Lightning, Telephones & Injuries: Legal Liability in the USA

Table of Contents

1. Introduction

When people use a telephone during a local thunderstorm, lightning currents on the telephone wires can cause injury (e.g., ruptured eardrum, burns on skin of head or ears, permanent neurological damage, etc.) or even kill the user by electric shock to the brain. Many telephones in service in the USA are protected with antique technology that does not provide state-of-the-art protection, and, further, many of the surge arresters in service have been improperly installed (e.g., missing or inadequate grounding). Because the technical problems with lightning protection technology on telephone systems are not widely appreciated, many attorneys for plaintiffs may not fully recognize the opportunities in such injury cases.

This article is divided into four parts: (1) review surge-protective devices for telephones and define some key words and phrases, (2) discuss the role of engineering standards is setting a standard of care in tort litigation, (3) discuss case law in the USA spanning more than 100 years in many different jurisdictions, and (4) call attention to the possibility of large consequential damages from surges on telephone lines that destroy computer modems or facsimile machines.

How frequently are people injured by lightning while they use a telephone? No one knows the precise answer to this question. A survey of weather-related deaths and injuries in the USA showed 4 people killed and 36 injured by lightning while using a telephone during the seven years from 1959 to 1965[1]. However, these data were collected from newspaper reports, which were later shown to underreport the actual number of deaths and injuries[2]. A review of death records in the North Carolina medical examiner's office during the years 1972-1988 showed 75 people killed by lightning, of whom 2 (3%) were using a telephone inside a building when they were killed[3]. On average, lightning kills approximately 110 people/year in the USA[4]. If the 3% fraction killed while speaking on the telephone in North Carolina is valid for the entire United States, then one would expect about 3 deaths/year from lightning to people using the telephone. A survey of deaths caused by lightning in Sweden during 1975-84 found 18 deaths, of whom 2 (11%) were using the

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[1] F.H. Zegel, *Lightning Deaths in the United States*, 20 Weatherwise 169, 172 (1967).

[2] R.E. López, R.L. Holle, et al., *The underreporting of lightning injuries and deaths in Colorado*, 74 Bulletin Am. Meteorological Soc. 2171 (1993)(for Colorado in 12 years between 1980 to 1991, National Weather Service database included 72% of deaths from lightning and only 58% of injuries requiring hospitalization).

[3] R.L. Langley, K.A. Dunn, J.D. Esinhart, *Lightning Fatalities in North Carolina 1972-1988*, 52 North Carolina Med. J. 281 (1991).

[4] P.J. Duclos and L.M. Sanderson, *An Epidemiological Description of Lightning-Related Deaths in the United States*, 19 Internat. J. Epidemiology 673 (1990).

telephone at the time of the lightning strike[5], but the numbers of people killed by lightning in Sweden are too small to make reliable extrapolations, and the protective measures in Sweden may differ from the protective measures in the USA.

The number of people injured by lightning is between 2 and 4 times the number of people killed by lightning[6]. One survey of 18 people injured by lightning in Florida who sought treatment at one of 29 hospitals in Florida during 1978-87 found one person (5%) was using a telephone inside a building when injured[7]. One article claims that "the first recorded 'electrical accident'" was caused by lightning on telephone wires[8]. Medical journals contain occasional case reports of people killed or injured by lightning while talking on the telephone[9]. One well-known expert on the physics of lightning estimates that the number of people injured by lightning while using a telephone each year in the USA is "probably 100 or more", with 15 to 20 of these being "seriously injured"[10].

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5 A. Eriksson and L. Örnehult, *Death by Lightning*, 9 Am. J. Forensic Medicine and Pathology 295, 298 (1988).

6 R.E. López and R.L. Holle, *Demographics of Lightning Casualties*, 15 Seminars in Neurology 286, 287 (1995); P.J. Duclos, L.M. Sanderson, K.C. Klontz, *Lightning-Related Mortality and Morbidity in Florida*, 105 Public Health Reports 276, 280 (1990).

7 P.J. Duclos, L.M. Sanderson, K.C. Klontz *Lightning-Related Mortality and Morbidity in Florida*, 105 Public Health Reports 276, 280 (1990).

8 A. Le Roy de Méricourt, *Paralysie partielle suite de commotion electrique*, Gaz Hôp 382 (1860). *cited by* B.R. Johnstone, D.L. Harding, B. Hocking, *Telephone-Related Lightning Injury*, 144 Med. J. Australia 706, n.12 (1986).

9 C.J. Andrews, *Telephone-Related Lightning Injury*, 157 Med. J. Australia 823 (1992); C.J. Andrews and M. Darveniza, *Telephone-Mediated Lightning Injury: An Australian Survey*, 29 J. Trauma 665 (1989); B.R. Johnstone, D.L. Harding, and B. Hocking, *Telephone-Related Lightning Injury*, 144 Med. J. Australia 706 (1986); K.S. Weiss, *Otologic Lightning Bolts*, 1 Am. J. Otolaryngology 334 (1980); J.W. Wright and K.L. Silk, *Acoustic and Vestibular Defects in Lightning Survivors*, 84 Laryngoscope 1378 (1974)(reporting seven cases, of whom two victims were struck by lightning currents on telephone wires); Z.V. Morgan, et al., "Atrial Fibrillation and Epidural Hematoma Associated with Lightning Stroke," 259 New England J. Med. 956 (1958)(lightning apparently entered patient's head via telephone line, patient spent 36 days in hospital).

10 Martin A. Uman, Professor of Electrical Engineering at University of Florida in Gainesville, personal communication, March 1997.

Interestingly, among the many dozens of articles that the author has read in medical journals concerning lightning and electrical injuries, only one article[11] by a physician mentions legal issues and she says only that "almost all of these [ac electrical injury] cases eventually involve litigation ... careful charting of both the alleged history and physical findings may save the physician court time later." It would be a service to the patient for the physician to refer the patient to an attorney who specializes in personal injury or worker's compensation cases, since the patient is probably unaware of his or her legal rights.

Given the many problems facing our society, why is the death of approximately 3 people/year significant? There are three answers. First, these deaths and injuries are probably nearly all preventable by inexpensive technology that is well known to telephone engineers. However, in order to recover against the telephone company, the plaintiff's lawyer needs to understand some technical engineering issues, which have not been mentioned in the legal literature. Second, as our society moves from the industrial age to the information age, damage by lightning to electronic equipment connected to telephone lines (e.g., computer modems and facsimile machines) can be expected to become a significant economic problem. While recovery for personal injury is straightforward, recovery for damage to equipment and for loss of service is frustrated by utility tariffs. Third, this article shows an example of the use of engineering standards to establish the breach of a duty of care, without the fact-finder needing to be immersed in technical engineering issues.

This essay is intended only to present general information about an interesting topic in law and is *not* legal advice for your specific problem. See my disclaimer at http://www.rbs2.com/disclaim.htm .

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[11] M.A. Cooper, *Electrical and Lightning Injuries*, 2 Emergency Medicine Clinics of North America 489, 489 (1984).

2. review of surge-protective technology

Before discussing legal theories, it is necessary to briefly describe relevant technology and define some jargon. Because the early work in telephony was done by neither physicists nor electrical engineers, telephone jargon is a separate language from science and engineering. This difference in language can cause problems among expert witnesses with different backgrounds: a person who learned about electricity during employment with a telephone company may use different words, than, for example, a professor of electrical engineering.

Transient overvoltages and currents on electric power, telephone, and data lines are known in engineering jargon as "surges". The duration of a surge is typically less than one millisecond. (One millisecond is 0.001 seconds.) Severe surges on telephone lines are usually caused by lightning, but other causes are also possible. Because of the design of the telephone system, most surges have approximately the same line-ground voltage on each of the two wires that serve one telephone number[12], which is called a "common-mode surge" in electrical engineering jargon and a "longitudinal surge" in telephone jargon[13].

There are three kinds of voltages present on telephone wires during normal operation of the telephone[14]: (1) a constant 56 volts to power the telephone, (2) a dial tone, dialing signal, and voice signal, all of which have typical amplitudes of less than 1 volt, and (3) a ringing signal that is a sinusoid with a typical frequency between 15 and 30 Hz. Because the ringing signal can have peak voltages as large as 210 volts, surge-protective devices to be used on any telephone line in the USA can only respond to voltages with magnitudes greater than about 220 volts, to avoid interference with the ringing voltage.

In many parts of the USA, telephone lines are routed on overhead poles, just below the electric power distribution wires. When lightning strikes the power pole or overhead power wire, some of the lightning current is carried on the telephone wires into buildings.

