



# **NVIDIA UFM Enterprise User Manual v6.18.0**

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## Info

You can download a PDF version [here](#).

## About This Document

NVIDIA® UFM® Enterprise is a powerful platform for managing InfiniBand scale-out computing environments. UFM enables data center operators to efficiently monitor and operate the entire fabric, boost application performance and maximize fabric resource utilization.

This user guide provides documentation for network administrators responsible for deploying, configuring, monitoring, and troubleshooting the network in their data center.

For a list of the new features, bug fixes and known issues in this release, see [Release Notes](#).

## Software Download

To download the UFM software, please visit [NVIDIA's Licensing Portal](#).

If you do not have a valid license, please fill out the [NVIDIA Enterprise Account Registration](#) form to get a UFM evaluation license.

## Document Revision History

For the list of changes made to this document, refer to [Document Revision History](#).

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# Release Notes


NVIDIA® UFM® is a powerful platform for managing InfiniBand scale-out computing environments. UFM enables data center operators to efficiently monitor and operate the entire fabric, boost application performance and maximize fabric resource utilization.

## Key Features

UFM provides a central management console, including the following main features:

- Fabric dashboard including congestion detection and analysis
- Advanced real-time health and performance monitoring
- Fabric health reports
- Threshold-based alerts
- Fabric segmentation/isolation
- Quality of Service (QoS)
- Routing optimizations
- Central device management
- Task automation
- Logging
- High availability
- Daily report: Statistical information of the fabric during the last 24 hours
- Event management
- Switch auto-provisioning

- UFM-SDN Appliance in-service software upgrade
- Fabric validation tests
- Client certificate authentication
- IPv6 on management ports

 **Warning**

Prior to installation, please verify that all prerequisites are met.  
Please refer to [System Requirements](#).

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# UFM Overview

## Scale-Out Your Fabric with Unified Fabric Manager

NVIDIA®UFM is a host-based solution that provides all the management functionalities required for managing fabrics.

*Fabric Topology with UFM*



**UFM Server** is a server on which UFM is installed and has complete visibility over the fabric to manage routing on all devices.

**UFM HA Server** is a UFM installed server on a secondary server for High Availability deployment.

**Managed Switching Devices** are fabric switches, gateways, and routers managed by UFM.

**Managed Servers** are the compute nodes in the fabric on which the various applications are running, and UFM manages all servers connected to the fabric.

**UFM Host Agent** is an optional component that can be installed on the Managed Servers. UFM Host Agent provides local host data and host device management functionality.

The UFM Host Agent provides the following functionality:

- Discovery of IP address, CPU, and memory parameters on host
- Collection of CPU/Memory/Disk performance statistics on host
- Upgrading HCA Firmware and OFED remotely
- Creating an IP interface on top of the InfiniBand partition

**UFM Switch Agent** is an embedded component in NVIDIA switches that allows IP address discovery on the switch and allows UFM to communicate with the switch. For more information, please refer to [Device Management Feature Support](#).



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# UFM Installation and Initial Configuration

UFM® software includes Server and Agent components. UFM Server software should be installed on a central management node. For optimal performance, and to minimize interference with other applications, it is recommended to use a dedicated server for UFM. The UFM Agent is an optional component and should be installed on fabric nodes. The UFM Agent should not be installed on the Management server.

The following sections provide step-by-step instructions for installing and activating the license file, installing the UFM server software, and installing the UFM Agent.

## Prerequisites for UFM Server Software Installation

Please refer to [Installation Notes](#) for information on system prerequisites.

## UFM Installation Steps

To install the UFM software:

1. [Download the UFM software and license file](#)
2. [Install the UFM Server Software and Activate the Software License](#)
3. [Perform initial configuration](#)
4. [Run the UFM server software](#)

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# Manage Users

## Accounts and Roles

Each UFM user can be assigned to one of the following four roles:

- **System Admin** – users can perform all operations including managing other users accounts.
- **Fabric Admin** – users can perform fabric administrator actions such as update SM configuration, update global credentials, manage reports, managing unhealthy ports, and manage PKeys, etc.
- **Fabric Operator** – users can perform fabric operator actions such as device management actions (enable/disable port, add/remove devices to/from groups, reboot device, upgrade software, etc.)
- **Monitoring Only** – users can perform monitoring actions such as view the fabric configuration, open monitoring sessions, define monitoring templates, and export monitoring data to CSV files, etc.

## User Account Management

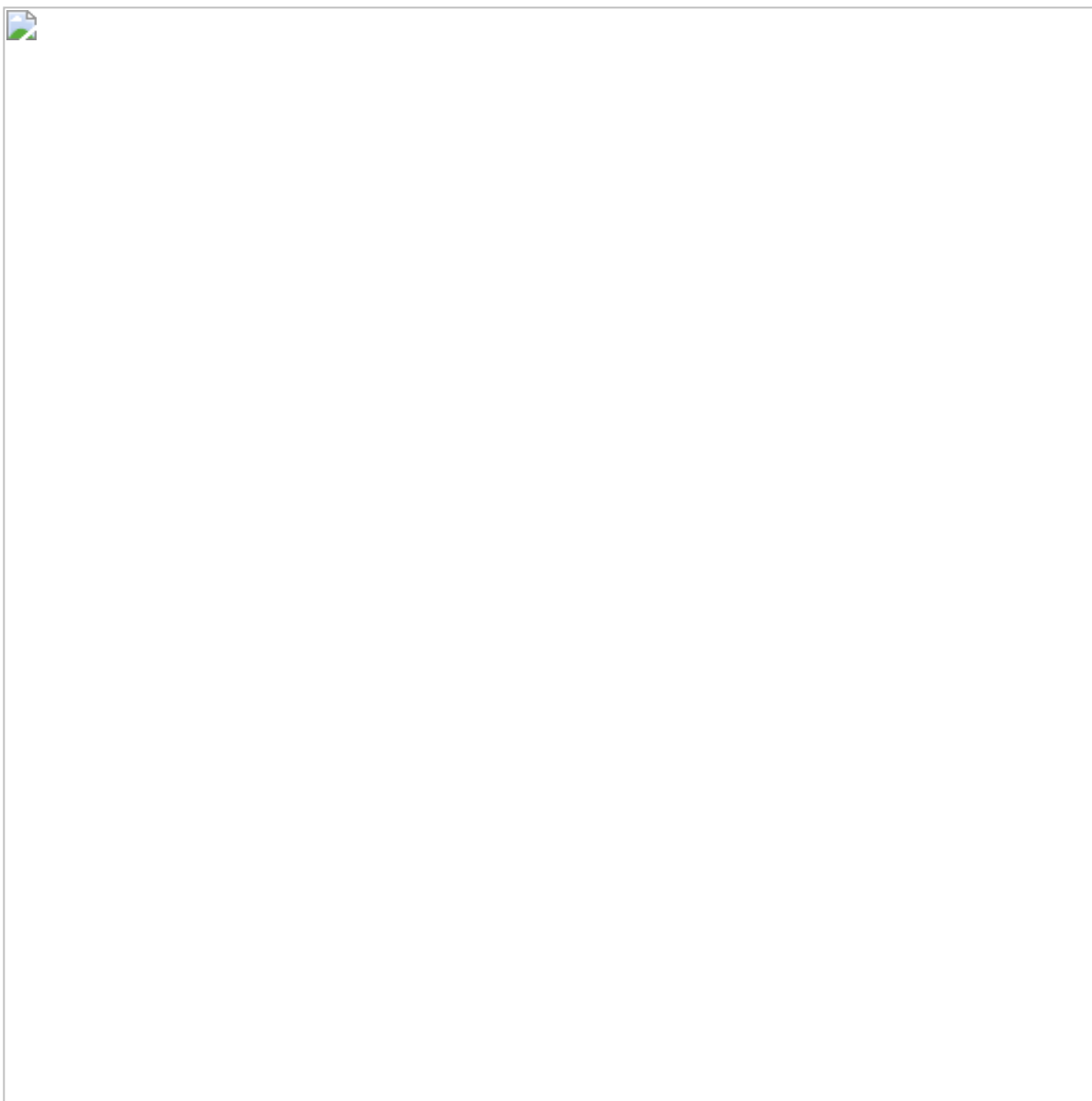
By default and upon every UFM deployment, the **admin** user (System Admin) is generated to allow initial access to the UFM.

A user with system Administration rights can manage other users' accounts, including the creation, deletion, and modification of accounts.

To edit existing user accounts, right-click the account from the list of user accounts and perform the desired action (Change Password/Remove).

## Add New User

1. Click the “New” button.



2. Fill in the required fields in the dialog box.

### Create A User ×

User Name

Group

Password

Confirm Password

## Edit/Remove Existing User

Right-click the account from the list of user accounts and perform the desired action (Change Password/Remove).



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# UFM Server Health Monitoring

The UFM Server Health Monitoring module is a standalone module that monitors UFM resources and processes according to the settings in the `/opt/ufm/files/conf/UFMHealthConfiguration.xml` file.

For example:

- Each monitored resource or process has its own failure condition (number of retries and/or timeout), which you can configure.
- If a test fails, UFM will perform a *corrective operation*, if defined for the process, for example, to restart the process. You can change the configured corrective operation. If the corrective operation is set to "None", after the defined number of failures, the *give-up* operation is performed.
- If a test reaches the configured threshold for the number of retries, the health monitoring initiates the *give-up* operation defined for the process, for example, UFM failover or stop.
- By default, events and alarms are sent when a process fails, and they are also recorded in the internal log file.

Each process runs according to its own defined schedule, which you can change in the configuration file.

Changes to the configuration file take effect only after a UFM Server restart. (It is possible to kill and run in background the process `nohup python /opt/ufm/ufmhealth/UfmHealthRunner.pyo &.`)

You can also use the configuration file to improve disk space management by configuring:

- How often to purge MySQL binary log files.

- When to delete compressed UFM log files (according to free disk space).

The settings in the `/opt/ufm/files/conf/UFMHealthConfiguration.xml` file are also used to generate the UFM Health Report.

The following section describes the configuration file options for UFM server monitoring.

## UFM Health Configuration

The UFM health configuration file contains three sections:

- Supported Operations—This section describes all the operations that can be used in tests, and their parameters.
- Supported Tests—This section describes all the tests. Each test includes:
  - The main test operation.
  - A corrective operation, if the main operation fails.
  - A give-up operation, if the main operation continues to fail after the corrective operation and defined number of retries.

The number of retries and timeout is also configured for each test operation.

- Test Schedule - This section lists the tests in the order in which they are performed and their configured frequency.

The following table describes the default settings in the `/opt/ufm/files/conf/UFMHealthConfiguration.xml` file for each test. The tests are listed in the order in which they are performed in the default configuration file.

You might need to modify the default values depending on the size of your fabric.

For example, in a large fabric, the SM might not be responsive for `sminfo` for a long time; therefore, it is recommended to increase the values for timeout and number of retries for **SMResponseTest**.

