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Infrastructure, regulatory and financial information for the antenna-siting community

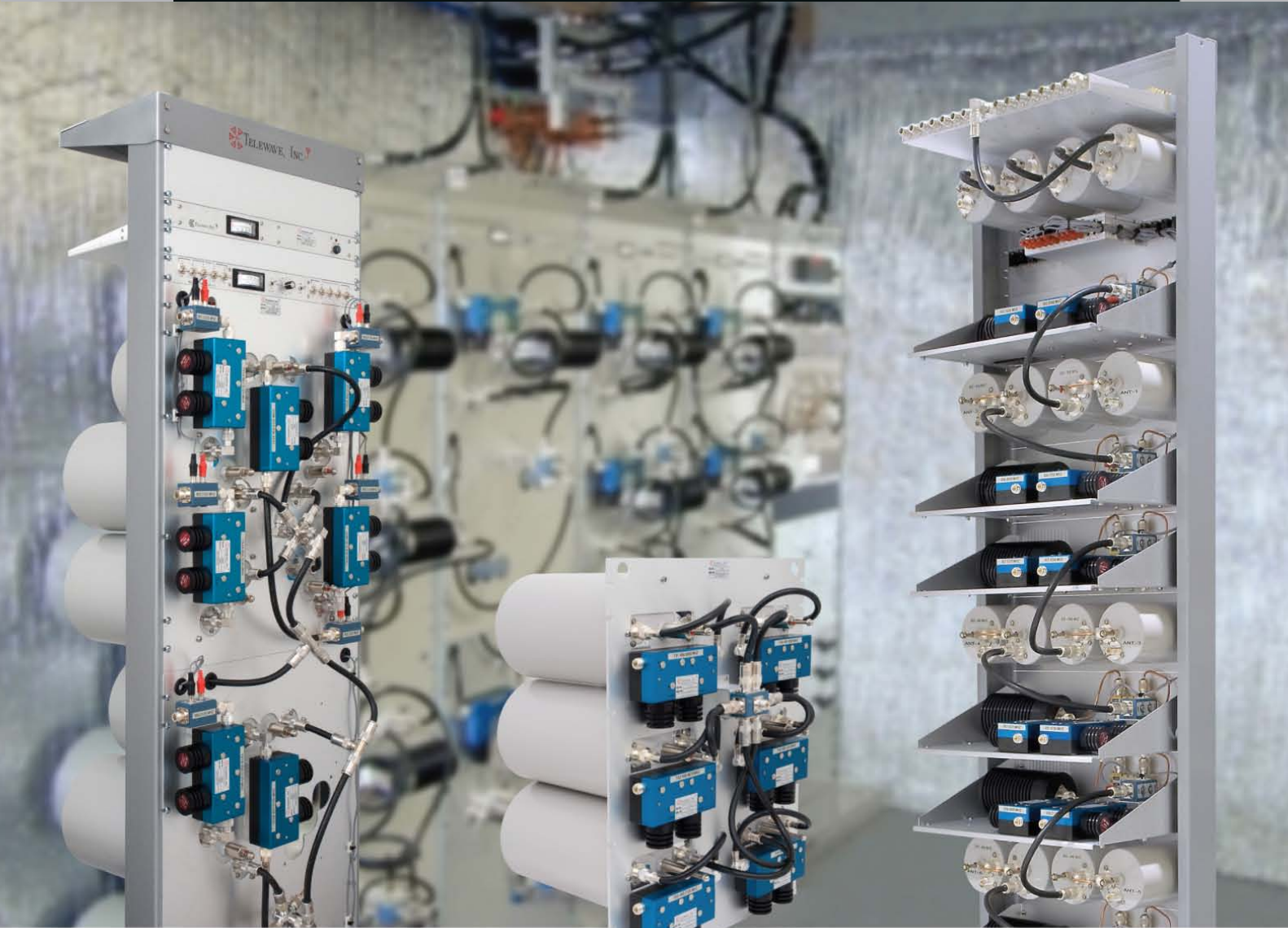
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on the cover

A beauty, one of a double set, rises from desert in North Las Vegas, Nev. The moneymaking tower and its companion support antennas for as many as seven carriers. See another view on page 30. The images were captured in February, the day before the AGL Regional Conference in Las Vegas.

Photography for the cover and Tower of the Month by Don Bishop

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Network Upgrading

Speaking to an audience at the AGL Regional Conference in Las Vegas in February, RBC Capital Markets Analyst Jonathan Atkin described investing



in tower company shares as a technology-neutral way to play wireless capital expenditure (capex).

For the most part, the more the wireless carriers upgrade the technologies they use and expand their networks' capacity and coverage, the better

it is for the owners of telecommunications towers with space to rent for antennas. An offset to the benefits that flow from network upgrading might be found in the miniaturization of equipment such that it requires only equivalent or perhaps less space.

Now, how wonderful would it be if you could get your competitor to pay for your network upgrade? That seems to be just what happened when the proposed AT&T acquisition of T-Mobile USA failed to happen. Not only does T-Mobile remain on its own — well, still owned by Deutsche Telecom, but having to make its way without cash injections from the parent company — but also it plans to spend \$4 billion on a network modernization and 4G upgrade effort that will pave the way for Long Term Evolution (LTE) service in 2013. The money, \$3 billion in cash and \$1 billion worth of spectrum, comes from AT&T as a condition of the acquisition failing to go through.

T-Mobile's chief technology officer, Neville Ray, said that the company's network strategy includes installing new equipment at 37,000 cell sites and refarming spectrum to launch LTE. Helping to spur T-Mobile along the trail to catch up with its competitors' network offerings is an increasingly rapid adoption of 3G and

4G services among consumers and improved consumer device performance.

T-Mobile hinted about forthcoming miniaturization. "T-Mobile expects to be the first carrier in North America to modernize its 4G network infrastructure with new antenna-integrated radios on many of its cell towers, which will deliver higher performance and strengthen coverage," a statement from the company reads. Maybe that involves Alcatel-Lucent's lightRadio integrated, miniaturized base station equipment, the lightRadio cube. Others also offer miniaturized base station equipment, so whose antenna-integrated radios T-Mobile will use may not be certain.

Collocation progress

Antenna site developers in New Jersey may be helped by legislation that Gov. Chris Christie signed into law on Feb. 9. It provides that applications to collocate on existing wireless communications sites are not subject to site plan review in certain instances, according to Gail Goldman, the New Jersey Wireless Association's media representative. Congratulations to NJWA and others who helped bring the legislation forward.

Conference season

The month of May brings the Tower Technology Summit in New Orleans, organized by Light Reading with programming produced by AGL. On June 22, the AGL Regional Conference teams up with the MoKan Wireless Association and its trade show in Overland Park, Kan. Another AGL Regional Conference follows on Aug. 22 in Seattle, organized in collaboration with the Northwest

Wireless Association. Come join us; we hope to see you at these meetings. ■



By Don Bishop, Executive Editor
dbishop@agl-mag.com



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Infrastructure, regulatory and financial information for the antenna-siting community

PUBLISHER/CEO

Richard P. Biby, P.E.
(703) 910-5055; rbiby@agl-mag.com

EXEC. EDITOR/ASSOC. PUBLISHER

Don Bishop
(913) 322-4569; dbishop@agl-mag.com

CONTRIBUTING EDITOR

J. Sharpe Smith
(515) 279-2282; ssmith@agl-mag.com

ART DIRECTOR

Scott Dolash
(913) 961-7501; sdolash@agl-mag.com

ADVERTISING MANAGERS

Mercy Contreras
(303) 988-3515; mcontreras@agl-mag.com
Phil Cook
(951) 301-5769; pcook@agl-mag.com
Mary Carlile
(484) 453-8126; mcarlile@agl-mag.com

CIRCULATION MANAGER

(951) 301-5769; circulation@agl-mag.com

CORPORATE OFFICE

Biby Publishing LLC
P.O. Box 2090
Ashburn, VA 20146-2090
(703) 910-5055

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publisher's note

No Frosting on the Cupcakes

We want a tower

I'm observing more and more change in the perception of communications lately. At least in the area I live in, people are becoming more vocal about wanting



better wireless coverage — and not just cellular services. I'm in a location where some pretty large areas are never going to have fiber or coax. Residents are now becoming vocal about wanting all of the economic, social and safety benefits of having a good connection with the Internet via (cellular) wireless coverage for the out-and-about part of the day, and good, uncapped fixed wireless for high-speed browsing and entertainment.

What's funny is that people understand that the towers and related infrastructure are part of the solution and are a requirement. People ask me why they can't get a cell tower (which they equate with coverage). These days, I hear less often from the old NIMBY folks.

What's funny is that people understand that the towers and related infrastructure are part of the solution and are a requirement. People ask me why they can't get a cell tower (which they equate with coverage). These days, I hear less often from the old NIMBY folks.

We want more bytes

The days of the all-you-can-consume data plans are long gone, and the price of a gigabit of data continues to rise, so why do carriers even bother with that pesky old voice service? I've been looking through some detailed business plans, and the revenue from voice traffic is small, yet the percentage of network resources and money spent providing voice services is amazingly high. I'm slowly changing my mind about what some of the data-only services do. Data is nice because you don't have to have the best coverage. A drop in coverage on a data network is not that big of a deal. You can just finish the session a few feet down the road. Not having data service in any specific location is not the end of the world, and strangely enough

By Rich Biby, Publisher
rbiby@agil-mag.com

consumers expect data services to be a little more hit or miss.

How LUCKY we are

Ever since I was my son's age, I've understood that when everything else is in the tank, the communications industry does well. My father first shared this observation with me in 1978. Right now, the old broadcast guys are about done and out, while new media is king. Wireless communications folks are doing great, and everyone from AT&T to T-Mobile and Sprint is spending one heck of a lot of money to get LTE working. Of course, as our dear friends at Verizon had much of their network construction completed before everyone else started theirs, we don't see as much from Verizon lately.

Let's just consider ourselves very lucky to be in such a great industry. Sometimes business activity contracts and some folks are forced off the island, and the never-ending game of cost-cutting has had some major impacts on boat payments, however, we're still doing just fine.

Every time I've seen the profit cut out of the industry (oops, we call that "inefficiency"), it comes at the same time as great change. I remember as a young engineer designing cellular systems around 1985 to 1987. We used to design systems with the assumption that a base station was worth its weight in gold. We had only to look about every 12 to 15 miles along a route on a topographic map, find any town of appreciable size, pick the tallest hilltop and assume we could build a 300- to 400-foot tower on it. And chances were good we could, back then. It's so funny to me to have gone from thinking you could build just about anything, anywhere, to now owning a periodical serving a community of people trying

to build infrastructure according to the unrealistic dreams of the RF engineers.

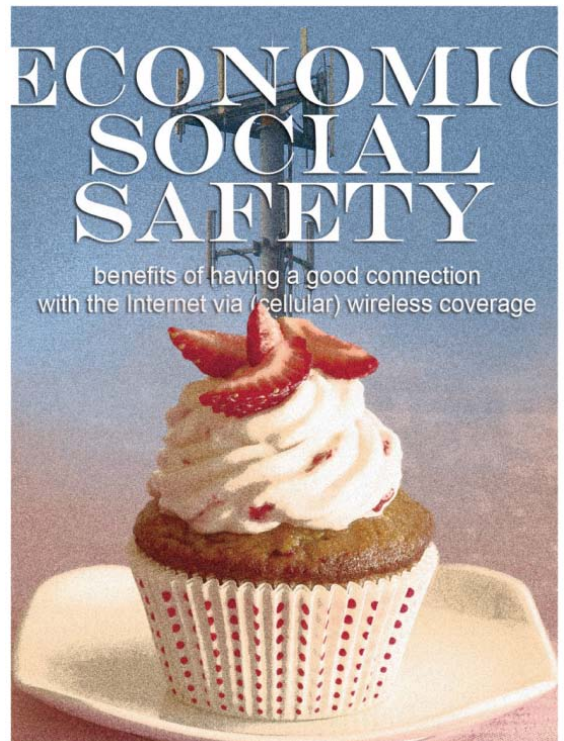
I could go on for pages about the old days and where I happen to think things are going. Suffice it to say that future infrastructure construction will involve smaller, more densely populated areas and will involve less input from engineers and other professionals.

Icing

Now, this is the first time I've done this — use a heading with little if anything to do with the column. However, as I write this and Easter draws to a close, and people are asked if they want frosting on their cupcakes, I'm reminded that sometimes we should be considered "lucky enough" as an industry and not accept or, even worse, request, the icing (even though it may be made from light cream cheese).

I choose to enjoy the cupcake, purely, one bite at a time. Adding any kind of frosting seems to say that the cupcake is not good enough by itself, as if to say some good things need to be made even better.

Enjoy. ■





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safety

Safety Tips to Protect Workers From Heat

Safety engineers offer safety tips to protect workers from heat-related illness and possible death. Employers of workers who climb telecommunications towers can take steps to ensure safe working conditions when the weather is hot.

By Terrie S. Norris

Because heat can cause workplace injuries and illness, it is important for workers to be protected against the heat, sun exposure and other hazards. The American Society of Safety Engineers, a 100-year-old safety society with more than 34,000 occupational safety, health and environmental professional members, suggests employers and employees should be aware of the factors that can lead to heat stress, the symptoms of heat exhaustion and heat stroke, ways to prevent heat stress and what can be done for heat-related illnesses that can be deadly.

Each year, thousands of outdoor workers experience heat illness, which often manifests as heat exhaustion. If not quickly addressed, heat exhaustion can become heat stroke, which killed more than 30 workers in 2010, according to the U.S. Occupational Safety and Health Administration (OSHA).

