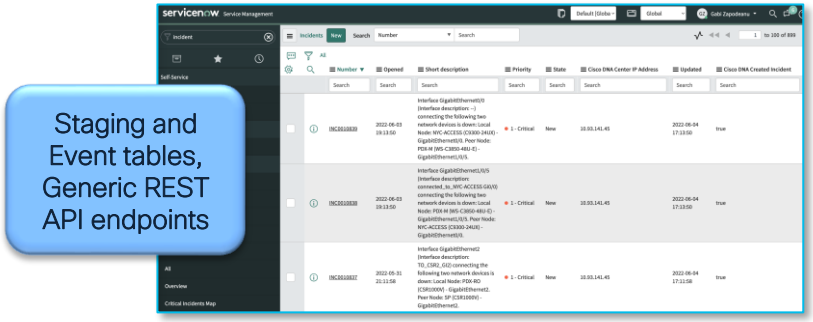
ITSM Integration Architecture

Without Cisco DNA App



REST APIs

servicenow



Notes:
No support for closed-loop workflows.
Code development on ServiceNow required.

Multi Cisco Catalyst Center clusters integrated with one ServiceNow Instance supported

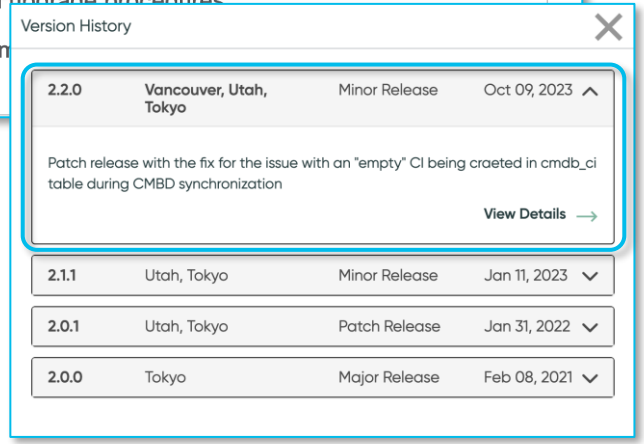
Integration Compatibility

Without the Cisco DNA App

Versions:
Cisco Catalyst Center, 2.3.7.4
ServiceNow

Table 2. Catalyst Center-to-ServiceNow Integration Without the Catalyst Center App Procedure

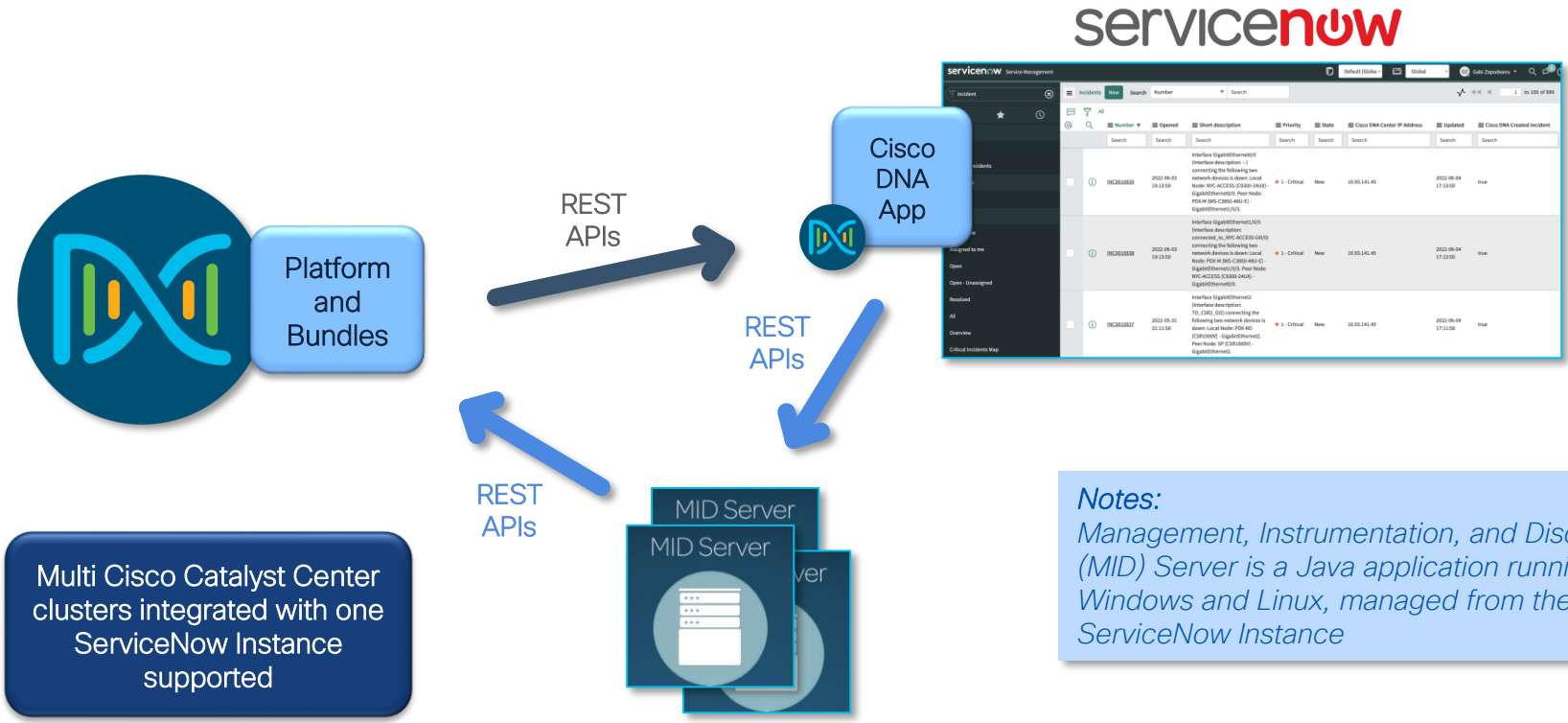
Step	Description
Step 1	Install or upgrade to the latest Catalyst Center release. For information about *installing* Catalyst Center, see the *Cisco Catalyst Center Installation Guide*.
Step 2	Install or upgrade to a compatible version of ServiceNow mentioned on the ServiceNow Store website. Click the following link to access the ServiceNow Store website: https://store.servicenow.com/sn_appstore_store.do#!/store/application/03eb0f4ddbf6ba00f27978b5ae96197b Refer to your ServiceNow documentation for its installation and upgrade procedures. **Note** This procedure must be performed by a ServiceNow adm



Ref: Cisco Catalyst Center ITSM Integration Guide

ITSM Integration Architecture

With the Cisco DNA App



Notes:
Management, Instrumentation, and Discovery (MID) Server is a Java application running on Windows and Linux, managed from the ServiceNow Instance

Integration Compatibility

With the Cisco DNA App

Versions:
Catalyst Center 2.3.7.4
ServiceNow Store
Cisco DNA App 2.2.0

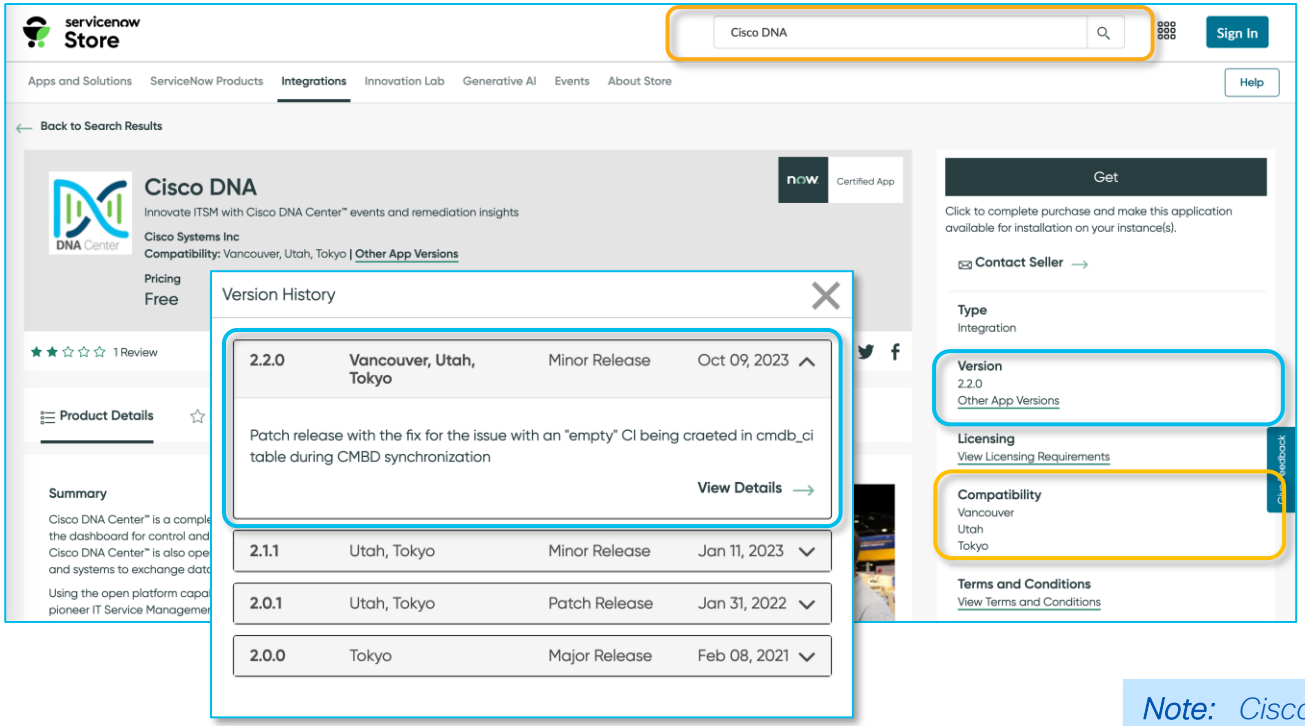
Table 3. Catalyst Center-to-ServiceNow Integration with Catalyst Center App Procedure

Step	Description
Step 1	Install or upgrade to the latest Catalyst Center release. For information about installing Catalyst Center, see the *Cisco Catalyst Center Installation Guide*.
Step 2	Install or upgrade to a compatible version of ServiceNow mentioned on the ServiceNow Store website. Click the following link to access the ServiceNow Store website: https://store.servicenow.com/sn_appstore_store.do#!/store/application/03eb0f4ddbf6ba00f27978b5ae96197b/2.2.0 Refer to your ServiceNow documentation for its installation and upgrade procedures. **Note** This procedure must be performed by a ServiceNow administrator.
Step 3	Click the following link to access the ServiceNow Store website where the Catalyst Center app is located: https://store.servicenow.com/sn_appstore_store.do#!/store/application/03eb0f4ddbf6ba00f27978b5ae96197b/2.2.0 Download and install the Catalyst Center app (version 2.2.0) into ServiceNow by following the documentation available at the website. **Note** This procedure is to be performed by a ServiceNow administrator. The Catalyst Center app versions 2.1.1 and 2.0.1 are compatible with the Tokyo and Utah releases of ServiceNow. If you want to use the Vancouver release of ServiceNow, you must first upgrade the Catalyst Center a 2.2.0.

Ref: Cisco Catalyst Center ITSM Integration Guide

Cisco DNA App – ServiceNow Store

https://store.servicenow.com

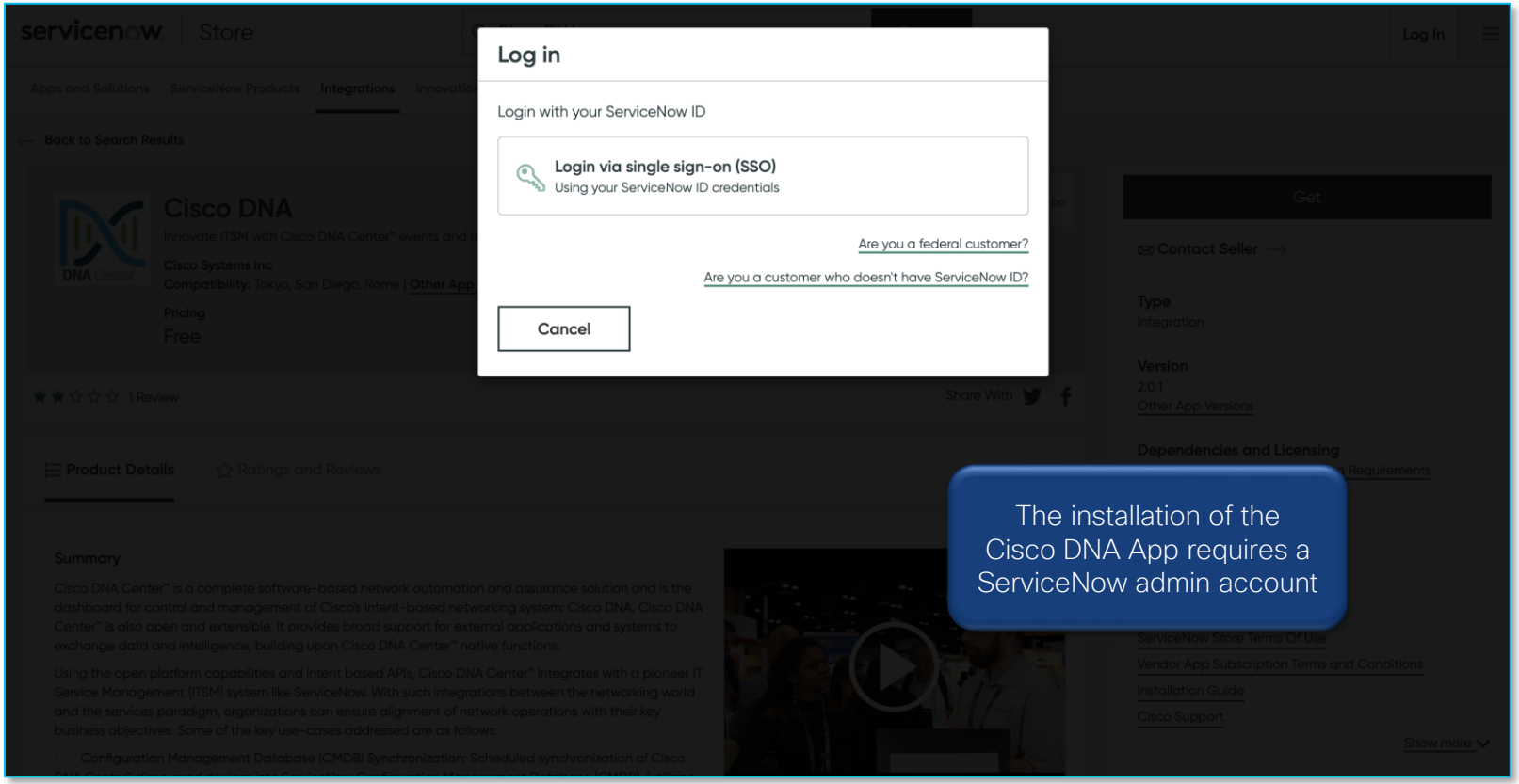


Search Cisco DNA
Cisco DNA App 2.2.0
ServiceNow Compatibility

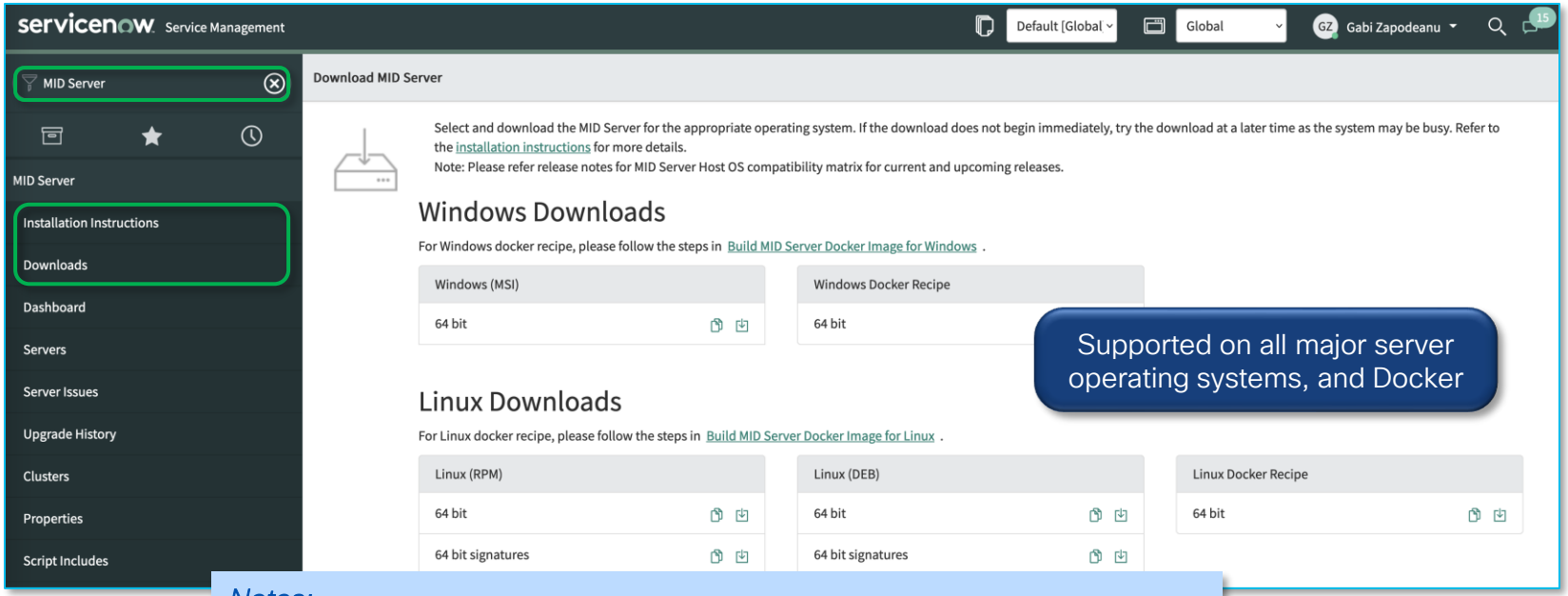
Cisco DNA App installation and configuration guides ServiceNow MID Server installation and configuration guide

Note: Cisco DNA App and MID server installations require ServiceNow Admin role

Cisco DNA App Installation and Configuration



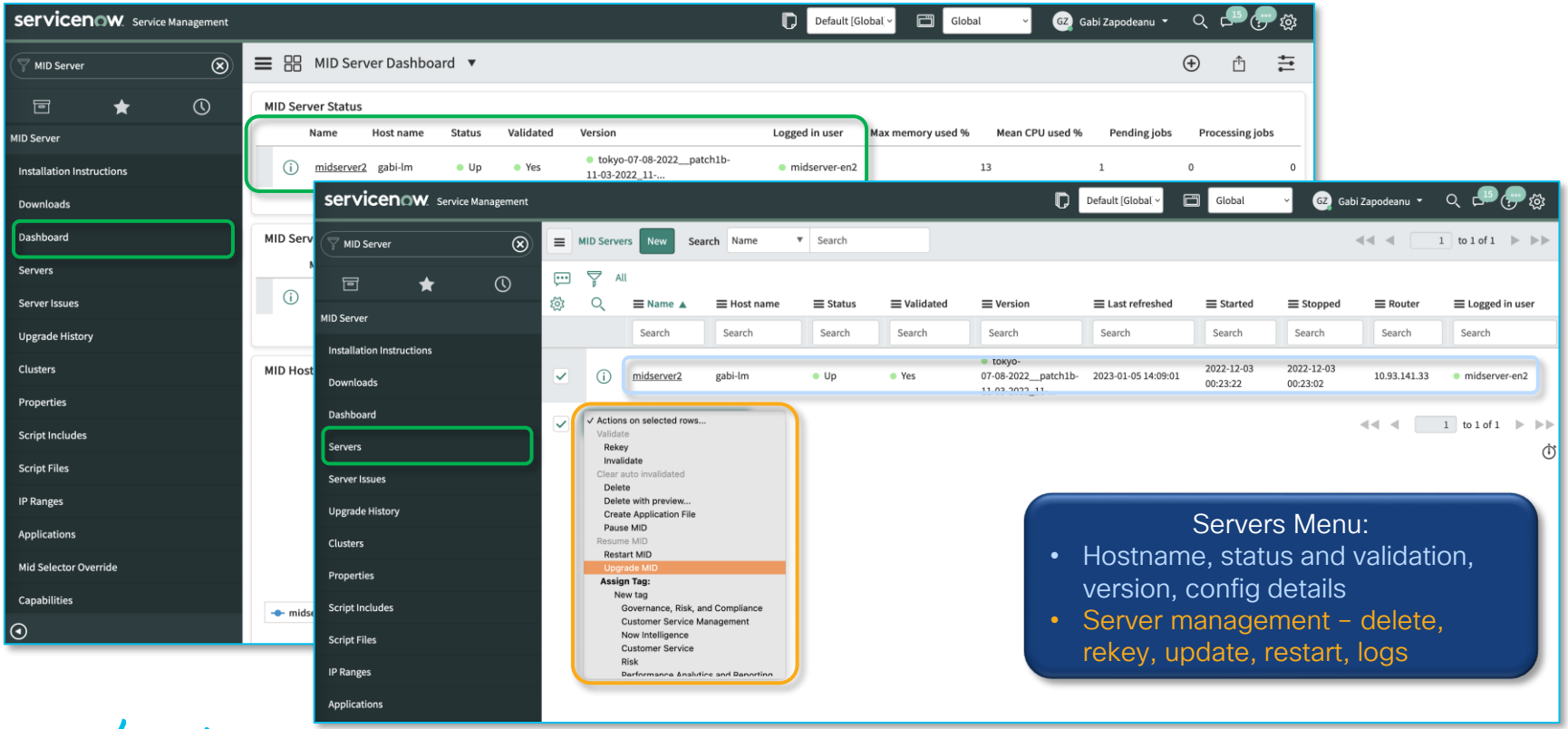
ServiceNow MID Server Installation



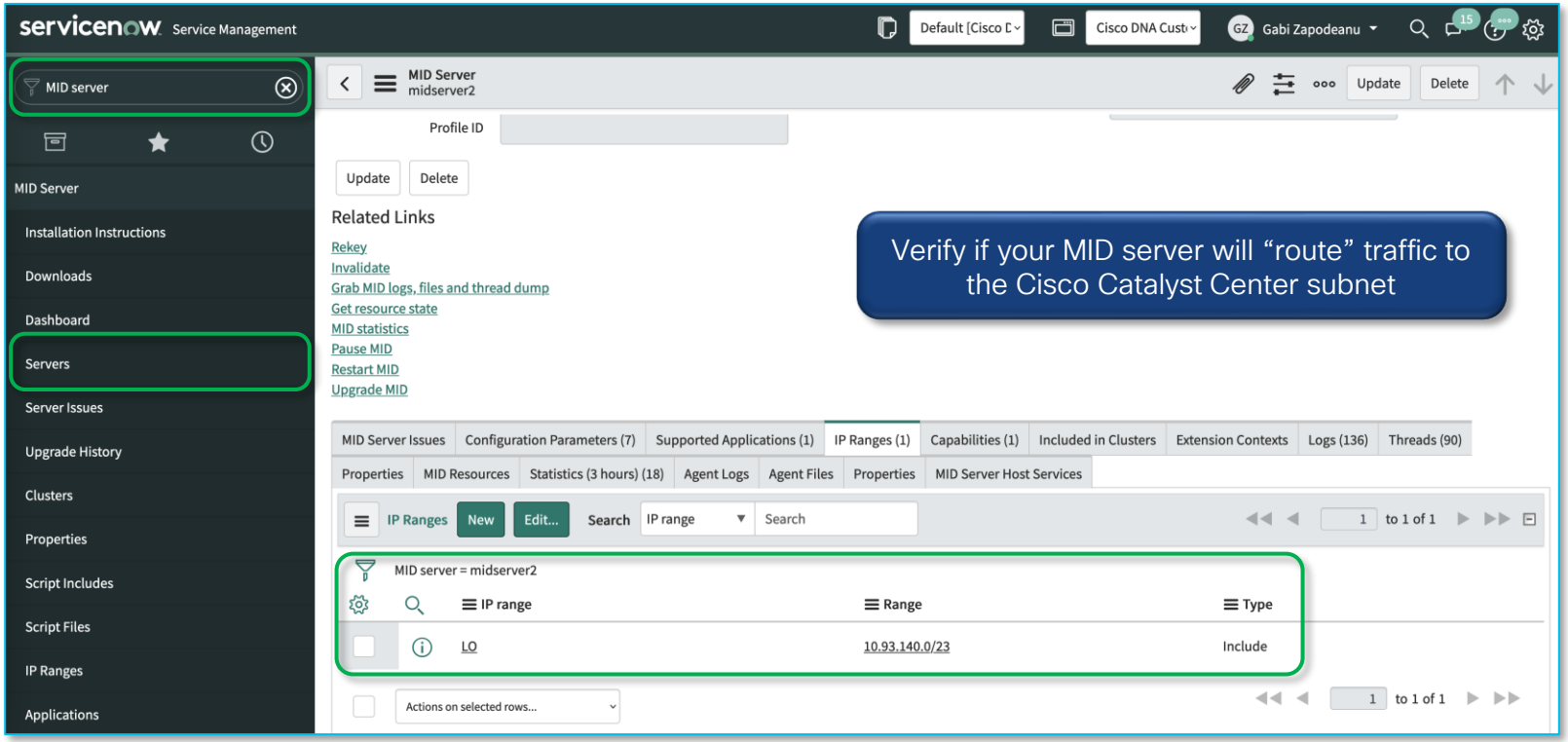
Supported on all major server operating systems, and Docker

Notes:
Installation instructions include all details for your host VM operating system
Not required to have a dedicated MID server for the ITSM integration

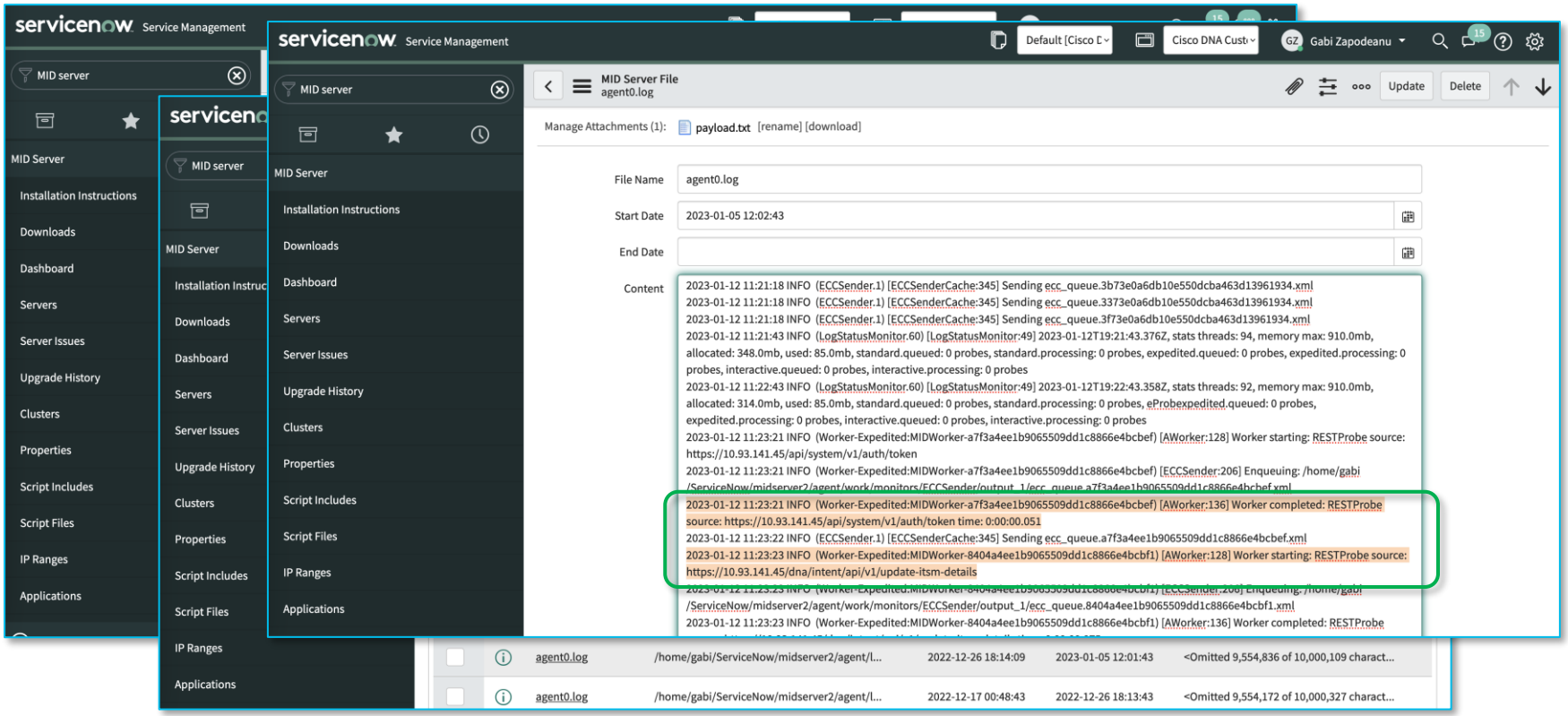
ServiceNow MID Server Management



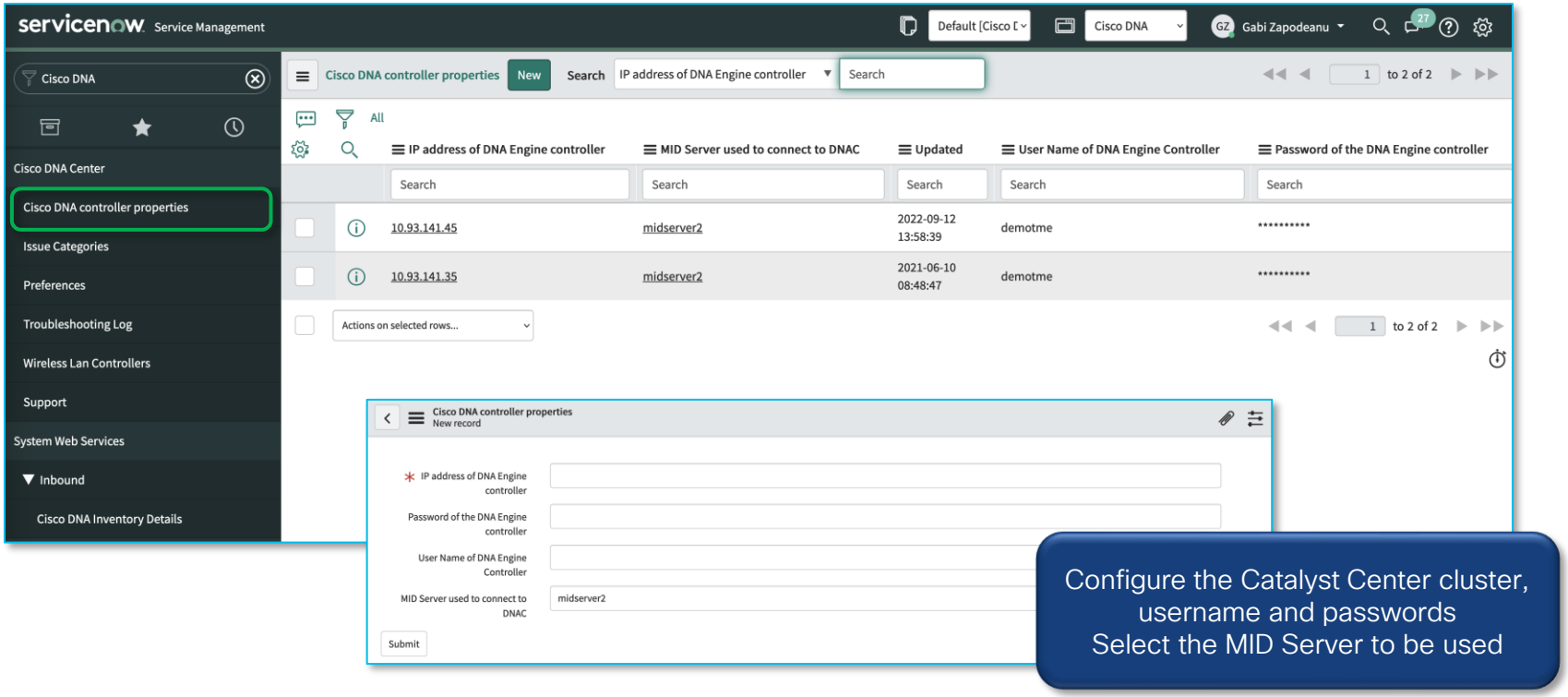
MID Server IP Ranges



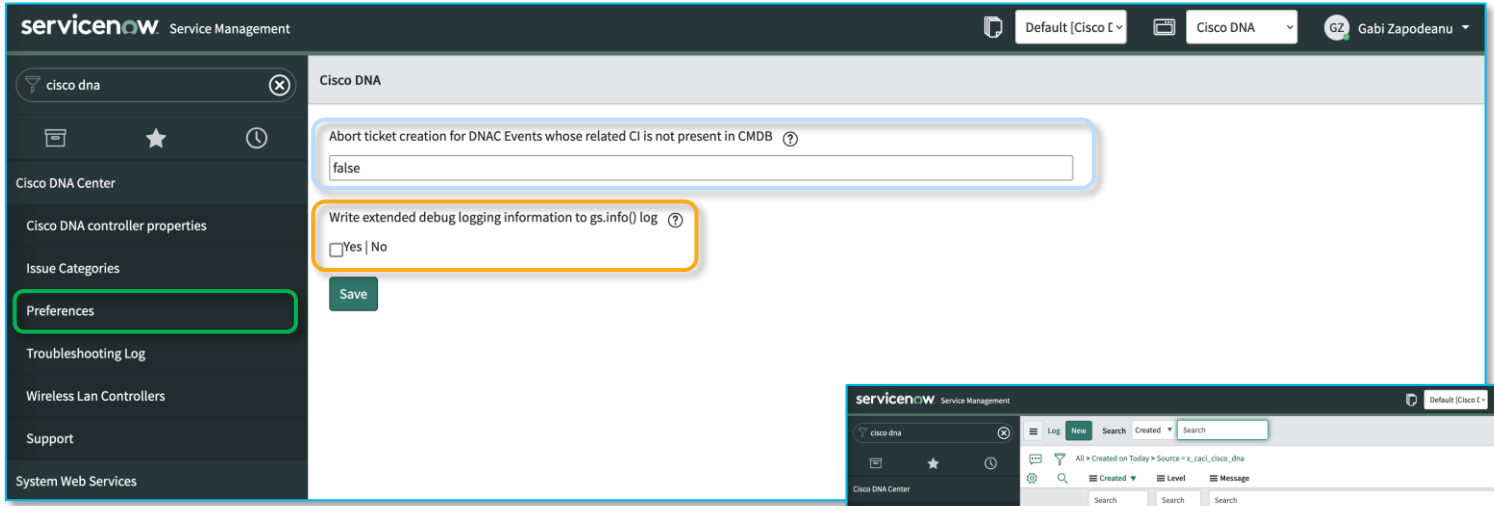
MID Server Logs

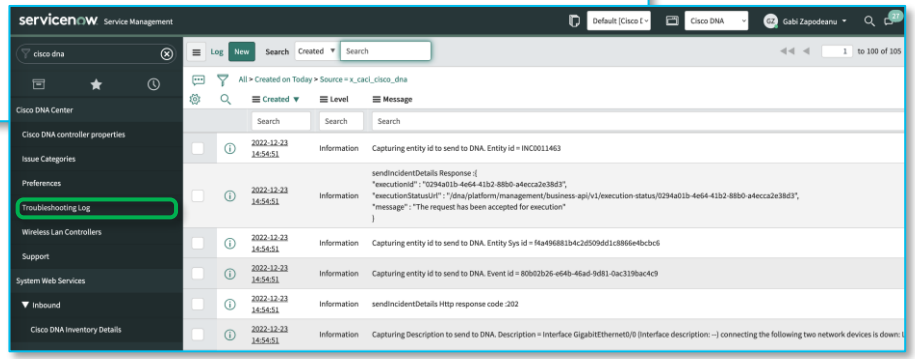


Cisco DNA Controller Properties



Cisco Catalyst Center Preferences

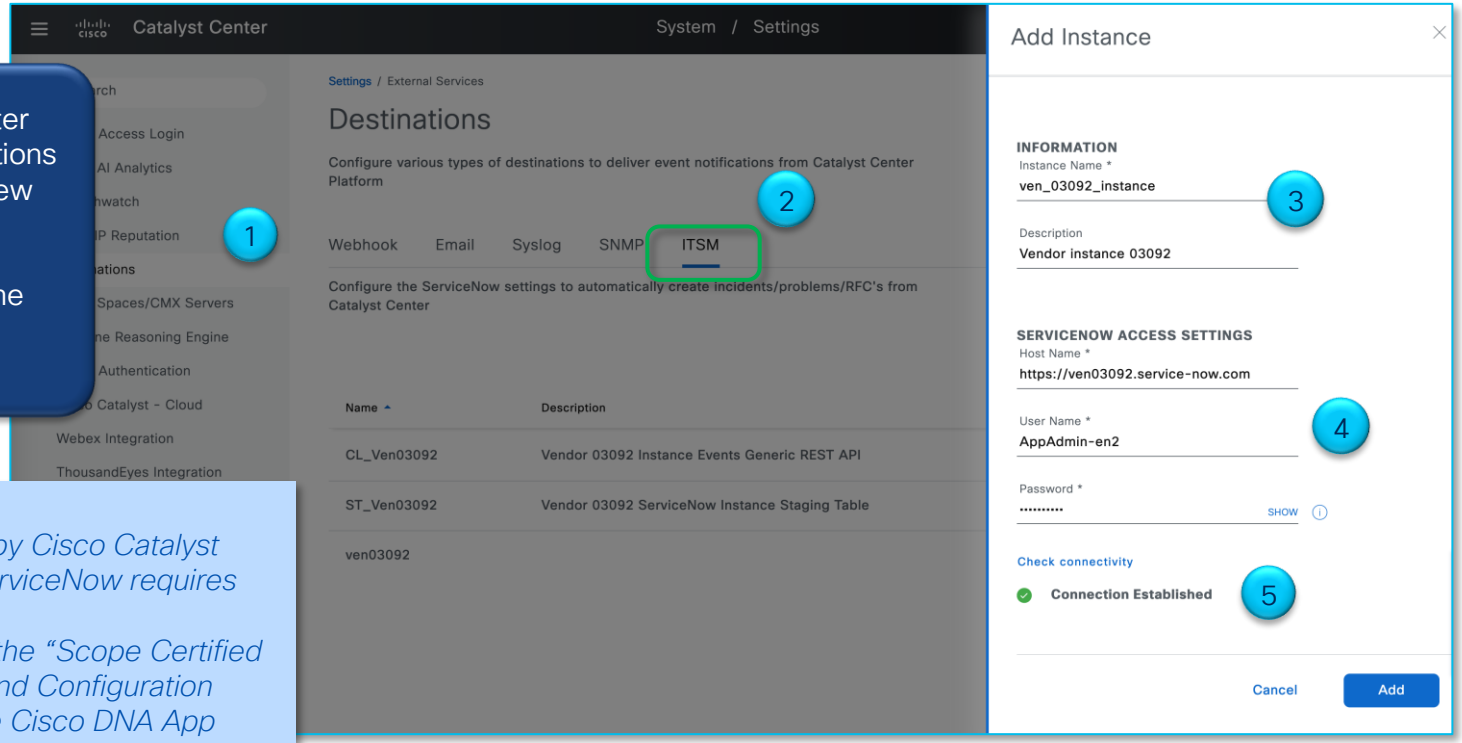




Allow to create incidents for networks devices not in the ServiceNow CI table
Enable debugging when troubleshooting: API calls, transform sets, business rules

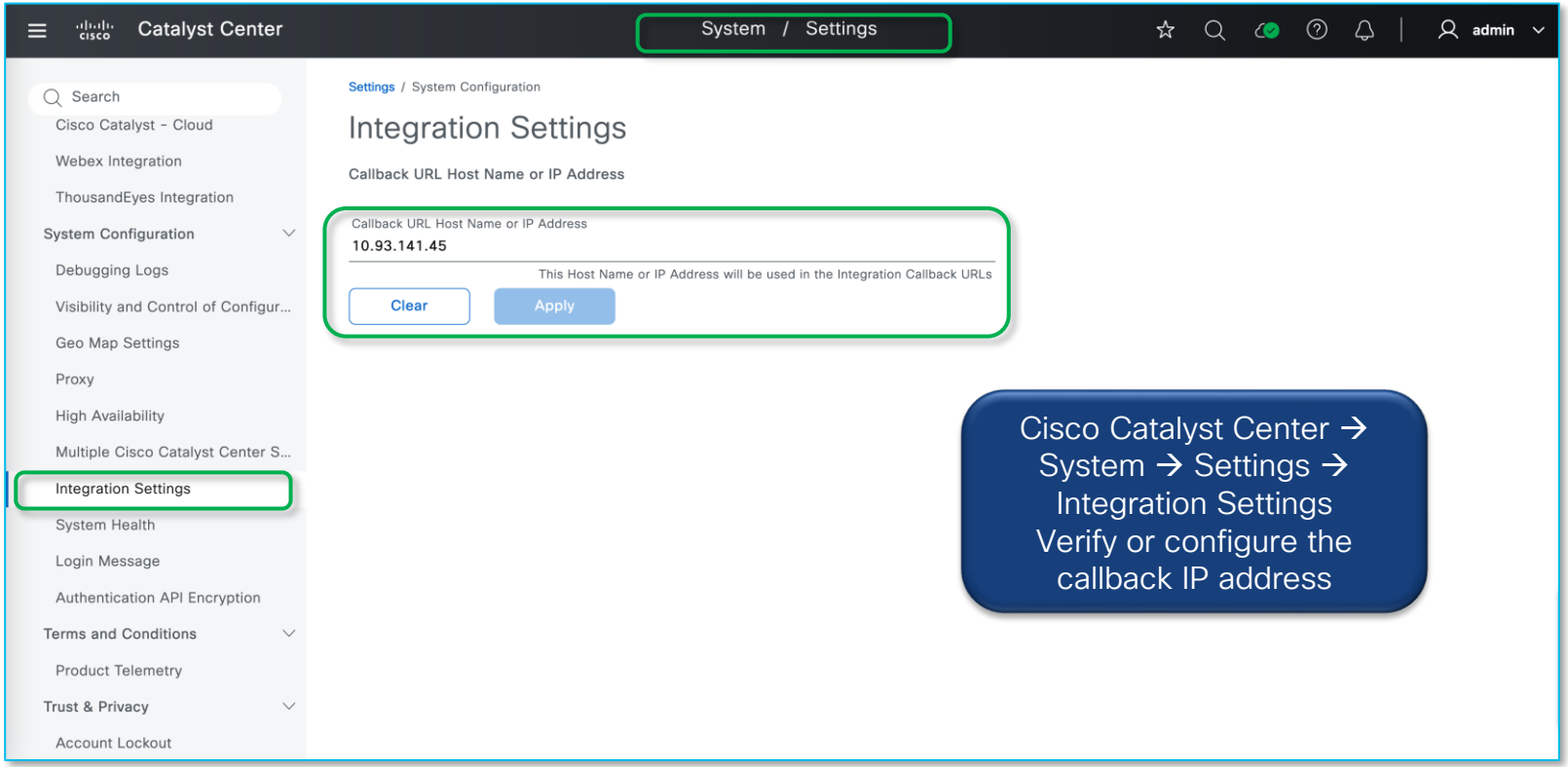
ITSM Destination Settings

1. Cisco Catalyst Center Settings → Destinations
2. Select ITSM, add new
3. Instance Name, Description
4. Hostname, username and password
5. Verify Connectivity

