

# Pluribus UNUM™ Insight Analytics™

## Network Performance Monitoring and Analytics

### Insight Analytics

UNUM Insight Analytics (IA) is a powerful integrated analytics module within the Pluribus UNUM platform that provides the IT operations team with proactive insight into network and application performance to assure peak operating performance and meet user experience expectations. Insight Analytics leverages Netvisor® ONE's embedded monitoring telemetry and packet flow data sources to enable pervasive visibility across the network, eliminating the need for expensive probes or complex monitoring overlay networks.

Integrated Netvisor telemetry monitors every TCP connection, including traffic within a VXLAN tunnel, across the entire fabric at the speed of the network to track east/west and north/south traffic flows, as well as virtualized workloads to expose important network and application performance characteristics.

Insight Analytics leverages the collected network intelligence from the UNUM database, which stores up to 2.5 billion flows, to build knowledge of the network, and enables contextual drill-down from dashboards and analysis views. The UNUM analytics engine constantly monitors and analyzes all traffic and transactions to identify network and application performance characteristics, allowing IT operations to quickly identify performance trends and interrelationships in real time. User-defined alert notifications can be generated when anomalies are discovered, such as volumetric changes, performance deviations or threshold-based violations, enabling rapid triage to precisely pinpoint root cause and speed resolution.

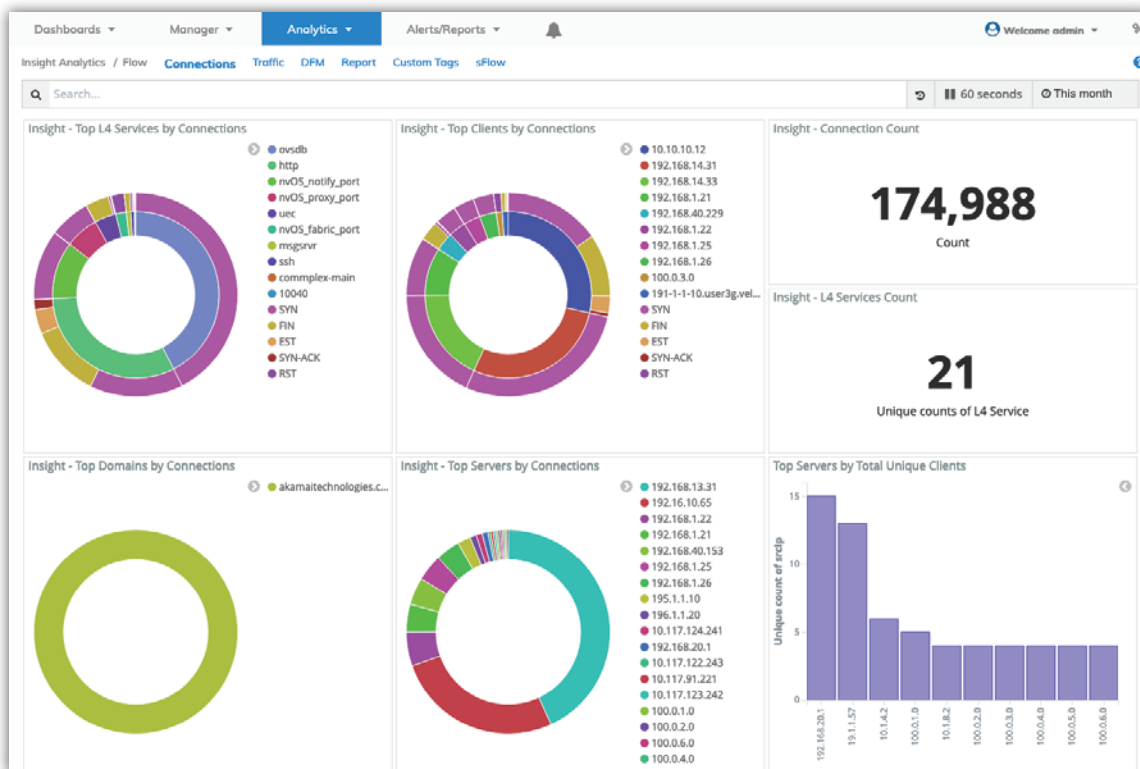
Insight Analytics provides extensive operational intelligence that supports many performance management use cases, allowing operators to quickly pinpoint performance issues, accelerate troubleshooting, improve operational intelligence, identify security risks and speed remediation. Insight Analytics requires an UNUM add-on license.