Modern practice is to bury telephone and power lines, but burial does not make these conductors immune to lightning. Lightning can strike trees, street lamps, or buildings and then travel underground towards buried telephone and power lines. The danger of lightning current on buried conductors is greater if the soil is dry, so that the path of least resistance for the lightning is through buried metallic conductors instead of the dry soil.

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[12] D.W. Bodle, et al., CHARACTERIZATION OF THE ELECTRICAL ENVIRONMENT (1976).

[13] R.B. Standler, PROTECTION OF ELECTRONIC CIRCUITS FROM OVERVOLTAGE, 56-63 (1989).

[14] 47 C.F.R. § 68.312

Proper protection against lightning on telephone lines requires an arrester installed at or near the point where the telephone wires enter the building. Fig. 1a shows the electrical circuit including an antique form of protection, which is still used in many parts of the USA. The arrester in Fig. 1a is a pair of independent spark gaps with carbon electrodes spaced approximately 0.003 inches apart, called a "carbon block" in telephone jargon. Because lightning currents must travel to ground, a functional arrester requires a connection to ground. Normally each spark gap in the arrester is an insulator, with no connection from the ground wire to either of the two telephone conductors. Excessive voltage (e.g., more than 1000 volts) between a telephone wire and ground, causes a spark gap in the arrester to become conductive and divert dangerous current to ground.

[Fig. 1 is available at http://www.rbs2.com/ltgteleFig1.jpg]

One can think of the arrester as a valve between each of the two telephone conductors and ground: normally the valve is closed, so no current passes to ground. But during a surge, the valve opens and current passes to ground. After a surge, the valve automatically closes and normal operation of the telephone is restored, unless the telephone was damaged by the surge before the arrester diverted the surge. It is important to understand that the arrester neither "arrests" nor stops the surge – an arrester only diverts surge current to ground.[15] If the ground connection is missing or improperly installed, the arrester can not divert current to ground. Because the charge in lightning flows to ground, if these currents do not reach ground through an arrester, then they will reach ground through a spark in air that can cause a fire, through a person using the telephone or through a computer modem or facsimile machine, and cause damage in the process. It is common for telephone experts to speak of "grounding the *telephone*", when a more precise phrasing would be "grounding the *arrester*".

A carbon block is antique technology: an early patent[16] was issued on this kind of arrester in 1890, just 14 years after the first patent on the telephone. There is nothing wrong with using antique technology, if it works well. However, in practice, a carbon block often conducts only after the voltage between one telephone wire and ground has exceeded 1000 volts. Surges with peak voltages of less than 1000 volts can damage telephone equipment, facsimile machines, and computer modems. In some situations, carbon blocks can *increase* the damage done by a surge. Because most surges have approximately equal line-ground voltage on each of the two wires and because carbon blocks are two *independent* spark gaps, it is possible for only one gap to conduct, which leaves a large voltage between the two telephone wires[17], causing acoustic trauma (e.g.,

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[15] A conducting surge arrester also limits the line-ground voltage to a safe value (e.g., 20 volts).

[16] A.C. White, *Lightning Arrester*, U.S. Patent 438,788, 21 Oct 1890.

[17] D.W. Bodle and P.A. Gresh, *Lightning Surges in Paired Telephone Cable Facilities*, 40 Bell System Technical J. 547 (1961).

perforated eardrum) to the user of the telephone.

In contrast to the old protective method that is shown in Fig. 1a, state-of-the-art protection, which is shown in Fig. 1b, has two major improvements: (1) replaces the antique carbon blocks with a single three-electrode gas tube and (2) inserts a surge protector near the equipment to be protected.

A three-electrode tube minimizes the possibility of a differential-mode surge voltage that can cause acoustic trauma to a telephone user, because a three-electrode tube will connect *both* wires to ground when the voltage between any two terminals causes the tube to conduct[18]. Three-electrode gas tubes have been available since the 1960s, but they cost slightly more than carbon blocks.

Since the mid-1980s, state-of-the-art protection also includes a surge suppressor inside the building near the telephone, facsimile machine, or computer modem to be protected. The surge suppressor will contain resistors, shown as R in Fig. 1b, in series with the telephone line to coordinate the arrester and suppressor, and a silicon bidirectional thyristor[19] between each telephone conductor and ground[20]. Such thyristors will typically become conductive at peak voltages between 220 and 300 volts. The telephone surge suppressor is connected to the ac supply mains in the building, which supplies the grounding conductor for the telephone surge suppressor *if* the green wire in a three-pin power receptacle is properly connected to ground, as the green wire should be. Common telephone surge suppressors also contain metal-oxide varistors to the ac power conductors[21] to limit voltages between conductors at the ac power input to the equipment that might otherwise damage a facsimile machine or computer, but such protection is beyond the scope of this article.

The silicon thyristors in the surge suppressor can be damaged by surges with large peak currents, so the suppressor is connected downstream from a robust gas tube. The gas tube

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[18] R.B. Standler, PROTECTION OF ELECTRONIC CIRCUITS FROM OVERVOLTAGES, 128-129 (1989); C.J. Kawiecki, *Spark Gap Device*, U.S. Patent 3,811,064 (1974); C.J. Kawiecki, *Surge Protector*, U.S. Patent 3,564,473 (1971).

[19] R.G. Norris, M.F. Webb, V.Q. Le, *Electronic Trigger Switch of Maintenance Termination Unit*, U.S. Patent 4,827,497 (1989); F. Bertotti, et al., *Controlled Electronic Switching Device for the Suppression of Transients*, U.S. Patent 4,614,962 (1986).

[20] Without the series resistor, a thyristor or gas tube inside a suppressor may draw large surge currents inside the building. *See* R.B. Standler, *Calculations of Lightning Surge Currents Inside Buildings*, IEEE 1992 International EMC Symposium, 195-199, August 1992.

[21] R.B. Standler, *Design and Performance of Surge Suppressors*, IEEE 1993 International EMC Symposium 363-368 (1993).

protects the suppressor, the suppressor protects the equipment downstream from the suppressor. The use of a surge suppressor is optional, but is particularly desirable when either a facsimile machine or a computer modem is to be used. The surge suppressor also gives additional protection for people who use a telephone during a local thunderstorm, although – for reasons of liability – manufacturers of surge suppressors are reluctant to claim that the suppressor will protect people.

The law[22] holds the telephone company responsible for everything upstream from a box called the *network interface*, "NI" in telephone company jargon[23]. Therefore, the telephone company is responsible for the arrester and its ground wire, but *not* the surge suppressor inside the building. The user must purchase and install the surge suppressor. Prior to the breakup of AT&T by Judge Greene, the local telephone company owned the entire local network, including the wire and telephone equipment inside the user's building, so the old practice, shown in Fig. 1a, has no NI, because there was then no need for a line demarcating the telephone company's and user's responsibilities.

Reported court cases sometimes mention fuses as a protective device[24]. The purpose of fuses in telephone arresters is to prevent fires and damage to equipment when there is an accidental connection of electric power circuits to the telephone circuit, which is called a "power cross" in telephone jargon. Common sources of power cross are overhead high-voltage power distribution lines (often at 12,000 volts or more) that break and fall onto the telephone wires that are strung on the same poles, beneath the power lines. Power lines can break from the weight of ice, from impact of automobiles with the utility pole, or can be melted by lightning strikes. Fuses in telephone protection circuits can be effective protection against power cross, but are too slowly responding to protect against surges from lightning[25]. The results of power cross without appropriate fuses can be dramatic: loud continuous ringing of telephone, with flame and smoke emitted from the telephone set[26].

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[22] 47 C.F.R. § 68.3

[23] There is nothing complicated about the NI, it is only a plug and socket, whereby the external telephone network can be easily disconnected from all circuits inside the building.

[24] *E.g., Gandy v. Southwestern Bell Telephone Co.*, 341 S.W.2d 554, 557 (Tex.Civ.App. 1960).

[25] R.B. Standler, PROTECTION OF ELECTRONIC CIRCUITS FROM OVERVOLTAGES, 179-183 (1989).

