



Connecting Powered IEEE 1394 Devices

A Guide for Multiple IEEE 1394 Cameras

When connecting more cameras to your computer, external power supplies might be necessary. Problems that arise when using multiple power supplies and lead to damaged devices are shown and solutions to bypass them are given.



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Powered IEEE 1394 Devices

All devices that have an IEEE 1394 connector with six contacts are able to receive or feed power from or to the IEEE 1394 bus (or simply bus for short). Connectors with only four contacts do not contain power supply.

Onboard or PCI OHCI compliant cards are always self-powered. Generally, they are powered by the computers power supply of 12V. Cameras, Hubs, and repeaters can be powered by the bus or also by separate power supplies. Thus, there is the possibility that there can be more than one power supply for one bus. Some setups even require that there is more than one power supply.

Possibilities of External Power Supplies

Power Supply	Description
Repeater	For attaching a single camera to i.e. a four-pin connector
Hub	For attaching multiple devices to a four- or six-pin connector. As an example: the IEEE1394-CONNECT-KIT5 has six IEEE 1394 connectors for five cameras
Camera	Directly powering the camera if it supports external power supplies (i.e. AVT Dolphin series)
Cable	Special manufactured cable with connection to a power supply (i.e. a four-pin to six-pin cable with power input on the four pin-side)

When to Use Powered IEEE 1394 Devices

If you are applying up to three cameras to your computer, no additional power supplies will be needed. The cameras attached are powered by the computers power supply. The number of cameras you can use without applying additional power supplies depends on the power consumption of your IEEE 1394 devices, the power supply and additional consumers.

Use external power supplies when

- a four-pin connector is used (i.e. in a laptop)
 - power consumption exceeds the limits of the power supply device
- If you are not sure if your power supply is sufficient better use additional power supplies.

As a rule of thumb, additional power supplies should be used for every Hub in the setup

Example:

The IEEE1394-CONNECT-KIT5 permits 15 watts at 12V. Thus if the maximum number of five cameras is attached every camera is allowed to have a consumption of up to three watts.



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Dangers of Setups with Multiple Power Supplies

When one or more power supplies i.e.

- fail
- are switched off
- turned on/off one after another

the load is distributed to the remaining power supplies attached to the bus. In this situation it may happen that the limits of the device are exceeded and it takes damage.

To prevent situations like this the setup should be divided into smaller safe areas. For segregating the power supplies a special cable (named FIREWIRE-CASCADE) can be used. This cable enables the user to communicate with all devices on the bus without sharing the same power supply.

For an example of a fault-prone system and how to make it safe see the next pages.

Also it should be paid attention to using power supplies with the same voltage. Because of the computers power supply of 12V only power supplies with this voltage should be used. Otherwise some devices may sustain damage due to overload.



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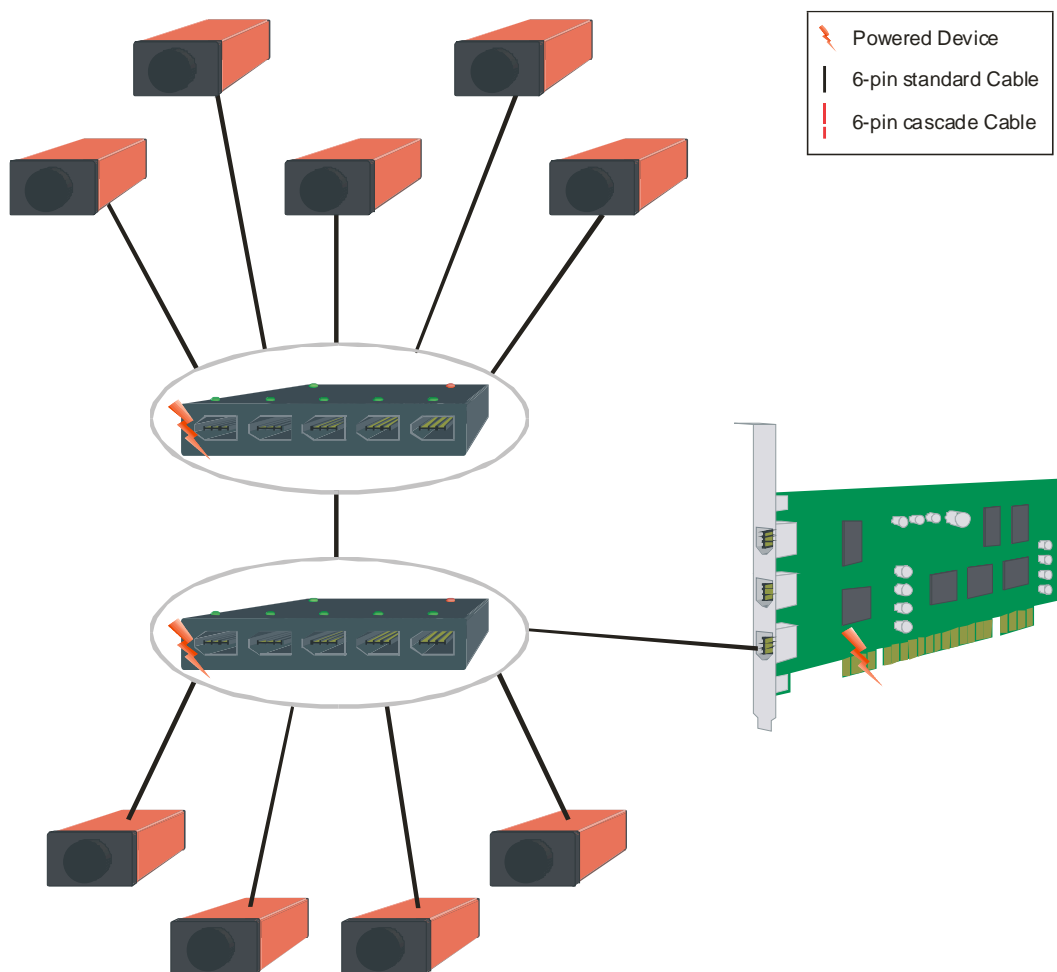
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Example Setups

Fault-Prone Setup



In this setup three self-powered devices are used to feed and connect nine cameras (up to three watts each): one PCI-card and two Hubs. All devices are connected via standard IEEE 1394 cables with six-pin-connectors. Seen from the PCI-card: Four cameras are connected to the first Hub, which itself is connected to the PCI-card. The second Hub is connected to the first one. Attached to the second Hub are the remaining five cameras. Attached to the second Hub are the remaining five cameras.



There seems to be enough power available for all devices in this setup. However, imagine a system start-up: A user plugs in the first Hub while the second Hub and the computer are switched off. At this moment all devices receive power because they are all connected via the bus. As stated before, one Hub is capable of feeding 15 watts, but there are nine devices consuming three watts each.

The resulting 27 watts exceed the limits of the Hub and lead to its destruction!



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Safe Setup

When changing the fault-prone setup a little, it can be made safe. The cables connecting the self-powered devices are replaced by the FIREWIRE-CASCADE cables (marked by the dotted line). Now all powered devices are safe because only the permitted number of devices is attached to them (at most five cameras – resulting in 15 watts):