### Network Intelligence in a White Box Environment

Insight Analytics tracks network and endpoint service state and performance across the Unified Cloud Fabric to understand how the users and services are consuming the infrastructure, and conversely, how the infrastructure is supporting the users and services.

The intelligence garnered from across the fabric enables operators to analyze and compare actual versus desired performance and implement corrective actions such as changes to policy, rerouting traffic to implement on-demand changes to the infrastructure. Since all visualization is done within the same platform, changes can be implemented from a single pane of glass, simplifying operations and speeding change implementation.

Insight Analytics provides a suite of tools designed to analyze data with search capabilities on information collected from UNUM collectors (a designated switch UNUM uses to collect fabric information), packet capture analytics and monitoring capabilities.

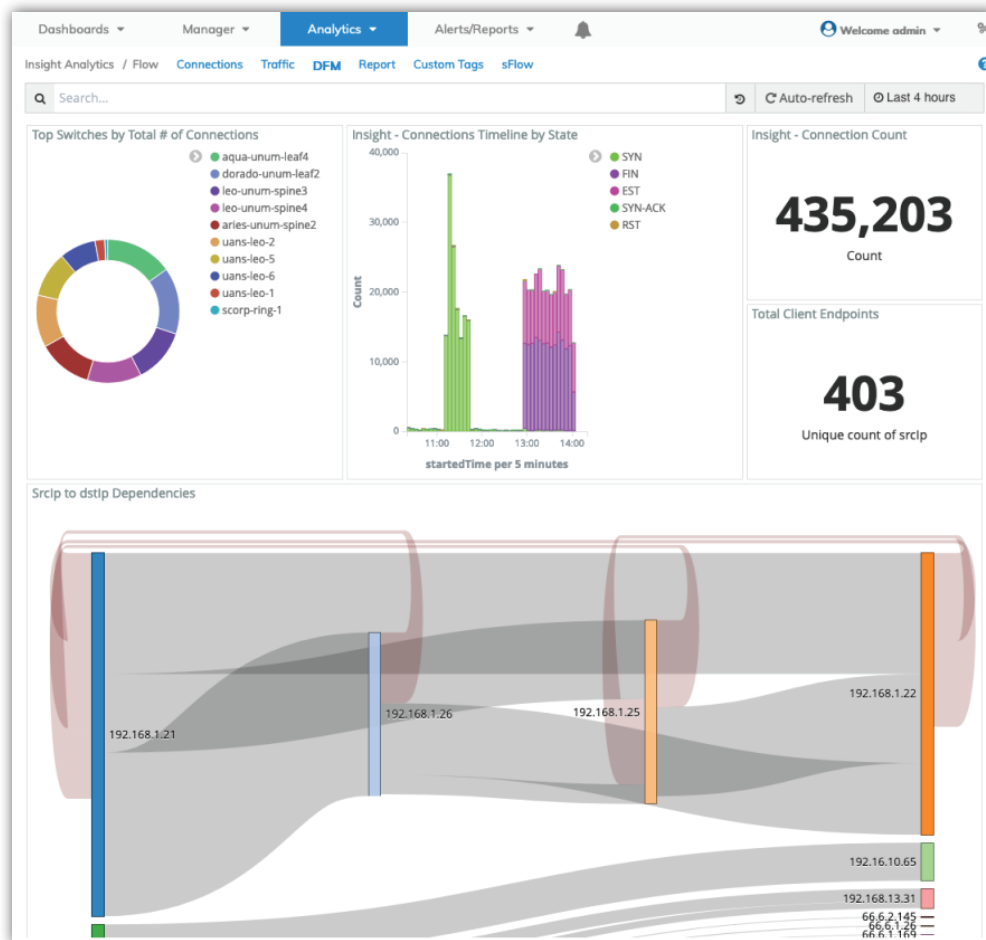


UNUM - Insight Analytics Flow Traffic Dashboard

## Flow Analytics

IA - Flow Analytics collects fabric and network flow data over time, and graphically displays the information via a variety of tools.

