


# Quick Introduction to OpenNMS

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# History

- OpenNMS was started in the Summer of 1999
- First Code Contributed to Sourceforge on 30 March 2000
- Maintained by Oculan until May, 2002
- Maintained by the OpenNMS Group since September, 2004

A decorative graphic on the left side of the slide, consisting of a network of blue dots connected by dashed lines, forming a mesh-like structure.

OpenNMS is the **world's first**  
**enterprise-grade** network  
management **application**  
**platform** developed under  
the **open source** model.



# world's first

- NetSaint 2000-01-10 1323
- OpenNMS 2000-03-30 4141
- Zabbix 2001-03-23 23494
- Nagios 2001-05-03 26589
- RRDTool 2003-01-13 71544
- Groundwork 2006-02-21 160654
- ZenOSS 2006-03-20 163126
- Hyperic 2006-07-17 172556



# enterprise-grade

OpenNMS was designed from Day One to monitor tens if not hundreds of thousands of devices. Current work is focused on removing those constraints to allow for millions of devices and billions of metrics.

That scalability comes in a number of forms:

- Discrete devices (hundreds of thousands)
- Performance metrics (millions)
- Events per second (thousands)
- Remote monitors (thousands)



# application platform

While OpenNMS works “out of the box”, it really starts to shine when you customize it. It is highly configurable and offers a myriad of ways to integrate with other systems.

- Full-featured ReST Interface for both configuration and queries, forms the basis for OpenNMS Compass
- Device and event information stored in a database
- Notification system can execute arbitrary commands
- Built-in integration includes
  - RANCID configuration management
  - DNS for provisioning
  - Trouble Ticketing API (RT, Jira, OTRS, Remedy, etc.)




# open source

Fully 100% of the OpenNMS source code is available under an Open Source license (as defined by the Open Source Initiative).

The main application is published under the AGPLv3, with various subsystems such as Newts published under more permissive licenses such as the Apache License.

# It's the Community



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**OpenNMS |**

<https://www.opennms.org/>

OpenNMS is a carrier-grade, highly integrated, open source platform designed for building network monitoring solutions. There are two distributions of ...

[The OpenNMS Demo](#) · [Docs](#) · [Flavors](#) · [Releases](#)

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[blog.captterra.com/top-open-source-free-network-monitoring-software/](http://blog.captterra.com/top-open-source-free-network-monitoring-software/)

May 24, 2017 - Interested in open source or free network monitoring software? Check out our list of the top five OS and free network monitoring solutions.



# The Four Main Areas of OpenNMS

- **Event and Notification Management**: Generate, receive, enhance, reduce and correlate various network alerts and feed them to a robust notification system.
- **Provisioning**: Both Automated Discovery and Directed Discovery.
- **Service Assurance**: Is a particular network service reachable and available?
- **Performance Data Collection**: Gather numeric data from across the network for display, trending and thresholding

# Event and Notification Management

- OpenNMS can receive events from various sources: SNMP, syslog, TL/1, custom events
- Events can be exported to Elasticsearch
- Events can be enhanced to include external information
- Events can create notifications
- Events can be turned into alarms
  - Alarms can be reduced to remove duplicates
  - Correlation can be performed via automations or Drools rules
- Alarms can be integrated with Trouble Ticketing systems

# Event Translator

6982188	Normal ⊕ ⊖	Aug 24, 2017 3:04:02 PM 📄 📄	apxn01.internal.opennms.com	172.20.1.1 ⊕ ⊖
		<a href="#">uei.opennms.org/translator/traps/SNMP_Link_Up</a> ⊕ ⊖ <a href="#">Edit notifications for event</a>		
		Agent Interface Up (linkUp Trap) on interface index:517; ifDescr:ge-0/0/2; ifName:ge-0/0/2; IfAlias:VPN01		
6982187	Minor ⊕ ⊖	Aug 24, 2017 3:03:56 PM 📄 📄	apxn01.internal.opennms.com	172.20.1.1 ⊕ ⊖
		<a href="#">uei.opennms.org/translator/traps/SNMP_Link_Down</a> ⊕ ⊖ <a href="#">Edit notifications for event</a>		
		Agent Interface Down (linkDown Trap) on interface index:517; ifDescr: ge-0/0/2; ifName:ge-0/0/2; ifAlias:VPN01		

# Notifications

- Events can create notifications, a “poor man’s trouble ticket”
- A number of actions can be performed, such as:
  - Send an e-mail
  - Send an SMS
  - Contact via PagerDuty
- Notifications can be escalated
- Any command that can be run from the OpenNMS server can be used in notifications.

