

## How Secure is your Security Surveillance system from Lightning strikes!

For Essential Services Segment, service-availability is the most important requirement, as is heard a lot about 24\*7 service around the company in recent times. What will happen, if coincidentally, there is a threat from mankind (terrorist) and also from the nature (lightning) at the same time and the Security Camera fails to capture the terrorist due to a lightning strike? Keeping this in view, it has been estimated that Rs 30,000 crores will be spent for country's security over the next few years.

A few of the safety critical environments in various segments are:

- Military / Defence Establishment
- Nuclear Power Plants (a small problem can create disaster)
- Telecom (Connectivity)
- Instrumentation Systems (DCS, especially closed loops and costly equipment)
- Railways (Public Transport)
- Hospitals (essential services)
- Police (Surveillance).

Common to all the above services is the Surveillance System though it is not contributing directly to the productivity. Safety is the prime concern here.

Even though one can take a slight chance (as long as it is tolerable) against mankind - attacks, nobody probably should take chance against natural phenomena like lightning and earthquakes.

A close examination of Surveillance System indicates that protection is important at both camera end and also at the DVR (Digital Video Recorder) end because each one is important due to different reasons. Cameras (especially outdoor cameras) are prone to direct lightning attack where as DVR is very costly and any failure in

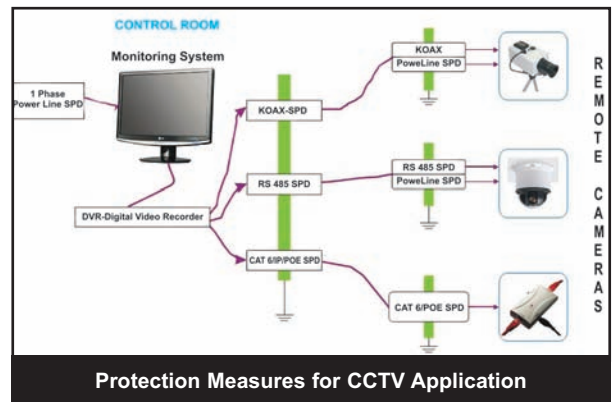
it needs immediate replacement, which otherwise proves costly when it comes to security. Irrespective of the number of inputs at DVR end, the first & fundamental protection is its power line. For TT network, which is predominant in India, an SPD is needed between Line and Neutral & one more between Neutral and Protective earth. (referred as potential equalization in foreign countries).

For the cameras, SPD is needed at both ends (at the camera- end & also at the DVR - end) as shown in the figure because, failure can happen due to 2 possibilities.

First one is simple & straight forward; lightning strikes to the overhead cables. As the attaching point of lightning strike is not known, SPDs are needed at both ends as the lightning current has the tendency to travel in both directions though there will be minor variation in quantum of current flow in each direction which is decided by the impedance of the system.

The second and most common failure which is less understood is the one due to GPR (Ground Potential Rise). GPR happens mainly due to lightning surges. The lightning impulse has 3 main parameters - peak current, charge and specific energy.

A study by IBM says that 88% of failures happening in all Electronic equipment are either due to Oscillatory decaying transients or due to Impulse transients. Oscillatory decaying transients originate predominantly from switching operations of capacitive and inductive



loads, welding etc. Impulse transients arise out of lightning.

Above Pie chart reveals one important fact. Though lightning surge intensity is much severe, the probability of lightning surge is less, when compared to switching surge. Actually, it depends on the geographical location of the plant. For example, most of the countries falling near equator have more lightning flash density (measured as number of flashes / sq km / year) which is computed by a technique called OTD (Optical Transient Detection). In India, the coastal areas (Eastern & Western part, especially Assam & Kerala coast) are prone to more lightning strikes when compared to central parts of India.

Selection of SPDs for camera depends basically on the type of camera viz. Analog, Digital, IP, PTZ cameras.

Given below are the different type of cameras and its operating voltages.

- Coaxial inputs (Typically 1V PP signal; 75  $\Omega$  impedance; BNC connector; bandwidth of 65 MHz)
- Apart from signal through co-axial line, Power supply input to camera also needs protection. It varies from 12VDC upto 230VAC. As SPDs are voltage operated device, power supply input voltage is the