- The Connections dashboard allows network admins to measure, sort and analyze TCP connection states (SYN, SYN-ACK, EST, FIN, etc.) by service, client, domains and many other options over time.
- The Traffic dashboard breaks flows down into busiest services, servers, domains and switches.
- Dynamic Flow Mapping (DFM) dashboard illustrates the total connections based on server, state and endpoints.
- Custom Tagging enables customers to choose up to 100 different options to tag IP addresses, VLANs, MAC addresses and switch ports with metadata/contextual tags, and then aggregate or filter their flows based on their custom tags.
- Report dashboard displays a standardized view of high-level flow statistics over the past seven days.
- VMware vCenter integration - The Netvisor vCenter Connection Service provides UNUM Insight Analytics with virtual machine and virtual network configuration data, allowing any recorded communication to be identified and indexed. This enables insight into the virtualization layer.



UNUM Insight Analytics Dynamic Flow Mapping Dashboard

## Search

UNUM Insight Analytics utilizes a powerful, distributed engine to store, filter, correlate and visualize vast amounts of data in real time, while isolating and filtering specific flows from millions, all in a fraction of a second. Features of the search engine include:

- Powerful query syntax to filter flow metadata information based on field-based exact matches, regular expressions, ranges and Boolean operators.
- Selected views from the Connection Dashboard.
- Aggregated flow stats: duration, latency, total bytes per connection.

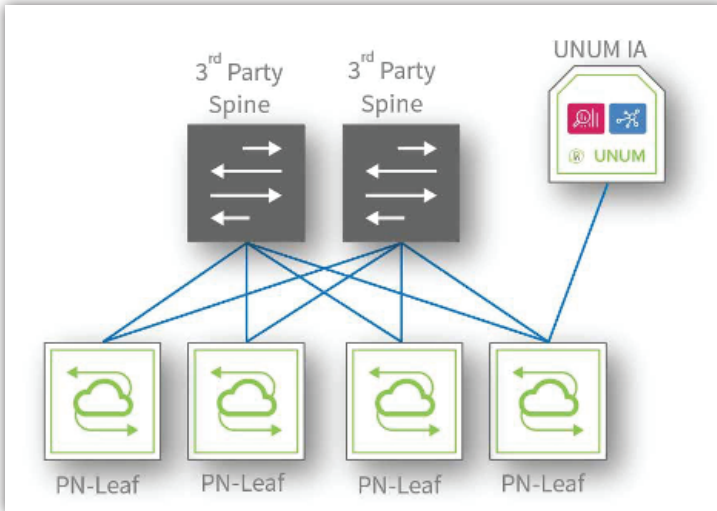
- Extensive “time machine” functionality with absolute or relative year/month/day/hour/minute/second granularity.
- IP geolocation for client and servers.
- Detailed flow table consisting of over 30 metadata fields associated with each flow.

## Alerts

Potential use cases for Pluribus Insight Analytics Alerts and programmable tagging include the detection of unauthorized access attempts, DDOS attacks or fabric node failure.

## Deployment Options

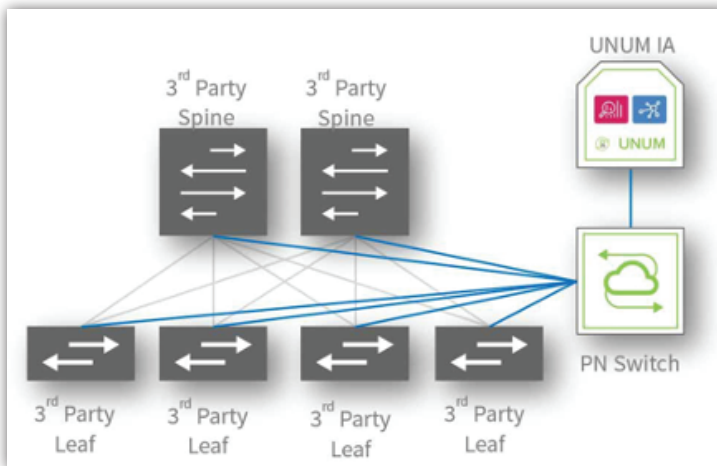
Pluribus UNUM Insight Analytics is deployed in one of two scenarios. The first is with Pluribus Netvisor switches in-line to maximize the capture of switch telemetry for analysis, providing a comprehensive view of the fabric, including syslog and SNMP. Netvisor Flow, or nvFlow, is the technology used by Netvisor ONE to collect metadata and telemetry for the Insight Analytics database.



