Protecting an Outdoor IP Camera: Minimize Risk to Your Network

A Lightning Rod of Security

The proliferation of externally mounted IP-based network cameras is increasing the risk of damage from high-voltage surge events to sensitive equipment in the data center or telecom room and the camera. Instead of grounding the charge from a lightning strike or power-line cross, security cameras act as lightning rods—drawing the voltage through the copper cabling to the networking equipment. If a lightning strike hits within 300 feet of a cable, it can produce 5,000 volts and 6 million watts.[1] Without the proper protection, this can seriously damage or destroy networking equipment and cause serious injury or death. Because current standards and codes governing building entrance protection are ambiguous in their requirements for IP-based outdoor network cameras, Anixter recommends using primary building entrance protection for all outside network cameras to prevent damage to sensitive networking equipment.

The Evolution of Networking Configurations

This threat comes from the evolution of the video surveillance network from a stand-alone configuration to an integrated system utilizing a single cabling infrastructure. In a traditional analog video surveillance system, a single coaxial cable runs from a camera directly back to the video headend. Even though surge protection for analog configurations is available and recommended, the installation practices are not governed by Article 800 of the NEC, which addresses communications circuits and circuit protectors that use twisted-pair cabling. The equipment at risk of damage in this traditional stand-alone configuration is limited to the camera itself and the headend equipment, such as a VCR, DVR or monitor.

In a networked video surveillance system, the IP-based cameras can run on a dedicated video network or connect directly back to the data center or telecom room. On a dedicated video network, a high-voltage surge can cause extensive damage to sensitive electronics such as Ethernet switches, network servers and storage devices. If the cameras are connected to the main production network, the surge can cause serious damage to mission-critical equipment.
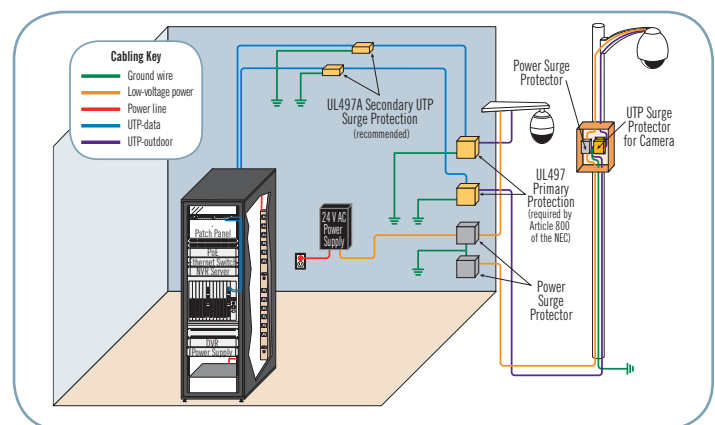
Best Practices for Safeguarding Network Equipment

To prevent damaging networking equipment, Anixter recommends considering the Ethernet cabling as a communications circuit under Article 800 of the NEC. The Article recommends using a UL 497 Listed primary protector for all conductive communications paths entering or leaving a building as close as possible, but no more than 50 feet, from the cables' point of entrance. Because of its much faster

clamping time and increased longevity, Anixter recommends using a solid-state protector module over a traditional gas-tube module. By clamping to ground up to 2,000 times faster than a traditional gas-tube module, a solid-state protector reduces damage to valuable electronic equipment and typically never needs to be replaced, even after multiple surge hits. Using a UL 497A secondary protector will further mitigate the risk of equipment damage from voltage surges that were not eliminated using a UL 497 primary protector. The diagram below provides the recommended surge protection in a networked video surveillance configuration and also shows that proper surge protection for the camera should also be installed as close to the camera as is practical.

IP-based network cameras provide greater flexibility and increased network integration capabilities. As more companies look to protect their assets by mounting more IP-based network cameras on top of buildings or on top of light poles, it is important to follow these best practices to effectively safeguard networking equipment against any potential damage from high-voltage electrical surges.

[1] Source: Atlantic Scientific, 2004

Cabling Key
- Ground wire
- Low-voltage power
- Power line
- UTP-data
- UTP-outdoor

UL497A Secondary UTP Surge Protection (recommended)

Power Surge Protector

UTP Surge Protector for Camera

UL497 Primary Protection (required by Article 800 of the NEC)

Power Surge Protector

Patch Panel

PoE Ethernet Switch / NVR Server

NVR Power Supply

24 V AC Power Supply

For more details on industry standards, go to anixter.com/literature to order your copy of the Anixter Standards Reference Guide, or contact your local Anixter sales representative or visit anixter.com.