





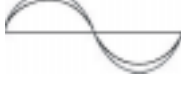

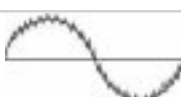
# Power Problems and their Consequences

## Origins for Power Problems

Utility companies cannot guarantee the supply of the clean source of power that sensitive electronic equipment require. 3 major origins can be listed:

- ▶ **Mother Nature:** Thunderstorms, strong winds, hurricanes, earthquakes, snow, ice, flood can all affect power lines. No place in the country is safe from any climatic hazard.
- ▶ **Human errors:** Remember the San Francisco power outage (1 million people in the dark for 7 hours in December 1998)? The reason was a “simple human error”, as workers adjusting several 115-kilovolt lines turned power on without proper grounding.
- ▶ **Office environment:** departmental copiers, neon lights, elevators generate disturbances that can affect the proper operation of any information system.

## Types of Power Problems

<p>▶ <b>Blackouts</b> Total loss of utility power for more than 1 cycle</p>		Thunderstorms, overloads, accidents, ice on power lines	System crashes, lost data, corrupted data
<p>▶ <b>Brownouts</b> Sustained under-voltage conditions</p>		Overloads, excessive power demand (AC or heating turned on)	System crashes, overheating, damage, operating errors
<p>▶ <b>Surges</b> Temporary over-voltage condition</p>		Startup of large loads	Operating errors, system shutdown, component stress
<p>▶ <b>Spikes</b> Short duration, sudden voltage jump</p>		Lightning, static discharges	Operating errors, system shutdown, corrupted data
<p>▶ <b>Overvoltage</b> Continuous voltage above nominal</p>		Wiring faults, faulty regulation systems	Overheating, component stress, damage, operating errors
<p>▶ <b>Harmonics</b> Frequency oscillations up to 100% amplitude</p>		Incorrect electrical settings, faulty control systems	Power supply malfunction, data loss
<p>▶ <b>Noise</b> Electromagnetic interference (EMI)</p>		Electric motors	Operating errors, data loss

## Financial Consequences

According to an independent survey from The Standish Group, one minute of application downtime can cost thousands of dollars in lost revenues.

Based on these costs, the ROI for power protection can be as fast as a few seconds of downtime, or simply the first power outage.

Call location	\$27,000
Number portability	\$14,000
Enterprise Resource Planning	\$13,000
Supply Chain Management	\$11,000
Electronic Commerce	\$10,000
Internet Banking	\$7,000
Universal Personal Services	\$6,000
Customer Service Center	\$3,700
Point of Sale/Electronic Fund Transfer	\$3,500
Messaging	\$1,000

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