

Lenovo Network Advisor for Splunk

# Deployment and User Guide

Version 1.0

**Lenovo**<sup>TM</sup>

**Note:** Before using this information and the product it supports, read the general information in the *Safety information and Environmental Notices* and *User Guide* documents on the *Lenovo Documentation CD* and the *Warranty Information* document that comes with the product.

Second Edition (December 2018)

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# Splunk Overview

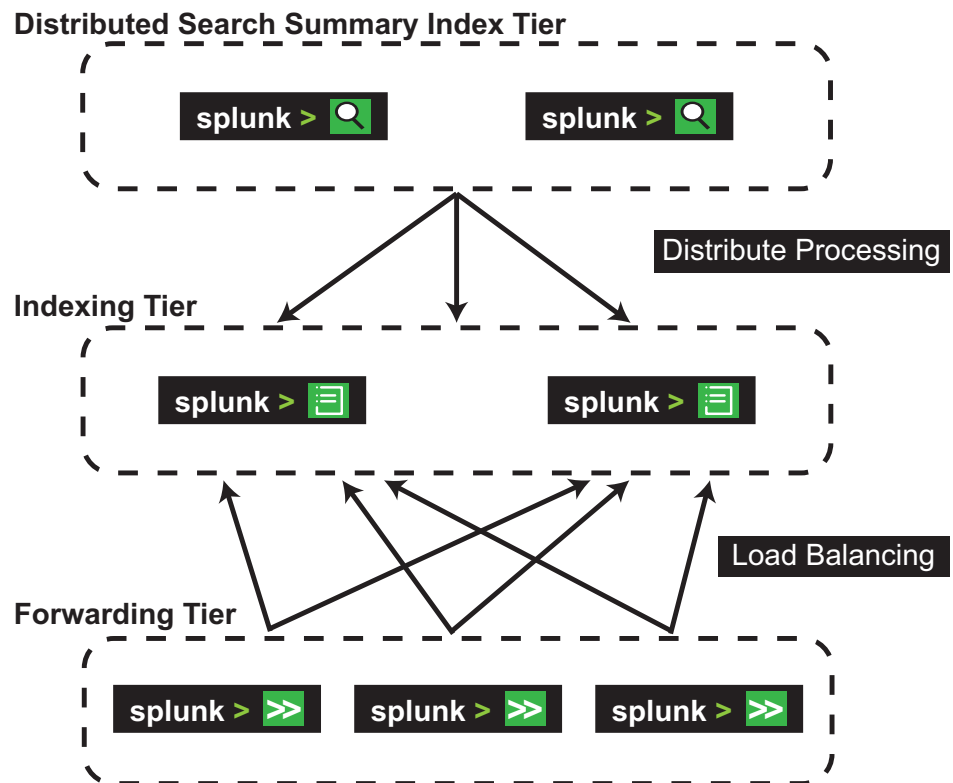
Splunk is a software application for gathering, searching, analyzing, and visualizing machine-generated data. It collects data from different sources, such as network devices, websites, sensors, and applications, and uses this data to generate graphs, reports, alerts, dashboards, and visualizations.

A Splunk solution usually includes a Splunk Enterprise Server. Optionally, a Splunk Forwarder can also be part of the Splunk solution. It collects network device data and sends it to the Splunk Enterprise Server for visualizing.

The Splunk application resides on the Splunk Enterprise Server. It features a navigable user interface comprising of Splunk knowledge objects, data inputs, and dashboards.

Splunk is built based on MapReduce, a programming model and an associated implementation for processing and generating big data sets. The Splunk Search Language uses the MapReduce mechanism without the need to write code or to understand how to divide processing between the map and the reduce phases.

**Figure 1.** Splunk Distributed Architecture



Consult the official documentation at the link below for more details about Splunk:

<https://docs.splunk.com/Documentation>

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## Splunk Components

A Splunk solution consists of the following components:

- Indexer

The Splunk Indexer offers local and remote data processing and storage. The Splunk instance indexes the gathered raw data and performs queries on the indexed data based on specified search requests;



- Search Head

In a distributed search environment, the Splunk Search Head is a Splunk instance that directs search requests to Indexers and merges the results. The Search Head is the visualizing part of the Splunk solution and it can generate alerts, reports, and dashboards;



- Forwarder

Splunk Forwarders are Splunk instances that transmit machine-generated data to remote Indexers to be stored and processed;



- Deployment Server

The Splunk Deployment Server distributes applications, configurations, and content updates to Splunk Enterprise instance groups, such as Forwarders;

- Splunk application

The Splunk application is located on the Splunk Enterprise Server and includes a navigable user interface that consists of different Splunk knowledge objects, data inputs, and dashboards.

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# Lenovo Network Advisor for Splunk

The Lenovo Network Advisor for Splunk application helps you in troubleshooting your network by monitoring the health status and network utilization of switches running Lenovo Cloud Network Operating System (CNOS). The Lenovo Network Advisor application runs on Splunk Enterprise Server which is a data analytics tool that collects network-generated data to provide visualization, analysis, and search capabilities for seamless network operations and troubleshooting.

The switches are periodically queried for network telemetry data. The Splunk software platform collects and visualizes this data to provide insights into the health of the network and the health of individual switches.

The Lenovo Network Advisor application uses an extensive data set and innovative analytics capabilities to provide insights into network utilization and notifies about current or potential network problems, which otherwise be unnoticed (for example, microburst detection through congestion drop counters).

The powerful combination of data and intelligence deliver valuable information about network utilization over time and critical alarms relating to the operation of the network.

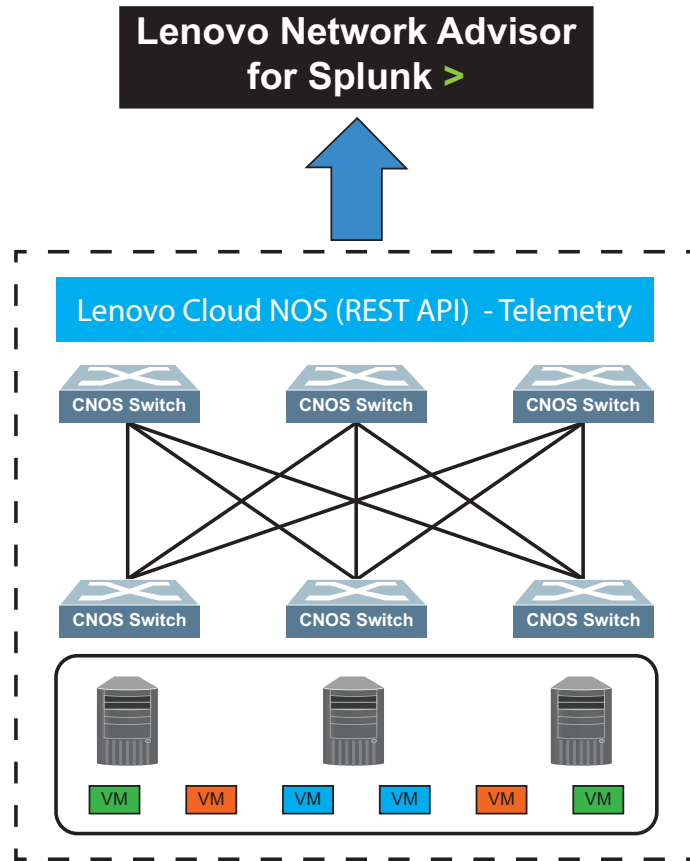
The basic data set includes Network and Device Health Status, Traffic Statistics and Performance, and Critical Network and Device Alerts.

The advanced data set extensions allow access to low-level features of the switch's packet processing engine, which include In-Depth Buffer Utilization and Port Congestion Statistics. This enhanced data is exposed by the Lenovo Cloud Network Operating System (CNOS) through the use of the BroadView™ Instrumentation Agent. BroadView is an open-source software provided by Broadcom©.

The Splunk software platform comprises of a Splunk Enterprise Server and a Splunk Universal Forwarder. The Splunk Forwarder collects data from switches and sends it to the Splunk Enterprise Server, which visualizes the received data. The Lenovo Network Advisor for Splunk application resides on the Splunk Enterprise Server and contains a navigable user interface comprising of different Splunk knowledge objects, data inputs, and dashboards.

**Note:** For the rest of the document, switches running Lenovo CNOS are referred to as switches, and Lenovo Network Advisor (LNA) for Splunk is referred to as the LNA Application.

**Figure 2.** Lenovo Network Advisor Application Overview



**Table 1.** Lenovo Network Advisor Application Capabilities

Aspect	Status
Features	Visualization (GUI), Alarms and Search
Data	<p>Basic Features:</p> <ul style="list-style-type: none"> <li>● Network and Device Health Status</li> <li>● Traffic Statistics and Performance</li> <li>● Critical Network and Device Alerts</li> </ul> <p>Advanced Features:</p> <ul style="list-style-type: none"> <li>● In-Depth Buffer Utilization</li> <li>● Port Congestion Statistics</li> </ul>



**Table 1.** Lenovo Network Advisor Application Capabilities

Aspect	Status
Customer Value	<ul style="list-style-type: none"><li>● Provides insights into network utilization including detailed buffer utilization</li><li>● Provides notifications about current or potential network problems, which otherwise be unnoticed</li></ul>
Components	<ul style="list-style-type: none"><li>● Network switches: CNOS Telemetry Agent based on Broadcom's BroadView Instrumentation Agent</li><li>● Applications: Splunk (enhanced features), Ganglia (basic features), and Lenovo back-end scripts (installation, deployment, data collection)</li></ul>

The Splunk software platform consists of the following components:

- Splunk Enterprise 7.0.3 or later  
Splunk Enterprise comprises of an Indexer, Search Head, and Deployment Server. It is available for download at the link below:  
[https://www.splunk.com/goto/download\\_gov](https://www.splunk.com/goto/download_gov)
  - Lenovo Network Advisor application  
The LNA Application runs on the Splunk Enterprise Server. It receives telemetry data from switches, and then analyzes and visualizes the data. The LNA Application uses the Splunk Search Head to query and visualize the data.  
Configuration files, script, and libraries that are part of the LNA Application are distributed to the Splunk Forwarders.
  - Decoder  
The Decoder is a Python-based script that receives JSON-based telemetry data and converts the data to Splunk log messages and stores them in a file;
  - Splunk Universal Forwarder 7.0.3 or later  
The Splunk Forwarder takes the contents of the log file generated by the Decoder and synchronizes it to the Splunk Indexer, which indexes the telemetry data. The Splunk Universal Forwarder runs as a separate instance of Splunk on a separate machine or docker container within the same server hosting the Splunk Enterprise Server. It is available for download at the link below:  
[https://www.splunk.com/en\\_us/download/universal-forwarder.html](https://www.splunk.com/en_us/download/universal-forwarder.html)
- Note:** If you need an older Splunk release, they can be found at:
- Older Splunk Enterprise releases:  
[https://www.splunk.com/page/previous\\_releases](https://www.splunk.com/page/previous_releases)
  - Older Splunk Universal Forwarder releases:  
[https://www.splunk.com/page/previous\\_releases/universalforwarder](https://www.splunk.com/page/previous_releases/universalforwarder)

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## Lenovo Network Advisor Deployments

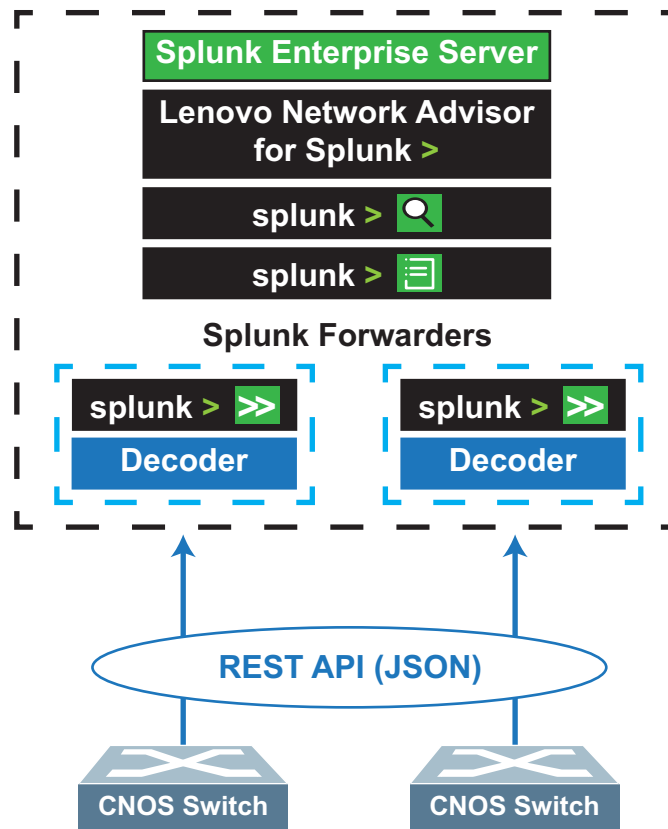
The LNA Application supports a periodic pull model. In this model, telemetry data is pulled periodically from switches and is controlled through a Graphical User Interface (GUI) Setup Page in the LNA Application.