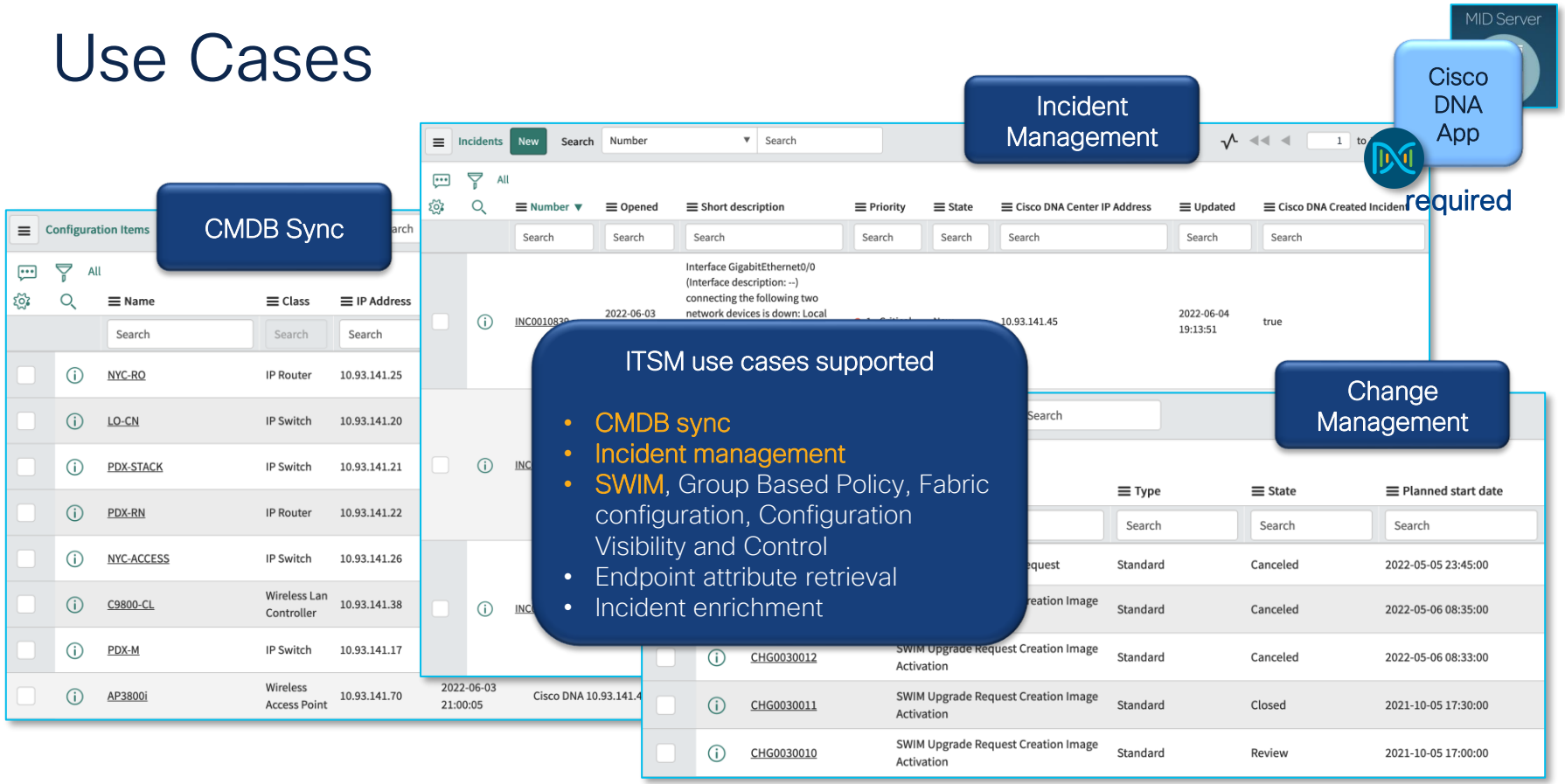


Notes:
The user account used by Cisco Catalyst Center to connect to ServiceNow requires specific roles.
Please find all details in the "Scope Certified Application Installation and Configuration Guide" included with the Cisco DNA App documentation on ServiceNow

Integration Settings



Use Cases



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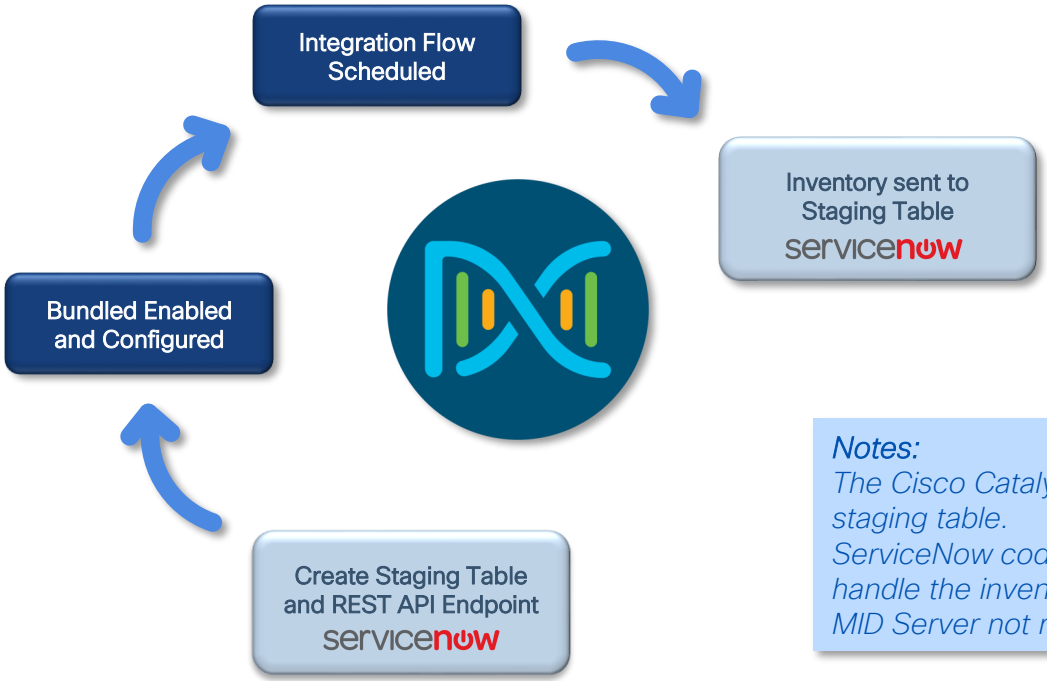
Configuration Management Database Sync

To Staging Table

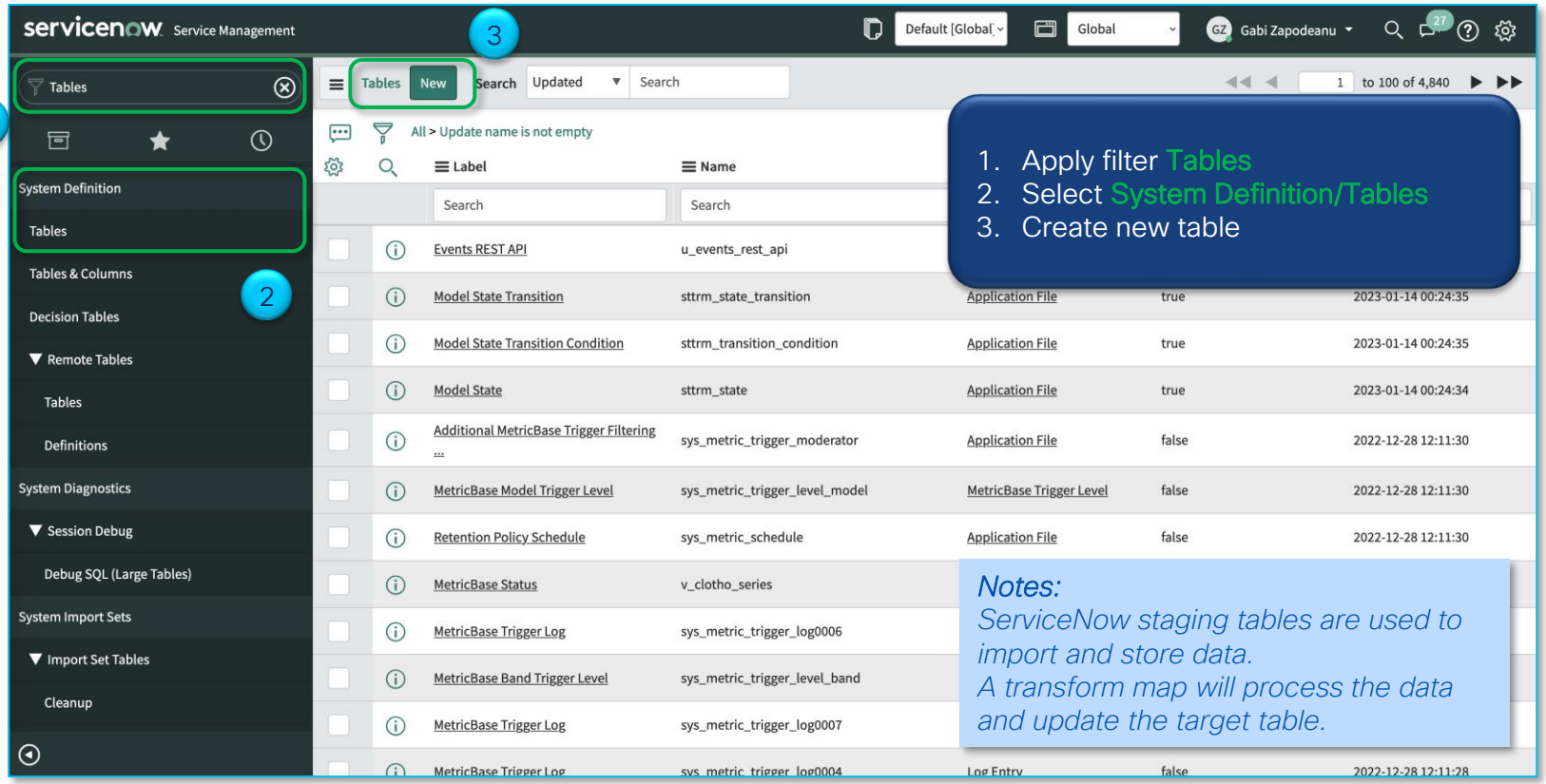


Cisco DNA App

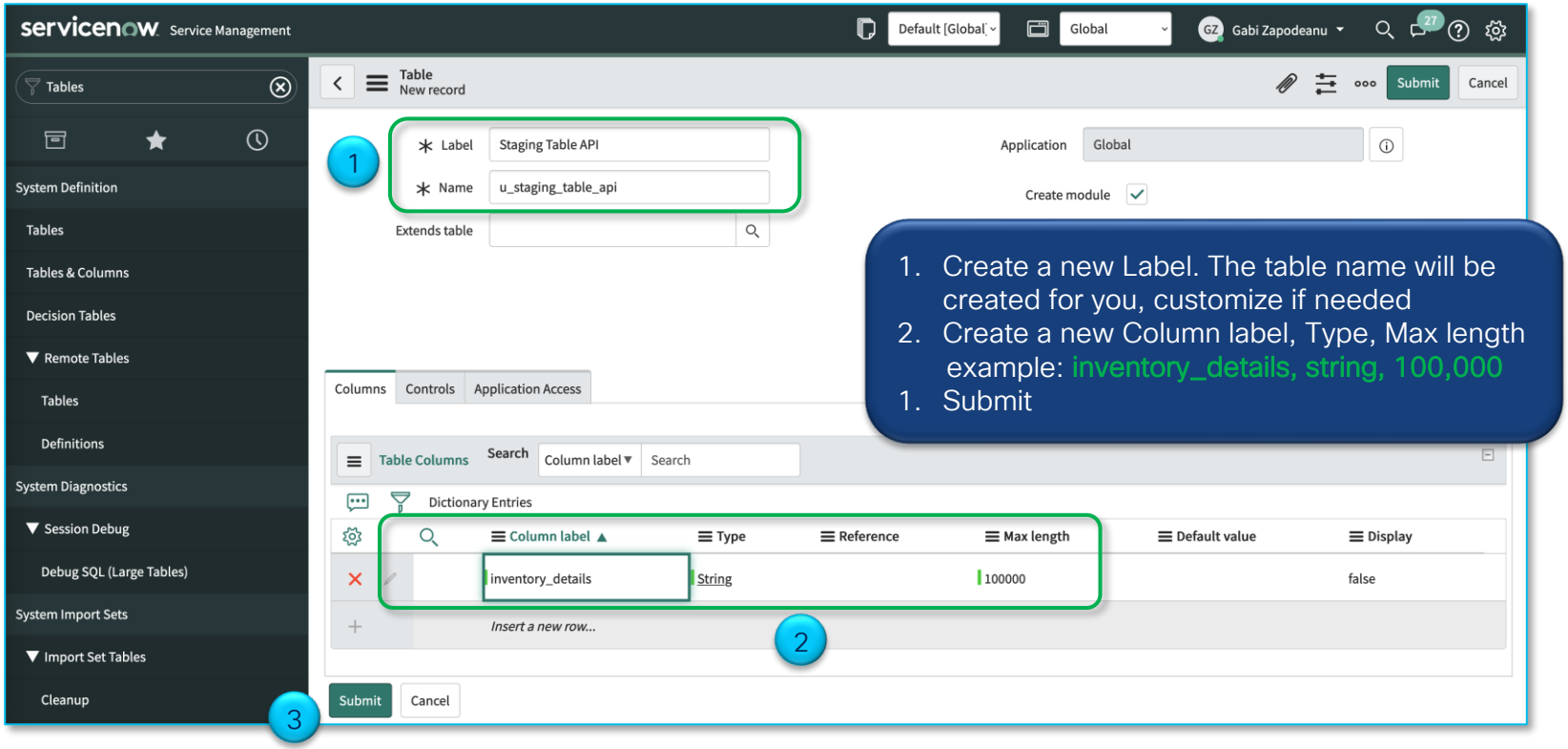
Not required

Notes:
The Cisco Catalyst Center inventory sent to a staging table.
ServiceNow code development is required to handle the inventory details.
MID Server not required

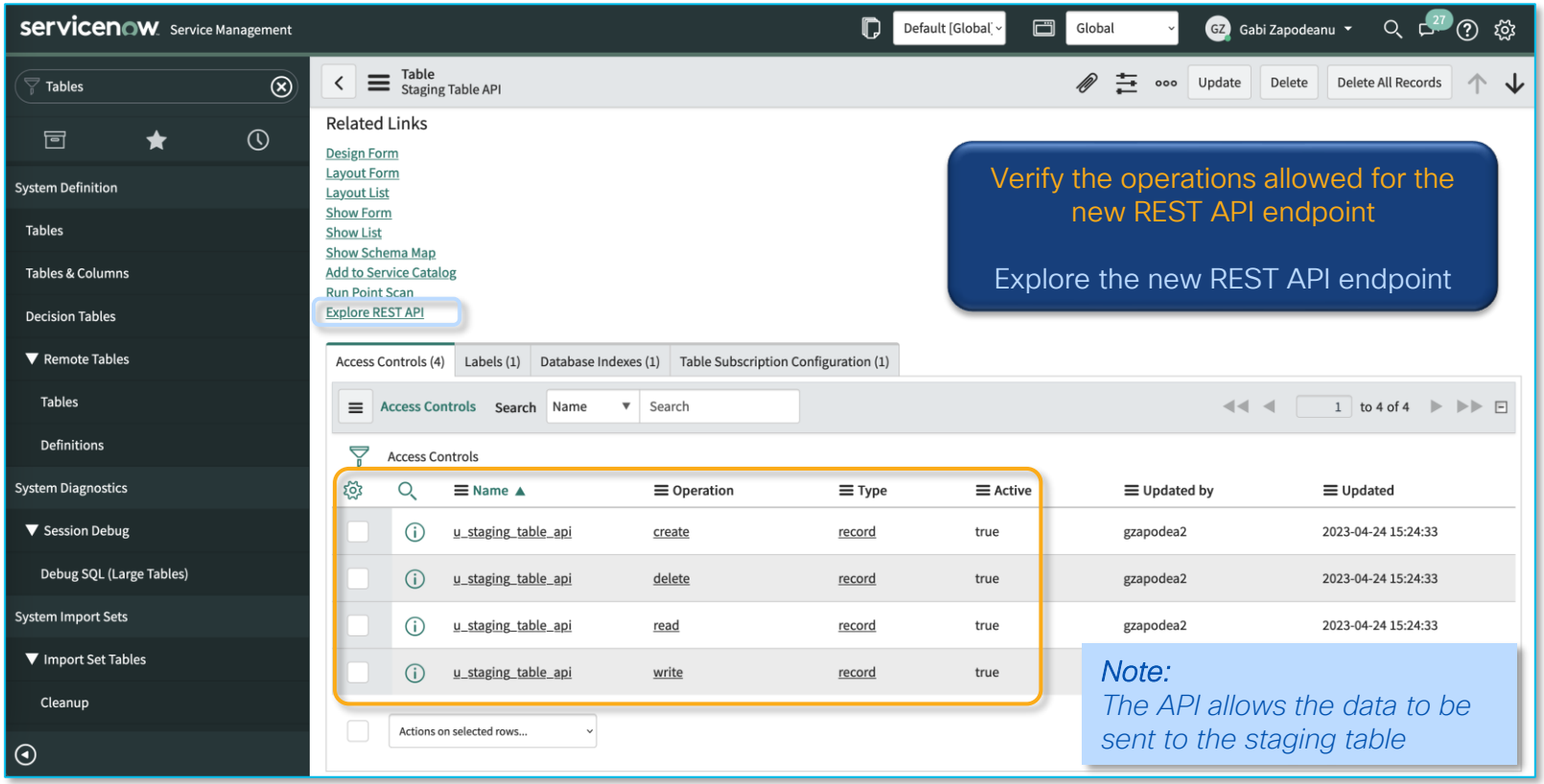
ServiceNow Create New Staging Table



ServiceNow Create Table and REST API Endpoint



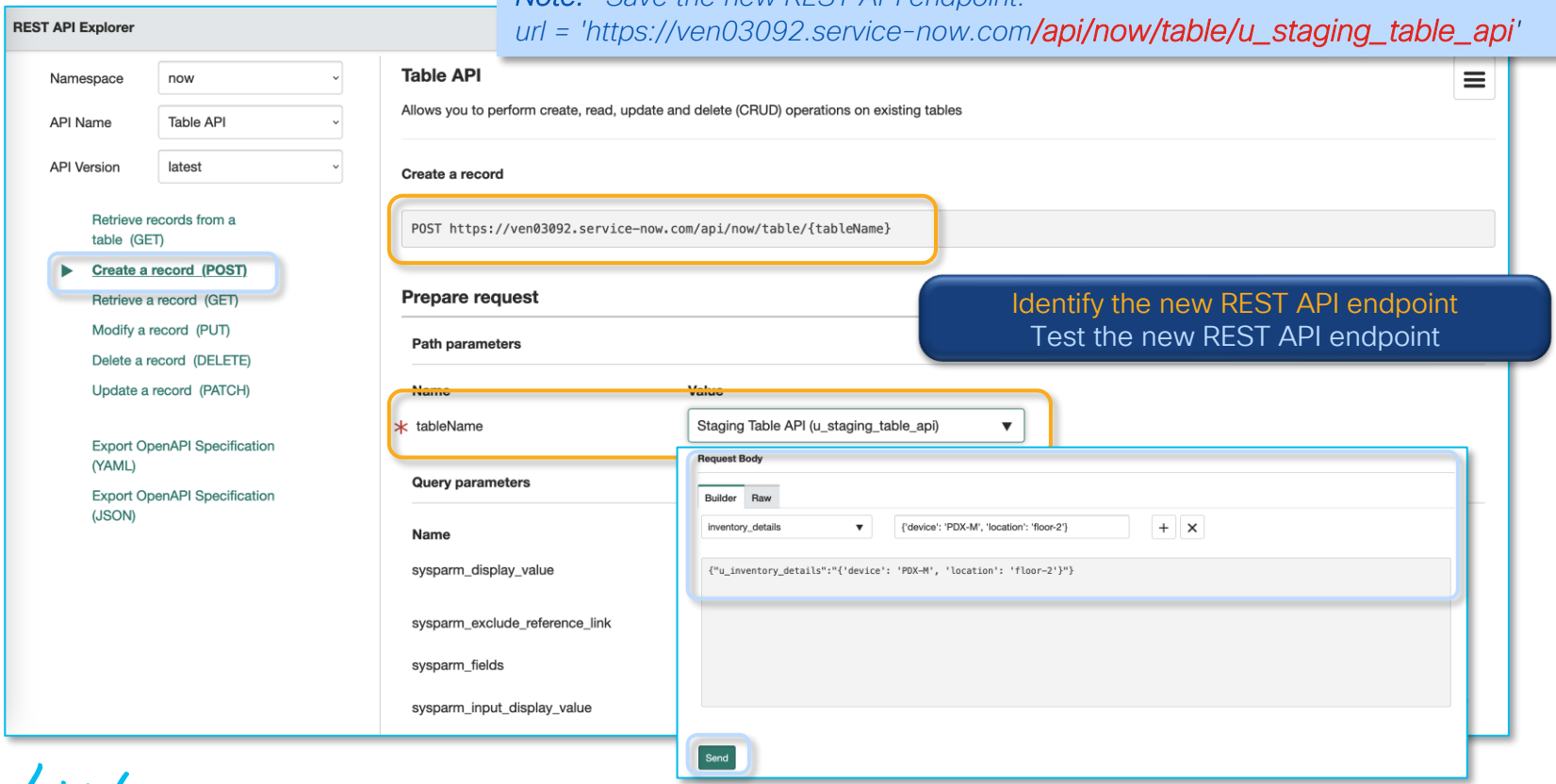
ServiceNow New REST API Endpoint



ServiceNow New REST API Endpoint – continued

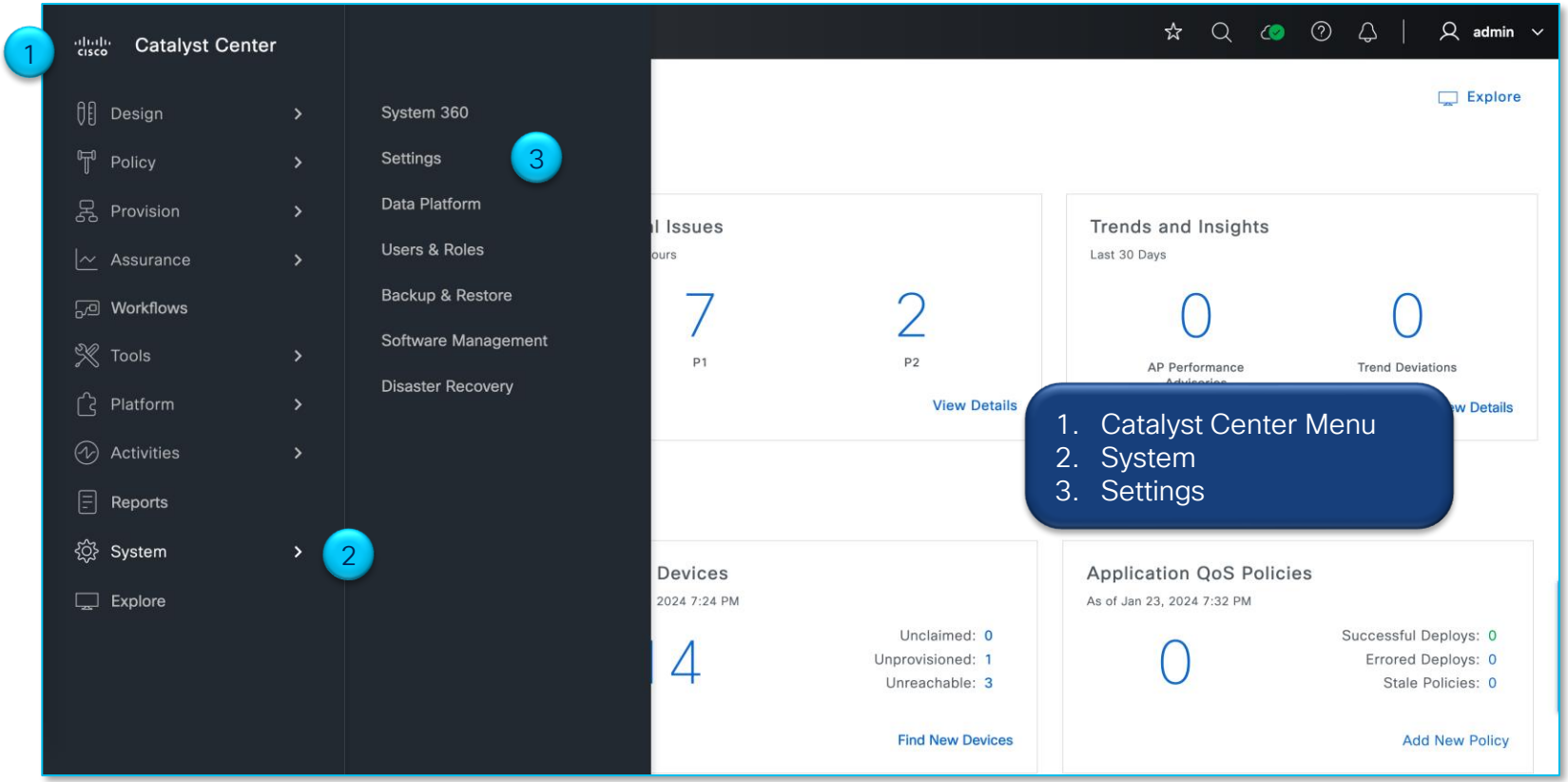
REST API Explorer

Note: *Save the new REST API endpoint:*
url = 'https://ven03092.service-now.com/api/now/table/u_staging_table_api'

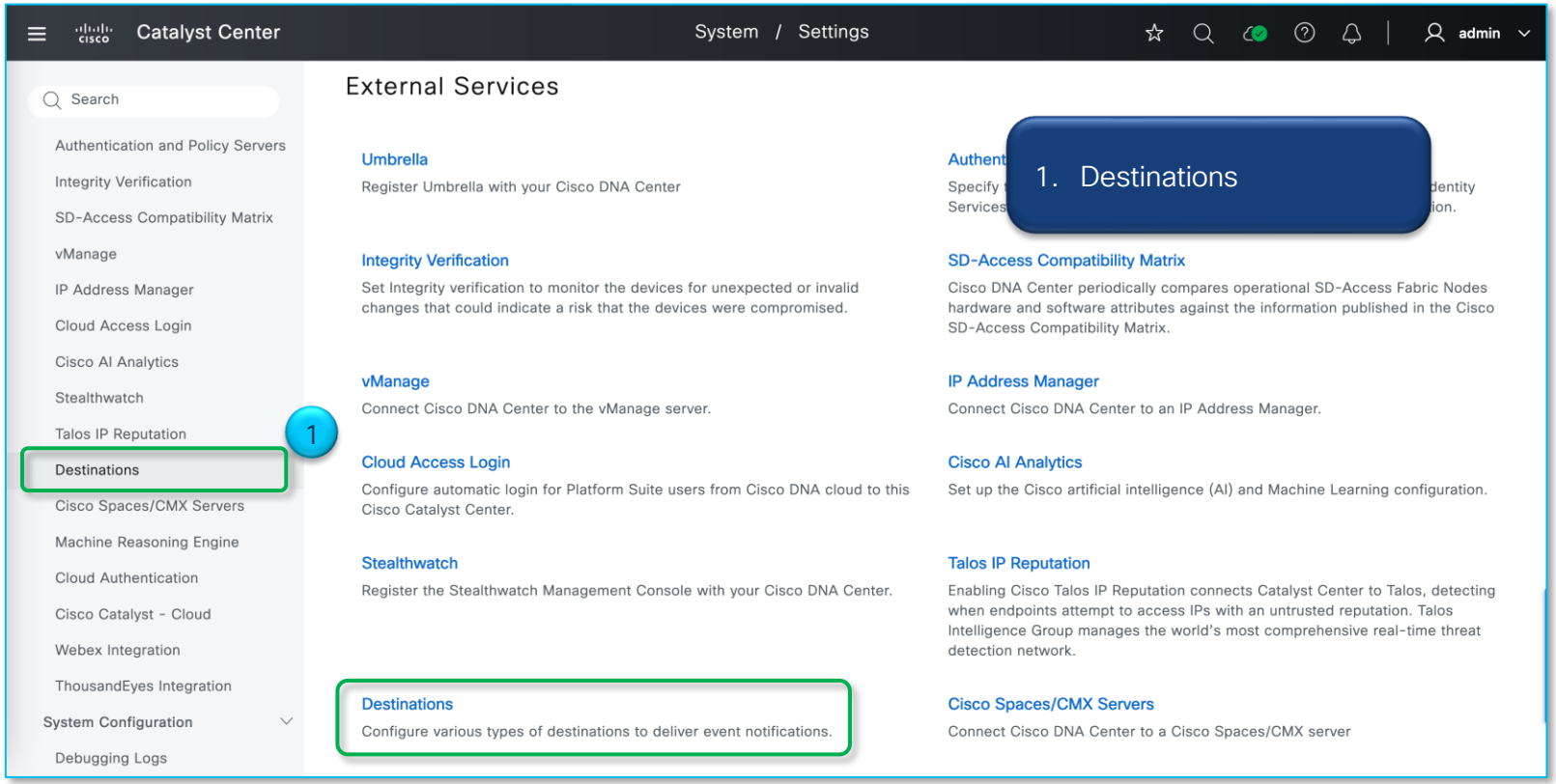


Identify the new REST API endpoint
Test the new REST API endpoint

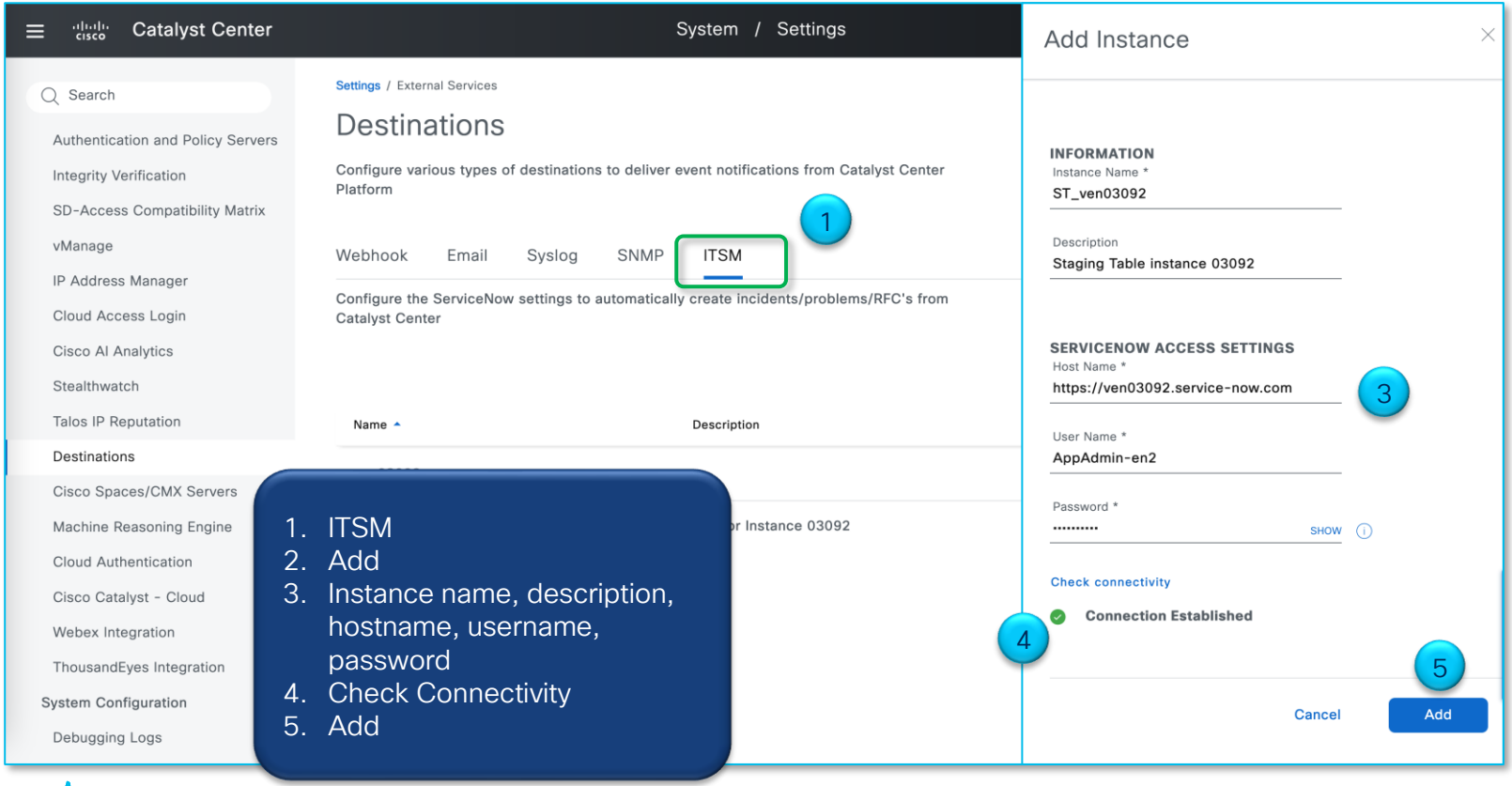
Create a New ServiceNow Destination



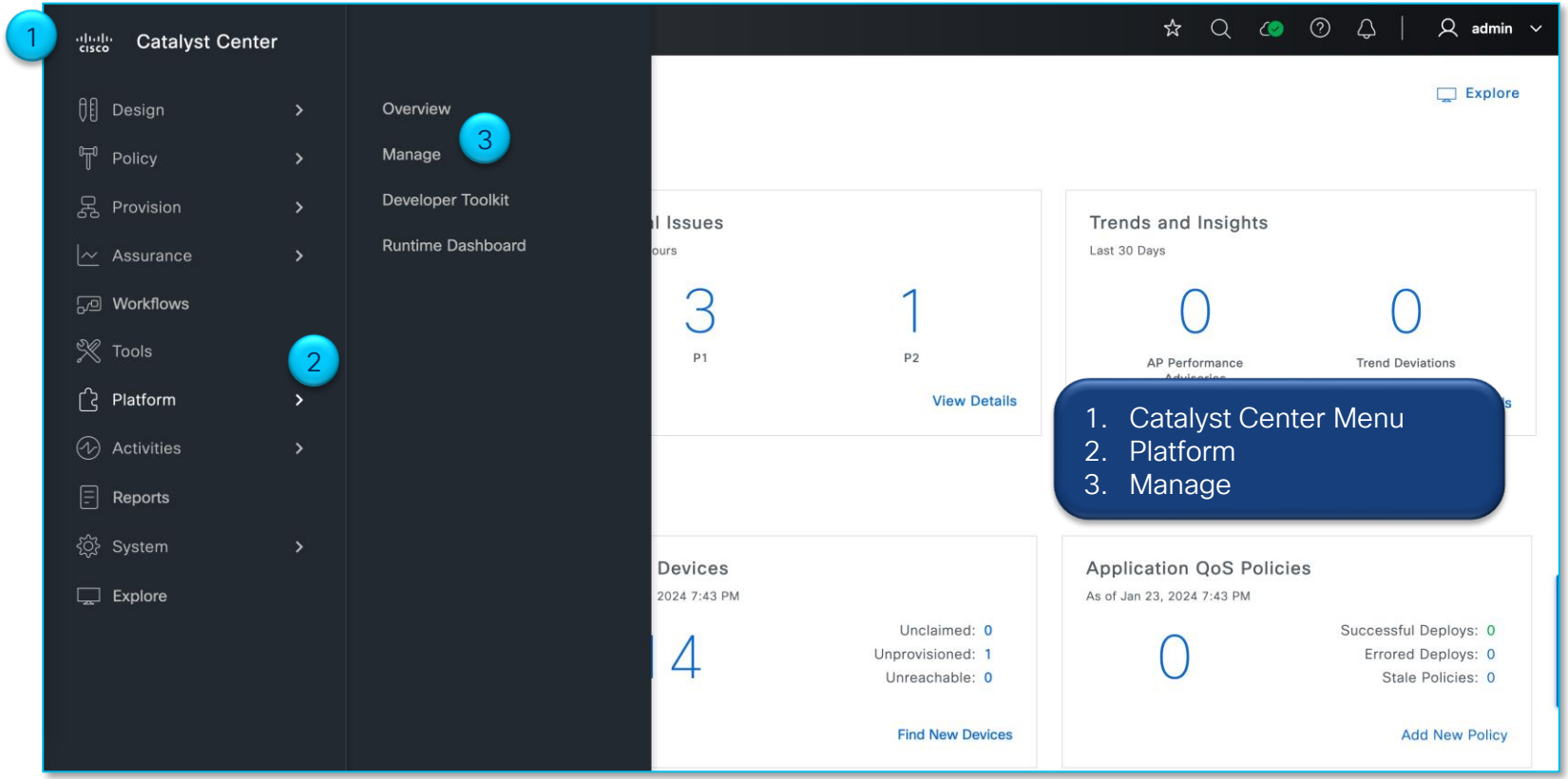
Create a New ServiceNow Destination - continued



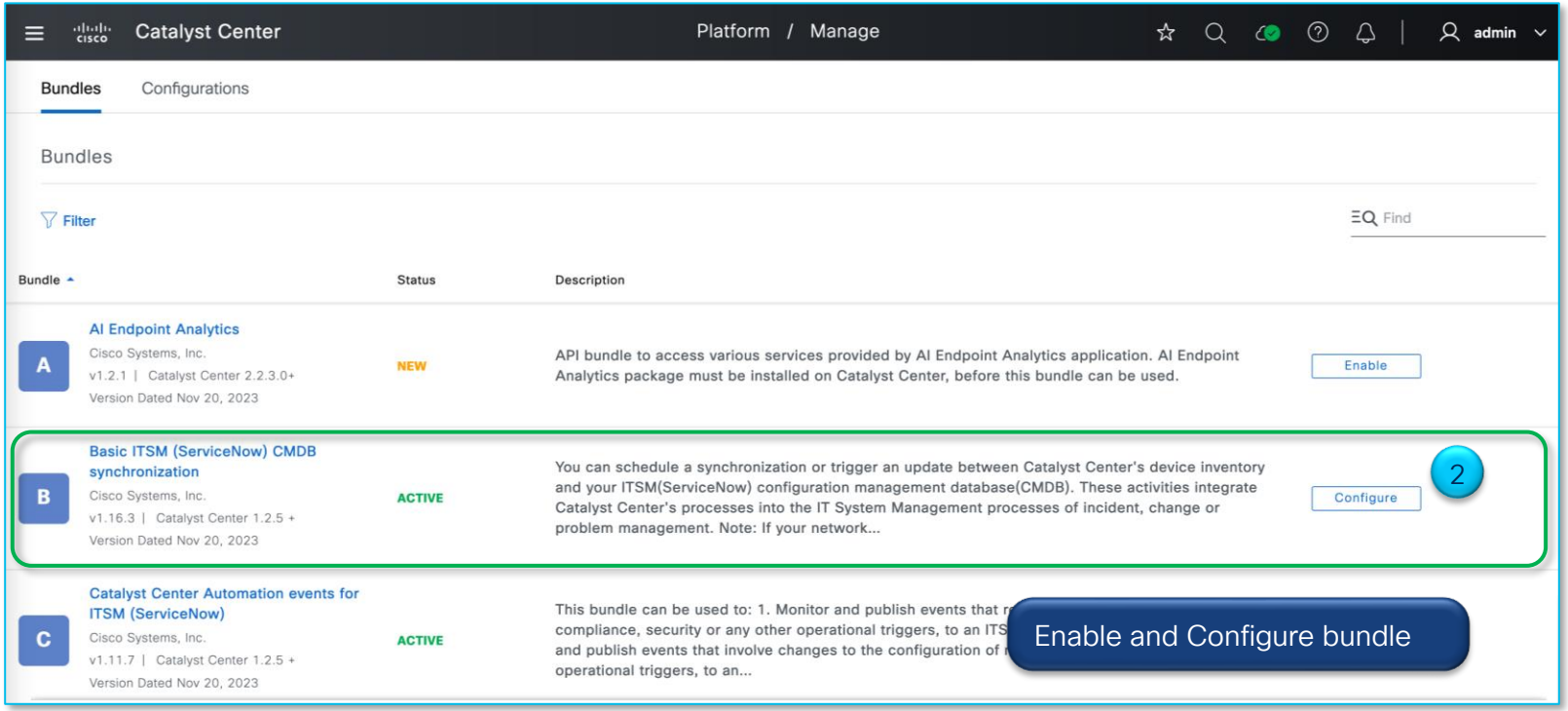
Create a New ServiceNow Destination - continued



