

DEPLOYMENT GUIDE

Infoblox Network Insight Integration with Cisco ACI

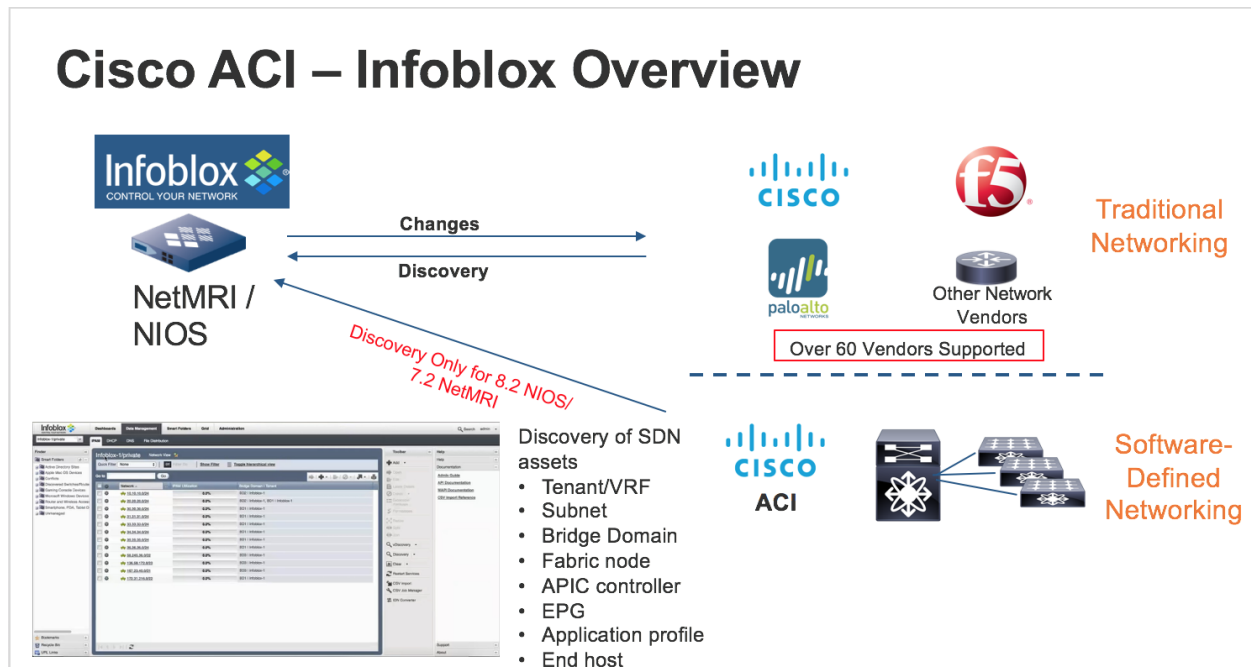
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Introduction

Cisco ACI (Application Centric Infrastructure) is Cisco’s SDN (software-defined networking) solution for data centers. This deployment guide illustrates how to configure Infoblox’s Network Insight to discover Cisco ACI components and end hosts.

Overview



In addition to discovering various network devices and hosts in Network Insight, you can now discover assets within Cisco ACI such as:

- Tenants and VRFs
- IP subnets
- Bridge Domains
- Fabric Nodes
- APIC controller
- EPG
- Application profile (NetMRI only)
- End hosts

Requirements

The following items are required for Cisco ACI Integration in NIOS:

- Network Insight license.
- Infoblox Network Discovery Appliance.
- Infoblox NIOS 8.2.1 or later is required. NIOS 8.5.0 is the advised release

The following items are required for Cisco ACI Integration in NetMRI:

- NetMRI license.
- Infoblox NetMRI Appliance.
- Infoblox NetMRI 7.2.1 or later is required. NetMRI 7.4 is the advised release

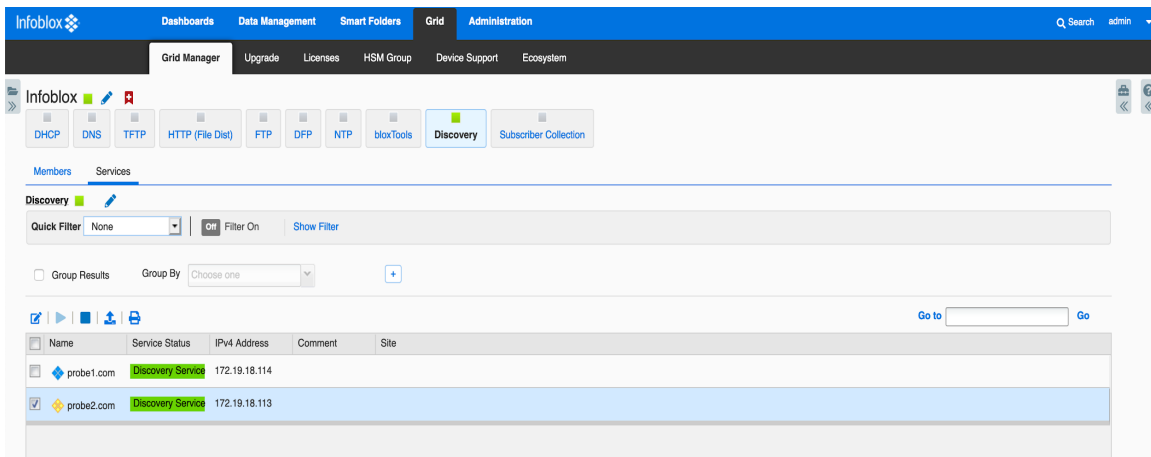
Deployment Instructions

Note: This deployment guide covers only Cisco ACI discovery deployment instructions. Please review the Network Insight Deployment Guide or NIOS Administrator's Guide for Network Insight configuration instructions. Please review the NetMRI Administrator Guide for NetMRI configuration instructions.