Risk factors

First, when one's body is unable to cool itself by sweating, according to OSHA, several heat-induced illnesses such as heat stress or exhaustion and the more severe heat stroke can occur, and can result in death. Factors leading to these conditions include high temperatures, being in direct sun or heat, limited air movement, physical exertion, poor physical condition, some medicines and inadequate tolerance for hot workplaces.

According to the Mayo Clinic, heat-

stroke is a life-threatening condition that occurs when your body temperature reaches 104 degrees F (40 degrees C) or higher. Heat stroke can be brought on by high environmental temperatures, by strenuous physical activity or by other conditions that raise your body temperature. Whatever the cause, the clinic notes, immediate medical attention to prevent brain damage, organ failure or death is needed.

Heat and humidity can be a serious safety threat to all workers during the summer — from telecommunications tower workers to utility, agriculture, construction and roadway workers. People should act quickly when they begin to feel symptoms. Headaches, dizziness, lightheadedness or fainting; weakness and moist skin; mood changes such as irritability or confusion and upset stomach and vomiting are symptoms of heat exhaustion. Symptoms of heat stroke include dry, hot skin with no sweating; mental confusion or losing consciousness; and, seizures or convulsions.

Prevention efforts

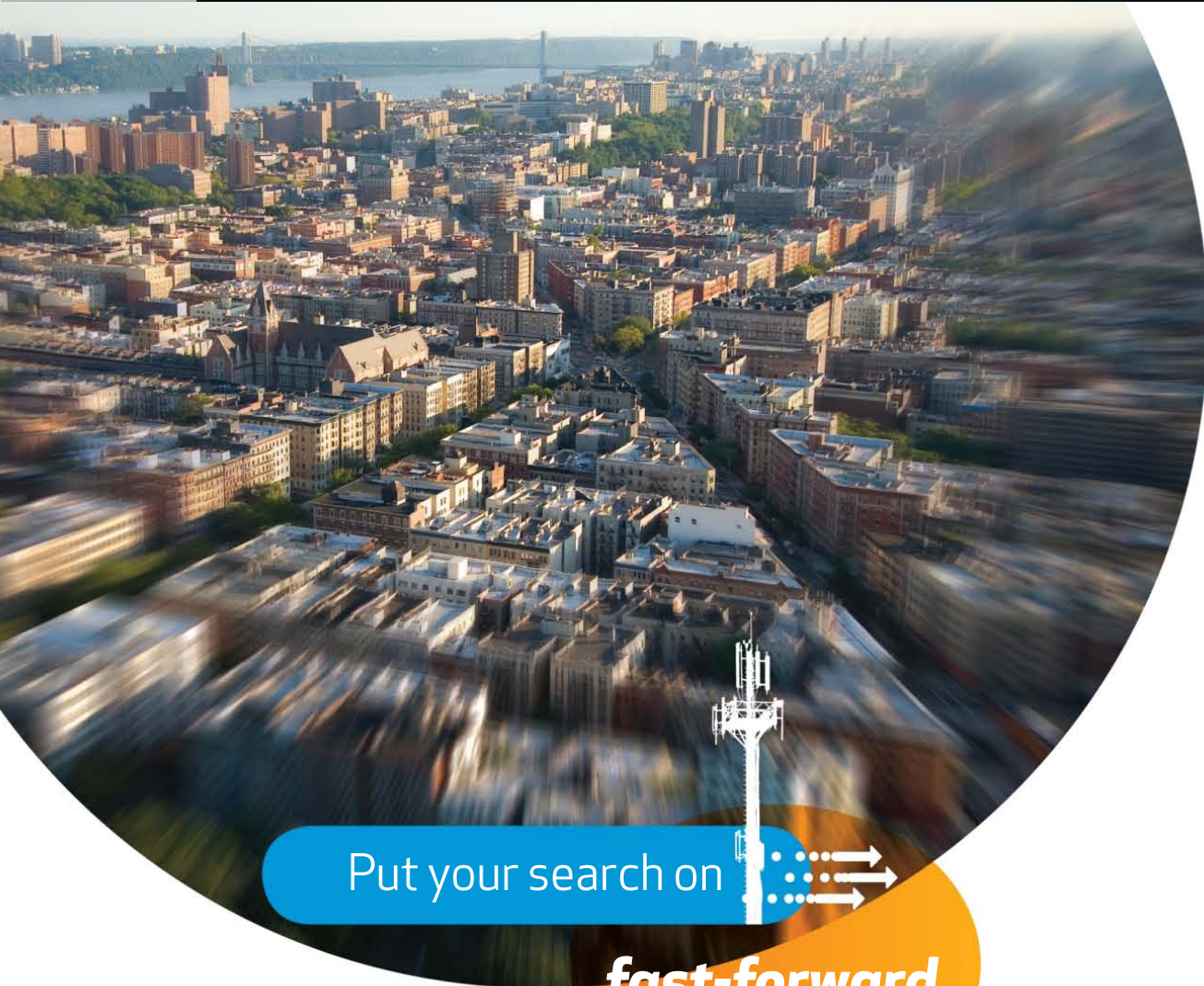
To prevent heat stress, officials suggest you monitor your co-workers and yourself. Prevention efforts include blocking out direct sun or other heat sources, using cooling fans or air conditioning and taking rest regularly. It is important to drink lots of water, about one cup every 15 minutes, and to

wear lightweight, light-colored loose-fitting clothes.

It is also recommended that anyone working in the sun should avoid alcohol, caffeinated drinks and heavy meals. According to the National Institute of Occupational Safety and Health (NIOSH), heat can also cause injury due to accidents related to sweaty palms, fogged up glasses and dizziness. Sunburns are also a hazard of sun and heat exposure.

Suggested tips for employees and employers to use in order to prevent heat-related illnesses and injuries include:

- Use cooling pads that can be inserted into hardhats or around the neck to keep the head and neck cool. Vented hardhats or neckbands soaked in cold water can also be used to minimize prolonged heat exposure and prevent the body from overheating.
- Wear protective eyewear that features sufficient ventilation or antifog lens coating to reduce lens fogging from the heat. Sweatbands can also be used to prevent perspiration from dripping into the eyes.
- Use gloves with leather palms and cotton or denim backs, which allow for an increased airflow and still protect hands. Also, choose gloves with a liner to absorb sweat, preventing perspiration buildup. Some gloves also feature strips of nylon mesh or are perforated at the back of the hand for more airflow.



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- Wear light-colored, loose-fitting, breathable clothing such as cotton, recommends OSHA. Take breaks in cooler, shaded areas.
- For workers exposed to extreme heat, proper hand protection from burns depends on the temperature and type of work to which workers are exposed.
- To prevent dehydration, another hazard associated with exposure to heat, NIOSH recommends that workers drink five to seven ounces of fluids every 15 to 20 minutes. Drink cool water and avoid diuretics such as coffee, tea, alcohol or soda that actually deplete body fluid. Sports drinks are also good for replacing fluid in the body but use should be monitored because of the high sodium content.

A *Professional Safety* journal article, "Heat Stress – Improving Safety in the Arabian Gulf Oil and Gas Industry," describes what one company did in the State of Qatar to index the sever-

ity of the heat-related illness problem and the preventive work practices provided workers that resulted in a reduction of heat-stress-related medical treatments. The authors, ASSE member Oliver F. McDonald, CSP, CIH; Nigel J. Shanks, M.D., Ph.D.; and Laurent Fragu, M.S., noted that in Qatar, reducing heat-related work stress included allowing workers to become acclimated to the heat and using engineering controls such as cooling, ventilation and shading, which are difficult to accomplish because of the daily change in environments. Additional steps included providing personal protective equipment (PPE) such as umbrellas and evaporative bandanas, constant distribution of water in insulated water bottles, work scheduling, employee rotation and self-evaluation. Further steps included using the buddy system, working in shade and shielding, and providing area cooling, ventilation and mechanical assistance. Water stations were

placed inside or near rest areas, and workers took mandatory water breaks.

Materials and tips

In addition, heat stress communication materials and safety tips were posted at key work locations, and colored flags alerting workers to the heat index were flown above the work projects. Materials for the workers were available in several languages. Ongoing employee training for new and existing employees and contractors included explaining heat stress symptoms, the heat index system, the color coding and the controls implemented. The program was recognized as a significant positive work practice during a company audit.

NIOSH's heat safety Web page is found at www.cdc.gov/niosh/blog/nsb071408_summerheat.html. OSHA's heat safety work tips are available at www.osha.gov/SLTC/heatillness/index.html. ■

Terrie S. Norris, CSP, ARM, is president of the American Society of Safety Engineers. Visit www.asse.org for information about ASSE.

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OSHA Willful Citations Increase Employer Liabilities

The knowledge, statements and conduct of the on-site supervisors may prove to be key to whether a willful citation is issued and whether that citation would survive judicial scrutiny. Failure to defend against willful citations may have drastic consequences.

By Mark A. Lies II and Elizabeth Leifel Ash

As employers should know, an Occupational Safety and Health Administration (OSHA) willful citation opens the door to significant OSHA and other liabilities. Under the current administration, willful citations are being issued with increased frequency. A willful citation can be an intimidating enforcement tool for the agency, having an immediate negative impact on an employer.

Willful citations multiplying

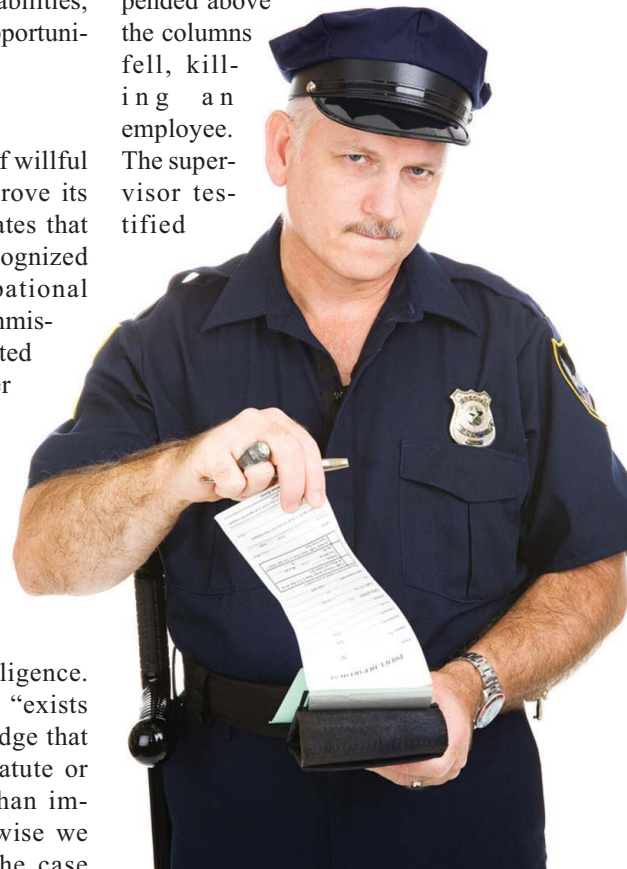
OSHA's current strategy has resulted in more alleged violations and more alleged willful violations. OSHA's current preference for willful violations is often at odds with the standard of proof required for a willful violation. A willful violation is committed either *intentionally* or *with plain indifference* to the requirements of the Occupational Safety and Health Act. This contrasts with a serious violation, which requires only that the employer "knew or should have known" of the violation. Willful violations carry higher civil penalties — up to \$70,000 per violation compared with \$7,000 for a serious violation — and can result in criminal prosecution of the employer and its

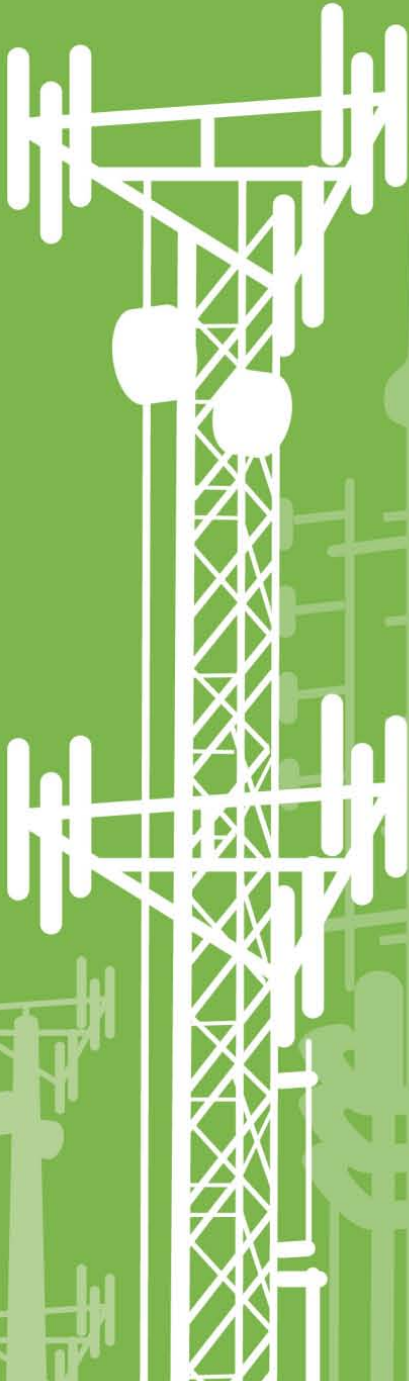
individual managers if the willful violation caused an employee's death. They can also affect potential civil liabilities, insurance rates and business opportunities, particularly job bidding.