Recommended configurations for `SMResponseTest` are:

- For a fabric with 5000 nodes:

- Number of retries = 12
- Frequency = 10
- For a fabric with 10000 nodes:
  - Number of retries = 12
  - Frequency = 20

Test Name / Description	Test Operation	Corrective Operation (if Test Operation fails)	No. Retries / Give-up Operation	Test Frequency
CpuUsageTest Checks total CPU utilization.	CPUTest Tests that overall CPU usage does not exceed 80% (this percentage is configurable).	None If UFM Event Burst Management is enabled, it is automatically initiated when the test operation fails	1 Retry None	1 minute
AvailableDiskSpaceTest Checks available disk space.	FreeDiskTest Tests that disk space usage for <i>/opt/ufm</i> does not exceed 90% (this percentage is configurable).	CleanDisk Delete compressed UFM log files under <i>/opt/ufm</i>	3 Retries None	1 hour
CheckIBFabricInterface Checks state of active fabric interface.	IBInterfaceTest Tests that active fabric interface is up.	BringUpIBFabricInterface Bring up the fabric interface	3 Retries SMOrUFMFailoverOrDoNothing	35 seconds
CheckIBFabricInterfaceStandby (HA only) Checks state of fabric interface on standby.	IBInterfaceTestOnStandby Tests that fabric interface on standby is up.	None	1 Retry None	1 minute



Test Name / Description	Test Operation	Corrective Operation (if Test Operation fails)	No. Retries / Give-up Operation	Test Frequency
MemoryTest Checks total memory usage.	MemoryUsageTest Tests that memory usage does not exceed 90% (this percentage is configurable).	None	1 Retry None	1 minute
SMProcessTest Checks status of the OpenSM service.	SMRunningTest Tests that the SM process is running.	RestartProcess Restart the SM process	1 Retry UFMFailoverOrDoNothing	10 seconds
SMResponseTest Checks responsiveness of SM (when SM process is running).	SMTTest Tests SM responsiveness by sending the sminfo query to SM.	None	9 Retries UFMFailoverOrDoNothing	10 seconds
IbpmTest Checks status of the IBPM (Performance Manager) service.	ProcessIsRunningTest Tests that the IBPM service is running.	RestartProcess Restart the IBPM service	3 Retries None	1 minute
ModelMainTest Checks status of the main UFM service	ProcessIsRunningTest Tests that the UFM service is running.	RestartProcess Restart the UFM service	3 Retries UFMFailoverOrDoNothing	20 seconds
HttpdTest Checks status of the httpd service.	ProcessIsRunningTest Tests that the httpd service is running.	RestartProcess Restart the httpd service	3 Retries None	20 seconds

Test Name / Description	Test Operation	Corrective Operation (if Test Operation fails)	No. Retries / Give-up Operation	Test Frequency
MySqlTest Checks status of the MySql service.	ConnectToMySql Tests that the MySql service is running.	None	1 Retry UFMFailoverOrDoNothing	20 seconds
CleanMySql Purges MySql Logs	AlwaysFailTest Fails the test in order to perform the corrective action.	PurgeMySqlLogs Purge all MySql Logs on each test	1 Retry None	24 hours
UFMServerVersionTest Checks UFM software version and build.	UfmVersionTest Returns UFM software version information.	None	1 Retry None	24 hours
UFMServerLicenseTest Checks UFM License information.	UfmLicenseTest Returns UFM License information.	None	1 Retry None	24 hours
UFMServerHAConfigurationTest (HA only) Checks the configuration on master and standby.	UfmHAConfigurationTest Returns information about the master and standby UFM servers.	None	1 Retry None	24 hours
UFMMemoryTest Checks available UFM memory.	UfmMemoryUsageTest Tests that UFM memory usage does not exceed 80% (this percentage is configurable).	None	1 Retry None	1 minute

Test Name / Description	Test Operation	Corrective Operation (if Test Operation fails)	No. Retries / Give-up Operation	Test Frequency
UFMCpuUsageTest Checks UFM CPU utilization.	CPUTest Tests that UFM CPU usage does not exceed 60% (this percentage is configurable).	None	1 Retry None	1 minute
CheckDrbdTcpConnectionPerformanceTest (HA only) Checks the tcp connection between master and standby	TcpConnectionPerformanceTest Tests that bandwidth is greater than 100 Mb/sec and latency is less than 70 usec (configurable).	None	2 Retry None	10 minute

**Note**

The Supported Operations section of the configuration file includes additional optional operations that can be used as corrective operations or give-up operations.

## UFM Core Files Tracking

To receive a notification every time OpenSM or ibpm creates a core dump, please refer to the list of all current core dumps of OpenSM and ibpm in the UFM health report.

 **To receive core dump notifications, do the following:**

1. Set the `core_dumps_directory` field in the `gv.cfg` file to point to the location where all core dumps are created (by default, this location is set to `/tmp`).

```
core_dumps_directory = /tmp
```

2. Set the naming convention for the core dump file. The name must include the directory configured in the step above.

The convention we recommend is:

```
echo "/tmp/%t.core.%e.%p.%h" > /proc/sys/kernel/core_pattern
```

3. Make sure core dumps directory setting is persistent between reboots. Add the `kernel.core_pattern` parameter with the desired file name format to the `/etc/systctl.conf` file. Example:

```
kernel.core_pattern=/tmp/%t.core.%e.%p.%h
```

4. Configure the core file size to be unlimited.

```
ulimit -c unlimited
```

5. (Only on UFM HA master) Update the UFM configuration file `gv.cfg` to enable core dump tracking.

```
track_core_dumps = yes
```

## Example of Health Configuration

The default configuration for the overall memory test in the `opt/ufm/files/conf/UFMHealthConfiguration.xml` file is:

```

<Test Name="MemoryTest" NumOfRetriesBeforeGiveup="3" RetryTimeoutInSeconds="10">
  <TestOperation Name="MemoryUsageTest">
    <Parameters>
      <Parameter Name="ThresholdInPercents" Value="90"/>
    </Parameters>
  </TestOperation>
  <CorrectiveOperation Name="None"/>
  <GiveupOperation Name="None"/>
</Test>

```

This configuration tests the available memory. If memory usage exceeds 90%, the test is repeated up to 3 times at 10 second intervals, or until memory usage drops to below 90%. No corrective action is taken and no action is taken after 3 retries.

To test with a usage threshold of 80%, and to initiate UFM failover or stop UFM after three retries, change the configuration to:

```

<Test Name="MemoryTest" NumOfRetriesBeforeGiveup="3" RetryTimeoutInSeconds="10">
  <TestOperation Name="MemoryUsageTest">
    <Parameters>
      <Parameter Name="ThresholdInPercents" Value="80"/>
    </Parameters>
  </TestOperation>
  <CorrectiveOperation Name="None"/>
  <GiveupOperation Name="UFMFailoverOrStop"/>
</Test>

```

## Event Burst Management

UFM event burst management can lower the overall CPU usage following an event burst by suppressing events. Event burst management is configured in the *gv.cfg* configuration file.

When the overall CPU usage exceeds the threshold configured by the *CpuUsageTest* in the */opt/ufm/files/conf/UFMHealthConfiguration.xml* file, a High CPU Utilization event occurs.

This event initiates the UFM event burst management, which:

- Suppresses events. The default level of suppression enables critical events only.
- If, after a specified period of time (30 seconds, by default), no further High CPU Utilization event occurs, the UFM server enables all events.

To modify Event burst management configuration, change the following parameters in the `gv. cfg` file:

```
# The events' level in case events are suppressed (the possible levels are disable_all_events,  
enable_critical_events, and enable_all_events)  
# The entire feature can be turned off using the level "enable_all_events"  
suppress_events_level = enable_critical_events  
# The amount of time in seconds which events are suppressed  
suppress_events_timeout = 30
```

---

# Events and Alarms

UFM offers comprehensive diagnostics for your InfiniBand fabric, covering a range of categories:

1. Fabric configurations
2. Fabric topology
3. Hardware issues
4. Communication errors
5. Maintenance
6. Security
7. Switch module status
8. NVIDIA SHARP notifications

Events are notifications generated by UFM, indicating issues within the mentioned categories in the InfiniBand fabric. On the other hand, alerts are urgent notifications derived from events (many events can be configured as alarms based on customer preferences).

These detections are performed both before running applications and during standard operation. They help troubleshoot and notify network administrators of potential network issues before they escalate.

Events can originate from various sources:

- SM traps
- SHARP AM traps
- UFM internal analysis, encompassing:

- Internal detection of topology changes
- Internal fabric analysis (based on IBDiagnet)
- Internal monitoring of managed switches
- Maintenance activities (device action tracking, licensing, cable integrity)
- Threshold-crossing events determined by telemetry counter readings

	WebUI	REST API
<b>Events</b>	UFM events can be viewed via the Events and Alarms WebUI view. Refer to <a href="#">Events &amp; Alarms</a> .	<a href="#">Events REST API</a>
	For device-specific events, refer to the <a href="#">Events &amp; Alarms</a> .	N/A
	Configuration of events is managed within the <a href="#">Events Policy Tab</a> in the Settings window	<a href="#">Events Policy REST API</a>
<b>Alarms</b>	UFM alarms can be viewed via the Events and Alarms WebUI view. Refer to <a href="#">Events &amp; Alarms</a> .	<a href="#">Alarms REST API</a>
	Configuration of alarms is managed within the <a href="#">Events Policy Tab</a> in the Settings window	N/A

For showing all the UFM supported events, refer to [Threshold-Crossing Events Reference](#).



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# Reports

UFM reports provide summarized information about selected topics. Through the different UFM WebUI tabs, you can create reports that run a series of checks on UFM components.

The table below summarizes the types of reports and provides useful links for more information.

Report Type	Description	WebUI	REST API
UFM Health Report	A report that run a series of checks related to UFM server health, including CPU, memory, license, configurations and disk monitoring.	<a href="#">UFM Health Tab</a>	<a href="#">Reports REST API</a>
Fabric Health Report	Through the Fabric Health tab, you can access the fabric health reports. There are two kinds of reports: <ul style="list-style-type: none"><li>• Custom Reports - The user can generate a report that runs a series of checks on the fabric on demand.</li><li>• Periodic Reports - An automatically generated report that is periodically generated by the UFM.</li></ul>	<a href="#">Fabric Health Tab</a>	<a href="#">Reports REST API</a> <a href="#">Periodic Fabric Health REST API</a>
Topology Comparison Report	Reports on topology comparison, available as: <ul style="list-style-type: none"><li>• Periodic Comparison - allows users to compare the current fabric topology with a preset master topology.</li><li>• Custom Comparison - compares user-defined topology with the current fabric topology.</li></ul>	<a href="#">Topology Compare Tab</a>	<a href="#">Topology Compare REST API</a>

Report Type	Description	WebUI	REST API
Daily Reports	The Daily Report feature collects, analyzes, and reports the most significant issues of the fabric in the last 24 hours	<a href="#">Daily Reports Tab</a>	N/A

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# Telemetry

UFM Telemetry allows the collection and monitoring of InfiniBand fabric port statistics, such as network bandwidth, congestion, errors, latency, and more.

UFM provides a range of telemetry capabilities:

- Real-time monitoring views
- Monitoring of multiple attributes
- Intelligent Counters for error and congestion counters
- InfiniBand port-based error counters
- InfiniBand congestion XmitWait counter-based congestion measurement
- InfiniBand port-based bandwidth data

The telemetry session panels support the following actions:

- Rearrangement via a straightforward drag-and-drop function
- Resizing by hovering over the panel's border

UFM Telemetry data is collected via UFM telemetry instances invoked during UFM startup.

Telemetry Instance	Description	REST API
<b>High-Frequency (Primary) Telemetry Instance</b>	<p>A default telemetry session that collects a predefined set of ~30 counters covering bandwidth, congestion, and error metrics, which UFM analyzes and reports. These counters are used for:</p> <ul style="list-style-type: none"><li>• Default Telemetry Session - An ongoing session used by the UFM to display UFM WebUI dashboard</li></ul>	<p>For Default and Real-time Telemetry: <a href="#">Monitoring REST API</a></p> <p>For Historical Telemetry:</p>

Telemetry Instance	Description	REST API
	<p>charts information and for monitoring and analyzing ports threshold events (the session interval is 30 secs by default)</p> <ul style="list-style-type: none"> <li>• <b>Real-Time Telemetry</b> - allows users to define live telemetry sessions for monitoring small subsets of devices or ports and a selected set of counters. For more information, refer to <a href="#">Telemetry - User-Defined Sessions</a></li> <li>• <b>Historical Telemetry</b> - based on the primary telemetry and collects statistical data from all fabric ports and stores them in an internal UFM SQLite database (the session interval is 5 mins by default)</li> </ul>	<a href="#">History Telemetry Sessions REST API</a>
<b>Low-Frequency (Secondary) Telemetry Instance</b>	<p>Operates automatically upon UFM startup, offering an extended scope of 120 counters. For a list of the Secondary Telemetry Fields, refer to <a href="#">Low-Frequency (Secondary) Telemetry Fields</a>.</p>	N/A

For direct telemetry endpoint access, which exposes the list of supported counters:

For the **High-Frequency (Primary) Telemetry Instance**, run the following command:

```
curl http://r-ufm114:9001/csv/cset/converted_enterprise
```

For the **Low-Frequency (Secondary) Telemetry Instance**, run the following command:

```
curl http://r-ufm114:9002/csv/xcset/low_freq_debug
```

## Historical Telemetry Collection in UFM

### Storage Considerations

UFM periodically collects fabric port statistics and saves them in its SQLite database. Before starting up UFM Enterprise, please consider the following disk space utilization for various fabric sizes and duration.

