

Deployment Guide

Infoblox Network Insight Integration with Cisco ACI



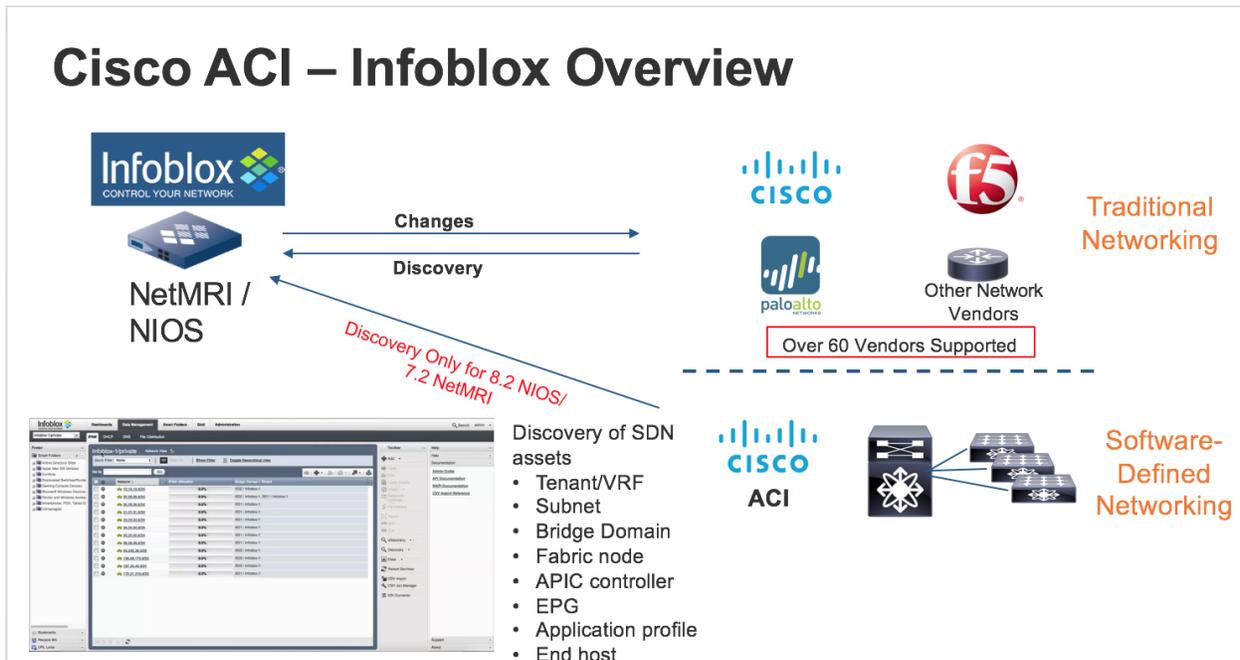
Table of Contents

Introduction	2
Overview	2
Requirements	2
Deployment Instructions	3
Configure Cisco APIC information for Network Insight.	3
Configure Cisco APIC information for NetMRI.	4
Viewing Discovered Data for Network Insight.	5
Viewing Discovered Data for NetMRI.	9
Troubleshooting - NIOS	14
Troubleshooting – NetMRI	16

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

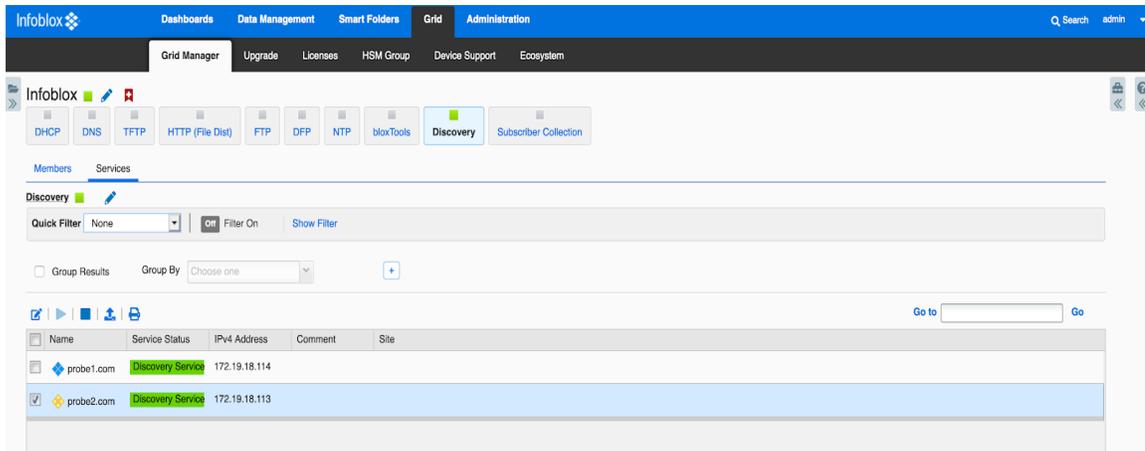
Deployment Instructions

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.