**Deployment Option #1**

**UNUM Insight Analytics with Pluribus Netvisor OS switches in-line.**

The second scenario is when a customer has an already-deployed network and would like to use IA as a collection and analysis tool for SNMP traps and syslog data.



**Deployment Option #2**

**UNUM Insight Analytics with Pluribus Netvisor OS mirror switch**

## Licensing

The Pluribus UNUM platform is simple to deploy and can manage and support any sized network with multiple fabrics distributed across multiple locations. Licensing is elastic, enabling pay-as-you-grow flexibility. Insight Analytics is a fully integrated module of UNUM that is optionally activated through a license key.

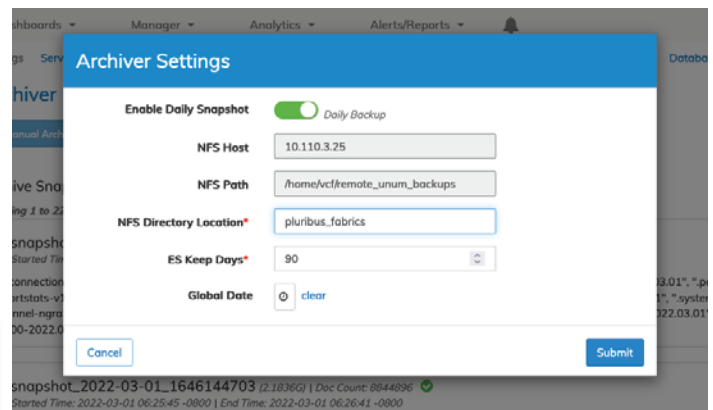
## Pluribus UNUM and Netvisor ONE Compatibility

Pluribus UNUM supports the equivalent release of Netvisor ONE, plus the prior version. For example, UNUM 5.1.x supports Netvisor versions 5.1.x and 5.0.x. For other combinations, please contact Pluribus Networks customer service before deploying.

Please Note: early field trial (EFT) features are not fully tested and are annotated in the Pluribus UNUM release notes. Before implementing an EFT feature in production, please consult your local partner or Pluribus Networks account team. Please refer to the [UNUM supported feature table](#) for more information.

## UNUM Archiver

Insight and switch analytics metadata can now be stored beyond the 30-day limit onto a user defined NFS solid state repository. The add-on UNUM-ARCHIVER-LIC license comes with a read-only viewer UNUM that can load and display the saved metadata files, so there will be no impact to live operations. Admins can copy the archived files to other long-term storage for historical analysis and compliance purposes.



**UNUM Archiver**

## Support and Professional Services

Pluribus Networks offers a wide range of advanced services spanning the entire network lifecycle to protect investments and help accelerate success from initial deployment to ongoing optimization. Multiple extended support options are available, including on-demand global support, on-site support, advanced hardware replacements and customized technical training.

Professional implementation services can help design, deploy and optimize the operating environment tailored to your organization's specific requirements. Maintenance options include direct access to a team of expert network engineers with deep networking experience and our self-service online Customer Portal. For more information about Pluribus support options, visit <http://www.pluribusnetworks.com/support> or contact a Pluribus Networks authorized reseller.