[26] *Bricker v. City of Troy*, 287 S.W. 341 (Mo. 1926).

selection of surge-protective devices

While the telephone operating company purchases tens of thousands of arresters and can afford to test the response of candidate arresters, a user who is purchasing only a few suppressors for indoor use cannot afford to test surge suppressors. The only engineering standard for telephone surge suppressors in the USA is UL 497A, which is mainly concerned that the suppressor not cause a fire, but *not* concerned with protection of people or electronic equipment from surge voltages and currents. There is currently no engineering performance standard that could guide users to an appropriate product. This is a serious matter, because of the technical complexity of surge-protective technology. Such a specification is not understandable by most scientists and engineers, because they are not knowledgeable about surge-protective technology, and such a specification would be gibberish to a layman.

grounding

It is essential that every arrester be connected to ground, because the charge in a lightning stroke flows to ground. However, providing a low-impedance connection to ground is one of the most difficult practical problems in installing a surge arrester. The best engineering practice is to connect the telephone arrester to a metal water supply pipe, as is also done for the ac electricity supply inside the building[27]. In buildings without a metal water supply pipe, the electrical code allows one to use a metal rod driven at least 2.4 meters (8 feet) deep into the earth as the ground for the telephone arrester, however such a rod is inadequate for a direct lightning stroke. Even worse is the situation in which there is no metal water supply pipe *and* bedrock is near the earth's surface, so a metal rod can not be driven deep in the ground. In such situations, which are common in the Rocky Mountain region of the USA, it is technically difficult and expensive to provide a good ground connection.

Regardless of how the ground connection is made, it is important that the ground terminal for the electrical distribution system inside the building be connected to the ground terminal of the telephone arrester ground, in order to reduce differences in voltage between the telephone wires and the ground wire in the power branch circuits, which is important for protecting computer modems, facsimile machines, and other electronic equipment that is connected to both the ac power and telephone lines.

As stated above, a surge suppressor uses the ground connection in an ac supply mains receptacle. Many receptacles in the USA are *not* properly connected to ground. The lack of a ground connection will prevent the surge suppressor from offering a low impedance path to ground for surge currents. In cases where a surge suppressor was used indoors, have an electrical

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[27] National Electrical Code §§ 250-81(a), 250-26(c) (1996).

engineer verify that the ground wire is properly connected to the wall receptacle. If the ground connection is missing, the attorney may wish to include the electrician who (mis)wired the receptacle as another defendant in the litigation.

A court case describes one ground rod, with a length of 64 inches that was installed in 1949 in Mississippi: the rod was driven only 34 inches into the earth, which was not far enough to reach moist soil[28]. The court noted that the ground rod "protruded 2.5 feet above the ground and was bent over by the workman with his foot so as to just about touch the ground."[29] This rod was not effective in grounding the arrester. But the shallow depth was not the only defect in installation, as the wire from the arrester was not clamped to the ground rod, but merely wrapped loosely around the rod, so the ground wire made a poor connection to the rod.

Another court case describes an arrester that was "grounded" by a wire with several sharp bends that was connected to the sewer vent pipe, which is an inadequate ground connection[30]. The sharp bends in the wire increase the impedance of the wire at high frequencies, which may cause surges to leave the wire and travel through the air to a lower impedance path to ground.

maintenance of telephone arresters

A properly functioning arrester can later fail, for example, by exposure to large surge currents or by breaking or disconnecting the ground wire. Therefore, routine inspection of the arrester and grounding is desirable. Only a few court decisions have discussed the obligation of the telephone company to make routine inspections[31].

Because telephone billing is determined automatically from a central office, there is no opportunity for a meter reader to visit each customer's site, which could also be a routine opportunity to inspect for the presence of a ground wire at the telephone arrester. Unless the

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[28] *Dickerson v. Southern Bell Telephone*, 212 F.2d 107 (5thCir. 1954).

[29] *Id.* at 109.

[30] *Keilhamer v. West Coast Telephone Co.*, 118 P.2d 173, 176 (Wash. 1941).

[31] "A telephone company is under a duty to maintain, inspect, to discover and repair defects." 52 Am.Jur. Telegraphs & Telephones § 73 *cited with approval in Gandy v. Southwestern Bell Telephone Co.* 341 S.W.2d 554, 557 (Tex.Civ.App. 1960). *Cohen & Stryck v. Home Tel. Co.*, 200 S.W. 344, 347 (Ken.Ct.App. 1918)(Ordering jury instruction that telephone company must "exercise reasonable care to maintain the telephone in a reasonably safe condition...."). *See also Williams v. Louisiana Power & Light Co.*, 590 So.2d 786, 789 (La.Ct.App. 1991)(electric "power company has an obligation to make reasonable inspections of wires and other instrumentalities in order to discover and remedy hazards and defects.")

customer requests a service call (e.g., to install an additional telephone line or add jack(s) inside the building), telephone arresters and their grounding after often *un*inspected for many tens of years.

Telephone arresters or ground wires have been removed by third-parties, such as contractors that install vinyl siding on buildings[32]. Arresters are often not properly replaced after removal.

When telephone company technicians visit a customer for a service call, they may also inspect the arresters, and perhaps upgrade a carbon block to a gas tube arrester. Such refurbishment may not be apparent to other people, since gas tubes, and even silicon thyristors, are available in packages similar to carbon blocks, to avoid the need for time-consuming replacement of the arrester socket. Therefore, like many other legal situations, it is important that the plaintiff contact an attorney first, so that evidence of the arrester can be preserved. If the plaintiff calls the telephone company first, the telephone company may visit the customer's site and replace the arrester, and discard the damaged arrester that was connected at the time of the injury. Utilities are often sloppy about preserving such evidence[33].

When evidence was lost or destroyed, there has traditionally been an inference or rebuttable presumption against the destroyer of evidence, *if* the evidence was destroyed because the evidence could hurt the destroyer's case[34]. A modern view is that an inference can also be raised against the destroyer of evidence if the destroyer *should have known* that the evidence would be useful in future litigation[35]. In particular, intent to destroy evidence "can be inferred 'where an action has not been commenced and there is only a potential for litigation, the litigant is under a duty to preserve evidence which it knows or reasonably should know is relevant to the action.'"[36] If plaintiff's claim against the utility is dismissed for lack of evidence, then, in a few states, the utility may be

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[32] *Whitehead v. General Telephone Co.*, 254 N.E.2d 10, 11-12 (Ohio, 1969).

[33] *Bryant v. Tri-County Electric Membership Corp.*, 844 F.Supp. 347, 354 (W.D.Ky. 1994); *Gandy v. Southwestern Bell Telephone Co.*, 341 S.W.2d 554, 557 (Tex.Civ.App. 1960).

[34] *Nation-Wide Check Corp. Forest Hills Distributors* 692 F.2d 214, 218 (1stCir. 1982); J.W. Strong, McCormick on Evidence, § 265 (4th ed. 1992).

[35] *See e.g., Boyd v. Travelers Ins. Co.*, 652 N.E.2d 267, 271 (Ill. 1995)("[A] defendant owes a duty of due care to preserve evidence if a reasonable person in the defendant's position should have foreseen that the evidence was material to a potential civil action."); *Hirsch v. General Motors*, 628 A.2d 1108, 1116 (N.J.Super. 1993)(A duty to preserve evidence "may exist where there is, inter alia, 'foreseeability of harm to the plaintiff.'") *quoting County of Solano v. Delancy*, 264 Cal.Rptr. 721, 729 (1989).

[36] *Hirsch v. General Motors*, 628 A.2d 1108, 1130 (N.J.Super. 1993) *quoting with approval Fire Ins. Exchange v. Zenith Radio Corp.*, 747 P.2d 911, 914 (Nev. 1987). *Accord Cincinnati Ins. Co. v. General Motors*, 1994 WL 590566 at *3 (Ohio App. 1994).

sued for the tort of spoliation of evidence[37], which is a new tort that alleges the defendant interfered with a prospective civil action. Regardless of the specific legal theory, it would be unjust to allow the utility to escape liability, simply because the utility had discarded evidence that was needed to prove negligence of the utility[38]. A utility, as a regulated monopoly engaged in public service, may have an obligation beyond that of an ordinary corporation, although no reported cases have addressed this point.

3. engineering standards

The standard of care in torts is whatever the jury believes a "reasonable man of ordinary prudence" would do[39]. In areas that are within the experience of the laymen on the jury, such a test is relatively straightforward. Understanding the origin and propagation of surges involves mathematics of partial differential equations and laws of electromagnetism, and understanding surge protection technology involves analysis of nonlinear electrical circuits, which are beyond the comprehension of most members of the jury. Therefore, testimony of an expert witness is necessary to explain what the defendant should have done, just as expert witnesses are used in medical malpractice and product liability cases.

