

What kind of computer should I buy for a FlexRadio Transceiver?

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Content provided by: FlexRadio Systems Engineering

When buying a computer that will become *the other half of a software defined radio system*, it is important to understand what characteristics are needed. A software defined radio runs a *real-time audio processing application* (PowerSDR) and there are numerous factors that effect how well it will run, such as operating system type, system I/O throughput, and internal system latency. All of the factors are interdependent so you can not focus on just one metric such as CPU type; you must consider the whole system.

First, the "ideal" computer or PC configuration is a very subjective thing to quantify. We are bounded by things like trading cost vs. performance. Also, PowerSDR will operate at a very acceptable performance level on a wide range of computer configurations. There are also other compromises that have to be factored in.

One of the trade offs is sampling rate. A lesser PC that is not properly running PowerSDR at 96 or 192 KHz (audio drop outs) may work fine at 48 KHz.

Below are some *guidelines* that you want to consider when getting a computer that will be able to run at the highest sampling rate of 192 KHz. Please note that these are only recommendations and not strict hardware endorsements from FlexRadio Systems.

Selecting a computer with requirements less than what is suggested is not recommended.

[Rule of Thumb](#) - "Get the highest performance PC you can afford and get one that allows you to upgrade if necessary"

CPU type and Speed:

You used to be able to tell if a CPU was a better performer if it had a higher clock speed. Multi-core processors have changed this tried and true metric. You definitely want to use a multi-core (AMD or Intel) processor since future versions of PowerSDR will be taking advantage of the technology provide by those chips. You also want to get a CPU that has the largest L2 or L3 (or combination of both) on-chip memory cache available, depending on CPU manufacturer.

Video Graphics Controller:

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PowerSDR currently utilizes only non-hardware accelerated 2-D graphics, but this could change where the display could support OpenGL 3-D rendering. A mid high-end video card that has an NVIDIA or ATI graphics engine (GPU) and has fast graphics memory on the card is recommended. The cards that use the PCI-E x16 slots will provide faster performance over the older AGP based cards. It is also recommended that you get a video card that will allow you to connect two or more monitors to it at one time. Many people are using dual monitors with PowerSDR to allow other programs to easily fit on the screen like logging and digital mode programs.

RAM:

PowerSDR does not use a lot of it, but the operating system (Windows) likes to have it available. Get the fastest DDR2/DDR3 RAM your motherboard will support. If you are using a 32-bit (x86) version of XP, Windows Vista or Win7, 2 GB is the minimum and 4 GB is recommended *minimum* for 64-bit versions. 32-bit operating systems can only address up to 4 GB of RAM so adding more than 4 GB of RAM to a 32-bit operating system does not provide any benefit.

1394a FireWire Host Controllers (FLEX-5000 and FLEX-3000 only):

One of the more critical elements for determining if a computer will run PowerSDR with a FlexRadio Systems *Firewire based* software defined radio is the throughput achieved from the Firewire host controller. Some computers come with an integrated Firewire interface. In general, these integrated peripherals are usually not optimized for high throughput data rates. Using an a bus connected Firewire host controller card that is PCI or PCI-E based is recommended for optimum data throughput. For laptops, you want to get an ExpressCard Firewire host controller rather than a PCMCIA if at all possible.

The second thing to consider are Firewire chipsets. The manufacturer of the FireWire interface used in the FLEX-5000/FLEX-3000 recommends FireWire cards based on the Lucent AGERE chip set. Texas Instruments (TI) has the most compatible chip set across a wide variety of Firewire devices.

Refer to the following Knowledge Center article [Selecting High Performance Firewire Cards for FlexRadio Transceivers](#) for more information regarding selecting a Firewire host controller for your PC.

Monitors:

The most important consideration for a monitor other than size is how much EMF it radiates and the resultant RFI to the software defined radio hardware. LDC displays seem to have

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lower EMF than CRT type displays, but the resolution of LCDs is less than that of CRTs (a trade off). You want a lot of monitor "real estate" consider one of the new HD wide screen type monitors that are at least 20". Refer to the Video Graphics Controller section above.

Hard Drives:

PowerSDR does not utilize a hard drive to any great degree after the program has started and is running. Windows on the other hand does use the hard drive for managing memory utilization by creating virtual memory with a "swap file". If your PC is low in the amount of RAM it has installed, Windows will swap out RAM to the hard drive. This hard disk activity has the over all effect of slowing down your PC causing PowerSDR to momentarily freeze up causing disruptions. Even systems with sufficient amounts of RAM will still experience Windows swapping memory out to the hard drive's swap file, but to a lesser extent.

It is important to get a fast hard drive to mitigate the effects of Windows using virtual memory. There are several characteristics of hard drives that should be considered. The first is interface type. Older computers use IDE data interfaces. Newer computers use SATA. SATA is faster than IDE and should be used. There are different speeds for SATA drives. Get the fastest SATA drive that your PC supports. Platter rotational speed and seek times are the two other primary factors for selecting a hard drive. You want to choose a hard drive that has the fastest platter rotational speed (measured in RPMs) and has the lowest seek times (measured in milliseconds).

Laptop or Desktop:

In general, a desktop computer does not have the power and heat constraints that are taken into account when engineering a laptop computer, therefore desktop computers are higher in I/O performance and have lower internal latency when both have comparable CPUs and RAM. Recent advances in laptop technology have been producing some laptops with very high performance that have been known to work well with PowerSDR especially ones that incorporate multi-core CPUs but this is not true for all laptops even from the same manufacturer that have the same CPU architecture. Additionally, Firewire performance on laptop computers with integrated Firewire controllers has been reported to be lacking. This issue is easily corrected by using either an ExpressCard or PCMCIA (PC Card) Firewire host controller rather than the integrated Firewire port on the laptop. Recently laptop computers have been omitting the Firewire interface and even the ExpressCard slots for adding a Firewire adapter, so make note of this when purchasing a laptop computer. This is usually not an issue with USB controllers that are used with the FLEX-1500

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