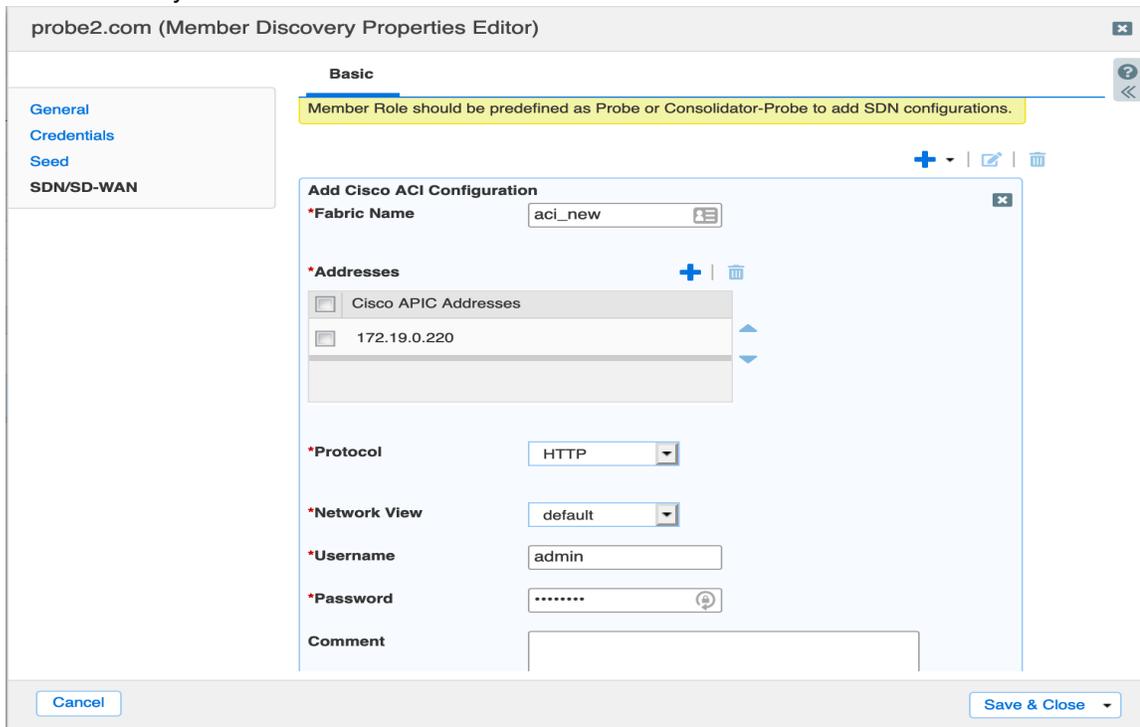
Configure Cisco APIC information for Network Insight.

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.

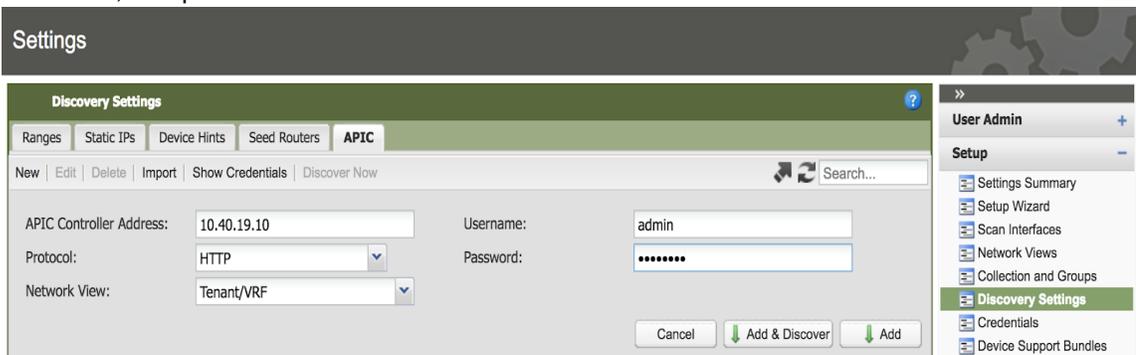
3. Enter the IP address of the Cisco APIC. Note: multiple entries are supported for redundancy

