



Appendixes

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APPENDIX—Enhancing System Security According to NIST SP 800-131A

Our switch systems, by default, work with NIST SP 800-131A, as described in the table below.

This appendix describes how to enhance the security of a system in order to comply with the NIST SP 800-131A standard. This standard is a document which defines cryptographically “acceptable” technologies. This document explains how to protect against possible cryptographic vulnerabilities in the system by using secure methods. Because of compatibility issues, this security state is not the default of the system and it should be manually set.

i Note

Some protocols, however, cannot be operated in a manner that complies with the NIST SP 800-131A standard.

Component	Configuration	Command
HTTP	HTTP disabled	no web http enable
HTTPS	HTTPS enabled	no web https enable
	SSL ciphers = TLS1.2	web https ssl ciphers all
	SSL renegotiation disabled	web https ssl renegotiation enable
SSH	SSH version = 2	ssh server min-version 1

Component	Configuration	Command
	SSH ciphers = aes256-ctr, aes192-ctr, aes128-ctr, aes128-gcm@openssh.com, aes256-gcm@openssh.com	no ssh server security strict

Web Certificate

The OS supports signature generation of sha256WithRSAEncryption, sha1WithRSAEncryption self-signed certificates, and importing certificates as text in PEM format.

To configure a default certificate:

1. Create a new sha256 certificate.

```
switch (config) # crypto certificate name <cert name> generate
self-signed hash-algorithm sha256
```

Note

For more details and parameters refer to the command "[crypto certificate name](#)".

2. Show crypto certificate detail.

```
switch (config) # show crypto certificate detail
```

Search for "signature algorithm" in the output.

3. Set this certificate as the default certificate. Run:

```
switch (config) # crypto certificate default-cert name <cert name>
```

To configure default parameters and create a new certificate:

1. Define the default hash algorithm.

```
switch (config) # crypto certificate generation default hash-algorithm sha256
```

2. Generate a new certificate with default values.

```
switch (config) # crypto certificate name <cert name> generate self-signed
```

Note

When no options are selected, the generated certificate uses the default values for each field.

To test strict mode connect to the WebUI using HTTPS and get the certificate. Search for “signature algorithm”.

Note

There are other ways to configure the certificate to sha256. For example, it is possible to use “certificate generation default hash-

algorithm” and then regenerate the certificate using these default values.

i Note

It is recommended to delete browsing data and previous certificates before retrying to connect to the WebUI.

i Note

Make sure not to confuse “signature algorithm” with “Thumbprint algorithm”.

SNMP

SNMPv3 supports configuring username, authentication keys and privacy keys. For authentication keys it is possible to use MD5 or SHA. For privacy keys AES or DES are to be used.

To configure strict mode, create a new user with HMAC-SHA1-96 and AES-128. Run:

```
switch (config) # snmp-server user <username> v3 auth sha  
<password1> priv aes-128 <password2>
```

To verify the user in the CLI, run:

```
switch (config) # show snmp user
```

(i) Note

To test strict mode, configure users and check them using the CLI, then run an SNMP request with the new users.

(i) Note

SNMPv1 and SNMPv2 are not considered to be secure. To run in strict mode, only use SNMPv3.

HTTPS

By default, the OS supports HTTPS encryption using TLS1.2 only. Working in TLS1.2 mode also bans MD5 ciphers which are not allowed per NIST 800-131a. In strict mode, the switch supports encryption with TLS1.2 only with the following supported ciphers:

- RSA_WITH_AES_128_CBC_SHA256
- RSA_WITH_AES_256_CBC_SHA256
- DHE_RSA_WITH_AES_128_CBC_SHA256
- DHE_RSA_WITH_AES_256_CBC_SHA256
- TLS_RSA_WITH_AES_128_GCM_SHA256
- TLS_RSA_WITH_AES_256_GCM_SHA384
- TLS_DHE_RSA_WITH_AES_128_GCM_SHA256
- TLS_DHE_RSA_WITH_AES_256_GCM_SHA384

To enable all encryption methods, run:

```
switch (config) # web https ssl ciphers all
```

To enable only TLS ciphers (enabled by default), run:

```
switch (config) # web https ssl ciphers TLS
```

To enable HTTPS strict mode, run:

```
switch (config) # web https ssl ciphers TLS1.2
```

To verify which encryption methods are used, run:

```
switch (config)# show web
Web User Interface:
  Web interface enabled: yes
  HTTP enabled: yes
  HTTP port: 80
  HTTP redirect to HTTPS: no
  HTTPS enabled: yes
  HTTPS port: 443
  HTTPS ssl-ciphers: TLS1.2
  HTTPS certificate name: default-cert
  Listen enabled: yes
  No Listen Interfaces.

  Inactivity timeout: disabled
  Session timeout: 2 hr 30 min
  Session renewal: 30 min

Web file transfer proxy:
```

```
Proxy enabled: no
```

```
Web file transfer certificate authority:  
HTTPS server cert verify: yes  
HTTPS supplemental CA list: default-ca-list
```

On top of enabling HTTPS, to prevent security breaches HTTP must be disabled.

