COMMSCOPE®

White paper

Squirrel damage to outside plant cables

Background

Researchers in pest management agree that attempts to control and prevent rodent damage date back to ancient times. Perhaps the corollary to this for the communications industry is that, since the time Alexander Graham Bell uttered the famous words, “Mr. Watson, come here...” rodent damage to cables has been a problem. Industry humorists might even postulate that Bell was calling Watson to dispatch a rodent gnawing on that first telephone cable.

In any event, rodent damage to communications cables continues to be problematic today. In fact, Level 3 Communications reported, in August of 2011, that 17 perfect of fiber cable damages in their outside plant were due to squirrel chews[1]. These ubiquitous, furry buzz saws are most likely damaging aerial cable plant in worldwide settings, increasing maintenance expenses and reducing productivity of technical operations groups. Service outages caused by squirrels can also adversely affect the image of service providers, possibly reducing revenue growth. This paper focuses on damage to aerial cable plant from squirrels and the methods to reduce or prevent it.

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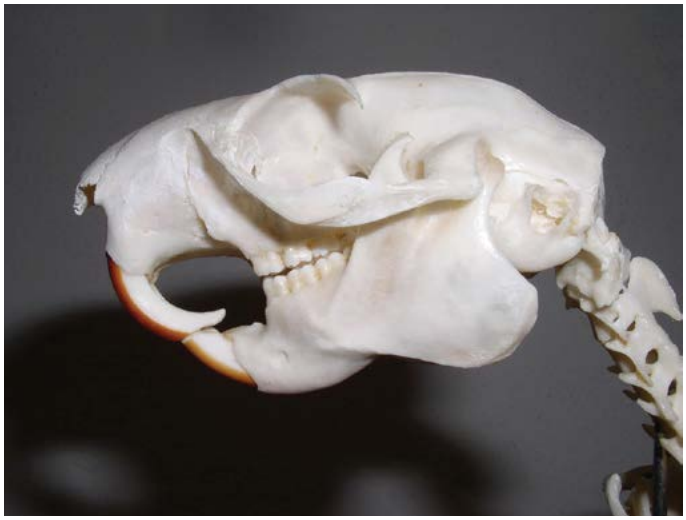
Cause

Squirrels, of the order Rodentia, more than over 350 species in seven families. Like all rodents, squirrels have four incisors (cutting teeth) that grow continuously throughout their life. In one year’s time, a squirrel’s incisors can grow up to six inches[2]. Squirrels, however, are able to keep their incisors short by wearing them

down through gnawing. Most of the time squirrels gnaw to fulfill a portion of their dietary habits—opening hard-shelled nuts. If, however, squirrels do not have adequate dietary reason or opportunity to exercise their incisors, there is a danger of the teeth “overgrowing.” In these cases, the incisors can prevent the squirrel’s mouth from closing (severely restricting its ability to eat), or the teeth may actually cause injury to the animal, including puncturing the roof of the mouth[3].

Enter the communications cable (fiber or copper; trunk, distribution or drop)—if squirrels have need of wearing down their incisors, and there are no other hard substances nearby, they will gnaw on cable. Cable components such as polyethylene and aluminum shielding handily meet the needs of squirrels in the neighborhood when it comes to oral maintenance. The question now is what can be done about this behavior?



(photo courtesy of Wikimedia.com)

Solutions

Generally speaking, there have been three approaches to deterring squirrel (or other rodent) chews on communications cables: mechanical (through the use of physical barriers), lethal toxins, and repellents (electrical or chemical).

The concept of physical barriers to prevent rodent chews has been investigated for decades. Methods include barriers that completely or partially surround the outside of the cable (conduit, for example) and the use of armoring tapes inside the cable. Barriers outside the cable are typically designed to prevent a rodent's jaws from opening wide enough to effectively chew the barrier, thus protecting the cable inside.

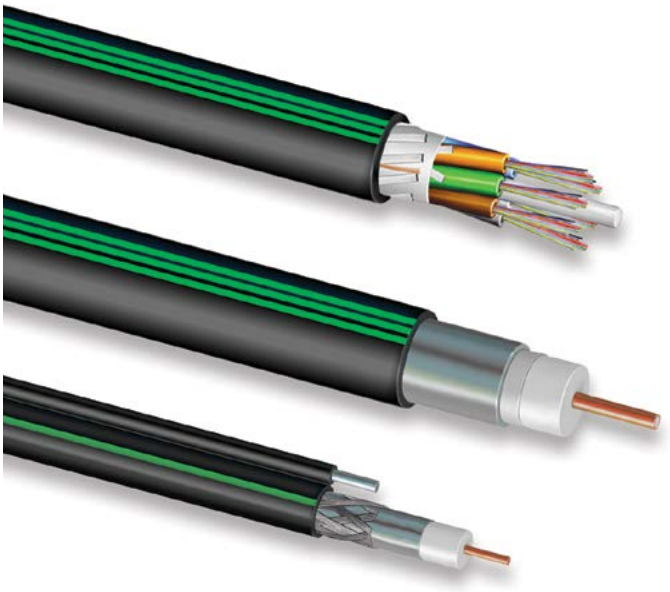
Armor tapes surround the entire circumference of a cable core and are normally placed between the outer jacket and the cable strength members. In a study conducted shortly after WWII, Bell Telephone concluded that armor tapes of 5-mil steel or 10-mil copper were "adequate" to protect a cable from animal attacks[1]. Physical barriers such as conduit and cable armoring have efficiently deterred gnawing rodents in buried cable plant for some time. These same barriers can be deployed in aerial applications; however, there are several considerations one should take into account before doing so.