Court resistance

Despite the enhanced use of willful citations, OSHA must still prove its case, and the case law indicates that the burden of proof is still recognized as meaningful. The Occupational Safety and Health Review Commission and the courts have resisted the Agency's attempts to lower the standard for willfulness. In *American Wrecking Corp. v. Secretary of Labor*, 351 F.3d 1254 (D.C. Cir. 2003), the court affirmed the important distinction between serious and willful violations, noting that willfulness involves more than just negligence. It stated that the distinction "exists only if willful means knowledge that the conditions violate the statute or regulations—actual rather than imputed knowledge, for otherwise we are back to negligence." The case

involved the demolition of a building. Two columns collapsed and bricks suspended above the columns fell, killing an employee. The supervisor testified





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that he believed the bricks were secure and did not create a hazard. OSHA alleged that the hazardous condition was so obvious that the supervisor's belief was unreasonable. The Review Commission rejected the notion that a willful violation exists simply because a hazardous condition "should have been obvious." *American Wrecking* also articulated the legal analysis necessary to determine if an employer's conduct constitutes a willful viola-

tion — rejecting the administrative law judge's vague observations and conclusions about the employer's state of mind and requiring competent and specific evidence of the employer's knowledge or indifference at the time of the alleged violation.

Rejected standard

In *Secretary of Labor v. Active Oil Service, Inc.*, OSHRC Docket No. 00-0553 (July 15, 2005), the Review

Commission also rejected OSHA's attempt to reduce willfulness to a "should have known" standard. Active Oil Service was hired to remove two oil tanks. An employee entered one of the tanks to clean it prior to removal and was overcome by fumes. A second employee, serving as the attendant, attempted a rescue and was also overcome. The Review Commission overturned the administrative law judge's finding that the employer had committed a willful violation of the general duty clause by permitting an employee to enter a permit-required confined space without first evaluating it. The Review Commission concluded

The Review Commission overturned the administrative law judge's finding that the employer had committed a willful violation of the general duty clause by permitting an employee to enter a permit-required confined space without first evaluating it.

that OSHA had not demonstrated the employer had actual knowledge of the violation. The testimony was not clear whether the foreman saw, or was even in a position to see, the employee enter the tank. Having eliminated the intentional disregard prong of the test, the Review Commission moved to the plain indifference prong — asking whether the employer was "so indifferent to safety that 'if he were informed of the rule, he would not care.'" The Review Commission concluded that even though the employer was lax in its approach to safety, its actions did not demonstrate plain indifference. The fact that the employer had a safety program that, if followed, would

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have avoided the violation, had the required equipment on-site at the time of the accident, and had followed the requirements in the past (including the previous day) undermined the allegations of plain indifference. The Review Commission affirmed that “knew or should have known” is not the standard for a willful violation and amended the citation to serious.

The Review Commission likewise rejected a willful citation in *Secretary*

of Labor v. Southern Pan Services Co., OSHRC Docket No. 99-0933 (September 30, 2005) because the evidence showed neither a conscious effort to disregard the OSHA requirements nor a plain indifference to safety. The suggestion that company officials and supervisors were present in the area and “should have” been aware that the exposed employee was working without fall protection was not enough to support a finding of willfulness. Again,

the Review Commission downgraded the citation to serious.

Mistaken belief

The Review Commission has also recently affirmed that an employer’s mistaken belief as to whether an OSHA standard was met does not rise to the level of willfulness. In *Secretary of Labor v. ASM-Sanders, Inc.*, OSHRC Docket No. 09-1158 (July 6, 2010), OSHA cited an excavation contractor under 29 C.F.R. § 1926.652(a) (1) where employees were working in a trench greater than five feet deep without cave-in protection. While the administrative law judge found that

The suggestion that company officials and supervisors were present in the area and “should have” been aware that the exposed employee was working without fall protection was not enough to support a finding of willfulness.

the employer had, in fact, violated the cited standard, he found that OSHA had not satisfied its burden of proving that the employer had acted willfully. Specifically, the administrative law judge found that the employer had not measured the trench, but rather had “eyeballed” its depth and concluded that it was under five feet in depth. The administrative law judge held that although the employer was mistaken in its judgment of the depth of the trench, the mistake did not rise to the level of willfulness.


As these cases demonstrate, the issue of willfulness often turns on one or two facts regarding the employer’s knowledge and steps taken to address safety hazards. In each of the

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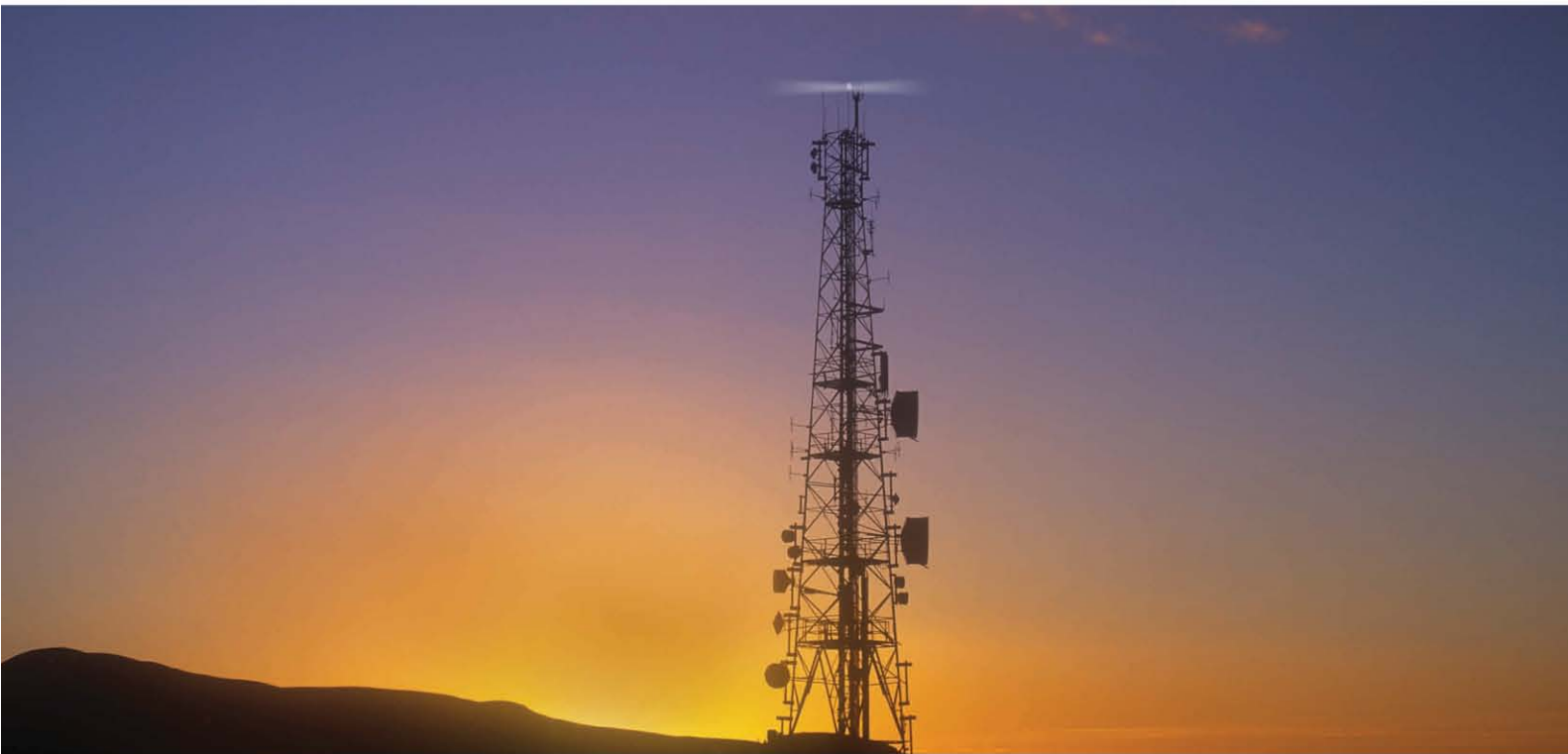
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safety

cases cited above, as is often the case with willful citations, the knowledge, statements and conduct of the on-site supervisors were the keys to whether a willful citation was issued and whether that citation survived judicial scrutiny.

Recommendations

Employers can protect themselves from OSHA's penchant for willful citations by establishing an effective safety program that:

- Includes programs and procedures addressing the hazards of the workplace and the requirements of the standards
- Communicates the importance of safety to employees and supervisors both in writing and in action
- Ensures that employees and supervisors are properly trained (including addressing potential language barriers or literacy issues involving employees), have the necessary

- equipment and properly use it
- Incorporates regular site inspections and work observations and corrects noted deficiencies in a timely manner
- Contains an effective and progressive disciplinary system that is routinely and consistently followed
- Documents these elements

Conclusion

In the event OSHA initiates an inspection, especially an investigation involving a fatality, an employer should seriously consider engaging counsel. Counsel can, among other

In the event OSHA initiates an inspection, especially an investigation involving a fatality, an employer should seriously consider engaging counsel.

things, conduct privileged investigations, participate in OSHA's interviews with management representatives (and sometimes non-management personnel) and in the closing conference, and otherwise help shape how OSHA interprets the evidence. If OSHA issues a willful citation, an employer must carefully evaluate the case — the evidence, OSHA's rationale for the willful classification and the impact of a willful violation on any civil cases, potential criminal liability, insurance rates, and future business opportunities — and pursue all available resources to defend against such citations because of the drastic consequences of failure to do so. ■

Mark A. Lies II is a partner in the Seyfarth Shaw law firm Chicago office. His email address is mlies@seyfarth.com. Elizabeth Leifel Ash is an associate in the Seyfarth Shaw Chicago office. Her email address is eash@seyfarth.com.

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lightning protection and surge suppression



RF Lightning Protectors and PIM — What You *Need* to Know

In-line RF lightning protection devices may contribute to passive intermodulation (PIM) interference unless properly designed and tested devices are selected and installed according to recommended guidelines.

By Bogdan “Bogey” Klobassa

The basic function of an RF lightning and surge protection device is to limit voltage and energy to the protected equipment by conducting surge current to the shield/ground during lightning events. One important factor in the selection process is whether the

application requires RF only or if it requires DC voltage and current on the center conductor to power towpotop electronics.

Other factors that need to be considered in selecting lightning protectors for RF applications include insertion

loss, return loss (variable standing wave ratio), surge-handling capability, voltage and energy-limiting capability, form factor, corrosion resistance, ruggedness and durability.

In today’s wireless architecture, another important issue is passive in-

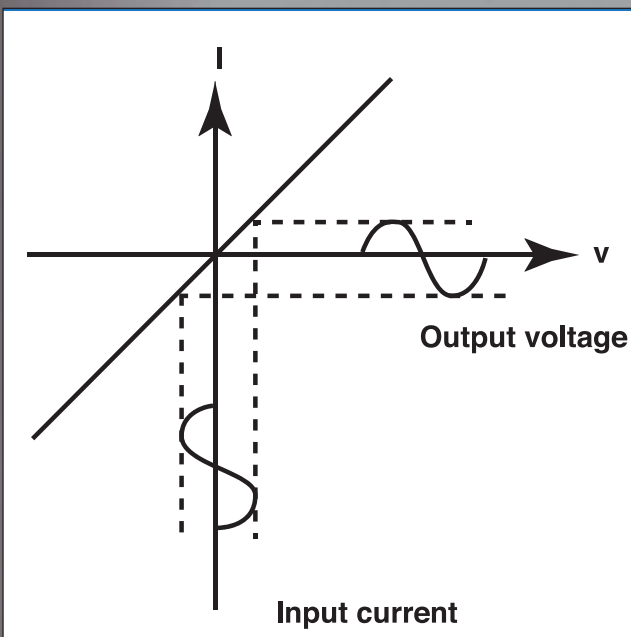


Figure 1. The linear response of an ohmic contact.

