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White Paper

Data Center Networking Automation with Blade Network Manager (BNM)

Executive Summary

While Supermicro SuperBlade® and MicroBlade™ solutions bring significant cost savings by optimizing key components of TCO (Total Cost of Ownership) for today's datacenters, with features such as free-air cooling, superb power efficiency and extraordinary node density, Supermicro Blade Network Manager (BNM) brings additional cost reductions.

BNM provides automation of network provisioning and a pragmatic framework to manage, orchestrate and monitor a network of thousands of Supermicro blade enclosures instead of a per-switch or per-enclosure approach.

- It is a web based software application with an intuitive graphical user interface;
- It provides a single pane of glass to monitor, manage and troubleshoot Supermicro blade switches;
- It provides automation and orchestration features for rapid network provisioning;
- It provides network monitoring and logging, delivering networking insight from analytic engine through a dashboard;
- It can accelerate the blade network deployment from hours or days to seconds or minutes ;
- It scales to support thousands of enclosures.

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Data Center Networking Challenges

While blade server systems provide unique cost savings on power, space, cooling, and cabling, blade switches are also more numerous in racks due to the high density of their compute nodes. For instance, there could be over 20 or more blade switches deployed in a single rack comprising nearly 200 blade servers. Provisioning the networking for thousands of blade switches could consume a significant amount of time and effort.

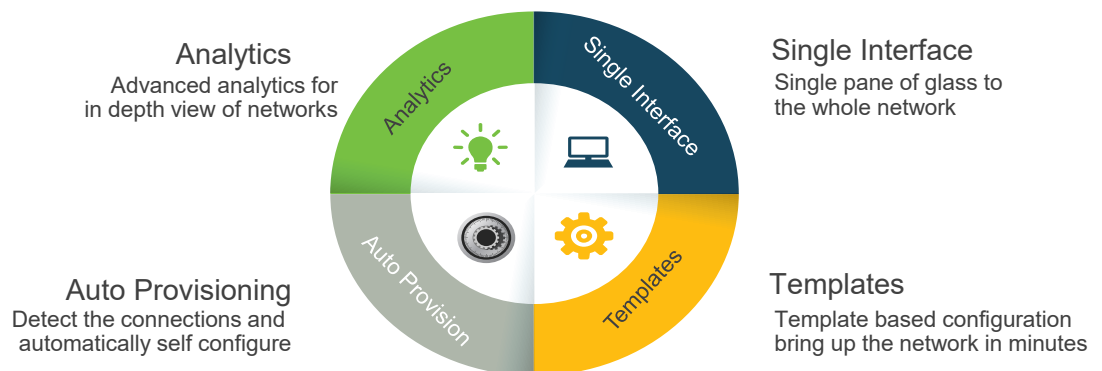
Besides the provisioning of networks for thousands of blade enclosures, managing and monitoring these on a daily basis will also take a significant amounts of IT resources. The process to troubleshoot problems can be difficult and prone to errors without the proper tools to provide access to and analysis of the information that is gathered.

Supermicro Blade Networking Manager (BNM) Overview

The Supermicro high performance, high density and energy efficient blade server solutions are enhanced by a user-friendly software utility for managing every aspect of networking configuration within each SuperBlade or MicroBlade enclosure and across multiple enclosures.

The new Supermicro Blade Network Manager (BNM) is a part of Supermicro's blade management software suite designed to reduce IT management overhead and manual networking configuration errors within a SuperBlade or MicroBlade enclosure.

