



Purpose

This document describes how to configure Nagios XI to receive and process SNMP traps from external devices. Monitoring SNMP traps allows system administrators to receive real-time events and network incidents to ensure an accurate and healthy monitoring environment.

Target Audience

This document is intended for use by Nagios administrators looking to integrate SNMP traps into their monitoring configuration to gain greater insight into their IT infrastructure.

Nagios XI Trap Interface (NXTI)

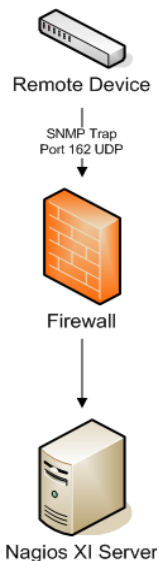
NXTI was introduced with Nagios XI 5.5 and is enabled with the Enterprise edition license of Nagios XI. It provides an easier way of configuring and managing traps through the Nagios XI web interface. It is recommended to use NXTI if you have the Enterprise edition license. Please refer to the [SNMP Traps With NXTI](#) documentation for detailed information. If you do not have the Enterprise edition license then this documentation will show you how to integrate traps with Nagios XI.

Intermediary Firewalls

Before you can configure remote devices to send SNMP traps to Nagios XI you will have to configure any intermediary firewalls between the Nagios XI server and the remote device to allow inbound SNMP traps to be sent to Nagios XI. This involves allowing **UDP port 162** traffic from remote devices to the Nagios XI server.

Remember that unlike with most checks, Nagios XI is the server (rather than the client) for SNMP traps, so the packet flow is inbound to the Nagios XI machine.

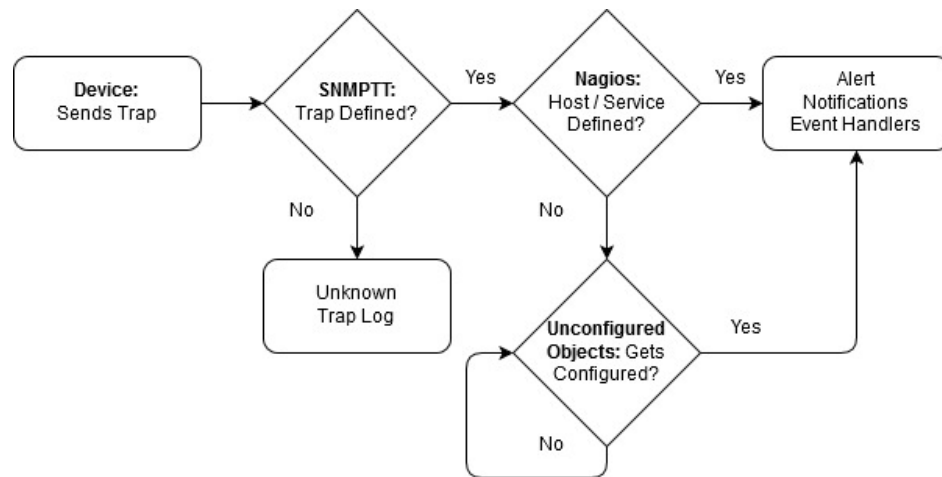
Nagios XI is automatically configured with a firewall rule to allow UDP port 162 inbound, there is no addition configuration required on your Nagios XI server.



SNMP Trap Translator (SNMPTT)

SNMPTT is what processes the received traps and decides if they should be sent to Nagios XI. This documentation will briefly explain how SNMPTT works and how it can be configured.

A flowchart diagram will help explain this visually:



SNMPTT checks incoming traps against existing trap definitions. If the incoming trap matches an incoming definition, the trap is passed to Nagios XI, where the trap receives standard Nagios treatment:

- Event is logged
- Alert is generated
- Notifications / Event Handlers (or both) occur.
- If the incoming trap does not match an incoming definition, the trap is sent to the Unknown Trap Log
 - Unconfigured Objects are handled with the [SNMP Trap Wizard](#)

Defining Traps

Trap definitions can be created in two ways.