Statutes provide one accepted legal benchmark for the defendant's duty: a reasonable man would not violate a relevant statute that was intended to prevent the injury to plaintiff[40]. In most locations in the USA, the National Electrical Code (NEC) is incorporated by reference in the local

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[37] *Continental Ins. Co. v. Herman*, 576 So.2d 313, 315 (Fla. 3d Dist.Ct.App. 1991)(listing elements of cause of action for negligent destruction of evidence); *Bondu v. Gurvich*, 473 So.2d 1307 (Fla. 3d Dist.Ct.App. 1984)(negligent spoilation); *Smith v. Superior Court*, 198 Cal. Rptr. 829 (Ct.App. 1984) (writ of mandamus directing trial court to permit tort of intentional spoilation of evidence against car dealer who discarded allegedly defective parts that caused automobile accident); Thomas G. Fischer, Annotation, *Intentional Spoliation of Evidence, Interfering with Prospective Civil Actions, as Actionable*, 70 ALR4th 984 (1989). *But see Boyd v. Travelers Ins. Co.*, 652 N.E.2d 267, 270 (Ill. 1995)("An action for negligent spoliation can be stated under existing negligence law, without creating new tort).

[38] *Cf. County of Solano v. Delancy*, 264 Cal.Rptr. 721, 730 (1989)("spoliation of evidence enables the spoliator to, in effect, 'profit from his own wrong'").

[39] Restatement (Second) Torts § 283 (1965); W. Page Keeton et al., PROSSER AND KEETON ON THE LAW OF TORTS, §§ 32, 37 (5th ed. 1984); *Delmarva Power & Light v. Stout*, 380 A.2d 1365, 1367 (Del. 1977).

[40] Restatement (Second) Torts §§ 285-86 (1965); W. Page Keeton et al., PROSSER AND KEETON ON THE LAW OF TORTS, §§ 36, 37 (5th ed. 1984).

building code[41]. The NEC is also the default standard for installation of telephone systems in buildings[42]. The relevant portions of the NEC for surge arresters on telephone lines are contained in Article 800, particularly NEC 800-30, and also the sections on grounding (e.g., NEC 250-80, et seq.). Note that NEC 800-30 requires compliance with NEC 110-3(b), which, in turn, requires installation of the arrester in accordance with the manufacturer's instructions, so that these instructions are legally relevant to proper installation. NEC 800-30 requires a "listed primary protector"; NEC 800-31 notes that ANSI/UL 497-1991 is "one way to determine applicable requirements for a listed primary protector", without giving any other way, so this UL Standard is also legally relevant. Because of the complexity of these requirements, an expert witness will be required to interpret whether the telephone company's practice met the requirements of the NEC.

Most engineering standards are referenced in neither statutes nor government regulations, but these standards are admissible as evidence to determine if the defendant's conduct met an appropriate standard of care[43]. However, compliance with statutes, regulations, and engineering standards does *not* prevent a finding of negligence[44]. As Justice O.W. Holmes said in a famous decision,

> What usually is done may be evidence of what ought to be done, but what ought to be done is fixed by a standard of reasonable prudence, whether it usually is complied with or not.

Texas & Pacific Railway Co. v. Behymer, 189 U.S. 468, 470 (1903) *quoted with approval in Pierce v. Platte-Clay Electric Cooperative, Inc.*, 769 S.W.2d 769, 772 (Mo. 1989); *Kohli v. Public Utilities Commission of Ohio*, 479 N.E.2d 840, 842 (Ohio 1985).

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41 National Electrical Code, NFPA 70 (1996). This standard is typically revised every three years. Forty-five states and more than 480 of the largest cities in the USA have adopted the NEC, sometimes with a few amendments. *Indian Head, Inc. v. Allied Tube & Conduit Corp.*, 817 F.2d 938, 939, n.1 (2dCir. 1987), *aff'd,* 486 U.S. 492 (1988). Violation of city's building code is negligence *per se. Raymond v. Baehr*, 163 N.W.2d 51, 54 (Minn. 1968).

42 47 C.F.R. § 68.215(d)(4)

43 *Hansen v. Abrasive Engineering and Manufacturing, Inc.*, 856 P.2d 625, 628 (Or. 1993). *See also* D.E. Feld, "Annotation: Admissibility in Evidence, on Issue of Negligence, of Codes or Standards of Safety Issued or Sponsored by Governmental Body or by Voluntary Association," 58 ALR3d 148 (1974).

44 Restatement (Second) Torts §§ 288C, 295A (1965); *Telecky v. Yampa Valley Electric Association*, 837 P.2d 253, 254-255 (Colo.Ct.App. 1992); *Pierce v. Platte-Clay Electric Cooperative*, 769 S.W.2d 769, 772 (Mo. 1989); *Kohli v. Public Utilities of Ohio*, 479 N.E.2d 840, 842 (Ohio 1985); *Brauning v. Cincinnati Gas & Electric Co.*, 560 N.E.2d 811, 815-816 (Ohio Ct.App. 1989).

Several courts have specifically noted that engineering standards are only a *minimum* requirement[45]. Several courts went further and noted that engineering standards "will inevitably lag behind the state of the art."[46]

The Missouri Supreme Court has wisely noted that

> Were we to permit industry standards to establish the legal standard of care, we would also permit industry to dictate the terms under which its members could be held liable for negligence.[47]

The author observes in passing that there is an interesting distinction in tort law: the standard of care in medical malpractice is what physicians in good standing do in the same or similar locality[48]. This allows professionals in medicine to set their own standard, while manufacturers and utilities are held to a standard set by the jury of what a reasonable person would do. Such a distinction may not be reasonable, because engineering design and practice are often just as complicated – and just as beyond the experience and comprehension of the jury – as technical issues in medicine.

Accepting engineering standards as the legal obligation, therefore, would allow the telephone industry to regulate itself, without meaningful input from the public. From a legal viewpoint, most of the authors of engineering standards have a conflict of interest; the impression is that the fox is guarding the chickens. Courts have noted that ANSI standards are the consensus of manufacturers, government agencies, labor representatives, and insurance companies[49]. However, in the area of surge-protective devices (SPDs) such a consensus is illusory, because of the dominance of manufacturers of SPDs and utilities, the tiny minority of government employees and professors (less than 1% each), and the total absence of representatives of labor and insurance.

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[45] *Meisner v. Patton Electric Co.*, 781 F.Supp. 1432, 1443 (D.Neb. 1990); *Telecky v. Yampa Valley Electric Association*, 837 P.2d 253, 254 (Colo.Ct.App. 1992); *Douglas County v. Public Utilities Commission*, 829 P.2d 1303, 1312 (Colo. 1992); *Freeman v. Kansas City Power & Light Co.*, 502 S.W.2d 277, 283 (Mo. 1973).

[46] *Elgin Airport Inn v. Commonwealth Edison Co.*, 432 N.E.2d 259, 261 (Ill. 1982) *quoted with approval in Otte v. Dayton Power & Light*, 523 N.E.2d 835, 841 (Ohio 1988).

[47] *Platte-Clay Electric Cooperative, Inc.*, 769 S.W.2d 769, 772 (Mo. 1989).

[48] *Lundgren v. Eustermann*, 370 N.W.2d 877 (Minn. 1985); *Cornfeldt v. Tongen*, 262 N.W.2d 684 (Minn. 1977); *Marshall v. Tomaselli*, 372 A.2d 1280 (R.I. 1977); W.J. Curran, M.A. Hall, D.H. Kaye, HEALTH CARE LAW, 263-269 (4th ed. 1990).

[49] *Moore v. OSHRC*, 556 F.2d 431, 434 (9thCir. 1977); *Bowles v. Litton Industries, Inc.*, 518 So. 1070, 1075 (La.Ct.App. 1987).

Therefore, ANSI C62 standards should be considered as industry standards, which should *not* establish a legal standard of care.

Engineering standards generally state only a conventional, consensus view. It is possible that other methods or practices, not mentioned in a standard, would also be safe and effective. If an engineering standard is unfavorable to plaintiff's case, the plaintiff's attorney should consider hiring independent experts, such as professors of electrical engineering or physics with experience in lightning research, to evaluate the recommendations in the standard.

Courts sometimes state that a particular arrester has been "approved" by some organization, such as the National Bureau of Standards (NBS), Underwriter's Laboratories (UL), or by some document, such as the National Electrical Code (NEC)[50]. Such a statement may be misleading. NBS, despite its name, does *not* write standards for performance of products. NBS, which is now called the National Institute for Standards and Technology (NIST), maintains standards for weight, length, time, etc. and does research in science and technology.