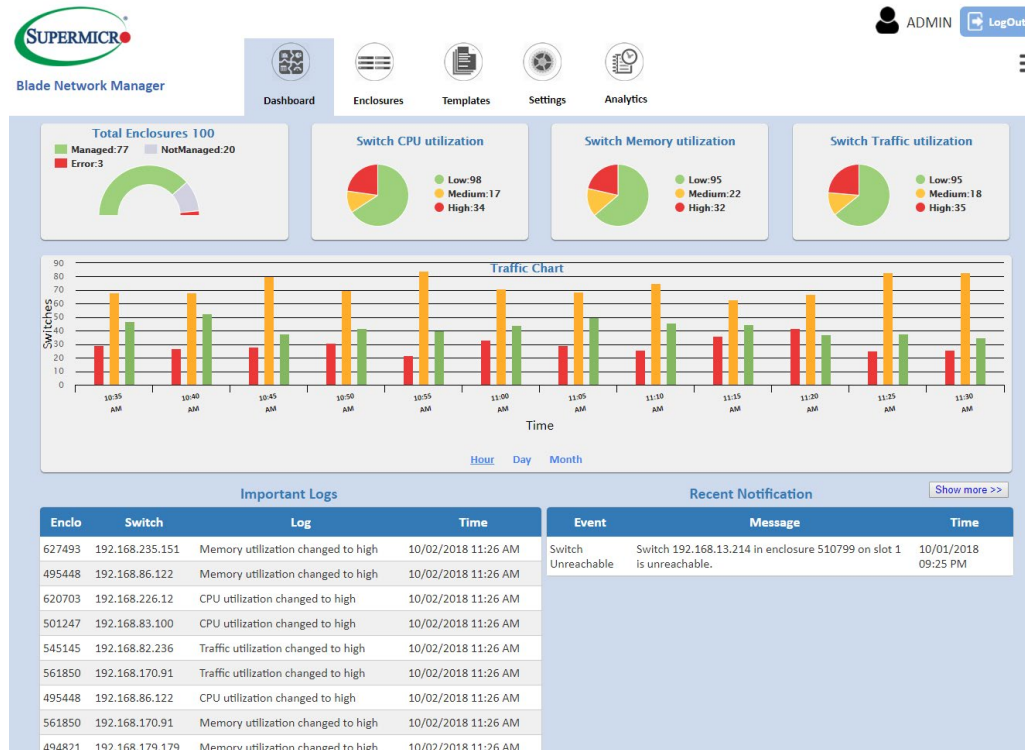
BNM offers a single pane of glass to monitor and manage the networking configurations across multiple SuperBlade and MicroBlade enclosures in a data center environment. BNM provides an overview of the networking topology for each blade server and helps to easily manage the Ethernet Blade switches and to diagnose networking configuration issues.



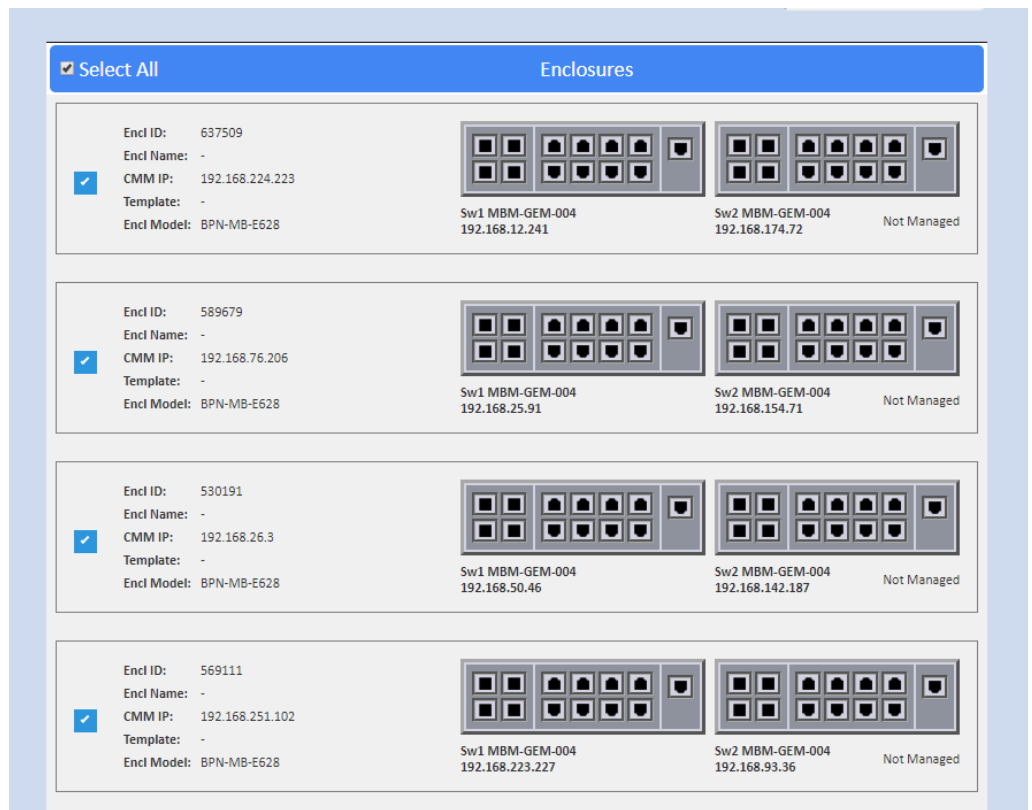
BNM Use Case 1: Configuration Templates and Volume Provision