- Created from a MIB you upload to Nagios XI
 - Explained in the [Installing MIBs](#) section
- In a case where either no MIB exists, or the existing MIB does not define a required trap, you can define the trap in the `/etc/snmp/snmpd.conf` file
- This is also how you can define custom/complex trap definitions
 - Explained in the [Defining Traps In snmpd.conf](#) section

Installing MIBs

If the remote device you are sending traps from has a MIB file, you can upload this MIB file to configure `snmpd` on the Nagios XI server to understand these incoming traps. This can be done via **Admin > System Extensions > Manage MIBs**.

Click the **Browse** button to find the MIB to be added. Check the box **Process trap** and then click the **Upload MIB** button.

This will find any trap definitions in the MIB file and add them to the `/etc/snmp/snmpd.conf` file, they will be added as an **EVENT** to this file. The MIB will also be copied into the `/usr/share/snmp/mibs/` directory. If you had previously uploaded a MIB file but did not select the Process trap check box you can run the following command in a terminal session:

```
addmib <PathToNewMIB>
```

For example:

```
addmib /usr/share/snmp/mibs/NAGIOS-NOTIFY-MIB.txt
```

Defining Traps In `snmpd.conf`

Trap definitions are defined in the `/etc/snmp/snmpd.conf` file, they always start with **EVENT** line are followed by a **FORMAT** line and an **EXEC** line. There are other lines that will exist but are not mandatory. For example anything between **SDESC** and **EDESC** is purely comment information and is not processed as part of the trap.

EVENT

This is the line that has the OID / MIB, if this is matched against the incoming trap then SNMPTT will action it by executing the **EXEC** line.

FORMAT

This allows you to define what is logged in the `/var/log/snmpd/snmpd.log` file when an `EVENT` is matched. If a received trap is NOT matched by `SNMPD` then it will be logged in the `/var/log/snmpd/snmpdunknown.log` file.

EXEC

This is the line that submits the received trap to Nagios XI. By default it will execute the `/usr/local/bin/snmptraphandling.py` script which will submit the check result to Nagios XI.

Here is an example (the `EXEC` line is wrapped over two lines):

```
EVENT linkDown .1.3.6.1.6.3.1.1.5.3 "Status Events" Critical
FORMAT Link down on interface $1. Admin state: $2. Operational state: $3
EXEC /usr/local/bin/snmptraphandling.py "$r" "SNMP Traps" "$s" "$@" "$-*" "Link
down on interface $1. Admin state: $2. Operational state: $3"
```

Very briefly:

The `EVENT` line will define this trap as **CRITICAL** when submitted to Nagios XI

The `EXEC` line will be targeting the service called **SNMP Traps** when submitted to Nagios XI

Note: If you find the `EXEC` line does not look like the examples above, please follow the steps in this KB article: [Nagios XI - Update Default snmpd.conf EVENT](#).

SNMPD Processing Behavior

It's important to note that `SNMPD` will compare a received trap against every `EVENT` in the `snmpd.conf` file. Multiple `EVENTS` with the same `OID / MIB` can exist and hence multiple `EXEC` statements can be executed. The key point being made here is that `SNMPD` does not stop looking through the `snmpd.conf` file once an `EVENT` is matched.

This behavior allows for more complicated `EVENTS` that have filters applied using `MATCH` lines. If you have two identical `EVENTS`, it's possible that you'll submit two traps to Nagios XI at the same time and the last trap received will overwrite the previous one. This is outside of the scope of this documentation however it is worth mentioning.

