

# Using vRealize Network Insight

VMware vRealize Network Insight 5.0

You can find the most up-to-date technical documentation on the VMware website at:

<https://docs.vmware.com/>

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# About vRealize Network Insight User Guide

# 1

The *vRealize Network Insight User Guide* provides information about using vRealize Network Insight.

## Intended Audience

This information is intended for administrators or specialists responsible for using vRealize Network Insight. The information is written for experienced virtual machine administrators who are familiar with enterprise management applications and datacenter operations.

# Getting Started

# 2

This chapter includes the following topics:

- Introduction
- Homepage
- Navigation
- Settings

## Introduction

vRealize Network Insight delivers intelligent operations for software-defined networking and security. It helps customers build an optimized, highly-available, and secure network infrastructure across multi-cloud environments. It accelerates micro-segmentation planning and deployment, enables visibility across virtual and physical networks, and provides operational views to manage and scale the VMware NSX deployments.

Think of your entire data center as being composed of entities and their relationships. As an example, a virtual machine is an entity, and the virtual machine is part of a Host which is another entity. vRealize Network Insight provides visibility and information on numerous entities that are part of your data center.

Table 2-1.

Entities	Description
	Host
	Problem
	NSX Firewall
	Virtual Machine

Table 2-1. (continued)

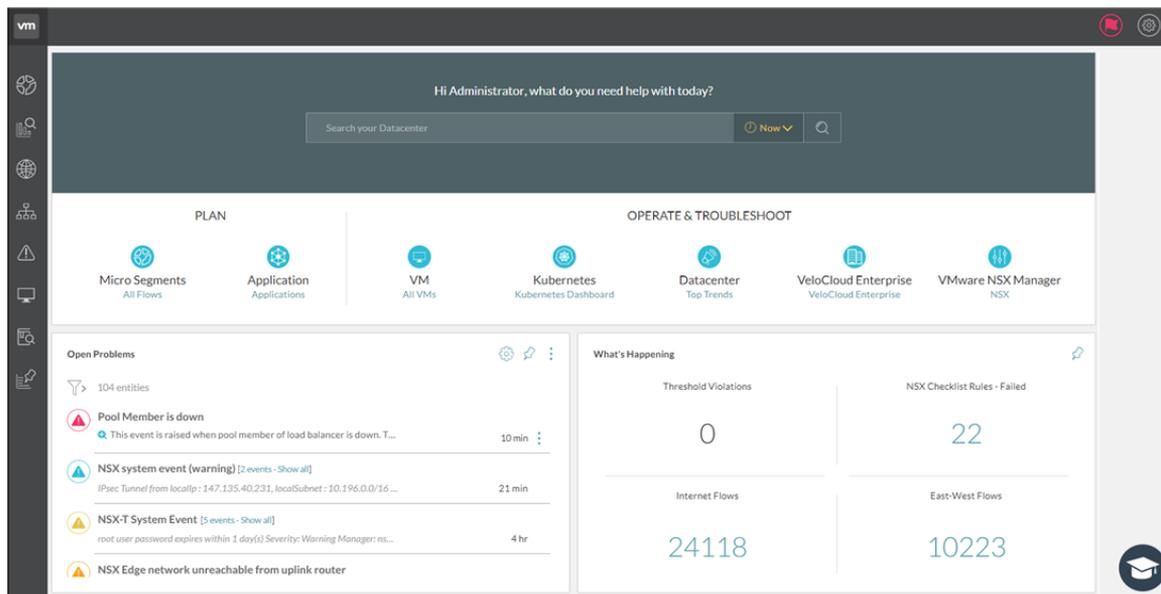
Entities	Description
	vSphere Distributed Switch
	Physical Switch
	Virtual Port Group
	Cisco Fabric Extender
	Logical Switch
	Datastore
	Physical Network Interface Card
	Security Group
	Blade
	Router
	VLAN
	Group of VMs
	Configuration Changes
	Router Interface
	Troubleshoot

Table 2-1. (continued)

Entities	Description
	Network Access Translation (NAT)
	Mail Server

## Homepage

The VMware vRealize Network Insight homepage provides you a quick summary of what is happening in your entire data center. It provides you a quick access to the important components of vRealize Network Insight of your data center.



The homepage is divided into the several sections:

### Search Bar

The Search bar provides you the ability to search across your data center network (and its corresponding entities). You can use the search bar to search for the entities that are available in your data center. The search bar is available at the top of the homepage.

Based on your requirement, you can perform search as per the following time line options:

- **Presets:** Using this option, you can narrow down your search results for presets such as last week, last 3 days, last 24 hours, yesterday, today, last 2 hours, last hour, and now (current time).
- **At:** Using this option, you can narrow down your search results for a particular date and time.
- **Between:** Using this option, you can search for data between a particular time interval.

## Plan Section

- **Micro Segments:** You can plan the micro-segmentation of the network based on the flows between all the VMs.
- **Application:** You can define your applications and analyse their flows, and plan their security.

## Operate and Troubleshoot Section

The **Operate and Troubleshoot** section provides visibility, metrics, and analytics for the following components:

- Virtual Machine (VM)
- VLAN Network
- Data Center
- NSX Security Group
- VMware NSX

## Open Problems

The **Open Problems** section provides a quick glance of the critical events that the platform finds in your data center. All such similar events are grouped. Use **Show All** to view all the events. To view more details of an event, click  (**View Details**). You can use the Configure Events icon to navigate to the System Events page and configure them.

Also, if you click **Configure event** option under **More Options** for a particular event, you can navigate directly to the edit view of the particular event to modify the configurations.

## What's Happening

The **What's Happening** section provides a quick view of very high-value properties from your data center. To view the property details, click the count of a particular property. This section also contains filters on the left side to filter the events, and expand all and collapse all buttons to view the details of the events.

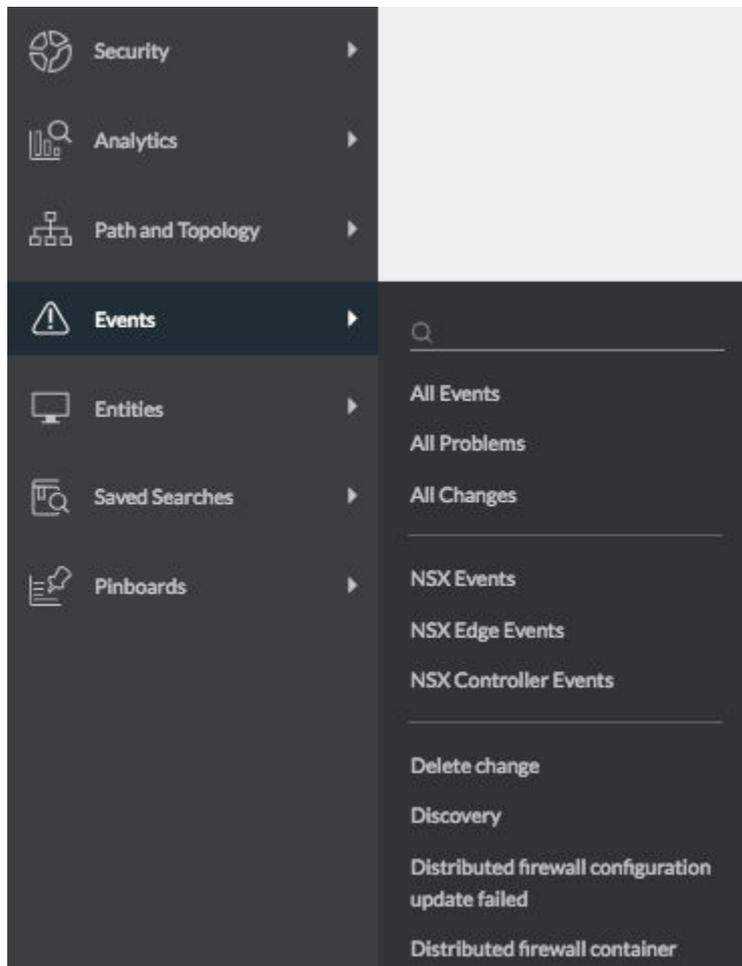
## Navigation

vRealize Network Insight contains a navigation panel on the left that helps users to navigate quickly to the key product features such as Security, Topologies, Entities, Events, and Saved Searches of interest without having to type any search queries.

The Navigation Panel contains the following options:

- Security: Provides you the following options:
  - Plan Security: Allows you to analyze the flows in the environment and helps to plan the micro-segments within the environment. You can select all the entities or select a particular entity and then select the duration to analyze the selected entity.

- Applications: Allows you to create applications in vRealize Network Insight by using custom search. Once you create an application, you can plan it accordingly.
- PCI Compliance: The PCI-Compliance dashboard helps in assessing compliance against the PCI requirements only in the NSX environment.
- Path and Topology: Allows you to view any VM to VM path or topology of several entities of the data center.
- Events: Allows you to view the events (changes and problems) in your environment. There is also a list of event types so that you can quickly view a specific type of event.
- Entities: Displays the list of all the different types of entities present in your environment. Click any entity type from the given list to view a list of all the entities of that type. The text box above the entities list can be used to narrow down the list based on text entered.
- Saved Searches: Displays the searches that have been saved previously.



## Settings

The **Settings** page provides controls to manage data providers, users, and notifications.

To go to the **Settings** page:

- 1 On the top-right hand corner in the Home page, click the Profile icon.
- 2 Click **Settings**. The **Settings** page appears.

# Adding a Data Source in vRealize Network Insight

# 3

Data sources provide the application the ability to gather data from certain aspects of your data center. These range from your NSX installation to physical devices such as Cisco™ Chassis 4500 and Cisco™ N5K.

To add a data source, do the following:

- 1 In the **Install and Support** page under **Settings**, click **Accounts and Data Sources**.
- 2 Click **Add new source**.
- 3 Select an account or a source type.
- 4 Provide the required information on the form.
- 5 Click **Validate**.
- 6 Enter Nickname and Notes (if any) for the data source.
- 7 Click **Submit** to add the data source to the environment.

For each data source, you can view the following details:

Properties	Description
Type(Nickname)	Displays name of the Data source.
IP Address/FQDN	Displays IP address or FQDN details for the Data Source.
Last Collection	Displays the last collection time on which the data is collected.
Discovered VMs	Displays the number of VMs that have been discovered for that data source. <b>Note</b> The Discovered VMs column is populated only if the data source is vCenter or AWS source.
Collector VM	Displays the name of the collector to which the data source has been added. This column is not visible if all the listed data sources have been added on the same collector. You can view this column only if the data sources are present on different collectors.
Enabled	Indicates if the data source is enabled or not.
Actions	Displays options to edit and delete the data source.

vRealize Network Insight provides the following functions to enable easy access to the information of data sources.

- You can perform search for a data source by its name, its IP address, or by the collector VM name by using the search bar above the column headers.
- You can filter information by different data sources in the **Type( Nickname)** column.
- You can filter information by various collector VMs in the **Collector VM** column.
- The data sources are sorted by their types and nicknames in the alphabetical order.

For each added data source, you can view the following information:

- All: Displays all the available data sources.
- With Problems: Displays the data sources where vRealize Network Insight has found a problem.
- With Recommendations: Displays auto generated recommendations from vRealize Network Insight for the data sources that require additional information.
- Disabled: Displays the data sources that have been disabled.

This chapter includes the following topics:

- [Supported Products and Versions](#)
- [Add vCenter Server](#)
- [Add VMware NSX Manager](#)
- [Add VMware NSX-T Manager](#)
- [Add VMware SD-WAN](#)
- [Add VMware Cloud on AWS](#)
- [Add Amazon Web Services](#)
- [Add Azure Subscription](#)
- [Add VMware PKS](#)
- [Add Kubernetes](#)
- [Add OpenShift](#)
- [Add Palo Alto Networks Panorama](#)
- [Add Check Point Management Server](#)
- [Add Cisco ASA](#)
- [Add a Fortinet FortiManager](#)
- [Add Dell OS10 Switches](#)
- [Add Huawei 6800/7800/8800 Series](#)
- [Add Cisco ACI](#)

- [Add a Physical Flow Collector for NetFlow and sFlow](#)
- [Add Log Insight](#)
- [Add Infoblox](#)
- [Add F5 BIG-IP](#)
- [Add ServiceNow](#)
- [Add a New Generic Router or Switch](#)

## Supported Products and Versions

vRealize Network Insight supports several products and versions.

Data Source	Version/Model	Connection Protocol	Permissions/Privileges
Amazon Web Services (Enterprise License Only)	Not Applicable	HTTPS	See the Add a Standard AWS Data Source section in the <i>vRealize Network Insight User Guide</i> .
Arista switches	7050TX, 7250QX, 7050QX-32S, 7280SE-72	SSH, SNMP	Read only user Read only SNMP user

Data Source	Version/Model	Connection Protocol	Permissions/Privileges
Azure Subscription	Not Applicable	HTTPS	<p>You must have the following permission:</p> <p>Microsoft.Resources/subscriptions/read  Microsoft.Compute/virtualMachines/read  Microsoft.Network/virtualNetworks/read  Microsoft.Network/networkSecurityGroups/read  Microsoft.Network/networkInterfaces/read  Microsoft.Network/applicationSecurityGroups/read  Microsoft.Storage/storageAccounts/read  Microsoft.Storage/storageAccounts/listkeys/action  Microsoft.Network/networkWatchers/queryFlowLogStatus/action</p> <p>Alternatively, for ease of use you can add the Storage Account Key Operator Service Role, Network Contributor, and Reader permission.</p>
Brocade Switches	VDX 6740, VDX 6940, MLX, MLXe	SSH, SNMP	<p>Read only user  Read only SNMP user</p>
Check Point Firewall	Check Point R80 , R80.10	HTTPS, SSH	See the Check Point Firewall section in the <i>vRealize Network Insight User Guide</i> .
Cisco ACI	3.2	HTTPS (to APIC controller) SNMP (to APIC controller and ACI switches)	<p>To connect to the APIC controller REST API over HTTPS, a user with the read-only permission having access to all the tenants is required</p> <p>For SNMP, the user needs the read-only permission.</p>
Cisco ASA	X Series with OS 9.4	SSH, SNMP	The user should have rights to switch to the enable mode. The user's password should be same as the one used for the enable mode of Cisco ASA.
Cisco Catalyst	3000, 3750, 4500, 6000, 6500	SSH, SNMP	Read only SNMP user with default privilege level 15

Data Source	Version/Model	Connection Protocol	Permissions/Privileges
Cisco Nexus	3000, 5000, 6000, 7000, 9000	SSH, SNMP	Read only user Read only SNMP user
Cisco UCS (Unified Computing System)	Series B blade servers, Series C rack servers, Chassis, Fabric interconnect	UCS Manager: HTTPS UCS Fabric: SSH, SNMP	Read only user Read only SNMP user
Dell switches	FORCE10 MXL 10, FORCE10 S6000, S4048, Z9100, S4810, PowerConnect 8024, Dell OS10	SSH, SNMP	Read only user Read only SNMP user
Fortinet FortiManager	6.0.1	HTTPS	The user must have: <ul style="list-style-type: none"> <li>■ at least the <b>Restricted User</b> role with access to all ADOMs and policy packages.</li> <li>■ the <b>rpc-permit read</b> access enabled from Command Line Interface (CLI).</li> </ul>
F5 BIG - IP	12.1.2 and later	HTTPS, SSH, SNMP	The user must have at least the guest role. Also, TMSH must be enabled and must have access to all partitions. F5 BIG-IP supports both routing and load balancing.
HP	HP Virtual Connect Manager 4.41, HP OneView 3.0	HP OneView 3.0: HTTPS HP Virtual Connect Manager 4.41: SSH	Read only user
Huawei Cloud Engine	6800, 7800, 8800	SSH, SNMP	Read only user Read only SNMP user
Infoblox	Infoblox NIOS version 8.0, 8.1, 8.2	HTTPS	Read only user with API Interface access Read-only permissions for DNS object types as follows: <ul style="list-style-type: none"> <li>■ Permission Type - DNS</li> <li>■ Resource - A Records, DNS Zones, DNS Views</li> </ul>
Juniper Switches	EX3300, QFX 51xx Series (JunOS v12 & v15, without QFabric)	Netconf, SSH, SNMP	Read only user Read only SNMP user
Kubernetes	<ul style="list-style-type: none"> <li>■ 1.12 on NSX-T 2.3.1</li> <li>■ 1.12 on NSX-T 2.3.2</li> <li>■ 1.13 on NSX-T 2.3.2</li> </ul>	HTTPS	User must have cluster admin role with read permissions.

Data Source	Version/Model	Connection Protocol	Permissions/Privileges
Palo Alto Networks	Panorama 7.0.x, 7.1, 8.x, 9.0	HTTPS	User must have admin role with XML API access. For details, see the Palo Alto Networks section in the <i>vRealize Network Insight User Guide</i> .
ServiceNow	London	HTTPS	User must have admin role
VMware SD-WAN	VeloCloud Orchestrator and Edge Version 3.3.1 and later	HTTPS	User must have <b>Account Role</b> with any of the following permission: <ul style="list-style-type: none"> <li>■ <b>Superuser</b></li> <li>■ <b>Standard Admin</b></li> <li>■ <b>Customer Support</b></li> </ul>
VMC on AWS - vCenter	M5P2 and above <b>Note</b> Only NSX-T based VMware Cloud on AWS SDDCs are supported.	HTTPS	User must have the following permission: <ul style="list-style-type: none"> <li>■ <b>Cloud Administrator:</b> To add data source and enable IPFIX.</li> </ul>
VMC on AWS - NSX Manager	M5P2 and above <b>Note</b> Only NSX-T based VMware Cloud on AWS SDDCs are supported.	HTTPS	User must have any of the following permission: <ul style="list-style-type: none"> <li>■ <b>Org Member.Administrator:</b> To add data source and enable IPFIX.</li> <li>■ <b>Org Member.Cloud Admin:</b> To add data source and enable IPFIX.</li> <li>■ <b>Org Member.VMware Cloud on AWS (all role):</b> To add data source and enable IPFIX.</li> <li>■ <b>Org Member.Cloud Auditor:</b> To add data source.</li> </ul>
VMware Identity Manager	3.3 and later	HTTPS	User must have admin role.
VMware PKS	PKS 1.3.2 on NSX-T 2.3.1 PKS 1.3.2 on NSX-T 2.3.2		User must have cluster admin role with read permissions.
VMware NSX Manager (VMware NSX-V)	<a href="#">Supported Versions</a>	SSH, HTTPS	See the Edge Data Collection section in the <i>vRealize Network Insight User Guide</i> .
VMware NSX-T Manager	2.4. For additional supported version, see <a href="#">Supported Versions</a>	HTTPS	Read only user

Data Source	Version/Model	Connection Protocol	Permissions/Privileges
VMware vRealize Log Insight	<a href="#">Supported Versions</a>	HTTPS	API user with permissions to install, configure, and manage the content pack
VMware vSphere	<a href="#">Supported Versions</a> For IPFIX, VMware ESXi version needed: <ul style="list-style-type: none"> <li>■ 5.5 Update 2 (Build 2068190) and above</li> <li>■ 6.0 Update 1b (Build 3380124) and above</li> <li>■ VMware VDS 5.5 and above</li> </ul> <p><b>Note</b> VMware tools should be installed on all the VMs in the data center to identify the VM to VM path.</p>	HTTPS	Read only user Privileges required to configure and use IPFIX vCenter Server Credentials with privileges: Distributed Switch: Modify dvPort group: Modify The predefined roles in the vCenter server must have the following privileges assigned at root level that need to be propagated to the children roles: System.Anonymous System.Read System.View global.settings

## Add vCenter Server

You can add vCenter Servers as data source to vRealize Network Insight.

Multiple vCenter Servers can be added to vRealize Network Insight to start monitoring data.

### Procedure

- 1 Click **Add vCenter**.
- 2 Click **Add new source** and customize the options.

Option	Action
<b>Source Type</b>	Select the vCenter Server system from the drop-down menu.
<b>IP Address/FQDN</b>	Enter the IP address or fully qualified domain name of the vCenter Server.
<b>Username</b>	Enter the user name with the following privileges: <ul style="list-style-type: none"> <li>■ <b>Distributed Switch:</b> Modify</li> <li>■ <b>dvPort group:</b> Modify</li> </ul> For information about the required additional privileges, see the <i>vCenter Privileges</i> section in the <i>Install Guide</i> .
<b>Password</b>	Enter the password for vRealize Network Insight software to access the vCenter Server system.

### 3 Click **Validate**.

If the number of VMs discovered exceeds the capacity of the platform or a collector node or both, the validation fails. You will not be allowed to add a data source until you increase the brick size of the platform or create a cluster.

The specified capacity for each brick size with and without flows is as follows:

Brick Size	VMs	State of Flows
Large	6k	Enabled
Large	10k	Disabled
Medium	3k	Enabled
Medium	6k	Disabled

### 4 Select **Enable Netflow (IPFIX) on this vCenter** to enable IPFIX.

For more information on IPFIX, see the Enabling IPFIX configuration on VDS and DVPG section.

### 5 Add advanced data collection sources to your vCenter Server system.

### 6 Click **Submit** to add the vCenter Server system. The vCenter Server systems appear on the homepage.

## Add VMware NSX Manager

You can add NSX-V as a data source in vRealize Network Insight.

### Prerequisites

Verify the following:

- You have the correct permission. For information on permissions, see Supported Products and Versions section in *Installing vRealize Network Insight*.
- You have required privileges. For information on privileges, see the Privileges section in *Installing vRealize Network Insight*.
- You have already added a vCenter as a data source.

### Procedure

- 1 On the **Settings** page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under **VMware Managers**, click **VMware NSX Manager**.

- 4 In the **Add a New VMware NSX Manager Account or Source** page, provide the required information.

Option	Action
<b>Collector (Proxy) VM</b>	Select a collector VM from the drop-down menu.
<b>Primary VMware vCenter</b>	Select the vCenter you want to add in vRealize Network Insight.  <b>Note</b> Ensure that the vCenter and the associated NSX Manager data source are added to the same collector. Otherwise, you will not see the denied flows (when NSX IPFIX is enabled) and the Applied Firewall Rule might not be available in some flows.
<b>IP Address/FQDN</b>	Enter the IP address or the FQDN details.
<b>Username</b>	Enter the user name.
<b>Password</b>	Enter the password.

- 5 Click **Validate**.
- 6 (Optional) If you want to collect NSX Controller data, then select **Enable NSX Controller data collection** check box.
- If you select this option, vRealize Network Insight collects controller data such as logical router interface, routes, logical switch mac table, vtep records, controller cluster status, and role. The data collection is done by NSX Central CLI or Controller-SSH session.
- 7 (Optional) If you want to collect NSX Edge data, then select **Enable NSX Edge data collection** check box.
- For information on the NSX Edge data collection, see [Edge Data Collection](#).
- 8 (Optional) If you want to collect IPFIX flows, then select **Enable IPFIX** check box.
- If you select this option, vRealize Network Insight receives DFW IPFIX flows from NSX-V. For more information on enabling IPFIX, see [Enabling VMware NSX-V IPFIX](#).
- 9 (Optional) If you want to collect latency metrics data, select **Enable Virtual Infrastructure Latency** check box.
- If you select this option, vRealize Network Insight receives latency metrics from NSX hosts. This option is available only for NSX-V 6.4.5 and later. Ensure that the port 1991 is open on the collector to receive the latency data from the ESXi host.
- 10 In the **Nickname** text box, enter a nickname.
- 11 (Optional) In the **Notes** text box, you can add a note if necessary.
- 12 Click **Submit**.

## Add VMware NSX-T Manager

VMware NSX-T is designed to address the emerging application frameworks and architectures that have heterogeneous endpoints and technology stacks. In addition to vSphere, these

environments may also include other hypervisors, containers, bare metal, and public clouds. vRealize Network Insight supports NSX-T deployments where the VMs are managed by vCenter.

## Considerations

- vRealize Network Insight supports only the NSX-T setups in which vCenter manages the ESXi hosts. Ensure that vCenter is added as Compute Manager in NSX-T.

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**Note** Compute Managers should be added as data sources in vRealize Network Insight before adding NSX-T as a data source.

---

- vRealize Network Insight supports NSGroups, NSX-T Firewall Rules, IPSets, NSX-T Logical Ports, NSX-T Logical Switches, NSX-T distributed firewall IPFIX flows, Segment, Group, and Policy Based VPN.
- vRealize Network Insight supports both NSX-V and NSX-T deployments. When you use NSX in your queries, the results include both NSX-V and NSX-T entities. NSX Manager lists both NSX-V and NSX-T Managers. NSX Security Groups list both NSX-T and NSX-V security groups. If NSX-V or NSX-T is used instead of NSX, then only those entities are displayed. The same logic applies to the entities such as firewall rules, IPSets, and logical switches.
- With NSX-T 2.4 release, vRealize Network Insight supports NSX Declarative Policy Management which simplifies and automate network and security configurations through outcome-driven policy statements.

---

**Note** Micro-segmentation for Security Group is done based on NSX Policy data. But in case there is no corresponding NSX Policy Group, the standalone NS Group is included in the Micro-segmentation analysis. For more details on NS Group, see [NSX-T product documentation](#).

---

## To Add an NSX-T Manager as a Data Source

Here are the prerequisites for adding an NSX-T Manager as a data source:

- Add at least one vCenter which is associated with NSX - T to vRealize Network Insight.
- It is recommended that you add all the vCenters associated with NSX-T as data sources in vRealize Network Insight.
- Ensure that there are no logical switches in the exclusion list in the Distributed Firewall (DFW). If there are any logical switches in this list, then the flows are not reported for any VMs attached to these logical switches.

To add an NSX-T Manager:

- 1 On the **Accounts and Data Source** page under **Settings**, click **Add Source**.
- 2 Under **VMware Manager** in the **Select an Account or Data Type** page, select **VMware NSX-T Manager**.

## 3 Provide the user credentials.

**Note**

- If you have more than one management node in a single NSX-T deployment, you must add only one node as a data source in vRealize Network Insight or use VIP (of those nodes). If you add more than one management node, then vRealize Network Insight may not function properly.
- If IPFIX is not required, the user must be a local user with the audit level permissions. But if IPFIX is required then the user must have one of the following audit level permissions: **enterprise\_admin**, **network\_engineer**, or **security\_engineer**.

4 Select **Enable IPFIX** to update the IPFIX settings on NSX-T. By selecting this option, vRealize Network Insight receives DFW IPFIX flows from NSX-T. For more information on enabling IPFIX, see [Enabling VMware NSX-T DFW IPFIX](#).**Note**

- DFW IPFIX is not supported in the Standard Edition of NSX-T.
- vRealize Network Insight does not support NSX-T Switch IPFIX flows.

5 (Optional) If you want to collect latency metrics data, select **Enable Virtual Infrastructure Latency** check box. If you select this option, vRealize Network Insight receives latency metrics (VTEP - VTEP) from NSX - T. This option is available only for NSX-T 2.5 (Firestar release) and later. Ensure that the port 1991 is open on the collector to receive the latency data from the ESXi node.

## Examples for Queries

Here are some examples for queries related to NSX-T:

Table 3-1. Queries for NSX-T

Queries	Search Results
<code>NSX-T Manager where VC Manager=10.197.53.214</code>	NSX-T Manager where this particular VC Manager has been added as the compute manager.
<code>NSX-T Logical Switch</code>	Lists all the NSX-T Logical switches present in the instance of vRealize Network Insight. including the details on whether it is a system-created or a user-created switch.
<code>NSX-T Logical Ports where NSX-T Logical Switch = 'DB-Switch'</code>	Lists the NSX-T logical ports belonging to that particular NSX-T logical switch, DB-Switch.
<code>VMs where NSX-T Security Group = 'Application-Group'</code> Or <code>VMs where NSGroup = 'Application-Group'</code>	Lists all the VMs in that particular security group, Application-Group.
<code>NSX-T Firewall Rule where Action='ALLOW'</code>	Lists all the NSX-T Firewall Rules which have their action set as ALLOW.

Table 3-1. Queries for NSX-T (continued)

Queries	Search Results
<code>NSX-T Firewall Rule where Destination Security Group = 'CRM-Group'</code>	Lists the firewall rules where the CRM-Group is the Destination Security Group. The results include both Direct Destination Security Groups and Indirect Destination Security Groups.
<code>NSX-T Firewall Rule where Direct Destination Security Group = 'CRM-Group'</code>	Lists the firewall rules where the CRM-Group is the Destination Security Group. The results include only the Direct Destination Security Groups.
<code>VMs where NSX-T Logical Port = 'App_Port-Id-1'</code>	Lists all the VMs which have that particular NSX-T Logical Port.
<code>NSX-T Transport Zone</code>	Lists the VLAN and the overlay transport zone and the respective details associated with it including the type of the transport node.  <b>Note</b> vRealize Network Insight does not support KVM as a data source.
<code>NSX-T Router</code>	Lists the TIER 1 and TIER 0 routers. Click the router shown in the results to view more details associated with it including the NSX-T Edge Cluster and the HA mode.

Table 3-2. Queries for NSX Policy

<code>NSX Policy Segment</code>	Lists all the NSX Policy Segments present in the instance of vRealize Network Insight.
<code>NSX Policy Manager</code>	Lists all the NSX Policy Manages present in the instance of vRealize Network Insight.
<code>NSX Policy Group</code>	Lists all the NSX Policy Groups present in the instance of vRealize Network Insight.
<code>NSX Policy Firewall</code>	Lists all the NSX Policy Firewalls present in the instance of vRealize Network Insight.
<code>NSX Policy Firewall Rule</code>	Lists all the NSX Policy Firewall Rules present in the instance of vRealize Network Insight.
<code>NSX Policy Firewall Rule where Action = 'ALLOW'</code>	Lists all the NSX Policy Firewall Rules which have their action set as ALLOW.
<code>NSX Policy Based VPN</code>	Lists all the NSX Policy Based VPNs present in the instance of vRealize Network Insight.

**Note** If NSX-T 2.4 and VMware Cloud on AWS are added as data sources in your vRealize Network Insight, then to get the NST-T entities, you must add `SDDC type = ONPREM` filter in your query. For example, `NSX Policy Based VPN where Tier0 = '' and SDDC Type = 'ONPREM'`.

## Support for NSX-T Metrics

The following table displays the vRealize Network Insight entities that support the NSX-T metrics currently and the widgets that display these metrics on the corresponding entity dashboards.

Table 3-3.

Entities	Widgets on the Entity Dashboard	Supported NSX-T Metrics
Logical Switch	Logical Switch Packet Metrics	Multicast and Broadcast Rx
	Logical Switch Byte Metrics	Multicast and Broadcast Tx Unicast Rx Unicast Tx Dropped Rx Dropped Tx Rx Packets (Total) Tx Packets (Total)
Logical Port	Logical Port Packet Metrics	Multicast and Broadcast Rx
	Logical Port Byte Metrics	Multicast and Broadcast Tx Unicast Rx Unicast Tx Rx Packets (Total) Tx Packets (Total)
Router Interface	Router Interface Metrics	Rx Packets Tx Packets Dropped Rx Packets Dropped Tx Packets Rx Bytes Tx Bytes
Firewall Rule	Firewall Rule Metrics	Hit Count Flow Bytes Flow Packets

Here are some sample queries for NSX-T Metrics:

- `nsx-t logical switch where Rx Packet Drops > 0`

This query lists all the logical switches where the count of the dropped received packets is greater than 0.

- `nsx-t logical port where Tx Packet Drops > 0`

This query lists all the logical ports where the count of the dropped transmitted packets is greater than 0.

- `top 10 nsx-t firewall rules order by Connection count`

This query lists the top 10 firewall rules based on the connection count(Hit Count).

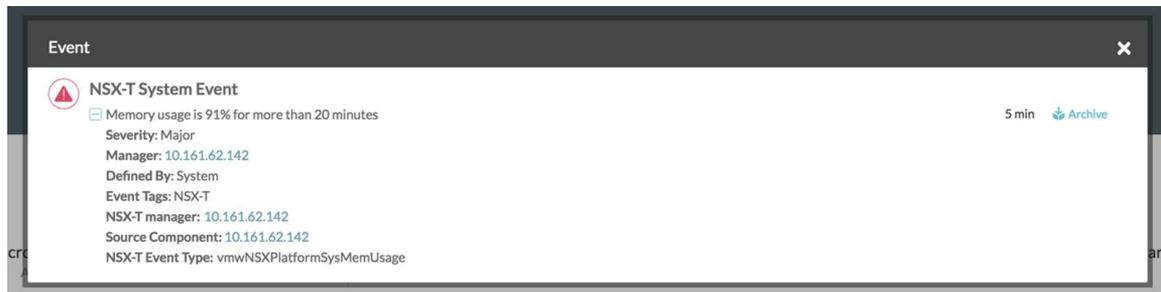
## NSX-T Events

vRealize Network Insight enables you to view the NSX-T events for NSX-T version 2.3 onwards. The source component is the source that emits the event. It can be a manager, controller, or an edge.

The following NSX-T events are generated by vRealize Network Insight:

### System Events

- NSX-T Edge Node has no manager connectivity
- NSX-T Edge Node has no controller connectivity
- NSX-T Edge Node's controller connectivity degraded



### Custom Events

- NSX-T MTU Mismatch

---

**Note** The mismatch is between the uplinks of T0 and the corresponding interfaces of the uplink device.

---

- Routing Advertisement disabled for Tier-1 router
- No Uplink Connectivity for Tier-1 router

---

**Note** The Tier-1 router is not connected to Tier-0.

---

- NSX-T IPFIX Switch data is not supported in Network Insight

---

**Note** vRealize Network Insight does not support IPFIX flows. Remove the vRealize Network Insight Collector VM IP address from the NSX-T Switch collector profiles that are used in NSX-T switch IPFIX profiles.

---

- No vtep is available on the transport node
- NSX-T Vlan misconfiguration on Tier 0 router
- NSX-T VMs included in the firewall exclusion list
- No transport zone attached on the transport node

## NSX-T and PKS Events

List of NSX-T and PKS events supported in vRealize Network Insight.

Event Name	Event Source	Description
vmwNSXPlatformSysCpuUsage	NSX-T system events	CPU Usage on both manager and edge appliances (Equinox).
vmwNSXPlatformSysDiskUsage	NSX-T system events	Disk Space Usage on both manager and edge appliance for /var/log partition (Equinox).
vmwNSXPlatformSysMemUsage	NSX-T system events	Memory Usage on both manager and edge appliance (Equinox).
vmwNSXPlatformSysConfigDiskUsage	NSX-T system events	Disk Usage for Manager and Edge Appliances for /config partition (Flash).
vmwNSXPlatformSysVarDumpDiskUsage	NSX-T system events	Disk Usage for Manager and Edge Appliances for /var/dump partition (Firestar).
vmwNSXPlatformSysRepositoryDiskUsage	NSX-T system events	Disk Usage for Manager and Edge Appliances for /repository partition (Firestar).
vmwNSXPlatformSysRootDiskUsage	NSX-T system events	Disk usage for Manager and Edge appliances for root partition (Firestar).
vmwNSXPlatformSysTmpDiskUsage	NSX-T system events	Disk usage for Manager and Edge appliances for tmp partition (Firestar).
vmwNSXPlatformSysImageDiskUsage	NSX-T system events	Disk Usage for Manager and Edge appliances for /image partition (Firestar).
vmwNSXDhcpPoolUsageOverloadedEvent	NSX-T system events	DHCP pool overloaded/normal (Firestar).
vmwNSXDhcpPoolLeaseAllocationFailedEvent	NSX-T system events	DHCP pool lease allocation failed/succeeded (Firestar).
vmwNSXPlatformPasswordExpiryStatus	NSX-T system events	Password expiration for manager (Flash).
vmwNSXPlatformCertificateExpiryStatus	NSX-T system events	Certificate expiration for manager (Flash).
vmwNSXRoutingBgpNeighborStatus	NSX-T system events	BGP neighbor status (Equinox).
vmwNSXVpnTunnelState	NSX-T system events	VPN Tunnel up/down (Equinox).
vmwNSXVpnL2TunnelStatus	NSX-T system events	L2 VPN Session up/down (Equinox).
vmwNSXVpnIkeSessionStatus	NSX-T system events	IKE Session up/down (Equinox).
vmwNSXDnsForwarderStatus	NSX-T system events	DNS Forwarder Status (Flash).
vmwNSXClusterNodeStatus	NSX-T system events	Cluster Node status (Flash).

Event Name	Event Source	Description
vmwNSXFabricCryptoStatus	NSX-T system events	Edge crypto mux driver failed/passed Known_Answer_Tests(KAT) (Flash).
NSX-T Edge Node has no controller connectivity	vRNI Computed	vRNI (NSX-T Edge Node is not able to communicate with any of the controllers).
NSX-T Edge Node has no manager connectivity	vRNI Computed	NSX-T Edge Node has lost manager connectivity.
NSX-T Edge Node's controller connectivity degraded	vRNI Computed	NSX-T Edge Node is not able to communicate with one or more controllers.
NSX-T MTU mismatch	vRNI Computed	The MTU configured on interfaces of Tier-0 logical router does not match with the interfaces of uplink switch/ router from same L2 network. This can impact the network performance.
NSX-T VMs included in the firewall exclusion list	vRNI Computed	One or more VMs are not protected by NSX-T DFW firewall. vRealize Network Insight will not receive IPFIX flows for these VMs.
NSX-T VLAN misconfiguration on Tier 0 router	vRNI Computed	Communication is disrupted because VLAN on uplink port of Tier 0 router is different than VLAN on the external gateway.
No Uplink Connectivity	vRNI Computed	NSX-T Tier-1 logical router is disconnected from Tier-0 router. Networks under this router are not reachable from outside and vice versa.
No transport zone attached on the transport node	vRNI Computed	No transport zone attached to the transport node. Causes the VMs to lose connectivity.
No vtep is available on the transport node	vRNI Computed	All vteps are deleted from the transport node. Causes the VMs to lose connectivity.
Routing Advertisement disabled	vRNI Computed	Routing advertisement is disabled for NSX-T Tier-1 logical router. Networks under this router are not reachable from outside.
Manager Disk Utilization is not OK	NSX-T system events (vmwNSXPlatformSysDiskUsage)	
BGP Neighbor down	NSX-T system events (vmwNSXRoutingBgpNeighborStatus )	Need an alert when the BGP neighbor is down.
BGP Neighbor Up	NSX-T system events (vmwNSXRoutingBgpNeighborStatus )	Clear Alarm when a neighbor comes up.

Event Name	Event Source	Description
Storage usage over X	NSX-T system events(vmwNSXPlatformSysDiskUsage)	Alarm for Storage over X - Event is raised for all appliance VM (MP, CCP) or transport nodes (edge, host).
Memory usage over X	NSX-T system events (vmwNSXPlatformSysMemUsage)	Alarm for Memory over X - Event is raised for all appliance VM (MP, CCP) or transport nodes (edge, host).
CPU usage over X	NSX-T system events (vmwNSXPlatformSysCpuUsage)	Alarm for CPU over X - Event is raised for all appliance VM (MP, CCP) or transport nodes (edge, host).

## Add VMware SD-WAN

You can add VMware SD-WAN by VeloCloud as a data source in vRealize Network Insight.

### Prerequisites

Ensure the following:

- You have the correct permission to add the data source. For information on permissions, see [Supported Products and Versions](#).
- You are using VeloCloud Orchestrator and Edge version 3.3.1 or later.
- You have added at least one VMware SD-WAN license.
- There is no other VMware SD-WAN added as a data source.

### Procedure

- 1 On the **Settings** page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under **SD-WAN**, click **VeloCloud**.
- 4 In the **Add a New VeloCloud Account or Source** page, provide the required information.

Option	Action
<b>Collector (Proxy) VM</b>	Select a collector VM from the drop-down menu.
<b>VCO URL</b>	Enter the VCO URL that you want to add as a data source.
<b>Username</b>	Enter the user name.
<b>Password</b>	Enter the password.

- 5 Click **Validate**.
- 6 In the **Nickname** text box, enter a nickname.
- 7 (Optional) In the **Notes** text box, you can add a note if necessary.
- 8 Click **Submit**.

## What to do next

You must enable the NetFlow for all Profiles and Edges on port 2055. To know about how to enable the NetFlow collection, in the **Edit Data Source** page for VMware SD-WAN, click **View Instruction**.

---

**Note** You can see the **View Instruction** option in Note: Netflow collection should be enabled for all the Profiles and Edges.

---

## Add VMware Cloud on AWS

vRealize Network Insight supports VMware Cloud on AWS for the enterprise license users only. You can add VMware Cloud on AWS (vCenter) or VMware Cloud on AWS (NSX Policy Manager) as a data source.

### Add a VMware Cloud on AWS - vCenter

You can add VMware Cloud on AWS - vCenter as a data source.

#### Prerequisites

- You must have the `Cloud Administrator` privileges.
- Obtain the credentials to add NSX Manager as a data source
  - a Log in to your VMWare Cloud Services console.
  - b Click **VMware Cloud on AWS** under **My Services**.
  - c Click the name of the desired SDDC.
  - d In the **Settings** tab, copy the **vCenter FQDN** in the **vCenter FQDN** tab. From the **Default vCenter User Account** tab, copy the user credentials.

#### Procedure

- 1 Click **Settings > Accounts and Data Source > Add Source**.
- 2 Under **VMware Cloud on AWS**, click **VMware Cloud on AWS - vCenter**.
- 3 In the **Add a VMware Cloud on AWS - VMware vCenter** page,
  - Select the Collector VM.
  - Provide the vCenter FQDN that you have retrieved from the VMware Cloud Services..
  - Provide the user credentials that you retrieved from the VMware Cloud Services.
- 4 Click **Validate**.
- 5 Enter **Nickname** and **Notes** (if any) for the data source and click **Submit**.
- 6 [Add a VMware Cloud on AWS - NSX Policy Manager](#).

## Add a VMware Cloud on AWS - NSX Policy Manager

You can add VMware Cloud on AWS - NSX Policy Manager as a data source.

### Prerequisites

- You must have the `Cloud Administrator` privileges.
- Obtain the credentials to add NSX Manager as a data source
  - a Log in to your VMWare Cloud Services console.
  - b Click **VMware Cloud on AWS** under **My Services**.
  - c Click the name of the desired SDDC.
  - d In the **Settings** tab, copy the **vCenter FQDN** in the **vCenter FQDN** tab. From the **Default vCenter User Account** tab, copy the user credentials.

### Procedure

- 1 Perform one of the following:
  - If you have not added VMware Cloud on AWS - vCenter,
    - a [Add a VMware Cloud on AWS - vCenter](#).
    - b Click **Add NSX Manager**.
  - If you have already added VMware Cloud on AWS - vCenter,
    - a Click **Settings > Accounts and Data Source > Add Source**.
    - b Under **VMware Cloud on AWS**, click **VMware Cloud on AWS - NSX Manager**.
- 2 In the **Add a new VMC NSX Manager Account** page,
  - Select the corresponding vCenter.

The collector is automatically selected based on the selection of the vCenter. VMware Cloud on AWS. You must add the NSX Manager to the same collector VM as that of the corresponding vCenter.
  - Provide the IP address and the CSP Refresh Token.
  - Provide the user credentials.
- 3 Click **Validate**.
- 4 If you want to collect IPFIX flows for DFW, select **Enable DFW IPFIX**.

---

**Note** The error messages pop up if the following conditions are not met:

- To enable DFW IPFIX, you need to have the `Cloud Administrator` privileges.
  - VMware Cloud on AWS NSX Manager allows only four collectors to be added to its DFW IPFIX collector profile. See also [Unable to Enable DFW IPFIX](#).
-

5 Enter **Nickname** and **Notes** (if any) for the data source and click **Submit**

## VMware Cloud on AWS Deployment Model

vRealize Network Insight supports the following deployment model:

- Collector deployed in VMware Cloud on AWS :
  - a In this deployment model, the collector is deployed as a workload in Compute Gateway in VMware Cloud on AWS . The platform is deployed in the SDDC on-premises version.
  - b The firewall rules of Management Gateway allow communication to VMware Cloud on AWS vCenter and VMware Cloud on AWS NSX Manager over HTTPS.
  - c The collector communicates to the platform using the existing communication mechanisms over VPN or Direct Connect.

The prerequisites for the above deployment model are:

- There should be a Management Gateway firewall rule to allow the vRealize Network Insight collector to invoke vCenter and NSX Manager APIs over HTTPS (443).
- There should be a Compute Gateway rule within the gateway firewall to allow the collector to communicate with the on-premises Platform or the SaaS platform.

---

### Note

- For a single node SDDC in VMware Cloud on AWS, set the CPU resource reservation for the proxy VM to 1251 MHz. Currently, the proxy OVA delivered as a part of the release has the resource reservation set to 2048 MHz. After importing the OVA in the SDDC vCenter, modify the settings of the proxy VM to use the maximum allowed CPU reservation of 1251 MHz.
- 

## Add Amazon Web Services

You can add Amazon Web Services (AWS) as a data source in vRealize Network Insight.

You can add the following two types of AWS accounts as a data source.

- Primary and linked AWS Accounts
- Standard AWS Account

### Primary and Linked AWS Accounts

The primary AWS account (Organization Account or Payer Account) has the organization level access to discover and list all linked AWS accounts in your organization through API calls.

All the AWS accounts in your organization that are added to the primary account are known as Linked Accounts. For more information, see [ListAccount](#).

The primary AWS Account must assume a role over the linked AWS accounts to access and control the resources of the linked AWS account . All the linked AWS Account must trust the primary AWS account through a Role ARN. For more information about roles, see [AssumeRole](#).

When you add a primary AWS account as a data source, all the linked AWS accounts are added as a data source automatically.

## Standard AWS Account

A Standard AWS Account doesn't have primary and linked relationship.

## Add a Primary AWS Account

By adding a primary AWS Account, you can automatically add all the linked AWS Accounts in your organization in the vRealize Network Insight.

### Prerequisites

- [Configure Firewall for AWS API Access.](#)
- [Create a Primary and Linked Account Policy.](#)
- [Create a Role in AWS.](#)
- [Create a User in the Primary AWS Account.](#)
- Get your Amazon Access Key ID that you created in the AWS console. For more details, see <http://docs.aws.amazon.com/general/latest/gr/managing-aws-access-keys.html>.
- Get the role Amazon Resource Names (ARN) of the linked AWS account. See, [Amazon Resource Names \(ARNs\) and AWS Service Namespaces](#)

### Procedure

- 1 Log in to vRealize Network Insight.
- 2 Go to **Settings > Accounts and Data Sources > Add Source.**
- 3 Under the Public Clouds section, click **Amazon Web Services.**
- 4 Select the Collector (Proxy) VM.
- 5 Enter your Amazon Access Key ID and corresponding Secret Access Key.  
vRealize Network Insight takes 15–20 minutes to collect your AWS account data.
- 6 Click **Validate.**

If the number of VMs discovered exceeds the capacity of the platform or a collector node, or both, the validation fails. You will not be allowed to add a data source until you increase the brick size of the platform or create a cluster. The specified capacity for each brick size with and without flows is as follows:

Brick Size	VMs	State of Flows
Large	6k	Enabled
Large	10k	Disabled

Brick Size	VMs	State of Flows
Medium	3k	Enabled
Medium	6k	Disabled

- 7 After validation of your AWS account completes, select the **Add Linked Accounts Automatically** option.
- 8 In **Role ARN**, enter the role Amazon Resource Names of the linked AWS account to trust the primary AWS Account.
- 9 Enter **Nickname** and **Notes** for the data source.
- 10 Click **Submit**.

vRealize Network Insight validates Role ARN and adds the account.

## Create a Primary and Linked Account Policy

You must create a primary account policy for the primary amazon web service (AWS) account and a linked account policy for all the linked AWS accounts. You can use these policies to manage access in AWS.

You can attach the AWS policy to an IAM identity such as Users or Roles. For more information, see [Policies and Permissions](#).

### Procedure

- 1 In the AWS console, go to **IAM > Policies > Create policy**.
- 2 In the **Create policy** page, click the **JSON** tab.

### 3 In the **JSON** text box, enter a policy

Option	Description
<p><b>Add a primary account policy</b></p> <hr/> <p><b>Note</b> You must add the primary account policy in the primary AWS account.</p> <hr/>	<pre> {   "Version": "2012-10-17",   "Statement": [     {       "Effect": "Allow",       "Action": [         "iam:ListAccountAliases"       ],       "Resource": [         "*"       ]     },     {       "Effect": "Allow",       "Action": [         "ec2:Describe*"       ],       "Resource": "*"     },     {       "Action": [         "logs:Describe*",         "logs:Get*",         "logs:TestMetricFilter",         "logs:FilterLogEvents"       ],       "Effect": "Allow",       "Resource": "*"     },     {       "Effect": "Allow",       "Action": [         "organizations:ListAccounts"       ],       "Resource": "*"     },     {       "Effect": "Allow",       "Action": "sts:AssumeRole",       "Resource": "&lt;Role ARNs&gt;"     }   ] } </pre>
<p><b>Add a linked account</b></p> <hr/> <p><b>Note</b> You must add the linked account policy in all the linked accounts that are added in the primary AWS account.</p> <hr/>	<pre> {   "Version": "2012-10-17",   "Statement": [     {       "Effect": "Allow",       "Action": [         "iam:ListAccountAliases"       ],       "Resource": [         "*"       ]     },     {       "Effect": "Allow",       "Action": [ </pre>

Option	Description
	<pre>       "ec2:Describe*"     ],     "Resource": "*"   },   {     "Action": [       "logs:Describe*",       "logs:Get*",       "logs:TestMetricFilter",       "logs:FilterLogEvents"     ],     "Effect": "Allow",     "Resource": "*"   } ] } </pre>

- 4 Click **Review policy**.
- 5 Under the **Review policy** section, enter a policy name and click **Create policy**.

#### What to do next

Log in to all the Linked Accounts one by one, and add a role to trust the Primary AWS Account that you want to add to vRealize Network Insight, and attach the linked account policy. To create a role and attach the linked account policy, see [Create a Role in AWS](#).

**Note** If a role created in all the linked accounts already includes the standard policy permissions and trusts the primary account, skip this step.

## Create a Role in AWS

You can create an AWS role to trust the accounts that you want to add to vRealize Network Insight.

#### Prerequisites

Make a list of all linked account policy that you created in [Create a Primary and Linked Account Policy](#)

#### Procedure

- 1 In the AWS console, go to **Services > IAM > Roles > Create role**.
- 2 On the **Create role** page, click **Another AWS account**.
- 3 In the **Account ID** text box, enter the Primary account ID that you want to trust and click **Next:Permission**.
- 4 Search and select all the linked account policies, and click **Next:Tags**.
- 5 In the **Review** section, enter a **Role name** and click **Create role**.

## What to do next

[Create a User in the Primary AWS Account.](#)

## Create a User in the Primary AWS Account

You must create a user in the AWS account to get the Amazon Access Key ID and the corresponding Secret Access Key, which you use during addition of data source in vRealize Network Insight.

### Procedure

- 1 Log in to the AWS console.
- 2 Go to **Services > IAM > Users > Add user**.
- 3 On the **Add user** page, enter a **User name**, select the **Programmatic access** check box, and click **Next Permission**.
- 4 Under the **Set Permission** group, click **Attached existing policies directly**, and then search and select an account policy that you created previously.
  - For a primary AWS Account, select the primary account policy.
  - For a standard AWS Account, select the standard account policy.
- 5 Click **Next Tags > Next:Review**.
- 6 Click **Create user**.
- 7 Note down the **Access key ID** and **Secret access key**.

## What to do next

- [Add a Primary AWS Account.](#)
- [Add a Standard AWS Data Source.](#)

## Configure Firewall for AWS API Access

The collector VM requires a list of URLs to gain access to the AWS.

- The AWS can be deployed in multiple regions. There are separate URLs associated with different regions. If you are unaware of the region or the service, have a wildcard entry for the URL such as `*.amazonaws.com`.

---

**Note** The wildcard entry does not work for the China region.

---

If you want to give fine-grained access to separate URLs, there are 4 services based on the region:

- Regions except GovCloud and China
  - `ec2.<REGION>.amazonaws.com`
  - `logs.<REGION>.amazonaws.com`

- `sts.<REGION>.amazonaws.com`
- `iam.amazonaws.com`

### GovCloud Region

- `ec2.us-gov-west-1.amazonaws.com`
- `logs.us-gov-west-1.amazonaws.com`
- `sts.us-gov-west-1.amazonaws.com`
- `iam.us-gov.amazonaws.com`

### China (Beijing) Region

- `ec2.cn-north-1.amazonaws.com.cn`
- `logs.cn-north-1.amazonaws.com.cn`
- `sts.cn-north-1.amazonaws.com.cn`
- `iam.cn-north-1.amazonaws.com.cn`

You can use any of the following values for `REGION` based on the AWS region:

Region Name	Region
US East (Ohio)	<code>us-east-2</code>
US East (N. Virginia)	<code>us-east-1</code>
US West (N. California)	<code>us-west-1</code>
US West (Oregon)	<code>us-west-2</code>
Asia Pacific (Mumbai)	<code>ap-south-1</code>
Asia Pacific (Seoul)	<code>ap-northeast-2</code>
Asia Pacific (Singapore)	<code>ap-southeast-1</code>
Asia Pacific (Sydney)	<code>ap-southeast-2</code>
Asia Pacific (Tokyo)	<code>ap-northeast-1</code>
Canada (Central)	<code>ca-central-1</code>
EU (Frankfurt)	<code>eu-central-1</code>
EU (Ireland)	<code>eu-west-1</code>
EU (London)	<code>eu-west-2</code>
South America (São Paulo)	<code>sa-east-1</code>
Gov Cloud	<code>us-gov-west-1</code>
China (Beijing)	<code>cn-north-1</code>

## Add a Standard AWS Data Source

To add an AWS data source:

### Prerequisites

- Configure the organization firewall for AWS API access. See [Configure Firewall for AWS API Access](#).
- Create a standard account policy for the AWS account that you want to add in vRealize Network Insight. To create a policy, see [Create a Standard Account Policy](#).
- Create a user in the Standard AWS Account. To create a user in AWS, see [Create a User in the Primary AWS Account](#).

### Procedure

- 1 Go to **Settings > Accounts and Data Sources > Add Source**.
- 2 Under **Public Clouds**, click **Amazon Web Services**.
- 3 Select the Collector (Proxy) VM.
- 4 Enter your Amazon Access Key ID and corresponding Secret Access Key.

---

**Note** Your Amazon Access Key ID is a 20-digit string with a corresponding Secret Access Key. For more details, see <http://docs.aws.amazon.com/general/latest/gr/managing-aws-access-keys.html>.

---

**Note** To add AWS Gov Cloud Region as a data source, create an AWS IAM user by using the recommended policy in the AWS account with access to the Gov Cloud region. Use the Access key and the Secret key for the newly created account to add the data source to vRealize Network Insight.

---

This process takes around 15–20 minutes for adding and displaying your account data.

- 5 Click **Validate**.

If the number of VMs discovered exceeds the capacity of the platform or a proxy node or both, the validation fails. You will not be allowed to add a data source until you increase the brick size of the platform or create a cluster.

The specified capacity for each brick size with and without flows is as follows:

Brick Size	VMs	State of Flows
Large	6k	Enabled
Large	10k	Disabled
Medium	3k	Enabled
Medium	6k	Disabled

- 6 After you have validated your AWS account, you can select **Enable Flows data collection** to get deeper insights.

## Create a User in the Primary AWS Account

You must create a user in the AWS account to get the Amazon Access Key ID and the corresponding Secret Access Key, which you use during addition of data source in vRealize Network Insight.

### Procedure

- 1 Log in to the AWS console.
- 2 Go to **Services > IAM > Users > Add user**.
- 3 On the **Add user** page, enter a **User name**, select the **Programmatic access** check box, and click **Next Permission**.
- 4 Under the **Set Permission** group, click **Attached existing policies directly**, and then search and select an account policy that you created previously.
  - For a primary AWS Account, select the primary account policy.
  - For a standard AWS Account, select the standard account policy.
- 5 Click **Next Tags > Next:Review**.
- 6 Click **Create user**.
- 7 Note down the **Access key ID** and **Secret access key**.

### What to do next

- [Add a Primary AWS Account](#).
- [Add a Standard AWS Data Source](#).

## Create a Standard Account Policy

You must create a standard account policy for the Standards AWS Accounts. With this policy, you can manage access in AWS.

You can attach the AWS policy to an IAM identity such as Users or Roles. For more information, see [Policies and Permissions](#).

### Procedure

- 1 In the AWS console, go to **IAM > Policies > Create policy**.
- 2 In the **Create policy** page, click the **JSON** tab.

- 3 In the **JSON** text box, enter the following account policy:

Option	Description
<p><b>To add a standard account policy</b></p> <hr/> <p><b>Note</b> You must add the standard account policy in the Standard AWS Account that you want to add as a data source.</p> <hr/>	<pre> {   "Version": "2012-10-17",   "Statement": [     {       "Effect": "Allow",       "Action": [         "iam:ListAccountAliases"       ],       "Resource": [         "*"       ]     },     {       "Effect": "Allow",       "Action": [         "ec2:Describe*"       ],       "Resource": "*"     },     {       "Action": [         "logs:Describe*",         "logs:Get*",         "logs:TestMetricFilter",         "logs:FilterLogEvents"       ],       "Effect": "Allow",       "Resource": "*"     }   ] } </pre>

- 4 Click **Review policy**.
- 5 Under **Review policy** section, enter a policy name and click **Create policy**.

#### What to do next

- [Create a User in the Primary AWS Account.](#)

## AWS: Geo-Blocking Support

As the geo-blocking policy is strictly implemented on the corporate firewall, the AWS API calls are limited to specific AWS regions. vRealize Network Insight supports the geo-blocking policy for the AWS environments.

To enable the geo-blocking policy in vRealize Network Insight:

#### Procedure

- 1 On the **Add AWS Data Source** page, enter the AWS access and the secret keys. Click **Validate**.

- 2 Select **Allow access to specific AWS regions only**. Select the **AWS regions** from the list to enable the automatic collection from the regions. If this option is not selected, then the automatic collection does not happen.
- 3 Click **Submit**.

## Add Azure Subscription

You can add Microsoft Azure Subscription as a data source in vRealize Network Insight.

You must have the following permission:

- `Microsoft.Resources/subscriptions/read`
- `Microsoft.Compute/virtualMachines/read`
- `Microsoft.Network/virtualNetworks/read`
- `Microsoft.Network/networkSecurityGroups/read`
- `Microsoft.Network/networkInterfaces/read`
- `Microsoft.Network/applicationSecurityGroups/read`
- `Microsoft.Storage/storageAccounts/read`
- `Microsoft.Storage/storageAccounts/listkeys/action`
- `Microsoft.Network/networkWatchers/queryFlowLogStatus/*`
- `Microsoft.Network/networkWatchers/read`
- `Microsoft.Network/publicIPAddresses/read`

Alternatively, for ease of use, you can add the Storage Account Key Operator Service Role, Network Contributor, and Reader permission.

### Procedure

- 1 On the **Settings** page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under the **Public Clouds** group, click **Microsoft Azure**.
- 4 In the **Add a New Azure Subscription** page, provide the required information.

Option	Action
<b>Collector VM</b>	Select a collector VM from the drop-down menu.
<b>Tenant ID</b>	Enter the tenant ID of Azure active directory (AD).
<b>Application ID</b>	Enter the application ID.

Option	Action
<b>Application Secret Key</b>	Enter the application secret key.
<b>Subscription ID</b>	Enter the subscriptions ID.

**5** Click **Validate**.

You must have at least one VM, network security group (NSG), NIC, and VNet for a successful validation.

**6** (Optional) If you want to collect the NSG flow logs to get details insight on flows, then select **Enable NSG flow data collection** check box.

**7** In the **Nickname** text box, enter a nickname.

**8** (Optional) In the **Notes** text box, you can add a note if necessary.

**9** Click **Submit**.

## Enable NSG Flow Log

To enable the Network Security Group (NSG) flow data collection in vRealize Network Insight, you must enable the NSG flow log in your Azure environment.

The procedure and task related to Azure are documented in <https://docs.microsoft.com/en-us/azure/network-watcher/>.

### Prerequisites

Verify that you have the correct permission. For information on permissions, see [Supported Products and Versions](#).

### Procedure

- 1** Enable network watcher in your Azure environment. For more information, see tutorials on Log VM network traffic in *Azure Network Watcher Documentation*.
- 2** Register insights provider in your Azure environment. For more information, see tutorials on Log VM network traffic in *Azure Network Watcher Documentation*.
- 3** Enable NSG flow log in your Azure environment. For more information, see tutorials on Log VM network traffic in *Azure Network Watcher Documentation*.
- 4** In the **Microsoft Azure** portal, Click **Storage Account > Blob**.
- 5** Select the container in which you are storing the flow logs, then click **Change access level** and select **Container (anonymous read access for container and blobs)**.

You must do this step for all the container in which you are storing the flow logs.

## Add VMware PKS

You can add VMware PKS as a data source and fetch your PKS cluster details in vRealize Network Insight.

### Prerequisites

You must add the corresponding NSX-T Manager.

### Procedure

- 1 On the Settings page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under Containers, select **VMware PKS**.
- 4 On the Add Data Source page, provide the following details:

Field Name	Description
NSX-T Manager	Select the NSX-T Manager that supports the underlying networking for the VMware PKS deployment.
Collector (Proxy) VM	vRealize Network Insight automatically selects the corresponding collector VM associated with the chosen NSX-T Manager.  <b>Note</b> The collector VMs that are added as a NetFlow collector are not available in the list.
API Hostname (FQDN)	Enter the FQDN details of the PKS API server.
Username	Enter the PKS user name that has access to the clusters.
Password	Enter the password.