Underwriters' Laboratories is a nonprofit organization that writes standards and tests products for compliance with those standards. UL is concerned only with fire and safety issues, *not* with the ability of an arrester or appliance to function for its intended purpose. Further, UL standards are written with review by manufacturers of the product being tested, which raises the specter of the fox guarding the chickens. UL's income is principally from fees paid by manufacturers to test their products at UL.

Finally, it is important to recognize the antagonism that exists between many engineers and lawyers who represent injured people. Engineers at the telephone local operating companies are often openly antagonistic to plaintiff's attorneys who are attacking their employer in court. Engineers at the manufacturers of surge-protective devices are also openly antagonistic to attorneys who might sue one of their few customers. In addition to the different economic interests of these engineers and attorneys, there is also a widespread distrust of attorneys among the scientific and engineering community that may be related to the misuse of science and technology in courts. It does not help that a typical tort attorney misuses technical words in science and engineering (e.g., charge, current, voltage, power, energy) and thus shows that the attorney is not only clueless[51], but also unable to understand what a knowledgeable scientist or engineer has to say. In some cases, attorneys have called laymen to testify as expert witnesses on the highly technical subject of

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50 *Burdett v. Southern Bell Telephone & Telegraph Co.*, 72 So.2d 595, 597-8 (La.Ct.App. 1954);

51 One can also find plenty of scientific nonsense in opinions written by the courts, such as "nonmetallic metal such as aluminum" in *Lobermeier v. General Telephone Co. of Wisc., et al.*, 82-240, 1983 WL 161633 (Wisc.Ct.App. 1983).

lightning[52]. A symptom that someone is *not* an expert on lightning is that they speak of millions of *volts* between the cloud and earth, instead of focusing on the *current* in the lightning.

4. review of legal issues

The first reported court case[53] in the USA of personal injury from a telephone was in 1900. It was well established in American law by the end of 1910 that the telephone company had a duty to install an arrester and ground wire[54]. Surprisingly, modern cases[55] are similar to these old cases, despite the development of substantial technology in the intervening decades. Additional cases are noted below, in the section entitled "when victim is employee", below at page 20.

Like many other kinds of personal injury cases, injuries caused by lightning on telephone wires are generally settled out of court. There is no published record of the disposition of most cases, therefore, it is difficult to find statistics on the magnitude of the problem. As was cited in the introduction of this paper, no one knows how many people are killed or injured each year in the USA by lightning while they talk on the telephone.

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[52] *Sinkovich v. Bell Telephone Co. of Pa.*, 133 A. 629, 630-631 (Pa. 1926).

[53] *Griffith v. New England Telephone & Telegraph Co.*, 48 A. 643 (Vt. 1900)(man killed while reading book while sitting under a telephone, telephone pole struck by lightning about 1/4 mile from decedent).

[54] *Southwestern Telegraph & Telephone Co. v. Abeles*, 126 S.W. 724 (Ark. 1910)(ground wire omitted, victim deaf in left ear); *Southern Telegraph & Telephone Co. v. Evans*, 116 S.W. 418 (Tex.Civ.App. 1909)(ground wire omitted, victim burned and unconscious for several hours); *Griffith v. New England Telephone & Telegraph Co.*, 48 A. 643 (Vt. 1900)(victim killed, no ground wire).

[55] *General Telephone Co. of Alabama v. Cornish*, 280 So.2d 541 (Ala. 1973) (victim killed by lightning while talking on telephone, employee of telephone company testified that arrester not properly grounded); *McDowell v. Southwestern Bell Telephone Co.*, 546 S.W.2d 160 (Mo.Ct.App. 1976) (permanent hearing loss caused by lightning in telephone line); *Robinson v. Southwestern Bell Telephone Co.*, 434 S.W.2d 249 (Mo.Ct.App. 1968) (victim has burns on hands and arm, in addition to hearing loss); *Keilhamer v. West Coast Telephone Co.*, 118 P.2d 173 (Wash. 1941) (damage to nerves in face and arm, pain, inability to continue working); *Lobermeier v. General Telephone Company of Wisc.*, 349 N.W.2d 466 (Wisc. 1984) (plaintiff's eardrum ruptured and hair singed, defendant admitted negligence in not grounding arrester).

There are four elements of a tort: (1) duty of care, (2) breach of that duty by defendant, (3) the defendant's conduct caused the injury, (4) and injury[56]. To prove the first two elements, the plaintiff's attorney needs to produce an expert witness[57] to testify about engineering standards that establish the duty of care and facts that establish the breach of that duty, for example: that the arrester was either defective or missing, or that the ground wire at the arrester was either missing or improperly installed. Causation can be established by testimony of the victim or other witnesses that the injury or damage occurred during a local thunderstorm[58], so that there is at least circumstantial evidence that the injury was caused by lightning current in the telephone lines. The injury, of course, is proved by testimony of a physician.

The telephone company will probably argue that lightning is "an Act of God," for which they are not responsible. While it is true that lightning itself is an "act of God" (i.e., a natural occurrence not under the control of the defendant), technology available to the telephone company gives man ways to avoid being vulnerable to injury by lightning. Therefore, failure to use appropriate surge-protective devices or failure to properly ground the arrester is an Act of Man, which is negligence by the telephone company[59], because this failure is an intervening force[60] that interrupts the causation by the Act of God. As noted earlier in this paper, violation of law (e.g., building code that requires compliance with the National Electrical Code) establishes negligence per se[61], which is the simplest way for the plaintiff to establish the duty.

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[56] Prosser and Keeton, PROSSER AND KEETON ON THE LAW OF TORTS, § 30 (5th ed. 1984); Restatement (Second) Torts § 281 (1965).

[57] *Rural Home Telephone Co. v. Arnold*, 119 S.W. 811, 812 (Ky.Ct.App. 1909).

[58] *E.g., Montgomery v. Monroe Telephone Co.*, 128 S.E.2d 121 (N.C. 1962) (plaintiff's eardrum ruptured and her face scorched while she talked on telephone, recovery denied because plaintiff offered no evidence of local thunderstorm at time of her injury).

[59] *Rletveld v. Mountain States Telephone and Telegraph Co.*, 485 P.2d 525 (Colo.Ct.App. 1971); *Peninsular Telephone Co. v. McCaskill*, 60 So. 338 (Fla. 1912); *Cohen & Stryck v. Home Tel. Co.*, 200 S.W. 344, 345 (Ken.Ct.App. 1918); *Chesapeake & Potomac Telephone Co.*, 199 A. 832, 834-5 (Md. 1938); *Warren v. Missouri & Kansas Telephone Co.*, 196 S.W. 1030, 1032 (Mo.Ct.App. 1917). *See also* Restatement (Second) of Torts § 302 (1965)("A negligent act or omission may be one which involves an unreasonable risk of harm to another through ... the foreseeable ... force of nature.").

[60] Restatement (Second) of Torts §§ 441, 442A, 442B (1965).

[61] *See e.g., Raymond v. Baehr*, 163 N.W.2d 51, 54 (Minn. 1968).

The author can find no reported case in which a telephone company was accused of negligence because the telephone company used antique carbon blocks in the arrester, instead of modern technology (e.g., gas tubes or silicon thyristors) in the arrester. One of the purposes of this article is to call the attention of tort attorneys to the existence of technology that might better protect the public from injury. The information in the section 3 of this paper, on engineering standards, may be useful to plaintiff's attorney who wishes to argue for a higher duty of care than mere compliance with the NEC. For example, one appellate court overturned a jury verdict in favor of the victim whose eardrum was ruptured by lightning while talking on the telephone, because the telephone company had used protective technology that "met the highest standards" of the telephone industry[62]. The appellate judge ruled that "the law does not require perfection beyond the limits of scientific knowledge and practicability as applied to industry."[63] This court's argument is flawed because the "limits of scientific knowledge" are nearly always beyond the conventional practice that is described in engineering standards. In this particular case, the telephone company was using antique carbon blocks as the only arrester[64]. The court did not consider the issue of whether the victim's injury could have been prevented by better arresters (e.g., gas tube) that were known at the time. As discussed earlier in this paper, engineering standards in the USA describe a minimum acceptable level to the engineers who wrote the standard, and are *not* indicative of the best performance known to mankind. As a matter of public policy, obligating utilities to only follow practices described in engineering standards does not encourage utilities to use the best available technology to protect their customers from injury.

Because surge-protective technology is technically complicated and beyond the ability of most consumers to understand, therefore, as a matter of public policy, the utility is best situated in the community to provide protection[65].