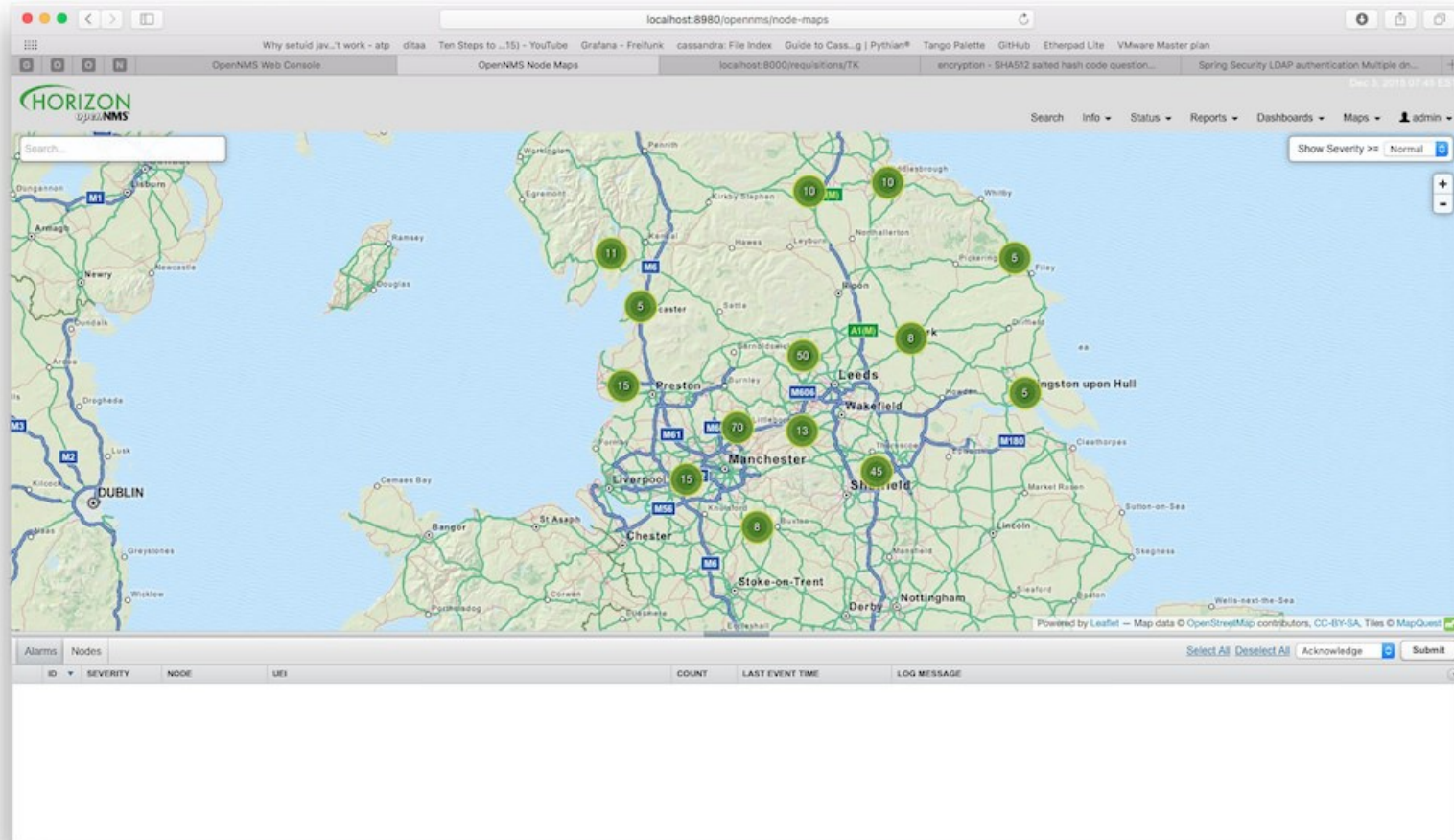
# Alarms

- Events are like logs, alarms are used for workflow
- Alarms can reduce multiple similar events into one alarm
- Automations can act on alarms to escalate or clear them
- Complex business rules implemented using Drools
- Alarms can have “sticky” and “journal” notes
- There is an API to interface with common Trouble Ticketing software such as Remedy, RT, OTRS and Jira.