The measurements in the table below were taken with sampling interval set to once per 30 seconds.

**i Note**

Be aware that the default sampling rate is once per 300 seconds. Disk utilization calculation should be adjusted accordingly.

Number of Nodes	Ports per Node	Storage per Hour	Storage per 15 Days	Storage per 30 Days
16	8	1.6 MB	576 MB (0.563 GB)	1152 MB (1.125 GB)
100	8	11 MB	3960 MB (3.867 GB)	7920 MB (7.734 GB)
500	8	50 MB	18000 MB (17.58 GB)	36000 MB (35.16 GB)
1000	8	100 MB	36000 MB (35.16 GB)	72000 MB (70.31 GB)

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# UFM Web UI

This section is constituted by the following sub-sections:

- [Fabric Dashboard](#)
- [Network Map](#)
- [Managed Elements](#)
- [Events & Alarms](#)
- [Telemetry - User-Defined Sessions](#)
- [System Health](#)
- [Jobs](#)
- [Settings](#)

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# Multi-Subnet UFM

## Overview

The Multi-Subnet UFM feature allows for the management of large fabrics, consisting of multiple sites, within a single product, namely Multi-Subnet UFM.

This feature is comprised of two layers: UFM Multi-Subnet Provider and UFM Multi-Subnet Consumer.

The UFM Provider functions as a Multi-Subnet Provider, exposing all local InfiniBand fabric information to the UFM consumer. On the other hand, the UFM Consumer acts as a Multi-Subnet Consumer, collecting and aggregating data from currently configured UFM Providers, enabling users to manage multiple sites in one place. While UFM Consumer offers similar functionality to regular UFM, there are several behavioral differences related to aggregation.

## Setting Up Multi-Subnet UFM

In `/opt/ufm/files/conf/gv.cfg`, fill in the section named `[Multisubnet]` for UFM Multi-Subnet Provider and Consumer.

### To set up UFM as a Multi-Subnet Provider, perform the following:

- Set `multisubnet_enabled` to `true`
- Set `multisubnet_role` to `provider`
- Set `multisubnet_site_name` (optional, if not set, it will be randomly generated); e.g., `provider_1`
- Start UFM

### To set up UFM as a Multi-Subnet Consumer, perform the following:

- Set `multisubnet_enabled` to `True`

- Set `multisubnet_role` to `consumer`
- Start UFM

It is important to note that UFM Multi-Subnet Consumer can be configured on a machine or VM without an established InfiniBand connectivity. Additionally, users may customize UFM Provider and Consumer using optional configuration parameters found in the [Multisubnet] section of `/opt/ufm/files/conf/gv.cfg`.

## Functionality

1. Following the initial launch of the Consumer, the Dashboard view is devoid of data, and a message containing a hyperlink leading to the Provider Management section is displayed.





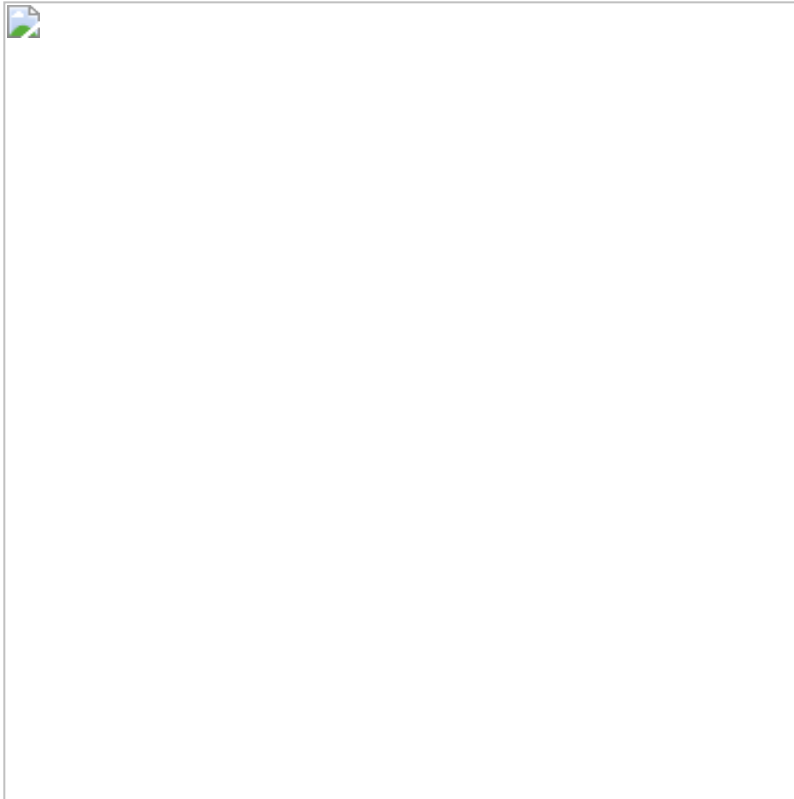


2. As shown in the below snapshot, a new section for Provider Management has been added, enabling users to configure UFM Providers.



1. To add a provider, the user is required to enter its IP address and credentials. Unless there are multiple instances of UFM providers on a single machine, the advanced section parameters should be set with default values. However, if

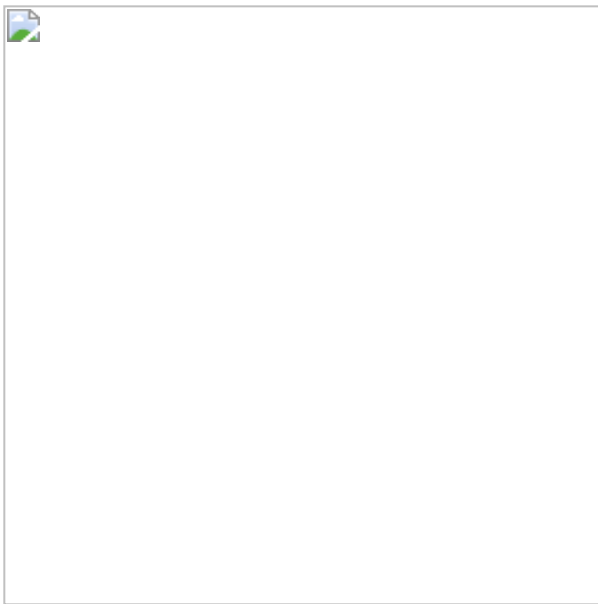
there are multiple instances, the advanced parameters may be set per Provider and then be configured in the Providers Management view.



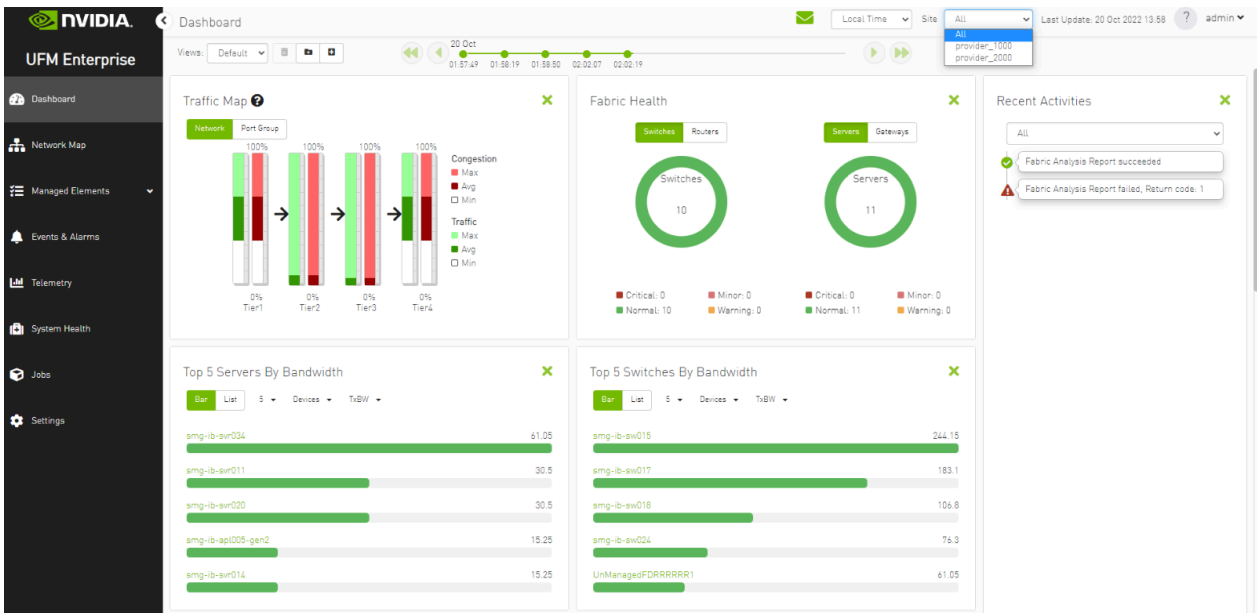
2. By editing the Provider view, you can change Provider's credentials.



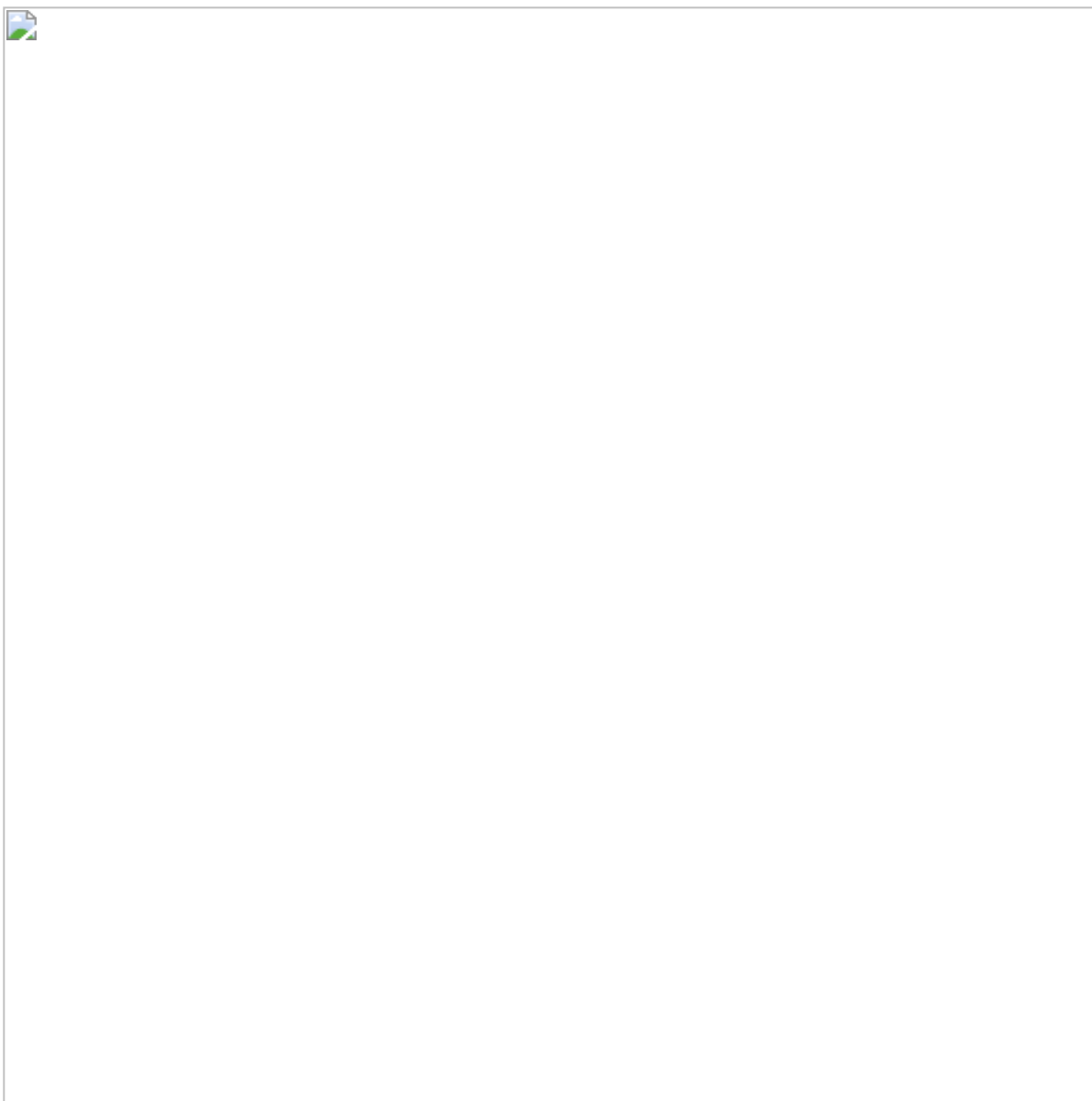
3. The "Delete Provider" function removes the selected Provider from the Consumer. Please note that this action may take some time to complete, and changes may only be reflected in the view after approximately 30 seconds.



