Computer Solutions
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Power supply management

Consideration of whether a dirty power supply may affect any particular system is not so much if it will occur but the consequences of it when it does occur. Such consequences include -

the cost of replacing damaged equipment;

the financial implications of not being able to use the computer (e.g. no access to customer and suppliers, inability to generate work, inability to generate invoices, inability to access accounts); and

the cost of re-installing and configuring software and re-entering data.

Power supply disruptions may come from the mains supply or from a near neighbour. Especially prone to causing such disruptions are automatic switches (e.g. fridge, freezer, central heating thermostats) and electrical equipment drawing large currents (e.g. compressors). A mains electrical supply may effect the efficient working of a computer in various ways. These may be categorised as -

Deficiencies in the power supply -

transient over-voltage (also called 'spike', 'surge' and 'glitch') which is an increased voltage of anything from between a few volts to thousands of volts which may last no more than a few milliseconds;

power outage (also called 'blackout') which is a total loss of power which may last between several milliseconds and many hours;

under-voltage (also called 'brownout') which is a reductions in the supply voltage which may last for any time from a few seconds;

over-voltage which is a sustained increase in supply voltage which may last for any time from a few seconds;

sag (also called 'dip') which is a sustained decrease in the supply voltage which may last for no more than a few seconds; and

swell (also called 'surge') which is an increase in the supply voltage which may last for no more than a few seconds.

Deficiencies carried by the power the power supply -

electrical noise or radio frequency interference (also called RFI) which is a continuous high frequency (more than 5kHz) distortion;

harmonics which is a continuous distortion at frequencies of up to 3kHz; and

nuclear electromagnetic pulse (also called NEMP) which is an electromagnetic pulse (EMP) caused by a nuclear explosion and increased solar activity.

Deficiencies carried by conductive material other than the power supply -

electrostatic discharge (also called static) which is the discharge of an electrostatic charge (generated by two insulating objects being rubbed together) to a conducting object.

Such disruption could cause damage to the computer and loose information not already saved to disk. Indeed, any file being saved at the time of power disruption could be completely unrecoverable.

Consideration of what protection is required for a particular system depends on the amount of acceptable risk. In general, a large network needs to be protected by an uninteruptable power supply. This will allow users and the network manager a grace period in which to close all files, applications and the system itself in a controlled way. Small networks and stand-alone computers need to be protected by a surge protection device. These come in the form of an extension power lead with between three and six outlets. It should be borne in mind that such protection may reduce the threat to an absolute minimum but can never eliminate it completely.

When comparing surge protection devices, consideration should be given to -

Joule rating (J). A higher joule rating provides better protection;

maximum surge current (A). This is the maximum non-repetitive surge that can be discharged by the device. A higher maximum surge current provides better protection;

clamping voltage (V). This is the voltage level at which the device cuts off the power surge. A lower clamping voltage provides better protection;

three channel protection. This is the ability to protect all three channels (i.e. earth, live, neutral). The ability to protect all three channels provides better protection;

safety thermal cut-out. Repeated low surges over a period of years or one high surge can lead to degradation of the components in the device. This can lead to temperature increase and combustion;

operational indicator. This indicates whether or not the device is operational and, in consequence, if the equipment attached to it is being protected.

response time. This is the time the device takes to respond. A response time of 10 nano seconds (10 thousand millionth of a second) is considered to be an optimal response time; and

RFI filter. The inclusion of an RFI filter removes radio frequency noise and interference.

Compliance with British Standards BSEN60950:1992 'Safety Of Information Technology Equipment' and IEC1643:1998 'Surge Protective Devices Connected To Low-voltage Power Distribution Systems'.

If you have any further queries on this subject please contact me.