# Provisioning

- OpenNMS can automatically scan your network for devices
- For large networks, this can be impractical
- The provisioning system provides several ways to add devices:
  - WebUI
  - XML file import
  - ReST API
- Multi-threaded discovery processes handles large devices

# Geographical Map

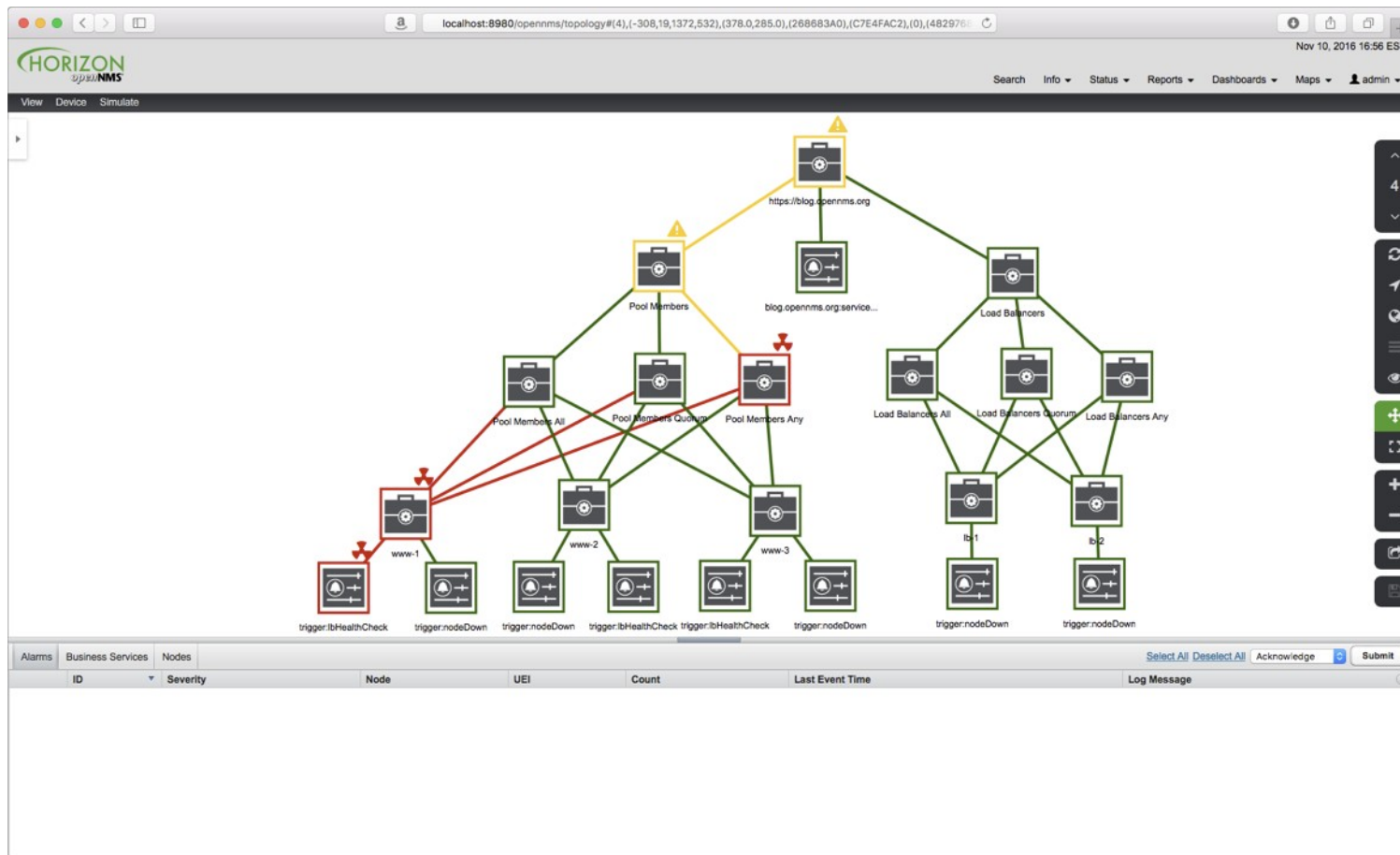


# Service Assurance

- OpenNMS performs synthetic transactions to test the availability of services
- Built-in monitors range in complexity from the ICMP and TCP monitors up to the Page Sequence and Selenium Monitors
- There is a unique “downtime model” to manage transient errors
- Services that can’t be actively polled can be monitored via the Passive Status Keeper
- The Remote Poller tests services from the point of view of remote locations
- You can create service hierarchies to manage business services



