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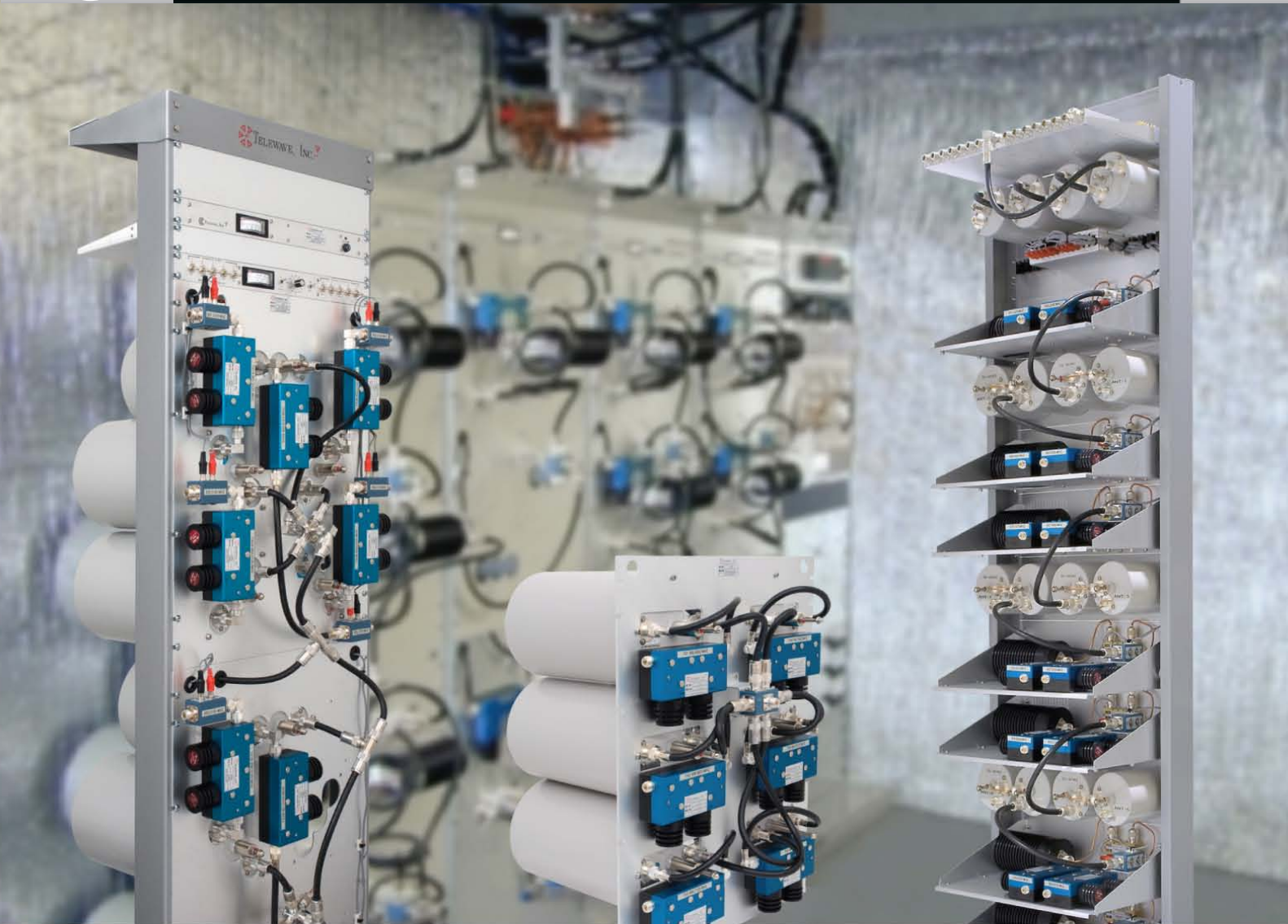
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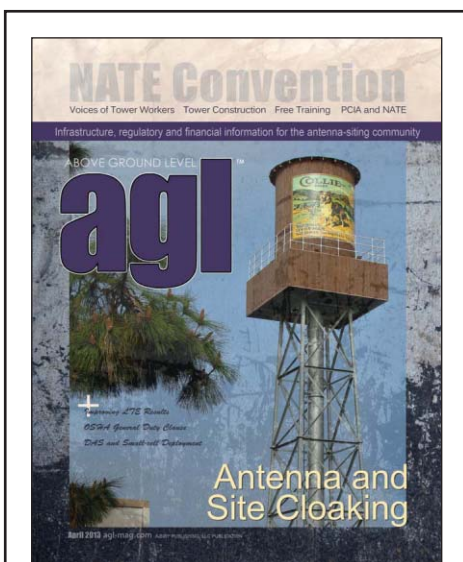
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54



on the cover

The photo from Stealth shows an 80-foot-tall, rustic, four-legged faux water tank with hand-painted artwork on top. See Ernest Worthman's article on page 42.

Cover design by Scott Dolash

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42



NATE Conference & Exposition Coverage

- 8 Voices of Tower Workers at the NATE Convention**
By Don Bishop
- 14 Western Iowa Tech Offers Free Tower-related Training**
By Don Bishop
- 18 Tower Construction Is Central to the Wireless Industry**
By Steve Largent
- 22 PCIA and NATE Missions Benefit Each Other's Members**
By Jonathan Adelstein

Features

- 34 Summit Covers Broad Swath of Wireless Infrastructure Industry**
By the AGL Staff
- 36 AGL Tower of the Month**
Photography courtesy of Valmont Pirod
- 38 OSHA General Duty Clause Holds Heavy Penalties for Unwary Employers**
By Mark A. Lies II
- 42 Antenna and Site Cloaking**
By Ernest Worthman
- 48 Improve LTE Results with Carbon-fiber Towers and Hybrid Renewable Power**
By Tom Andrews

Departments

- 4 Editorial Comment — Regulation — Good?**
By Don Bishop
- 6 Publisher's Note — Rare Moments**
By Richard P. Biby, P.E.
- 54 Questions and Answers — Deployment Promises Growth in a World of Small Cells and DAS**
- 58 Buyers Guide — Quick Guide to Tower Manufacturers**
- 66 Product Showcase — Site Camouflage and Concealment**
- 70 Advertiser Index and Professional Directory**

editorial comment

Regulation—Good?

In the wireless infrastructure industry, the view of regulation sometimes is a love-hate matter. You may love regulation that allows you to construct



antenna sites that you want to build and that makes it difficult for a competitor to do the same. You may hate regulation that poses too low of a barrier of entry to competitors, reducing the value of your assets, but you may hate it if it makes it too difficult for you

to obtain site or collocation approvals.

Maybe wireless communications carriers generally favor regulation that makes it easy for them to place network antennas where they need them for system capacity and coverage. Maybe tower companies prefer some higher level of restrictions that give their sites some exclusivity, providing support for antenna-space rental rates.

So it goes that an FCC action to define terms used in Section 6409(a) of the Middle Class Tax Relief and Job Creation Act of 2012, in which the federal government pre-empts some local regulation of antenna collocation, has its supporters and detractors.

The wireless infrastructure industry obtained what it wanted, which is some certainty in the interpretation and application of Section 6409(a). Local government entities lost what they wanted, which is the wiggle room to interpret Section 6409(a) on their own and perhaps avoid some loosening of their ability to decide whether local opposition to the placement of additional antennas on existing sites has merit.

As J. Sharpe Smith, the editor of the *AGL Bulletin* email newsletter, explained, the FCC published its answers to several of the most frequently asked questions about Section 6409(a).

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

Using the Nationwide Collocation Agreement with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers, the Commission defined the term “tower” as “any structure built for the sole or primary purpose of supporting FCC-licensed antennas and their associated facilities.” A “base station,” according to the FCC, consists of “radio transceivers, antennas, coaxial cable, a regular and backup power supply, and other associated electronics,” including small cells and DAS.

The FCC said a “substantial change in the physical dimensions” of a tower or base station, could be determined by a four-prong test, which was instituted in the Nationwide Collocation Agreement.

