Multi-Report

User Guide

Multi-Report User Guide (Version 2.1)

This user guide will provide an explanation of how to run the Multi-Report script and how to configure it for your specific use. Please read this entire user guide before proceeding as there are many customizations for practically every situation.

IF YOU HAVE A PROBLEM

If you discover a drive (HDD/SSD/NVMe/USB) that does not appear to be addressed, please run the script using the '-dump email' and enter a short message pointing out the problem when asked. An example is: "Test Age for ada2 is incorrect." This will send me an email with all your dump data and I will be able to look into the issue and address it. I will respond to you once I receive the data. If you are just sending me drive data for collection purposes, please enter a message similar to "Hi Joe, here is some drive data for you."

NOTE: When you send me an email, I will know the address you sent it from. I will not share your email, go buy a new car with it, or sell it to the Mafia. I may use it to send you back a message if you reported a problem.

Contents

What is Multi-Report?

Multi-Report is a joint effort to produce a simple script that would report key drive data points in order to predict drive failure and deliver that via email. Additionally multi-report can maintain statistical data in a Comma Separated Value (CSV) format compatible with any typical spreadsheet program.

This is a highly configurable program designed to allow the end user the ability to customize the script to the specific needs of the user.

Versioning

Multi-Report versioning is controlled by the version number and the date. Example: "multi_report_v2.2_04_Apr_2023.txt" and Beta will be clearly identified. Small bug fixes are likely to have a third digit, for example: "multi_report_v2.2.1_02_Apr_2023.txt" The multi_report_config.txt is also recognized by versioning text in the first line of the file.

New Version Update Alert

Multi-Report v2.2 implements checking the GitHub repository and should an update be available, it will notify the user in the first few lines of the email report and those lines will be RED in color. I have not implemented Automatic Updating (yet) as I feel users should be in full control of their software. In order to perform the software update, the user must run the script using the '-update' switch. Follow the prompts. The script will exit after the update.

Messages from the Creator

Multi-Report v2.2 implements a message delivery system that will let users know of up coming updates or problems and concerns about the product. These messages will appear just under the "Execution Time:" information.

What do I ask for in return?

I would like to create the best and most inclusive free product but to do that, whenever someone has a problem, or when someone installs a NEW model drive, I would appreciate a little data in return. By running the script using the '-dump email' switch you will be prompted to enter a simple short message and then an email will be generated to my personal email address (created just for this project) that will contain drive configuration data. Drive Model data I already have and was used to test this script is listed in Appendix A.

Initial Setup

The basic setup for Multi-Report is to install the script into a Dataset within your pool, and preferably a dataset that has an accessible share such as SMB. This will make everything easier to manipulate in the future. For this example, the script is named "multi_report.sh" and the dataset is located at '/mnt/mypool/scripts'.

Prerequisites:

1. TrueNAS Core/Scale must be installed and operating normal.
2. TrueNAS must have the email account setup already. If you cannot send yourself an email, it's not setup properly.

Steps to establish a basic setup: (Do not enter the single quotes)

In the examples below the dataset location will be '/mnt/my_pool/scripts' and the Multi-Report script must be named 'multi_report.sh'

1. Copy the script to a Dataset. NOTE: The dataset path cannot have any spaces in the path.
   Incorrect Example: '/mnt/my pool/scripts'
   Correct Example: 'mnt/my_pool/scripts'
2. Open an SSH terminal window, or Shell and log in.
3. Type 'cd /mnt/my_pool/scripts'
4. Make the file executable 'chmod +x multi_report.sh'
5. Run the script './multi_report.sh -config' NOTE: If you run the script without a configuration file, the script will display an error message and direct you to create a configuration file.
6. Press the 'n' key to create a New configuration file.
7. Read the questions and enter the answers (Email Address, EmailAlert Address, and From Address). If you would like to send to more than one email address, use a comma to separate the emails addresses.
   Example of multiple emails: 'joe@aol.com,joe@work.com'
8. The Automatic Drive Compensation is good to use if you have any drives which have UDMA_CRC_ERRORS or bad sectors errors. This will offset the value and bring it back to a zero value. Should other issues occur, the value will increment. This is useful to identify drives which increment slowly so you do not have to remember what the value was previously.
9. The script will create an external configuration file called 'multi_report_config.txt' where the user "could" edit this file with a simple text editor, however it's strongly advised against it due to the tight formatting restrictions. If you venture out to manually edit the configuration file and it starts working incorrectly, recreate a new configuration file using the steps above.
10. Let's run the script again but this time without any CLI switches './multi_report.sh'
11. If all goes well you will receive an email that contains a chart and text section.

