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MAGAZINE

PUBLIC SAFETY COMMUNICATIONS AND RESPONSE

WHEN LIGHTNING STRIKES THE COMM CENTER

DISASTER PLANNING

MANAGING A PLANE CRASH

- **NORTH CAROLINA**
- **FRESNO, CA**

**FEMA'S EMERGENCY
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**EMERGENCY CONTINGENCY
PLANNING FOR THE
COMM CENTER**



Great Balls of

Protecting PSAPs from Lightning Devastation

Danger!

Using a telephone during an electrical storm could cause serious injury!

In most telephone books in the United States there is a customer safety section which alerts customers to this danger. Emergency dispatchers, however, do not have the luxury to back away from their communications equipment. If the equipment is not properly protected, they can be endangered as can their ability to provide emergency services to the community at large.

There is no way to stop lightning from striking but there is a way to minimize the danger to personnel and protect communications equipment. Let's examine a couple of Public Safety Answering Points (PSAPs) in Maryland which have sustained a lot of damage due to lightning hits.

The Wicomico County PSAP which is located in Salisbury, Maryland has been hit by lightning, storm after storm, and has sustained an enormous amount of damage. According to Sandy Wheatley, the Director of the Wicomico County Emergency Communications Center, they can hear the static of the storm coming through their communications consoles. She reported sparking consoles, the room glowing blue and a dispatcher who had to be treated by a physician for ringing in his ears. An eyewitness had seen lightning hit the building's power lines just prior to that incident. Later, when the recording of the day's taped calls was played back she heard the lightning coming through the lines.

According to Wheatley, the center



RANDALL LARSON

Microwave dishes are also potential targets for lightning strikes.

Fire!

BY BRYNA SHUCHAT

has been situated in its present location for four years and the lightning storms seem to be getting increasingly more severe. One storm which was particularly nasty, yielding five inches of rain in under an hour, damaged almost every piece of equipment including consoles, recording devices, radio and computer equipment. The sheriff's office is located in the same building and sustained significant damage as well. Fourteen fire companies and all the volunteer services along with backup systems had to provide assistance during these horrendous storms. It took two weeks after that for everything to get back to normal.

The phone company made numerous attempts to correct the situation including grounding lightning rods to no avail. The situation continues to be frustrating and aggravating. It places additional stress on the dispatchers who already work under incredibly stressful circumstances. Constantly replacing equipment has been a financial burden as well. "When we're down without radio and console equipment it costs lives and property that are worth more than the financial repercussions," Wheatley said.

Carroll County is another PSAP with similar problems, located 40 miles northwest of Baltimore in an area of central Maryland called Westminster. They have had lightning problems for years starting in 1985, a year after they purchased a new E9-1-1 system. One lightning strike in 1987 came through the radio tower located behind the building. The jolt traveled through the antenna and caused



RANDALL LARSON

Public safety communications antennas are highly susceptible to lightning which can travel through the cabling and damage equipment or even injure the telecommunicator.

considerable damage.

In 1992, the center was furnished with new E9-1-1 equipment. In the summer of 1993 the center was struck twice. This time the cost was astronomical. E9-1-1 equipment had to be purchased three times. In addition to that, Carroll County had to keep a huge inventory of equipment because they never knew when the next electrical storm would occur. When the center's 9-1-1 service had been knocked out they had to resort to their contingency plan, which is a secondary service at the local fire stations.

"There was a ball of fire that rolled across the console through the phone wires" recalled Buddy Redman, Chief, Bureau of Emergency Operations for Carroll County. "The consoles were knocked out in addition to the 9-1-1 and administration lines. My office is at one end of the building and dispatch is in another. I heard thunder and lightning, and the dispatchers saw a flash of light precede me as I left my office."

The situation was getting out of hand and they desperately needed a solution. The telephone company recommended that the county bring in grounding engineers, which they did. Ernest Duckworth, a specialist in high voltage protection communications and Field Sales Manager at Positron Industries' Power Products Division, was invited to review the overall communications and grounding system.

Although several grounding recommendations were made, a thorough analysis showed that a Ground Potential Rise (GPR) was the primary cause of the equipment damage. How does this work? The earth has a finite resistance for conducting electricity. When lightning strikes the earth, the energy is so massive (as much as 100,000 amps) that it takes a while to dissipate and for a short period of time the earth's potential at the PSAP increases, which creates a GPR that can reach thousands of volts.



The Carroll County, Maryland, Communications Center was severely damaged by lightning in 1987. Installation of a Teleline Isolator effectively protected their equipment and personnel.

Communication equipment has trunk and administrative lines that lead off the PSAP premises to a distant location such as a Central Office, which has a lower voltage potential during a lightning episode. If the

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GPR is not redirected or isolated it will "discharge" out to the lower voltage causing damage to anything in its path.

Traditional solutions employ gas tubes or similar devices which try to establish an alternate path to redirect the current around the equipment. The problem is that when lightning strikes, the gas tubes will hopefully react quickly enough and dissipate the energy before damage occurs. This is why phone books issue their warnings. In the case of a GPR,

though, the gas tubes will actually introduce the GPR onto the communications lines, causing damage.

The solution to Carroll County's problem was a Teleline Isolator, which was installed by Positron in mid 1993. The Isolator is used as standard equipment by both telephone companies and power utilities to protect communication lines in high voltage environments such as electrical power substations. The Isolator breaks the copper continuity to eliminate the path of electricity so that no GPR current flows to the equipment. It does not allow the current to have a remote path to the ground. If the wires are permanently open then it is extremely unlikely for there to be equipment damage.

Since installation of the Teleline Isolator, Carroll County weathered one of the worst lightning storms to hit Maryland in 50 years. One storm knocked the entire area out of power. Across the street, the cable company was out and so was the PSAP down the road. Carroll County emergency center was struck by lightning but it sustained no damage.

Needless to say, the communications center and the phone company were elated. Thom Kortisses, from C&P Telephone asked Positron to examine a few more sites and give an analysis of the grounding. In each case, the problems were the same. All the E9-1-1 equipment damage was associated with only that equipment tied to a remote ground through a communications pair.

This is an indication of a GPR and the equipment should be isolated from remote ground using the Teleline Isolator.

The bottom line is that we have to protect our equipment and our dispatchers so they will protect our community. Responding to 9-1-1 calls is stressful enough without having to worry about lightning! ■

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