- 5 Click **Validate**.  
You see the `Validation Successful` message.
- 6 Enter the nick name for the data source and add any notes for description, as desired.
- 7 Click **Submit**.

## Add Kubernetes

You can add Kubernetes as a data source and fetch your Kubernetes Cluster details into vRealize Network Insight.

---

**Note** The Kubernetes Cluster and the corresponding NSX-T Manager must be added to the same collector VM.

---

### Prerequisites

- Add NSX-T Manager in vRealize Network Insight.
- Ensure that the Kubernetes API Server is accessible from the Collector VM.

## Procedure

- 1 On the Settings page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under Containers, select **Kubernetes**.
- 4 On the Add Data Source page, provide the following details:

Field Name	Description
NSX-T Manager	Select the NSX-T Manager that supports the underlying networking for Kubernetes.
Collector (Proxy) VM	vRealize Network Insight automatically selects the corresponding collector VM associated with the chosen NSX-T Manager.  <b>Note</b> The collector VMs that are added as a NetFlow collector are not available in the list.
Kubeconfig	Click <b>Browse</b> and upload the Kubernetes configuration file that has Kubernetes cluster details. For more information about the format of the Kubeconfig configuration file, refer to the <a href="#">Kubernetes documentation</a> .  <b>Note</b> The user configured in the Kubeconfig file must have the <b>List</b> and <b>Watch</b> privileges.

- 5 Click **Validate**.  
You see the `Validation Successful` message.
- 6 Enter the nick name for the data source and add any notes for description, as desired.
- 7 Click **Submit**.

## Results

vRealize Network Insight can now fetch the Kubernetes cluster details.

## What to do next

Go to Kubernetes Dashboard and view the details, see [Viewing Kubernetes Details](#).

# Add OpenShift

You can add OpenShift as a data source and fetch your OpenShift details into vRealize Network Insight.

---

**Note** OpenShift and the corresponding NSX-T Manager must be added to the same collector VM.

---

## Prerequisites

- Add NSX-T Manager in vRealize Network Insight.

## Procedure

- 1 On the Settings page, click **Accounts and Data Sources**.

- 2 Click **Add Source**.
- 3 Under Containers, select **OpenShift**.
- 4 On the Add Data Source page, provide the following details:

Field Name	Description
NSX-T Manager	Select the NSX-T Manager that supports the underlying networking for OpenShift.
Collector (Proxy) VM	vRealize Network Insight automatically selects the corresponding collector VM associated with the chosen NSX-T Manager.  <b>Note</b> The collector VMs that are added as a NetFlow collector are not available in the list.
Kubeconfig	Click <b>Browse</b> and upload the Kubernetes configuration file that has Kubernetes cluster details. For more information about the format of the Kubeconfig configuration file, refer to the <a href="#">Kubernetes documentation</a> .  <b>Note</b> The user configured in the Kubeconfig file must have the <b>List</b> and <b>Watch</b> privileges.

- 5 Click **Validate**.  
You see the `Validation Successful` message.
- 6 Enter the nick name for the data source and add any notes for description, as desired.
- 7 Click **Submit**.

#### Results

vRealize Network Insight can now fetch the OpenShift details.

#### What to do next

See the details on the [Viewing Kubernetes Details](#).

## Add Palo Alto Networks Panorama

You can add Palo Alto Networks Panorama as a data source in vRealize Network Insight.

#### Prerequisites

Ensure that you have **admin role** with XML API access. For more details, see [Palo Alto Networks](#).

#### Procedure

- 1 On the **Settings** page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under **Firewalls**, click **Palo Alto Networks Panorama**.

- 4 In the **Add a New Palo Alto Networks Panorama Account or Source** page, provide the required information.

Option	Action
<b>Collector (Proxy) VM</b>	Select a collector VM from the drop-down menu.
<b>IP Address/FQDN</b>	Enter the IP address or the FQDN details.
<b>Username</b>	Enter the user name.
<b>Password</b>	Enter the password.

- 5 Click **Validate**.
- 6 In the **Nickname** text box, enter a nickname.
- 7 (Optional) In the **Notes** text box, you can add a note if necessary.
- 8 Click **Submit**.

## Add Check Point Management Server

You can add Check Point Management Server as a data source in vRealize Network Insight.

### Prerequisites

Ensure that you have the correct permission. For information on permissions, see [Check Point Firewall](#).

### Procedure

- 1 On the **Settings** page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under the **Firewall** group, click **Check Point Management Server**.
- 4 In the **Add a New Check Point Management Server Account or Source** page, provide the required information.

Option	Action
<b>Collector (Proxy) VM</b>	Select a collector VM from the drop-down menu.
<b>IP Address/FQDN</b>	Enter the IP address or the FQDN details.
<b>Username</b>	Enter the user name.
<b>Password</b>	Enter the password.

- 5 Click **Validate**.
- 6 In the **Nickname** text box, enter a nickname.
- 7 (Optional) In the **Notes** text box, you can add a note if necessary.
- 8 Click **Submit**.

## Add Cisco ASA

You can add Cisco ASA as a data source in vRealize Network Insight.

### Prerequisites

Ensure that you have the correct permission. For information on permissions, see [Supported Products and Versions](#).

### Procedure

- 1 On the **Settings** page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under **Firewall** group, click **Cisco ASA**.
- 4 In the **Add a New Cisco ASA Account or Source** page, provide the required information.

Option	Action
<b>Collector (Proxy) VM</b>	Select a collector VM from the drop-down menu.
<b>IP Address/FQDN</b>	Enter the IP address or the FQDN details.
<b>Username</b>	Enter the user name.  <b>Note</b> The user should have the enable mode privilege to set terminal length to 0, and for switching security context.
<b>Password</b>	Enter the password.  <b>Note</b> Ensure that you enter the same password as the one that you used for the enable mode of Cisco ASA.

- 5 (Optional) To enable richer data collection, click **Use SNMP (recommended for richer data collection)** check box.
- 6 Click **Validate**.
- 7 In the **Nickname** text box, enter a nickname.
- 8 (Optional) In the **Notes** text box, you can add a note if necessary.
- 9 Click **Submit**.

## Add a Fortinet FortiManager

In vRealize Network Insight, you can add Fortinet FortiManager as a data source:

### Prerequisites

Verify the following:

- You are using FortiManager version 6.0.1.
- You have at least the **Restricted User** role with access to all ADOMs and policy packages.

- You have the **rpc-permit read-write** access enabled from Command Line Interface (CLI).

To configure the **rpc** permission, use the following command in FortiManager CLI:

```
config system admin user
edit "<administrator name>"
set rpc-permit [none | read | read-write ]
end
```

#### Procedure

- 1 In the **Settings** page, click **Accounts and Data Sources > Add Source**.
- 2 Under the **Firewall** section, click **Fortinet FortiManager**.
- 3 On the **Add a New Fortinet FortiManager Account or Source** page, enter the required information:

Option	Action
<b>Collector(Proxy) VM</b>	Select the collector VM from the drop-down menu.
<b>IP Address/FQDN</b>	Enter the IP Address or the FQDN details.
<b>Username</b>	Enter the user name you want to use for this data source.
<b>Password</b>	Enter the password.

- 4 Click **Validate**.
- 5 In the **Nickname** text box, enter a nick name for the data source.
- 6 (Optional) In the **Note** text box, you can add a note if necessary.
- 7 Click **Submit**.

## Add Dell OS10 Switches

You can add Dell OS10 switches as a data source in vRealize Network Insight.

#### Prerequisites

For information about supported Dell switches, see [Supported Products and Versions](#).

#### Procedure

- 1 On the **Settings** page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under the **Routers & Swiches** group, click **Dell OS10**.

- 4 In the **Add a New Account or Source** page, provide the required information.

Option	Action
<b>Collector VM</b>	Select a collector VM from the drop-down menu.
<b>IP Address/FQDN</b>	Enter the IP address or the FQDN details.
<b>Username</b>	Enter the user name.
<b>Password</b>	Enter the password.

- 5 Click **Validate**.

You see the `Validation Successful` message.

- 6 To enable SNMP or the data collection, select **Use SNMP**.

- 7 In the **Nickname** text box, enter a nickname.

- 8 In the **Notes** text box, you can add a note if necessary.

- 9 Click **Submit**.

#### What to do next

[Enable Telemetry on Dell OS10 Switches](#)

## Enable Telemetry on Dell OS10 Switches

You can enable telemetry on Dell OS10 switches to integrate Buffer Statistics and Tracking on Dell switches.

#### Prerequisites

[Add Dell OS10 Switches](#)

When requests are received from the switch, vRealize Network Insight collector stores or buffers the packet on the defined port.

When the buffer size increases due to the increase of input rate when compared with the output rate, the requests might slow down or time-out. Dell OS10 switches use gRPC to capture such metric information, which you can see on vRealize Network Insight. This allows you to diagnose application performance problems that were potentially caused due to network congestion and also proactively provides the impact of congestion on application and network.

#### Procedure

- ◆ Run the following commands on the Dell OS10 switch:

```
telemetry
enable
!
destination-group dg03
  destination vRNI Collector IP 50000
!
```

```
subscription-profile sp03
  sensor-group bgp
  sensor-group buffer
  sensor-group device
  sensor-group environment
  sensor-group interface
  sensor-group lag
  sensor-group system
  destination-group dg03
  encoding gpb
  transport grpc no-tls
  source-interface ethernet1/1/1
```

## Results

vRealize Network Insight collector collects the following telemetry information from the Dell OS10 switches.

- per-port egress unicast queues
- per-port egress multicast queues
- per-port egress service pool
- per priority group ingress shared headroom
- per service pool ingress

## What to do next

Run any of the following queries:

- `show ports where metric > X in time range`
- `show switches where metric > X in time range`
- `port show metrics in time range`
- `swicth show metrics in time range`
- `show switches where at least one port metric > X in time range`

You see the respective event triggered. For example, `SwitchPort Buffer Threshold Exceeded` Event.

You can also search for the Interface Peak Buffer Utilization metric and identify the reason for the request slow down.

## Add Huawei 6800/7800/8800 Series

vRealize Network Insight supports a multiple series of Huawei Cloud Engine.

### Prerequisites

The user must have at least Read-Only permissions.

**Procedure**

- 1 On the Settings page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under **Routers & Switches**, select **Huawei 6800/7800/8800 Series**.
- 4 Enter the following information:

Properties	Description
Collector(Proxy) VM	Select the proxy VM from the drop-down menu.
IP Address/FQDN	Enter the IP Address or the FQDN details.
Username	Enter the user name you want to use for this data source.
Password	Enter the password.

- 5 Click **Validate**.
- 6 If you enable SNMP for the data collection, select **SNMP Version**.
  - a For 2c, enter the associated community string.
  - b For 3, enter the following:
    - Username
    - Context Name
    - Authentication Type
- 7 Provide the **Nickname** and **Notes** as required.
- 8 Click **Submit**.

**What to do next**

You can use the following features of vRealize Network Insight with Huawei devices or routers.

- VM-VM path
- VM Underlay topology
- Huawei Router or Switch dashboard
- Metrics: Switch port and router interface metrics
- Dashboards
  - Huawei Router or Switch
  - Router Interfaces
  - Port Channels
  - Switch Ports

- Routes
- High availability: supports M-LAG (Multi-Chassis Link Aggregation) and VRRP (Virtual Router Redundancy Protocol)
- Searches
  - VRF (Virtual routing and forwarding) of Huawei
  - Router Interface of Huawei
  - Switch port of Huawei
  - Port Channel of Huawei
  - Routes in Huawei
- Huawei NetStream data monitoring

## Add Cisco ACI

You can add Cisco ACI as a data source. This feature is available only for the enterprise license users.

To add Cisco ACI as a data source, the user should have access to all the tenants and read-only privilege. Here are the steps for the Cisco ACI data source addition:

### Procedure

- 1 In the **Accounts and Data Source** page under **Settings**, click **Add Source**.
- 2 Under **Others**, click **Cisco ACI**.
- 3 In the **Add a new Cisco ACI Account or Source** page, provide the following information:
  - Select the Collector VM.
  - Provide the IP address of any of the APIC controllers in the cluster.

---

**Note** You do not have to add the individual switches in the ACI fabric.

---

  - Provide the user credentials.
  - vRealize Network Insight collects the metric data over SNMP from the individual switches. To enable this task, select **Use SNMP**.
- 4 Click **Validate**.
- 5 Enter **Nickname** and **Notes** (if any) for the data source and click **Submit**

## Add a Physical Flow Collector for NetFlow and sFlow

You can add a physical flow collector and configure the switches to push sFlow and NetFlow records to the collector. The collector VM that is used for NetFlow or sFlow is a dedicated

collector. It cannot be used for any other data source. If any other data source is also added on the proxy server, it is not available as a Physical Flow Collector for sFlow and NetFlow.

#### Procedure

- 1 In the **Settings** page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under **Flows**, click **Physical Flow Collector (Netflow, sFlow)**.  
sFlows are accepted only on the physical collector.
- 4 Enter **Nickname** and **Notes** as required.
- 5 Click **Submit**.

#### Results

---

**Note** vRealize Network Insight collects the packet samples for sFlow and so cannot show the complete metrics for the flows.

---

#### What to do next

Configure the switches to push the flows to the Physical Flow Collector.

- Define the destination (Collector IP address that you added in vRealize Network Insight).
- Set the port for the flow collector.
- Assign poll interval.

---

**Note** The procedure to configure depends on the switch that you want to configure. For more information, see the specific switch documentation.

---

## Add Log Insight

vRealize Log Insight collects NSX logs dynamically when an NSX event occurs. However, vRealize Network Insight collects data from NSX every 10 minutes. So, adding vRealize Log Insight in vRealize Network Insight enables you to get event information faster, rather than waiting for it.

In the vRealize Network Insight and vRealize Log Insight integration, the alerts generated by vRealize Log Insight are consumed by vRealize Network Insight. Whenever a security group is created or modified, the logs of NSX are sent to vRealize Log Insight which in turn sends an alert. After receiving the alert, vRealize Network Insight polls the NSX Manager on which the security group was created and fetches the corresponding data for the changed security groups. Currently, this integration supports only the security group CRUD-related alerts.

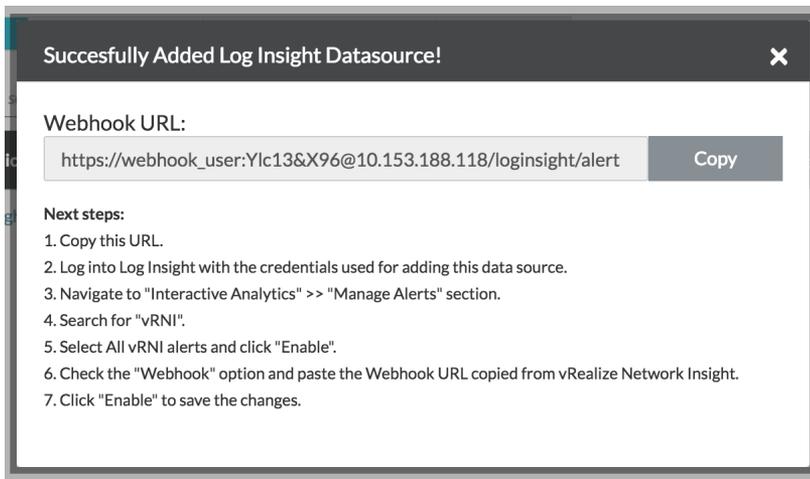
The vRealize Network Insight and vRealize Log Insight integration supports the following versions:

- VMware vRealize Log Insight 4.5 and later versions

- vRealize Network Insight v3.8 and later versions
- VMware NSX Manager v6.2 and later versions

**Procedure**

- 1 Create or reuse a vRealize Log Insight user with access to the APIs of vRealize Log Insight.
- 2 On the **Install and Support** page, click **Accounts and Data Sources**.
- 3 Click **Add Source**.
- 4 Click **Log Insight** under **Log Servers**.
- 5 On the **Add a New Log Insight Server Account or Source** page, click **Instructions** next to the page title. A pop-up window appears that provides the prerequisites for adding the Log Insight data source and the instructions to enable the Webhook URL on vRealize Log Insight.

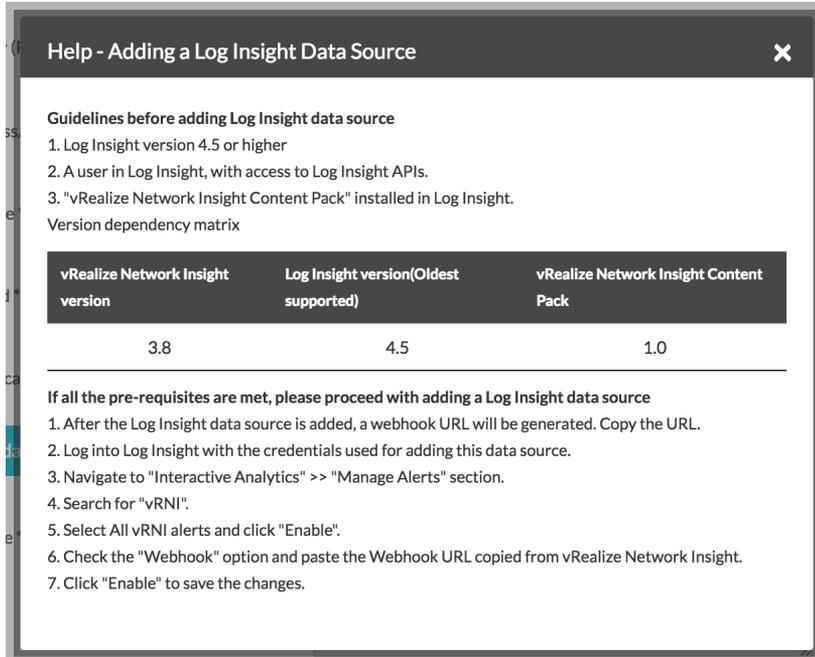


**Note** The Webhook URL, which is generated after the addition of the data source, is used in vRealize Log Insight.

- 6 Enter the required details.

Name	Description
Collector (Proxy) VM	Select the IP address of the data collector that you have deployed for the data collection process.
IP Address / FQDN	Enter the IP address or the FQDN of the data source.
User Name	Enter the user name you want to use for a particular data source.
Password	Enter the password for the data source.
Authentication Provider	Select the respective authentication provider for the credentials that you have provided.

- After the data source has been created, a pop-up window appears that will provide the Webhook URL and the steps that have to be performed to enable this URL on vRealize Log Insight. Copy the Webhook URL. Log in with the credentials that were used for adding this data source. Enable alerts in the vRealize Log Insight application and configure this Webhook URL. Send Test Alert to ensure that the integration is successful.



**Note** Any alert displayed on the vRealize Log Insight data source in vRealize Network Insight is resolved in an hour.

## Add Infoblox

vRealize Network Insight allows you to add Infoblox Grid as a DNS data provider.

Infoblox DNS offers an advanced solution to manage and control DNS. It uses Infoblox Grid to ensure that the DNS is highly available throughout the network. The DNS data from Infoblox is used only for enriching the flows where either the source or the destination IP addresses are associated with the physical devices.

The Infoblox DNS data co-exists with the DNS data that is imported by using CSV.

If you configure an Infoblox DNS data source on a collector, you can configure other data sources also on the same collector. You do not need a dedicated collector for Infoblox.

### Considerations

- vRealize Network Insight supports only single-grid mode for Infoblox in the current release.
- Only A Records are supported in the current release. Shared A Records are not supported currently.

- The DNS enrichment is supported only for the IP addresses that are marked as physical in the current release.
- If there are multiple FQDNs for a single physical IP address, all FQDNs are returned.

#### Procedure

- 1 On the **Settings** page, click **Accounts and Data Sources**.
- 2 Click **Add new source**.
- 3 Click **Infoblox** under **DNS**.
- 4 Provide the following information:

**Table 3-4.**

Properties	Description
Collector VM	Select the collector VM from the drop-down menu.
IP Address/FQDN	Enter the IP Address/FQDN of Infoblox Grid.
Username	Enter the user name you want to use for a particular data source.
Password	Enter the password.

- 5 Click **Validate**.

---

**Note** Ensure that you have the `API Privilege` to access the Infoblox APIs.

---

- 6 Enter **Nickname** and **Notes** (if any) for the data source and click **Submit** to add the Infoblox DNS data source to the environment.

## Add F5 BIG-IP

vRealize Network Insight supports the router and load balancer functionalities of F5 BIG-IP. The features like VM-VM path, high availability, VRFs, Routes, Router Interfaces, Switch Ports, Port Channels, Switch Port metrics, VRF Dashboard, Switch Dashboard and Router dashboard are supported. For search on the F5 BIG IP entities, use the query string `F5 BIG-IP Data Source`. vRealize Network Insight does not support LLDP neighbors or the neighboring devices in the VM-VM path.

To add F5 BIG-IP as a data source:

#### Prerequisites

- The user must have:
  - the `Guest` role or Read Only permissions with access to all partitions.
  - access to REST API.
  - access to TMSH terminal access.

- Enable SSH on the device.

Enable `password` authentication for SSH as follows:

### Note

- Use `root` or the administrator role privilege for changing the SSHD configuration.
- Do not use the `root` user privilege while adding F5 BIG-IP data source in vRealize Network Insight .
- Root user does not have HTTP access. The `root` user privilege is used for the administrative purpose.

```
[root@bigip:Active] config # tmsh
root@bigip(Active) (/Common) (tmsh)# edit sys sshd

## Adding the following configuration ##

modify sshd {
  include "
  ChallengeResponseAuthentication no
  PasswordAuthentication yes"
}
#####
Save changes? (y/n/e) y
root@bigip(Active) (/Common) (tmsh)#
root@bigip(Active) (/Common) (tmsh)# save sys config

root@bigip(Active) (/Common) (tmsh)# show running-config sys sshd
sys sshd {
  include "
  ChallengeResponseAuthentication no
  PasswordAuthentication yes"
}
```

### Procedure

- 1 On the Settings page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under **Routers & Switches** select **F5 BIG-IP**.
- 4 Provide the following information:

Properties	Description
Collector(Proxy) VM	Select the proxy VM from the drop-down menu.
IP Address/FQDN	Enter the IP Address or the FQDN details.

Properties	Description
Username	Enter the user name you want to use for this data source.
Password	Enter the password.

- 5 After entering the information in the text boxes, click **Validate**.
- 6 If you enable SNMP for the data collection, select **SNMP Version**.
  - a If you select 2c, then enter the associated community string.
  - b If you select 3, then enter the following:
    - Username
    - Context Name
    - Authentication Type

---

**Note** Ensure that you configure SNMP on the F5 BIG-IP UI console.

- a Log in to F5.
  - b Navigate to **System > SNMP**.
  - c Go to **SNMP > Agent > Access (v1,v2c)**.
  - d Enter the community string.
  - e Enter the source IP address.
  - f Select the **Read Only** access.
  - g Click **Finished**.
- 
- 7 Provide the **Nickname** and **Notes** as required. Click **Submit**.

## Add ServiceNow

ServiceNow Configuration Management Database (CMDB) provides you the full visibility of software and hardware infrastructure and relation between them in your datacenter, which helps you to manage your inventory. With ServiceNow integration, vRealize Network Insight can discover applications available in ServiceNow CMDB to enable you to directly add them into vRealize Network Insight.

## CMDB Concepts

Basically, a CMDB consists of:

- Configuration item: An entity or a component in a system. Example, a computer, a switch, a service, an application, a server, or a VM.

- Relationship: a link or a type of communication between configuration items. Example: depends on, runs on, exchanges data.

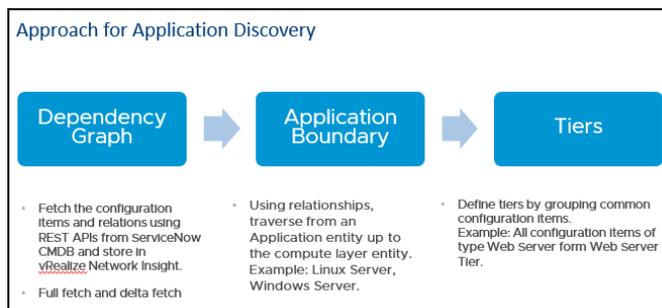
Each configuration item has a defined schema.

- Configuration Item Class: Each configuration item must be associated with a class, which defines its properties.
- Relationship class: Defines the type of relation between configuration items.

You can extend both the classes to add additional properties or customize the properties.

ServiceNow supports application service, which is a set of interconnected applications and hosts that offer a service. ServiceNow allows you to create an application service manually, by using an API, or can automatically discover by Service Mapping. All these applications are stored in ServiceNow CMDB.

When you add a ServiceNow datasource into vRealize Network Insight, vRealize Network Insight fetches the configurations items and the relationships from the ServiceNow CMDB configuration file.



vRealize Network Insight fetches data in regular intervals, by default.

- The complete data fetch happens every 12 hours, which fetches all the records of the classes defined the CMDB configuration. Also, the complete fetch happens when you add or update the datasource.
- The delta fetch happens every 2 minutes, which fetches all new, modified, and deleted records of the classes defined in the CMDB configuration. Approximately, vRealize Network Insight takes around 12 minutes to reflect these details on the user interface.

---

**Note** vRealize Network Insight fetches the class hierarchy and the relationship types during complete fetch only.

---

Default values for Limitations

Limit Name	Description	Default Value	Impact for Exceeding the Limit
maxAppsPerDataSource	Maximum applications per datasource.	500	The data source stops fetching data with an error on datasource and events page and the applications are not updated.
maxTiersPerApp	Maximum tiers that can be stored per application.	150	The applications are not updated until number of tiers are reduced to fit in limit.
maxMembersPerApp	Maximum members that can be stored per application.	500	The applications are not updated until number of members are reduced to fit in limit.
maxGraphTraversalStackSize	Maximum size of stack used in graph traversal.	100	The application will not get created and throws <code>SizeLimitExceededException</code> .
maxResponseAppCount	Maximum apps that can be returned in API response.	500	Only the number of applications that fits the limit are returned and UI shows error.

## Adding ServiceNow

You can add ServiceNow as a data source into vRealize Network Insight and fetch your application and tier details.

### Prerequisites

You must have the administrator privilege to add a data source.

### Procedure

- 1 On the Settings page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under CMDB, select **ServiceNow**.
- 4 On the Add Data Source page, provide the following details:

Field Name	Description
Collector (Proxy) VM	The host URL of ServiceNow
IP Address/FQDN	Enter the IP Address or the FQDN details.
Username	Enter the user name you want to use for this data source.  <b>Note</b> The user you plan to add must be an <b>Administrator</b> or <b>Read-Only Administrator</b> in ServiceNow.
Password	Enter the password.

- 5 Click **Validate**.

You see the `Validation Successful` message.

- 6 To add a customized CMDB configuration,
  - a Select **Customize CMDB configuration**.
  - b Click **download** to download the default configuration file.
  - c Update the file properties. See, [Customizing the CMDB Configuration](#).
  - d On the Add Datasource page, browse to select the updated JSON file.
- 7 Enter the nick name for the data source and add any notes for description.
- 8 Click **Submit**.

### What to do next

After you add a ServiceNow datasource, vRealize Network Insight discovers the applications available in the ServiceNow CMDB, which you add into vRealize Network Insight. For more information, see [Add Discovered Applications](#).

## Default CMDB Configuration File

vRealize Network Insight supports ServiceNow customizations using the configuration file in the JSON format.

```
{
  "fetchOnlyApprovedApplications": false,
  "nameBasedSearchForVm": false,
  "ignoreWorkloadCheck": false,
  "ciGroup": [
    {
      "name": "applicationClasses",
      "value": [
        "cmdb_ci_service_discovered"
      ],
      "valueType": "CI_CLASS",
      "systemGenerated": true,
      "expandCIClass": true
    },
    {
      "name": "relationshipTypeClasses",
      "value": [
        "*"
      ],
      "valueType": "CI_VALUE",
      "systemGenerated": true,
      "expandCIClass": false
    },
    {
      "name": "workloadRelationshipTypeClasses",
      "value": [
        "Hosted on::Hosts",
        "Instantiates::Instantiated by",
        "Runs on::Runs",
        "Virtualized by::Virtualizes"
      ],
    }
  ],
}
```

```

    "valueType": "CI_VALUE",
    "systemGenerated": true,
    "expandCIClass": false
  },
  {
    "name": "workloadCIClasses",
    "value": [
      "cmdb_ci_computer",
      "cmdb_ci_vm_instance",
      "cmdb_ci_vmware_instance"
    ],
    "valueType": "CI_CLASS",
    "systemGenerated": true,
    "expandCIClass": true
  },
  {
    "name": "relationClasses",
    "value": [
      "cmdb_rel_ci"
    ],
    "valueType": "CI_CLASS",
    "systemGenerated": true,
    "expandCIClass": true
  },
  {
    "name": "ignoredCIClasses",
    "value": [
      "cmdb_ci_vcenter_server_obj"
    ],
    "valueType": "CI_VALUE",
    "systemGenerated": true,
    "expandCIClass": true
  },
  {
    "name": "ignoredTierCIClasses",
    "value": [
    ],
    "valueType": "CI_VALUE",
    "systemGenerated": true,
    "expandCIClass": true
  },
  {
    "name": "trackedCIClasses",
    "value": [
      "cmdb_ci_appl",
      "cmdb_ci_cluster",
      "cmdb_ci_cluster_node",
      "cmdb_ci_database",
      "cmdb_ci_lb_service",
      "cmdb_ci_spkg",
      "cmdb_ci_qualifier_manual_connection",
      "cmdb_ci_endpoint",
      "cmdb_ci_network_adapter",
      "cmdb_ci_translation_rule"
    ],

```

```

    "valueType": "CI_CLASS",
    "systemGenerated": true,
    "expandCIClass": true
  }
],
"traversalRule": [
  {
    "fromNode": [
      "applicationClasses"
    ],
    "toNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "relationship": [
      "relationshipTypeClasses"
    ],
    "priority": 5
  },
  {
    "fromNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "toNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "relationship": [
      "relationshipTypeClasses"
    ],
    "priority": 3
  }
],
"traversalStopRule": [
  {
    "fromNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "toNode": [
      "applicationClasses"
    ],
    "relationship": [
      "relationshipTypeClasses"
    ],
    "priority": 5
  }
],
"associationRule": [
  {
    "fromNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],

```

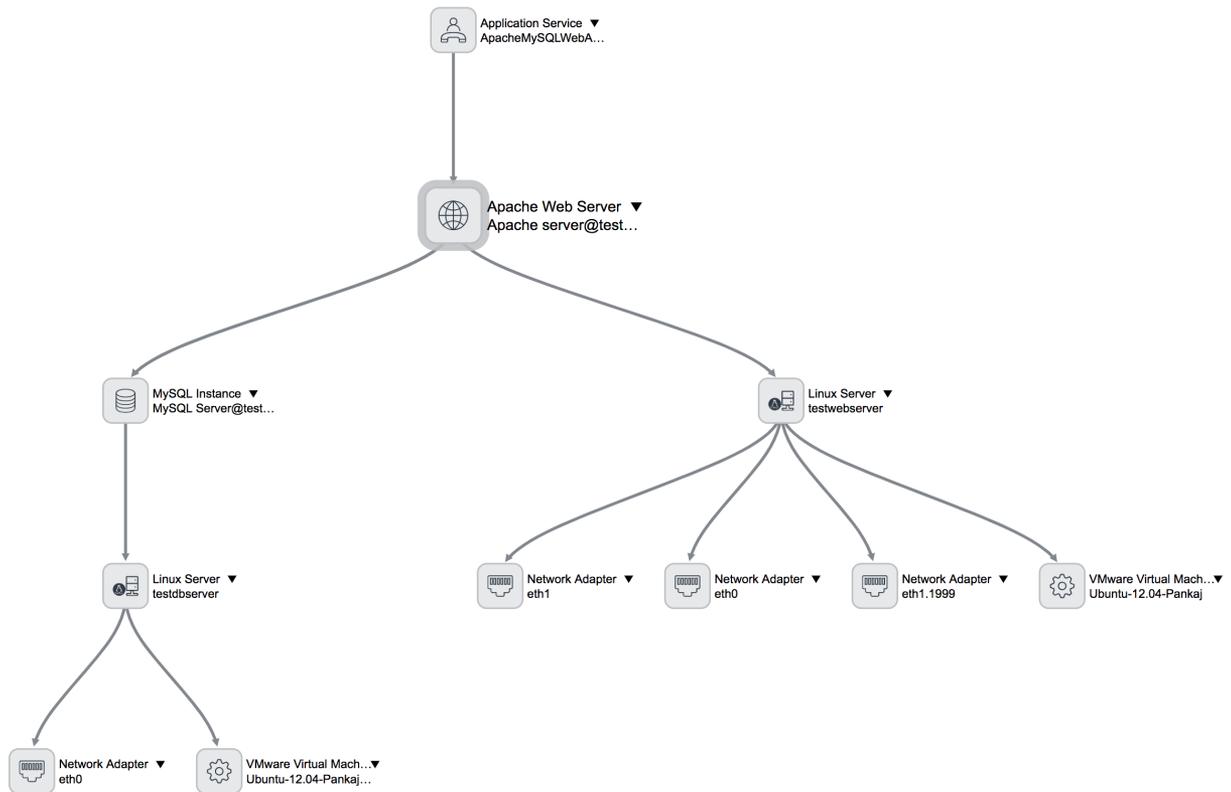
```
"toNode": [  
  "workloadCIClasses"  
],  
"relationship": [  
  "workloadRelationshipTypeClasses"  
],  
"priority": 5  
}  
]  
}
```

vRealize Network Insight When the configuration change occurs, might take 30 minutes for full data fetch and for recomputation of all applications.

**Example: An example of a ServiceMap and discovered application using default CMDB configuration**

**Example: The updated page on vRealize Network Insight for adding an application**

This enables vRealize Network Insight to discover the applications in ServiceNow.



## Modify Application



Application Name \* ApacheMySQLWebApp Application Total: 2 VMs | 0 Physical IPs

▼ Tier Tier Total: 1 VMs | 0 Physical IPs

Name \* ApacheMySQLWebApp\_apache\_web\_server

Virtual Machines / IP Addresses \* VM Names ▼ 'Ubuntu-12.04-Pankaj' 1 Vms

[Add another Condition](#)

▼ Tier Tier Total: 1 VMs | 0 Physical IPs

Name \* ApacheMySQLWebApp\_db\_mysql\_instance

Virtual Machines / IP Addresses \* VM Names ▼ 'Ubuntu-12.04-Dark--Pankaj-1' 1 Vms

[Add another Condition](#)

[Add Tier](#)

Analyze Flows

Save Cancel

## Customizing the CMDB Configuration

To support various customizations, the ServiceNow and vRealize Network Insight integration supports a generic configuration. The CMDB configuration must be in the JSON format.

The configuration includes:

- the configuration items
- the relation between the configuration items
- the rules for the dependency graph traversal.

You can customize the CMDB configuration based on your implementations.

---

**Note** When you change the configuration, a complete fetch happens and all the applications are recomputed. So, this process might take at least 30 minutes to appear on the Discovered Application Dashboard.

---

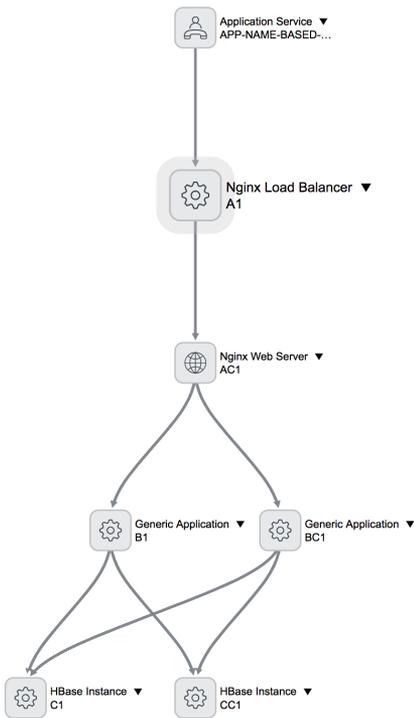
Field Name	Description
fetchOnlyApprovedApplications	Allows the boolean value to fetch only approved applications from ServiceNow. By default, the value is set to <b>False</b> .
nameBasedSearchForVm	Allows the boolean value to indicate whether to create a custom VM search criteria with the VM name if the ServiceNow VM is not present in vRealize Network Insight. If the value is set to <b>True</b> , then a custom VM name criteria is created and count will be reflected when corresponding VM is detected in vRealize Network Insight without recomputing the application.  This can be used when you create the dependency graphs or the service map manually, without using Service Mapping. By default, the value is set to <b>False</b> .
ignoreWorkloadCheck	Allows a boolean value to indicate whether to add an entity to the tier even when an associated workload entity does not exist.  This can be used when you create the dependency graphs or the service map manually, without using Service Mapping and when relationships are not defined till the workload layer. By default, the value is set to <b>False</b> .
ciGroup	Defines configuration items and relationships to fetch from ServiceNow. This field allows the following properties: <ul style="list-style-type: none"> <li>■ Name: Name for the configuration item group</li> <li>■ Value: List of ServiceNow class names that are part of this group.</li> <li>■ ValueType: Allows <b>CI_CLASS</b> (the class name to fetch) and <b>CI_VALUE</b>. <ul style="list-style-type: none"> <li>■ <b>CI_CLASS</b> - to fetch the class.</li> <li>■ <b>CI_VALUE</b></li> </ul> </li> </ul> <p><b>Note</b> vRealize Network Insight always fetches applicationClasses, workloadCIClasses, trackedCIClasses, workloadCIClasses, and relationClasses.</p> <ul style="list-style-type: none"> <li>■ systemGenerated: Allows the boolean value to indicate whether the class is a user-defined class or a default class.</li> <li>■ expandCIClass - Allows the boolean field to indicate whether to fetch the subclasses of the configuration item class listed in Value.</li> </ul>
Rules for graph traversal	Supports three types of traversal rules: <ul style="list-style-type: none"> <li>■ traversalRule: All allowed or valid traversals.</li> <li>■ traversalStopRule: Traversals that are not allowed.</li> </ul> <p><b>Note</b> The rules in traversalStopRule have higher priority than the rules in traversalRule.</p> <ul style="list-style-type: none"> <li>■ associationRule: Traversals that are allowed for the associated workload with entity.</li> </ul> <p>Properties of a rule:</p> <ul style="list-style-type: none"> <li>■ fromNode: List of ciGroup that are the source of the traversal.</li> <li>■ toNode: List of ciGroup that are the destination of traversal.</li> <li>■ relationship: List of ciGroup that have a relationship in a type of traversal.</li> <li>■ priority: If a ciGroup matches two rules, then the rule for the ciGroup is set based on the priority. Greater the priority number higher the priority value.</li> </ul>

Field Name	Description
<code>applicationClasses</code>	<p>Lists all entry point configuration item classes for the graph traversal. These classes represent the configuration item types which are used as application classes in the CMDB.</p> <p>The default configuration uses <code>cmdb_ci_service_discovered</code> class. This class represents applications created by the ServiceMapping feature of ServiceNow.</p>
<code>workloadCIClasses</code>	<p>Lists all the configuration items that host either a software-based service or an operating system like Linux Server, Windows Server. Example, VMs, AWS instances, Physical Servers.</p> <p>Typically, workload configuration items are placed towards the end of the dependency graph. Tiers are not created for the configuration item classes that are mentioned in this group.</p> <p>The default configuration contains the following configuration item classes:</p> <ul style="list-style-type: none"> <li>■ <code>cmdb_ci_computer</code>: Represents all compute related configuration items. This is a super class for all Linux and Windows Servers.</li> <li>■ <code>cmdb_ci_vm_instance</code>: Represents virtual compute entities like VMs and AWS instances.</li> <li>■ <code>cmdb_ci_vmware_instance</code>: Represents VMware VMs.</li> </ul>
<code>trackedCIClasses</code>	<p>Lists all configuration items that can be part of the dependency graphs, but are not <code>applicationClass</code> or <code>workloadCIClass</code>. The configuration items in this group are required for the graph to complete from <code>applicationClasses</code> to <code>workloadCIClasses</code>.</p> <p>vRealize Network Insight creates tiers for all the classes mentioned in <code>trackedCIClasses</code>, unless the class is mentioned under <code>ignoredTierCiClasses</code>.</p>
<code>relationshipTypeClasses</code>	<p>Lists all related configuration items represented by relation configuration items classes or relation types.</p> <p>The default configuration uses <code>*</code> to fetch all relation types.</p>
<code>workloadRelationshipTypeClasses</code>	<p>lists relation types which typically represent the relations with workload entities. Following are the relations supported by default in ServiceNow:</p> <ul style="list-style-type: none"> <li>■ <code>Hosted on::Hosts</code></li> <li>■ <code>Instantiates::Instantiated by</code></li> <li>■ <code>Runs on::Runs</code></li> <li>■ <code>Virtualized by::Virtualizes</code></li> </ul>
<code>ignoredCiClasses</code>	<p>Lists all the configuration items that vRealize Network Insight must ignore to fetch from ServiceNow CMDB.</p> <p>This is useful while fetching a super class, to ignore the unnecessary subclasses. By default, <code>cmdb_ci_vcenter_server_obj</code> is listed under <code>ignoredCiClasses</code> as vCenter Server are not required for the application discovery.</p>
<code>ignoredTierCiClasses</code>	<p>Lists all the configuration items for which tiers must not be created.</p>

## An Example of Discovering Applications Without Workload Relations

Here is a customized CMDB configuration file in which `nameBasedSearchForVm` is defined to discover the applications, where `cmdb_ci_service_discovered` class is the entry point and the workload relations are not defined.

## Topology



## Customized CMDB Configuration File

```

{
  "fetchOnlyApprovedApplications": false,
  "nameBasedSearchForVm": true,
  "ignoreWorkloadCheck": true,
  "ciGroup": [
    {
      "name": "applicationClasses",
      "value": [
        "cmdb_ci_service_discovered"
      ],
      "valueType": "CI_CLASS",
      "systemGenerated": true,
      "expandCIClass": true
    },
    {
      "name": "relationshipTypeClasses",
      "value": [
        "*"
      ],
      "valueType": "CI_VALUE",
      "systemGenerated": true,
      "expandCIClass": false
    },
    {
      "name": "workloadRelationshipTypeClasses",
      "value": [

```

```

    "Hosted on::Hosts",
    "Instantiates::Instantiated by",
    "Runs on::Runs",
    "Virtualized by::Virtualizes"
  ],
  "valueType": "CI_VALUE",
  "systemGenerated": true,
  "expandCIClass": false
},
{
  "name": "workloadCIClasses",
  "value": [
    "cmdb_ci_computer",
    "cmdb_ci_vm_instance",
    "cmdb_ci_vmware_instance"
  ],
  "valueType": "CI_CLASS",
  "systemGenerated": true,
  "expandCIClass": true
},
{
  "name": "relationClasses",
  "value": [
    "cmdb_rel_ci"
  ],
  "valueType": "CI_CLASS",
  "systemGenerated": true,
  "expandCIClass": true
},
{
  "name": "ignoredCIClasses",
  "value": [
    "cmdb_ci_vcenter_server_obj"
  ],
  "valueType": "CI_VALUE",
  "systemGenerated": true,
  "expandCIClass": true
},
{
  "name": "ignoredTierCIClasses",
  "value": [
    "cmdb_ci_qualifier_manual_connection",
    "cmdb_ci_endpoint"
  ],
  "valueType": "CI_VALUE",
  "systemGenerated": true,
  "expandCIClass": true
},
{
  "name": "trackedCIClasses",
  "value": [
    "cmdb_ci_appl",
    "cmdb_ci_cluster",
    "cmdb_ci_cluster_node",
    "cmdb_ci_database",

```

```

    "cmdb_ci_lb_service",
    "cmdb_ci_spkg",
    "cmdb_ci_qualifier_manual_connection",
    "cmdb_ci_endpoint",
    "cmdb_ci_network_adapter",
    "cmdb_ci_translation_rule"
  ],
  "valueType": "CI_CLASS",
  "systemGenerated": true,
  "expandCIClass": true
}
],
"traversalRule": [
  {
    "fromNode": [
      "applicationClasses"
    ],
    "toNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "relationship": [
      "relationshipTypeClasses"
    ],
    "priority": 5
  },
  {
    "fromNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "toNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "relationship": [
      "relationshipTypeClasses"
    ],
    "priority": 3
  }
],
"traversalStopRule": [
  {
    "fromNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "toNode": [
      "applicationClasses"
    ],
    "relationship": [
      "relationshipTypeClasses"
    ],
    "priority": 5
  }
]
}

```

```

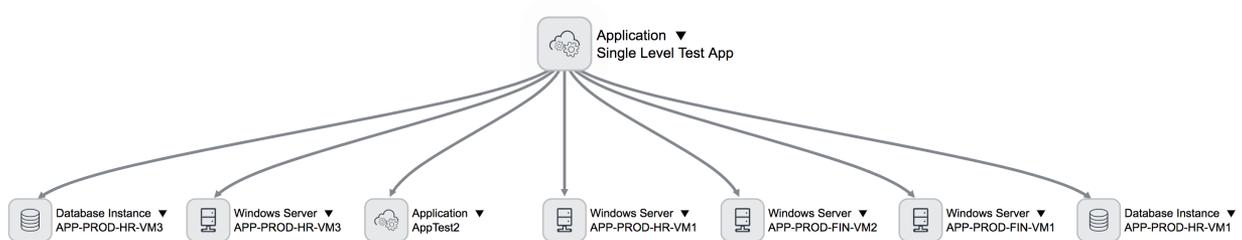
],
"associationRule": [
  {
    "fromNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "toNode": [
      "workloadCIClasses"
    ],
    "relationship": [
      "workloadRelationshipTypeClasses"
    ],
    "priority": 5
  }
]
}

```

## An Example of Discovering Single Level Applications

Here is a customized Cmdb configuration file in which `nameBasedSearchForVm` is defined to discover the single level applications, where `cmdb_ci_service_discovered` class is the entry point and the workload relations are not defined.

### Topology



### Customized Cmdb Configuration File

```

{
  "fetchOnlyApprovedApplications": false,
  "nameBasedSearchForVm": true,
  "ignoreWorkloadCheck": true,
  "ciGroup": [
    {
      "name": "applicationClasses",
      "value": [
        "cmdb_ci_appl"
      ],
      "valueType": "CI_CLASS",
      "systemGenerated": true,
      "expandCIClass": false
    },
    {
      "name": "relationshipTypeClasses",

```

```

    "value": [
      "*"
    ],
    "valueType": "CI_VALUE",
    "systemGenerated": true,
    "expandCIClass": false
  },
  {
    "name": "workloadRelationshipTypeClasses",
    "value": [
      "Hosted on::Hosts",
      "Instantiates::Instantiated by",
      "Runs on::Runs",
      "Virtualized by::Virtualizes"
    ],
    "valueType": "CI_VALUE",
    "systemGenerated": true,
    "expandCIClass": false
  },
  {
    "name": "workloadCIClasses",
    "value": [
      "cmdb_ci_computer",
      "cmdb_ci_vm_instance",
      "cmdb_ci_vmware_instance"
    ],
    "valueType": "CI_CLASS",
    "systemGenerated": true,
    "expandCIClass": true
  },
  {
    "name": "relationClasses",
    "value": [
      "cmdb_rel_ci"
    ],
    "valueType": "CI_CLASS",
    "systemGenerated": true,
    "expandCIClass": true
  },
  {
    "name": "ignoredCIClasses",
    "value": [
      "cmdb_ci_vcenter_server_obj"
    ],
    "valueType": "CI_VALUE",
    "systemGenerated": true,
    "expandCIClass": true
  },
  {
    "name": "ignoredTierCIClasses",
    "value": [
      "cmdb_ci_qualifier_manual_connection",
      "cmdb_ci_endpoint"
    ],
    "valueType": "CI_VALUE",

```

```

    "systemGenerated": true,
    "expandCIClass": true
  },
  {
    "name": "trackedCIClasses",
    "value": [
      "cmdb_ci_appl",
      "cmdb_ci_cluster",
      "cmdb_ci_cluster_node",
      "cmdb_ci_database",
      "cmdb_ci_lb_service",
      "cmdb_ci_spkg",
      "cmdb_ci_qualifier_manual_connection",
      "cmdb_ci_endpoint",
      "cmdb_ci_network_adapter",
      "cmdb_ci_translation_rule"
    ],
    "valueType": "CI_CLASS",
    "systemGenerated": true,
    "expandCIClass": true
  }
],
"traversalRule": [
  {
    "fromNode": [
      "applicationClasses"
    ],
    "toNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "relationship": [
      "relationshipTypeClasses"
    ],
    "priority": 5
  },
  {
    "fromNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "toNode": [
      "trackedCIClasses",
      "workloadCIClasses"
    ],
    "relationship": [
      "relationshipTypeClasses"
    ],
    "priority": 3
  }
],
"traversalStopRule": [
  {
    "fromNode": [
      "trackedCIClasses",

```

```

        "workloadCIClasses"
    ],
    "toNode": [
        "applicationClasses"
    ],
    "relationship": [
        "relationshipTypeClasses"
    ],
    "priority": 5
    }
],
"associationRule": [
    {
        "fromNode": [
            "trackedCIClasses",
            "workloadCIClasses"
        ],
        "toNode": [
            "workloadCIClasses"
        ],
        "relationship": [
            "workloadRelationshipTypeClasses"
        ],
        "priority": 5
    }
]
}

```

## Add a New Generic Router or Switch

If the router or switch that you want to add is not supported in vRealize Network Insight, you can add that unsupported router or switch as a Generic Routers or Switches by uploading a device configuration file. vRealize Network Insight uses the information in the device configuration file to provide insight for the router or switch. After you upload a device configuration file in vRealize Network Insight, you cannot modify the information of the uploaded device configuration file.

### Prerequisites

Create a device configuration file in `.zip` format using the SDK provided by the vRealize Network Insight. A device configuration file contains information about entities like Router Interfaces, Routes, Switch Ports, VRFs, Switch Device Information, and so on. To create a device configuration file, see <https://github.com/vmware/network-insight-sdk-generic-datasources>.

### Procedure

- 1 On the Settings page, click **Accounts and Data Sources**.
- 2 Click **Add Source**.
- 3 Under Routers & Switches, click **Generic Routers & Switches**.

- 4 On the **Add a New Generic Router/Switch** page, modify the required information.

Option	Action
<b>Collector VM</b>	Select a Collector VM from the drop-down menu.
<b>Device Configuration File</b>	Select and upload the configuration file (.zip) created using the SDK.
<b>IP Address/FQDN</b>	Enter the IP address or the FQDN details.

- 5 Click **Validate**.
- 6 In the **Nickname** text box, enter a nickname for the switch or router you want to add.
- 7 (Optional) In the **Notes** text box, you can add a note if necessary.
- 8 Click **Submit**.

## Edit a Generic Router or Switch

In vRealize Network Insight, you can modify the configuration of an existing generic router or switch by uploading new configuration file.

### Prerequisites

Create a device configuration file in .zip format using the SDK provided by the vRealize Network Insight. A device configuration files contains information about entities like Router Interfaces, Routes, Switch Ports, VRFs, Switch Device Information, and so on. To create a device configuration file, see <https://github.com/vmware/network-insight-sdk-generic-datasources>.

### Procedure

- 1 On the Settings page, click **Accounts and Data Sources**.
- 2 Click the **Edit Data Source** icon next to the generic router or switch data source you want to edit.
- 3 Click **Replace File** and upload the new device configuration file.
- 4 (Optional) To view your uploaded device configuration file, click **Upload History**.  
You can view, download, and delete the last five uploaded device configuration files.
- 5 Click **Validate**.
- 6 (Optional) In the **Nickname** text box, change the nickname.
- 7 Click **Submit**.

# Delete a Data Source from vRealize Network Insight

# 4

If you do not want to view data from a data source or a data source is not in use, you can delete the data source from vRealize Network Insight.

---

**Note** If any data source is no longer available in your environment, you must delete that data source from vRealize Network Insight.

---

## Procedure

- 1 Sign in to the vRealize Network Insight web console.
- 2 Go to **Settings > Accounts and Data Sources**.
- 3 Click the **Delete Data Source** icon next to the data source you want to delete.  
The vRealize Network Insight prompts you for confirmation.
- 4 Click **Yes**.

---

**Note** After you remove a data source from the system, you can add the same data provider back only after two or more hours.

---

# Migrating Data Sources

# 5

If a proxy VM is down or deleted, you can add a new proxy VM and migrate data source from the old proxy VM to the new proxy VM.

To migrate a data source:

## Procedure

- 1 In the **Install and Support** page, under the **Collector (Proxy) VMs** section, click the edit icon.  
If a proxy VM is down, you can see the error message that proxy VM is not available under the same section.
- 2 In the **Edit Collector (Proxy) VM** page, you can assign a nickname to the proxy VM.
- 3 The Edit Collector (Proxy) page lists all the data sources added to the proxy. To migrate a data source, click **Migrate** for a particular data source.
- 4 The Edit account or source page appears. Ensure that you fill the following information:

Table 5-1.

Fields	Description
Collector (Proxy) VM	Name of the new proxy VM to which the data source has to be migrated
IP Address	Pre-filled IP/FQDN address of data source
Username	Username for the data source
Password	Password for the data source

- 5 Click **Validate**. Click **Submit**. The data source is then deleted in the old proxy VM and is added to the new proxy VM.

- 6 Once the migration is successful, you will see the new proxy VM against the data source in the **Enabled** column in the **Accounts and Data Sources** page.

---

**Note**

- If you are migrating vCenter to another proxy VM, then sure that you migrate the corresponding NSX Manager also to the same proxy VM.
  - When you migrate NSX Manager to another proxy VM, the child data providers such as NSX Controller and NSX Edge are migrated as well to the new proxy VM.
-

# Configuring vRealize Network Insight Settings

# 6

You can configure various aspects of vRealize Network Insight from the **Settings** page. To access the **Settings** page, click **Profile > Settings**.

This chapter includes the following topics:

- Viewing System Health
- Configure Data Retention Interval
- Configuring IP Properties and Subnets
- Configure Events and Notifications
- Configuring Identity and Access management
- Configuring Logs
- Configure Mail Server
- Configure SNMP Trap Destination
- Managing Licenses
- Configure Auto-Refresh Interval
- Configure User Session Timeout
- Add Google Maps API Key
- View the Audit Logs
- Join or Leave the Customer Experience Improvement Program
- Viewing Health of your Setup
- Enabling the Support Tunnel
- Managing your Disk Utilization
- View the Node Details
- Create a Support Bundle
- Understanding Capacity for Collector and Platform Load

## Viewing System Health

In vRealize Network Insight, you can view the health status of your system. The health of your system is determined by process lag, indexer lag, and grid usage. If all these parameters are in the green state, your system health is good. If any one of these three parameters is in the red state, your system health is bad.

### Procedure

- ◆ On the **Settings** page, click **Install and Support**.

In the **Install and Support** page, you can see the **System Health** section.

---

**Note** If your system health is in the bad state for more than six hours, you must contact the vRealize Network Insight support.

---

## Configure Data Retention Interval

In vRealize Network Insight, you can specify for how long do you want to retain your data.

---

**Note** vRealize Network Insight supports configurable data management on an enterprise license only. In the advanced license edition, the data retention defaults to 1 month.

---

The data is divided into the following categories:

**Table 6-1.**

Category	Minimum Value	Maximum Value
Events	1 month	13 months
Entities and Configuration Data	1 month	3 months
Metrics	1 month	13 months
Flows	NA	1 month
Miscellaneous Data	NA	100 GB of additional disk space

---

**Note** For all the categories, the minimum value is the default value.

---

Different policies can be configured and controlled for each category. You can configure the policy as per your requirement.

To configure data management:

- 1 On the top-right corner of the Home page, click  and then click **Settings**.
- 2 In the **Settings** section, click **Data Management**.
- 3 When you log in for the first time, this page shows the default data.

- 4 Click the information icon on more information on how data occupies the disk.
- 5 Click **Change Policy** to change the data retention period for the various categories of data. Once you make the changes, the information is recorded in the database.
- 6 Click **Submit**.

---

**Note** The retention period for low-resolution metrics is longer than the high-resolution metrics.

---

## Configuring IP Properties and Subnets

In vRealize Network Insight, you can configure different IP properties for better security planing and identification.

### Import the DNS mapping file

To provide the information for the flows between physical devices, you can import the DNS mapping file. The supported formats for the DNS mapping file are the Bind and CSV file format. Ensure that you have placed these files in a single ZIP file.

---

**Note** vRealize Network Insight does not support the password-protected ZIP files.

---

#### Procedure

- 1 In the **Settings** page, click **IP Properties and Subnets..**
- 2 Click **Physical IP and DNS Mapping**.
- 3 Click **Upload and Replace** to upload your DNS mapping file. After you select and upload the file, click **Validate**. The number of DNS records is displayed after the validation.

The **Upload and Replace** operation removes any existing DNS mappings and replaces them with the the mappings that are being imported. The DNS Mapping file consists of the following three fields:

- Host Name
- IP Address
- Domain Name

### Configure Mapping Between Subnet and a VLAN

You can define a mapping between subnet and a VLAN.

You can use this mapping for the following:

- Enriching the information about the IP entities that are learned from physical to physical flows by adding the source and destination subnets and the Layer2 networks associated with the flow.

- Planning the network topology based on the subnet and VLAN for physical addresses.

#### Procedure

- 1 In the **Settings** page, click **IP Properties and Subnets**.
- 2 Click **Physical IP and DNS Mapping**.
- 3 In the **Settings** page, under **IP Properties and Subnets**, click **Physical Subnets and VLANs**.  
This page lists all the subnets and the associated VLAN IDs.
- 4 Click **Add** to add the subnet and VLAN information.
- 5 After defining the mapping information, you can only edit the VLAN ID that is associated with the subnet. It is not possible to change to the subnet CIDR associated with the VLAN ID. To edit a subnet associated with the VLAN ID, delete the subnet to be edited and create a subnet VLAN mapping with the required values.

When the subnet-VLAN mapping information is updated, a new VLAN is created for the specified VLAN ID and the subnet information is associated with this VLAN.

- 6 To delete the subnet-VLAN ID mapping, click the delete icon.

---

**Note** All VLAN creation, updation, and deletion operations do not happen immediately after the subnet and VLAN mappings are created. It takes some time for the changes to be propagated and the corresponding VLAN being to be created or modified.

---

## Configure East-West IPs

The IPs that are within the range of RFC1918 standard are considered private IPs. The IPs that are outside the RFC1918 are treated as Internet IPs. However, users can specify their East-West IPs (datacenter public IPs) that they want to be treated as non-Internet IPs while tagging flows and micro-segmentation, even if these are outside the private IP address range as defined by RFC1918.

To specify public IPs to be treated as non-internet IPs

- 1 On the top-right corner of Home page, click the Profile icon, and then click **Settings**.
- 2 In the Settings section, click **East-West IPs**.
- 3 In the IP Addresses box, enter specific IPs, or IP ranges, or subnets, which are to be treated as non-internet IPs.
- 4 Click **Save**. The IP Addresses Saved confirmation message is displayed upon successful saving.

## Configure North-South IPs

The IPs that are in the RFC1918 space are categorized as North-South IPs. The users can specify their North-South IPs while tagging flows and micro-segmentation.

To specify North-South IPs:

- 1 On the top-right corner of Home page, click the Profile icon , and then click **Settings**.
- 2 In the Settings section, click **North-South IPs**.
- 3 In the IP Addresses box, enter specific IPs, or IP ranges, or subnets.
- 4 Click **Save**. The IP Addresses Saved confirmation message is displayed upon successful saving.

## Configure Events and Notifications

In vRealize Network Insight, you can configure various types of events and notifications. vRealize Network Insight creates an event whenever the system meets a preset rule.

On the **Settings** page, click **Events** to view the various types of events:

- **System Events**
- **User Defined Events**
- **Platform Health Events**

### View and Edit System Events

The event is defined either by the system or the user. The system events are predefined events.

The system events are listed in the **System Events** page under **Settings**. The following fields are specified for each event. You can filter the information based on your requirements in all the following columns except the Event column.

Table 6-2.

Column	Description
Event	This field specifies the name of the event.
Severity	This field specifies the severity of the event. You can set it to the following values: <ul style="list-style-type: none"> <li>■ Critical</li> <li>■ Moderate</li> <li>■ Warning</li> <li>■ Info</li> </ul>
Type	This field specifies if the event denotes a <b>Problem</b> or a <b>Change</b> . <p><b>Note</b> All the events of type <b>Problem</b> are logged into syslog.</p>
Entities	This field specifies that the event is configured to either include or exclude entities for event generation. By default, the value is <code>All</code> .

Table 6-2. (continued)

Column	Description
Notifications	This field specifies the types of notifications that are sent. The notifications can be sent by email or SNMP trap or both.  <b>Note</b> You must enable notification for all critical system defined events. To get the list of all critical system event, sort system event by severity.
Enabled	This option is selected if the event is enabled.

When you hover the mouse on each event, you can see **More Information**. By clicking this option, you can see the description, event tags, and entity type for that event.

You can perform the following tasks on the system events:

- Edit an event
- Perform bulk edit
- Disable an event for a particular entity

## Critical System Events List

This section provides the list of the critical system events. To receive notification about the critical system events, you must enable notification for each critical event.