Unfortunately, because manufacturers do not have a standard to live by, it's almost impossible to take into account every drive configuration and the end user will need to do some customizations. They are easy.

If you have any drive errors such as a Sector Error or the Wear Level is incorrect, then you will need to customize some of the settings.

NOTE: If you do not want to run the script using the file name "multi_report.sh" then you must change the variable in the script under the "Auto-generated Parameters" called "runfilename" to the filename you desire. By default, it is set to "multi_report.sh". A Symlink will be created after you run the script for the first time, meaning the file name you are running, while it may look like it's own file, it is really the full length multi_report file name. Do not delete it. Why a Symlink? This preserves any CRON job you have setup and it was pointed out to me that the original (previous) script file is retained, after version 2.2, prior versions are deleted if they are named "multi_report.sh".

The Multi-Report External Configuration File

The external configuration file is a file created to limit the needless reconfiguring of the parameters when upgrading the script to newer versions. The script will generate the configuration file and update the configuration file with the upgrades. The configuration file by default will create itself in the same directory as the script is located and the name of the file is 'multi_report_config.txt'.

This configuration file is normally edited from within the script using the '-config' switch but may be edited using a simple text editor.

Prior to exiting the configuration tool ensure you WRITE the changes to your configuration file or the changes will be lost.

External Configuration File Update

Multi-Report is controlled by a configuration file called "multi_report_config.txt" and this configuration file is adjusted to control the configuration of Multi-Report. Most of these adjustments can and should be made from running the '-config' switch (see below). When the script is run it will check the version of the configuration file. Should the configuration file be out of date it will create a copy of the configuration file and then create an updated version of the configuration file. Both files will be sent to the user with the emailed report. This allows a user the ability to revert easily to the previous version should they desire. Additionally when a software update occurs, a backup of the configuration file is made on the system so you may use that file as well to revert back to the original.

Explanation of the Email

Header information

The email generated contains the following information:
Program Version, Operating System Version
Report Run Date and Time
How long it took to execute the script.

Zpool/ZFS Status Report Summary

Pool Name, Status, Capacity, Fragmentation, Errors, Last Scrub Age, Scrub Duration

Hard Drive Summary Report / SSD Summary Report / NVMe Summary Report

Device ID, Drive Identification, Capacity, SMART Status, Temperature, Power On Hours, Drive Errors Last Test Age, Last Test Type

These are the core identifiers used in this script and will lead any user to easily identify a problem. Any errors have the background color changed making it obvious.

Encrypted TrueNAS_Config in Email

If you desire the TrueNAS_Config.zip file to be encrypted then you MUST manually edit the 5th line of the script and enter a password. Why encrypt this data? While the data "should" be perfectly safe since the password file is encrypted, some of us prefer a little extra security. Additionally, normally Windows Explorer will not open the encrypted attachment, you must use a third-party application. I recommend 7-Zip which is a free community-based program.

Reference: https://www.7-zip.org/download.html

To add encryption, you are looking at line #5 of the script, not the multi_report_config.txt file and then looking for line #5 (see below).

TrueNASConfigEmailEncryption="" # Set this to "" for no encryption or enter some text as your passphrase.

By default, there is no encryption, additionally some email providers will block certain encrypted content.

And example of a password might be:

TrueNASConfigEmailEncryption="ThisIsMyPassword#3#2@1!"

There are two files in the .zip file:

freenas-v1.db – Main Configuration File

pwenc_secret – All the passwords in an encrypted format.

When you restore 'freenas-v1.db' the other file will automatically be restored.