“Although Congress did not adopt the Commission’s terminology of ‘substantial increase in size’ in Section 6409(a), we believe that the policy reasons for excluding from Section 6409(a) collocations that substantially change the physical dimensions of a structure are closely analogous to those that animated the Commission in the Nationwide Collocation Agreement and subsequent proceedings,” the FCC said.

According to the Nationwide Collocation Agreement, a “substantial increase in the size of the tower” can be ascertained by: 1) the addition of a certain amount of height, 2) the addition of an appurtenance adding a certain width to the structure, 3) the addition of more than the standard number of equipment cabinets and equipment shelters, or 4) an excavation outside the current site.

The FCC also concluded that even though the state or local government must approve and may not deny a request for collocation, it may require filing an application for administrative approval.

The wireless infrastructure industry obtained from the FCC most of what it might have hoped for, and so did the wireless carriers. ■



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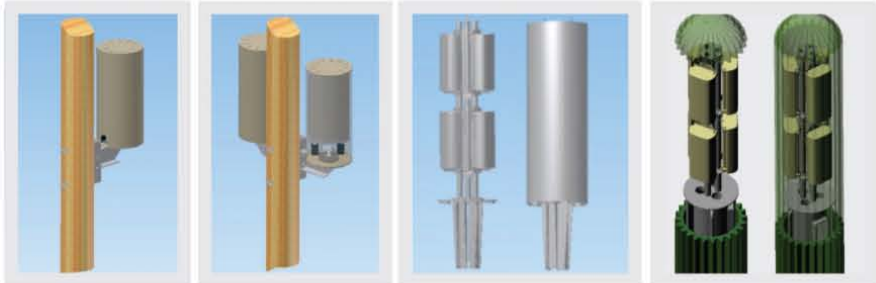


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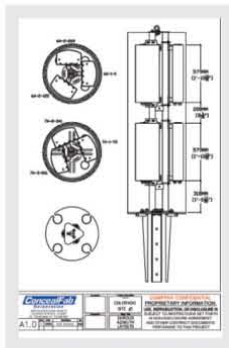
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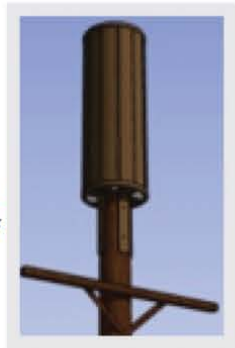


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publisher's note

Rare Moments

Funny things happen in wireless. At the NATE Conference & Exposition, I had a chance to catch up with

fun convergence of personalities. You never know when it's the first or last time something like this will happen.

I'll put the first-time meeting of the three of us down as a fun time.

Back to business

I'll take a minute to rant a little about the Samsung Galaxy 4S, which was released the day before I wrote this. By some accounts, you might think that a particular phone's success, or in particular, the iPhone's success, equated with industry success. According to many publications and newsletters, it might appear that the success of Samsung or Apple is directly proportional to the existence of the entire wireless

say that we get more calls every day looking for help with small cell deployments. More modifications are happening to cell sites more rapidly than ever before. One carrier shared some statistics on a relatively small region. Five years ago, the carrier had 5,000 sites in the region and changed something on each site about once every 24 months. Now, the carrier has almost 10,000 sites to worry about and is changing something on each site, each year. Actually, this is not entirely an accurate story; however, I've now heard several people describe about the same magnitude of activity with their sites.

Another common complaint — and it's a theme here at Biby Publishing — is that we can't just keep doing the same thing we've been doing for the last 30 years and expect to do larger quantities of work without looking at the price, time, scope and quality variables. From what I can see, the quality of work on antenna sites is running at an all-time low, as is the price that the carriers are willing to pay. But we all get to make it up in volume! Scope is all over the place, and it varies greatly from region to region, not, as you might expect, from carrier to carrier.

Just mentioning 30 years reminded me of exactly how long I've been at this. I probably have enough memories and other information for at least a chapter in a book. I started out as an engineer pulling terrain elevations off topo maps to run Carey contour calculations to determine cellular coverage. I love it that my earliest interactions with towers only involved figuring out how high they needed to be to obtain the desired coverage. It was a resource of infinite possibilities. 200 feet? 300 feet? 400 feet? In the world of abstract engineering, the tower could be as tall as you needed it to be. Oh well, it makes for a long chapter for someone's book, now in its first draft. ■



From the left: Jeff Mucci, CEO and editorial director, *RCR Wireless News*; Richard P. Biby, P.E., CEO of Biby Publishing and publisher of *AGL*, and Craig Lekutis, president of WirelessEstimator.com.

an old friend and friendly competitor, Craig Lekutis of WirelessEstimator.com fame. I met Craig back in the '90s when he was building towers in Florida for a company that was purchased by American Tower. Craig continues to do a great job, and we're happy to see the industry information he presents.

As if that were not enough, I even had a chance to sit down with Jeff Mucci of *RCR Wireless News*. We had never had a chance to swap lies and make up stories, but I really enjoyed learning of his history in the industry. With about as much laughter as you might expect from a drug store photo booth, the three of us got together for a photograph. It was a

industry. I won't rant much longer on how silly this is, but instead I'll point out how quickly people forget how complex are all of the systems and networks that come together to deliver a reliable voice and data network, and the massive capital investment they represent.

Who cares which phone is selling well, or whether Angry Birds has more downloads than Minecraft? I don't understand why so many people spend so much time on those details. If it's not one device, it will be another — one game, or another. The only thing I glean from all of this is that wireless technology is more and more pervasive, and we only have a bright future.

Site modifications

With my consultant's hat on, I'll

By Rich Biby, Publisher
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nate conference & exposition

Voices of Tower Workers at the NATE Convention

Tower workers attending the National Association of Tower Erectors Conference & Exposition told *AGL* what they like about their work and what gives them a sense of accomplishment.

By Don Bishop

At the National Association of Tower Erectors Conference & Exposition conducted in February in Fort Worth, Texas, tower workers who visited the exhibition floor spoke with *AGL* about their work and about the convention.

Ky Nguyen, “the tower legend,” and Joel Mosher, “the tower god,” who are tower technicians with Rio Steel & Tower in Alvarado, Texas, were among the tower workers who talked with *AGL*. Nguyen said, “I like the challenge. It’s a challenge every day. It’s fun. The view is awesome, and the people in the business are awesome. It’s incredible how we give people communications.” He said another aspect of the job that he

likes is that he gets to travel all over the United States.

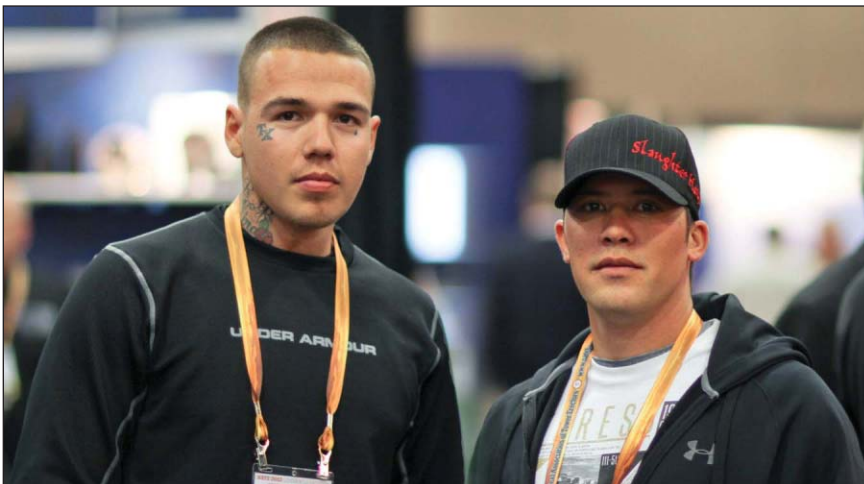
Asked what gives him a sense of accomplishment about the job, Nguyen said it’s when he stands back and looks at a completed tower and realizes what he helped to build. “You realize what you’ve built and what you’ve done,” he said. “Not many people can jump into the tower construction industry and do it and handle the physical demands.”

Nguyen said he and Mosher work on broadcast towers as tall as 2,000 feet, which, depending on conditions, can take two hours for a climb to the top. “When you climb through the clouds and look over the top and there’s clear

blue sky above and clouds below, that’s awesome, too,” he said. “That really makes the climb worth it.”