Configure Cisco APIC information for Network Insight.

Note: Refer to the NIOS 8.2 Administrators Guide for Network View configuration.

1. Navigate to **Grid** → **Grid Manager** → **Discovery**. Click on the **Discovery** member.



2. Click on the **Edit** button on the **Services** screen. Click on the **SDN/SD-WAN** button. Select the **Cisco ACI** entry and click on the **Edit** button. *Note: Talk with your Cisco ACI administrator to get the IP*

address, username, and password. The Cisco ACI administrator can also provide a CA certificate from the APIC.

The screenshot shows a web-based configuration interface for a member discovery tool. The main window is titled "probe2.com (Member Discovery Properties Editor)". On the left, there is a sidebar with navigation links: "General", "Credentials", "Seed", and "SDN/SD-WAN". The "Basic" tab is selected, and a yellow warning message at the top reads: "Member Role should be predefined as Probe or Consolidator-Probe to add SDN configurations." The central area is a modal dialog titled "Add Cisco ACI Configuration". It contains the following fields and options:

- *Fabric Name:** Text input field containing "aci_new".
- *Addresses:** A list of IP addresses. The first entry is "Cisco APIC Addresses" (checkboxed), and the second is "172.19.0.220" (checkboxed). There are plus and trash icons to the right of the list.
- *Protocol:** A dropdown menu set to "HTTP".
- *Network View:** A dropdown menu set to "default".
- *Username:** Text input field containing "admin".
- *Password:** Password input field with masked characters "....." and a show/hide icon.
- Comment:** A text input field.

At the bottom of the dialog, there are "Cancel" and "Save & Close" buttons.

3. Enter the IP address of the Cisco APIC. *Note: Multiple entries are supported for redundancy.*
4. Select the **Protocol** which is either HTTP or HTTPS. If you decide to use HTTPS, you will need to add a CA certificate.
5. Select the **Network View**.
6. Enter the **Username** for the APIC login.
7. Enter the **Password** for the APIC login.
8. Click on the **Save** button and then the **Save & Close** button.

Configure Cisco APIC information for NetMRI.

Note: Refer to the NetMRI Administrators Guide for Network View configuration.

1. Log into the NetMRI GUI.
2. Click on the **Settings** wheel.
3. Go to **Setup** → **Discovery Settings** → **APIC**.

- Click on the 'New' button. Fill in the fields for: APIC controller address, protocol, network view, username, and password.

The screenshot shows the 'Settings' page with the 'Discovery Settings' section expanded. The 'APIC' sub-tab is active. The form fields are as follows:

- APIC Controller Address: 10.40.19.10
- Protocol: HTTP
- Network View: Tenant/VRF
- Username: admin
- Password: [masked]

Buttons at the bottom include 'Cancel', 'Add & Discover', and 'Add'.

- Click on the 'Add & Discover' or 'Add' button.

The screenshot shows the 'Settings' page with the 'Discovery Settings' section expanded. The 'APIC' sub-tab is active. A table of discovered data is displayed below the form:

IP Address	Network View	Protocol
10.40.19.10	Tenant/VRF	http

At the bottom of the page, there is a footer: © 2017 Infoblox, Inc. All rights reserved.

Viewing Discovered Data for Network Insight.

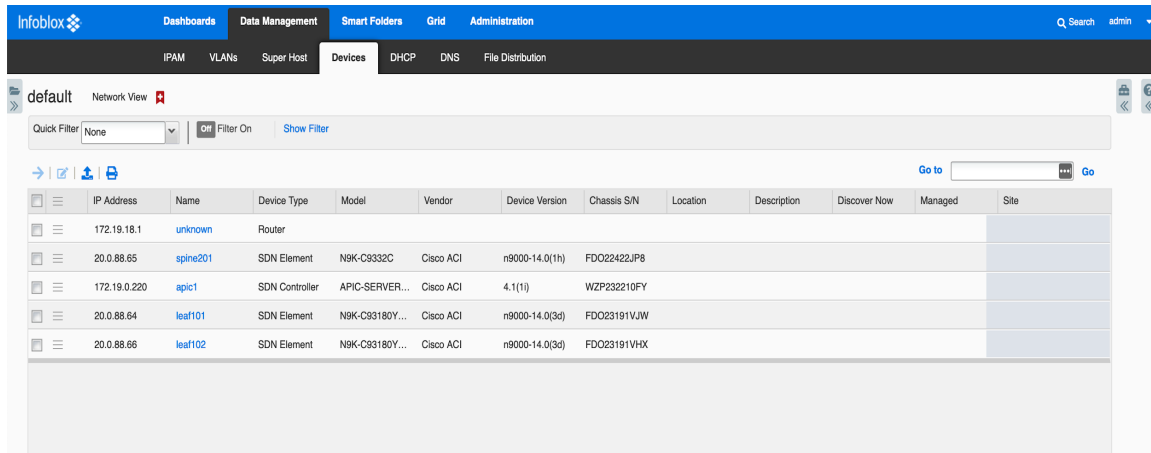
Below is a table showing the mappings of ACI specific components into IPAM objects.