To disable HTTP, run:

```
switch (config) # no web http enable
```

Code Signing

Code signing is used to verify that the data in the image is not modified by any third-party. The operating system supports signing the image files with SHA256, RSA2048 using GnuPG.

Note

Strict mode is operational by default.

SSH

The SSH server on the switch by default uses secure ciphers only, message authentication code (MAC), key exchange methods, and public key algorithm. When configuring SSH server to strict mode, the aforementioned security methods only use approved algorithms as detailed in the NIST 800-181A specification and the user can connect to the switch via SSH in strict mode only.

To enable strict security mode, run the following:

```
switch (config) # ssh server security strict
```

Note

The following ciphers are disabled for SSH when strict security is enabled:

- 3des-cbc
- aes256-cbc
- aes192-cbc
- aes128-cbc
- rijndael-cbc@lysator.liu.se

The no form of the command disables strict security mode.

Make sure to configure the SSH server to work with minimum version 2 since 1 is vulnerable to security breaches.

To configure min-version to strict mode, run:

```
switch (config) # ssh server min-version 2
```

Note

Once this is done, the user cannot revert back to minimum version 1.

LDAP

By default, the switches support LDAP encryption SSL version 3 or TLS1.0 up to TLS1.2. The only banned algorithm is MD5 which is not allowed per NIST 800-131a. In strict mode, the switch supports encryption with TLS1.2 only with the following supported ciphers:

- DHE-DSS-AES128-SHA256
- DHE-RSA-AES128-SHA256
- DHE-DSS-AES128-GCM-SHA256
- DHE-RSA-AES128-GCM-SHA256
- DHE-DSS-AES256-SHA256
- DHE-RSA-AES256-SHA256
- DHE-DSS-AES256-GCM-SHA384
- DHE-RSA-AES256-GCM-SHA384
- ECDH-ECDSA-AES128-SHA256
- ECDH-RSA-AES128-SHA256
- ECDH-ECDSA-AES128-GCM-SHA256
- ECDH-RSA-AES128-GCM-SHA256
- ECDH-ECDSA-AES256-SHA384
- ECDH-RSA-AES256-SHA384
- ECDH-ECDSA-AES256-GCM-SHA384
- ECDH-RSA-AES256-GCM-SHA384
- ECDHE-ECDSA-AES128-SHA256
- ECDHE-RSA-AES128-SHA256
- ECDHE-ECDSA-AES128-GCM-SHA256

- ECDHE-RSA-AES128-GCM-SHA256
- ECDHE-ECDSA-AES256-SHA384
- ECDHE-RSA-AES256-SHA384
- ECDHE-ECDSA-AES256-GCM-SHA384
- ECDHE-RSA-AES256-GCM-SHA384
- AES128-SHA256
- AES128-GCM-SHA256
- AES256-SHA256
- AES256-GCM-SHA384

To enable LDAP strict mode, run the following:

```
switch (config) # ldap ssl mode {start-tls | ssl}
```

i Note

Both modes operate using SSL. The difference lies in the connection initialization and the port used.

APPENDIX—Splunk

Integration with NVIDIA

Products

Splunk automatically clusters millions of log records in real time back into their patterns and finds connections between those patterns to form the baseline flows of each software individually, thus enables you to search, monitor and analyze that data to discover powerful insights across multiple use cases.

This appendix provides a guide on the first steps with Splunk and helps you to begin enjoying reduced time in detecting and resolving production problems.

Getting Started with Splunk

1. Download Splunk and extract the Splunk Enterprise version. (Splunk software is available as an RPM or TGZ.)
2. Create a Splunk User /group. Run:

```
[root@server] groupadd splunk
[root@server] useradd -d /opt/splunk -m -g splunk splunk
```

3. Splunk installation. Run:

```
[root@server] tar -xzvf splunk-7.0.0-c8a78efdd40f-Linux-x86_64.tgz
[root@server] ls
```

4. A new folder called Splunk is created.

```
[root@server] cp -rp splunk/* /opt/splunk/  
[root@server] chown -R splunk: /opt/splunk/  
[root@server] su - splunk  
[splunk@server] cd bin  
[splunk@server] ./splunk start --accept-license
```

Now you can access your Splunk WebUI at <http://IP:8000/> or <http://hostname:8000/>. You need to make sure that port 8000 is open in your server firewall.