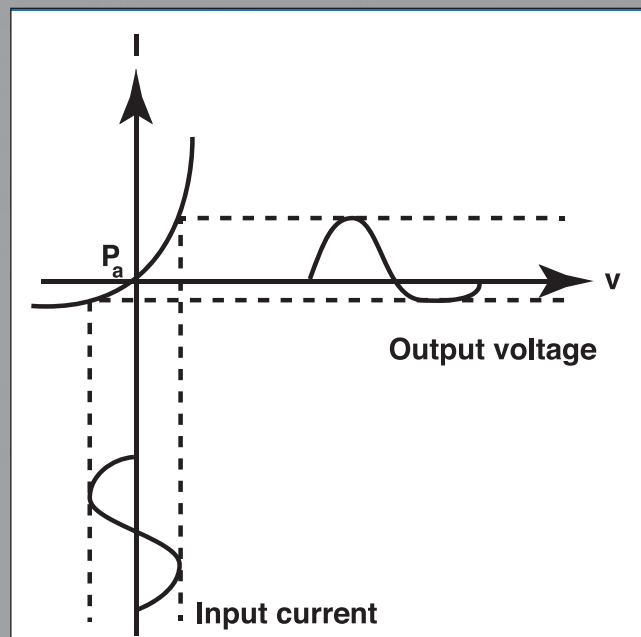


Figure 2. The nonlinear response possible from contact resistance.

lightning protection and surge suppression

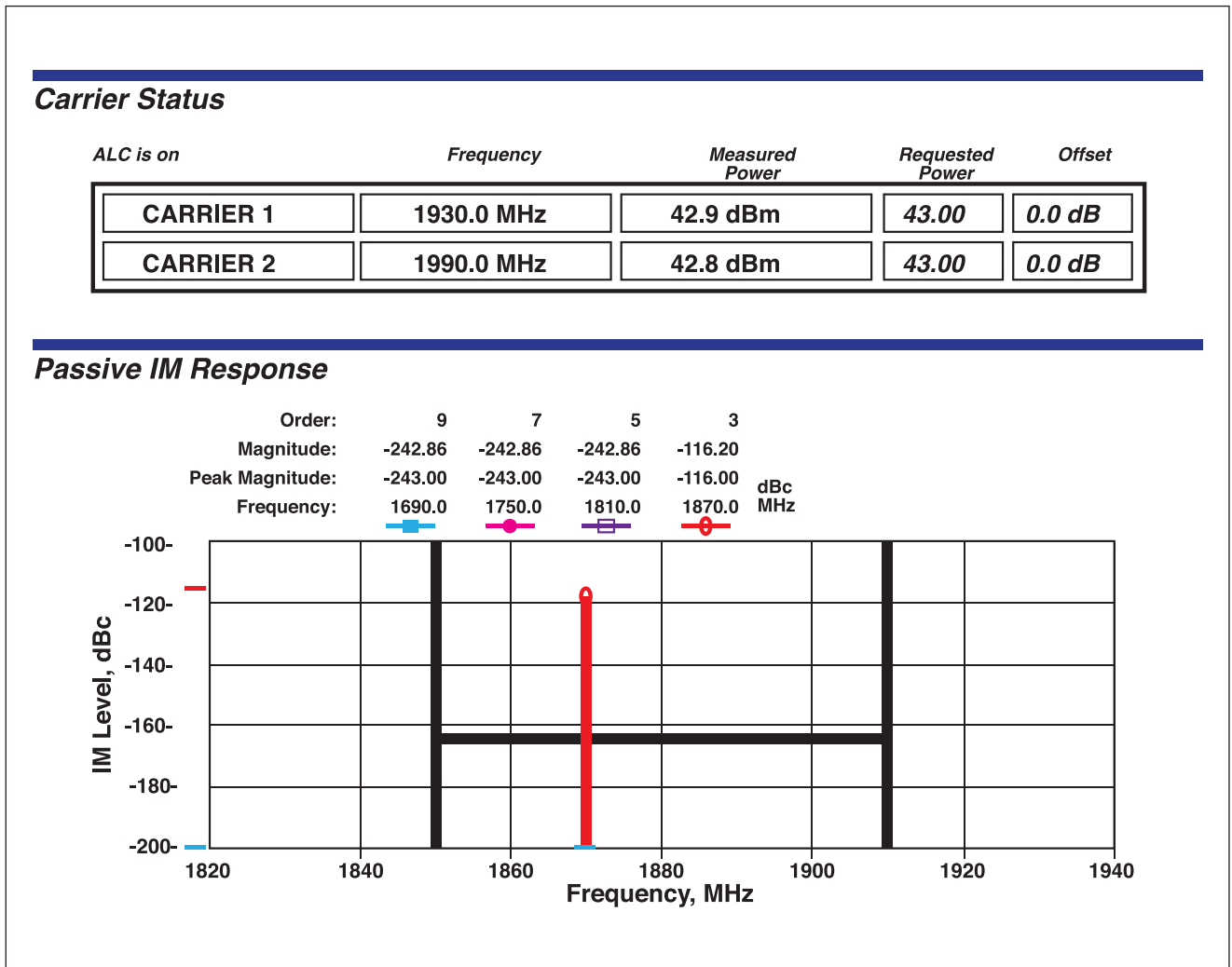


Figure 3. The PIM-distortion performance of a basic gas tube lightning protection device.

termodulation (PIM) distortion. PIM distortion is generated when two or more RF signals pass through a non-linear junction. Figures 1 and 2 are visual illustrations of the PIM distortion phenomenon. Figure 1 shows the linear response of a proper contact, and Figure 2 represents the behavior of a nonlinear junction in the RF path.

The primary causes for PIM generation are dissimilar metals (galvanic action), poor surface quality (roughness), low contact pressure (improper torque or solder), poor contact cleanliness (residual chemical films), the use of magnetic materials, and changes in temperature and current density.

In-line RF lightning protection devices contribute to PIM interference based on one or more of these causes. For PIM-sensitive applications, properly

Primary Causes of Passive Intermodulation (PIM) Interference

- Dissimilar metals (galvanic action)
- Poor surface quality (roughness)
- Low contact pressure (improper torque or solder)
- Poor contact cleanliness (residual chemical films)



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lightning protection and surge suppression

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CARRIER 1	1930.0 MHz	43.1 dBm	43.00	0.0 dB
CARRIER 2	1990.0 MHz	43.1 dBm	43.00	0.0 dB

Passive IM Response

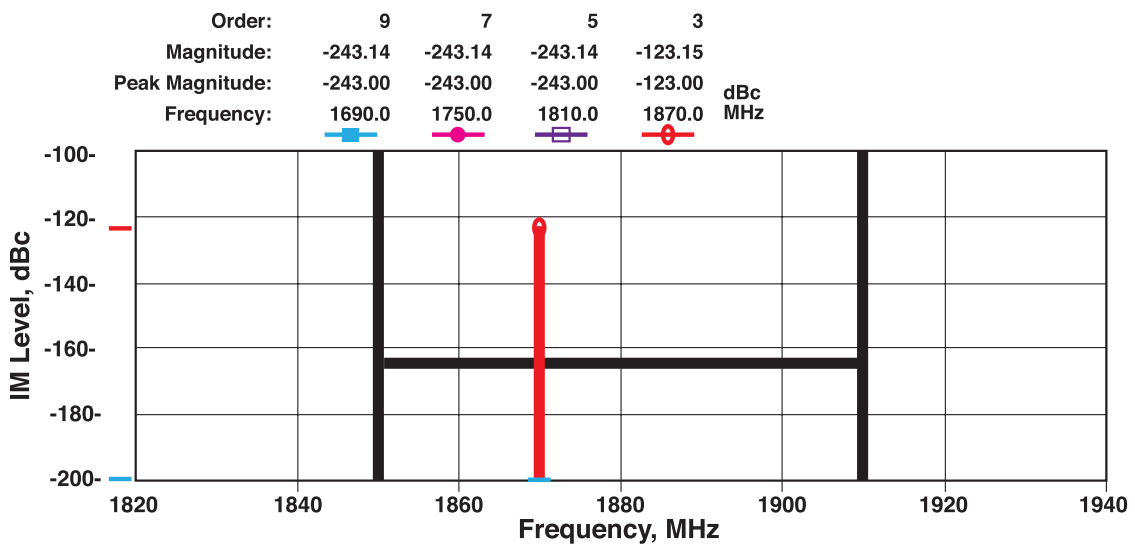


Figure 4. The PIM-distortion performance of an ultra-low PIM RF lightning protection product base on a high-band-pass filter design.

designed and tested lightning protectors should be selected and installed in accordance with required guidelines.

Figures 3, 4 and 5 are sweeps that represent three RF lightning protector designs tested for PIM distortion with two +43 dBm (20-watt) carriers applied to the surge-side connector. All units were taken “out of the box” to provide an objective evaluation.

Figure 3 illustrates PIM performance of a basic gas tube lightning protection device. Although gas tube protection technology may be sufficient in some applications, gas tube protectors are inherently bad for PIM distortion. A typical protector, based on a single gas tube design, measures -110 dBc at the previously stated test parameters. This is not adequate for many wireless communications base station applications.

Figure 4 is the PIM performance of an ultra-low PIM RF lightning protection product based on a high-band-pass

Although gas tube protection technology may be sufficient in some applications, gas tube protectors are inherently bad for PIM distortion.

filter design. This ultra-low PIM product is rated to <-155 dBc on the manufacturer’s data sheet, but testing showed that the measured value was -123 dBc

to -124 dBc. This is a level that can potentially cause performance problems in a wireless base station.

The Times Microwave Systems low-PIM line of lightning protectors for PIM-sensitive applications is a broadband design with center-conductor DC blocking and inductive decoupling of the center conductor to the shield or ground. Several static and dynamic tests were performed on these units to ensure reliable data capture. The measured PIM value for the LP-STR and LP-STRL series protectors is -174 dBc with a specified minimum value of -160 dBc (see Figure 5).

Manufacturers of RF lightning protection devices for PIM-sensitive applications should factor into the design, the manufacturing process, and the final inspection and testing the



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lightning protection and surge suppression

Carrier Status

ALC is on	Frequency	Measured Power	Requested Power	Offset
CARRIER 1	1930.0 MHz	42.8 dBm	43.00	0.0 dB
CARRIER 2	1990.0 MHz	43.2 dBm	43.00	0.0 dB

Passive IM Response

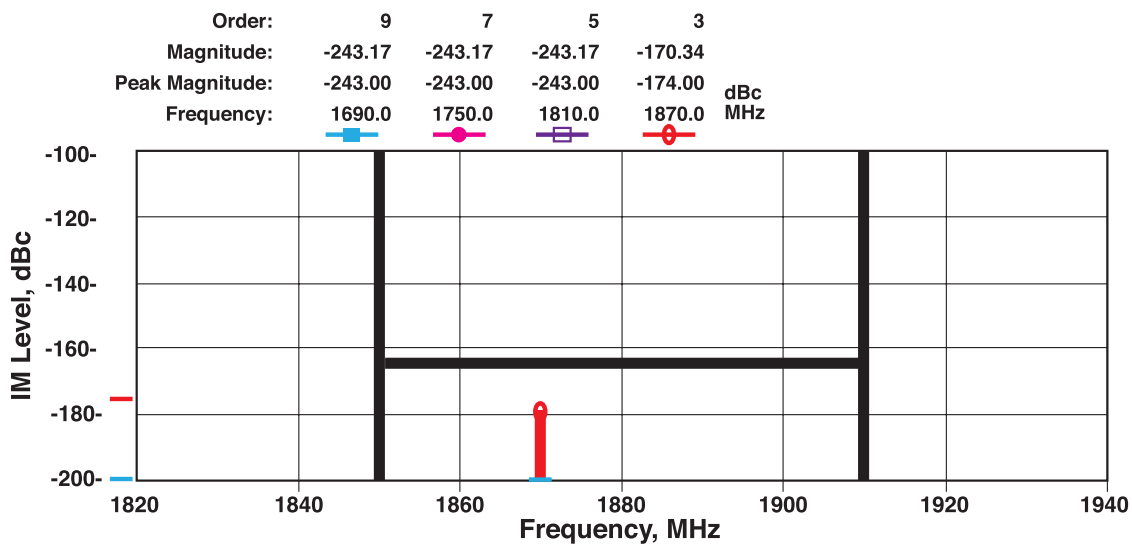


Figure 5. The Times Microwave Systems low-PIM-distortion line of lightning protectors for PIM-sensitive applications measures has a measured PIM value as low as -174 dBc with a specified minimum value of -160 dBc.

following practices:

- Proper selection of RF protection circuit topology using PIM-friendly components.
- Materials and plating techniques ensuring minimum, if any, dissimilar galvanic junctions.
- Materials utilized in protector design and assembly should be free of any roughness.
- Use of materials with magnetic properties should be avoided in protector design.
- Plating of internal components for RF-protection circuits should be carefully controlled.
- Final inspection and testing must consist of PIM sweeps in both dynamic and rest conditions.
- Every RF lightning protector for

PIM-sensitive applications should be PIM-certified.

Proper connector torque, avoidance of dissimilar metals (galvanic junctions) and weatherproofing components used outdoors will yield stable, long-term performance for a wireless site.

In addition, ensuring clean installation of any in-line RF components, including a lightning protector, is critical to overall system performance. Proper connector torque, avoidance of dissimilar metals (galvanic junctions) and weatherproofing components used outdoors will yield stable, long-term performance for a wireless site. Site maintenance and periodic checks of RF system interconnecting cables and connectors is critical to eliminating PIM distortion problems over the long run. PIM testing requires high-quality PIM test components, including test leads, adapters and loads. ■

Bogdan “Bogey” Klobassa is director of protection technologies at Times Microwave Systems. His email address is bogdan.klobassa@timesmicro.com.



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U.S. government actions

Federal Tower Siting Law and Regulation

Antenna collocation, the shot clock, access to federal facilities for antenna site development, environmental notification for tower construction that requires FCC approval, and whether distributed antenna system (DAS) networks are wireless providers all have seen recent U.S. government action.

From a presentation by Russell H. Fox

On March 9, Russell H. Fox, a member of the Mintz Levin law firm in the firm's Washington office, spoke to an audience at the AGL Regional Conference conducted at the Philadelphia Airport Marriott hotel. These are some remarks from his presentation, "Recent Developments in Federal Tower Siting Law and Regulation," edited for length and style.

Congress passed the Middle Class Tax Relief and Job Creation Act in February and the president signed it on Feb. 22.

Specific to tower siting, a basic provision of the legislation says that state and local governments can't deny and must approve requests by — and here's the key — any eligible facility to modify an existing wireless tower or base station that doesn't involve a substantial change in the physical dimension of the tower.

Questions: What's an eligible facility? What is an existing tower or base station? What does it mean when there is no substantial change in the tower?

The definition of eligible facility is in the act. An eligible facility is anything that involves collocation, anything that involves removal or anything that involves replacing existing equipment.