Nguyen said he found that all of the convention’s classes were helpful. He said he was impressed to find people from all parts of the communications and tower industry “willing to teach you and give you free seminars.” He said the convention made it possible to meet and talk with other people in the industry.

Asked how he received the nickname “the tower legend,” Nguyen said it was given to him by other tower hands who saw him jump into the work, that he wasn’t afraid to do it, and that he approached it with a positive attitude.



Joel Mosher, “the tower god” (left) and Ky Nguyen, “the tower legend,” are tower technicians with Rio Steel & Tower, Alvarado, Texas. Nguyen said, “I like the challenge. The view is awesome, and the people in the business are awesome. Not many people can jump into the tower construction industry and do it and handle the physical demands.”



John T. Houston, co-founder of Houston’s Tower Service, Lubbock, Texas: “With tall towers, you definitely have to know what you’re doing.”

Mosher said it was Nguyen who nick-named him “the tower god” because he always works hard, shows up on time, climbs fast and learns quickly.

John T. Houston, co-founder of Houston’s Tower Service in Lubbock, Texas, said his company handles broadcast towers, tower modifications, tower construction and gin pole work. “It’s definitely interesting to get into all the tall tower work and heavy picks — complicated work.” Asked what gives him a sense of accomplishment, he said, “Just to look in the rearview mirror and see the tall tower we just built. It feels pretty good to say that we built that.”

Regarding the challenge of working on a tall tower versus a 150- or 200-foot tower, Houston said, “With tall towers, you definitely have to know what you’re doing. If you’re just doing cathead and rope, that kind of experience ain’t going to cut it. You have to know gin poles, safe working loads and how to keep your guys safe. You have to work with winches and hydraulics that could pull you apart and you wouldn’t even know it. You really have to pay attention to what you’re doing so you don’t kill everybody.”

Houston said he came to the NATE convention because “it’s nice to walk



Rick Stinson, a project manager with EasTex Tower in Longview, Texas: “It’s not like working in a factory, where everything’s the same.”

around and meet people and see what kind of jobs they have going on. The convention is not too much geared toward the broadcasters. It’s more geared toward the LTE wireless stuff. I wish it was a little bit more geared toward broadcasters because in the sessions they’re just talking about wireless. They’re not talking about the broadcast FMs and the TV towers that are the ones putting it on TV and through the FM

stations that can learn about all these new products. We’re kind of left in the dark, so to speak.”

Rick Stinson, a project manager with EasTex Tower, Longview, Texas, said that he likes the fact that with the work he does, each job is different. “It’s not like working in a factory where everything’s the same,” he said. “Each job is unique to itself, and that makes it exciting.” Stinson said what gives him the biggest sense of accomplishment is for the job to go well and for the customer to be satisfied.

Making his first visit to a NATE convention, Stinson said the interesting part was meeting new system people and vendors with whom he might start doing some business.

Ryan Evers, Rob Eklund and Brian Caya, three tower technicians from Train’s Towers in Haddon Heights, N.J., expressed what they like in common about their jobs, which is working with their hands. Evers also said he likes the change in scenery every day. “I used to work in retail and I hated it,” he said. “Now, I get to work with my hands all the time. So, I love this.” He said seeing the result of the work gives him a sense of accomplishment. “You see that you did good work, and you take pride in it.”



From the left are Ryan Evers, Rob Eklund and Brian Caya, tower technicians with Haddon Heights, N.J.-based Train’s Towers. Evers said, “I used to work in retail and I hated it. Now, I get to work with my hands all the time. So, I love this.” Caya, a tower technician for five months, said, “You look up the tower at the end of the day, and you think, ‘We just got all this work done at 700 feet or 900 feet.’ It’s pretty cool when you get on the ground and you look up and you realize what you just did.”

nate conference & exposition



Matt Becker, a tower hand with Green Mountain Communications in Pembroke, N.H.: “What I’ve discovered at the NATE show is how far this industry has come in a short amount of time, not only with the safety aspect but with the technologies and the other things that we’re moving toward now.”



Dan Renaud, corporate safety director for Montreal-based Netricom: “The people at the NATE convention are really great. Everybody’s into a mentality of doing things right. I have seen our competitors on the site doing things not right. I wish they were NATE members, too, and they would learn.”

Evers said he came to the NATE convention mostly for the OSHA training. “I’ve only been working on towers for two years, so I’m fairly green to the industry,” he said. “This is a big learning experience for me.” He said that safety is important, and trusting the people that he works with is the biggest lesson that he has learned. “Know the people around you because they are the people who have your back,” he said.

Physical work

Eklund said he has 10 years of experience, but he still has a lot to learn. He likes the job of a tower technician because “it’s not like you’re working on a report all day and you email it, and you can’t really see what you’ve done. You can look at a report on the computer, but this work is physical. You get a better sense of pride in your work. When I’m stuck in an office for a day, I’m ripping my hair out. That’s why I don’t have any hair.”

He said he liked attending the NATE convention because he learned what the hard-core specifications are for steel and for safety training, “something I heard about but didn’t really have a full grasp

of. The OSHA 10-hour course is pretty neat, too, with the electrical theory. I learned a lot there. Also, it’s cool meeting the people who you talk with on the phone when you’re doing quotes. You get to kind of place where they are.”

Working at heights

Caya said he has been a tower technician for five months. He previously worked in carpentry and didn’t like it, so when the opportunity came to work at Train’s Towers, he took it. “You look up the tower at the end of the day, and you think, ‘We just got all this work done at 700 feet or 900 feet,’” he said. “It’s pretty cool when you get on the ground and you look up and you realize what you just did.”

Caya said the most interesting part of the NATE convention was the safety information and learning from Jocko Vermillion, an OSHA official. “I thought that was really interesting because I never had any experience dealing with OSHA and the process of when they come on your job,” he said. “It’s cool meeting all the other climbers, too. They’re pretty much exactly like you. They’re crazy.”

Matt Becker, a tower hand with Green Mountain Communications in Pembroke, N.H., said he likes his work because “it can be an adventure sometimes. It’s a little bit daring at times. It could be fun and I like it that it has a construction aspect and it’s also technology. You have to work both with your hands and your mind. In some other trades that might not be so true.”

He said the most challenging mental aspect of the job involves “doing the little finicky detail tasks that the carriers are starting to move toward at heights where you can’t drop the little pieces or they’re gone forever. It can be mentally strenuous to stay so focused and detail-oriented in a world where that sometimes can be difficult.”