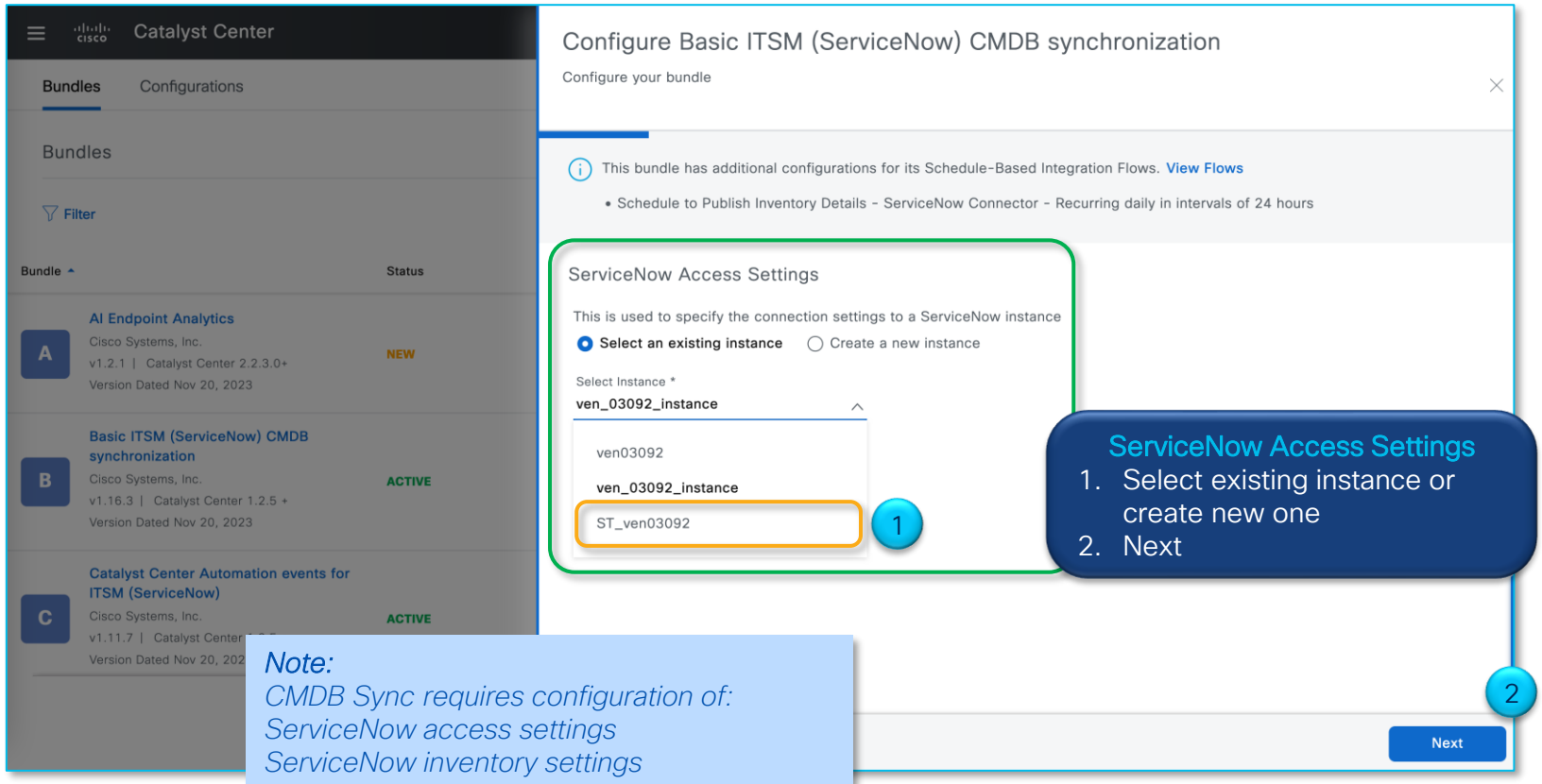
CMDB Sync Bundle Configuration



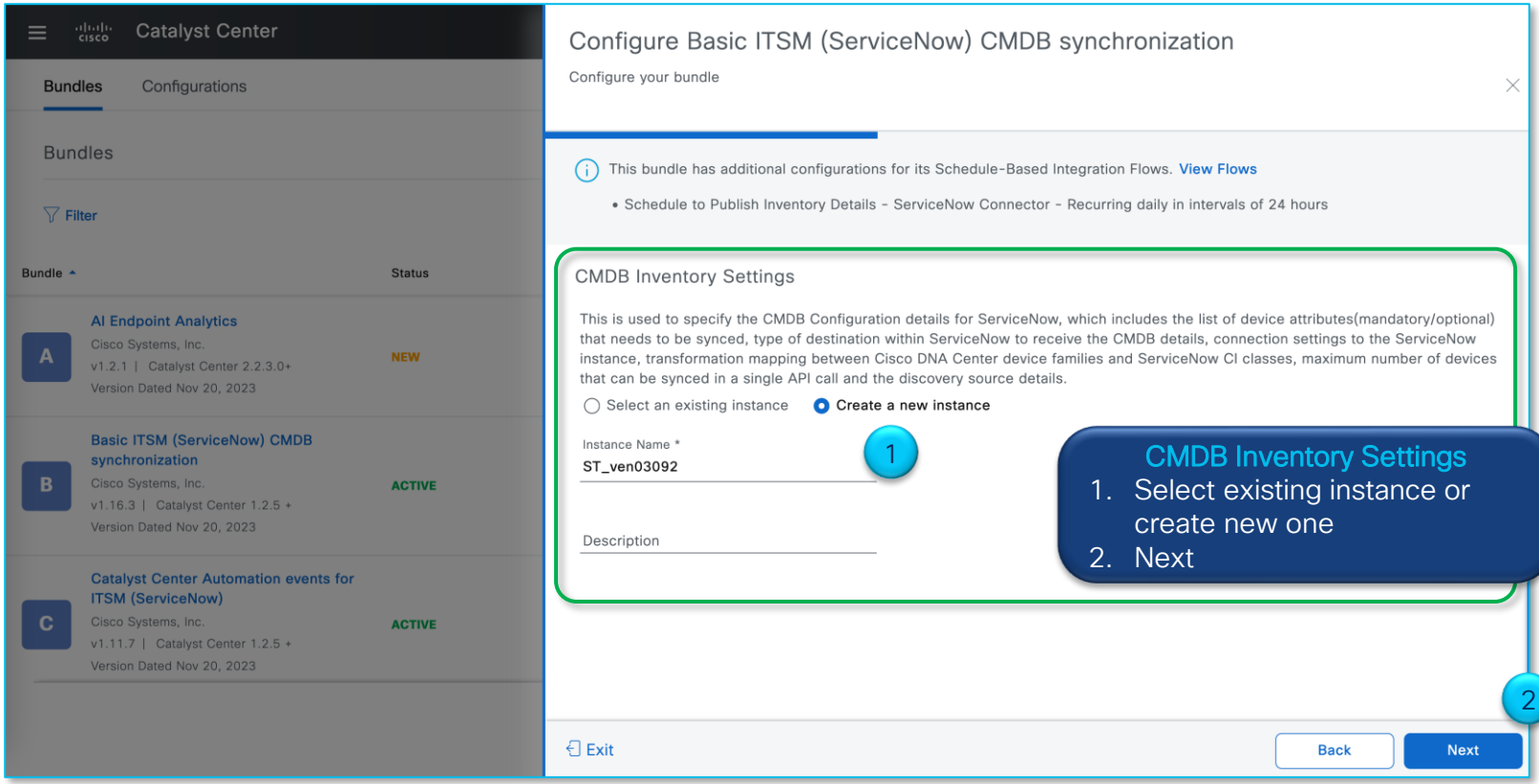
CMDB Sync Bundle Configuration – continued



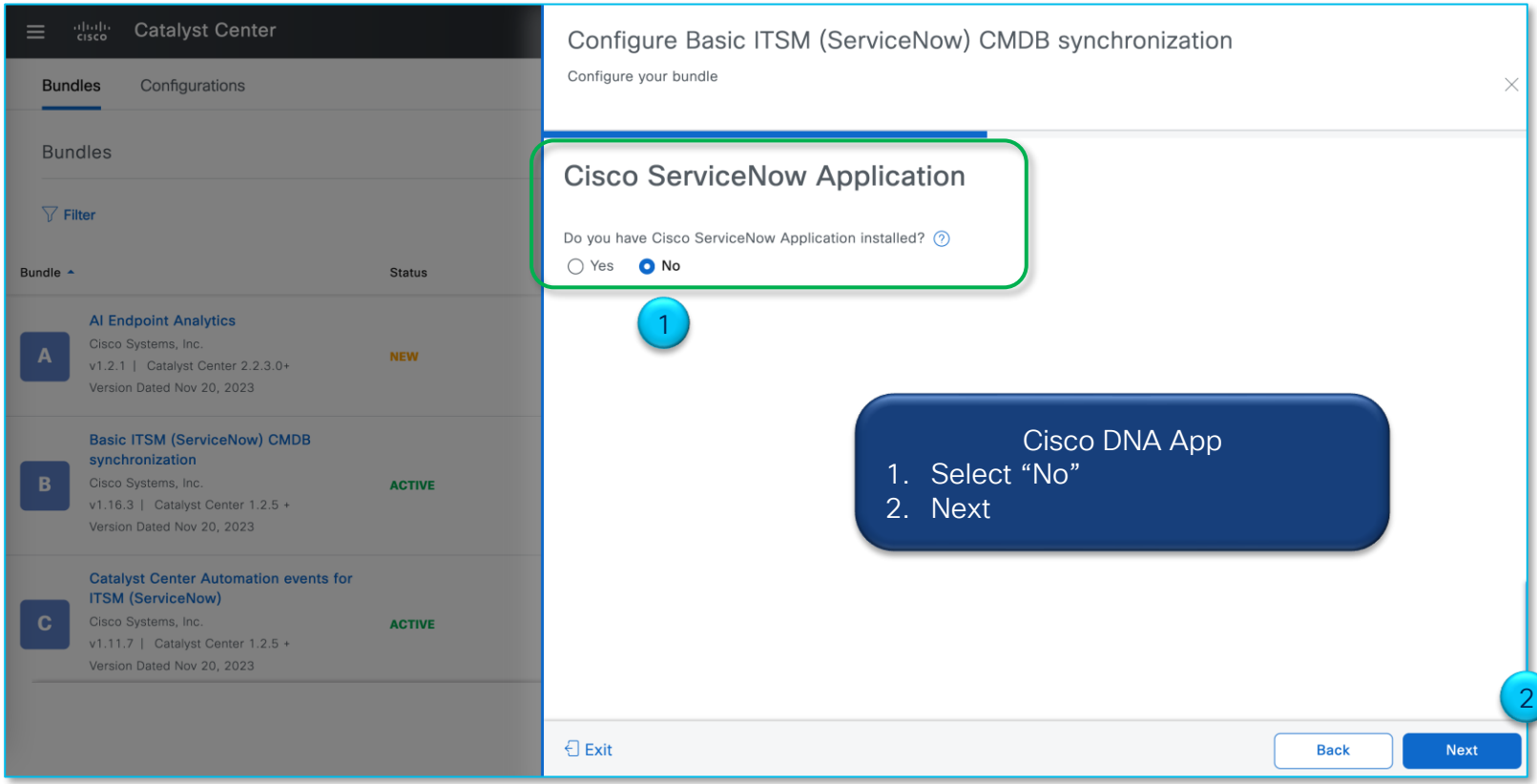
CMDB Sync Bundle Configuration – continued



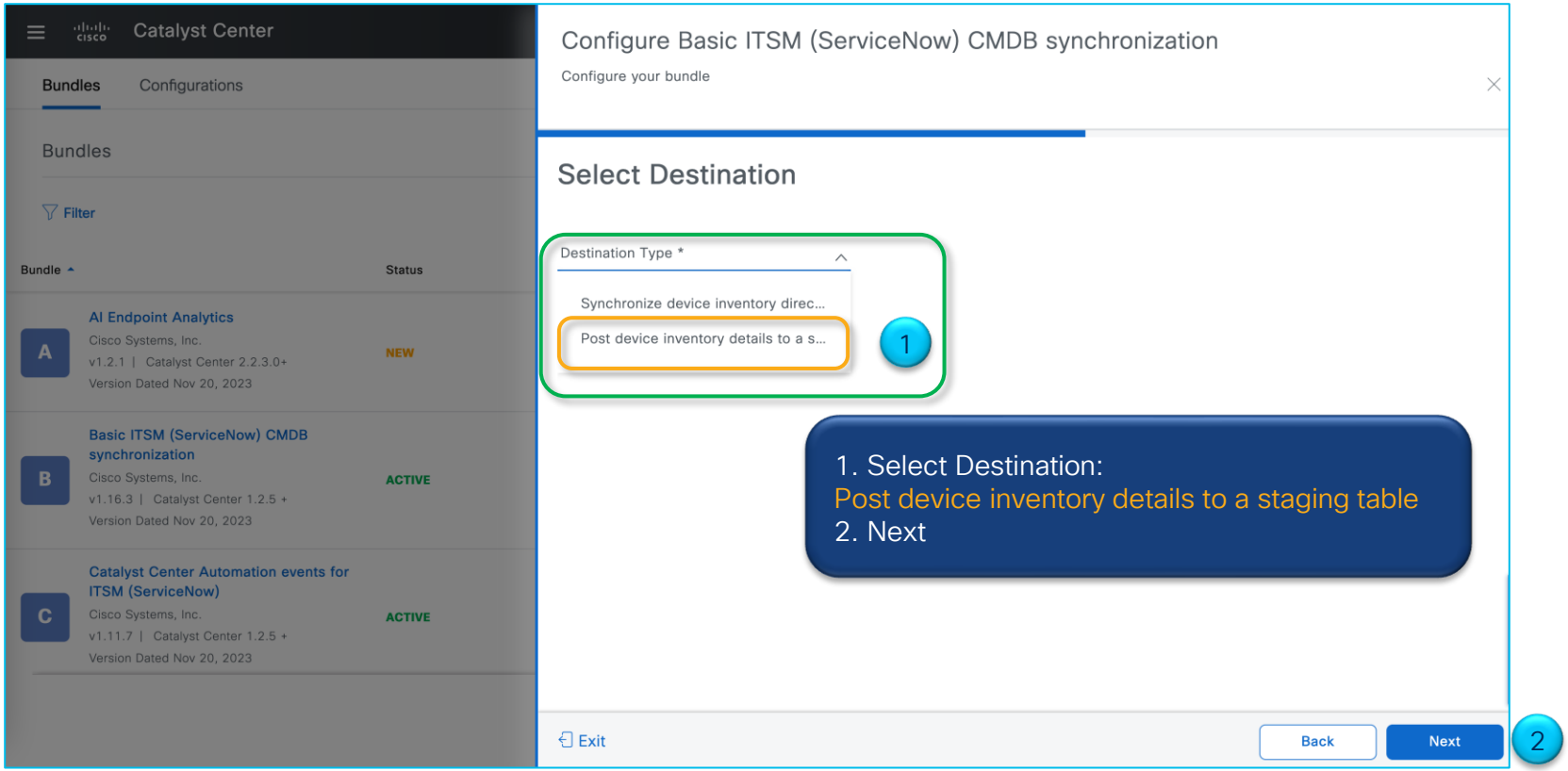
CMDB Sync Bundle Configuration – continued



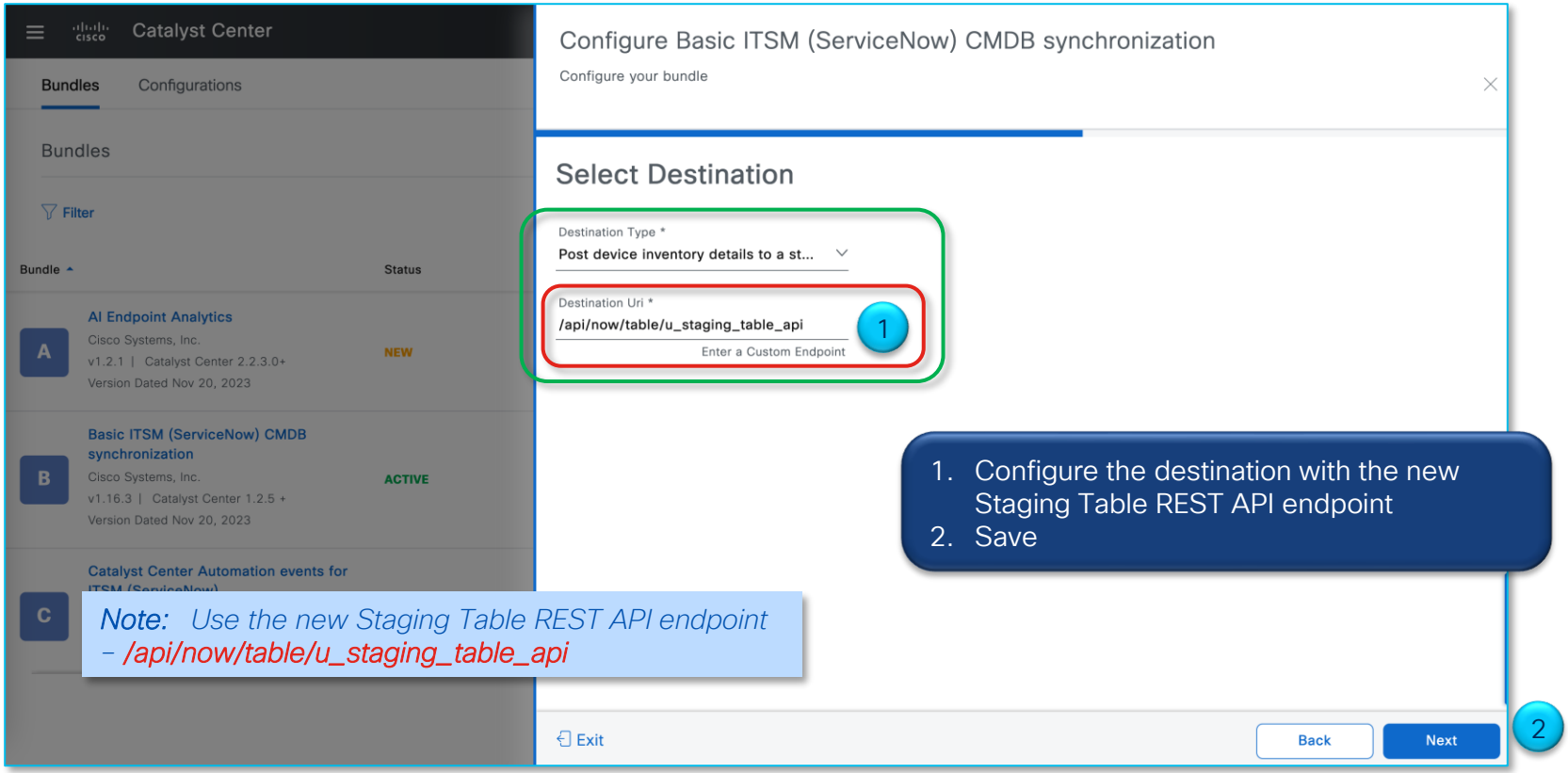
CMDB Sync Bundle Configuration – continued



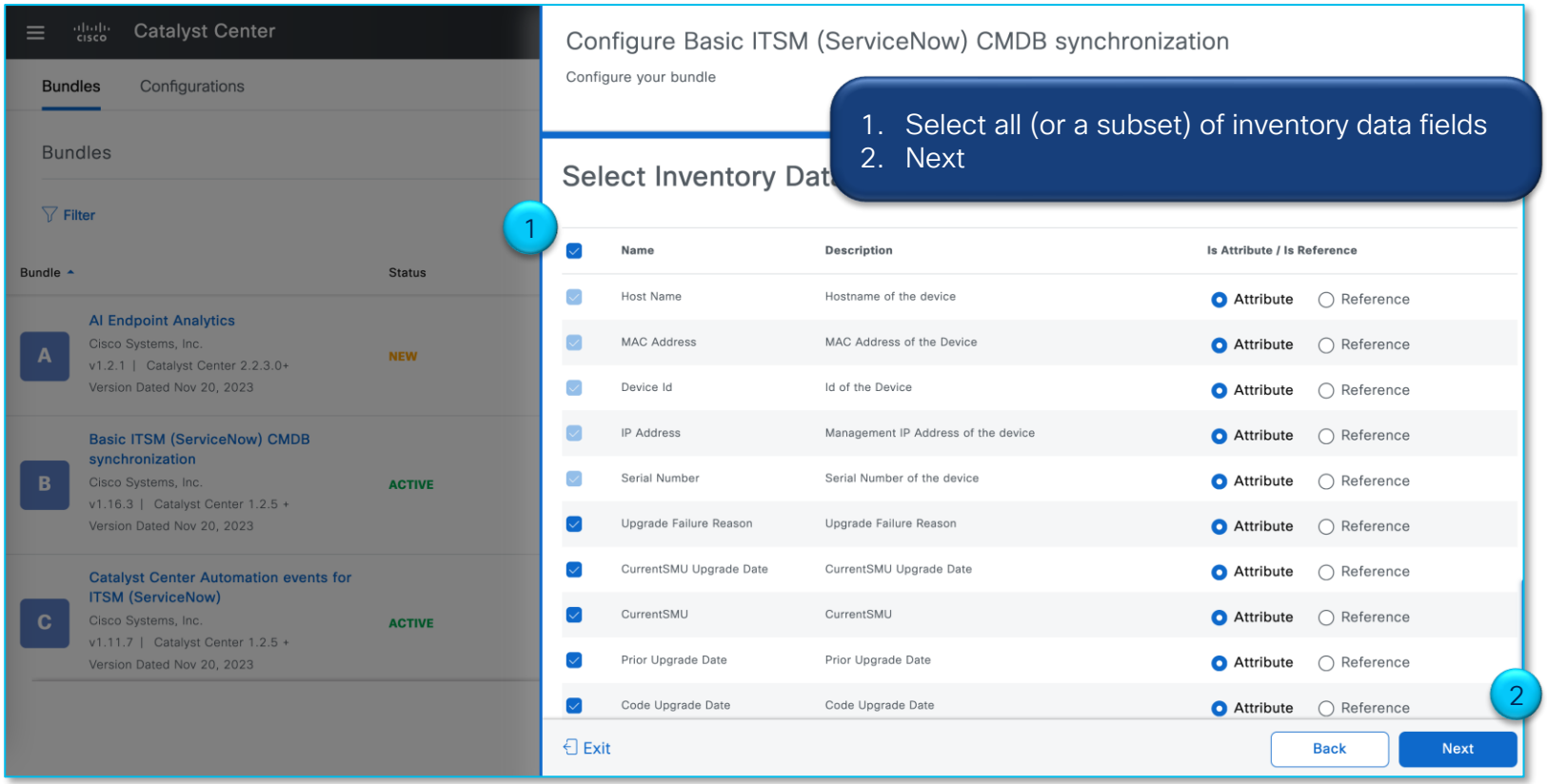
CMDB Sync Bundle Configuration – continued



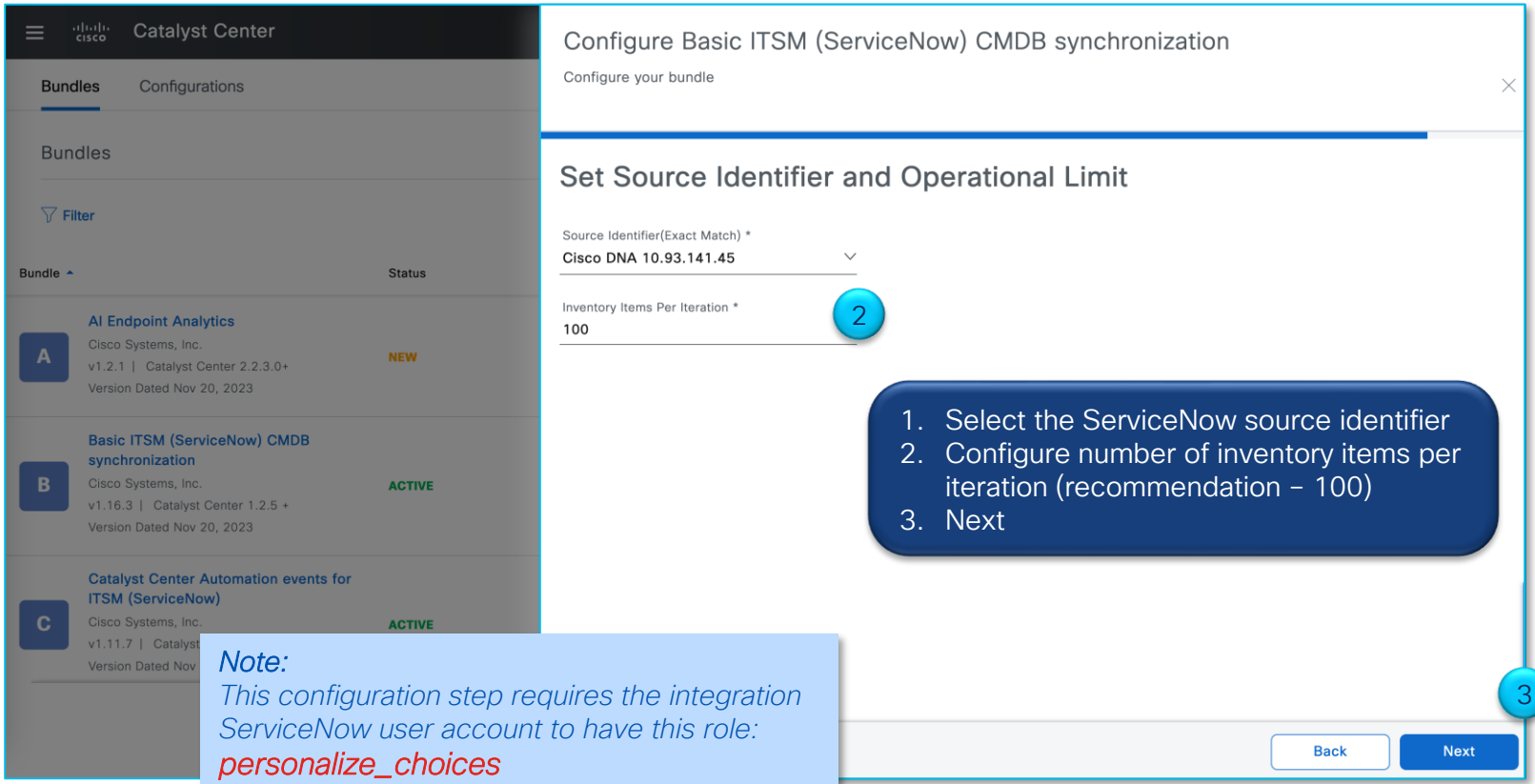
CMDB Sync Bundle Configuration – continued



CMDB Sync Bundle Configuration – continued

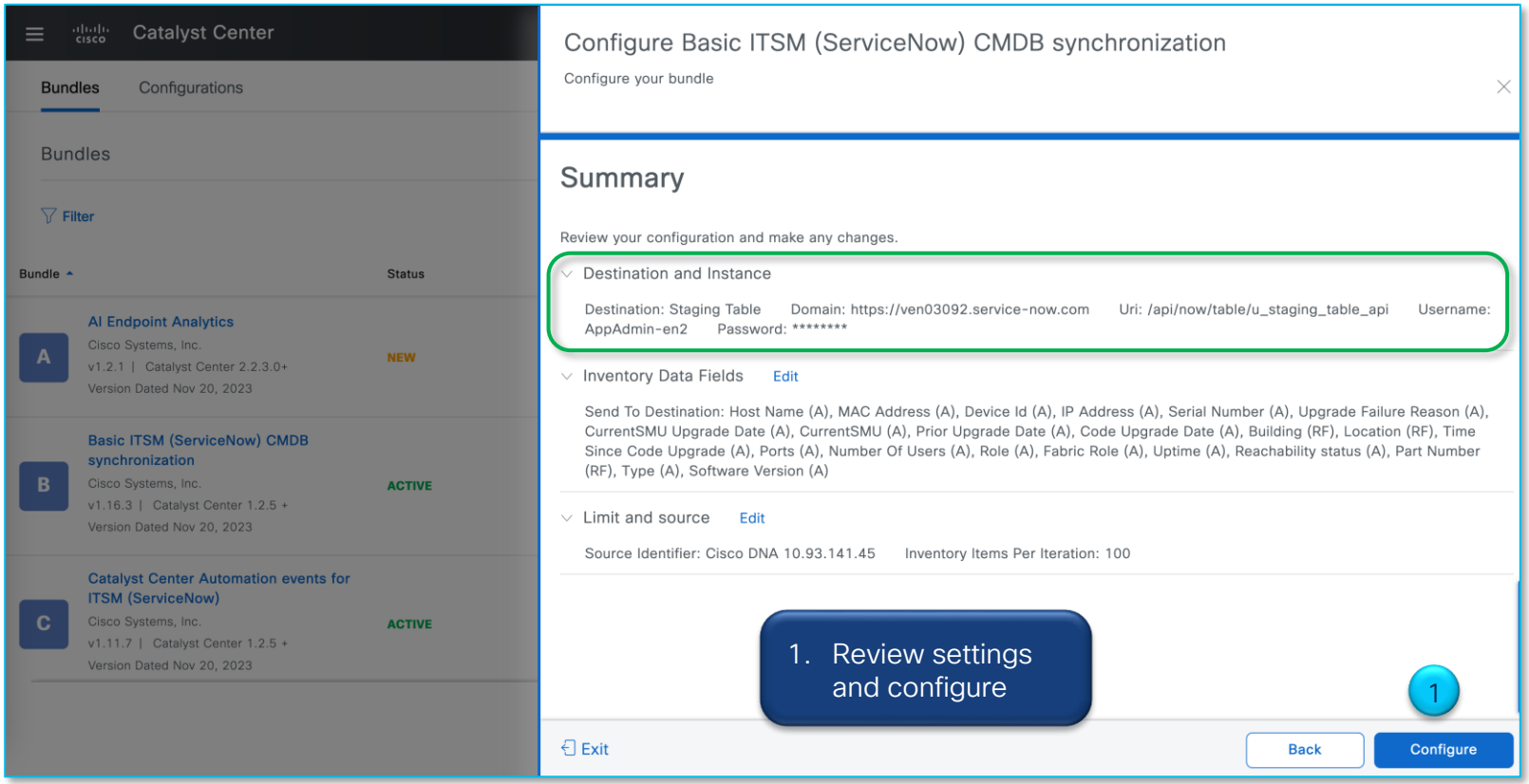


CMDB Sync Bundle Configuration – continued

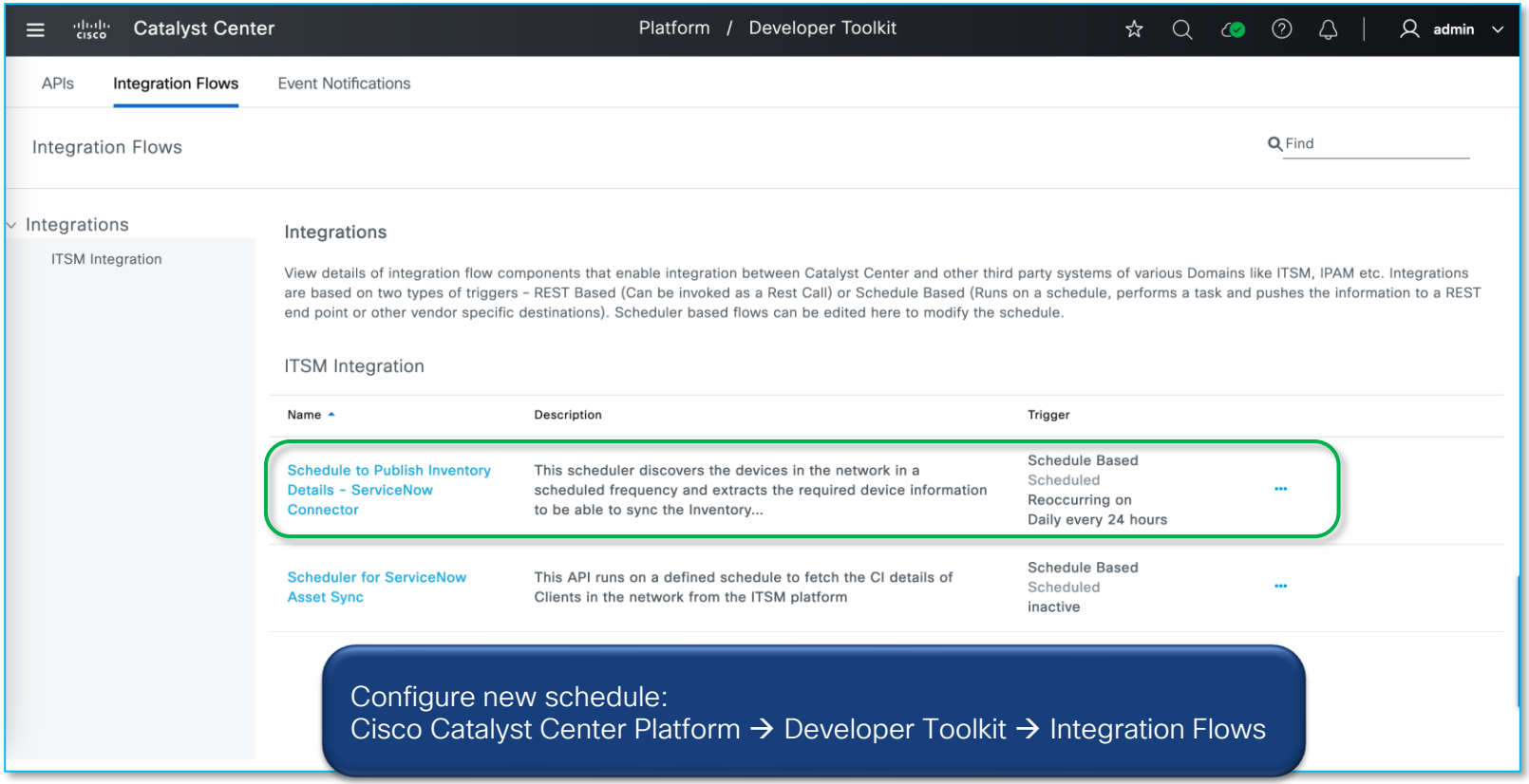


Note:
This configuration step requires the integration ServiceNow user account to have this role:
personalize_choices

CMDB Sync Bundle Configuration – continued

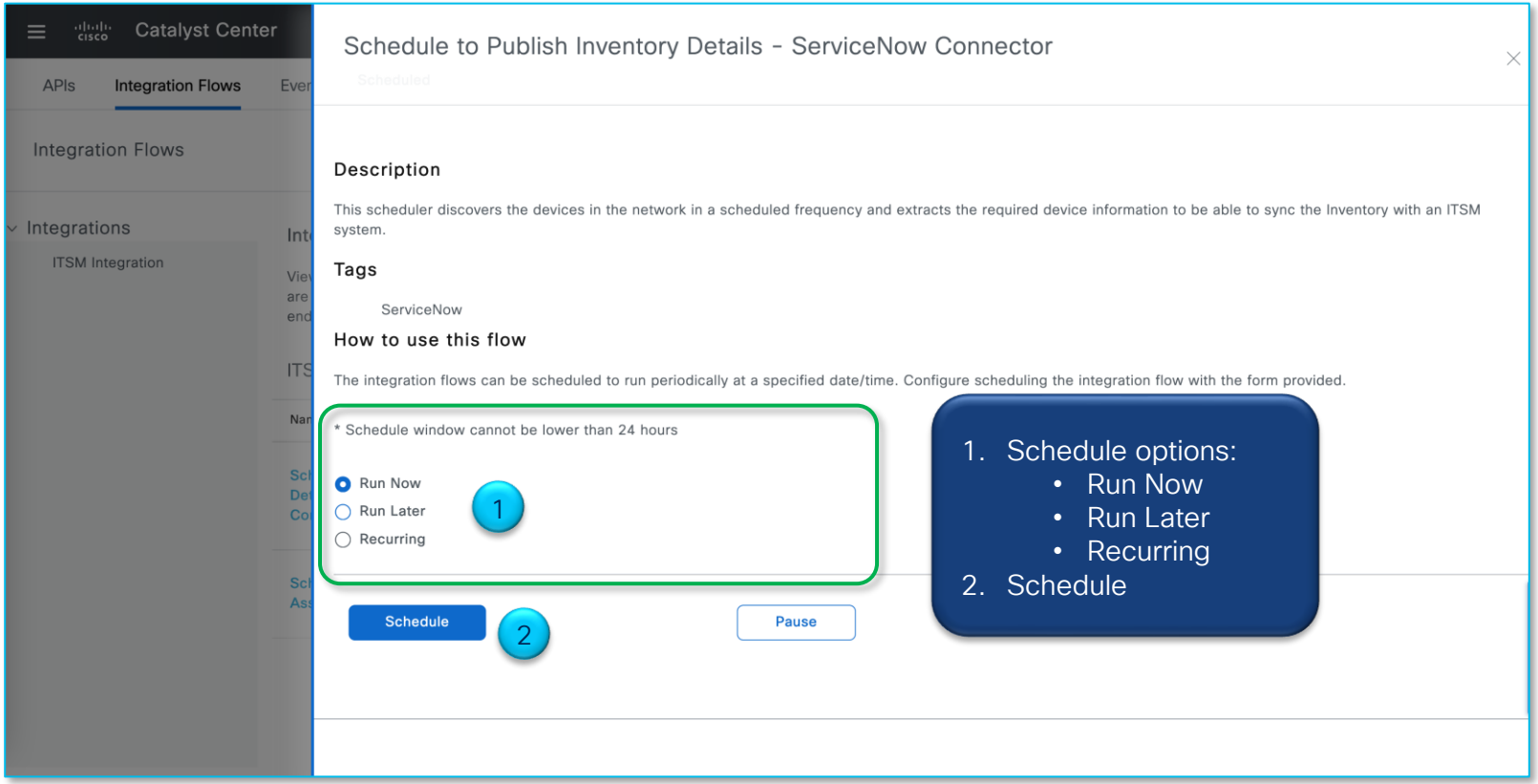


CMDB Sync Schedule Configuration

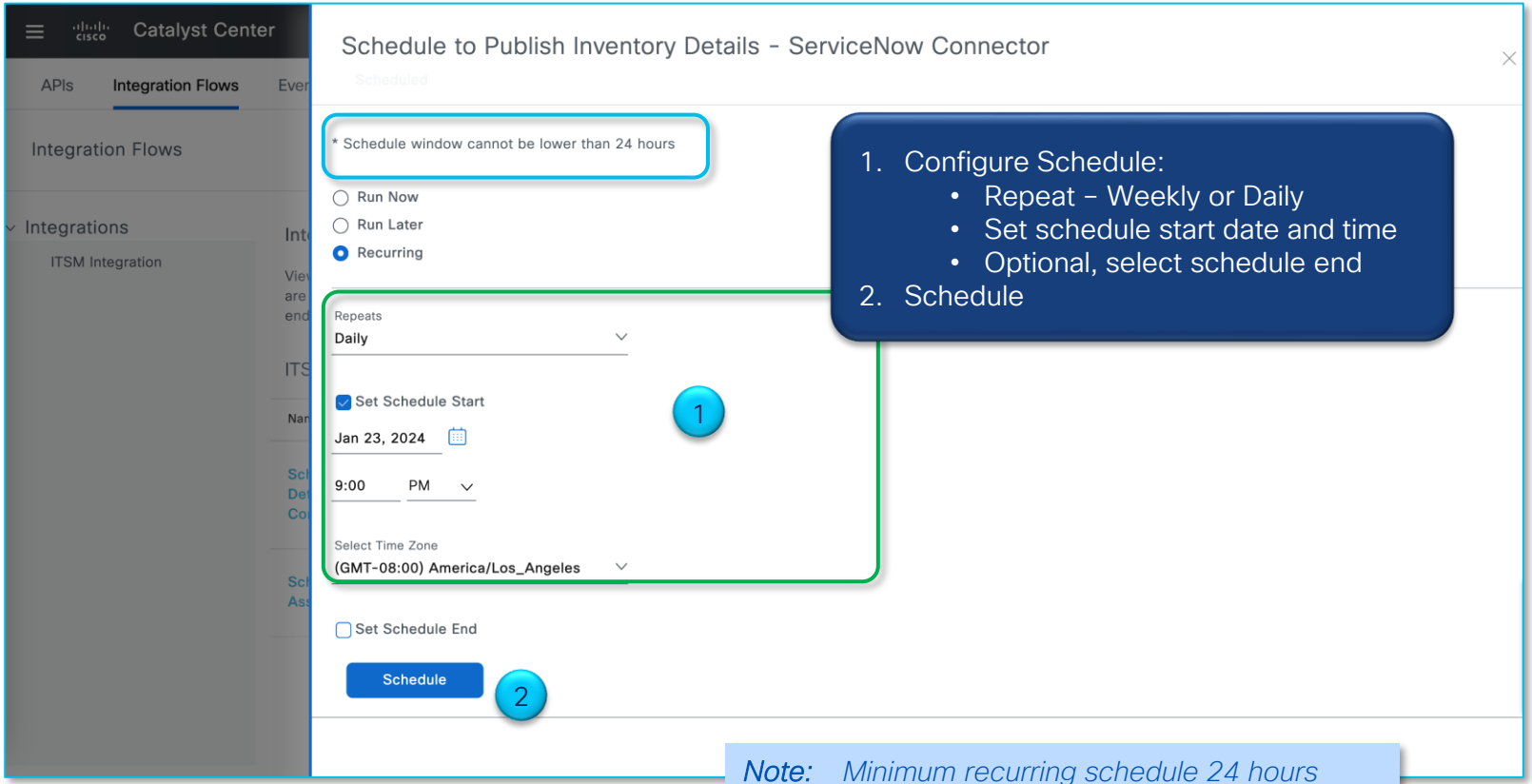


Configure new schedule:
Cisco Catalyst Center Platform → Developer Toolkit → Integration Flows