ACI	Network Insight
Fabric Node (leaves and spine)	Device record under Devices tab
APIC Controller	Device record under Devices tab

Tenant	Tenant attribute for Networks and IP addresses under IPAM tab
Bridge Domain	Bridge Domain attribute for Networks and IP addresses under IPAM tab
EPG	EPG attribute for IP addresses under IPAM tab

After waiting about 15 minutes for the discovery to complete, you can now view your discovered devices.

1. Navigate to **Data Management** → **Devices**. Change to the network view that was used to enter the **Cisco ACI** details. For example, network view default was chosen.



2. In the previous screen shot, you can now see the SDN Controller and 3 SDN elements; leaf01, leaf02, and spine201.
3. You can drill down on the SDN Controller and SDN elements to gather information on interfaces, networks, IP addresses, assets, and components. Below are screen shots of each for one of the leaf nodes:

Infoblox Dashboards Data Management Smart Folders Grid Administration Search admin

IPAM VLANs Super Host **Devices** DHCP DNS File Distribution

Devices Home

leaf101 (Cisco ACI 20.0.88.64) Device

Interfaces Networks IP Addresses Assets Components

Quick Filter: None Filter On Show Filter

Go to: [] Go

Name	IP Address	VRF Name	VRF Description	VRF RD	MAC Address	VLAN ID	VLAN Name	Port Type	Port Speed	Admin Status	Operation Status	Trunk
eth1/51.3								propVirtual		Up	Off	
lo0	20.0.88.64							propVirtual		Up	Off	
eth1/35					00:3A:9C:8A:5A:03				25 Gbps	Up	Down	On
tunnel11								tunnel		Up	Up	Off
eth1/21					00:3A:9C:8A:59:F5				25 Gbps	Up	Down	On
eth1/18					00:3A:9C:8A:59:F2				25 Gbps	Up	Down	On
eth1/17					00:3A:9C:8A:59:F1				25 Gbps	Up	Down	On
po1					00:3A:9C:8A:5A:40	100 1000	qa_barem... qa_barem...	propVirtual		Up	Down	Off
tunnel8								tunnel		Up	Up	Off
eth1/52.4								propVirtual		Up	Off	
eth1/11					00:3A:9C:8A:59:EB				25 Gbps	Up	Down	On
eth1/38					00:3A:9C:8A:5A:06				25 Gbps	Up	Down	On
eth1/6					00:3A:9C:8A:59:E6	1000	qa_barem...	1000base-T	1 Gbps	Up	Up	Off
vlan24	Multiple	qa_baremetal_...		0/0	00:22:BD:F8:19:FF			propVirtual		Up	Up	Off
eth1/25					00:3A:9C:8A:59:F9				25 Gbps	Up	Down	On

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IPAM VLANs Super Host **Devices** DHCP DNS File Distribution

Devices Home

leaf101 (Cisco ACI 20.0.88.64) Device

Interfaces Networks IP Addresses Assets Components

Quick Filter: None Filter On Show Filter

Go to: [] Go

Network	VRF Name	VRF Description	VRF RD	Comment	Managed
15.15.15.0/24	qa_baremetal_...		0/0		No
88.88.88.0/24	qa_baremetal_...		0/0		No
17.17.17.0/24	qa_baremetal_...		0/0		No
8.8.8.0/24	qa_baremetal_...		0/0		No
7.7.7.0/24	qa_baremetal_...		0/0		No
11.11.11.0/24	qa_baremetal_...		0/0		No
34.34.34.0/24	qa_baremetal_...		0/0		No
20.0.0.32/32					
12.12.12.0/24	qa_baremetal_...		0/0		No
77.77.77.0/24	qa_baremetal_...		0/0		No
14.14.14.0/24	qa_baremetal_...		0/0		No
18.18.18.0/24	qa_baremetal_...		0/0		No
20.0.0.0/27					No
19.19.19.0/24	qa_baremetal_...		0/0		No
10.10.10.0/24	qa_baremetal_...		0/0		No

https://172.19.18.119/ui/xi/INW_mFTDS-dNkAp1l6t_g/xlNc9/t_gfb#

Infoblox Dashboards Data Management Smart Folders Grid Administration Q Search admin

IPAM VLANs Super Host **Devices** DHCP DNS File Distribution

Devices Home

leaf101 (Cisco ACI 20.0.88.64) Device 🔧 🔴

Interfaces Networks **IP Addresses** Assets Components

Quick Filter: Filter On [Show Filter](#)

[↩](#) [📄](#) [🔄](#) Go to [Go](#)

	IP Address	VRF Name	VRF Description	VRF RD	Interface Name	MAC Address	VLAN ID	VLAN Name	Admin Status	Operation Status	Managed	Site
<input type="checkbox"/>	15.15.15.1	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	88.88.88.8	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	17.17.17.17	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	8.8.8.1	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	7.7.7.1	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	11.11.11.11	qa_baremetal_...		0.0	vlan24	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	34.34.34.34	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	20.0.0.32				lo1023				Up		No	
<input type="checkbox"/>	12.12.12.12	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	77.77.77.77	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	14.14.14.1	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	18.18.18.18	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	20.0.0.30				vlan8	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	19.19.19.19	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	
<input type="checkbox"/>	10.10.10.10	qa_baremetal_...		0.0	vlan21	00:22:BD:F8:1...			Up	Up	No	

Infoblox Dashboards Data Management Smart Folders Grid Administration Q Search admin