Running the Script

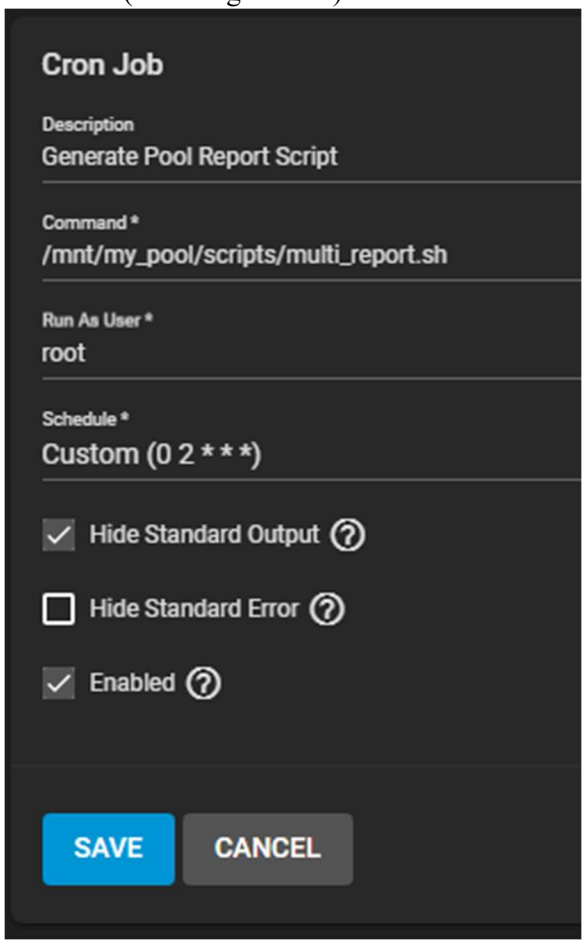
The script can be normally executed by simply entering the program name "./multi_report.sh" the script will run normally. Below are various command line options you may use with the script in order to configure, run, and troubleshoot. Read these options carefully.

Setting Up a CRON Job

Typically, this type of script is designed to be automated to run periodically. In order to run this script, we will setup a CRON job.

TrueNAS Core:

1. Log into the TrueNAS GUI.
2. Click on Tasks -> Cron Jobs.
3. On the right screen click ADD.
4. Next fill in the Description, Command, Run As User, Schedule, Hide Standard Output, and Enabled. (See image below)



5. We identified a job Description called “Generate Pool Report Script”.
6. We identified the command to run this script as “/mnt/my_pool/scripts/multi_report.sh”.

   Note: The full path to the location of the script is required.

7. Run as is set to “root”, but this could be any user with privledges.
8. Schedule is Custom (0 2 * * *) which means 0 minutes, 2 hours, All Days/Months/Years, or in other words, 2AM every day the script will run.
9. Hide Standard Output is Checked.

10. Hide Standard Error in Unchecked.
11. Enabled is Checked.
12. Now click SAVE.

TrueNAS Scale is similar to setup.

Recommended Script and SMART Testing Schedule

The first thing you must know is that S.M.A.R.T. was designed to warn a user that a failure would occur in less than 24 hours. That was the goal and to be honest, SMART can give a person notification well in advance of a common media failure problem, HOWEVER SMART is not very good at warning a person of a pending spindle motor electronics failure. So first understand that it's not perfect and it's an attempt to provide us some sort of notification in advance. It is not a genie in a bottle. Do not over-expect. With all that said, it is recommended (by me) to run a SMART Short Test once a day and run a SMART Long/Extended test once a week. These are both non-destructive read-only tests. The Short Test generally takes less than 2 minutes to complete, whilst the Long/Extended Test can take 5 hours, 10 hours, 18 hours, or longer. Your SMART data provides you the time in minutes that the Long/Extended Test will take. For this example, we will say you have a 14TB hard drive and it takes 19 hours to complete a Long/Extended Test. Below is an example of a schedule you could used based on the NAS being used during the Day Light Hours:

SMART TEST	Run Start	Runtime
SHORT	11:05 PM (All Days)	2 minutes
LONG/EXTENDED	11:10 PM (Friday)	19 Hours
multi_report.sh	6 AM (All Days)	2 minutes

The above schedule would first run a Short Test every day. Then it would run a Long/Extended Test only on Fridays just after the SMART Short Test completed. And you would get a status report from Multi-Report every morning at 6 AM. Concerns about running the SMART Long/Extended Test are amplified by the drive size and drive count. If you do have large hard drives, say 14TB, and you have 12 of said hard drives, you would not want to perform a SMART Long/Extended Test on all the drives at the same time as this will affect performance when the NAS needs to be useful. Instead perform a SMART Long/Extended Test on two drives a day. This will generally make your NAS more responsive and the huge power consumption would be reduced and spread out over time, thus easing the load on the poor power supply.

Command Line Switches

-config
Configuration

The '-config' switch will present the user with highly configurable series of menus.

Below is the first menu you will see when invoking this switch.