3. A general filter has been added to the top right corner of the page, enabling users to filter displayed data by site.



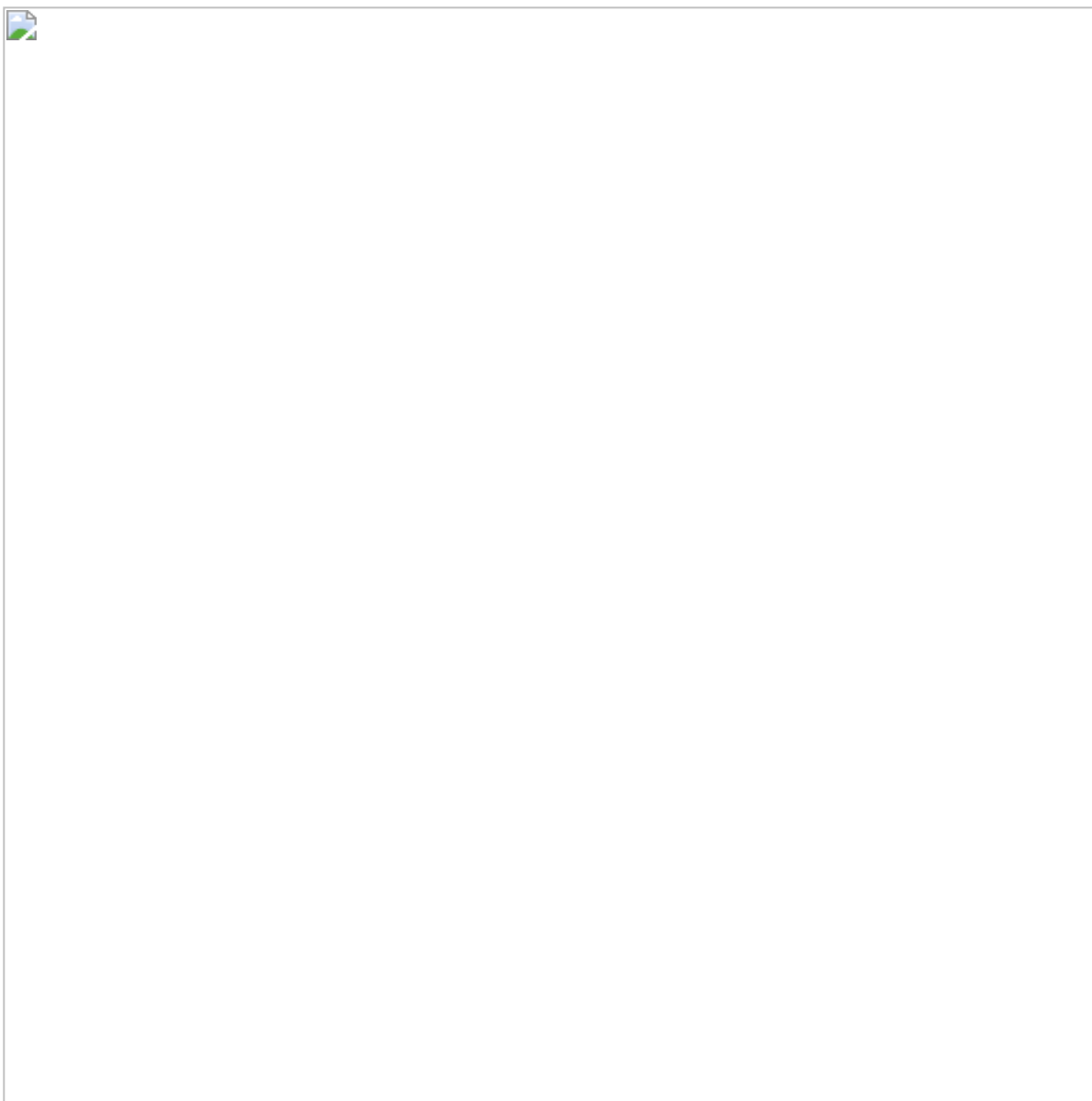




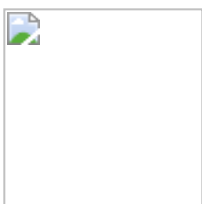
4. Network map contains “clouds” for each provider.



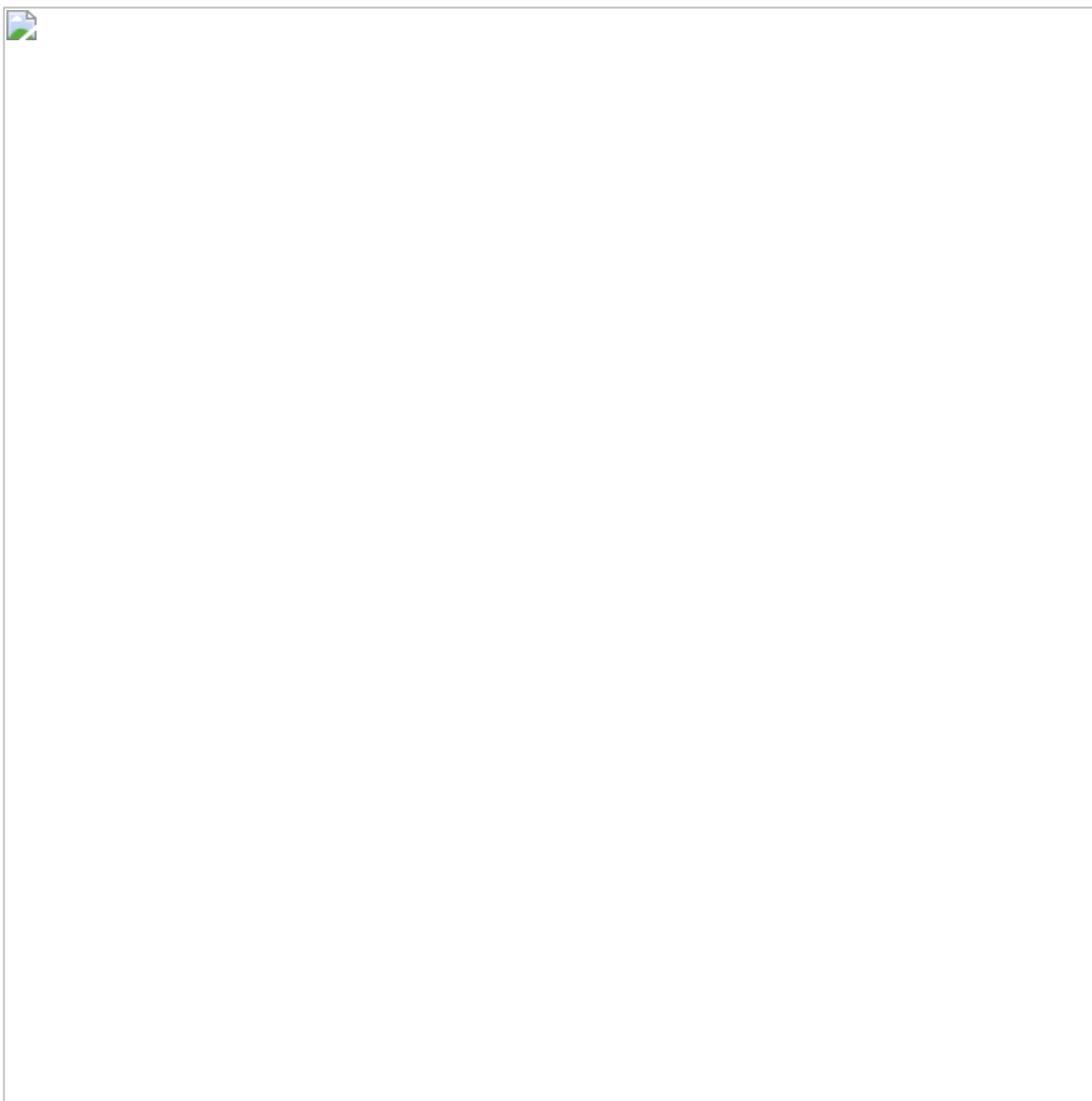




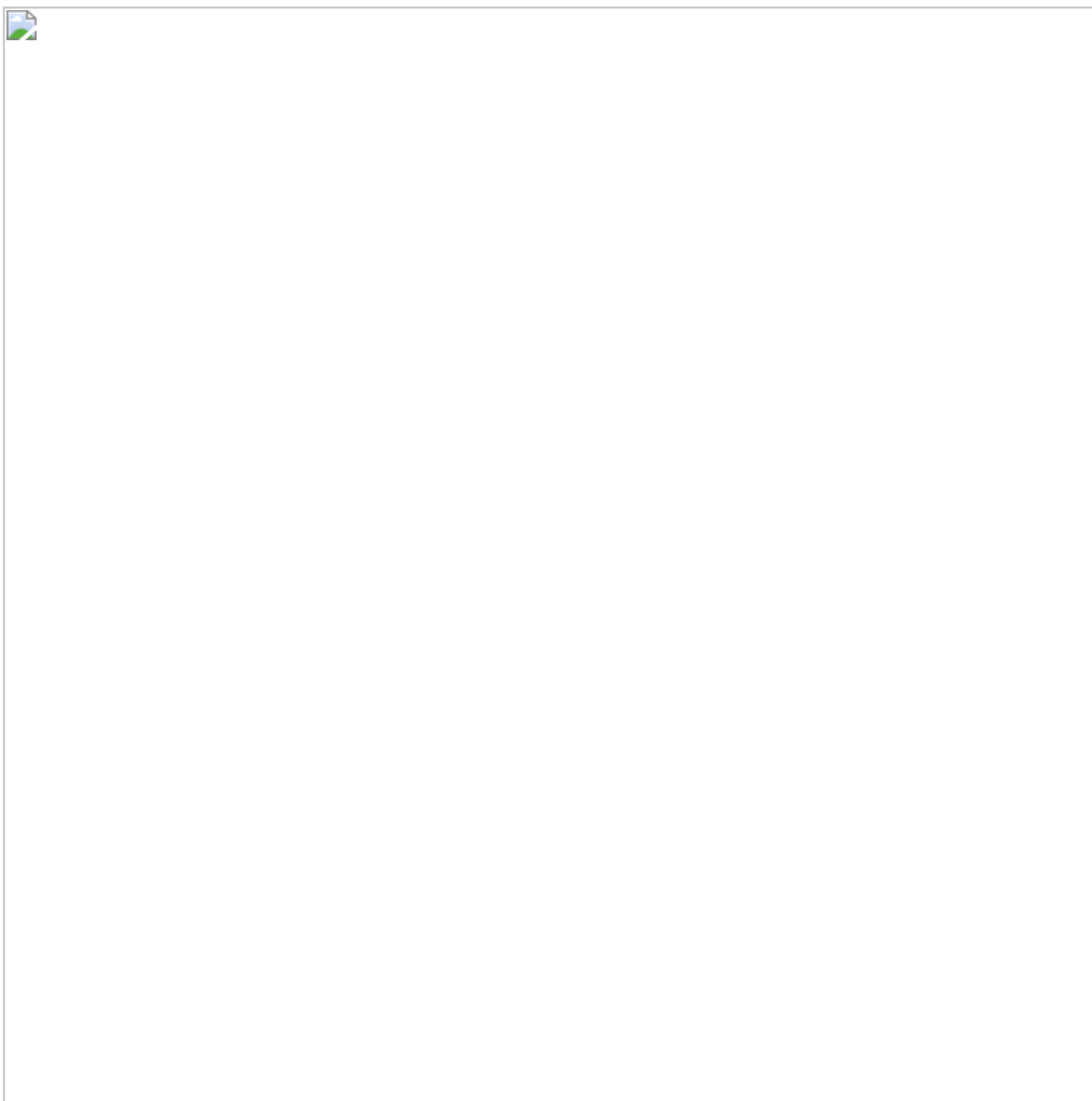
5. A "Site Name" column is present in all Managed Elements sections. The column is disabled (hidden) by default.