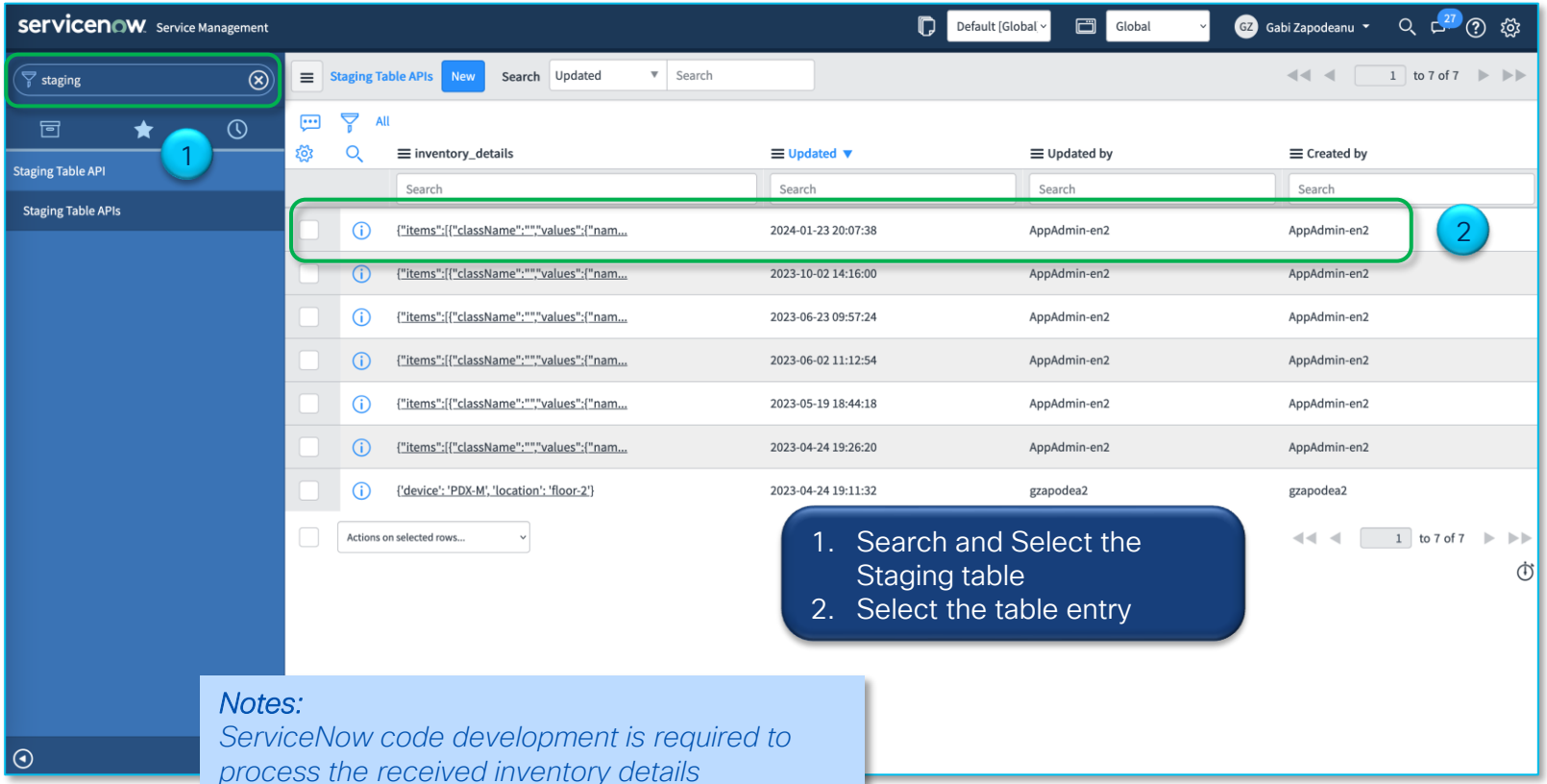
CMDB Sync Schedule Configuration – continued



CMDB Sync Schedule Configuration – Recurring

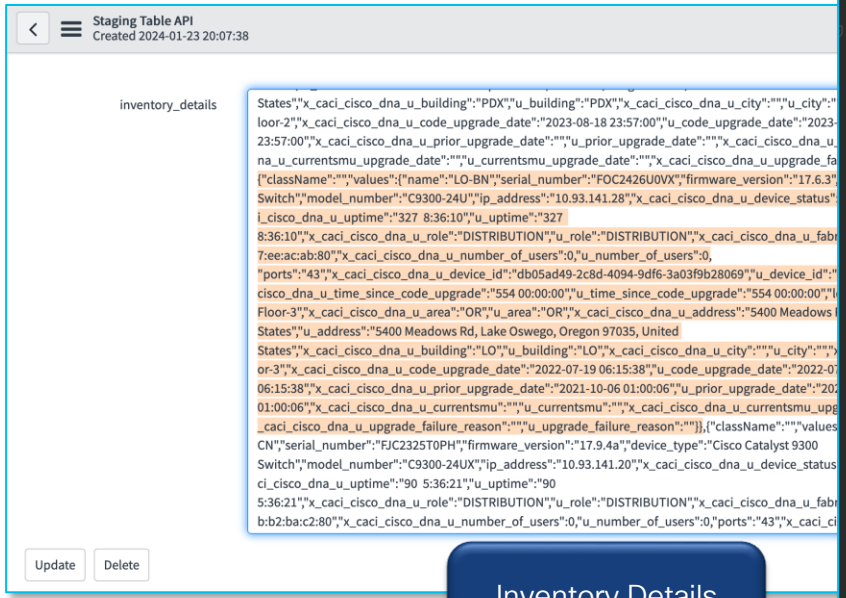


Verify CMDB Inventory in the Staging Table



Notes:
ServiceNow code development is required to process the received inventory details

Verify CMDB Inventory in the Staging Table



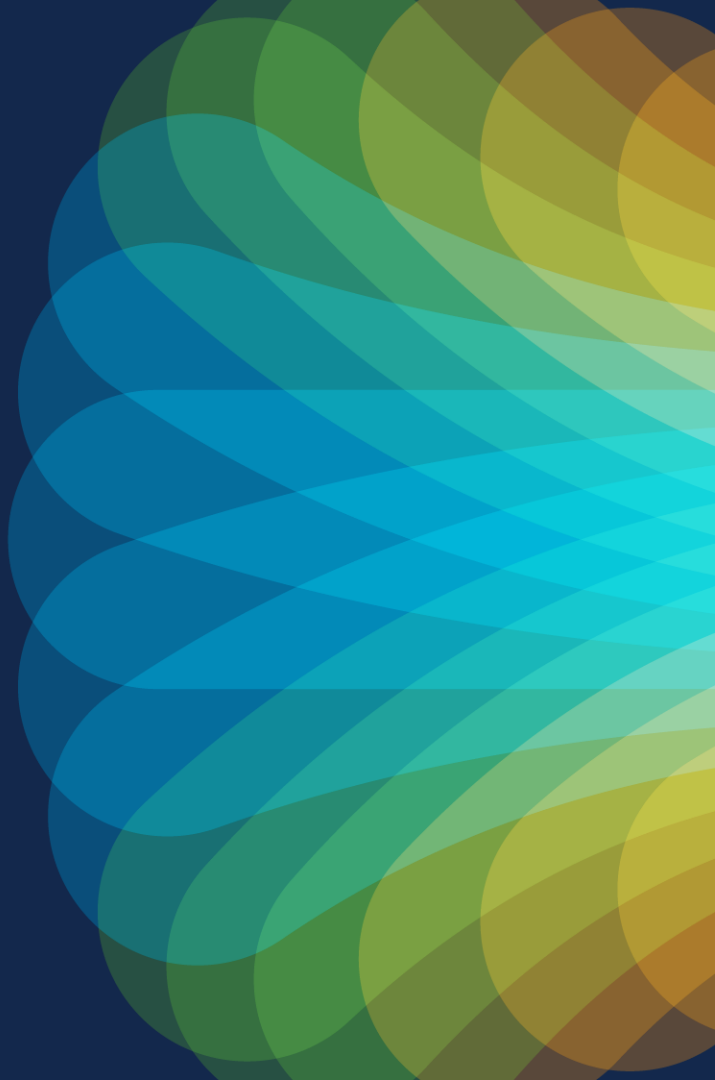
Inventory Details

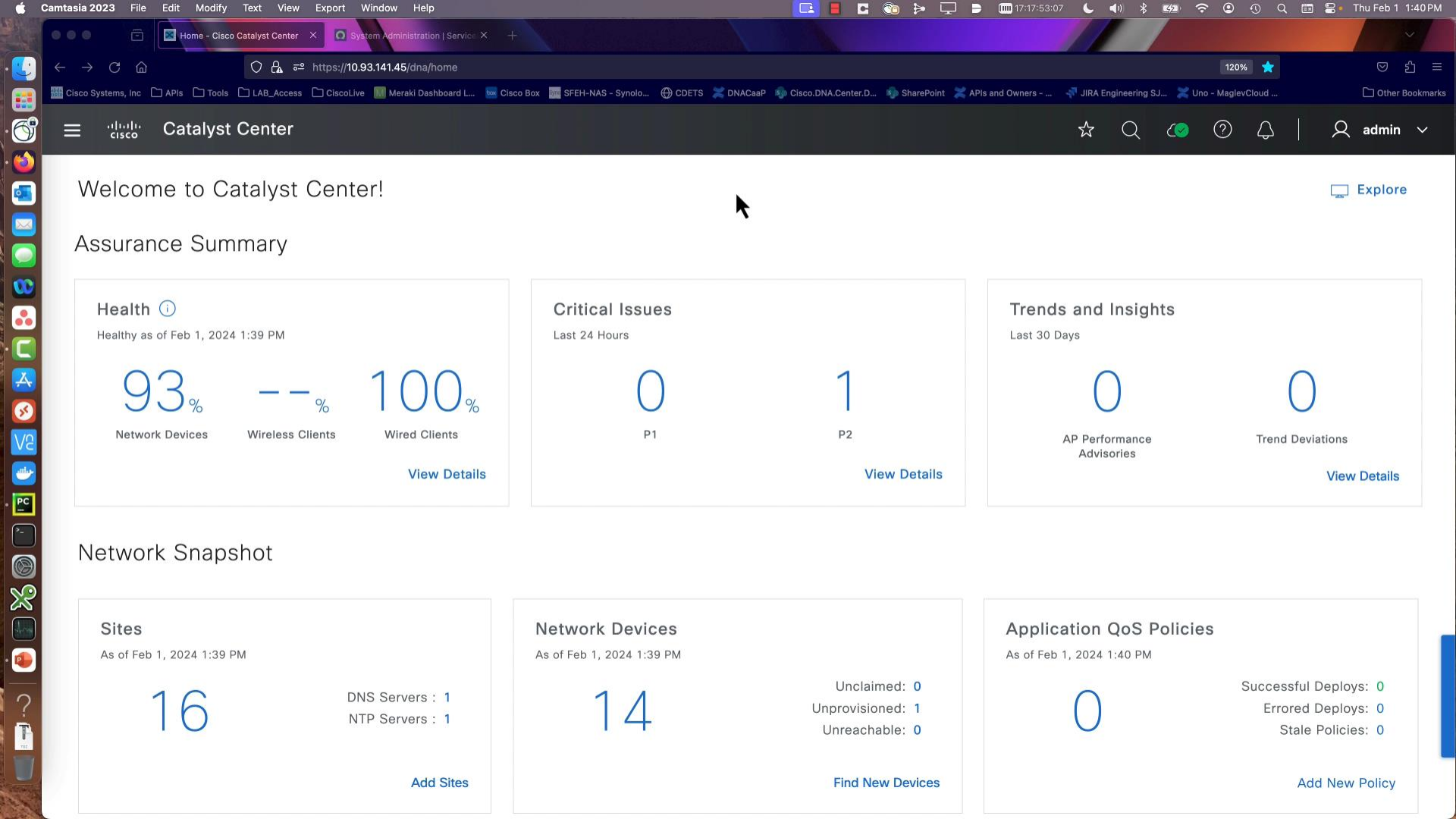

```
{
  "className": "",
  "values": {
    "name": "LO-BN",
    "serial_number": "FOC2426U0VX",
    "firmware_version": "17.6.3",
    "device_type": "Cisco Catalyst 9300 Switch",
    "model_number": "C9300-24U",
    "ip_address": "10.93.141.28",
    "x_caci_cisco_dna_u_device_status": "Reachable",
    "u_device_status": "Reachable",
    "x_caci_cisco_dna_u_uptime": "327  8:36:10",
    "u_uptime": "327  8:36:10",
    "x_caci_cisco_dna_u_role": "DISTRIBUTION",
    "u_role": "DISTRIBUTION",
    "x_caci_cisco_dna_u_fabric_role": "",
    "u_fabric_role": "",
    "mac_address": "90:77:ee:ac:ab:80",
    "x_caci_cisco_dna_u_number_of_users": 0,
    "u_number_of_users": 0,
    "ports": "43",
    "x_caci_cisco_dna_u_device_id": "db05ad49-2c8d-4094-9df6-3a03f9b28069",
    "u_device_id": "db05ad49-2c8d-4094-9df6-3a03f9b28069",
    "x_caci_cisco_dna_u_time_since_code_upgrade": "554 00:00:00",
    "u_time_since_code_upgrade": "554 00:00:00",
    "location": "Global/OR/LO/Floor-3",
    "x_caci_cisco_dna_u_area": "OR",
    "u_area": "OR",
    "x_caci_cisco_dna_u_address": "5400 Meadows Rd, Lake Oswego, Oregon 97035, United States",
    "u_address": "5400 Meadows Rd, Lake Oswego, Oregon 97035, United States",
    "x_caci_cisco_dna_u_building": "LO",
    "u_building": "LO",
```


Device Detail

Notes:
ServiceNow code development is required to process the received inventory details

Demo
CMDB Sync to Staging Table



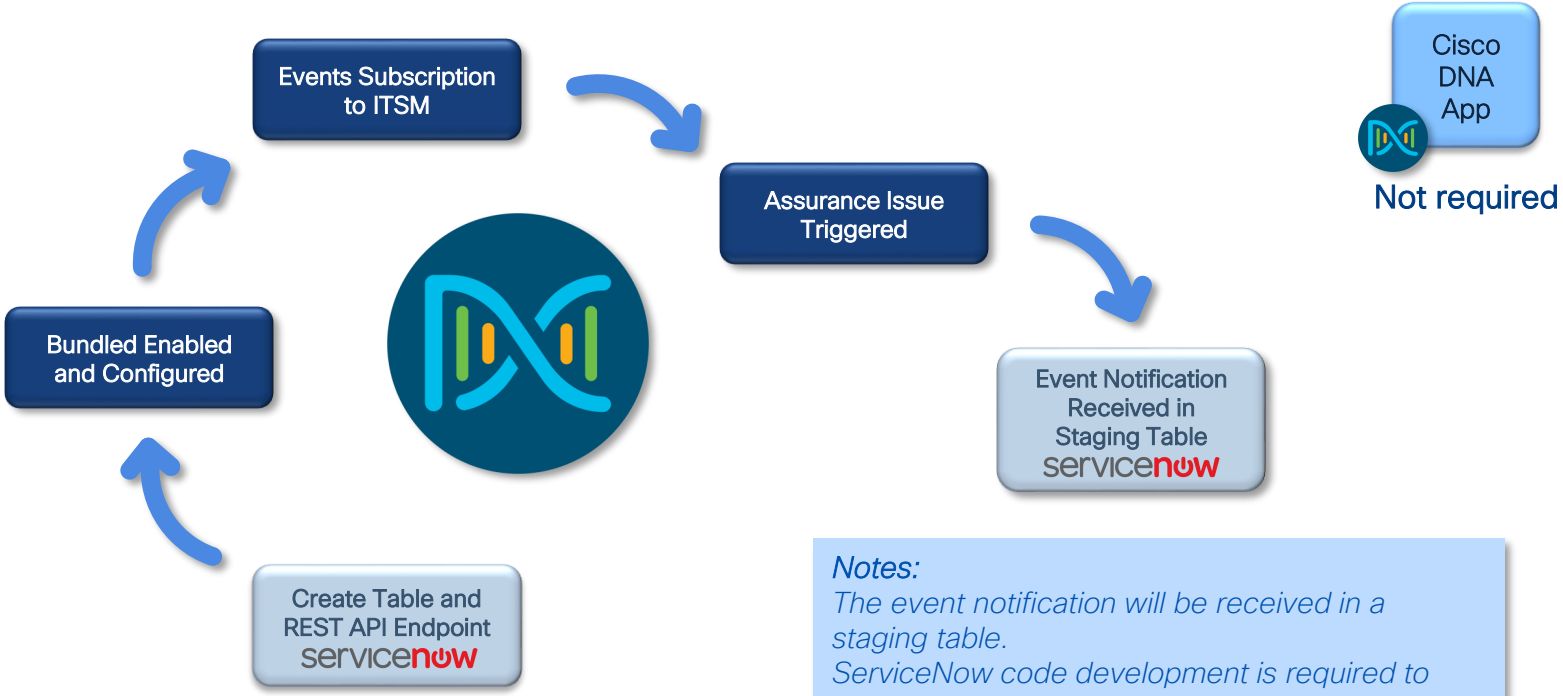

Camtasia 2023 File Edit Modify Text View Export Window Help
Thu Feb 1 1:40 PM
Home - Cisco Catalyst Center
https://10.93.141.45/dna/home
120%
Catalyst Center
admin
Welcome to Catalyst Center!
Explore
Assurance Summary
Health
Healthy as of Feb 1, 2024 1:39 PM
93%
Network Devices
--%
Wireless Clients
100%
Wired Clients
View Details
Critical Issues
Last 24 Hours
0
P1
1
P2
View Details
Trends and Insights
Last 30 Days
0
AP Performance Advisories
0
Trend Deviations
View Details
Network Snapshot
Sites
As of Feb 1, 2024 1:39 PM
16
DNS Servers : 1
NTP Servers : 1
Add Sites
Network Devices
As of Feb 1, 2024 1:39 PM
14
Unclaimed: 0
Unprovisioned: 1
Unreachable: 0
Find New Devices
Application QoS Policies
As of Feb 1, 2024 1:40 PM
0
Successful Deploys: 0
Errored Deploys: 0
Stale Policies: 0
Add New Policy

Agenda

- Cisco Catalyst Center Platform
- ITSM (ServiceNow) Integration Overview
- CMDB Sync to Staging Table
- Events Notifications to Generic REST API Endpoint
- Network Troubleshooting Custom Workflow
- Summary

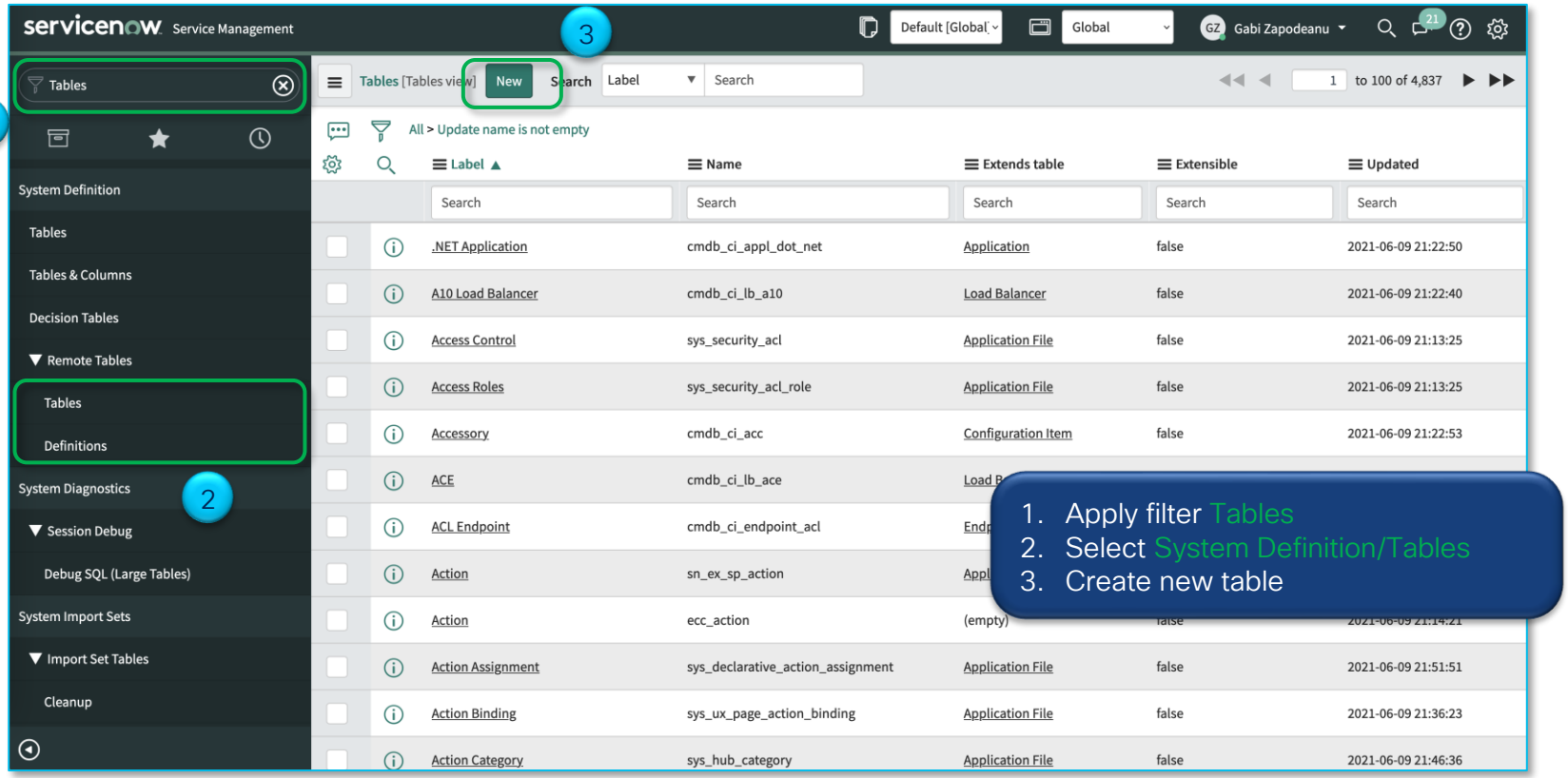
Network Issue Monitor and Enrichment

To Generic REST API Endpoint

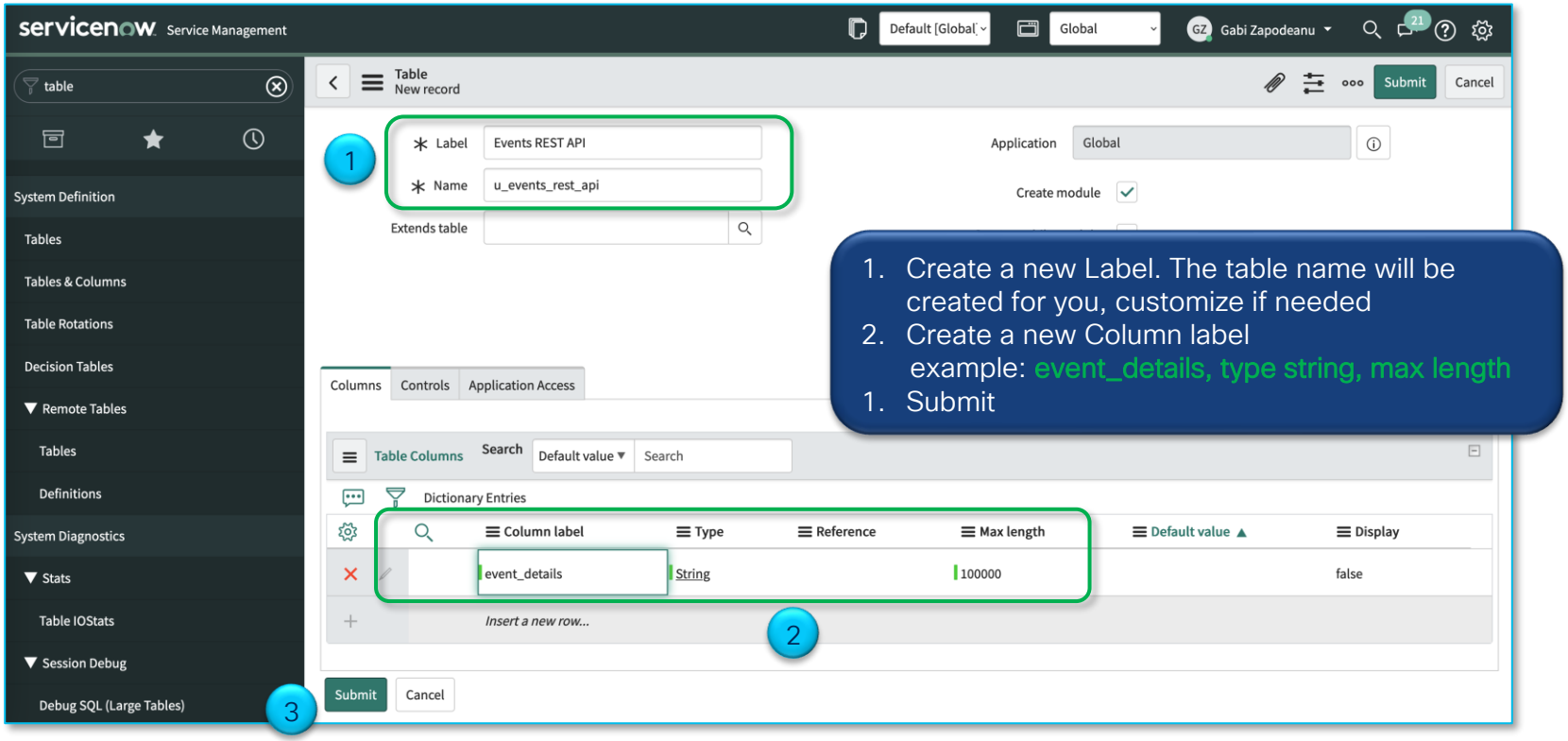


Notes:
The event notification will be received in a staging table.
ServiceNow code development is required to handle these event notifications.
MID server not required

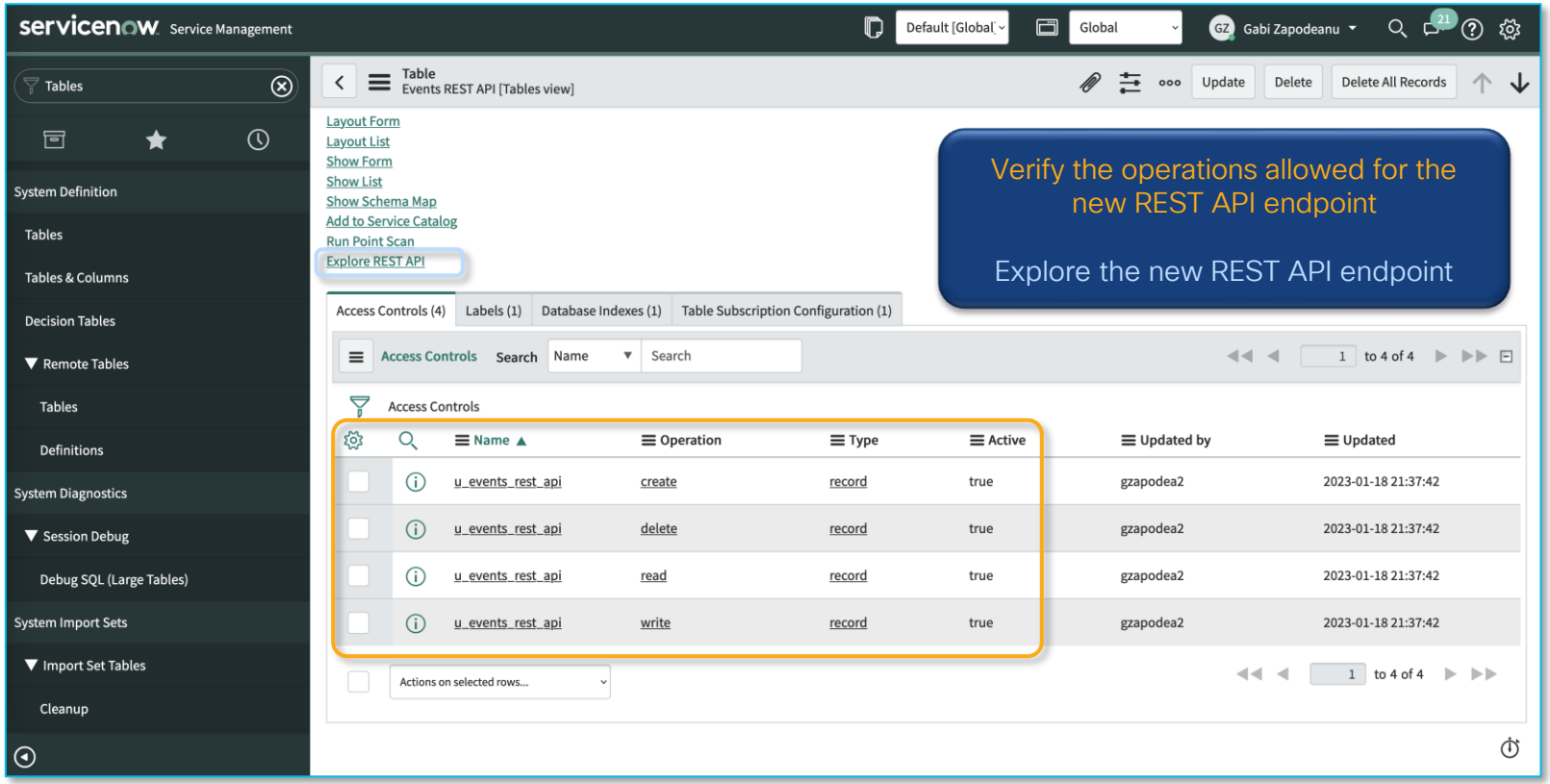
ServiceNow Create New Table



ServiceNow Create Table and REST API Endpoint

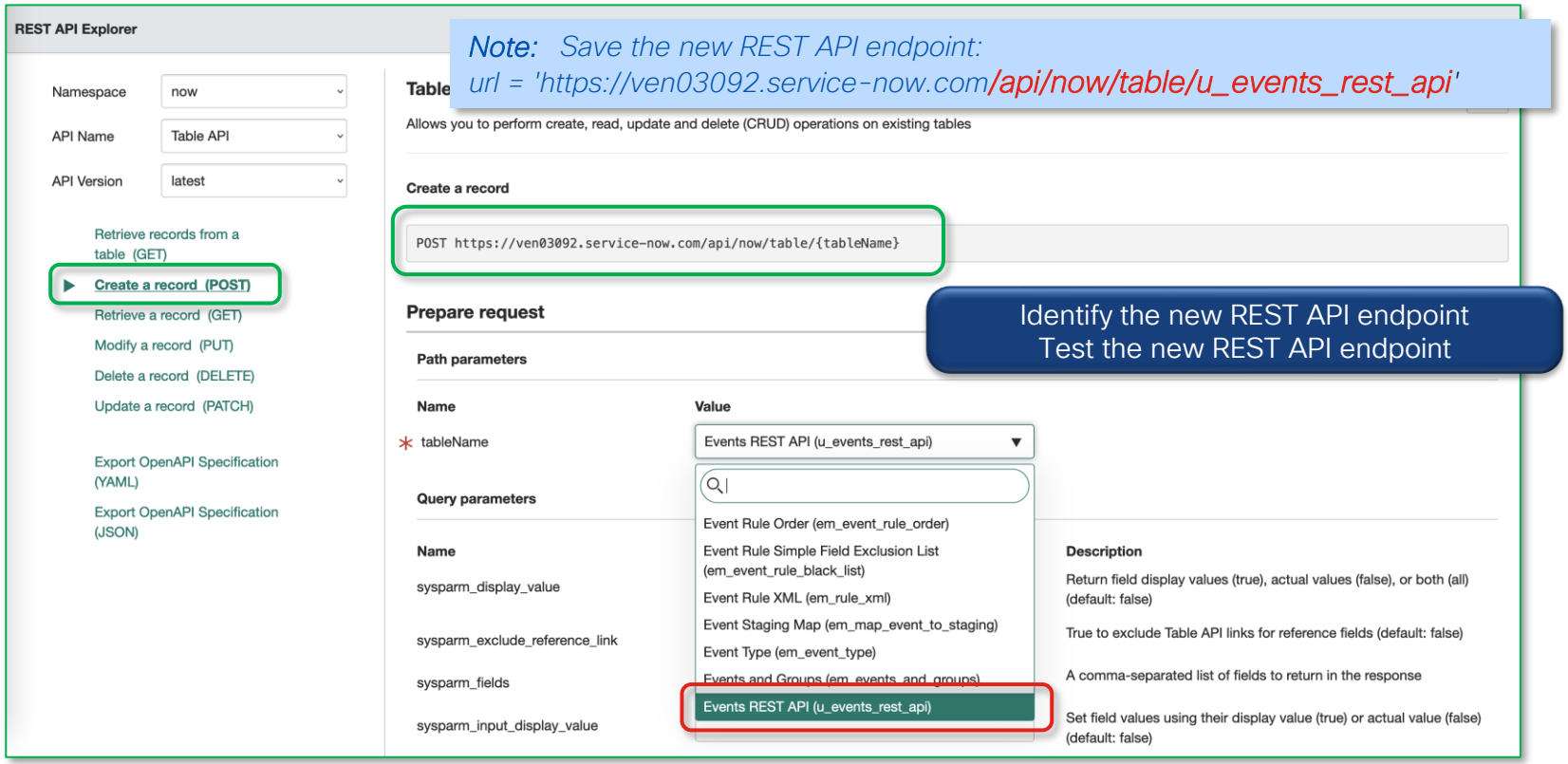


ServiceNow New REST API Endpoint

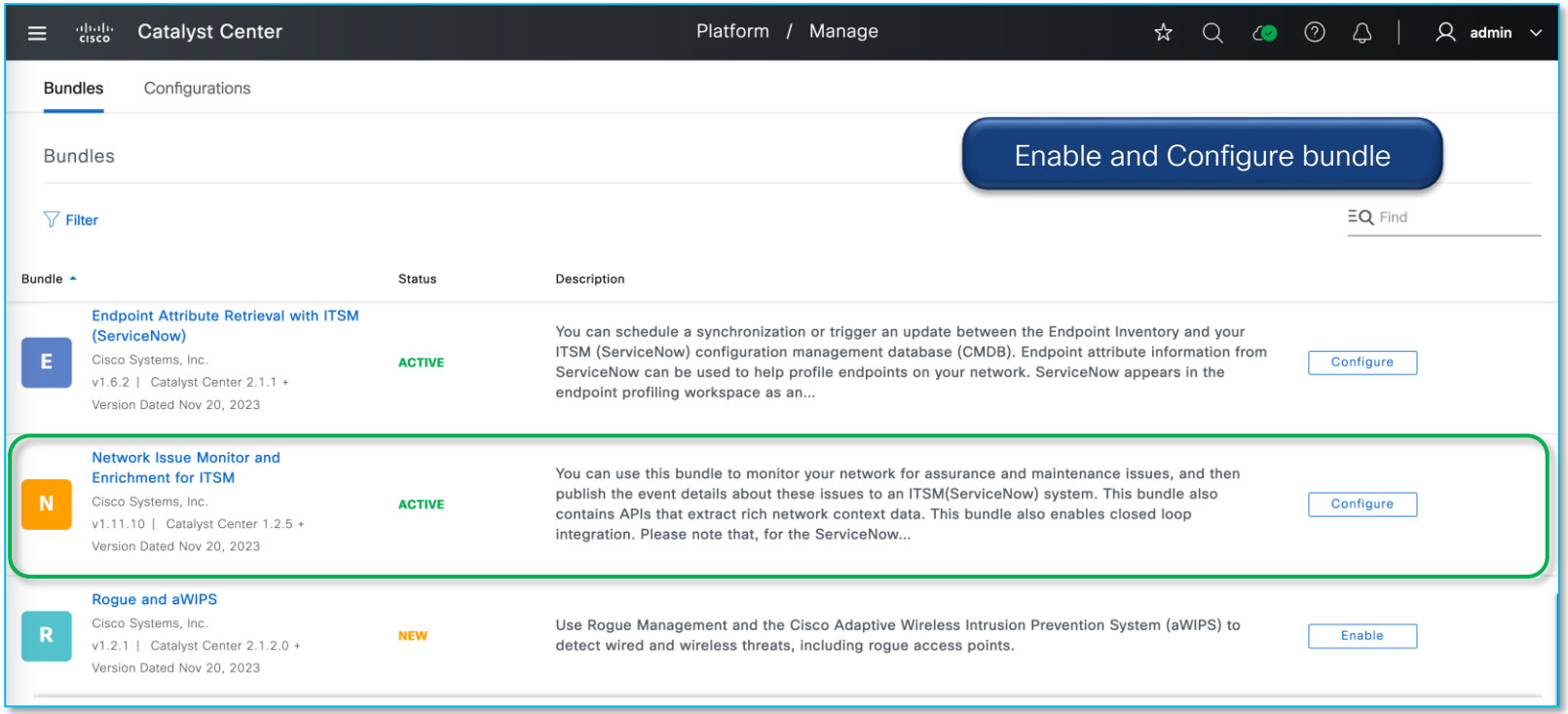


ServiceNow New REST API Endpoint – continued

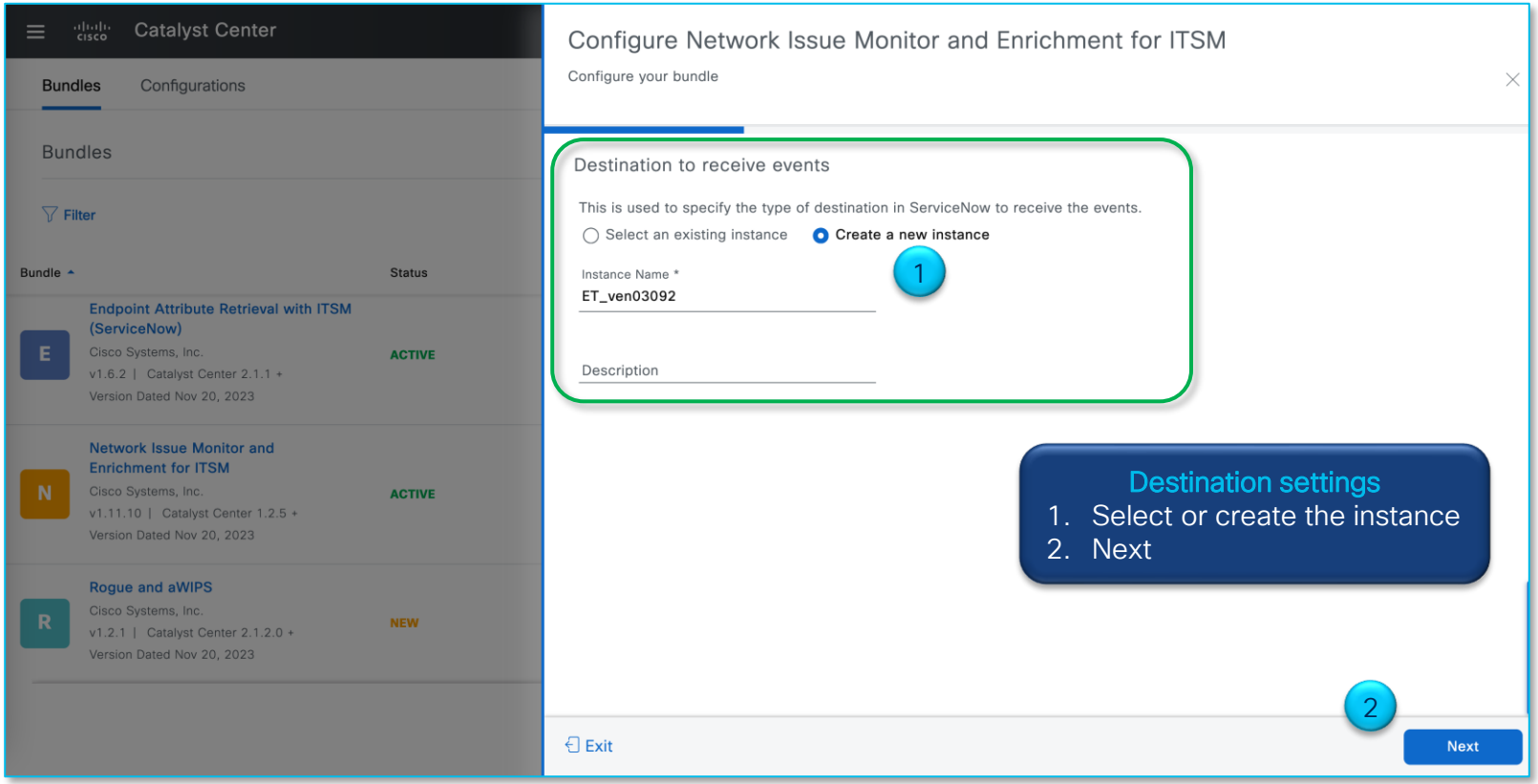
REST API Explorer



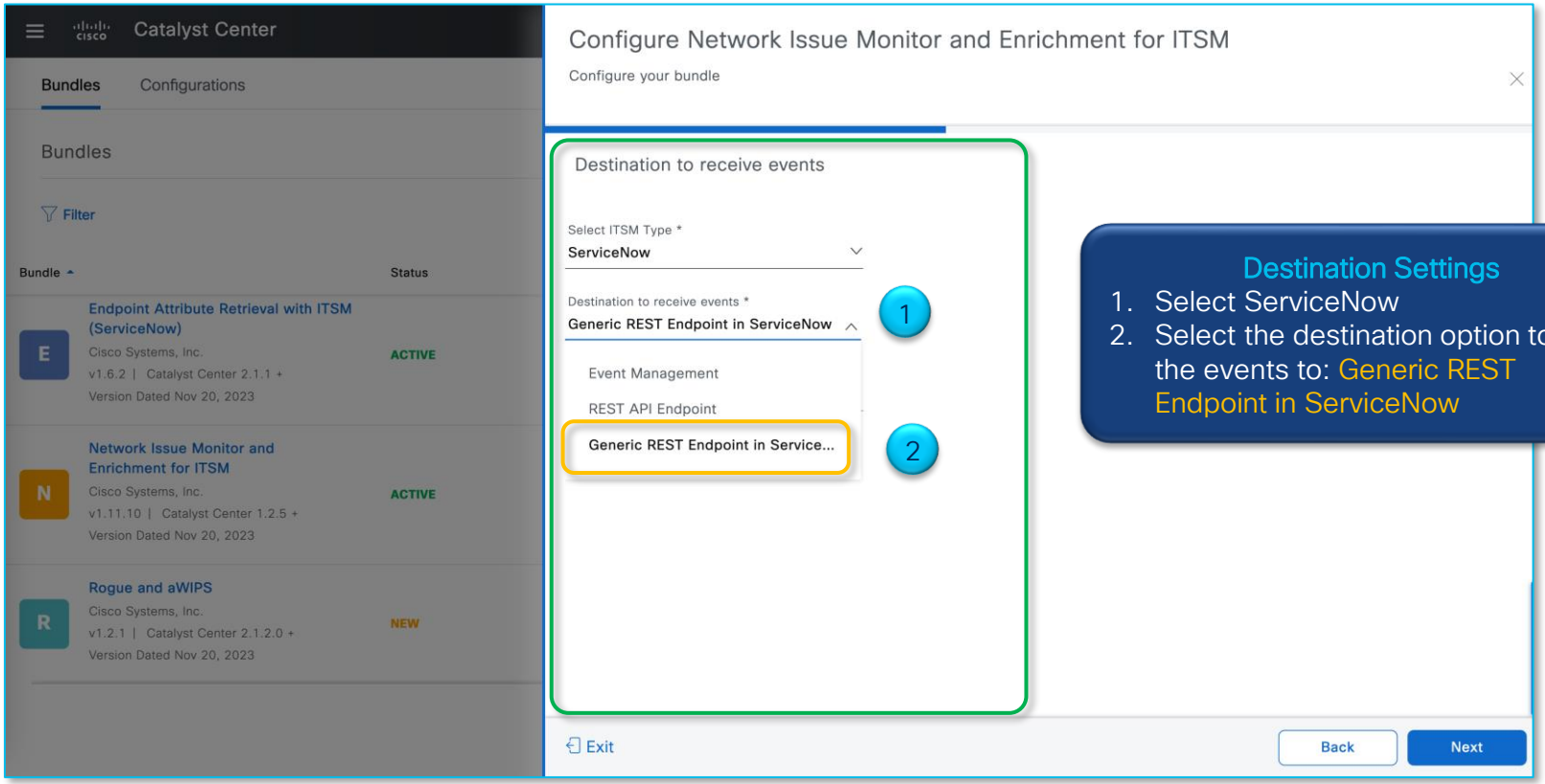
Network Issue Monitor and Enrichment Configuration