### Splunk All-In-One Deployment

In a Splunk all-in-one deployment, the Splunk Enterprise Server and the Splunk Forwarders are running on a single physical or virtual machine.

Decoders, libraries, and configuration files are distributed to each Forwarder, which periodically pulls telemetry data from switches by means of their REST API interface. The Decoder transform the JSON response of the switches into Splunk logs. The Forwarders transmit the Splunk logs to the Splunk Enterprise Server on which runs the Splunk Indexer instance for indexing the data.

**Figure 3.** Lenovo Splunk All-In-One Deployment



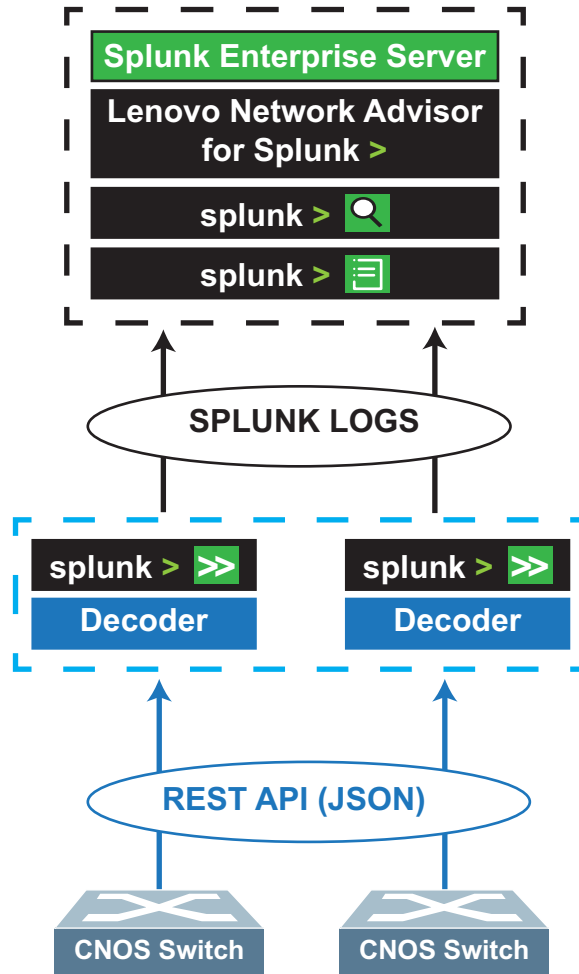
## Splunk Forwarder in One Server Deployment

In this deployment, multiple Splunk Forwarder run on a single machine and the Splunk Enterprise Server exclusively operates on a different machine.

Decoders, libraries, and configuration files are distributed to each Forwarder, which periodically pulls telemetry data from switches.

The Splunk Enterprise Server runs on a separate machine than the Forwarders together with the LNA Application.

**Figure 4.** Splunk Forwarder in One Server Deployment

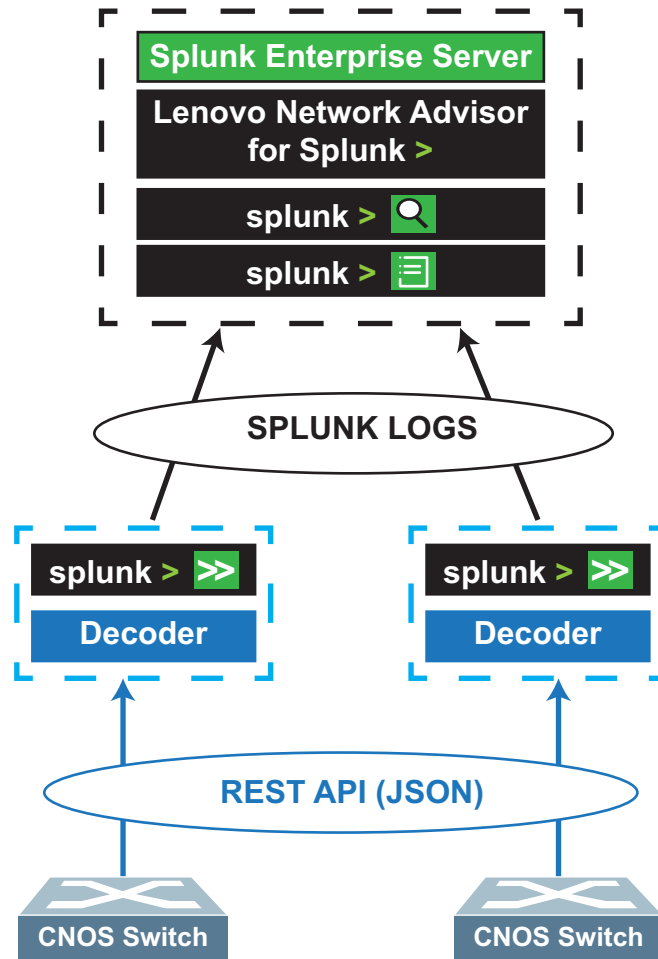


## Dedicated Forwarder Deployment

In a Dedicated Forwarder deployment, each Universal Splunk Forwarder runs on a physical or virtual machine. The Splunk Enterprise Server runs on a dedicated physical or virtual machine. The machine running the Splunk Forwarder also runs the Decoder which pulls data from switches and forwards it to the Splunk Enterprise Server.

Decoders, libraries, and configuration files are distributed to each Forwarder.

**Figure 5.** Typical Lenovo Splunk Dedicated Forwarder Deployment



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# Splunk Enterprise Server and Universal Forwarder Installation

The Splunk Enterprise Server and a number of Universal Forwarders (depending on the number of switches present in the network) are required to be up and running before installing the LNA Application. This can be achieved either by using a Docker Container, or either by manually installing Splunk.

## Docker Container

We recommend that you use this method when deploying the LNA Application. It provides the following advantages:

- It ensures that the Development, Test, and Production environment is consistent;
- It is easy to install and maintain;
- Using the Docker volumes, it is easy to back up and restore important data, such as configuration, application, and Splunk data;
- It can be deployed on the fly. The Docker Container senses when changes are made to the Docker volumes, without the need to pause or shutdown the Docker container.

When compared to the manual installation method, Docker Container differs in the following aspects:

- Containers operating on the same host machine communicate with the Docker virtual network;
- By default, the service ports of the container are not exposed to the host machine operating system, unless explicitly specified through the configuration or by command execution. If the Splunk Enterprise Server or Forwarders running in the Docker Container are required to work with outside clients, the container service port needs to be mapped to the host's OS service port;
- Docker Container cannot be deployed on Windows machines.

Following are the steps required for deployment using the Docker Container:

1. Install the Docker Container. This step might differ depending on the operating system (OS). For example, for Ubuntu 16.04 (64-bit required):

```
apt-get install docker-compose
```

2. Create a Docker account at [docker.com](https://docker.com). It is needed to download a customized Universal Forwarder Docker image from the Docker repository. The customized image is automatically deployed with the Docker;
3. Download the compose file from [GitHub](https://github.com). There are multiple compose file templates. Copy and modify the compose files to create your own setup configurations. You can also use the following script to generate a customized setup Docker configuration:

```
multiple_forwarder_compose_file_generator.sh
```

4. Execute commands to bring up the containers which download Docker images automatically.

## Docker Container Splunk Deployment Example

The following example is for deploying Splunk in a Docker Container using Ubuntu 16.04 (64-bit required):

1. Install the Docker Container:

```
sudo apt-get install docker-compose
```

2. Download the Lenovo Docker environment setup configurations:

```
git clone https://github.com/lenovo/networking-telemetry.git
```

3. Navigate to the Scripts directory:

```
cd networking-telemetry/splunk/lenovo_network_splunk_env/docker-compose
```

4. Execute the following script:

```
.multiple_forwarder_compose_file_generator.sh <forwarder_num>  
<dest_compose_file>
```

The script generates compose files based on the number of required forwarders. It takes as parameters the number of forwarders (<forwarder\_num>) and the destination compose file (<dest\_compose\_file>).

5. Log into your Docker account:

```
sudo docker login
```

6. Execute the following command:

```
sudo docker-compose -f <dest_compose_file> up
```

where <dest\_compose\_file> is the destination compose file. It contains the description of the required Docker images. They are automatically download from the Docker repository.

Based on the destination compose file, the Docker containers are initialized one after the other. Docker containers have their own private network and storage, and some of them need to be mapped to the host machine's operating system.

A part of the setup connection information is included in the compose file. This information is used to interconnect the Splunk Enterprise Server and the Splunk Forwarders.

## Manual Installation

The official Splunk Installation Manual can be found at the following link:

<https://docs.splunk.com/Documentation/Splunk>

The deployment of the Splunk environment differs depending on the operating system (different distributions or version of Linux or Windows).

Following is the deployment of the Splunk environment using Ubuntu 16.04:

1. Download and install Splunk Enterprise Server version 7.0.3 or later:  
[https://www.splunk.com/goto/download\\_gov](https://www.splunk.com/goto/download_gov)
2. Download and install Splunk Universal Forwarder version 7.0.3 or later:  
[https://www.splunk.com/en\\_us/download/universal-forwarder.html](https://www.splunk.com/en_us/download/universal-forwarder.html)
3. Rename the directory from `/opt/splunkforwarder` to `/opt/splunk`
4. Change the `SPLUNK_HOME` variable to `/opt/splunk` and the `SPLUNK_SERVER_NAME` variable to a unique Forwarder name for each Forwarder in the `/opt/splunk/etc/splunk-launch.conf` file.
5. Install Python version 2.7 on the machine that hosts the Splunk Universal Forwarder
6. Install the Python dependence packages required for the host machine of the Splunk Universal Forwarder:

```
apt-get install python python-dev python-pip
pip install ConcurrentLogHandler
```

7. Configure the Forwarders and ensure that they connect to the Splunk Enterprise Server on the machine hosting the Splunk Universal Forwarder:

```
cd /opt/splunk/bin
./splunk add forward-server <server IP>:<port>
```

8. Set up the deployment client on the Splunk Universal Forwarder:

```
cd /opt/splunk/bin
./splunk add forward-server <server IP>:<port>
```

To set up the LNA Application, see [page 16](#).

---

## Lenovo Network Advisor Installation

Once the Splunk Enterprise Server and Forwarders are set up and configured correctly, the Lenovo Network Advisor is ready to install.

**Note:** The LNA Application works with switches running Lenovo Cloud Network Operating System (CNOS) version 10.8.1.0 or later.

You can download and install the LNA Application either:

- from the Splunk Enterprise Server Shop, or
- from [Splunkbase](#)

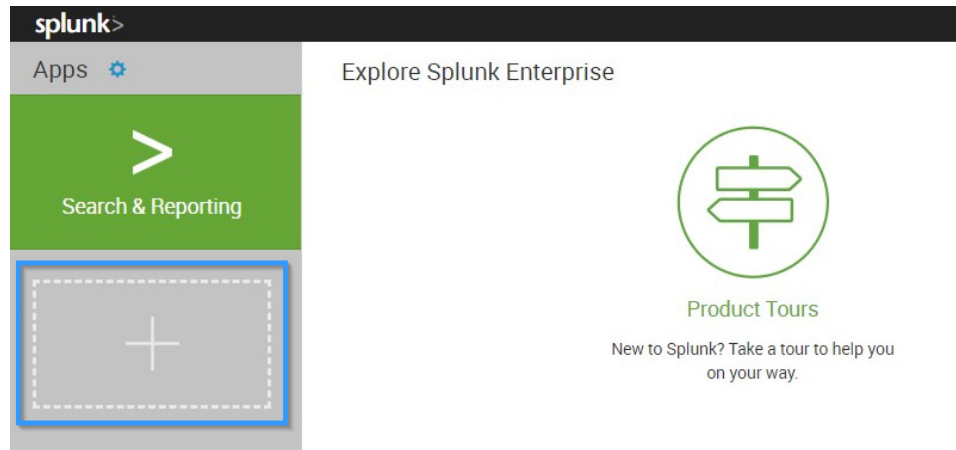
We recommend installing the LNA Application from the Splunk Enterprise Server Shop.