# Business Service Monitor

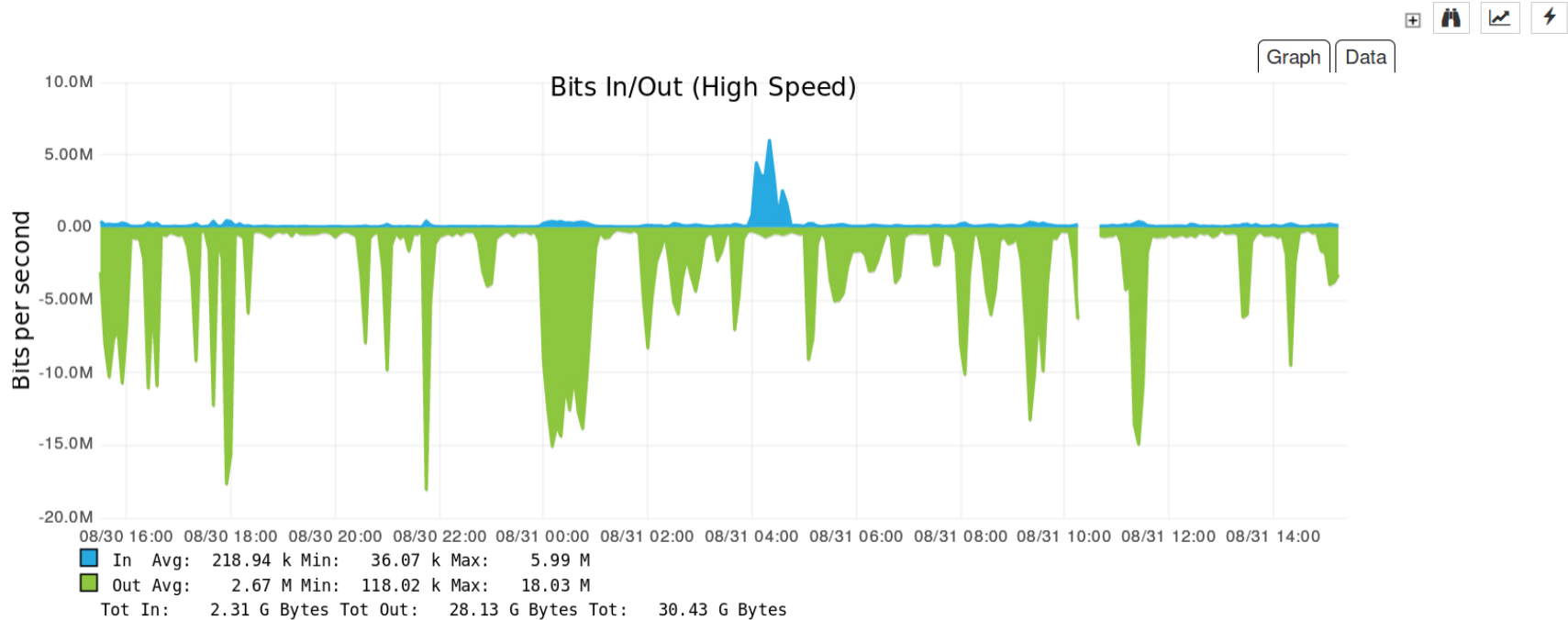


# Data Collection

- OpenNMS can collect data from numerous sources, such as SNMP, HTTP, XML, JSON, JDBC, vSphere etc.
- The data can be stored, graphed, checked for thresholds and trends can be calculated
- Virtually unlimited scale using storage via Newts running on Cassandra or ScyllaDB
- Integration with external tools such as Graphite and Grafana