For more information on editing events, see Edit System Event.

Name	Entity Type
AWS Limit: Inbound Rules per Security Group	AWS Firewall Rule
AWS Limit: Outbound Rules per Security Group	AWS Firewall Rule
AWS Limit: Security Groups per AWS VPC	AWS Security Group
AWS Limit: Security Groups per Network Interface	AWS Security Group
AWS Limit: Security Groups per Region	AWS Security Group
All NSX Edges in the ECMP Cluster are currently down	VMware Edge Device
Both NSX Edge HA VMs in active state	VMware Edge Device
Check Point Gateway SIC Status not in Communicating state	Check Point Security Manager
Check Point service VM not found on host	Check Point Security Manager
Critical NSX System Event	-
DLR networks unreachable from NSX Edge or external router	VRF
Host control plane to controller connection not established for one or more logical switches	Host

Name	Entity Type
Host with Infrastructure VMs cannot be accessed	Host
Host's VTEP count mismatched with cluster	Cluster
IP of Service Node not found	-
Message bus and/or control plane connection not established between NSX Manager and host	Module
Multiple NIC corresponding to Service Node IP found	-
NSX Edge VM not in active/self state	VMware Edge Device
NSX Fabric Agent for Check Point not found on Host	Host
NSX Fabric Agent not found on Host	Host
NSX Manager to Edge VM communication failure	VRF
NSX VIB or host module not detected on host	Module
NSX infrastructure VM not powered on	VM
NSX management service not running	-
NSX-T Edge Node has no controller connectivity	NSX-T Transport Node
NSX-T Edge Node has no manager connectivity	NSX-T Transport Node
No VTEP found on prepared host	Host
One or more BGP neighbours are not in established state	VMware Edge Device
Palo Alto Panorama not registered with NSX Manager	PAN Manager
Palo Alto service VM not found on host	PAN Manager
Pool Member is down	Pool Members
Pool is Empty	-
Pool is down	-
Service VM's status mismatched between Check Point and NSX Manager	Check Point Security Manager
Service VM's status mismatched between Panorama and NSX Manager	PAN Manager
VM associated with Pool Member is down	-
Virtual Server of Load balancer is disabled	Virtual Server
VeloCloud Edge Transactional QOE degraded	VeloCloud Edge
VeloCloud Edge Video QOE degraded	VeloCloud Edge
VeloCloud Edge is not healthy	VeloCloud Edge

Name	Entity Type
VeloCloud Link Transactional QOE degraded	VeloCloud Edge
VeloCloud Link Video QOE degraded	VeloCloud Edge
VeloCloud Link Voice QOE degraded	VeloCloud Edge
VeloCloud Link is not healthy	VeloCloud Link
VeloCloud Edge is not healthy	VeloCloud Edge
VeloCloud Link is not healthy	VeloCloud Link
Application Packet Loss exceeds threshold	SD-WAN Edge Application
VeloCloud Link Upstream Packet Loss exceeds threshold	VeloCloud Link
VeloCloud Link Downstream Packet Loss exceeds threshold.	VeloCloud Link

## Edit the System Events

You can edit system events and define notifications for the preferred system events.

### Procedure

- 1 Click the edit icon next to the **Enabled** column for a particular event.
- 2 Add or remove event tags if required.
- 3 Change the severity.
- 4 Select Include/Exclude entities if you want the event to be enabled or disabled for selected entities.
  - To create inclusion rules:
    - a Select **Inclusion List**.
    - b Specify the entities which you want to include for the event under **Conditions**.
  - To create exclusion rules:
    - a Select **Exclusion List**.
    - b Specify the entities which you want to exclude for the event under **Conditions**.

---

### Note

- You can create multiple rules in both inclusion and exclusion lists.
  - When you select *NSX Manager*, you can add exceptions in both the lists. You can define exception if you want the inclusion or the exclusion rule to hold exception for a particular entity.
  - You can also specify *Custom Search* by writing your own query to include or exclude entities.
-

- 5 Select **Enable Notifications** to configure when the notifications have to be sent.
  - To setup an email server, click [Configure Mail Server](#).
  - To setup an SNMP server, click [Configure SNMP Trap Destination trap](#).

---

**Note** If you have already configured, these options will not be available.

---

- 6 Perform the following:
  - For e-mail notifications, specify the e-mail address and the frequency at which you would like to receive the emails.
  - For SNMP notifications, select the **Send SNMP Trap to IP-address**.  
You can click **Change** to modify the SNMP configuration.
- 7 Click **Submit**.

## Perform a Bulk Edit on an Event

- 1 In the **System Events** page, when you select multiple events, the options **Enable**, **Disable**, and **Edit** appear above the list.
- 2 Click **Edit**.
- 3 In the **Edit** page, you have the following options:
  - **Override existing values:** In this option, only the fields that you edit will get overwritten.
  - **Add to existing:** In this option, you can add to the existing values such as email addresses and event tags.
- 4 Click **Submit**.

## Disable an Event

- 1 You can select an event in the **Open Problems** widget in the Homepage. You can also enter **Problems** in the search bar and select an event from the list.
- 2 Select a particular event and click **Archive**.
- 3 Select **Disable all events of this type in future for** and select an entity or all entities.
- 4 Click **Save**.

---

**Note** The changes made in severity, tags, or inclusion/exclusion rules will reflect for the future events. The existing events continue to show the old configuration.

---

## Event Limitations

This section provides the limitations for the various system defined events.

## Distributed firewall rule masked by preceding rule event limitation

This event has the following limitations:

- This event is supported only for NSX-V distributed firewall rules. Other firewall vendors are not supported.
- The following firewall rule properties are currently supported for masking computation:
  - Source
  - Destination
  - Applied To
  - Service protocol and Port ranges
  - Packet type
  - Layer-7 application IDs
- Rules with source or destination inversion are not supported.
- Disabled rules are ignored.
- Rules with security groups containing excluded members directly or indirectly in Source/ Destination or Applied To is not supported.
- The masking computation for Source, Destination, and Applied To properties are based on the static membership and IP range overlap of member IP Sets. Dynamic membership of a security group are not considered for masking.

## Edit User Defined Events

The user-defined events are based on search.

All the user-defined events are listed on the **User-defined Events** page under **Settings**. The following fields are specified for each event.

**Table 6-3.**

Field	Description
Name (Search Criteria)	This field specifies the name of the event and the search criteria for the event.
Severity	This field specifies the severity of the alert. You can set it to the following values: <ul style="list-style-type: none"> <li>■ Critical</li> <li>■ Moderate</li> <li>■ Warning</li> <li>■ Info</li> </ul>
Type	This field specifies if the event denotes a problem or a change.
Notify when	This field specifies when the notification has to be sent.

Table 6-3. (continued)

Field	Description
Created By	This field specifies who created the event.
Enabled	This option is selected if the event is enabled.

You can edit or delete the event. While editing it, you can specify the email address and the frequency of the email notification.

## Configure the User Defined Event

You can create a user defined event through the search.

### Procedure

- 1 Click the create notification icon on the search result window.  
The Configure User Defined Event page opens.
- 2 Enter a unique name for the event.
- 3 Select the check box to mark the event as a problem and select the severity.
- 4 Enter the unique search criteria.
- 5 Select the condition when you want to receive the notifications.
- 6 Select the notification frequency as **Immediately** or **As a daily digest**.
- 7 Specify the email address.
- 8 To configure SNMP server, click **Configure SNMP trap**.  
If you have already configured the SNMP server, select the **Send SNMP Trap to IP-address**.  
You can click **Change** to modify the SNMP configuration.
- 9 Click **Save**.

## View Platform Health Events

The Platform Health Events page is your one-stop page to view all the events that provide details on the overall health of the system. These events might have occurred on a datasource or a node in the infrastructure. You can also view these events through search.

Table 6-4.

Field	Description
Event	This field specifies the name of the event.
Severity	This field specifies the severity of the event. You cannot change the severity of the event.

Table 6-4. (continued)

Field	Description
Type	This field specifies if the event denotes a problem or a change.
Notifications	This field specifies the types of notifications that are sent. The notifications can be sent by email or SNMP trap or both.

## Notifications

### Search-based Notifications

The search-based notifications can be categorized as follows:

- System-based notification
- User-defined notification

System-based notification parameters are predefined and upon activating notification alert, notification in the form of mails are sent. User-defined notifications are set by users, based on their requirements. You can create email notifications based on your search query. After you run a search, on the Results page, the **Create notification** option is displayed. For each search, you can:

- Select the condition when you want to receive the notifications.
- Define how frequently you want to receive the notifications.
- Enter the email recipients for each notification (by default, your email ID is present in the receiver's list; you can also add multiple email IDs).

For a user-defined search:

- It is mandatory for you to assign a name to the search-based notification.
- It is mandatory to select the severity of a search-based event that is marked as a problem.
- The user-defined events are uniquely identified by the search criteria.
- You can specify the notification frequency as **Immediately** or **As a daily digest**.

You can manage your notifications from the **Settings > Search-based Notifications** page. On the **Search-based Notifications** page, you can view the existing notifications, edit them, activate or deactivate them, and also delete unwanted notifications.

### Configure the Event Notification

The notifications are sent in the form of emails.

To set up the notification, you must first configure the mail server. To know how to configure mail server, see [Configure Mail Server](#).

## Specifying Notification Events for Emails to be sent

Users can specify events for which mail notifications are to be sent.

To specify events

- 1 On the **Settings** page, click **Search-based Notifications**, or simply search for any information using the Search box.
- 2 On the Search-based Notifications page, click the **Create Notification** icon. A notification dialog box is displayed.
- 3 In the **Receive notification when** box, select the event on the occurrence of which notifications are to be sent.
- 4 In the **Notify** box, select the frequency at which the notifications are to be sent.
- 5 If the event is undesirable, select the **Mark it as a problem** check box.
- 6 Enter the email addresses to which the notifications are to be sent, and then click **Save**.

---

**Note** To verify whether the notification mail is correctly set up, click **Send test Email**.

---

## Event Notifications

vRealize Network Insight contains a list of predefined system events (system problems and system changes) for which you can receive automated email notifications every four hours, which you can modify.

You can view the list of notifications on the **Settings > System Notifications** page.

If you have not configured any e-mail or SNMP notifications for an event, you see an alerting message on the home page that reminds and allows you to define notifications. You can click **Enable Notifications** on the alert message to directly navigate to the System Events page and subscribe notifications for the preferred events.

To disable the reminder, select the **Don't show this message again** option. The alert message will not appear for that particular user. To define notifications later, navigate to **Settings > Events**.

## Archiving Problems

### Archiving a Problem

- 1 Click the Show All link (if there is more than one instance of an event) to display all instances of the event.
- 2 Hover on the instance of the event that you want to archive to display a set of icons, and then click the Archive icon .
- 3 In the Event specific dialog box
  - a Select This event from the You are about to archive list, if you want to archive only this event.

- b Select All events of this type from the You are about to archive list, if you want to archive all events of the same type in the system.

4 Click **Save**.

### Viewing all archived events

- 1 On the Home page, type events in Search box and press **Enter**. A list of events is displayed.
- 2 On the left hand pane, in the Archived facet, select True checkbox (highlighted in the screenshot below).

You can view all archived events here.

### To restore an archived event

- 1 On the Archived event, click the Archived icon . (See the preceding section on To view an archived event to know how to go to the Archived events page).
- 2 In the Event specific dialog box
  - a Select This event from the You are about to restore from archive list, if you want to restore only this event.
  - b Select All events of this type from the You are about to restore from archive list, if you want to restore all similar type of events.
  - c Click Save to complete restoring.

### Disabling Events

Users can selectively disable events and prevent notifications from being sent in future.

#### To disable event notification

Method 1

- 1 On the event, click the **Show All** link (if there is more than one instance of an event) to display all instances of the event.
- 2 Hover on the instance of the event, whose notification you want to disable. This displays a set of icons, click the Archive icon .
- 3 In the Event specific dialog box, select the **Disable all events of this type in future** checkbox, and then click **Save**.

Method 2

- 1 On the top-right corner of **Home** page, click the **Profile** icon, and then click **Settings**.
- 2 In the **Settings** section, click **Event Notifications** to see a list of all enabled and disabled events.
- 3 On the enabled event that you want to disable, in the **Enabled** column, click the left-side space of the respective slider.
- 4 In the **Confirm Action** dialog box, click **Yes**.

## Configuring Event Notification Service

Users can enable customer notifications for different events

### To set notification services

- 1 On Settings, go to Event Notification, and click the (edit) icon corresponding to the problem, for which you want to enable e-mail notifications and SNMP.
- 2 In the Edit System Notification dialog box, enter the email address to which you want the email notification to be sent. In the Email Frequency box, select the time frequency at which you want to receive notifications.
- 3 Select the Enable SNMP trap for this event checkbox to set SNMP notifications.
- 4 Click **Save**.
- 5 Once successfully enabled, the respective mail and SNMP icons appear, as highlighted in the screenshot below.

## Configuring Identity and Access management

In vRealize Network Insight, you can create a user or configure access of LDAP user and VMware Identity Manager users. You can also assign different roles to the users.

### Configure LDAP

In vRealize Network Insight, you can configure access of LDAP users.

vRealize Network Insight supports the following two types of users:

- User created on vRealize Network Insight platform VM
- LDAP users

To allow the LDAP users log into vRealize Network Insight, configure the LDAP service in the vRealize Network Insight Platform as follows:

### To Enable LDAP-Based User Authentication

- 1 On the **Settings** page, click **Identity & Access Management > LDAP**.
- 2 Click **Configure**.

- 3 On the **Configure LDAP** page, type the appropriate domain, LDAP Host URL, and LDAP credentials in the respective boxes. See the following table for individual field descriptions.

**Table 6-5.**

Field	Description
Domain	This is typically the last part of the user email address after the '@' sign. Example: For a user logging in as johndoe@example.com, this field is <code>example.com</code>
LDAP Host URLs	You can specify multiple LDAP Host URLs separated by commas.
Username	User with the necessary rights to log in using the settings provided.
Password	Password of the user.

You can configure a group and provide a role to the members of that group. To enable this functionality, select **Group based access control**.

- a Under **Base DN**, type the Base DN, the point from which the server starts searching for users.
- b Under **Group DN**, add groups .
- c For each group, select the role of the user as member or administrator from the drop-down menu. If you select the administrator role for a particular group, then all the members of that group have the administrator privilege. Similarly, if you select the member role for a particular group, then all the members of that group have the member privilege. If this option is not selected, then the group setting is used to assign the privileges. But other valid LDAP users who do not belong to the groups that you have added can log in to the product.
- d Click **Add more** to add groups in the inclusion list.

To allow access to the users only from the LDAP groups (direct or inherited membership) that you have added, select the **Restrict access to members of the above groups only** check box.

- 4 Click **Submit** to configure LDAP.

After the LDAP configuration is successful, a new drop-down menu is available on the login screen where users can select whether they want to log in locally or using their LDAP credentials.

The LDAP credentials are not saved anywhere.

#### **Considerations about Groups and Inheritance**

- For the groups that you have added under Group DN, their child groups also can log in using the LDAP credentials.

- Inheritance is not considered for the role assignment. For example, if a user has to be an administrator, the direct group to which the user belongs should be assigned the administrator role. The user belonging to the child group will not have the administrator role.
- Suppose that you have assigned the administrator role to a group and you want to exclude a particular user in that group from the administrator role, perform the following steps:
  - a On the **Settings** page, click **User Management**.
  - b Under the **LDAP Users** tab, you can see the assigned role of that particular user and also that the role has been inherited from the group.
  - c Click the edit icon. Under **Role**, select **Member** from the drop-down menu for that user. In this way, you assign a role directly to the user.
  - d Click **Save Changes**.
  - e Enter your password to confirm. Click **Authorize**.
- Suppose that you want a user to inherit the role from the group to which the user belongs, then perform the following steps:
  - a On the **Settings** page, click **User Management**.
  - b Under the LDAP Users tab, you can see the assigned role of that particular user and also that the role has been directly assigned to the user.
  - c Click the delete icon to delete that LDAP user.
  - d When that particular user logs in, the user inherits the role from the parent group by default.
- While a user is logged in, if someone changes the role of the group to which the user belongs, the new role comes into effect only after the user logs out.
- Suppose that there are some LDAP users who are logged in before an upgrade. After an upgrade, the LDAP users have direct roles and do not inherit from the group.
- Suppose that a user belongs to multiple groups. For example, a user belongs to Group A, Group B, and Group C. If Group A is assigned the administrator role, and Group B and Group C are assigned the member role, then the user inherits the administrator role.

## Configure VMware Identity Manager (vIDM)

Administrators can authorize VMware Identity Manager users for accessing vRealize Network Insight features based on their roles.

### Prerequisites

Register vRealize Network Insight as an OAuth client to the VMware Identity Manager host. For more information see the [VMware Workspace ONE Access Documentation](#).

### Procedure

- 1 Log in to vRealize Network Insight and click **Settings**.

- 2 Under Identity & Access Management, select **VIDM**.
- 3 Provide the following information.

Parameter	Description
<b>VMware Identity Manager Appliance</b>	The fully qualified domain name (FQDN) of the VMware Identity Manager host.
<b>OAuth Client ID</b>	The ID that is created when registering vRealize Network Insight to the VMware Identity Manager host.
<b>OAuth Client Secret</b>	The secret that is created when registering vRealize Network Insight to the VMware Identity Manager host.
<b>SHA-256 Thumbprint</b>	This is an optional field. The certificate thumbprint of the VMware Identity Manager host. For more information, see <a href="#">Obtain the Certificate Thumbprint from the VMware Identity Manager Host</a> .

- 4 Click **Submit**.

After configuration, you see the VMware Identity Manager appliance and the client details you have configured.

- 5 Click the toggle button to enable or disable VMware Identity Manager. If you disable, you cannot use the VMware Identity Manager authentication in vRealize Network Insight.

## Obtain the Certificate Thumbprint from the VMware Identity Manager Host

For the SSL certificate validation, you can obtain the SHA-256 thumbprint from VMware Identity Manager host.

### Procedure

- 1 To get the SSL/TLS certificate, run the following command:

```
openssl s_client -connect <FQDN of vIDM host>:443
```

Copy the Server Certificate starting from -----BEGIN CERTIFICATE----- to -----END CERTIFICATE----- into a file called `cert.pem` and save the file.

- 2 To get the thumbprint, run the following command:

```
openssl x509 -fingerprint -noout -sha256 -in cert.pem
```

### Results

You see the thumbprint in the following format:

```
SHA256
```

```
Fingerprint=3D:E8:4C:CD:19:D6:AD:23:30:86:E4:A1:72:D5:22:08:F9:72:6D:D3:E7:6E:99:32:C8:C7:3D:F8:E2:91:91:AE
```

## What to do next

Copy the thumbprint and paste it in the configure VMware Identity Manager page.

## Configure User Management

In vRealize Network Insight you can add, manage, and assign role to a user.

You can assign either a member role or an administrator role to a user.

An administrator has full access to the vRealize Network Insight settings. An administrator can add data sources, add users, manage users, configure SNMP and mail server, and so on. But a member user has limited access to the vRealize Network Insight settings. In the **Settings** page, a member user can view and edit system and platform health events, view user defined events, access property and app discovery templates, access my preferences, and view and copy service tag.

## Add New User

- 1 In the **Settings** page, click **Identity & Access Management > Local Users > Add New User**, and provide the required information in the form.

The form has the following text boxes:

Properties	Description
Name	Enter the name of the user.
Email (Login ID)	Enter your email or login ID if any.
Role	Select the role from drop-down list.
Password	Enter the password.
Re-enter new password	Re-enter the password for confirmation.

- 2 Click **Add User** to save the user information.

## Assign Administrator Role

You can assign an administrator role to any LDAP user.

Even if that particular user is not logged in, you can still assign the administrator role to that user. To assign the administrator role:

- 1 In the **Settings** page, click **Identity & Access Management > LDAP Users > Assign Admin Role**.
- 2 Provide the login ID of the user to whom you want to assign the administrator role.
- 3 Click **Add User**.
- 4 Once you add the user, you can see the login ID in the LDAP Users tab.
- 5 To change the role, click the edit icon next to the login ID in the LDAP Users tab.

## Import Users from VMware Identity Manager

You can import VMware Identity Manager user accounts to allow them to use vRealize Network Insight and assign them the roles.

### Procedure

- 1 On the vRealize Network Insight Settings page, expand **Identity & Access Management**.
- 2 Click **User Management** and select the **VIDM** tab.
- 3 Provide the required details.

Field Name	Description
Domain Name	Enter the VMware Identity Manager domain name for import.
Search Users/ Groups	Enter a search string, and select the user account from the autocomplete list. You can either select a single user or select a user group. If you select a group, all the members in the group can access to vRealize Network Insight.
Role	Assign the <b>Member</b> or <b>Administrator</b> role to the user account.

- 4 Click **Add User**.

### Note

- If you have selected a group, all the members in the group get the same role. If you want to assign a different role to a specific user in the group, you must add the user individually, and assign the required role.

For example, to assign the **Administrator** role only to the *user1* in the *Mygroup*:

- add *Mygroup* and assign the **Member** role and
- add *user1* and assign **Administrator** role.

The role assigned to the user directly overwrites the role assigned to the user as a part of group.

- If a user belongs to multiple groups with different roles, the highest privilege role is assigned to the user.

For example, if a user belongs to *Group A* that has the **Administrator** role, and also belongs to *Group B* and *Group C* that have the **Member** role, the user inherits the **Administrator** role.

### Results

Now, this VMware Identity Manager user or group members can log in to vRealize Network Insight and use the features based on the assigned role.

## Configuring Logs

In vRealize Network Insight, you can view and configure different types of logs.

## View and Export Audit Logs

Audit logs capture administrative actions carried out in the system. These are regular CRUD operations as well as login and logout events. The administrative actions carried out via UI, CLI or API are logged.

The audit logs capture the actions from API, UI, and CLI.

### Features

- The audit log feature is always on.
- vRealize Network Insight supports the UTC format in the audit logs.
- The audit log is integrated with the syslog. You can configure the syslog collector to collect all the audit logs.
- You can export all the audit log data in a CSV file.

## Setup Syslog Configuration

You can configure remote syslog servers for vRealize Network Insight by using the **Syslog Configuration** page.

While every proxy server can potentially have a different remote syslog server, all the platform servers in a cluster use the same remote syslog server.

In the current release, the vRealize Network Insight problem events and platform/proxy server syslogs are sent to the remote syslog server.

Currently, vRealize Network Insight supports only UDP for communication between vRealize Network Insight servers and remote syslog servers. So ensure that your remote syslog servers are configured to accept syslog traffic over UDP.

To configure syslogs:

- 1 In the **Settings** page, click **Syslog Configuration**. The **Syslog Configuration** page has the configured syslog servers and their mappings to the virtual appliances listed. If you are accessing this page the first time, then the syslog is disabled by default and the list of servers on this page does not appear.
- 2 To add a syslog server:
  - a Click **Add Syslog Server**.
  - b Enter IP Address, nickname, and port number of the server. The standard port number for UDP is 514.
  - c To test the configuration, click **Send Test Log**.
  - d Click **Submit**.
  - e If it is the first server that you have added, then enable syslog at the top of the page.

- 3 To map the server to platforms and proxies:
  - a Click **Edit Mapping**.
  - b Select the syslog server for All Platforms and Proxy servers.
  - c If you do not want to enable syslog on any proxy server or on the platform, select the **No server** option.
  - d Click **Submit**.

---

**Note** After you make the changes, it might take a few minutes for them to be effective.

---

## Configure Mail Server

In vRealize Network Insight, you can configure a mail server to receive event notifications through mail.

To configure mail server:

- 1 On the top-right corner of Home page, click the **Profile** icon, and then click **Settings**.
- 2 Click **Mail Server**.
- 3 Select the SMTP server check box.
- 4 Enter appropriate values in the boxes.

**Table 6-6.**

Field	Description
Sender Email	Sender's email address.
SMTP Hostname/IP Address	Hostname or IP address of the SMTP server.
Encryption	The following encryption options are available: None, TLS, and SSL.
SMTP Port Number	Port number of the SMTP server (default 25).

---

**Note** To use Gmail server as the choice of e-mail server, additional configuration settings as listed on Google Support are required.

---

Optionally, for additional security, select the Authentication checkbox, and enter the user name and password.

---

**Note** To verify whether the notification mail is correctly set up, click **Send test Email**.

---

- 5 Click **Submit** to complete the configuration.

## Configure SNMP Trap Destination

In vRealize Network Insight, you can configure Simple Network Management Protocol (SNMP) traps to receive mail notifications. The product supports the following v2c and v3 versions of SNMP:

- 1 On the top-right hand corner in the Home page, click the Profile icon, and then click **Settings**.
- 2 Select **SNMP Trap Destination**.
- 3 On the SNMP Trap Destination page, in the Version box, select SNMPv2c or SNMPv3 protocol.

---

**Note** SNMPv2c protocol does not require authentication. SNMPv3 protocol supports authentication.

---

- 4 In the Destination IP Address/FQDN box, enter the IP address of the SNMP agent, or enter the Fully Qualified Domain Name (FQDN).
- 5 In the Destination Port box, enter **162**.
- 6 If you select the SNMPv2c protocol, in the Community String box, enter **Public**. If you select the SNMPv3 protocol, in the Username box, enter the name of the user you created in the SNMP agent.

For SNMPv3, also do the following:

- Select the **Use Authentication** checkbox.
- Select an authentication protocol, and then enter the password you had set for the particular user in the SNMP agent. Optionally, in the Privacy Protocol and Privacy Phrase boxes, select a privacy protocol and a privacy phrase respectively.

To verify whether the configuration is correctly done, click **Test SNMP trap**, and then find whether the trap has been sent to the SNMP agent.

- 7 Click **Submit**.

## Managing Licenses

VMware follows an honor system for vRealize Network Insight licensing, which means any violation in the license count, you see a warning message on the user interface, but does not restrict you from using the available features.

You see a license warning messages on all the pages of the UI in the following scenarios:

- License usage exceeds for socket (CPU) license.  
You must add an additional license to support your requirements.
- Mixed license type
  - When you have added both Advanced license and Enterprise license.

After you upgrade from the Advanced edition to the Enterprise edition, you must delete the Advanced license manually (**Settings > License and Usage**). Ensure that you have sufficient number of Enterprise licenses to use the Enterprise features.

- When you have added a socket license and a core license.  
Delete one of the license types based on your requirement.

## License Usage Calculation

vRealize Network Insight license usage is calculated based on the following ratio.

Object	Description	Object Count allowed per socket License
VMware vSphere CPUs	Total number of CPU Sockets of on-premise host machines	1
VMware Cloud Hosts on AWS	Total number of VMware Cloud on AWS hosts	0.5
AWS vCPUs	Total number of vCPUs of AWS instances	16
Non-VMware endpoints	Total number of non-internet and non-VMware endpoints appearing in flows that are exclusively reported by Non-VMware flow reporting capabilities (for example, a netflow coming from a physical switch)	15
Kubernetes PODs	Total number of Kubernetes PODs	12

**Note** vRealize Network Insight considers disabled datasources also during calculation of license usage. If you want vRealize Network Insight to ignore them during counting, delete the data sources.

## SD-WAN License

To add VMware SD-WAN as a data source and view your VMware SD-WAN deployment in vRealize Network Insight, you must add an VMware SD-WAN license. You can add the VMware SD-WAN license as a standalone license, or you can use it with an Enterprise license. But you cannot use an VMware SD-WAN license with an Advance license. You can use multiple VMware SD-WAN license keys to support Edges of a different bandwidths.

With the VMware SD-WAN license, addition to VMware SD-WAN data source, you can also add vCenter without IPFIX, switches and routers, and Infoblox.

## Add and Change License

This page displays the license usage details and allows you to add a license. vRealize Network Insight supports the addition of multiple licenses.

## Add License

To add a license:

- 1 On the License and Usage page, click **Add License**.
- 2 Provide the license key for the **New License Key** field.
- 3 Click **Validate**.  
You see the type of license, socket or core count available with the license, and the expiry details.
- 4 Click **Activate**.
- 5 You can see the list of licenses in the page.
- 6 You can also delete the license by clicking the delete icon next to the Expiration column. If the license belongs to an Enterprise edition and if it is the last remaining Enterprise edition in the system, then ensure that you have deleted the AWS account before you delete the Enterprise license.

## Change License

In the event of expiry of evaluation license, when you log in to the product, a message appears stating that the license has expired and that you need to renew your license. Use the following steps to change a license.

To change a license:

- 1 Click the link contained in the Expiry message to go to the Change License page. Alternatively, in **Settings**, click **License and Usage**, and then click **Change License**.
- 2 In the **Change License** page, in **New License Key**, enter the new license key you received from VMware.
- 3 Click **Validate**.
- 4 Click **Activate**.

---

**Note** Upon the expiry of the Evaluation license, the data providers are disabled and they stop collecting data. After renewing the license, the data providers must be enabled again from the UI to start data collection.

---

## Configure Auto-Refresh Interval

In vRealize Network Insight, you can configure auto-refresh interval for entity pages and pinboards.

vRealize Network Insight provides the auto-refresh feature for the entity dashboards and pinboards. The dashboard refreshes automatically once in every  $n$  minutes specified on the header bar.

You can specify the time interval for which you want all your dashboards to perform an auto refresh. After the specified time interval ( $n$  minutes), all the open widgets on the dashboard will reload automatically.

---

### Note

- You cannot change the auto-refresh time interval for a particular dashboard.
  - Auto-refresh is paused if you select a past time interval in timeline slider.
- 

You can pause auto-refresh if you do not require it for a particular dashboard. On the header bar, set **Pause** to **ON**. The auto-refresh counter resets once you set **Pause** to **OFF**.

If you are viewing a pinboard and if another user is making changes to it such as changing the layout of the pinboard, the auto-refresh feature not only updates the content but also refreshes the entire pinboard. This occurs only if sharing and collaboration exists between you and the other user.

### Procedure

- 1 On the **Settings** page, click **My Preferences**. Or on the respective dashboard, click **Modify** next to Auto-Refresh in the header bar.
- 2 Click **Edit** to change the time interval for auto-refresh. Select the time interval from the drop-down menu. Click **Save**.
- 3 To disable the auto-refresh option, select **Disabled** from the drop-down menu. All the dashboards are disabled from refreshing automatically if you select this option.

## Configure User Session Timeout

By default, the user session timeout is set to 15 minutes. You can modify this value according to your preference.

### Procedure

- 1 On the **Settings** page, click **System Configuration**.

---

**Note** The **System Configuration** tab is visible only to the `admin` user.

---

- 2 Click the edit icon to change your preference for the user session timeout.
- 3 Drag the slider bar to set the timeout value for the session. The value ranges from 15 minutes to 24 hours.
- 4 You can also view the details on who modified the timeout value and when in the **Last Modified** field.

- 5 Click **Submit**. The Success message appears to confirm that the updated session duration will be effective from the next login.

---

**Note** The new value for the user session timeout will come into effect only after you log out and log in again.

---

## Add Google Maps API Key

To get the map view of your SD-WAN deployment, you must add a Google Maps API key in vRealize Network Insight.

### Prerequisites

Ensure the following:

- You are a member of Google Cloud Platform and billing is enabled in your account.
- You have the Google map API key. To get the API key, see *Get an API key procedure in Google Maps Platform documentation*.
- You have restricted the API key to prevent any misuse. To know more, see *Restrict the API key in Google Maps Platform documentation*.

### Procedure

- 1 On the **Settings** page, click **System Configuration**.
- 2 In the **Google Maps API Key**, enter the API key and click **Save**.

## View the Audit Logs

Audit logs capture administrative actions carried out in the system. These are regular CRUD operations as well as login and logout events. The audit logs capture the actions from API, UI, and CLI.

- The audit log feature is always on.
- vRealize Network Insight supports the UTC format in the audit logs.
- The audit log is integrated with the syslog. You can configure the syslog collector to collect all the audit logs.
- You can export all the audit log data in a CSV file.

### Procedure

- 1 On the **Settings** page, click **Audit Logs** under **Logs**.

- 2 The following details are shown on the **Audit Logs** page:

Information	Description
Date & Time	Timestamp of the actual action performed.
IP Address	IP address of the client from which the connection is established such as the CLI or the browser.
User Name	User who is performing the action.
Object Type	Object on which the action is being performed.
Operation	Different actions that the user performs on the object.
Object Identifier	Unique identifier for that particular object on which the action is being performed.
Response	Indicator for success or failure of the operation
Details	Details of the settings that have been changed such as the nickname or a property.

- 3 To allow the collection of information when the user logs in through a browser or CLI, enable **Allow collection of Personally Identifiable Information**. This option is disabled by default.

**Note** The IP Address and the User Name columns are blank if this option is disabled.

- 4 Click **Export as CSV** to export the audit log data in the CSV format.

## Join or Leave the Customer Experience Improvement Program

This product participates in VMware's Customer Experience Improvement Program (CEIP). The CEIP provides VMware with information that enables VMware to improve its products and services, to fix problems, and to advise you on how best to deploy and use our products. As part of the CEIP, VMware collects the technical information about your organization's use of the VMware products and services regularly in association with your organization's VMware license keys. This information does not personally identify any individual.

Details regarding the data collected through CEIP and the purposes for which it is used by VMware are set forth at the Trust & Assurance Center at <https://www.vmware.com/solutions/trustvmware/ceip.html>.

You can join or leave the Customer Experience Improvement Program (CEIP) for vRealize Network Insight.

- 1 In the **About** page, under Customer Experience Improvement Program, click **Modify**.
- 2 The CEIP window pops up. To join CEIP, check **Enable**. This action activates CEIP and sends data to <https://vmware.com>.
- 3 To leave CEIP, uncheck **Enable**.

4 Click **Submit**.

## Viewing Health of your Setup

The **Health** indicator is available in the **Overview** section on the **Install and Support** page.

The **Health** indicator turns red if any of the following malfunctioning events occur:

- If proxy stops collecting flow data
- If platform stops processing data due to some reason; for example, insufficient disk space
- If search indexer lags behind, resulting in outdated search result

The overall health indicator displays the number of irregularities, with a Red light on. The individual irregularities are listed with their details, when the number of problems against overall health, is clicked on. In case of normal functioning, the health indicator shines a Green light.

---

**Note** vRealize Network Insight might not detect an out-of-sync system clock sometimes. If the clock is not in sync with NTP, some services may become unhealthy or stop working.

---

## Enabling the Support Tunnel

The support tunnel allows VMware to remotely connect to your platform and collector VMs on the SSL secured connection for advanced troubleshooting or debugging.

To request the advanced support, toggle the **Support Tunnel** option in the **Overview** section of the **Install and Support** page.

---

**Note** Ensure that the traffic to `support2.ni.vmware.com` on port 443 is allowed.

---

## Managing your Disk Utilization

If the disk utilization is high for a platform or a collector, an event is triggered to warn the user. Also, a recommendation of how much more disk space needs to be added is provided. You can view the event in the platform or the collector dashboard. The alert is also shown in the corresponding collector or the platform section in the **Install and Support** page.

## Platform VMs

IP Address (Name)	Last Activity	Status
 <b>Critical: Disk Utilization is high</b> 		<div style="background-color: #333; color: white; padding: 5px;">           Disk utilization is at 85%. The Platform might run out of disk in 2 days. Add 100 GB more disk space to avoid any service interruption.         </div>

You can add disks to the nodes by performing the following steps:

**Note** Do not expand the existing hard disk.

### Procedure

- 1 Log into vCenter through the Web client with sufficient privileges.
- 2 Right click the node and click **Edit settings**.
- 3 Add the hard disk as per the recommendation provided in the alert.  
vRealize Network Insight takes a few minutes to detect the appliance and add it to the `/var` partition.

## View the Node Details

You can view the details of each node in a platform or a collector.

### Procedure

- 1 To view the details of a particular platform node, click its name that is listed under **Platform VMs** on the **Install and Support** Page.  
The NI Platform dashboard appears.
- 2 To view the details of a particular collector node, click its name that is listed under **Collector (Proxy) VMs** on the **Install and Support** page.  
The NI Collector dashboard appears.

## Create a Support Bundle

You can create a support bundle that collects diagnostic information such as product-specific logs, configuration files of your setup. When you raise a support request, VMware Technical Support uses this information to troubleshoot your setup issues.

### Procedure

- 1 On the Settings page, click **Install and Support**.
- 2 Click **Create Support Bundle**.
- 3 Select the platform VMs and the collector VMs for which you want to create the support bundle.

To select all VMs, click the check box in the header of the platform VMs and the collector VMs tables.

- 4 Click **Create**.
- 5 Click **Yes** to confirm creation of a new support bundle.

vRealize Network Insight takes some time to complete the creation of the bundle.

### Results

A new support bundle is created displaying date and time. To initiate the download of support bundle, click the **Download** link next to the respective VM.

---

### Note

- The support bundle creation on a medium sized system can take in excess of fifteen minutes.
  - Only two support bundles can be present at one given time. So, while creating a new one, if there are already two support bundles present, the older one is deleted.
- 

### What to do next

Attach the support bundle to your service request for VMware to access the details.

## Understanding Capacity for Collector and Platform Load

vRealize Network Insight provides the approximate capacity and load information of a collector node and a platform. This limits-based information helps you to prevent the performance and experience issues later.

### Understanding Capacity

There are two kinds of capacity:

- VM capacity: It is defined as the number of discovered VMs that a node or a setup can handle.
- Flow capacity: It is defined as the number of flows that a node or a setup can handle.

The capacity is defined as follows:

- Single platform with one or more proxy nodes: The capacity of a proxy node or the platform is the number of discovered VMs that it can handle without the degradation of performance.
- Cluster setup: The capacity of the platform in a cluster setup is the aggregation of all the capacities of all the platform nodes while the capacity of proxy nodes is considered at the level of an individual node.

## Accessing the Capacity Information

You can view **VM Capacity** and **Flow Capacity** on the **Install and Support** page.

For every collector node listed under Collector (Proxy) VMs, only the VM capacity information is provided.

---

**Note** When the number of discovered VMs from the data sources across the deployment exceed the capacity of either the system or the collector or both, you will not be allowed to trigger the upgrade.

---

To view the discovered VMs for a data source:

- 1 In the **Accounts and Data Sources** page, you can see the number of VMs that have been discovered for a particular data source which is already added and currently active. This column will have a value only if the data source is vCenter or AWS source.

---

**Note** The discovered VM count includes placeholder and template VMs. So it can be different from the count of VMs in the product.

---

# Creating and Expanding Clusters

# 7

This chapter includes the following topics:

- [Create Clusters](#)
- [Expand Clusters](#)

## Create Clusters

You can create clusters from the **Install and Support** page.

### Prerequisites

At least two additional platforms are required. The additional platform VMs should be deployed and powered on.

### To create cluster

- 1 Click **Create Cluster** for **Platform VMs**.
- 2 On the **Create Cluster** page, enter the following information:
  - **IP Address:** Enter the IP address of the new platform that you want to add.
  - **Password:** Enter the support user password of the platform VM. If you have not changed the password yet, then refer the *Default Login Credentials* section in *vRealize Network Insight Installation Guide* for the password.
- 3 To keep adding more platforms, click **Add more** and enter the IP address and the support user password.
- 4 Click **Submit**. Click **Yes**.

- 5 After creating a cluster, the user needs to log in to the product again.

---

### Note

- The **create cluster** option is enabled only when the platform is of large brick size. All platforms should be of large brick to create cluster.
  - Enabling telemetry on a single node enables it on all the nodes.
  - To expand clusters, refer the *Expanding a Cluster* section in the *vRealize Network Insight Installation Guide*.
- 

## Expand Clusters

Once the cluster is created, you can expand the cluster by adding more platform nodes to it.

---

**Note** You must perform the expand cluster operation only from Platform 1 (P1) node.

---

### Procedure

- 1 On the **Install and Support** page, click **Expand Cluster** for **Platform VMs**.
- 2 The IP addresses of the VMs that are part of the cluster already are listed on the Expand Cluster page. To add one or more nodes to the existing cluster, provide the IP address of the node and the support user password.

---

### Note

- Currently, vRealize Network Insight supports 10 nodes in an existing cluster. Once the limit is reached, the **Add more** button is disabled.
  - Ensure that all the new nodes are non-provisioned and are reachable through SSH.
  - Ensure that you have taken a backup of the existing platform VMs before you go ahead with the cluster expansion.
- 

- 3 Click **Submit**.

The step-by-step progress is displayed.

- 4 Once the cluster expansion link is completed, a message indicating success is displayed. While the cluster expansion is in progress, the application cannot be used for any other operation.

# Viewing Entity Details



The entity pages provide a comprehensive outlook of the entities that are present in your data center. This information can range from detailed topologies to show relationships with other entities of your data center to detailed metrics about a particular entity.

Each entity page is a collection widgets and each widget shows specific information related to the entity. The information provided is both real time and historical, and an exhaustive list of metrics and properties for the entity.

If you want to see more information about entities, then click **Profile > Help** on the top-right corner of the page.

## Timeline

The timeline provides you the following information:

- The state of the data center at a particular time in the past.
- A bird's eye view of events that were detected across a selected time range.

Select the time range of the timeline that you want to view.

To view a particular timeline, select the time range by using the **Time Range** option.

## Property Widget

The property widgets display important attributes in a two-column layout. Some property pins might also display only a singular attribute value. An example of the property pin is the **VM Properties** pin. The **VM Property** pin displays the properties of a VM, such as operating system, IP address, default gateway, logical switches, CPU, memory, power state, and so on.

This chapter includes the following topics:

- [Viewing vRealize Network Insight System \(NI-System\) Details](#)
- [Viewing Platform VM details](#)
- [Viewing Collector VM Details](#)
- [Viewing VMware vCenter Data Source Details](#)
- [Viewing PCI Compliance Details](#)

- Viewing Kubernetes Details
- Viewing Load Balancer Details
- Viewing VM Details
- Viewing NSX Manager Details
- Viewing Virtual Server Details
- Viewing Pool Members Details
- Viewing Microsoft Azure Details
- Viewing VeloCloud Enterprise Details
- Viewing SD-WAN and Edge SD-WAN Application Details
- Viewing Flow Insight Details
- Viewing Micro-Segmentation Details
- Viewing Application Details
- Analytics - Outlier Detection
- Analytics: Static and Dynamic Thresholds

## Viewing vRealize Network Insight System (NI-System) Details

The vRealize Network Insight System (NI System) page provides a snapshot of all the information related to the system. To access the vRealize Network Insight System page:

- On the **Install and Support** page, click **View Details** next to **Overview**. The NI System page appears.
- Provide `NI-System` as the search query to view the vRealize Network Insight System page.

The NI System page is divided into three sections:

- **Overview:** This section consists of information on the key properties, the data sources, the problems that are open, and all the changes and the problems related to the system. View the details of each data source by clicking it.
- **Events:** This section lists all the problems and changes in the system, data sources, platforms, and the collectors.
- **Platforms and Collectors:** This section lists all the platforms and the collectors associated with the system. To view more details about any platform or collector, click it.

## Viewing Platform VM details

The **Platform VM** page provides a snapshot of the properties, changes, and problems of a particular platform node.

In the **Platform VM** page, you see:

- Important information about the selected platform node, such as name, IP address, CPU cores, memory, the last upgraded time, and the version.
- Open problems that are associated with the platforms and are open.
- The list of events related to the selected platform node.
- The graphical representation of the metrics such as CPU Usage, Memory Usage, and Data Disk Usage.

## Viewing Collector VM Details

The **Collector VM** page provides a snapshot of the properties, changes, and problems of a particular collector node.

In the **Collector VM** page, you see:

- Important information about the selected platform node, such as name, IP address, CPU cores, memory, the last upgraded time, and the version.
- Number of open problems related to the collector and the problem details.
- Number of open problems related to the data sources and the problem details.
- List of the changes that occurred in the data source in the last seven days.
- Details of the data sources and the NetFlow reporters available in the collector. The number of flows are shown for each NetFlow reporter. For data sources, the number of flows and the discovered VMs are shown.
- The graphical representation of the metrics such as CPU Usage, Memory Usage, and Data Disk Usage

## Viewing VMware vCenter Data Source Details

The **VMware vCenter Data Source** page provides a snapshot of the properties, changes, and problems of a particular data source.

In the VMware vCenter Data Source page, you see:

- Important information about the selected VMware vCenter Data Source, such as IP Address/FQDN, Collector Name, Enabled, number of discovered VMs, IPFIX Enabled Status, and so on.
- All the open problems associated to the data source.

- All the changes and the problems encountered in a particular data source in the last seven days.

## Viewing PCI Compliance Details

The **PCI Compliance** page is available only for the Enterprise License users.

### Access the PCI Compliance

- 1 In the navigation panel on the left of the Homepage, select **Security > PCI Compliance**.
- 2 The **PCI Compliance** window appears. Select the required scope, the corresponding entity, and the duration for which you require the data. Click **Assess**.
- 3 The **PCI Compliance** page appears.

### PCI Compliance page details

The **PCI Compliance** page helps in assessing compliance against the PCI requirements only in the NSX environment. These requirements are mentioned under the first pin in the dashboard. The rest of the pins in the dashboard that provide data for the assessment of these requirements are as follows:

- Network flow diagram: It shows the data flow, firewalls, connections, and other details associated with a network.
- Flows: It lists the flows that you view in the network flow diagram.
- Clear text protocol flows based on the destination port: The traffic that flows on certain ports are in clear text. This pin displays the clear text protocol flows based on a particular destination port.
- Virtual machines in scope: It shows the virtual machines in the scope that you have selected in the query. This pin shows the outgoing rules, incoming rules, and security groups for virtual machines in that scope.
- Security groups of virtual machines: It lists the security groups of the virtual machines.
- Virtual machine count by Security Groups: You can view the list of the virtual machines in a security group by clicking Count in this pin.
- Virtual machine count by Security Tags: You can view the list of virtual machines with security tags by clicking Count in this pin.
- Firewall rules applied on internal traffic : You can view the firewall rules for the traffic between the virtual machines within the selected scope.
- Firewall rules applied on incoming traffic: You can view the firewall rules for the traffic that is coming from a virtual machine outside the scope to the virtual machine within the selected scope.

- Firewall rules applied on outgoing traffic: You can view the firewall rules for the traffic that is going to a virtual machine outside the scope from the virtual machine within the selected scope.
- Security tag membership changes: The changes related to the membership for security tags are shown in this pin.
- Security group membership changes: The changes related to the membership of a security group are shown in this pin.
- Firewall rule changes: The changes related to any firewall rule is listed in this pin.

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**Note** If NSX has nested security groups, then the scope of PCI Compliance should be other than security group.

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## Export as PDF

vRealize Network Insight enables you to create and export the information on the PCI Compliance dashboard as a PDF report.

### Procedure

- 1 In the PCI Compliance dashboard, click **Export as PDF** on the right top side of the page. The Export to PDF window appears.
- 2 The Export to PDF window lists all the widgets and their respective properties available on the PCI Compliance dashboard. Select the widgets and the properties that you want to export.

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### Note

- You have to select at least one property.
- The maximum number of properties that you can select is 20.
- The maximum number of entries in the list view that can be exported is 100.
- Certain widgets do not allow you to select the properties. In such instances, specify only the number of entries.

- 
- 3 Provide a title for the PDF report.

---

### Note

- The maximum number of characters in the title is 200.
- The maximum number of pages that can be generated in the report are 50.

- 
- 4 Click **Preview**. You can see the preview of the complete report.
  - 5 Click **Export PDF**.

## Viewing Kubernetes Details

You can use the Kubernetes dashboard to get a quick overview of your Kubernetes or VMware PKS deployments in vRealize Network Insight.

You see details about,

- Top talking Clusters and Namespaces based on the flows
- Overview of Kubernetes cluster entities such as, count of Namespaces, Pods, services and Nodes
- Kubernetes clusters added in vRealize Network Insight
- List of containers images running on Pods and count of Pods for each container image
- List of new pods discovered, its count, namespace and cluster details.

In addition, you can click on the count of various Kubernetes entities on the dashboard to see the list view and go to details of that particular entity.

**Table 8-1. Kubernetes Entity Dashboard**

Dashboard	Description
Cluster Dashboard	You get the deployment details at the cluster level, which includes <ul style="list-style-type: none"> <li>■ cluster overview that includes count of namespaces, services, pods and nodes in the deployment.</li> <li>■ the list of top namespaces based on flows.</li> <li>■ Interaction between namespaces.</li> </ul>
Namespace Dashboard	You get the cluster namespace details such as, <ul style="list-style-type: none"> <li>■ the namespace overview that includes count of pods, services and nodes that are in that particular namespace.</li> <li>■ the list of top talking services based on flows.</li> <li>■ Service interactions in the namespace.</li> <li>■ Network traffic by packets and bytes.</li> </ul>
Service Dashboard	You see the details of the Kubernetes services, like <ul style="list-style-type: none"> <li>■ the service overview that includes the count of pods and the count of nodes on which the service is deployed.</li> <li>■ Service interaction in the namespace</li> <li>■ Network traffic by packets and bytes</li> <li>■ Logical ports of the corresponding pods</li> </ul>

Table 8-1. Kubernetes Entity Dashboard (continued)

Dashboard	Description
Pods Dashboard	You see the details such as, <ul style="list-style-type: none"> <li>the cluster, namespace, and node that the pod belongs</li> <li>Network traffic between pods based on packets and bytes</li> </ul>
Nodes Dashboard	You see details such as, <ul style="list-style-type: none"> <li>list of namespaces details</li> <li>list of services</li> <li>list of container pods</li> <li>Network traffic between nodes based on packets and bytes</li> </ul>

### Note

- vRealize Network Insight collects Kubernetes cluster details from VMware PKS every 10 minutes.
- vRealize Network Insight collects entity (Namespace, Node, Pod, Service) details from Kubernetes cluster every 4 hours.
- VMware PKS does not provide details about the Kubernetes primary nodes.
- vRealize Network Insight provides the details of the clusters that are in successfully created state only.

## Common Events or Error Messages

- `Data Source not reachable` - Ping the IP/FQDN of the VMware PKS from the proxy virtual machine to ensure VMware PKS is reachable.
- `Kubernetes Cluster API Servers not reachable`-Ensure that all the Kubernetes Cluster API Servers are reachable from the proxy virtual machine.

## Viewing Load Balancer Details

Load Balancer page summarizes all the information of the virtual servers and the pools that are created on the load balancer.

You see,

- list of virtual servers along with its problems on the load balancer
- list of pools on the load balancer and their associated problems
- events associated with the load balancer

- list of flows, count and its network traffic on different destination IPs.

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**Note** The flow information is not captured for NSX-V load balancer.

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- the properties of the load balancer that provides information such as the vendor, type, serial number, virtual servers, pools.

## Viewing VM Details

You can use the VM page to get a detailed overview of your VMs available in vRealize Network Insight.

In the VM page, you see the following sections:

Section	Details
<b>Overview</b>	<p>You see,</p> <ul style="list-style-type: none"> <li>■ VM details.</li> <li>■ topology information.</li> <li>■ various configuration parameters.</li> <li>■ security-related parameters.</li> <li>■ VM to Internet path.</li> </ul>
<b>Neighbors</b>	<p>You see,</p> <ul style="list-style-type: none"> <li>■ the graphical view of various metric properties in comparison with the neighbor VMs</li> <li>■ the list of VMs belongs to the same host.</li> </ul>
<b>Events</b>	You see the list of events related to the selected VM.
<b>Flows</b>	You see the list of flows which are either originated or trying to reach the selected VM for which firewall action is allowed and denied.
<b>Metrics</b>	<p>You see,</p> <ul style="list-style-type: none"> <li>■ the metrics information related to the selected VM.</li> <li>■ information about the network usage of ports in the path to ToR.</li> <li>■ information about all the metrics properties.</li> <li>■ Input - output metrics information.</li> <li>■ the virtual disk space.</li> <li>■ the datastore performance</li> </ul> <hr/> <p><b>Note</b> You cannot see the datastore metrics of a VM if it is hosted on vSAN datastore.</p> <hr/> <ul style="list-style-type: none"> <li>■ the virtual infrastructure latency details.</li> </ul> <hr/> <p><b>Note</b> To see virtual infrastructure latency, the port 1991 must be open on the collector to receive latency data from the ESXi host.</p>

## Viewing NSX Manager Details

You can use the **NSX Manager** page to get a detailed overview of your NSX Manager available in vRealize Network Insight.

### How to access the NSX Manager page

To access this page, search for `NSX Manager` where `SDDC Type = 'VMC'` and in the search result list, click the **NSX Manager** page you want to view.

### Overview

In the **NSX Manager** page, you see the following section:

Table 8-2.

Section	Details
<b>Overview</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ NSX policy entities overview details.</li> <li>■ Modified entities in last 24hours.</li> <li>■ Top flows by rule.</li> <li>■ List of routers.</li> </ul> <hr/> <p><b>Note</b> The number of entities shown in the <b>NSX Policy Entities Overview</b> widget and the <b>Entities in last 24 hours</b> widget can differ. If some entities discovered in the last 24 hours were deleted, then the number of entities shown in the <b>Entities in last 24 hours</b> widget can be greater than the number of entities shown in the <b>NSX Policy Entities Overview</b> widget.</p>
<b>Top Talkers</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ Top talking entities in your environment.</li> </ul>
<b>Network Traffic and Events</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ Network traffic and alerts overview details.</li> <li>■ List of events.</li> </ul>

## Viewing Virtual Server Details

The Virtual Server page includes the virtual server metrics, and the problem and change events.

You see,

- the list of all pool members in the virtual server and its details, along with an alert for any problem.
- the list of virtual machines
- the list of physical servers
- the list of problem events that are associated with the virtual server

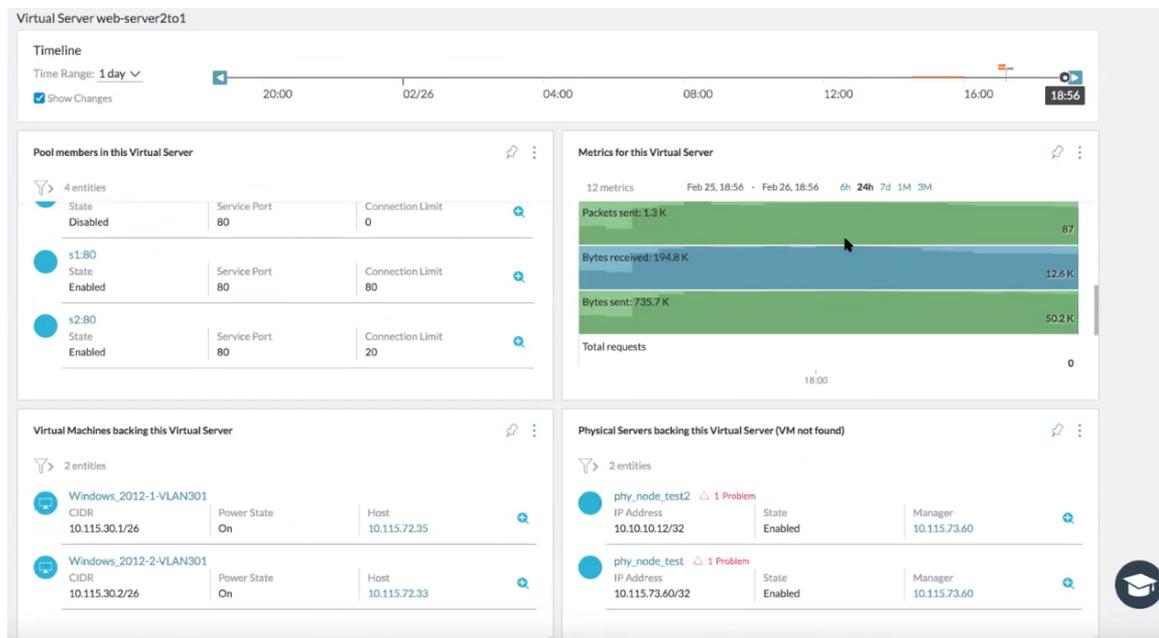
- the list of metrics that are related to the virtual server, like
  - connections (count, duration)
  - network metrics (packets and bytes received or sent)
  - CPU usage

**Note** For the list of supported NSX-V load balancer metrics, see [Supported NSX-V Metrics](#).

- the top flows for the pool members used by the virtual server.

**Note** The flow information is not captured for NSX-V load balancer.

- the virtual server properties that provides information about the load balancer IP address, network traffic, service port.



To view the topology path associated with the load balancer, you can use the following query: *client VM name to Virtual server IP*. If there are multiple virtual servers on different service ports, you see the list under the Select a Destination VM section. You can select a server from the list and click **Show Path** to see the VM to virtual server path.

You can click the virtual server on the VM Path topology to see a set of VMs on the Virtual Server window. Click **View Path** to see the path from virtual server to the selected VM.

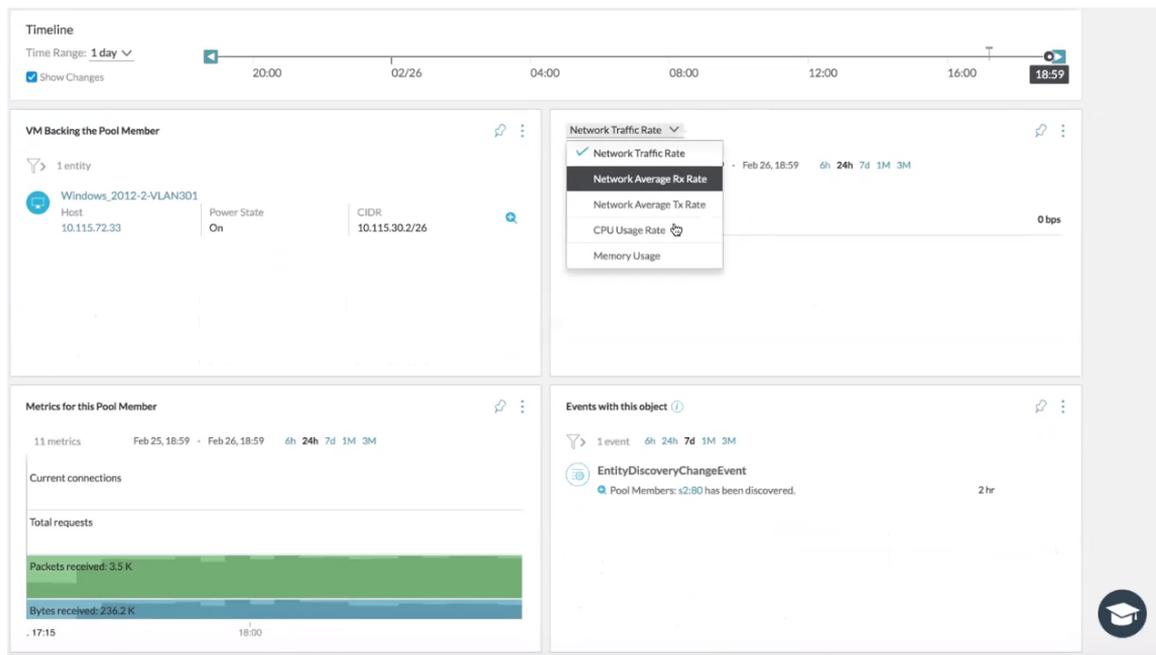
## Viewing Pool Members Details

Pool Member page provides insight about the pool members, metrics, and events associated with the pool member.

You see:

- the list of virtual machines and additional details about the VM

- allows you to compare the metrics of the pool member with the metrics of the VM. For example, memory and CPU usage, Network traffic.
- the list of metrics that are related to the pool member, like
  - connections (count, duration, age )
  - network metrics (packets and bytes received or sent)
  - CPU usage
- the pool member properties that provide information about the load balancer, node, status, service port.



## Viewing Microsoft Azure Details

You can use the **Microsoft Azure** page to get a quick overview of your Azure environment details in vRealize Network Insight.

### How to access

To access this page, search **Azure**. Alternatively, in the Home page, in the **OPERATE & TROUBLESHOOT** section, click the **Microsoft Azure** icon.

### Overview

In this page, you see:

- List of subscriptions
- List of virtual machines
- List of network interfaces, virtual networks, subnets, route tables, and routes

- List of network security groups, application security groups, and NSG rules.

You can also click the entities on this page to see more detailed insight about the particular entity.