Multi-Report v2.1 dtd:2023-03-15 (TrueNAS Core 13.0-U4)

Configuration File Management

*** WARNING - A CONFIGURATION CURRENTLY FILE EXISTS ***

N)ew configuration file (creates a new clean external configuration file)

U)pdate configuration file (updates select static variables to default)

A)dvanced configuration (must have a configuration file already present)

H)ow to use this configuration tool (general instructions)

X) Exit

NOTE: In using this configuration script when the value is:

Number or Text: The current value will be displayed. You have the option to just press Enter/Return to accept the current value or you may enter a different value.

True or False: The current value will be displayed. You have the option to press Enter/Return to accept the current value or you may press 't' for true or 'f' for false.

Make your selection:

New Configuration File – Will create a new external configuration file in the same directory in which the script resides.

Update Configuration File – This option will reset most of the static variable to factory defaults.

Advanced Configuration – This option provides a step-by-step menu driven customization of the multi_report_config.txt file. See the Advanced Configuration section for details.

How to use this configuration tool – These are the basic instructions on how to answer questions. (See next page)

-m [-s]
Monitor

The '-m' switch by itself will check for any Critical Alarms and any Warning Temperatures. If present a simple short email will be generated to the email(s) on file. No statistical data will be collected unless the '-s' switch is also specified.

-s [-m]
Statistical Data Only

The '-s' switch will only record statistical data in the CSV file and no email will be sent out, unless used with the '-m' switch (see above). This is useful if you want to setup a CRON task to run periodically to collect temperature data over time for example. The statistical data file is a Comma Separated Value (CSV) format which can be opened in any spreadsheet program.

-dump [all] or [email]
Dump drive data files and Multi-Report configuration data

The -dump will generate several files for each drive in the system and append these files and the multi_report_config.txt file to the generated email. This is useful when troubleshooting a drive problem. Option 'all' which will include the Statistical Data File and the TrueNAS configuration file. Option 'email' will send the data generated in the '-dump' command also to joeschmuckatelli2023@hotmail.com which is a dedicated email to support this project. No personal information will be sent except your email address. Sorry, I can't get away from that but I will not share your information with anyone.

-u7zip
Uninstall 7-zip on Scale systems.

-update
The '-update' switch will update your script with the version on the GitHub server and then exit.

-h
Command line help

This will provide a brief listing of the command line switches and a brief description

-help
Help

This will provide detailed help information.

Multiple Instance Protection

This script will check to find out if another instance is running and if it does detect this, it will exit immediately. This is to prevent data of a same named file form having it changed by two running scripts at the same time.

How to use this configuration tool

This tool has many options and you should be able to perform a complete configuration using this tool.

In order to use the advanced options, you will need to have created an external configuration file then the tool will be able to read and write to this file.

Throughout this process you will be asked questions that require three different responses:

1) String content: Where you will either enter a new string followed by the Enter/Return key, or just press Enter/Return to accept the current value.

2) Numeric content: Where you will either enter a new number followed by the Enter/Return key, or just press Enter/Return to accept the current value.

3) True/False content: Where you will either enter 't' or 'f' followed by the Enter/Return key, or just press Enter/Return to accept the current value.

4) Some options will give you a choice of 'd' to delete the value and continue, or 'e' to Edit.

Advance Configuration Settings

This is the main configuration if the defaults are not exactly what you desire.

Advanced Configuration Settings

A) Alarm Setpoints (Temp, Zpool, Media, Activate In/Out, Ignore)

B) Config-Backup (Edit Config-Backup & Multi-Report_Config Settings)

C) Email Address (Edit Email address and Encryption)

D) HDD Column Selection (Select columns to display/hide)

E) SSD Column Selection (Select columns to display/hide)

F) NVMe Column Selection (Select columns to display/hide)

G) Output Formats (Hours, Temp, Non-Existent, Pool Capacity)

H) Report Header Titles (Edit Header Titles, Add/Remove Text Section)

I) Statistical Data File Setup

J) TLER / SCT (Setup if TLER is active)

K) Drive Errors and Custom Builds (Ignore Drives, UDMA CRC, MultiZone, Reallocated Sectors, ATA Errors, Warranty Expiration)

S) Custom Drive Configuration

W) Write Configuration File (Save your changes)

X) Exit - Will not automatically save changes

Make your selection:

Alarm Configuration Settings

Temperature Settings (Global)

