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# HDD/SSD Validation

HDD validation (in this case) basically involves 5 stages.

1. A SMART short test. This is a test that looks at certain aspects of the electrical and mechanical performance of the HDD. It is not a thorough test of the HDD. The tests take somewhere in the region of 2-5 minutes to complete.
2. A SMART conveyance test. This is a test performed on HDDs to check if they have survived transit without any damage. (I don't know how they differ from the short or long test if someone wants to give me the information Fester will try to add it.)
3. A SMART long test. Think of this as an extended version of the short test. It is a much more thorough test of the HDD and will include a surface scan of the drive. This test will take many hours to complete depending on the capacity of the HDD.
4. A Badblocks test. This is a test where every physical location on the HDD has a write/read test performed on it. The test consists of a block of data that gets written to every physical location on the HDD in sequence. Every physical location on the HDD is then read back also in sequence and each time at each location the value is checked to see if it is correct. This is one pass. The whole process if repeated with a different block of data, this is the second pass. The badblocks test uses 4 patterns by default. This test will take a very long time, usually between 24 hours to a few days depending on the capacity of the drive.
5. The SMART long test is repeated.

## SMART Tests: A Short Introduction

SMART stands for Self-Monitoring Analysis and Reporting Technology.

A SMART test is a test a HDD or SDD can perform by itself on itself. These tests, often referred to as "self tests" are carried out by the HDD's/SDD's onboard firmware, not a separate piece of software running on the server as we have already seen.

The results of these tests are stored in the drives onboard non-volatile memory so they can be retrieved and utilised by simply interrogating the drive in the correct way.

However, to be able to use the SMART capabilities built into the drives we need a program or an OS that is capable of communicating with the built in SMART functions of the drive.

With such a program or OS present we can simply issue commands to invoke the firmware to initiate a SMART test and/or interrogate a SMART drive to obtain the results of that test (very convenient).

Only one SMART test can be performed per drive. So you cannot run the short test and the long test on the same drive simultaneously. Also the current SMART test must complete before another can be run on the same drive. If a SMART test is running on a drive and you start another then the current test is stopped and abandoned in favour of the newly requested test.

Fortunately, you can run SMART tests in parallel on different drives. So you could have any number of

drives all performing the short test at the same time, or the long test or a mix if you wish (i.e. some performing the short test and some performing the long test).

## **HDD/SSD Validation Via the FreeNAS OS Route**

There is more than one way to carry out the HDD/SSD validation tests on the server.

A program specially written for this purpose could be used in a bootable form and run on the server.

However, the easiest way to conduct the HDD/SSD validation tests is to install the FreeNAS OS on the server. It has everything we need. This is not a proper installation of the OS, but just a test installation so we can conduct the SMART and badblocks tests needed.

There are a number of ways the FreeNAS OS can be installed, for example from a CD/DVD, or across a network using PXE. Fester favours a USB stick.

[Create the installer USB stick](#), [install FreeNAS](#), and [enable the SSH service](#), as described on the linked pages. When you first log in to the web GUI, you'll likely see the Initial Wizard; you can just exit out of this at this time.

## **Conducting The HDD/SSD Validation Tests (Finally!) In FreeNAS Via An SSH Console**

FreeNAS comes with certain software tools and capabilities built into it that will make the task of HDD/SSD validation much easier. This is why we needed to install it before conducting the tests.

The SSH console provides no tools for validation purposes, but does provide the means by which we can flexibly interact with the built in tools in FreeNAS to accomplish the validation tests. This is why we needed to set this up before carrying out the tests.

### **SMART Short Tests Via The SSH Console**

### **SMART Conveyance Tests Via The SSH Console**

### **SMART Long Tests Via The SSH Console Badblocks Tests Via The SSH Console**

### **FreeNAS Storage Volumes And A Known Problem With tmux**

### **Detaching The Storage Volume Before A Badblocks Test (DESTRUCTIVE Method)**

## **Detaching The Storage Volume Before A Badblocks Test (Non-Destructive Method)**

## **Importing An Unencrypted Volume After A Non-Destructive Badblocks Test**

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## **Getting Your Test Results**

## **Making Sense of SMART Data**

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