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

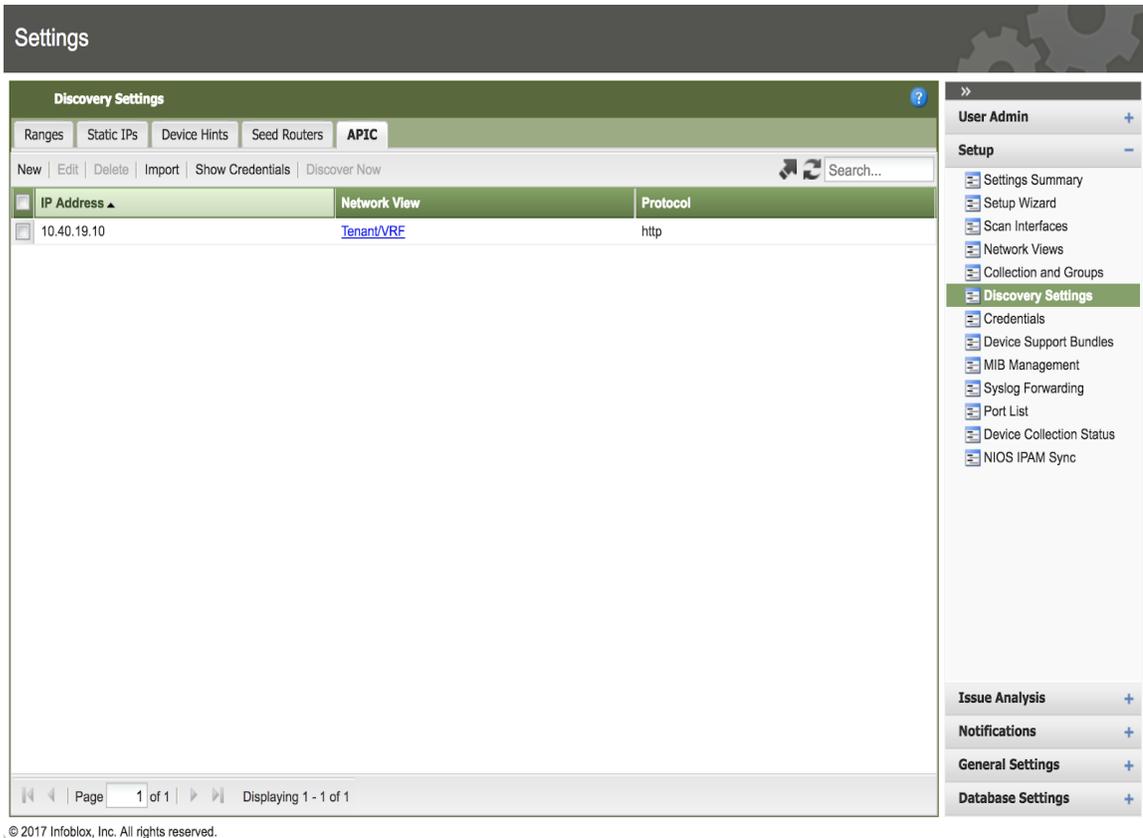


The screenshot displays the NetMRI Settings interface. At the top, there is a 'Settings' header with a gear icon. Below it, the 'Discovery Settings' section is active, with a sub-tab for 'APIC'. The 'APIC' tab contains several sub-tabs: 'Ranges', 'Static IPs', 'Device Hints', 'Seed Routers', and 'APIC'. The 'APIC' sub-tab is selected, showing a 'New' button and a search bar. The main configuration area has the following fields:

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

At the bottom of the form, there are three buttons: 'Cancel', 'Add & Discover', and 'Add'. On the right side of the interface, there is a sidebar with a 'User Admin' section and a 'Setup' section. The 'Setup' section is expanded, showing a list of options: 'Settings Summary', 'Setup Wizard', 'Scan Interfaces', 'Network Views', 'Collection and Groups', 'Discovery Settings' (which is highlighted), 'Credentials', and 'Device Support Bundles'.

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



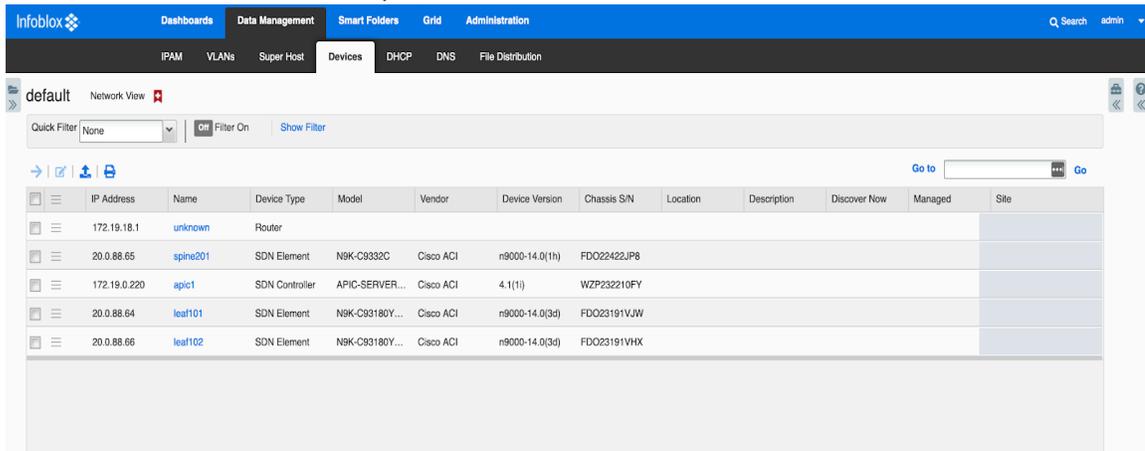
Viewing Discovered Data for Network Insight.