In addition to the **Microsoft Azure** page, you can see the insight about the following Azure entities:

**Table 8-3. Azure Entity details**

Entity name	Description
<b>Azure Application Security Group</b>	You see: <ul style="list-style-type: none"> <li>■ List of properties, events, associated VMs, and associated VMs for last 24 hours.</li> <li>■ List of incoming NSG rules and outgoing NSG rules.</li> <li>■ List of allowed flows, denied flows, flows for last 24 hours.</li> </ul>
<b>Azure Data Source</b>	You see: <ul style="list-style-type: none"> <li>■ List of properties, events, and metrics.</li> </ul>
<b>Azure NSG Rules</b>	You see: <ul style="list-style-type: none"> <li>■ List of properties, events, and metrics.</li> </ul>
<b>Azure Network Interface</b>	You see: <ul style="list-style-type: none"> <li>■ List of properties, events, and metrics.</li> </ul>
<b>Azure Network Security Group</b>	You see: <ul style="list-style-type: none"> <li>■ List of properties, events, NICs, and subnet.</li> <li>■ List of outbound rules and inbound rules.</li> <li>■ List of allowed flows, denied flows, flows for last 24 hours.</li> </ul>
<b>Azure Route</b>	You see: <ul style="list-style-type: none"> <li>■ List of properties, events, and metrics.</li> </ul>
<b>Azure Route Table</b>	You see: <ul style="list-style-type: none"> <li>■ List of properties, events, and metrics.</li> </ul>
<b>Azure Subnet</b>	You see: <ul style="list-style-type: none"> <li>■ List of properties, events, VMs, NICs, and custom routes.</li> <li>■ List of NSG rules.</li> </ul>
<b>Azure Subscription</b>	You see: <ul style="list-style-type: none"> <li>■ List of properties and events.</li> <li>■ List of virtual machines.</li> <li>■ List of NICs, virtual networks, and route table</li> <li>■ List of network security groups, application security groups, and NSG Rules.</li> </ul>

Table 8-3. Azure Entity details (continued)

Entity name	Description
<b>Azure Virtual Machine</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ List of properties, events, NICs, associated Application Security Groups (ASGs).</li> <li>■ List of incoming NSG rules and outgoing NSG rules.</li> <li>■ List of allowed flows and denied flows.</li> </ul>
<b>Azure Virtual Network</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ List of properties, events, VMs, VMs created in last 24 hours, associated ASGs, associated ASGs for last 24 hours, subnets, and route tables.</li> <li>■ List of allowed flows, denied flows, and flows for last 24 hours.</li> </ul>

## Viewing VeloCloud Enterprise Details

You can view the **VeloCloud Enterprise** page for an overview of your VMware SD-WAN deployment in vRealize Network Insight.

### Access the VeloCloud Enterprise page

To access this page, search for **VeloCloud Enterprise**. Alternatively, in the Home page, in the **OPERATE & TROUBLESHOOT** section, click the **VeloCloud Enterprise** icon.

## Overview

In this page, you see the following sections:

Section	Details
<b>Overview</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ A summary of your VMware SD-WAN deployment, including the event chart, the number of Edges, Hubs, gateways, links, Edge to Edge flows, Internet flow, and applications. You also see the health condition of these entities.</li> <li>■ A map view of your VMware SD-WAN deployment and list of applications on Edges.</li> </ul> <p><b>Note</b> To get the map view, you must add a Google Maps API key in vRealize Network Insight. For more information, see <a href="#">Add Google Maps API Key</a>. If you do not add a Google Maps API key, you can only see the list view of the Edges.</p>
<b>Event</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ A list of various events.</li> </ul>

Section	Details
<b>Analytics</b>	You see: <ul style="list-style-type: none"> <li>■ Various traffic distribution lists, such as the traffic distribution by applications, Edge, Edge pairs, flow path, traffic type, link policy, and route type.</li> </ul>
<b>Availability</b>	You see: <ul style="list-style-type: none"> <li>■ A list of available Edges/Hubs and unavailable Edges/Hubs.</li> </ul>
<b>Metrics</b>	You see: <ul style="list-style-type: none"> <li>■ Various metrics based on the Edge traffic, Edge packet, Edge QoE, application traffic, application packets, link packet, link latency, link throughput, and link QoE. You can click the plus (+) icon to get more details.</li> </ul>

You can also click the entities on this page to see more detailed insight about the particular entity.

In addition to the **VeloCloud Enterprise** page, you can see the insight about the following VMware SD-WAN entities:

**Table 8-4. VMware SD-WAN Entity Details**

Entity Name	Description
<b>VeloCloud Cluster</b>	You see: <ul style="list-style-type: none"> <li>■ A list of properties.</li> </ul>
<b>VeloCloud Data Source</b>	You see: <ul style="list-style-type: none"> <li>■ A list of properties, open problems, changes and problems occurred in last 7 days.</li> </ul>
<b>VeloCloud Edge</b>	You see: <ul style="list-style-type: none"> <li>■ Details about the VMware SD-WAN Edge. For more details, see <a href="#">Viewing VeloCloud Edge Details</a>.</li> </ul>
<b>VeloCloud Gateway</b>	You see: <ul style="list-style-type: none"> <li>■ A list of properties and Edges.</li> </ul>
<b>VeloCloud Layer2 Network</b>	You see: <ul style="list-style-type: none"> <li>■ A list of properties and events.</li> </ul>
<b>VeloCloud Link</b>	You see: <ul style="list-style-type: none"> <li>■ A list of properties and events.</li> <li>■ Metrics about QoE, packet, uptime, latency, and throughput.</li> </ul>
<b>VeloCloud Profile</b>	You see: <ul style="list-style-type: none"> <li>■ A list of properties and Edges.</li> </ul>
<b>VeloCloud Segment</b>	You see: <ul style="list-style-type: none"> <li>■ A list of properties.</li> </ul>

## Viewing VeloCloud Edge Details

You can use the **VeloCloud Edge** page to get a quick overview of the VMware SD-WAN Edge in vRealize Network Insight.

### How To Access

To access this page, search **VeloCloud Edge** and click any of the search results.

### Overview

In this page, you see the following sections:

Section	Details
<b>Overview</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ Summary of your VMware SD-WAN Edge, like the event chart, uptime details, number of applications, segments, links, layer 2 networks, LAN interfaces, and WAN interfaces.</li> <li>■ VMware SD-WAN Edge topology.</li> <li>■ List of Edge QoE and link QoE</li> </ul>
<b>Event</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ List of various events.</li> </ul>
<b>Flows</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ List of flows.</li> </ul>
<b>Analytics</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ Various traffic distribution lists, like the traffic distribution by application and priority, flow path, traffic type, link policy, and route type.</li> </ul>
<b>Metrics</b>	<p>You see:</p> <ul style="list-style-type: none"> <li>■ Various metrics based on the Edge traffic, Edge packet, application traffic, application packets, link packet, link latency, and link throughput. You can click the plus (+) icon to get more details.</li> </ul>

You can also click the entities on this page to see more detailed insight about the particular entity.

## Viewing SD-WAN and Edge SD-WAN Application Details

You can use the **SD-WAN Application** and **Edge SD-WAN Application** page to get a quick overview of the SD-WAN application and Edge SD-WAN application in vRealize Network Insight.

### Overview

In this page, you see the following sections:

Table 8-5. SD-WAN Application

Section	Details
Overview	You see: <ul style="list-style-type: none"> <li>■ A list of Edges, events, traffics, packets, and flows.</li> </ul>
Analytics	You see: <ul style="list-style-type: none"> <li>■ A list of traffic by Edges and traffic by clients.</li> </ul>

You can also click the entities on this page to see more detailed insight about the particular entity.

In addition to the **SD-WAN Application** page, you can see the following insight about the **Edge SD-WAN Application**:

- A list of properties, events, and metrics.

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**Note** vRealize Network Insight supports maximum 2 segments per VMware SD-WAN Edge and maximum 20000 layer 3 domains.

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## Viewing Flow Insight Details

The **Flow Insight** page provides an insight into data centers, devices, and flows. It is a context-based page as it performs analysis based on the entities, flows, and the time range that you select.

To access the Flow Insight page, do the following:

- 1 In the left navigation pane, click **Analytics > Flow Insights**.
- 2 Select the **Scope** and **Duration**.
- 3 Click **Analyze**.

Alternatively, you can search for **Flows** and in the search result page, click **Flow Insight**.

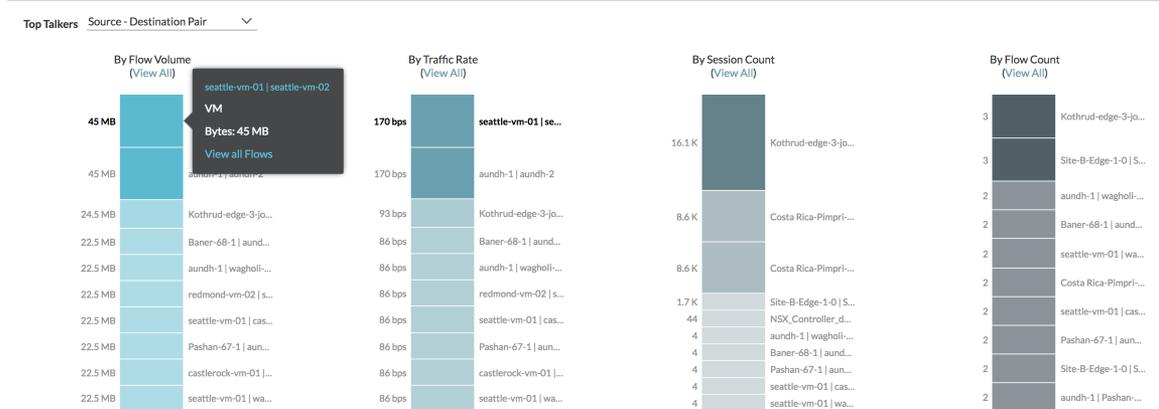
The various sections in the Flow Analytics Dashboard are:

- Top Talkers
- What's New
- Network Performance
- Outliers

## Top Talkers

This section helps you to recognize which entities are talking the most in your environment. You can select different kinds of entities such as Source-Destination pair, VM, Cluster, L2 Network, Subnet. This widget lists the top 10 talkers in the entity category that you select. It helps the customer to plan for network optimization. The metrics that are represented by bars in this widget are as follows:

- By Flow Volume: Indicates the traffic volume.
- By Traffic Rate: Indicates the rate of traffic.
- By Session Count: Indicates the number of sessions.
- By Flow Count: Indicates the number of flows



### Note

- If a VM appears in one or more metrics, when you point to that VM in a bar, it will also be highlighted in other bars.
- When you click a VM in the metrics bar, the complete list of flows coming to this VM is shown.
- When you select VM as the entity in the Top Talkers list, all the flows related to this VM irrespective of it being the source or destination is shown. If you select Source VM in the list, then only the flows coming from this VM are considered.
- If you are considering the physical flows, you can select either Source IP or Destination IP.
- After you select the Source-Destination pair and point on the metric bar, if you click the link in the tool tip, the corresponding dashboard appears. For example, for a VM in Source-Destination pair, the VM-VM path dashboard appears.
- For a flow group view or a flow entity projection or a flows group query, you cannot see the **Flow Analytics** button.

## What's New

This section helps you to track what services and entities are discovered in the data center in the selected time range. The widget in this section are as follows:

- New Virtual Machines Accessing Internet: Lists the new VMs that access Internet.
- New Internet Services Accessed: Lists the new Internet services discovered in the environment.
- New Internal Services Accessed: Lists the new intranet services that are discovered and accessed from the Internet endpoint.
- New Internal/E-W Services Accessed: Lists the services that are exposed and accessed by the machines within a data center
- New Services with Blocked Flows: Lists services that have blocked flows. This section is populated only for IPFIX.
- New Firewall Rule Hits: Lists the new firewall rules that are brought into effect. This section is populated only for IPFIX.

## Network Performance

In this section, you can find and visualize the abnormal flows for the various ranges of TCP Round Trip Time (RTT) values based on the selected criteria.

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**Note** vRealize Network Insight shows average TCP RTT metrics at 5 minutes granularity for last 24 hours only.

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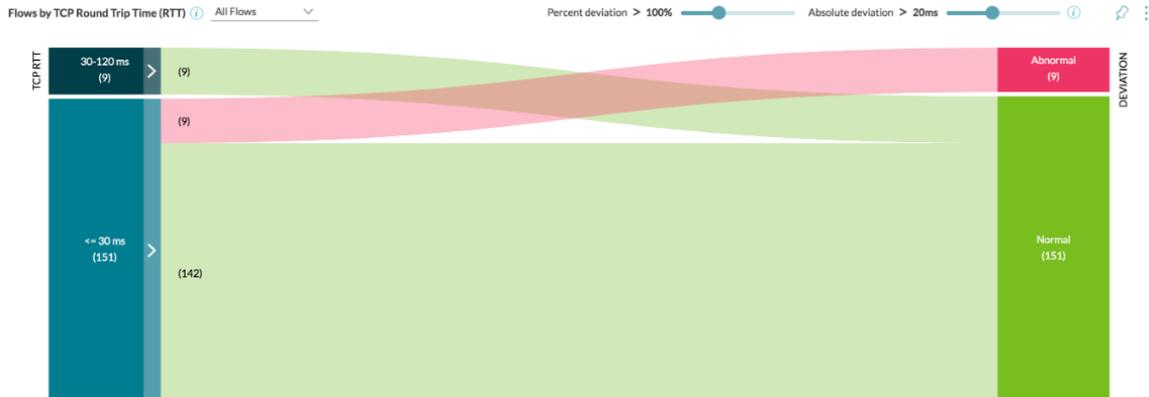
If the flow deviation percentage is 100 percent and absolute deviation is 20 milliseconds (ms), then vRealize Network Insight considers that flow as an abnormal flow.

In the visualization, the left side shows the different range of TCP RTT and the right sides shows the normal and abnormal deviation range. Based on the values of percentage deviation and absolute deviation, flows are connected from left (TCP RTT) to right (DEVIATION). You can analyze the following types of flows:

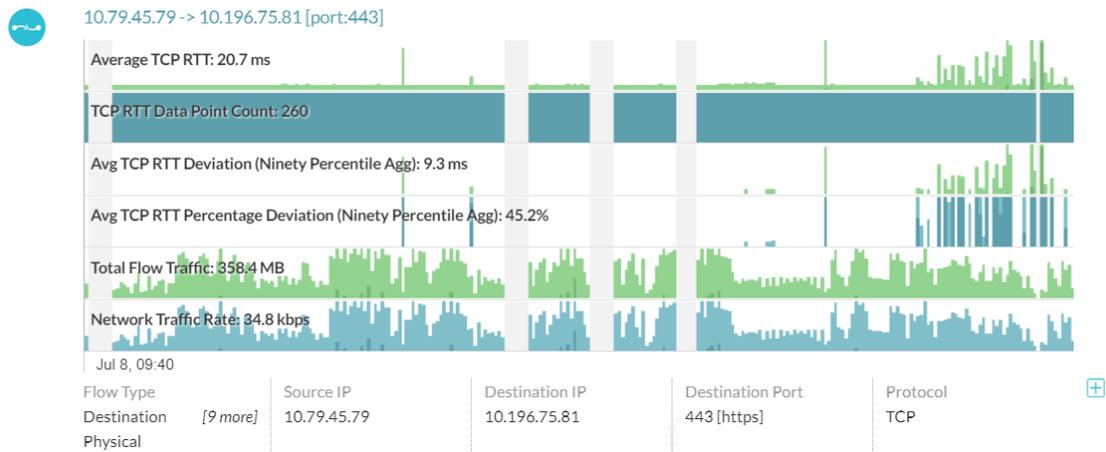
- Inter-Host
- Intra-Host
- Internet
- All Flows

You can also change the percent deviation and absolute deviation based on your requirement.

In the following example, there are two different ranges of TCP RTT, one is less than equal to 30 ms and the other is 30-120 ms. You can find there are total 151 flows comes under the less than equal to 30 ms TCP RTT range. Out of the 151 flows, 9 flows are shown as an abnormal flow.



To get more insight about the TCP RTT distribution information and counts of flows, click the colored line in the visualization. In the following example, you can see the detail insight about the TCP RTT distribution information and counts of flows:

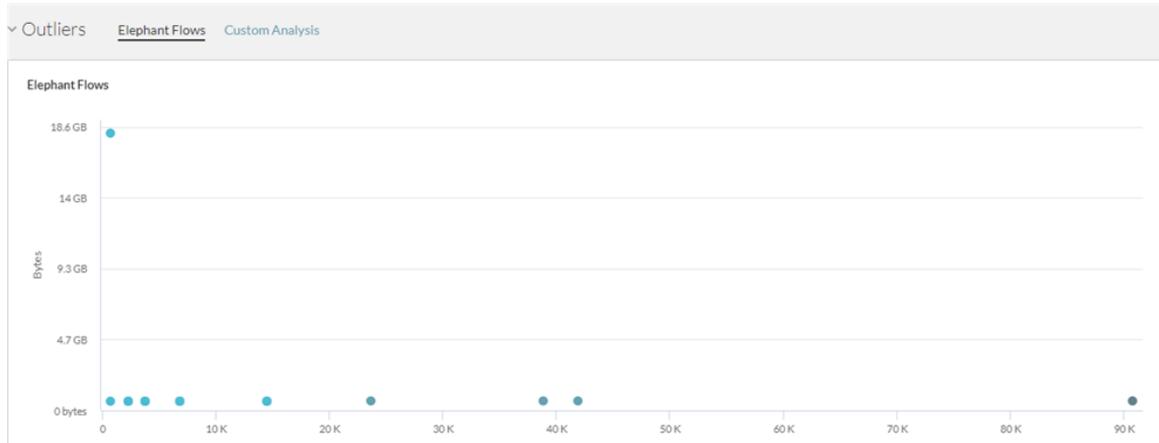


## Outliers

This section helps you to track and analyze related data. It consists of the following sections:

- **Elephant Flows:** This section helps to identify the flows which have small count of sessions and high throughput versus flows which have large count of sessions and small throughput. Typically, the flows with the large session counts and small throughput are also referred as mice flows. The analysis is based on the ratio of bytes to the number of sessions. Each dot in the graph represents multiple flows. When you point to a dot, you can see the list of flows. To view the details of a particular flow, click that flow in the list.
- **Custom Analysis:** This section allows you to visualize the flow data on 2 dimensions of your choice. It helps in analyzing the data to find the outliers in various ways.

**Note** The metrics represented in this section are the approximate values and not the exact values.



## Viewing Micro-Segmentation Details

You can analyze the flows by selecting scope and segment them accordingly based on entities such as VLAN/VXLAN, Security Groups, Application, Tier, Folder, Subnet, Cluster, virtual machine (VM), Port, Security Tag, Security Group, and IPSet.

The micro-segmentation page provides the analysis details with the topology diagram. This page consists of the following sections:

- **Micro-Segments:** This widget provides the diagram for topology planning. You can select the type of group and flows. Based on your inputs, you can view the corresponding topology planning diagram.
- **Traffic Distribution:** This widget provides the details of the traffic distribution in bytes.
- **Top Ports by Bytes:** This widget lists the top 100 ports that record the highest traffic. The metrics for the flow count and the flow volume are provided. You can view the flows for a particular port by clicking the count of flows corresponding to that port.

To access the micro-segmentation page:

### Procedure

- 1 On the navigation panel on the left side of the home page, click **Security>Plan Security**.
- 2 Select the scope, subscope, and the duration for which you want to plan and analyze. Click **Analyze**.

The micro-segmentation page appears.

---

**Note** The donut view can show upto 600 nodes and 6000 edges. If the limit exceeds, you see the Too many micro-segments to analyse. Please select a different entity or micro-segmentation criteria error.

---

## Viewing Application Details

An application is a collection of tiers. Each tier in an application is a collection of VMs and physical IPs based on the user-defined filter criteria. The applications allow you to create a group of tiers and visualize traffic or flows between the tiers of the same application and between applications.

You can create or add an application into vRealize Network Insight in three ways:

- [Create an Application Manually](#)
- [Public API](#)
- [Application Discovery](#)

Application page provides complete visibility of a single application in vRealize Network Insight. This enables you to troubleshoot problems and also view the analytics.

- An Overview
  - the application topology
    - Tier Overview
    - List of VMs in the applications
    - the physical IPs that the application depends or uses
    - Shared services
    - Applications with which this particular application is talking to
  - Events related to the applications
  - application VMs Manager
- What's New in last 24 hours
  - Incoming and outgoing traffic count
  - Dropped flows
  - New and unprotected members
  - External accessed services
  - Internet accessed services
  - Used application ports
- Traffic flows or flow analytics
  - Top Talkers
  - Top application flows by rule
- Micro-segmentation
  - Contextual flows between entities, which provides data of different flow types like all allowed flows, and dropped flows, protected and unprotected flows by NSX DFW.

- What's New in an application
- Metrics
  - the VM metric information that represents network rate, CPU, memory and disk information.
  - the Kubernetes metrics

## Analytics - Outlier Detection

vRealize Network Insight offers outlier detection based on the metrics associated with the flows defined over the VMs and physical IP addresses. These VMs/IPs should have similar traffic patterns so that a classification of a particular VM/IP as an outlier is of value. For example, the VMs, which belong to the same tier of an application, generally perform the same function for the application, such as the VMs of an SQL database serving requests for a web application. For these kind of VMs, the number of requests received, the amount of traffic sent out, the session count, and so on go through a series of similar variations.

Through outlier detection, vRealize Network Insight enables you to detect a particular VM which might be experiencing very different traffic pattern compared to other VMs/IPs in the group. For example, if the VM is sending or receiving much higher/lower traffic compared to the rest of the group. It could be because of a wrongly configured load balancer, DDOS attack, and so on. vRealize Network Insight classifies such VMs/IPs as outliers. By looking at these outliers, the user easily knows about this unexpected behaviour and takes appropriate actions.

## How to Detect the Outlier VMs

### Procedure

- 1 On the sidebar, click **Analytics**. Click **Outlier**.
- 2 Click **Add** to add a configuration.

### 3 In the **Analytics/Configure** page, provide the following details for the configuration:

**Table 8-6.**

Field	Description
Name	Name of the configuration
Scope	<p>Name of the group that defines the VMs and the IPs for which the analysis needs to be done. You can select Application Tier or Security Group as the scope.</p> <p>If you select Application Tier, provide the name of the application and the tier separately. The number of VMs and Physical IPs that are defined for the tier is shown next to the name of the tier.</p> <p>If you select <b>Security Group</b>, provide the name of the Security Group.</p> <p><b>Note</b> The current limit for the number of VMs and Physical IPs in a tier is 200. Choose a tier or a security group with VMs and Physical IPs less than this limit. The scope should also contain a minimum of 3 VMs/Physical IPs.</p> <p>You can view the micro segmentation for the selected configuration by clicking <b>View Micro-Segments</b>.</p>
Detection Type	Currently, vRealize Network Insight enables you to detect the outlier in the system.
Metric	<p>The detection is based on this flow metric. You can select the following options:</p> <ul style="list-style-type: none"> <li>■ <b>Bytes</b></li> <li>■ <b>Packets</b></li> <li>■ <b>Sessions</b></li> <li>■ <b>Traffic Rate</b></li> </ul>
Traffic Direction	You can select <b>Outgoing</b> , <b>Incoming</b> , or <b>Both</b> as the traffic direction. If you select <b>Both</b> , then you can specify Incoming or Outgoing in the preview of the configuration.
Traffic Type	You can select <b>Internet</b> , <b>East-West</b> , or All based on the requirement.
Destination Ports	<p>You can either select all ports detected on the flows discovered on the selected scope or manually enter the destination ports of your choice. If you select <b>All Ports</b>, the number of the destination ports is shown. If you select <b>Manually enter ports</b>, then enter the ports in the autocomplete text box, the analysis would be restricted to only these ports</p> <p><b>Note</b> The current limit for the number of ports is 20.</p>

Table 8-6. (continued)

Field	Description
Sensitivity	It is a measure of the sensitivity of the detection and reporting that you require. The default value is <b>Medium</b> .
Preview	This section provides a preview of the particular configuration based on the inputs and parameters that you have provided. Specify the ports and the traffic direction if you have selected Both for Traffic Direction before. You will be able to identify the outlier VM in the graph.

#### Note

- The outlier is detected by evaluating the data available in last 24 hours.
- You need a continuous flow of IPFIX data to detect the outlier.

- 4 Click **Submit** to create the analytics configuration.
- 5 Once the application is created, it is available in the list view of the applications in the Analytics Configurations page. Click that particular application to see a dashboard associated with it.

## Analytics: Static and Dynamic Thresholds

vRealize Network Insight enables you to set and configure thresholds and receive alerts based on aberrations in the behavior of the entities. You can configure two types of thresholds:

- **Static Threshold:** If a particular metric value goes beyond or below the configured value, then a static-threshold-based alert is generated.
- **Dynamic Threshold:** If the threshold is determined by the system based on the analysis of the historical data, an alert is generated in case this threshold is violated. The data is analyzed for a period of 7 days before any alert is generated. The process of creating a baseline is restricted to 21 days of the historic data and the older metric values are not considered to create a baseline for the new metric values.

The alert is generated immediately after a threshold is violated. The enterprise license users can view the number of Threshold Violations in the **What's Happening** section of the Home page. To view the event details, click on the Threshold Violations number. If there are no threshold configurations present in the system, then the **What's Happening** section shows the **+Configure** link. You can click the **+Configure** link to configure the threshold.

## Configure Thresholds and Alerts

You can add a threshold configuration and gets alerts for the configured threshold.

To configure the analytics-associated thresholds and alerts:

## Procedure

- 1 On the Home page, in the left navigation panel, click **Analytics > Thresholds > Add**.
- 2 In the **Threshold - Add configuration** page, in the **Name** text box, enter a unique name for the configuration.
- 3 From the **Scope** drop-down menu, select a scope, and in the **Select criteria** text box, enter a criteria.

The **Scope** drop-down consists of the **Virtual Machines**, **Flows**, and **Application** entities. The scope is based on the search query system. You can create a query from the available suggestions as per your requirements.

- 4 In the **Condition** section, set a condition to create an alert.

Based on the condition you set, the system decides if the threshold is violated.

5 The default metric is `network traffic rate`. Select the grouping of the entity and the value for which you are checking the threshold. You can set a threshold on a cumulative metric by aggregating the data over a group of entities.

a To configure the static threshold, select either of the following threshold conditions from the list:

- **exceeds threshold**
- **drops below**
- **is outside range**

When you enter the `Upper Bound` or the `Lower Bound` (if there is range) for `network traffic rate` or `total traffic` or any other metric, ensure that you enter the value in the specified metrics for that particular text box. The following conversion values are for your reference:

- 1 Kbps= 1000 bps
- 1 Mbps= 1000 kbps
- 1 Gbps = 1000 mbps
- 1 KB=1024 B
- 1 MB=1024 KB
- 1 GB = 1024 MB

b To configure the dynamic threshold, select **deviates from the past behavior**. Select the sensitivity based on your requirement of reporting.

Condition ⓘ

For metric `network traffic rate` aggregated over `virtual machine` when `any value` `deviates from past behavior`

Sensitivity `Medium (2.5 standard deviation)`

When you set the threshold, you can view the associated graph at the top of the page.

The pink bar denotes the VMs or the flows violating the threshold. You can view the list of the entities that have violated thresholds and the entities that are within the thresholds in the system.

6 Configure the notifications or alerts by setting the following properties:

- **Severity**
- **Email frequency**
- **Send notification emails to:**

---

**Note** Select **Send SNMP Trap** if you have configured SNMP traps on your system.

---

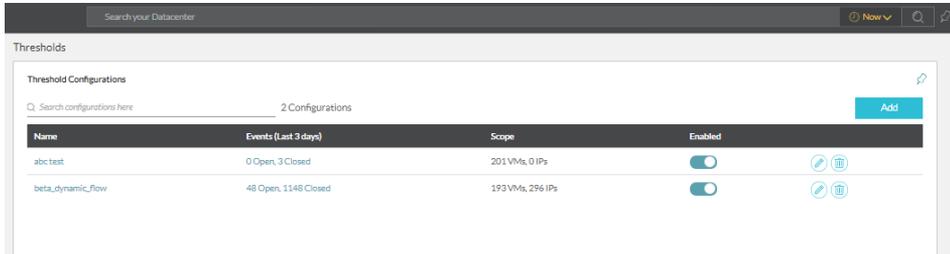
7 Click **Submit** to create the threshold configuration.

## View the Threshold Configuration Page

Once you have added a threshold configuration, you can view its details on the **Threshold Configuration** page.

### Procedure

1 On the left navigation panel, click **Analytics**. Click **Thresholds**.

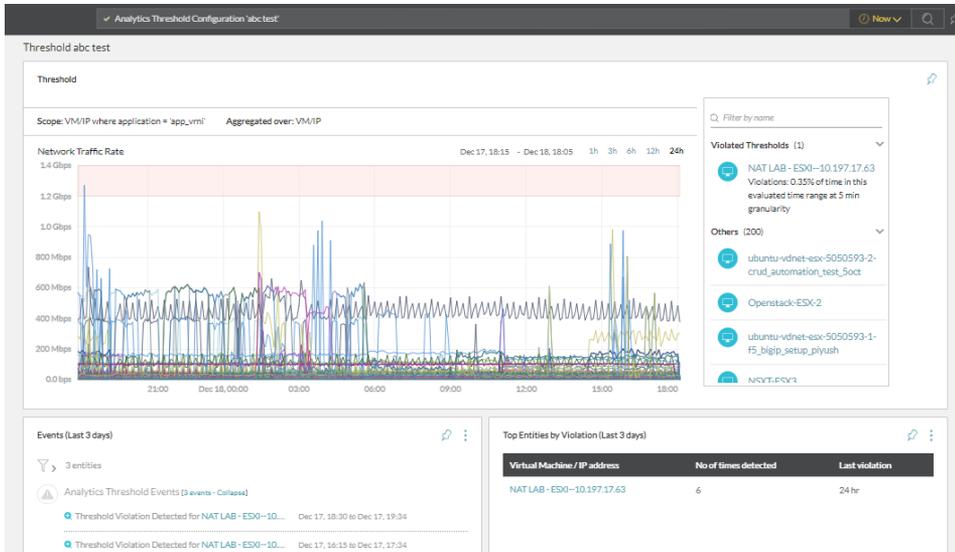


2 The following details for a threshold configuration are provided:

- Name
- Events
- Scope

If the configuration is disabled, then the alert for the violation of that particular threshold is not generated. You can also search for any particular threshold configuration on this page.

3 Click the desired threshold configuration from the list to view the dashboard for that particular configuration.



You can view the following widgets on the dashboard:

- **Graph:** The threshold graph helps you detect the entities that have violated the thresholds.
- **Events:** This widget provides the list of events that have been generated for violated thresholds for the last three days.
- **Top Entities by Violation:** This widget lets you know the top entities that have been the cause of aberrations for the last three days.

# Viewing Entity Topology

# 9

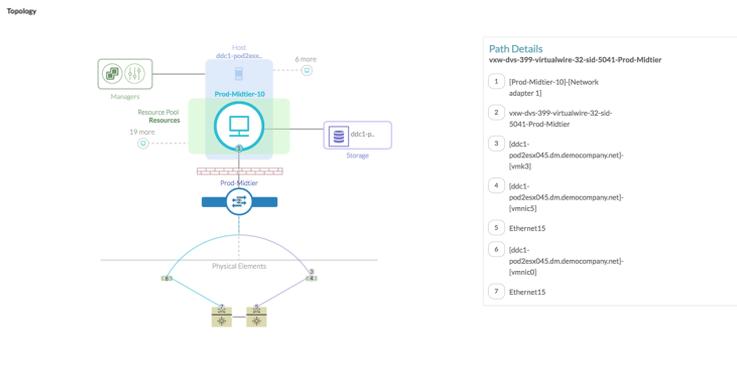
The topology provides a comprehensive pictorial view of the entity.

This chapter includes the following topics:

- Virtual Machine Topology
- Hosts Topology
- VXLAN Topology
- VLAN Topology
- NSX Manager Topology

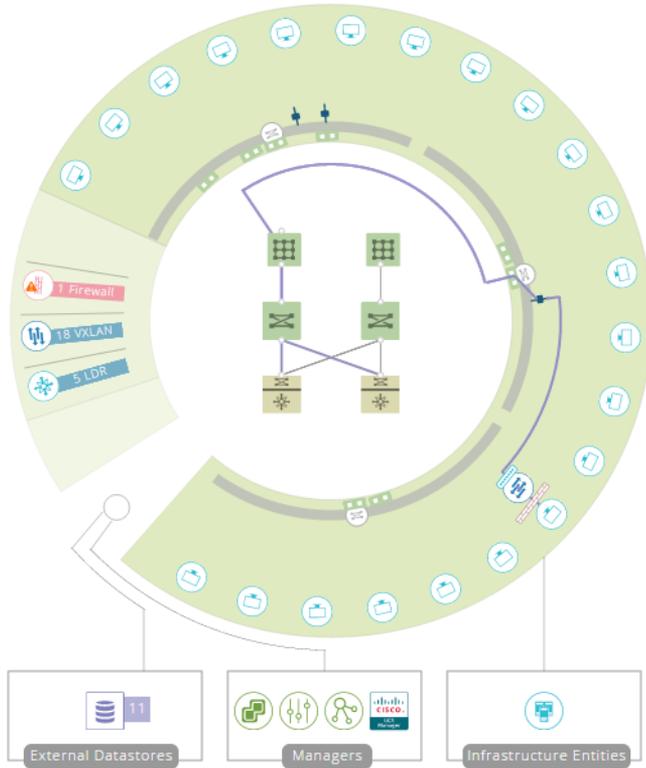
## Virtual Machine Topology

The virtual machine topology provides a comprehensive view of a singular virtual machine in relation to the rest of your data center.



## Hosts Topology

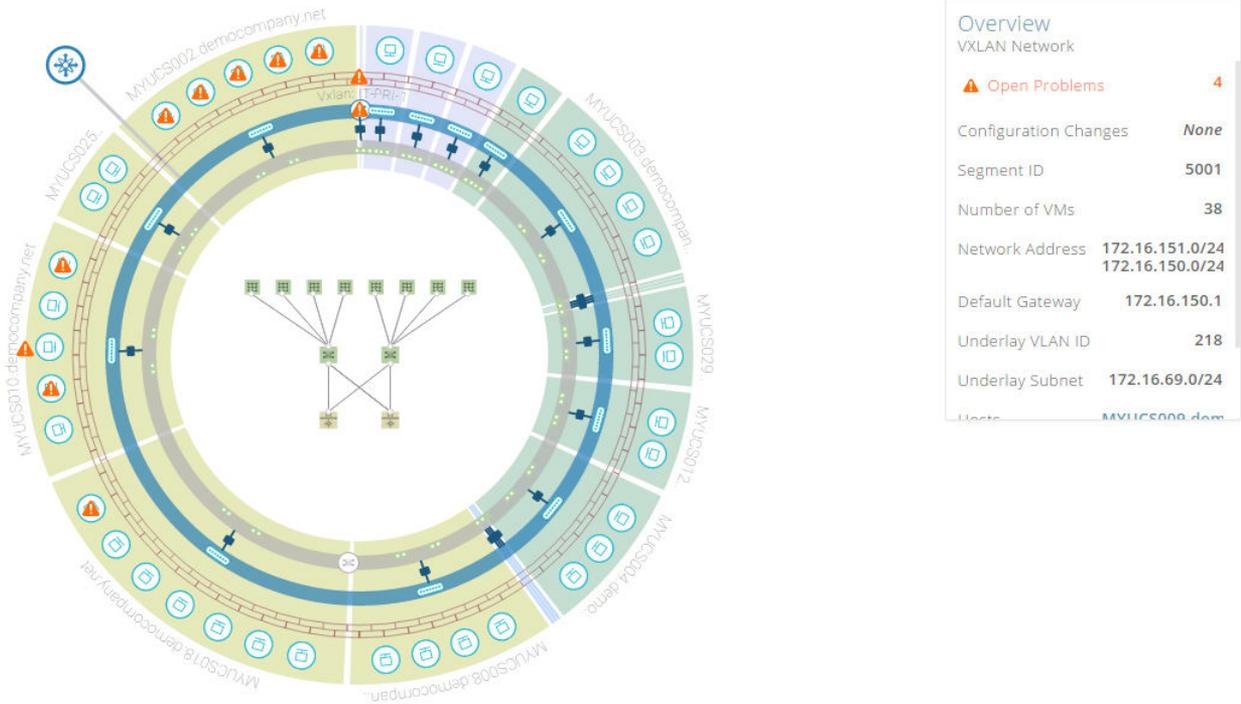
The host topology shows how VMs of a particular host are connected to the virtual and physical components of your data center and also how the host itself is connected with your data center.



## VXLAN Topology

Virtual eXtensible Local Area Network (VXLAN) overlay networking technology is an industry standard that is developed by VMware jointly with the major networking vendors.

The VXLAN topology is an innovative visualization that gives you an overview of the selected VXLAN. The following diagram elucidates the various components that make up the visualization:



**Note** Both virtual and physical components can be visualized in this manner.

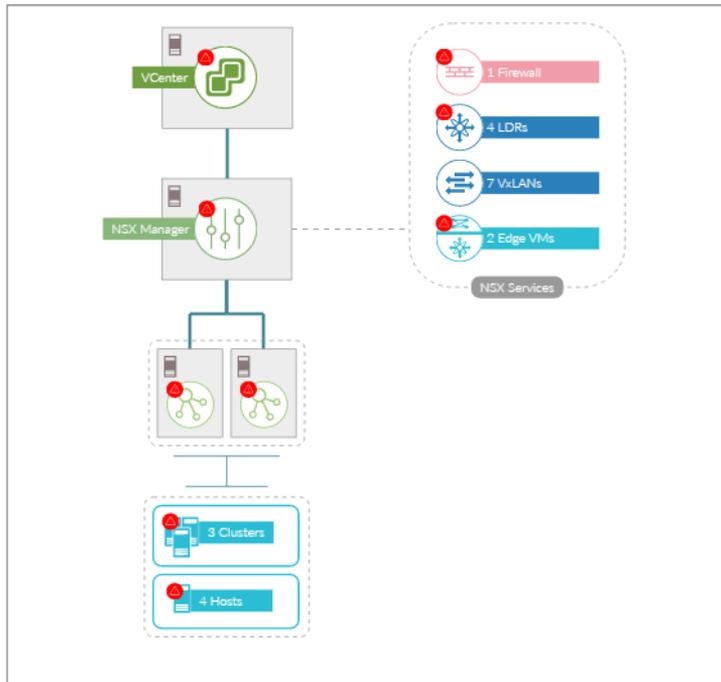
## VLAN Topology

Virtual LANs (VLANs) enable a single physical LAN segment to be further segmented so that groups of ports are isolated from one another as if they were on physically different segments.

The VLAN topology is constructed in a similar manner as the VXLAN topology.

## NSX Manager Topology

The NSX Manager topology shows the components that are associated with the NSX Manager.



## Edge Data Collection

Whenever you add an NSX data source, you can enable the automatic edge data collection. In the previous releases, the edge data collection was done either by NSX Central CLI or Edge-SSH session. From the current release onwards, the edge data collection is done by NSX Central CLI. So no edge data providers are created under NSX Manager.

---

### Note Validation of NSX User Privileges

---

While adding the NSX data source and enabling the edge population, the NSX user privileges are validated.

Suppose that a user has the enterprise admin privilege in NSX 6.3 and is working on the current release of vRealize Network Insight, an `Insufficient Privileges` error comes up on the **Accounts and Data Sources** page for **VMware NSX Manager**. The error is shown because the user has to be a super user to run the NSX Central CLI commands in NSX 6.3.

Table 9-1.

NSX Version	User
NSX 6.4 and the further releases	<ul style="list-style-type: none"> <li>■ To add NSX Manager as a data source, you have to be a super user, an enterprise administrator, an auditor, or an NSX security administrator.</li> <li>■ An enterprise administrator, a super user, an NSX security administrator, or an auditor can run the NSX Central CLI commands required by vRealize Network Insight.</li> </ul> <p><b>Note</b> An NSX network administrator cannot add NSX Manager as a data source.</p>
NSX 6.2 and the further releases before NSX 6.4	<ul style="list-style-type: none"> <li>■ The user should be an administrator to enable the edge data population.</li> <li>■ An auditor, a super user, or an NSX security administrator can run the NSX Central CLI commands required by vRealize Network Insight.</li> <li>■ The user credentials that need to be provided while adding NSX Manager as a data source must be of an enterprise admin or super user.</li> </ul>

## Viewing Audit Information of NSX objects in vRealize Network Insight

vRealize Network Insight can capture an audit information of NSX objects quickly from the NSX-T Manager and NSX-V Manager. The information includes the user name who created or modified the NSX object, when the operation happened and the operation details on the object.

If you have enabled audit logs in NSX-T Manager or NSX-V Manager, vRealize Network Insight can collect the audit details for some of the NSX-T and NSX-V objects.

### NSX-V

List of NSX-V objects for which vRealize Network Insight collects audit details within three to five minutes.

- SecurityGroup
- SecurityGroupTranslation
- FirewallConfiguration
- FirewallStatus
- IPSet
- SecurityTag
- UniversalSecurityGroup
- UniversalSecurityGroupTranslation

■ UniversalIPSet

The audit details of the NSX-V objects are captured for the Discovery, Property Change, and Delete events:

■ Discovery



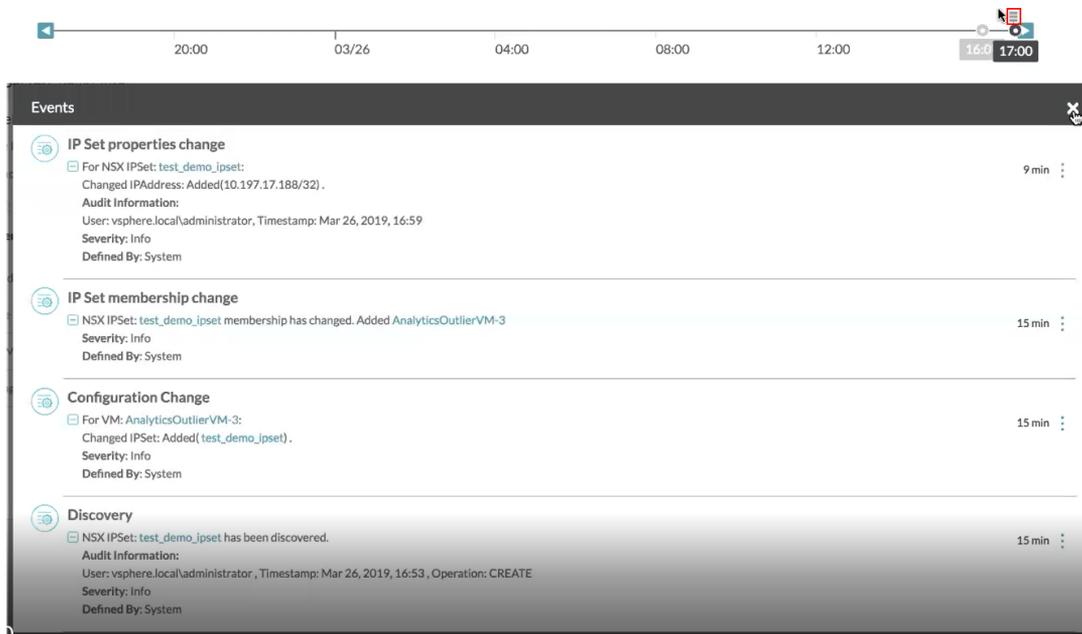
■ Properties Change



■ Delete



You can view the audit information on the timeline of the object also.



## NSX-T

List of NSX-T objects for which vRealize Network Insight collects audit details.

**Note** The audit information is not available for the VMC Policy entities.

- NSGroup
- NSService
- NSServiceGroup
- NSFirewallRule

**Note** The audit information is not available for the Delete event of the NSFirewallRule.

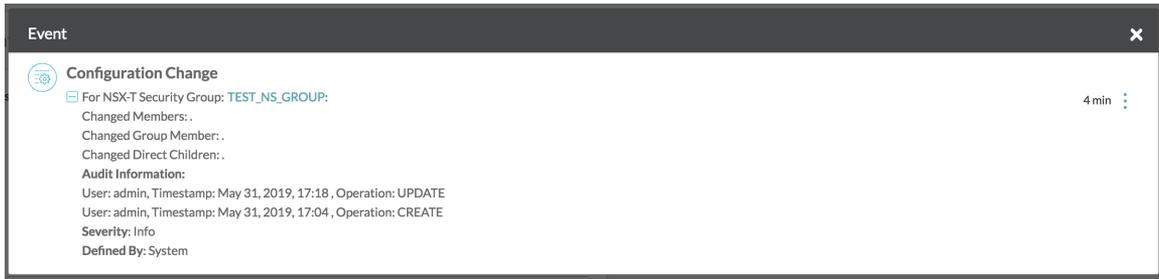
- IPSet
- NSX Policy Group
- NSX Policy Firewall Rule

The audit details of the NSX-T objects are captured for the Discovery, Property Change and the Delete events:

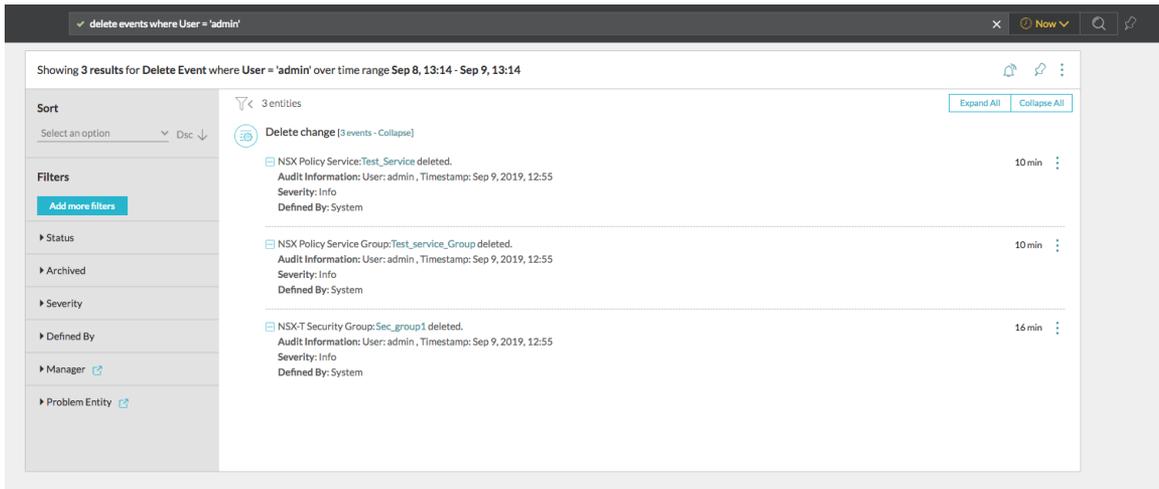
- Discovery



■ Properties Change



■ Delete



**Note** The Delete events are not available on the entity dashboard. However, you can search the event to see the audit information.

### Sample queries to see audit information

- `events where user = username`
- `discovery events where user = username`
- `delete events where user = username`
- `change events where user = username`

# Working with Pins

# 10

All parts of the application are denoted as pins; fundamental units that can be saved and grouped to club data that you think can be useful together and to share them with other members of your team. You can pin a search query and also the pins that are available for an entity.

To add a pin, click the Pin icon. All your saved pins are displayed in Pinboards section which can be invoked by clicking the Pinboard icon in the header.

This chapter includes the following topics:

- Pins
- Pinboards

## Pins

The information on each entity page is segregated into pins. All the entity pages are made up of pins and each pin contains a specific bit of information related to the entity.

The pins have the following features:

- You can maximize the view of any pin using the More options ( ) button and also view more information about the pin using the **Help** option.
- Pins can also contain filters so that you can drill down on the data that is displayed on the pin.
- Many pins also contain the Export as CSV option so that you can export the data present in the pin in CSV format. You can select the specific properties and the number of CSV rows you want to export in the dialog that is displayed.

---

**Note** The Export to CSV feature for the flow data takes more than 30 minutes for 180,000 flows when all the fields are selected.

---

## Types of Pins

Most of the pins that are available in the software can be categorized into the following:

### Metrics Pins

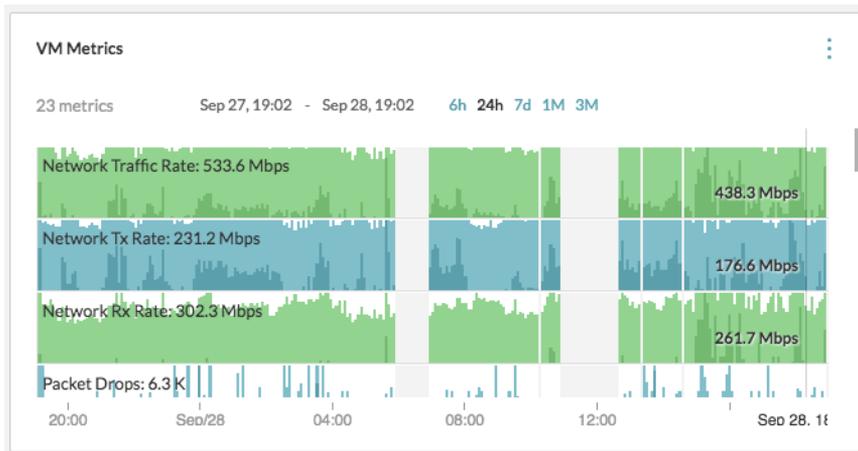
The metrics pins show important metrics pertaining to the selected entity.

The metrics pin uses the cubism graph to display data by dividing each graph into two bands and transposing the higher value one over another. The higher values hence are shown in darker color and are easier to discern.

You can select the particular metric to display from the drop-down present in the pin header and change the selection of entities to display.

The time range can be modified by either using the range presets or entering in a custom date/time.

An example of the Metrics pin is the VM Metrics pin. This pin displays the network traffic rate, network Tx rate, network Rx rate, and packet drops of the virtual machine.

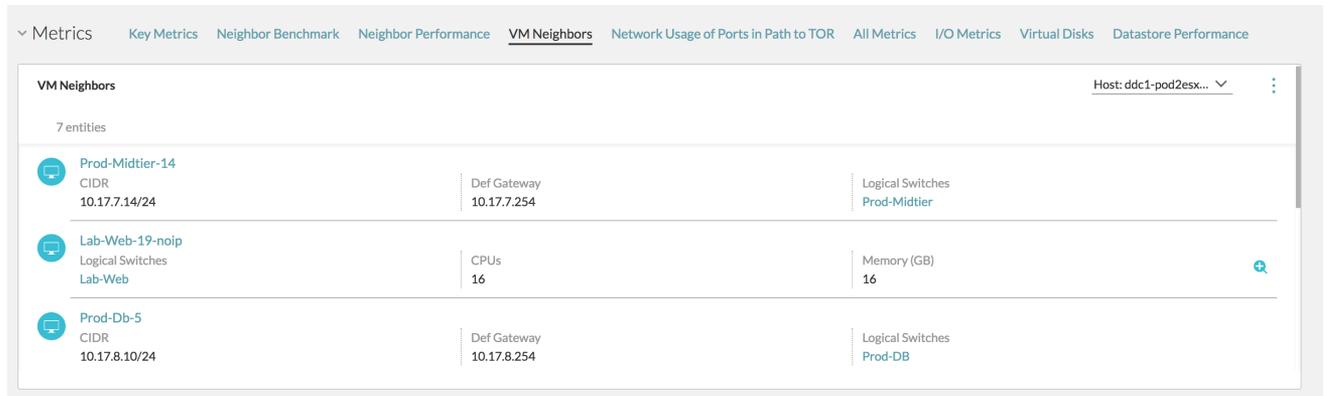


## Entity List View Pins

The Entity List View pins display a list of entities that are grouped by a common theme. The list shows important attributes per entity.

You can see more attributes of a particular entity by clicking the magnify icon on the far right. Clicking the entity name takes you to the entity page.

Like other pins, the filter icon houses various facets with which the list can be filtered. An example of the Entry List View pin is the VM Neighbors pin. By default, this pin shows the VMs that are present on the same host. You can also filter VMs by Security Groups, VXLAN, and datastore.

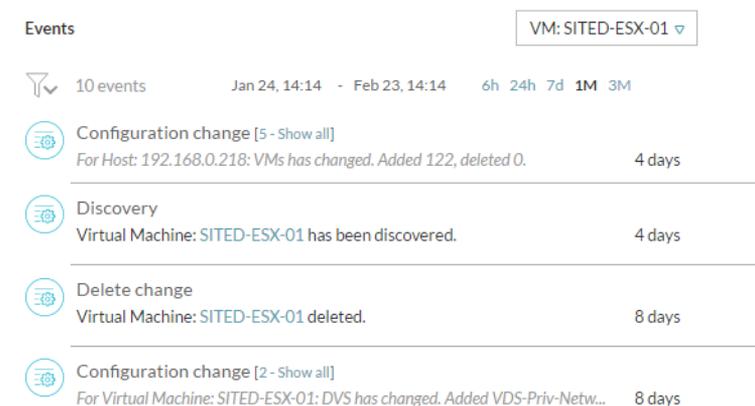


## Event View List Pins

The Events List view pins provide a list of events in chronological order for a particular entity or group of entities (that can be selected from the dropdown in the pin header).

You can change how far back in time (from now) should the pin show the events by using the available presets or entering in a custom date/time. Other filter options such as **Event Status** and **Event Type** can be selected by clicking on the filter icon.

In the below image, the events related to VM Prod-db-vm21 and its related entities are displayed. You can click the entity name to view events from other related entities. Using the filter you can filter the events based on their status and their types. An event can be a change or a problem related to an entity.

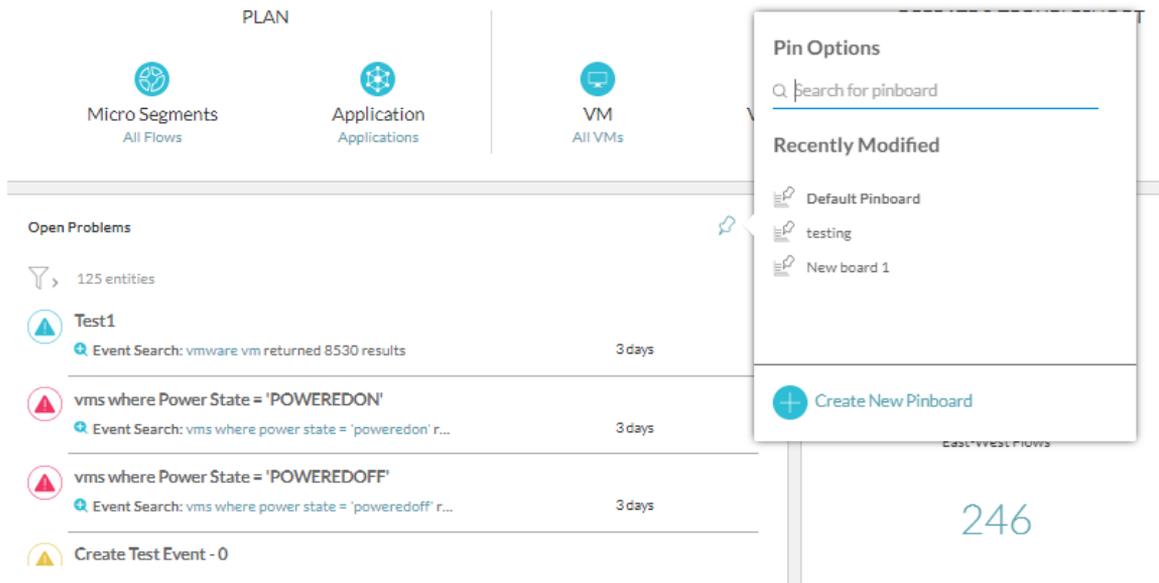


You can search for the events by using the events search query. You can search for open or closed events with queries such as open events or closed events. You can also search for problems with the same modifiers.

## Pinboards

You can pin any widget from any page on a pinboard to make it easier to access and share data.

## To Create a Pinboard



- 1 Click the pin icon on the widget that you want to pin.
- 2 Click **Create New Pinboard** in the pop-up window.

### Note

- If you have not created any pinboard yet, you can select **Default Pinboard** from the **Recently Modified** list.

**Note** The Default Pinboard provides the look and feel of a typical pinboard to the first-time user. It helps the user to get familiar with the layout and features of a pinboard. It cannot be shared or deleted. You can copy pins from the default pinboard to any custom pinboard.

- The maximum number of entries that you can see in the Recently Modified list is 15.
- The maximum number of pinboards that you can create across all the users is 500.

**Note** The total number of pinboards include the custom pinboards, shared pinboards, and the default pinboards.

- The maximum number of pins per pin board is 20.

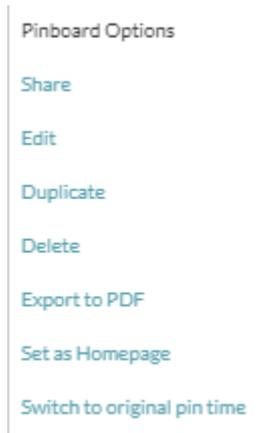
- 3 In the **Create pinboard** window, enter the name and the description for the new pinboard. Click **Create and Pin**.

### Note

- The name of the pinboard has to be unique across the system.
- The maximum number of characters allowed for the pinboard name is 100. You can use only letters, numbers, and spaces in the name of the pinboard.

- 4 The **Pinboard created** message appears. Click **Share Now** to share the pinboard immediately.
- 5 To pin the widget to an existing pinboard, select the pinboard under **Recently Modified** and click **Pin**. The message **Your Pin has been added** with the link to the respective pinboard appears.

## To Access the Pinboard Options



Click **More Options** on the topmost right corner of a pinboard to access the **Pinboard Options**.

---

**Note** You can see all the pinboard options only if you have created the pinboard or if you have shared with any other user with the **View and Edit** permissions. Any other user can only see **Export to PDF** and **Switch to original pin time** options.

---

You can perform the following actions on the pinboard:

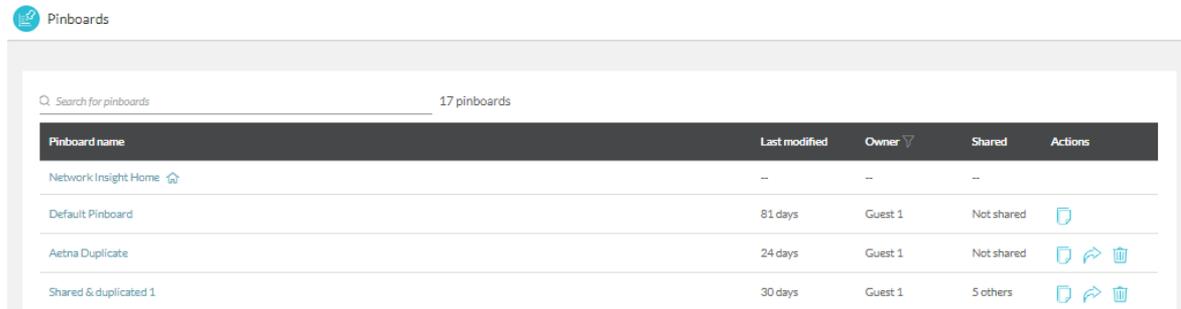
- You can share the pinboard with any other existing vRealize Network Insight user.
- You can edit the name of the pinboard and the pin on the pinboard.
- You can rearrange the pins on a pinboard. Their positions are persisted.
- Click **Delete** to delete that particular pinboard.
- Click **Export to PDF** to export the information on the pinboard as a PDF report. For more details, see [Export as PDF](#).
- To view the data on the pin at the time it was pinned, click **Switch to original pin time**. This feature enables you to view the data for each pin at the time it was created.

## To Work with the Timeline Slider for a Pinboard

vRealize Network Insight supports a timeline slider on pinboards. To view the pinboard data for any desired time, you can use the timeline slider. When a pinboard loads, it loads all the pins for the current time (**Now**).

## To View the Pinboard Library

If you are an admin user, you can see the **My Pinboards** tab and the **All Pinboards** tab in the Pinboard library as shown in the following image. If you are a member user, you can see a list of the pinboards in the Pinboard library.

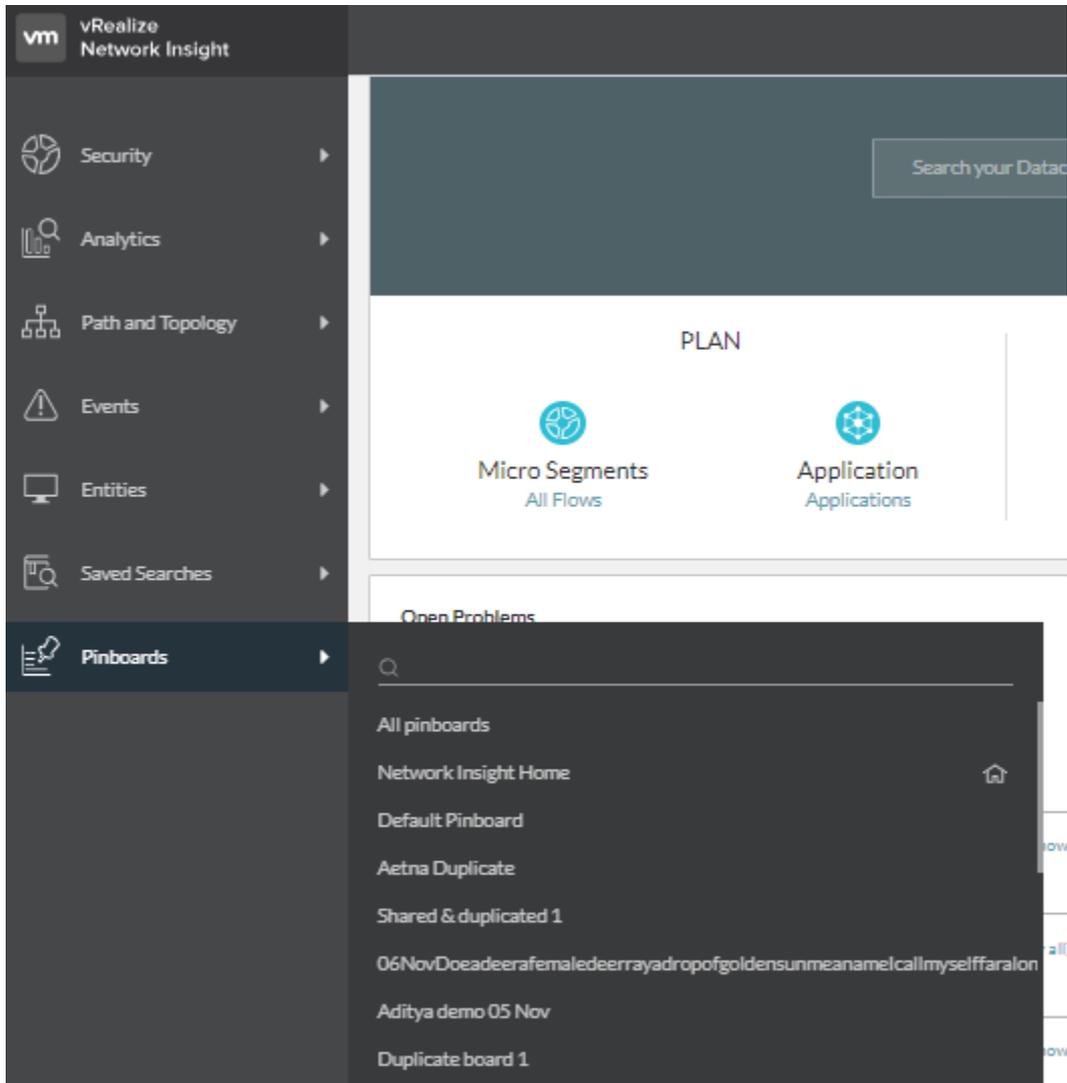


- 1 On the left navigation bar of the home page, click **Pinboards**.
- 2 Click **All Pinboards** to view all the pinboards in the system.
- 3 You can view the list of the existing pinboards in the navigation bar. The list has the same items as that of the **My Pinboards** tab in the pinboard library. The last modified pinboard appears at the top of the list. Click the pinboard that you want to view.