Fiber-optic cables

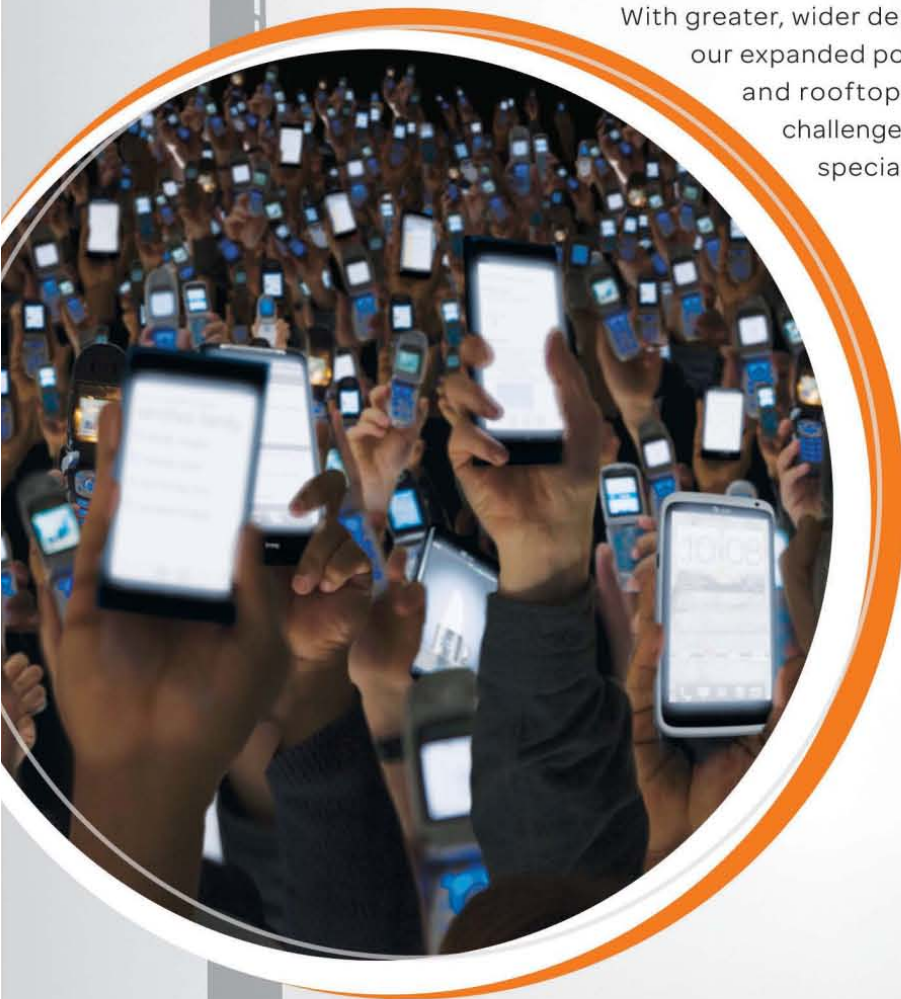
Becker said the tiny pieces to which he referred have to do with fiber-optic cables. “They aren’t very forgiving, the glass ends of the fiber and the pieces that see into the equipment,” he said. “They’re no bigger than a thumb drive and cost about \$500 apiece. If they go down the tower, they’re all done. So you have to be very careful about that. In the

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old days, the components and equipment were a lot more forgiving to the abuse that they sometimes encounter on the tower, especially during installation.”

Asked what gives him a sense of accomplishment on the job, Becker said, “When we construct the site and we just do it quickly, efficiently. Everything looks really good and we get feedback from the carriers that the site came up

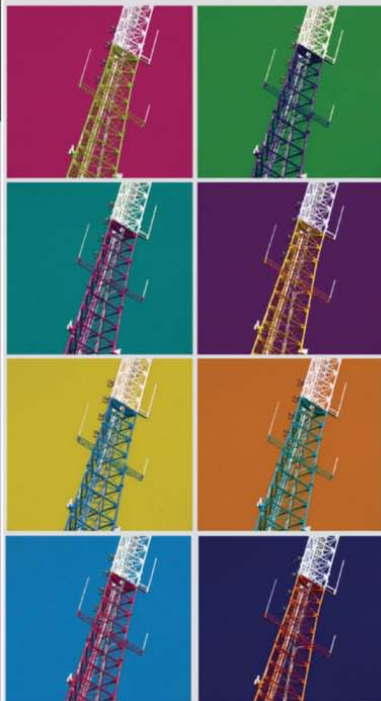
with no problems. We don’t have to go back and troubleshoot. I always strive for, ‘We only come here once.’ That’s when I get a sense of pride out of it — doing the best quality work that I can.”

Becker said this was his first time at a NATE convention. “My company invited me to come with them, and I was honored to come,” he said. “Because I’m a young man in this industry, what I’ve

discovered at the NATE show is how far this industry has come in a short amount of time, not only with the safety aspect but with the technologies and the other things that we’re moving toward now.”

Dan Renaud, corporate safety director for Montreal-based Netricom, said what he likes about his job is being able to teach people, helping to make sure people do their work safely so they can go home, and learning new technologies. He said that during a NATE session, he learned about LTE antenna placement and why T-booms are not sufficient and need to be reinforced. “I’m definitely bringing that back with

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Matt Becker: “I always strive for, ‘We only come here once.’ That’s when I get a sense of pride out of it — doing the best quality work that I can.”

me and incorporating it into my training instruction,” he said.

Renaud said it gives him a sense of accomplishment when the feedback from his company’s tower workers indicates that when they apply their training, it helps them to do their jobs, “in some cases more economically and faster, but most importantly, that they realize it was a safer way to do it, and that they feel cared for by the company because we take their safety seriously.”

The corporate safety director said at the NATE convention he learned how to mount microwave antenna systems properly — including what not to do. “The people at the NATE convention are really great,” Renaud said. “Everybody’s into a mentality of doing things right. I have seen our competitors on the site doing things not right. I wish they were NATE members, too, and they would learn.” ■

For more information about the National Association of Tower Erectors, visit www.natehome.com. Photography by Don Bishop.



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Western Iowa Tech Offers Free Tower-related Training

Thanks to a Susan Harwood Training Grant from the U.S. Occupational Safety & Health Administration, an Iowa community college offers on-site training for tower workers at no charge.

By Don Bishop

Bill Koontz, project manager with the Corporate College at Western Iowa Tech Community College in Sioux City, Iowa, said that the college received a Susan Harwood Training Grant from the U.S. Department of Labor’s Occupational Safety & Health Administration (OSHA). “The grant enabled us to build four training modules specifically designed for the tower and wind industry. They include heat and cold stress, high-angle rescue and confined space.”

Susan Harwood, for whom the grant

that Western Iowa Tech received is named, was a director of the Office of Risk Assessment in OSHA’s health standards directorate who died in 1996. During her 17 years with OSHA, she helped to develop standards to protect workers. OSHA awarded \$10.7 million in Susan Harwood Training Grants to 72 nonprofit organizations in 2012.

Koontz explained that confined-space training teaches individuals how to work in a confined area with only one exit. “Someone working in a confined

space has to be trained and needs to understand what chemicals might be in the space, what gases might be present, and how to get out safely,” he said “If a ladder falls, if their way out is not properly attainable after they have entered into the confined space, they have to be trained on how to get out and what precautions to take before they go in.”

He said that there is a huge push for heat-and-cold-stress training. “Many workers get up on a tower and they are ill-prepared for heat and cold stress,” Koontz said. “As silly as it sounds, they’re either overdressed or underdressed, depending on what the conditions are when going up the tower. They’re coming down with frostbite; they’re coming down with heat exposure, heatstroke. It’s good that they have an understanding of heat and cold stress before they go up the tower.”

Koontz said each of the workers has to be certified on a yearly basis as an authorized climber with training for climbing, such as the 10-hour class about workplace hazards taught by OSHA-authorized trainers. “What the grant allows us to do is to travel to any of these tower construction and maintenance companies,” he said. “As long as we can provide the modules that we built for OSHA, at the same time that we deliver the authorized climber training, we can come for free. The grant completely pays for it. We’ve serviced tower



Bill Koontz, project manager, Corporate College at Western Iowa Tech Community College in Sioux City, Iowa: “The tower industry’s companies and workers are passionate about what they do and passionate about safety. First and foremost, they’re concerned about putting people on the towers who are prepared, trained and ready to go.”

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industries in the Bahamas, in Alaska, and North Carolina. It doesn't matter where we go, the grant pays for it."

Multiple grants from OSHA

The project manager said OSHA is committed to the tower construction and maintenance industry to make sure that people are trained and they're safe, and the Susan Harwood grant enables Corporate College to provide the training. He said Western Iowa Tech has been awarded 12 such grants. "We had a strong commitment with our previous project manager, Bob Schmeckpeper," Koontz said. "Bob was a huge pioneer in putting these grants together. We have a tight connection with the tower industry here at the college. We're excited to provide the training. If OSHA remains as committed as it has always been with allowing us to go out and build these modules and train for free, we'll continue to do it as long as we can."

Continuing education

The Corporate College conducts its training program on a nonprofit basis, Koontz explained. He said OSHA is paying for the bare minimum, but it is not paying the college any extra money. The training is provided as a continuing education element of the state-run institution. "We have to justify our own incomes, and we have to justify the training, and we're monitored by our stakeholders and by our board of education," he said. "We're also managed by our board locally. So, we have a lot of commitment that we have in all of our training courses because we're committed to the community and to the individuals whom we train."

Koontz said that Western Iowa Tech has been fortunate with the Susan Harwood grants and works hard on its grant applications to make sure that the Corporate College can offer the training, if sometimes not for free, then at a highly discounted price. He said other community colleges also are members of NATE, but there are many more for-profit organizations that offer training.