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

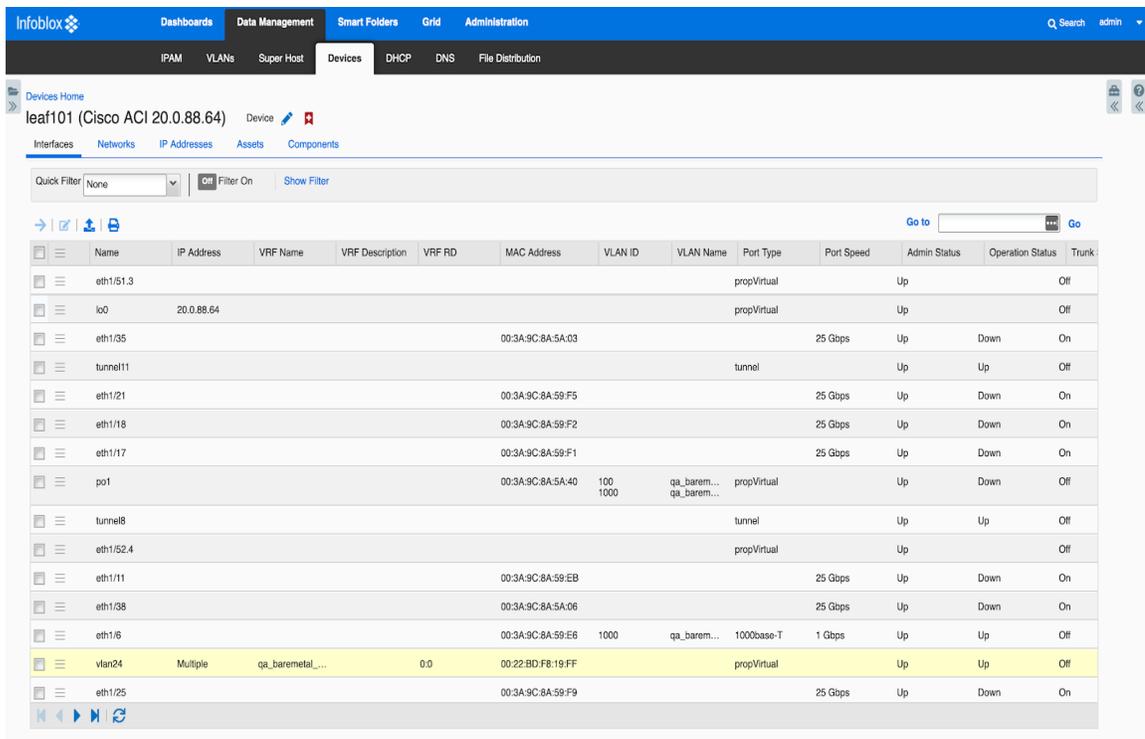
ACI	Network Insight
Fabric Node (leaves and spine)	Device record under Devices tab
APIC Controller	Device record under Devices tab
Tenant	Tenant attribute for Networks and IP addresses under IPAM tab
Bridge Domain	Bridge Domain attribute for Networks and IP addresses under IPAM tab
EPG	EPG attribute 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 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: None Filter On Show Filter

Go to Go

	Network	VRF Name	VRF Description	VRF RD	Comment	Managed
<input type="checkbox"/>	15.15.15.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	88.88.88.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	17.17.17.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	8.8.8.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	7.7.7.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	11.11.11.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	34.34.34.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	20.0.0.32/32					
<input type="checkbox"/>	12.12.12.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	77.77.77.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	14.14.14.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	18.18.18.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	20.0.0.27					No
<input type="checkbox"/>	19.19.19.0/24	qa_baremetal_...		0.0		No
<input type="checkbox"/>	10.10.10.0/24	qa_baremetal_...		0.0		No