## Ordering Information

Pluribus UNUM software is available in three flavors: a BASE virtual machine, a medium capacity virtual machine, and a high-capacity option which can be ordered on an appliance or installed on four Dell RX740 servers. Refer to the Hardware Requirements and Scalability tables for more information on the different UNUM options. See the ordering information below for Pluribus UNUM, Insight Analytics, server appliances, and add-on reports/alerts. Support is ordered separately, and subscription options are available.

**Pluribus UNUM Software** is available in three options.

- **UNUM-LIC** — Pluribus UNUM BASE license.
- **UNUM-MC-LIC** — Pluribus medium-capacity license.
- **UNUM-HC-LIC** — Pluribus high-capacity license. Requires either the appliance option below or four Dell RX740 servers ordered directly from Dell, as well as professional services for deployment.

**Insight Analytics Module License** is optionally licensed in addition to the Pluribus UNUM software.

- **IA-MOD-LIC** — Pluribus Insight Analytics module BASE license. Supports up to 100 million flows.
- **IA-MC-MOD-LIC** — Pluribus Insight Analytics Medium-Capacity (MC) module license. Supports up to 500 million flows.
- **IA-HC-MOD-LIC** — Pluribus Insight Analytics High-Capacity (HC) module license. Supports up to 2 billion flows. Cannot be deployed on existing customer hardware – HC server appliance or four Dell RX740 are required.
- **IA-SC-MOD-LIC** — Introductory, low-cost license for Insight Analytics that will enable the storage of 1 million flows.

### UNUM Appliance Hardware

- **AP-HC-HW** — UNUM high capacity hardware server appliance. Hardware only (software licenses are required) – add to order when a high-capacity appliance is needed. Requires professional services deployment.

### Other Optional, add-on UNUM Licenses

- **UNUM-RPRT-LIC** — Pluribus UNUM add-on reporting license.
- **UNUM-ALRT-LIC** — Pluribus UNUM add-on e-mail alert license.
- **UNUM-ARCHIVER-LIC** — Archive daily snapshots capturing Insight & Switch Analytics meta data to an NFS repository (network folder) for long term storage. Includes a second UNUM “viewer” virtual machine so that archived data can be loaded and analyzed.

## Specifications

The following are highlights of features provided by the Pluribus UNUM platform. Many automation capabilities are integrated as part of the Netvisor ONE network OS and are not included in this summary.

### Operational

- Runs in a VM as a virtual appliance
- Single node deployment
- High-performance cluster supported for analytics
- Device inventory
- Manual device discovery
- Automatic device discovery via LLDP
- Day-0 automation/Zero-touch provisioning (ZTP)
- Per-device logs of all actions taken by the portal
- Device connectivity status (up/down)
- Network provisioning - configuration
- Switch configuration management
- Change history tracking
- Device configuration validation
- View devices through network provisioning
- Filter view of network provisioning based on devices
- Topology mapping for Netvisor-enabled devices
- Third-party device topology mapping and visualization requires LLDP
- CLI/API tracking via the syslog dashboard
- vCenter Connection Service

### Configuration

- Automated ongoing device configuration change management
- Automated detection and rollback of invalid configuration changes
- Network-wide rollback supported from Netvisor OS

### Telemetry Supported

- nvFlow for real-time analytics stream from Netvisor devices
- Syslog

## Software Requirements & Specifications

Specifications provided are operational requirements to use UNUM virtual machines. Values do not include ESXi resource requirements.

UNUM Appliance	vCPU (cores)	RAM	Storage
<b>UNUM Base Capacity VM</b> <sup>4</sup>	8vCPU (4-core)	64 GB	480 GB SSD
<i>UNUM Base Capacity VM - Archive Viewer</i> <sup>1,3,4</sup>	8vCPU (4-core)	64 GB	480 GB SSD
<b>UNUM Medium Capacity VM</b> <sup>4</sup>	8vCPU (4-core)	64 GB	960 GB SSD
<i>UNUM Medium Capacity VM - Archive Viewer</i> <sup>1,3,4</sup>	8vCPU (4-core)	64 GB	960 GB SSD
<b>UNUM High Capacity VM Cluster</b> <sup>2,4</sup>	Special	Special	Special
<i>UNUM High Capacity VM Cluster - Archive Viewer</i> <sup>1,3,4</sup>	Special	Special	Special

<sup>1</sup> UNUM Archiver requires the Archiver license and a shared NFS SSD storage to store daily analytics snapshots.