---

**Note** It takes some time for the pinboard to appear in this list after it is created.

---



4 You can also perform a search for a pinboard in the library.

## To Copy a Pin

- 1 Click the pin icon on the widget.
- 2 Select the pinboard to which you want to copy the pin.
- 3 Click **Add**.

## Sharing and Collaboration of Pinboards

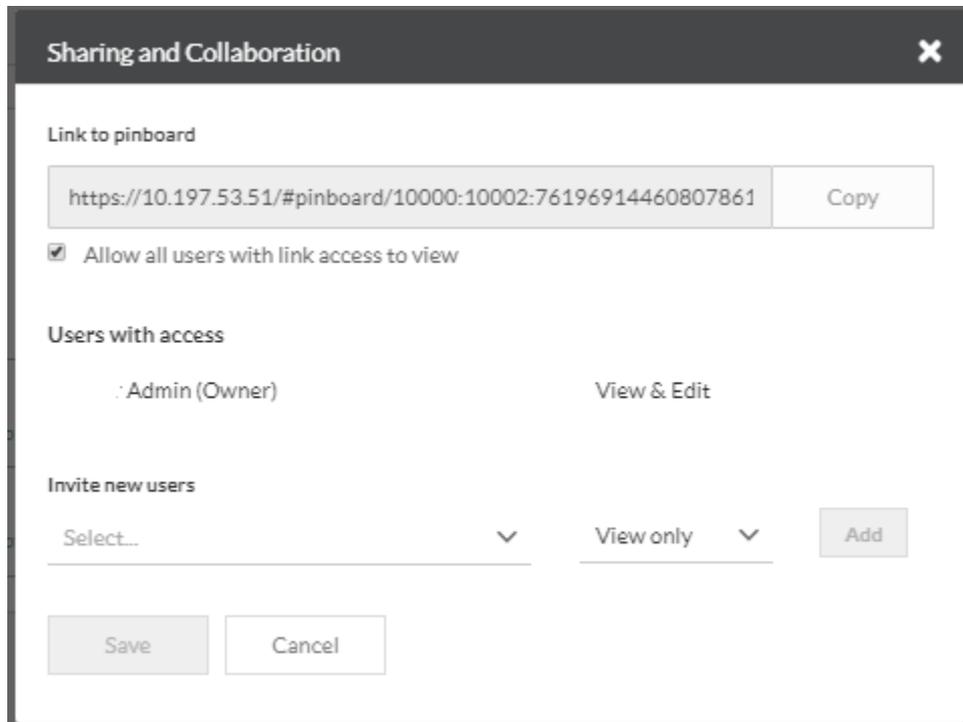
You can share the pinboards that you create with other users. An admin user can view and delete any pinboard. The following are the features of sharing and collaboration of pinboards:

If you have created a pinboard, you can view, edit, or delete it irrespective of you being an admin or a member user.

Table 10-1.

Pinboard Owner	Shared With	Privilege	Possible Action
Admin	Admin	View and Edit	View, Edit, Delete
	Admin	View only	View, Delete
	Member	View and Edit	View, Edit
	Member	View only	View
Member	Admin	View and Edit	View, Edit, Delete
	Admin	View only	View, Delete
	Member	View and Edit	View, Edit
	Member	View only	View

**Note** If a pinboard must be deleted and the user who created is not available, the admin user can delete it.



To share a pinboard:

**Procedure**

- 1 Click **More Options** on the pinboard that you want to share.
- 2 Click **Share**.

- 3 You can also share a pinboard from the **Pinboard Library** by clicking the share icon under **Actions**.
- 4 By default, the link sharing is enabled. You can share the link of a pinboard with any user who is logged in.
- 5 You can add the users with whom you want to share the pinboard. You can specify the privileges such as `view` and `view and edit` to a particular user.

---

**Note** The user who has only the view privilege cannot share the pinboard with any other user.

---

- 6 Click **Save** to save the share and collaboration changes that you have made.
- 7 You can view the sharing and collaboration information for any pinboard through either of the following options.
  - In the **Pinboard Library**, you can view the sharing information in the **Shared** column for a particular pinboard.
  - Click the pin icon on the widget. Point to any of the pinboards listed under **Recently Modified** to see the details regarding the owner and with whom it has been shared.

## To Set A Pinboard as the Home Page

You can set a pinboard of your choice as your default home page.

### Procedure

- 1 Navigate to the desired pinboard that you want to set as the home page.
- 2 Click **Pinboard Options**. Click **Set as Home Page**.

This particular pinboard is set as the home page.

---

**Note** Once you set a pinboard as the home page, the **Set as Home Page** option on that pinboard is disabled.

---

- 3 You can also set a particular pinboard as the default home page from the **My Preferences** page under **Settings**.

- If you want to view the previous home page, then click **Network Insight Home** under **Pinboards** on the left navigation panel. The message **Do you want to set Network Insight Home as Homepage?** pops up. If you want to revert back to the default home page, click **Set Homepage**. Click **Dismiss** to close the message.

---

### Note

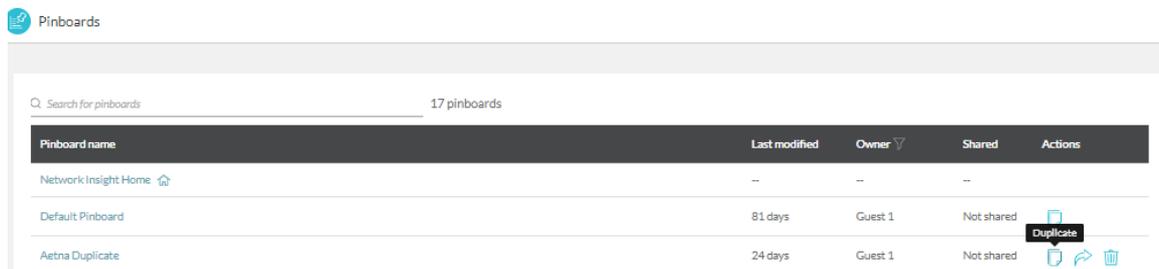
- If you delete a pinboard that you have set as your home page, then the default home page is reset to **Network Insight Home** page. If you are the owner of the pinboard that you are deleting, a message pops up for confirmation for deletion.
  - If another user has set the pinboard that you have created as the home page, when you delete it, the home page reverts back to **Network Insight Home** automatically for that user.
- 

## Results

## To Duplicate a Pinboard

### Procedure

- Click the duplicate icon under **Actions** for the particular pinboard in the list in the pinboard library.



- A pop-up comes up where you have to enter the name of the pinboard. The description is same as that of the original pinboard. Click **Duplicate**.

**Note** The name of the pinboard is mandatory. The **Duplicate** button is not enabled until you enter the name.

- If you are trying to duplicate a pinboard that is shared, then you can opt to retain the source pinboard users and permissions. Select **Keep source pinboard users and permissions** if you want to retain them.

**Note** If the pinboard that you want to duplicate is shared with you with read-only access, you will not see the **Keep source pinboard users and permissions** option.

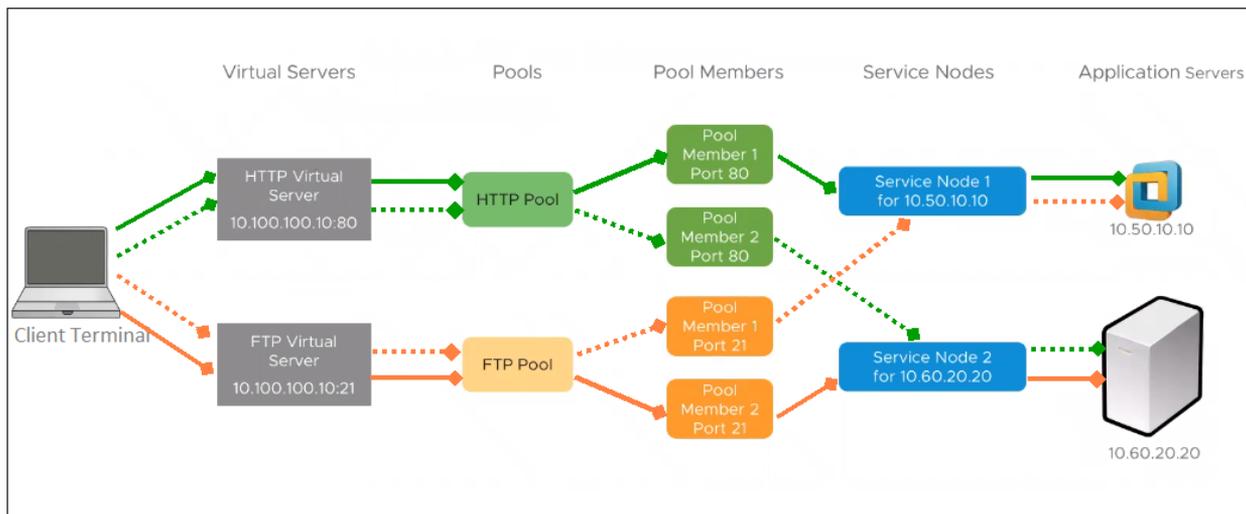
The user who duplicates a pinboard becomes the owner of the new pinboard.

# F5 as a Load Balancer

# 11

To support and enable the load balancing feature of F5, vRealize Network Insight has been added with required components or entities.

## Overview of a F5 Load Balancer and its Components



- Application Servers - The machines where the applications are hosted. For example, if you have a web server, your server runs on application servers (physical or a virtual server).
- Service Nodes - F5 represents the application servers as service nodes. So, service node has the same IP address or FQDN of the application server. Each service node can have multiple applications.
- Pool Members - A logical entity. Each application in a service node is represented by a pool member, which has the same IP address or FQDN of the service node. To identify different applications, the pool members embed the port number with the IP address of the Service Nodes.
- Pools - All pool members that serve one application are grouped as a pool.
- Virtual Servers - A public facing IP address of the application. So, the clients that want to use an application connects to the virtual server IP address (For example, 10.100.100.10) and port number (80 or 21).

- Client Terminal - The connection starts from a client terminal, which is a virtual machine.

The client request connects to the virtual server, which decides the pool members based on the pool. Pool members, then, forwards the request to the application server (VM or physical server).

---

**Note** A single application server can serve multiple requests from different ports and different service nodes.

---

vRealize Network Insight provides additional advantages with the load balancing feature support:

- Enables to identify whether the application servers are physical servers or the virtual machines.
- Allows you to debug or troubleshoot the problems easily by providing visibility into the application server (host or VM) information such as configuration, performance, flows.
- Provides visibility into physical or virtual networking components in an application where the load is distributed.
- Raises alerts for any issue in the environment and also helps to detect the reason for the issue. For example, application is not responding because the service node VM is down.
- provides an end to end flow visibility.

This chapter includes the following topics:

- [NSX-V as a Load Balancer](#)

## NSX-V as a Load Balancer

Starting from the 4.2 release, vRealize Network Insight supports and enables the load balancing feature of NSX-V.

Here is the list of metrics currently supported:

- Virtual Server
  - Total Bytes In
  - Total Bytes Out
  - Current Sessions
  - Total Sessions
- Pool
  - Total Bytes In
  - Total Bytes Out
  - Current Connections
  - Max Connections
  - Total Connections

Currently in vRealize Network Insight only the VMs are supported as pool members.

# Working with Network and Security

# 12

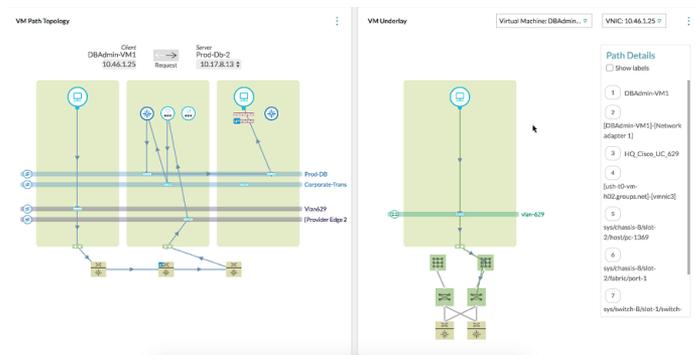
This chapter includes the following topics:

- Network Visibility
- Security

## Network Visibility

### Path Topology

The path topology draws a detailed connection that exists between any two virtual machines in your environment.



The topology involves both Layer 3 and Layer 2 components. This topology can be viewed using the search query `vm_name_1 to vm_name_2`. If a path exists, the VM-to-VM path visualization proceeds to populate all the components that exist between `vm_name_1` to `vm_name_2` and also draws an animated path. If the routers are physical, then they are shown outside the boundary.

In the Path topology, you see the VM-to-VM path between the source and the destination. If the default path is not configured between the VMs, an error message appears to inform that the path is not defined or the router interface is not found.

In case of Kubernetes, the Path topology displays the path for the following scenarios:

- Kubernetes Service to Kubernetes Service
- Kubernetes Service to Kubernetes Pod

- Kubernetes Pod to Kubernetes Pod

---

**Note** The path involving physical devices is not supported.

---

The **Path Via Load Balancer** option lists all the load balancers that are used in between the path from the selected source and the destination VM. To see the path between the VMs via a particular load balancer, select the load balancer name from the list. If you hover the mouse on load balancer component on the path topology, you see the following details:

- Virtual Server name
- Load Balancer IP address
- Port number
- Load Balancer Algorithm
- The default gateway that was taken from the load balancer.

You can also see the routing components on the path topology.

If you hover your mouse on any of the routers, edges, or LDRs that are involved in the path, the complete routing or NAT information is shown.

The VM Underlay section that is on the right side of the VM Path topology shows the underlay information of the VMs involved and their connectivity to the top of the rack switches and the ports involved. For Kubernetes entities, VM Underlay displays the VM or the Kubernetes node information on which the Pod resides.

In the VM underlay section, the components are labeled if you select **Show labels** under **Path Details**. In this section, the drop-down list at the top shows the endpoint VMs and the active VMs at the edges. For each edge VM, the neighboring drop-down list shows the ingress and the egress interface IP addresses. Based on the selection, the underlay path for that particular interface is shown.

You can also reverse the path direction using the arrows on top of the topology map.

The topology map gives more visibility regarding the ports involved in the VM-VM path. In the **Path Details** section, the name of the actual port channel is shown.

---

**Note** There is no complete visibility for layer 2 on the physical front. If a packet is traversing from one switch to another, there may be multiple switches involved. But the topology does not show the switches in the underlay network.

---

## AWS VM-VM Path

The VM-VM path for AWS provides the path visibility between the on-premises VMs and the AWS EC2 instances.

Currently, vRealize Network Insight supports the following scenarios:

- AWS intra-VPC VM-VM path: This scenario involves the communication between the VMs of the same subnet or different subnets in a particular VPC.
- AWS inter-VPC VM-VM path through the peering connection: This scenario involves the communication between the VM of one VPC to the VM of another VPC through a peering connection.
- AWS VM to Internet: The VM in a VPC communicates to Internet through the Internet Gateway.
- AWS VM to the data center VM through AWS VPN connection: In this scenario, the VM in a VPC communicates to the VM in a data center through the AWS VPN connection. vRealize Network Insight supports SDDC and NSX-V and NSX-T data centers for this scenario.

---

**Note**

- The hybrid path topology to NSX-T and NSX-V data centers works only when the NSX-T and NSX-V edge routers are configured with a public IP address.
- vRealize Network Insight does not support the VM underlay topology for AWS.

---

**Note**

An example of the AWS VM-VM path for the AWS inter-VPC VM-VM path through the peering connection is as follows:

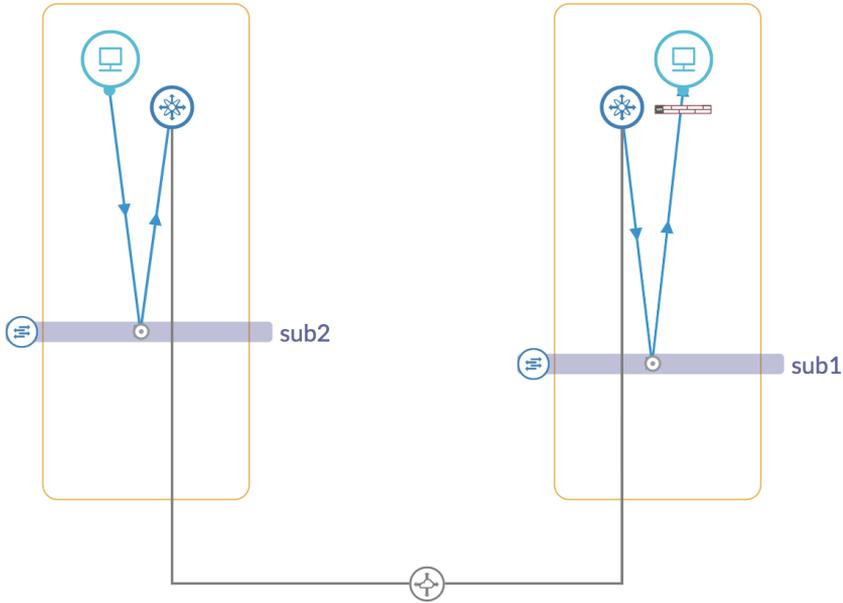
VM Path Topology i



Client  
sub2-vm2  
10.1.2.191

Request

Server  
sub1-vm1  
192.168.1.199



   AWSVPC

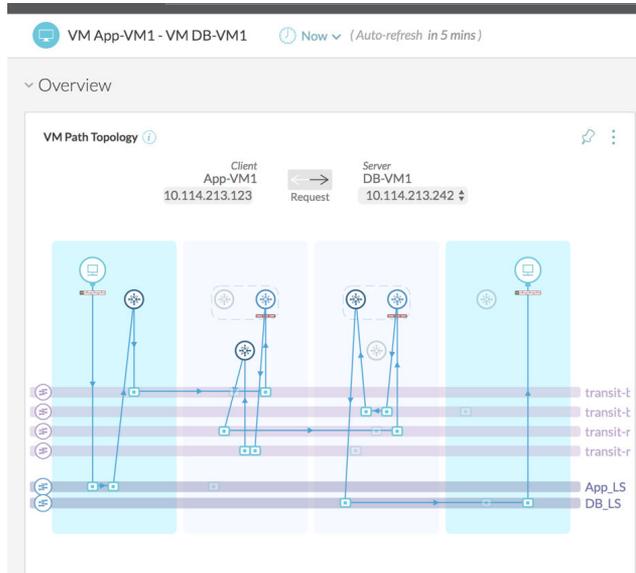
You can view the properties of the peering connection by pointing to its icon in the VM-VM path.

You can search the following entities concerning the AWS VM-VM path:

- AWS Subnet
- AWS Route Table
- AWS Virtual Private Gateway
- AWS Internet Gateway
- AWS VPN Connection
- AWS VPC Peering Connection

## NSX-T

An example for VM-VM path for NSX-T is as follows:



The blue color represents the host node and the grey color represents the edge node. The icons used in the VM path topology are listed on the right side of the screen along with the labels under Path Details. The distributed routers are shown in the same color irrespective of their tiers. The color of the service router in the topology diagram changes as per the associated tier. All the tier 1 components are shown at the same level and all the tier 0 components are shown at a different level. In NSX-T, the edge firewalls are depicted in the diagram.

To plan security for the NSX-T network, you can select the scope as **NSXT Layer2 Network** and use the following query:

```
plan NSX-T Layer2 Network '<NAME_OF_NSX_T_LOGICAL_SEGMENT>'
```

You can also obtain the same result by performing the following steps:

- Select **Security** from the Navigation side bar.
- Select **NSX-T Layer2 Network** as the scope from the drop-down menu.

### Note

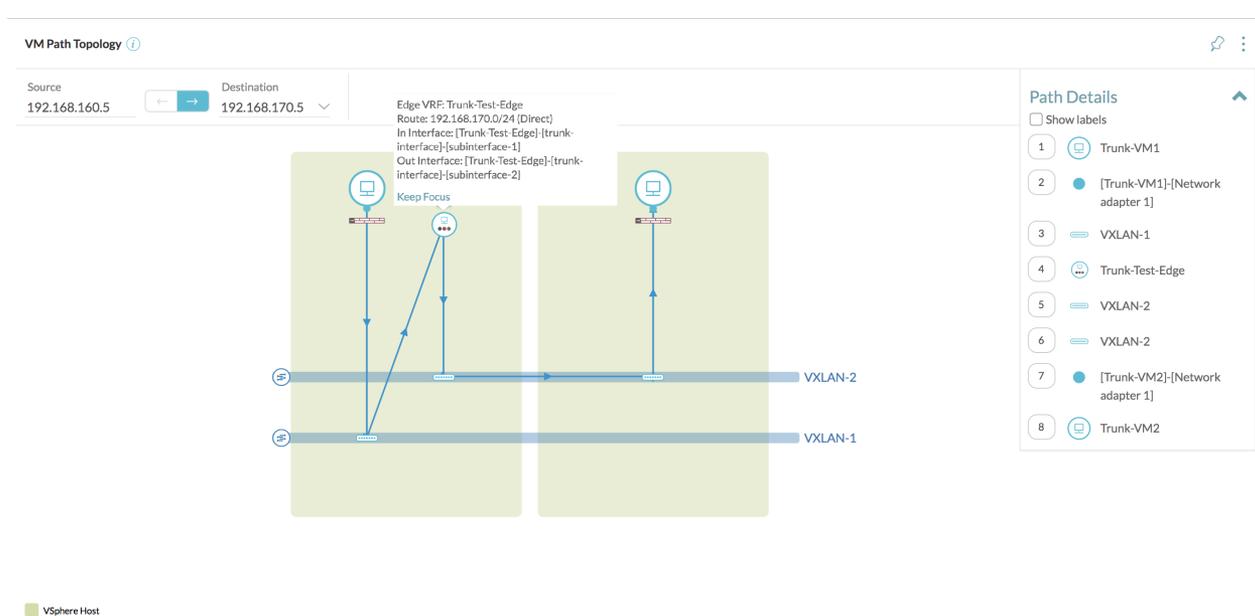
- NSX-T related entities such as **NSX-T L2 Network** and **Tags** are available in the scope. You can use these NSX-T related entities in planning, micro-segmentation, and application definition.
- In The **Group by** drop-down menu, **NSX-T Security Group** is a part of **Security Tag** and **Logical Segment** is part of **VLAN/VXLAN**.

## NSX-V Edge Trunk Interface VM-VM Path

In vRealize Network Insight, you can view the VM-VM path and the VM to Internet path when the DVPG is connected to trunk vNIC of the NSX Edge and the sub interfaces are connected to VLAN or VXLAN.

Following is an example of VM-VM path through the NSX Edge:

**Note** vRealize Network Insight does not support the underlay information for the trunk interfaces of the Edge VM.



## Support for NAT in NSX-T

Currently, vRealize Network Insight supports SNAT, DNAT, reflexive rules in the flows and the VM to VM Path.

To obtain all the NAT rules in NSX-T, use the `NSX-T Edge NAT Rule` query. To obtain all the NAT rules in both NSX-V and NSX-T, use the `NAT Rules` query.

### Considerations

- For the VM-VM path with the NSX-T logical routers where NAT service is enabled, vRealize Network Insight won't show the NSX-T edge firewall rules correctly for such a path.
- The NAT rules that are configured on the uplink interface of the VMware NSX-T Tier Router only are processed by the VM to VM path. If NAT is configured on any NSX-T Tier router, then it is expected that there are NAT rules for all the VMs attached to the router else the VM to VM path and the path to Internet does not work. Instead, it displays a missing rule message.
- vRealize Network Insight supports the nested NAT hierarchy.
- NSX-V and NSX-T based edges only are supported.
- vRealize Network Insight supports the edges and the tier routers with NAT-defined uplinks.
- vRealize Network Insight supports SNAT rules with range. However, DNAT must be one-to-one mapping between the destination and translated IP addresses (Parity with NSX-V).

- vRealize Network Insight does not support the following use cases:
  - a In NSX-T, NAT rules can be applied at the service level. For example, in NSX-T, L4 ports set is a type of service and the associated protocols can be TCP or UDP. So in the VM-VM path, the service level details are not supported.
  - b Any port level translation is not supported.
  - c The SNAT match destination address and the DNAT match source address are not supported. Use the SNAT match destination address as the destination IP address when you specify the SNAT rule. Use the DNAT match source address as the source IP address when you specify the DNAT rule. For example, if there is a destination IP address mentioned in the SNAT rule, vRealize Network Insight applies the SNAT rule irrespective of whether the packet has the destination address as the destination IP address.
  - d NSX-T Edge firewall has implications for the data path when enabled with the NAT service on the same logical router. If a flow matches both NAT and Edge firewall, the NAT lookup result takes precedence over firewall. So the firewall is not applied to that flow. If the flow matches only a firewall rule, then the firewall lookup result is honored for that flow.

## VMware SD-WAN VM-VM path

In vRealize Network Insight, you can view the VM-VM path for your VMware SD-WAN deployment.

vRealize Network Insight supports the following scenarios:

- IP to IP Path: Both the IPs must be directly on the VLAN behind a VMware SD-WAN Edge.
- IP to Internet / IP to Unknown IP: Source IP must be directly on the VLAN behind a VMware SD-WAN Edge.

---

**Note** Internet or Unknown IP is any IP that is not discovered in vRealize Network Insight.

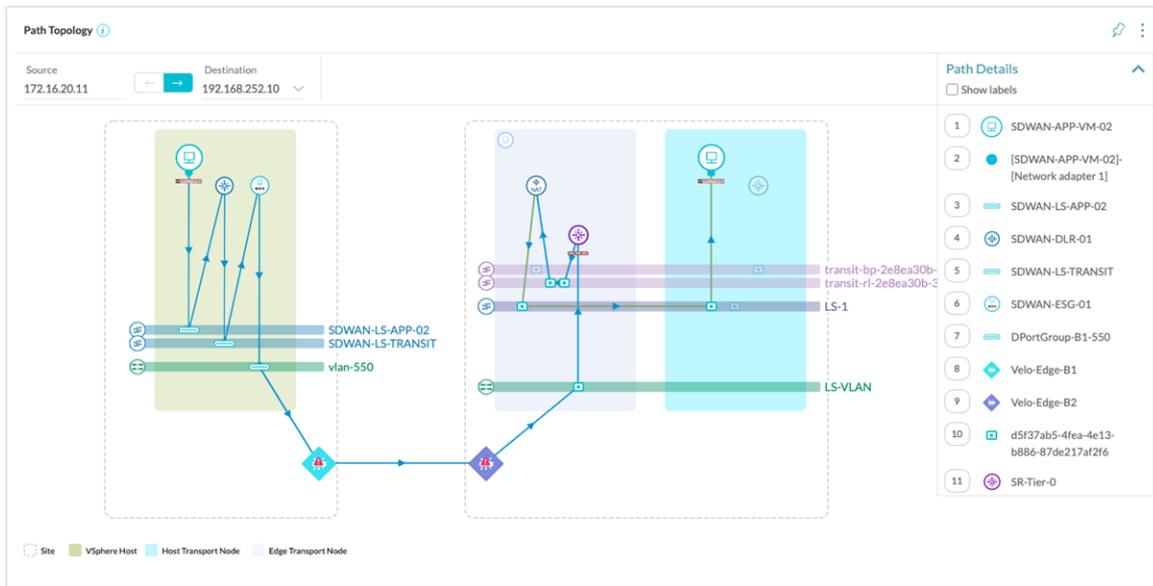
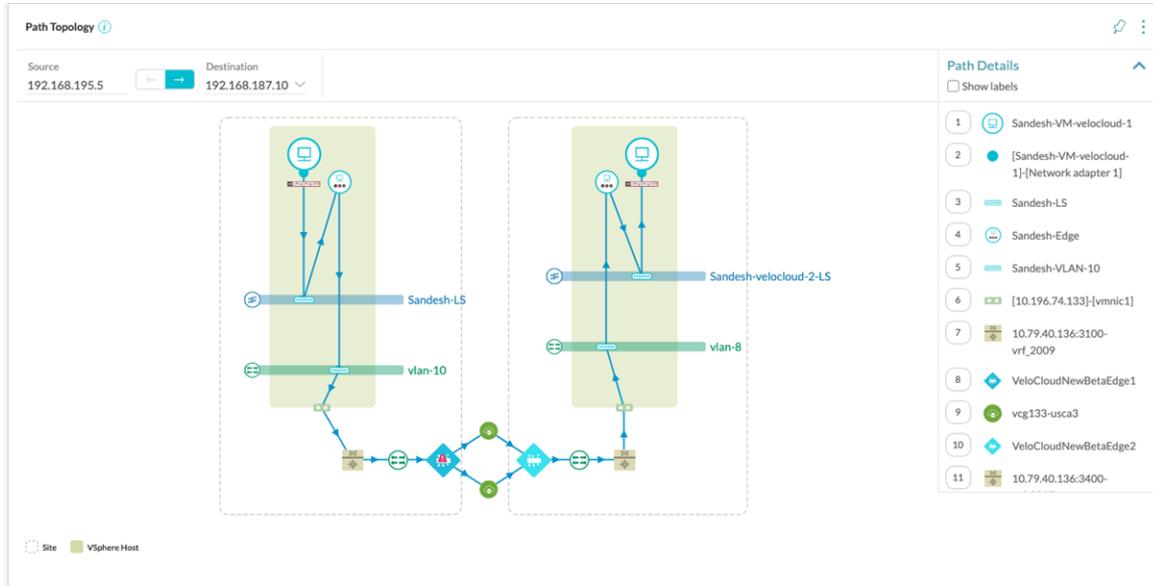
---

- VM to IP, IP to VM, or VM to VM Path:
  - VMs only in NSX/NSX-T data centers are supported. VMs in VMware Cloud on AWS, Amazon Web Services, and AZURE are not supported.
  - VMware SD-WAN Edge must be connected to a Physical/Virtual Router in the data center via a VLAN.
- **Note** If the VMware SD-WAN Gateway's configured for the source VMware SD-WAN Edge and the destination VMware SD-WAN edge are not same, then the path is shown via the gateways of the Source VMware SD-WAN Edge.

If Branch to Branch VPN between the VMware SD-WAN Edges is via a VMware SD-WAN Cluster then all the members of the cluster are shown in the path.

---

Following are few example of VMware SD-WAN VM-VM path:



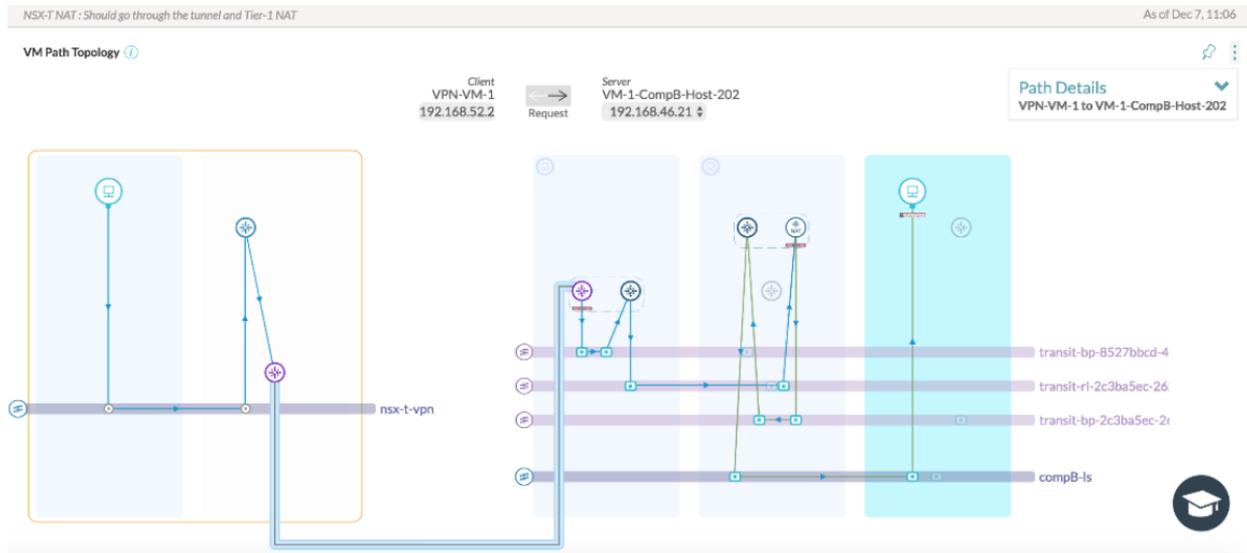
## VMware Cloud on AWS: VM-VM Path

vRealize Network Insight supports the following hybrid paths in VMware Cloud on AWS:

- VMware Cloud on AWS and VMware Cloud on AWS
- VMware Cloud on AWS and NSX-T
- VMware Cloud on AWS and NSX-V
- VMware Cloud on AWS and AWS
- Intra VMware Cloud on AWS

For all VMs present in VMware Cloud on AWS, the underlay information is shown only until the segment on which the VM lies because the underlying physical elements of the network are abstracted out by VMware Cloud on AWS and no visibility is present at that level.

A sample VMware Cloud on AWS and NSX-T VM-VM path is as follows:



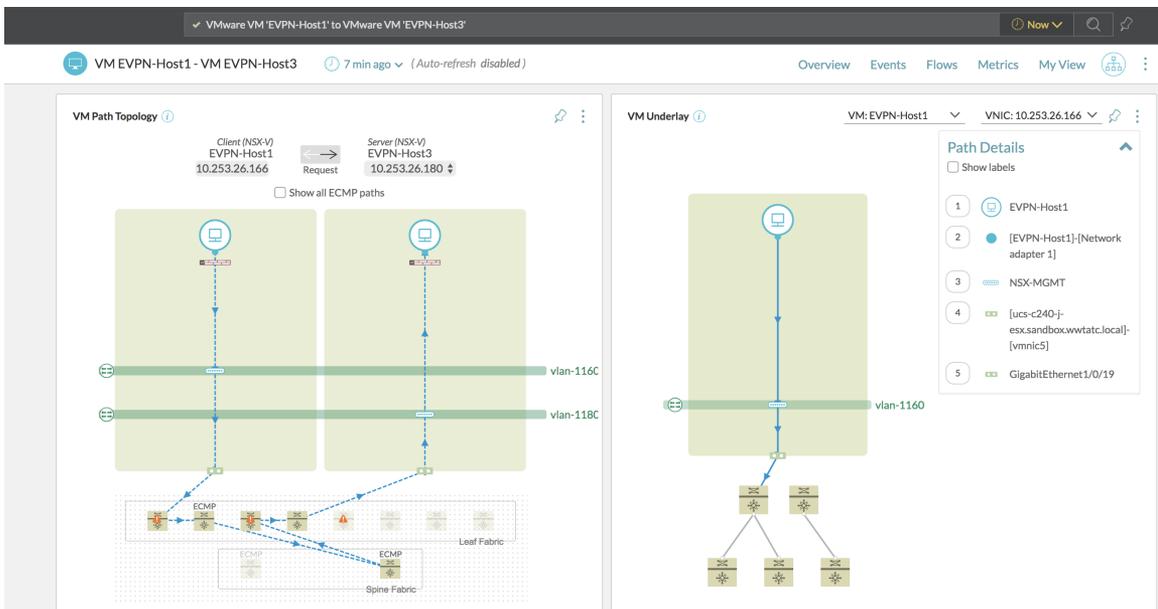
The dark blue line depicts the tunnel.

## Support for the Cisco BGP-EVPN Mode

vRealize Network Insight supports the fabric of Cisco 9000 switches configured in the Cisco BGP-EVPN configuration mode for the Enterprise edition only. vRealize Network Insight does not support the switch models other than Cisco Nexus 9000 with the Cisco BGP-EVPN configuration.

Each Cisco Nexus 9000 switch that is a part of the fabric is individually added as a data source. To view all the spine or leaf switches in the fabric, use the `switches where role is set query`.

A sample VM-VM path for the Cisco BGP-EVPN mode is as follows:

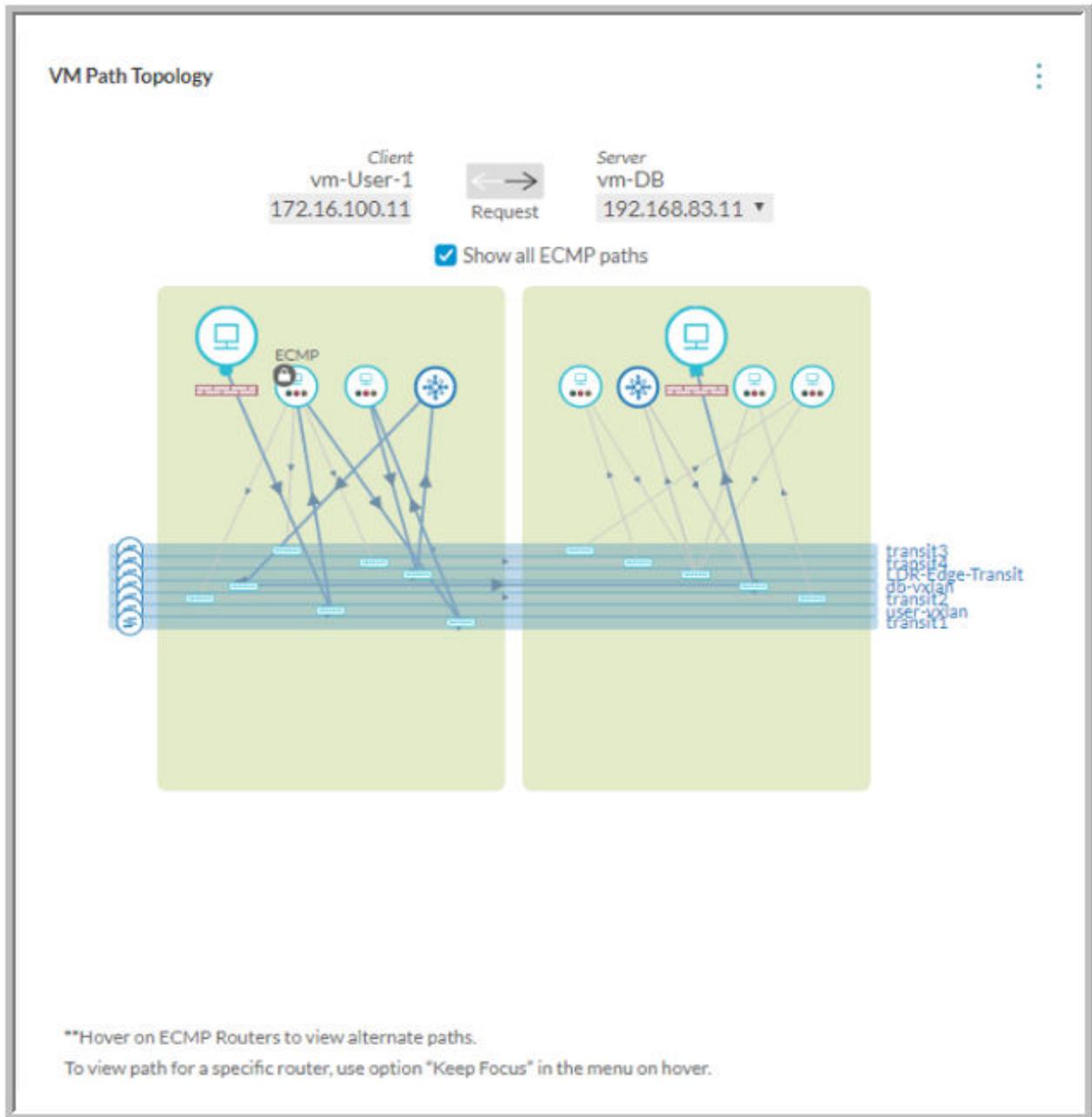


## Support for Equal-Cost Multi-Path (ECMP) Route

vRealize Network Insight provides ECMP support in the VM-VM path.

The VM-VM path shows the following information on ECMP:

- The multiple ECMP paths from source to destination
- The routers on which ECMP occurs
- The possible outgoing paths for a given router (VRF)
- The route for the possible path



In the preceding figure, you can see the ECMP-enabled routers. If you point over them, the additional paths are shown. Also, you can create a path by selecting and locking the routers as per your requirement. If you want to view all the ECMP paths between the two VMs, select the **Show all ECMP paths** option in the topology diagram.

If you want to view the path for a particular router, point on the router and click **Keep Focus**. The paths specific to the router is shown.

## Support for the L2 Bridges

The L2 or the VLAN bridges create a single broadcast domain from multiple VLANs. In the previous releases, if the VM-VM path involved an L2 bridge between two or more VLANs, the VM-VM path did not work. From this release onwards, vRealize Network Insight supports L2 bridging. Currently, this feature is supported only for the Cisco ASA routers.

## Monitoring Various States of BGP

vRealize Network Insight supports the monitoring of the states of BGP. You can view the neighbors of BGP for an NSX edge or a logical router.

### Procedure

- 1 Enter `Routers` in the search bar.
- 2 To view the results of particular NSX manager, filter by selecting `NSX Manager` from the left panel,
- 3 Expand the particular router from list to see the details.
- 4 You can view the following information under **BGP neighbours**.
  - IP Address
  - Remote AS
  - Weight
  - Keep Alive Time
  - Hold Down Time
  - Status

---

### Note

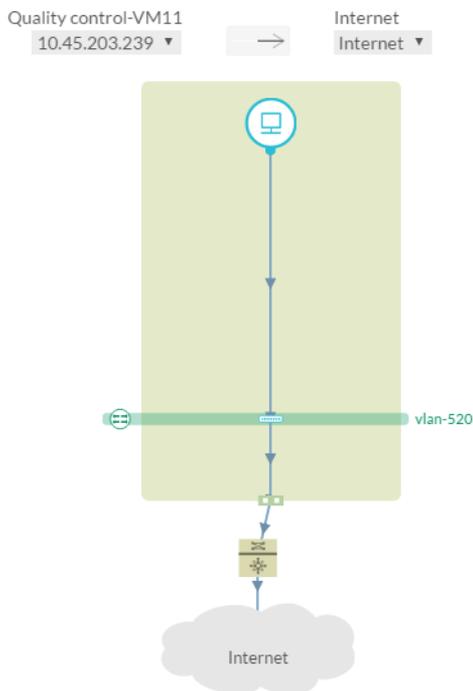
- If the information regarding the neighbors is not fetched, then the `Status` is shown as `Unknown`.
  - If the `Status` is not `Established.up`, then the `One or more BGP neighbours are not in established state` event is raised for that edge. You can also view this event when you search for `problems`.
-

## Path to Internet

For each virtual machine that is present in your environment, vRealize Network Insight shows you how the VM is connected to the Internet by using an animated path in the **Path to Internet** pin.

The path populates all the components (both virtual and physical) that exist between the virtual machine and the Internet. It draws an animated path that connects each component in a sequence. The path direction can also be reversed by using the arrows situated above the visualization.

Point your mouse pointer to the entity icons to get their addressable names. Click an icon on the path to display a summarized account of its primary attributes. You can also maximize the pin to see the path details.



## Security

### Cross vCenter NSX

In a cross-vCenter NSX environment, you can have multiple vCenter Servers, each of which must be paired with its own NSX Manager.

One NSX Manager is assigned the role of primary NSX Manager, and the others are assigned the role of secondary NSX Manager. The primary NSX Manager is used to deploy a universal controller cluster that provides the control plane for the cross-vCenter NSX environment. The secondary NSX Managers do not have their own controller clusters. The primary NSX Manager can create universal objects, such as universal logical switches. These objects are synchronized

to the secondary NSX Managers by the NSX Universal Synchronization Service. You can view these objects from the secondary NSX Managers, but you cannot edit them there. You must use the primary NSX Manager to manage universal objects. The primary NSX Manager can be used to configure any of the secondary NSX Managers in the environment.

The following Universal objects are supported:

- Universal LDR
- Universal Transport Zone
- Universal Logical Switch
- Universal Firewall Rule
- Universal Security Group
- Universal IPSets
- Universal Service
- Universal Service Groups
- Universal Segment Range

## Palo Alto Networks

vRealize Network Insight supports the Palo Alto Panorama firewall.

---

**Note** vRealize Network Insight does not support the Palo Alto Panorama integration with multiple NSX managers.

---

To add the Palo Alto Panorama in vRealize Network Insight, the Palo Alto Networks user must have **admin role** with XML API access. Do the following steps to add an admin role for XML API.

- 1 Select **Panorama > Admin Roles**.
- 2 Click **Add** to add a new admin role.
- 3 The Admin Role Profile window opens.
- 4 Enter the name to the role and select **Panorama**.
- 5 Click the **Web UI** tab and disable all entries.
- 6 Click the **XML API** tab and disable all entries, except **configuration** and **Operational Requests**.
- 7 Click **OK** to close the window.  
The new admin role appears in the list.
- 8 Click **Commit**.
- 9 Assign this role to an administrator account or create a new user and assign this role to the new user.

The Palo Alto Network features that are supported by vRealize Network Insight are as follows:

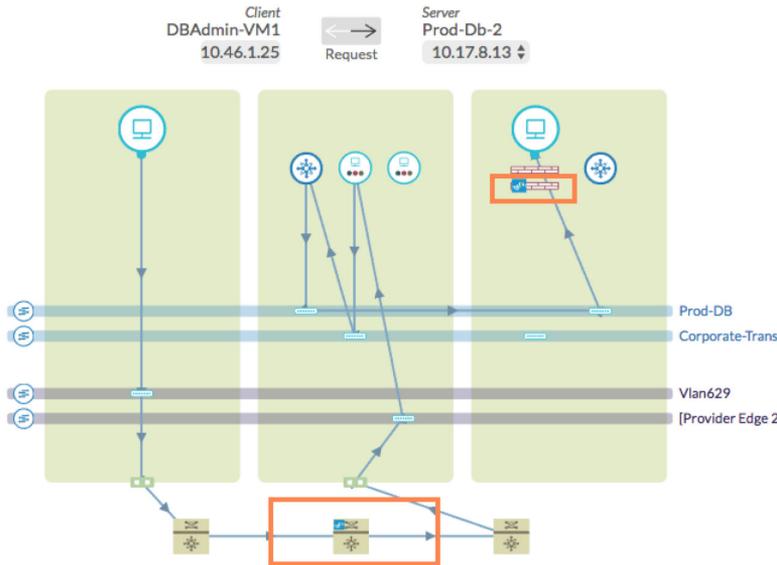
- Interrelation of Palo Alto and NSX entities: The VM membership of the address and the address group of Palo Alto Networks is computed based on the IP Address to VM mapping. This membership info can be queried as follows:
  - `VM where Address = <>`
  - `Palo Alto address where vm = <>`
  - `VM where Address Group = <>`
  - `Palo Alto address group where vm = <>`
- Query: You can perform a query for all the Palo Alto entities that are supported by vRealize Network Insight. All the entities are prefixed by Palo Alto. Some of the queries are as follows:

**Table 12-1.**

Entities	Queries
Palo Alto Address	<code>Palo Alto address where vm = &lt;&gt;</code> <code>VM where Address = &lt;&gt;</code>
Palo Alto Address Group	<code>Palo Alto address group where Translated VMs = &lt;&gt;</code> <code>VM where address group = &lt;&gt;</code>
Palo Alto Device	<code>Palo Alto Device where Version = &lt;&gt;</code> <code>Palo Alto Device where connected = true</code> <code>Palo Alto Device where family = 'PA-5060'</code>
Palo Alto Physical Device	<code>Palo Alto Physical Device where model = 'PA-5060'</code>
Palo Alto VM Device	<code>Palo Alto VM Device where model = 'PA-VM'</code>
Palo Alto Device Group	<code>Palo Alto Device Group where device = &lt;&gt;</code> <code>Palo Alto Device Group where address = &lt;&gt;</code> <code>Palo Alto Device Group where address group = &lt;&gt;</code>
Palo Alto Service	<code>Palo Alto service where Port = &lt;&gt;</code> <code>Palo Alto service where Protocol = &lt;&gt;</code>
Palo Alto Service Group	<code>Palo Alto service group where Member = &lt;&gt;</code>
Palo Alto Policy	<code>Palo Alto Policy where Source vm = &lt;&gt; and Destination vm = &lt;&gt;</code> <code>Palo Alto Policy where Source IP = &lt;&gt; and Destination IP = &lt;&gt;</code>
Palo Alto firewall	<code>Palo Alto firewall where Rule = &lt;&gt;</code>
Palo Alto Zone	<code>Palo Alto Zone where device = &lt;&gt;</code>
Palo Alto Virtual System	<code>Palo Alto Virtual System where Device = &lt;&gt;</code> <code>Palo Alto Virtual System where Device Group = &lt;&gt;</code>

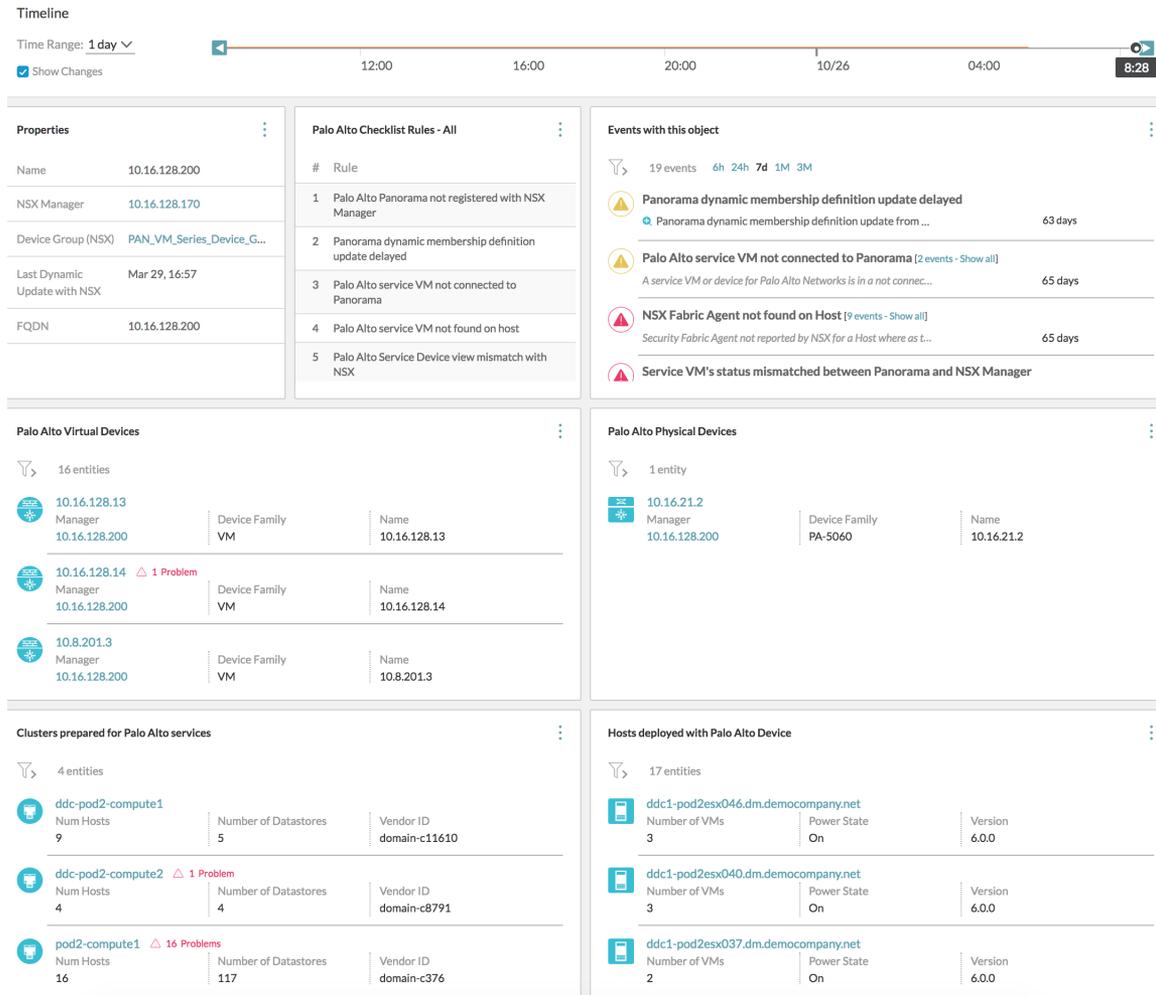
**Note** Other than the queries, you can also use facets to analyze the search results.

- VM to VM Path: As a part of the VM-VM topology, vRealize Network Insight displays the Palo Alto VM Series firewall on the host. The applicable rules are displayed when one clicks the firewall icon. If a firewall device (routing device) of Palo Alto Network is also present in the path, then that device is also displayed. When you click the device icon, you can see the basic information such as a Routing table, Interfaces, and a table containing the applied firewall rules.



- You can view some system events related to the following scenarios for Palo Alto Networks:
  - Palo Alto device not connected to Panorama (manager)
  - NSX Manager not in registered with Panorama
  - NSX fabric agent not found on the ESX for palo alto device
  - Palo alto device not found on Panorama for NSX fabric agent
  - Out of sync security group membership data
- You can create and register multiple service definitions in Panorama with a given NSX manager. If different ESXi clusters have workloads that require the VM-Series firewall to handle traffic differently, then multiple service definitions are created. Each service definition has an associated device group from which the policies are picked. While displaying the VM-VM path in vRealize Network Insight, the correct set of policies based on the cluster information of the VM should be considered.

## A sample Palo Alto Manager dashboard

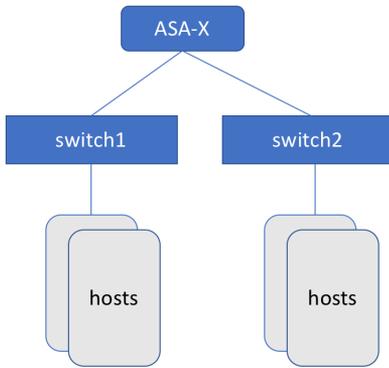


## Cisco ASA Firewall

vRealize Network Insight supports Cisco ASA firewall.

The features for Cisco ASA firewall are as follows:

- vRealize Network Insight supports only Cisco ASA-X series.
- vRealize Network Insight does not support Firepower modules.
- Currently, vRealize Network Insight supports Cisco ASA operating system version 9.4.
- vRealize Network Insight does not support the cluster deployment of Cisco ASA.
- vRealize Network Insight does not support the high availability of Cisco ASA.
- vRealize Network Insight does not support Cisco ASA if it is directly connected to the host. A topology that is similar to the following one is supported:



- Cisco ASA access rules of only `Extended` type are supported. Other access rule types like `Standard`, `WebType`, `EtherType`, and so on are not supported.
- The Cisco ASA firewall in the VM-to-VM path does not display applicable access rules if the firewall is configured in the `Transparent` mode.

### Example

You can perform a query for all the Cisco ASA entities that are supported by vRealize Network Insight.

**Table 12-2.**

Entities in Cisco ASA	Keywords	Sample Queries
Security Context	ASA Firewall ASA Security Context	<code>asa firewall where access group = &lt;&gt;</code>
Access Rule	ASA Access Rule	<code>asa access rule where source ip = &lt;&gt;</code> <code>asa access rule where destination ip = '192.168.2.2'</code> <code>asa access rule where port = &lt;&gt;</code> <code>asa access rule where interface = &lt;&gt;</code>
Access Group	ASA Access Group	<code>asa access group where interface = &lt;&gt;</code>
Network Object / Network Object Group	ASA Network Object ASA Network Object Group	<code>asa network object where ip address = &lt;&gt;</code> <code>asa network object group where ip address = &lt;&gt;</code>
Service Object / Service Object Group	ASA Service Object ASA Service Object Group	<code>asa service object where port = &lt;&gt;</code> <code>asa service where protocol = &lt;&gt;</code> <code>asa service object group</code>

## Check Point Firewall

vRealize Network Insight supports the following Check Point Management Servers:

- Check Point Security Manager (SmartCenter)
- Check Point Multi-Domain Manager (MDS / Provider-1)

The Check Point Management Server should accept API access from the Collector IP address. It can be set up from **Manage & Settings > Blades > Management API > Advanced Settings**.

If Check Point MDS is added as data-source, vRealize Network Insight fetches data from all the user-defined domains and the global domain.

vRealize Network Insight uses Check Point public Web API for fetching the data from the Check Point management server. If the VSX gateway is attached to the management server, we use SSH-based CLI commands to fetch the VSX-managed Virtual System VS routing table to support display of the VS gateway in the VM-VM path.

vRealize Network Insight requires read-only privileges for the Web-API access for fetching most of the Check Point data. There are few exceptions as follows:

- If a non-VSX physical gateway is attached to the management server, the user should have read-write access privileges for the Web API. This is required to fetch the gateway routes for using the `run script` Web API for the VM-VM path computation.
- If a VSX gateway is attached to the management server, the user should have the SSH access with the same password. In addition, the user should have access to the CLI command `vsx_util view_vs_conf`. This command is used to fetch the VSX gateway routes for the VM-VM path computation.
- For MDS server IP as data-source, the user should have the Web API access to all domains including the MDS domain and the global domain. It is required to fetch rules, policy packages and other data from all the domains.

---

### Note

- vRealize Network Insight supports Check Point firewall version R80 and R80.10.
  - For the VM-VM path, vRealize Network Insight does not support the VSX cluster containing the virtual switch and the virtual router.
- 

You can perform a query for all the Check Point entities that are supported by vRealize Network Insight. All the entities are prefixed by `Check Point`. Some of the queries for Check Point are as follows:

Table 12-3.

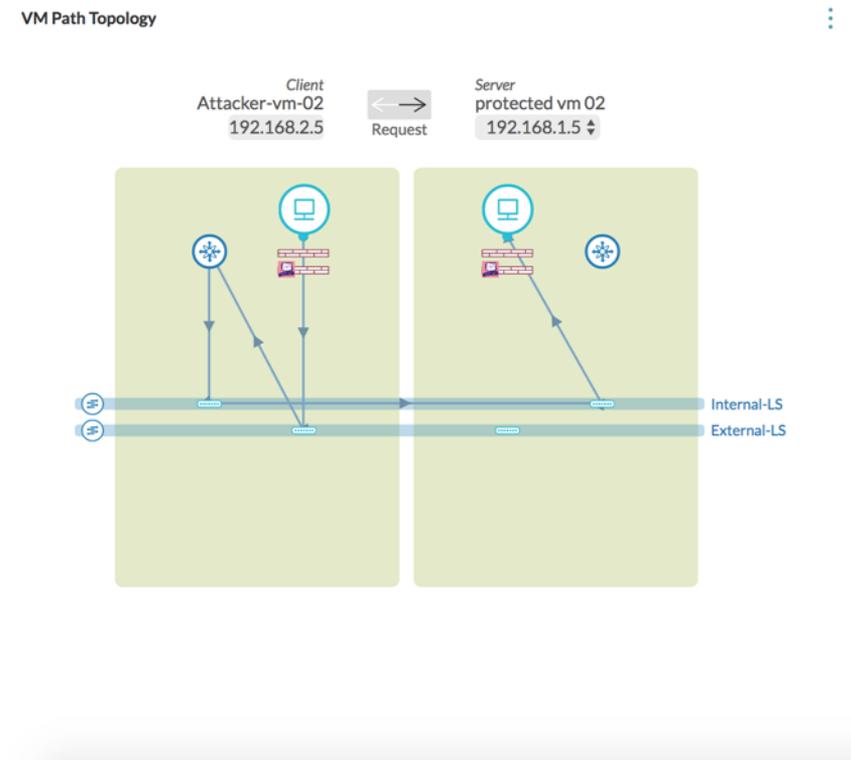
Entities in Check Point	Keywords	Queries
IPset	Check Point Address Range Check Point Network	vm where Address Range = <> vm where Address Range = <> Check Point Address Range where Translated VM = <>
Grouping	Check Point Network Group	Check Point Network Group where Translated VM = <> vm where Network Group = <>
Service/ Service Group	Check Point Service Check Point Service Group	Check point service where Port = <> Check point service where protocol = <>
Access Layer	Check Point Access Layer	Check Point Policy where Access Layer = <>
Domain	Check Point Domain	check point domain where ip address = <> check point policy where domain = <> check point access layer where domain = <>
Gateways and Gateway Cluster	Check Point Gateway Check Point Gateway Cluster	Check Point Gateway Cluster where Policy Package = <>
Policy Package	Check Point Policy package	Check Point Policy where Policy Package = <> Check Point Policy Package where Rule = <>
Policy	Check Point Policy	Check point policy where source ip = <> and Destination IP = <> Rule where source ip = <> and Destination IP = <> (will display other rules- nsx, redirect along with check point policies in the system)

A sample Check Point Manager dashboard is shown as follows:

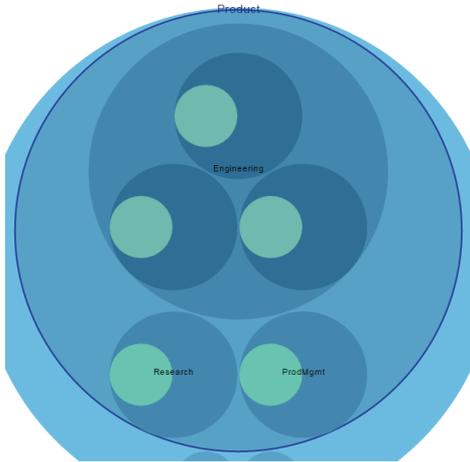
The screenshot displays the vRealize Network Insight interface for a specific object. At the top, a 'Timeline' section shows a time range of '1 day' with a 'Show Changes' button. The timeline itself shows several events, including 'NSX Fabric Agent for Check Point not found on Host' and 'Configuration Change'. Below the timeline, there are two main sections: 'NSX Fabric Agents For Check Point' which lists two entities with their respective Manager, Host, and Version information, and 'Clusters prepared for Check Point services' which shows a 'New Cluster' with 2 hosts and 2 datatypes. The interface is clean and uses a light blue and grey color scheme.