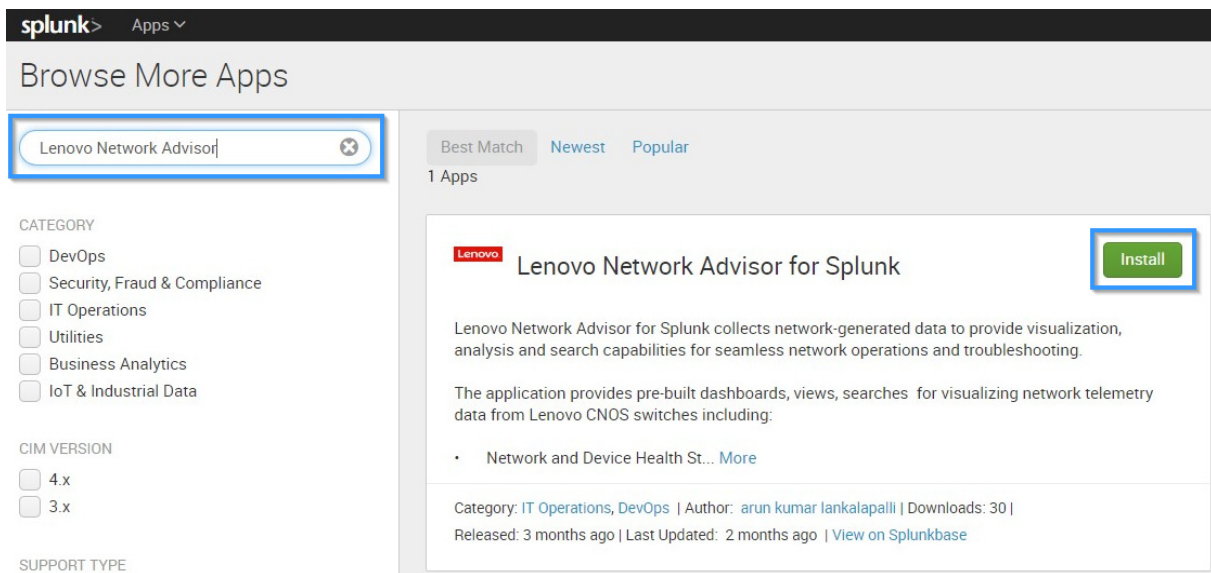
# Install the LNA Application from Splunk Enterprise Server Shop

We recommend using this method to install the LNA Application.

1. Log into <http://host-ip:8000>
2. Click on dashed white rectangle in the left side menu.



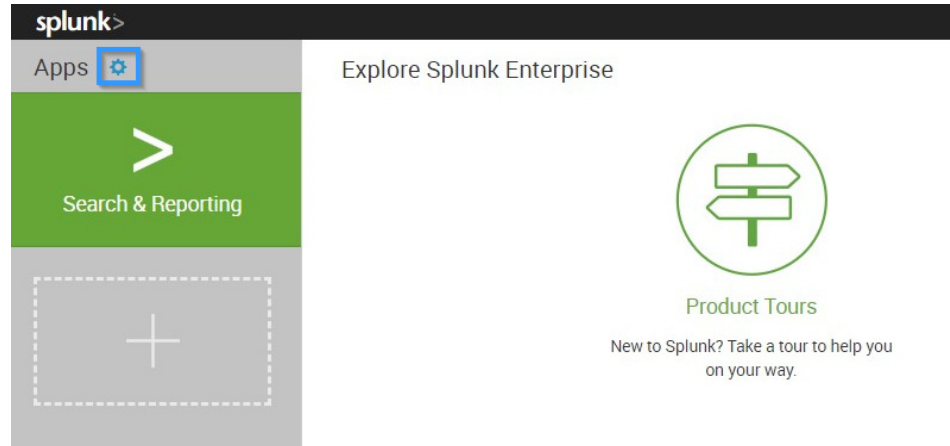
3. In the Search bar, type *Lenovo Network Advisor* or simply *Lenovo*. Click **Install**.



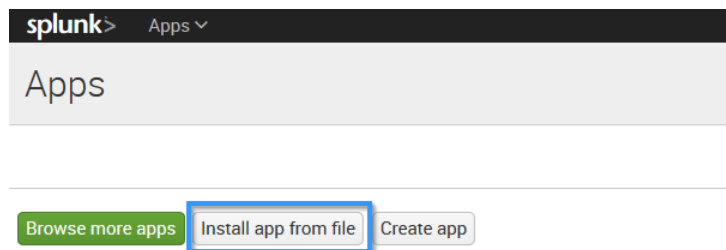
4. After installing the LNA Application, click on **Restart Now**.

## Download and Install the LNA Application from Splunkbase

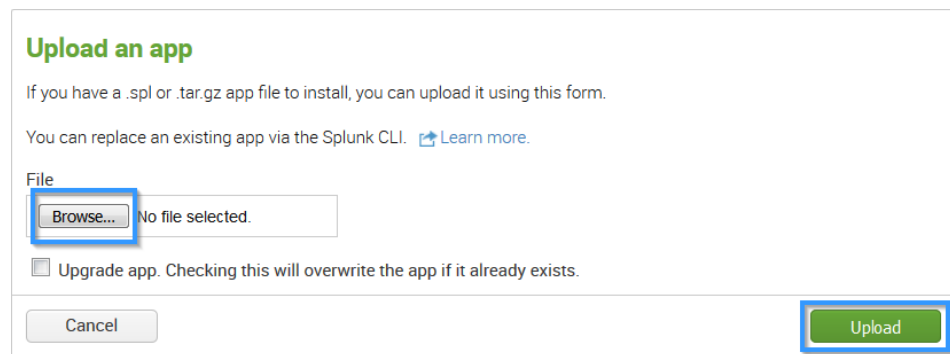
1. Download the LNA Application from [Splunkbase](#)
2. Log into <http://host-ip:8000>
3. Click on the **gear icon** in the left side menu



4. Click on the **Install app from file** button



5. Click on the **Browse** button and select the downloaded LNA Application, then click on **Upload**.



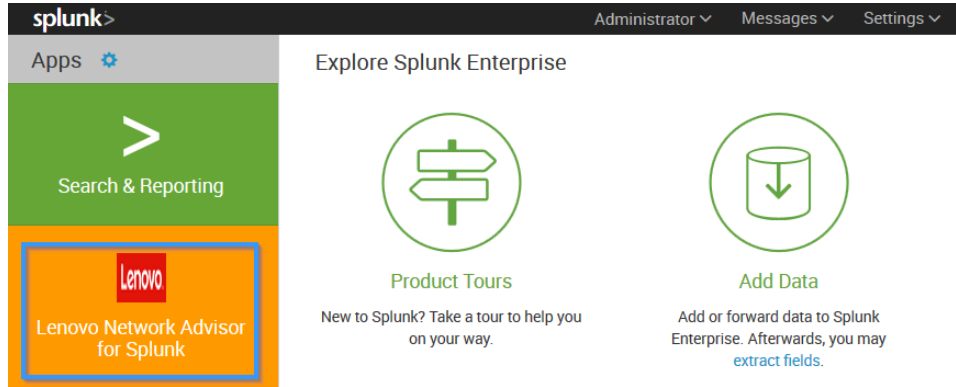
6. After installing the LNA Application, click on **Restart Now**.

# Configuring the LNA Application

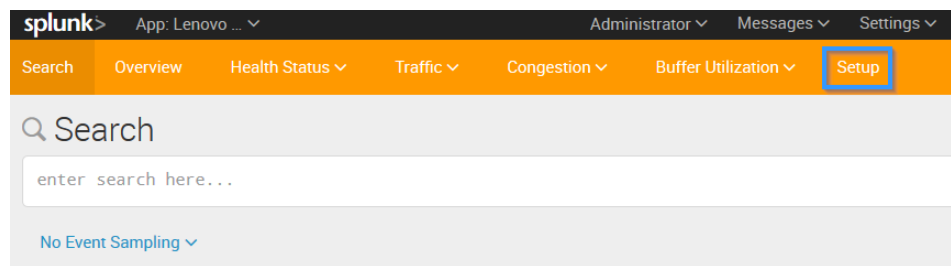
1. Configure the Splunk Enterprise Server and the Splunk Forwarder:

a. Log into <http://host-ip:8000>

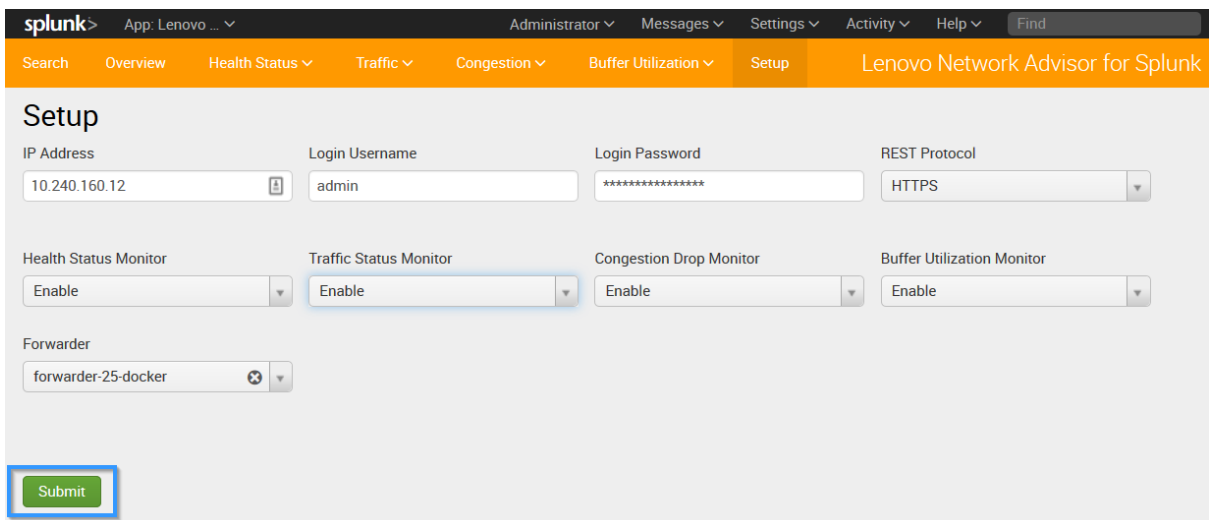
b. Click on **Lenovo Network Advisor for Splunk**



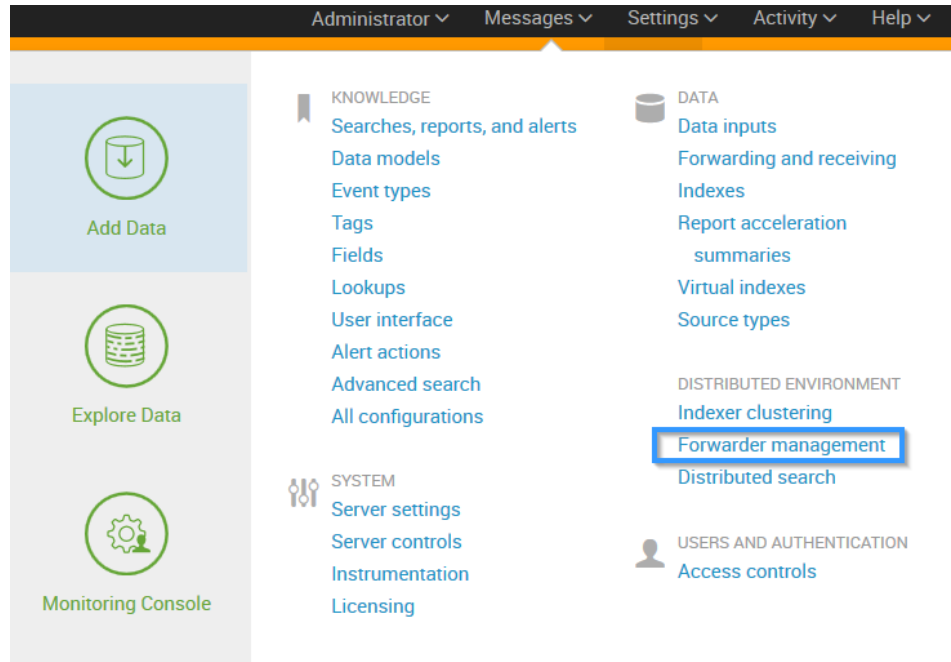
c. Click on the **Setup** menu



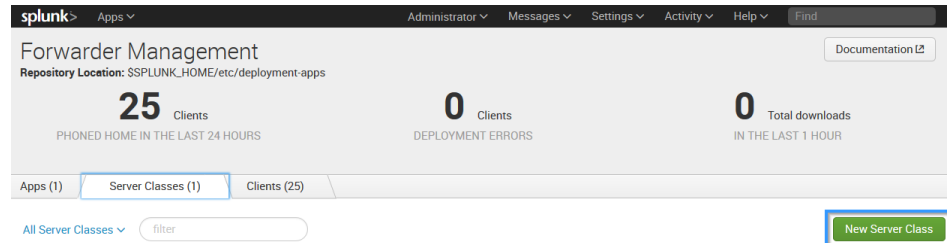
d. Add switches to every available Forwarder



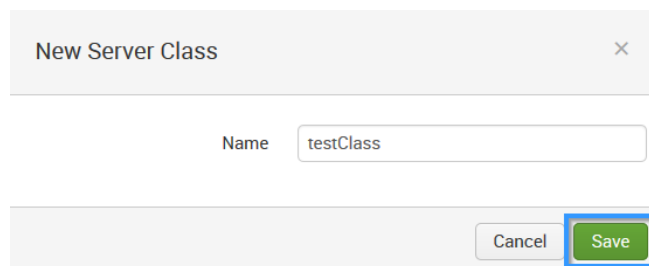
- e. Click on the **Settings** menu in the top-right corner. And the click on **Forwarder Management**.



