



Monitoring FluidFS using SolarWinds Network Performance Monitor

Dell Storage Engineering

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Revisions

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1 Preface

1.1 Audience

This document is intended for system, network and storage administrators, and integrators who plan to use the Fluid File System SNMP feature with SolarWinds® software.

It is assumed throughout the document that the reader is familiar with the following topics:

- The Dell™ FluidFS network attached storage platform functionality, features, installation, user interface and operation
- SNMP protocol implementation and terminology
- The SolarWinds Network Performance Monitor (NPM)

1.2 Purpose

This document describes best practices for monitoring Dell FS8600 SNMP with SolarWinds Network Performance Monitor (NPM). Set up and environment configuration instructions are also provided. Additional documents that provide step-by-step procedures for recommended configurations are referenced throughout this document.

In general, the reader is encouraged to use this document in conjunction with the *FluidFS Admin Guide*, which includes descriptions of the FluidFS features and configuration procedures.



2 FS8600 introduction

FluidFS is an enterprise-class, fully distributed file system that provides customers with the tools necessary to manage file data in an efficient and simple manner. The underlying software architecture leverages a symmetric clustering model with distributed metadata, native load balancing, advanced caching capabilities and a rich set of enterprise-class features. FluidFS removes the scalability limitations such as limited volume size associated with traditional file systems, and supports high capacity, performance-intensive workloads by scaling up (adding capacity to the system) and scaling out (adding nodes, or performance, to the system).

The FS8600 scale-out NAS consists of one to four FS8600 appliances configured as a FluidFS cluster. Each NAS appliance is a rack-mounted 2U chassis that contains two hot-swappable NAS controllers in an active-active configuration. In a NAS appliance, the second NAS controller that has one paired NAS controller is called the peer controller. FS8600 scale-out NAS supports expansion; NAS appliances can be added to the FluidFS cluster as needed to increase performance.

The FS8600 shares a back-end infrastructure with the Storage Center. The SAN network connects the FS8600 to the Storage Center and carries the block level traffic. The FS8600 communicates with the Storage Center using either the internet small computer system interface (iSCSI) or Fibre Channel protocol, depending on the NAS appliance configuration purchased.



3 SNMP Overview

SNMP: Simple Network Management Protocol

The main SNMP components are managed devices, agents, and network-management systems (NMSs). A managed device is a node with an SNMP agent that resides on a managed network. These devices can be storage, servers, switches, or other network devices.

An agent (a software module residing within a device) translates information into a compatible format with SNMP and an NMS runs monitoring applications. They provide most of processing and memory resources required for network management

MIB: Management Information Base

The SNMP protocol can be used to provide access to a hierarchically organized collection of information known as an MIB. MIBs describe the structure of the management data of a device subsystem using a hierarchical namespace that contains object identifiers (OIDs).

OIDs: Object Identifiers

Object Identifiers are uniquely identify managed objects in an MIB hierarchy. SNMP MIBs use a tree structure; each leaf level is an OID. Each OID identifies a variable that can be read or set using SNMP.

3.1 SNMP Versions

SNMP version 1: Defined on ietf.org at [RFC1155](#) and [RFC1157](#), this simple setup only require a plaintext community. The main disadvantages are that it only supports 32-bit counters and it provides little security.

SNMP version 2c: Defined on ietf.org at [RFC1901](#), [RFC1907](#), and [RFC2578](#), this version is identical to version 1 with the addition of support for 64-bit counters.

SNMP version 3: Defined on ietf.org at [RFC3411](#) and [RFC3412](#), this version adds security to the 64-bit counters with both encryption and authentication. The security measures can be used together or separately.



4 SolarWinds Network Management Software

Stated by SolarWinds, the Network Performance Monitor (NPM) is a powerful and affordable network monitoring software that enables you to quickly detect, diagnose, and resolve network performance problems and outages.