6. The "Group" and "Telemetry" sections include "Site" filters.



7. The filter in "Groups" impacts the Members table only.





8. In the System Health tab, subsections for Consumer and Provider are available.

1. Consumer System Health tab contains sections applicable to Consumer UFM specifically (e.g., logs from Consumer UFM).



2. Provider System Health contains sections applicable to one or multiple providers (e.g., Fabric Health Report can be triggered on multiple Providers from the Consumer).





9. UFM Health tab contains sub report tables for each provider.

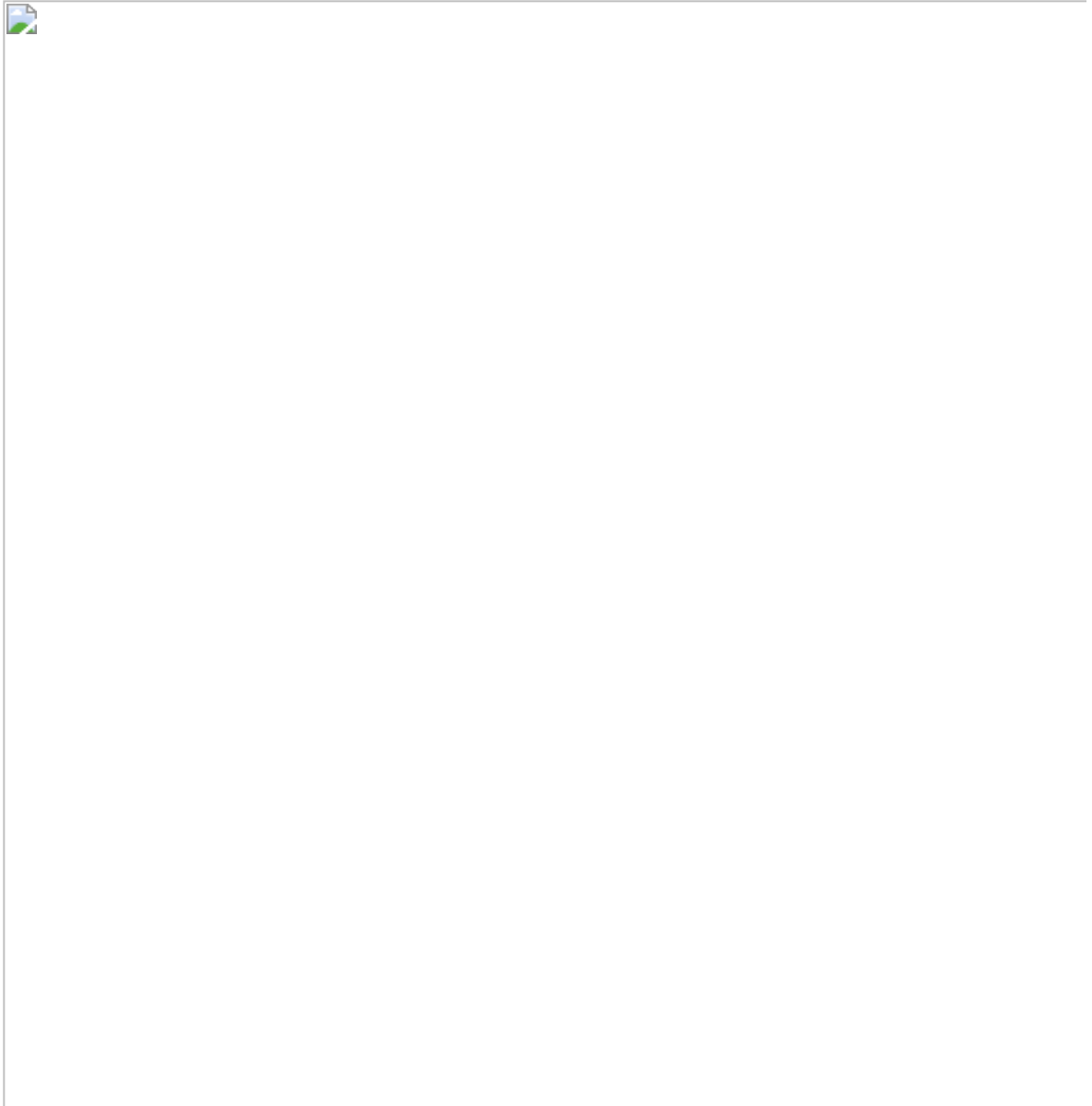


10. Fabric Health contains sub report tables for each provider.



## 11. Daily Reports:

1. Consumer Daily reports display consumer reports.



2. Providers Daily reports display reports from all providers.

Providers System Health Local Time (Asia/Jerusalem) Site All

UFM Health UFM Logs UFM System Dump Fabric Health Daily Reports Fabric Validation

Recipients List Displayed Columns

Report ↓	Site Name
Filter..	Filter..
2023-04-11	provider_2000
2023-04-10	provider_2000

Viewing 1-2 of 2 20

12. The "Fabric Validation" tab contains sub report tables for each provider.



13. In "UFM Logs" Tab:

1. Consumer logs:



2. Providers logs display providers log separately, displaying logs for all providers is not supported.



14. In the "System Dump" tab:

1. "Consumer System Dump" collects system dump for consumer





2. "Providers System Dump" collect system dumps for one or all providers and mergeS them into one folder

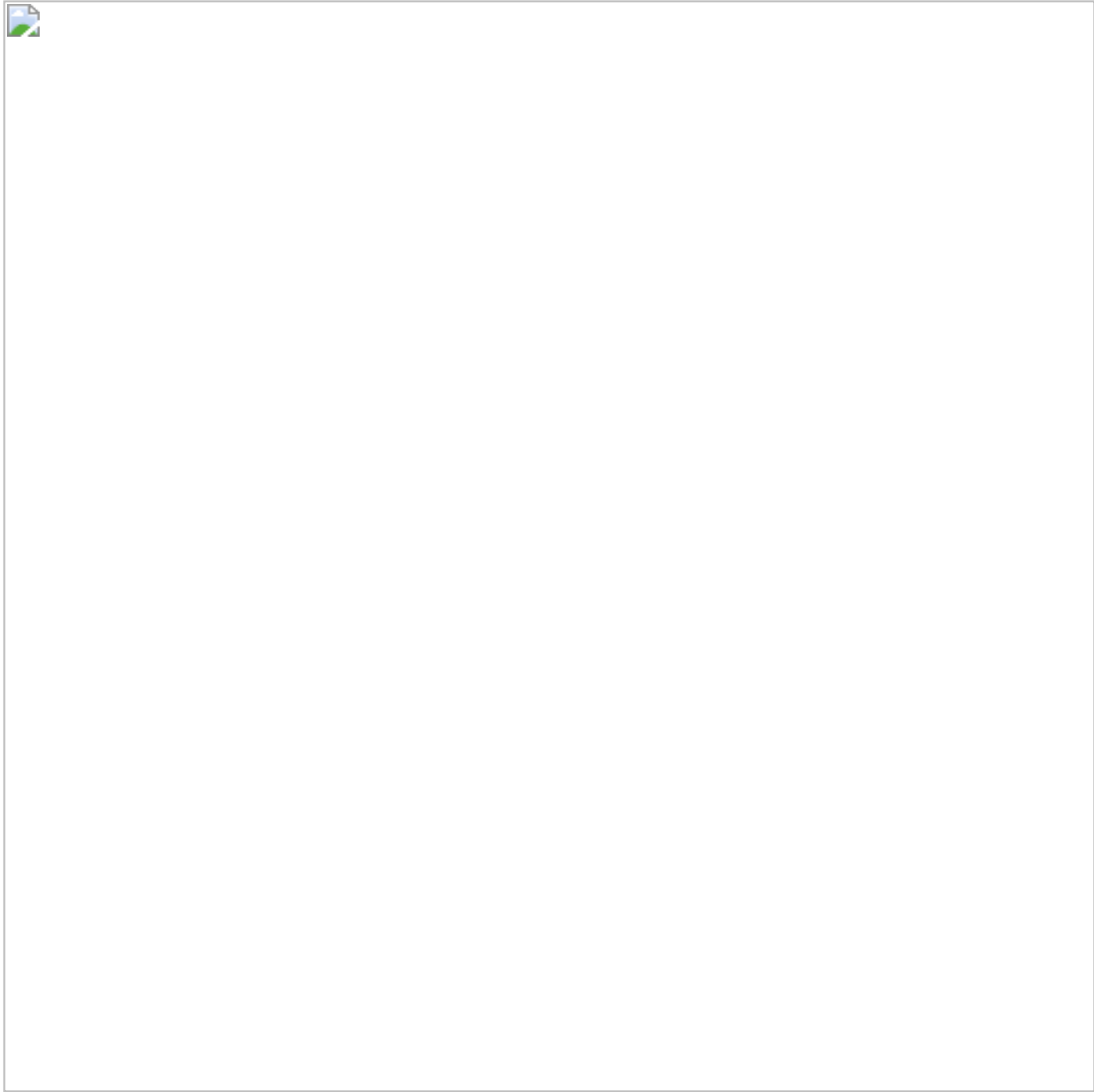


15. Under "Settings", subsections for Consumer and Provider are available.

1. "Consumer Settings" contain sections applicable to Consumer UFM specifically (e.g., creation of access tokens for UFM consumer authentication);



2. "Provider Settings" contain sections applicable to one or multiple providers (e.g., Event Policies can be changed for multiple Providers at once from the Consumer).



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# UFM Plugins

## UFM Plugins Management

UFM plugin management can be done either via the `manage_ufm_plugins.sh` script or via the Web UI.

### UFM Plugin Management Using `themanage_ufm_plugins.sh` Script

The `manage_ufm_plugins.sh` script, located in the `/opt/ufm/scripts` directory, is designed to manage UFM plugins through the command line interface.

To see the actions supported by this script, run:

```
/manage_ufm_plugins.sh --help
usage: manage_ufm_plugins.sh <command> [<args>]
positional arguments:
  {show,get-all,enable,start,stop,disable,add,upgrade,remove_image,remove,is-running,is-enable,get-
http-proxy-port,debug,deploy,deploy-bundle}
      Commands
show          Show plugins info
get-all      get all loaded plugins
enable       Enable plugin
start        Start plugins
stop         Stop all plugins
disable      Disable plugin
add          Add plugin
upgrade      Upgrade plugin
remove_image Remove plugin`s image
remove       Remove plugin
is-running   Test plugin is running
is-enable    Test plugin is enabled
get-http-proxy-port
              Get plugin HTTP proxy port
debug        Debug
```

```
deploy      Deploy plugin image
deploy-bundle  Deploy bundle of plugins
```

### Optional Arguments:

```
-h, --help      show this help message and exit
-v, --version    Print version information
```

Each supported option has its own help flag, which can be received by requesting help for a specific parameter. For example:

```
./manage_ufm_plugins.sh add --help
```

### Usage:

```
manage_ufm_plugins.pyc <command> [<args>] add [-h] -p <[A-Za-z0-9_-] Name size: 32> [-t <[A-Za-z0-9_-] Name size: 128>]
```

### Optional Arguments:

```
-h, --help      show this help message and exit
-p <[A-Za-z0-9_-] Name size: 32>, --plugin-name <[A-Za-z0-9_-] Name size: 32>      Plugin
name
-t <[A-Za-z0-9_-] Name size: 128>, --plugin-tag <[A-Za-z0-9_-] Name size: 128>      Plugin tag
```

The following table lists the supported commands and provides their description and information on the parameters.