In a VM-VM topology diagram, you can see the Check Point Service VMs on a host to signify the Check Point rules applied on the particular traffic. The VSX-managed Virtual System (VS) gateway can be seen in the VM-VM path as a physical gateway. The list of applicable Check Point policies is displayed when you click the gateway icon.

**Note** For the VM-VM path, vRealize Network Insight does not support the VSX cluster containing Virtual Switch and Virtual Router.







## Policy-Based VPN

vRealize Network Insight supports policy-based VPN in VMware Cloud on AWS, NSX-T, and NSX-V. The following scenarios are supported for the policy-based VPN:

- VPN tunnel between the VMware Cloud on AWS public IP address and NSX-V/NSX-T/AWS public IP address
- VPN tunnel from the VMware Cloud on AWS public IP address and the corporate firewall public IP address to a 1:1 NAT between the corporate firewall public IP address and the internal NSX Edge

---

**Note** vRealize Network Insight does not support the scenario of the VPN tunnel from the VMware Cloud on AWS ending on a corporate firewall and no NAT configured with the internal NSX edge.

---

## Policy-Based VPN Entities

vRealize Network Insight fetches data for the `L3 VPN Session` entity which is the actual VPN configured in the data center.

Here are the search terms for the policy-based VPN entities:

**Table 12-4.**

Search terms	Description
Policy based VPN	All policy-based VPN sessions for VMware Cloud on AWS, NSX-V, and NSX-T
VMC Policy based VPN	VMware Cloud on AWS policy-based VPN sessions
NSX-T Policy based VPN	NSX-T policy-based VPN sessions
NSX Policy based VPN	NSX policy-based VPN sessions

## NSX Distributed Firewall Inactive Rules

vRealize Network Insight supports the visibility of the NSX distributed firewall rules for which there have been no flows for some time. These rules are known as inactive rules. Such rules use memory heap and can cause security issues. To monitor these inactive rules, vRealize Network Insight provides the following two widgets in the **Security** dashboard:

---

**Note** To view the Security dashboard, enter **Security** in the search bar.

---

- Unused NSX Firewall Rule: This widget lists all the NSX firewall rules where no flow is reported on the given time. You can also use the following search query to retrieve these rules:

```
nsx firewall rule where flow is not set
```

---

**Note** Ensure that you have enabled NSX Distributed Firewall IPFIX for the specified time.

---

## Fortinet Firewall

In vRealize Network Insight, you can view insight about Fortinet firewall.

vRealize Network Insight supports the following Fortinet entities -

- Fortinet Manager
- Fortinet ADOM - Fortinet Administrative Domain details
- Fortinet VDOM - Fortinet Virtual Domain details. vRealize Network Insight supports only Flow-based filtering is supported. Transparent mode is not supported.
- Fortinet Address - List of ADOM specific Addresses. vRealize Network Insight support ipmask, iprange, and NSX fabric connectors.
- Fortinet Address Groups - List of ADOM specific address groups
- Fortinet Dynamic Addresses - List of ADOM specific dynamic addresses (VDOM Mapped Addresses)
- Fortinet Dynamic Address Groups - List of ADOM specific dynamic address groups (VDOM Mapped Address Groups)
- Fortinet Dynamic Interfaces - List of ADOM specific dynamic interfaces.
- Fortinet Zones - List of ADOM specific zones.
- Fortinet Services - List of manual and auto generated services for each ADOM.
- Fortinet Service Groups - List of service groups for each ADOM.
- Fortinet Policy - Fortinet Policies for each ADOM. We currently support only IPv4 policies, Fortinet Global Header Policies, and Fortinet Global Footer policies.
- Fortinet Policy Packages - List of Policy packages. The policy packages name also contain the path to the policy package preceding the name of package.

- Fortinet Devices - List of Fortinet devices that are associated with the FortiManager.
- Fortinet Device Groups - List of Fortinet Device Groups specified by the user.

The followings are not supported:

- VM to VM path in NAT mode.
- VM to VM path for physical devices in transparent mode.
- Advanced (non-IP based) policy properties like User, User Group, Application, and Security Profile.

# Configuring Flows in vRealize Network Insight

# 13

This chapter includes the following topics:

- [Enabling IPFIX Configuration](#)
- [Flow Support for Physical Servers](#)
- [View Blocked and Protected Flows](#)
- [Network Address Translation \(NAT\)](#)
- [VMware Cloud on AWS Flows](#)
- [Create VPC Flow Log](#)
- [Sending Flow Records from F5 To vRealize Network Insight Collectors](#)

## Enabling IPFIX Configuration

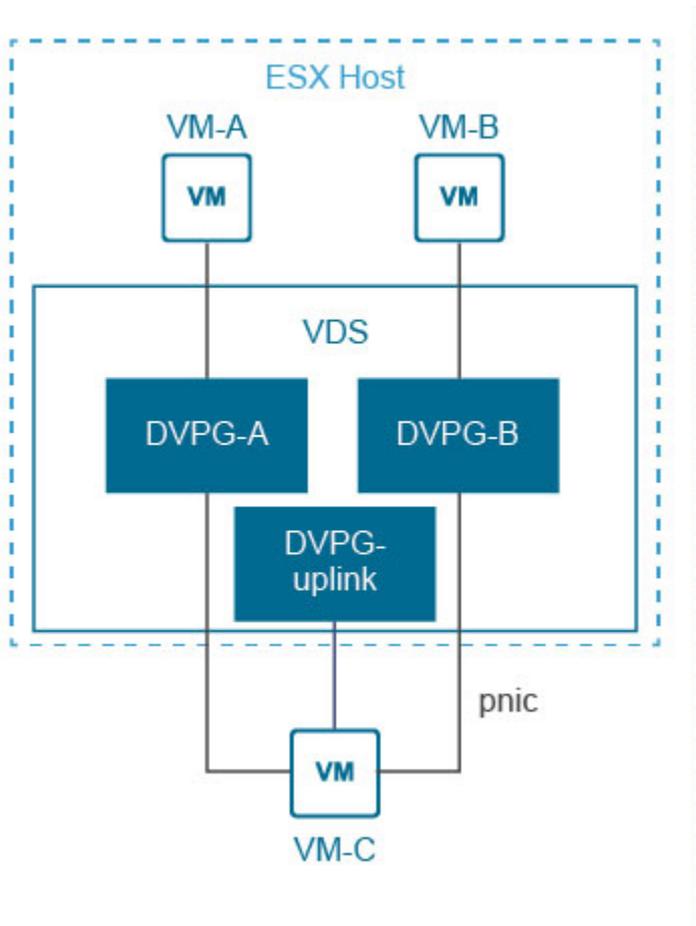
IPFIX is an IETF protocol for exporting flow information.

A flow is defined as a set of packets transmitted in a specific timeslot, and sharing the same 5-tuple values - source IP address, source port, destination IP address, destination port, and protocol. The flow information may include properties such as timestamps, packets/bytes count, Input/Output interfaces, TCP Flags, VXLAN ID, Encapsulated flow information, and so on.

## IPFIX Configuration on VDS and DVPG

A VDS in vSphere environment can be configured to export flow information using IPFIX. Flow monitoring has to be enabled on all the port groups attached to the VDS. If packets arrive on port X of a VDS and exit from port Y, a corresponding flow record is emitted if flow monitoring is enabled on port Y.

To analyze the complete information of any session, the IPFIX data about packets in both the directions is required. Refer the following diagram where VM-A is connected to DVPG-A and is talking to VM-C. Here DVPG-A will only provide data about the C→A packets, and DVPG-Uplink will provide data about A→C packets. To get the complete information of A's traffic, IPFIX should be enabled on DVPG-A, DVPG-uplink.



vRealize Network Insight Proxy VM has built-in collector/receiver for IPFIX flow information. You can enable the IPFIX information collection in the vCenter Data Source settings at various levels of granularity.

## Enabling IPFIX Configuration on VDS and DVPG

To enable IPFIX information at vCenter level:

### Procedure

- 1 Select **Enable Netflow (IPFIX)** when you are adding vCenter.
- 2 Select the VDS for which you want to enable IPFIX from the list of available VDS in vCenter.
- 3 A notification icon is displayed for the VDS where one of the hosts has unsupported version of ESXi. If vRealize Network Insight has detected that IPFIX is already configured for a VDS with some other IP address apart from vRealize Network Insight Proxy VM, then it displays the **Override** button. Click **Override** to view the list of DVPGs under that VDS.

- 4 The list of available DVPGs for the selected VDS is displayed. All the DVPGs are selected by default. Turn **Manual Selection** on to select specific DVPGs for which you want to enable IPFIX. Select the desired DVPGs and click **Submit**.

---

**Note** The DVPG with a notification icon denotes that it is the uplink DVPG and it has to be selected.

---

## VMware NSX IPFIX Configuration

VMware NSX IPFIX provides network monitoring data similar to that provided by physical devices and gives administrators a clear view of virtual network conditions.

VMware NSX virtualizes the network by allowing the network administrator the ability to decouple the network from physical hardware. This functionality makes it easy to grow and shrink the network as needed and making the network transparent to the applications traversing it.

By using NSX IPFIX in a virtualized network, the network administrators gain visibility into the virtual overlay network. The VXLAN IPFIX reporting using Netflow is enabled on the host uplink. It provides visibility on the VTEP that is encapsulating the packet, and the details of the VM that generated the inter-host traffic on an NSX Logical Switch (VXLAN).

The distributed firewall implements stateful tracking of flows. As these tracked flows go through a set of state changes, IPFIX can be used to export data about the status of that flow.

The tracked events include flow creation, flow denial, flow update, and flow teardown. The denied events are exported as syslogs.

### Enabling VMware NSX-V IPFIX

To enable VMware NSX-V IPFIX in vRealize Network Insight:

#### Prerequisites

- Ensure that you have the security administrator or enterprise administrator credentials.
- It is recommended that you enable VDS IPFIX on all the DVS and DVPGs from which NSX IPFIX data has to be collected. You can enable VDS IPFIX from the details page of the associated vCenter.

#### Procedure

- ◆ Select **Enable IPFIX** when adding or editing a NSX-V Manager data source.

### Enabling VMware NSX-T DFW IPFIX

To enable VMware NSX-T IPFIX in vRealize Network Insight:

## Prerequisites

- Ensure that you have any one of the following privileges:
  - `enterprise_admin`
  - `network_engineer`
  - `security_engineer`
- Ensure that the Distributed (DFW) firewall is enabled.
- Ensure that priority 0 is available for the Network Insight IPFIX profile. If there is another IPFIX profile with priority 0, then you have to change it to some other value.

## Procedure

- ◆ Select **Enable IPFIX** when adding or editing an NSX-T Manager data source.

## What to do next

After you enable IPFIX, vRealize Network Insight creates its own Network Insight Collector profile and Network Insight IPFIX profile on NSX-T. Ensure that you do not modify any of these profiles.

After enabling IPFIX on NSX-T, if the flows are not seen in vRealize Network Insight, then the following events may occur:

- Network Insight Collector Profile is not registered in the NSX-T Manager.
- Network Insight IPFIX Profile is not registered in the NSX-T Manager.
- Network Insight IPFIX Profile port number has changed.
- Network Insight Collector Profile does not match in the Network Insight IPFIX profile in the NSX-T Manager.

---

**Note** To resolve all the above issues, enable NSX-T IPFIX again.

---

- Network Insight IPFIX Profile priority is not zero in the NSX-T Manager.  
To resolve this issue, log into NSX-T Manager and set the priority of Network Insight IPFIX Profile to zero.
- Network Insight Collector IP cannot be added in existing Network Insight Collector Profile in the NSX-T Manager.  
Delete one of the collectors from the Network Insight Collector Profile in the NSX-T Manager and re-enable NSX-T IPFIX from data source page.
- Distributed Firewall is disabled in NSX-T Manager.  
Log into NSX-T Manager and enable the DFW firewall.

With NSX-T 2.4, after enabling IPFIX on NSX-T, if the flows are not seen in vRealize Network Insight Network Insight, then the following events may occur:

- Network Insight IPFIX Collector configuration is absent in NSX-T Manager collector profile.

- DFW IPFIX Profile is absent in NSX-T Manager.

To resolve these issues, enable DFW IPFIX again.

---

**Note** All the logical switches present in NSX-T are appended in the IPFIX profile within 10-15 minutes.

---

## Flow Support for Physical Servers

vRealize Network Insight supports the device that sends the NetFlow data of versions v5, v7, and v9. If the DNS Mapping and Subnet-VLAN mapping information is provided, vRealize Network Insight can enrich the NetFlow data with DNS Domains, DNS Host Names, Subnets, and Layer 2 networks. This feature is available for the Enterprise License users only.

To configure NetFlow in vRealize Network Insight, perform the following steps:

- 1 [Add a Physical Flow Collector for NetFlow and sFlow.](#)
- 2 [Configuring a NetFlow Collector in a Physical Device.](#)
- 3 [Import the DNS mapping file.](#)
- 4 [Configure Mapping Between Subnet and a VLAN.](#)

## Configuring a NetFlow Collector in a Physical Device

To send the NetFlow information to the vRealize Network Insight NetFlow collector, configure the physical device manually. Here are the steps for the configuration in most of the physical devices:

- 1 Create a flow record.

The required fields for a flow record are as follows:

- Mark the following fields as `Match`.
  - `ipv4 protocol`
  - `ipv4 source address`
  - `ipv4 destination address`
  - `transport source-port`
  - `transport destination-port`
  - `interface input`
- Mark the following fields as `Collect`.
  - `direction`
  - `counter bytes`
  - `counter packets`
  - `timestamp sys-uptime first`

- `timestamp sys-uptime last`
  - Mark the following field as `Match` or `Collect`. If not, skip it.
    - `transport tcp flags`
- 2 Create a flow exporter.
    - Provide vRealize Network Insight NetFlow Proxy IP and Port 2055.
  - 3 Configure the flow cache as follows:
    - Active timeout: 30 seconds
    - Inactive timeout: 60 seconds
  - 4 Create the flow monitor using the created flow record and flow exporter.
  - 5 Configure the monitor on each interface.

### Prerequisites

### Example

The sample steps to configure the physical devices are provided in the following sections:

- [Cisco 4500](#)
- [Cisco Nexus 1000v](#)
- [Cisco Nexus 9000](#)

---

**Note** The steps may vary from version to version and device to device.

---

## Cisco 4500

- 1 To create the flow record

```
configure terminal
flow record netflow-original
match ipv4 protocol
match ipv4 source address
match ipv4 destination address
match transport source-port
match transport destination-port
match interface input
collect transport tcp flags
collect counter bytes
collect counter packets
```

```
collect timestamp sys-uptime first
collect timestamp sys-uptime last
End
```

## 2 To create the flow exporter

```
configure terminal
flow exporter e1
destination <PROXY_IP>
transport udp 2055
end
```

## 3 To create the flow monitor

```
configure terminal
flow monitor m1
record netflow-original
exporter e1
end
```

## 4 To configure the timeouts

```
configure terminal
cache timeout inactive 30
cache timeout active 60
end
```

## 5 To configure the flow monitor for each interface on the ingress mode and the egress mode or at least the ingress mode

```
configure terminal
interface <INTERFACE_NAME>
ip flow monitor m1 unicast input
end
```

## Cisco Nexus 1000v

### 1 To configure timeouts

```
configure terminal
Active timeout 60
Inactive timeout 15
```

```
end
```

2 To configure the exporter

```
configure terminal  
  
flow exporter <EXPORTER_NAME>  
  
destination <PROXY_IP>  
  
transport udp 2055  
  
source <VSM_IP_OR_SUBNET>  
  
end
```

3 To configure the flow monitor for each interface:

```
configure terminal  
  
flow monitor <MONITOR_NAME>  
  
record netflow-original  
  
exporter <EXPORTER_NAME>  
  
end
```

4 To configure the flow monitor for each interface on the ingress mode and the egress mode or at least the ingress mode

```
configure terminal  
  
port-profile type vethernet <IF_NAME>  
  
ip flow monitor <MONITOR_NAME> input  
  
ip flow monitor <MONITOR_NAME> output  
  
.  
  
.  
  
end
```

## Cisco Nexus 9000

Here are some of the sample device commands for Cisco Nexus 9000:

1 To enable the NetFlow feature

```
configure terminal  
  
feature netflow  
  
end
```

2 To create flow record

```
configure terminal
```

```
flow record vrni-record
match ipv4 protocol
match ipv4 source address
match ipv4 destination address
match transport source-port
match transport destination-port
match interface input
collect transport tcp flags
collect counter bytes
collect counter packets
collect timestamp sys-uptime first
collect timestamp sys-uptime last
End
```

### 3 To create flow exporter

```
configure terminal
flow exporter vrni-exporter
destination <PROXY_IP>
transport udp 2055
version 9
source <INTERFACE_NAME>
end
```

### 4 To create the flow monitor for each interface

```
configure terminal
flow monitor vrni-monitor
record vrni-record
exporter vrni-exporter
end
```

### 5 To configure timeouts

```
configure terminal
cache timeout inactive 30
cache timeout active 60
```

```
end
```

- 6 To configure the flow monitor for each interface on the ingress mode and the egress mode or at least the ingress mode

```
configure terminal
interface <INTERFACE_NAME>
ip flow monitor vrni-monitor input
end
```

## Enriching Flows and IP Endpoints

You can import the DNS mapping and the subnet-VLAN mapping information through the UI.

The flow information is enriched with the following types of information based on the import of the DNS data and the specification of subnet-VLAN mappings.

- Source DNS Domain
- Source DNS Host Name
- Destination DNS Domain
- Destination DNS Host Name
- Source L2 Network
- Source Subnet network
- Destination L2 Network
- Destination Subnet network

The IP Endpoint information is enriched with the following types of information based on the import of the DNS data and the specification of subnet-VLAN mappings.

- DNS Domain
- DNS Host Name
- FQDN
- L2 Network
- Subnet network

For more information on enriching flows through the DNS information, refer [Import the DNS mapping file](#).

For more information on enriching flows through the Subnet-VLAN mapping, refer [Configure Mapping Between Subnet and a VLAN](#).

---

### Note

- The DNS mapping and subnet information are enhanced only for the physical IPs. No subnet or DNS mapping information is associated with any virtual NIC.
  - The information is enriched only for flows that have been seen by vRNI after this information has been imported.
- 

## Search for Physical to Physical Flows

You can search for the physical to physical flows based on the following attributes:

- Source DNS Host
- Destination DNS Host
- Source DNS Domain
- Destination DNS Domain
- Source Subnet Network
- Destination Subnet Network

You can search for Physical-Physical flows based on the following attributes. A few examples of flow search query using the enriched DNS and Subnet-VLAN mapping information are as follows:

```
bytes,Dns Domain,Dns Host,12 network of flows where flow type = 'Physical-Physical'
```

```
bytes,Dns Domain,Dns Host,12 network of flows where flow type = 'Source is VM' and flow type = 'Destination is Physical'
```

```
bytes,Dns Domain,Dns Host,12 network of flows where flow type = 'Source is Internet' and flow type = 'Destination is Physical'
```

## View Blocked and Protected Flows

The NSX-IPFIX integration enables the visibility of the blocked and protected flows in the system.

The basic filters in the Micro-Segmentation Planning page are as follows:

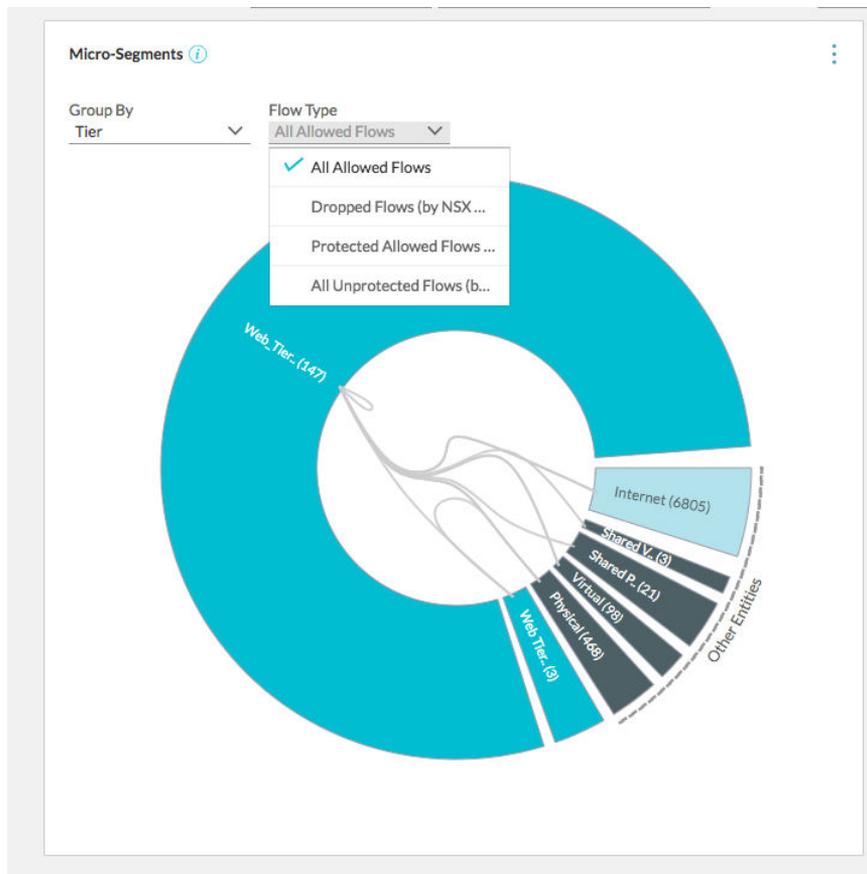
- All Allowed Flows: This option is selected by default. To see all the flows for which the action in the firewall rules is set to **Allowed**, select this option.
- Dropped Flows: This option helps to detect the dropped flows and planning the security in a better way.
- All Protected Flows: This option helps to detect all the flows which have a rule other than of the type `any(source) any(dest) any(service) allow` associated with it. Such flows are known as protected flows.

- All Unprotected Flows: This option helps to detect all the flows that have the default rules of the type `any(source) any(dest) any(service) allow`. Such flows are known as unprotected flows.

The firewall rules are visible only for the allowed and unprotected flows.

For example, if you are in the planning phase and you want to see the allowed flows in the system, perform the following steps:

- 1 On the Micro-Segmentation Planning page, for a particular group, select **All Allowed Flows** from the drop-down menu.
- 2 Click the dropped flows in the topology diagram to see the corresponding recommended firewall rules.
- 3 Implement those firewall rules by exporting them into NSX manager.



## Network Address Translation (NAT)

The NAT flow support in vRealize Network Insight is as follows:

- Currently, vRealize Network Insight supports SNAT, DNAT, reflexive rules in the flows and the VM to VM Path for the NSX-V and NSX-T edges only.

---

**Note** The NAT rules on the NSX Edge version 5.5 or the previous versions are not supported.

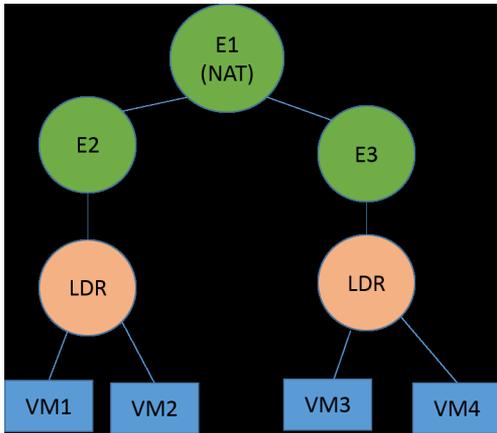
---

- To obtain all the NAT rules in NSX-T, use the `NSX-T Edge NAT Rule` query. To obtain all the NAT rules in both NSX-V and NSX-T, use the `NAT Rules` query.
- Only the NAT rules that are configured on the uplink interface of the VMware NSX-T Tier router are processed by the VM to VM path. If NAT is configured on any NSX-T Tier router, then it is expected that there are NAT rules for all the VMs attached to the router else the VM to VM path and the path to Internet does not work. Instead, it displays a missing rule message.
- vRealize Network Insight supports the nested NAT hierarchy.
- vRealize Network Insight supports the edges and the tier routers with NAT-defined uplinks.
- vRealize Network Insight supports SNAT rules with range. However, DNAT must be one-to-one mapping between the destination and translated IP addresses (Parity with NSX-V).
- vRealize Network Insight does not support the following use cases:
  - a In NSX-T, NAT rules can be applied at the service level. For example, in NSX-T, L4 ports set is a type of service and the associated protocols can be TCP or UDP. So in the VM-VM path, the service level details are not supported.
  - b Any port level translation is not supported.
  - c The SNAT match destination address and the DNAT match source address are not supported. Use the SNAT match destination address as the destination IP address when you specify the SNAT rule. Use the DNAT match source address as the source IP address when you specify the DNAT rule. For example, if there is a destination IP address mentioned in the SNAT rule, vRealize Network Insight applies the SNAT rule irrespective of whether the packet has the destination address as the destination IP address.

## NAT Flow Support - Examples

This section consists of few examples for the supported NAT flow in vRealize Network Insight.

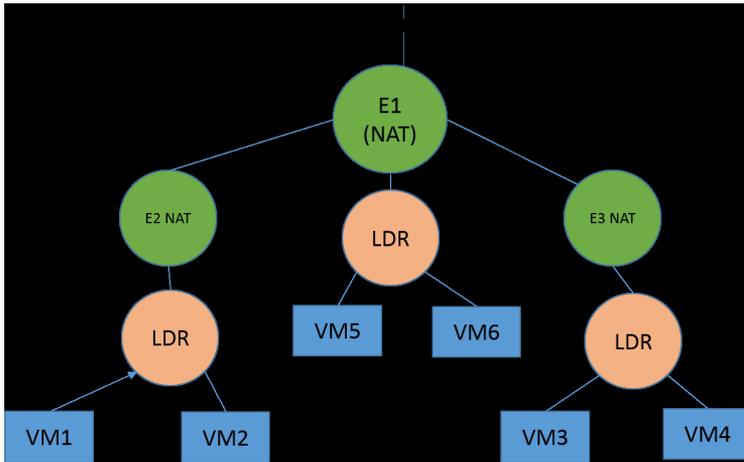
### Example 1



In the above topology, E2, E3, LDRs, VMs ( VM1, VM2, VM3, VM4) are part of NAT domain E1. Anything above E1 such as uplink of E1 is part of default NAT domain. The above topology consists of the following:

The flow from VM1 to VM2 and vice versa is reported in vRealize Network Insight. Similarly the flow from VM3 to VM4 and vice versa is reported.

### Example 2



The above topology consists of the following:

- VM1 and VM2 are part of E2 domain.
- VM3 and VM4 are part of E2 domain.
- E2 and E3 NAT domains are child domains of E1 NAT domain.
- E1 is the single child of default NAT domain.
- VM5 and VM6 are part of E1 NAT domain.

In the above topology, the following flows are reported in vRealize Network Insight:

- Flow from VM5 to VM6

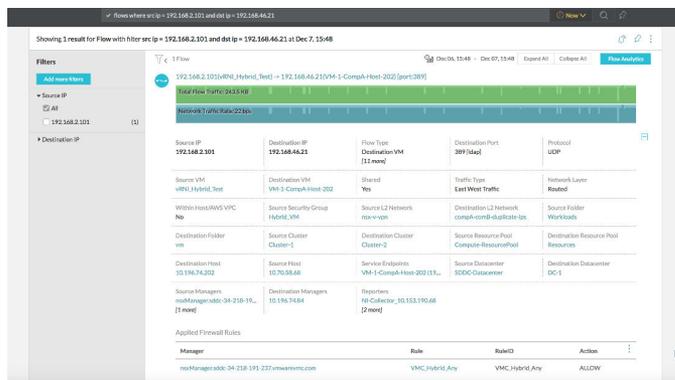
- Flow from (VM1, VM2) to (VM3, VM4)

## VMware Cloud on AWS Flows

If you have enabled IPFIX on the data source in the **Settings** page, you can view the flow count and the last collection time.

You can search for any particular flow and get the details associated with the entities. For example, you can view the policy segment and the policy group information in `Source L2 Network` and `Source Security Group` respectively. You can also view the policy firewall rule attached to flow.

vRealize Network Insight supports the hybrid flows over the VPN. The flow information is enriched with the source and the destination entities.



## Create VPC Flow Log

With Virtual Private Cloud (VPC) Flow Logs, you can capture information about the IP traffic going to and from network interfaces in your VPC.

You can create flow logs through the AWS portal.

### Procedure

- 1 Sign in to the AWS console.
- 2 In the **Find Service** text box, enter and select **CloudWatch**.
- 3 Go to **Logs > Action > Create log group**.  
The **Create log group** window appears.
- 4 In the **Create Group Name** field, enter a group name and click **Create log group**.
- 5 In the top navigation pane, click **Service** and then enter and select **VPC**.
- 6 In the **VPC Dashboard** page, click **Your VPCs**.
- 7 Select the VPC that you want to modify, and click **Flow Logs > Create flow log**.

8 In the **Create flow log** window, configure the flow log:

Option	Action
Filter	Select one of the following: <b>Accept</b> , <b>Reject</b> , or <b>All</b> .
Destination	Select <b>Send to CloudWatch Logs</b> .
Destination log group	Select the log group you created.

9 Click **Set Up Permissions**.

The system opens the **VPC Flow Logs is requesting permission to use resources in your account** page.

10 Create an IAM role.

- a In the **VPC Flow Logs is requesting permission to use resources in your account** page, in the **IAM Role**, select **Create a new IAM Role**.
- b In the **Role Name** text box, enter a role name.
  - a Click **Allow**.

11 On the **Create flow log** page, in the **IAM role** drop-down, select the role you created.

12 Click **Create**

### Results

Flow log starts publishing on the selected log group. For more information about VPC Flow Log, see the AWS documentation at <https://docs.aws.amazon.com/vpc/latest/userguide/flow-logs.html#create-flow-log>.

## Sending Flow Records from F5 To vRealize Network Insight Collectors

To send the flow records, you must do the following:

SI No.	Task	Link
1	Create a pool of IPFIX collectors to receive the IPFIX log messages from the BIG-IP system.	<a href="#">Create a pool of IPFIX Collectors</a>
2	Create a log destination to format the logs in IPFIX templates.	<a href="#">Create an IPFIX Log Destination</a>
3	Create a log publisher to send logs to a specified log destinations.	<a href="#">Create a Log Publisher</a>
4	Create an iRule to send the flow information to the configured vRealize Network Insight collector.	<a href="#">Create iRules</a>

SI No.	Task	Link
5	Add the iRule to a virtual server configuration so that the iRule parses all of the virtual server's network traffic.	<a href="#">Add the iRule To a Virtual Server</a>
6	If the collector VM is unreachable from F5, you must create a route entry for the collector to send the flow records.	<a href="#">Create a Route Entry</a>

## Create a pool of IPFIX Collectors

Create a pool of IPFIX collector. The BIG-IP system sends IPFIX log messages to this pool.

### Procedure

- 1 Log in to a F5 console.
- 2 Click **Main > Local Traffic > Pools > Pool Lists > Create**.  
The **New Pool** screen opens.
- 3 In the **Name** text box, enter a unique name for the pool.
- 4 In **Health Monitors**, select **gateway\_icmp** and move it in the **Active** box.
- 5 In the **New Member** section, configure the collector IP address and click **Add**.

Option	Action
<b>Node Name</b>	Enter the Collector IP address.
<b>Service Port</b>	2055

- 6 Click **Finished**.

What to do next

## Create an IPFIX Log Destination

Create a log destination to format the logs in IPFIX templates. After the formatting, these logs are sent to the IPFIX collector.

### Procedure

- 1 In the F5 console, click **Main > System > Logs > Configuration > Log Destinations > Create**.  
The **Log Destinations** screen appears.
- 2 In the **Name** text box, enter a unique name.
- 3 In the **Type** list, click **IPFIX**.

#### 4 Configure the **IPPIX Settings**.

Option	Action
Protocol	Click <b>Netflow V9</b> .
Pool Name	Click the pool name you created in the previous step.

#### 5 Click **Finished**.

## Create a Log Publisher

To send the logs to a specified log destination, you need to create a log publisher .

### Procedure

- 1 In the F5 console, click **Main > System > Logs > Configuration > Log Publishers > Create**.  
The **Log Publishers** screen appears.
- 2 In the **Name** field, enter a unique name.
- 3 In the **Destination** box, select the log destination you created previously from the **Available** box, and move it in the **Selected** box.
- 4 Click **Finished**.

## Create iRules

To send the flow information to the configured vRealize Network Insight collector, you must create a iRule. You must create two iRules. One iRule for the TCP protocol and another iRule for the UDP protocol.

### Procedure

- 1 In the F5 console, click **Main > iRules > iRule List > Create**.  
The **New iRule** screen appears.
- 2 In the **Name** text box, enter a unique name.
- 3 In the **Definition** text box, enter the TCP rules for the TCP protocol and the UDP rule for the UDP protocol. For information on the rules, see [iRules for TCP and UDP protocol](#).  
Ensure the iRule points to the publisher created previously.
- 4 Click **Finished**.

## iRules for TCP and UDP protocol

Use these to create iRules for TCP and UDP protocol

## TCP Rule

Use the following rule to create iRule for TCP protocol:

---

**Note** Ensure the iRule points to the Log Publisher created previously.

---

```

when RULE_INIT {
    set static::http_rule1_dest ""
    set static::http_rule1_tmplt ""
}

# CLIENT_ACCEPTED event to initiate IPFIX destination and template
when CLIENT_ACCEPTED {
    set start [clock clicks -milliseconds]
    if { $static::http_rule1_dest == "" } {
        # open the logging destination if it has not been opened yet
        set static::http_rule1_dest [IPFIX::destination open -publisher /Common/<Log Publisher>]
    }
    if { $static::http_rule1_tmplt == "" } {
        # if the template has not been created yet, create the template
        set static::http_rule1_tmplt [IPFIX::template create "flowStartMilliseconds \
            sourceIPv4Address \
            sourceIPv6Address \
            destinationIPv4Address \
            destinationIPv6Address \
            sourceTransportPort \
            destinationTransportPort \
            protocolIdentifier \
            octetTotalCount \
            packetTotalCount \
            octetDeltaCount \
            packetDeltaCount \
            postNATSourceIPv4Address \
            postNATSourceIPv6Address \
            postNATDestinationIPv4Address \
            postNATDestinationIPv6Address \
            postNAPTSourceTransportPort \
            postNAPTDestinationTransportPort \
            postOctetTotalCount \
            postPacketTotalCount \
            postOctetDeltaCount \
            postPacketDeltaCount \
            flowEndMilliseconds"]
    }
}

# SERVER_CONNECTED event to initiate flow data to vrni and populate 5 tuples
when SERVER_CONNECTED {
    set rule1_msg1 [IPFIX::msg create $static::http_rule1_tmplt]
    set client_closed_flag 0
    set server_closed_flag 0
    IPFIX::msg set $rule1_msg1 flowStartMilliseconds $start
    IPFIX::msg set $rule1_msg1 protocolIdentifier [IP::protocol]

    # Clientside

```

```

if { [clientside {IP::version}] equals "4" } {
  # Client IPv4 address
  IPFIX::msg set $rule1_msg1 sourceIPv4Address [IP::client_addr]
  # BIG-IP IPv4 VIP address
  IPFIX::msg set $rule1_msg1 destinationIPv4Address [clientside {IP::local_addr}]
} else {
  # Client IPv6 address
  IPFIX::msg set $rule1_msg1 sourceIPv6Address [IP::client_addr]
  # BIG-IP IPv6 VIP address
  IPFIX::msg set $rule1_msg1 destinationIPv6Address [clientside {IP::local_addr}]
}
# Client port
IPFIX::msg set $rule1_msg1 sourceTransportPort [TCP::client_port]
# BIG-IP VIP port
IPFIX::msg set $rule1_msg1 destinationTransportPort [clientside {TCP::local_port}]

# Serverside
if { [serverside {IP::version}] equals "4" } {
  # BIG-IP IPv4 self IP address
  IPFIX::msg set $rule1_msg1 postNATSourceIPv4Address [IP::local_addr]
  # Server IPv4 IP address
  IPFIX::msg set $rule1_msg1 postNATDestinationIPv4Address [IP::server_addr]
} else {
  # BIG-IP IPv6 self IP address
  IPFIX::msg set $rule1_msg1 postNATSourceIPv6Address [IP::local_addr]
  # Server IPv6 IP address
  IPFIX::msg set $rule1_msg1 postNATDestinationIPv6Address [IP::server_addr]
}
# BIG-IP self IP port
IPFIX::msg set $rule1_msg1 postNAPTSourceTransportPort [TCP::local_port]
# Server port
IPFIX::msg set $rule1_msg1 postNAPTDestinationTransportPort [TCP::server_port]
}

# SERVER_CLOSED event to collect IP pkts and bytes count on serverside
when SERVER_CLOSED {
  set server_closed_flag 1
  # when flow is completed, BIG-IP to server REQUEST pkts and bytes count
  IPFIX::msg set $rule1_msg1 octetTotalCount [IP::stats bytes out]
  IPFIX::msg set $rule1_msg1 packetTotalCount [IP::stats pkts out]
  # when flow is completed, server to BIG-IP RESPONSE pkts and bytes count
  IPFIX::msg set $rule1_msg1 octetDeltaCount [IP::stats bytes in]
  IPFIX::msg set $rule1_msg1 packetDeltaCount [IP::stats pkts in]
  if { $client_closed_flag == 1 } {
    # send the IPFIX log
    IPFIX::destination send $static::http_rule1_dest $rule1_msg1
  }
}

# CLIENT_CLOSED event to collect IP pkts and bytes count on clientside
when CLIENT_CLOSED {
  set client_closed_flag 1
  # when flow is completed, client to BIG-IP REQUEST pkts and bytes octetDeltaCount
  IPFIX::msg set $rule1_msg1 postOctetTotalCount [IP::stats bytes in]
  IPFIX::msg set $rule1_msg1 postPacketTotalCount [IP::stats pkts in]
}

```

```

# when flow is completed, BIG-IP to client RESPONSE pkts and bytes count
IPFIX::msg set $rule1_msg1 postOctetDeltaCount [IP::stats bytes out]
IPFIX::msg set $rule1_msg1 postPacketDeltaCount [IP::stats pkts out]
# record the client closed time in ms
IPFIX::msg set $rule1_msg1 flowEndMilliseconds [clock click -milliseconds]
if { $server_closed_flag == 1 } {
    # send the IPFIX log
    IPFIX::destination send $static::http_rule1_dest $rule1_msg1
}
}
}

```

## UDP Rule

Use the following rule to create iRule for UDP protocol:

**Note** Ensure the iRule points to the Log Publisher created previously.

```

when RULE_INIT {
    set static::http_rule1_dest ""
    set static::http_rule1_tmplt ""
}

# CLIENT_ACCEPTED event to initiate IPFIX destination and template
when CLIENT_ACCEPTED {
    set start [clock clicks -milliseconds]
    if { $static::http_rule1_dest == "" } {
        # open the logging destination if it has not been opened yet
        set static::http_rule1_dest [IPFIX::destination open -publisher /Common/<Log Publisher>]
    }
    if { $static::http_rule1_tmplt == "" } {
        # if the template has not been created yet, create the template
        set static::http_rule1_tmplt [IPFIX::template create "flowStartMilliseconds \
            sourceIPv4Address \
            sourceIPv6Address \
            destinationIPv4Address \
            destinationIPv6Address \
            sourceTransportPort \
            destinationTransportPort \
            protocolIdentifier \
            octetTotalCount \
            packetTotalCount \
            octetDeltaCount \
            packetDeltaCount \
            postNATSourceIPv4Address \
            postNATSourceIPv6Address \
            postNATDestinationIPv4Address \
            postNATDestinationIPv6Address \
            postNAPTSourceTransportPort \
            postNAPTDestinationTransportPort \
            postOctetTotalCount \
            postPacketTotalCount \
            postOctetDeltaCount \
            postPacketDeltaCount \
            flowEndMilliseconds"]
    }
}

```

```

}
}

# SERVER_CONNECTED event to initiate flow data to vrni and populate 5 tuples
when SERVER_CONNECTED {
  set rule1_msg1 [IPFIX::msg create $static::http_rule1_tmplt]
  set client_closed_flag 0
  set server_closed_flag 0
  IPFIX::msg set $rule1_msg1 flowStartMilliseconds $start
  IPFIX::msg set $rule1_msg1 protocolIdentifier [IP::protocol]

  # Clientside
  if { [clientside {IP::version}] equals "4" } {
    # Client IPv4 address
    IPFIX::msg set $rule1_msg1 sourceIPv4Address [IP::client_addr]
    # BIG-IP IPv4 VIP address
    IPFIX::msg set $rule1_msg1 destinationIPv4Address [clientside {IP::local_addr}]
  } else {
    # Client IPv6 address
    IPFIX::msg set $rule1_msg1 sourceIPv6Address [IP::client_addr]
    # BIG-IP IPv6 VIP address
    IPFIX::msg set $rule1_msg1 destinationIPv6Address [clientside {IP::local_addr}]
  }
  # Client port
  IPFIX::msg set $rule1_msg1 sourceTransportPort [UDP::client_port]
  # BIG-IP VIP port
  IPFIX::msg set $rule1_msg1 destinationTransportPort [clientside {UDP::local_port}]

  # Serverside
  if { [serverside {IP::version}] equals "4" } {
    # BIG-IP IPv4 self IP address
    IPFIX::msg set $rule1_msg1 postNATSourceIPv4Address [IP::local_addr]
    # Server IPv4 IP address
    IPFIX::msg set $rule1_msg1 postNATDestinationIPv4Address [IP::server_addr]
  } else {
    # BIG-IP IPv6 self IP address
    IPFIX::msg set $rule1_msg1 postNATSourceIPv6Address [IP::local_addr]
    # Server IPv6 IP address
    IPFIX::msg set $rule1_msg1 postNATDestinationIPv6Address [IP::server_addr]
  }
  # BIG-IP self IP port
  IPFIX::msg set $rule1_msg1 postNAPTSourceTransportPort [UDP::local_port]
  # Server port
  IPFIX::msg set $rule1_msg1 postNAPTDestinationTransportPort [UDP::server_port]
}

# SERVER_CLOSED event to collect IP pkts and bytes count on serverside
when SERVER_CLOSED {
  set server_closed_flag 1
  # when flow is completed, BIG-IP to server REQUEST pkts and bytes count
  IPFIX::msg set $rule1_msg1 octetTotalCount [IP::stats bytes out]
  IPFIX::msg set $rule1_msg1 packetTotalCount [IP::stats pkts out]
  # when flow is completed, server to BIG-IP RESPONSE pkts and bytes count
  IPFIX::msg set $rule1_msg1 octetDeltaCount [IP::stats bytes in]
  IPFIX::msg set $rule1_msg1 packetDeltaCount [IP::stats pkts in]
}

```

```

if { $client_closed_flag == 1 } {
    # send the IPFIX log
    IPFIX::destination send $static::http_rule1_dest $rule1_msg1
}
}

# CLIENT_CLOSED event to collect IP pkts and bytes count on clientside
when CLIENT_CLOSED {
    set client_closed_flag 1
    # when flow is completed, client to BIG-IP REQUEST pkts and bytes count
    IPFIX::msg set $rule1_msg1 postOctetTotalCount [IP::stats bytes in]
    IPFIX::msg set $rule1_msg1 postPacketTotalCount [IP::stats pkts in]
    # when flow is completed, BIG-IP to client RESPONSE pkts and bytes count
    IPFIX::msg set $rule1_msg1 postOctetDeltaCount [IP::stats bytes out]
    IPFIX::msg set $rule1_msg1 postPacketDeltaCount [IP::stats pkts out]
    # record the client closed time in ms
    IPFIX::msg set $rule1_msg1 flowEndMilliseconds [clock click -milliseconds]
    if { $server_closed_flag == 1 } {
        # send the IPFIX log
        IPFIX::destination send $static::http_rule1_dest $rule1_msg1
    }
}
}

```

## Add the iRule To a Virtual Server

### Procedure

- 1 In the F5 console, click **Main > Virtual Server > Virtual Server List**.  
The **Virtual Server List** screen appears.
- 2 Select the server you want to add the iRule.
- 3 Click **Resources** tab, and in the iRule section click **Manage**.
- 4 Select the TCP and UDP iRules that you created previously and move the iRules from **Available** box to **Enable** box.
- 5 Click **Finished**.

## Create a Route Entry

The collector VM must be reachable from F5. If the collector VM is unreachable from F5, you must create a route entry for the collector.

To check if the collector VM is reachable from F5, you must run the following command: `ping <collector-ip> -I <virtual interface>` from the Command Line Interface (CLI). If the collector is unreachable from F5, you must create a route entry for the collector.

For example,

```
admin@(localhost) (cfg-sync Standalone) (Active) (/Common) (tmos)# ping 10.153.191.116 -I VLAN301
PING 10.153.191.116 (10.153.191.116) from 10.115.30.50 VLAN301: 56(84) bytes of data.
From 10.115.30.50 icmp_seq=1 Destination Host Unreachable
From 10.115.30.50 icmp_seq=2 Destination Host Unreachable
```

## Procedure

- 1 In the F5 console, click **Main > Network > Routes > Add**.

The **New Route** screen appears.

- 2 In the **Properties** section, configure the route entries to send the flow records from F5 to the vRealize Network Insight collector through the virtual server.

# Kubernetes and VMware PKS Scoping and Flow Information

# 14

You can perform scoping of container entities and view the flow information in vRealize Network Insight.

## VMware PKS and Kubernetes Flow Information

vRealize Network Insight supports the following flow types for Kubernetes entities.

- VM to Kubernetes Pod
- Kubernetes Pod to Pod
- Destination is Kubernetes Pod
- Source is Kubernetes Pod

You can use these flow types to search for a particular Kubernetes entities.

For example, `flows where flow type = x` where `x` is one of the flow types

vRealize Network Insight can provide flow information such as metrics, time-series and relations for all entities, which includes the container source and destination details and its entities details.

Also, you can view the top talkers by Kubernetes Cluster, Namespace, Service and Node on the Flow Analytics Dashboard.

## Planning and Micro-segmentation of Kubernetes Entities

You can plan for a specific Kubernetes entity type by selecting Kubernetes Cluster, Kubernetes Service, Kubernetes Namespace, or Kubernetes Node as the scope and Micro-Segments in the Plan Security page. Also, you can plan or analyze data for the application and define grouping based on Kubernetes entities to view the application flow information.

Also, you can export the recommended firewall rules related to Kubernetes entities in the YAML format from Micro-Segments in the Plan Security page.

---

**Note** You cannot export the application scope in the YAML format if it contains VMs or VM members. If the application contains only container entities, exporting to YAML format is available.

---

# Working with Micro-Segmentation

# 15

vRealize Network Insight provides planning and recommendations for implementing the micro-segmentation security. It helps the user to manage and scale the VMware NSX deployments quickly and confidently.

This chapter includes the following topics:

- [Analyzing the Application](#)
- [Application Discovery](#)
- [VMware Cloud on AWS: Planning and Micro-Segmentation](#)

## Analyzing the Application

The micro-segmentation planning topology shows all the flows that are present in your environment by dividing the flows into segments.

In vRealize Network Insight, a flow is a 4-tuple. It includes:

- Source IP
- Destination IP
- Destination port
- Protocol

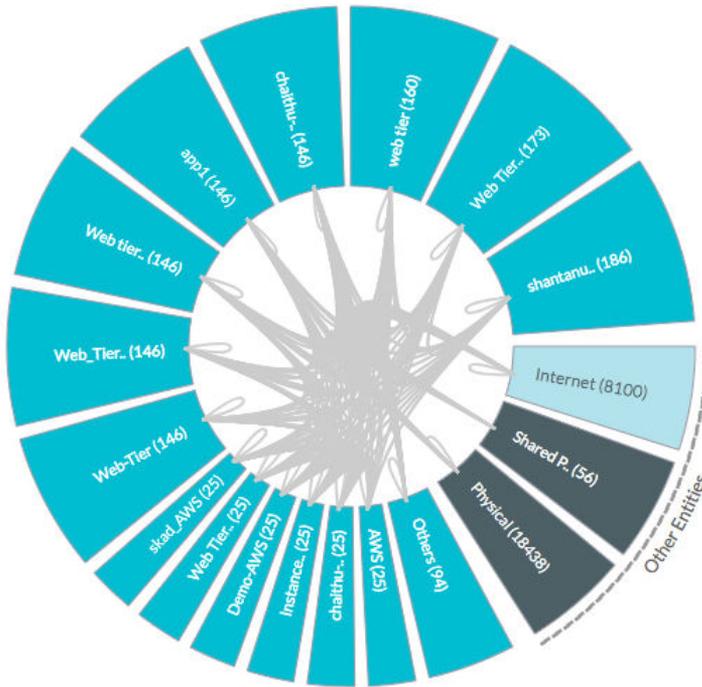
You can view the data in two formats: Donut View and the Grid View

## Viewing Micro-Segmentation And Flow Data in Donut View

In the Donut view, the blue lines denote the outgoing flows, the green lines denote the incoming flows, and the yellow lines denote the flows that are bidirectional. You can click any of the segments to view its details.

Micro-Segments i

Group By Tier v Flow Type All Allowed Flows v

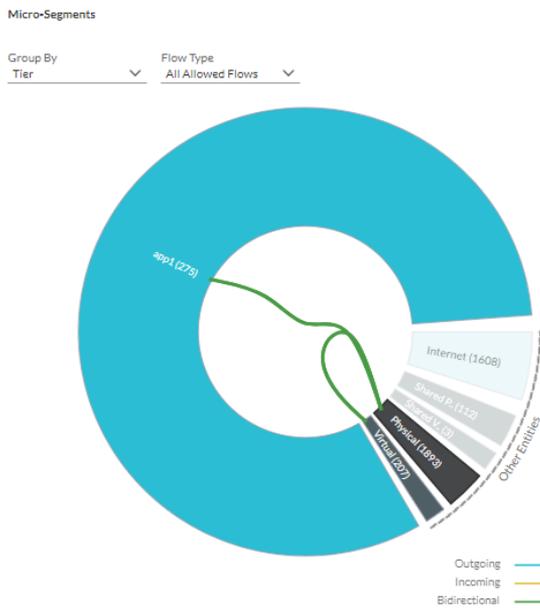


The VMs that are outside the selected scope are grouped as **Other Entities** in the micro-segmentation planning topology.

You can also analyze the flows by creating subgroups as per Physical, Other Virtual, and Internet categories.

Group By	Also show groups for
VLAN/VXLAN	All
Application	Physical
<input checked="" type="checkbox"/> Tier	Virtual
Subnet	Internet
Folder	<input checked="" type="checkbox"/> None
Cluster	
VM	
Port	
Security Tag	
Security Group	
IPSet	
VPC	

Each group is expanded into a wedge. In the following topology, the wedge for **Physical group** is seen.



The Flows pin shows that the flows for different time intervals segregated by ports. You can either view all the flows or view the flows between two entities. You can filter the flows by Allowed and Blocked flows. You can view flows by either Total Bytes or by Allowed Session Count. For the flows that are protected by a firewall, a Protected by Firewall sign is used to denote that the flows in that port that are protected by a firewall.

The planning for a scope such as an entire data center or a cluster selects flows that have VMs or Physical Servers (identified by the Physical IPs) as the source or the destination.

A topology has two distinct zones:

- Internal: This zone includes the VMs or the IP addresses in the scope.
- External: This zone includes the VMs or the IP addresses that are out of scope but talk to the VM or IP addresses in the internal zone. The external zone consists of the following wedges:
  - DC Virtual: It includes the source or the destination data center internal VMs that are talking to VMs or IP addresses in the internal zone and are not hosting any well-known shared services such as LDAP, NTP, and so on.
  - Shared Virtual: It includes the destination data center internal VMs hosting well-known shared services such as LDAP, NTP, and so on to which the VMs or IP addresses in the internal zone are talking.
  - DC Physical: It includes the source or the destination data center internal physical IP addresses that are talking to VMs or IP addresses in the internal zone and are not hosting any well-known shared services like LDAP, NTP, and so on.
  - Shared Physical: It includes the destination data center internal Physical IP addresses hosting well-known shared services such as LDAP, NTP, and so on to which the VMs or IP addresses in the internal zone are talking.
  - Internet: It includes the source or the destination data center external VMs or the physical IP addresses that are talking to the VMs or IP addresses in the internal zone.

---

#### Note

- Data center Internal implies RFC 1918 designated IPs by default + any overrides defined in E-W settings.
  - Data center External implies non-RFC 1918 designated IPs by default + any overrides defined in N-S settings.
- 

## View Micro-segmentation And Flow Data in Grid View

vRealize Network Insight enables you to see the communication between objects in a tabular or grid view.

### Procedure

- 1 Navigate to **Security > Plan Security** and click the grid view  icon.

- 2 Select a value for **Group By** option, for example **VMs, Application, Security Groups** to see the corresponding details in the tabular format.

Field Name	Description
Source Object	Name of the source
Destination Object	Name of the destination
Related Flows	Count of communication or flows between the source and destination Click on the count value to see the related flow details.
Sum of Bytes	Aggregated number of bytes between all the flows
Max of Traffic Rate	Maximum traffic rate observed among all related flows
Count of Sessions	Number of active sessions for the particular flow

### Note

- You can click on each column header to sort the data in ascending or descending order.
- You can hide the field from the table view, click the more icon next on the field header and deselect the field name.

- 3 In addition, you can perform several actions on the grid view page.
  - In the filters pane on the left side of the screen, you can perform the following actions:
    - Select an individual source or destination to filter the flows that are related to selected source or destination object.
    - Select the firewall action to see the allowed flows or the dropped flows.
    - Select the protection status to see the flow status.
  - Click **Add more filters** to add additional filters.
  - To export the tabular data in a CSV format, click the more option on top of the table, and select **Export as CSV**.

## Create an Application Manually

You can manually create an application in the vRealize Network Insight user interface.

### Procedure

- 1 On the vRealize Network Insight home page, click **Security > Applications**.
- 2 On the **Saved Applications** tab, click **Add Application**.
- 3 On the **Add Application** page, in the **Application Name** text box, enter a name for the application you want to create.
- 4 In the **Tier/Deployment** section, enter a unique name.

You can create a tier/department for VMs, physical machines, or services as per your requirements.

**5** In the **Members** field,

- a Select a condition from the drop-down menu to create a tier.

You can define a condition based on VM Properties, location of VMs (application, cluster, folders) and also based on the Kubernetes services (service name, cluster IP address, namespace, cluster IP, or service labels).

To search a specific Kubernetes service that has the same name or the same IP or the same tag in multiple clusters, you use custom search.

- b Enter or select the value that you want to add to the tier.

For entering multiple values, use comma after individual values.

To add a service to be part of the tier, select **Service Name** and enter the name in the value.

Based on the defined condition, you see the associated or related VM count, or the physical IP count, or the service count.

**6** To add any additional conditions, click **Add another Condition**.**7** (Optional) To create another tier under one application, click **Add Tier/Deployment**.

You can create multiple tier under one application.

The application creates all the tiers and shows the count of VMs, Physical IPs and services matching all the conditions.

**8** (Optional) To create a dynamic threshold configuration, select the **Enable Threshold Analytics** check box.

The system creates a threshold configuration in the **Threshold Configurations** page. vRealize Network Insight created threshold configuration name starts with `sys` prefix.

---

**Note** You cannot delete a system generated threshold configuration. When you delete the application or clear the **Enable Threshold Analytics** check-box and save the application, the system generated threshold configuration related to that application automatically gets deleted.

---



---

**Note** If you add a member in application and select the **Enable Threshold Analytics** check-box, it might take around 20 minutes to reflect the member in the threshold configuration page.

---

**9** Select Analyze Flows to view the flows before you finally add the application. You can see the tiers based on VMs or physical addresses accordingly.**10** Click **Save**.

---

**Note** If your application does not have any VMware VM and you select **Enable Threshold Analytics** check box, you cannot save the application. You must add a VMware VM or clear the **Enable Threshold Analytics** check box to save your application.

---

**11** (Optional) To preview the flow analysis, click **Preview Flows**.

Shows the Micro-Segment view for the application.

#### What to do next

You can see the application details under **Saved Application**.

## Creating Tiers for Physical IPs

While creating an application, you can select **Custom IP Search** from the drop-down list to create tiers for the physical IPs based on the enriched fields. For more information on the enriched fields, refer [Enriching Flows and IP Endpoints](#).

The enriched DNS, Subnet, VLAN information can be used in specifying tiers as follows :

- Web

```
Query: IP Endpoint where Subnet Network = '172.16.101.0/24'
```

- App

```
Query: IP Endpoint where Dns Domain = app.example.com
```

- DB

```
Query: IP Endpoint where L2 Network = 'vlan-102'
```

- Common Services

```
Query: IP Endpoint where Dns Domain = svc.example.com
```

## Application Discovery

When you have several applications or when you have multiple tiers in an application, creating applications using the public APIs or the user interface becomes a long process. vRealize Network Insight auto-discovers the applications and enables you to them and their tiers automatically, which reduces a lot of manual efforts.

vRealize Network Insight can perform Application Discovery based on:

- Tags (vCenter Server or AWS tags)
- VM Names
- [Add ServiceNow](#)

### Example: An Example of the Application Discovery Construct

Let's assume,

- you have added vCenter Server as a data source
- you have four VMs in your datacenter - VM1, VM2, VM3, and VM4.

- you have defined tags (key-value) that defines the application names to which each VMs belongs
- you have defined tags (key-value) that defines the tier to which each VMs belongs

For example, see the table:

VM Name	Key-value tags
VM1	<ul style="list-style-type: none"> <li>■ Application Name: MyApplication1</li> <li>■ Application Tier: App</li> </ul>
VM2	<ul style="list-style-type: none"> <li>■ Application Name: MyApplication1</li> <li>■ Application Tier: Web</li> </ul>
VM3	<ul style="list-style-type: none"> <li>■ Application Name: MyApplication2</li> <li>■ Application Tier: App</li> </ul>
VM4	<ul style="list-style-type: none"> <li>■ Application Name: MyApplication2</li> <li>■ Application Tier: Web</li> </ul>

## To discover applications based on tags

vRealize Network Insight, you can define a grouping criteria for application discovery for these tags.

In this example, based on the defined tags and grouping criteria, vRealize Network Insight discovers two applications (MyApplication1 and MyApplication2) with two tiers (App and Web) and its related VMs.

Application	Tiers and its VMs
MyApplication1	<ul style="list-style-type: none"> <li>■ App and VM1</li> <li>■ Web and VM2</li> </ul>
MyApplication2	<ul style="list-style-type: none"> <li>■ App and VM3</li> <li>■ Web and VM4</li> </ul>

## To create an application and tiers based on VM Names

Let's assume, the VM names are defined in a particular format. `ApplicationName : Tier : VMName`

```
MyApplication1 : App : VM1
MyApplication1 : Web : VM2
MyApplication2 : App : VM3
MyApplication2 : Web : VM4
```

**Note** Randomly defined VM names cannot be grouped for application discovery.

When you use the following regex, vRealize Network Insight discovers two applications.

- App Regex: `(.*)_(.*)_.*-.*`
- Tier Regex: `(.*)_(.*)_(.*)-.*`

Application	Tiers and its VMs
MyApplication1	<ul style="list-style-type: none"><li>■ App and MyApplication1 : App : VM1</li><li>■ Web and MyApplication1 : Web : VM2</li></ul>
MyApplication2	<ul style="list-style-type: none"><li>■ App and MyApplication2 : App : VM3</li><li>■ Web and MyApplication2 : Web : VM4</li></ul>

## Add Discovered Applications

You can discover existing applications and add them into vRealize Network Insight.