Assume a large number of blade enclosures/blade switches are to be deployed.

1. Login to Supermicro Blade Networking Manager web interface.



2. Upon powering on the blade enclosures, BNM can "auto-discover" un-provisioned blade enclosure.



3. Different templates can be defined for various blade enclosures based on the networking requirements, such as VLAN, or rate limiting.

1 Enclosure 2 Blade 3 Uplink

Blade Server Network Settings

Select Enclosure Model

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1

Configure below network settings and apply the settings on the blades in above picture.

Does this Blade have 2 servers? No Yes

All the NIC's in the server use same network settings? No Yes

BladeSetting No VLAN

Enclosure Blade Uplink

Uplink Network Settings

No VLAN
Using default vlan 1

Access VLAN

Trunk - Multiple VLAN

Storm Control
Broadcast pps Multicast pps Unknown pps

Rate Limiting Mbps

Use Default speed settings? No Yes

Apply above settings on all Uplinks? No Yes

- Define the enclosures to be provisioned and apply the template on selected enclosures.

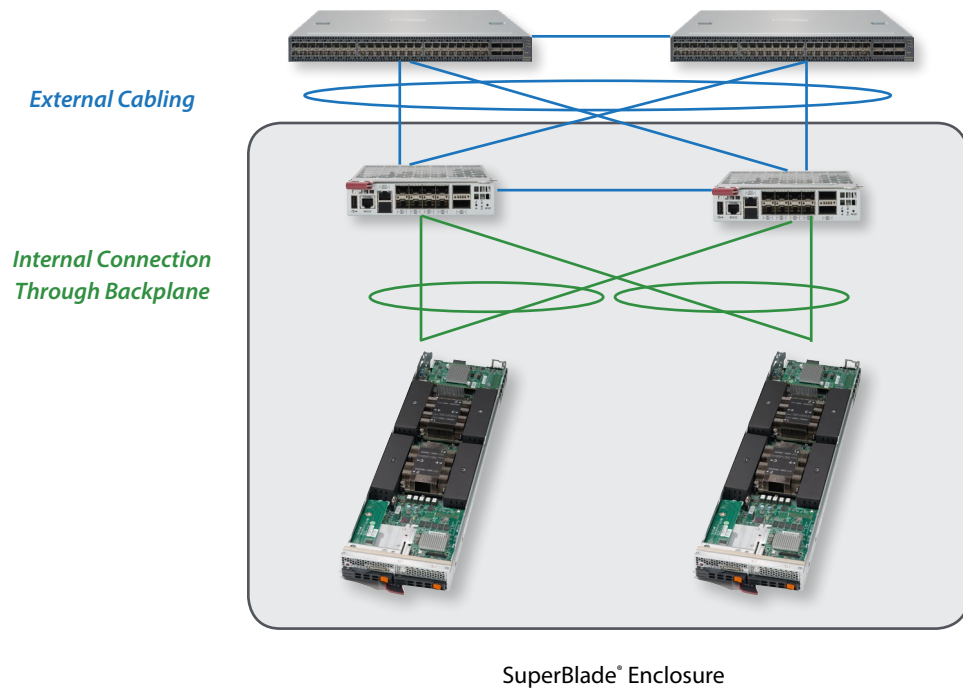
The screenshot displays the BNM web interface. At the top, there are navigation tabs: Dashboard, Enclosures (selected), Templates, Settings, and Analytics. Below these are action buttons: Manage, Release, Clear Alerts, Apply Template (highlighted), Ports Down, Ports Up, Restart, Delete, and FW Upgrade. A search bar and a 'Show 10 Entries' dropdown are present. The main content area is titled 'Enclosures' and contains a table of enclosure information:

Encl ID	Encl Name	CMM IP	Template	Encl Model	Sw1	Sw2	Details
GB172S000239	-	172.31.57.99	BNMDefaultTemplate	BPN-MB-E628B	Sw1 MBM-GEM-004 172.31.57.45	Sw2 MBM-GEM-004 172.31.57.180	Details
GB173S000353	-	172.31.34.31	-	BPN-MB-820C	Sw1 SBM-25G-100 172.31.35.18	Sw2 MBM-GEM-004 172.31.34.170	Not Managed

- BNM automates the provisioning for large volumes of blade switches based on the templates and enclosure selections.
- BNM auto provisions the link aggregations and MLAG for the required internal blade connections and also for external uplink connections based on the learned topology.

BNM Use Case 2: Configure for High Availability

It is common practice in data centers for each server to connect to two redundant switches for high availability. The two links on each server are aggregated in an active-active configuration. On switches, the ports connected to servers are configured as MLAG aggregations. The below diagram shows a typical high availability setup using blade servers.



The active-active connections offer fail-over redundancy and higher bandwidth by load balancing on both links. To achieve this, it requires numerous configurations on the switches. For example to provision MLAG setup for 28 servers in a blade enclosure the following configurations need to be done in the switches:

1. MLAG global configurations including MLAG system identifier need to be configured.
2. Downlink port channel needs to be configured for each server connection. Each port channel configuration might require at least four configuration commands. Setting up 28 downlink port channel might require 100+ commands.
3. Inter peer link port channel needs to be configured between blade switches.
4. Uplink port channel needs to be configured for the links that are connected to uplink switches.
5. The above configurations need to be done on both the blade switches by executing 100+ commands on each switch.
6. BNM automates all the above MLAG configurations. BNM detects the connections automatically and provision inter peer link port channel, downlink MLAG port channels and uplink MLAG port channels.

When an enclosure is managed from BNM, all switches on the enclosure are set to auto MLAG mode. The switches automatically learn and monitor all existing and new connections to create, update and delete MLAG port channels.

It takes only a couple of mouse clicks to manage an enclosure from BNM, since it will trigger the auto provision of all the required MLAG configurations on the switches in the managed enclosure.