Benefits of using SolarWinds NPM:

- Speeds troubleshooting
- Increases service levels, and reduces downtime
- Monitors and displays response time, availability, and performance of network devices
- Enhanced network visibility with automatic capacity planning, wireless heat maps, and topology-aware intelligent alerts
- Improves operational efficiency with out-of-the-box dashboards, alerts, and reports
- Automatically discovers network devices and typically deploys in less than an hour



5 Dell FS8600 and SNMP

SNMP is one way to monitor the health of the system and generate alert messages (SNMP traps) for system problems. To use SNMP, the FluidFS cluster-specific MIBs and traps must be compiled into a customer-provided SNMP management station.

The SNMP MIBs and traps for the FluidFS cluster are available for download from the FluidFS cluster FTP server. When using SolarWinds Network Performance Monitor (NPM) the FluidFS MIB is already integrated with SolarWinds MIB's database and it's not necessary to download the MIB from the FluidFS cluster.

The following configurations are possible with the Dell FS8600

- Setting the system to send SNMP traps to SolarWinds Trap Viewer and to the Orion console
- Monitor OID's from FluidFS MIB's on SolarWinds Orion console

Details are located in the *Dell FluidFS NAS Solutions NX3600/NX3610 Deployment Guide* on dell.com.

5.1 Settings SNMP Traps on Dell FS8600

Typically, SNMP agents listen on UDP port 161, and asynchronous traps are received on port 162. The network administrator needs to make sure these ports are open in the firewall.

Table 1 FS8600 port protocol and service

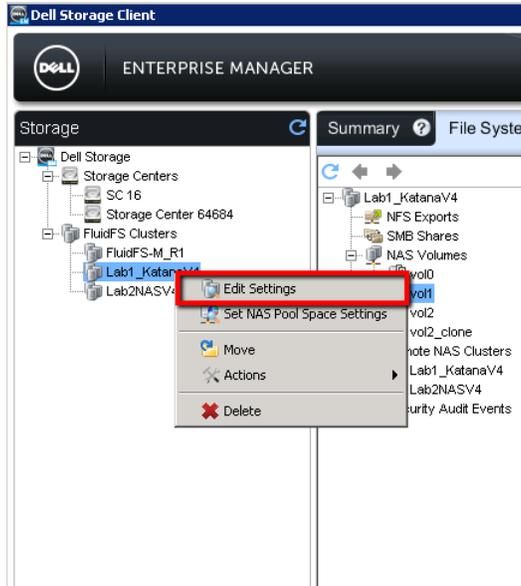
Ports	Protocol	Service
161	UDP	SNMP Agent
162	TCP	SNMP Traps



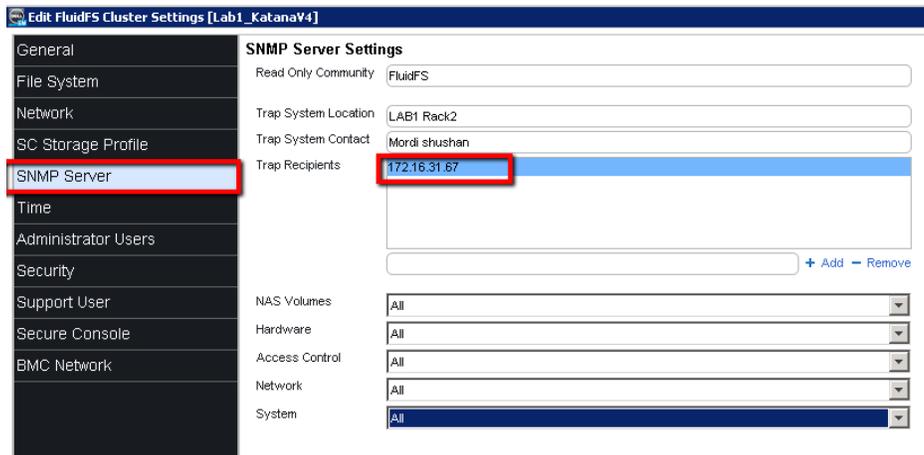
5.2 SNMP Server Settings

The following steps demonstrate how to configure SNMP servers and traps recipients on a Dell FS8600:

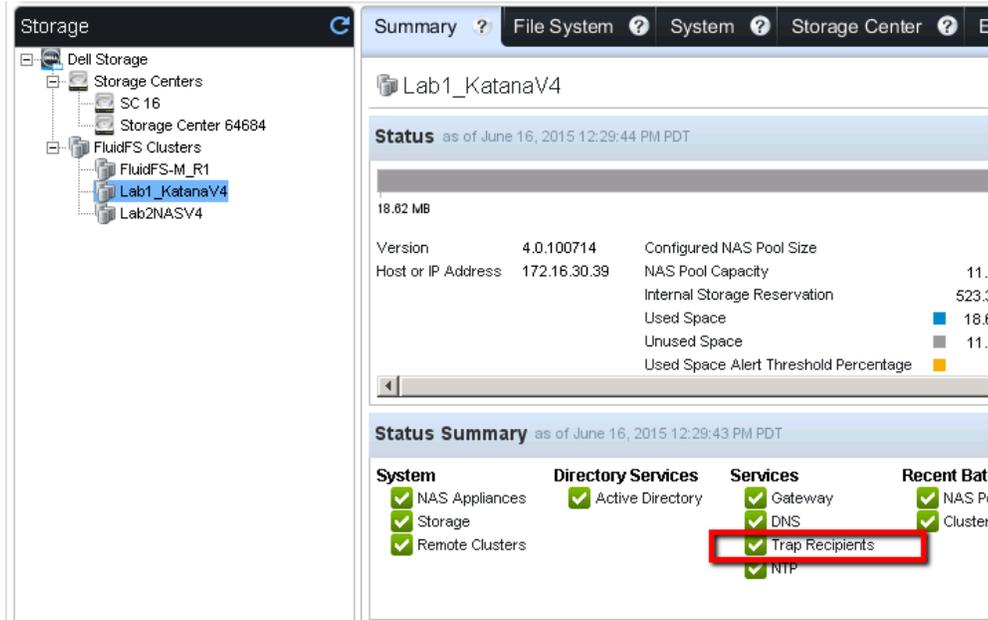
1. Open Enterprise Manager, right click on the FluidFS cluster and click **Edit Settings**.



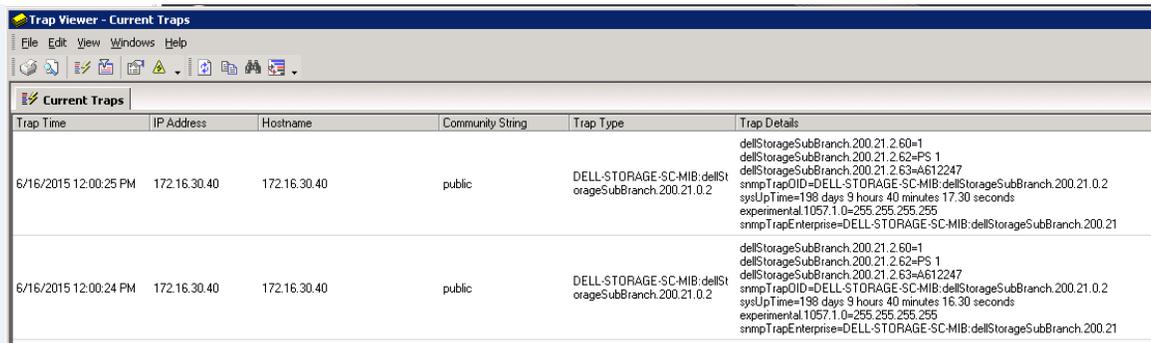
2. Click on **SNMP Server** and configure the following:
 - **Read Only Community:** The default name, FluidFS, can be changed.
 - **Trap System Location:** Provide the location of the Dell FS8600 cluster.
 - **Trap System Contact:** Provide the system contact name
 - **Trap Recipients:** Provide the IP/DNS name of SolarWinds NPM.
 - Configure the traps that will get sent to the SolarWinds NPM.



- After the server is configured, verify that trap recipient service is running on the FluidFS cluster by clicking the FluidFS cluster **Summary** tab to display the status.



- Open SolarWinds Trap viewer or SolarWinds Orion console to display traps from the cluster IP.