First, the use of physical barriers can increase the expense of deploying aerial cables; every barrier layer added to the cable increases material costs. Secondly, the more you increase the diameter and weight of an aerial cable, the more severe the ice and wind loading. Additionally, sharp edges on the armor can impair the safety of technicians and will require the use of gloves

during installation. Overall, physical barriers have proven effective, especially when deployed underground; however, their use in aerial applications may not be optimal due to the issues described above. Lethal toxins fall under the category of "Rodenticides"; more explicitly, they are poisons. Quite honestly, there is not a lot of good to be said about the use of poisons to control squirrels. Long-term use of rodenticides is discouraged mainly due to the negative environmental effects[2]. The use of poisons can be hazardous to children and pets that may ingest the material. Secondary effects of rodenticides are also significant, as squirrels that are poisoned will also prove toxic to any animals that consume their carcasses. In addition to environmental concerns, public image with communities served by system operators is bound to suffer if toxins are used to deter squirrel damage[6]. CommScope does not recommend the use of any lethal toxins to control local squirrel populations.

Repellents can involve techniques such as applying electrical current to the outside of cables, as well as the use of non-lethal chemicals. The use of electric current (as well as other "scaring devices") has not proven to be successful[7] in preventing rodent damage and may raise safety concerns for technicians. The use of nontoxic chemicals, however, has been demonstrated to reduce cable gnawing by several species of rodents[3,4]. Interesting findings in these reports show that capsaicin (used in hot pepper flavoring) and chemicals that produce bitter tastes were able to reduce cable damage from gnawing rodents. In one study, cables treated with capsaicin incurred 95 percent less damage than the control sample. The test results also showed that there was no statistically significant difference between capsaicin and the bitter-tasting agent; in fact, both were effective in reducing the amount of overall damage to the sample cables.

Test results suggest that rodents are repelled by the sensation of heat from the capsaicin and the bitter-tasting chemical. The results of these lab tests as they relate to cable squirrel damage were qualitatively confirmed by CommScope in a multiyear, multistate field trial with a large multisystem operator (MSO). CommScope provided cables whose jackets were manufactured of a proprietary blend of both capsaicin and bitter agents blended with polyethylene. Test sites were chosen based on histories of repeated damage to aerial cables by squirels. In follow-up visits by MSO and CommScope personnel, it was confirmed that (1) most cables exhibited no signs of squirrel damage and (2) those that had been chewed by squirrels showed only minor surface scratches. It was apparent that squirrels had learned to avoid the cables that provided unpleasant sensations from heat and bitter taste. CommScope now offers this Alternative Jacket™ blend in fiber cables and in trunk and distribution and drop coaxial cables.



Outside plant Alternative Jacket products are now available from CommScope, shown above (from top to bottom): fiber optic, trunk and distribution and drop cables.

Conclusion

Of the three methods of reducing squirrel damage, we believe the use of repellents is the most efficient means currently available. We believe that squirrels and other rodents are more likely to avoid cables with Alternative Jacket. Repelling rodents will reduce maintenance expenses by reducing cable replacement and truck rolls associated with repair of cables damaged by squirrels. The use of Alternative Jacket is also safer for technicians to deploy than other repellent methods and reduces risks to children or pets compared to alternative methods.

[1]Destruction of Cable Insulation by Rodents and Other Biological Agents, 4, Harold P. Vind, Ph.D., Naval Civil Engineering Laboratory, www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=AD0820728, accessed 10/12/2012

[2]Rodenticide Use in Rodent Management in the United States: An Overview, Gary Witmer and John D. Eismann, Proceedings of the 12th Wildlife Damage Management Conference 2007, 116, http://www.aphis.usda.gov/wildlife_damage/nwrc/publications/07pubs/witmer079.pdf, accessed 10/17/2012

[3]Repellents to Reduce Cable Gnawing by Northern Pocket Gophers, USDA National Wildlife Research Center – Staff Publications, Stephen A. Shumake, Ray T. Sterner and Stanley E. Gaddis, 1347, http://digitalcommons.unl.edu/icwdm_usdanwrc/855/ accessed 10/17/2012

[4]Repellents to Reduce Cable Gnawing by Wild Norway Rats, USDA National Wildlife Research Center – Staff Publications, Stephen A. Shumake, Ray T. Sterner and Stanley E. Gaddis, 1011, http://digitalcommons.unl.edu/icwdm_usdanwrc/838/ accessed 10/17/2012

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