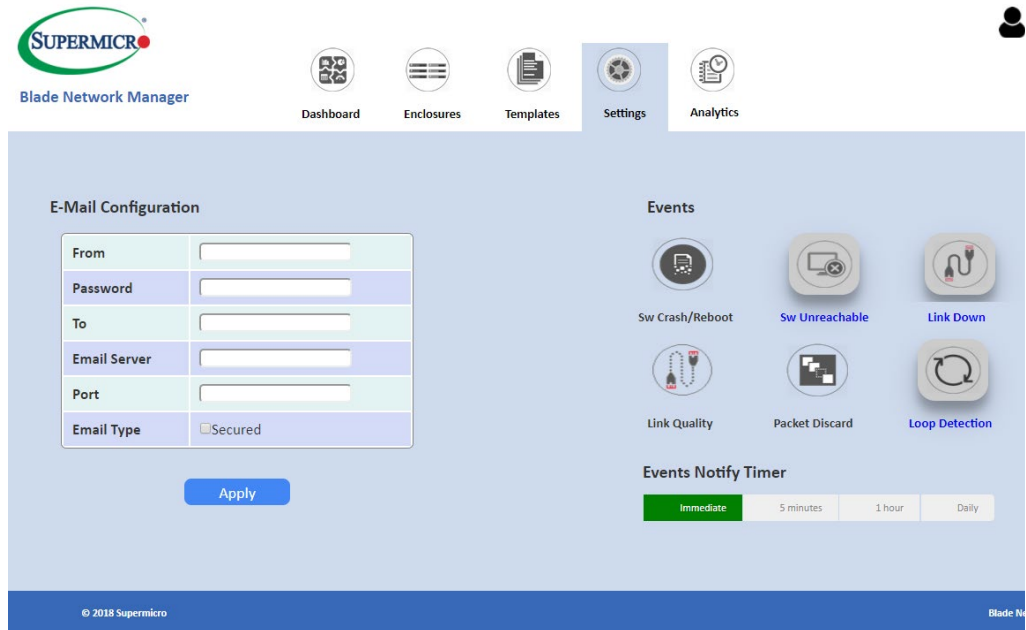
The auto provisioning feature of BNM reduces the initial provisioning time from hours or days to seconds. Also the auto provisioning avoids the human mistakes on the configurations that could lead to time consuming troubleshooting.

The screenshot displays the BNM web interface. At the top, there are five main navigation tabs: Dashboard, Enclosures (which is selected), Templates, Settings, and Analytics. Below these is a secondary toolbar with nine action icons: Manage, Release, Clear