FreeNAS Quick Hardware Guide

2019-04 Edition Revision 2a)

Maintained by Ericloewe of the FreeNAS forums

The safety of your data is intrinsically tied to the hardware you choose for your server. Fortunately, the community has significant experience choosing hardware for FreeNAS. Unfortunately, it can still be a daunting task, given the wide range of hardware available.

Although this document presents hardware that is widely considered rock-solid, it is highly recommended that you read the Hardware Recommendations Guide – particularly if your needs lie outside what most users of FreeNAS do with their servers. There you will also find the reasoning for the choices laid out in this document.

This guide should not be interpreted as a comprehensive compatibility list – it is not in any way complete and other options may exist. Instead, it is more of a list of popular hardware that will not raise any eyebrows when posting on the forum.

This document is bound to change over time, as new hardware is released and old hardware is discontinued. The updated version is available in the FreeNAS forums' Resources section, where changelogs can also be found.

Distribution of this document is discouraged, in order to avoid the proliferation of outdated versions. Please link to the Resource page instead of distributing this document. The most recent version can always be found there.

Table of Contents

Chassis

For large systems, Supermicro rackmount chassis are by far the best solution. These can often be found used at very attracted prices, sometimes bundled with old hardware that may or may not be of use.

For smaller systems, many popular options exist. 5.25" to 3.5" bay adapters can be combined with a cheap desktop chassis to support a good number of disks.

Large Systems (10+ disks)	Medium Systems (6-10 disks)	Small Systems (1-5 disks)
Supermicro 3U and 4U	Supermicro 2U	Fractal Design Node 304
Norco RPC-4224	Fractal Design R4	Fractal Design Node 804
	Desktop chassis w/ drive bays	

Power Supplies

Good rackmount chassis typically include good power supplies already and often need special sizes. 80 Plus Gold or better is very strongly recommended.

The rule of thumb for sizing PSUs is $(30\text{ W} + \text{TDP of other parts}) \cdot 1.2$, for typical 3.5" disks and a 20% safety margin.

Good Quality	Excellent Quality	Overkill
Seasonic Focus Plus	Seasonic Prime Gold	Seasonic Prime Titanium
Corsair RM	Seasonic Prime Platinum	Corsair AXi
	Corsair AX	

Boot Devices

SSDs are strongly recommended over USB flash drives. Most cheap SSDs from reputable brands like Samsung, Crucial, Intel, Toshiba, SanDisk or Western Digital will work well. SATA or NVMe are both good options.

CPUs

Intel CPUs are the standard choice. Although AMD's Ryzen architecture is very interesting, experience is limited and low-end server products are few and far between.

Basic usage

Intel Pentium G4600

Socket	Cores/Threads	Clock
LGA1151 (SKL/KBL)	2/4	3.6 GHz

Intel Pentium Gold G5500

Socket	Cores/Threads	Clock
LGA1151 (CFL)	2/4	3.8 GHz

Moderate Transcoding

Intel Core i3-7300

Socket	Cores/Threads	Clock
LGA1151 (SKL/KBL)	2/4	4.0 GHz

Intel Core i3-8300

Socket	Cores/Threads	Clock
LGA1151 (CFL)	4/4	3.7 GHz

Heavy Transcoding

Intel Xeon E3-1275 v6

Socket	Cores/Threads	Clock
LGA1151 (SKL/KBL)	4/8	3.8 GHz

Intel Xeon E-2126G

Socket	Cores/Threads	Clock
LGA1151 (CFL)	6/6	3.3 GHz

Intel Xeon E-2176G

Socket	Cores/Threads	Clock
LGA1151 (CFL)	6/12	3.7 GHz

Motherboards

Some popular motherboards are listed below, organized by supported CPUs. Note that LGA1151 motherboards for Skylake and Kaby Lake (SKL/KBL) **are not** compatible with Coffee Lake (CFL) CPUs. LGA1151 motherboards for Coffee Lake (CFL) **are not** compatible with Skylake and Kaby Lake CPUs[1].

LGA1151 for Skylake and Kaby Lake (SKL/KBL)

Supermicro X11SSM-F

Form Factor	SATA ports	PCIe electrical (mechanical)
µATX	8	x8 (x16) + x8 + x4 (x8) + x4 (x8)

Supermicro X11SSL-CF

Form Factor	SATA ports	PCIe electrical (mechanical)
µATX	6 + 8 SAS3	x8 (x16) + x4 (x8) + x1

Supermicro X11SSH-CTF

Form Factor	SATA ports	PCIe electrical (mechanical)
µATX	8+8 SAS3	x8 + x2 (x4) + x4 (M.2)
2x 10GBase-T ports		

LGA1151 for Coffee Lake (CFL)

Supermicro X11SCH-F

Form Factor	SATA ports	PCIe electrical (mechanical)
µATX	8	x8 (x16) + x8 + x4 (M.2) + x4 (M.2)

Supermicro X11SCL-F

Form Factor	SATA ports	PCIe electrical (mechanical)
µATX	6	x8 (x16) + x4 (x8) + x4 (x8) + x4 (M.2)

Supermicro X11SCH-LN4F

Form Factor	SATA ports	PCIe electrical (mechanical)
µATX	8	x8 (x16) + x8 + x4 (M.2) + x4 (M.2)
4x 1GbE NICs		

---

[1] Yes, this is 100% arbitrary and you can thank Intel. You can also thank motherboard vendors who wanted to cheap out on their system firmware flash ICs and probably would not have been able to cram in the microcode for so many different CPUs, particularly after the whole Spectre/Meltdown debacle. But mostly Intel. Someone even got a Coffee Lake part to boot in a Skylake/Kaby Lake motherboard, the Supermicro X11SSM-F – it was very broken, since the processor presumably was loaded with pre-release microcode instead of shipping microcode, but it showed that it was possible. The "power delivery" excuse Intel came up with has also been demonstrated to be false. So yeah, blame Intel.

RAM

RAM should be chosen according to the motherboard's qualified parts list. The big manufacturers are Micron/Crucial, Samsung and Hynix.

Higher density is generally preferred over filling all memory channels.

Hard Drives

5400 RPM NAS/server drives are recommended. iXsystems recommends WD Red disks, but other options exist, both from WD and Seagate. High-end helium drives work well, if high capacities are desired.

Both SATA and SAS work well, but SAS requires an SAS controller.

HDD controllers

The only reliable way of adding SATA or SAS ports to a system is with LSI SAS HBAs (and SAS expanders, if at least one controller is present).

Any card using the SAS2008, SAS2308 or SAS3008 controller will work, but some may need to be crossflashed to IT mode to operate as HBAs and not entry-level RAID cards. This includes rebadged cards from other vendors – although Dell cards are somewhat trickier to crossflash.