IPAM VLANs Super Host **Devices** DHCP DNS File Distribution

Devices Home

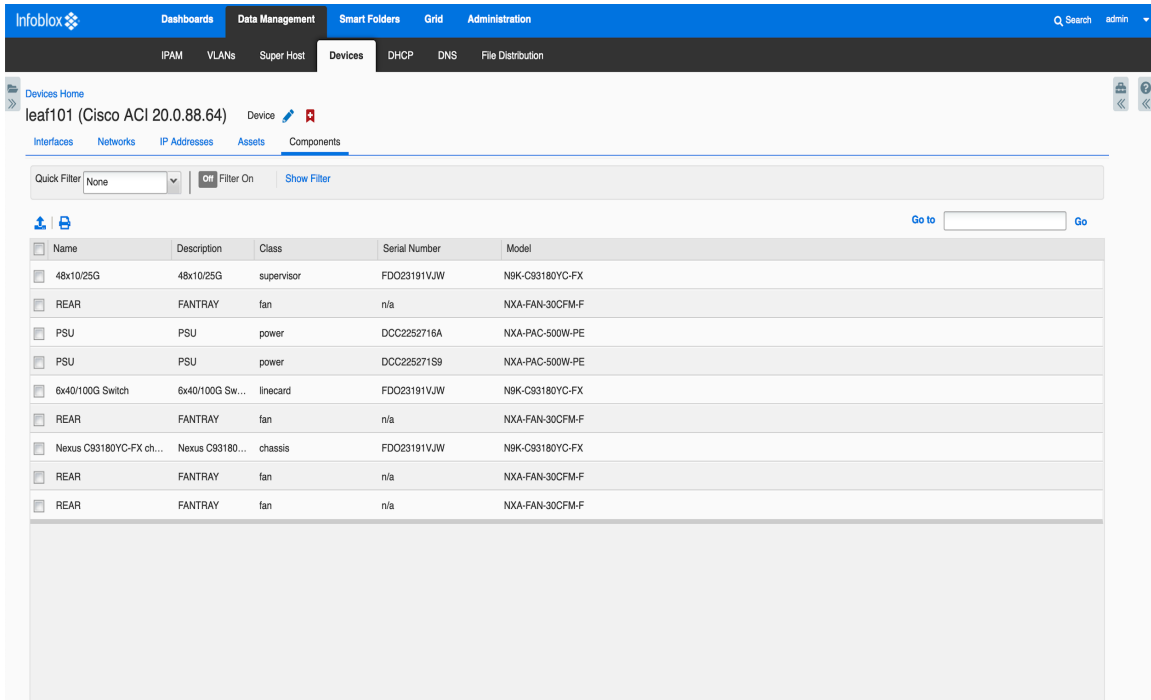
leaf101 (Cisco ACI 20.0.88.64) Device 🔧 🔴

Interfaces Networks **IP Addresses** **Assets** Components

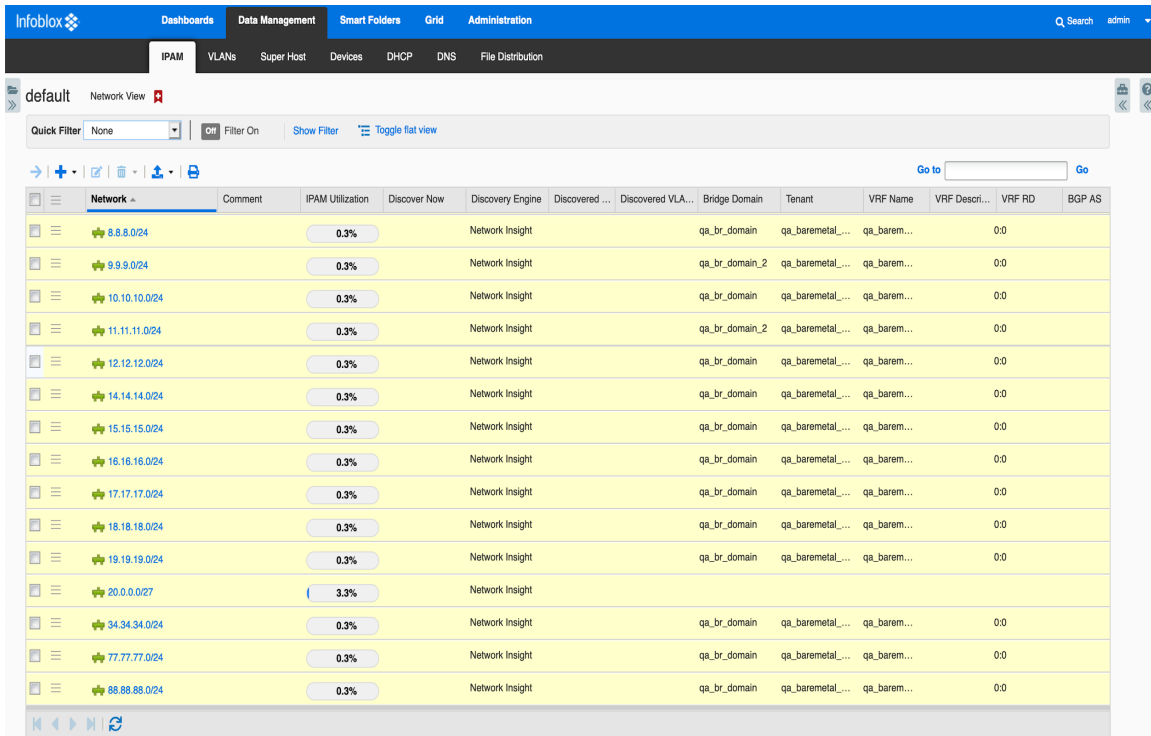
Quick Filter: Filter On [Show Filter](#)

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	Name	Interface Name	VRF Name	VRF Description	VRF RD	IP Address	Type	Asset MAC Address	VLAN ID	VLAN Name	Admin Status	Operation Status
<input type="checkbox"/>	spine201	eth1/49				20.0.88.65	SDN Element	A8:54:56:B0:04:A5			Up	Up
<input type="checkbox"/>	apic1	eth1/1				172.19.0.220	SDN Controller	C4:F7:D5:F6:99:94			Up	Up



4. Navigate to **Data Management** → **IPAM** to view the discovered networks. Take note of the networks with bridge domains and tenants.