"I'm not going to rock the boat and say any of the for-profits are doing any better or any worse than us; I just know

where our commitment is," he said. "We have a commitment to the communities we serve because we're a nonprofit organization. But there's no one else that's doing it for free, which we can do because of the grant. This year, only 12 entities received Susan Harwood grants. We are the only one doing it for the tower and wind industries." The Corporate College project manager credited Schmeckpeper with the original idea. "As the pioneer, Bob did the training and went out and worked with the companies," he said.

Faculty participation

As a community college, Iowa Western Tech provides other training services, including welding, leadership and management, Koontz said. "We have the ability to draw from the faculty for some of the training," he said. "They are industry leaders working for us whom we can use for some of the training, which is fortunate. We can form partnerships with the companies that use our services and not only do tower training but also a whole lot of other training."

Koontz said he was introduced to NATE when he started with the Corporate College three years ago, and he has been with Western Iowa Tech for 15 years. He became a project manager a year ago, and this year was his first time attending NATE's convention. "The

members are a tight-knit community," he said. "The show is passionate about the industry and the speakers are incredible, yet because the show is relatively small, it also is intimate. I've been to other conferences for the wind industry, and they're enormous, some with 20,000 people. The American Wind Energy Association conference had fewer people last year than the year before, and still there were 70,000 people at that conference."

The wind industry rises and falls with tax credits that facilitate purchases of wind energy equipment, and Koontz said tax credits were the talk of the wind energy conferences last year. "The upside to the tower industry and what I'm really excited about is that it does not depend on tax credits," he said. "The tower industry's companies and workers are passionate about what they do and passionate about safety. First and foremost, they're concerned about putting people on the towers who are prepared, trained and ready to go. That's why I'm excited to be a part of NATE." ■

Bill Koontz was interviewed during the National Association of Tower Erectors Conference & Exposition. For more information about NATE, visit www.natehome.com. For more information about the Corporate College at Western Iowa Tech Community College, visit www.corporatecollege.biz. Photography by Don Bishop.

Tower Safety Training Topics

- Web-based safety director certificate course
- Tower safety OSHA 10-hour construction course
- Tower safety competent person/30-hour construction course
- Authorized climber
- Tower rescue/competent climber
- RF safety/hazard awareness
- Rough terrain forklift safety and train the trainer
- Rigging safety certificate 8- and 16-hour courses
- Electrical safety
- Excavation and trenching safety/competent person certificate
- Hoist operator course – 8-hour personal hoisting standard, OSHA CPL

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Tower Construction Is Central to the Wireless Industry

Major U.S. carriers have impressive plans to offer advanced wireless communications services to American consumers. That's good news for tower construction and maintenance companies and their employees.

By Steve Largent

Steve Largent, since 2003 the president and CEO of CTIA, a trade association for the wireless communications industry, spoke to an audience at the National Association of Tower Erectors' Conference & Exposition. A former congressman who for nine years represented Oklahoma's first district, including Tulsa, Largent also is known for his 14 years as a wide receiver for the Seattle Seahawks in the National Football League. These are his remarks, edited for length and style.

I have deep admiration for the work that the tower construction and maintenance industry does with the wireless communications industry. There would be no wireless service without what you do. One thing that stands out is how you are used to dealing with heights. It adds a different dimension to your job, and sometimes it presents challenges.

In October 1983 in Chicago, they made the first commercial cell phone call. Look at how far we've come in such a short period — from the big, bulky, bag phone to the clunky brick that weighed a couple of pounds that you might remember Michael Douglas using when he played Gordon Gecko in the movie *Wall Street*. Later came the candy bar phones, then flip phones, and now we have iPhones. It's extraordinary. The iPhone and other devices like it are

incredible. They put more processing capability in your hand than the *Apollo* spacecraft had. They're making information accessible to more people than any other device in history.

More people have cell phones than have running water or electricity. That is extraordinary. Wireless technology is bringing profound changes. We're better connected to our friends and families than ever before. Wireless social media such as Facebook and Twitter give us opportunities to share important moments with more people. And it's not just a tool to shine a light on our lives. It becomes a powerful weapon to fight political oppression in foreign countries. It's also proven to be instrumental at other times of crisis. Relief support after the 2010 earthquake in Haiti was coordinated with mobile communication. And the charitable support made possible through wireless was record-setting. According to the Pew Research Center, 14 percent of the charitable donations totaling more than \$30 million were made with text messaging.

You in the tower construction and maintenance community are central to this fantastic revolution. You're a vital and necessary link in the incredible engineering feat that is wireless communications. You and your work are why we're able to conduct business and share information, our thoughts and lives to such an extraordinary degree.

At CTIA's spring trade show last year in New Orleans, former President Clinton said, "What works in real life is creative networks of cooperation." The business that we're in created more new networks of knowledge than any other single development in history.

Ways networks help

Those new networks are wide-ranging. In transportation, they can be the information gateway that is used to tell the best way to drive home, or, for a dispatcher, to reroute his national trucking fleet. In the area of health care, they're at the core of a program such as Text4baby, an initiative developed by the Wireless Foundation. It sends timely text messages to expectant moms to help make them and their babies healthier. Networks also help agencies such as the Centers for Disease Control and the World Health Organization counteract epidemics and disease outbreaks. Doctors are using mobile communications during surgery to consult in real time even if they are thousands of miles away. It's also helping chronic disease patients with cardiac problems or diabetes live longer.

Tower location and wireless network coverage can be just as crucial to economic development. Sensor technology can tell a farmer if his crops are stressed by weather, water or pests. Telematics can give him a heads up the minute



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Steve Largent, president and CEO of CTIA: “A view from the top is hard-earned and spectacular. Of all the players in our wireless ecosystem, you should know that better than any others. It is our mission at CTIA to help you and the rest of this great industry keep that top spot.”

tractors are about to have a mechanical problem and when it's time to till the soil or reap its harvest. Wireless communication is keeping the farm machines on the straight and narrow with new precision farming, saving fuel costs. Our networks are helping to make important strides in education, energy, finance and commerce. Wireless communication is helping people do their jobs. It's helping them find jobs. And it's creating new jobs.

Connectivity

But no matter how powerful or sophisticated the technology is, nothing would matter if we didn't have connectivity. It would be worthless if we couldn't send and receive signals in a quick and efficient manner. Being able to do that is an incredibly complex and important task. It's one of your core missions, and you do it extremely well.

2012 was a record-setting year in the antenna-siting industry. According to the CTIA semi-annual survey, more towers and antennas were constructed last year than in any other year. Much of that has to do with the aggressive 4G deployment that's going on in the United States.

We're leading the world in that regard.

Let me provide you some perspective on that. The United States has about 5 percent of the world's population and about 5 percent of the world's mobile subscribers. Those baselines are important when we look at the scope of mobile technology deployed here. Third-generation or 3G technology is available to about 98 percent of the U.S. population. No other country comes close.

But as you know, this industry never stands still. U.S. wireless carriers are aggressively rolling out 4G service. When you compare what they're doing with what's going on in other countries, you'll see just how far ahead of the pack we are. LTE is one flavor of 4G technology. The United States has half of the world's LTE subscribers. That's with 5 percent of the population. During the past year, LTE has been deployed in markets that are home to almost 90 percent of the American people. And we're not just talking about big cities here. Dozens of wireless providers such as Blue Grass Sailor, Celcom and U.S. Cellular are building out LTE in rural and small-town America.

WiMAX is another advanced tech-

nology, and we have almost 70 percent of the world's WiMAX subscribers, again with 5 percent of the world's wireless subscribers. You can see that the majority of consumers using the most advanced wireless technology live here in the United States.

Cisco index

The major U.S. carriers all have impressive plans to offer advanced wireless communications services to American consumers. That's good news for you. You should also be encouraged by the increasing demand for high-speed wireless broadband. According to Cisco's Visual Network Index, U.S. mobile data traffic growth is expected to increase nine times from last year to 2017. And that figure doesn't include the traffic offloaded to Wi-Fi. Cisco says the average U.S. mobile consumer used a little more than 750 megabytes of data per month last year. It estimates this will increase to about 6 gigabytes of data per month by 2017.