5.3 Monitor OIDs from FluidFS MIB

To monitor an OID from FluidFS MIB, browse the MIB. The FluidFS MIB can either be downloaded or viewed in the SolarWinds NPM database.

In the SolarWinds database, FluidFS MIB OIDs start from: **1.3.6.1.4.1.674.11000.2000.200.xx.xx.xx**

5.3.1 Monitoring OIDs with SolarWinds NPM

Before monitoring OIDs, make sure that the Dell FS8600 VIP is shown in the nodes list. If it does not exist, add the node manually and specify the Community String.



The Community String was set in Section 5.2 “SNMP Server Settings”.

1. Test the connection and verify it was successful.

Help me choose a polling method

- External Node: No Status
No data is collected for this node. Useful for monitoring a hosted application or other element on the node but not the node itself.
- Status Only: ICMP
Limited data (status, response time, and packet loss) is collected using ICMP (ping). Useful for devices which do not support SNMP or WMI.
- Most Devices: SNMP and ICMP**
Standard polling method for network devices such as switches and routers, as well as Linux and Unix servers.

SNMP Version: SNMPv2c is used, by default, when SNMPv3 is neither required nor supported.

SNMP Port:

Allow 64 bit counters

Community String: Press down arrow to view all

Read/Write Community String:

✔ Test Successful

2. Browse the MIB using the SolarWinds Orion Universal Device Poller.
3. Monitor the FluidFS network traffic statistics using the SolarWinds Orion console.
4. Create a new **Universal Device Poller** type (1.3.6.1.4.1.674.11000.2000.200) in the OID field and expand the navigation tree to browse.

Browse MIBs

Browse MIBs

- dell(674)
 - megalDE(3)
 - server(10890)
 - server2(10891)
 - server3(10892)
 - storage(10893)
 - dellAn(10895)
 - cm(10899)
 - iAssistant(10900)
 - upsdell(10902)
 - pdu(10903)
 - bizClient(10909)
 - enterpriseSW(11000)
 - sysMgmtBranch(10)
 - storageMgmt(2000)
 - fluidFS(200)**
 - compliantEnte

FLUIDFS-MIB:fluidFS
OID: 1.3.6.1.4.1.674.11000.2000.200

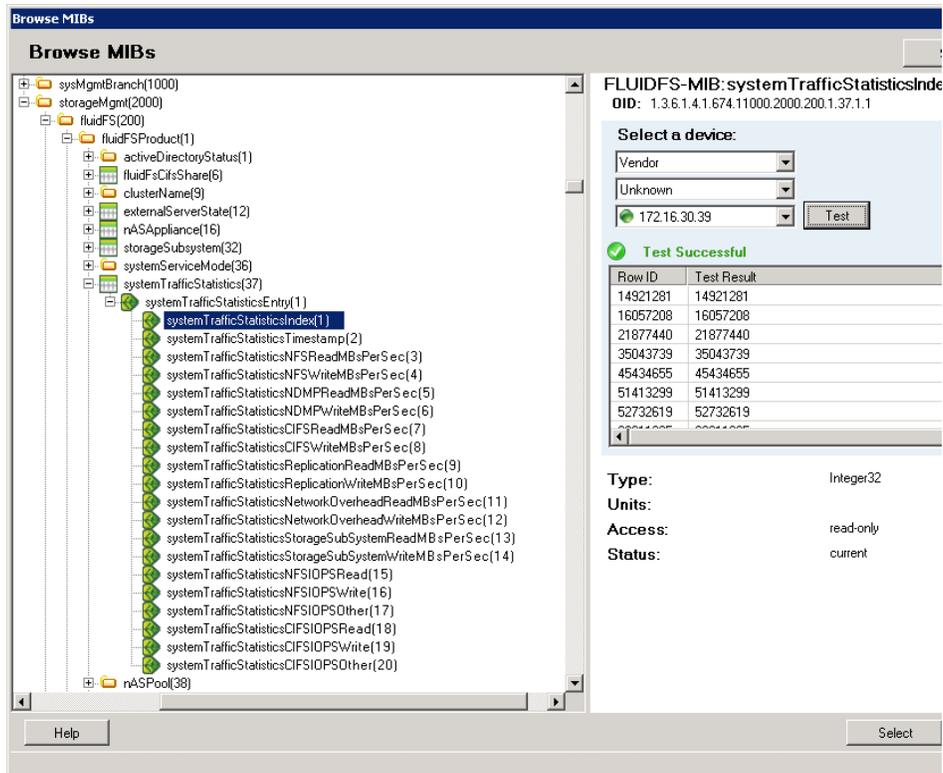
Select a device:

Vendor:

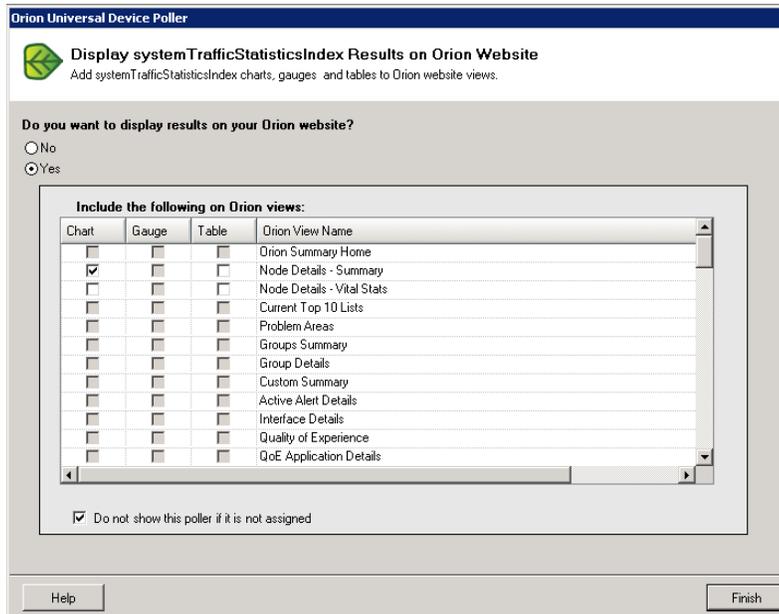
172.16.30.39

5. Browse to **systemTrafficStatisticIndex(1)** and click **Test** to verify success.





- To display the statistics on SolarWinds Orion console, click in the **Chart** column for the Node Details that you want to display.



- On the SolarWinds Orion console in the node view, click **Rediscover** and **Poll now**.



Management EDIT HELP

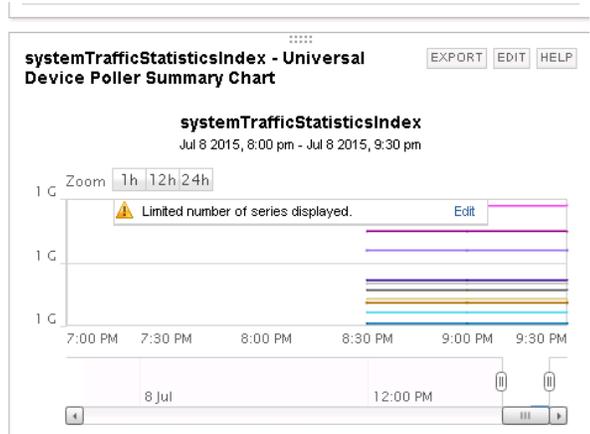
NODE

Edit Node
 List Resources
 Unmanage
 Pollers
 Poll Now
 Rediscover

MIB Browser
 Add New Alert



The Chart below is showing the results (after a period of active time in the FS860 cluster)



6 OIDs description

This section provides information for OIDs that are available to monitor. To see a complete OID list that is accessible use the SolarWinds MIB browsers utility or look at the MIB text file.

The MIB is accessible using the FTP at

ftp://<FluidFS_administrator_user_name>@<Cluster_VIP_or_name>:44421/mibs/

6.1 Monitoring storage space usage

Monitoring storage space usage enables you to compile key metrics like rate of storage growth, capacity predictions, and cost forecasts. Collect storage capacity planning information dynamically for your storage infrastructure, and analyze historical storage performance to expose hot spots.