Viewing Discovered Data for NetMRI.

1. After upgrading NetMRI to 7.2.1 and above, a device group called ACI is used to hold all of the Cisco ACI components such as the APIC, leaves, and spine. Select the ACI device group from the Device Group panel.
2. Navigate **Network Explorer** → **Inventory** → **Devices** → **All Devices**.

The screenshot displays the Infoblox Network Explorer interface. The main content area shows a table of discovered devices under the 'All Devices' group. The table has columns for IP Address, Network View, Device Name, Type, Vendor, and Model. The data is as follows:

IP Address	Network View	Device Name	Type	Vendor	Model
10.40.19.10	TenantVRF	apic1	SDN Controller (99%)	Cisco	APIC-SERVER-M1
10.40.19.12	TenantVRF	LEAF1	SDN Element (99%)	Cisco	NSK-C9396PX
10.40.19.13	TenantVRF	LEAF2	SDN Element (99%)	Cisco	NSK-C9396PX
10.40.19.14	TenantVRF	SPINE	SDN Element (99%)	Cisco	NSK-C9336PQ

The interface also shows a left-hand navigation pane with categories like Infrastructure Devices, Device Components, Connected End Hosts, Connected IP Phones, Virtual Devices, Interfaces, OSs, and Models. A right-hand pane shows a tree view of device groups, including 'All Devices (38)' and 'ACI (4)'. The bottom status bar indicates 'Page: 1 of 1' and 'Displaying 1 - 4 of 4'.

- If you click on the IP address, you will get the device viewer for that IP address. You will then be able to view the EPG, Bridge Domains, VLANs and interfaces.

LEAF1 | 10.40.19.12 (Physical Device) | Tenant/VRF

Type:	SDN Element (99%)	Vendor:	Cisco
O/S Version:	n9000-12.2(1n)	Model:	N9K-C9396PX
Up Time:	2d 08h 54m 33s	SNMP Status:	Enabled (Unknown Community)
Last Communication:	2017-09-28 15:45:17	MAC Address:	00:22:BD:F8:19:FF
Discovery Blackout:	N/A	Change Blackout:	N/A

EPG

Views Filters

Tenant	Application profile	EPG
common	default	VM-EPG
infra	access	default
mgmt	VM-Tenant-App-Profile	VM-EPG
NetMRI-Tenant	dev-ap	dev-epg-2
NetMRI-Tenant	dev-ap	dev-main-epg
NetMRI-Tenant	dev-ap	netmri-epg
NI-Tenant	NI-AP	ni-main-epg
test	NIOS-ANP	DDI-2
test	NIOS-ANP	DDI-1

Page 1 of 1 | Displaying 1 - 9 of 9 | Updated at 2017-09-28 15:52:40

Network Analysis +

Device/Network Explorer +

ACI -

EPG

Bridge Domains

Interfaces +

Router +

Switch +

Settings & Status +

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- If you click on the **Network View**, you will be able to see the VRFs.

The screenshot shows two sections of the Infoblox interface:

Associated VRFs

Device Name	VRF Name	VRF RD
LEAF1	black-hole	0:0
LEAF1	management	0:0
LEAF1	NetMRI-Tenant:NetMRI-VRF	0:0
LEAF1	common:Infoblox-PN	0:0
LEAF1	overlay-1	0:0
LEAF2	NetMRI-Tenant:NetMRI-VRF	0:0
LEAF2	NetMRI-Tenant:netmri-vrf-2	0:0

Page 1 of 2 | Displaying 1 - 10 of 17 | Updated at 2017-09-28 15:50:23

Imported VRFs

Route Target	Device Name	VRF Name	VRF RD
No data to display			

Page 1 of 1 | No data to display | Updated at 2017-09-28 15:50:23

- When clicking on **Summaries** → **Network Views**, you will be able to see details of the network view.

The screenshot shows the 'Network Views' section of the Infoblox interface. The left sidebar lists various network objects, with 'Network Views' selected. The main area displays a table of VRFs for the 'common:Infoblox-PN' group.

VRF Name	VRF Network View	VRF Description	VRF RD	Device Name	IP Address	Network View
common:Infoblox-PN	TenantVRF		0:0	LEAF1	10.40.19.12	TenantVRF
common:Infoblox-PN	TenantVRF		0:0	LEAF2	10.40.19.13	TenantVRF

Page 1 of 1 | Displaying 1 - 2 of 2 | Updated at 2017-09-28 15:57:54

- When clicking on **Summaries** → **VRFs**, you will be able to see the VRFs that are assigned to the devices.

The screenshot displays the Infoblox Network Explorer interface. The main content area shows a table of VRFs for the device group 'common:Infoblox-PN'. The table has columns for VRF Name, VRF Network View, VRF Description, VRF RD, Device Name, IP Address, and Network View. Two rows are visible, both for 'TenantVRF' on devices LEAF1 and LEAF2 with IP address 10.40.19.12.