It's also believed that we're going to see connections increase by 600 percent, and that smartphone and tablet traffic will increase exponentially. Cisco reports that last year, three quarters of the U.S. data traffic was on 3G networks, and most of the rest was on 4G. Cisco predicts that by 2017 those numbers will almost completely flip, with 63 percent of the data traffic on 4G networks and most of the remainder on 3G. Satisfying the need for speed and the demand for new devices with immense capabilities is a top priority for the wireless industry. Obviously, it means improved coverage on the deployment of new equipment. And that underscores the importance of your jobs to America's future.

At CTIA, we spend time on issues important to the tower community. We engage with the FCC and other relevant federal agencies such as the FAA, FEMA and NTIA. Our advocacy takes us to Congress, to the states and to zoning jurisdictions. We are involved in the courts much more than we would prefer, but it's essential to stand up for the industry's need to expand coverage to satisfy consumer demand.

During the past year, CTIA has been active in numerous zoning issues. That includes facilitating collocations, modifications and DAS roll out. The U.S. Supreme Court heard an appeal to the FCC's tower-siting shot clock, and we're hopeful the high court will rule on that some time this year, possibly as early as the third quarter.

Avian mortality

The migratory birds issue continues to be a challenge, and we're making good progress. I can't help but point out a study conducted by researchers at the Smithsonian Conservation Biology Institute. Funded by the U.S. Fish and Wildlife Service, the study concluded that as many as 3.7 billion birds are killed every year in the United States by cats. I only bring this up to show that there are many factors to consider about migratory birds. And I'm just glad that cats aren't one of them.

CTIA is also working to streamline

the National Environmental Policy Act procedures. We're advancing issues before the FAA, such as relaxing the agency's 200-foot rule. We've also supported policy that would help expedite siting on federal lands and buildings. Some of those new procedures were passed as part of the 2012 Middle Class Tax Relief and Job Creation Act.

The series of storms and natural disasters of the past several months have shined a spotlight on business continuity and network reliability. Outage reporting and backup power are important areas that are receiving attention at the federal and state levels.

We'll be representing these industry interests and other matters in many venues throughout the year. They hold the keys to advancing the industry and to providing the kind of exceptional service that American consumers have come to expect. A lot of pressure comes with that. But that's what happens when you're the best. The bar is set

high when you're the world's leader, which we are. It's enormously hard to achieve that status. It's even harder to stay there. It can be a struggle, but I know we're up to it.

Competition

The wireless communications industry is ultracompetitive. You either innovate and improve, or you fall behind. No other country's wireless industry comes close to providing the value and benefits that you're a part of in the United States. A view from the top is hard-earned and spectacular. Of all the players in our wireless ecosystem, you should know that better than any others. It is our mission at CTIA to help you and the rest of this great industry keep that top spot. ■

Steve Largent can be reached at CTIA, 202-785-0081. For more information about CTIA, visit www.ctia.org, and for the National Association of Tower Erectors, visit www.natehome.com. Photography by Don Bishop.

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PCIA and NATE Missions Benefit Each Other's Members

PCIA wants to work with NATE on making sure that together the members of the two organizations keep the wireless infrastructure industry safe. Areas of potential cooperation extend well beyond safety to include promoting wireless network deployment.

By Jonathan Adelstein

Jonathan Adelstein, who last year became president and CEO of PCIA, a trade association for the wireless infrastructure industry, spoke to an audience at the National Association of Tower Erectors' Conference & Exposition. A former administrator of the U.S. Department of Agriculture's Rural Utility Service during the previous four years, Adelstein also was an FCC commissioner for seven years. These are his remarks, edited for length and style.

It feels good to join folks who really are the boots on the ground in this industry. I should say boots often well above the ground. We are together building the next generation of wireless networks. Many of the same people attend the NATE and PCIA conventions. At a time when the economy is still having difficulty getting back on its feet, it is great to be part of an industry that's doing so well.

Everything that NATE does benefits PCIA members. And I

believe that everything that PCIA does benefits NATE members. I especially appreciate your focus on safety and what you do to make sure that this industry is on top of difficult, challenging safety issues. We at PCIA want to work with you on making sure that together we keep this industry safe. We're like brother organizations in many ways, and NATE Executive Director Todd Schlekeway and I are going to work together closely on our mutual agenda.

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Jonathan Adelstein, president and CEO of PCIA: “We’ve been working on a tower issue, trying to launch an initiative to correct the regulatory loophole in the FCC’s historic preservation rules.”

On the FCC, I fought for a national broadband plan that would guide the build out of today’s broadband networks. FCC Chairman Julius Genachowski, who took my seat on the FCC, finally got a broadband plan out there. After I left the FCC, the president gave me the opportunity to run the Rural Utility Service, the agency that pioneered rural electrification back in the 1930s. And Congress provided \$7 billion for the RUS and for the U.S. Commerce Department to allocate to build out infrastructure across the country. That is where I saw some of the challenges that you face every day.

We in this room think towers are beautiful, but for some reason not

everybody does. It’s hard to find somebody outside of PCIA and NATE who thinks that they’re gorgeous, but what they enable is truly beautiful. Consumers expect connectivity and a lot of capacity.

Consumers want their wireless devices to work faster. So, how do you get there? Spectrum is just one of the ways that you get there. And the other big way that you get there is infrastructure. You can take that same spectrum and reuse it again and again by putting more and more antennas out. You can densify the network and reuse that same spectrum. That’s the best way to take advantage of the spectrum that we have and any spectrum that we get.

Network densification is happening, and that’s why everybody in this room is in a good mood. Business is going well because network densification is happening every day, with no sign of it abating, at least in the next few years.

Think about the changes that happened just three years ago when the iPad was introduced. Now, there are 100 million of them and as many as 25 percent of adults have wireless

The president issued an executive order on accelerating broadband infrastructure deployment on federal land.

tablets. More Americans are cutting the cord. A third of Americans do not have a wired phone. You can hardly find anyone under the age of 30 who has a wired connection in their home. What I’m hearing from a lot of you is that you can’t build these networks fast enough. It’s hard to get enough qualified people to build out the networks. Network construction will keep the carriers, the OEMs and the infrastructure providers that you and PCIA represent busy for a long time.

Network builds

Dish Network plans to build out a whole new network. We were happy to facilitate a meeting at that event between the Dish Network Chairman Charlie Ergan and FCC Chairman Genachowski to talk about ways that the wireless networks can get built. In November, AT&T announced Project Velocity IP, which includes an \$8 billion investment in significantly expanded wireless IP broadband networks. Last year, T-mobile announced a \$4 billion initiative.

Genachowski pointed out that LTE network builds will add \$151 billion to the U.S. gross domestic product in the next four years, creating 707,000 new

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jobs. Once these networks are built, the platform for job creation and economic growth continues for years to come.

Section 6409(a) definitions

In January, the FCC issued a public notice to clarify the meaning of some terms used in Section 6409(a) of the Middle Class Tax Relief and Job Creation Act of 2012 and define what the law did not, such as what “base station,” “collocation” and “modification” mean. It defined “tower,” and it even defined a base station to include distributed antenna systems and small cells. No longer will we find local governments questioning what the law means because the FCC defined it for them. The FCC action will save us all kinds of litigation, and the law will pave the way for you to do your jobs more easily.

Shot clock

Thankfully, the FCC also clarified

that Section 6409 doesn't preclude the adherence of state and local governments to the shot clock, which is another thing the FCC did for us to make sure that within a certain period of time, applications for antenna sites have to be reviewed and decided upon. And now, if the application is for collocation, since the local jurisdiction has to approve it in the end, it's a great combination because that means within 90 days or less they have to approve minor collocations or modifications. It means that we have real timelines for deployment, and that helps you implement your plans. It's the kind of commonsense move that is great when it happens. The FCC really gets it, when it comes to wireless broadband getting to consumers.

Meanwhile, the president issued an executive order on accelerating broadband infrastructure deployment on federal land. A lot of providers don't like going near government facilities

because they get so harassed when trying to get the approvals they need to place wireless infrastructure there. I was glad that the president's task force is working on uniform deployment processes. Right now, each federal agency has contracting procedures, but they're going to try to standardize them. That makes a lot of sense.