- f. Navigate to the **Server Classes** tab and create a new server class to bind the LNA Application to the selected Forwarders by clicking on **New Server Class**.



- g. Enter a name for the new server class and click **Save**



- h. Click on **Back to Forwarder Management**. Navigate to the **Apps** tab and then click on **Edit** to the right of the **lenovo\_network\_advisor** app.

The screenshot shows the 'Forwarder Management' page in Splunk. At the top, it indicates '25 Clients' and '0 Clients DEPLOYMENT ERRORS'. Below this, there are tabs for 'Apps (1)', 'Server Classes (1)', and 'Clients (25)'. A table lists the apps, with 'lenovo\_network\_advisor' having an 'Edit' button highlighted in a blue box. The 'After Installation' column for this app shows 'Enable App, Restart Splunkd'.

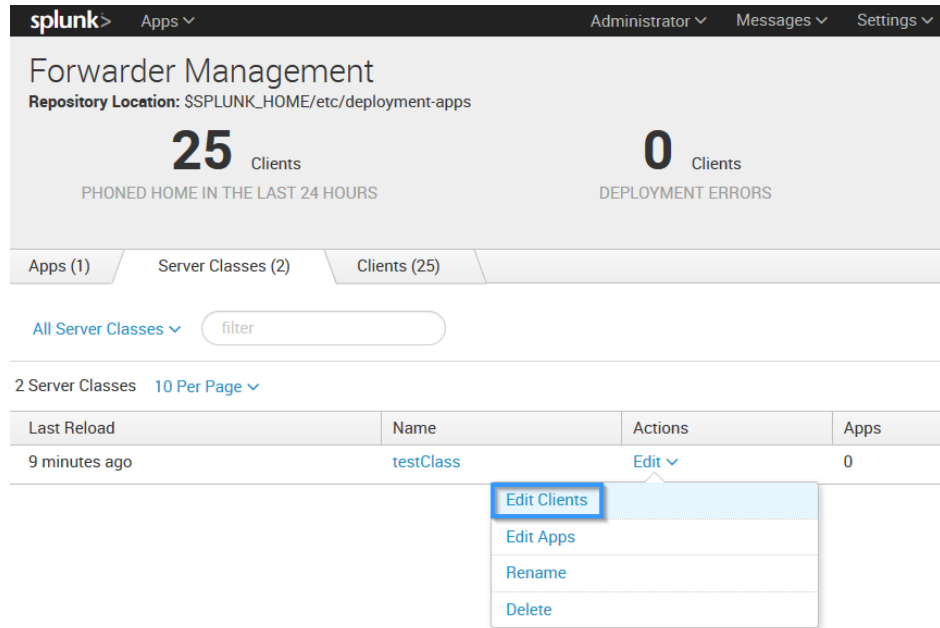
- i. Ensure that **Restart Splunkd** is selected and click **Save**.

The screenshot shows the 'Edit App: lenovo\_network\_advisor' configuration page. Under the 'After Installation' section, the 'Restart Splunkd' checkbox is checked and circled in red. The 'Save' button is highlighted in a green box. Below the configuration area, there is a table of 25 clients.

i	Host Name	Client Name	Instance Name	IP Address	Actions	Machine Type	Deployed Apps	Phone Home
>	forwarder-25-docker	0651A89E-E12F-49D0-8025-C8C2CD19803A	forwarder-25-docker	172.18.0.23	Delete Record	linux-x86_64	1 deployed	a minute ago
>	forwarder-21-docker	0E996BA9-5910-4C6D-B9E1-9CA416021F9A	forwarder-21-docker	172.18.0.22	Delete Record	linux-x86_64	1 deployed	a minute ago

- j. Go back to **Forwarder Management**. Select the **Server Classes** tab and bind the LNA Application to the Forwarder Clients by clicking on **Edit Clients**.

**Note:**The exact name of the Forwarder is required for this step. We recommend that you copy and paste it when editing clients.



The screenshot shows the Splunk Forwarder Management interface. At the top, there's a navigation bar with 'splunk' and 'Apps' dropdown. Below that, the page title is 'Forwarder Management' with a sub-header 'Repository Location: \$SPLUNK\_HOME/etc/deployment-apps'. There are two large statistics: '25 Clients PHONED HOME IN THE LAST 24 HOURS' and '0 Clients DEPLOYMENT ERRORS'. Below these are tabs for 'Apps (1)', 'Server Classes (2)', and 'Clients (25)'. The 'Server Classes' tab is active, showing 'All Server Classes' and a filter input. Below that, it says '2 Server Classes' and '10 Per Page'. A table lists server classes with columns: 'Last Reload', 'Name', 'Actions', and 'Apps'. One row is visible with '9 minutes ago', 'testClass', and '0' apps. An 'Edit' dropdown menu is open for the 'testClass' row, showing options: 'Edit Clients', 'Edit Apps', 'Rename', and 'Delete'. The 'Edit Clients' option is highlighted.

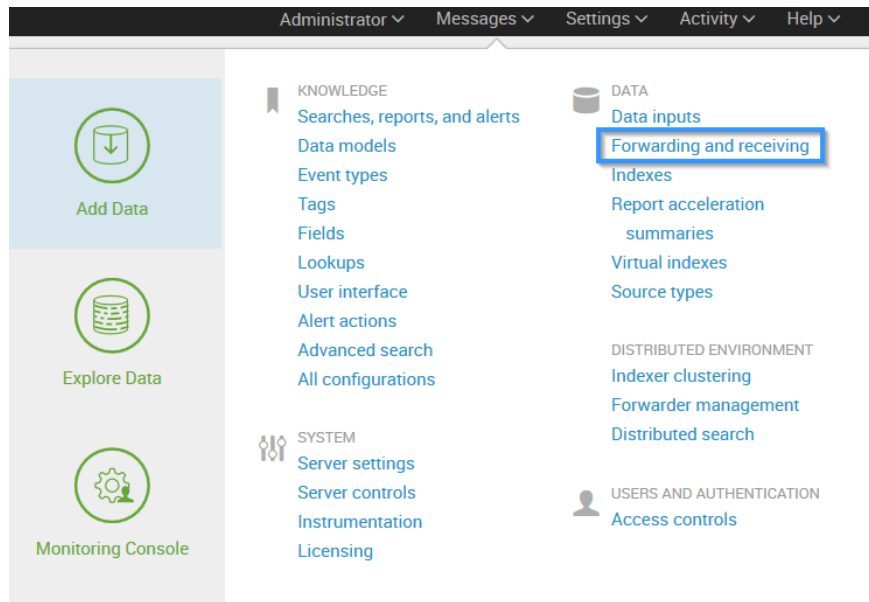
Last Reload	Name	Actions	Apps
9 minutes ago	testClass	Edit	0

These steps are required to ensure that the Forwarder Splunk Daemon restarts after the LNA Application is distributed to the Forwarder. If you do not strictly follow these steps, the LNA Application might be distributed to the Forwarder without restarting the Splunk Daemon, resulting in the LNA Application not running automatically.

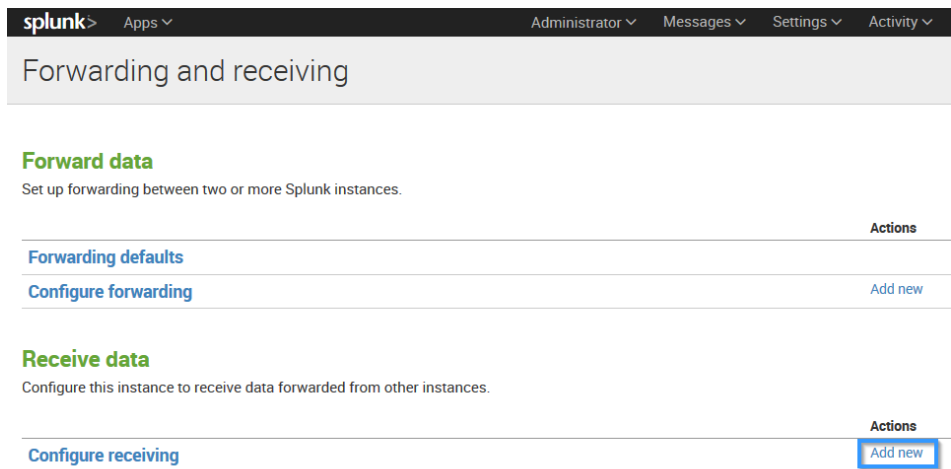
2. Configure the receiving port for the Splunk Enterprise Server to 9997.

**Note:** This step is automatically done by the Docker environment setup toolkit.

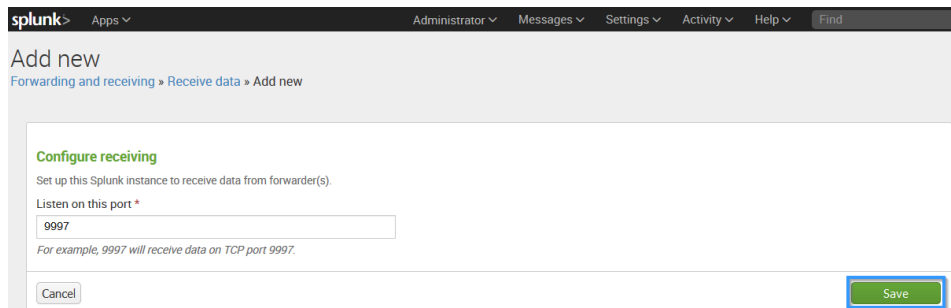
a. Go to **Settings** and click on **Forwarding and Receiving** from the Data menu



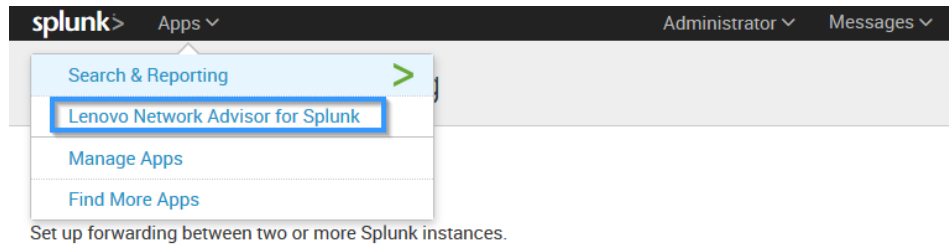
b. Configure the Splunk instance to receive data from forwarders by clicking on **Add new** in the Receive Data section



c. Configure the receiving port to 9997 and click **Save**

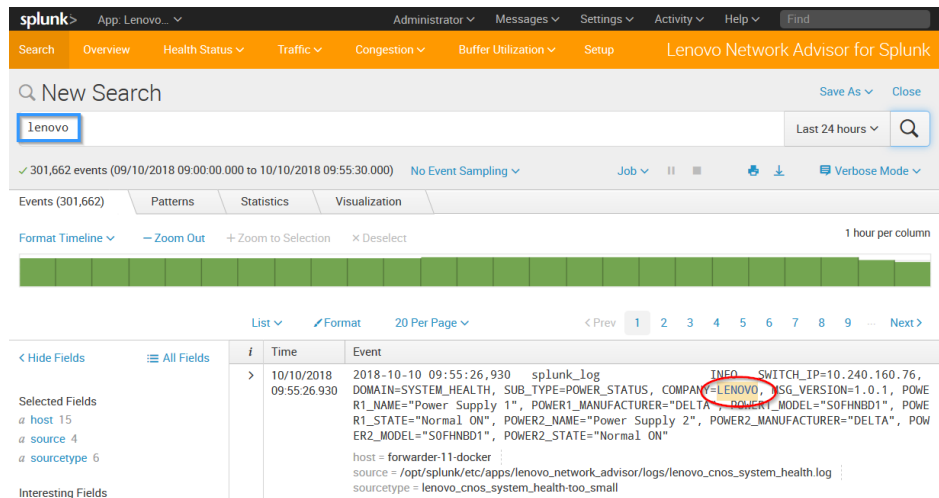


3. Verify that the deployment is proceeding correctly.
  - a. Go to **Apps** and click on **Lenovo Network Advisor**.



- b. In the search field, type **LENOVO** as the keyword and press **Enter**.