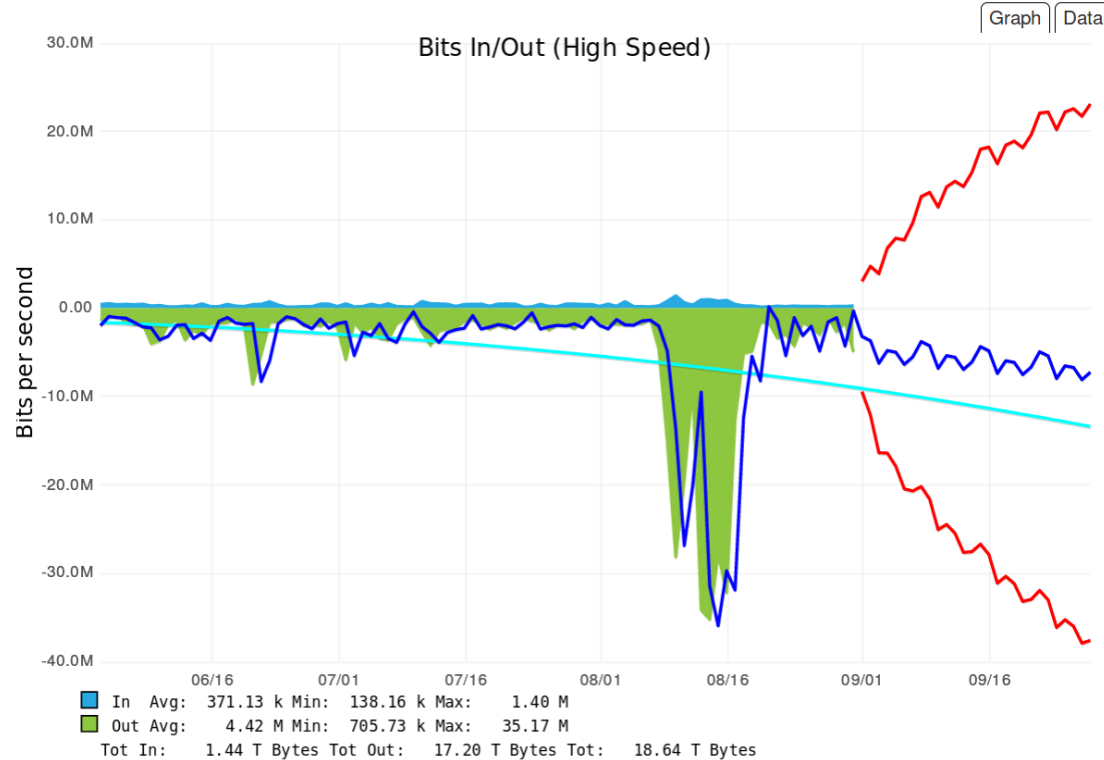
# SNMP Data Collection

Node: kyle.internal.opennms.com  
SNMP Interface Data: em2 (66.57.83.98, 1 Gbps)



# Trending with R

Forecasting mib2.HCbits on node[OpenNMS+Servers%3A1487000579003].interfaceSnm[em2-90b11c444204]



Select the metric to forecast:

Out

Select a template:

31 day forecast

Choose from one of the available forecasting templates, or configure your own options.

Reset

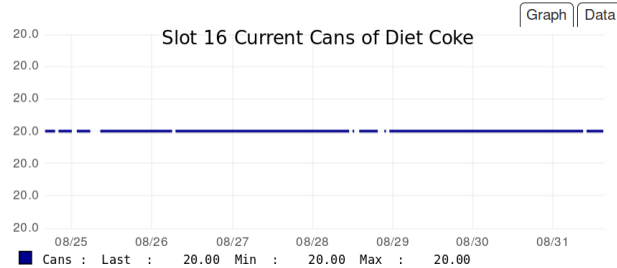
Forecast

# HTTP Data Collection



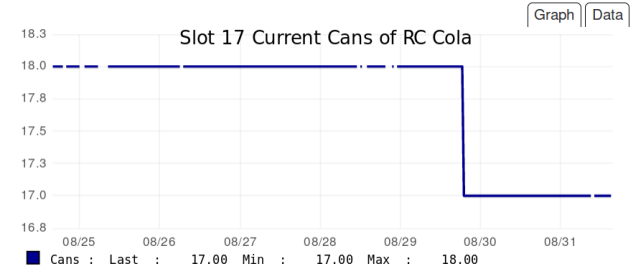
OpenNMS Drink Machine Slot 16  
From: Thu Aug 24 15:16:59 EDT 2017  
To: Thu Aug 31 15:16:59 EDT 2017