https://172.19.18.119/ui/xiNW_mFTDS-dnKAp16t_g/xiNc9t_gfb#

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

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

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

Devices Home

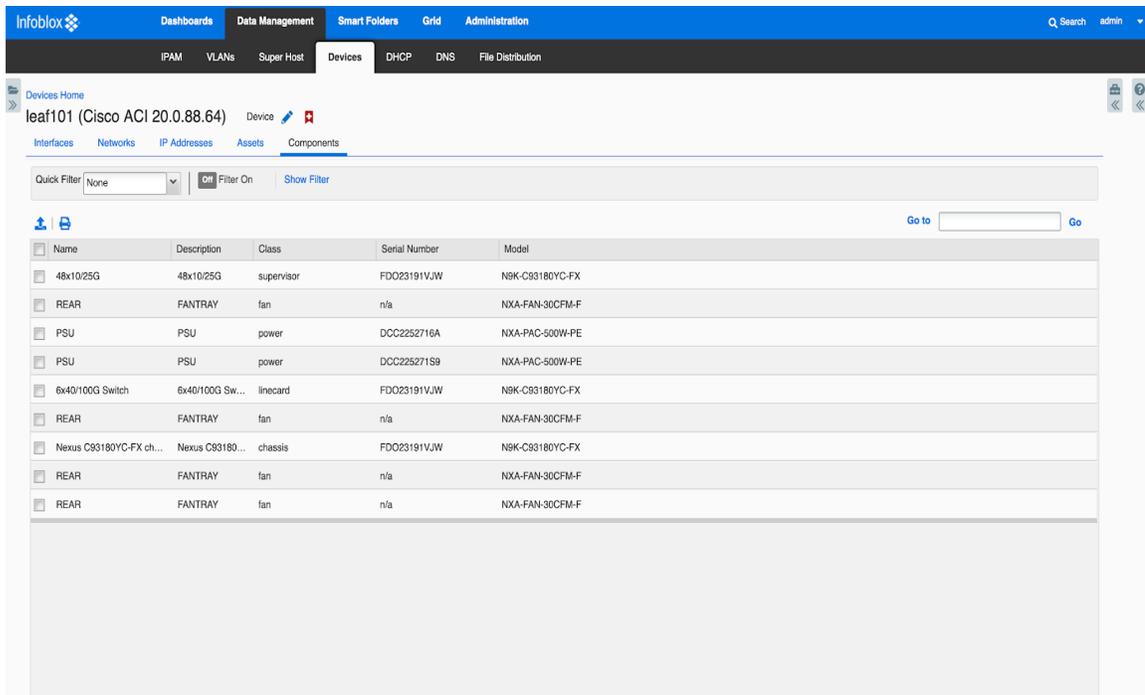
leaf101 (Cisco ACI 20.0.88.64) Device

Interfaces Networks **IP Addresses** Assets Components

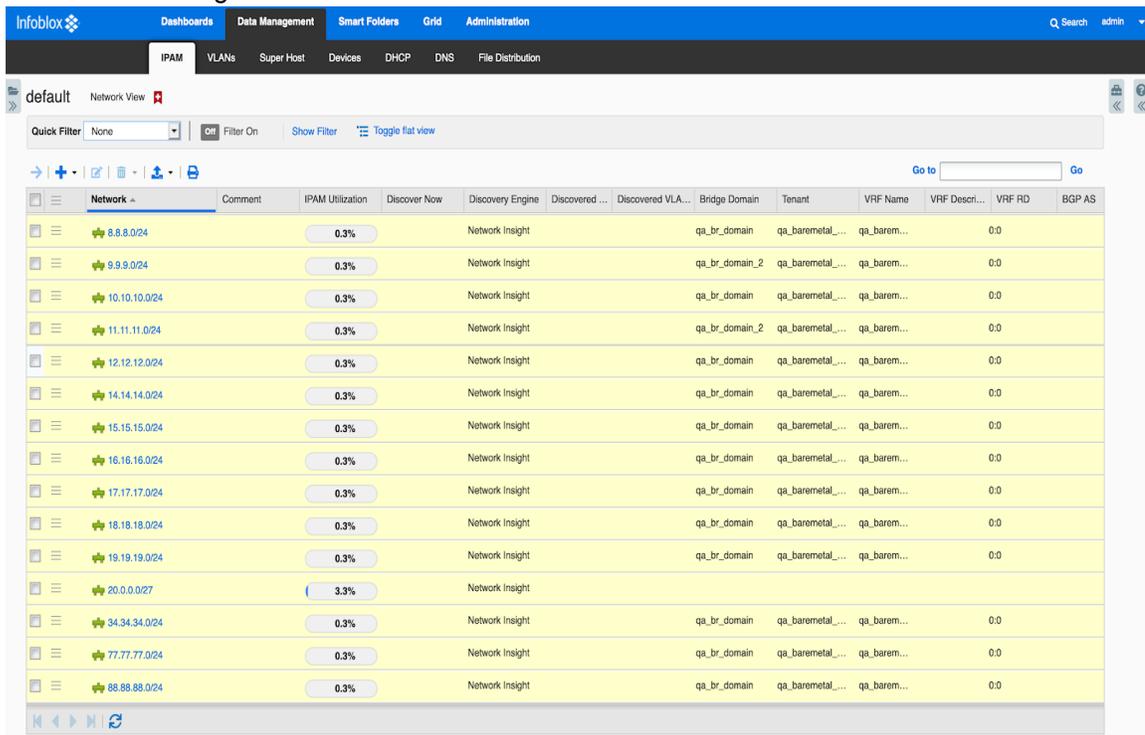
Quick Filter: None Filter On Show Filter

Go to: [] Go

	Name	Interface Name	VRF Name	VRF Description	VRF RD	IP Address	Type	Asset MAC Address	VLAN ID	VLAN Name	Admin Status	Operation Status
	spine201	eth1/49				20.0.88.65	SDN Element	A8:B4:58:B0:04:A5			Up	Up
	apic1	eth1/1				172.19.0.220	SDN Controller	C4:F7:D5:F6:99:94			Up	Up

