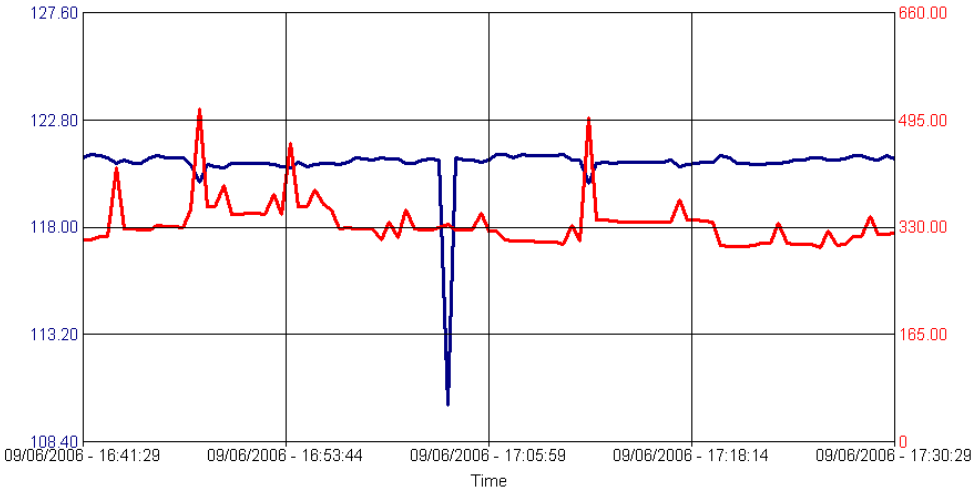
PQ Influences on Telecommunications

Telecommunication systems have been developing rapidly in recent years. In addition to voice communications, telecommunications has seen a continuing growth in data transmission. This expansion of data transmissions means that telecommunication systems are getting more advanced and thus more vulnerable to power quality problems. The electronics they employ are more susceptible to power quality phenomena such as sags / dips, swells, transients and harmonics.

Telecommunication equipment can trip offline. This problem is most associated with voltage sags / dips and swells. Voltage sags / dips are momentary decreases from the nominal voltage value. Voltage sags / dips are typically caused by abrupt increases in loads such as short circuits or faults, motors starting, or electric heaters turning on; sags / dips may also be caused by abrupt increases in source impedance, typically caused by a loose connection. Voltage swells are almost always caused by an abrupt reduction in load on a circuit with a poor or damaged voltage regulator, although they can also be caused by a damaged or loose neutral connection. When equipment trips offline, telecom customers can lose their service, costing the telecom money every minute the equipment is off line.



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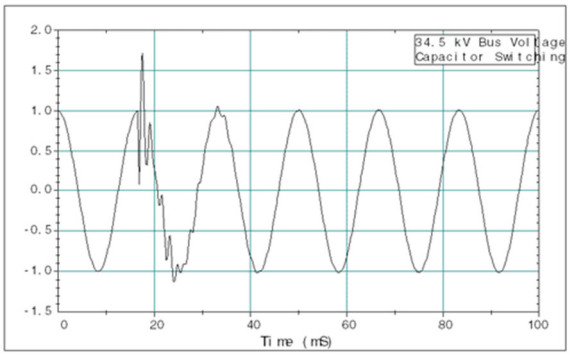
Computer equipment can lock up and the data can get garbled due to transient voltages. Large enough transient voltages can also damage equipment. Transient voltages are abrupt short duration changes in voltage (less than 1 cycle). Generally there are two different types of transients: low frequency transients with frequency components in the few-hundred-hertz region typically caused by capacitor switching, and high-frequency transients with frequency components in the few-hundred-kilohertz region typically caused by lightning and inductive loads. Transients not only can cause equipment to malfunction and fail: they can also cause insulation to break down, leading to premature failures transformers.



Harmonics are another power quality phenomenon that can cause telecommunications equipment to malfunction. Harmonics are a sinusoidal component of a periodic wave or quantity with a frequency that is an integral multiple of the fundamental frequency. Harmonics can cause computer equipment to lock up or cause the data to become garbled, as well as causing the neutral wire to overheat. Linear loads such as incandescent lights and motors draw current equally throughout the waveform. Non-linear loads found throughout telecommunications equipment, such as switching power supplies, draw current only at the peaks of the wave. It is these non-linear loads that cause harmonics.