Switch Configuration

In this example we are not using the default UDP port 514 to show that any other port can be also used.

5. In order to add a task, the switch must be configured to send logs to our Splunk server. Run:

```
switch > enable  
switch # configure terminal  
switch (config) # show snmp  
SNMP enabled:          yes  
SNMP port:             161  
System contact:  
System location:  
Read-only communities:  
    public  
  
Read-write communities:  
    (none)  
  
Interface listen enabled: yes  
No Listen Interfaces.  
switch (config) # snmp-server host 10.212.23.1 informs port 8597
```

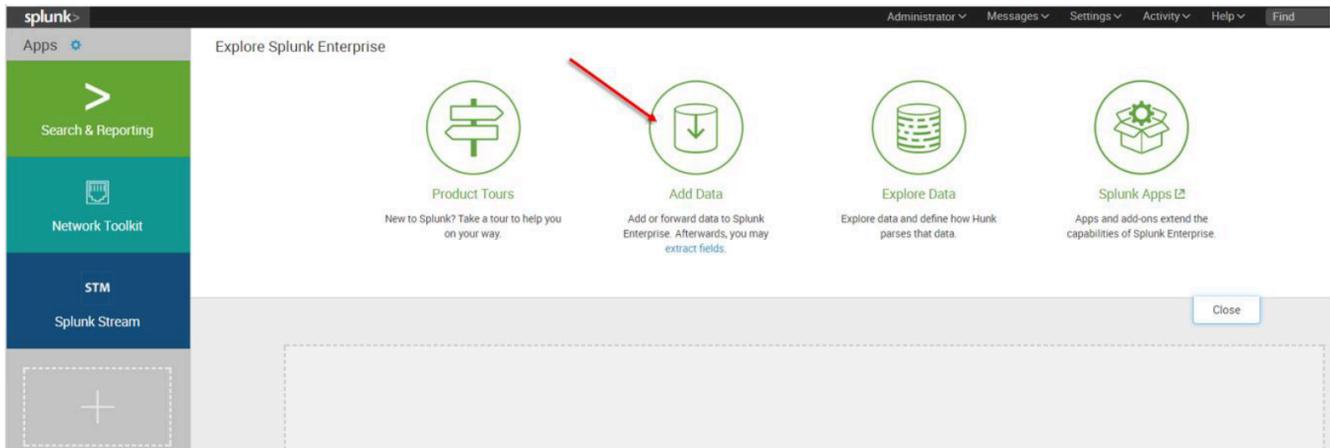
```
switch (config) # snmp-server host 10.212.23.1 traps port 8597
switch (config) # snmp host 10.212.23.1 informs 8597
switch (config) # snmp host 10.212.23.1 traps 8597
```

Summary configuration:

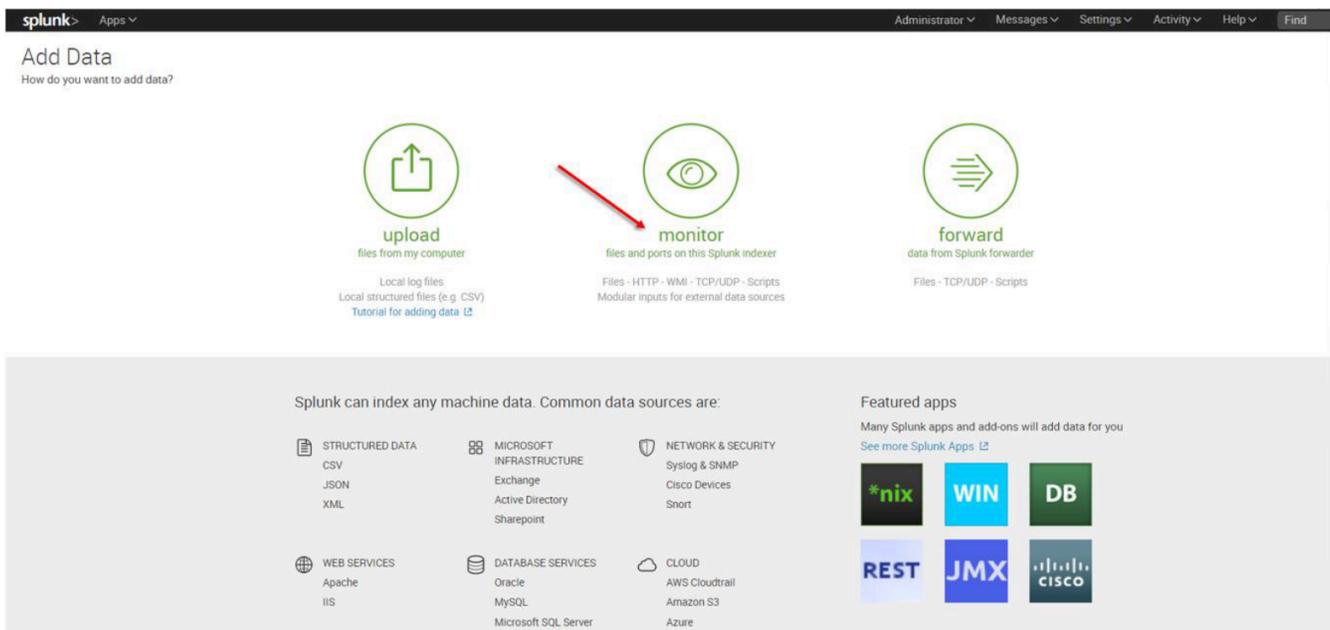
```
switch (config) # show running-config
## Logging configuration
##
logging 10.212.23.1
logging 10.212.23.1 port 8597
logging 10.212.23.1 trap info
logging 10.212.23.1 trap override class events priority err
logging monitor events notice
logging receive
## SNMP configuration
no snmp-server host 10.209.21.221 disable
snmp-server host 10.209.21.221 traps port 8597 version 2c
no snmp-server host 10.212.23.1 disable
snmp-server host 10.212.23.1 traps port 8597 version 2c 8597
```

Adding a Task

6. The first screen encountered after signing into the Splunk WebUI includes the “Add Data” icon.



7. The “Add Data” tab opens up with three options: Upload, Monitor, and Forward. Here our task is to monitor a folder, so we click Monitor. to proceed

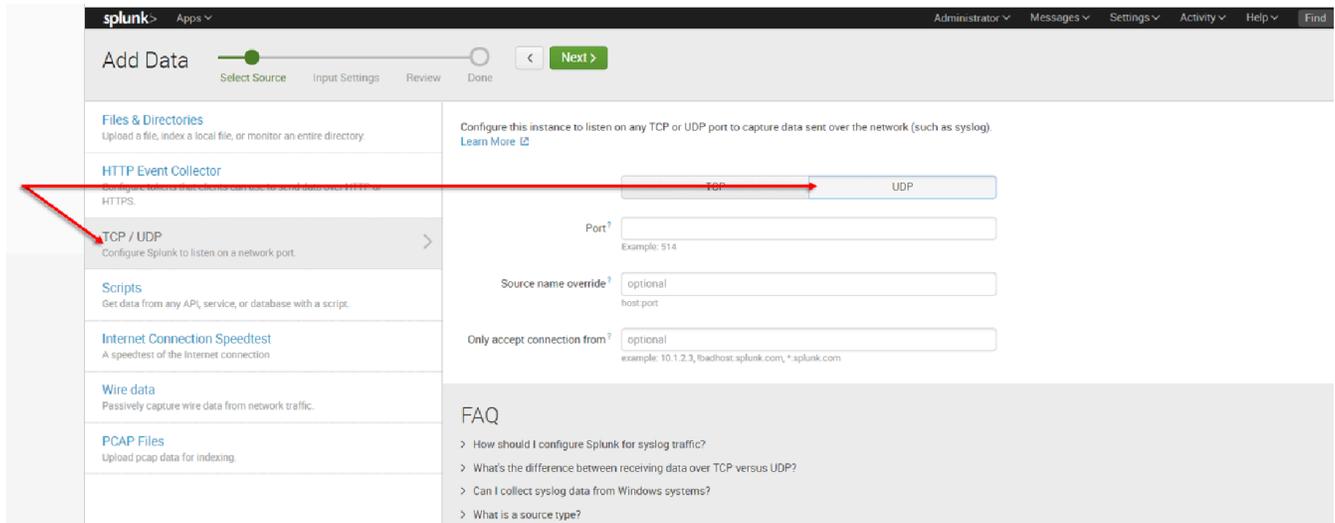


In the Monitor option, the following four categories are available:

- File & Directories – monitor files/folders
- HTTP Event Collector – monitor data streams over HTTP
- TCP/UDP – monitor service ports
- Scripts – monitor scripts

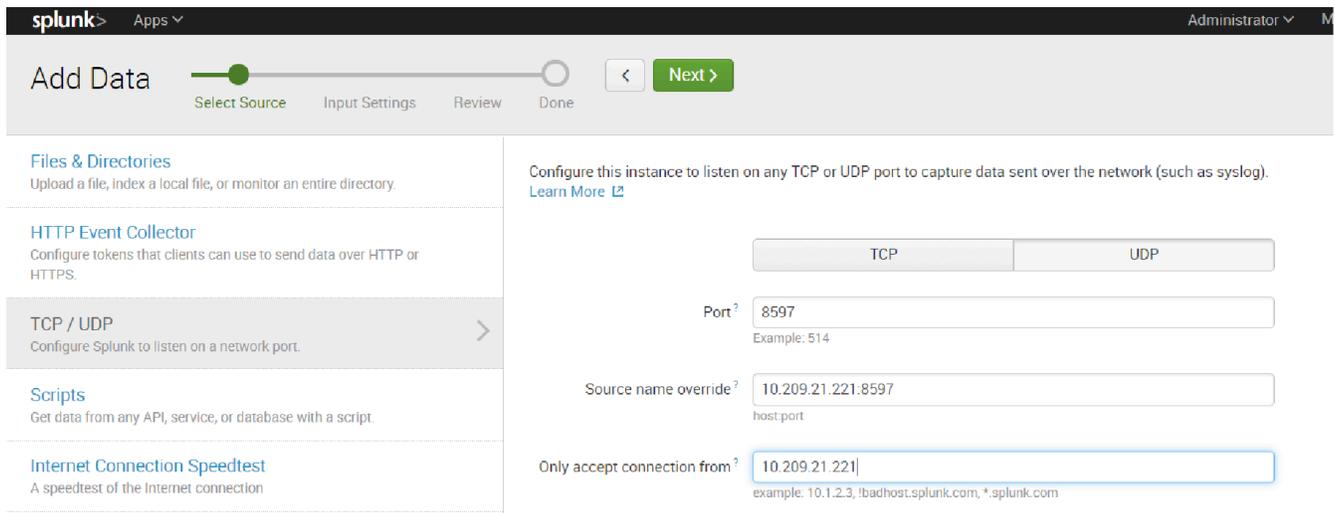
Retrieving Data from TCP and UDP Ports

8. Per our current purpose, we choose TCP/UDP option.



9. Click the TCP or UDP button to choose between a TCP or UDP input, and enter a port number in the “Port” field.

10. In the “Source name override” field, enter a new source name to override the default source value, if required.



11. Click “Next” to continue to the Input Settings page where we will create a new source type called Mellanox-Switch.

splunk > Apps

Add Data Select Source Input Settings Review Done Review >

Input Settings

Optionally set additional input parameters for this data input as follows:

Source type

The source type is one of the default fields that Splunk assigns to all incoming data. It tells Splunk what kind of data you've got, so that Splunk can format the data intelligently during indexing. And it's a way to categorize your data, so that you can search it easily.

Source Type: Select New

Source Type Category:

Source Type Description:

App context

Application contexts are folders within a Splunk instance that contain configurations for a specific use case or domain of data. App contexts improve manageability of input and source type definitions. Splunk loads all app contexts based on precedence rules. [Learn More](#)

App Context:

Host

When Splunk indexes data, each event receives a "host" value. The host value should be the name of the machine from which the event originates. The type of input you choose determines the available configuration options. [Learn More](#)

Method:

Index

Splunk stores incoming data as events in the selected index. Consider using a "sandbox" index as a destination if you have problems determining a source type for your data. A sandbox index lets you troubleshoot your configuration without impacting production indexes. You can always change this setting later. [Learn More](#)

Index: [Create a new index](#)

12. Click Next > Review > Done > Start Searching

✓ **UDP input has been created successfully.**

Configure your inputs by going to [Settings > Data Inputs](#)

Start Searching Search your data now or see [examples and tutorials](#).

Extract Fields Create search-time field extractions. [Learn more about fields](#).

Add More Data Add more data inputs now or see [examples and tutorials](#).

Download Apps Apps help you do more with your data. [Learn more](#).

Build Dashboards Visualize your searches. [Learn more](#).