VRF Name	VRF Network View	VRF Description	VRF RD	Device Name	IP Address	Network View
common:Infoblox-PN	TenantVRF		0:0	LEAF1	10.40.19.12	TenantVRF
common:Infoblox-PN	TenantVRF		0:0	LEAF2	10.40.19.13	TenantVRF

Below the table, there is a search bar and a list of VRFs. The 'common:Infoblox-PN' VRF is selected and highlighted. The list includes: View All VRFs, (default)OS, black-hole, common:Infoblox-PN, management, NetMRI-Tenant:NetMRI-VRF, NetMRI-Tenant:netmi-vrf-2, NI-Tenant:NI-VRF, overlay-1, and test1 vrf test1.

The interface also shows a sidebar on the left with navigation options like Routes, Subnets, VLANs, etc., and a sidebar on the right showing device groups like ACI (4) with sub-items like Network Management (1), Network w/o SNMP (6), Routing (19), Switching (16), and UNKNOWN (3).

Page 1 of 1 | Displaying 1 - 2 of 2 | Updated at 2017-09-28 15:57:54

7. Navigating to **Network Explorer** → **Discovery** will show the discovery status, IP addresses, interfaces, VRF names, and network views.

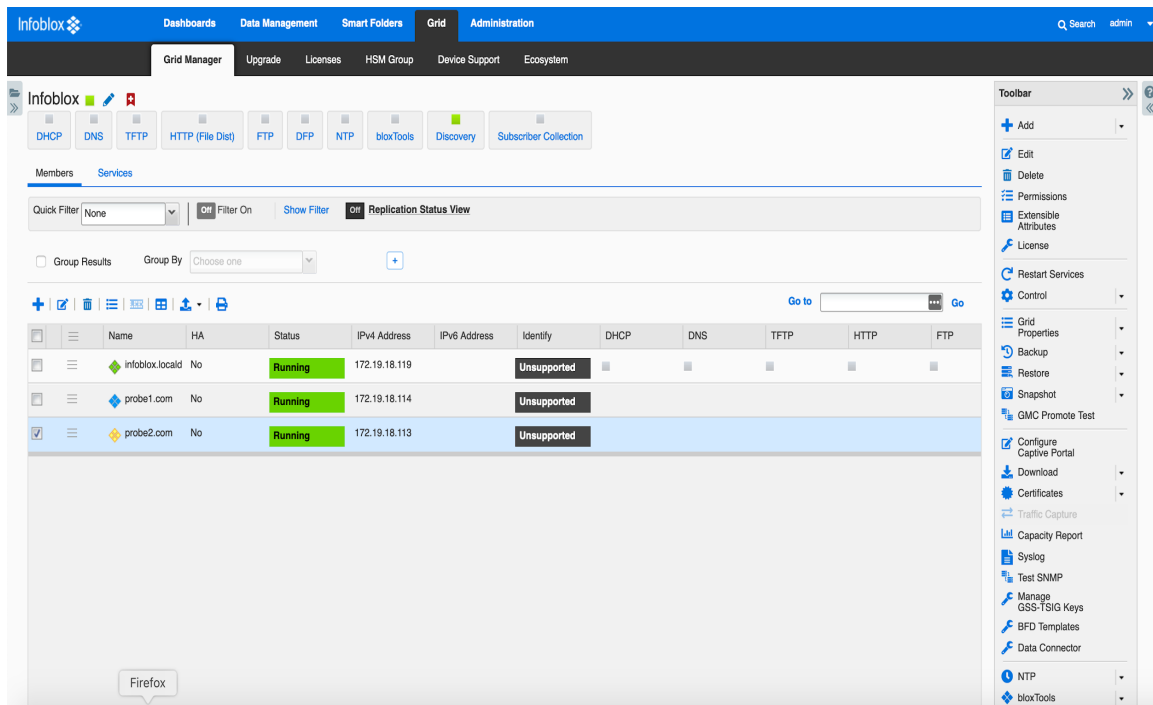
The screenshot shows the Infoblox Network Explorer interface. The main content area displays a table of network elements under the 'Discovery' tab. The table has columns for IP Address, Network View, Name, and various status indicators (E, P, R, S, SC, C, CC, Q, DB, CB, Type). The table lists several elements, including a SPINE switch and two LEAF switches (LEAF1 and LEAF2). The bottom of the interface shows a summary bar with the following statistics:

Entire Network Totals	
Network Devices:	34
Licensed Devices:	28
IP Addresses:	Classified 119 Reached 127 Identified 128