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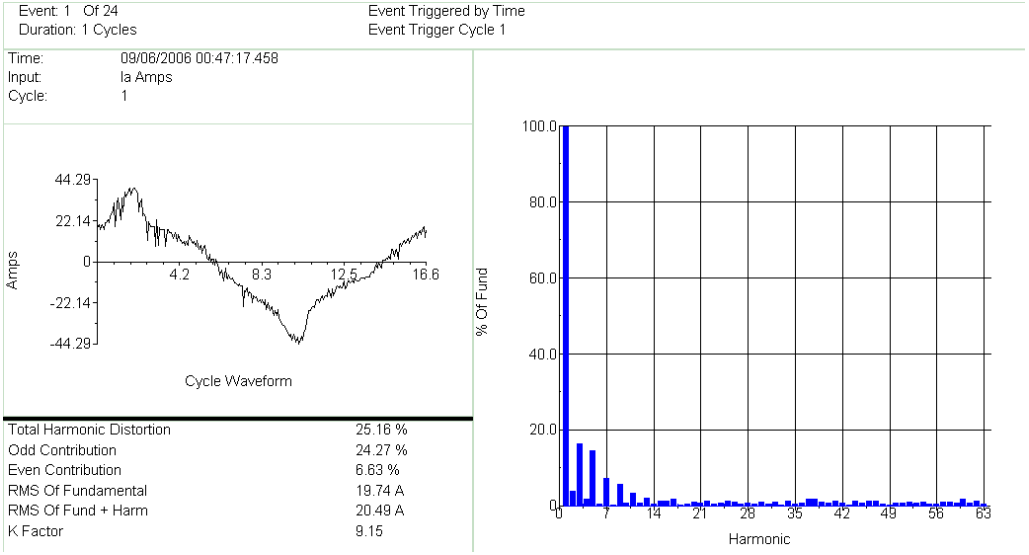
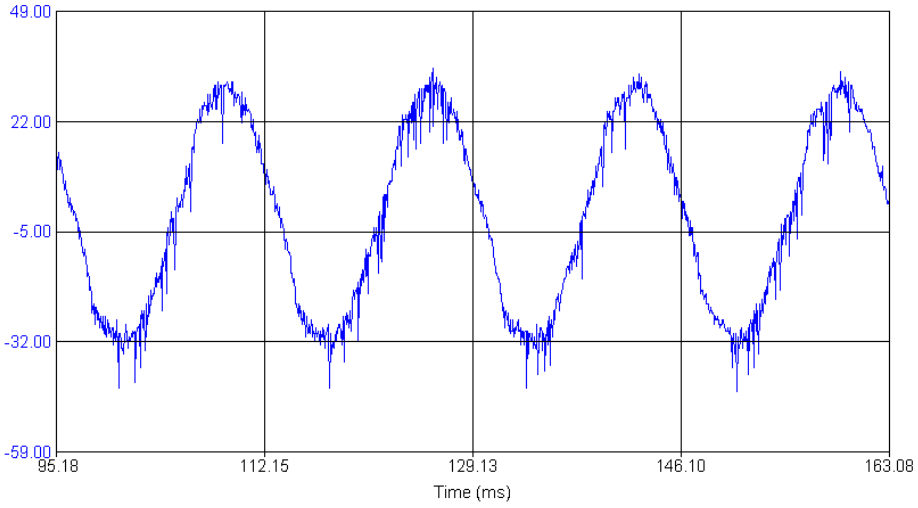


Electrical noise is another power quality phenomenon that can disrupt data-carrying signals. Noise can be electromagnetically coupled onto signal lines from power lines. Power systems transmit very high energy. Telecommunications systems transmit data at low power. Even though telecom systems are designed to reject a good amount of interference, these high power lines can cause poor transmission efficiency and disruptions. Power lines and telecom cables can run close together which leads to electromagnetic coupling and noise on the telecom cables.



Telecommunication services are judged by the reliability and quality of their services. Power Quality phenomena can cause poor data transmission rates; disrupt transmissions and cause

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equipment malfunctions and failures. The reliability and quality of a telecommunication system is only going to be as good as its weakest link.

Telecommunications service interruptions not only generate immediate costs; such as customer claims, service agreement claims, contracted technician troubleshooting hours and equipment repair costs, but also have further- reaching consequences. These consequences can be seen as the impact on a service provider's quality and reliability reputation. This can have an even far greater cost than the immediate effects of the service disruptions. These costs can be minimised by reducing the disruptions and malfunctions caused by power quality phenomena, which can be reliably done by taking periodic accurate power quality measurements to assess the condition of incoming power. The quality of the incoming power is not solely affected by the transmission and distribution of that power, but also by the load drawing the power. This means the quality of the incoming power can vary periodically – not only from changes on the transmission and distribution side but also as internal equipment changes are made.

In addition to power quality issues, telecommunication equipment also draws a great deal of energy. Not only does the computer and backup equipment draw a great deal of energy but so does the cooling system for that equipment. By using power quality equipment, companies can also measure their energy usage in great detail. This can help companies run more efficiently and save on energy costs.

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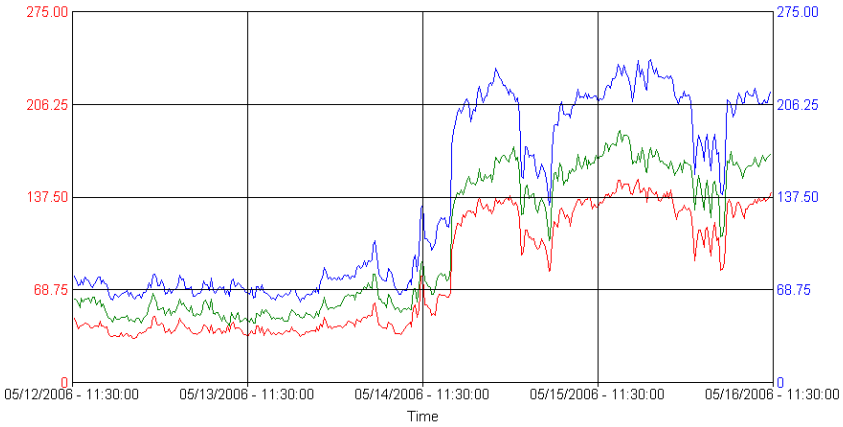

A telecommunications company can save money, improve quality and reliability by periodically monitoring their incoming power quality and their energy usage. By owning a simple and easy-to-use Power Quality device, telecoms companies can perform their own periodic assessments without the cost of employing outside service companies to perform these tests. The Megger family of Power Quality products offers this ability. The Megger family of power quality products with their one-touch recording, auto-data analysis, energy analysis and unrivalled software can save telecommunications companies money and help them improve their quality and reliability.