Network Issue Monitor and Enrichment Configuration



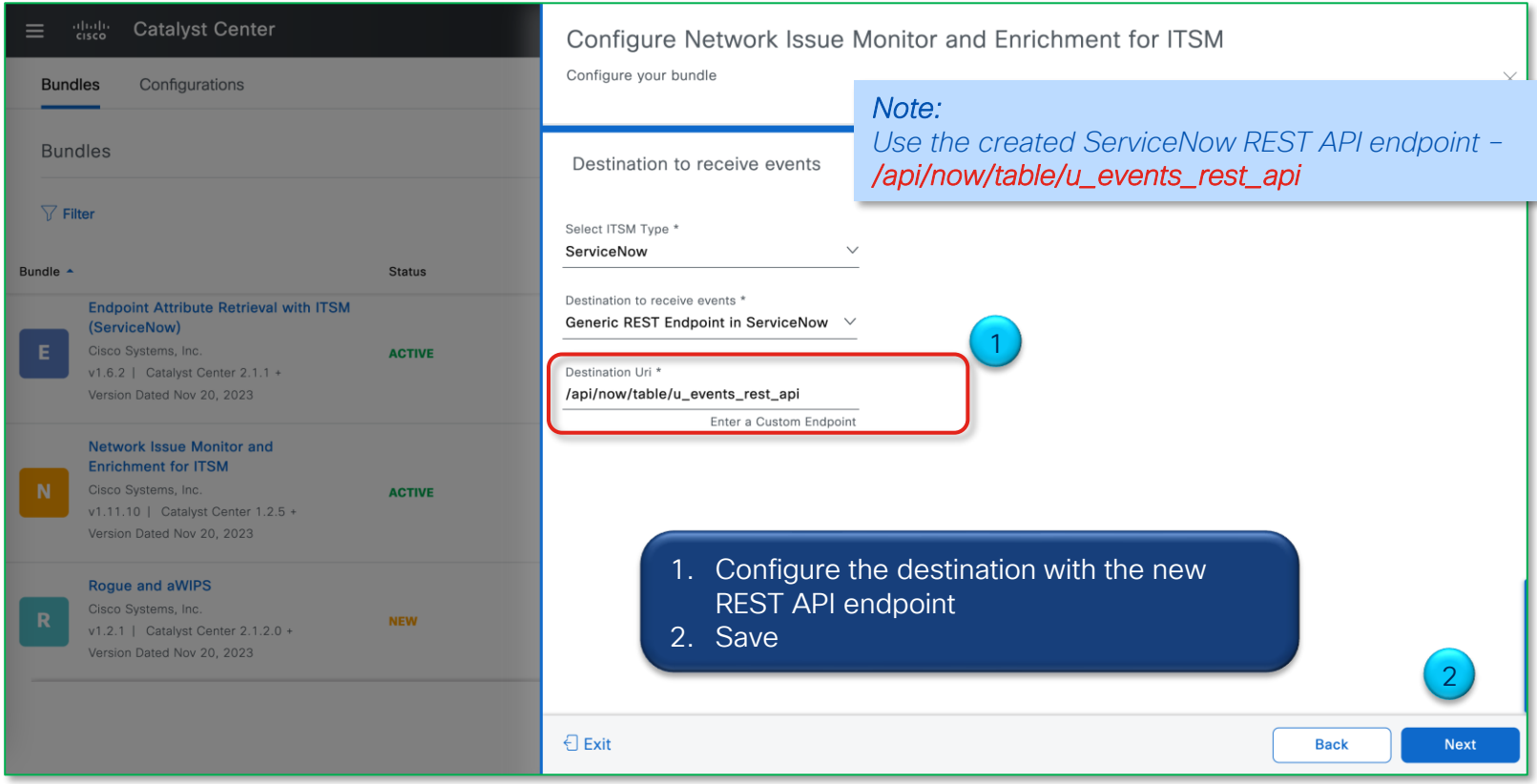
Network Issue Monitor and Enrichment Configuration



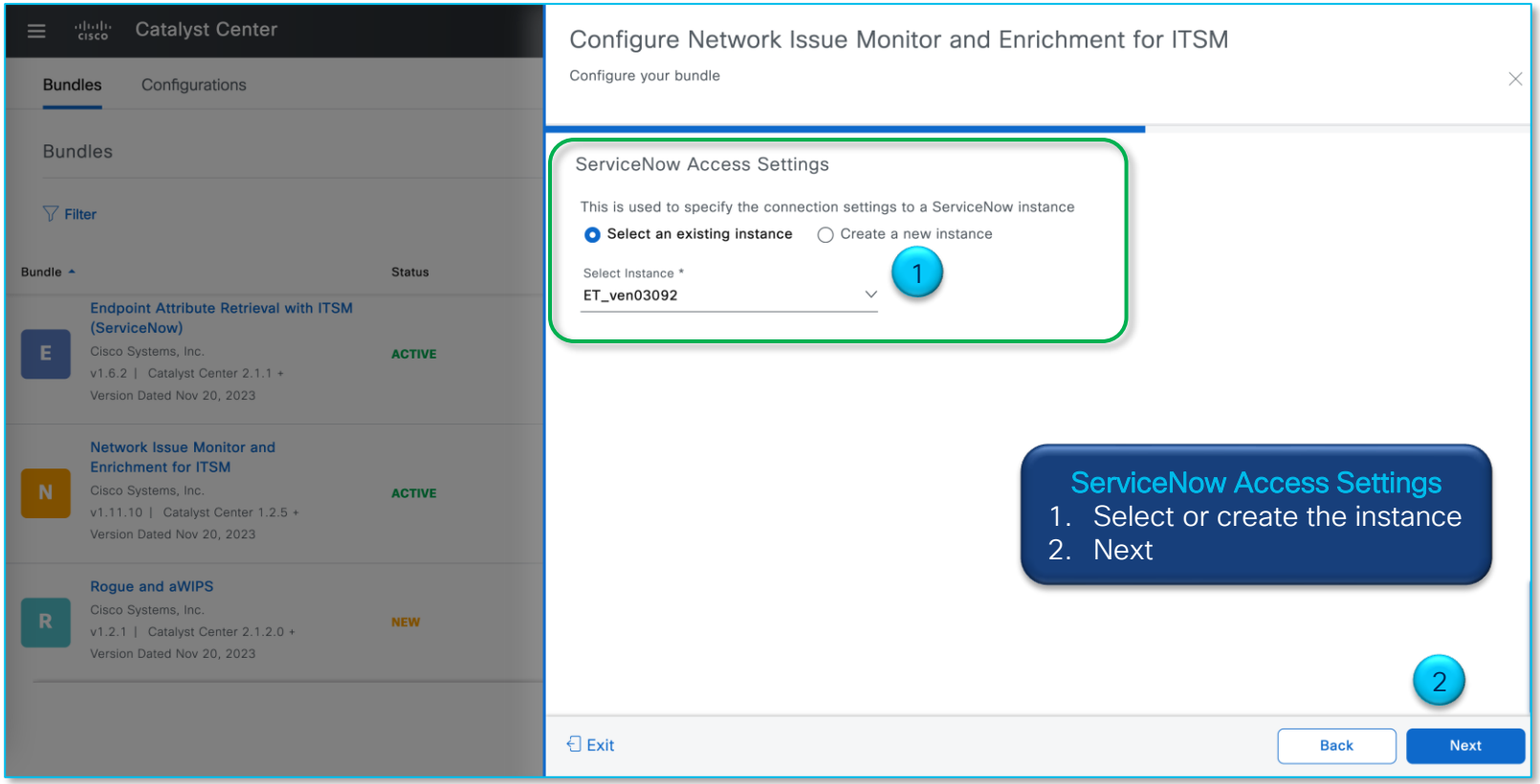
Destination Settings

1. Select ServiceNow
2. Select the destination option to send the events to: Generic REST Endpoint in ServiceNow

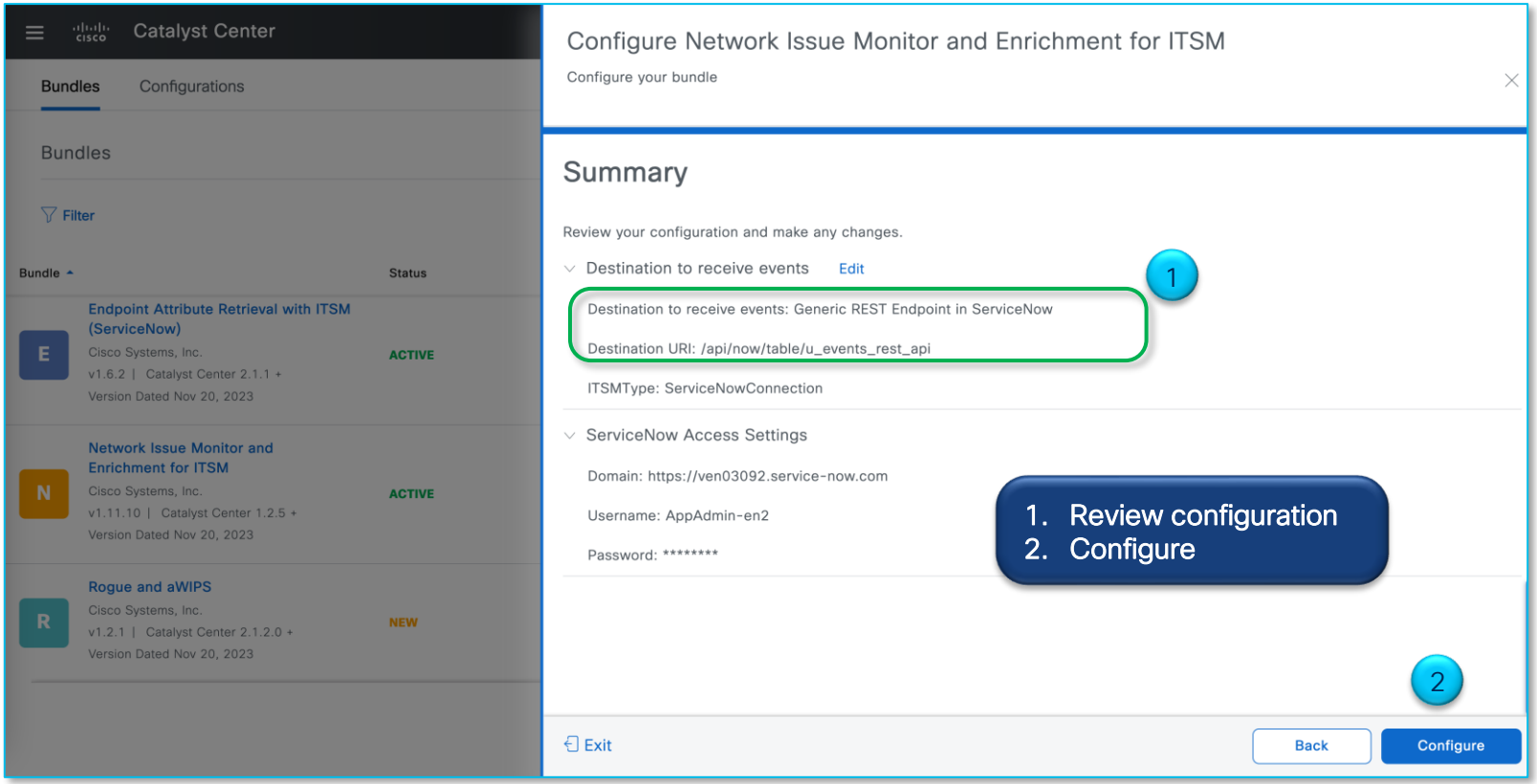
Network Issue Monitor and Enrichment Configuration



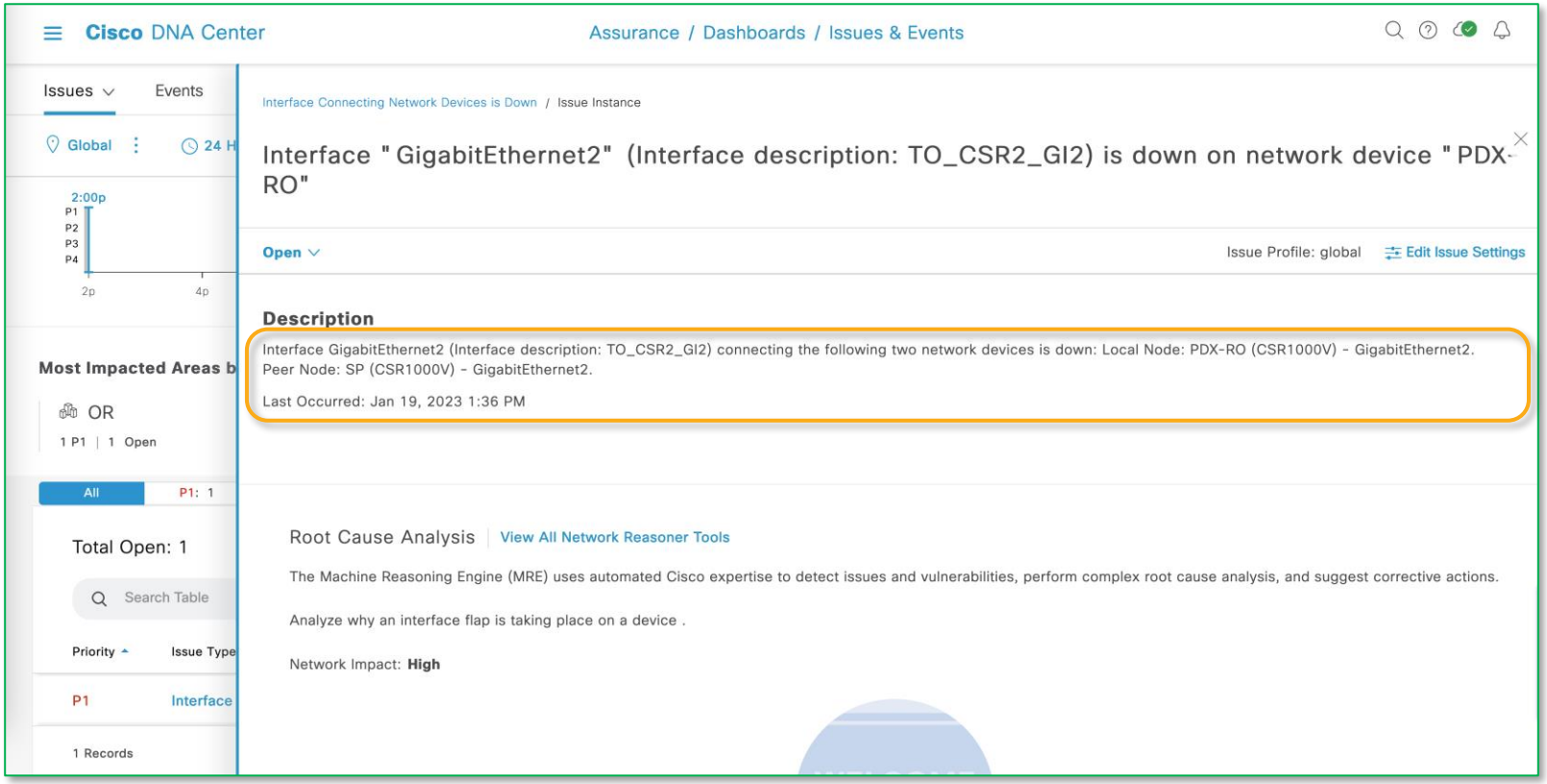
Network Issue Monitor and Enrichment Configuration



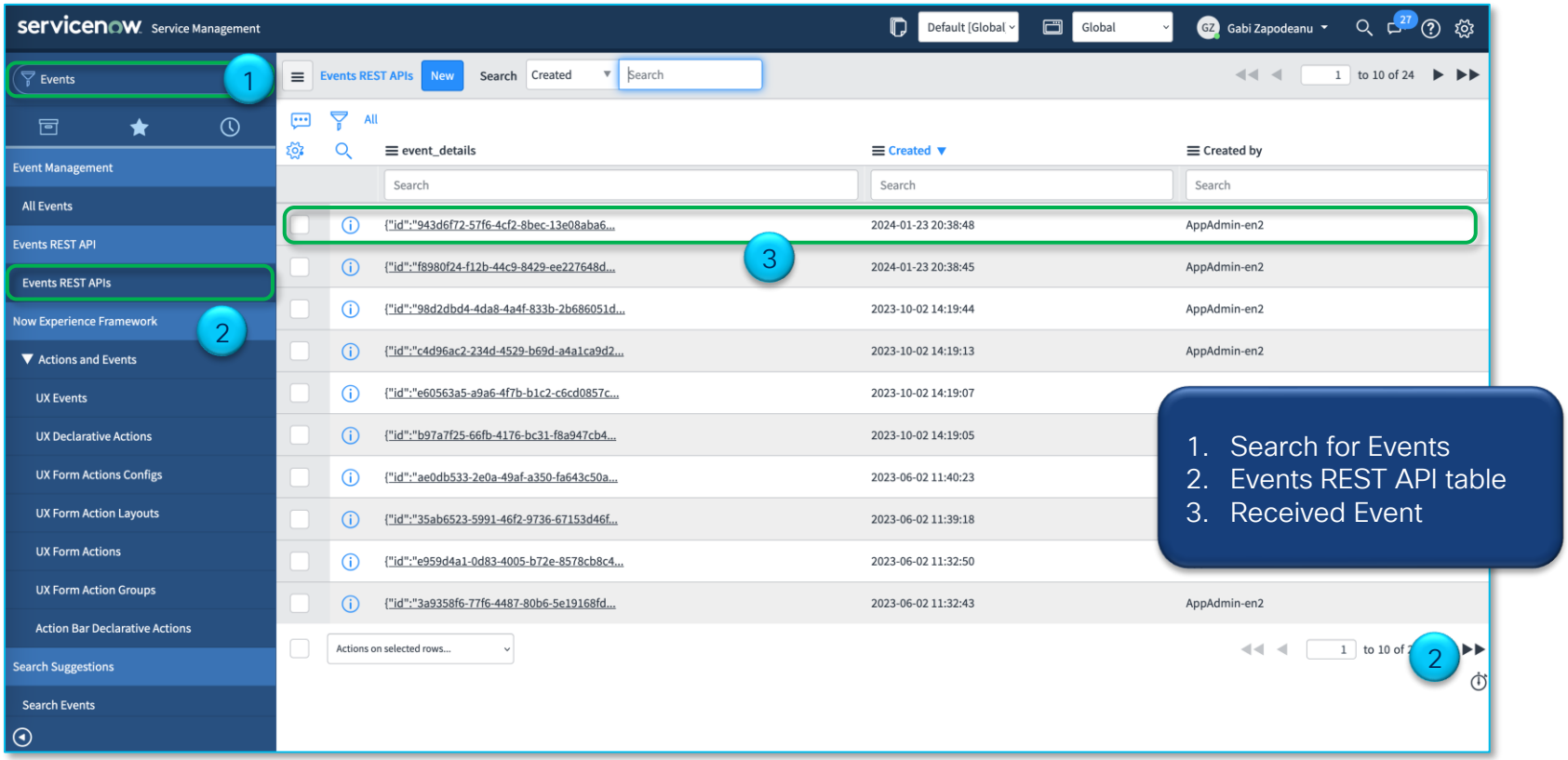
Network Issue Monitor and Enrichment Configuration



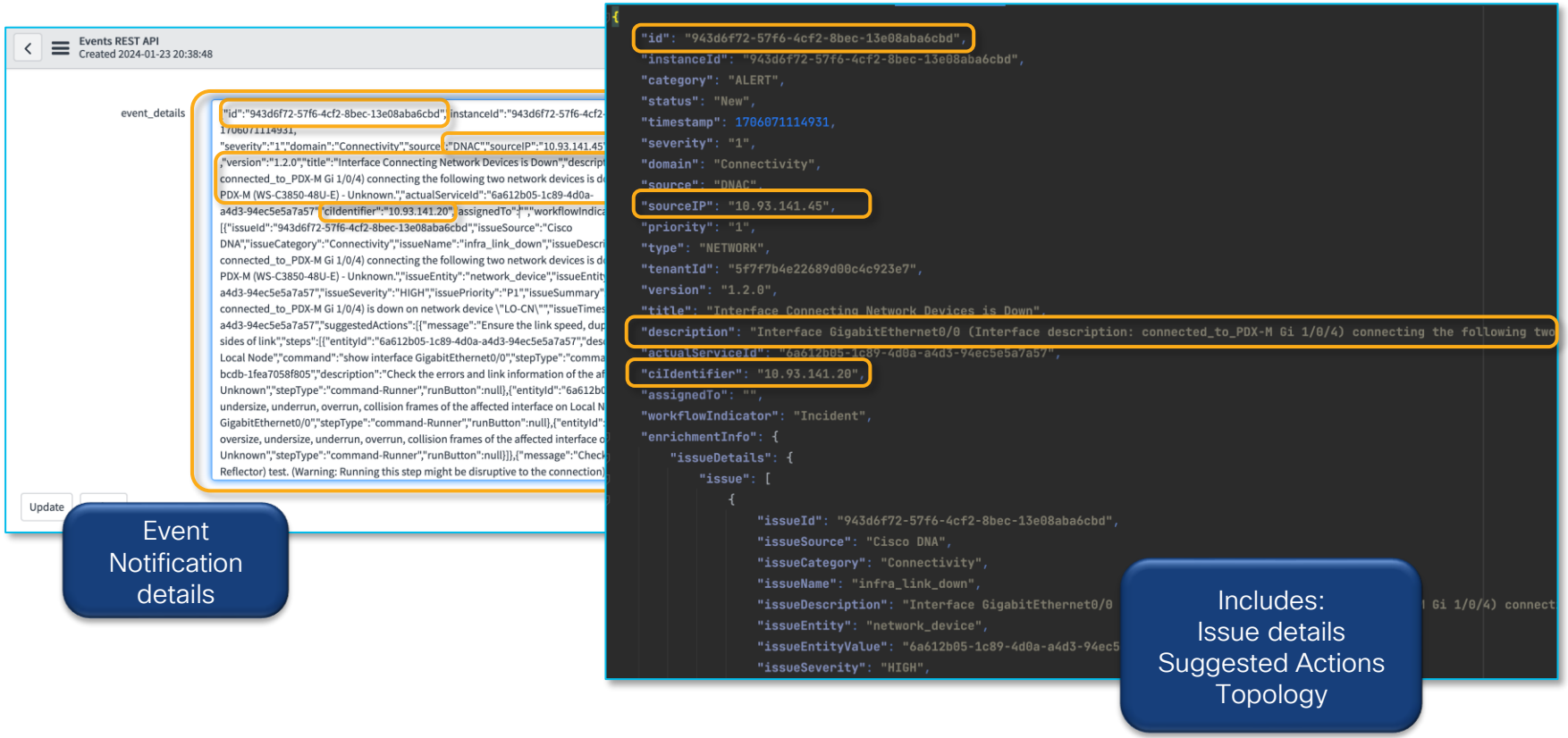
Trigger a Cisco Catalyst Center Assurance Issue



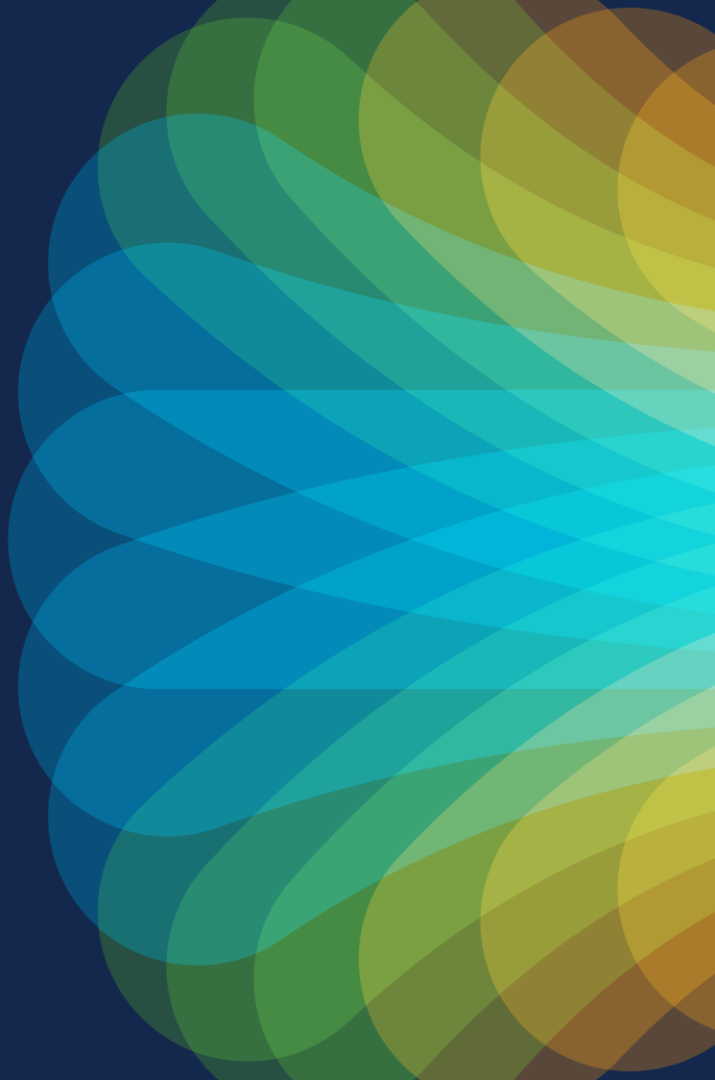
Verify Received Events in the New Table

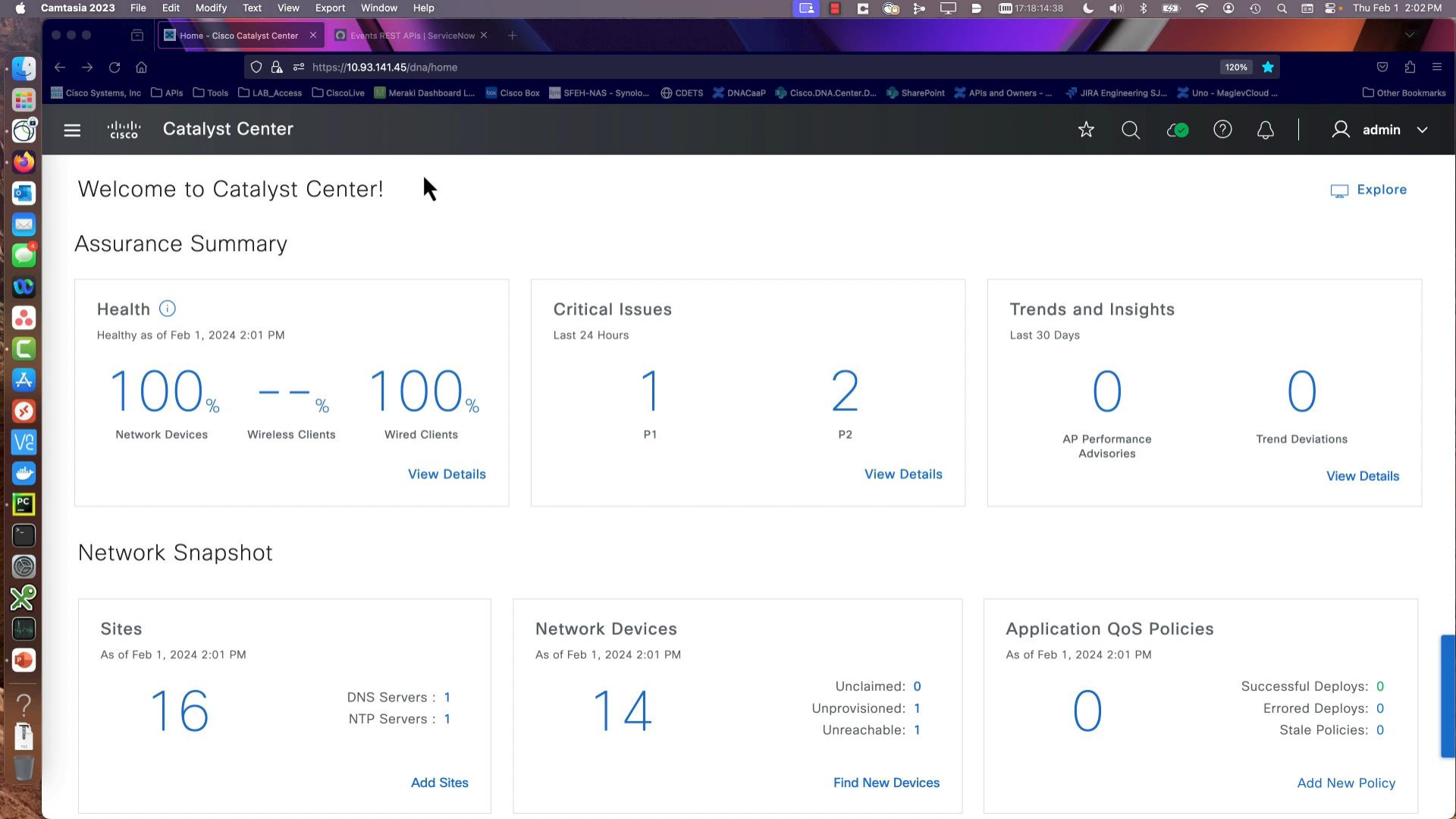


Verify Received Events in the New Table



Demo
Events to Generic REST API Endpoint

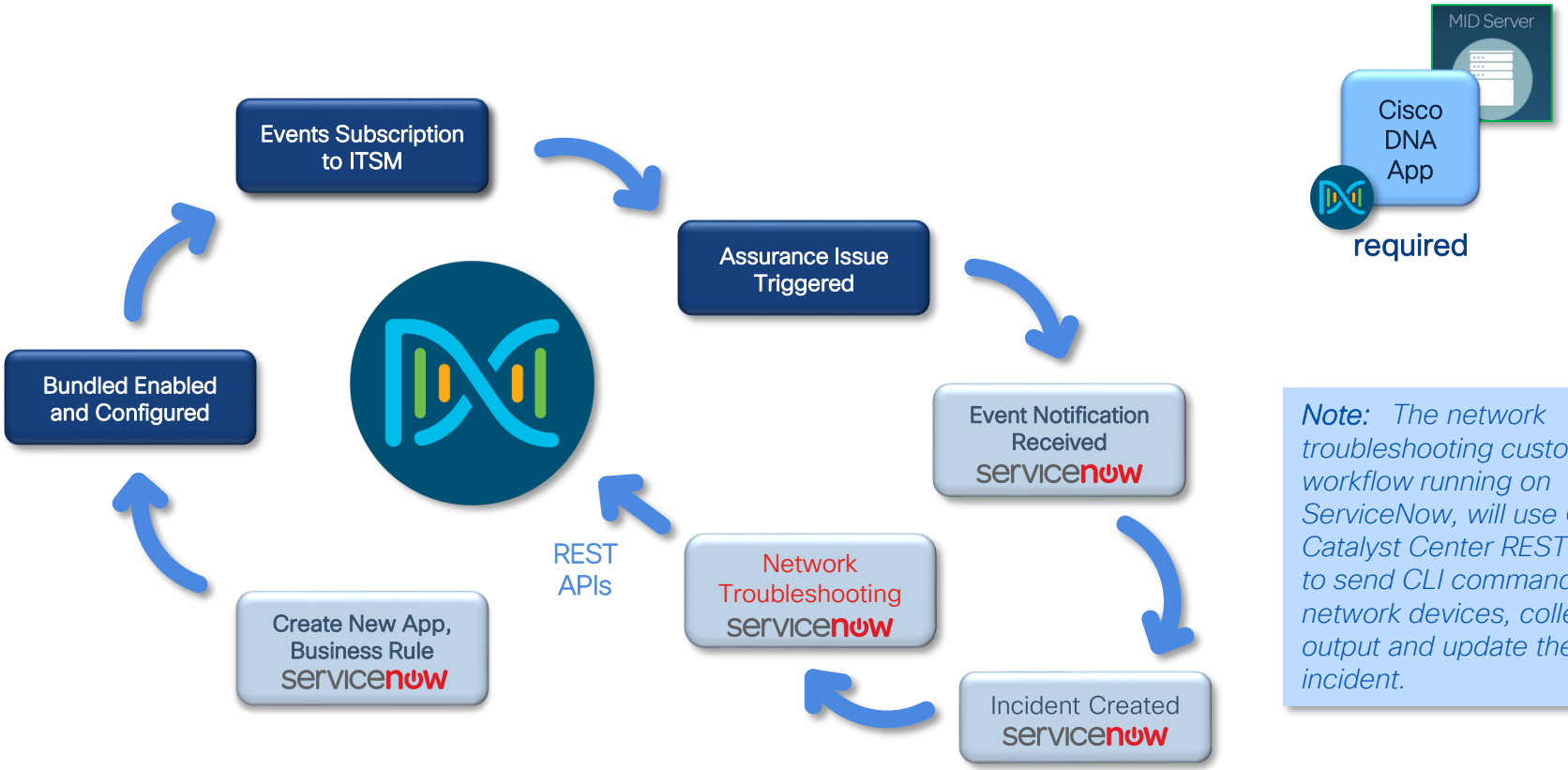



Camtasia 2023 File Edit Modify Text View Export Window Help
Thu Feb 1 2:02 PM
Home - Cisco Catalyst Center
Events REST APIs | ServiceNow
https://10.93.141.45/dna/home
120%
Cisco Systems, Inc
APIs
Tools
LAB_Access
CiscoLive
Meraki Dashboard L...
Cisco Box
SFEH-NAS - Synolo...
CDETS
DNACaaP
Cisco.DNA.Center.D...
SharePoint
APIs and Owners - ...
JIRA Engineering SJ...
Uno - MaglevCloud ...
Other Bookmarks
Catalyst Center
admin
Welcome to Catalyst Center!
Explore
Assurance Summary
Health
Healthy as of Feb 1, 2024 2:01 PM
100%
Network Devices
--%
Wireless Clients
100%
Wired Clients
View Details
Critical Issues
Last 24 Hours
1
P1
2
P2
View Details
Trends and Insights
Last 30 Days
0
AP Performance Advisories
0
Trend Deviations
View Details
Network Snapshot
Sites
As of Feb 1, 2024 2:01 PM
16
DNS Servers : 1
NTP Servers : 1
Add Sites
Network Devices
As of Feb 1, 2024 2:01 PM
14
Unclaimed: 0
Unprovisioned: 1
Unreachable: 1
Find New Devices
Application QoS Policies
As of Feb 1, 2024 2:01 PM
0
Successful Deploys: 0
Errored Deploys: 0
Stale Policies: 0
Add New Policy

Agenda

- Cisco Catalyst Center Platform
- ITSM (ServiceNow) Integration Overview
- CMDB Sync to Staging Table
- Events Notifications to Generic REST API Endpoint
- Network Troubleshooting Custom Workflow
- Summary

Network Troubleshooting Custom Workflow



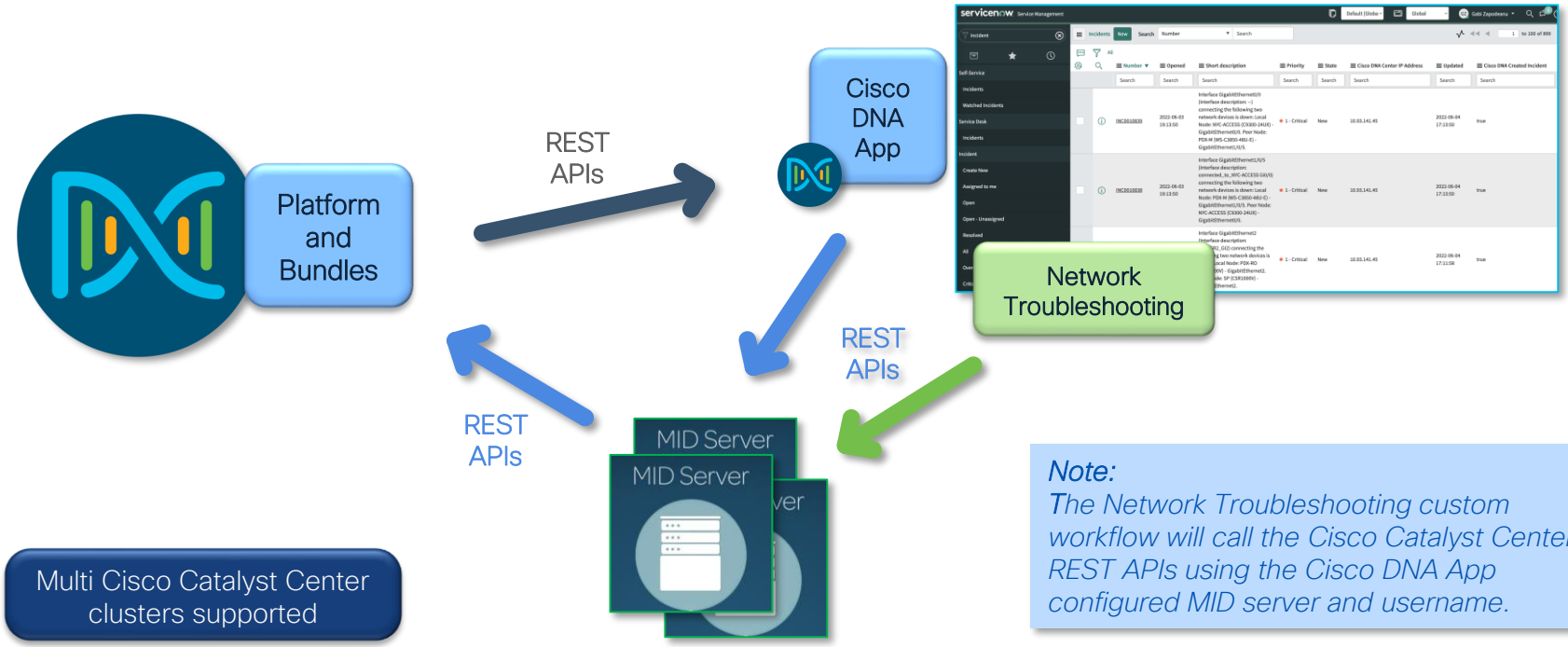
Note: The network troubleshooting custom workflow running on ServiceNow, will use Cisco Catalyst Center REST APIs to send CLI commands to network devices, collect the output and update the incident.