The following OIDs can help monitor used and unused space:

- **nASPoolTotalUsedMB**: The amount of used space (MBs) in all NAS volumes
- **nASVolumeOptimizationSavedSpaceMB**: Space saved by optimization for this virtual volume (MB)
- **nASPoolTotalOverCommittedMB**: The amount of over committed space (MBs) in all NAS volumes

6.2 Monitoring performance

Understanding the protocol traffic utilization is the key for network management. Track performance history and collect data to help determine where hot spots are in the storage, especially during peak traffic hours.

Benefits of using FluidFS MIB SNMP monitoring:

- Avoid bandwidth and storage performance bottlenecks
- Find what protocol / application using up the bandwidth
- Reduce cost by understanding the actual bandwidth needed

The OID list below describes some of the OIDs that an administrator can use to monitor performance using FluidFS MIB.

6.2.1 Monitoring NFS/SMB performance

Monitoring read/write throughput reveals whether the system is being fully utilized and if the connected clients are maximizing connections to the FS8600 storage system. For example, changes in the following items can affect the protocol performance.

- Network protocol TCP/UDP (NFS protocol)
- Client transfer size (rsize and wsize) (NFS protocol)
- Jumbo Frames (both protocols)
- TCP Windows Scaling (RFC 1323) (SMB protocol)



The following OIDs can be used to monitor the NFS/SMB protocol performance:

- **systemTrafficStatisticsNFSReadMBsPerSec**: The Amount of data (in MBs) that was read through NFS protocol in one second
- **systemTrafficStatisticsNFSWriteMBsPerSec**: Amount of data (in MBs) that was written through NFS protocol in one second
- **systemTrafficStatisticsCIFSReadMBsPerSec**: Amount of data (in MBs) that was read through CIFS protocol in one second
- **systemTrafficStatisticsCIFSWriteMBsPerSec**: Amount of data (in MBs) that was Written through CIFS protocol in one second

6.2.2 Monitoring replication performance

Monitoring replication throughput is important in order to achieve the required RTO. The following factors can affect replication performance:

- Available bandwidth for replication between sites
- WAN latency
- Percentage of packet loss

Monitor the following OIDs to identify changes that need to be made to achieve RTO.

- **systemTrafficStatisticsReplicationReadMBsPerSec**: Amount of data (in MBs) that was read by the replication process in one second
- **systemTrafficStatisticsReplicationWriteMBsPerSec**: Amount of data (in MBs) that written by the replication process in one second



7 Conclusion

FluidFS can display statistics and send SNMP traps to the SolarWinds NPM.

For easier use with Dell FS8600 MIB, SolarWinds already includes the MIB in their database so that downloads are not required and access to MIB OID through the SolarWinds MIB browser is simple.

The Dell FS8600 MIB provides a growing list of statistics that can be monitored as additions are made in future releases.



A Additional resources

A.1 Related documentation

Referenced or recommended publications:

- *Dell Compellent FluidFS v4 (FS8600) Networking Best Practices*
http://en.community.dell.com/techcenter/extras/m/white_papers/20437940.aspx
- SolarWinds NPM Knowledge base
[http://knowledgebase.solarwinds.com/kb/categories/Network+Performance+Monitor+\(NPM\)/](http://knowledgebase.solarwinds.com/kb/categories/Network+Performance+Monitor+(NPM)/)

A.2 Customer support

For support of Dell SC Series products:

- [Customer Portal](#) (login required)
- 24/7 United States phone support: 1-866-EZSTORE (866.397.8673)
- Email: support@compellent.com (monitored during normal business hours)
- [Dell global online support](#)

The Dell SC Series [Customer Portal](#) is an online portal for existing customers. A valid portal account is required to access the Knowledge Center. Once you are logged in to the portal, go to **Knowledge center**.

[Dell TechCenter](#) is an online technical community for IT professionals and is a great resource to discover and learn about a wide range of technologies such as storage, servers, networking, software, and cloud management.

Support.dell.com is focused on meeting customer needs with proven services and support.

DellTechCenter.com is an IT community that facilitates communication between Dell customers and Dell employees for the purpose of sharing knowledge, best practices and information about Dell products and installations.