If you observe that messages are present in the search result, then the Splunk Enterprise Server, the Splunk Forwarders, the LNA Application, and switches have been correctly set up.



4. Switches can be added or removed by using the LNA Application's Setup menu. For more details, see [page 38](#).

## Deployment Summary

	Dedicated Host	Shared Host	Mixed Deployment	Windows
Splunk Enterprise Server	Yes	Yes	Yes	Yes
Universal Forwarder	Yes	Yes	Yes	Yes
Splunk Enterprise Server in Docker	Yes	Yes	Yes	No
Universal Forwarder in Docker	Yes	Yes	Yes	No



## Lenovo Network Advisor Alerts

The LNA Application classifies switches based on Lenovo Splunk alerts. These alerts are events that need attention from a system administrator and are classified as critical, warning, or informational.

**Table 2.** *Lenovo Network Advisor for Splunk Alerts*

Parameter	Alerts	
	Critical	Warning
Fan		Utilization > 80% One or more fans down
Temperature	Temperature > 80°C	Temperature between 50°C and 81°C
CPU	Utilization > 90%	Utilization between 70% and 90%
Memory	Utilization > 90%	Utilization between 70% and 90%
Traffic Statistics		Input discards on an interface Input errors on an interface
Congestion	One or more congested interfaces	
Buffer utilization (per counter group):		
1. Device	Utilization > 90%	Utilization between 70% and 90%
2. Ingress Service Pool	Utilization > 90%	Utilization between 70% and 90%
3. Ingress Port Service Pool	Utilization > 90%	Utilization between 70% and 90%
4. Ingress Port Priority Group	Utilization > 90%	Utilization between 70% and 90%
5. Egress Service Pool	Utilization > 90%	Utilization between 70% and 90%
6. Egress Port Service Pool	Utilization > 90%	Utilization between 70% and 90%
7. CPU Queue	Utilization > 90%	Utilization between 70% and 90%
8. RQE Queue	Utilization > 90%	Utilization between 70% and 90%

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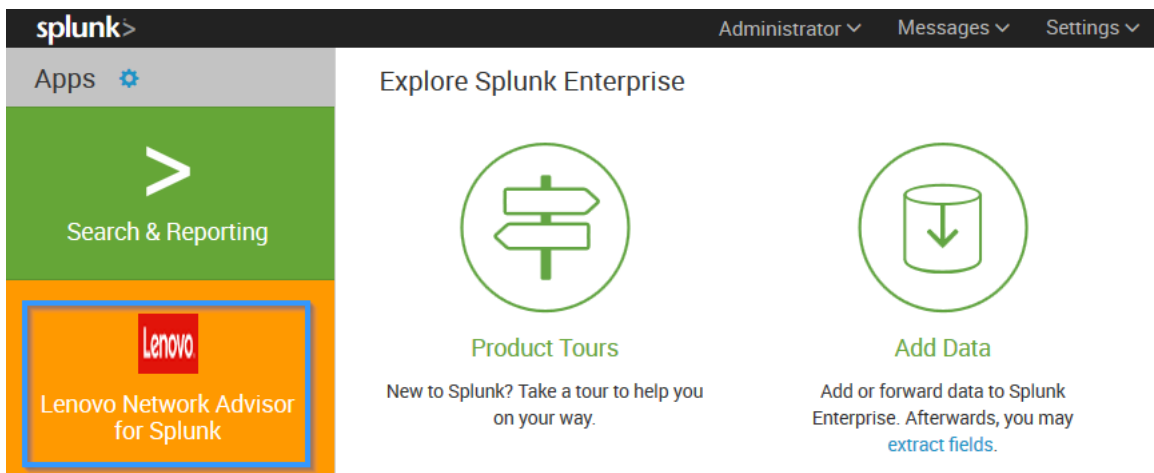
## Lenovo Network Advisor Overview

The LNA Application is a collection of dashboards consisting of user inputs and visualization tools, such as charts or tables.

The LNA Application contains the following menus:

- Overview
- Health Status
- Traffic
- Congestion
- Buffer Utilization
- Setup

To navigate to the dashboards, click on **Lenovo Network Advisor for Splunk**

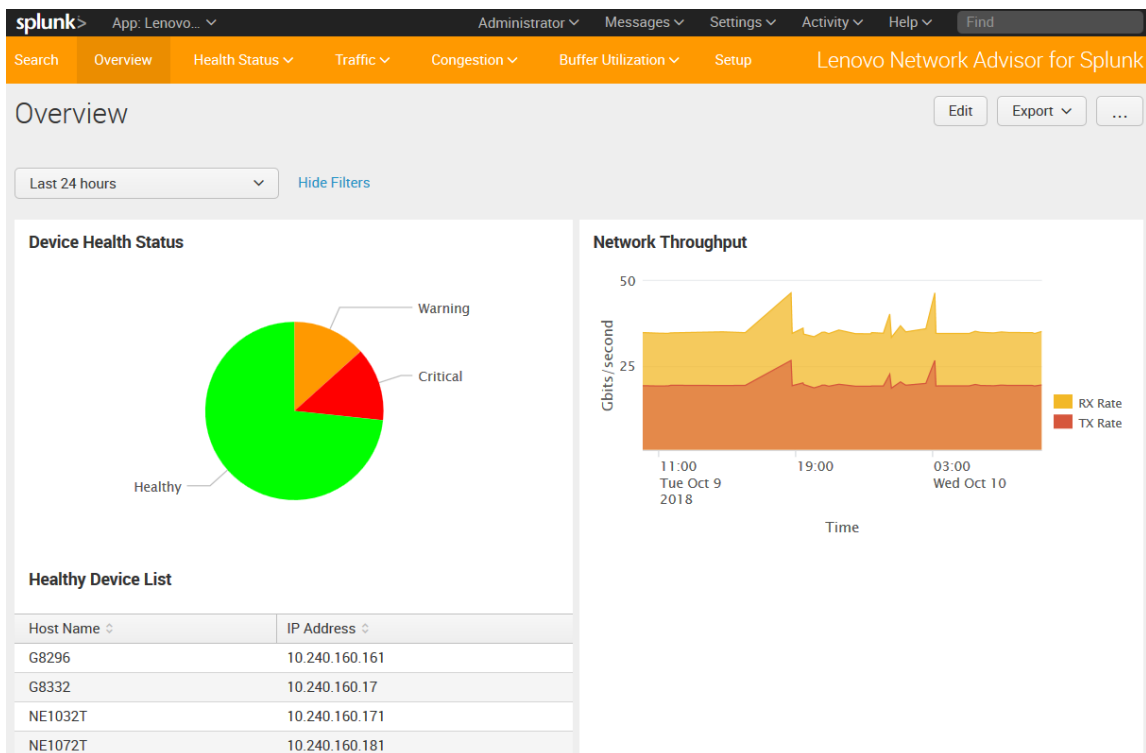
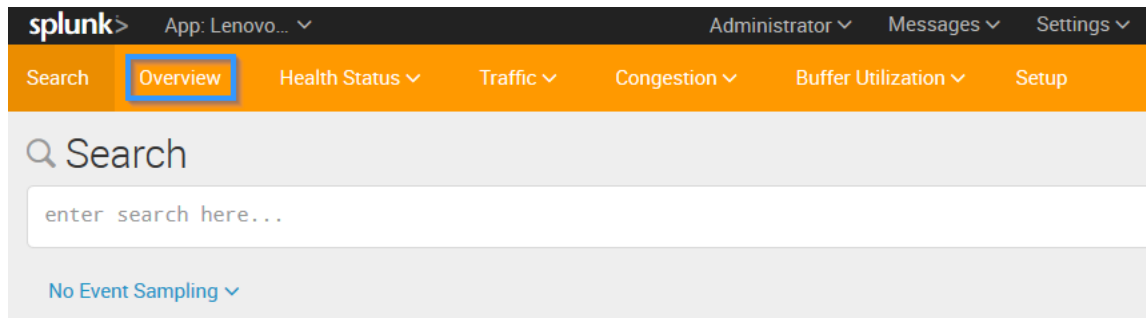


# Overview

The Overview dashboard provides an overall status of the switches present in a network environment. It offers a high level view of the health, traffic statistics, congestion, and buffer utilizations for each switch. Network devices are classified as following:

Health Score	Color Code	Description
Healthy	Green	No critical alerts No warnings
Warning	Orange	No critical alerts One or more warnings
Critical	Red	One or more critical alerts

To navigate to the Overview Dashboard click on **Overview**



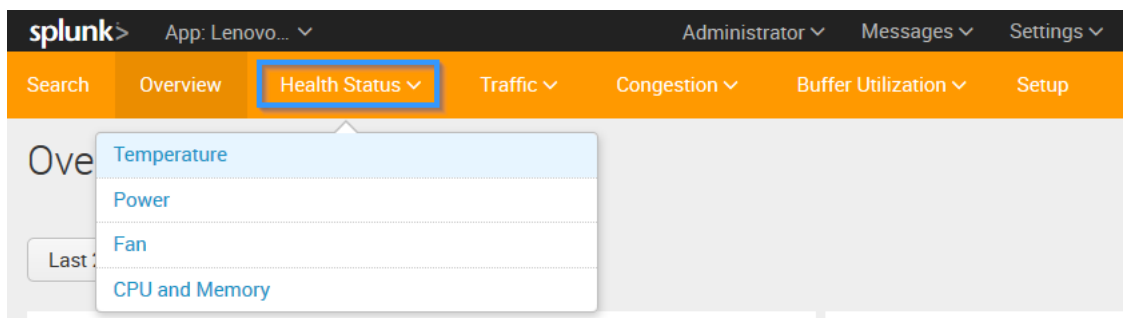
## Health Status

The Health Status dashboard contains information regarding the health parameters monitored by the each switch.

Health Status has the following menus:

- Temperature
- Power
- Fan
- System CPU and Memory

To navigate to the Temperature, Power, Fan, or System CPU and Memory dashboards, click on **Health Status** and select the appropriate option



## Temperature Dashboard

The Temperature dashboard provides switch temperature information, such as CPU or ambient temperature.

A screenshot of the Splunk 'Temperature' dashboard. The dashboard displays a table with columns for Host Name, IP Address, CPU State, CPU Temperature (Celsius), Ambient State, Ambient Temperature (Celsius), Hot Spot State, and Hot Spot Temperature (Celsius). The table contains 12 rows of data, each with a small line graph showing temperature trends over time. The dashboard also includes a search bar, a 'Last 24 hours' filter, and 'Edit' and 'Export' buttons.

i	Host Name	IP Address	CPU State	CPU Temperature (Celsius)	Ambient State	Ambient Temperature (Celsius)	Hot Spot State	Hot Spot Temperature (Celsius)
>	1 G8272	10.240.160.151	OK		OK		OK	
>	2 G8296	10.240.160.161	OK		NA	NA	NA	NA
>	3 G8332	10.240.160.17	OK		NA	NA	OK	
>	4 NE1032T	10.240.160.171	NA	NA	NA	NA	NA	NA
>	5 NE1072T	10.240.160.181	NA	NA	NA	NA	NA	NA
>	6 NE0152T	10.240.160.22	OK		NA	NA	NA	NA
>	7 NE1032	10.240.160.39	NA	NA	NA	NA	NA	NA
>	8 NE2572	10.240.160.69	NA	NA	OK		OK	
>	9 NE10032	10.240.160.76	NA	NA	OK		OK	
>	10 G8272	10.240.177.103	OK		OK		OK	
>	11 JUP3	10.240.177.122	OK		NA	NA	NA	NA
>	12 V034	10.240.177.123	OK		NA	NA	NA	NA

## Power Dashboard

The Power dashboard provides switch power information, such as the status of each power unit.

The screenshot shows the Splunk interface for the Power dashboard. The top navigation bar includes 'splunk', 'App: Lenovo...', 'Administrator', 'Messages', 'Settings', 'Activity', 'Help', and a search bar. Below this is a secondary navigation bar with 'Search', 'Overview', 'Health Status', 'Traffic', 'Congestion', 'Buffer Utilization', 'Setup', and 'Lenovo Network Advisor for Splunk'. The main content area is titled 'Power' and includes a 'Last 24 hours' filter and a 'Hide Filters' link. The data is presented in a table with the following columns: Host Name, IP Address, Power One, and Power Two.