Opportunities are going to abound for thinking contractors who can be nimble enough to transition from LTE build out to the deployment of heterogeneous networks made up of macro cells, DAS and small cells. Small-cell, DAS and Wi-Fi deployments require a different skillset. RF training and other technical skills are going to be as critical as they can be as the landscape begins to shift to smaller cells. Macro towers aren't going anywhere. But there will be even more growth in small cells while the old macros that provide vast coverage will continue to be in demand, given the basic physics

Not All Towers Are The Same

From selling the rooftop of the John Hancock Center in Chicago to single tower transactions, clients rely on MVP's expertise to get the most value and certainty of closing. Since the 1990s, the MVP Team has completed more than 130 tower and 65 wireless and spectrum transactions with an aggregate value in excess of \$2.5 billion.

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 AMERICAN TOWER has acquired the broadcast facility at the John Hancock Center, Chicago 	 Ranch Creek Holdings, LLC has sold six towers in Oklahoma to 	 Milestone has sold 21 towers in Virginia to 	 BRIDA BROADCASTING has sold a broadcast tower in Georgia to 	 PINNACLE TOWERS has sold certain tower assets to
 GREEN DIAMOND RESOURCE COMPANY has sold two towers in California to 	 NEXTMEDIA has sold certain broadcast towers to 	 TOWERCAST has sold a tower in Nebraska to 	 QUANTUM COMMUNICATIONS has sold two broadcast towers in Massachusetts to 	 CAPITAL has sold certain tower assets to
 GMG Interests, LP has sold a tower in Tennessee to 	 OPUS has sold two towers in Florida to 	 CIG has sold certain tower assets to 	 Sainte Partners II, L.P. has sold its broadcast tower in California to 	



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of RF. They are just a priceless part of the environment.

Consider what you're going to do about small cells. AT&T said it's going to deploy 40,000 small cells and 1,000 DAS networks that might have hundreds of nodes themselves.

At PCIA, we do our part for network expansion through advocacy. We see no reason that your business should be hindered by outdated and vague rules.

To that end, we've been working on a tower issue, trying to launch an initiative to correct the regulatory loophole in the FCC's historic preservation rules. Right now, it's barring thousands of towers from being utilized for collocation without a lengthy and costly process. And while this probably affects some commercial infrastructure that was built between 2001 and 2005, it also affects many state and local government towers

now used by first responders and that could also be used in the pending construction of a nationwide public safety network that I spoke about.

We're also supporting modernization of Part 17 tower lighting and marking rules. We propose some civil fixes that would allow widespread use of state-of-the-art monitoring facilities and that will harmonize the FCC rules with the FAA rules. It facilitates weather transition to lighting schemes that maximize aviation safety and minimize environmental effects, including migratory birds.

Another area of focus for PCIA is the

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Jonathan Adelstein: "The FCC needs to clarify the treatment of DAS."

re-examination of the National Historic Preservation Act to account for Wi-Fi, DAS and small-cell technologies. Today, if a structure is over 45 years old, it is eligible for listing on the National Register of Historic Places. It may seem ridiculous, but a 45-year-old light pole or telephone pole could be eligible for a listing in the register. Then, using the pole — or even an old tower — may require a big Section 106 review. We can't afford such delays that keep you from doing your work.

Meanwhile, the FCC needs to clarify the treatment of DAS so that wireless and wireline communications providers are not so often treated differently, and money can be spent on design and deployment rather than on litigation.

The FCC also is examining the reliability of telecommunications networks in the wake of recent natural disasters. We want to make sure the FCC doesn't

propose harmful regulations, yet does make sure that we allow ourselves to restore sites to operation quickly. For example, some people are complaining the main problem was that although towers weren't toppled by extreme weather conditions, power interruptions took them offline. Many carriers like to install generators, but many times localities do not allow it because of environmental rules, objections to the batteries and fuel storage, and noise from generator operation. They can't have it both ways. If they want these systems to work in emergencies, they've got to let us put generators there, and they can't complain if they didn't let us put a generator there and then the system didn't work.

State legislation

We want you to get involved in our state wireless association program. PCIA has 29 member associations covering 38 states. State association membership includes carrier representatives, infrastructure companies, OEMs and service providers. PCIA has experts who testify at legislatures and who conduct local outreach. We're really moving toward a lot of state legislation in a number of states. We need your boots on and above the ground, and we'd love to get you involved in the state wireless associations.

PCIA wants to partner with NATE on moving legislation forward. We saw

We want you to get involved in our state wireless association program. PCIA has 29 member associations covering 38 states.

favorable legislation in Michigan, New Jersey and Pennsylvania last year. This year, we're pushing for legislation in New Hampshire, Missouri, Georgia and Washington. We're active in California where bills have been introduced in the legislature. In California, people want

the connectivity and they want the capacity, but many of them don't seem to want the antennas. So, we're going to do something about that.

Given the focus on state legislative efforts we could really use your input. Our expertise relies on having a really powerful grassroots network. Working hand in hand with NATE and with all hands on deck, we can really move the agenda forward. For cable companies,

carriers, OEMs, infrastructure companies and pure-play wireless providers, we want to be the home of getting these wireless networks built. And we want to work with NATE as our brother organization to get that done. ■

Jonathan Adelstein can be reached at PCIA, 800-759-0300. For more information about PCIA, visit www.pcia.com, and for the National Association of Tower Erectors, visit www.natehome.com. Photography by Don Bishop.

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tower & small cell summit

Summit Covers Broad Swath of Wireless Infrastructure Industry

A ticket to the Tower & Small Cell Summit includes admission to CTIA keynote speeches and exhibits, too.

By the AGL Staff

With opportunities increasing in both towers and small cells, it's as important as ever to stay on top of the latest developments, straight from the mouths of FCC officials, wireless consultants and industry analysts. To better cover the latest wireless trends, the Tower & Small Cell Summit, formerly the Tower Technology Summit, has expanded this year to include two tracks, one on tower topics and the other on small cells. Collocated with CTIA, the Summit's panel sessions will take place in the afternoon on May 21 and 22 at the Sands Expo Convention Center in Las Vegas.

AGL had the pleasure of working with the staff of Light Reading in developing the session content and securing industry experts to speak at this event.

Former FCC Chairman Kevin Martin will keynote the event, giving the big picture of how the FCC's Wireless Broadband Initiative is affecting the development of cell towers and small cells. Martin, who is now co-chair of the Patton Boggs law firm's technology and communications practice, has 20 years of experience as a lawyer and policy-maker in the telecommunications field, including his tenure as FCC chairman from March 2005 to January 2009 when the industry was undergoing a period of unprecedented growth and innovation.

Plenary sessions

Each day's panel agenda will begin with a plenary session. On day one, a panel on **"The Changing Wireless Landscape"** will discuss major trends in macro cells and metro cells, such as the

rapid rollout of LTE, new regulation by the FCC, the shifting rural wireless picture, the rapid emergence of small cells and industry consolidation. The second day's plenary session, **"The Common Challenge of Site Acquisition,"** will cover site acquisition hurdles and how they threaten the rapid rollout of wireless sites, as well as what solutions are being developed.

Tower track

The tower discussions will begin by looking at the increases in spectrum achieved by the major carriers and their announcements of LTE network construction worth billions of dollars. Speakers at **"Spectrum Acquisitions: Their Impact on Cell Towers"** will explain how the new spectrum will affect tower build out plans. In the session **"LTE and Today's Challenges for Tower Construction,"** experts will look at how LTE has changed tower construction and performing amendments on existing towers, emphasizing best practices for meeting tight deadlines.

Since Superstorm Sandy wreaked havoc in the Northeast, the FCC has begun holding field hearings with industry to develop a plan to ensure continuation of cell service in the wake of disasters. **"Making Cell Sites Stand Up to the Next Disaster"** will provide an update on the FCC's plans for requiring the hardening of cell sites, backup power options, carrier readiness and resource-sharing protocols.