Node: [ike.internal.opennms.com](http://ike.internal.opennms.com)  
SNMP Node Data: [Node-level Performance Data](#) [Detail](#)



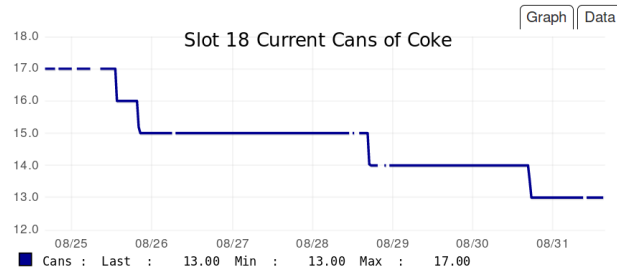
OpenNMS Drink Machine Slot 17  
From: Thu Aug 24 15:16:59 EDT 2017  
To: Thu Aug 31 15:16:59 EDT 2017

Node: [ike.internal.opennms.com](http://ike.internal.opennms.com)  
SNMP Node Data: [Node-level Performance Data](#) [Detail](#)



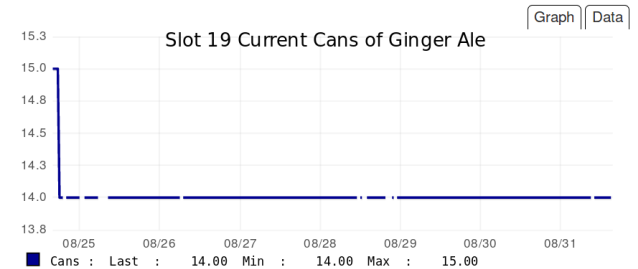
OpenNMS Drink Machine Slot 18  
From: Thu Aug 24 15:16:59 EDT 2017  
To: Thu Aug 31 15:16:59 EDT 2017

Node: [ike.internal.opennms.com](http://ike.internal.opennms.com)  
SNMP Node Data: [Node-level Performance Data](#) [Detail](#)

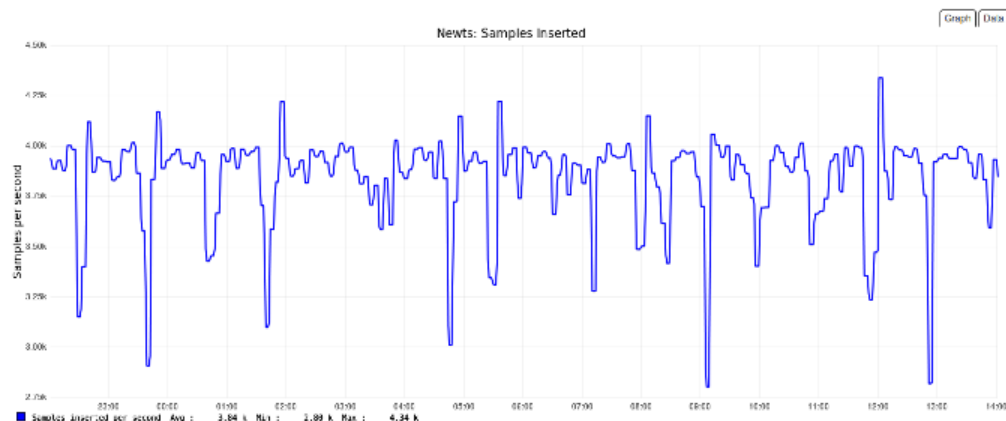


OpenNMS Drink Machine Slot 19  
From: Thu Aug 24 15:16:59 EDT 2017  
To: Thu Aug 31 15:16:59 EDT 2017

Node: [ike.internal.opennms.com](http://ike.internal.opennms.com)  
SNMP Node Data: [Node-level Performance Data](#) [Detail](#)



# Newts



```
org.opennms.newts.stress.InsertDispatcher.samples
```

```
count = 10512100
```

```
mean rate = 51989.68 events/second
```

```
1-minute rate = 51906.38 events/second
```

```
5-minute rate = 38806.02 events/second
```

```
15-minute rate = 31232.98 events/second
```