Network Troubleshooting Custom Workflow

Requires the Cisco DNA App

Cisco DNA App required

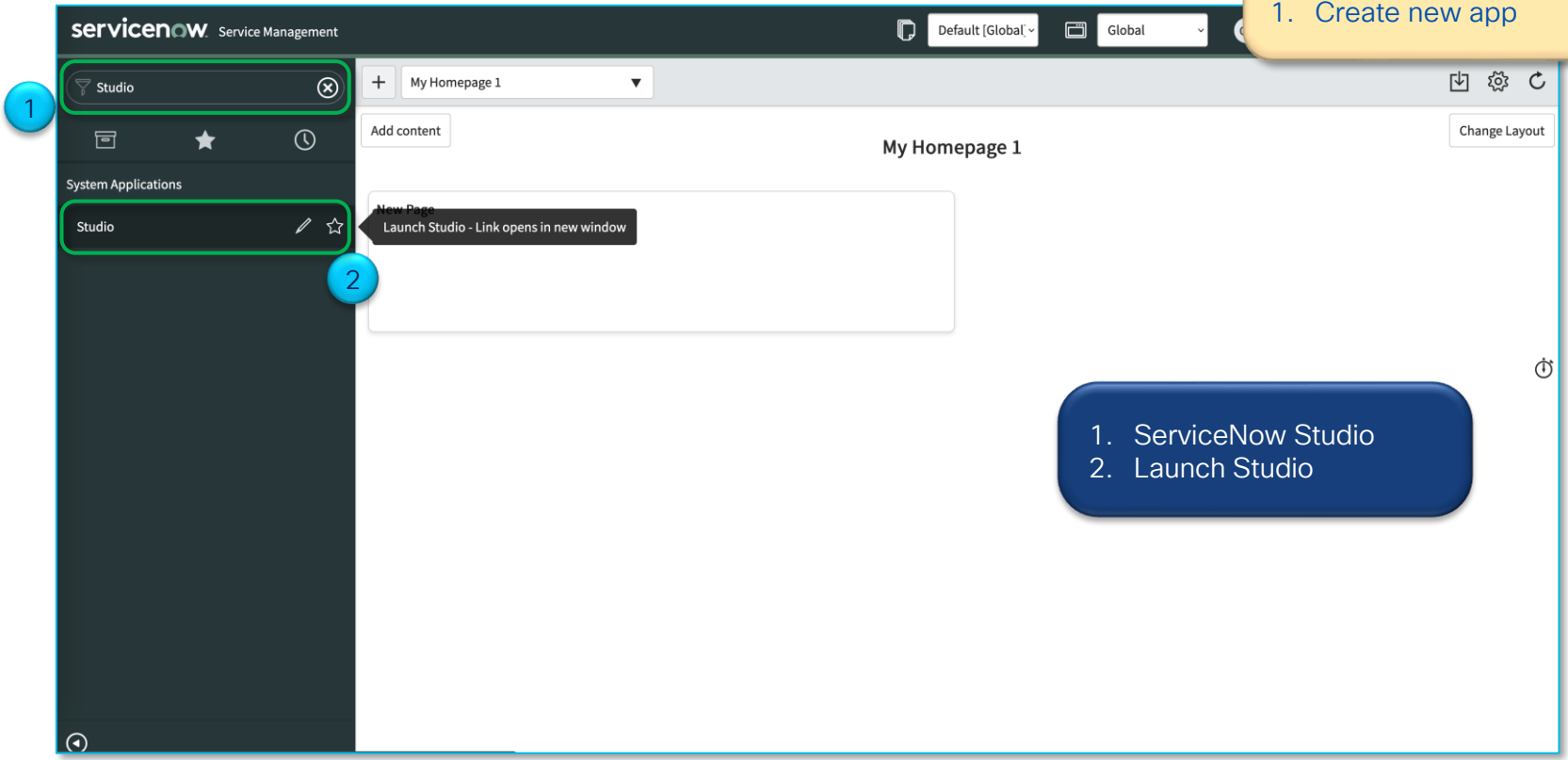
servicenow



Note:
The Network Troubleshooting custom workflow will call the Cisco Catalyst Center REST APIs using the Cisco DNA App configured MID server and username.

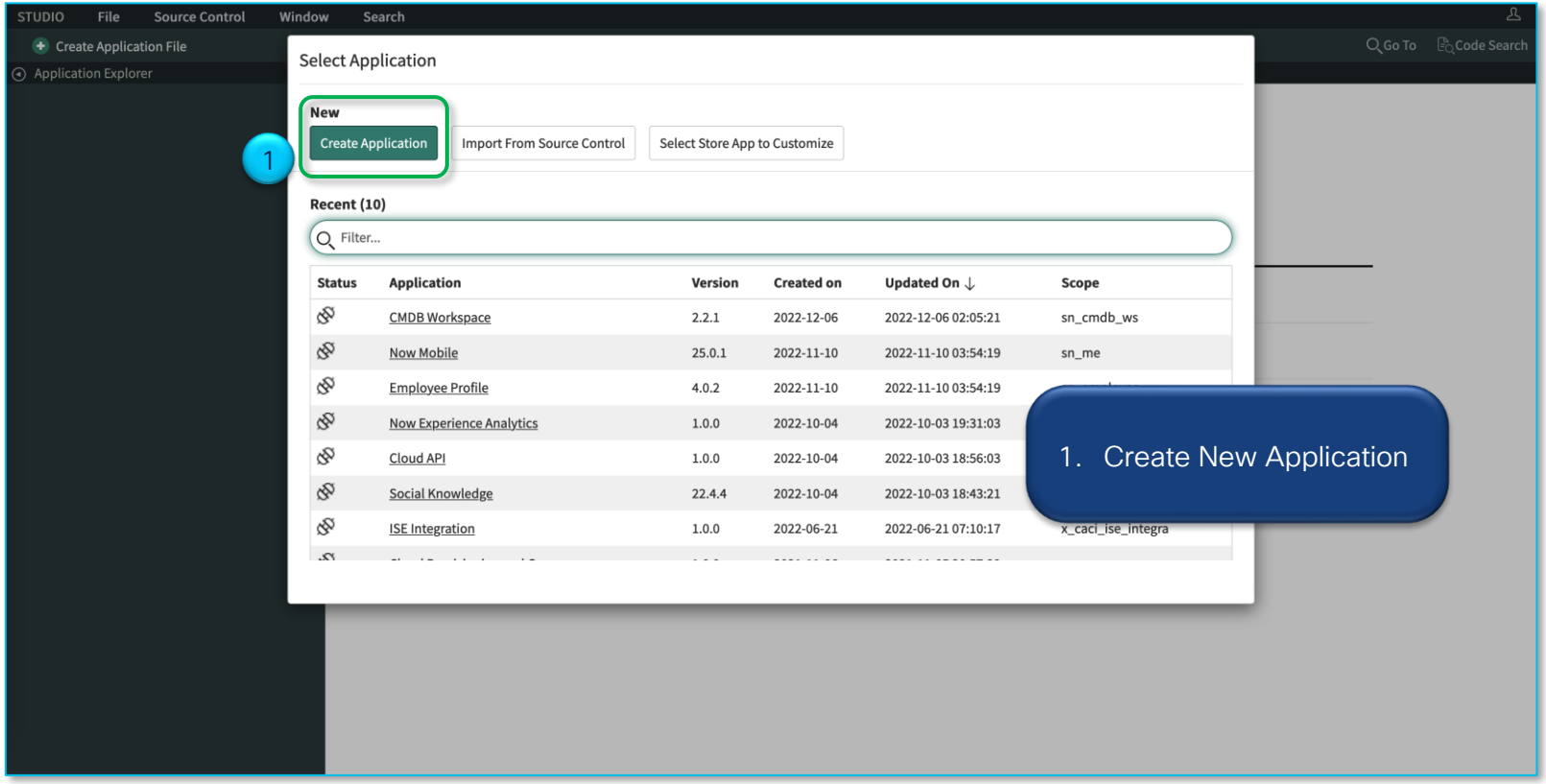
ServiceNow Create New App

Create Custom Workflow
1. Create new app

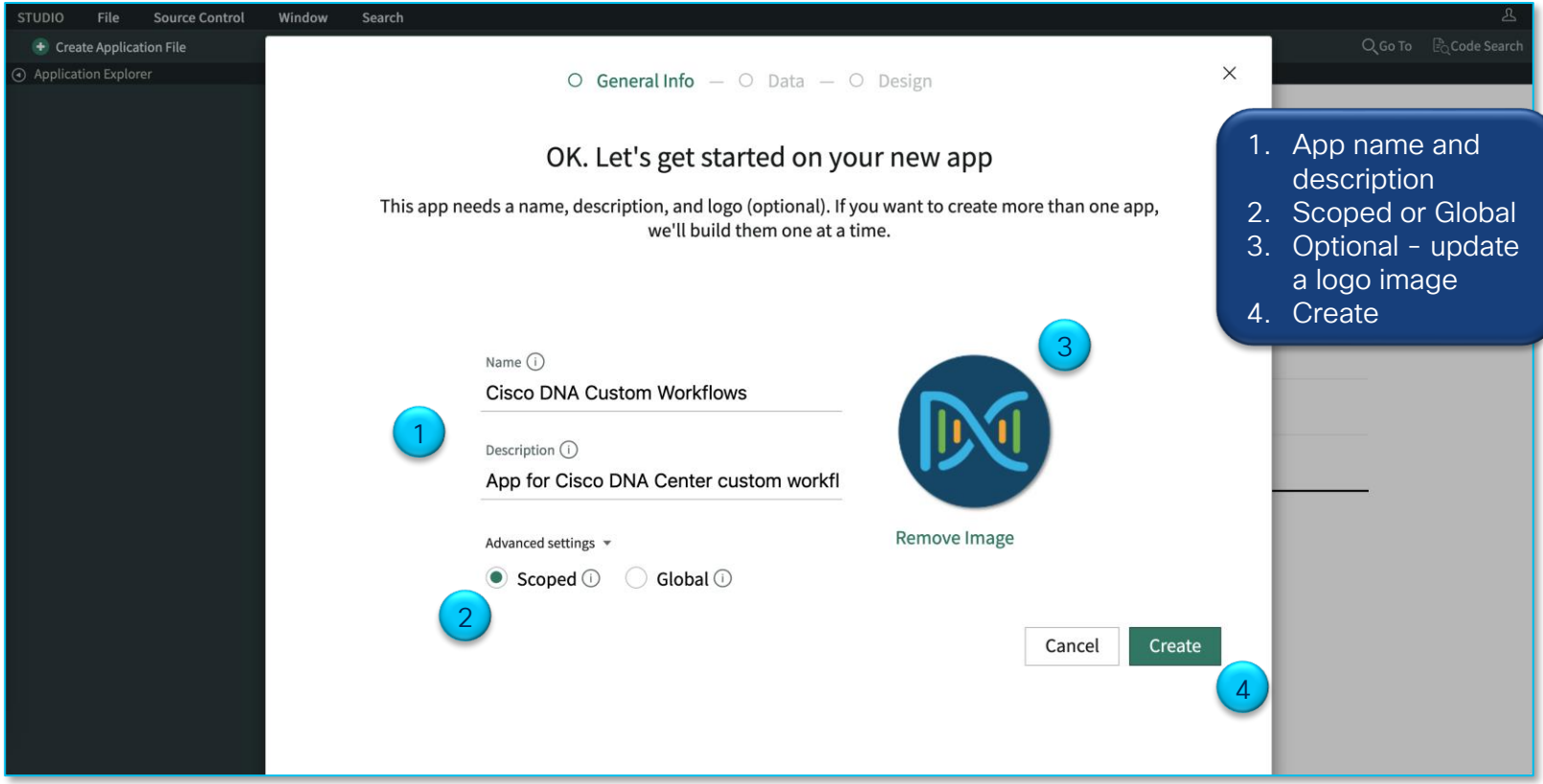


1. ServiceNow Studio
2. Launch Studio

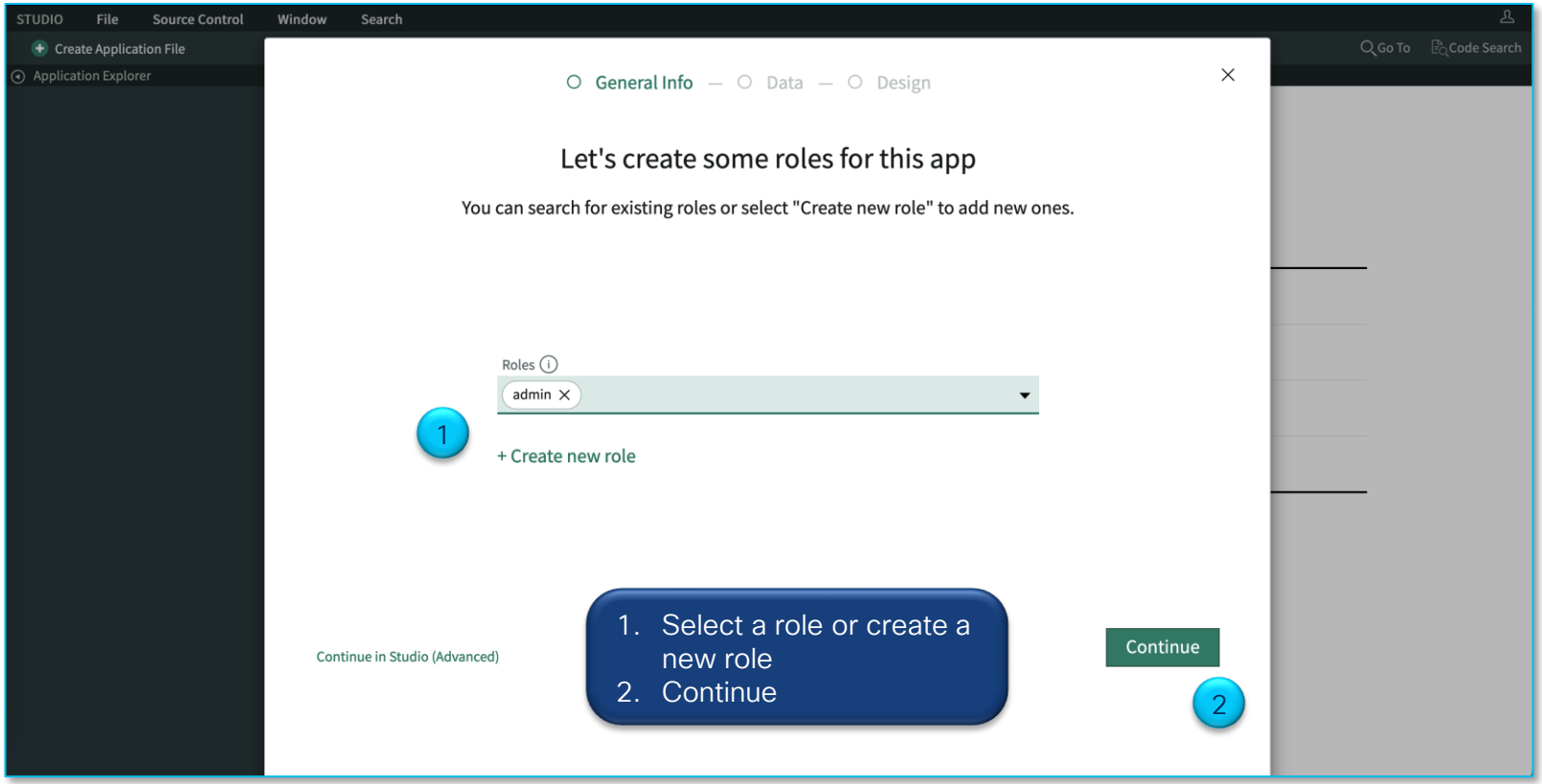
ServiceNow Create New App - continued



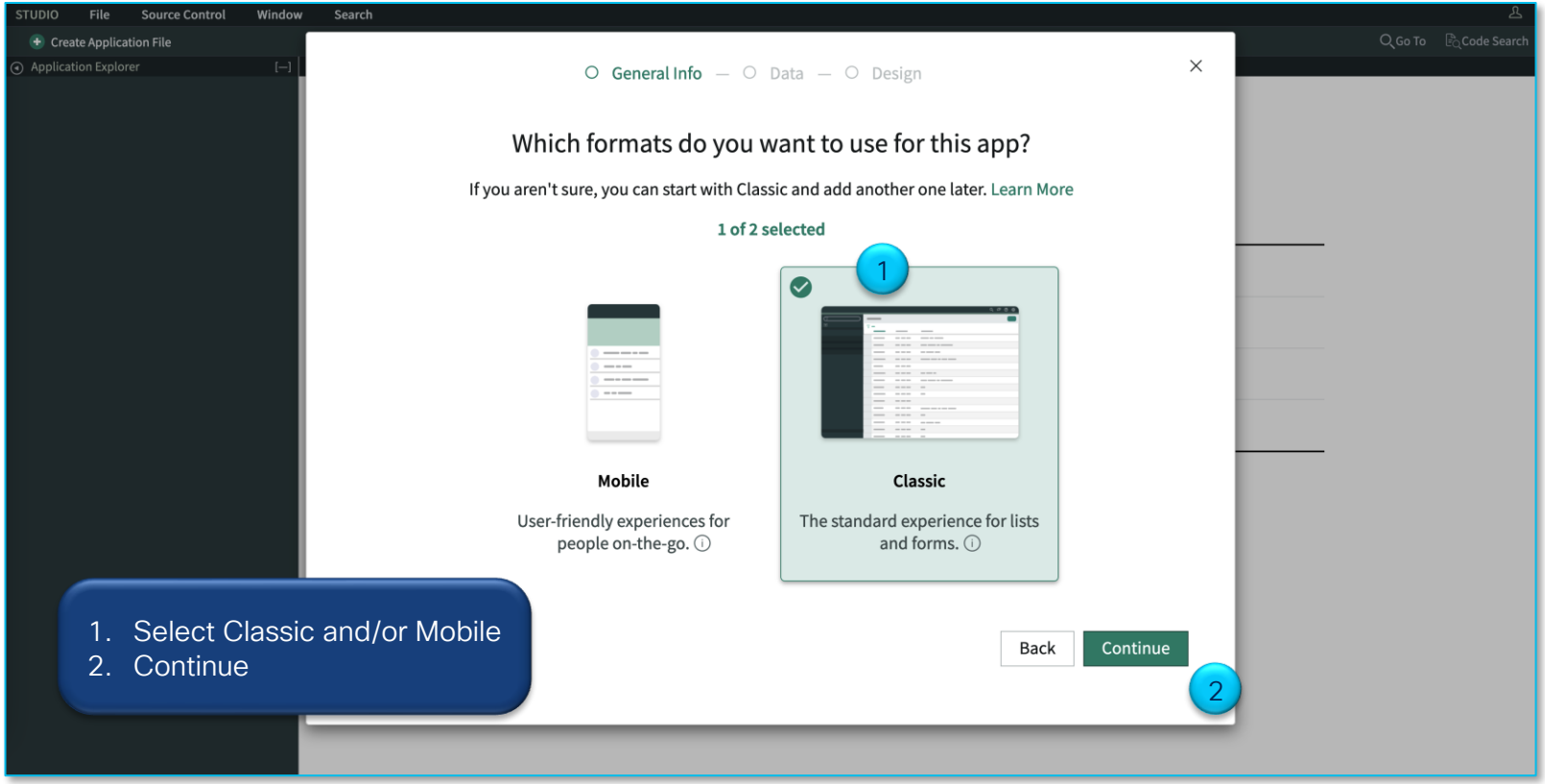
ServiceNow Create New App - continued



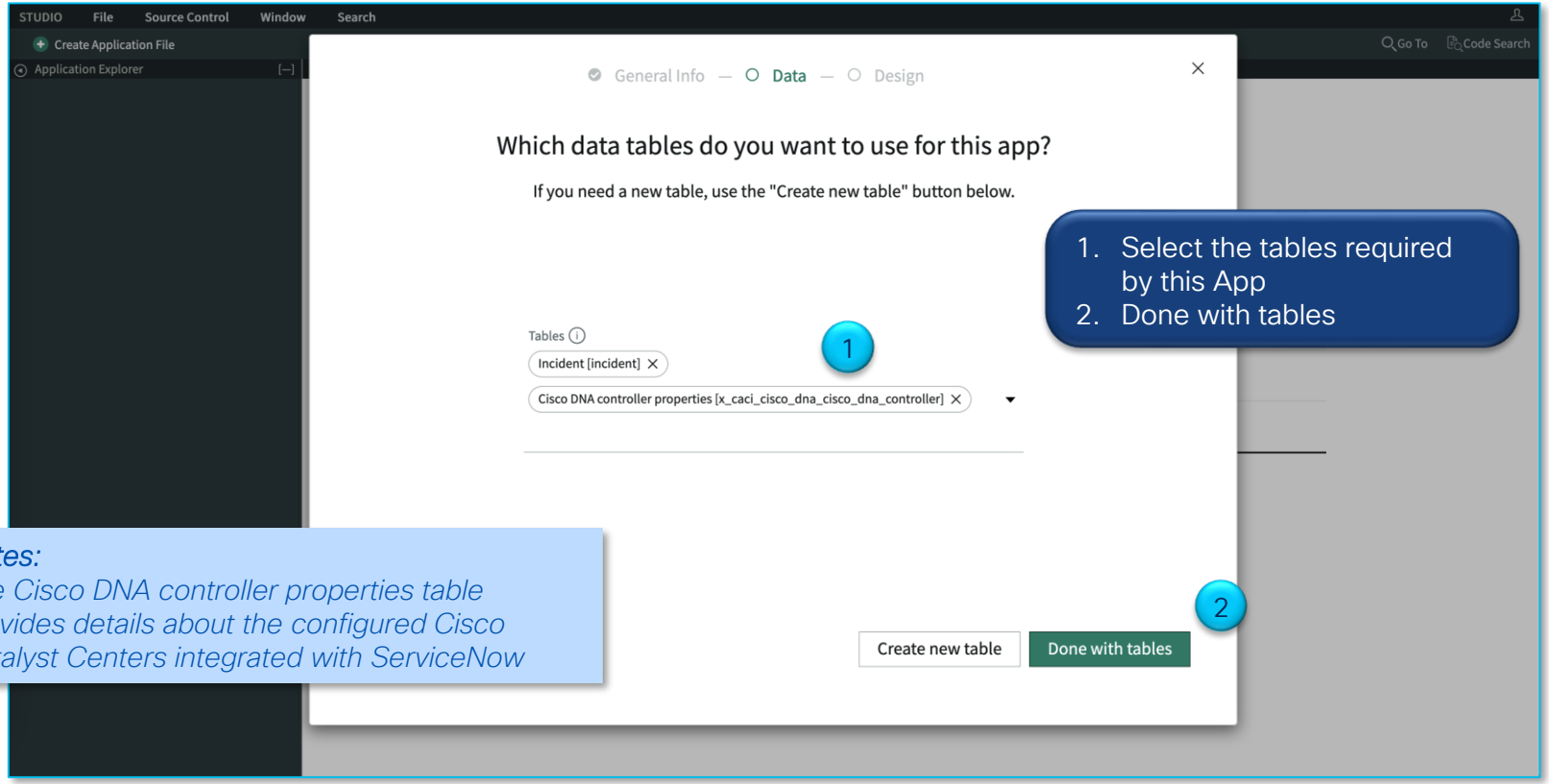
ServiceNow Create New App - continued



ServiceNow Create New App - continued

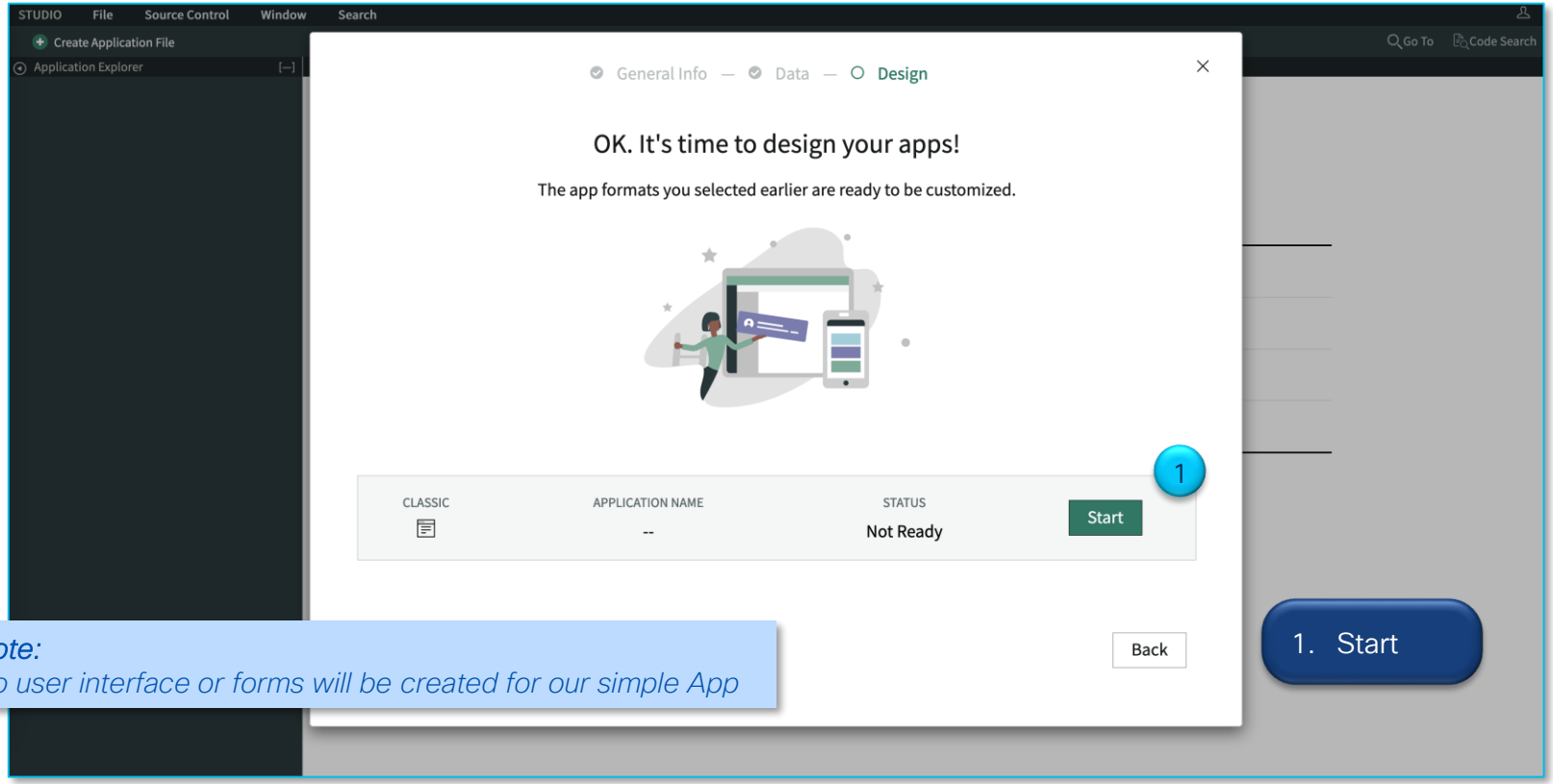


ServiceNow Create New App - continued



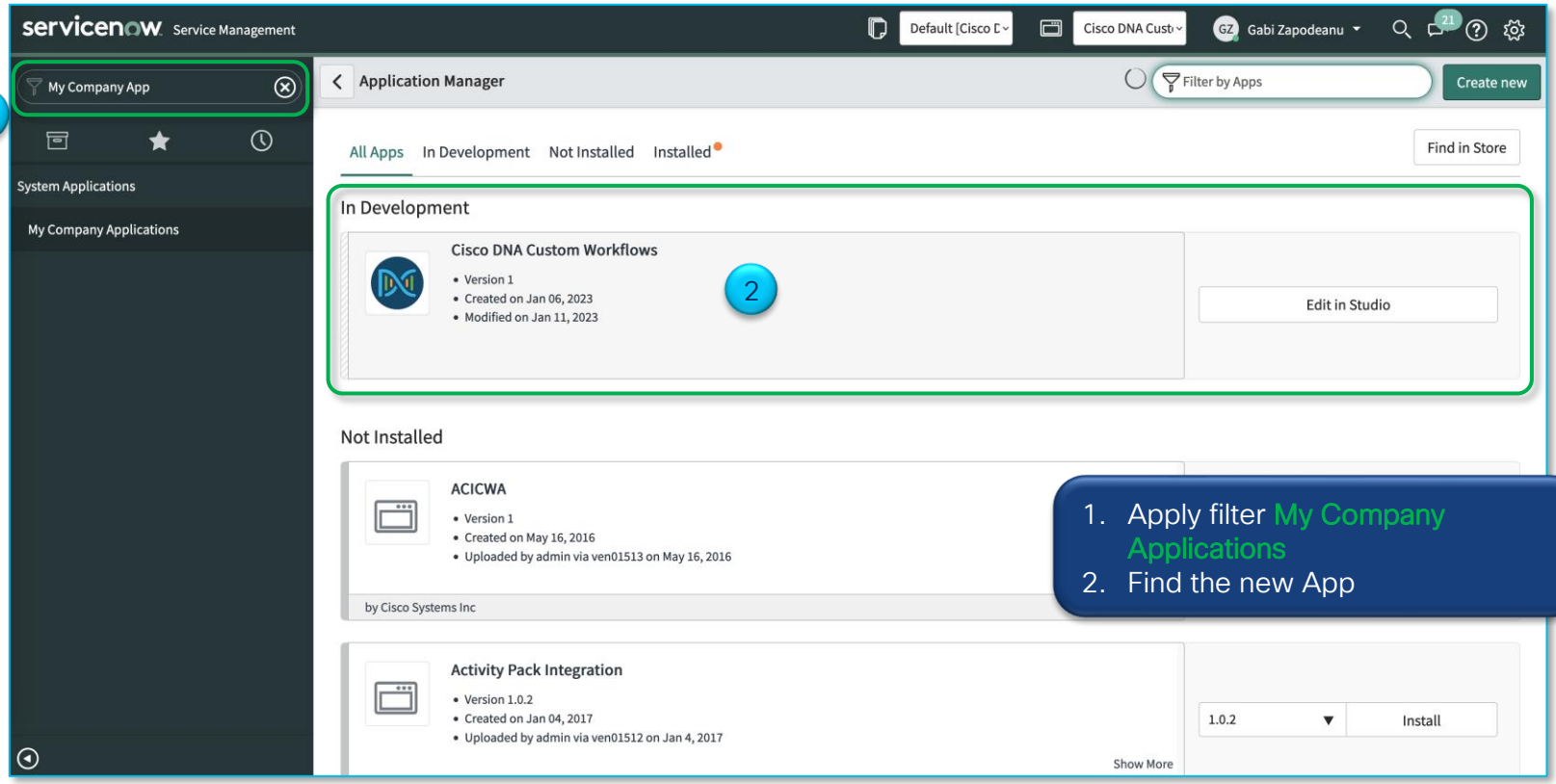
Notes:
The Cisco DNA controller properties table provides details about the configured Cisco Catalyst Centers integrated with ServiceNow

ServiceNow Create New App - end

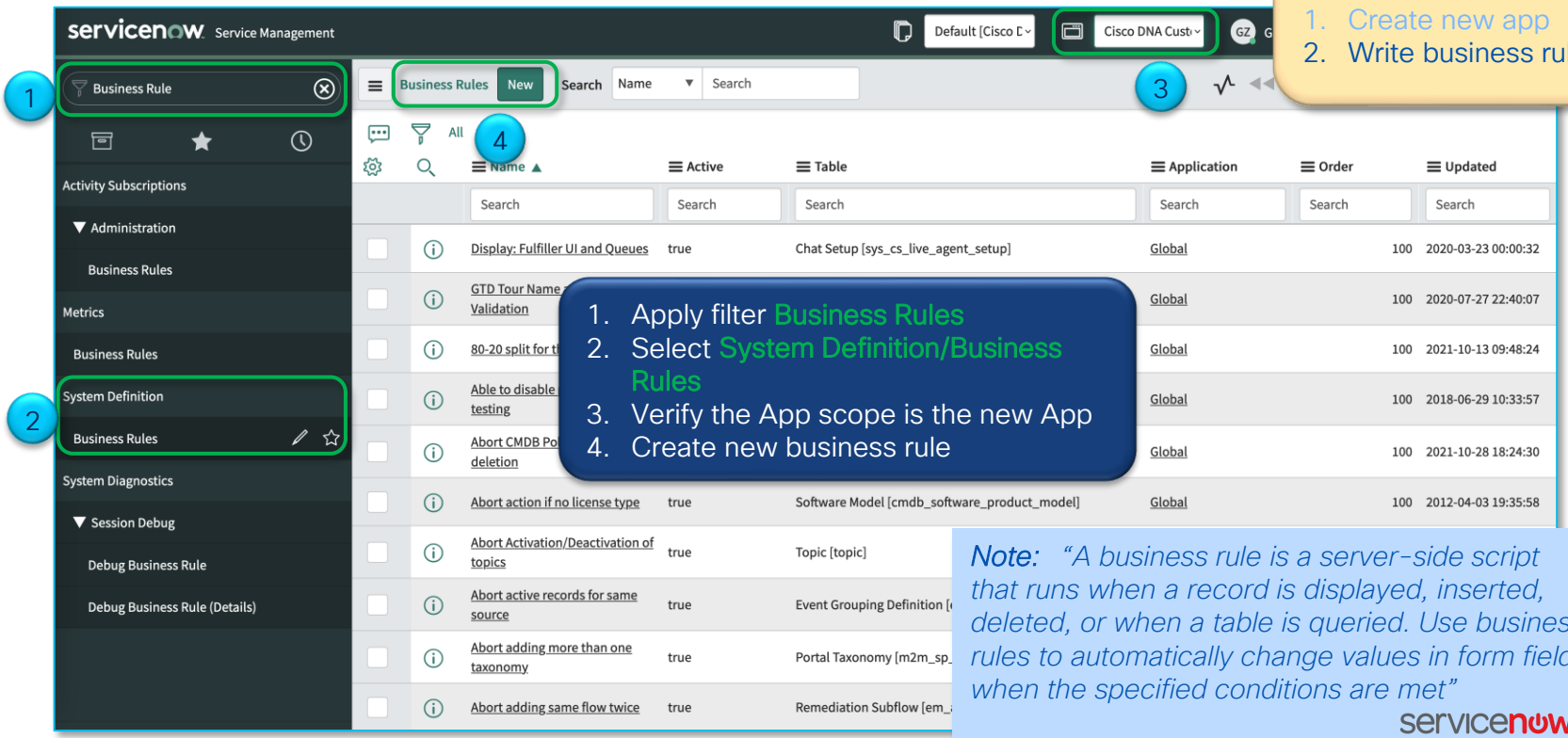


Note:
No user interface or forms will be created for our simple App

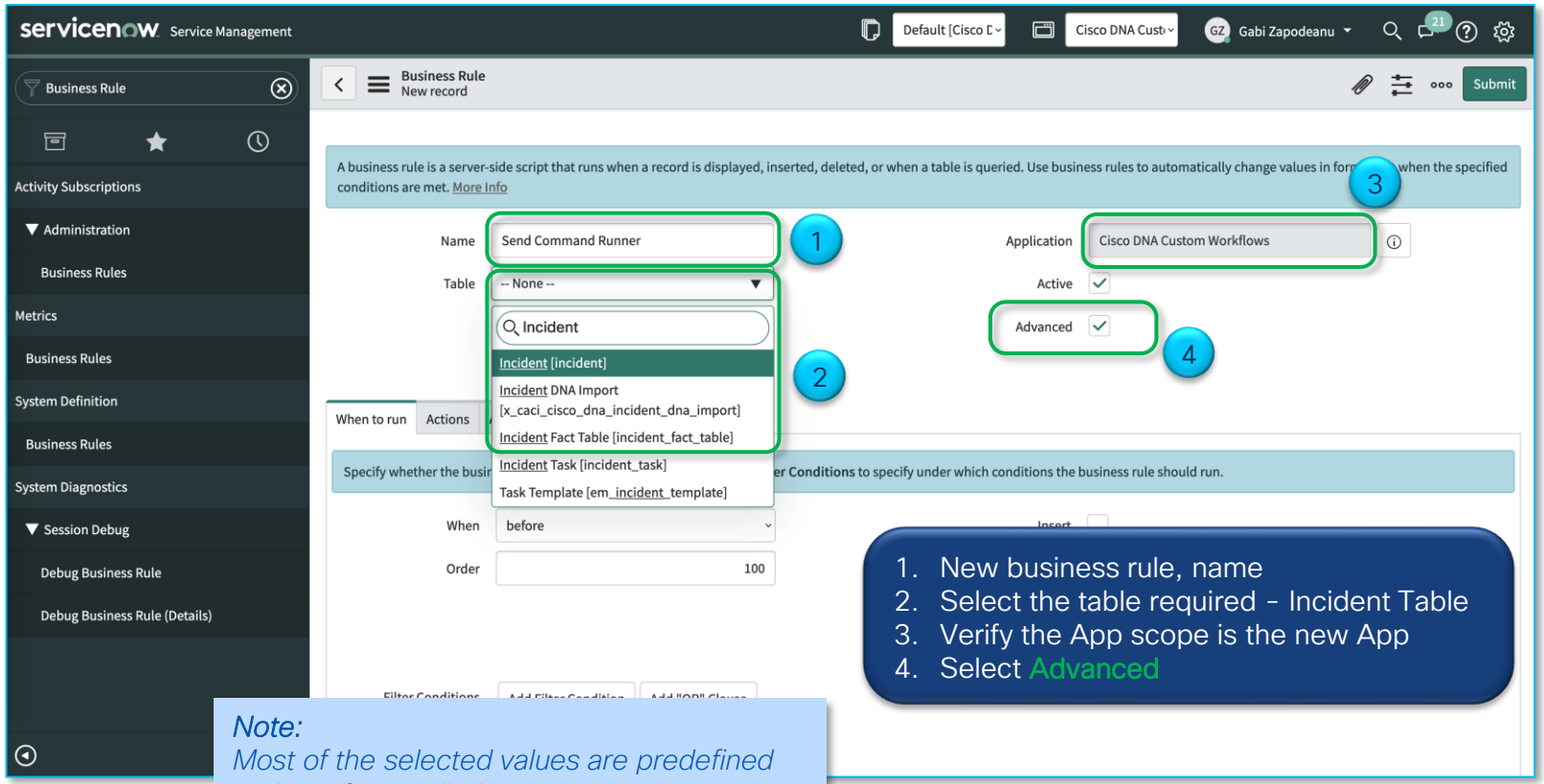
ServiceNow Create New App - Verify



ServiceNow Create New Business Rule

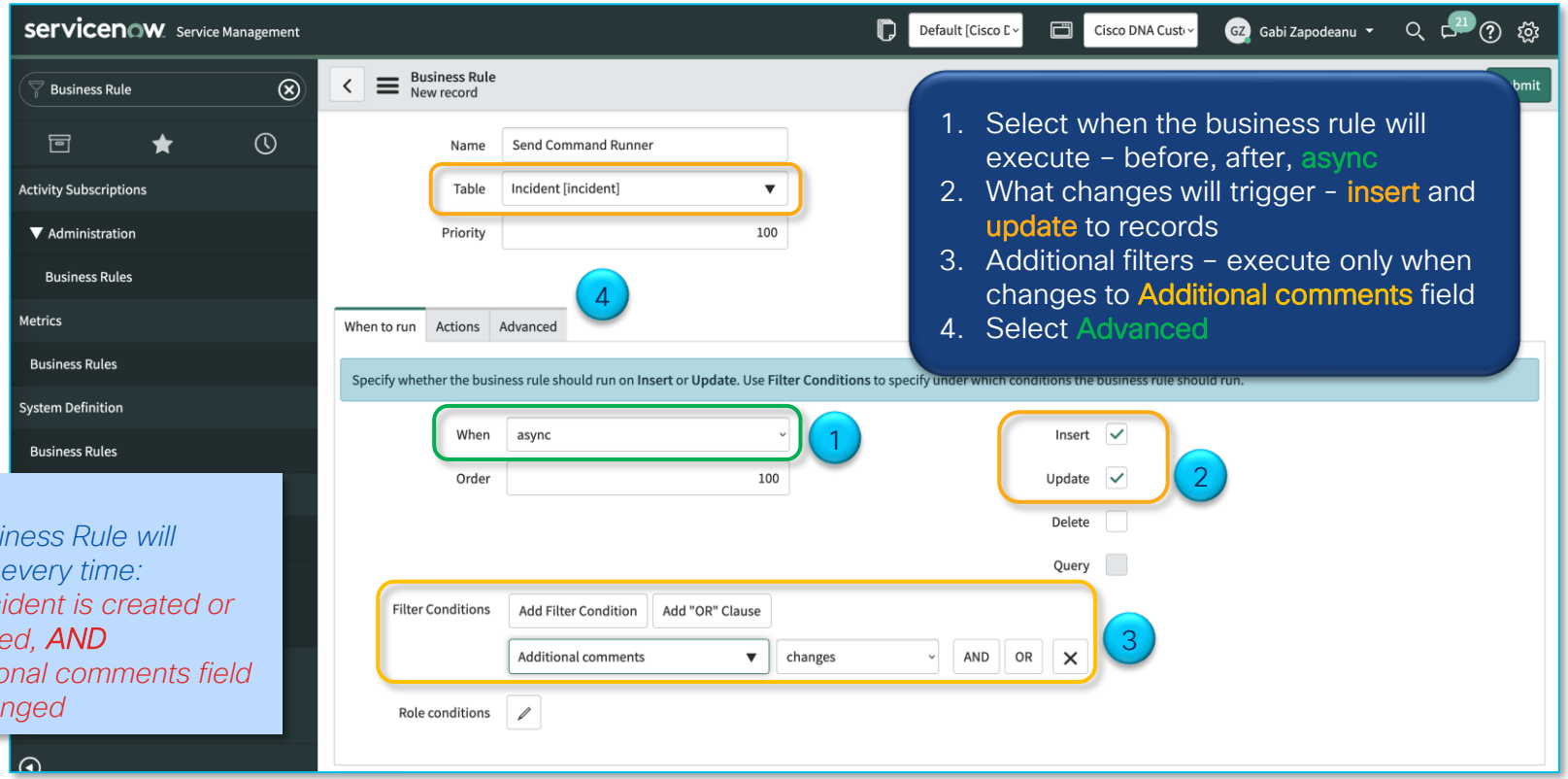


ServiceNow Create New Business Rule – continued



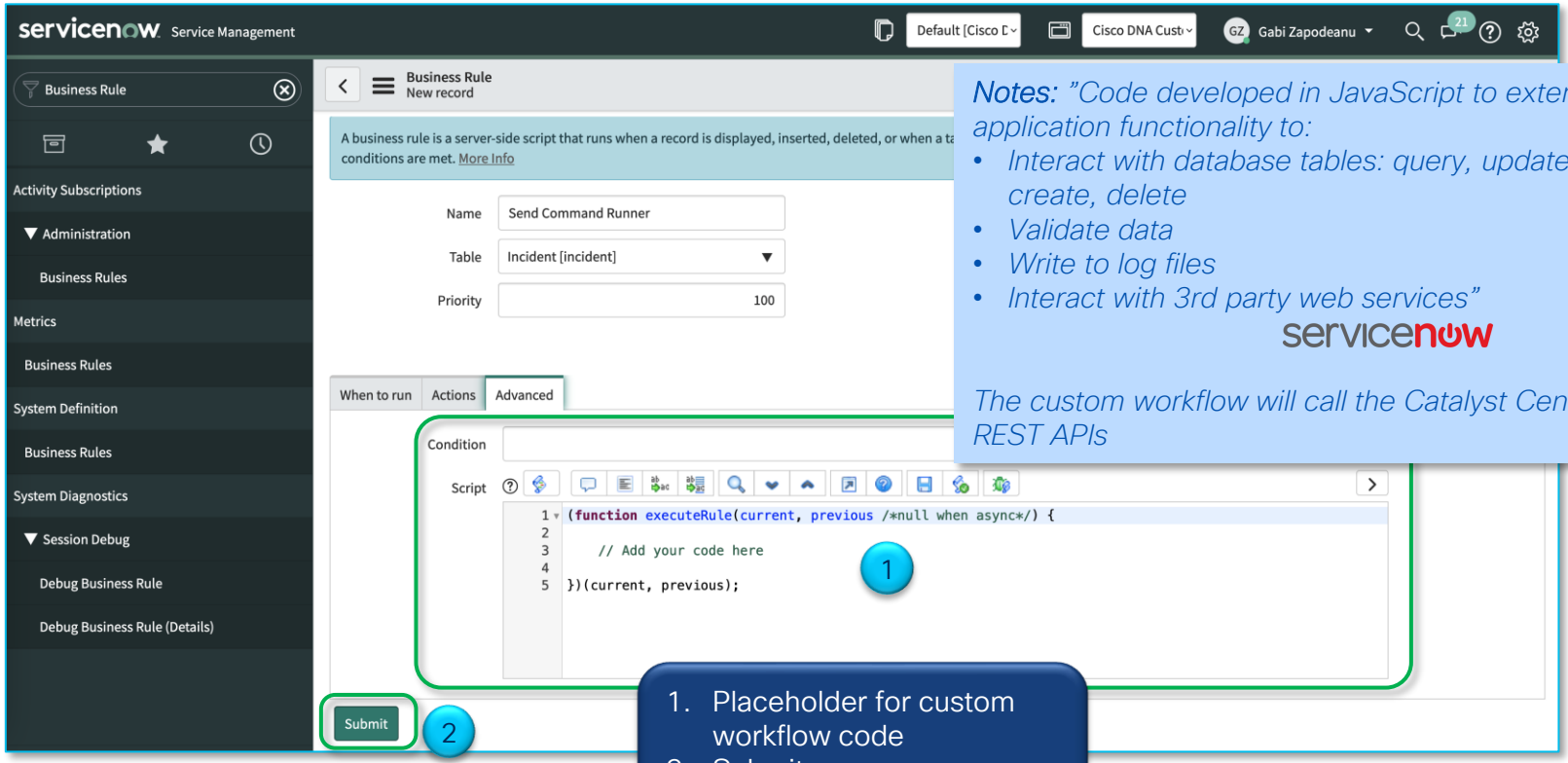
Note:
Most of the selected values are predefined options, from pull-down menus