Command	Description	Parameters
show	Shows information about running plugins	N/A
get-all	Gets information about deployed plugins in JSON format	N/A
enable	Enables plugin	Loaded Parameter: plugin image name
start	Starts UFM plugin	Loaded Parameter: plugin name
stop	Stops UFM plugin	Loaded Parameter: plugin name
disable	Disables UFM plugin	Loaded Parameter: plugin name
add	Adds UFM plugin	Loaded Parameter: image name
upgrade	Upgrades UFM plugin	Loaded Parameter: plugin name
remove_image	Removes UFM plugin's image	Loaded Parameter: plugin image name
remove	Removes UFM plugin	Loaded Parameter: plugin name
is-running	Tests plugin is running	Loaded Parameter: plugin name

Command	Description	Parameters
is-enabled	Tests plugin is enabled	Loaded Parameter: plugin name
get-http-proxy-port	Gets plugin HTTP proxy port	Loaded Parameter: plugin name
deploy	Deploys plugin image	Loaded Parameter: -f flag with path to UFM plugin image
deploy-bundle	Deploys bundle of plugins	Loaded Parameter: -f flag with path to tarball file, that will contain number of UFM plugins. All the plugin images from the tar ball will be deployed to UFM. Operation could take some time. The progress of the plugin images from the tar file deployment will be printed to terminal, including error messages, if exists.

## UFM Plugins

- [Plugins Bundle](#)
- [REST-RDMA Plugin](#)
- [NDT Plugin](#)
- [UFM Telemetry Fluentd Streaming \(TFS\) Plugin](#)
- [UFM Events Fluent Streaming \(EFS\) Plugin](#)
- [UFM Bright Cluster Integration Plugin](#)
- [UFM Cyber-AI Plugin](#)
- [Autonomous Link Maintenance \(ALM\) Plugin](#)
- [ClusterMinder Plugin](#)
- [GRPC-Streamer Plugin](#)



- [Sysinfo Plugin](#)
- [SNMP Plugin](#)
- [Packet Level Monitoring Collector \(PMC\) Plugin](#)
- [PDR Deterministic Plugin](#)
- [GNMI-Telemetry Plugin](#)
- [UFM Telemetry Manager \(UTM\) Plugin](#)
- [UFM Consumer Plugin](#)
- [Fast-API Plugin](#)
- [UFM Light Plugin](#)
- [Key Performance Indexes \(KPI\) Plugin](#)

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# Troubleshooting

## Split-Brain Recovery in HA Installation

The split-brain problem is a DRBD synchronization issue (HA status shows DUnknown in the DRBD disk state), which occurs when both HA nodes are rebooted. For example, in cases of electricity shut-down. To recover, please follow the below steps:

- **Step 1:** Manually choose a node where data modifications will be discarded.

It is called the split-brain victim. Choose wisely; all modifications will be lost! When in doubt, run a backup of the victim's data before you continue.

When running a Pacemaker cluster, you can enable maintenance mode. If the split-brain victim is in the Primary role, bring down all applications using this resource. Now switch the victim to the Secondary role:

```
victim# drbdadm secondary ha_data
```

- **Step 2:** Disconnect the resource if it's in connection state **WFConnection**:

```
victim# drbdadm disconnect ha_data
```

- **Step 3:** Force discard of all modifications on the split-brain victim:

```
victim# drbdadm -- --discard-my-data connect ha_data
```

For DRBD 8.4.x:

```
victim# drbdadm connect --discard-my-data ha_data
```

- **Step 4:** Resync starts automatically if the survivor is in a WFCConnection network state. If the split-brain survivor is still in a Standalone connection state, reconnect it:

```
survivor# drbdadm connect ha_data
```

Now the resynchronization from the survivor (SyncSource) to the victim (SyncTarget) starts immediately. There is no full sync initiated, but all modifications on the victim will be overwritten by the survivor's data, and modifications on the survivor will be applied to the victim.

## Performing Failover on Non-Master Node

The `ufm_ha_cluster` failover action fails with the following error: "Cannot perform failover on non-master node". To fix, follow the below action:

- **Step 1:** Verify that `/etc/hosts` file on both the master and standby UFM hosts contains the correct host names and IP addresses mapping.
- **Step 2:** If necessary, fix the mapping and retry the failover command.

## Restoring UFM Data Upon In-Service Upgrade Failure

### Note

These instructions apply in high availability scenario only.

In the event of an in-service upgrade failure, the previous version of UFM's data will be safeguarded as a backup in the `/opt/ufm/BACKUP` directory, formatted as `"ufm_upgrade_backup_<prev_version>-<new_version>_<date>.zip."`

To restore the data on the unupgraded node, follow these steps:

1. Copy the backup file from the upgraded node to the unupgraded node using the following command:

```
scp /opt/ufm/BACKUP/ufm_upgrade_backup_<prev_version>-<new_version<_<date>.zip  
root@<unupgraded_node_ip>:/opt/ufm/BACKUP/
```

2. Perform a failover of UFM to the master node, which is mandatory for data mount migration (including '/opt/ufm/files') to the master node: On the Master node, execute:

```
ufm_ha_cluster takeover
```

3. Stop UFM on the unupgraded node:

```
ufm_ha_cluster stop
```

4. Restore UFM configuration files from the backup:

```
/opt/ufm/scripts/ufm_restore.sh -f /opt/ufm/BACKUP/ufm_upgrade_backup_<prev_version>-  
<new_version<_<date>.zip
```

5. Start UFM on the unupgraded node (Note: Only the upgraded node can function until the upgrade issue is resolved, and failovers will not work).

Now, the issue that caused the upgrade failure can be addressed. If the problem is resolved, you can attempt the in-service upgrade again by failing UFM over to the upgraded node.

Alternatively, if needed, you can revert the changes made by reinstalling the old UFM version on the upgraded node.

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# Appendixes

- [SM Configurations](#)
- [Appendix – Diagnostic Utilities](#)
- [Appendix - Supported Port Counters and Events](#)
- [Appendix – Used Ports](#)
- [Appendix – Configuration Files Auditing](#)
- [Appendix – IB Router](#)
- [Appendix – NVIDIA SHARP Integration](#)
- [Appendix - UFM SLURM Integration](#)
- [Appendix - Switch Grouping](#)
- [Appendix – Device Management Feature Support](#)

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# Document Revision History

Release	Date	Description
6.1 8.0	Aug 14, 2024	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a></li> <li>• <a href="#">Bug Fixes in This Release</a></li> <li>• <a href="#">Known Issues in This Release</a></li> <li>• <a href="#">Installation Notes</a></li> <li>• <a href="#">Installing UFM Server Software</a> - Added a note on Docker installation via SNAP on Ubuntu OSs</li> <li>• <a href="#">Data Streaming</a></li> <li>• <a href="#">Installing UFM on Docker Container - High Availability Mode</a> - Added two pre-deployment requirements</li> <li>• <a href="#">REST-RDMA Plugin</a> - Updated "Authenticated Remote ibdiagnet Request"</li> <li>• <a href="#">Topology Compare Tab and Events &amp; Alarms</a> - Updated screenshots</li> <li>• <a href="#">Appendix - Supported Port Counters and Events</a> - Added 1605 and 1606 alarm IDs</li> <li>• <a href="#">Autonomous Link Maintenance (ALM) Plugin</a> - Added "Data Filter" and "Metric Filter" ALM jobs</li> <li>• <a href="#">UFM Telemetry Manager (UTM) Plugin</a> - Added an important note on UFM credentials, added instructions on accessing UTM API commands and "Command List"</li> <li>• <a href="#">GNMI-Telemetry Plugin</a></li> </ul> <p>Added:</p> <ul style="list-style-type: none"> <li>• <a href="#">Excluding Unhealthy Ports from Fabric Health Report</a></li> <li>• <a href="#">Adjusting UFM Configuration Files Based on Fabric Size</a></li> <li>• <a href="#">Exposing Performance Histogram Counters</a> .</li> <li>• <a href="#">Plugins Bundle</a></li> <li>• <a href="#">UFM Plugins Management</a></li> <li>• <a href="#">Key Performance Indexes (KPI) Plugin</a></li> <li>• <a href="#">UFM Light Plugin</a></li> </ul>
6.1 7.2	Jun 24, 2024	Added bug fix (Ref #3912416) to <a href="#">Bug Fixes in This Release</a>

Release	Date	Description
	Jun 26, 2024	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Upgrading UFM on Bare Metal Server</a></li> <li>• <a href="#">Upgrading UFM on Docker Container</a></li> <li>• <a href="#">GNMI-Telemetry Plugin</a></li> <li>• <a href="#">Fast-API Plugin</a></li> </ul>
6.1 7.1	May 28, 2024	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Bug Fixes in This Release</a></li> <li>• <a href="#">Known Issues in This Release</a></li> </ul> <p>Added <a href="#">Fast-API Plugin</a></p>
	Jun 17, 2024	<ul style="list-style-type: none"> <li>• Updated the <a href="#">Fast-API Plugin</a> name</li> <li>• Updated <a href="#">Enabling UFM Authentication Server</a></li> </ul>
6.1 7.0	May 7, 2024	<p>Introduced a minor reorganization of the document.</p> <p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a></li> <li>• <a href="#">Bug Fixes in This Release</a></li> <li>• <a href="#">GNMI-Telemetry Plugin</a></li> <li>• <a href="#">Events Policy</a> - Updated event policy parameters</li> <li>• <a href="#">Inventory Window</a></li> <li>• <a href="#">Devices Window</a></li> <li>• <a href="#">UFM Health Tab</a></li> <li>• <a href="#">UFM System Dump Tab</a></li> <li>• <a href="#">Device Access</a> - Updated screenshot and parameters</li> <li>• <a href="#">Configurations of the UFM Authentication Server</a> - Updated that it is turned on by default</li> <li>• <a href="#">Autonomous Link Maintenance (ALM) Plugin</a></li> <li>• <a href="#">PDR Deterministic Plugin</a> - updated the configuration table</li> <li>• <a href="#">Low-Frequency (Secondary) Telemetry Fields</a></li> <li>• <a href="#">Appendix - Supported Port Counters and Events</a> - Added and removed alarm IDs</li> </ul> <p>Added:</p>



Release	Date	Description
		<ul style="list-style-type: none"> <li>• <a href="#">Events and Alarms</a></li> <li>• <a href="#">Reports</a></li> <li>• <a href="#">Telemetry</a></li> <li>• <a href="#">Events Policy Simulation</a></li> <li>• <a href="#">UFM Telemetry Manager (UTM) Plugin</a></li> <li>• <a href="#">UFM Consumer Plugin</a></li> </ul>
	May 13, 2024	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Known Issues in This Release</a> - Added issue # 3862847</li> <li>• <a href="#">Installation Notes</a> - Updated the latest tested FW versions in Supported NVIDIA Externally/Internally Managed Switches</li> <li>• <a href="#">PDR Deterministic Plugin</a></li> </ul>
	May 24, 2024	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Known Issues in This Release</a> - Added issue #3872303</li> <li>• <a href="#">UFM Telemetry Fluentd Streaming (TFS) Plugin</a></li> <li>• <a href="#">GNMI-Telemetry Plugin</a></li> <li>• <a href="#">PDR Deterministic Plugin</a></li> </ul>
6.1 6.0	Feb 8, 2024	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a></li> <li>• <a href="#">Bug Fixes in This Release</a></li> <li>• <a href="#">Installation Notes</a></li> <li>• <a href="#">Secondary Telemetry</a> - Added the secondary_slvl_support flag and information on the default counters and added <a href="#">Secondary Telemetry Exposing IPv6 Counters</a></li> <li>• <a href="#">PDR Deterministic Plugin</a> - Updated instructions</li> <li>• <a href="#">Link Analysis</a> - Updated GUI screenshots</li> <li>• <a href="#">Device Cable Tab</a> - Updated GUI screenshots</li> <li>• <a href="#">Cables Window</a> - Updated GUI screenshots</li> <li>• <a href="#">Packet Level Monitoring Collector (PMC) Plugin</a> - Updated overview and GUI screenshots</li> <li>• <a href="#">General Tab</a>, <a href="#">Inventory Tab</a> and <a href="#">Inventory Window</a> - Updated GUI screenshots</li> </ul>