Host Name	IP Address	Power One	Power Two
G8272	10.240.160.151	Fault	ON
G8296	10.240.160.161	ON	No I2C Access
NE1032	10.240.160.39	Fault	ON
NE1032T	10.240.160.171	ON	Not Installed
NE10032	10.240.160.76	ON	ON
JUP3	10.240.177.122	ON	No I2C Access
VO34	10.240.177.123	No I2C Access	ON
NE0152T	10.240.160.22	ON	ON
NE1072T	10.240.160.181	ON	ON
G8272	10.240.177.103	ON	Fault
NE2572	10.240.160.69	ON	ON
G8332	10.240.160.17	ON	ON

## Fan Dashboard

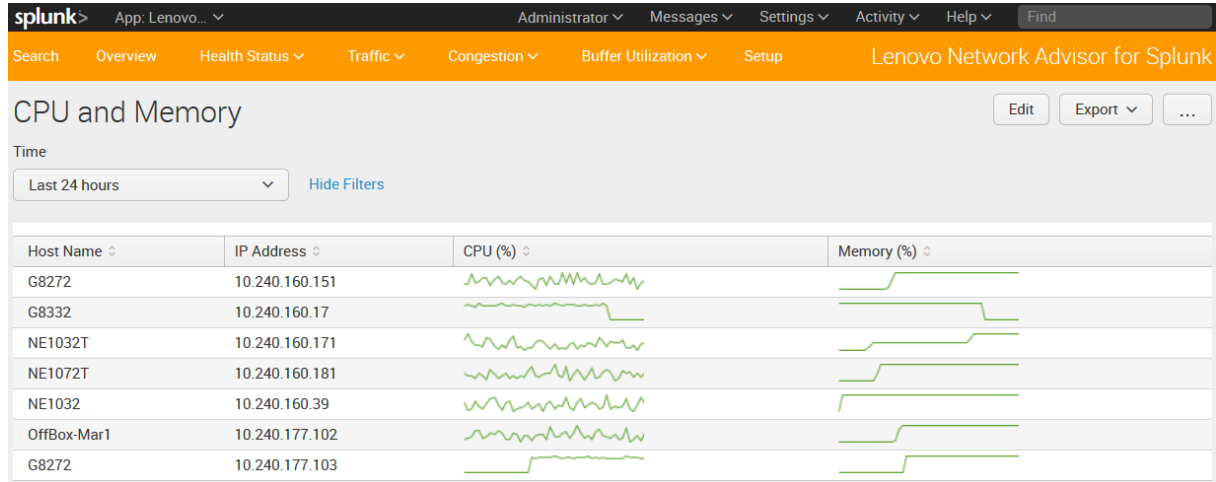
The Fan dashboard provides switch fan information, such as the number of active and inactive fans and their speeds.

The screenshot shows the Splunk interface for the Fan dashboard. The top navigation bar is identical to the Power dashboard. The main content area is titled 'Fan' and includes a 'Last 24 hours' filter and a 'Hide Filters' link. The data is presented in a table with the following columns: Host Name, IP Address, Num of Fans, Active Fans, Inactive Fans, and Average Fans Speed trend (%). Each row also includes a small line graph representing the speed trend.

Host Name	IP Address	Num of Fans	Active Fans	Inactive Fans	Average Fans Speed trend (%)
G8272	10.240.160.151	8	8	0	
G8296	10.240.160.161	3	3	0	
G8332	10.240.160.17	8	8	0	
NE1032T	10.240.160.171	6	6	0	
NE1072T	10.240.160.181	10	10	0	
NE0152T	10.240.160.22	3	3	0	
NE1032	10.240.160.39	6	6	0	
NE2572	10.240.160.69	12	12	0	
NE10032	10.240.160.76	12	10	2	
G8272	10.240.177.103	8	8	0	
JUP3	10.240.177.122	3	3	0	
VO34	10.240.177.123	3	3	0	

## System CPU and Memory Dashboard

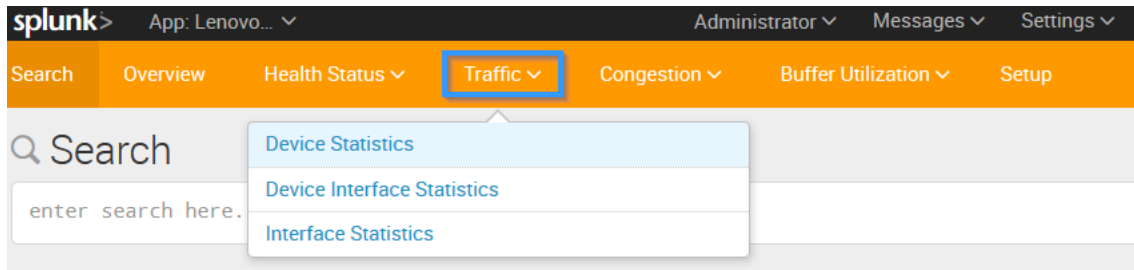
The System CPU and Memory dashboard provides switch CPU and memory utilization information.



## Traffic

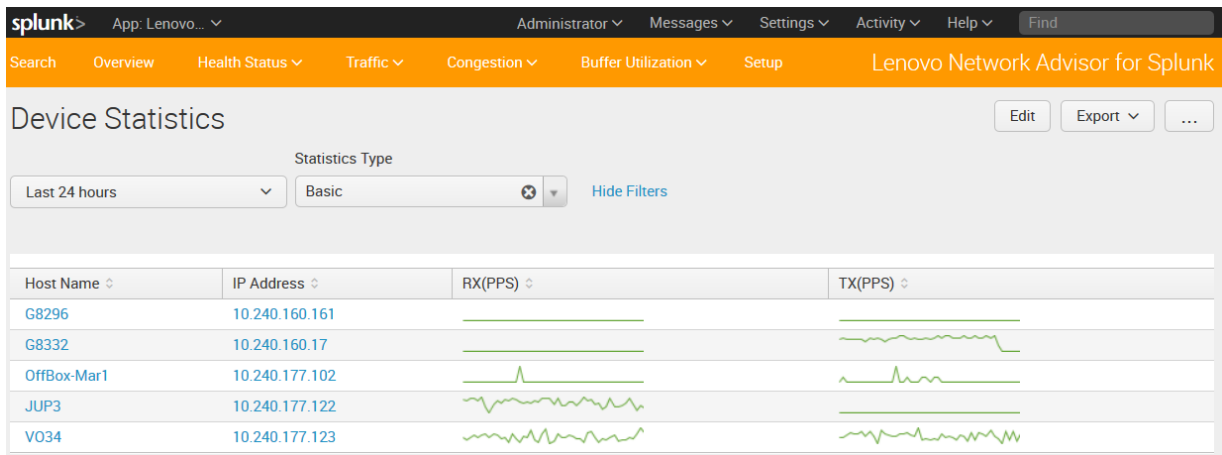
The Traffic dashboard provides switch traffic information, such as ingress and egress traffic rates, and unicast, multicast, and broadcast packet rates.

To navigate to the Device Statistics, Device Interface Statistics, or Interface Statistics dashboards, click on **Traffic** and select the appropriate option



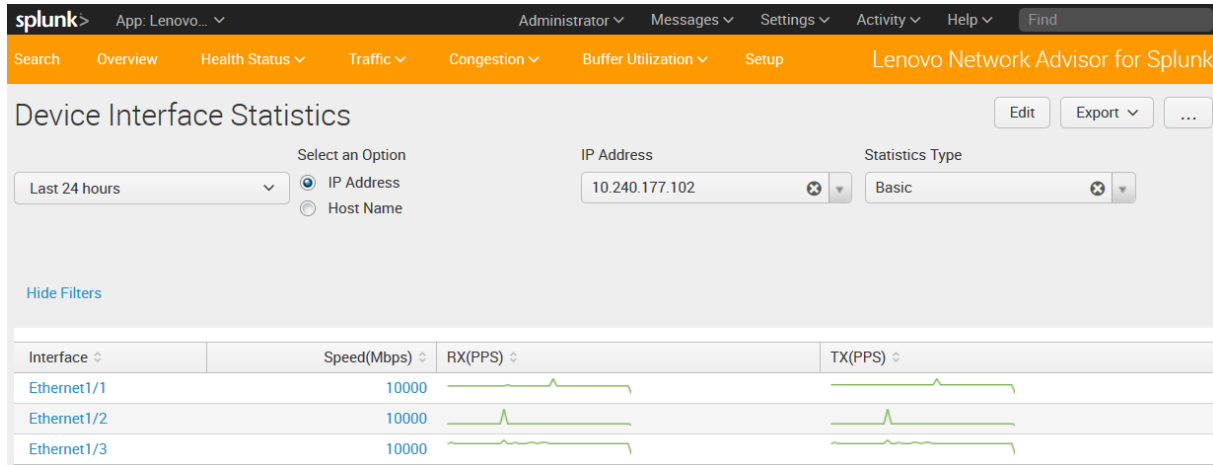
## Device Statistics Dashboard

The Device Statistics Dashboard lists device level statistics for all switches. When clicking on the IP address column, the LNA Application navigates to the interface traffic statistics of the selected switch.



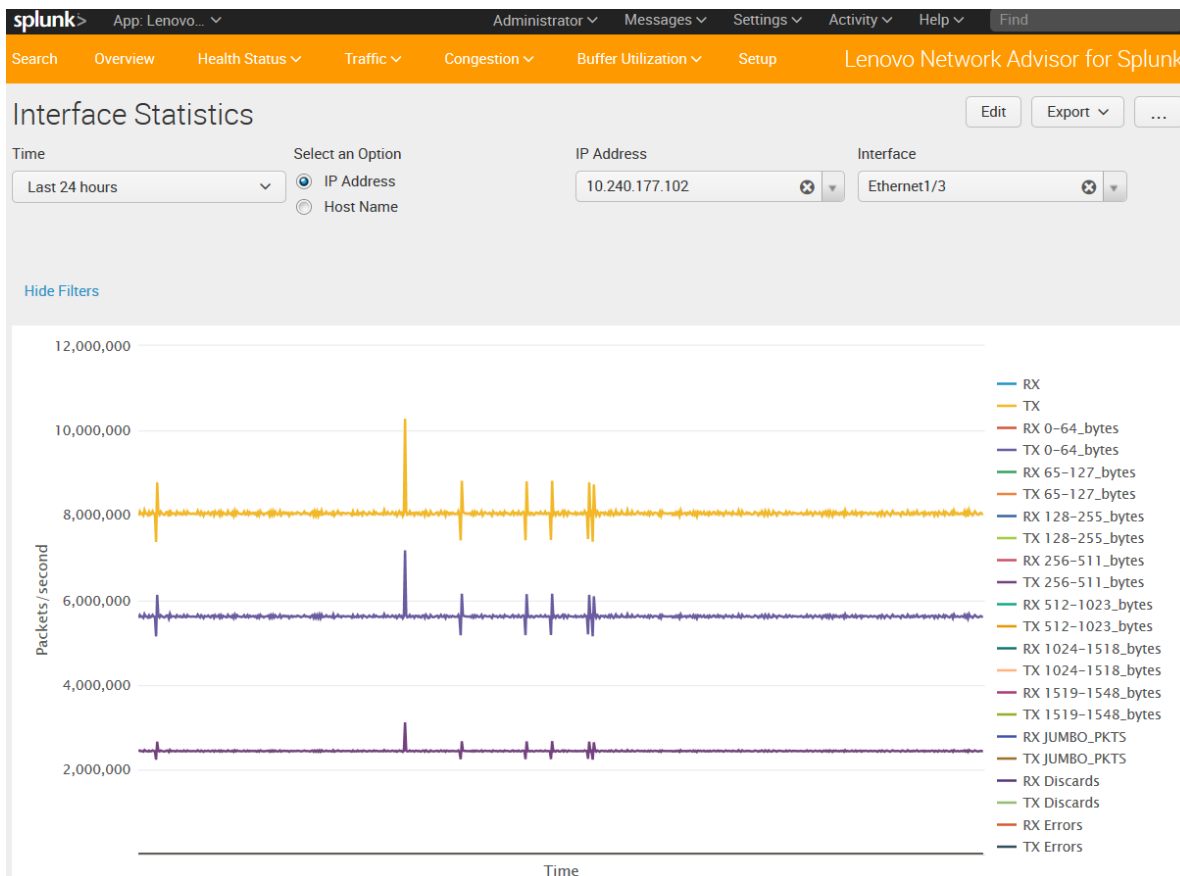
## Device Interface Statistics Dashboard

The Device Interface Statistics Dashboard displays the interface level traffic statistics of the switch. When clicking on an interface, the LNA Application navigates to the interface traffic rate chart for the selected switch interface.