Send Test SNMP Trap

It's very easy to send a test trap to Nagios XI to demonstrate how traps are received by Nagios XI. In a terminal session execute the following command:

```
snmptrap -v 2c -c public 127.0.0.1 '' linkUp ifDescr s eth0 ifAdminStatus i 1 ifOperStatus i 1
```

Once you execute this command you'll see the following logged in the `/var/log/snmpd/snmpd.log` file:

```
Mon Nov 28 11:15:42 2016 .1.3.6.1.6.3.1.1.5.4 Normal "Status Events" localhost
- Link up on interface eth0. Admin state: up. Operational state: up
```

You'll also see the following logged in the `/usr/local/nagios/var/nagios.log` file:

```
[1480298939] Warning: Passive check result was received for service 'SNMP
Traps' on host 'localhost', but the service could not be found!
[1480298939] Error: External command failed ->
PROCESS_SERVICE_CHECK_RESULT;localhost;SNMP Traps;0;Link up on interface eth0.
Admin state: up. Operational state: up / ifDescr (OCTETSTR):eth0
ifAdminStatus (INTEGER):up ifOperStatus (INTEGER):up
```

Nagios XI has now received the SNMP Trap however as you can see from the message above it is reporting that the `SNMP Traps` service could not be found. The next step will show you how to use the SNMP Trap wizard to create this service in Nagios XI.

Using The SNMP Trap Wizard

Each host or device that you wish to receive and process SNMP traps for must have a corresponding SNMP Traps service defined in Nagios XI. Nagios XI has a built-in wizard that makes the configuration of these SNMP trap events quick and simple. Navigate via the top menu bar to **Configure > Run a configuring wizard** and select the **SNMP Trap** wizard. In the following screenshot you can see how the search field allows you to quickly find a wizard.

The screenshot shows the Nagios XI interface. The top navigation bar includes 'Home', 'Views', 'Dashboards', 'Reports', 'Configure' (circled in blue), 'Tools', 'Help', and 'Admin'. The left sidebar has a 'Configure' section with 'Configuration Wizards' circled in blue. The main content area is titled 'Configuration Wizards - Select a Wizard'. It features a search bar with 'SNMP Trap' entered and a 'Get More Wizards' button. A search result is displayed in a box: 'SNMP TRAP Monitor SNMP Traps.'

The first screen says **This wizard allows you to enable SNMP Traps for existing hosts that are being monitored.** Click **Next** to continue.

The wizard will then ask you which host you wish to add an SNMP trap service.

When you have selected all the hosts you want click **Next**.

Complete the wizard by choosing the required options in Step 3 – Step 5. To finish up, click on **Finish** in the final step of the wizard. This will create the new service called **SNMP Traps** and will be waiting to receive a trap.

Once the wizard applies the configuration, click the **View status details for localhost** link to see the new service that was created.

The screenshot shows the 'Configuration Wizard: SNMP Trap - Step 2' page. The title is 'Configuration Wizard: SNMP Trap - Step 2'. Below the title is the 'SNMP Trap Details' section. It asks to 'Select the hosts you would like to enable SNMP Traps for.' There are two options: 'Host Name' (unchecked) and 'localhost' (checked). At the bottom are 'Back' and 'Next' buttons.

| Host | Service | Status | Duration | Attempt | Last Check | Status Information |
|-----------|------------|--------|----------|---------|---------------------|---------------------|
| localhost | SNMP Traps | Ok | 37s | 1/1 | 2016-11-28 13:37:14 | Waiting for trap... |

Send Test SNMP Trap

By sending a test trap you'll be able to see how it's received in XI. In a terminal session execute the following command:

```
snmptrap -v 2c -c public 127.0.0.1 '' linkUp ifDescr s eth0 ifAdminStatus i 1 ifOperStatus i 1
```

Once you execute this command, you'll see the service update as follows:

| Host | Service | Status | Duration | Attempt | Last Check | Status Information |
|-----------|------------|--------|----------|---------|---------------------|--|
| localhost | SNMP Traps | Ok | 33s | 1/1 | 2016-11-28 13:44:32 | Link up on interface eth0. Admin state: up. Operational state: up / ifDescr (OCTETSTR):eth0 ifAdminStatus (INTEGER):up ifOperStatus (INTEGER):up |