SNMP Input to Poll Attribute Values and Catch Traps

SNMP represents an incredibly rich source of data that you can get into Splunk for visibility across a very diverse IT landscape.

SNMP agents may also send notifications, called Traps, to an SNMP trap listening daemon.

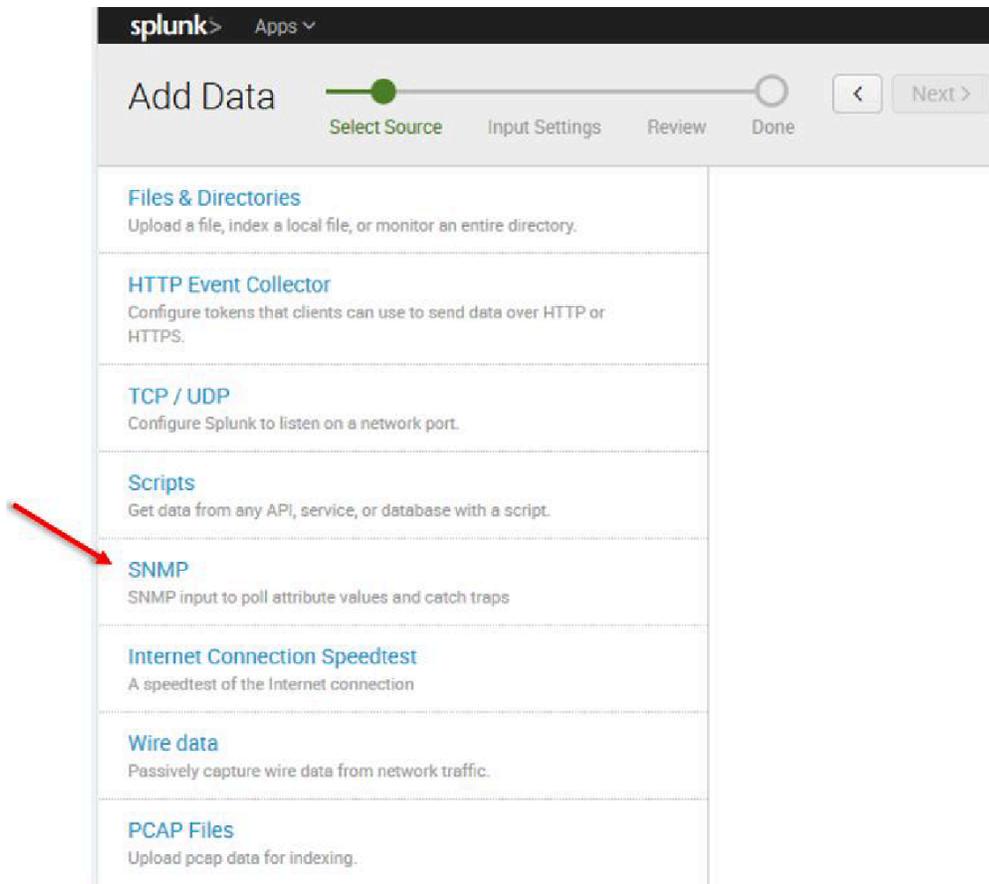
Getting Started

Browse to Splunkbase and download the SNMP Modular Input from <https://splunkbase.splunk.com/app/1537/>.

To install, simply untar the file to `SPLUNK_HOME/etc/apps` and restart Splunk.

Configuration

Login to the Splunk WebUI and go to Manager > Add Data > Monitor > SNMP > New, and set up your input data.



splunk > Apps > Administrator > Messages > Settings > Activity > Help

Add Data Progress: Select Source (100%) Done < Next >

Files & Directories
Upload a file, index a local file, or monitor an entire directory.

HTTP Event Collector
Configure tokens that clients can use to send data over HTTP or HTTPS.

TCP / UDP
Configure Splunk to listen on a network port.

Scripts
Get data from any API, service, or database with a script.

SNMP >
SNMP input to poll attribute values and catch traps.

Internet Connection Speedtest
A speedtest of the Internet connection.

Wire data
Passively capture wire data from network traffic.

PCAP Files
Upload pcap data for indexing.