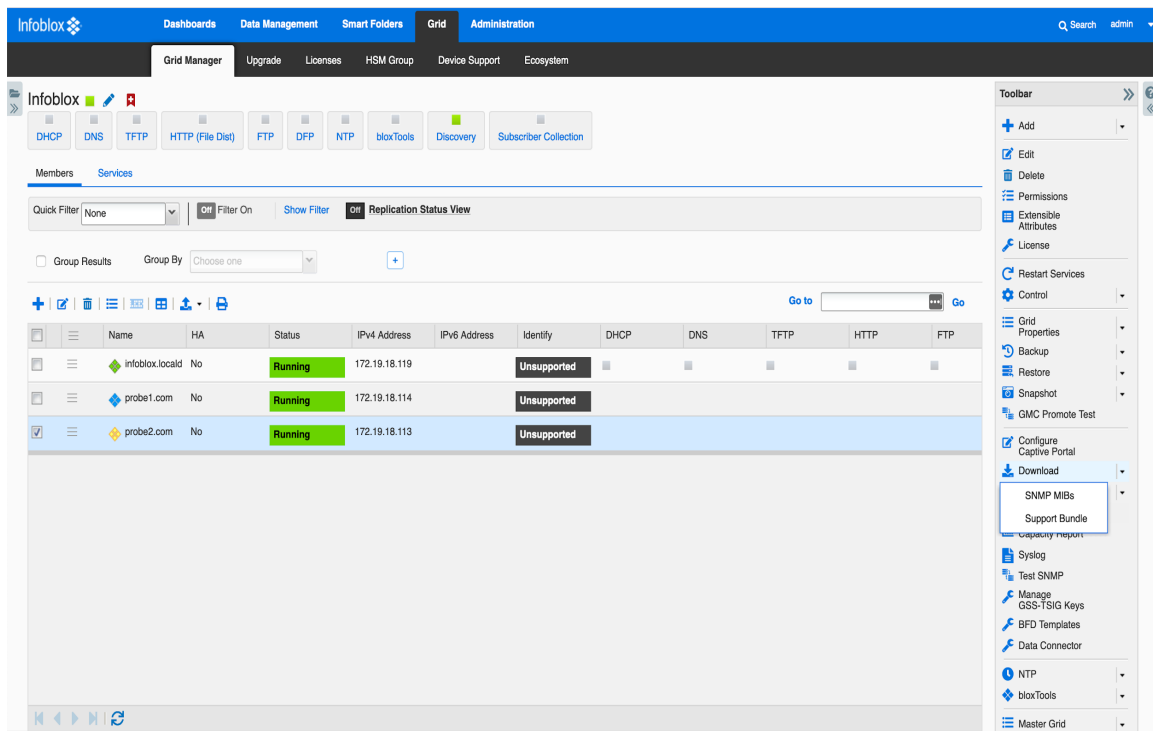
Troubleshooting - NIOS

1. Try to ping the IP address of the APIC. If successful, then go to the next step.

2. Download a support bundle. Navigate to **Grid** → **Grid Manager** → **Members**.



3. Click on the Discovery member which is probe2.com in this example. Navigate to **Toolbar** → **Download** and click on **Support Bundle**.



4. A compressed file will be created and can be downloaded to your Downloads directory. The file name is supportBundle.tar.gz. Uncompress this file.
5. After uncompressing, change directory to the newly created subdirectory called **SupportBundle**. Search for the compressed file called nm_discovery_support_bundle.tgz. Uncompress this file.
6. The subdirectory Augusta is now created in the subdirectory supportBundle. Change directory to Augusta/snmp_logs. Open the latest dataEngine.log.<year>-<month>-<day> file. The information related to Cisco ACI can be found by searching string 'AciObject' or IP address of Cisco APIC/LEAF. For example:

```
2017-08-01 16:11:47 [info] 13627 (worker14) 10.40.19.10/AciObject-3707429403927922829:
AciObject: collection completed
```

```
2017-08-01 16:11:47 [info] 13627 (worker14) 10.40.19.10/AciObject-3707429403927922829: Done
(663ms)
```

```
2017-08-01 16:20:24 [info] 22904 (worker01) 10.40.19.12/AciObject-4004721853816867796: ACI
request POST /api/aaaLogin.json failed: Request to ACI failed: 401 Unauthorized
```

```
(401: Username or password is incorrect - FAILED local authentication)
```

```
2017-08-01 16:20:24 [error] 22904 (worker01) 10.40.19.12/AciObject-4004721853816867796: Cannot
login to ACI controller 10.40.19.10: Request to ACI failed: 401 Unauthorized (401: Username or password
is incorrect - FAILED local authentication)
```

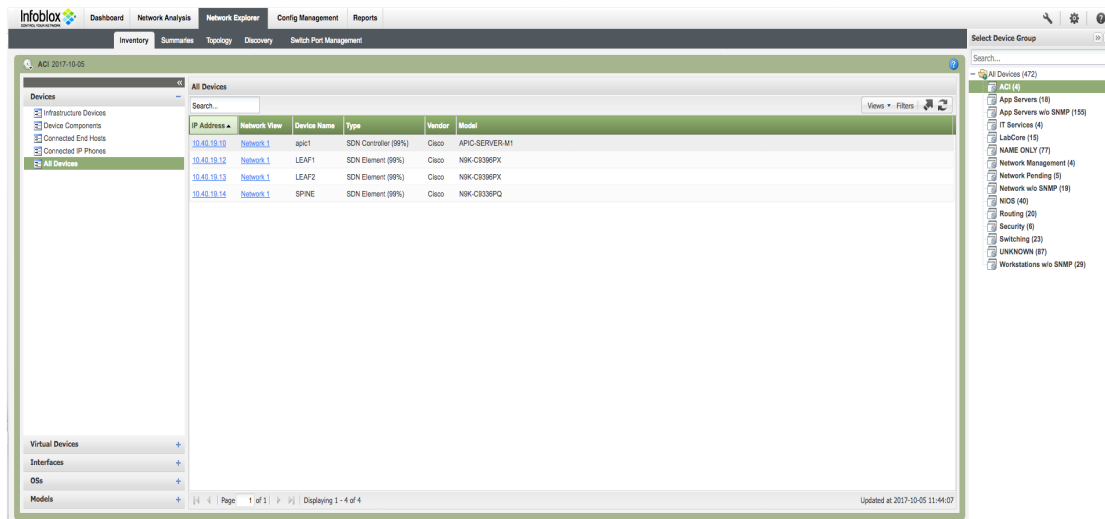
```
2017-08-01 16:22:25 [info] 23101 (worker13) 1.1.1.1/AciObject-6001678353361986687: ACI request
POST /api/aaaLogin.json failed: Request to ACI failed: 500 Can't connect to 1.1.1.1:80 (Connection timed
out)
```

```
2017-08-01 16:22:25 [error] 23101 (worker13) 1.1.1.1/AciObject-6001678353361986687: AciObject:
Failed collection: Cannot login to ACI controller 1.1.1.1: Request to ACI failed: 500 Can't connect to
1.1.1.1:80 (Connection timed out)
```

Troubleshooting – NetMRI

1. Try to ping the IP address of the APIC from within NetMRI. If successful, then go to the next step.

2. Navigate to any of the ACI devices in **Network Explorer** → **Inventory** → **All Devices**. Make sure the ACI device group is highlighted.