### Procedure

- 1 In the Search box, search with the **applications** string.
- 2 Click the **Discovered Applications** tab.

You see the following tabs to add an application, which are **Tags, ServiceNow, Name.**

### 3 Select the preferred tab and perform the related steps.

Tab	Description
<b>Tags</b>	<p>a Define the scope.</p> <ul style="list-style-type: none"> <li>■ Select <b>All VMs</b> to see a list of all VMs from all the data sources that are added in vRealize Network Insight, or</li> <li>■ Select <b>Manual Selection</b> and filter the VMs based on the your requirement like account, datacenter, manager, and so on.</li> </ul> <p>b Define the key and value for the tag.</p> <ul style="list-style-type: none"> <li>■ Enter a key for the tag. For example <i>Automation</i>, <i>Category</i>, <i>CreatedBy</i>, and <i>Owner</i>.</li> <li>■ (Optional) Enter a value for the respective key.</li> </ul> <p>c Click <b>Unclassified VMs</b> to see a list of VMs that are not following a particular name pattern or tag pattern. You can edit the VMs to fix the name or tag criteria.</p> <p>d Click <b>Save changes to</b> for creating a new template or update an existing template.</p> <hr/> <p><b>Note</b> If you are an admin user, you can update all templates; if you are a member user, you can only edit the templates that you had created.</p> <hr/> <p>e Click <b>Discover</b>.</p>
<b>ServiceNow</b>	<p>You see the applications available on ServiceNow.</p>
<b>Name</b>	<p>a Define the scope.</p> <ul style="list-style-type: none"> <li>■ Select <b>All VMs</b> to see the list of all VMs from all the data sources that are added in vRealize Network Insight, or</li> <li>■ Select <b>Manual Selection</b> and filter the VMs based on the your requirement like account, datacenter, manager, and so on.</li> </ul> <p>b Click <b>Pattern Builder</b>.</p> <p>Based on the scope you have defined, vRealize Network Insight filters the list of VMs in the Pattern Builder.</p> <ol style="list-style-type: none"> <li>1 Select the default VM name or select a VM from the list to build a pattern or the regular expression (regex) based on the VM name.</li> <li>2 Click on a position or a group to construct a pattern.</li> </ol> <hr/> <p><b>Note</b> After selecting a group, if you select a character or position, vRealize Network Insight ignores your group selection for building the pattern and vice versa.</p> <hr/> <p>Based on your selections, you see the pattern appearing on the screen. And also, you see the list of applications that match the pattern and the count of VMs in the respective applications.</p> <ol style="list-style-type: none"> <li>3 Click <b>Submit</b>.</li> </ol> <p>c Click the <b>Found count Applications</b> link to see the list of application names and the number of VMs that matches the regex</p> <p>d Click <b>Unclassified VMs</b> to see a list of VMs that are not following a particular name pattern.</p> <p>e Click <b>Save changes to</b> for creating a new template or update an existing template.</p> <hr/> <p><b>Note</b> If you are an admin user, you can update all templates; if you are a member user, you can only edit the templates that you had created.</p>

Tab	Description
	f Click <b>Discover</b> .

You see the tabular and the hexagonal map view of all applications that matches the criteria.

In the map view, each hexagon represents an application. You can hover on the hexagon to see the information such as application name, discovered VM count, and the tier count. The lines between applications and internet represents the connections. You can click on the lines to see the flow details such as count of source and destination flows, and the count of unprotected source flows and unprotected destination flows. The question mark on the hexagon represents that vRealize Network Insight could not find or fetch any flow details for the application may be because the application has exceeded the flow limit or has unprotected flows.

In the tabular view, you see application details, which includes application names, count of flows that do not reach the destination and gets dropped as the firewall action is denied, and the count of tiers and members.

The map and the table view are interactive. When you click on an application in the tabular view, the hexagon is highlighted or focussed on the map view and displays all the network connections.

#### 4 (Optional) Perform any of the following actions on the map view:

- Zoom in and Zoom out, or move the map to see the applications.
- Filter the number the hexagons that you can see in the topology (for example, Top 10, Top 20, Top 50 and Top 100, and filter based Tiers, name and members.

Greater the count, darker the color of the hexagon.

- See all the unprotected applications.
- See the applications talking to the internet.
- See all the applications that uses hosts shared services.
- See the applications with problems.

#### 5 (Optional) Perform any of the following actions on the table view:

- Click on the column header to sort the values in ascending or descending order.
- Hover the mouse on the value in the member column to see the individual count of VMs, physical IPs, and services.
- Click an application name to open the application dashboard and view the details of that specific application.
- Click the + icon in the tabular view to expand the application details such as the criteria and the VM and tier count.

---

**Note** The icon is available for the discovered applications only.

---

- 6 To save the discovered application,
  - On the map view, hover the mouse on the hexagon and click **Save Application**, or
  - On the tabular view, click **Save Application**.

---

**Note** You can perform bulk save of the applications by selecting multiple checkboxes of applications in the table and then click **Save Application**.

---

- 7 Verify the details on the Add Application page and click **Submit**.

After you save, you see `application:Saved` on the application hexagon hover list and a tick mark for the application in the tabular view. If the application is saved already, you can hover on the tick mark and click **Save As** to save the application in a different name.

---

**Note** If the applications are modified in ServiceNow, the auto-update does not happen in vRealize Network Insight. You must update the application manually in vRealize Network Insight.

**Table 15-1. Limitations**

Objects	Maximum Limits	Recommended Limits (based on a 5 node EXTRA LARGE platform cluster setup)
Application List in Map View	3000 applications	NA
Application list in the tabular view	NA (Paginated)	NA
Saved Applications	5K	400
Total Tiers across all applications	20K	3500
Tiers Per Application	150	20
Members Per Tier	NA	NA
Members Per Application	5K	1.8K
		If an application exceeds the limit, you then you might not see the flow information in the Application Topology pinboard or you see an error message.
Flows Per Application	500K	300K

---

If your setup exceeds the recommended limits of tiers and applications, you can still continue to add the objects up to the maximum limit, however, the performance might degrade.

---

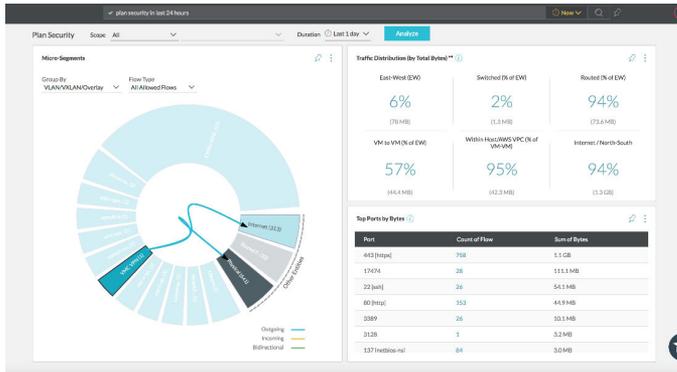
### What to do next

Click **Export as CSV** to export the application details to the .csv format. You can define the application count and the fields that you want to export. The application name and tier name fields will be repeated based on the member count (one row per member). Only the fields that are related to the application are filled, leaving the remaining fields empty.

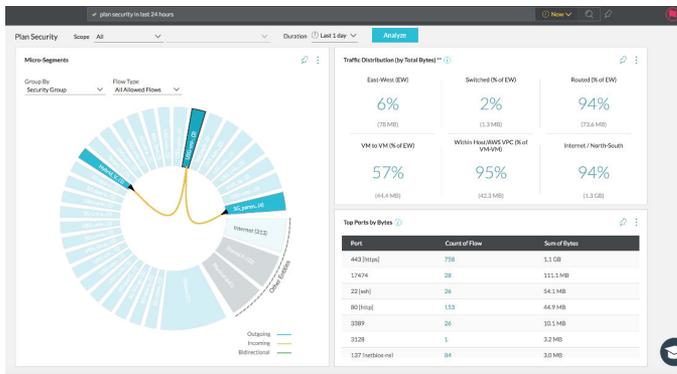
# VMware Cloud on AWS: Planning and Micro-Segmentation

You can plan for a specific VMware Cloud on AWS segment by selecting **VMC Segment** as the scope in the **Plan Security** page.

For the policy segments, use the `vLAN/VXLAN/Overlay` clause in the group.



For the policy groups, use the `Security Group` clause in the group.

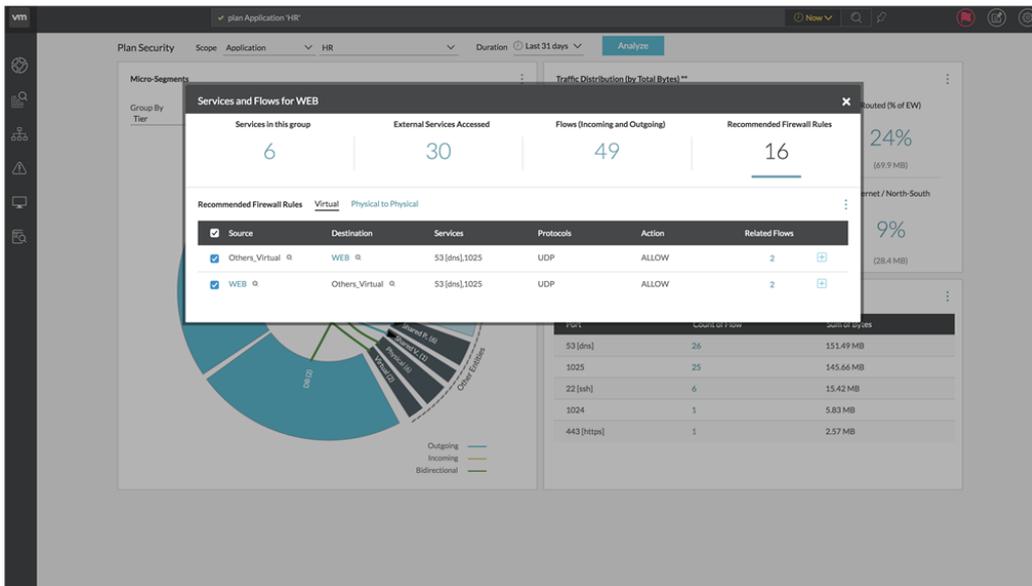


# Recommended Firewall Rules

# 16

On the **Plan security** page, when you click the wedge or the edge in the topology diagram, you can view the list of the services and flows for that particular segment. Click **Recommended Firewall Rules** to view the rules defined on it. The members of the source or the destination are listed under the following types of rules:

- **Physical to Physical:** This tab lists all the rules associated with the physical and Internet IPs. The rules can be for physical-physical, physical-Internet, Internet-physical, or Internet-Internet entities.
- **Virtual:** This tab lists all rules where at least one of the endpoints is a VM.



For each firewall rule, the following details are available:

- Show members of the group: Click the + sign next to the name of the entity to see the members of the group.

Source	Destination	Services	Protocols	Action	Related Flows
integration.tier2	integration.tier1	53 [dns],1025	UDP	ALLOW	2
integration.tier1	integration.tier2	53 [dns],1025	UDP	ALLOW	2
integration.tier1	integration.tier2	22 [ssh]	TCP	ALLOW	2

### Note

- The members are not shown for the groups belonging to the Internet category.
  - If a security group has both virtual and physical IPs, the physical and the Internet IPs are not shown in the list of the members of that particular group.
  - The member Kubernetes services are shown under the **Kubernetes Services** tab.
  - If the member count or the entry is zero for **Virtual Machine, Physical & Internet IPs**, or **Kubernetes Services** the tab is not visible.
- Source
  - Destination
  - Services
  - Protocols
  - Action
  - Related Flows: Click the number of the related flows to see the list of flows with the corresponding flow information.
  - View Applied Firewall Rules: Click the + sign next to the **Related Flows** column to view the applied firewall rules corresponding to the similar sets of flows.

Source	Destination	Services	Protocols	Action	Related Firewall Rules
integration.tier2	integration.tier1	53 [dns], 1025	UDP	ALLOW	2
integration.tier1	integration.tier2	53 [dns], 1025	UDP	ALLOW	2
integration.tier1	integration.tier2	22 [ssh]	TCP	ALLOW	2

You can export the recommended rules as XML or CSV based on your requirement.

**Note** You can export recommended rules related to Kubernetes objects in the YAML format also.

Refer to [Exporting Rules](#) for more information on these artifacts.

## Recommended Firewall Rule to Secure Vulnerable OS

Use the following procedure to get recommended firewall rule to secure vulnerable OS:

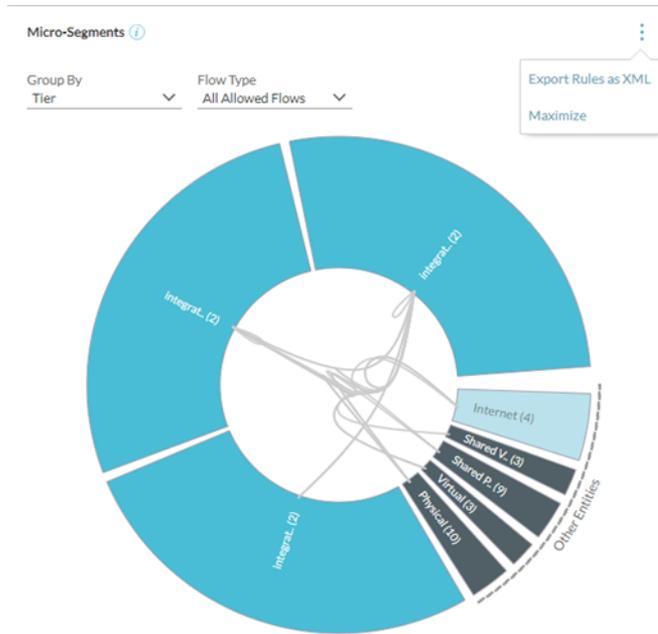
- 1 Go to **Security > Application > Create application**.
- 2 Enter a name for the Application and the Tier/Deployment.
- 3 In the **Member** drop-down, select **Custom VM Search** and in text box add the **in the qualifier put the matching criteria as: Operating System like 'Microsoft Windows Server 2003' or Operating System like 'Microsoft Windows Server 2008' or Operating System like 'Red Hat Enterprise Linux 6' or Operating System like 'Red Hat Enterprise Linux 5' or Operating System like 'SUSE Linux Enterprise 10'** condition.
- 4 Click **Save**.
- 5 Go to **Security > Plan Security**.
- 6 In the **Scope** drop-down, select **Application** and the name of application you created.
- 7 In **Duration** drop-down, select **Last 7 days**.
- 8 To get the recommended firewall rules, click **Analyze**

This chapter includes the following topics:

- [Exporting Rules](#)
- [Export and Apply Kubernetes Network Policies](#)

## Exporting Rules

You can export all the rules as XML for the entire topology. You can find this menu item in the **Micro-Segmentation Planning** page as follows:



The Export as XML option is available only for the following entities:

- Security Group
- Application Tier

If the planning scope spans a single NSX Manager only, the generated artifacts contain the XML files corresponding to the recommended services and firewall rules. If the planning scope spans multiple NSX managers, the generated artifacts contain the XML files corresponding to the recommended services, IPsets, security groups, and the firewall rules.

The following are the placeholder artifacts for security groups:

- SG-Others\_Internet.xml
- SG-Other.xml

You can export all the rules as XML or CSV for a particular wedge or edge depicted in the topology diagram.

---

**Note** You can export recommended rules related to Kubernetes objects in the YAML format also.

---

## NSX DFW Universal Artifacts

It is easy to manage objects in universal security groups across the various vCenter and NSX deployments. vRealize Network Insight supports the generation and the import of the universal artifacts for the Application and Tier groups only. With the universal security groups, it becomes easy to deploy and manage the firewall rules easily in the cross vCenter scenarios. Ensure that you import the universal artifacts on the primary NSX manager. You can manage the membership of the universal security group only through the primary NSX manager.

A universal security group can consist of:

- Other universal groups
- Universal IP sets
- Universal Security Tag

When you export the rules as XML, in addition to the NSX manager specific folders, a universal folder is created which consists of the NSX DFW universal artifacts. The corresponding universal security groups, universal IP sets, universal security tags, and universal DFW firewall rules are created after importing the NSX DFW universal artifacts.

---

#### Note

- The universal security tag is supported in only active-standby mode.
  - The universal IP set is supported in both active-active and active-standby modes.
- 

You can create universal IP set or universal security tag based on your requirement. If you create the universal security tag, then you can map the application VM to the security tag. Else, the universal IP set is used.

You can use the following flags in the import tool:

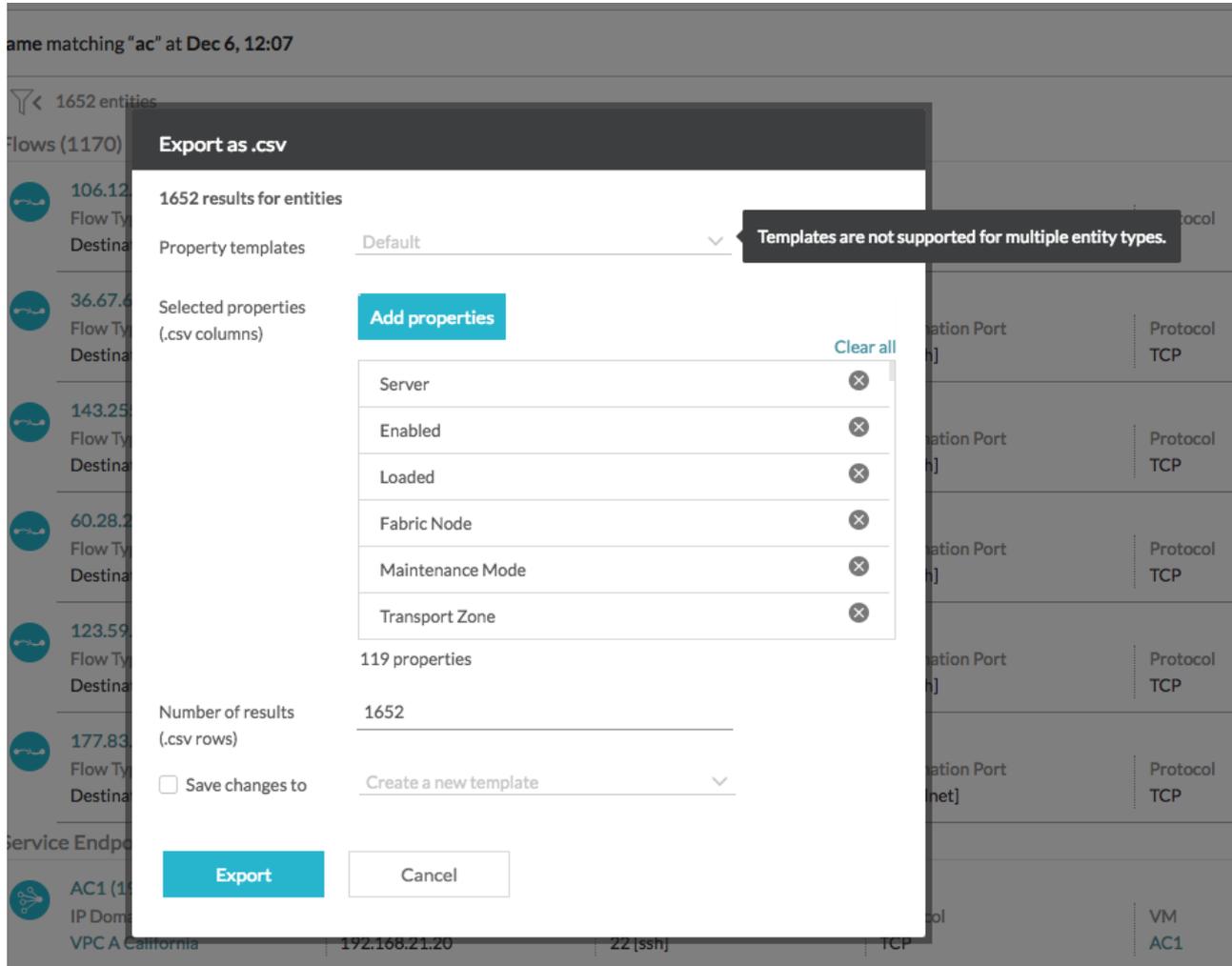
**Table 16-1.**

Flag Name	Description
-uni	To import artifacts from the universal folder.
-utag	To import the universal artifacts with the universal security tags in the membership of the universal security groups.
-log	To create rules in which logging is enabled.
	<b>Note</b> This flag is not specific to universal option.

---

## Save the Configuration for CSV Export as Property Template

While exporting the data from widgets in the CSV files, you can save the combination of the properties (or columns) that you want to export in the property templates. These property templates are enabled for the CSV export when the results belong to a single entity type. If you search with a keyword that lists the multiple entity types, they cannot save the combination of the properties in the property templates.



When you open the CSV export modal, you will see the default property selections for the search results (based on the entity type). You can change this list of the selected properties and save the new configuration for your future reference. Alternatively, you can also load or open a pre-saved property template from the **Templates** section on the CSV export modal. When you change the value, you will see the selected properties for the selected property template.

Once you make changes to the selected properties for the export, you can create a property template from the CSV export modal or edit an existing property template. This template is of the same entity type as that of the current search results.

You can view the list of the existing property templates in the system by navigating to the **Settings -> Property Templates** page. The list on the **Property Templates** page shows the existing templates with details such as entity type, last updated, and number of properties. You can edit or delete property templates from the **Property Templates** page. You can edit the property template except change its name.

## Export and Apply Kubernetes Network Policies

You can export the recommended network policy rules related to Kubernetes objects in the YAML format. vRealize Network Insight supports exporting to YAML format for the group by Namespace and group by Service topologies only.

### Prerequisites

- [Add Kubernetes](#)
- [Add VMware PKS](#)

### Procedure

- 1 To export the recommended rules to YAML format, on the Plan Security model, select your kubernetes cluster for which you wish to plan security, and perform one of the steps.
  - Expand more options in the Micro-Segments widget and select **Export Rules as YAML**, or
  - Select a node on the Micro-Segments donut view, click on the count of Recommended Firewall Rules, expand more options and select **Export Rules as YAML**.

vRealize Network Insight downloads a ZIP file named with the Kubernetes Network Policies and a timestamp associated with it. When you unzip the file, you see the following five CSV files and also multiple folders depending on the number of clusters. Each folder will contain multiple YAML files for the cluster.

File Name	Description
<code>network-policy-others-ipaddress.csv</code>	Contains the IP addresses of the physical servers and virtual machine with which the services or namespaces are communicating.
<code>recommended-namespace-labels-to-add.csv</code>	Contains the labels to be attached to the pods associated with the namespace. Example <ul style="list-style-type: none"> <li>■ <b>Cluster</b> - pdk8s</li> <li>■ <b>Namespace</b> - sock-shop</li> <li>■ <b>Label</b> - sock-shop-pdk8s</li> </ul>

File Name	Description
recommended-service-labels-to-add.csv	<p>Contains the labels to be attached to the pods associated with the service.</p> <p>Example</p> <ul style="list-style-type: none"> <li>■ <b>Cluster</b> - pdk8s</li> <li>■ <b>Namespace</b> - sock-shop</li> <li>■ <b>Service</b> - front-end</li> <li>■ <b>Label</b> - Service:front-sock-shop-pdk8s</li> <li>■ <b>Cluster</b> - pdk8s</li> <li>■ <b>Namespace</b> - sock-shop</li> <li>■ <b>Service</b> - user</li> <li>■ <b>Label</b> - Service:user-sock-shop</li> </ul>
recommended-network-policy.csv	Contains all the rules recommended by vRealize Network Insight.
exported-network-policy-rule-names.csv	Lists all the network policies exported based on the recommended rules.

**2** To apply the service labels, perform the following steps:

- a Run the following Kubernetes CLI command.

```
kubectl edit deployment service-name -n namespace-name
kubectl edit deployment redis-master -n guestbook
```

The deployment file of the service opens.

- b In the service label list, append the label which has been suggested in the CSV file, to the labels mentioned in the spec section of service deployment.

**3** to apply the namespace labels, perform the following steps:

- a Run the following Kubernetes CLI command.

```
kubectl edit namespace namespace-name
kubectl edit namespace guestbook
```

The deployment file of the namespace opens.

- b In the metadata , append the label which has been suggested in the CSV file, to the labels mentioned in the spec section of namespace deployment.

**4** Run the following command to verify whether the labels are applied to the pods.

```
kubectl get pods -n namespace-name--show-labels
kubectl get pods guestbook--show-labels
```

See the labels in the result view.

---

**Note** The labels are not reflected on Pods, when you apply on Namespace.

---

- 5 To create the network policies, copy the YAML files from the respective cluster folder and run the following command:

```
kubectl apply -f *.yaml OR kubectl apply -f YAML file.yaml
```

## Results

## Example:

## What to do next

# Working with Search Queries

# 17

vRealize Network Insight provides a robust search for all the entities in your environment.

Here are some of the terms that can help you with the search feature in vRealize Network Insight:

- **Entities:** A data center consists of physical and logical building blocks such as host, virtual machine, switch, router, NSX Manager and so on. The instances of these blocks are entities.
- **Property:** An entity consists of multiple properties. A property can be either a configuration property or a metric property.
  - a **Configuration Property:** An entity can be described by its configuration properties. A configuration property can be either integer or real value or a string or a boolean value.
    - Name, CPU cores, and operating system for virtual machines
    - Name, and number of virtual machines for hosts
  - b **Metric Property:** Any property which measures a particular characteristic of an entity is a metric property. The values of metric properties are captured at regular intervals of time. CPU usage, memory usage, and network usage for virtual machines are some examples of metric properties.
- **Aggregate Functions:** They can be used in the search queries to compute the total number of instances of a particular entity type or maximum property of an entity. vRealize Network Insight supports following aggregation functions.
  - a `sum`
  - b `max`
  - c `min`
  - d `avg`

When you search for entities, the software displays the entities that match your search query on the **Results** page.

For each search query, the search bar suggests you the next term that you can use to narrow down your search results. For example, when you enter the term **vm**, the search bar displays a possible list of terms that you can add to your existing term to narrow down your search results. The search bar also validates each search query. A check mark denotes a valid search query and a cross mark denotes an invalid search query. The **Help** page provides examples of currently supported queries.

This chapter includes the following topics:

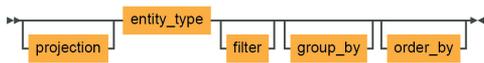
- [Search Queries](#)
- [Advanced Queries](#)
- [Time Control](#)
- [Search Results](#)
- [Filters](#)
- [vCenter Tags](#)

## Search Queries

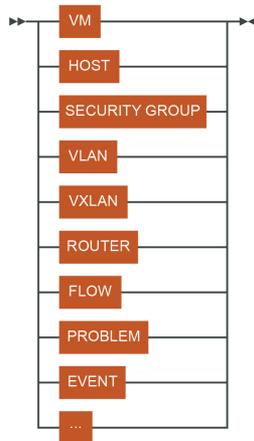
Search queries can be divided into following categories:

### 1 Structured Queries

A structured query consists of the following components:



- **Entity Type:** An entity type represents the type of object that we want to search. And it can be either in a singular form or in a plural form. The entity type is mandatory in a structured query.



Here are some examples:

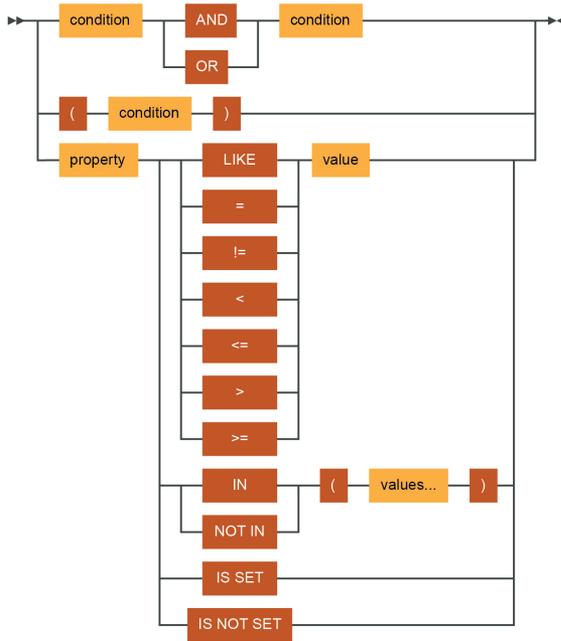
- 1 Virtual machines

- 2 Hosts
- 3 Flows
- 4 MTU Mismatch Events
- 5 Problems

■ **Filters:** The syntax for filter is as follows:



The syntax for condition is as follows:



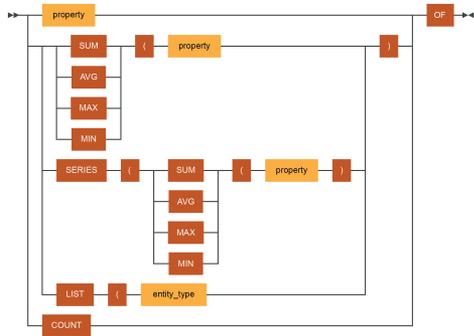
A filter clause can be used to filter search results. The condition in a filter clause consists of property, comparison operator, and value. The conditions can be combined with logical operators to form complex conditions. Here is a list of the operators that you can use:

Operator	Examples
=	flows where source ip address = '10.16.240.0/24' flows where flow type = 'Source is VM'
!=	vms where ip address != '10.17.0.0/16'
>	vms where memory > 4096 mb
<	vms where cpu usage rate < 70%
>=	vms where memory >= 4096 mb
<=	vms where cpu usage rate <= 70%

Operator	Examples
like	<code>vms where name like 'app'</code>
not like	<code>vms where name not like 'app'</code>
in	<code>flows where port in (22, 23, 80, 443)</code> <code>vm where ip address in (192.168.91.11, 192.168.91.10)</code>
not in	<code>flows where port not in (22, 23, 80, 443)</code> <code>vm where ip address not in (192.168.91.11, 192.168.91.10)</code>
is set	<code>vms where firewall rule is set</code>
is not set	<code>vms where firewall rule is not set</code>
()	<code>flows where (src tier = 'App' and destination tier = 'DB') OR (destination tier = 'App' and source tier = 'DB')</code>
and	<code>flows where src tier = 'App' and destination tier = 'DB'</code>
or	<code>flows where flow type = 'Source is VMKNIC' or flow type = 'Destination is VMKNIC'</code>
matches	<code>vm where name matches '.*'</code> <code>vm where name matches 'a.*'</code> <code>vm where name matches '[a-z]vm-delta[0-9]'</code>
not matches	<code>vm where name not matches '.*'</code> <code>vm where name not matches 'a.*'</code> <code>vm where name not matches '[a-z]vm-delta[0-9]'</code>
nested 'in' operator	<code>vm where in (vm where name = 'x')</code> <code>vm where in (vm of host where name = 'x')</code> <code>vm where host in (host of vm where name = 'x')</code> <code>vm where name in (name of vm where name = 'x')</code>

- **Projections:** A projection clause in a query decides what fields must be displayed from the filtered entities. This is an optional clause. If the projection clause is not specified, then the default set of fields is shown in the search results. A projection clause can contain any one of the following items:

- 1 Property
- 2 Count
- 3 List
- 4 Aggregation
- 5 Series



- 1 **Property:** When entities are searched by an entity type, default set of properties are shown in the search results. Using projections, we can select the fields that should appear in the search results. For example, `os of vms` lists all virtual machines with `os` property in the search results.

Here are some more examples:

- `cpu cores of vms`
- `source ip address of flows`

If a metric property is used, a graph is displayed for each entity with the metric property as y-axis and time as x-axis.

- 2 **Count:** The count query can be used to compute the number of objects of an entity type. Here are some examples:

- `count of vms`
- `count of hosts`
- `count of flows`

- 3 **List:** A list operator is helpful if the filter condition cannot be applied on the entity that you fetch.

For example:

```
List(host) of vms where memory <= 2gb
```

This query fetches list of hosts, whereas the filter condition is applied on virtual machines. Here are some more examples:

- `List(ip address)of vms where cpu cores = 1`

- 4 **Aggregate functions:** An aggregate function allows you to calculate a single value from a numerical `config` or `metric` property. The search query language supports the following aggregate functions:

- `max`
- `sum`
- `min`

- avg

Here are some examples:

- `sum(memory) of hosts`
- `sum(memory), sum(cpu cores) of vms`
- `sum(bytes) of flows`

- 5 **Series:** A series operator is used to perform aggregation on the metric properties. For example:

```
series(avg(cpu usage)) of vms where cpu cores = 4
```

This query displays graph containing average cpu usage of all virtual machines with 4 cpu cores. Here are some examples:

- `series(sum(network usage)) of vms where name like 'app'`
  - `series(sum(memory usage)) of vms where name like 'db'`
  - `series(avg(cpu usage)), series(avg(memory usage)) of vms`
- **Ordering:** The search results can be sorted using `order by` clause. Only one field is allowed in `order by` clause. Results are sorted in descending order by default.



Here are some examples:

- 1 `vms order by cpu cores`
- 2 `vms order by cpu cores asc`
- 3 `flows order by bytes`

The `limit` clause can be used to limit the number of results. This must be preceded by the `order by` clause. For example:

```
vms order by memory limit 5
```

- **Grouping:** The entities can be grouped by a property. When entities are grouped by a property, by default, the number of results in each group are shown. By adding a projection, sum/max/min of any property can be computed. Adding `order by` clause sorts the results. If `order by` or `projection` clause is present in a query, then the aggregation function must be present.



```
sum(bytes) of flows group by dest vm
```

This query is valid as the query has aggregation function in the projection clause. A query such as `bytes of flows group by dest vm` is invalid as there is no aggregation function in the projection clause.

Here are some examples:

- 1 `vms group by host`
- 2 `sum (bytes) of flows group by dest vm order by sum(bytes)`

## 2 Entity Queries



- a **Search by entity type:** All entities of an entity type can be listed by searching the entity type.

Examples: `vms`, `hosts`, `flows`, `nsx managers`

- b **Search by entity name**

- Search by full name: If the full name of an entity is known, it can be searched by enclosing the name in single quotes.

Examples: `'prod-68-1'`, `'app1-72-1'`

- Search by partial name: Search by a single word or multiple words fetches all the entities matching the input words.

Examples: `prod`, `app1`

---

**Note** If input contains keywords or entity types, then it may be processed as a search query.

---

- Search by entity type and name: If both the name and the type of an entity are known, it can be searched by querying entity type and entity name together.

Example: The search query `'vm app1'` returns all VMs containing `app1`.

## 3 Planning Queries

These queries can be used to plan the security of the data center by analyzing flows.

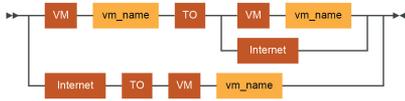


Examples:

- a `plan securitygroup1`
- b `plan host1`
- c `plan security`

## 4 Path Queries

These queries can be used to show the path between two VMs or the path from VM to Internet.



Examples:

- a Vm 'vm1' to Vm 'vm2'
- b VM 'vm1' to Internet

**Note**

- The search queries are not case-sensitive.
- The entity types or the configuration properties can have synonyms. For example, entity type 'virtual machine' has synonym 'vm'.

## Azure Search Queries

You can search Azure entity details in vRealize Network Insight.

Here are some sample search queries:

Azure Entities	Sample Queries
Microsoft Azure	Azure
Azure Application Security Group	Azure Application Security Group where Azure Virtual Network = 'Test-vnet2'
Azure Data Source	Azure Data Source
Azure NSG Rule	Azure NSG Rule where Action = 'ALLOW'
Azure Network Interface	Azure Network Interface where Azure Virtual Network = 'Test-vnet2'
Azure Network Security Group	Azure Network Security Group where Subscription = 'vrni-dev'
Azure Route	Azure Route where Route Table = 'TestRouteTable'
Azure Route Table	Azure Route Table where Azure Virtual Network = 'aks-vnet-28255566'
Azure Subnet	Azure Subnet where Azure Virtual Network = 'vrni-01-vnet'
Azure Subscription	Azure Subscription
Azure Virtual Machine	Azure Virtual Machine where Azure Application Security Group = 'TestASG'
Azure Virtual Network	Azure Virtual Network where Azure Peer Virtual Network = 'vrni-01-vnet'

## Cisco ACI Entities

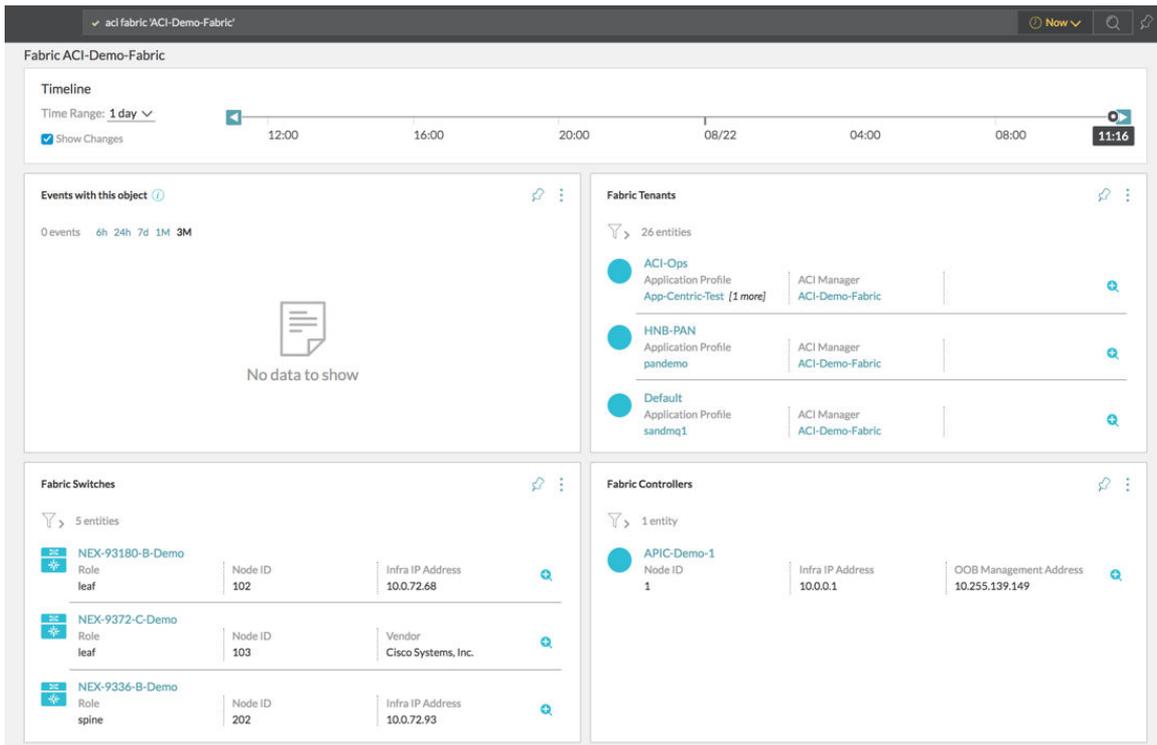
Here is a list of some of the Cisco ACI entities on which you can perform a search:

**Note** The entities are prefixed by `aci`.

- `aci application profile`
- `aci bridge domain`
- `aci endpoint group`
- `aci fabric`
- `aci switch`
- `aci tenant`

Here are some sample search queries:

- `aci fabric 'ACI-Demo-Fabric'`: This query retrieves information on the tenants, switches, and controllers in the ACI fabric.



- `aci switches by role`: This query retrieves information on the various leaf switches or the spine switches in the ACI fabric.

From the switch list, click a switch name to get more details about it.

aci switches by role

Showing 5 results for aci switch at Aug 22, 11:18

Filters

Add more filters

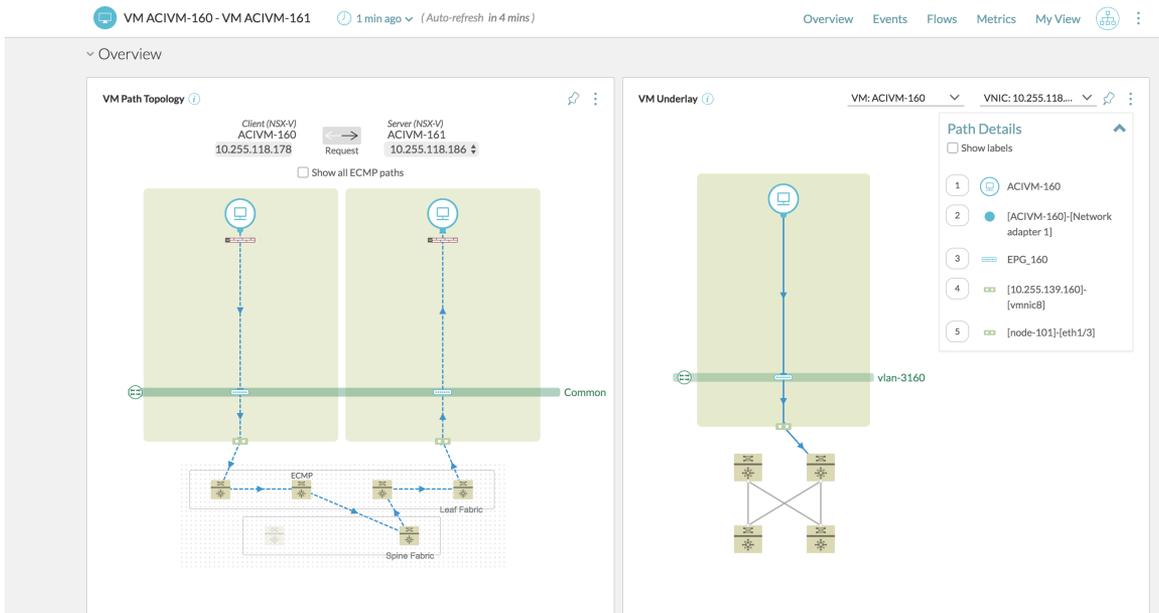
Role

- All
- leaf (3)
- spine (2)

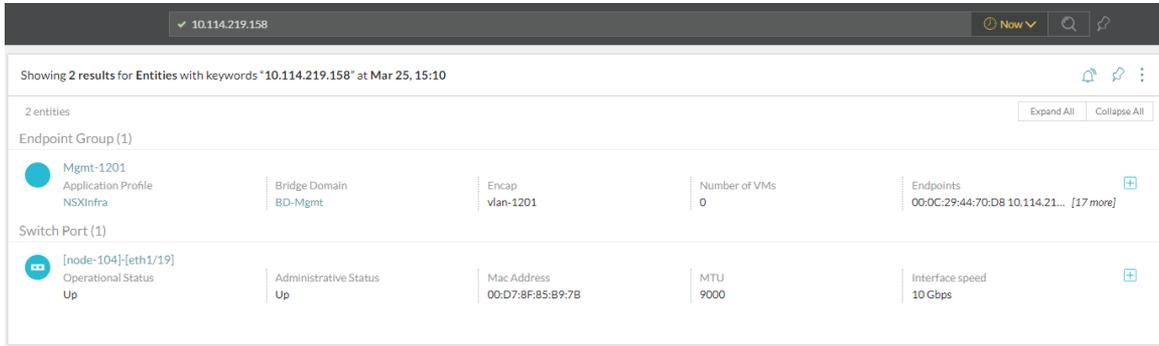
5 entities

Entity	Role	Node ID	Infra IP Address	OOB Management Address	Vendor
NEX-93180-B-Demo	leaf	102	10.0.72.68	10.255.139.151	Cisco Systems, Inc.
NEX-9372-C-Demo	leaf	103			Cisco Systems, Inc.
NEX-93180-A-Demo	leaf	101	10.0.72.69	10.255.139.150	Cisco Systems, Inc.
NEX-9336-B-Demo	spine	202	10.0.72.93	10.255.139.153	Cisco Systems, Inc.
NEX-9336-A-Demo	spine	201	10.0.72.94	10.255.139.152	Cisco Systems, Inc.

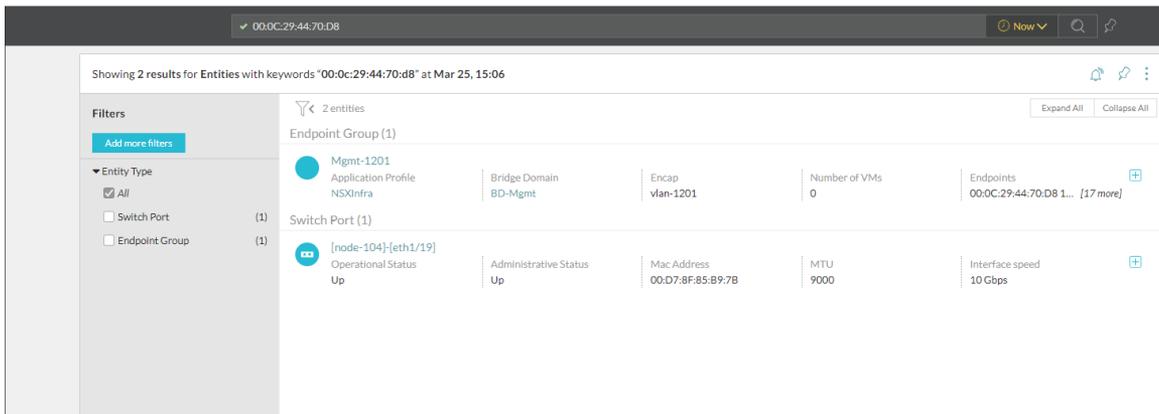
- aci endpoint group: This query retrieves a list of the endpoint groups with the associated VMs, bridge domains, and VRFs.
- aci application profile 'Production': This query retrieves the application profile of Production with the contained endpoint groups and VMs.
- VMware VM 'ACIVM-160' to VMware VM 'ACIVM-161' : This query shows the VM-VM path between the two VMs.



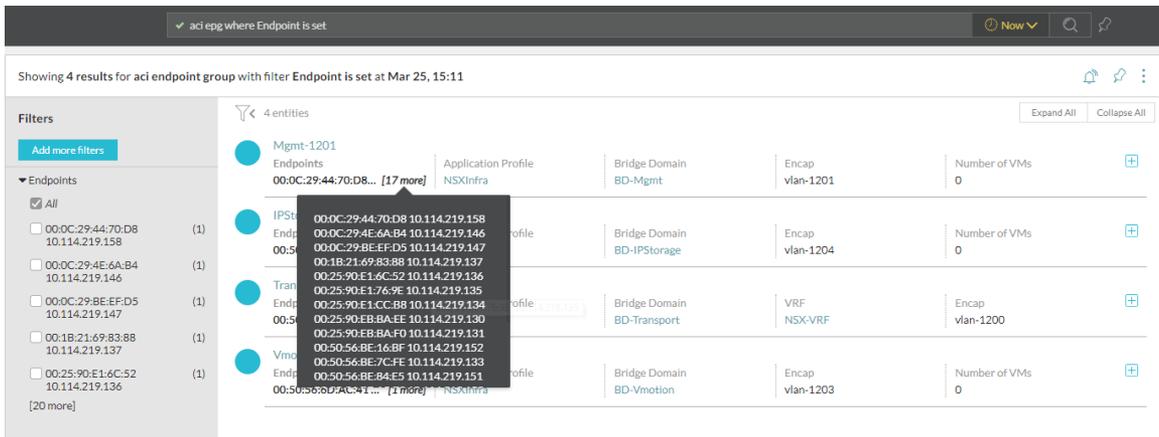
- You can search with IP address to get the port, end point group, and bridge domain details.



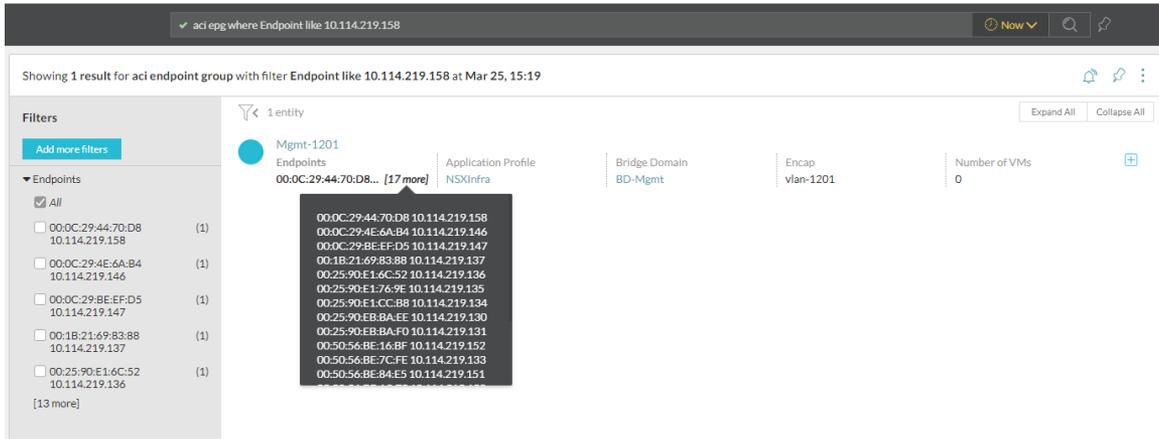
- You can search with Mac address to get the port, end point group, and bridge domain details.



- You can search for an end point group and get the list of associated endpoints.



- You can search for an endpoint.



## Fortinet Search Queries

You can search Fortinet entity details in vRealize Network Insight.

Here are some sample search queries:

Fortinet Entities	Sample Queries
Fortinet Policy Package	Fortinet Policy Package where Domain Manager = 'ADOM_NAME'
Fortinet Policy	Fortinet Policy where Source IP = '10.0.0.15'
Fortinet Address	Fortinet Address where Address Type = 'ipmask'
Fortinet Dynamic Address	Fortinet Dynamic Address where Domain Manager = 'ADOM_NAME'
Fortinet Dynamic Address Group	Fortinet Dynamic Address Group where Domain Manager = 'ADOM_NAME'
Fortinet service	Fortinet Service where port = 5900
Fortinet service Group	Fortinet Service Group where Manger = '10.0.15.101'
Fortinet ADOM	Fortinet ADOM where Manager ID = '10.0.15.101'
Fortinet VDOM	Fortinet VDOM where Domain Manager = 'ADOM_NAME'
Fortinet Dynamic Interface	Fortinet Dynamic Interface where Domain Manager = 'ADOM_NAME'

## Enriching Flows with the Infoblox DNS Data

vRealize Network Insight supports two sources of DNS information:

- Imported CSV file

- Infoblox DNS

**Note** If there is a conflict between Infoblox DNS and the CSV file, the information from Infoblox DNS takes precedence.

You can use various search queries to find out more about the source of DNS entries in a flow.

**Table 17-1.**

Keyword	Sample Search Query	Description
DNS Provider	<code>Flows where DNS Provider='Infoblox'</code>	Provides the list of flows in which the DNS data is obtained from Infoblox.
DNS Provider	<code>Flows where DNS Provider='CSV'</code>	Provides the list of flows in which the DNS data is obtained from CSV.
Source DNS Provider	<code>Flows where Source DNS Provider='Infoblox'</code>	Provides the list of flows in which the DNS provider for the source IP address is Infoblox.
Destination DNS Provider	<code>Flows where Destination DNS provider='Infoblox'</code>	Provides the list of flows in which the DNS provider for the destination IP address is Infoblox.

## Common Search Queries for Kubernetes Entities

You can search for Kubernetes entities details in vRealize Network Insight.

### Common Queries

- Search Flows: `flows where Kubernetes Object = Object name`  
Example: flows where **Kubernetes Cluster** = **'Production'**
- View the service scale: `kubernetes pods group by Kubernetes Services`
- View the node load: `kubernetes Pods group by Kubernetes Node`
- View the node health: `MemoryPressure and PIDPressure and DiskPressure and Ready of Kubernetes Node`
- View flow compliance: `flows from Kubernetes Object name of the object to Kubernetes Object name of the object`  
Example: flows from Kubernetes Namespace **'PCI'** to Kubernetes Namespace **'Non-PCI'**
- View the Path topology:
  - Kubernetes service *service name* to Kubernetes service *service name*
  - Kubernetes service *service name* to Kubernetes pod *pod name*
  - Kubernetes pod *pod name* to Kubernetes pod *pod name*

Table 17-2. Queries on Kubernetes Object

Kubernetes Object	Query	Description
Namespace	<ul style="list-style-type: none"> <li>■ kubernetes namespace where L2 Networks = 'a'</li> <li>■ list(Kubernetes Node) of Kubernetes Pod where Kubernetes Namespace = 'a'</li> </ul>	<ul style="list-style-type: none"> <li>■ Return the Kubernetes namespace where it is connected to L2 Network 'a'</li> <li>■ Return the list of Kubernetes nodes where Kubernetes namespace is 'a'</li> </ul>
Pod	<ul style="list-style-type: none"> <li>■ NSX-T Logical port where connectedto.modelKey in (modelKey of kubernetes nodes) order by Tx Packets desc</li> <li>■ NSX-T Logical port where connectedto.modelKey in (modelKey of kubernetes pods) and Rx Packet Drops &gt; 0</li> <li>■ new kubernetes pod in last 1 hour</li> </ul>	<ul style="list-style-type: none"> <li>■ Return the list of logical ports which are connected to a node based on transferred packets in descending order</li> <li>■ Return the list of logical ports which are connected to Kubernetes pods and Rx dropped packets &gt; 0</li> <li>■ New Kubernetes pods discovered in last one hour</li> </ul>
Services	<ul style="list-style-type: none"> <li>■ kubernetes pods where kubernetes services is not set</li> <li>■ kubernetes pods group by Kubernetes Services, Kubernetes Cluster</li> </ul>	<ul style="list-style-type: none"> <li>■ List of Kubernetes pods that does not have a service</li> <li>■ Number of pods running on each service</li> </ul>
Nodes	<ul style="list-style-type: none"> <li>■ kubernetes nodes where Ready != 'True'</li> <li>■ kubernetes node where Virtual Machine = 'vm-a'</li> </ul>	<ul style="list-style-type: none"> <li>■ List of unhealthy Kubernetes nodes</li> <li>■ Kubernetes node that is part of 'vm-a' virtual machine</li> </ul>
Flows	<ul style="list-style-type: none"> <li>■ flows where kubernetes service is set</li> <li>■ flows where source kubernetes node = 'a'</li> </ul>	<ul style="list-style-type: none"> <li>■ List of flows where either a source or a destination Kubernetes service exists</li> <li>■ List of flows where source Kubernetes node = 'a' or destination Kubernetes node = 'a'</li> </ul>

## Sample Search Queries Related to Load Balancer

You can use the following sample queries to filter or search the data related to the load balancer.

- `vm where lbServiceNodes is set` - Lists all the VMs that are hosting an application where load is distributed.
- `vm where lbServiceNodes is set and PowerState != 'POWEREDON'` - Lists all the VMs that are hosting a load balanced application, but currently non-functional.
- `pool member where state = 'DISABLED'` - Lists all pool members that are disabled.
- `Count of Pool Memebers where Service Port = '80'` - Provides the count of all pool members for a particular type of service that are running on port 80.

- service node where virtual machine is not set - Lists all service nodes that are using the physical server as an application server or the vCenter Server that is hosting the VMs is not added in vRealize Network Insight

## Search Queries for NSX Firewall Rules

You can search for NSX Firewall rules in vRealize Network Insight.

**Table 17-3. Firewall Rules Queries**

Search Query	Description
VM where incoming rules.Source Any	View rules with any source (can combine with a specific port).
Firewall rule where action = allow and service any = true	View firewall rules that allow any ports.
Firewall Rule Masked Event	View the list of unused firewall rules.
New firewall rules in last 24 hours	View the firewall rules created in the last 24 hours.
New firewall rules in last 7 days	View the firewall rules created in the last 7 days.
New firewall rules in last 30 days	View the firewall rules created in the last 30 days.
Firewall rule where flow is not set	View the list of all inactive firewall rules.
Flow group by firewall rule	View the count of flows hitting each firewall rule.
Security group where Indirect Incoming Rules is not set and Indirect Outgoing Rules is not set and Direct Incoming Rules is not set and Direct Outgoing Rules is not set	View the security group that is not used.
Ipset where Indirect Incoming Rules is not set and Indirect Outgoing Rules is not set and Direct Incoming Rules is not set and Direct Outgoing Rules is not set	View the IPSet that is not used.
Flow where rule id in (1011, 1012, 1013)	Flows hitting a specific rule ID.
Flow where application = appl	Flows hitting the application.

- Unused firewall rules
- Firewall rule Masking rule event

## VMware SD-WAN Search Queries

You can search VMware SD-WAN entity details in vRealize Network Insight.

Here are few sample search queries:

VMware SD-WAN Entities	Sample Queries
VeloCloud Cluster	<code>VeloCloud Cluster where Description = 'cluster one'</code>
VeloCloud Data Source	<code>VeloCloud Data Source where Enabled = true</code>
VeloCloud Edge	<code>VeloCloud Edge where Activation State = 'Activated'</code>
VeloCloud Enterprise	<code>VeloCloud Enterprise where Name = 'VMWare - vRNI'</code>
VeloCloud Gateway	<code>VeloCloud Gateway where City = 'Ashburn'</code>
VeloCloud Layer2 Network	<code>VeloCloud Layer2 Network where Network = '172.16.40.2/24'</code>
VeloCloud Link	<code>VeloCloud Link where Link Uptime = 100%</code>
VeloCloud Profile	<code>VeloCloud Profile where Name = 'APProfile'</code>
VeloCloud Segment	<code>VeloCloud Segment where Vendor ID = '1'</code>

## VMware Cloud on AWS for AWS Entities

Here are the entities related to VMware Cloud on AWS NSX Policy Manager:

- NSX Policy Manager Data Source
- NSX Policy Manager
- NSX Policy Firewall
- NSX Policy Firewall Rule
- NSX Policy Segment
- NSX Policy Based VPN
- NSX Policy Group

---

**Note** If NSX-T 2.4 and VMware Cloud on AWS are added as data sources in your vRealize Network Insight, then to get the VMware Cloud on AWS entities, you must add **SDDC type = VMC** filter in your query. For example, to list the Policy Based VPNs for VMware Cloud on AWS, enter **NSX Policy Based VPN where Tier0 = '' and SDDC Type = 'VMC'**.