Alerts, Apply Template, Ports Down, Ports Up, Restart, Delete, and FW Upgrade. The main content area is titled 'Enclosures' and features a 'Select All' button. It lists two enclosure entries:

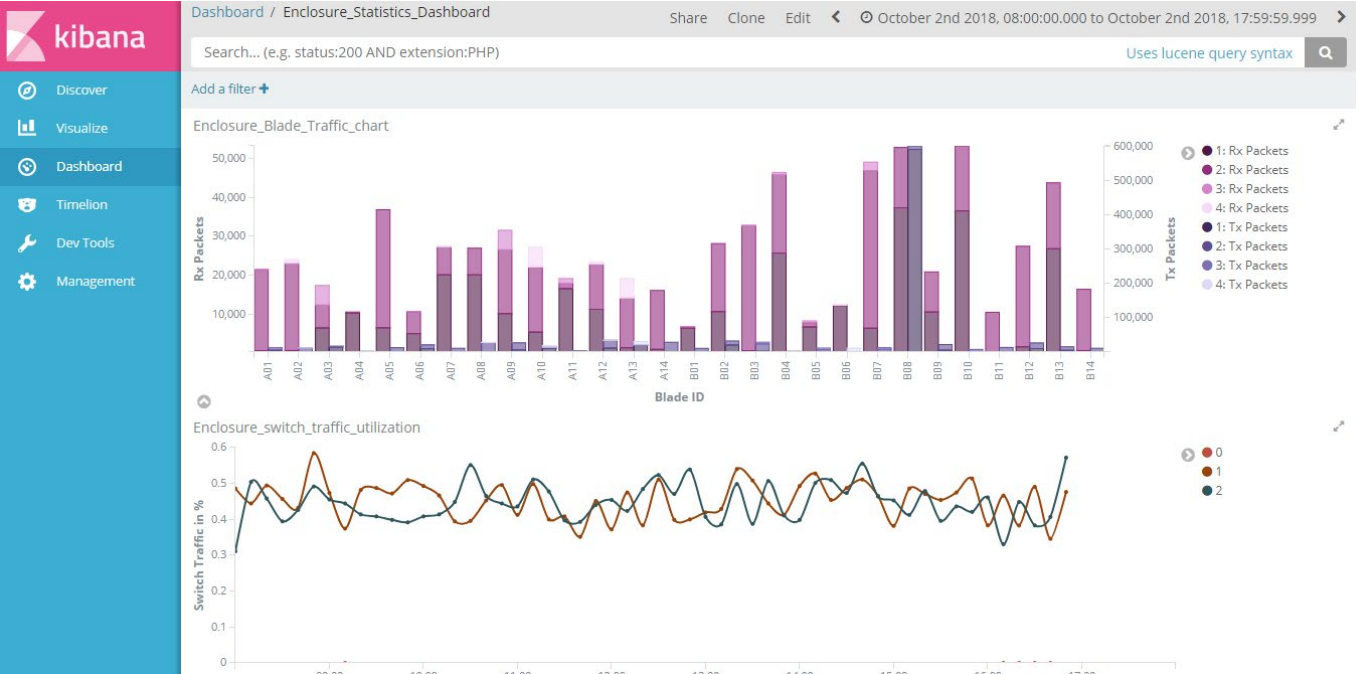
Encl ID	Encl Name	CMM IP	Template	Encl Model	Switch 1	Switch 2	Status
GB172S000239	-	172.31.57.99	-	BPN-MB-E628B	Sw1 MBM-GEM-004 172.31.57.45	Sw2 MBM-GEM-004 172.31.57.180	Not Managed
GB173S000353	-	172.31.34.31	-	BPN-MB-820C	Sw1 SBM-25G-100 172.31.35.18	Sw2 MBM-GEM-004 172.31.34.170	Not Managed