<sup>2</sup> The High Capacity VM cluster runs on four servers. Direct software download for existing servers is not supported, dedicated hardware needs to be purchased. See the Hardware Requirements and Specifications table.

<sup>3</sup> Customers wishing to use UNUM Archiver will require resources for a second VM (provided with the license).

<sup>4</sup> All UNUM virtual machines require ESXi 6.7.

## Server Hardware Specifications for UNUM Virtual Machines

Specifications provided are the minimum necessary server resources to run the UNUM virtual machine on dedicated hardware. This includes ESXi hardware requirements and resources for planned future expansions of UNUM.

Bring Your Own Server	UNUM Base Capacity Virtual Machine	UNUM Medium Capacity Virtual Machine	UNUM High Capacity VM Cluster
<b>CPU</b>	16 vCPU (8-core) <sup>2</sup>	16 vCPU (8-core) <sup>2</sup>	32 vCPU (8-core) <sup>2</sup> per server
<b>Memory</b>	96 GB	96 GB	256 GB per server
<b>Local SSD</b>	480 GB <sup>4,6</sup>	960 GB <sup>4,6</sup>	1920 GB <sup>4,7</sup> per server
<b>Shared NFS SSD</b>	480 GB required for HA <sup>3,4</sup>	960 GB required for HA <sup>3,4</sup>	960 GB required for HA <sup>3,4</sup>
<b>VMware ESXi Hypervisor</b>	6.7, 7.0	6.7, 7.0	6.7, 7.0
<b>Client Requirements</b>	Google Chrome (Version 44+) Mozilla Firefox (Version 39+)	Google Chrome (Version 44+) Mozilla Firefox (Version 39+)	Google Chrome (Version 44+) Mozilla Firefox (Version 39+)
<b>NIC</b>	Dual 10G Base-T NIC <sup>8</sup>	Dual 10G Base-T NIC <sup>8</sup>	Dual 10G Base-T NIC <sup>8</sup>
<b>High Availability (HA)</b>	Yes <sup>3,7</sup>	Yes <sup>3,7</sup>	Yes <sup>3,7</sup>

<sup>1</sup> The High Capacity VM cluster can be installed as a cluster on four dedicated DELL RX740 servers. Direct software download for existing servers is not supported, dedicated hardware or the appliance needs to be purchased. The Dell configuration requires professional services installation as well as an external 10 Gbps switch is needed to enable internal cluster communication.

<sup>2</sup> All versions of UNUM require CPU clock speeds of 2.4 GHz CPU's or higher.

<sup>3</sup> All High Availability configurations require the following: UNUM 6.0+, the VMware vSphere 6 Enterprise Plus License, the UNUM base license + any optional UNUM licenses, and a shared NFS SSD storage. Redundant (RAID-1) storage is recommended for the shared storage, as is a minimum of a 10 Gbps connection between the NFS storage and the servers.

<sup>4</sup> Solid State Drives are required on all UNUM platforms.

<sup>5</sup> No specific VMware license requirements for non-HA environments (ESXi free is OK).

<sup>6</sup> In HA deployments, the local storage for the Base VM and Medium Capacity VM must meet recommended VMware hardware requirements. Pluribus recommends a minimum of 480 GB. 960 GB of shared NFS storage is still required.

<sup>7</sup> In HA deployments, the local storage for two of the four servers in the High Capacity VM cluster can be reduced to 960 GB. 960 GB of shared NFS storage is still required.

<sup>8</sup> UNUM can only support one direct in-band fabric connection via the eth2 interface. Management of multiple In-band fabrics requires the addition of an external switch.

## Specifications for the UNUM High Capacity Appliance

Customers without an ESXi infrastructure or limited compute resources can purchase a Pluribus Networks tested and validated, turnkey appliance with UNUM pre-installed. Simply rack, stack, and power on. UNUM is ready to go.