---

Some sample search queries related to the VMware Cloud on AWS entities are:

- `VMs where L2 Network = ''` (L2 Network -> NSX Policy Segment)
- `NSX Policy Based VPN where Tier0 = ''`
- `NSX Policy Based VPN where Local Network = ''` (Local Network of Policy Based VPN Rule)
- `NSX Policy Based VPN where Remote Network = ''` (Remote Network of Policy Based VPN Rule)

- NSX Policy Group where Translated VM = ''
- VM where NSX Policy Group = ''

---

### Note

- NSX Policy Manager does not support child groups or IPSETS. Hence all the searches like NSX Policy firewall rule where Indirect \_\_\_\_\_ = '' or NSX Policy group where Indirect \_\_\_\_\_ = '' are disabled.
- 

## Advanced Queries

Here are some examples for advanced queries:

### Flow Queries for Communication Patterns

- Total Traffic across data centers or sites (DCI link use)
 

```
sum(bytes) of flows where ( Dst Manager = 'abc' AND src manager = 'cba') OR ( Dst
Manager = 'cba' AND src manager = 'abc')
```
- Total VTEP traffic
  - sum(bytes) of flows where Flow Type = 'Src is VTEP' or flow type = 'Dst is VTEP' VTEP traffic grouped by VMKNIC
  - sum(bytes) of flows where Flow Type = 'Src is VTEP' or Flow Type = 'Dst is VTEP' group by ip
- Other Management Traffic
 

```
flows where Flow Type = 'Source is VMKNIC' or Flow Type = 'Destination is VMKNIC'
```

### Flow Queries for Aggregation and Grouping

- Total Internet traffic by Source VM
 

```
sum(bytes) of flows where Flow Type = 'Internet' group by src vm
```
- Top ports by total bytes
 

```
sum(bytes) of flow group by port order by sum(bytes)
```
- Top subnet pairs by routed traffic volume
 

```
sum(bytes) of flow where Flow Type = 'Routed' group by Source Subnet Network,
destination subnet network order by sum(bytes)
```
- Total VM by total pair bytes
 

```
sum(bytes) of flows group by src vm , dest vm order by sum(bytes)
```
- Top Server VM/Port by total bytes
 

```
sum(bytes) of flows group by dest vm , port order by sum(bytes)
```

## Flow Queries for Capacity Estimation and Sizing

- Total bytes of all vm-internet/internet-vm traffic grouped by ESX ( Palo Alto Service VM sizing)

```
sum(bytes) of flows where flow type = 'internet' and (flow type = ' src is vm ' OR
flow type = 'destination is vm ') group by host order by sum(bytes)
```

- Aggregated traffic series for matching flows ( Palo Alto Service VM sizing)

```
series( sum(byte rate)) of flows where host = 'ddc1-pod2esx012.dm.democompany.net'
and (Flow Type = 'Source is VM' OR flow type = 'Destination is VM')
```

## Useful Queries for Application

- VMs in a given application

```
VM where application = 'CRM'
```

- Routed Flows from a given application

```
Flows where source application = CRM and Flow Type = 'Routed'
```

- Flows between two tiers (one-way)

```
Flows where src tier = 'App' and Destination Tier = 'DB'
```

- Flows between two tiers (one-way)

```
Flows where ( src tier = 'App' and destination Tier = 'DB') OR (destination tier =
'App' and source tier = 'DB')
```

## Useful Queries for VM and ESX

- Properties of Prod -Midtier-1 VM (MAC, IP, host, and so on)

```
CPU Usage Rate, Network Rate, Memory Usage Rate, mac address, ip , vxlan , host of
vm 'Quality control-VM26'
```

- Network segments having the highest VM count

```
vm group by l2 network
```

- Datastores have highest VM count

```
vm group by datastore
```

- Hosts by vSphere version

```
host group by version
```

- Hosts by vSphere Builds

```
host group by OS
```

- All VMs on all host/blade slotted in a particular UCS chassis (Nested Query)

```
vm where host in (host where Blade like 'sys/chassis-1')
```

## Useful Queries: General Capacity

- Number of Datacenters:

```
count of datacenter
```

- Number of clusters

```
count of cluster
```

- Number of Hosts

```
count of host
```

- Number of VMs

```
count of vm
```

- Number of Networks

```
count of vlan
```

## Useful Queries: Routes

- VNIs by Primary controller

```
vxlan group by Primary Controller
```

- Routes for Provider edge 3

```
routes where vrf = 'Provider Edge 3'
```

- Routes of DMZ DLR

```
NextHop Router of routes where VRF = 'LDR-DMZ'
```

- Routes having the given router as next hop

```
routes where NextHop Router = 'California-Edge'
```

## Useful Queries: Firewall Rules

- Firewall rules between two VMs

```
firewall rules from 'Prod-MidTier-1' to 'Prod-Db-1'
```

- Rules with have ANY source

```
firewall rules where Service Any = true
```

- VMs for a given rule

```
vm where Firewall Rule = 'Prod MidTier to Prod DB - DBService '
```

- Firewall rules where any port is allowed

```
firewall rule where action = allow and service any = true
```

- Flows hitting a particular firewall rule

```
flows where firewall rule = 'Admin to Prod and Lab - SSH'
```

- Denied flows in the system

```
flows where firewall action = deny
```

## Useful Queries: General Traffic Patterns

- East-West and North-South traffic count, switched traffic count, routed traffic count, and VM to VM traffic count

```
plan security in last 7 days
```

## Useful Queries: Traffic from a security lens

- Top talkers VMs details

```
top 7 vm group by name, Vlan order by sum(Total Network Traffic) in last 7 days
```

- Networks that carry the most traffic

```
top 7 vlan group by Vlan id, vm count order by sum(Total Network Traffic) in last 7 days
```

- Networks where most of the communication is within the VLAN (not crossing a physical firewall or L3 boundary)

```
top 7 flow where Flow Type = 'Switched' group by Subnet Network order by sum(Bytes) in last 7 days
```

- Networks where most of the communication is across VLAN (may be causing bottleneck problems at physical firewall)

```
top 7 flow where Flow Type = 'Routed' group by Source Subnet Network, Destination Subnet Network order by sum(Bytes) in last 7 days
```

- VMs that talks outside the country

```
top 7 flow where Destination Country != 'United States' group by Source VM, Destination Country order by sum(Bytes) in last 7 days
```

- Data stores experiencing the most storage latencies

```
avg(Read Latency), avg(Write Latency) of top 7 vm group by Datastore, vlan order by avg(Write Latency) in last 7 days
```

## Useful Queries: Compliance/Vulnerabilities

- Vulnerable OSs details

```
vm where Operating System like 'Microsoft Windows Server 2003' or Operating System
like 'Microsoft Windows Server 2008' or Operating System like 'Red Hat Enterprise
Linux 6' or Operating System like 'Red Hat Enterprise Linux 5' or Operating System
like 'SUSE Linux Enterprise 10' group by vlan, Operating System
```

- Vulnerable OS Count

```
count of vm where Operating System like 'Microsoft Windows Server 2003' or
Operating System like 'Microsoft Windows Server 2008' or Operating System like 'Red
Hat Enterprise Linux 6' or Operating System like 'Red Hat Enterprise Linux 5' or
Operating System like 'SUSE Linux Enterprise 10'
```

- Total attack surface due to Old OSs

```
vm where vlan in (vlan of vm where os in ('Microsoft Windows Server 2003',
'Microsoft Windows Server 2008', 'Red Hat Enterprise Linux 6', 'Red Hat Enterprise
Linux 5', 'SUSE Linux Enterprise 10')) group by Vlan
```

```
count of vm where vlan in (vlan of vm where os in ('Microsoft Windows Server 2003',
'Microsoft Windows Server 2008', 'Red Hat Enterprise Linux 6', 'Red Hat Enterprise
Linux 5', 'SUSE Linux Enterprise 10'))
```

---

**Note** To get recommended firewall rule for the vulnerable OS, see [Recommended Firewall Rule to Secure Vulnerable OS](#).

---

## Time Control

Time-control allows you to run a search query within the context of a selected time or time range. You can select from a list of presets such as last 24 hours, last 3 days, and so on. You can also specify a particular date and time using the **At** option or even a range using the **Between** option.

## Search Results

The search results page provides a detailed list of concerned entities that match a particular search. The page itself provides numerous information that ranges from the list of entities, their corresponding properties, and facets to filter the search results to refine your search.

You can also expand or collapse each entry in the search results to view more information about a particular entry. You can also create a notification for each search.

---

**Note** You can point to a particular property in the search results and also in the entity pages to view a tool tip containing more information about that property.

---

The following graphic shows the search results for the VXLANs where `num vms > 0` search query for a time from the past.

vxlans where Num VMs > 0

Showing 12 results for Vxlan with filter Num VMs > 0 at

Filters

Add more filters

VM Count

- All (5)
- 1 (5)
- 2 (2)
- 3 (2)

NSX Manager

Scope

12 entities

Entity Name	Number of VMs	NSX Manager	Scope	Segment ID	Network Address
Siteb-Aundh-LS	3	10.197.17.114	Global	5006	192.168.23.0/24
Siteb_P-seattle-vxlan	3	10.197.17.229	Global	5000	172.17.1.0/24
Siteb_P-redmond-vxlan	2	10.197.17.229	Global	5001	172.17.2.0/24
Siteb-Wagholi-LS	2	10.197.17.114	Global	5005	192.168.26.0/24
Siteb-pashan-ls-1	2	10.197.17.114	Global	5002	192.168.24.0/24
Siteb_P-transit-vxlan-2	2	10.197.17.229	Global	5005	172.17.6.0/24
Siteb_P-transit-vxlan-1	2	10.197.17.229	Global	5004	172.17.5.0/24
Siteb-Transit-LS-1	1	10.197.17.114	Global	5003	192.168.21.0/24

## Filters

Filters

Add more filters

Default Gateway

- All
- 192.168.23.10 (1)

NSX Manager

Scope

VM Count

Once you get the search results, click Add more filters on the left pane as per your requirements. You can view a series of filter categories that you can use to narrow down the search results. The number of available filters for each category is mentioned in a small box beside the category. View the available filters for that category (along with a short explanation for each filter) and

click to apply that filter. You can also use the filter search box to search for a particular filter and vRealize Network Insight automatically shows the filters that match your search query and you can click to apply that filter. Each filter has several properties to refine the search results. When you select a filter property from one of the filters, then the selected property is highlighted in the search results.

## vCenter Tags

vRealize Network Insight provides vCenter tags for search and planning.

You can perform a search of VMs based on the vCenter tags and custom attributes. For example, you can use the following query for search by using tags:

```
vm where tag = '{keyname}:{value}'
```

Every tag belongs to a category. In the above example, the keyname is the category to which the tag belongs and value is the name of the tag.

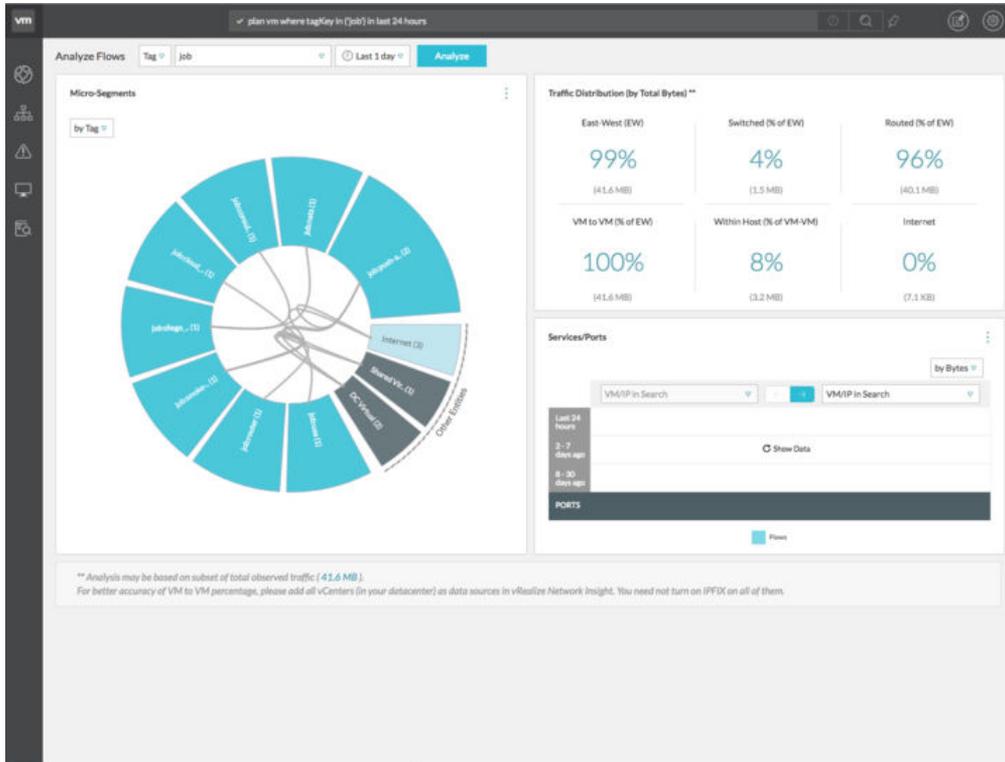
You can also provide an alternate name to a VM by using vCenter tags or custom attributes by using the `name` key. This alternate name is shown as the `other_names` property. It is also possible to search and make path queries using the alternate name.

For example, the following queries are supported:

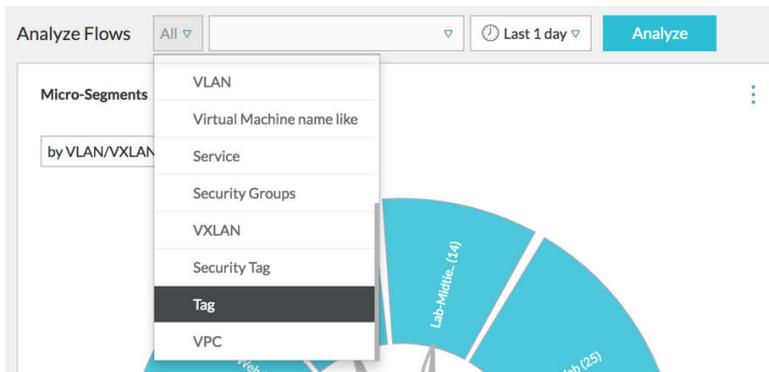
```
vm "other-name-1"
  vm "other-name-1" to vm "other-name-2"
```

In this example, `other-name-1` and `other-name-2` are custom attributes with the `name` key or tags belonging to the `name` category.

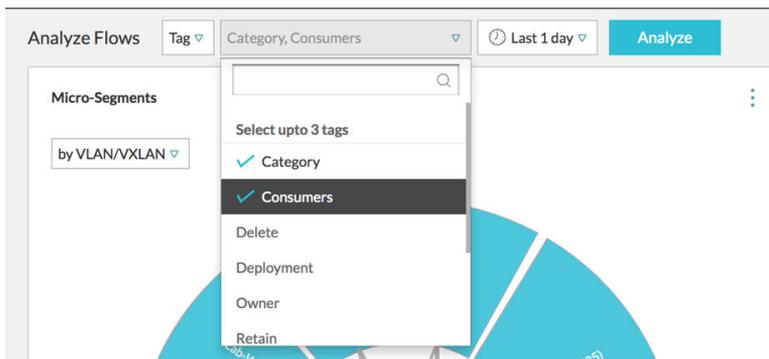
You can also analyze the flows in the network by using the vCenter tags as shown in the figure.



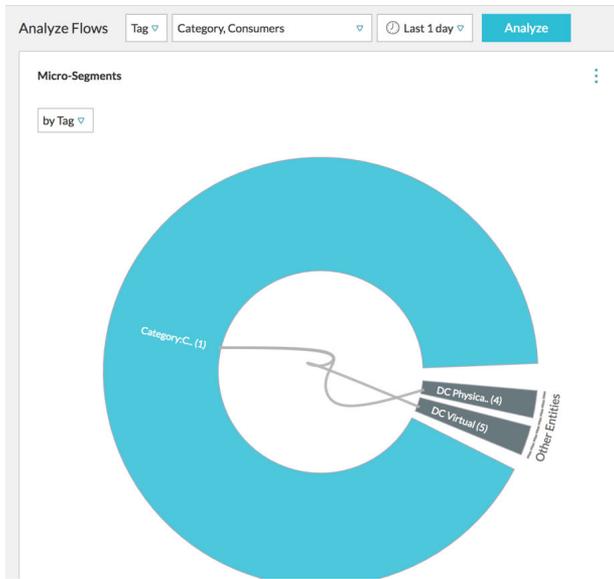
To use the vCenter tags, select the **Tag** option from the **Analyze Flows** drop-down list.



You can also select up to three tags at this level. After you select the tag, click **Analyze**.



In **Group by Criteria**, **Tag** is selected.



# Planning Disaster Recovery for vRealize Network Insight

# 18

VMware Site Recovery Manager (SRM) is a disaster recovery automation software that provides policy-based management, non-disruptive testing, and automated orchestration. vRealize Network Insight supports SRM 8.1 and the further versions. To protect your vRealize Network Insight, SRM automates every aspect of executing a disaster recovery plan to accelerate recovery and eliminate the risks involved when using a manual process.

For information about installing, upgrading, and configuring SRM, see [VMware Site Recovery Manager Documentation](#).

The prerequisites for the disaster recovery operation for vRealize Network Insight are as follows:

- Ensure that you have installed and configured vSphere Replication.
- SRM should be deployed and configured on both the protected and the recovery sites.
- Ensure that the site pairing is configured properly from within the SRM UI before proceeding with the creation of the recovery plan and other components.
- VMware vSphere Replication should be enabled for each of the protected nodes of the vRNI setup in context. While enabling VMware vSphere Replication, provide sufficient RPO considering the vRealize Network Insight node size & the usage so that minimum data loss is expected to incur during a disaster. For more information on replication, see [VMware vSphere Replication Documentation](#).
- Ensure that you create a separate protection group for vRealize Network Insight. For small and non-distributed deployments, ensure that all the VMs are in the same protection group. For distributed deployments, it is recommended that you place all the platforms in a single protection group so that it is easy to recover. You can place the collectors in different protection groups.
- Create a recovery plan and add the protection groups containing vRealize Network Insight VMs to this plan. Ensure that the protection group containing the platform nodes get the higher precedence. In the recovery plan, ensure that the primary platform node is placed in a higher priority group than the other platform nodes.
- Currently, any type of IPv4 customization with SRM is not supported

It is recommended that you migrate or recover vRealize Network Insight VMs to an identical network configuration. Also as per the SRM recommendation, you can perform test run periodically to ensure the existing plan works with underlying infrastructure and the configured RPO limit.

- Migrate or recover vRealize Network Insight VMs to an identical network configuration.

If the recovery site is configured to have the same network configuration as the protected site and a mapping is created between the identical networks, configure all replicated vRealize Network Insight virtual machines to be started with the same IPs, because these VMs are the protected nodes. The recovered system will become operational after the planned migration or disaster recovery has finished successfully.

- Do not specify any IP customization for a recovery plan when the recovery site does not have the same network as that of the protected site. In this scenario, SRM is used for the recovery of the appliance VMs. For configuring network post recovery, manually assign the network settings as follows:

- 1 Run the `change-network-settings` command simultaneously on all the platform nodes.
- 2 Run the `update-IP-change` command on the nodes on Platform1, Platform2 and Platform3 consecutively.
- 3 Run `vrni-proxy set-platform --ip-or-fqdn <with-updated-ip-of-Platform1>` on the collector node.
- 4 Check the service status. If some of the services on the platform nodes are not running, reboot the nodes in the recommended order.

---

**Note** For more information on the commands mentioned above, see *vRealize Network Insight Command Line Reference Guide*.

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This chapter includes the following topics:

- [Sample Disaster Recovery Scenario](#)

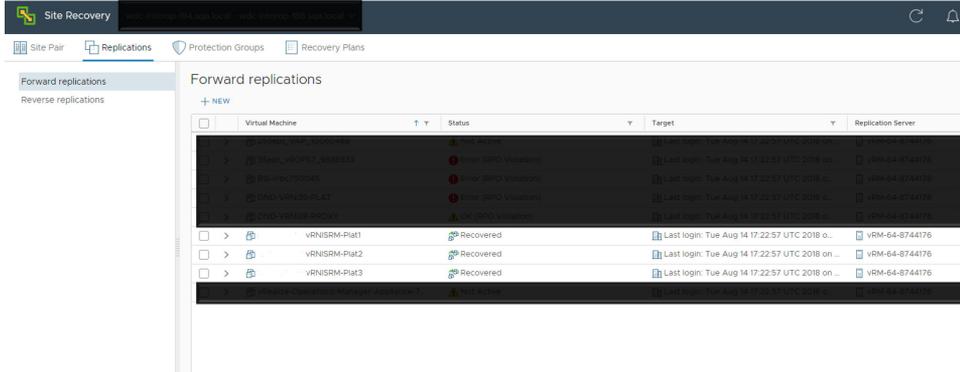
## Sample Disaster Recovery Scenario

Here are the steps for a sample scenario for vRealize Network Insight Disaster Recovery (DR):

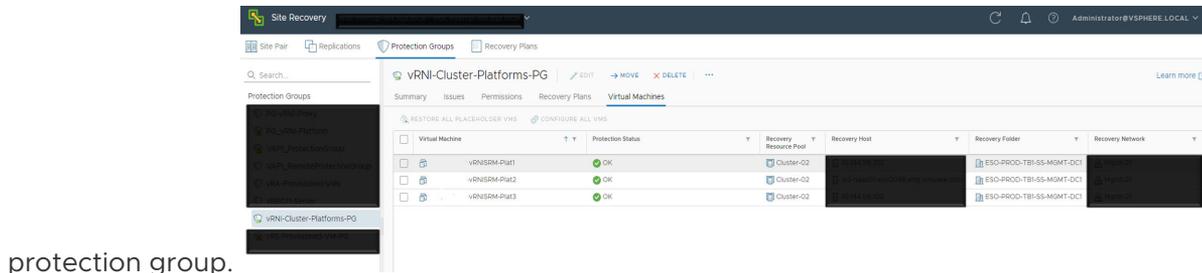
### Procedure

- 1 Ensure that SRM is configured and up in both the protected and the recovery sites.

- Configure replication for each of the vRealize Network Insight nodes that are to be protected. While configuring the replication, provide adequate Recovery Point Objectives (RPO) time for the vRealize Network Insight instance. For example, if it is a vRealize Network Insight deployment with a single platform and collector nodes (medium size), then RPO of 45 minutes is good. But if it is a cluster with nodes having bricks of large size, then the adequate RPO should be provided. The snapshot interval configuration is specific to the user environment and requirement.

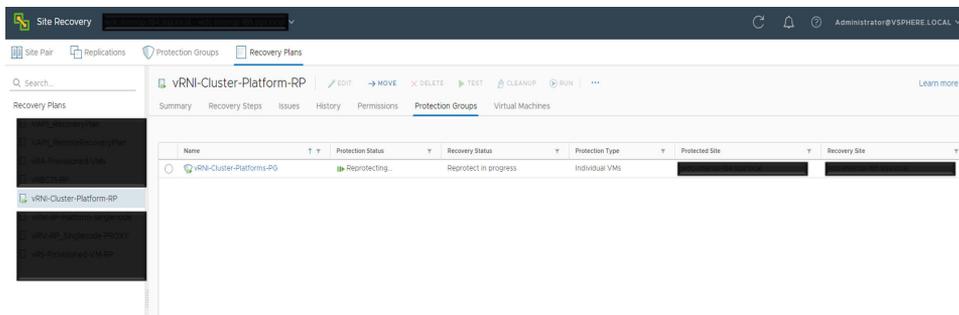


- Create protection group. Include the VMs that you want to protect under a specific



protection group.

- Create the recovery plan where you include the respective protection



groups.

- Perform test recovery. This is to ensure that your recovery plan works as expected.
- SRM recommends that users perform planned migration at regular intervals to validate the integrity of the existingDR plan.

- 7 Suppose the recovery site has a network configuration that forces the vRealize Network Insight VMs to come up with the new IPs. Recover the vRealize Network Insight VMs with a recovery plan that assumes no network change for the recovered VMs. Once the recovery of the VMs is reported as a success in vRealize Network Insight, assign new IP addresses manually to the vRealize Network Insight nodes, apply new certificates, and re-initialize the cluster.
- 8 As IPv4 customization with SRM is not supported currently, as a work around you can perform DR with vRealize Network Insight assuming as if there is no network change.

To manually assign the network settings:

- a Run the `change-network-settings` command simultaneously on all the platform nodes.
- b Run the `update-IP-change` command on the nodes on Platform1, Platform2 and Platform3 consecutively.
- c Run `vrni-proxy set-platform --ip-or-fqdn <with-updated-ip-of-Platform1>` on the collector node.
- d Check the service status. If some of the services on the platform nodes are not running, reboot the nodes in the recommended order.

This chapter includes the following topics:

- [Common Data Source Errors](#)
- [Unable to Enable DFW IPFIX](#)

## Common Data Source Errors

When you add a data source, you can come across several errors. This table contains the list of common errors with the cause and resolution for each.

Table 19-1.

Error Text	Cause	Resolution
Invalid Response from Data Source	vRealize Network Insight Proxy was unable to process the information received from the Data Source as the information was not in the expected format.	In some data providers this problem is observed intermittently and might go away in the next polling cycle. If it occurs consistently, contact support.
Data Source is not reachable from Proxy VM	Data source IP address on SSH/ REST (port 22 or 443) is either not reachable from the vRealize Network Insight Proxy VM or the data source is not responding. This error occurs while adding the data source.	Verify connectivity to the data source from vRealize Network Insight Proxy VM on port 22 or 443. Make sure data source is up and running and the firewall is not blocking connection from vRealize Network Insight Proxy VM to the data source.
No NSX Controller found	An NSX Controller has been selected in the NSX Manager data source page but there is no NSX Controller installed.	Install an NSX Controller on NSX Manager and then select NSX Controller check box on the NSX Manager data source page.
Data source type or version mismatch	Provided data source IP Address/ FQDN is not of selected data source type.	Verify that provided data source IP Address/FQDN is of selected data source type and version is supported by vRealize Network Insight

Table 19-1. (continued)

Error Text	Cause	Resolution
Error connecting to data source	vRealize Network Insight Proxy VM is unable to connect to the data source. This error occurs after adding the data source.	Verify connectivity to the data source from vRealize Network Insight Proxy VM on port 22 or 443. Make sure that the data source is up and running and firewall is not blocking connection from vRealize Network Insight Proxy VM to the data source.
Not found	vRealize Network Insight Proxy VM is not found.	Check if pairing is done between vRealize Network Insight Proxy VM and vRealize Network Insight Platform VM.
Insufficient privileges to enable IPFIX	The user who is trying to enable IPFIX in vCenter does not have the following privileges: DVSwitch.Modify; DVPortgroup.Modify	Provide adequate privileges to the user.
IP/FQDN is invalid	The IP/FQDN provided on the data source page is not valid or does not exist.	Provide valid IP/FQDN address.
No data being received	vRealize Network Insight Platform VM is not receiving data from vRealize Network Insight Proxy VM for that data source.	Contact Support.
Invalid credentials	Provided credentials are invalid.	Provide the correct credentials.
Connection string is invalid	The IP/FQDN provided on data source page is not in proper format	Provide valid IP/FQDN address.
Recent data may not be available, due to processing lag	vRealize Network Insight Platform VM is overloaded and lagging behind in processing data.	Contact support.
Request timed out, please try again	Could not complete request in specified time.	Try again. If the issue is not fixed, then contact support.
Failed for unknown reason, please retry or contact support	Request failed for some unknown reason.	Try again. If the issue is not fixed, then contact support.
Password authentication for SSH needs to be enabled on device	SSH login using password is disabled on the device added	Enable password authentication for SSH on the device being added for monitoring.
SNMP connection error	Error connecting to the SNMP port	Verify if SNMP is configured correctly on the target device.

## Unable to Enable DFW IPFIX

vRealize Network Insight does not allow you to enable DFW IPFIX.

### Problem

While adding a policy manager or source of VMware Cloud on AWS, when you attempt to enable DFW IPFIX, you might see the following error messages:

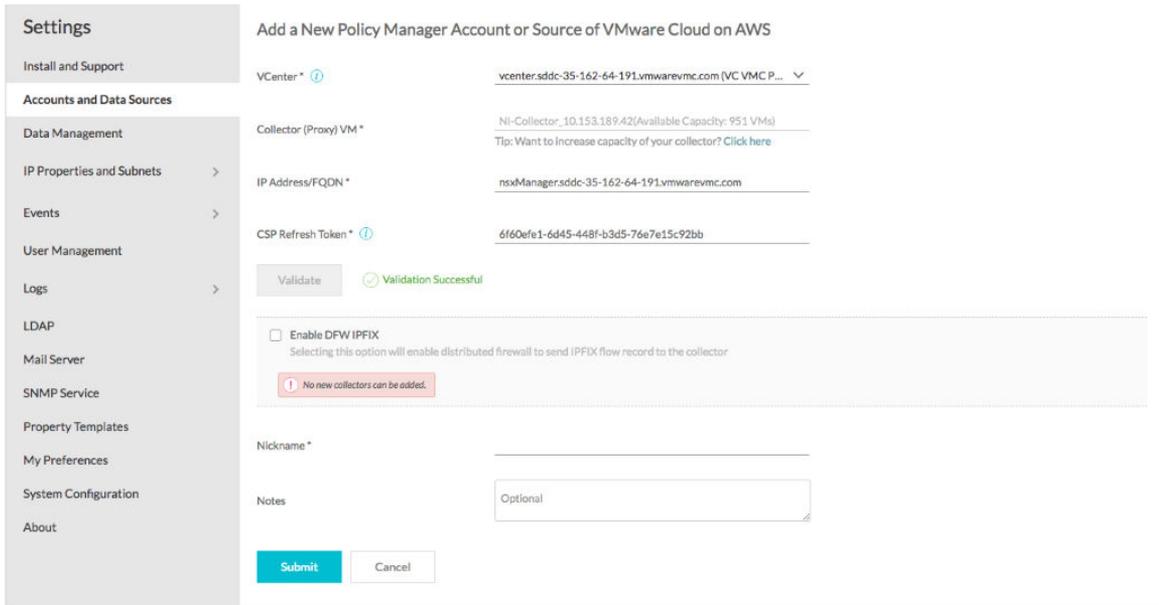
- No New collectors can be added.
- Provided user does not have the required role. Only users with the following role can enable IPFIX: Cloud Administrator.

### Cause

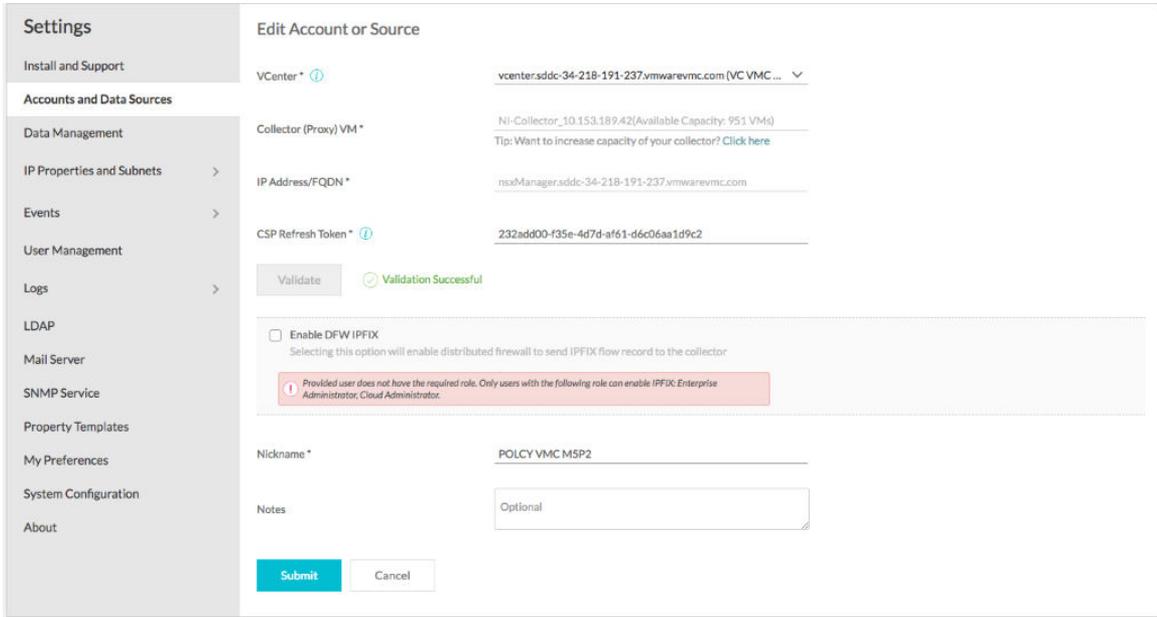
- VMware Cloud on AWS supports only four collectors to its DFW IPFIX collector profile. So, when the existing profile already has four collectors, you see the

No New collectors can be added

message.



- The user does not have the write permission. Only users with **Cloud Administrator** role can perform the write operation on the VMware Cloud on AWS policy manager.



### Solution

- ◆ To add a new collector, you must:
  - Delete an existing collector, or
  - Create a new profile, or
- ◆ To avoid or fix the user role issue, perform one of the following steps:
  - Assign the **Cloud Administrator** role to the user, or
  - Log in as user with **Cloud Administrator** role.

# Planning Application Migration to VMware Cloud on AWS using vRealize Network Insight

# 20

Using vRealize Network Insight, you can assess your on-premise environment for application migration to VMware Cloud on AWS or AWS.

Steps	Procedure	references
Step 1	Setting up your Environment	<ul style="list-style-type: none"> <li>■ Accept the End User License Agreement (EULA).                             <ol style="list-style-type: none"> <li>a Create a VMware user account or log in to the VMware account.</li> <li>b Update the registration form.                                     <p style="margin-left: 20px;">New users receive an email to activate their account.</p> </li> <li>c Accept VMware terms and EULA.</li> </ol> </li> <li>■ Download the OVA files                             <ol style="list-style-type: none"> <li>a Log in to the VMware Product Download page at <a href="https://my.vmware.com/group/vmware/home">https://my.vmware.com/group/vmware/home</a></li> <li>b Search for vRealize Network Insight.</li> <li>c Download the latest vRealize Network Insight platform and proxy OVA files.</li> </ol> </li> <li>■ Prepare for installation.                             <ol style="list-style-type: none"> <li>a Verify the <a href="#">System Recommendations and Requirements</a>.</li> <li>b Verify the <a href="#">Supported Products and Versions</a>.</li> </ol> </li> </ul>
Step 2	Deployment	<ol style="list-style-type: none"> <li>1 Deploy the vRealize Network Insight platform OVA file.</li> <li>2 <a href="#">Activate the License</a>.</li> <li>3 <a href="#">Generate a shared secret</a></li> <li>4 Deploy the vRealize Network Insight Proxy OVA file..</li> <li>5 <a href="#">VMware Cloud on AWS Deployment Model</a>.</li> </ol>
Step 3	Data Source Addition	<ol style="list-style-type: none"> <li>1 Log in to vRealize Network Insight.</li> <li>2 <a href="#">Add a VMware Cloud on AWS - vCenter</a>.</li> <li>3 <a href="#">Add a VMware Cloud on AWS - NSX Policy Manager</a>.</li> </ol>
Step 4	Model Application	<ul style="list-style-type: none"> <li>■ Analyze application dependencies                             <ol style="list-style-type: none"> <li>a <a href="#">Create an Application Manually</a></li> <li>b <a href="#">Creating Tiers for Physical IPs</a></li> <li>c <a href="#">Analyzing the Application</a></li> <li>d <a href="#">VMware Cloud on AWS: Planning and Micro-Segmentation</a></li> </ol> </li> <li>■ <a href="#">Chapter 16 Recommended Firewall Rules</a></li> <li>■ <a href="#">Chapter 17 Working with Search Queries</a></li> <li>■ <a href="#">Pinboards</a></li> </ul>

This chapter includes the following topics:

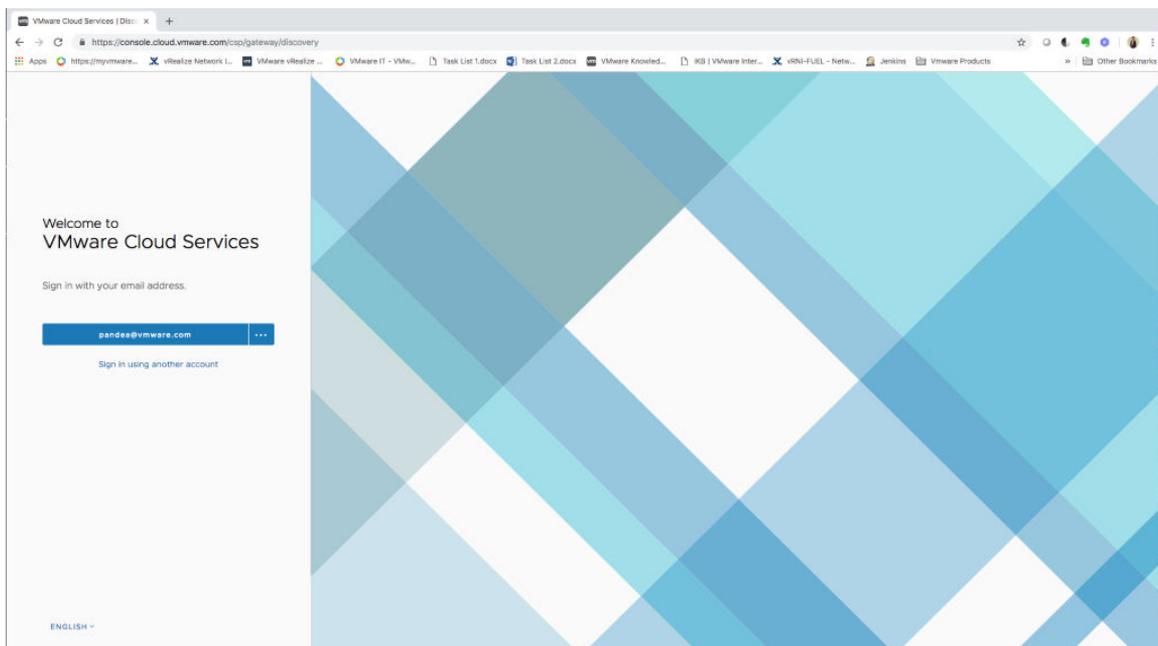
- [How do I obtain the CSP Refresh Token for NSX Manager](#)
- [How Do I Obtain vCenter Credentials](#)
- [Compute Gateway Firewall Rule](#)

## How do I obtain the CSP Refresh Token for NSX Manager

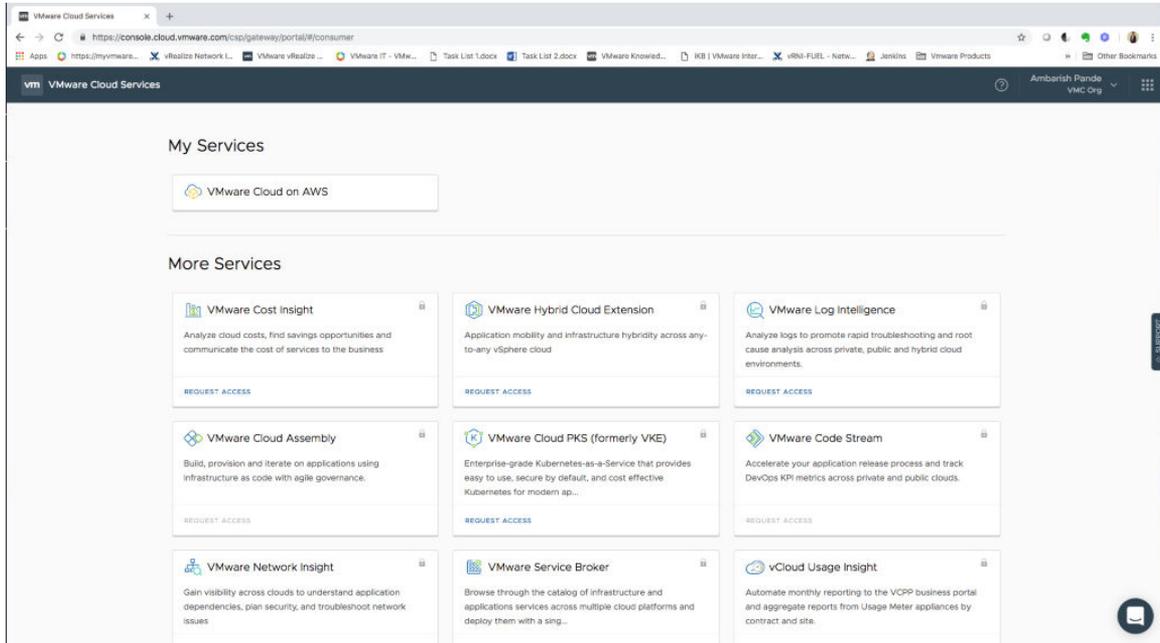
For adding a VMware Cloud on AWS NSX Manager as a Data Source in to vRealize Network Insight, you need a refresh token.

### Procedure

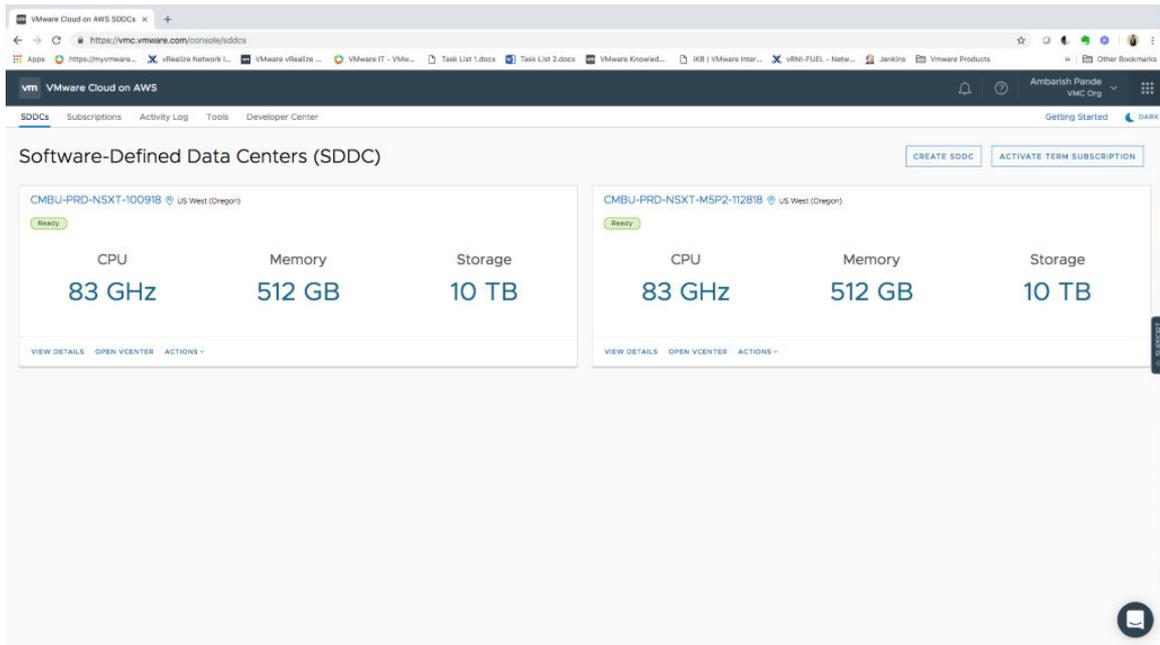
- 1 Log in to the VMware Cloud services console.



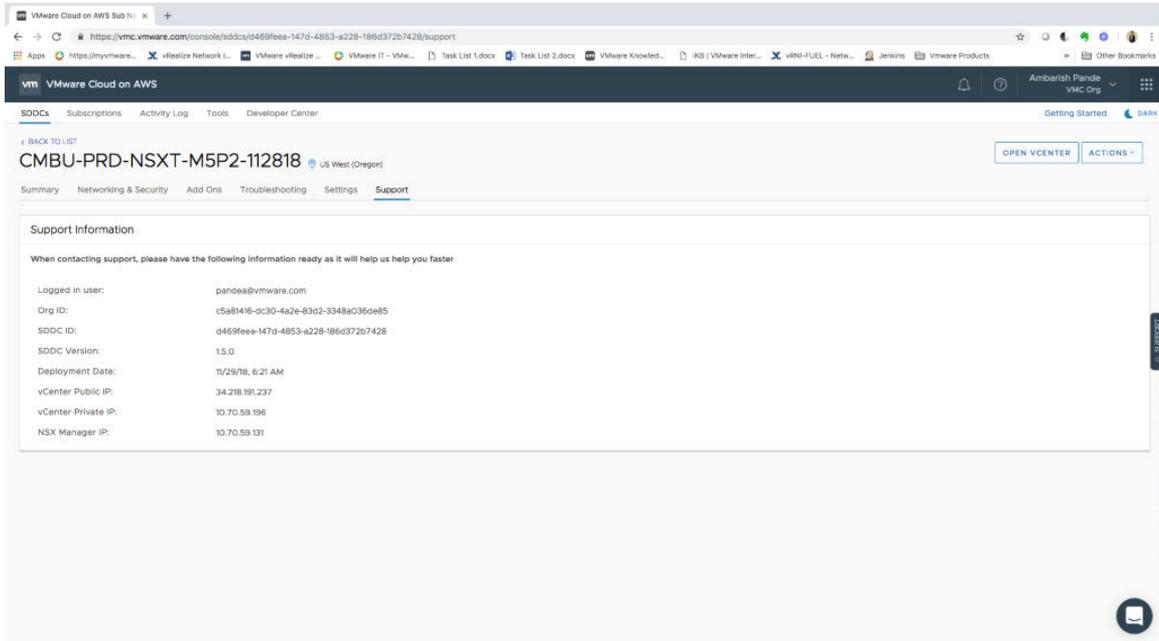
2 Under My Services, click VMware Cloud on AWS.



3 Select the desired Software-Defined Data Center (SDDC).



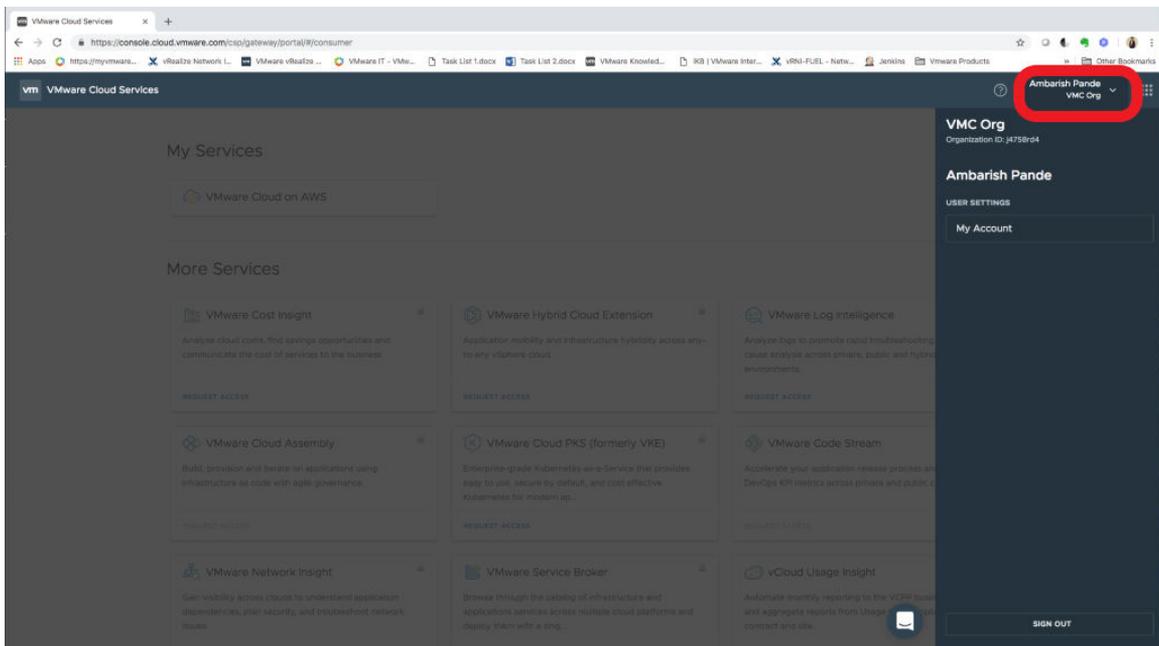
4 Click the **Support** tab.



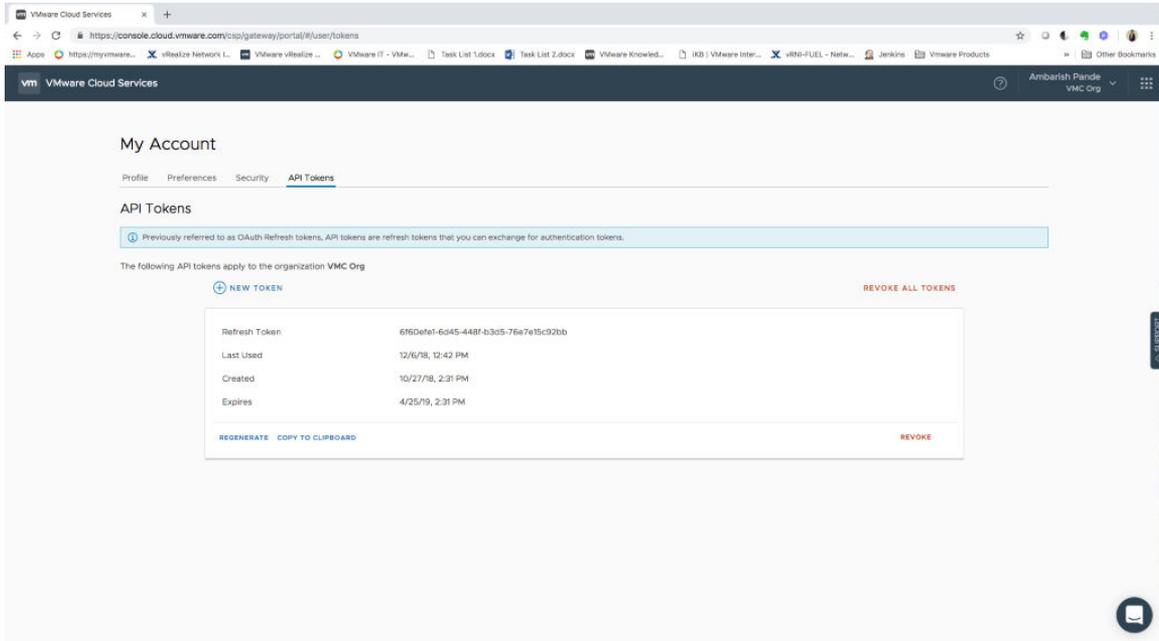
5 Make a note of the NSX Manager IP address.

6 Click on the organization name on the top banner.

**Note** Ensure that the organization resides in the selected SDDC.



7 On the **API Tokens** tab, copy the Refresh Token.



The Refresh Token is valid for Six months. vRealize Network Insight does not track the lifecycle of the token.

**Results**

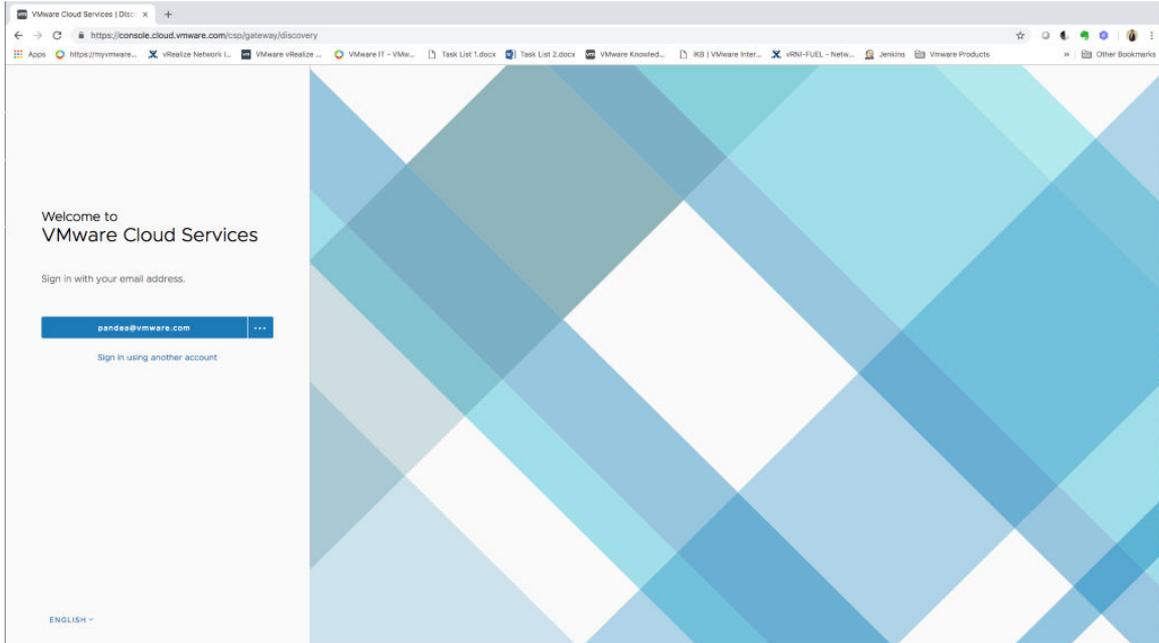
You can use this token for authenticating all VMware Cloud on AWS SDDCs on the organization.

## How Do I Obtain vCenter Credentials

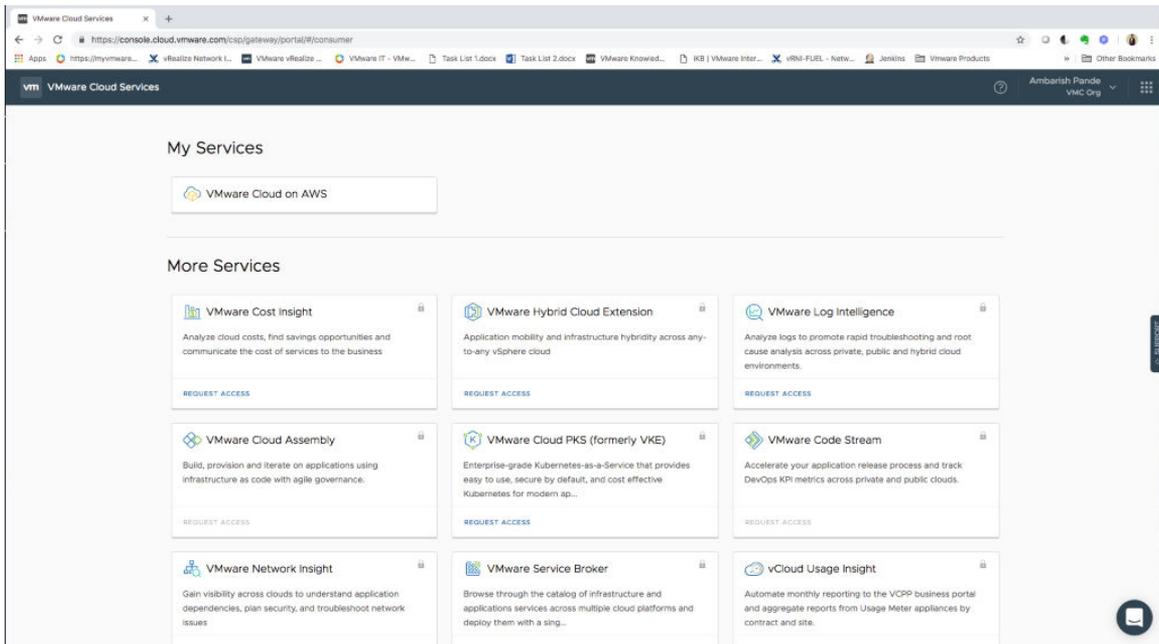
To add a vCenter datasource into vRealize Network Insight, you need the vCenter credentials.

## Procedure

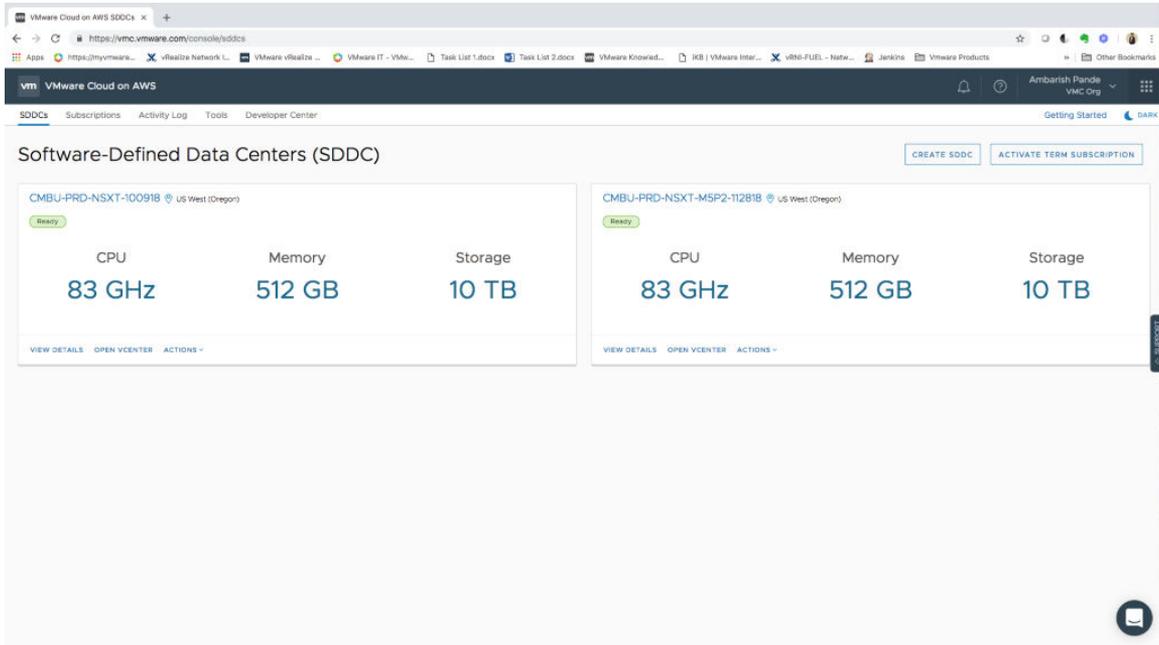
- 1 Log in to the VMware Cloud services console.



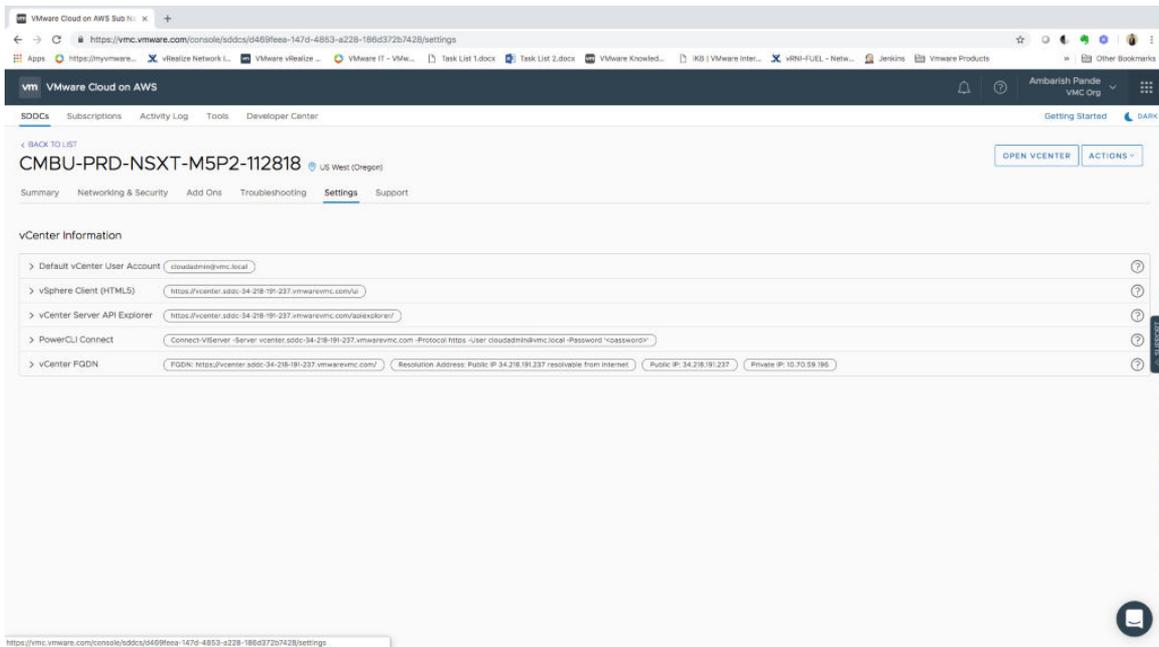
- 2 Under My Services, click VMware Cloud on AWS.



3 Select the desired Software-Defined Data Center (SDDC).



4 Click on the **Settings** tab.

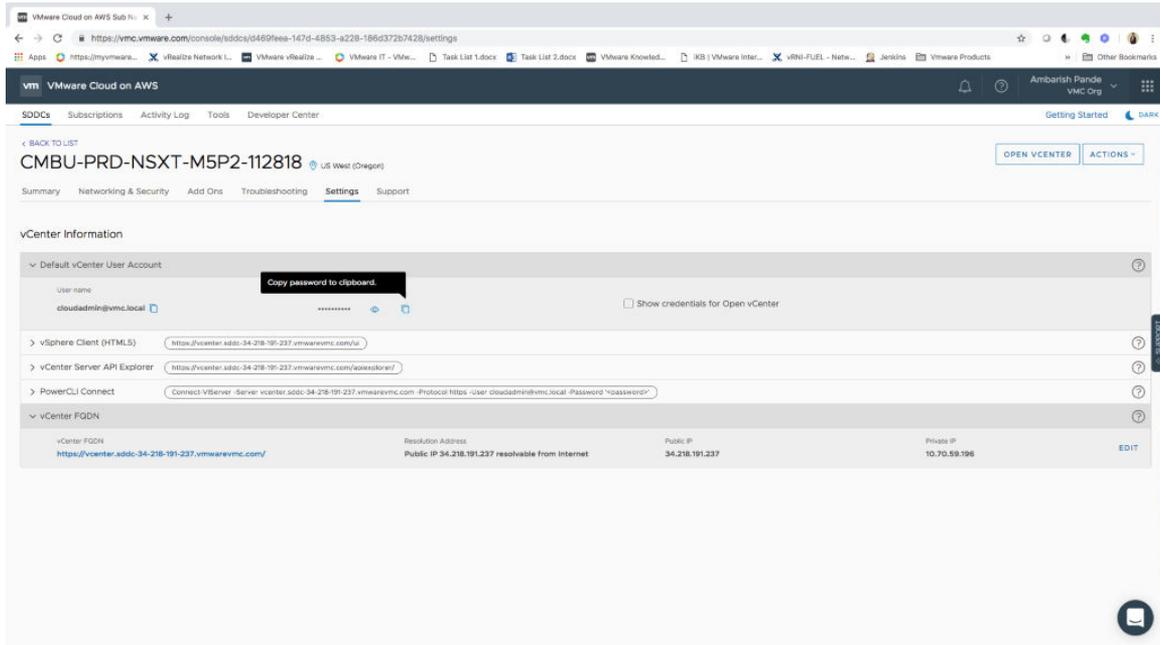


5 Expand vCenter FQDN.

Make a note of the vCenter FQDN details.

6 Expand Default vCenter User account to get the user name and password.

Copy the password and make a note of the user name.



## Compute Gateway Firewall Rule

When communicating with the vRealize Network Insight platform; the collector requires HTTPS port 443 to be open for outgoing traffic.

Following VMware hosted URLs are accessed by the collector through the firewall:

- \*.vmwareidentity.com
- gaz.csp-vidm-prod.com
- \*.vmware.com
- \*.ni-onsaas.com

Additionally, NTP and DNS traffic should be allowed for the correct functioning of the vRealize Network Insight or vRealize Network Insight collector.

Create a firewall rule with the following details:

- Name: An appropriate descriptive name
- Source: The name of the VMware Cloud on AWS Group containing the collector IP address.
- Destination: Select **ANY**
- Services – Select **HTTPS, DNS, DNS-UDP, NTP, ICMP**
- Action – **Allow**
- Applied To – **Internet Interface**

- Logging – Enable logging, if required.