How this plays out depends on who collocation is intended to benefit. If it is intended to benefit tower owners or managers, then it might help you to place more carriers or tenants on the site. If it is supposed to help people who are already there — carriers, for example — it may help carriers in the long run. That's something that will

play out as courts and others interpret this.

Let's take a look at some of these other things that courts and others will interpret.

It is not as clear what is considered an existing wireless tower or base station — for example, whether an existing wireless tower is a broadcast tower.

Tower Siting Legislation

- Basic provision
 - State and local governments may not deny and shall approve requests by "any eligible facilities" to modify an "existing wireless tower or base station" that does not involve "substantial" change in physical dimension
- Definition of eligible facilities – request that involves at least one of the following:
 - Collocation of new transmission equipment
 - Removal of transmission equipment
 - Replacement of transmission equipment
- Does not supersede NHPA or NEPA
- Does not eliminate need for making requests
- Therefore, three components:
 - Eligible facilities
 - Existing tower or base station
 - No substantial change

Broadcast is wireless, right? There is nothing in the legislation that defines what kind of wireless it has to be to be considered a wireless tower.

Some towers have a combination of broadcast and wireless or wireless and something else on them. Is that wireless, or not? What if it is just a tower today and it could have wireless and could have something else in the future? It is not clear if that is a wireless tower.

And who makes the decision? There are going to be state codes or municipal codes that say, if it looks like this, it's a wireless tower. If it looks like that, it's not a wireless tower.

The legislation talks about base stations and wireless towers. It is not clear what distinction the legislation intended to draw between the two. A base station is something that is located in the building or on the ground. If Congress intended to promote collocation, were they really talking about base stations or were they talking about antennas?

Substantial change

Nothing in the legislation defines substantial change, but there is some related wording in work that the FCC has already done involving the National Historic Preservation Act, the National Environmental Protection Act and the Programmatic Agreement. They have wording that says what a substantial change is. It is not clear whether the courts would adopt the FCC's definition of a substantial change or if it would make its own definition.

The FCC says a substantial change is one that makes a structure 10 percent or more higher or 20 feet or more wider. Adding more than four equipment cabinets or one new equipment shelter is considered to be a substantial change. Excavation is considered to be a substantial change.

Site developers are likely to try to take advantage of this legislation and,

potentially, state and local governments will push back, and it may wind up in court. Definitions might be adopted by courts, or the FCC may step in and interpret what Congress had in mind. The FCC did that in the shot clock rules that they adopted because the legislation itself was vague.

Federal facilities

Another provision in the legislation allows — but doesn't require — federal agencies to allow an easement or right of way for wireless service equipment. The General Services Administration needs to develop the permission forms for this. They are allowed to charge you a fee for the right of way or the easement, so they must develop a fee structure.

It is hard to say what the effect will be because the agencies are not required to take this action. Presumably, they could act today if they wanted to, to let you have an easement or right of way. Maybe this provision will encourage more of that.

By April 22, the General Services Administration is required to provide master contracts for deals to put wireless service facilities on federal buildings and federal structures.

Any publicly accessible federal building would be eligible unless the GSA determines that it is not appropriate for reasons such as it is not big enough or not structurally sound enough for an antenna.

It is difficult to determine the effect of this measure until the forms are developed and we see what kind of information they require and how responsive the federal agencies are in making their facilities available. You may have to bring some federal agencies to court before they let you use their buildings and structures.

Shot clock

The U.S. Fifth Circuit Court of
(continued on page 32)



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U.S. government actions

Federal Facilities Legislation

- Basic provision – easements and rights of way
 - Allows (but does not require) federal agencies that “control” buildings or property to permit third parties to have an easement or right of way to install, construct or maintain “wireless service antenna structures and equipment and backhaul transmission equipment”
- Process
 - GSA to develop common application form
 - GSA to develop fee structure, but has the ability to waive the fee in the interest of expanding wireless broadband coverage
 - Fees may be used by agencies to cover costs of granting easement or rights of way
- Impact
 - Likely minimal, because federal agencies are not mandated to take action (other than to develop forms)

(continued from page 29)

Appeals upheld the FCC’s shot clock declaratory ruling that implements a provision of the Communications Act that prohibits state and local govern-

ments from discriminating against or between competing services. They can’t act in a way that effectively prohibits *any* wireless facility from being placed in their town. If they are going to

turn down your application, they have to turn it down in writing; they can’t just send you home. They can’t make any decisions based on radio frequency exposure to the extent that the area already is covered by federal law. And the shot clock establishes appeals rights so that if your application is turned down, there is a pathway to the courts to get that addressed.

The FCC chose to issue its declaratory ruling because the law requires state and local governments to act on site requests “within a reasonable period of time,” which is remarkably vague. CTIA asked the FCC for some clarification of a reasonable period of time. It asked the FCC for a variety of other relief, too, but in response, what the FCC said was, a reasonable period of time is 90 days for a collocation request and 150 days to act on any other type of site request.

State and local governments could rebut the 90- and 150-day periods in









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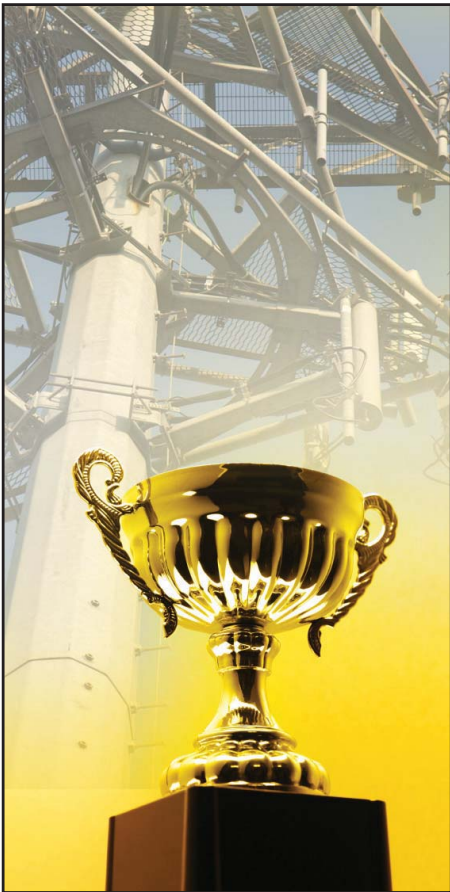
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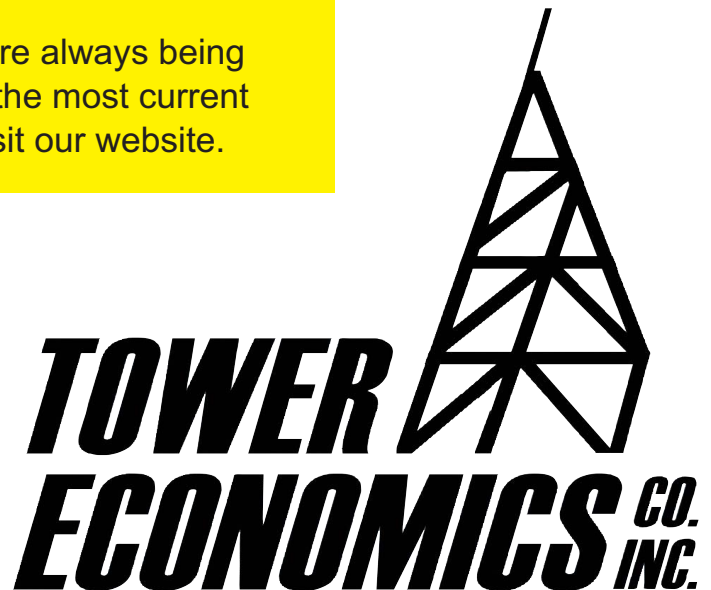
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len@towereconomics.com

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Director, Administrative Operations
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U.S. government actions

terms of “reasonableness.” If local governments don’t act within the 90- and 150-day periods, that is tantamount to failure to act. A failure to act gives rise to rights under the legislation, including the rights of the applicant to go to court. But the state and local governments could toll that — stop the shot clock — if they tell the applicant within 30 days that the application is incomplete and if they ask for more information. The clock

wouldn’t start again until the applicant gives them that information.

All of this was challenged by the City of San Antonio. It said the FCC is impinging on state and local rights. It said the FCC can’t do it in the first place, and in the second place, the 90-and 150-day periods are too short.

The court decided that the FCC does have the authority to implement the Communications Act provision that



Photography by Don Bishop

Russell H. Fox: “The City of San Antonio said the FCC is horning in on state and local rights.”

mentions a reasonable period of time. It said that interpreting the Communications Act is the FCC’s job. The court said that the FCC acted reasonably in determining that a reasonable period of time is 90 days on the one hand and 150 days on the other hand, but that this is not carte blanche or automatic.

Presumption of reasonableness

If the state or local government doesn’t act within the 90 or 150 days, that is not the end of the story; it is the beginning. The state or local government then could explain why. Once they introduce some reasons and evidence as to why in their case 90 or 150 days isn’t reasonable, then the court must decide whether the state is right and the application should have taken more than 90 or 150 days to process or whether the carrier or the site owner or whoever else is on the other side of the lawsuit is right and that the state or local government should have to adhere to what is the federal presumption of reasonableness: 90 or 150 days.

The court decision gives the matter clarity. State and local governments will, presumably, try to adhere more carefully to the 90- and 150-day rule. But it is not necessarily the end of the story. When they get to court, they have the opportunity to explain why their position is correct.

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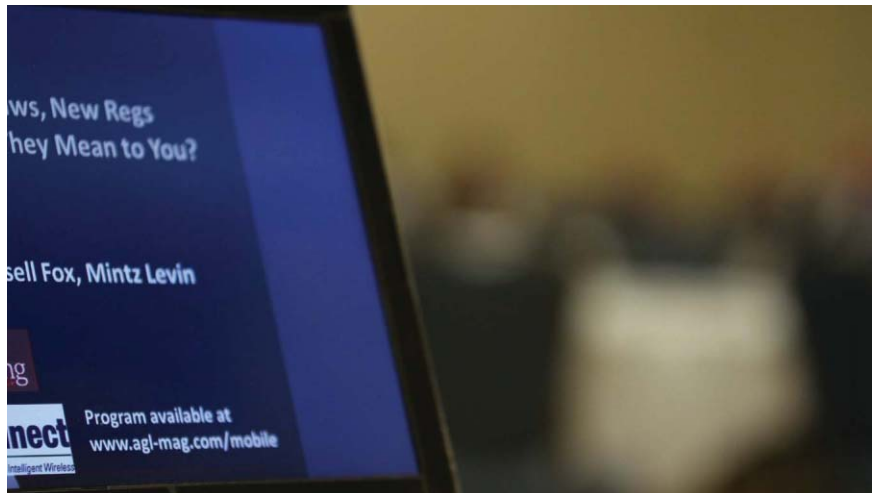
Photo Courtesy of Stuart Goettsch, Waller Communications

U.S. government actions

NEPA and tower authorizations

In December, the FCC issued an order on remand about the National Environmental Protection Act that requires the FCC to consider environmental impacts when it authorizes towers. The order stems from a lawsuit against the FCC that said the FCC should adopt rules that take into consideration the effect towers have on the mortality of migratory birds that fly along the Gulf Coast. The FCC wanted to defer the matter because of a pending proceeding involving migratory birds. But a federal court ordered the FCC to deal with it now.

Thus, in December, the FCC issued an order that created a pre-application notification procedure that involves both national notification through the FCC and local notification for public comment on NEPA-triggered towers. As an additional interim measure, the FCC said applicants would have to submit an environmental assessment for any tower



over 450 feet tall.

Those rules are not yet in effect, pending publication in the *Federal Register* and subsequent approval by the Office of Management and Budget for data collection purposes.

In the meantime, the rules have been challenged. The challengers say 450 feet is the wrong number; it should be

350 feet, there should be a safe harbor — anything 350 feet and below should not necessarily trigger the need for an environmental assessment. The petition for reconsideration also said local notification is unnecessary and there should be a shot clock rule for these types of NEPA-related proceedings, as there is for other local zoning rules.

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That petition for reconsideration remains pending and the FCC is interested in receiving comments about it.

Distributed antenna systems

FCC action is pending that involves distributed antenna system (DAS) networks and that stems from NextG Networks litigation with the City of Scottsdale, Ariz. Scottsdale wanted to call NextG a wireless provider because, if you look at what a DAS network is, and didn't know any better, you might say that what NextG has is what T-Mobile or AT&T or Verizon has — a transmission system that serves customers. A DAS network looks a lot like that.

Thus, Scottsdale wanted to tax NextG as a wireless provider. NextG said, "No, we're not a wireless provider; we're just a telecommunications provider. We're essentially a dumb pipe. All we do is take the carrier-directed traffic and move it along our system. Thus, you should treat us not like a wireless provider but as a telecommunications service provider."

There are different regulatory benefits and detriments that go along with being a wireless provider or a telecommunications provider. One benefit is that the federal government does not allow states to regulate wireless providers, although there are many federal regulations to which wireless providers must adhere, including reporting revenue and paying Universal Service Fund fees.

On the other hand, telecommunications service providers are regulated by the states, but they obtain access to rights of way and other beneficial treatment that are attractive to companies like NextG.

Thus, whether NextG gets regulated as a wireless provider or simply as what I'll call a dumb-pipe telecommunications service provider is meaningful. That issue is before the FCC. The deadline for submitting comments is April 1 and reply comments are due May 2. ■

The next AGL Regional Conference is set for June 22 in Overland Park, Kan., collocated with and produced in collaboration with the MoKan Wireless Trade Show. For information, visit www.agl-mag.com/events and www.mokanwireless.org. Russell H. Fox's email address is rfox@mintz.com.

backhaul

Backhaul Tsunami: Utility Communications Brace for Big Data

With the right approach, the utility smart grid data deluge can be more than just something to survive; it can be a force to drive reliability and efficiency and to unlock benefits never before anticipated.