3. Pick the device in question by clicking on the IP address to bring up the Device Viewer.

4. Within the Device Viewer, navigate to **Settings & Status** → **General Settings** → **Enable SNMP debug**.

General Settings

Finger Printing : Disabled	Analysis : Enabled
NetBIOS Scanning : Disabled	Config Change : N/A
ARP Cache Refresh : Disabled	Switch Port Mgmt : Enabled
Config Collection : N/A	

Modify Device Settings

Name: LEAF1

Management Network View: Network 1

Type: SDN Element

Configure SNMP collection status and debug parameters

SNMP Status: Enabled Disabled

SNMP Debug: Enabled Disabled

If 'Locked' or 'Unlocked' is selected for Config Change, this will override the Device Group setting.

Config Change: Group Default Locked Unlocked

To correct the reboot time for devices up longer than 497 days, enter the date and time of the last device reboot (YYYY-mm-dd hh:mm:ss).

Reboot Time:

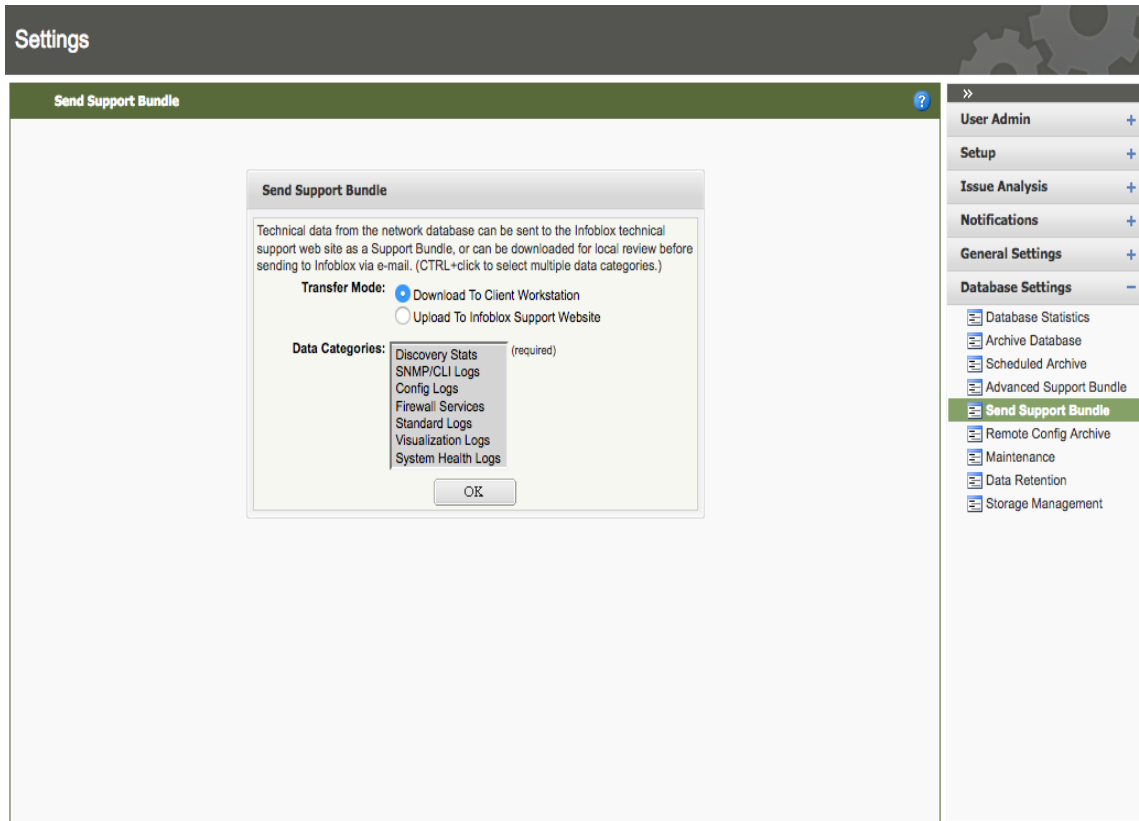
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Settings & Status

- Network Analysis +
- Device/Network Explorer +
- ACI +
- Interfaces +
- Router +
- Switch +
- Settings & Status -**
- General Settings
- Management Status
- User Audit Log
- Device Audit Log
- Logs
- Device Support

5. Click on the **Update** button.

6. Navigate to **Settings** → **Database Settings** → **Send Support Bundle**. Highlight all of the Data Categories and click on the **OK** button.



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7. You can then either review the `dataEngine.log` file or submit a support bundle to Infoblox TAC for further review.



Infoblox unites networking and security to deliver unmatched performance and protection. Trusted by Fortune 100 companies and emerging innovators, we provide real-time visibility and control over who and what connects to your network, so your organization runs faster and stops threats earlier.

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