ServiceNow Create New Business Rule – continued



Notes:
This Business Rule will execute every time:
- *an incident is created or updated, AND*
- *additional comments field is changed*

ServiceNow Create New Business Rule – end



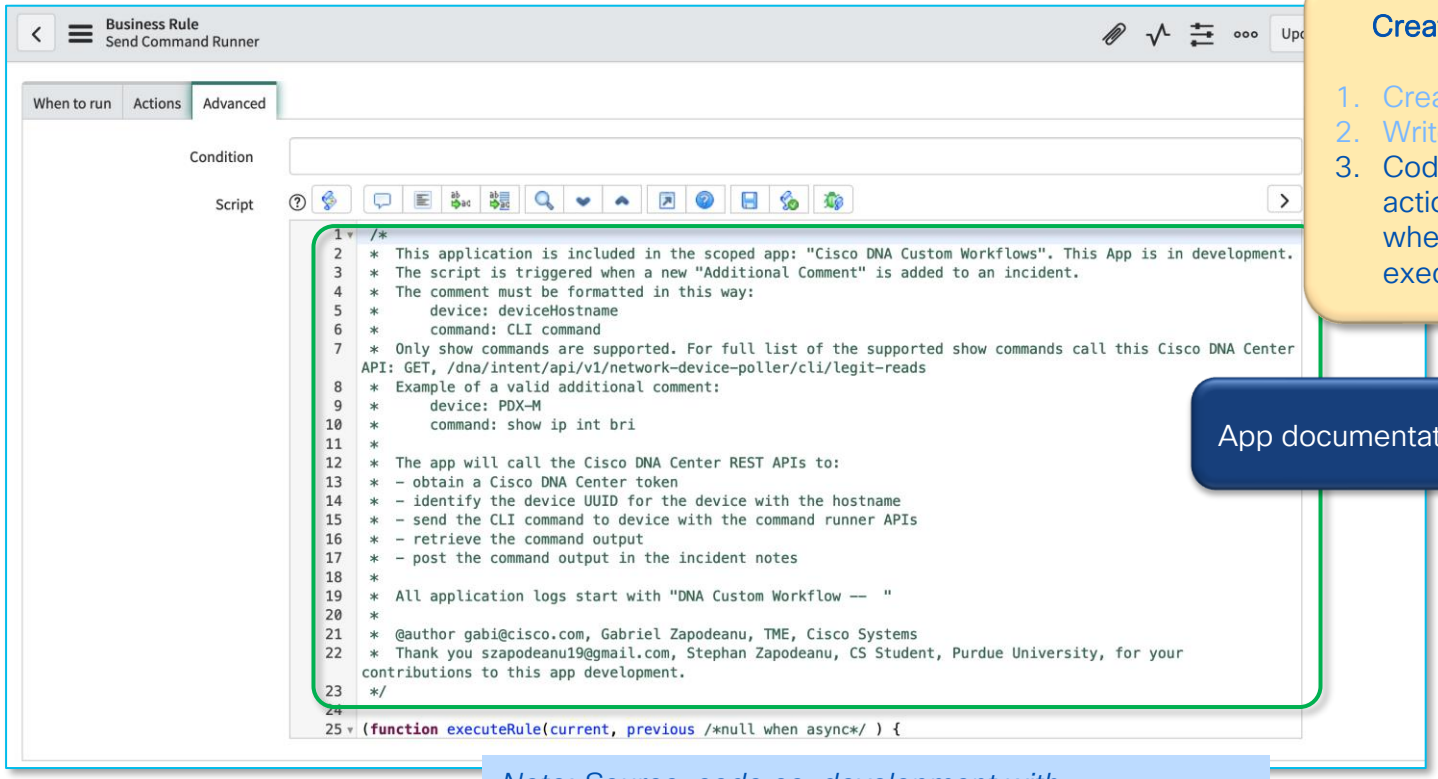
Notes: "Code developed in JavaScript to extend application functionality to:

- *Interact with database tables: query, update, create, delete*
- *Validate data*
- *Write to log files*
- *Interact with 3rd party web services"*

servicenow

The custom workflow will call the Catalyst Center REST APIs

Network Troubleshooting – Code Development



Create New Custom Workflow

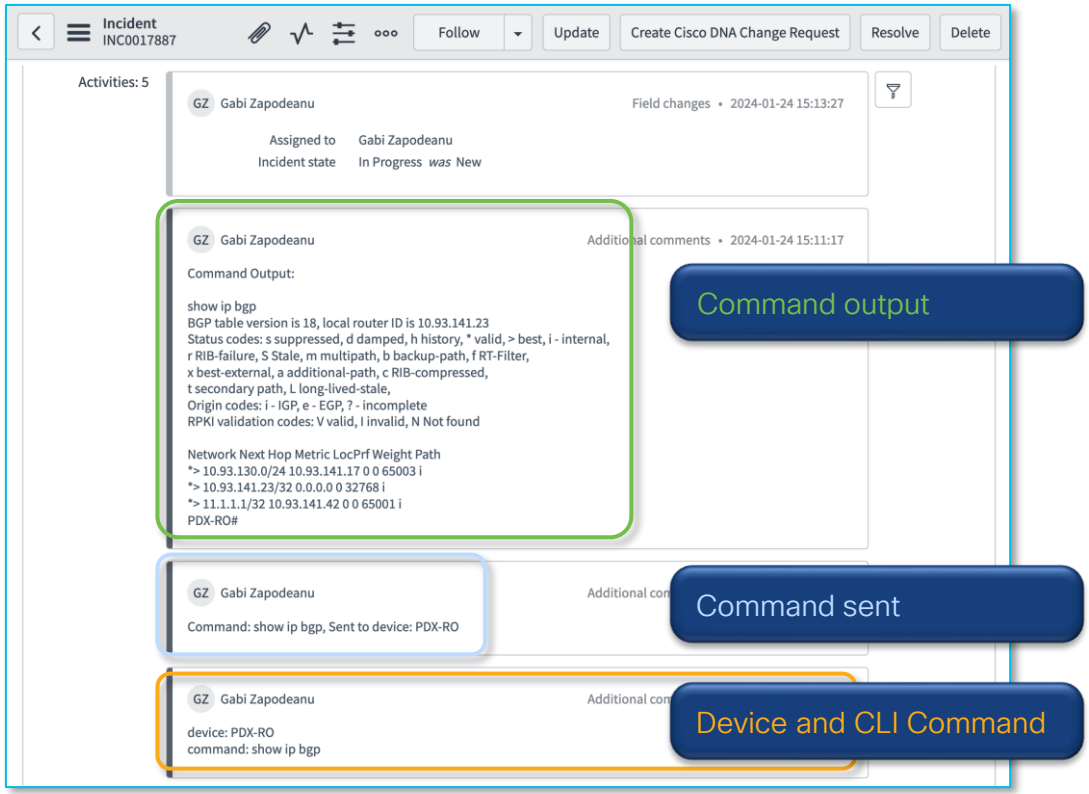
1. Create new app
2. Write business rule
3. Code development – actions executed when business rule executes

App documentation

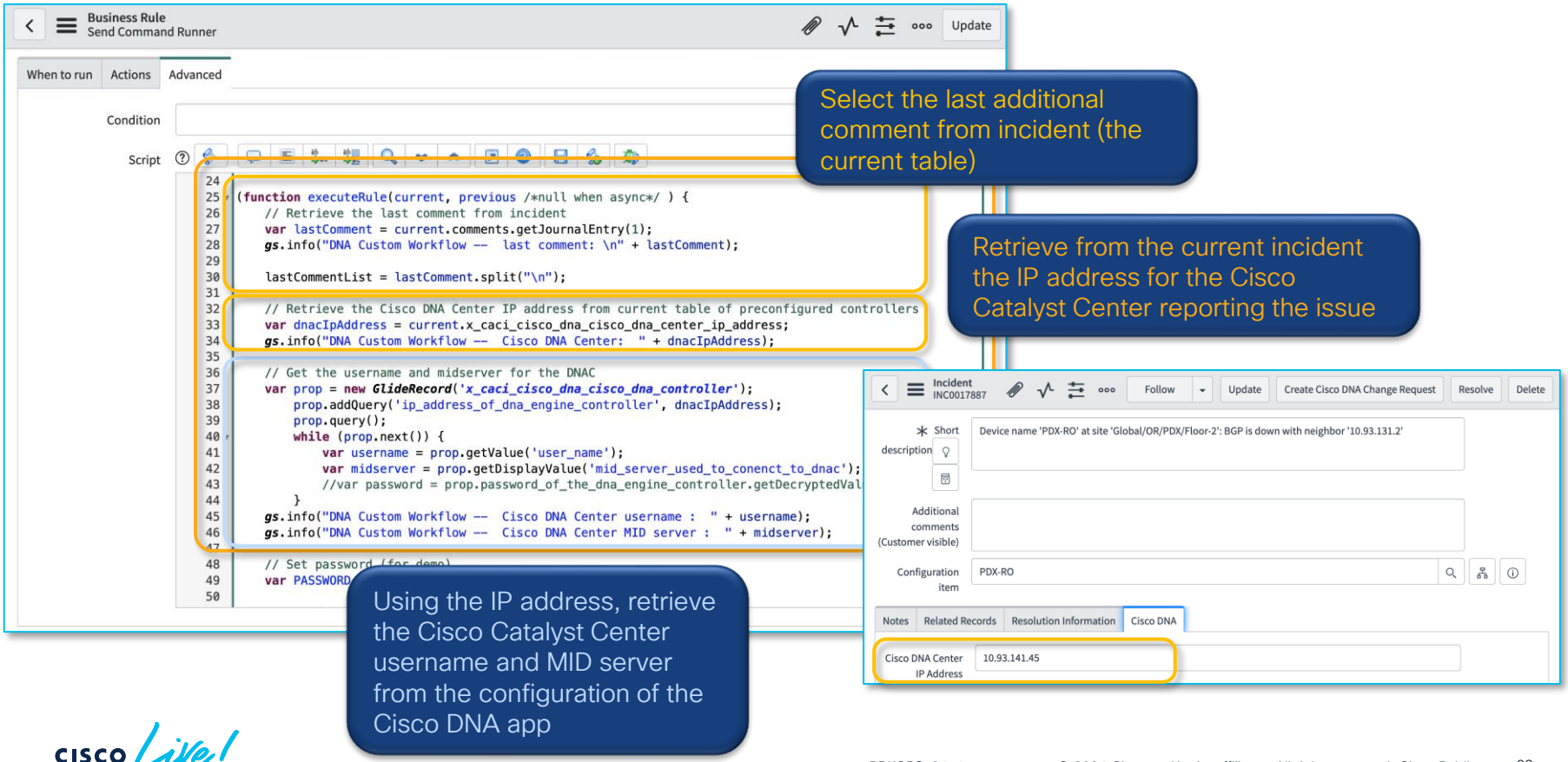
Note: Source-code co-development with Stephan Zapodeanu, MS Student, Purdue University

Network Troubleshooting – App Workflow

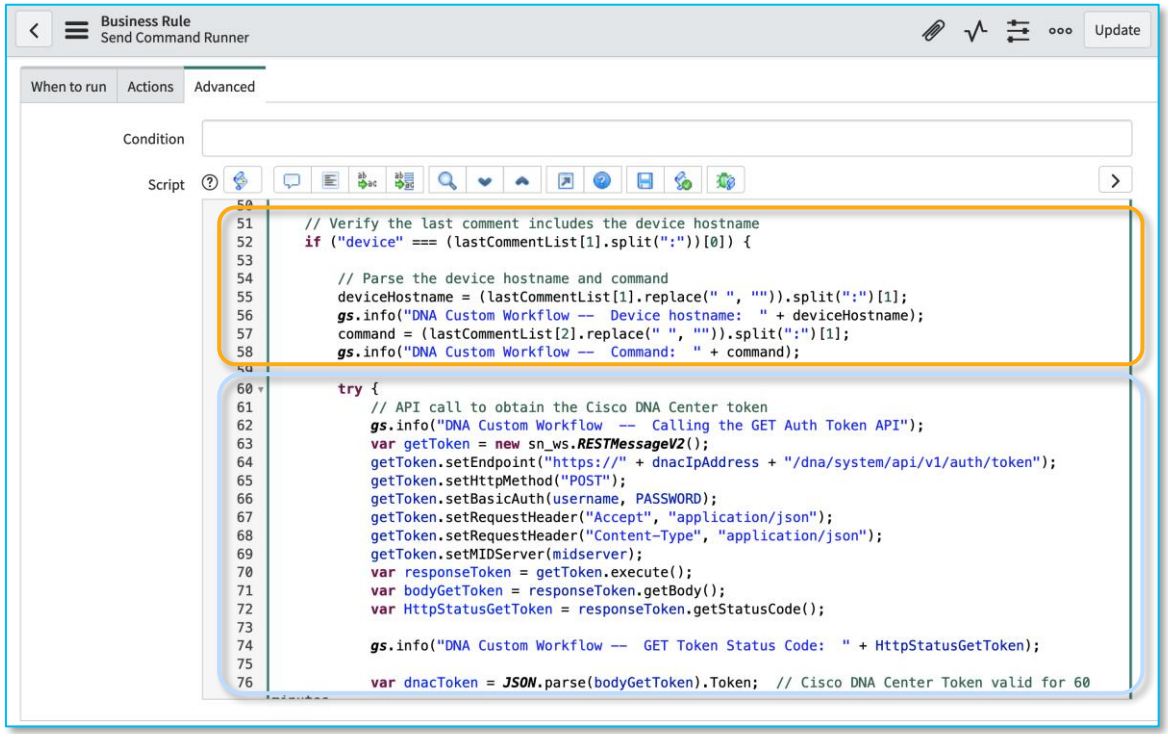
- Select the last additional comment from incident (the current table)
- Verify the pre-defined format for device and command
- Retrieve from incident the IP address for the Cisco Catalyst Center reporting the issue
- Using the IP address, retrieve the Cisco Catalyst Center username and MID server from the configuration of the Cisco DNA app
- GET the Cisco Catalyst Center Auth token
- API call to retrieve the device UUID by hostname.
- Command Runner API, method POST, send the CLI command to device
- Update incident with status
- Retrieve the file content using the GET file API, parse the content
- Update the current record with the CLI command output or error message, if any



Network Troubleshooting – Code Development – cont.



Network Troubleshooting – Code Development – cont.



Verify the pre-defined format for device and command

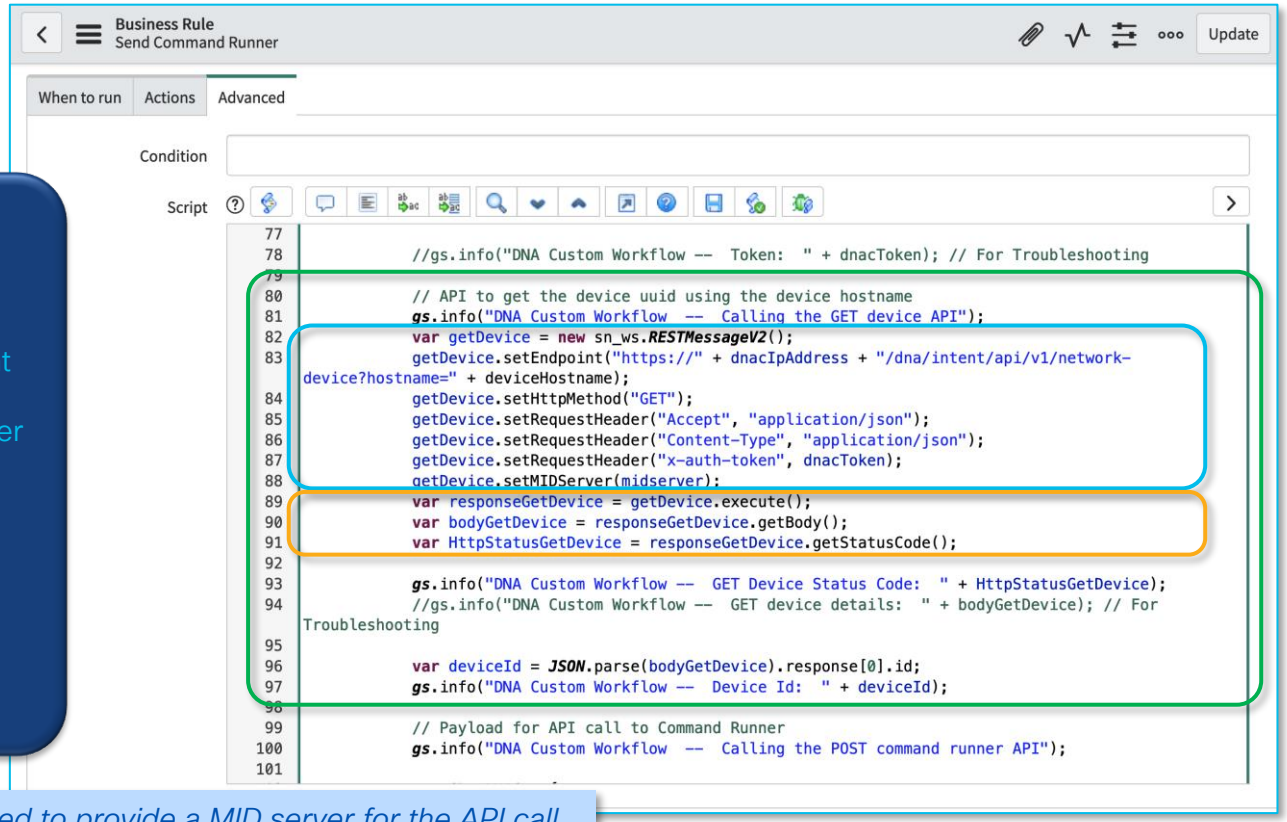
GET the Cisco Catalyst Center Auth token

Network Troubleshooting – API call details

API call to retrieve the device UUID by hostname:
.setEndpoint – API resource
.setHttpMethod – API method
.setRequestHeaders – content type and auth token
.setMIDServer – the MID server reaching out Cisco Catalyst Center

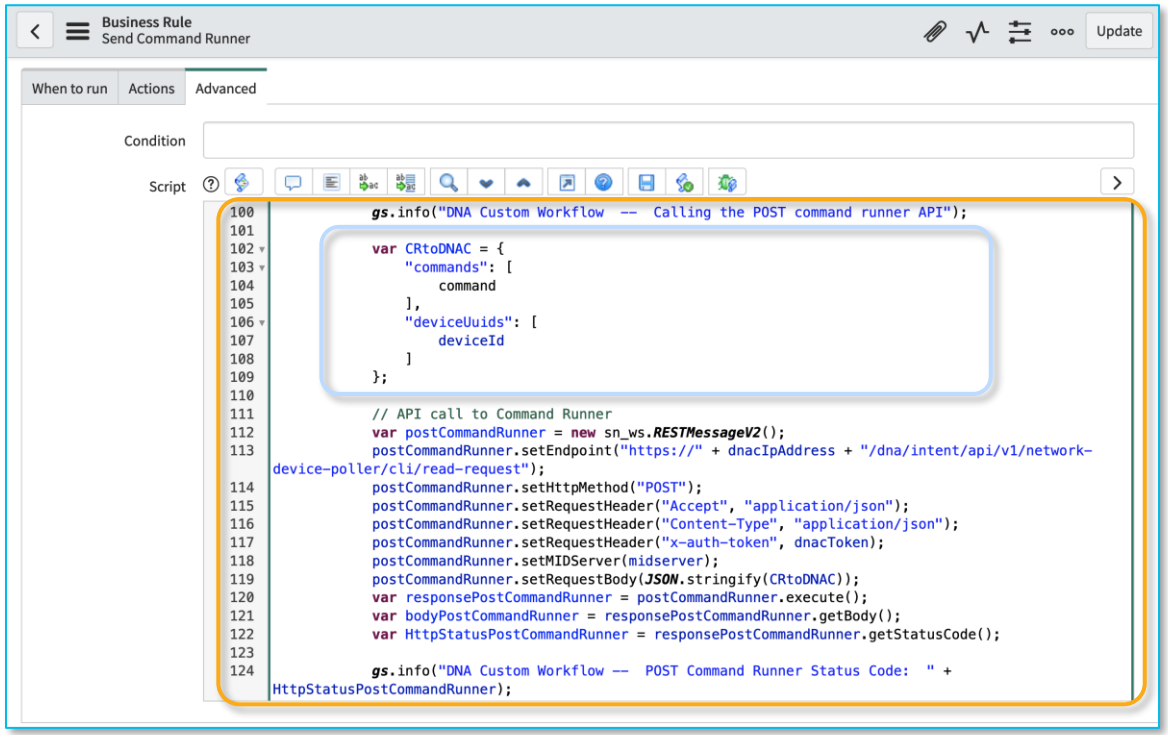
Call the API and parse the response

Log the API status code and device Id



Note: You will need to provide a MID server for the API call

Network Troubleshooting – Code Development – cont.



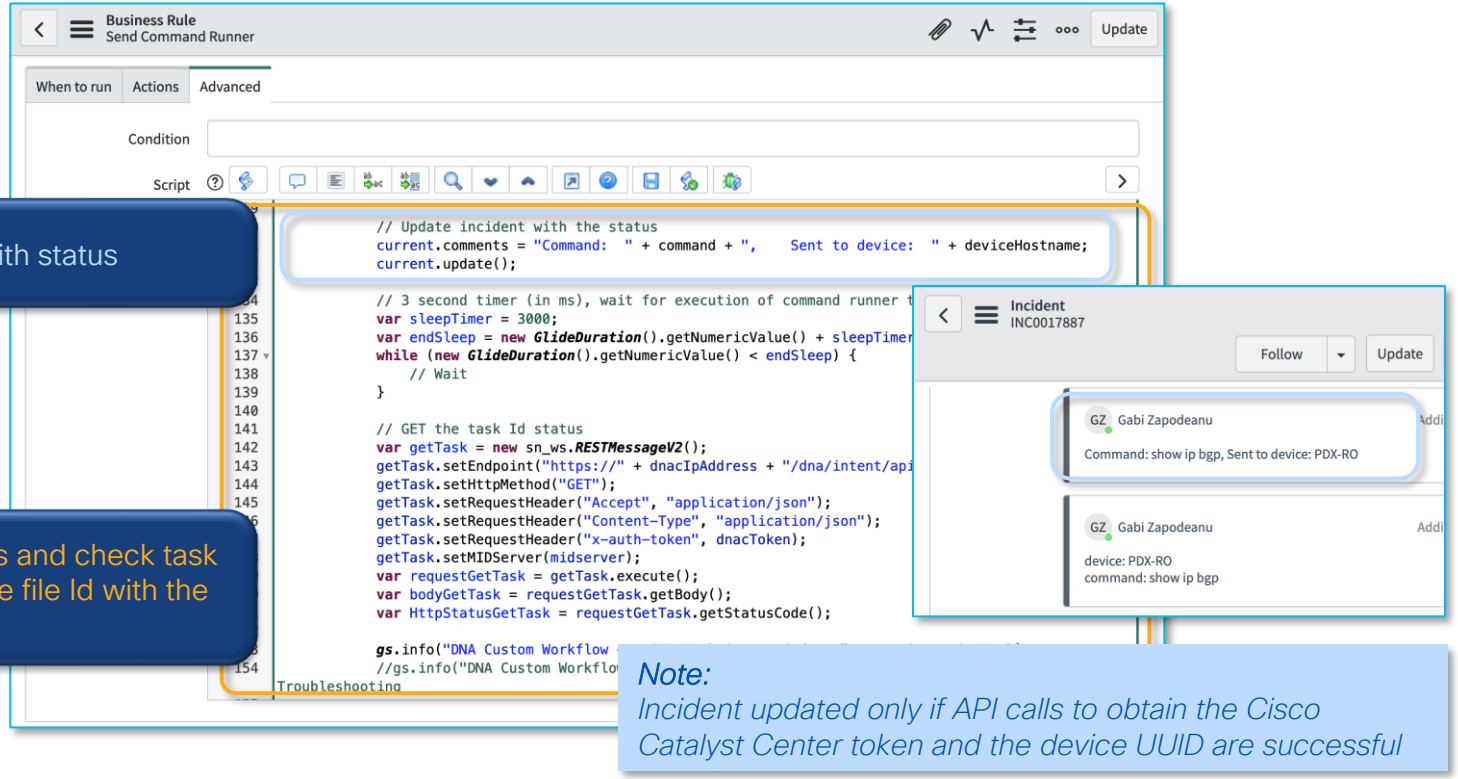
Command Runner API payload – requires the CLI command and device UUID

Command Runner API, method POST, send the CLI command to devices

Network Troubleshooting – Code Development – cont.

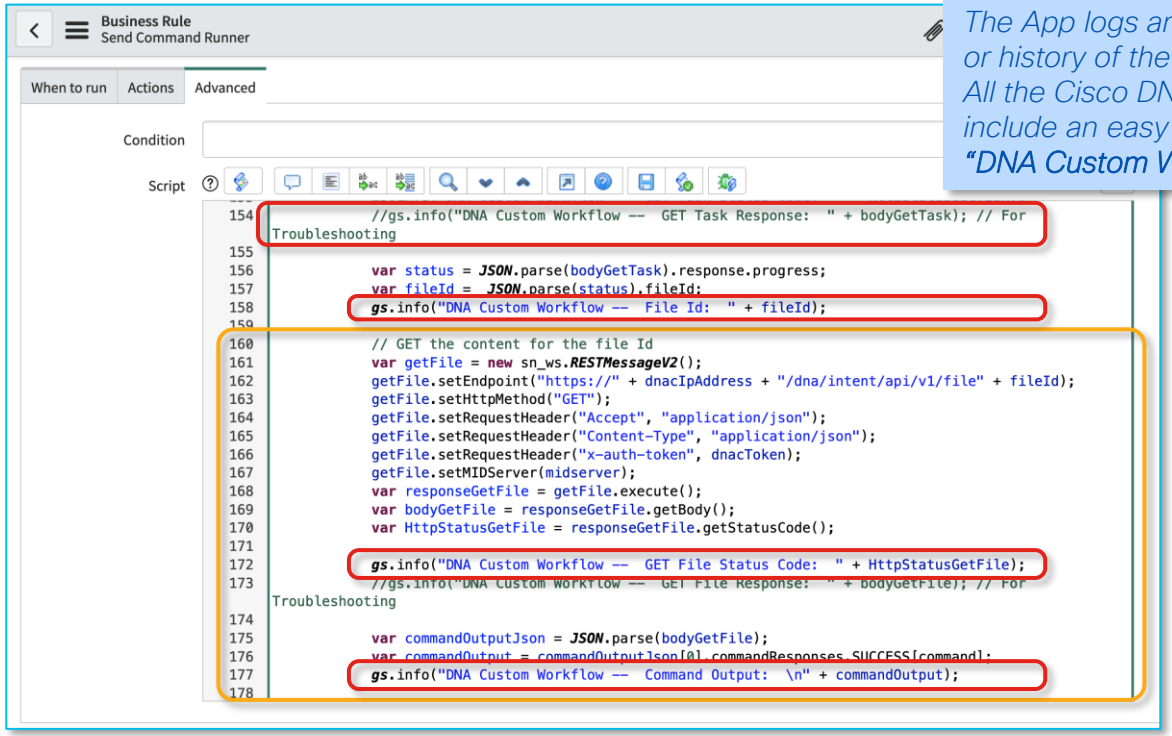
Update incident with status

Wait for 3 seconds and check task status. Retrieve the file Id with the output.



Note:
Incident updated only if API calls to obtain the Cisco Catalyst Center token and the device UUID are successful

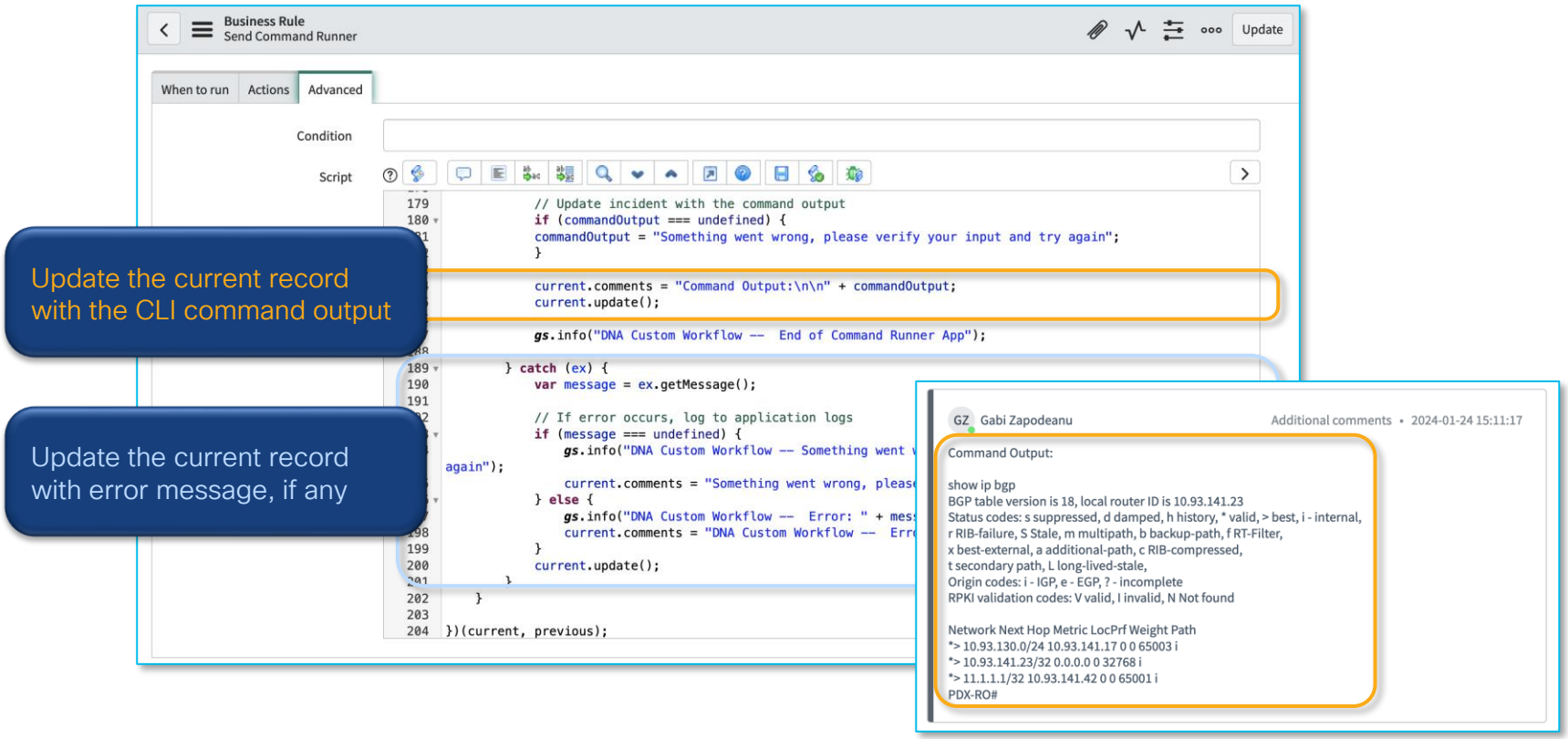
Network Troubleshooting – Code Development – cont.



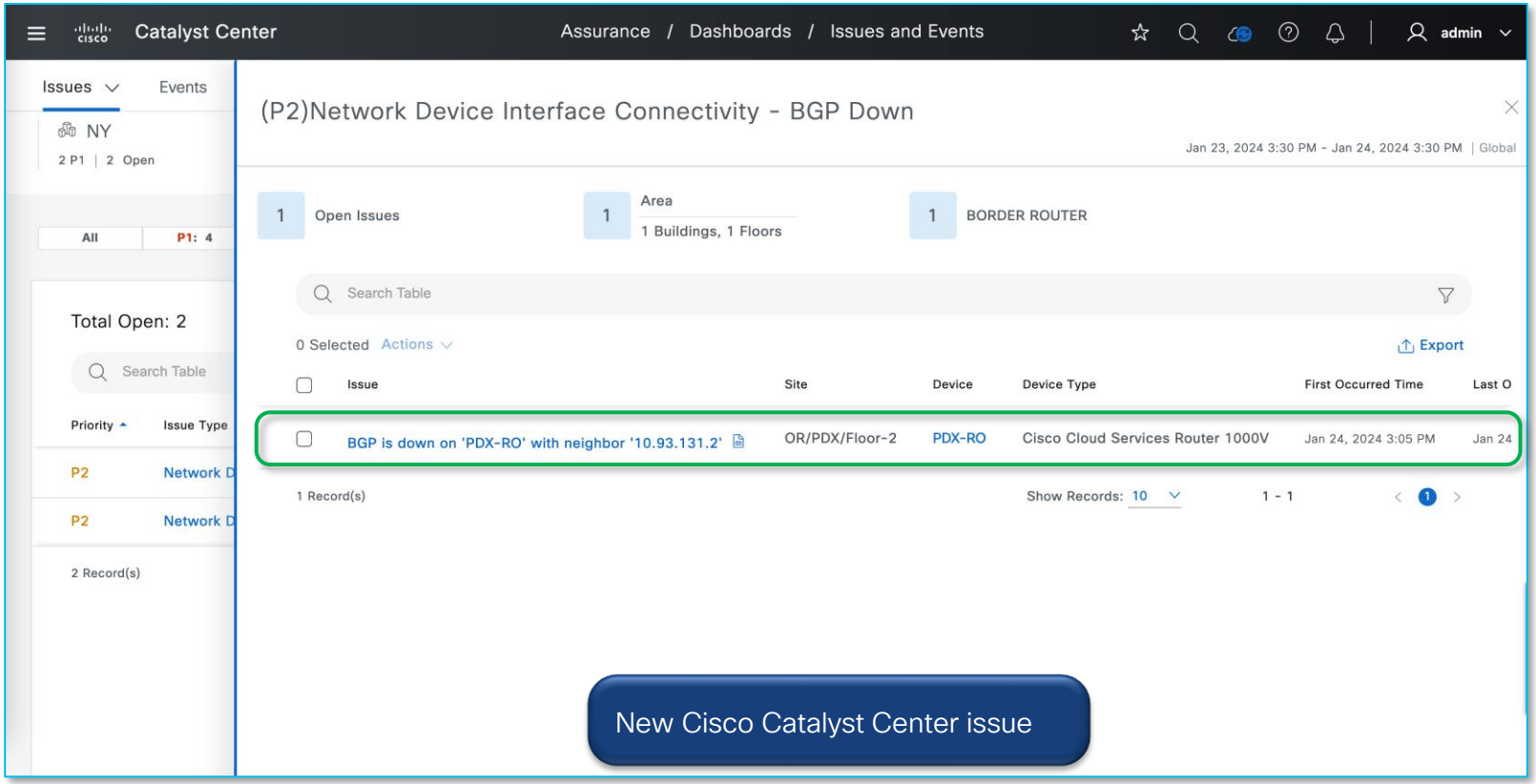
Notes:
The App logs are very useful for troubleshooting, or history of the business rule's executions.
All the Cisco DNA Custom Workflow App logs include an easy to identify comment – example:
"DNA Custom Workflow -- "

Retrieve the file content using the GET file API, parse the content and log info

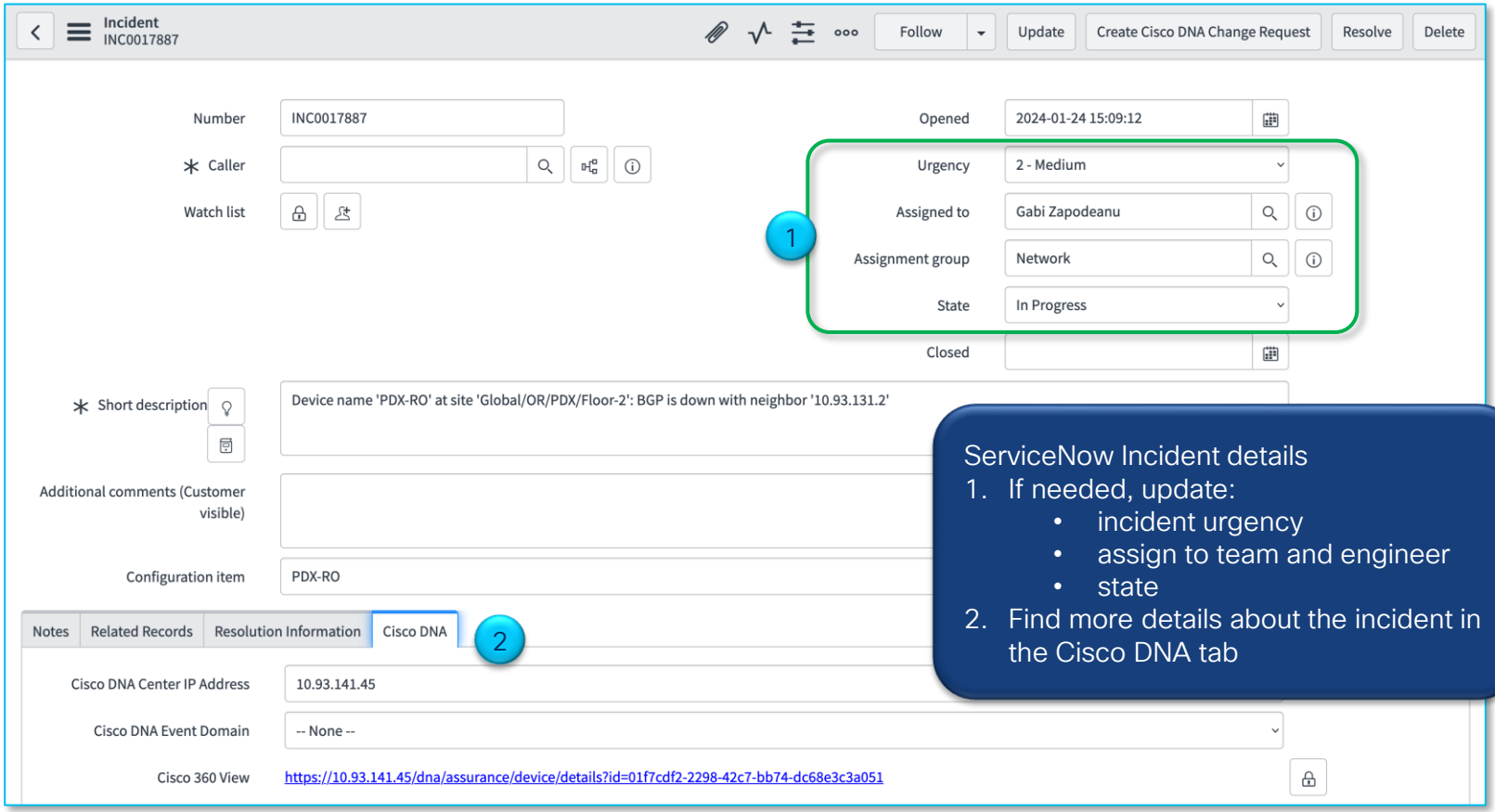
Network Troubleshooting – Code Development – cont.