Response Handler arguments string, key=value,key2=value2

SNMP Attribute polling settings

Destination:
IP or hostname of the device you would like to query, or a comma delimited list

Port:
The SNMP port. Defaults to 161

Object Names List:
1 or more Objects Names, comma delimited, in either textual(iso.org.dod.internet.mgmt.mib-2.system.sysDescr.0) or numerical(1.3.6.1.2.1.1.3.0) format

Interval:
How often to run the SNMP query (in seconds). Defaults to 60 seconds

Perform GET BULK:
Whether or not to perform an SNMP GET BULK operation. This will retrieve all the object attributes in the sub tree of the declared OIDs. Be aware of potential performance issues, http://www.net-snmp.org/wiki/index.php/GETBULK. Defaults to false.

Perform GET SUBTREE:
Whether or not to perform an SNMP GET SUBTREE operation. This will retrieve all the object attributes in the sub tree of the declared OIDs. Be aware of potential performance issues, http://www.net-snmp.org/wiki/index.php/GETNEXT. Defaults to false.

Split Bulk Results:
Whether or not to split up bulk output into individual events. Defaults to false.

Non Repeaters (for GET BULK):
The number of objects that are only expected to return a single GETNEXT instance, not multiple instances. Managers frequently request the value of sysUpTime and only want that instance plus a list of other objects. Defaults to 0.

Max Repetitions (for GET BULK):
The number of objects that should be returned for all the repeating OIDs. Agent's must truncate the list to something shorter if it won't fit within the max-message size supported by the command generator or the agent. Defaults to 25.

Source type
Set sourcetype field for all events from this source.

Set sourcetype:

Select source type from list:

Splunk classifies all common data types automatically, but if you're looking for something specific, you can find more source types in the Splunkbase apps browser or online at www.splunkbase.com.

More settings

Host

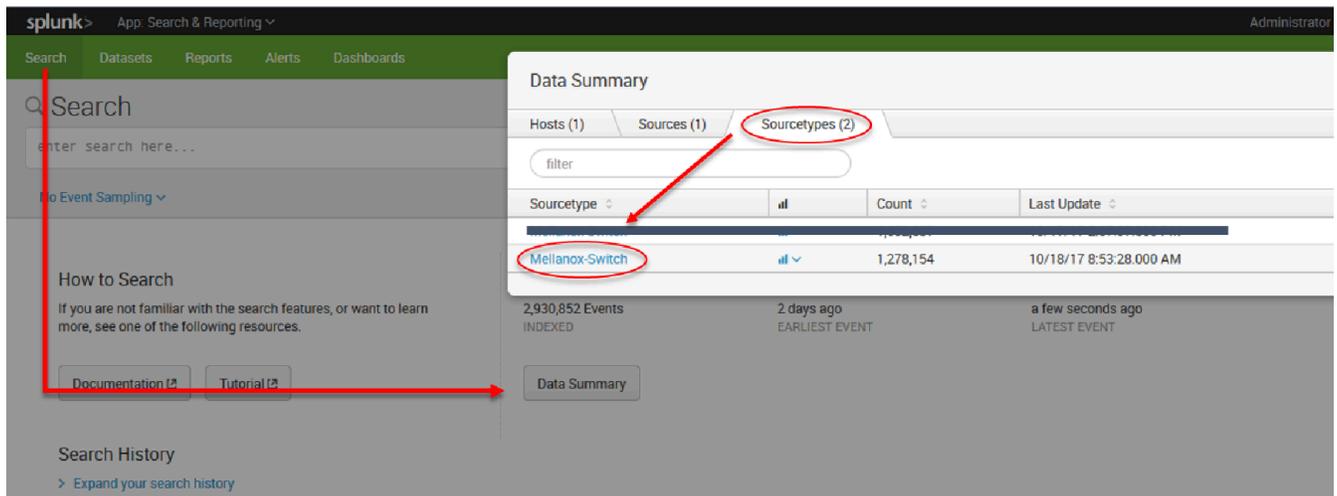
Host field value:

Index

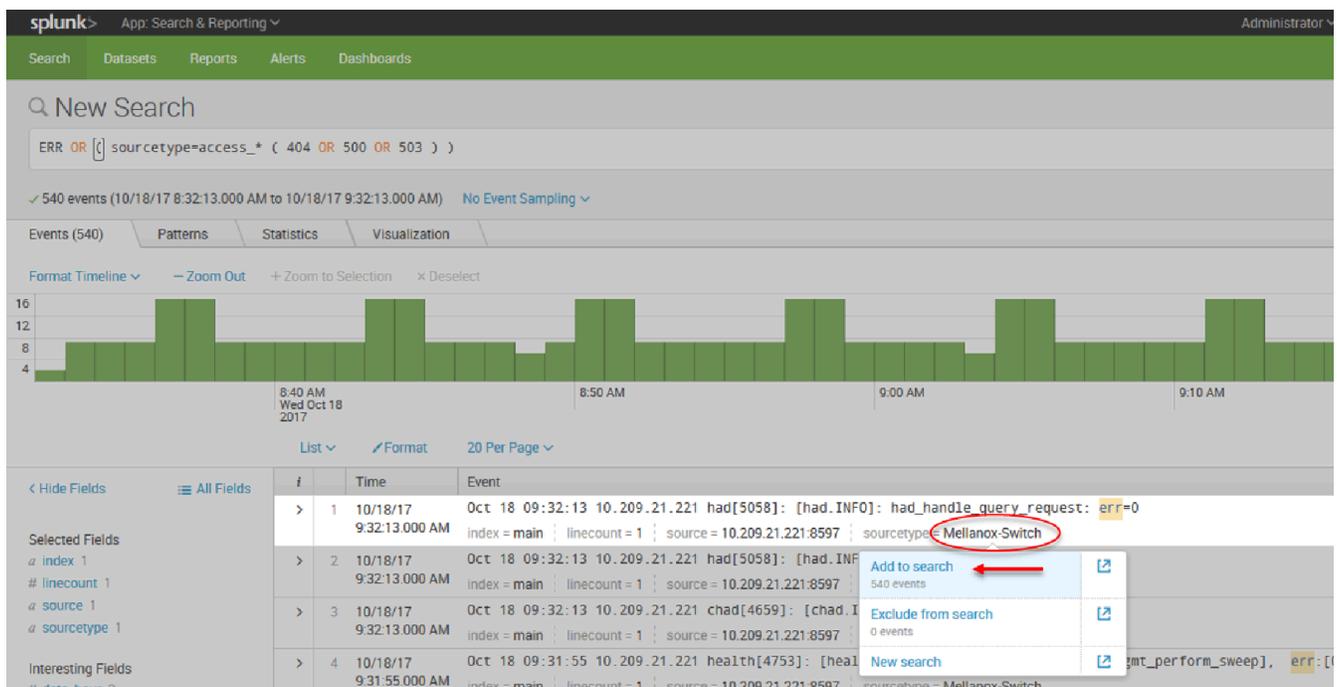
Set the destination index for this source.

Index:

13. After configuration is complete it is recommend to run MellanoX-Switch again: Search > Data Summary > Sourcetypes > MellanoX-Switch.



14. Select “Mellanox-Switch” and “Add to search”.



15. You can add to search any value that is relevant for you.



nat 20 Per Page ▾

Event	
Oct 18 09:01:31 10.209.21.221	dhclient[4508]: dhc6: send_packet6() sent -1 of 151 bytes host = 10.209.21.221 linecount = 1 source = 10.209.21.221:8597 sourcetype = Mellanox-Switch
Oct 18 09:01:31 10.209.21.221	dhclient[4508]: send_packet6: Network is unreachable host = 10.209.21.221 linecount = 1 source = 10.209.21.221:8597 sourcetype = Mellanox-Switch
Oct 18 09:01:31 10.209.21.221	dhclient[4508]: XMT: Solicit on mgmt1, interval 109220ms. host = 10.209.21.221 linecount = 1 source = 10.209.21.221:8597 sourcetype = Mellanox-Switch
Oct 18 09:01:31 10.209.21.221	arpd[4965]: TID 140429637707520: [arpd.INFO]: linux_ifindex: 4 host = 10.209.21.221 linecount = 1 source = 10.209.21.221:8597 sourcetype = Mellanox-Switch

Note

Patterns can be viewed not on real time and you can create alert on most repeatable events.

APPENDIX—Show Commands Not Supported By JSON API

Configuration Management
show configuration text files *
show files debug-dump *
show files stats *
Logging
show log
show log continuous
show log continuous matching *
show log continuous not matching *
show log debug
show log debug continuous
show log debug continuous matching *
show log debug continuous not matching *
show log debug files
show log debug files *
show log debug files * matching *
show log debug files * not matching *
show log debug matching *
show log debug not matching *
show log files
show log files *

Configuration Management
show log files * matching *
show log files * not matching *
show log matching *
show log not matching *
Scheduled Jobs
show jobs
show jobs *
Subnet Manager (SM)
show ib sm log
show ib sm log continuous
show ib sm log continuous matching *
show ib sm log continuous not matching *
show ib sm log matching *
show ib sm log not matching *
User Management and Security
show users history
show users history username *
User Interfaces
show cli
show cli max-sessions
show cli num-sessions
show terminal

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