## Interface Statistics Dashboard

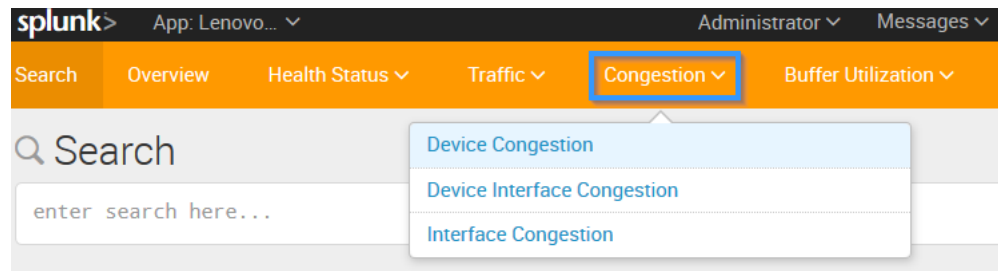
The Interface Statistics Dashboard displays packet-size distribution for incoming and outgoing traffic on a specific interface.





## Congestion

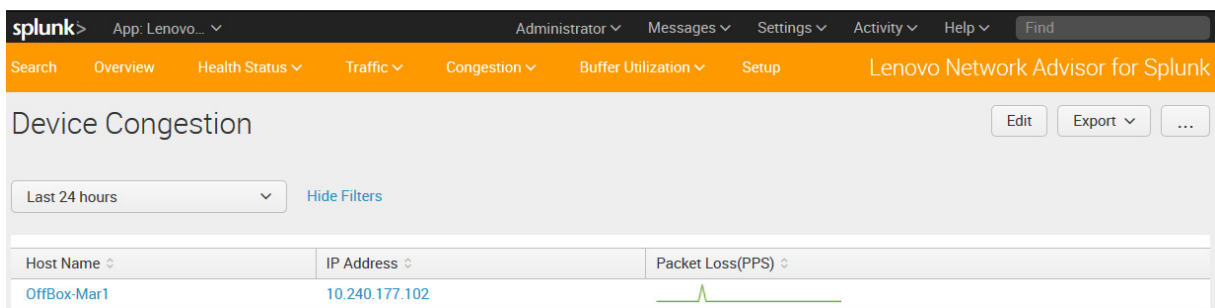
The Congestion dashboard provides switch congestion information, such as interface congestion rates. To navigate to the Device Congestion, Device Interface Congestion, or Interface Congestion dashboards, click on **Congestion** and select the appropriate option.



**Note:** The Congestion dashboard is not supported on Lenovo ThinkSystem NE0152T RackSwitch.

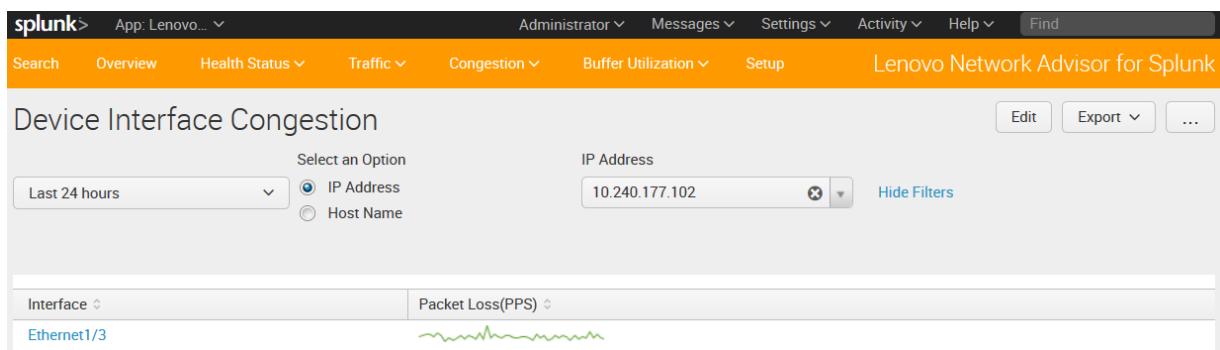
### Device Congestion Dashboard

The Device Congestion Dashboard lists device level congestion statistics for all switches. When clicking on the IP address column, the LNA Application navigates to Device Interface Congestion Dashboard for the selected switch.



### Device Interface Congestion Dashboard

The Device Interface Congestion Dashboard displays interface level congestion statistics for a single switch. When clicking on an interface, the LNA Application navigates to the interface congestion chart for the selected switch interface.

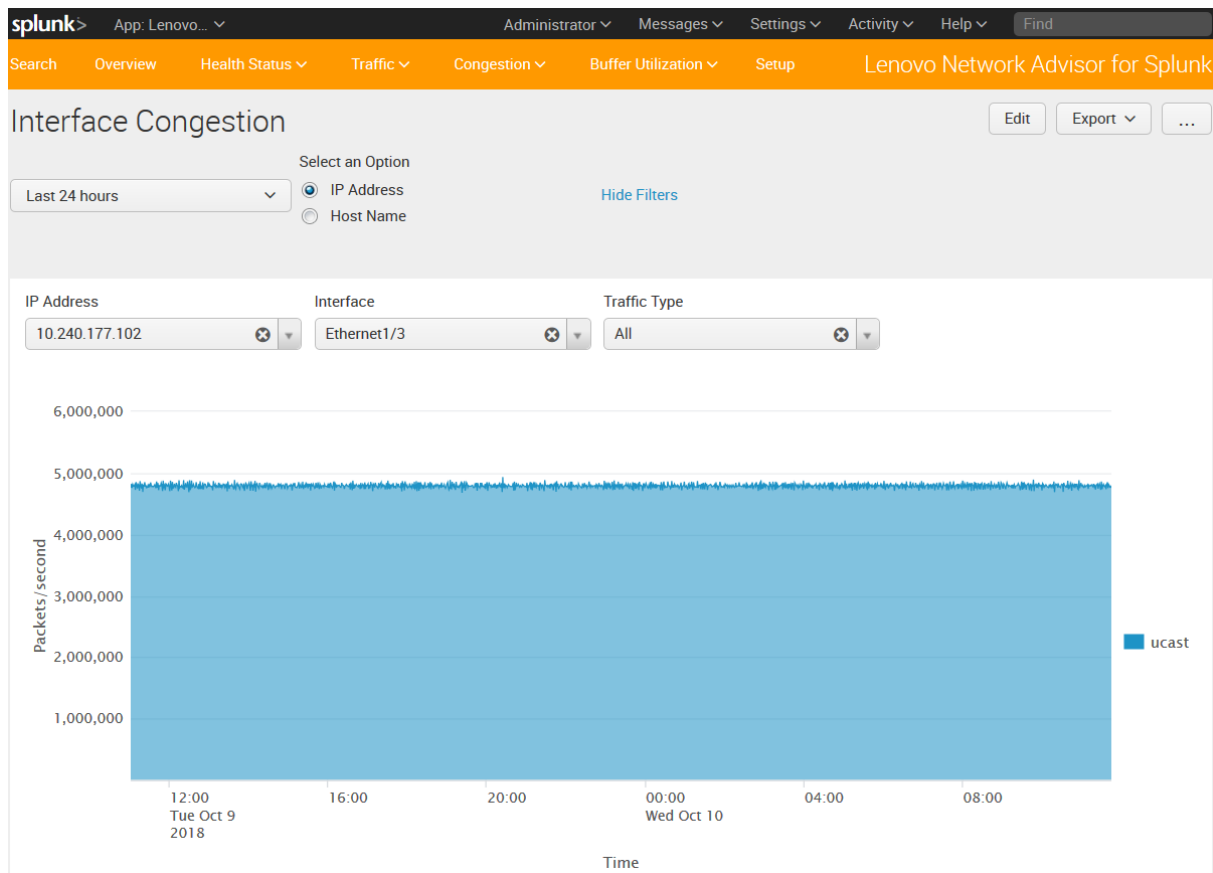


## Interface Congestion Dashboard

The Interface Congestion Dashboard displays more details on the traffic drops. It depicts three different congestion charts on an interface controlled by the traffic type drop-down list:

- All - displays the distribution of unicast and multicast packet drops
- Unicast - displays the distribution of packet drops across the unicast queue
- Multicast - displays the distribution of packet drops across the multicast queue

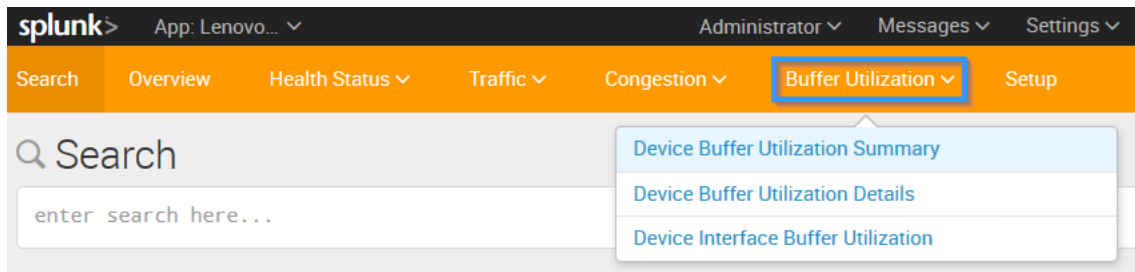
Following is an example of ethernet interface 1/3 having only unicast packet drops.



## Buffer Utilization

The Buffer Utilization dashboard provides switch buffer information for specific buffers, which control how traffic is processed at ingress or egress interfaces, CPU, and internal queuing engines.

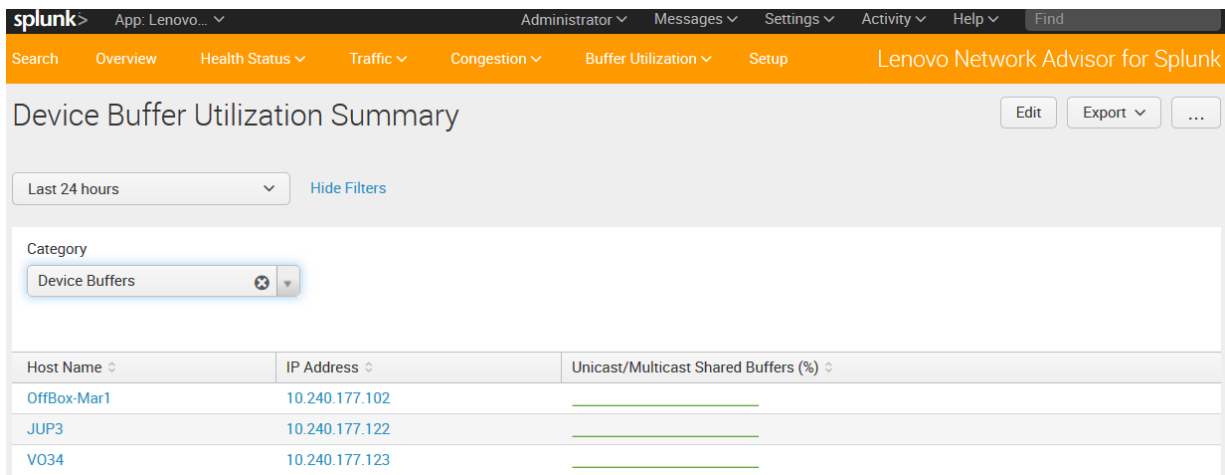
To navigate to the Device Buffer Utilization Summary, Device Buffer Utilization Details, or Device Interface Buffer Utilization dashboards, click on **Buffer Utilization** and select the appropriate option



**Note:** The Buffer Utilization dashboard is not supported on Lenovo ThinkSystem NE0152T RackSwitch.

### Device Buffer Utilization Summary Dashboard

The Device Buffer Utilization Summary Dashboard displays a summary of the buffer utilization of the connected network devices.



