Engineers who design industrial processes, commercial data centers, telecommunication systems, and other electronic systems have been including surge protective devices (SPDs) throughout the electrical distribution to mitigate the unwanted affects of induced transients.

The utilization of SPDs to protect equipment follows the recommendations of the Institute of Electrical and Electronic Engineers (IEEE) and the requirements of the National Fire Protection Association (NFPA). The SPDs have been tested in accordance with the National Electrical Manufacturer’s Association’s (NEMA’s) LS 1, and Underwriters Laboratories (UL) 1449 standards.

While traffic engineers also utilize SPDs to protect their equipment, most standards associations that specify traffic control systems have not yet incorporated the latest recommendations from the IEEE, and the NFPA, and are unaware of the performance, and safety standards of NEMA, and UL. Yet, when lightning or other electrical disturbances knocks out or disrupts the traffic signals on a highway or at a busy cross street, effects can range from inconvenience to motorists, at minimum, to havoc or worse. The best prevention is the best protection.

The utility grid provides electrical power to the traffic cabinet. External vehicle detection equipment detects the presence of vehicles using ground loops, cameras, etc. The traffic signals receive both power and communications from the microprocessor based controller through various analog to digital converters and other electronic components. Data to remote traffic control locations is transmitted over a plain old telephone system (POTS) line, Ethernet, or other type of communications.

Like every electronic system, traffic control systems are exposed to many environmental forces. Traffic control systems are generally located outside in a NEMA type weatherproof enclosure. Unlike other electronic systems, the inputs and outputs of the traffic control system are directly exposed to electromagnetic energy, such as lightning. Traffic control cabinets do provide some protection against lightning and other potentially damaging events but do not follow current NFPA or IEEE standards to the extent that the need for surge protection is noted.

Even though the standards of the NFPA do not directly address traffic control cabinets, the latest recommended revisions to NFPA 780 (Installation of Lightning Protection Systems) warrant serious evaluation for implementation by Traffic Engineers interested in high reliability systems and quality surge protection. The NFPA section on Surge Suppression was entirely rewritten to maximize the benefits of the types of protection, the methods, and the devices utilized, with focus on SPDs rated appropriately, as deemed by scientific analysis of the induced lightning transients on electrical and electronic systems.

Traffic Engineers who want to ensure optimal protection of and for the installation should recommend the noted higher rated SPDs. The new NFPA 780 standard covers permanently installed surge protection systems designed to protect against indirect lighting strikes, and other over-voltage transients created by direct or nearby lighting strikes.

According to the standard, SPDs shall be rated as follows:

- SPDs at the service entrance shall have a maximum surge current (Imax) rating of 40kA 8/20 per phase or greater (as stated in 4.18.3.1);
- SPDs for use on data communications systems (UL 497 series and UL 452) shall have an Imax rating of 10kA 8/20 or greater when installed at the service entrance location (as stated in 4.18.3.2).

To maximize the safety of pedestrians and drivers at intersections, all critical applications in a physical area merit optimized protection. The inductive loops, video cameras, pedestrian pushbutton loops, service loops for controls or signals that exit or enter the cabinet, and the AC that supplies the power to the lights need to be protected according to the new guidelines. Adhering to the latest standards would result in more robust protection. Upgrading protection to conform to the intent of NFPA 780 is neither expensive nor labor intensive and there are no downsides.

In addition to more stringent requirements to protect electronic systems, SPDs need to be tested in accordance with NEMA LS 1, and UL 1449. NEMA LS 1 is a performance standard that demonstrates the capability of the SPD to attenuate or divert transients. UL 1449 demonstrates the safety of the SPD for use in particular applications.

Everyone benefits from a robust system design that incorporates two types of SPDs that protect traffic equipment against surges – AC power SPDs and communications SPDs. The first type offers 40 kA protection for AC power at the AC power entrance to the cabinet; the second offers a minimum of 10kA of surge protection for all the communication loops and signals.

The upgrade makes sense as it reduces the susceptibility of the equipment, decreasing the likelihood of a disruption or interruption due to a surge-related event. This protection could extend useful life of the cabinet equipment and reduce maintenance costs, protects pedestrians and drivers from the effects of unwanted induced electromagnetic energy, and can reduce the likelihood of traffic chaos from malfunctioning or nonfunctioning traffic signals.

Continued on page 26
the equipment meets the spectrum efficiency standard of one channel per 6.25 kHz of channel bandwidth (voice) or 4800 bits per second per 6.25 kHz (data).

The Commission exempted Part 90 paging-only frequencies from the narrowingbanding requirements.

Licensees operating in the Federal Government bands 150.05–150.8 MHz, 162.0125–173.2 MHz, and 173.4–174 MHz, must wait for a decision in another proceeding, ET Docket No. 04-243, which will address whether different narrowingbanding requirements are needed to account for the Federal Government’s own narrowingbanding plans in those bands.

What does this mean to you?
If your agency currently operates a wideband (25 kHz) VHF (150 – 170 MHz) or UHF (421 – 512 MHz) radio communications system you should make note of these changes in your future:

• On or before January 1, 2013 your entire system must be converted to narrowingband emissions (12.5 kHz). This means that the bandwidth your signal occupies must be one half of what it is today.
• If you are planning to construct a new wideband system, add new stations to your existing wideband system or expand the coverage area of your existing system you must file your license application before January 1, 2011
• Importation or manufacture of wideband radio equipment will not be allowed after January 1, 2011.
• Paging only channels will not be affected by the order. This applies to designated paging channels and does not mean that a channel you may use for alert paging, such as commonly used by fire departments to alert call firefighters, are exempt. Such systems must also operate in a narrowingband mode by the 2013.

Alan Caldwell Stepping Down as IAFC Government Relations Director
There’s a change at the helm of the International Association of Fire Chief’s (IAFC) Government Relations Department. Alan Caldwell, who has managed the department for more than eight years, is stepping down as its director. He will remain with the IAFC and is taking on a new role as senior advisor to the department with national-preparedness and first-responder issues.

IAFC Executive Director Garry Briese said “As director, Alan Caldwell deepened, broadened and solidified our reputation and presence on the Hill and with the administration. Now, working from a different perspective, he’ll continue to help develop and guide the IAFC’s efforts.”

In his new role, Caldwell will focus on wireless radio communications and lend his expertise on other issues. Prior to joining the IAFC, Caldwell spent 34 years with RJR Nabisco, 20 as its director of federal government affairs. He is also a retired volunteer fire chief from Fairfax County (Va.) Fire & Rescue.

Alan is a friend and supporter of IMSA and public safety communications. I have worked with him for several years on a myriad of issues affecting public safety communications and I am pleased that he will still be a part of the IMSA/IAFC communications team.

2004 Edition of the Standard Highway Signs Book Available Online
The 2004 Edition of the Standard Highway Signs book, English and Metric versions, is now online on the MUTCD site, http://mutcd.fhwa.dot.gov. The SHS book is the companion document to the MUTCD and contains layout details for designing signs. It also contains some frequently-used designs that are not found in the MUTCD.

The Standard Highway Signs book is in PDF form, and is presently online as individual pages, accessed through the Table of Contents. Clicking on an item in the contents will take you to that page of the book. In early 2005 the book will be available as assembled chapters, similar to the previous edition. This will make downloading of the books easier, for those who wish to save or print a copy for themselves.