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[62] *Green v. Insurance Co. of North America*, 275 So.2d 425, 430 (La.Ct.App. 1973).

[63] *Id.* at 432.

[64] *Id.* at 429.

[65] *Pearce v. Mountain States Telephone & Telegraph Co.*, 173 P. 871, 872 (Colo. 1918); *Warren v. Missouri & Kansas Telephone Co.*, 196 S.W. 1030, 1032 (Mo.Ct.App. 1917). *See also Ransome v. Wisconsin Electric Power Co.*, 275 N.W.2d 641, 650 (Wisc. 1979)(holding that consumer self-protection is not feasible for electric power).

public sentiment against utilities

Many people, including jurors, see utilities as large, impersonal, monopolistic corporations that send an expensive invoice every month. Such a picture of utilities is prejudicial to the telephone company. While it is improper for plaintiff's attorney to mention such biases explicitly, it is acceptable to remind the jury in closing arguments that the telephone company is a large corporation with a responsibility to protect the public[66].

In the author's reading of reported cases that involve litigation against the local telephone company for injuries to people allegedly caused by lightning shows that the plaintiff usually prevailed in the trial court. It is not possible to separate possible juror prejudice against utilities from possible juror sympathy for the victim.

telephone company's disclaimer

It is conventional practice in the USA for telephone operating companies to print a notice or disclaimer in the informative section preceding the white pages of the telephone directory. Typical notices include:

> Try not to use the phone during an electrical storm. We take protective measures to limit electrical surges into your home, but no one can guarantee complete safety from lightning.[67]

> There is a slight risk of an electrical shock from lightning if you use a telephone during an electrical storm. While our equipment is designed to limit abnormal electrical surges, it is impossible to stop all of them. If you must make a call, keep it brief.[68]

Such a notice may be useful to inform the public, but they confuse the issue. The relevant standard is *not* perfect protection with an absolute guarantee of safety, but is only to use state-of-the-art protection technology. However, people are most often injured while using a telephone during a thunderstorm because the telephone company did not properly install a ground wire or an arrester. So, it is not the impossibility of providing perfect protection that was responsible for the victim's injury, but the failure of the telephone company to use or to maintain protection technology that has been known for 100 years. However, the telephone company may attempt to hide behind such notices as a disclaimer of their liability to the injured person, in effect, by saying "We told you not to use a telephone during a thunderstorm."

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66 *McDowell v. Southwestern Bell Tel. Co.*, 546 S.W.2d 160, 174 (Mo.Ct.App. 1976).

67 Concord, NH 1996 telephone directory, published by NYNEX. This two-sentence notice is buried amongst fifty pages of information in the front of the telephone directory.

68 from leaflet with monthly invoice, South Central Bell Telephone Co., July 1981, quoted in *Bickerstaff v. South Central Bell Telephone Co.*, 676 F.2d 163, 167 (5thCir. 1982).

There is generally no duty to warn of a danger that is known or obvious to the user. Because it "is a matter of common knowledge" that lightning is dangerous, the court in *Bickerstaff* held that the telephone company has no duty to warn[69]. The *Bickerstaff* court missed the point. While it is well-known that lightning itself is dangerous, "many people do not consider the telephone as a lethal instrument, though" people are killed and injured by lightning currents on telephone lines[70]. Therefore, a notice by the telephone company may be useful in avoiding some injuries.

when victim is employee

When an employee is injured by lightning while talking on a telephone, there is an additional issue: the employer may be liable for the injuries under Workers' Compensation statutes. There are several reported Workers' Compensation cases in which the plaintiff recovered for injuries sustained from lightning current on a telephone[71].

The plaintiff must produce evidence to show that the conditions of employment made the injury by lightning more likely than for a member of the general population[72]. For example, an unemployed person could postpone making a telephone call during a local thunderstorm. However, when the employer or manager directs an employee to make a telephone call during a local thunderstorm, then the employer has placed the employee at increased risk of injury. Such an employer might also be held to have an obligation to purchase and install surge suppressors on the

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69 *Bickerstaff v. South Central Bell Telephone Co.*, 676 F.2d 163, 165-167 (5th Cir. 1982).

70 F.H. Zegel, *Lightning Deaths in the United States: a Seven-Year Survey from 1959 to 1965*, 20 Weatherwise 169, 172 (1967).

71 *Foerman v. Seaboard Coast Line Railroad Co.*, 279 So.2d 825 (Fla. 1973) (railroad negligent in providing neither arresters nor ground); *Beecher Wholesale Greenhouse, Inc. v. The Industrial Commission*, 524 N.E.2d 750 (Ill.App. 1988)(permanent and total disability, "compelling circumstantial evidence that claimant was struck by lightning"); *Benner v. Terminal Railroad Ass'n of St. Louis*, 156 S.W.2d 657 (Mo. 1941) (aphasia and death following electric shock from telephone); *Texas Compensation Ins. Co. v. Ellison*, 71 S.W. 309 (Tex.Civ.App. 1934); *Atlantic Coast Line Ry. Co. v. Newton*, 87 S.W. 618 (Va. 1916)(telephone operator rendered unconscious by lightning conducted on telephone line, no carbon blocks inside arrester, inadequate ground wire).

72 *Netherton v. Lightning Delivery Co.*, 258 P. 306, 308 (Ariz. 1927); *Case Co. v. Industrial Commission*, 223 N.E.2d 847, 849-850 (Ill. 1966); *Illinois Country Club v. Industrial Commission*, 56 N.E.2d 786, 788 (Ill. 1944); *Citizens Independent Telephone Co. v. Davis*, 94 N.E.2d 495, 497 (Ind.App. 1950); *Caswell's Case*, 26 N.E.2d 328, 330 (Mass. 1940); *Thier v. Widdifield*, 178 N.W. 16, 19 (Mich. 1920) following *Andrew v. Failsworth Industrial Society*, 2. K.B. 32 (1904); *Texas Compensation Ins. Co. v. Ellison*, 71 S.W.2d 309, 313 (Tex.Civ.App. 1934).

indoor telephone lines, in addition to the surge arrester provided by the telephone company.

The employer has a higher obligation to protect employees against lightning hazards when hazardous materials are used, such as fuel at airports or explosives in mining and construction industries, because the employer's duty of care increases as the hazards increase[73]. Several federal regulations require a "suitable lightning arrestor [sic] of approved type" on telephone lines within 100 feet of where the lines enter a mine[74] or where the lines enter a building on the surface[75]. Various states have statutes that require "lightning arresters" on telephone wires that enter mines[76].

telephone company ends service but leaves wire

It is standard practice for the telephone company to leave the wires attached to the building when telephone service is discontinued to the building. This practice saves the telephone company the cost of removing the wires. It also saves the cost of re-installing wires if the occupant of the building, or a future occupant, subsequently decides to have telephone service. However, in risk/benefit terms, leaving the wires attached to the building after service has been disconnected offers no benefit to the occupant from the blessings of telephone service, but does offer some risk to the occupant from lightning surge currents that may enter the building on the wires. Therefore, the telephone company should continue to provide a functional surge arrester and proper ground at the point where the wires enter the building, to avoid foreseeable injury from surges that may be conducted into the building on these wires. The author can find no cases that discuss the duty of the telephone company to inspect and maintain an arrester and ground after service has been disconnected from a building.

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[73] Restatement (Second) Torts § 298 (1965). *See also* Restatement (Second) Torts, §§ 293, 297(b), 300 (1965).

[74] 30 C.F.R. §§ 56.12069, 57.12069, 75.521. Neither "suitable" or "approved" are defined in these regulations, but the OHSA regulations incorporate the National Electrical Code by reference at 29 C.F.R. § 1910.6.

[75] 30 C.F.R. §§ 77.508, 77.508-1.

[76] Ill. Ann. Stat. ch. 225, § 709/29.04 (1996); Ind. Code Ann. § 22-10-10-7(C) (1996); Ky. Rev. Stat. § 352.220 (1996)(also requiring insulating mats on floor in front of switchboard); Okla. Stat. Ann. tit. 45, chapt. 11, § 915(2) (1996); 52 Pa. Cons. Stat. § 70-1122(b), § 701-321(c) (1996); Va. Code Ann. § 45.1-161.191(c) (1996); W. Va. Code § 22A-2-42(d) (1996); Wyo. Stat. § 30-3-301(c) (1996).