Network Troubleshooting App Workflow



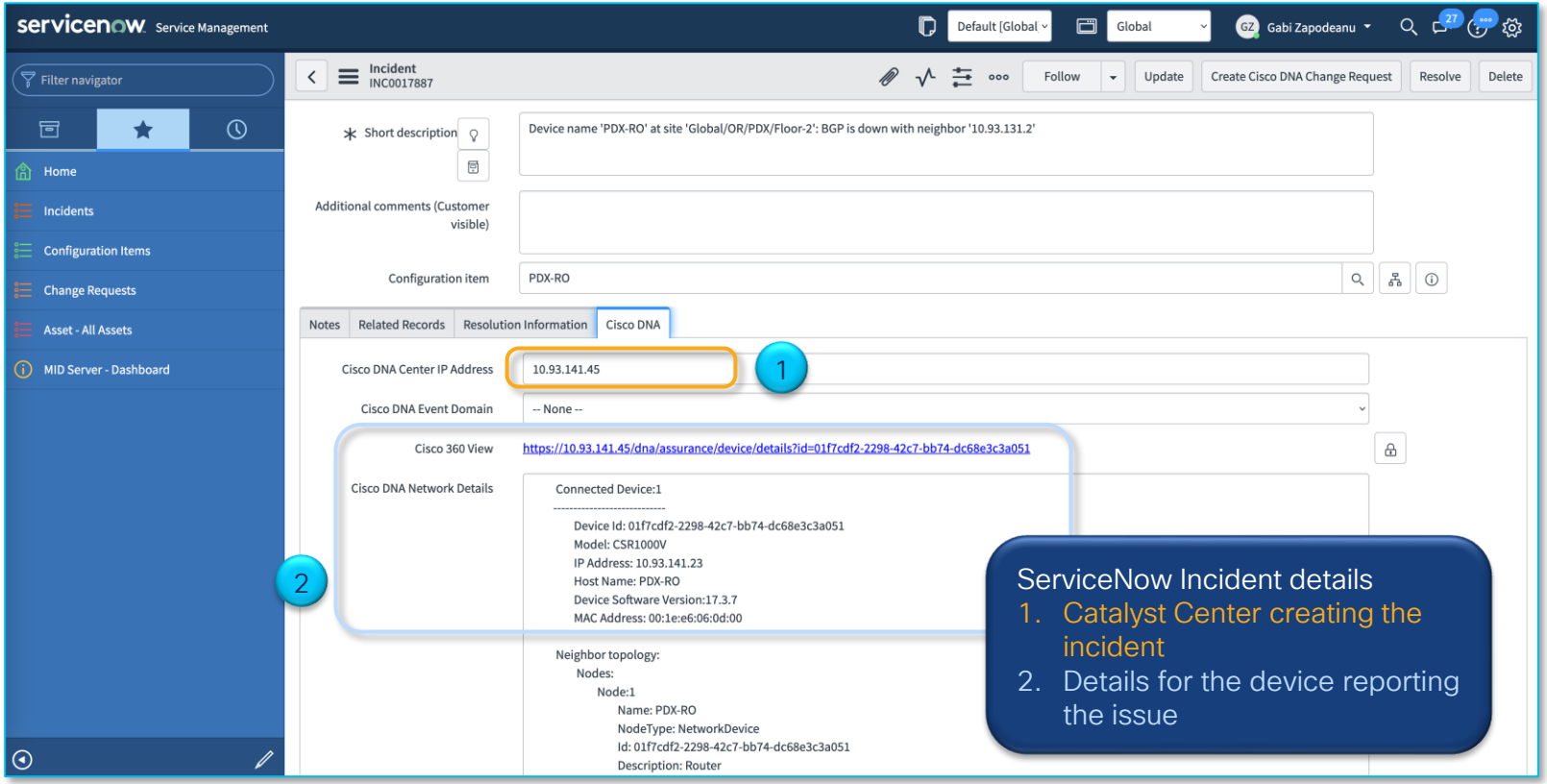
Network Troubleshooting App Workflow – cont.



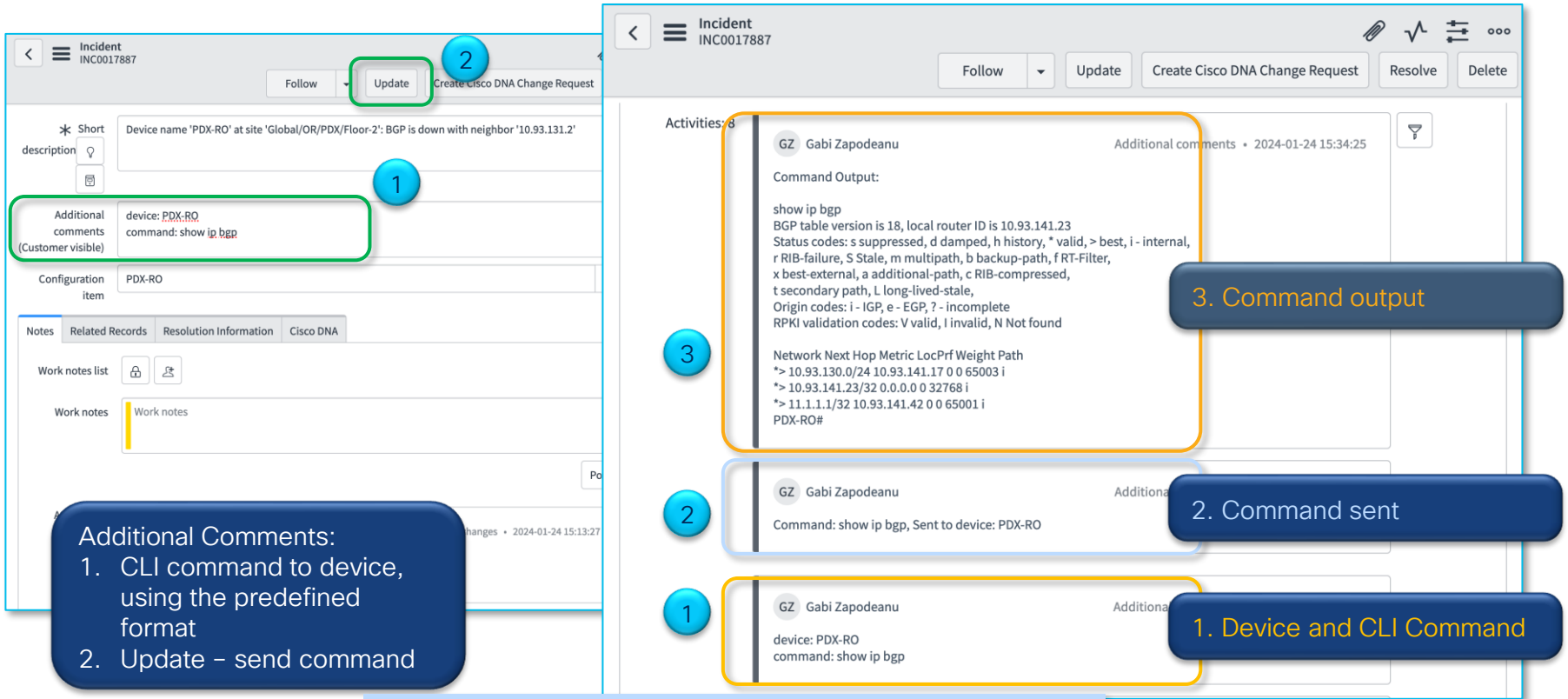
ServiceNow Incident details

1. If needed, update:
   - incident urgency
   - assign to team and engineer
   - state
2. Find more details about the incident in the Cisco DNA tab

Network Troubleshooting App Workflow – cont.

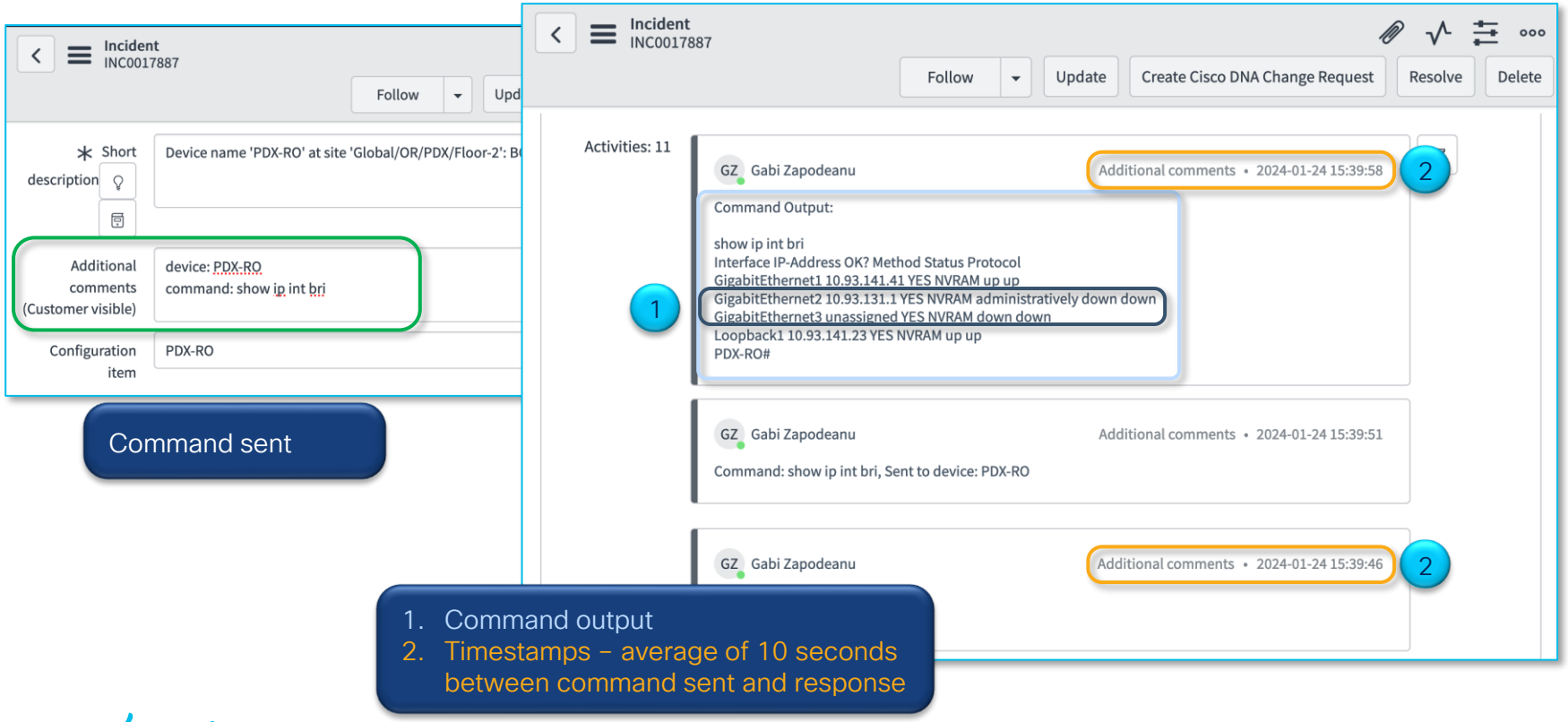


Network Troubleshooting App Command/Output

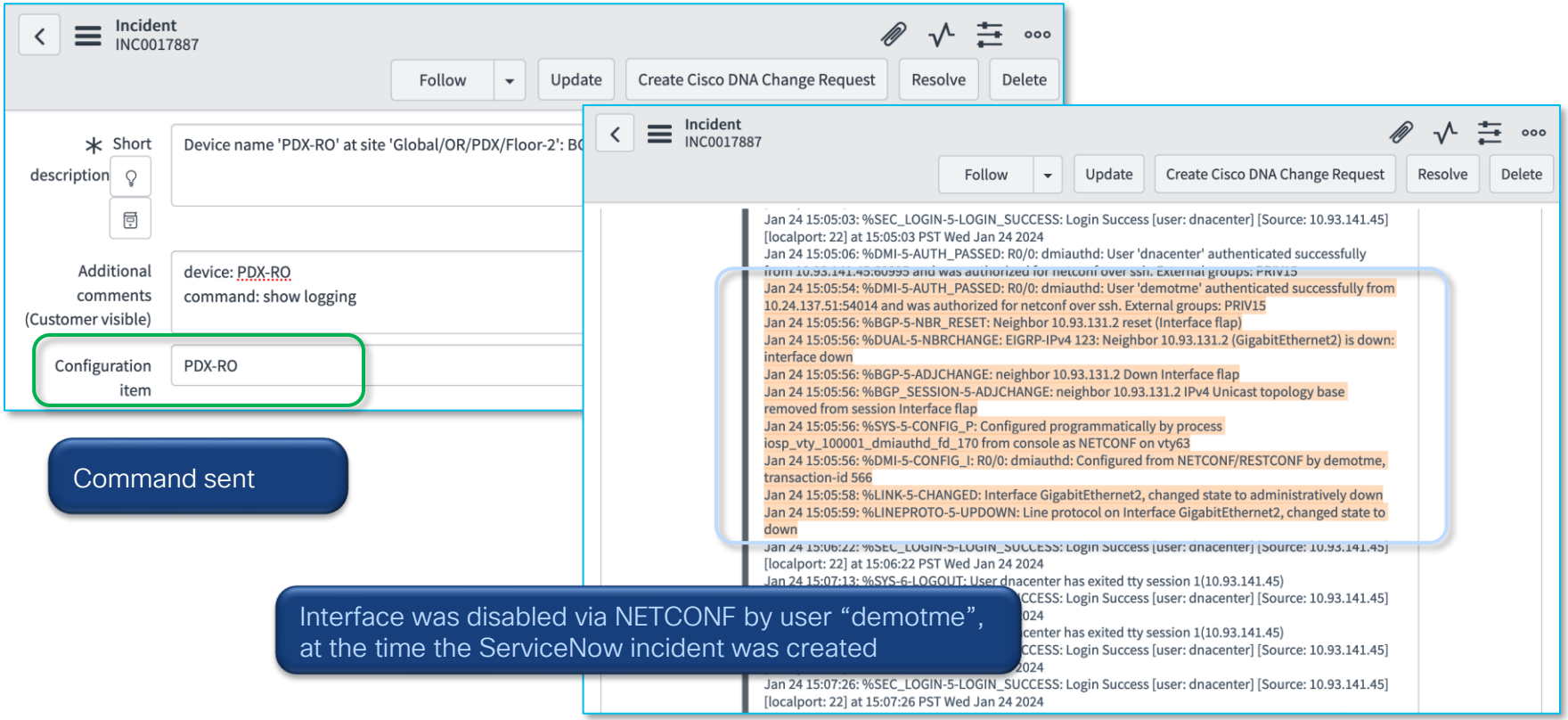


Note: *The network troubleshooting workflow does not require VPN access, or SSH to network devices.*

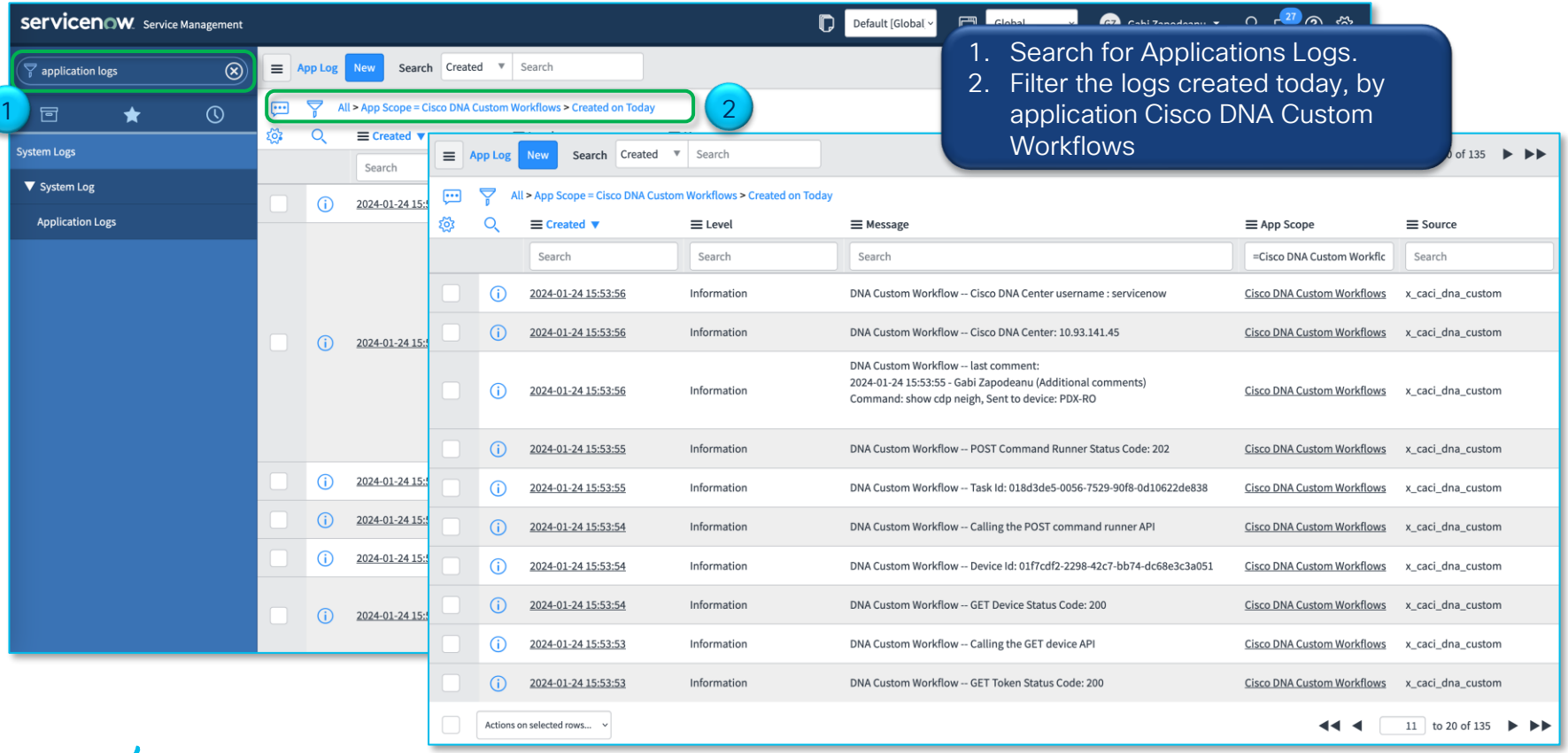
Network Troubleshooting App Command/Output – cont.



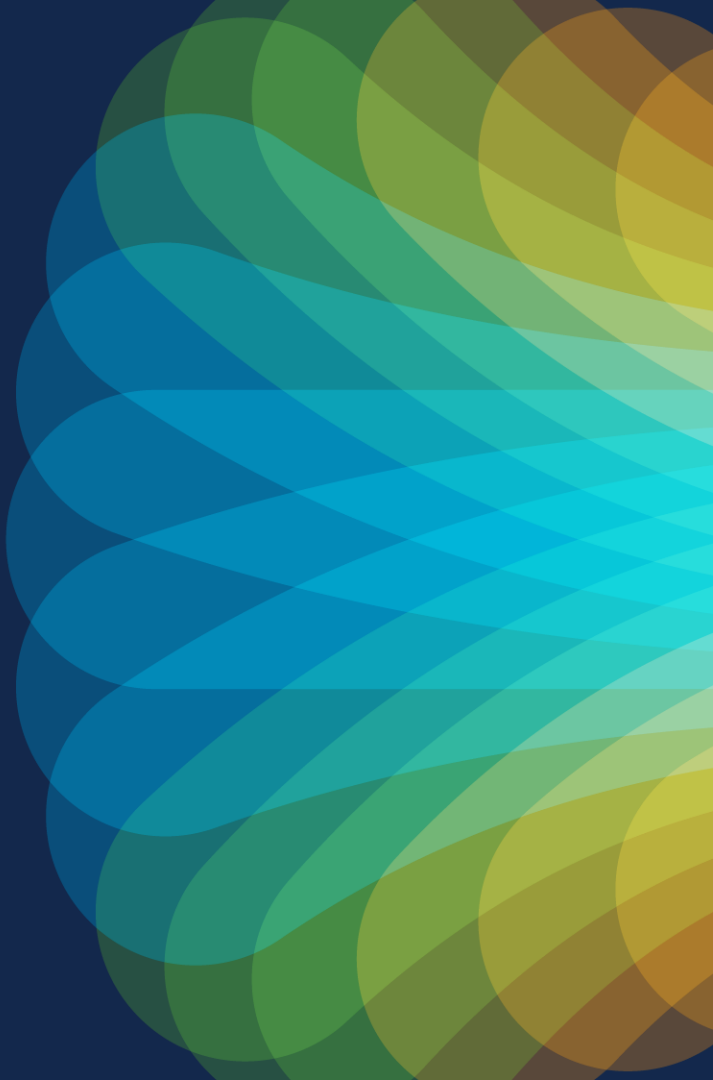
Network Troubleshooting App Command/Output – cont.

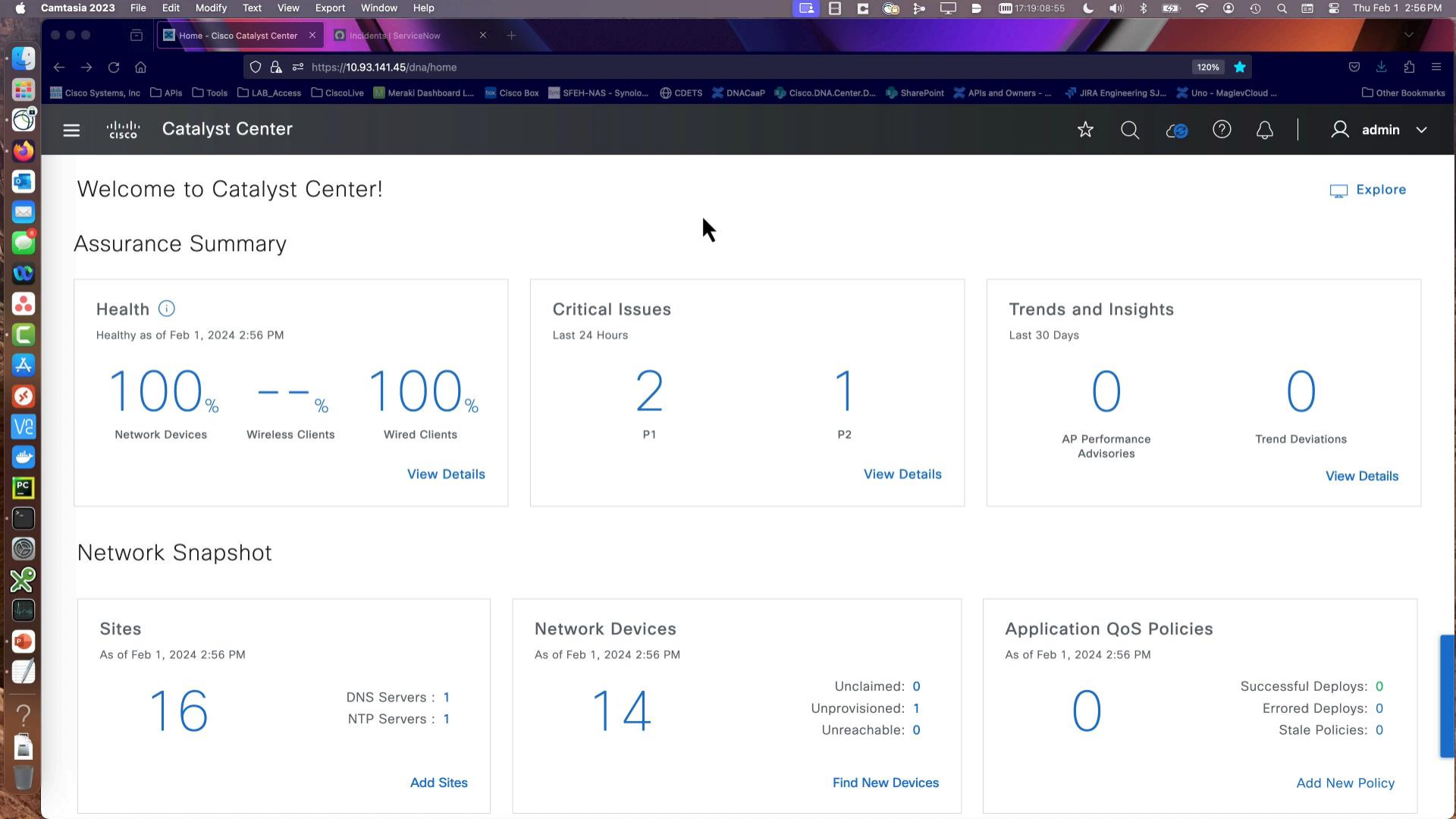


Application Logs – Network Troubleshooting



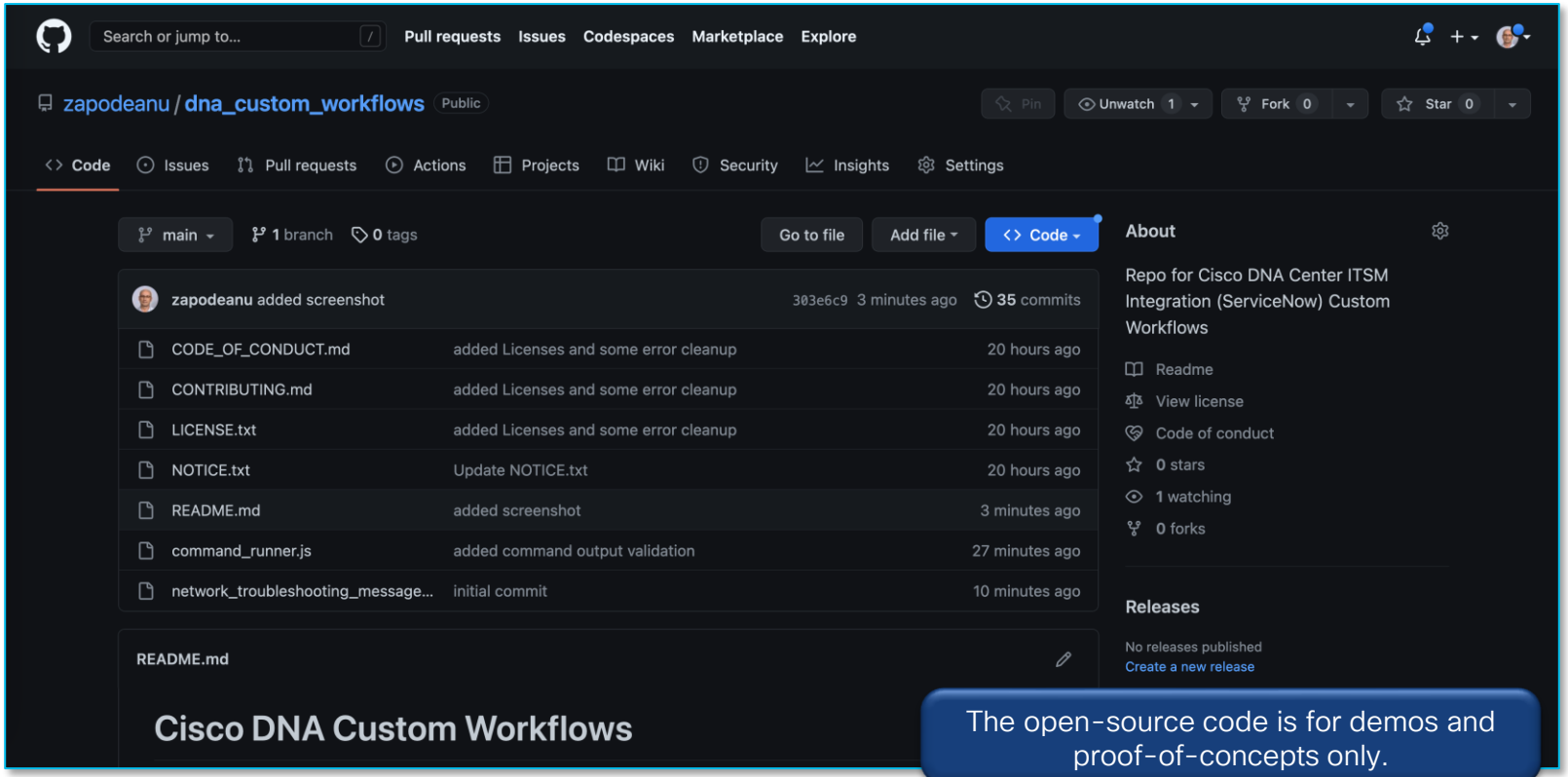
Demo Network Troubleshooting App




Camtasia 2023 File Edit Modify Text View Export Window Help
Thu Feb 1 2:56 PM
Home - Cisco Catalyst Center
Incidents | ServiceNow
https://10.93.141.45/dna/home
120%
Cisco Systems, Inc
APIs
Tools
LAB_Access
CiscoLive
Meraki Dashboard L...
Cisco Box
SFEH-NAS - Synolo...
CDETS
DNACaaP
Cisco.DNA.Center.D...
SharePoint
APIs and Owners - ...
JIRA Engineering SJ...
Uno - MaglevCloud ...
Other Bookmarks
Catalyst Center
admin
Welcome to Catalyst Center!
Explore
Assurance Summary
Health
Healthy as of Feb 1, 2024 2:56 PM
100%
Network Devices
--%
Wireless Clients
100%
Wired Clients
View Details
Critical Issues
Last 24 Hours
2
P1
1
P2
View Details
Trends and Insights
Last 30 Days
0
AP Performance Advisories
0
Trend Deviations
View Details
Network Snapshot
Sites
As of Feb 1, 2024 2:56 PM
16
DNS Servers : 1
NTP Servers : 1
Add Sites
Network Devices
As of Feb 1, 2024 2:56 PM
14
Unclaimed: 0
Unprovisioned: 1
Unreachable: 0
Find New Devices
Application QoS Policies
As of Feb 1, 2024 2:56 PM
0
Successful Deploys: 0
Errored Deploys: 0
Stale Policies: 0
Add New Policy

Cisco DNA Custom Workflows Open-Source Code

https://github.com/zapodeanu/dna_custom_workflows



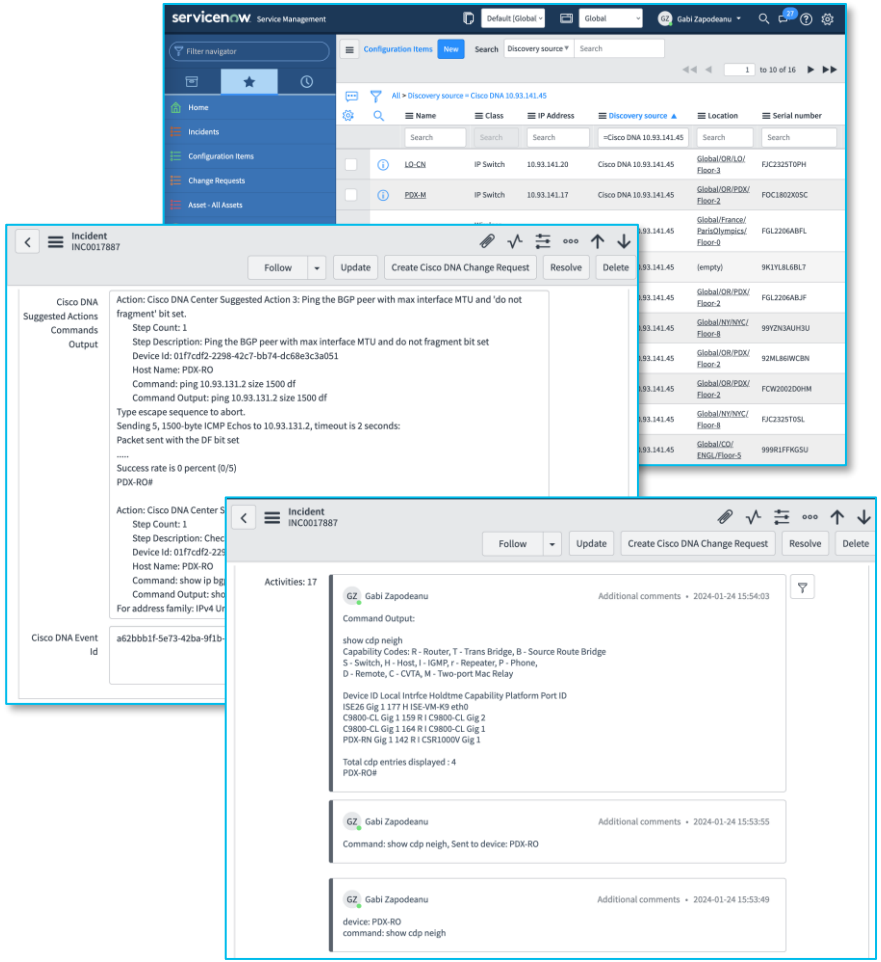
The open-source code is for demos and proof-of-concepts only.

Agenda

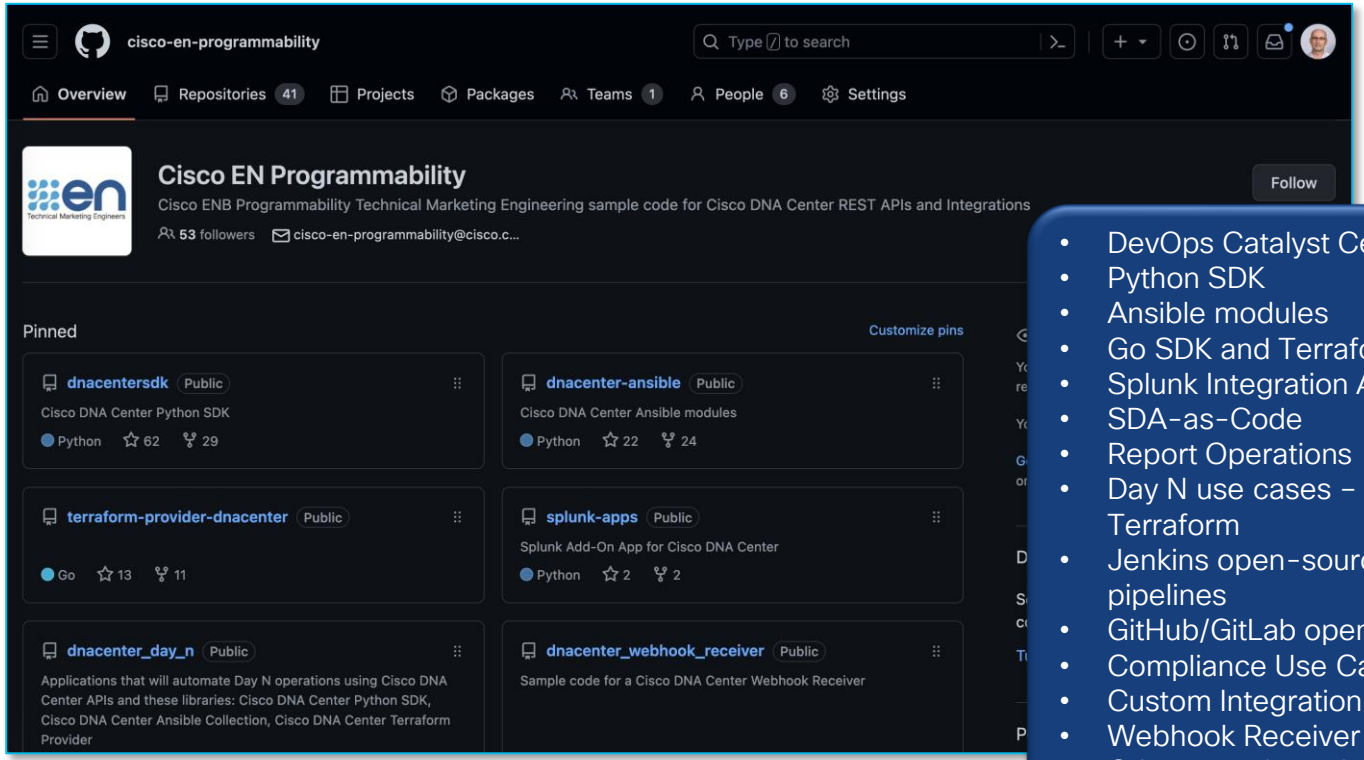
- Cisco Catalyst Center Platform
- ITSM (ServiceNow) Integration Overview
- CMDB Sync to Staging Table
- Events Notifications to Generic REST API Endpoint
- Network Troubleshooting Custom Workflow
- Summary

ITSM Integration Benefits

- Real-time incident and change control integration
- Enable innovation and business agility
- Ready to use, fully customizable
- Cost reduction and increased efficiencies



Cisco EN Programmability GitHub Org



- DevOps Catalyst Center use cases
- Python SDK
- Ansible modules
- Go SDK and Terraform provider
- Splunk Integration Apps
- SDA-as-Code
- Report Operations
- Day N use cases – Python SDK, Ansible, Terraform
- Jenkins open-source Integration and pipelines
- GitHub/GitLab open-source Integrations
- Compliance Use Case
- Custom Integration App
- Webhook Receiver
- Other sample code

https://github.com/cisco-en-programmability

Continue your education

TECOPS-2158
Cisco Catalyst Center Out-of-the-Box and Custom Integrations
Lab 8 - G106, 02/05/24, 08:45 AM

DEVNET-2958
Version Control Tools Integrations – Cisco Catalyst Center Infrastructure-as-Code Use Cases
DevNet Classroom 1, 02/05/24, 01:30 PM

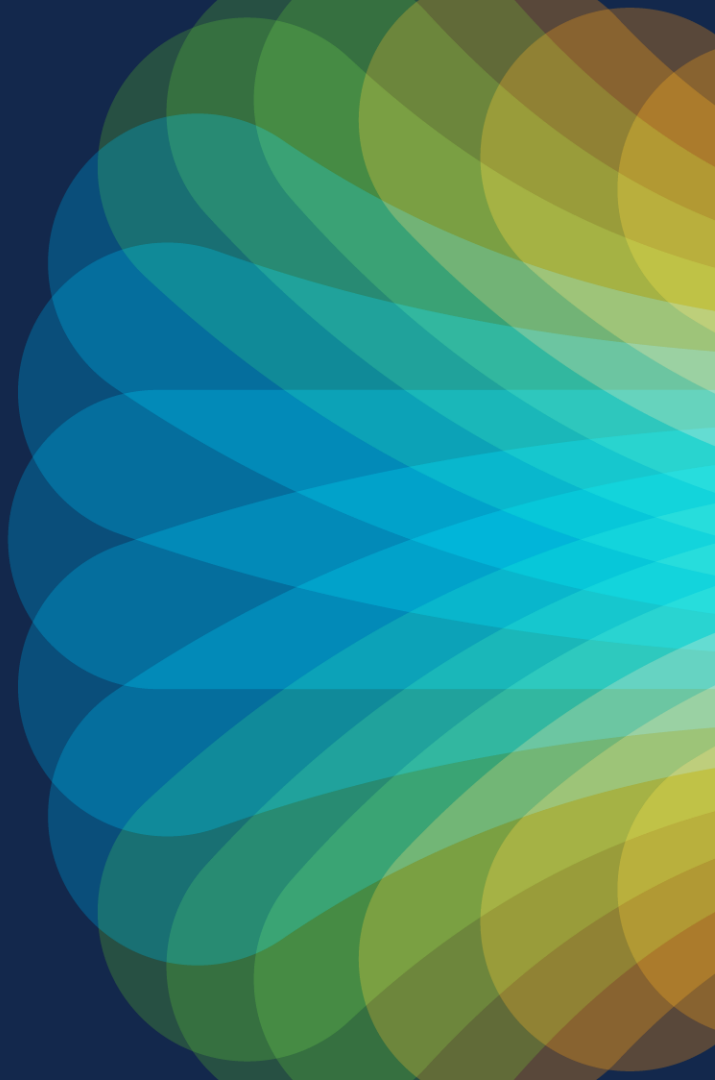
BRKOPS-2032
3 Cisco Catalyst Center and ITSM Workflows: CMDB, Incident Management and SWIM
Session Room A10, 02/06/24, 11:30 AM

DEVNET-2157
Cisco Catalyst Center-as-Code Network Compliance Use Cases
DevNet Classroom 1, 02/06/24, 01:30 PM

BRKOPS-2471
Custom Workflows for the Cisco Catalyst Center Integration with ServiceNow
Session Room A14, 02/08/24, 05:00 PM

The bridge to possible

Thank you



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