# Grafana



# The Goal

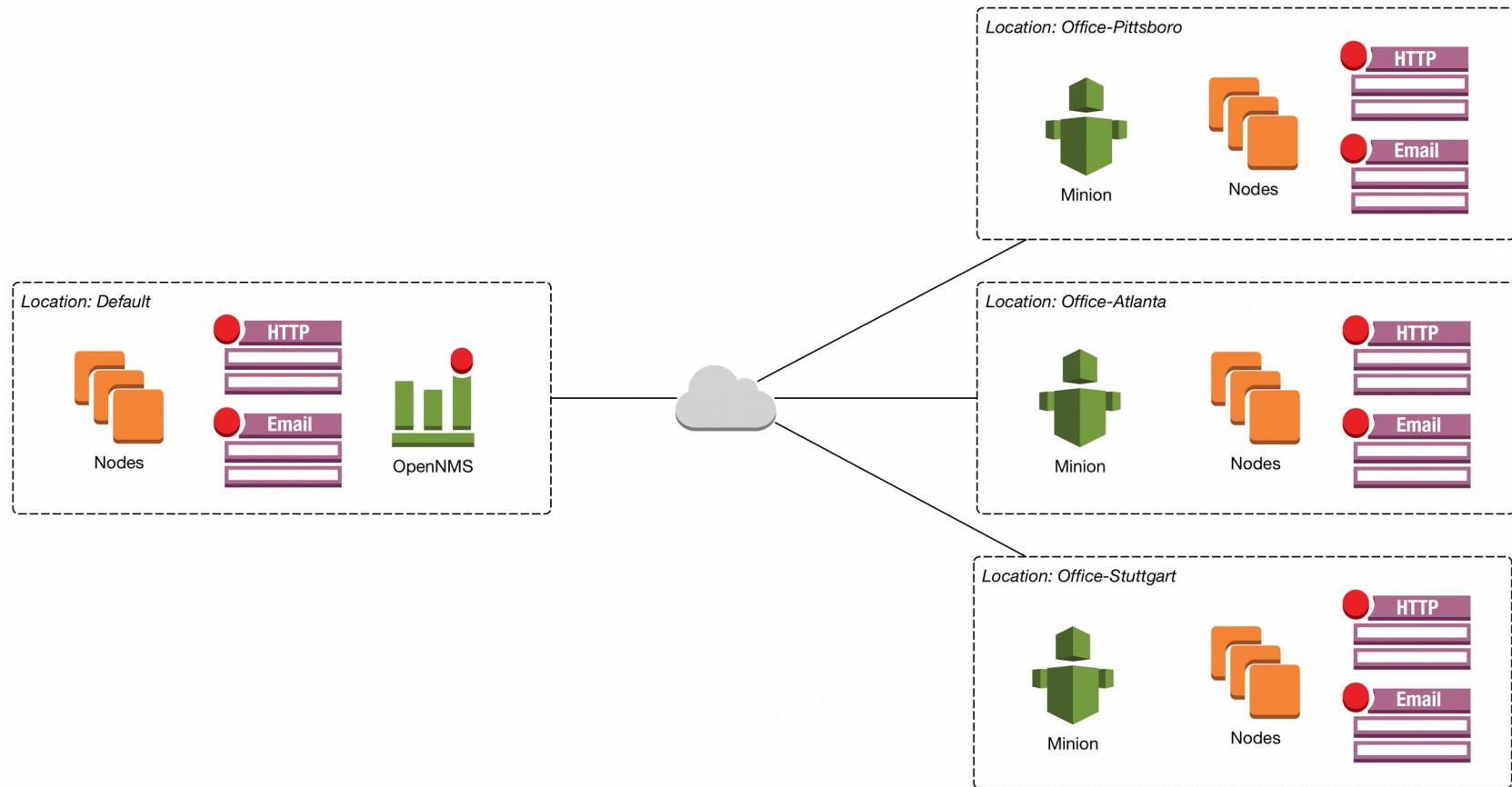
“Internet of Things” Scale

Millions of Devices

Billions of Metrics



# Minion



# Resources

## The OpenNMS Project:

- website: <https://www.opennms.org>
- wiki: <https://wiki.opennms.org>
- demo: <https://demo.opennms.org>
- documentations: <https://docs.opennms.org>
- chat: <https://chat.opennms.com>
- forum: <https://ask.opennms.eu>
- video: <https://www.youtube.com/user/opennms/>