Several early cases held that the telephone company was liable for damages when lightning entered the building on telephone wires after service had been disconnected[77]. However, in later cases in which the plaintiff alleged that lightning entered a building on telephone company wires after service had been disconnected, judgment was rendered for the telephone company[78]. The early cases and later cases are not contradictory, because in the later cases the plaintiff failed to offer credible evidence that lightning, in fact, did enter the building on the telephone company wires – the plaintiff only offered an allegation or a possibility that the lightning entered via these wires.

5. consequential damages from injury to electronic equipment

Lightning currents on telephone conductors can cause not only personal injury, and even death, to people using the telephone during a nearby lightning strike, but also can cause destruction of electronic circuits in facsimile machines and computer modems, which are also connected to the telephone lines. While personal injury cases have a larger emotional impact, economic loss may also be appreciable from failure of electronic equipment that is connected to the telephone line, with consequent loss of productive work. Failure of a computer modem can cause a branch bank to lose contact with its main office, so that the branch bank must rely on old printed or microfiche records of customer's account balances before issuing cash or certified checks. Failure of a facsimile machine in a hospital or law office can delay transmission of critical information, which might expose the hospital or law office to a malpractice claim. Consequential damages from failure of facsimile machines or modems could be much larger than the cost to repair or replace the damaged equipment.

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[77] *Southern Bell Telephone & Telegraph Co. v. McTyer*, 34 So. 1020 (Ala. 1903); *Texas Telegraph v. Scott*, 127 S.W. 587 (Tex.Civ.App. 1910); *Jackson v. Wisconsin Tel. Co.*, 60 N.W. 430 (Wisc. 1894).

[78] *Alling v. Northwestern Bell Telephone Co.*, 194 N.W. 313 (Minn. 1923); *Sinkovich v. Bell Telephone Co. of Pa.*, 133 A. 629 (Pa. 1926); *Western Telephone Corp. of Texas v. McCann*, 99 S.W.2d 895 (Tex.Ct.App. 1937).

telephone company may have limited liability

The author can find only one reported case in which a telephone company was sued for consequential damages from equipment damaged by surges on a telephone line. In this case, the customer sued a telephone company for consequential damages from malfunction of a telephone line connected to a modem[79]. The Illinois Commerce Commission held that the liability of the telephone company was limited by its tariff, so the customer was able to recover only $ 34 of a total of $ 600 in consequential damages. The relevant part of the tariff is:

> The liability of the Company for damages arising out of mistakes, omissions, interruptions, delays, errors or defects in transmission occurring in the course of furnishing service ... shall in no event exceed an amount equivalent to the proportionate charge to the customer for the period of service during which such mistake, omission, interruption, delay, error or defect in transmission occurs. No other liability shall in any case attach to the Company.[80]

There are a number of cases, some of which are cited below, in which the telephone company was sued for consequential damages because of interrupted or defective telephone service prevented operation of a fire or burglary alarm, prevented a voice call to 911 for rescue services, failed to refer callers to the customer's new telephone number, disconnected service without good reason, or failed to provide usable service[81]. The telephone company was often able to win a summary judgment motion, by reliance on an limitation of liability clause in the tariff that the telephone company filed with the state public utility commission (PUC).

The validity of such limitations of liability is a complicated area of law, with many conflicting legal principles. On one hand, the plaintiff can argue that, as a matter of public policy, a utility can not exempt itself from tort liability for harm caused by negligence of the utility[82]. The plaintiff was presented with a Hobson's choice of (1) accepting telephone service with this tariff from the only company offering telephone service in the plaintiff's location or (2) having no telephone service. Given that telephone service is a necessity for businesses and a common convenience for

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79 *Menco Corp. v. Illinois Bell Telephone Co.*, 1984 Ill. PUC Lexis 37, 84-0277 (1984).

80 *Id.* at 3. *See also In re Illinois Bell Switching Station Litigation*, 641 N.E.2d 440, 444 (Ill. 1994).

81 There are also many cases in which plaintiff alleges the telephone company made a mistake in the printed Yellow Pages telephone directory. Such cases are distinguishable from those alleging interruptions in service, because the telephone "directory is not the sole means of advertising available to customers of the telephone company." *Berjian v. Ohio Bell Telephone Co.*, 375 N.E.2d 410, 416 (Ohio 1978), whereas the telephone company maintains a monopoly on rapid communications. *See also Behrend v. Bell Telephone Co.*, 363 A.2d 1152, 1165 (Pa.Super. 1976).

82 Restatement (Second) of Contracts § 195(2)(b) (1981); Restatement (Second) of Torts § 496B, comments *g, i, j* (1965).

homes, such a choice is illusory. On the other hand, the PUC approves this limitation of liability in exchange for lower rates for telephone service[83], which is in the public interest. Further, the PUC purportedly represents the public interest and negotiates a good deal for all customers, which weakens legal arguments about the unconscionability of the limitation, unequal bargaining power, or adhesion contracts.

The state legislature gives the PUC a charter to regulate rates that customers pay for utility service and conditions of that service[84]. This means that the PUC performs a quasi-legislative function[85] that may be given deference by the courts, under the doctrine of separation of powers.

Courts in most states uphold the clauses in utility's tariff that limit the utility's liability[86].

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83 *Western Union Telegraph Co. v. Esteve Bros. & Co.*, 256 U.S. 566, 571 (1921) ("the limitation of liability was an inherent part of the rate"); *Waters v. Pacific Telephone Co.*, 523 P.2d 1161 (Calif. 1974); *In re Illinois Bell Switching Station Litigation*, 641 N.E.2d 440 (Ill. 1994).

84 *Coachlight Las Cruces, Ltd. v. Mountain Bell Telephone Co.*, 664 P.2d 994, 998-999 (N.M.Ct.App. 1983).

85 *Computer Tool & Engineering, Inc. v. Northern States Power Co.*, 453 N.W.2d 569, 573 (Minn.Ct.App. 1990).

86 *In re Illinois Bell Switching Station Litigation*, 641 N.E.2d 440 (Ill. 1994); *Harrell v. City of Chicago Heights*, 1996 WL 51835 (N.D.Ill. 1996); *Angelo Pavone Enterprises, Inc. v. South Central Bell Telephone Co.*, 459 So.2d 1223 (La.Ct.App. 1984); *Lebowitz Jewelers Ltd., Inc. v. New England Telephone and Telegraph Co.*, 508 N.E.2d 125 (Mass.App.Ct. 1987); *Computer Tool & Engineering, Inc. v. Northern States Power Co.*, 453 N.W.2d 569 (Minn.Ct.App. 1990); *Lahke v. Cincinnati Bell Inc.*, 439 N.E.2d 928 (Ohio Ct.App. 1981); *Behrend v. Bell Telephone Co.*, 363 A.2d 1152, 1164 (Pa.Super. 1976)("Of the other jurisdictions which have considered the issue, the great majority have upheld limitations of liability similar to that in Bell's tariff.").

However, a few states (e.g., Kansas[87], Missouri[88], New Mexico[89], Ohio[90], and California[91] before 1974) do *not* allow the telephone company to exempt itself from liability for its negligence. These states see the limitation of liability as an exculpatory clause, which is void against public policy, since the customer has no realistic choice, because the utility is a monopoly.

Some other states[92] have taken a middle ground, by permitting recovery for consequential damages only when the telephone company is guilty of "willful or wanton" misconduct, which is reckless disregard for the customer's safety[93]. However, one trial court improperly interpreted "willful" narrowly to mean that the telephone company intentionally wished to harm the plaintiff, not that the telephone company deliberately disregarded a duty[94].

One illustration of the application of a tariff was provided in the aftermath of the fire in the Hinsdale switching station, which caused a loss of service to more than one million customers in Chicago's western and southwestern suburbs for about one month in 1988. Many customers sued for consequential damages owing to interruption of service and these cases were consolidated in

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87 *McNally Pittsburg Mfg. Corp. v. Western Union Telegraph Co.*, 353 P.2d 199 (Kan. 1960).

88 *Forte Hotels, Inc. v. Kansas City Power & Light Co.*, 913 S.W.2d 803 (Mo.Ct.App. 1995).

89 *Southwestern Public Service Co. v. Artesia Alfalfa Growers' Ass'n*, 353 P.2d 62 (N.M. 1960).

90 *Berjian v. Ohio Bell Telephone Co.*, 375 N.E.2d 410, 414-415 (Ohio 1978).

91 *Product Research Associates v. Pacific Telephone & Telegraph Co.*, 94 Cal.Rptr. 216 (Cal.Ct.App. 1971), *disapproved in Waters v. Pacific Telephone Co.*, 523 P.2d 1161 (Cal. 1974).