Being a linkUp trap the service was submitted with an OK status. This is because the `EVENT` line ends with `Normal` (OK in Nagios XI) and the `EXEC` line sends the Normal state with the `"$s"` variable:

```
EVENT linkUp .1.3.6.1.6.3.1.1.5.4 "Status Events" Normal
FORMAT Link up on interface $1. Admin state: $2. Operational state: $3
EXEC /usr/local/bin/snmptraphandling.py "$r" "SNMP Traps" "$s" "$@" "$-*"
"Link up on interface $1. Admin state: $2. Operational state: $3"
```

Now send a test trap for a linkDown and you'll be able to see how it's received in XI. In a terminal session execute the following command:

```
snmptrap -v 2c -c public 127.0.0.1 '' linkDown ifDescr s eth0 ifAdminStatus i 2 ifOperStatus i 2
```

Once you execute this command, you'll see the service update as follows:

| Host | Service | Status | Duration | Attempt | Last Check | Status Information |
|-----------|------------|----------|----------|---------|---------------------|--|
| localhost | SNMP Traps | Critical | 5s | 1/1 | 2016-11-28 13:54:50 | Link down on interface eth0. Admin state: down. Operational state: down / ifDescr (OCTETSTR):eth0 ifAdminStatus (INTEGER):down ifOperStatus (INTEGER):down |

Being a linkDown trap the service was submitted with a CRITICAL status. This is because the `EVENT` line ends with `Critical` and the `EXEC` line sends the CRITICAL state with the `"$s"` variable:

```
EVENT linkDown .1.3.6.1.6.3.1.1.5.3 "Status Events" Critical
FORMAT Link down on interface $1. Admin state: $2. Operational state: $3
EXEC /usr/local/bin/snmptraphandling.py "$r" "SNMP Traps" "$s" "$@" "$-*"
"Link down on interface $1. Admin state: $2. Operational state: $3"
```

The SNMP Traps service will stay in a CRITICAL state until the next trap is received.

SNMP Traps Are Passive

An important point to stress with SNMP traps is that they are asynchronous events that can occur at any time, in Nagios XI this is what is called a **PASSIVE** check/service. This means that they are not actively checked by Nagios XI on a regular schedule, Nagios XI is waiting for a SNMP Trap to be received from the remote device. A comparison between an active check and a passive check helps explain the difference between **ACTIVE** and **PASSIVE** checks:

Scenario: UPS device loses input power and is running on batteries.

- With an **ACTIVE** check, if Nagios XI was checking the device on a 5 minute interval then it might be up to 5 minutes before Nagios XI is aware that the device is on batteries.

- With a **PASSIVE** check, the device immediately sends an SNMP Trap to Nagios XI when it is running on batteries.

More detailed information on passive service can be found in the following documentation:

[Configuring Passive Services With Nagios XI](#)

SNMP v2 vs SNMP v3

SNMP traps can be received using v2 or v3 of the protocol. By default the Nagios XI server will accept inbound SNMP v2 traps from any device. Security for accepting SNMP v2 traps is explained in the following KB article:

[Nagios XI - SNMP Trap Hardening](#)

Nagios XI needs to be configured before it can accept SNMP v3 traps, this is detailed in the following KB article:

[Nagios XI - SNMP Trap v3 Configuration](#)

Troubleshooting

SNMP traps can get very complicated and generally require some knowledge and troubleshooting to get working just the way you want. Here is an outline of a general troubleshooting for SNMP traps. Please note that if you are attempting to use this troubleshooting guide without using the above install script, your battle will be uphill as the script enables various aspects of **SNMPTT** that is used exhaustively.

First thing that is helpful is a separate server that we can send test traps from, this can also be done from the Nagios XI server although it will not validate any firewall rules that may be in place. Sending a test trap using the `snmptrap` command used in the previous examples will send a valid trap to the Nagios XI server.