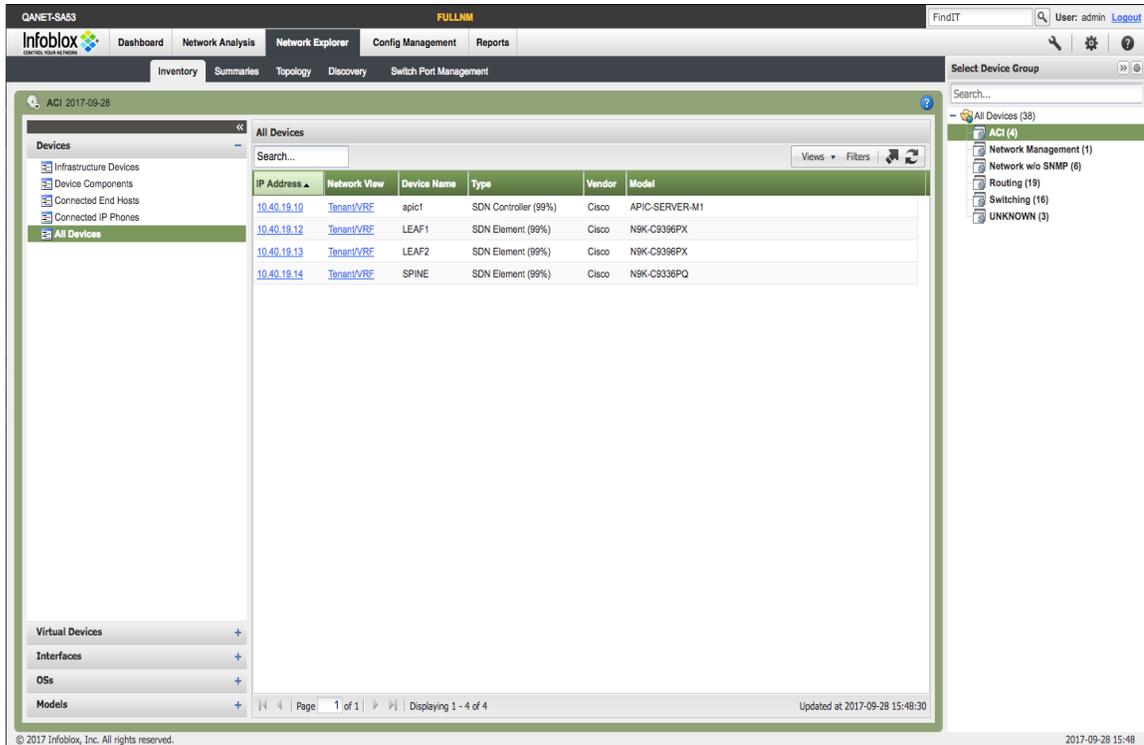


4. Navigate to **Data Management IPAM** to view the discovered networks. Take note of the networks with bridge domains and tenants.



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.



- 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. The top section, 'Associated VRFs', has a search bar and a table with columns: Device Name, VRF Name, and VRF RD. The bottom section, 'Imported VRFs', also has a search bar and a table with columns: Route Target, Device Name, VRF Name, and VRF RD. Both sections include pagination and update timestamps.

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

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

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

The screenshot shows the 'Network Views' section for 'common:Infoblox-PN'. It includes a search bar, a table with columns: VRF Name, VRF Network View, VRF Description, VRF RD, Device Name, IP Address, and Network View. A sidebar on the left lists various network objects, and a sidebar on the right shows a device group hierarchy.

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

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

The screenshot shows the Infoblox Network Explorer interface. The main content area displays a table of VRFs for the 'common:Infoblox-PN' VRF. The table has columns for VRF Name, VRF Network View, VRF Description, VRF RD, Device Name, IP Address, and Network View. Two entries are visible:

VRF Name	VRF Network View	VRF Description	VRF RD	Device Name	IP Address	Network View
common:Infoblox-PN	Tenant/VRF		0.0	LEAF1	10.40.19.12	Tenant/VRF
common:Infoblox-PN	Tenant/VRF		0.0	LEAF2	10.40.19.13	Tenant/VRF

On the left sidebar, the 'VRFs' section is expanded, showing a list of VRFs including 'common:Infoblox-PN'. The right sidebar shows a tree view of devices, including 'ACI (4)' and various network management categories.

- 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 Discovery page. The main content area displays a table of discovered devices. The table has columns for IP Address, Network View, Name, and various status indicators (E, P, R, S, C, CC, G, DB, CB, Type). The table shows several devices, including SPINE, LEAF1, LEAF2, and apic1.

IP Address	Network View	Name	E	P	R	S	C	CC	G	DB	CB	Type	Last Timestamp	Last Action
10.40.19.14	Tenant/VRF	SPINE	✓	✓	✓	✓	✓	✓	✓	✓	✓	SDN Element	2017-09-28 16:05:28	SNMP Collection: Successfully collected data / Table: Vians
10.40.19.12	Tenant/VRF	LEAF1	✓	✓	✓	✓	✓	✓	✓	✓	✓	SDN Element	2017-09-28 16:05:28	SNMP Collection: Successfully collected data / Table: Vians
10.40.19.13	Tenant/VRF	LEAF2	✓	✓	✓	✓	✓	✓	✓	✓	✓	SDN Element	2017-09-28 16:05:27	SNMP Collection: Successfully collected data / Table: Vians
10.40.19.10	Tenant/VRF	apic1	✓	✓	✓	✓	✓	✓	✓	✓	✓	SDN Contr...	2017-09-28 16:04:12	Device Groups: Successfully assigned to device groups