- ✓ HDD Warning Temperature (45)
- ✓ HDD Critical Temperature (50)
- ✓ HDD Max Temperature Override for power Cycle Enabled (true)
- ✓ SSD Warning Temperature (45)
- ✓ SSD Critical Temperature (50)
- ✓ SSD Max Temperature Override for power Cycle Enabled (true)
- ✓ NVMe Warning Temperature (50)
- ✓ NVMe Critical Temperature (60)

Zpool Settings

- ✓ Pool Scrub Maximum Age (37) days
- ✓ Pool Used Percentage (80)
- ✓ Pool Fragmentation Percentage (80)

Media Alarm Settings (Global)

- ✓ SSD/NVMe Wear Level Lower Limit (9)
- ✓ Sector Errors Warning (0)
- ✓ Sector Errors Critical (9)
- ✓ Reallocated Sectors Warning (0)
- ✓ Raw Read Errors Warning (5)
- ✓ Raw Read Errors Critical (100)
- ✓ Seek Errors Warning (5)
- ✓ Seek Errors Critical (100)
- ✓ MultiZone Errors Warning (0)
- ✓ MultiZone Errors Critical (5)
- ✓ Helium Minimum Level (100)
- ✓ Helium Critical Alert Message (true)
- ✓ S.M.A.R.T. Test Age Warning (2) days
- ✓ Flag Device ID RED on Error (true)

Activate Input/Output Settings

- ✓ Automatic SSD Detection (true)
- ✓ Automatic NVMe Detection (true)
- ✓ Force non-SMART Devices to report (true)
- ✓ Remove non-SMART data from report (false)

Ignore Alarms
- ✓ Ignore UDMA CRC Errors (false)
- ✓ Ignore Raw Read Rate Errors (false)
- ✓ Ignore Seek Errors (false)
- ✓ Ignore MultiZone Errors (false)
- ✓ Disable Warranty Email Header Warning (true)
- ✓ ATA Auto Enable (false)

Monitor Email Settings (only for the '-m' switch)
- ✓ Alert On Warning Temperature (true)
- ✓ Alert On Critical Error (true)

Config-Backup
- ✓ Save Local Copy of TrueNAS config-backup file (false)
- ✓ TrueNAS Backup Location (/tmp/)
- ✓ TrueNAS Backup Email Enabled (true)
- ✓ Day of the week to attach TrueNAS Backup file (Mon)
- ✓ Multi_Report_Config Email Enable (true)
- ✓ Day of the week to attach Multi_Report_Config (Mon)
- ✓ Attach Multi_Report_Config on any change (true)

Email Address
- ✓ Email Address
- ✓ Monitoring Email Address
- ✓ From Email Address (TrueNAS@local.com)
- ✓ TrueNAS Configuration Backup Encryption Passphrase

Output Formats
- ✓ Power On Hours Time Format (h)
- ✓ Temperature Display (*C)
- ✓ Non-Existent Value (---)
- ✓ Pool Size and Free Space (zfs)
- ✓ Mouseover (alt)

Statistical Data File Setup
- ✓ Statistical File Location (default to script location)
- ✓ Statistical Data Recording Enabled (true)
- ✓ Statistical Data Email Enabled (true)
- ✓ Statistical Data Purge Days (730)
- ✓ Day of week email attach Statistical Data (Mon)

TLER / SCT
- ✓ Activate TLER (false)
- ✓ TLER Warning Level (TLER_No_Msg)
- ✓ SCT Read Timeout Setting (70)
- ✓ SCT Write timeout Setting (70)

Drive Errors and Custom Builds

- ✓ Ignore Drives List (none)
- ✓ Automatic Drive Compensation 'y/n'
- ✓ Automatic ATA Error Count Updates (false)
- ✓ ATA Error Count (none)
- ✓ Drive Warranty Expiration Date Warning (none)
- ✓ Drive Warranty Expiration Chart Box Pixel Thickness (1)
- ✓ Drive Warranty Expiration Chart Box Pixel Color (#000000)
- ✓ Drive Warranty Expiration Chart Box Background Color (#f1ffad)

Custom Drive Configuration (Drive Serial Number Specific)

This adjusts individual media alarms for individual drives. For example, if you have one drive that is giving you an alarm condition such as a Sector Alarm, you can change the alarm setpoint for this specific drive. By default, Sector Warning = 1, if you have 3 bad sectors already then you can use this custom configuration to set the Sector Warning value to 4, or any other number you desire. This is drive specific, based on the drive serial number.