Execute the following command to send a test trap (it is one long command wrapped over two lines):

```
snmptrap -v 2c -c public <NAGIOS XI SERVER IP> '  
netSnmpExampleHeartbeatNotification netSnmpExampleHeartbeatRate i 123456
```

This will send an SNMP trap to your Nagios XI server. Remember to replace **<NAGIOS XI SERVER IP>** with the IP address of your Nagios XI server.

Now that you've sent the test trap, you should check a few things to make sure its all working. The specific trap that was sent DOES NOT exist in the `snmpd.conf` file, hence it will be logged in the file:

```
/var/log/snmpd/snmpdunknown.log
```

There should be logs of your test SNMP trap here (at the bottom of the file). If there is not, make sure that there is not some intermediary firewall in the way. Check to make sure your Nagios XI server firewall rules allow UDP port 162 inbound. Do not progress past this point until you are able to get this test trap. The following KB articles provide more detailed troubleshooting steps:

[SNMP Trap - Inbound UDP Traffic](#)

[SNMP Trap - Firewall Rules](#)

If you are able to receive a trap, you are ready to start capturing real SNMP traps. Monitor

`/var/log/snmpd/snmpd.log` for SNMP traps that are coming in. Also make sure that traps are not getting relegated to unknown status by keeping an eye on `snmpdunknown.log`.

If you are seeing traps in your `/var/log/snmpd/snmpd.log` but cannot locate them within your Nagios XI system, it may be that you have not set up your SNMP Traps service for the remote host sending the traps. Nagios XI is receiving these traps however is discarding the results as there is no service defined for the host that the trap belong to.

Nagios XI has a section called **Unconfigured Objects** which allows you to see the passive checks that have been received by Nagios XI, but no object exists for them. Navigate within the XI web-interface to **Admin > Monitoring Config > Unconfigured Objects**. You can either set up the **SNMP Traps** service using the SNMP Traps wizard (demonstrated above) OR by clicking on the blue triangle under actions which runs the **Unconfigured Passive Object** wizard. Further information on the **Unconfigured Passive Object** wizard can be found in the following documentation:

[Monitoring Unconfigured Objects With XI](#)

The following KB articles may also help with your troubleshooting:

[SNMP Trap - snmptrapd Service](#)

[SNMP Trap - snmpttt Service](#)

Further Reading

For those with the Enterprise Edition license please refer to the following documentation:

[SNMP Traps With NXTI](#)

More detailed examples for sending test SNMP Traps can be found in the following KB article:

[SNMP Trap - How To Send A Test Trap](#)

The following tutorial goes into extensive detail to explain how SNMP Traps work in Nagios XI and explain how to setup a test environment:

[Nagios XI - SNMP Trap Tutorial](#)

If you are having difficulties with SNMP Traps and IPv6 please read the following KB article:

[Nagios XI - Receiving IPv6 SNMP Traps](#)

Information on the variables in SNMP Traps:

[SNMP Traps - Understanding Trap Variables](#)

Standard Handler vs Embedded Handler:

[SNMP Traps - Standard Handler vs Embedded Handler](#)

SNMPTT documentation including the format of the snmptt.conf file:

<http://snmptt.sourceforge.net/docs/snmptt.shtml>

For more information on OIDs and what a given number is for, see <http://www.oid-info.com/>. You are encouraged to submit descriptions for any OIDs you know that are not in the repository yet. Not all event names will be as obvious as linkDown, so you may need to do some research to figure out what to use in your configuration. The MIBs you use may come with documentation that describes what event names can be used.

Finishing Up

This completes the documentation on integrating SNMP Traps with Nagios XI.

If you have additional questions or other support related questions, please visit us at our Nagios Support Forums:

<https://support.nagios.com/forum>

The Nagios Support Knowledgebase is also a great support resource:

<https://support.nagios.com/kb>