Release	Date	Description
		<ul style="list-style-type: none"> <li>• <a href="#">SM Congestion Control Configuration</a> - Updated GUI screenshot</li> <li>• <a href="#">Autonomous Link Maintenance (ALM) Plugin</a> - Added GUI screenshots in ALM UI</li> <li>• <a href="#">Appendix – UFM Subnet Manager Default Properties</a> - Updated the max_op_vls from 3 to 2.</li> </ul> <p>Added:</p> <ul style="list-style-type: none"> <li>• <a href="#">Kerberos Authentication and Enabling Kerberos Authentication</a></li> <li>• <a href="#">Secondary Telemetry Exposing IPv6 Counters</a></li> <li>• <a href="#">Dynamic Telemetry</a></li> <li>• <a href="#">Configuring Syslog</a></li> <li>• <a href="#">Configuring UFM Logging</a></li> <li>• <a href="#">Appendix - OpenSM Configuration Files for Congestion Control</a></li> </ul>
	Mar 6, 2024	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Troubleshooting</a></li> <li>• <a href="#">Known Issues in This Release</a></li> <li>• <a href="#">Installation Notes</a></li> </ul>
6.1 5.2	Jan 4, 2024	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a></li> <li>• <a href="#">Known Issues in This Release</a></li> </ul>
	Jan 23, 2024	Added a note to <a href="#">Installation Notes</a> about the UFM SM version
6.1 5.1	Dec 14, 2023	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Bug Fixes in This Release</a></li> <li>• <a href="#">Known Issues in This Release</a></li> <li>• <a href="#">Supported NVIDIA Internally Managed Switches</a> - Removed MTX6100, MTX6240 and MTX6280 switches and the SX6036G (FDR) gateway</li> <li>• <a href="#">Installation Notes</a> - Updated with the new MFT package version</li> <li>• <a href="#">System Requirements</a> - Added MLNX_OFED23.x</li> </ul>

Release	Date	Description
		<ul style="list-style-type: none"> <li>• <a href="#">Unsupported Functionalities/Features</a></li> </ul> <p>Added:</p> <ul style="list-style-type: none"> <li>• <a href="#">Cable Validation Report in Subnet Merger</a></li> </ul>
	Dec 19, 2023	<ul style="list-style-type: none"> <li>• Updated <a href="#">Changes and New Features</a></li> <li>• Added a Known issue to <a href="#">Bug Fixes in This Release</a></li> </ul>
6.1 5.0	Nov 5, 2023	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a></li> <li>• <a href="#">Bug Fixes in This Release</a></li> <li>• <a href="#">Azure Authentication Login Page</a> - Introduced new Azure authentication login page</li> <li>• <a href="#">Enabling Azure AD Authentication</a> - Added further instructions</li> <li>• <a href="#">UFM Logs Tab</a> - Added log occurrences display</li> </ul> <p>Added</p> <ul style="list-style-type: none"> <li>• <a href="#">Events History</a></li> <li>• <a href="#">Device Status Events</a></li> <li>• <a href="#">Link Status Events</a></li> <li>• <a href="#">GNMI-Telemetry Plugin</a></li> <li>• In <a href="#">Secondary Telemetry</a>, added instructions on <a href="#">Exposing Switch Aggregation Nodes Telemetry</a> and <a href="#">Stopping Telemetry Endpoint Using CLI Command</a></li> <li>• <a href="#">UFM Authentication Server</a></li> <li>• <a href="#">Enabling UFM Authentication Server</a></li> <li>• <a href="#">Low-Frequency (Secondary) Telemetry Fields</a></li> </ul>
6.1 4.1	Aug 31, 2023	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a></li> <li>• <a href="#">Bug Fixes in This Release</a></li> </ul>
	Oct 17, 2023	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">System Requirements</a></li> </ul>

Release	Date	Description
6.1 4.0	Aug 10, 2023	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a></li> <li>• <a href="#">Bug Fixes in This Release</a></li> <li>• <a href="#">Known Issues in This Release</a></li> <li>• <a href="#">Plugin Management</a></li> <li>• <a href="#">Secondary Telemetry</a></li> <li>• <a href="#">PDR Deterministic Plugin</a> - Updated step 3 in "Deployment".</li> <li>• <a href="#">REST-RDMA Plugin</a></li> <li>• <a href="#">NDT Plugin</a></li> <li>• <a href="#">Autonomous Link Maintenance (ALM) Plugin</a></li> <li>• <a href="#">Appendix - Supported Port Counters and Events</a> - Added alarm ID #134, 1602 and 1603 and status column for all alarm IDs.</li> </ul> <p>Added:</p> <ul style="list-style-type: none"> <li>• <a href="#">Disabling Rest Roles Access Control</a></li> <li>• <a href="#">Enabling Azure AD Authentication</a></li> <li>• <a href="#">Azure AD Authentication</a></li> <li>• <a href="#">Health Policy Management</a></li> <li>• <a href="#">Rest Roles Access Control</a></li> <li>• <a href="#">UFM Factory Reset</a></li> </ul>
6.1 3.1	May 18, 2023	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a></li> <li>• <a href="#">Bug Fixes in This Release</a></li> </ul>
6.1 3.0	May 5, 2023	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a></li> <li>• <a href="#">Bug Fixes in This Release</a></li> <li>• <a href="#">Known Issues in This Release</a></li> <li>• <a href="#">Email</a> - Added time zone preference</li> <li>• <a href="#">NDT Plugin</a></li> <li>• <a href="#">UFM Telemetry Fluentd Streaming (TFS) Plugin</a> - Updated REST API</li> <li>• <a href="#">UFM System Dump Tab</a></li> <li>• <a href="#">Appendix - Supported Port Counters and Events</a></li> </ul>

Release	Date	Description
		<p>Added:</p> <ul style="list-style-type: none"> <li>• <a href="#">Multi-Subnet UFM</a></li> <li>• <a href="#">Enable Network Fast Recovery</a></li> <li>• <a href="#">NDT Format Merger</a></li> <li>• <a href="#">Subnet Merger UI</a></li> <li>• Added the following Plugins: <ul style="list-style-type: none"> <li>◦ <a href="#">UFM Bright Cluster Integration Plugin</a></li> <li>◦ <a href="#">UFM Cyber-AI Plugin</a></li> <li>◦ <a href="#">Autonomous Link Maintenance (ALM) Plugin</a></li> <li>◦ <a href="#">ClusterMinder Plugin</a></li> <li>◦ <a href="#">Sysinfo Plugin</a></li> <li>◦ <a href="#">SNMP Plugin</a></li> <li>◦ <a href="#">Packet Level Monitoring Collector (PMC) Plugin</a></li> <li>◦ <a href="#">PDR Deterministic Plugin</a></li> </ul> </li> </ul>
	May 9, 2023	<p>Updated</p> <ul style="list-style-type: none"> <li>• <a href="#">Known Issues in This Release</a></li> <li>• <a href="#">Appendix – Enhanced Quality of Service</a> - Updated notes and example</li> </ul>
6.1 2.1	Feb 19, 2023	<p>Updated</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a></li> <li>• <a href="#">Bug Fixes in This Release</a></li> <li>• <a href="#">Known Issues in This Release</a></li> </ul>
	Mar 1, 2023	Updated <a href="#">Changes and New Features</a>
	Mar 16, 2023	Updated <a href="#">Changes and New Features</a> - Added MFT package integration details
	Mar 27, 2023	Updated <a href="#">UFM Server Communication with Externally Managed Switches</a>

Release	Date	Description
6.1 2.0	Feb 2, 2023	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a></li> <li>• <a href="#">Bug Fixes in This Release</a></li> <li>• <a href="#">Known Issues in This Release</a></li> <li>• <a href="#">Configuring Partial Switch ASIC Failure Events</a></li> <li>• Updated example in <a href="#">Multi-port SM</a></li> <li>• <a href="#">UFM System Dump Tab</a></li> <li>• <a href="#">Appendix - Used Ports</a></li> <li>• <a href="#">Appendix - UFM SLURM Integration</a></li> </ul> <p>Added:</p> <ul style="list-style-type: none"> <li>• Added a note under <a href="#">Ports Window</a></li> <li>• Added a note under <a href="#">Unhealthy Ports Window</a></li> <li>• <a href="#">Delegate Authentication to a Proxy</a></li> </ul> <p>Removed:</p> <ul style="list-style-type: none"> <li>• UFM Logical Elements tab from the Web UI</li> </ul>
	Feb 6, 2023	Updated <a href="#">Troubleshooting</a>
6.1 1.1	Dec 1, 2022	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Changes and New Features</a> to include the upgrade of NVIDIA SHARP SW version</li> <li>• <a href="#">Installation Notes</a></li> <li>• <a href="#">Known Issues in This Release</a></li> <li>• <a href="#">Troubleshooting</a></li> </ul>
	Dec 19, 2022	Updated <a href="#">Changes and New Features</a>

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Apache Portable Runtime	0.9.13, 0.9.15, 1.2.0, 1.2.10, 1.2.11, 1.2.12, 1.2.7, 1.2.8, 1.2.9, 1.3.0, 1.3.1, 1.3.10, 1.3.12, 1.3.2, 1.3.3, 1.3.4, 1.3.5, 1.3.7, 1.3.8, 1.3.9, 1.4.7, 1.5.1, 1.5.2; APR_1_0_RC2; JCW_0_9_5_PRE1	<a href="http://apr.apache.org/">http://apr.apache.org/</a>	Apache License 2.0
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Python programming language	v2.4a2	<a href="https://www.python.org">https://www.python.org</a>	Python Software Foundation License 2.0
Qualcomm Kernel Tree for MSM/QSD family and Android 4.4	ath-201808291719	<a href="https://www.codeaurora.org/projects/all-active-projects/linux-msm">https://www.codeaurora.org/projects/all-active-projects/linux-msm</a>	ISC License
TACACS+ client library and PAM module	1.2.10, 1.2.9	<a href="https://sourceforge.net/projects/tacplus">https://sourceforge.net/projects/tacplus</a>	BSD 3-clause "New" or "Revised" License
Stephane-D/SGDK	V1.62	<a href="https://github.com/Stephane-D/SGDK/blob/master/license.txt">https://github.com/Stephane-D/SGDK/blob/master/license.txt</a>	MIT License
TACACS+ client library and PAM module	1.3.2	<a href="https://sourceforge.net/projects/tacplus">https://sourceforge.net/projects/tacplus</a>	GNU General Public License v2.0 or later
Tarifa	Tarifa019.tar	<a href="http://sourceforge.net/projects/tarifa">http://sourceforge.net/projects/tarifa</a>	GNU General Public License v2.0 or later
Tcl/Tk	8.1.1	<a href="http://www.tcl.tk/">http://www.tcl.tk/</a>	TCL/TK License
Tecla Library	1.2.3, 1.4.0, 1.4.1, 1.5.0, 1.6.0, 1.6.2	<a href="http://www.astro.caltech.edu/~mcs/tecla/index.html">http://www.astro.caltech.edu/~mcs/tecla/index.html</a>	MIT License
The GWARE Project	2.10.2	<a href="http://sourceforge.net/projects/gware">http://sourceforge.net/projects/gware</a>	GNU Lesser General Public License v2.1 or later