By Ashish Singh

Electric utilities have long depended on a robust backhaul network to carry their mission-critical operational data over hundreds of miles of diverse countryside. Today, with the introduction of smart grid elements such as advanced metering infrastructure and advanced distribution automation and outage management applications, the reliance on increasingly robust and cost-effective networks has only grown. Networks once built for high-capacity and low-latency broadband connectivity must now also bring data from the smart grid access networks back to the enterprise. Consequently, backhaul networks now may include both wired and wireless point-to-point and point-to-multipoint broadband, cellular, satellite, fiber and microwave systems, with a wider range of latency and bandwidth to accommodate the surge in data and response needs.

Smart meters feeding the wave

By the end of 2010, U.S. utilities had installed and activated more than 20 million smart meters. Some estimate as many as 51 million meters will be deployed by the end of 2012, as indicated in the “2012 Smart Grid Executive Survey” from Zpryme Research

and Consulting, published in July 2011 (visit www.smartgridresearch.org). Monitoring outgoing and incoming smart grid data flows — whether for substations, end-customer meters, or multiple element managers — demands

Networks once built for high-capacity and low-latency broadband connectivity must now also bring data from the smart grid access networks back to the enterprise.

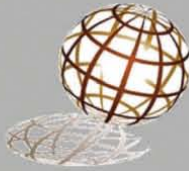
responsive, real-time, end-to-end network monitoring, often from a patchwork of communications technologies and vendors.

Today’s utilities face a daunting task to monitor the performance of this complex multinetwork system and to ensure networks are delivering to the promised data and service level standards. However, utilities also have

a new opportunity to leverage their high-speed communications networks for a variety of additional applications. Utilities have long wished for automation, real-time monitoring and remote control of system elements such as primary and secondary substations, power lines, capacitor banks, feeder switches, fault indicators and other physical facilities. As this movement toward a smarter grid continues, it is critical that utilities have a robust backhaul communications network to serve as the backbone for all smart grid access networks.

Beyond metering

Utilities are spending enormous time and resources building advanced metering infrastructure (AMI) networks. Increasingly, they are realizing the need to prepare for what comes after the networks are deployed. Utilities are discovering that properly designed two-way wireless backhaul networks are the great enablers of the connected utility of the future. They can provide not only monitoring but also active demand management (for example, by pushing demand response messages). The move to packet-switched technologies (IP, UDP and TCP/IP) from circuit-



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<p>Lone Star Wireless, LLC</p> <p>has sold 500 Spectrum Licenses for most of Texas to</p> <p>SMARTCOMM License Acquisitions, LLC</p> <p>Milestone Media, LLC</p>	<p>MidAmerica Towers, Inc.</p> <p>has sold 3 towers in the Metro Chicago area to</p> <p>GTP</p> <p>Milestone Media, LLC</p>	<p>New Horizon Towers, Inc.</p> <p>has entered into a management agreement for its 48 towers in Texas, Louisiana, & Texas with</p> <p>GTP</p> <p>Milestone Media, LLC</p>	<p>MAUNA TOWERS, LLC</p> <p>has sold its tower site at Breckenridge Mountains, Colorado to</p> <p>SUBcarrier COMMUNICATIONS</p> <p>Milestone Media, LLC</p>	<p>California Sierra Tower Company</p> <p>has sold a communications tower in Palm Springs, CA to</p> <p>HORIZON TOWER, LLC</p> <p>Milestone Media, LLC</p>	<p>PMNI</p> <p>has sold its White Rock and Sourdough tower sites in Pennsylvania to</p> <p>SUBcarrier COMMUNICATIONS</p> <p>Milestone Media, LLC</p>	<p>Dayfield Communications, Inc.</p> <p>has sold its tower site in Springfield, MO to</p> <p>GTP</p> <p>Milestone Media, LLC</p>
<p>VRE TOWERS, LLC</p> <p>has sold 3 mountain-top tower sites in Colorado to</p> <p>MILESTONE MEDIA, LLC</p> <p>Milestone Media, LLC</p>	<p>NEWSWEB CORPORATION</p> <p>CHANNEL 20 TV COMPANY, LLC</p> <p>has sold its tower site in Colorado to</p> <p>MAUNA TOWERS, LLC</p> <p>Milestone Media, LLC</p>	<p>COMMUNICATIONS TOWERS, INC</p> <p>has sold its tower site in Brevard County, Florida to</p> <p>GTP</p> <p>Milestone Media, LLC</p>	<p>CSB CHEYENNE STATE BANK</p> <p>retained</p> <p>MILESTONE MEDIA, LLC</p> <p>to provide valuation services</p> <p>Milestone Media, LLC</p>	<p>WVJT, LLC</p> <p>has sold its tower site in Clifton Forge, Virginia to</p> <p>GTP</p> <p>Milestone Media, LLC</p>	<p>BE TOWERS, LLC</p> <p>has sold its tower sites in Larkin, Kansas to</p> <p>MAUNA TOWERS, LLC</p> <p>Milestone Media, LLC</p>	<p>LANCER TOWERS OF TEXAS</p> <p>has sold its tower site in Corona, Texas to</p> <p>GTP</p> <p>Milestone Media, LLC</p>
<p>ROCK SPRINGS NATIONAL BANK</p> <p>retained</p> <p>MILESTONE MEDIA, LLC</p> <p>to provide valuation services</p> <p>Milestone Media, LLC</p>	<p>Communications, Inc</p> <p>has sold its tower site on Copper Mt in Wyoming to</p> <p>MAUNA TOWERS, LLC</p> <p>Milestone Media, LLC</p>	<p>JDS Systems</p> <p>has sold its tower site in Orange City, Florida to</p> <p>SUBcarrier COMMUNICATIONS</p> <p>Milestone Media, LLC</p>	<p>Kit Carson County Colorado</p> <p>has sold a tower site to</p> <p>MAUNA TOWERS, LLC</p> <p>Milestone Media, LLC</p>	<p>MAUNA TOWERS, LLC</p> <p>has sold its tower sites in West, Breckenridge, & Red Feather Lakes, Colorado to</p> <p>GTP</p> <p>Milestone Media, LLC</p>	<p>Jim Fakas</p> <p>has sold a tower site in Kona, HI to</p> <p>MAUNA TOWERS, LLC</p> <p>Milestone Media, LLC</p>	<p>BE TOWERS, LLC</p> <p>has sold 3 tower sites in Southern Colorado to</p> <p>SUBcarrier COMMUNICATIONS</p> <p>Milestone Media, LLC</p>
<p>MILESTONE MEDIA, LLC</p> <p>retained</p> <p>MILESTONE MEDIA, LLC</p> <p>to provide valuation services</p> <p>Milestone Media, LLC</p>	<p>High Bar, LLC</p> <p>has sold its tower site in American Fork, Utah to</p> <p>GTP</p> <p>Milestone Media, LLC</p>	<p>Steve Bartholomew</p> <p>has sold his tower site in Walsenburg, Colorado to</p> <p>SUBcarrier COMMUNICATIONS</p> <p>Milestone Media, LLC</p>	<p>THE FOSTER CHARITABLE FOUNDATION</p> <p>retained</p> <p>MILESTONE MEDIA, LLC</p> <p>to provide valuation services</p> <p>Milestone Media, LLC</p>	<p>Lincoln County Colorado</p> <p>has sold a tower site to</p> <p>MAUNA TOWERS, LLC</p> <p>Milestone Media, LLC</p>	<p>HPRM</p> <p>has sold its tower site in Loveland, Texas to</p> <p>GTP</p> <p>Milestone Media, LLC</p>	<p>COWBOY COMMUNICATIONS</p> <p>has sold its tower site on Pathfork Mt. in Wyoming to</p> <p>MAUNA TOWERS, LLC</p> <p>Milestone Media, LLC</p>

backhaul

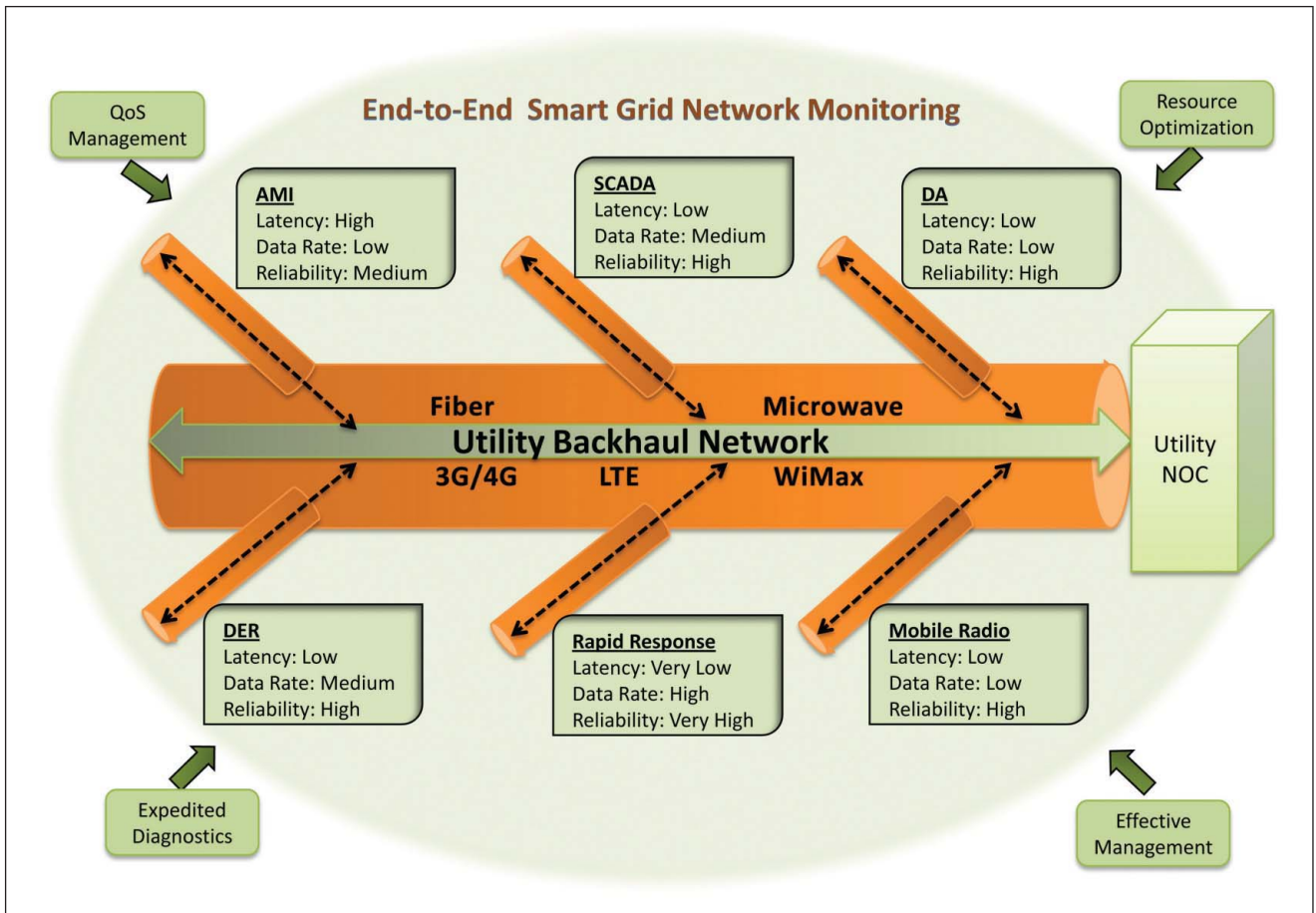


Figure 1. Real-time monitoring of multiple, disparate applications and systems requires new insights that are coming into the energy arena from the telecommunications world to monitor the end-to-end smart grid network.

switched technologies (TDM) for the utility mobile radio networks will also affect the backbone communication design. Lastly, there is an aggressive

monitor remote facilities around the clock with applications such as SCADA and video surveillance. The result is not only fewer and shorter disruptions, but also significantly improved management of power quality. These wireless communications networks will make it easier to add new distributed energy resources (such as solar and wind power) to the grid as they become available.

Utility latency requirements

Unlike most other enterprise data networks, support for geographically dispersed utility applications represents one of the most challenging aspects of utility backhaul network planning and management. Latency requirements for smart grid and other utility applications can vary signifi-

cantly, from less than 10 milliseconds for teleprotection, to about 20 milliseconds for some synchrophasor application, to 100 to 200 milliseconds for most smart grid supervisory control and data acquisition (SCADA) and voice-over Internet protocol (VoIP) applications, and up to several seconds for smart metering and other applications.

To meet new smart grid data requirements as their backhaul networks grow exponentially, utilities will not only face operational expense challenges, they will also face new quality of service (QoS) challenges beyond just performing automated meter reads.

Too many silos

As smart grid evolves to include new services on this network infrastructure, it will increase the network complexity, bandwidth demands and

Unlike most other enterprise data networks, support for geographically dispersed utility applications represents one of the most challenging aspects of utility backhaul network planning and management.

movement to retire proprietary SCADA protocols and replace them with DNP3 or IEC 61850 with Ethernet interfaces and TCP/IP backhaul.