At the bottom of the page, there is a summary section titled 'Entire Network Totals' with a progress bar and the following statistics:

- Network Devices: 34
- Licensed Devices: 28
- IP Addresses: Classified 119, Reached 127, Identified 128

Troubleshooting - NIOS

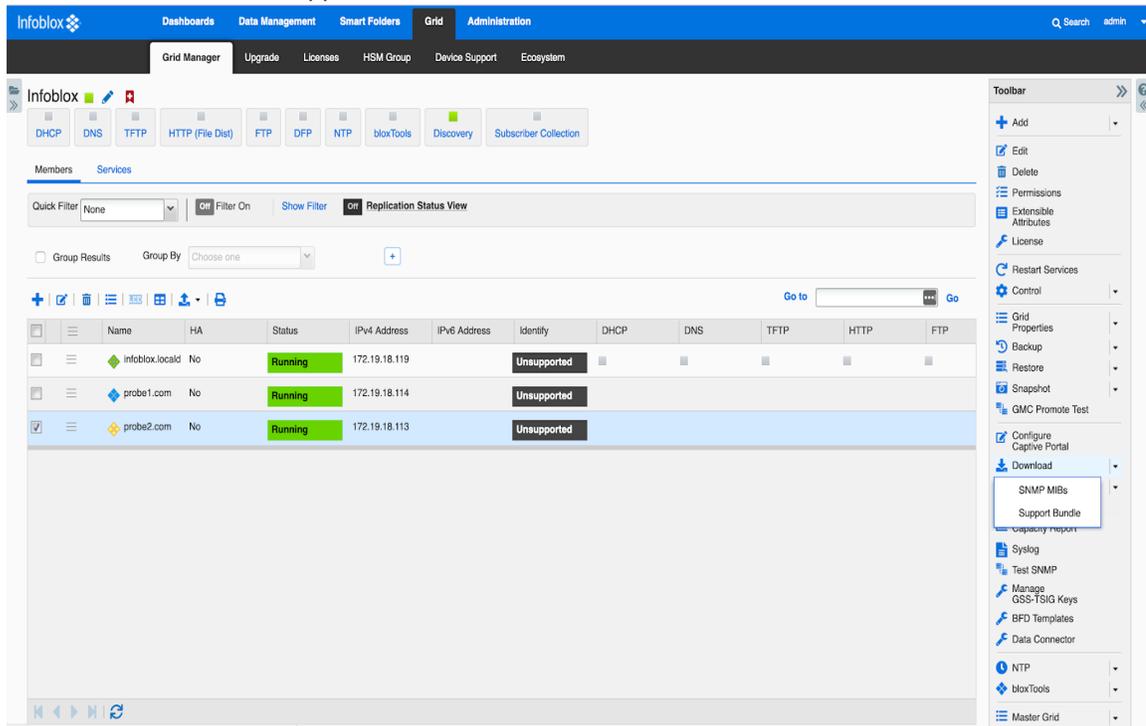
1. Try to ping the IP address of the APIC. If successful, then go to the next step.
2. Download a support bundle. Navigate to Grid > Grid Manager > Members.

The screenshot shows the Infoblox Grid Manager interface. The top navigation bar includes 'Grid' and 'Administration' tabs. Below the navigation bar, there are several service icons: DHCP, DNS, TFTP, HTTP (File Diet), FTP, DFP, NTP, bloxTools, Discovery, and Subscriber Collection. The main content area is titled 'Members' and 'Services'. It features a 'Quick Filter' dropdown set to 'None', a 'Filter On' button, and a 'Show Filter' button. Below this, there is a 'Group Results' checkbox and a 'Group By' dropdown menu. A table lists the members with the following columns: Name, HA, Status, IPv4 Address, IPv6 Address, Identify, DHCP, DNS, TFTP, HTTP, and FTP. The table contains three rows:

Name	HA	Status	IPv4 Address	IPv6 Address	Identify	DHCP	DNS	TFTP	HTTP	FTP
infoblox.locald	No	Running	172.19.18.119		Unsupported					
probe1.com	No	Running	172.19.18.114		Unsupported					
probe2.com	No	Running	172.19.18.113		Unsupported					

A 'Firefox' tooltip is visible at the bottom left of the interface.

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



- A compressed file will be created and can be downloaded to your Downloads directory. The file name is supportBundle.tar.gz. Uncompress this file.
- After uncompressing, change directory to the newly create subdirectory called SupportBundle. Search for the compressed file called nm_discovery_support_bundle.tgz. Uncompress this file.
- 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 you can be found by searching string 'AciObject' or IP address of Cisco APIC/LEAF. For example:

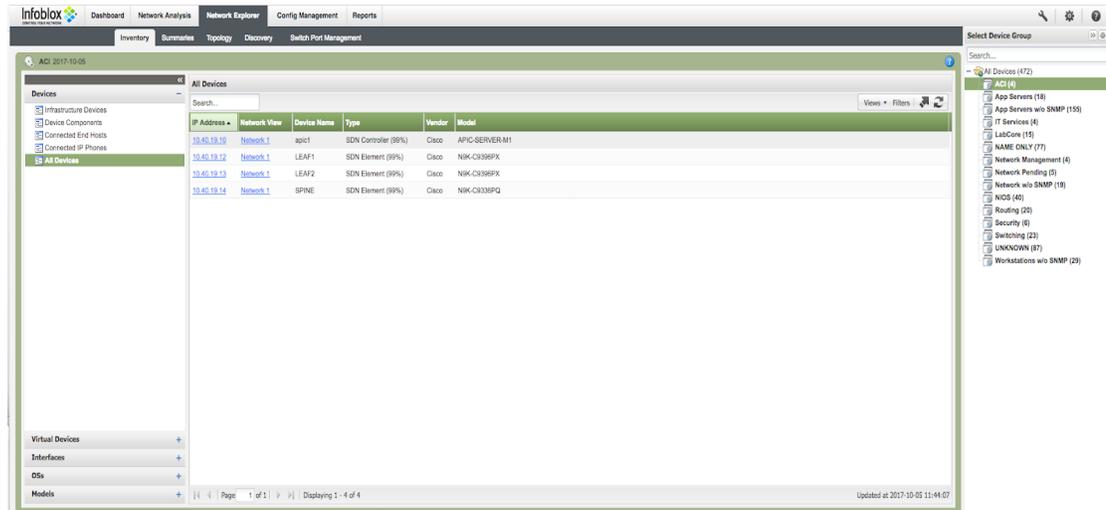
```
2017-08-01 16:11:47 [info] 13627 (worker14) 10.40.19.10/AciObject-3707429403927922829:
AciObject: collection completed
2017-08-01 16:11:47 [info] 13627 (worker14) 10.40.19.10/AciObject-3707429403927922829:
Done (663ms)
```

```
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

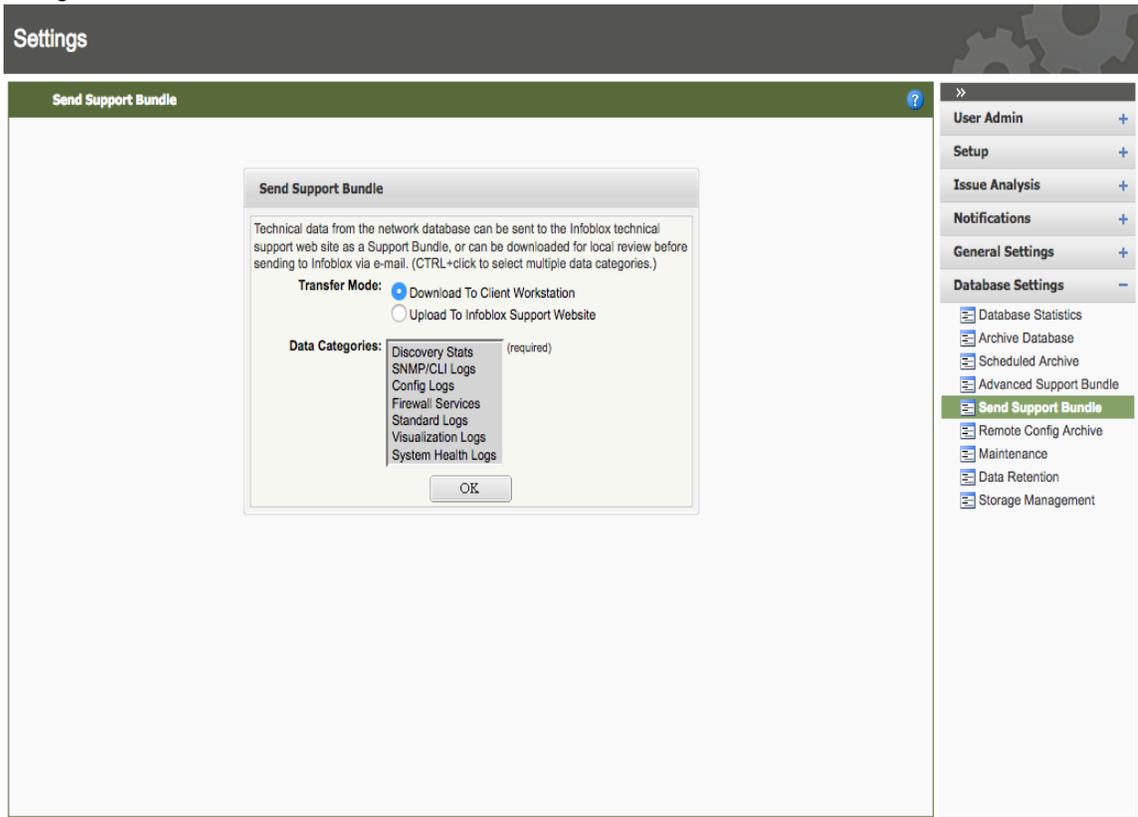
To correct the reboot time for devices up longer than 497 days, enter the date and time of the last device reboot (YYYY-mm-dd hh:mm:ss).

Reboot Time:

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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 support bundle to Infoblox TAC for further review.



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