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TizenRT	1.1_Public_Release	<a href="https://github.com/Samsung/TizenRT">https://github.com/Samsung/TizenRT</a>	Apache License 2.0
UC-7402.7408.7410.7420-LX Plus Source	20100210	<a href="http://www.moxa.com/product/UC-7408.htm">http://www.moxa.com/product/UC-7408.htm</a>	GNU General Public License v2.0 only
WinMerge	2.11.1.7	<a href="https://winmerge.org/">https://winmerge.org/</a>	Apache License 2.0
XAMPP	1.4.5, 1.6.4	<a href="https://www.apachefriends.org/index.html">https://www.apachefriends.org/index.html</a>	BSD 3-clause "New" or "Revised" License
XAMPP	1.6.4	<a href="https://www.apachefriends.org/index.html">https://www.apachefriends.org/index.html</a>	GNU General Public License v2.0 or later
XQilla	1.1.0	<a href="http://xqilla.sourceforge.net">http://xqilla.sourceforge.net</a>	BSD 3-clause "New" or "Revised" License
YaST	broken/svn/opensUSE-9_3	<a href="http://opensuse.org/YaST">http://opensuse.org/YaST</a>	MIT License
Zile (Zile is Lossy Emacs)	1.4, 1.5, 1.5.2, 1.5.3, 1.6, 1.6.1, 1.6.2	<a href="http://zile.sourceforge.net">http://zile.sourceforge.net</a>	GNU General Public License v2.0 or later
afwall	V2.6.0.1, v2.8.0, v2.9.0, v2.9.1, v2.9.4	<a href="https://github.com/ukanth/afwall">https://github.com/ukanth/afwall</a>	MIT License
alcatel	20	<a href="http://www.alcatel-mobilephones.com/">http://www.alcatel-mobilephones.com/</a>	Apache License 2.0
alcatel	4/18/2012, 20120601, 918	<a href="http://www.alcatel-mobilephones.com/">http://www.alcatel-mobilephones.com/</a>	GNU General Public License v2.0 or later

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appweb	3.0B.0-0	<a href="http://code.google.com/p/appweb">http://code.google.com/p/appweb</a>	Apache License 2.0
asuswrt-merlin	376.48, 376.48, 380.62	<a href="https://github.com/RMerl/asuswrt-merlin">https://github.com/RMerl/asuswrt-merlin</a>	Artistic License 1.0
asuswrt-merlin	378.51, 380.62	<a href="https://github.com/RMerl/asuswrt-merlin">https://github.com/RMerl/asuswrt-merlin</a>	GNU General Public License v2.0 or later
avahi	v0.6	<a href="http://avahi.org">http://avahi.org</a>	GNU Lesser General Public License v2.1 or later
awokengazebo-lfi	lfi-20080723	<a href="http://www.awokengazebo.com/software/lfi/">http://www.awokengazebo.com/software/lfi/</a>	BSD 4-clause "Original" or "Old" License
beefproject	beef-0.4.3.1	<a href="http://beefproject.com">http://beefproject.com</a>	Apache License 2.0
bitswitcher	0.2.0, 0.3.0, 0.3.3	<a href="http://sourceforge.net/projects/bitswitcher">http://sourceforge.net/projects/bitswitcher</a>	GNU General Public License v2.0 or later
buildroot-kindle	master-20130206	<a href="https://github.com/twobob/buildroot-kindle">https://github.com/twobob/buildroot-kindle</a>	GNU General Public License v2.0 or later
busybox	1.10.0, 1.12.0, 1.2.0, 1.4.0, 1.5.0, 1.8.0, 1_11_0, 1_13_0, 1_14_1, 1_16_0, 1_17_1 17 1, 1_17_2, 1_18_0, 1_18_2, 1_19_0, 1_19_1, 1_19_4, 1_20_2, 1_21_0, 1_24_0, 1_29_0, 1_3_0, 1_7_0	<a href="https://github.com/mirror/busybox">https://github.com/mirror/busybox</a>	GNU General Public License v2.0 only



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busybox	1_14_0, 1_15_0, 1_17_0, 1_19_2, 1_19_3, 1_20_0, 1_20_1, 1_28_0,	<a href="https://github.com/mirror/busybox">https://github.com/mirror/busybox</a>	GNU General Public License v2.0 or later
catboost/catboost	v0.2	<a href="https://catboost.ai">https://catboost.ai</a>	Apache License 2.0
curl	7.16.0	<a href="https://curl.se/">https://curl.se/</a>	curl License
decorator-ko	26, 28	<a href="http://jinself.tistory.com/372">http://jinself.tistory.com/372</a>	Public Domain
file	5.22	<a href="http://www.darwinsys.com/file/">http://www.darwinsys.com/file/</a>	Fine Free File Command License
fluxcapacitor	0	<a href="https://github.com/majek/fluxcapacitor">https://github.com/majek/fluxcapacitor</a>	MIT License
fvpatwds : fvpat Webdev Server	fvpatwds v0.1.4	<a href="http://sourceforge.net/projects/fvpatwds">http://sourceforge.net/projects/fvpatwds</a>	Apache License 2.0
generator-minxing	1.0.2	<a href="https://github.com/yeoman/generator-minxing#readme">https://github.com/yeoman/generator-minxing#readme</a>	Apache License 2.0
geonkick	2.3.6	<a href="https://github.com/iurie-sw/geonkick">https://github.com/iurie-sw/geonkick</a>	GNU General Public License v3.0 or later
hostap-ct	If-5.1.7, If-5.3.3, If-5.3.3b, If-5.3.4, If-5.3.5	<a href="https://github.com/greearb/hostap-ct">https://github.com/greearb/hostap-ct</a>	BSD 3-clause "New" or "Revised" License
hostapd	hostap_0_5_2, hostap_0_5_3, hostap_0_5_6,	<a href="http://w1.fi/hostapd/">http://w1.fi/hostapd/</a>	GNU General Public License v2.0 or later
howl	0.9.4, 0.9.6, 0.9.7, 0.9.9, 1.0.0, 0.9.3, 0.9.1	<a href="https://howl.io">https://howl.io</a>	BSD 3-clause "New" or "Revised" License

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illumos-joyent	20121101	<a href="http://www.illumos.org/projects/illumos-gate">http://www.illumos.org/projects/illumos-gate</a>	Common Development and Distribution License 1.0
krb5/krb5	1.0-alpha3, 1.0-beta2, 1.0-beta5	<a href="https://github.com/krb5/krb5">https://github.com/krb5/krb5</a>	Krb5-MIT License
libevent - an event notification library	0.1, 1.0d, 1.0e, 1.4.1-beta	<a href="http://libevent.org/">http://libevent.org/</a>	BSD 3-clause "New" or "Revised" License
libexpat	1.95.0, 1.95.1, 1.95.2, 2.0.0, v19991013	<a href="http://www.libexpat.org/">http://www.libexpat.org/</a>	Expat License
libexpat	V19991013	<a href="http://www.libexpat.org/">http://www.libexpat.org/</a>	Mozilla Public License 1.1
linux-yocto-dev	v2.6.12	<a href="http://git.yoctoproject.org/cgi/cgit.cgi/linux-yocto-dev/">http://git.yoctoproject.org/cgi/cgit.cgi/linux-yocto-dev/</a>	GNU General Public License v2.0 with Linux Syscall Note
littlekernel-m900-eclair	master-20110326	<a href="http://github.com/LouZiffer/littlekernel-m900-eclair">http://github.com/LouZiffer/littlekernel-m900-eclair</a>	GNU General Public License v2.0 only
lmdb	0.9.18	<a href="http://symas.com/mdb/">http://symas.com/mdb/</a>	Open LDAP Public License
math-linux	0.0.1	<a href="http://sourceforge.net/projects/math-linux">http://sourceforge.net/projects/math-linux</a>	GNU General Public License v3.0 or later
mod_dup	2.5.0	<a href="http://github.com/Orange-OpenSource/mod_dup/">http://github.com/Orange-OpenSource/mod_dup/</a>	Apache License 2.0
ngx_pagespeed	1.9.32.4-dbg-ssl-crash	<a href="https://github.com/pagespeed/ngx_pagespeed">https://github.com/pagespeed/ngx_pagespeed</a>	Apache License 2.0

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nss_ldap	253	<a href="https://github.com/PADL/nss_ldap">https://github.com/PADL/nss_ldap</a>	GNU Library General Public License v2 or later
opensm	3.3.17	<a href="http://www.openfabrics.org/">http://www.openfabrics.org/</a>	BSD 2-clause "Simplified" License
pGina	Plugin Bundle 05-11-2006	<a href="http://pgina.org/">http://pgina.org/</a>	MIT License
pam_radius	release_2_0_0	<a href="http://freeradius.org/pam_radius_auth/">http://freeradius.org/pam_radius_auth/</a>	GNU General Public License v2.0 only
protovis	3.3.1	<a href="http://mbostock.github.io/protovis/">http://mbostock.github.io/protovis/</a>	BSD 3-clause "New" or "Revised" License
root-project	5-13-04e	<a href="https://root.cern">https://root.cern</a>	(GNU Lesser General Public License v2.1 or later AND MIT License AND GNU General Public License v2.0 or later)
rsyslog	sysklogd-141-import	<a href="https://www.rsyslog.com/">https://www.rsyslog.com/</a>	GNU General Public License v2.0 or later
rtems-libbsd	5.1	<a href="http://git.rtems.org/rtems-libbsd.git/">http://git.rtems.org/rtems-libbsd.git/</a>	Apache License 2.0
rtl8186 - toolchain	0.5.5_src	<a href="http://rtl8186.sourceforge.net">http://rtl8186.sourceforge.net</a>	GNU General Public License v2.0 or later

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snake-os	0.9	<a href="http://code.google.com/p/snake-os/">http://code.google.com/p/snake-os/</a>	GNU General Public License v2.0 or later
ssmtp	2.61	<a href="http://packages.qa.debian.org/s/ssmtp.html">http://packages.qa.debian.org/s/ssmtp.html</a>	GNU General Public License v2.0 or later
<a href="svn://svn.tug.org/texlive/trunk">svn://svn.tug.org/texlive/trunk</a>	texlive-2009.0	<a href="http://www.tug.org/texlive/">http://www.tug.org/texlive/</a>	LaTeX Project Public License - Version Unspecified
util-linux	2.11q, 2.11w, 2.12a, 2.13-pre1	<a href="https://en.wikipedia.org/wiki/Util-linux">https://en.wikipedia.org/wiki/Util-linux</a>	GNU General Public License v2.0 or later
videolan/vlc	0.5.0	<a href="https://github.com/videolan/vlc">https://github.com/videolan/vlc</a>	(GNU Lesser General Public License v2.1 or later AND GNU General Public License v2.0 or later)
wakame-vdc	v13.06.0	<a href="http://wakame.axsh.jp/">http://wakame.axsh.jp/</a>	Unknown License
wpa_supplicant - IEEE 802.1X, WPA, WPA2, RSN, IEEE 802.11i	0.5.0, 0.5.3, 0.5.5, 0.5.6, 0.5.8, 0.6.0, 0.6.10, 0.6.2, 0.6.3, 0.6.4, 0.6.8, 0.7.0, 0.7.1, 0.7.2, 0.7.3, 1, 2, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.7+git20190108+11ce7a1, , 2.7~git20180504+60a5737, 2.7~git20180606+b	<a href="http://w1.fi/wpa_supplicant/">http://w1.fi/wpa_supplicant/</a>	BSD 3-clause "New" or "Revised" License

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	915f2c, 2.7~git20180706+4 20b5dd		
xorp.ct	1.5, xorp-1-7	<a href="http://www.candelatech.com/xorp.ct">http://www.candelatech.com/xorp.ct</a>	MIT License
zeroconf	0.9	<a href="https://files.pythonhosted.org/packages/20/d7/418ff6c684ace0f5855ec56c66cfa99ec50443c41693b91e9abcccfa096c/zeroconf-0.20.0.tar.gz">https://files.pythonhosted.org/packages/20/d7/418ff6c684ace0f5855ec56c66cfa99ec50443c41693b91e9abcccfa096c/zeroconf-0.20.0.tar.gz</a>	GNU General Public License v2.0 or later

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