These advancements all require more base stations, a high-speed backbone or both. Until recently, the major deterrent had been cost. Now, with affordable point-to-point microwave and the cost of using public cellular networks steadily decreasing, utilities can

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performance sensitivity. The multi-vendor, multidevice communications networks deployed by utilities will generate thousands of daily alarms from network devices. However, alarm correlation techniques to help determine root causes of faults across multiple networks (such as microwave, SDH and cellular) are absent, thereby delaying fault rectification. Traditional element and network management solutions often do not allow network ad-

ministrators to keep pace with the size and complexity of smart grid networks.

Today, network changes (such as fault corrections, new activations, reconfigurations and expansions) are often performed in silos without common coordination, resulting in unnecessary costs and service interruptions. Insufficient information on how networks are used and uncertainty about how planned changes will affect networks and grid applications

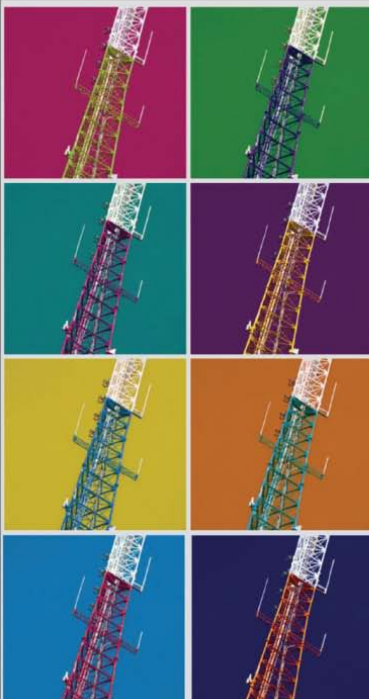
make network planning difficult and sometimes incomplete. The need to maintain multiple maintenance teams of engineers without a unified network management system hampers quick fault detection and has an adverse effect on operational efficiency.

The “network of networks”

To keep pace with communications performance and to unlock the value of data flooding in from disparate systems, utilities need a way to manage multiple networks simultaneously in real-time.

By leveraging network monitoring solutions across multiple networks, utilities could improve operational efficiency and ensure optimal network resource utilization, effectively lowering the total cost of ownership of all the communications assets in which they have invested. Centralized

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management capabilities will allow communication network operators to be proactive in detecting service-deteriorating problems and fixing these problems before they affect service.

The latest solutions entering the marketplace for utilities address these concerns with an end-to-end solution providing a central repository to record physical and logical network resources

and the interdependencies between them and the services running over the network. They tend to include tools to support the identification of service-level impacts from communication network changes and assist in business processes, such as network planning and service fulfillment (see Figure 1).

Cross-industry influences

In some ways, the new approach to managing communication networks mirrors the way utilities have always monitored the flow of electrons. The essence of this — real-time monitoring of multiple, disparate applications and systems — requires new insights that are coming into the energy arena from the telecommunications world. One important innovation derives from the ways in which telecom operators address the excessive operational issues inherent in managing different network platforms.

For example, a particularly common problem is the steep cumulative costs associated with training human resources to manage multiple networks across multiple platforms. It is very difficult to locate failures across multiple network management platforms without both end-to-end provisioning and unified performance-monitoring mechanisms. Troubleshooting becomes extremely complex and requires high back-end integration costs.

A new category of solutions

In 2012, a centralized communications networks monitoring sgMOM system was introduced by GridMaven Utility Solutions, a subsidiary of SK Telecom. The GridMaven Network Manager tool provides a complete end-to-end view of the multinet system and monitors fault and performance data from different network elements. It exemplifies a new category of solutions to address the complex communications needs of the U.S. utility market.

Starting from the core backhaul and moving out to the edge network endpoints, the centralized network “manager-of-managers” approach empowers the utility’s network operations to establish strategic demarcation groups that can quickly identify and isolate

problems. By continually monitoring critical key performance indicators (such as availability, packet loss, latency and bandwidth usage), operators can set thresholds and alarms to alert them to potential service degradations. This feature addresses a critical need, giving providers actionable information to significantly improve mean time to repair (MTTR), reduce trouble tickets and provide more effective and efficient customer care.

A relevant platform requires leveraging years of R&D investment into optimizing multinet management technologies. It needs to include multinet correlation and end-to-end smart grid policy-based network management capabilities.

Utilities require a tool with the sophistication to a deliver 24/7 network and service performance assurance and optimized service troubleshooting capabilities. They need a platform to

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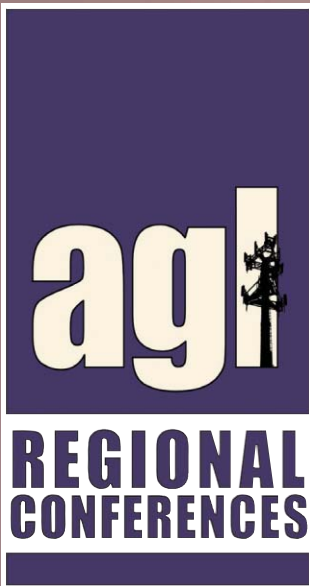
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provide a historical reporting engine that allows the operators to identify the performance degradations and to perform trend and comparison reporting. Ideally, a centralized network manager would deliver a performance-tracking module to support network capacity planning and proactive network performance-based lining to ensure that new smart grid-ready services can be properly supported as the connected utility becomes a reality.

Unlocking the benefits

In the coming smart grid era, “manager-of-managers” tools will equip utility network operators to perform the complex tasks they increasingly

Whether operators need to perform a quick network diagnostic, develop a detailed backhaul network upgrade, or validate an existing network SLA and QoS metrics, they will need the centralized network manager approach to fully execute these plans.

require. Whether operators need to perform a quick network diagnostic, develop a detailed backhaul network upgrade, or validate an existing network SLA and QoS metrics, they will need the centralized network manager approach to fully execute these plans. This approach benefits the operators in the following ways:

- Meets QoS expectations through end-to-end service visibility
- Optimizes network resources to improve performance and quality
- Cuts network operating costs
- Supports network planning process to roll out more smart grid network services

- Expedites smart grid network diagnostics

One of the key visions of the smart grid is to optimize asset utilization and operational efficiency. The availability of centralized grid communication intelligence will give management, planners and engineers the knowledge to build what is needed when it is needed, extend the life of assets, repair equipment before it fails unexpectedly and more effectively manage the communications

network that maintains the grid. With the right approach, the utility smart grid data deluge can be more than just something to survive; it can be a force to drive reliability and efficiency and to unlock benefits never before anticipated. ■

Ashish Singh is with GridMaven, a division of SK Telecom Americas. He has 19 years of diverse experience in the communications technology industry that includes in-depth market, product and technical insight into mobile carrier networks and cloud architecture. His email address is asingh@gridmaven.com.

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About: Copper Theft



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Clark P., San Antonio — Copper theft is still a daily occurrence for me. This week, 13 sites in San Antonio. What methods of deterrence have been successful at preventing copper theft attempts in

other regions of the United States?

Moderator's note: *Copper theft can carry a federal charge (18 USC 1362) of damaging a transmitting facility with up to 10 years in prison and a \$250,000 fine.*

Gary Wilson, Dailey Resources, Dallas/Ft. Worth — You would think with copper you could come up with a simple shorting alarm when touched that could be alarmed with loud noises to continue for several minutes, but does anybody even pay attention to loud noises anymore? It would probably require sirens and red lights at least.



Clark P., San Antonio — I don't believe that a simple loud noise is a sufficient deterrent. Many sites offer enough isolation and privacy that a siren wouldn't provide a solid deterrent. Some have ex-

perimented with video cameras, which have not been very effective either. I've watched video of vandals doing thousands of dollars in damage with no concern for cameras that were watching them.

Gary Wilson — True on video cameras, even inside large buildings they don't seem to be any deterrent. I guess the question then is what would be a deterrent because it

isn't reasonable to expect someone to arrive in time to stop it. It would seem only making the access impossible could have the desired result.

Tim Gasser, project manager for wireless collocation at Puget Sound Energy, Seattle

— Our utility has had some success with setting alarmed bait. A partial reel of wire is rigged to send a silent alarm. I'm not sure, but I believe it goes directly to the local law enforcement station. It hasn't stopped copper theft but has led to an increased rate of catching thieves in the act.

I had planned on including a session on theft protection at the upcoming UtiliSite Joint Use and Wireless Collocation conference, as this is a problem both utility companies and wireless carriers face, but ran out of available sessions. Maybe next year.

Anthony Peyton, principal at T.I.M.E., Hays, Kan.

— Towersentry.com/Opto22 or even an ITL Mon930 could easily adapt your tower lighting, generator monitor, levels monitor and dry contact pin pairs in your monitor/controller to monitor several motion detectors. Your monitor service would then call the local police. Video over IP is also available from HughesNet satellite. If you have to have a 24/7 monitor company and equipment, you could install it yourself. Most tower lighting monitor systems/companies will do dry contact motion detector monitoring and police calls; however, the way security systems companies are licensed by the state, the liability of the tower light monitor company is reduced. Security systems like ADT have in place the state licensure and can easily adapt motion detectors placed in a protected grid anywhere, as well as video over IP.



site security

Gabriel G., regional sales manager — Interesting topic. Last year in Texas, there were some proposed bills to deter copper theft, but like any law, they have loopholes.

Per state law enforcement statistics:

90% of metal theft is related to HVAC, which is regulated property and requires bills of sale to prove ownership.



Communication wire is regulated with bill of sale requirements as well.

Only 15% of recyclers are registered with the state, which SB 694 addresses to make it a crime not to register. HB1933 is silent on this issue.

Pictures of material, vehicles, and sellers and valid IDs are required in SB694 and not addressed in HB1933.

Jeffrey R., Orange County, Calif. — We have designed shrouds and encasements to restrict access to copper. Most carriers do not want to pay for this modification. They would rather pay for the fix.

Finley Willis, owner, FWJR Communications, Lexington, Ky. — I manage my own two towers and do some

part-time law enforcement work in Kentucky. Recently, a Kentucky tower worker was assaulted when he discovered two men dumping some copper-theft waste. The two men may have been from Texas, and I'm trying to track them down. If you have any information that might help establish a pattern of operation by the people involved, please send it to me at fwjr@earthlink.net, subject: copper theft. We suspect that the culprits know a lot about towers and radio-TV operations, and may be past or present members of active tower crews.

Stephen Costelli, site supervisor, American Tower, John's Island, S.C. — I manage 200 towers in South Carolina and Georgia.



I have been placing 24-hour video surveillance signs on the compounds and that seems to have slowed the thefts down and stopped the thieves from coming back to

the sites to get the rest of the copper that they did not get on the first visits.

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John Celentano, strategic marketing, Tessco Technologies, Baltimore, Md. —

Thought you all might be interested in what Tessco has done recently to address this problem. We've devel-

oped what we call the ground test remote monitor (GTRM). The GTRM continuously monitors the integrity and continuity of the site grounding system. When that integrity is somehow compromised, whether through lightning strike or copper theft, an alert is sent to the NOC or an email is sent to a designated smartphone, so you know right away that something has changed, and you will be given enough information to determine the appropriate next steps.

We produced a short video to explain how the GTRM works. Here is the link: www.youtube.com/watch?v=9ZvqEOqbrpk. Have a look and let me know what you think.

Tim Sawyer, principal, T.Z. Sawyer Technical Consultants — John, thanks for sharing the GTRM sensor information. I wonder how the system would work in a high-power RF environment — 50 kilowatts AM (540-

1600 kHz). A typical AM antenna ground system uses a ground plane consisting of 120 buried radial wires extending outward from the tower (like spokes on a wheel) for a distance of 200–300 feet.

Patrick Sanders, vice president of business development, Schrofftech, Spokane, Wash. — Thank you, John, I will go to the video link and check it out. Price range? Or does it show it on the video? Will you have it at CTIA?



John Celentano — Patrick, no, the GTRM is a product we developed. It is strictly an intelligent monitoring unit with up to five monitor points at customer-selected spots in the grounding system

as our video demonstrates (see the link to the video in my previous comment). It sits quietly in the background so an intruder won't know that it's there, but you will know that they are there as soon as they disturb the system.

It is listed on Tessco.com at \$525, but less than that even in small quantities. It's designed to be very cost-effective with a big ROI. Price is not shown in the video. Tessco will not be exhibiting at CTIA this year, but we will have

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staff at the show with conference/meeting facilities. If you are interested, we can show you a GTRM kit. Let me know when you would like to meet.

Christopher B. — Here's a new product beginning to catch on. www.allteccorp.com/resources/news/index.php?id=78



Jon S. — “If there’s a will, there’s a way.” Meth and heroin users are relentless.

The California market has sites with huge, industrial-grade locks on every cabinet and “tweakers” will still “snip” the exposed ground wires. They are using cordless reciprocating saws, bolt cutters and wire cutters.

I suggest spending the money to lock everything down with the “best.” Titanium?

Nick V. — For thermal bonds, you can coat the ground leads in tar or roofing sealer so the copper is much less appealing to potential thieves and at the very least will create a mess should they try to melt it later on. For critical sites

(first responder radio systems and other public safety agencies), we have seen electrified fencing installed behind a regular serpentine-topped fence. Although this is a costly approach, it does keep potential vandals at bay.



Reed Booth, Southeast regional site manager, Global Tower Partners, Atlanta — I’m seeing a lot of carriers coating the buss bars and ground leads with a very sticky, gooey substance similar to pine tar. It’s an incredible mess and will deter some thieves. Also, no need to go with the large



grounding bars — if it’s smaller, worth less and more difficult to take, it will slow down and deter some of the copper bandits. Anybody know exactly what they are using to coat the buss bars?