UNUM High Capacity Appliance <sup>1</sup>	
CPU	32 vCPU (16-core) per server
Memory	256 GB per server
Local SSD	1920 GB per server
Shared NFS SSD	960 GB required for HA
VMWare ESXi Hypervisor	6.7, 7.0
Client Requirements	Google Chrome (Version 44+) Mozilla Firefox (Version 39+)
NIC	Dual 10G Base-T NIC
High Availability (HA)	Yes
Rack Dimensions	1RU Base/Medium, 2RU High Capacity

<sup>1</sup>The High Capacity appliance is four dedicated nodes of the listed specifications.

## UNUM Fabric Manager Scalability Matrix

	UNUM Base Capacity VM/Appliance	UNUM Medium Capacity VM/Appliance	UNUM High Capacity VM Cluster/Appliance
Maximum Netvisor One Switches	55	55	140
Maximum Unified Cloud Fabrics <sup>5</sup>	10	10	10
Maximum Netvisor ONE Switches per Fabric <sup>4</sup>	32	32	128 Leafs per Super Fabric <sup>5</sup>
Syslog Records <sup>1</sup>	Up to 7 Days	Up to 30 Days	Up to 60 Days
Port Stats <sup>2,6</sup>	512	768	1536
Tunnel Stats <sup>2,6,7</sup>	246	384	768
vFlow Stats <sup>2,3,6</sup>	2560	3520	7040

<sup>1</sup>Records storage is a rolling first-in first-out window of both flow (nvFlow) and switch analytics records.

<sup>2</sup>Numbers provided are aggregate values of active stats captured. To get a per switch value of active stats captured, divide the value provided by the total number of switches being managed by UNUM. For example, if the UNUM Base Capacity VM is managing 24 switches total, then 512 / 24 = 21 port stats per switch (rounding down).

<sup>3</sup>Local(switch) vFlows. Divide by number of switches to get fabric level vFlows, for example in an 8-node fabric, 2560 divided by 8 would be 320 fabric wide vFlows.

<sup>4</sup>Maximum fabric size of 32 switches is a Netvisor ONE limitation but is listed here for convenience. UNUM supports a number of fabrics and switches, up to the maximum amount of either switches or fabrics. For example, one fabric of 32 nodes, two fabrics of 24 and 26 nodes, three fabrics of 12, 18, and 20 nodes or five fabrics of 11 nodes each for the UNUM Base Capacity virtual machine.

<sup>5</sup>Super Fabric can manage up to four pods, up to 128 leafs and up to 12 spines. Without super fabric any combination of leafs and spines are supported up to 140 total, 32 nodes maximum per fabric.

<sup>6</sup>Number of simultaneous stats collected every ten seconds.

<sup>7</sup>A Tunnel is a virtual connection between two fabric end points.

## UNUM Insight Analytics Scalability Matrix

	UNUM Base Capacity VM/Appliance	UNUM Medium Capacity VM/Appliance	UNUM High Capacity VM Cluster/Appliance
IA Maximum Records Stored <sup>1,2,3</sup>	100 Million	500 Million	2 Billion
IA Analytics Records, Maximum Days <sup>1,3</sup>	Up to 30 Days	Up to 30 Days	Up to 30 Days 4
IA Peak Ingestion Rate <sup>3</sup>	1000 flows/sec	1000 flows/sec	10,000 flows/sec

<sup>1</sup>Records storage is a rolling first-in first-out window of both flow (nvFlow) and switch analytics records.

<sup>2</sup>Long-term retention of records, up to the value stated (100M, 500M, 2B). Variations based on network traffic can occur.

<sup>3</sup>Ingestion rate will affect the number of days of records are stored. This can vary based on fabric size and traffic patterns.

<sup>4</sup>Busy environments generating more than 1000 flows per second impact the number of days records are stored. If sustained 10,000 flows per second occur, the maximum days of records stored will be reduced to approximately one week. This environment can be mitigated using the UNUM Archiver license and external SSD storage.

**Note:** All UNUM fabrics are required to have a minimum of one switch with 16 GB of RAM to act as a communication node. Two 16 GB switches will be required if seed switch redundancy is implemented.

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