BNM Use Case 3: Monitoring and Analytics

1. A single pane of glass dash board displays all the critical information that might need user attention. The dash board shows the summary status of networking for all the managed SuperBlade and MicroBlade enclosures.
2. BNM continuously monitors all the blade switches to detect any abnormal behaviors.
3. Users can customize event notifications to receive email alerts for specific network events.
4. If an enclosure up-link is down, such event can trigger a notification email to the administrator.
5. Administrators can go to the dashboard, and pinpoint the "problematic" enclosure or blade switch. The analytic engine can provide details from network utilization, performance history or detailed logging of the link state event of a specific blade switch/enclosure for troubleshooting.



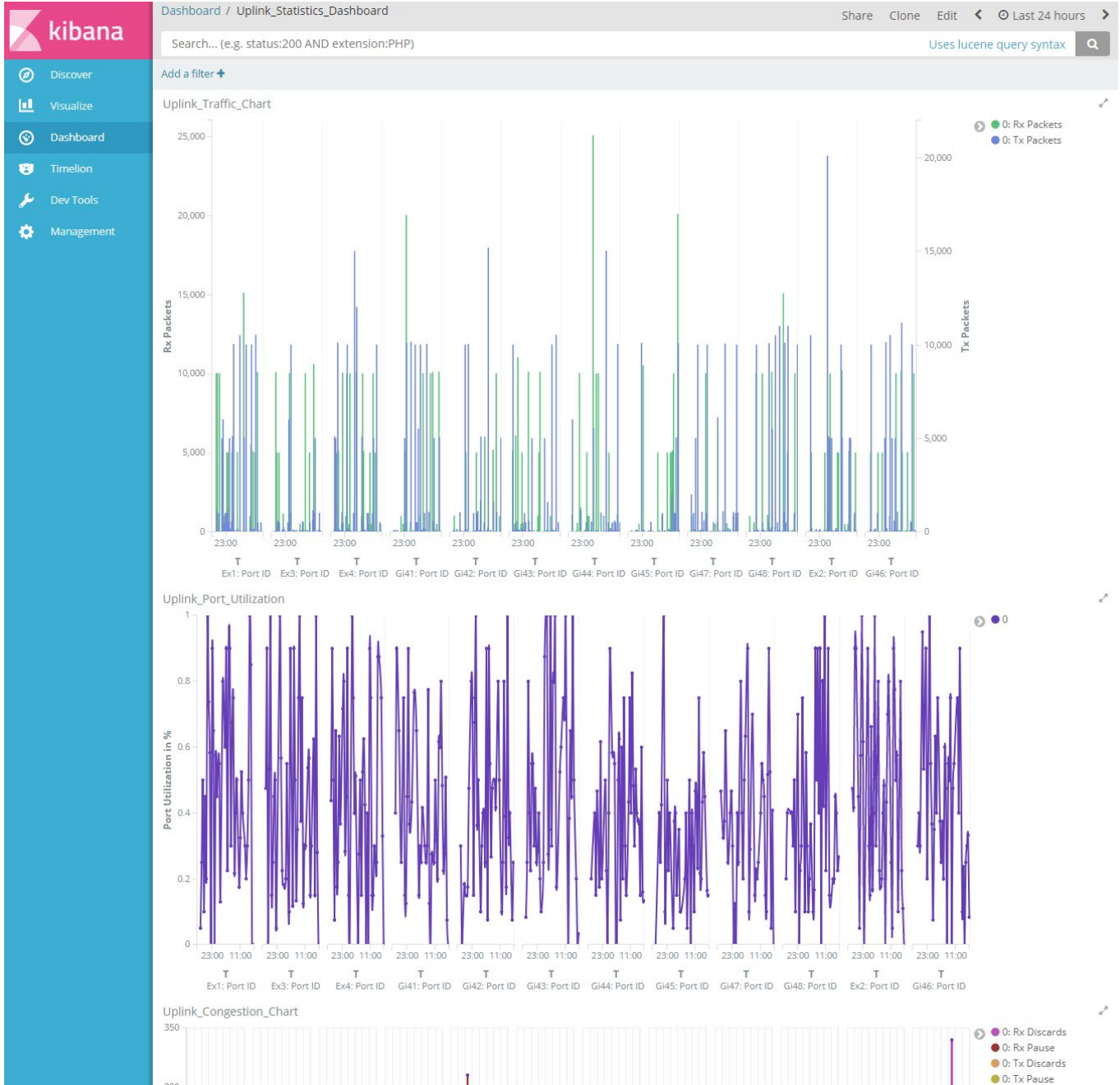
6. The Enclosure Analytics page shows the traffic chart for each blade servers, and the traffic chart, CPU utilization and memory utilization for each switches in the enclosure.



7. The Server Analytics page shows the traffic chart, utilization chart, link quality chart and congestion chart for each NIC in the selected blade server.



- The Uplink Analytics page shows the traffic chart, utilization chart, link quality chart and congestion chart for all the uplinks in the selected enclosure.



- BNM is built using Opensource Elastic Logstash Kibana (ELK) stack that helps users to create custom analytical dashboards based on their application requirements.

System Requirements for BNM

BNM is a software solution that can be deployed on any physical server or a virtual machine running Ubuntu Linux managed through a secure web interface.

Operating environment: (minimum requirements)

- BNM package can be installed on Ubuntu 16.04.03 LTS machines.
- Recommended CPU speed of at least 3.5 GHz, 8GB RAM and 40GB of storage.

Conclusion

In summary, Supermicro Blade Network Manager (BNM) provides an enhanced user experience for provisioning and managing a large number of blade switches through automation and orchestration. It also incorporates an analytic engine to provide networking insights for business planning and reduced TCO, allows IT departments to plan and manage their networks to meet stringent modern business SLAs.

We briefly discussed three use cases for utilizing the BNM for rapid volume provision, configuring high availability and analytics features. To learn more about BNM and how you can take advantage of its advanced features, please contact your Supermicro account manager.

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