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Jonathan W. — An unfortunate reality is that it is usually an industry insider who is responsible for the theft. No matter what system is installed, if it's the installers or their acquaintances who are reallocating the copper, there is just not much to be done. Use of the additional, usually unused, alarm circuits at the site is the most effective deterrent.

Tim Sawyer — Reallocation of copper? Now, that made me smile.



Terry Super, P.E., principal at Selective Site Consultants, Kansas City, Mo. — Clark, for ground wire protection, we've been using conduit sleeves embedded in the earth and extending above grade to the final connection point.

For tower/ice bridge ground bars, we've developed a locking nut called SpiNut that could be used. It has a rotating sleeve around a keyed nut that requires a special socket for removal. Of course, if the thieves are using bolt cutters to take the bars, SpiNut probably won't work; but if they're dismantling, it may deter them.

SpiNut was originally designed for utility and communication tower protection — used as a replacement for the locking nut on anchor bolts (see www.spinut.com for a video demonstration) — but it could work just as well for other applications. It's patented and certified as DHS-qualified anti-terrorism technology.

Might be worth checking out.

Derek Barth, RF engineer III at Ericsson, Portland, Ore. — Before I left the utility, we were looking at using copper-clad steel or copperweld. This is not worth as much as copper to scrap, and it is tedious or impossible to decouple the copper. A sign should be visible marking the cabling as such. Another simple and effective strategy was to paint the bright orange copper a black or gray color. The shiny copper color is just too tempting to resist, I guess.



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site security

Sharon Allen, owner of Safety Solution Resources, Seattle — We were just at the NATE conference in San Antonio with our new security product, FutureSentry First Responder, that will prevent theft and other concerns addressed here. I'd be happy to send along information on this product or you can view the product here: <http://safetysolutionresources.com/equipment-a-workwear/product/2963-first-responder-by-futuresentry/category/pathway-58>. For more information, please email me at sharon@safetysolutionresources.com.



Chad McNeil, Canada and North America regional sales manager at FutureSentry, New York — Just joining the discussion a bit late, sorry. I was in San Antonio with a dealer

of ours attending the NATE conference. Your story is definitely shared by all. FutureSentry has a proven track record along with a white paper on deterring cell tower theft and liability concerns. FS deterred a would-be perpetrator in Virginia, and within two weeks, up to eight cell towers had

been hit. Not only is the cost of copper the concern, but the fact that the new YouTube sensation of kids climbing towers exposes a huge liability that in an uneventful mishap will cost the owner big dollars in lawsuits. Sharon Allen at www.safetysolutionresources.com can guide you as to how to acquire this FutureSentry system (Govies Platinum Award 2011 HomeLand Security & ASIS Accolades 2011) and explain how it works. A true crime-prevention tool, this is a prevention measure and makes the bad guys rethink what they are going to do and go away — it works.



John Celentano — Point of clarification: I was referring only to a proprietary design called the ground test remote monitor (GTRM) from Tesco's Ventev Innovations division. This

monitoring product is unique in terms of its role and performance, and overall cost-effectiveness. If you have not seen it already, check out the GTRM video. Here is the link: www.youtube.com/watch?v=9ZvqEOqbrpk. Feel free to contact me with any questions.

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Rick Hansen, CEO, APS Global, Washington, D.C. — Patrick, I think John C. is referring to a Future Sentry device. DMS has these (<http://www.dmsusa.net>) and they also have self-

contained pole-mounted and mobile wireless camera systems. Disclaimer: I work for them and am biased. There is a Future Sentry in service at a cell site in Virginia where they used to do live demos.

The device autonomously points one or multiple cameras toward movement and turns on a light. You can also engage two-way audio or sound an alarm. The FS convinces the intruder that a person is following their movements. If there are multiple intruders, the camera will switch between them, and it supports multiple cameras on a property.

Another solution is pole-mounted and mobile trailer systems with multiple cameras. These can have analytics that reduce false alarms and allow you to enjoy your dinner in peace. Two-way audio and sirens are also a fun way to discourage the intruder(s).



Chad McNeill — We at FutureSentry have a white paper on copper theft with info from a tower in the Virginia area that warded off a would-be thief and in a two-week period, eight towers in the surrounding areas were hit.

chad.mcneil@futuresentry.com.

Visit our *AGL* site on LinkedIn to join this conversation and many others. ■

Jim Fryer is president of Fryer's Tower Marketing and Media in Philadelphia. His email address is jim@fryermarketing.com.



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product showcase — backhaul



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Zhone Technologies' MXK chassis-based platform provides a high-density GPON optical line termination (OLT) solution with support for more than 9216 GPON subscribers using Class B+ or C optics. It supports industry-standard 2.5 Gbps downstream bandwidth and 1.25 Gbps upstream bandwidth. The active Ethernet line card has the ability to subtend other Ethernet-based products over 10/100/1000BT copper. It also provides 100Mb/1000Mb fiber-based services to end users. The 20 ports on the active Ethernet card can be individually configured to support these services by using different SFPs in each port. The MXK 19x GPON OLTs can support up to 512 ONTs in a single 1U platform via the use of an eight-port GPON card. The MXK-19x GPON OLT is designed to fit into remote cabinets and space-constrained central offices.

www.zhone.com

Pico Base Station with Integrated Backhaul Device

The **Airspan Networks** multistandard, LTE picocell eNodeB, known as AirSynergy, integrates high-capacity wireless backhaul to allow operators to economically deploy urban heterogeneous 4G networks and to create sustainable 4G broadband networks in rural areas. The compact, software-defined radio base station supports multiple radio access network standards and wireless backhaul simultaneously. The point-to-multipoint, non-line-of-sight backhaul solution supports relay.

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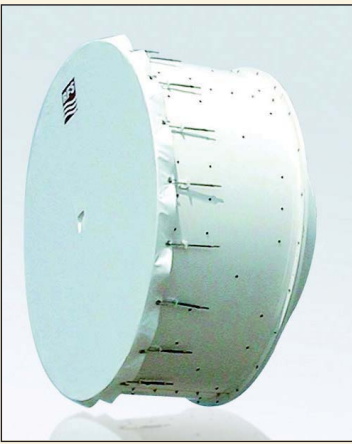




All-outdoor Packet Solution for 4G/LTE Backhaul

The latest member of the **Ceragon Networks** FibeAir IP-10 family, the FibeAir IP-10C, is a compact, all-outdoor, high-capacity wireless packet backhaul solution. This integrated, ultra-compact solution delivers up to 1 Gbps of IP traffic on a single radio channel. The low-power, environmentally sound solution is able to withstand harsh weather conditions and may be mounted on rooftops, lampposts, traffic light poles, and in small, outdoor mobile cell sites. Additional features include adaptive coding and modulation for increased spectrum usage and increased backhaul capacity.

www.ceragon.com



Ultra-wideband Microwave Antenna

Radio Frequency Systems' (RFS) quad-band, dual-polarized microwave antennas access the recently released 7-GHz spectrum to add capacity when needed. With a single antenna, users can switch among the four bands — unlicensed band (5.725 GHz to 5.85 GHz), the lower 6-GHz band (5.925 GHz to 6.425 GHz), the upper 6-GHz band (6.425 GHz to 6.875 GHz) and the 7-GHz band (6.875 GHz to 7.125 GHz) — to access additional spectrum. The unit operates like two antennas in one because multiple channels may be stacked on each polarization to increase capacity.

www.rfsworld.com



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product showcase — backhaul



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www.exaltcom.com

Mobile Backhaul over Wireless Radio

RAD USA's Airmux-200 and Airmux-400 are broadband wireless multiplexers for mobile backhaul over wireless radio, delivering unframed E1 or T1 and Fast Ethernet traffic with a total air interface throughput of 48 Mbps to 50 Mbps. The Airmux mobile backhaul wireless multiplexers ensure service availability by complying with

stringent latency, delay variation and clocking accuracy requirements for voice transmissions. The Airmux-200 and Airmux-400 support a range of up to 50 miles or 75 miles, respectively, between cellular base stations and their controllers.

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24-GHz License-exempt All-outdoor Microwave Backhaul System

The **Trango Systems** TrangoLINK Apex24UL all-outdoor wireless backhaul system is a point-to-point wireless backhaul system that uses the 24-GHz license-free spectrum band. The system utilizes 1024QAM modulation to enable throughput of 750 Mbps full duplex (1.5 Gbps aggregate) on a single channel. Additionally, channel assignments may be set from 10 megahertz to 60 megahertz, any modulation between QPSK & 1024QAM, and user-customized transmit/receive spacing. The system features a full Metro Ethernet Switch. Two GigE ports for traffic and in-band management support copper and fiber. Full 1+1 hot standby is also supported for a link where ring redundancy is not an option.

www.trangosystems.com



4G Backhaul

Horizon Compact+ from **Dragon-Wave** allows operators to address life cycle costs in three areas: spectrum utilization, capacity and location leasing costs. The all-outdoor system features cross-polarization interference cancellation technology, which doubles spectrum capability to as high as 2 Gbps. By integrating the modem and radio in the same outdoor system, Horizon Compact+ makes interior rack space available for other components and reduces rental expenditures.

www.dragonwaveinc.com

Packet Microwave Radio Platform

The **Redline Communications Group** licensed microwave product, the RDL-5000, operates in the 6-GHz to 38-GHz licensed bands. The platform is a component of Redline's wireless virtual fiber product line, bringing fiber-like network performance to areas where fiber installation is challenging or cost prohibitive. It delivers broadband connectivity wirelessly, with a wireless radio platform that delivers throughput of up to 800 Mbps. Using high power and high sensitivity, the radio can reach longer ranges at higher data speeds, while using smaller antennas.

www.rdlcom.com

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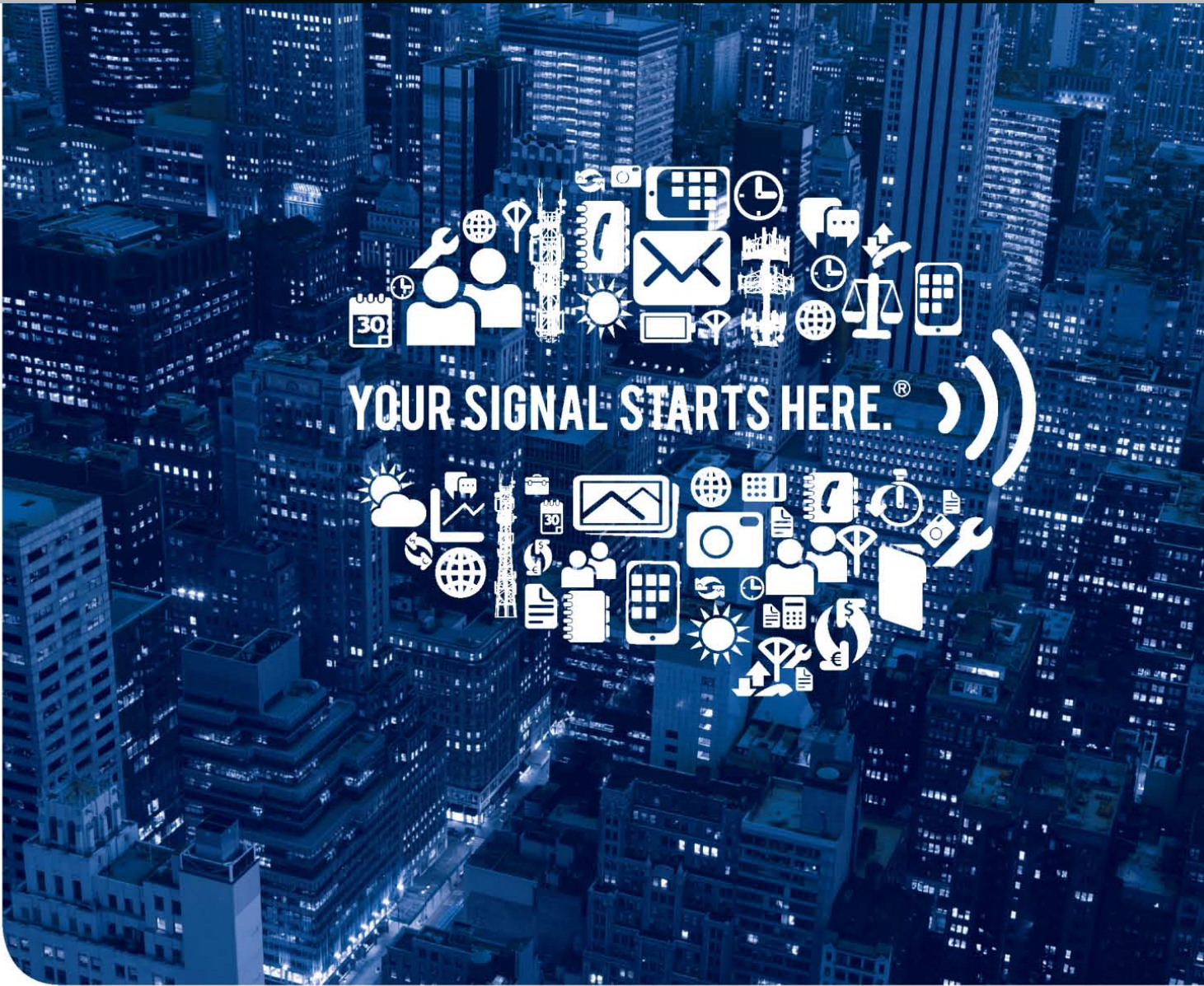


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