Custom Drive Configuration Mode

This feature allows you the user to customize the script to properly handle drives which may not conform to normal settings. This consists of the following:

- Temperature Warning, Temperature Critical
- Sectors Warning, Sectors Critical, Reallocated Sectors Warning
- MultiZone Warning, MultiZone Critical
- Raw Read Error RateWarning, Raw Rear Error Rate Critical
- Seek Error Rate Warning, Seek Error Rate Critical
- Test Age, Ignore Test Age
- Helium Minimum Level. Wear Level Adjustment (reverse value)

Why would you need such customizations? Well that is a good question and the simple answer is, because manufacturers do not have a common SMART definition and they provide the data they desire.

When would I use this feature?

Example: You have a drive that always report the Test Age is a high value such as 437 days. You know that you ran a SMART test and it passed however the drive data does not relate it properly to the power on hours value. In this situation you can just Ignore Test Age and you will not generate an alarm condition.

Example: You have a single drive with a Helium value of 97%. Under normal conditions this is an alarm issue. But you do not want to lower the warning setting for all the drives from 100 to 96% so you can use this feature to adjust the alarm setpoint to 96% just for the one drive.

If you choose to customize a drive you will be presented with the Drive ID, Drive Serial Number, and the "system default" alarm setting.

Press Return to accept the "system default" value. If you change the system value, this setpoint will follow, or enter a numeric value and this value will be hardcoded for this one drive.

Need Help?

If you need help you have a few options and you could do one, two, or all three if desired.

1. Post a question in the TrueNAS forum Resources Discussion area for Multi-Report.
2. Post a Private Message to JoeSchmuck.
3. Use the '-dump email' option and when asked for a message, type a short message pointing at the problem. Joe Schmuck will respond to the email he received if from unless the message states otherwise.

If you have a problem like "Last Test Age" is higher than expected, then you might need to use advanced feature "Customize Drive Configuration" in order to correct the issue.

If you have a Wear Level that is at 0% yet you know the drive should have 100% left on it, use advanced feature "Customize Drive Configuration" in order to correct the issue.

If you need to use customize the configuration to remove an alarm condition, please let Joe Schmuck know of the issue. Maybe a software fix is required instead of the "Customize Drive Configuration".

Appendix A Drive Models Tested: (As of 5 April 2023)

HDD Model Number
SEAGATE OOS14000G (SCSI)
WDC WD140EDGZ-11B2DA2
HGST HUH721010AL5200 (SCSI)
TOSHIBA MG07ACA14TE
TOSHIBA MG08ACA14TE
TOSHIBA MG09ACA18TE
HGST HDN726060ALE614
WDC WD80EFZX-68UW8N0
WDC WD60EFZX-68B3FN0
WDC WD60EFRX-68MYMN1
WDC WD10JFCX-68N6GN0
ST4000VN008-2DR166
ST12000NM0008-2H3101
ST16000NM001G-2KK103
ST12000NM001G-2MV103
ST6000VN001-2BB186
ST3000VN007-2AH16M

SSD Model Number
IBM HUSML4040ASS600 (SCSI)
SanDisk SD8SBAT128G1122
WDC WDS500G1R0A-68A4W0
SATADOM-MV 3ME
HITACHI HUSMM808 CLAR800 (SCSI)
HPE VO000960JWTBK (SCSI)
KINGSTON SA400S37120G
INTEL SSDSC2BX016T4
INTEL SSDSC2BB080G4
INTEL SSDSC2BX800G4
Lexar 240GB SSD
PNY CS900 120GB SSD
SAMSUNG MZ7LM240HMHQ-00003
Samsung SSD 850 EVO 1TB
Samsung SSD 850 PRO 256GB
Samsung SSD 860 EVO 250GB
SuperMicro SSD
Seagate IronWolf ZA250NM10002-2ZG100

NVMe Model Number
CT1000P3PSSD8
INTEL SSDPEK1A118GA
INTEL SSDPE21D280GA
Samsung SSD 960 EVO 250GB
Samsung SSD 970 EVO Plus 250GB
Samsung SSD 980 PRO 1TB
SAMSUNG MZVL2512HCJQ-00BL7
SAMSUNG MZVL2256HCHQ-00B00

If you have a drive model not listed above, please use '-dump email' to forward the data to Joe Schmuck.