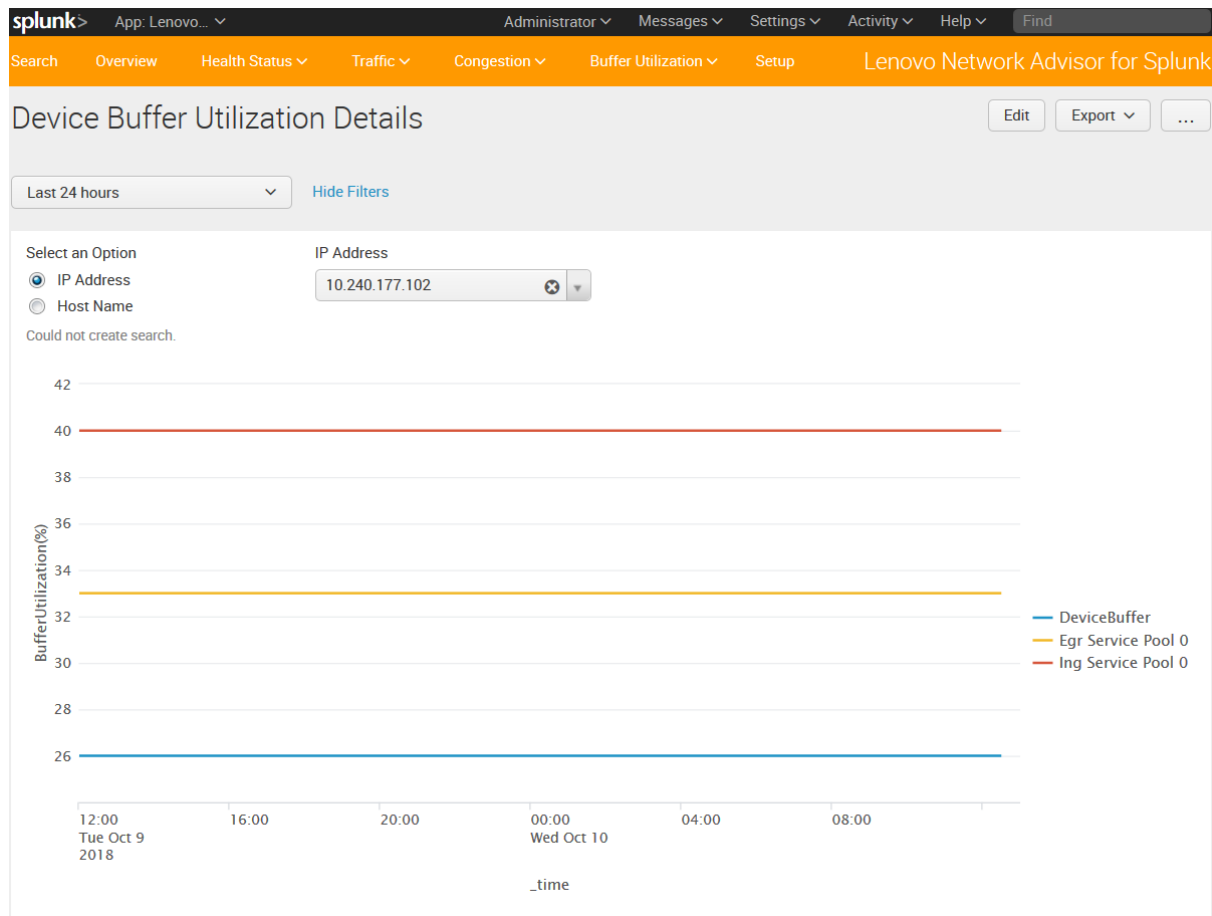
You can select only one category from the Buffer Utilization Realms to display its statistics in the dashboard by selecting the appropriate option from the Category drop-down list:

- Device Buffers
- Ingress Service Pool Buffers
- Ingress Port Service Pool Buffers
- Ingress Port Priority Group Buffers
- Service Pool Buffers
- Egress Port Service Pool Buffers
- Egress CPU Queue Buffers
- Egress RQE Queue Buffers

## Device Buffer Utilization Details Dashboard

The Device Buffer Utilization Details Dashboard displays device buffer utilization statistics charts at the device level. A switch is selected by either its hostname or its IP Address.

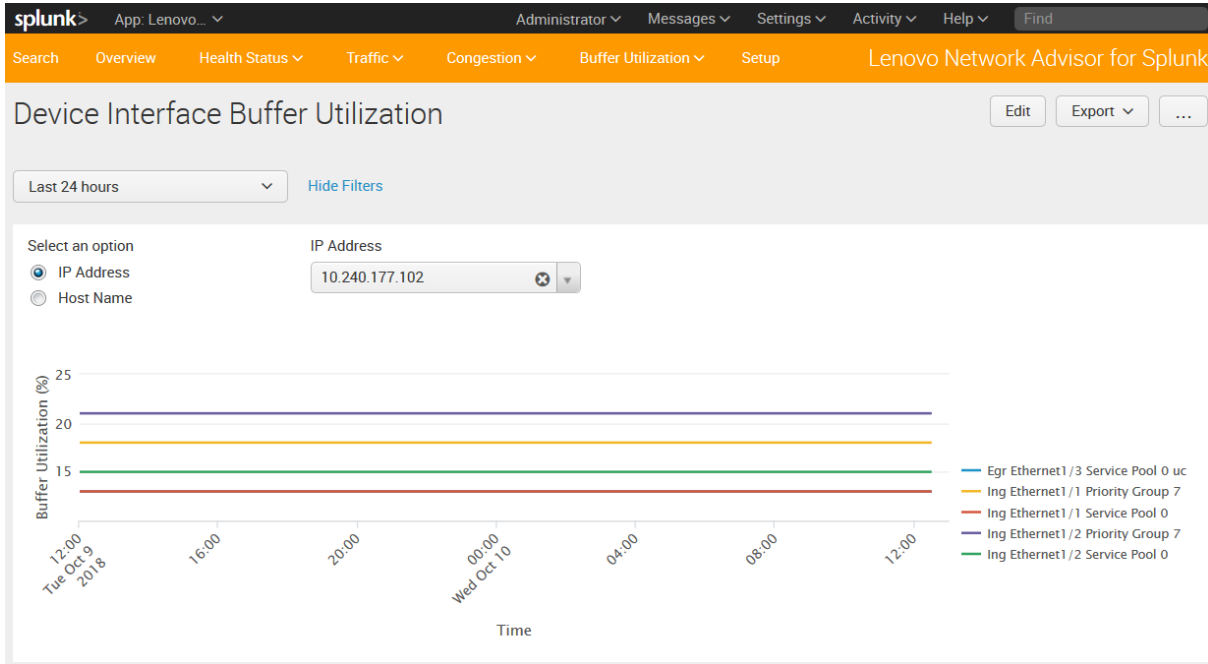
Device buffer utilization consists of device buffers, ingress service pool buffers, egress service pool buffers, egress CPU queue buffers, and egress RQE queue buffers category statistics.



## Device Interface Buffer Utilization Dashboard

The Device Interface Buffer Utilization Dashboard displays interface buffer utilization statistics charts for the selected switch. A switch is selected by either its hostname or its IP Address.

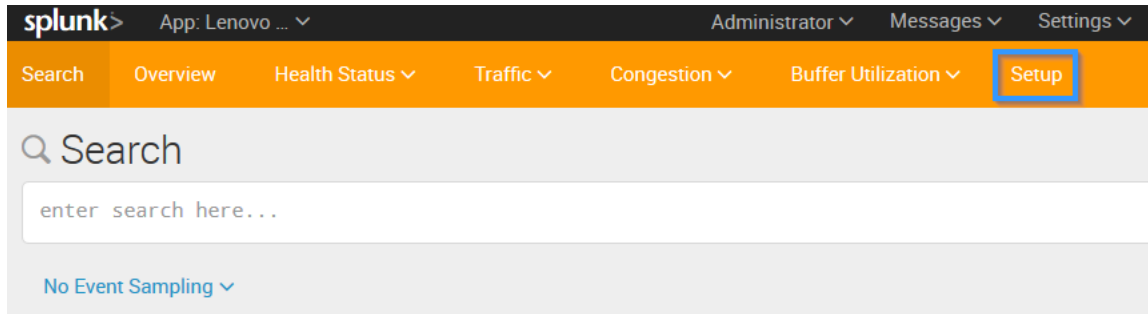
Interface buffer utilization consists of ingress port service pool buffers, ingress port priority group buffers, and egress port service pool buffers category statistics.



## Setup

From the Setup menu you can add switches to Splunk Forwarders. You can also remove switches.

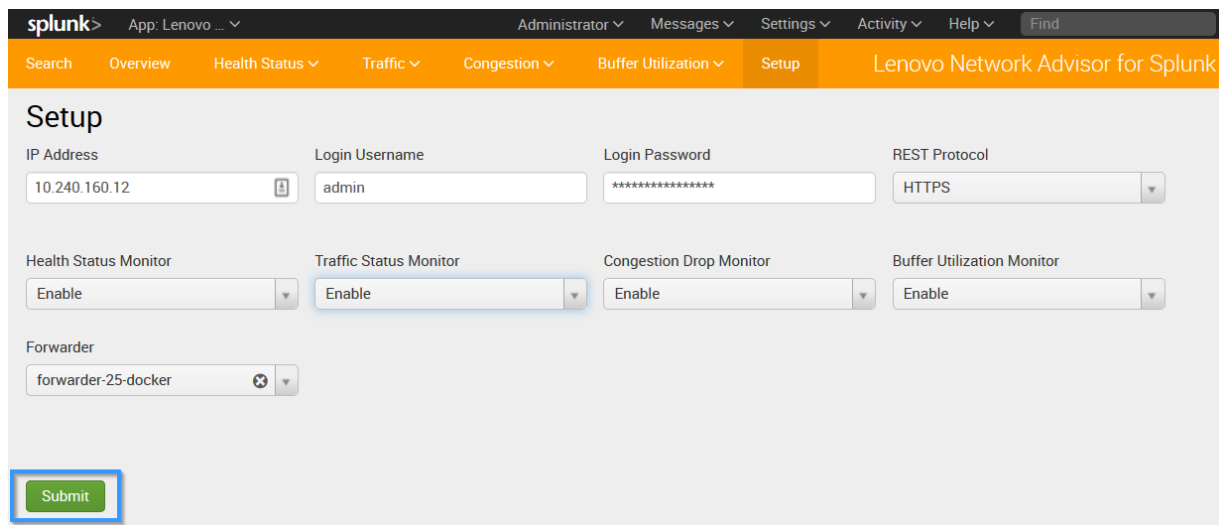
To enter the Setup menu, click on **Setup**.



The following fields are required when adding a switch:

- IP Address - IP address of the switch
- Login Username - the username credentials to access the REST API of the Lenovo switch
- Login Password - the corresponding password of the above login username
- REST Protocol - the REST Protocol running on the switch (the default option is HTTPS)
- Congestion Drop Monitor - enable or disable the LNA Application to monitor the switch's congestion statistics
- Buffer Utilization Monitor - enable or disable the LNA Application to monitor the switch's buffer utilization
- Forwarder - the Forwarder that is mapped to this switch

After populating all the above fields, click on **Submit** to add the switch to the specified Forwarder. The new switch appears in the Switch List.



To remove a switch from a Forwarder, copy its Key ID from the Switch List to the text box above the list and click on **Remove Switch**.

Enter a Key ID from the table below

Switch List

KeyID	SwitchIP	Forwarder	REST	Health	Traffic	Congestion	Buffer
5bb7be8d07a1fc0f6f623571	10.240.160.151	forwarder-1-docker	HTTP	Enable	Enable	Enable	Enable
5bb7befd07a1fc0f6f623572	10.240.160.23	forwarder-2-docker	HTTPS	Enable	Enable	Enable	Enable
5bb7bf2207a1fc0f6f623573	10.240.160.17	forwarder-3-docker	HTTP	Enable	Enable	Enable	Enable
5bb7bf3e07a1fc0f6f623574	10.240.160.161	forwarder-4-docker	HTTP	Enable	Enable	Enable	Enable
5bb7bf5507a1fc0f6f623575	10.240.160.171	forwarder-5-docker	HTTP	Enable	Enable	Enable	Enable
5bb7bf6c07a1fc0f6f623576	10.240.160.181	forwarder-6-docker	HTTP	Enable	Enable	Enable	Enable
5bb7bfc707a1fc0f6f623578	10.240.160.92	forwarder-8-docker	HTTP	Enable	Enable	Enable	Enable
5bb7c01007a1fc0f6f623579	10.240.160.182	forwarder-9-docker	HTTP	Enable	Enable	Enable	Enable
5bb7c04a07a1fc0f6f62357a	10.240.160.69	forwarder-10-docker	HTTPS	Enable	Enable	Disable	Disable
5bb7c0de07a1fc0f6f62357c	10.240.160.76	forwarder-11-docker	HTTP	Enable	Enable	Enable	Enable

« prev 1 2 next »





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## Appendix A. Getting help and technical assistance

Lenovo Network Advisor for Splunk is a free application that comes with no Lenovo Service and Support. If you have any questions on this application, please use one of these avenues to reach out to Lenovo:

1. Go to <https://forums.lenovo.com> and scroll through the top banner and click on Datacenter Networking. Navigate to the Board List and select the Networking Management/DevOps sub-category. Please ask your question by clicking on the **SUBMIT A TOPIC** button.

The direct link to the Networking Management/DevOps sub-category is:

[https://forums.lenovo.com/t5/Networking-Management-Devops/bd-p/nw02\\_eg](https://forums.lenovo.com/t5/Networking-Management-Devops/bd-p/nw02_eg)

2. On the [Lenovo Network Advisor for Splunk application web page](#) hosted by Splunk, navigate to the Support section and click on **Questions on Splunk Answers** to post a question.

The direct link to the Questions on Splunk Answers page for the application is:

<https://answers.splunk.com/app/questions/4202.html>



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