92 *Southern Bell Telephone & Telegraph Co. v. Invenchek*, 204 S.E.2d 457 (Ga.Ct.App. 1974); *Coachlight Las Cruces, Ltd. v. Mountain Bell Telephone Co.*, 664 P.2d 994 (N.M.Ct.App. 1983); *Warren v. New York Telephone Co.*, 324 N.Y.S.2d 243 (N.Y.Civ.Ct. 1971).

93 Restatement (Second) Torts § 500 (1965); W. Page Keeton et al., PROSSER AND KEETON ON THE LAW OF TORTS, § 34 (5th ed. 1984).

94 *Sommer v. Mountain States Telephone & Telegraph Co.*, 519 P.2d 874 (Ariz.Ct.App. 1974). *See also Singer v. Baltimore Gas & Electric Co.*, 558 A.2d 419, 428 (Md.Ct.Spec.App. 1989).

one class action litigation[95]. This switching station was fully automatic, so no employees were routinely in the building. Despite this automation, the only fire protection inside this building was manual fire extinguishers that were mounted on the interior walls of the building! Two different fire alarms reported the fire to telephone company offices, the first at 3:50 pm for nine consecutive minutes, the second at 4:20 pm, but telephone company employees failed to respond. The fire was first reported to the fire department at 4:50 pm by a person who noticed smoke pouring from the building[96]. The absence of automatic fire extinguishers and Bell's lack or response to the two alarms was not all of Bell's negligence. Prior to the Hinsdale fire, Bell had discontinued the practice of having redundancy in its system, which redundancy would have permitted service to continue after failure of one switching station[97]. Further, Bell refused to install temporary equipment to restore service, although Bell was offered this option within 72 hours of the fire[98]. Clearly, the telephone company was negligent, but the courts limited recovery to the trivial amounts specified in the tariff. The court speculated that the potential magnitude of claims could exceed ten million dollars and "the plaintiff could well end up owning the telephone company."[99] To which the dissenting judge replied:

> If the plaintiff customers were in control of the system they might well take better care of it. At the very least, they might have the sense to call the fire department before a major link in the network is reduced to a mass of melted wire. In any case, it is not our function to protect the telephone company, or any party, from the consequences of its misconduct.[100]

A concurring judge noted that every tariff by Bell since 1936 had contained a "virtually unchanged" limitation of liability clause and businesses should have purchased business

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95 *In re Illinois Bell Switching Station Litigation*, 641 N.E.2d 440 (Ill. 1994); *In re Illinois Bell Switching Station Litigation*, 596 N.E.2d 678 (Ill.App. 1992); *In re Illinois Bell Switching Station Litigation*, 1991 WL 141036 (Ill.App. 1991)(withdrawn from bound volume 578 N.E.2d 183). *See also American Drug Stores v. ATT Technologies*, 583 N.E.2d 694 (Ill.App. 1991).

96 *In re Illinois Bell Switching Station Litigation*, 641 N.E.2d 440, 442 (Ill. 1994).

97 *In re Illinois Bell Switching Station Litigation*, 641 N.E.2d 440, 450 (Ill. 1994) (Harrison, J., dissenting). Note that the two appellate court decisions and the majority opinion of the Illinois Supreme Court all ignored the lack of redundancy in a critical system. Further, a court in New York held an electric utility liable for food spoilage and loss of business arising from an electric power outage, because the electric utility failed to provide backup power sources. *Food Pageant, Inc. v. Consolidated Edison Co., Inc.*, 429 N.E.2d 738 (N.Y. 1981).

98 *In re Illinois Bell Switching Station Litigation*, 641 N.E.2d at 451. (Harrison, J., dissenting)

99 *In re Illinois Bell Switching Station Litigation*, 641 N.E.2d 440, 446 (Ill. 1994).

100 *In re Illinois Bell Switching Station Litigation*, 641 N.E.2d 440, 455 (Ill. 1994) (Harrison, J., dissenting).

interruption insurance, instead of litigating a consequential damage claim against the telephone company[101]. This judge also noted that "the liability that the plaintiffs seek to impose on Bell is virtually unlimited, and Bell's entire customer base would ultimately bear that cost"[102], which sounds as if the judge was afraid of a rate increase.

An additional argument for invalidating limitation of liability clauses is that these clauses remove the incentive for telephone company management to invest in state-of-the-art equipment and to vigilantly supervise operations of their employees, including routine maintenance. It is one thing to absolve utilities from interruptions of service that are beyond their control, such as a drunk driver colliding with a utility pole with subsequent breaking of wires. But telephone companies should be liable for using antique arresters, defective grounding of arresters, and other errors and omissions fully within the control of the telephone company.

The limitation of liability for interruption of service discussed above is restricted to failure or interruption of service that is caused by failure in the telephone company's system. It is not clear that this limitation would also prevent recovery for loss when a surge entered a customer's system on telephone company wires, the surge damaged the customer's modem or facsimile machine, and the customer suffered consequential damages. In an analogous area, an electric company's tariff that exonerated the utility from consequential damages "from the use of service or any interruption or disturbances of service" was held *not* to bar recovery for injury to cattle from stray voltage[103].

The issue of protecting computer modems and facsimile machines from lightning will become increasingly important in the future. For example, the operation of the Internet is totally dependent on connection of computers via telephone lines. Continuous operation of Internet connections is essential to businesses that sell or advertise on the Internet. In addition, to the increasing commercial importance of the Internet, businesses and professionals (e.g., attorneys and physicians) also increasingly rely on the continuous availability of facsimile transmissions and e-mail via telephone lines.

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101 *In re Illinois Bell Switching Station Litigation*, 641 N.E.2d 440, 447-48 (Ill. 1994)(Miller, J., concurring).

102 *Id.* at 448.

103 *ZumBerge v. Northern States Power Co.*, 481 N.W.2d 103, 106-107 (Minn. Ct.App. 1992).

6. conclusion

Injuries to people using the telephone during a local thunderstorm are preventable by using technology of surge arresters, surge suppressors, and proper grounding of these surge-protective devices. Damage to electronic equipment, such as computer modems and facsimile machines, is of increasing importance in our society, although the law in the USA does not yet permit recovery for consequential damages from lightning current on telephone lines.

The end result of successful litigation would be not only to compensate innocent victims, but also to encourage the telephone operating companies to sponsor research and development into improved surge-protection technologies.

Instead of attacking the problem with litigation after a customer has suffered a loss, an alternative is to petition the public utility commission to amend the tariff so that an individual customer has the option of paying a higher rate in exchange for premium service that has (1) state-of-the-art surge arresters and (2) routine checks of the arrester, including its grounding. Paying a higher rate in exchange for greater security has long been a favored method of resolving the conflict between the two desirable goals of low-cost service and high reliability[104].

There are few independent experts, since nearly everyone with knowledge in surge protection on telephones is either an employee of a manufacturer of surge-protective devices, an employee of the telephone company, or earns a living by consulting to one or both of those industries. There is a simple economic reason for this situation: only the telephone company's employees can connect an arrester to wires owned by the telephone company, so there is no employment for independent engineers for surge-protection of telephone wires. This lack of experts who are not economically dependent on telephone utilities is not only a problem in writing engineering standards, as explained in Section 3 of this paper, but also is a problem in finding expert witnesses for the plaintiff[105].

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[104] *Western Union Telegraph Co. v. Esteve Bros. Co.*, 256 U.S. 566 (1921); *Postal Tel. - Cable Co. v. Warren-Goodwin Co.*, 251 U.S. 27 (1919); *Primrose v. Western Union Telegraph Co.*, 154 U.S. 1 (1894).

[105] *Mancuso v. Southern California Edison Co.*, 283 Cal.Rptr. 300, 306 (Calif.Ct.App. 1991) *quoting Pierce v. Pacific Gas & Electric Co.*, 212 Cal.Rptr. 283, 291 (Calif.Ct.App. 1985) (commenting on problems in proof of negligence by electric utilities).

About the Author

Dr. Standler did scientific research in atmospheric electricity and lightning during 1971-79 and earned a Ph.D. in physics in 1977. During 1983-93, he did engineering research on protection of electronic equipment from transient overvoltages, such as caused by lightning. During 1987-95, Dr. Standler was active in the writing and approval of engineering standards for surge-protective devices in both the IEEE and ANSI C62 Low-Voltage Subcommittee. After the annihilation of financial support for research in all of his areas of science and engineering, he attended law school during 1995-98, where he wrote this article in 1997. Since 1998, Dr. Standler has been an attorney in Massachusetts.

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