With LTE quickly making inroads into the less-populated areas of the

country, **"LTE Build Out in Rural Areas"** will look at the reasons behind rural broadband wireless growth and the opportunities for tower owners and carriers to increase their business. As high-speed broadband cellular systems proliferate, so must their lifeline back to the network core, and **"Opportunities in Backhaul"** will explore the roles of technology, enterprise and government action that are making high-speed backhaul a reality. **"Infrastructure Sharing for the Public Safety Broadband Network"** will show how sharing tower locations, backhaul and other public and private assets will be critical to making FirstNet a reality.

Small-cell track

The first session in the small-cell track will analyze how small cells became the savior for the wireless industry as it deals with the data crunch. Once used mostly indoors, small cells are getting a major identity change. Identified in this space are technologies such as LTE-based metrocells, carrier-class Wi-Fi systems, enterprise-based femtocells and specialized systems targeting rural areas. **"Small-cell Evolution: Have We Just Begun?"** will explore the evolution of small cell technology, with a view toward existing and planned deployments and a discussion of what to expect in the 2013–2014 time frame.

"Meeting the Small-cell Challenge" will explore solutions to the challenges of building small-cell networks, such as site selection, site acquisition, power, network traffic analysis and man-

agement. With the marriage of Wi-Fi and small cells seemingly preordained, **“Integrating Wi-Fi into the Small-cell Picture”** will cover the upside of such integration and the ongoing relationship between these two wireless access technologies.

“Backhaul in the Small-cell Era” will explore how operators are using a range of backhaul options for small cells, including microwave, as well as copper and fiber, and how they are likely to combine these technologies going forward. **“The Network Impact of**

Small Cells” will look at the challenges to cost-effective small-cell deployments and the development of heterogeneous networks with automatic handoffs and minimized interference, as well as synchronization issues.

A growing number of major sports venues are deploying small-cell technology to handle the crush of wireless demand as fans flock to sporting events, travelers crowd airports and shoppers bustle through malls. **“Small-cell Strategies for High-usage Areas”** will offer new ideas for handling the traffic when

tens of thousands of users want to phone, text, email, stream live video and send pictures across the Internet all at the same time. How will DAS, small cells and Wi-Fi work together in this space?

All Tower & Small Cell Summit registrations, which are processed through CTIA’s website, provide access to Tower & Small Cell Summit educational sessions, the CTIA keynotes, both the Tower & Small Summit Pavilion and CTIA exhibits, and access to all free partner events at CTIA. The registration fee is \$649. ■

Changing Wireless Landscape

Among speakers invited for the “Changing Wireless Landscape” panel are, from the left, Joe Madden of Mobile Experts, Marc Ganzi of Global Tower Partners and Tom Engel of Milestone Media.



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safety

OSHA General Duty Clause Holds Heavy Penalties for Unwary Employers

Don't ignore potential General Duty Clause liability because OSHA can use the clause for what it calls willful or repeat citations, which can carry penalties up to \$70,000 per violation.

By Mark A. Lies II

The Occupational Safety and Health Administration (OSHA) enforces safety and health compliance through written regulations that address specific hazards (e.g., 29 CFR 1910 for general industry, 29 CFR 1926 for construction, etc.) and the General Duty Clause in Section 5(a)(1) of the Occupational Safety and Health Act.

Compliance with the General Duty Clause is challenging because it does not specify precisely what employers are required to do to comply. Recently, OSHA lost a court decision involving a citation it issued under the General Duty Clause because it improperly attempted to expand the scope of the General Duty Clause and utilize certain general information in an equipment manufacturer's manual and an ANSI-approved standard to create a "safety" or "hazard" warning where none existed.

Clause requirements

In order to prove a General Duty Clause violation, OSHA must establish the following elements:

- A condition or activity in the workplace created a hazard.
- The employer or its industry recognized the hazard.

- The hazard was likely to cause death or serious physical harm.
- A feasible means existed to eliminate or materially reduce the hazard.

Unless the agency can establish each element, the citation cannot be supported. In the recent case, *Secretary of Labor v. K.E.R. Enterprises, Inc., d/b/a Armadillo Underground*, OSHRC Docket No. 08-1225, the agency failed to meet this burden.

Armadillo decision

The employer in the Armadillo Underground case was an underground utility excavator contractor working at a site in Naples, Fla. The company was installing pipe and utilized a mechanical joint restraining gland that was manufactured by Sigma to connect sections of the pipe. The process required employees to tighten certain bolts prior to a hydrostatic pressure test on the pipe. After tightening the bolts, the hydrostatic pressure test was performed and the pipe attached to the restraining gland exploded, injuring several employees.

Citation

OSHA issued a citation under the General Duty Clause for (1) failing to

follow certain installation instructions in the Sigma manufacturer's manual for the

Employers who receive General Duty Clause citations should carefully scrutinize the basis for the citation to determine if OSHA's specific underlying source of authority contains any type of safety or hazard warnings that would put the employer on notice of an actual safety "warning" or "hazard."

restraining gland and (2) failing to install the restraining gland in accordance with an ANSI-approved, American Water Works Association (AWWA) standard



US PATENTS 7,616,170 & 8,039,574

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safety

relating to rubber gasket joints for ductile iron pressure pipe and fittings.

The administrative law judge carefully reviewed the Sigma manufacturer's instructions and the AWWA standard and found that there were no specific safety hazards or warnings referenced in these materials regarding the installation of the bolts on the gland and that OSHA introduced no evidence that either Armadillo Underground or its industry "recognized" any hazard relating to these manufacturer's instructions or ANSI standard. Thereafter, the judge vacated the citation. On appeal to the OSHA Review Commission, the judge's decision was affirmed.

Analysis

Based upon this decision, employers who receive General Duty Clause citations should carefully scrutinize the basis for the citation to determine if OSHA's specific underlying source of authority (in this case references

to parts of a manufacturer's manual relating to the bolting process and an ANSI-approved standard) contain any type of safety or hazard warnings that would put the employer on notice of an actual safety "warning" or "hazard." If not, OSHA will have difficulty establishing that the employer or its industry "recognized" the hazard.

General Duty Clause liability

Employers cannot ignore potential General Duty Clause liability because, although what OSHA calls a serious violation contains a potential penalty of \$7,000, the General Duty Clause can also be utilized for what OSHA calls willful or repeat citations, which can carry penalties up to \$70,000 per violation.

Recommendations

In order to avoid OSHA liability (and more importantly an accident with employee injury), the employer should

consider the following recommendations:

- Review manufacturer's manuals to identify specific safety or hazard warnings and incorporate them in employee safety policies and procedures.
- Review industry-consensus safety standards applicable to the employer's industry and identify safety recommendations to be incorporated in employer safety policies and procedures.
- Once the policies and procedures are developed, conduct employee training, with documentation, and enforce compliance with discipline up to and including termination, again with documentation. ■

Mark A. Lies II is a partner in the Seyfarth Shaw law firm Chicago office. He specializes in occupational safety and health law and related employment law and personal injury litigation. His email address is milies@seyfarth.com.

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Antenna and Site Cloaking

The art and science of modern antenna cloaking is more than just painting a tower or putting up a facade to hide the components. Multispectral platforms with multifunctional purposes in multifaceted installations will be everywhere — and nowhere to be seen.

By Ernest Worthman

The 21st century's hunger for omnipresent, infinite, multiband RF permeability has created an environment that requires placing RF-emitting elements in locations that were once considered unthinkable. Today's demand for anytime, anywhere, any-band RF coverage means that radiating elements and their structures must become pervasive — let no square inch of area be RF-inaccessible.

Today, unrestricted wireless access is expected everywhere in city centers, public and private buildings, office complexes, sports and entertainment venues, convention centers, malls, coffee shops, apartment building and houses. Wireless communications in each of these locations is expected to provide a slew of services. There is no end in sight to the demand that wireless communications be integrated into more and more technologies. Modern site designs must become both multifaceted and more easily modifiable to meet these challenges.

Several companies have risen to meet the challenge with unique, creative approaches, and they are deploying new technologies to make it possible to place towers and other antenna sites closer to the consumers in inconspicuous ways, and no one is the wiser. Getting RF to where it needs to be has become a new science.

The big picture

In the earlier days of VHF and UHF licensed spectrum, the use of

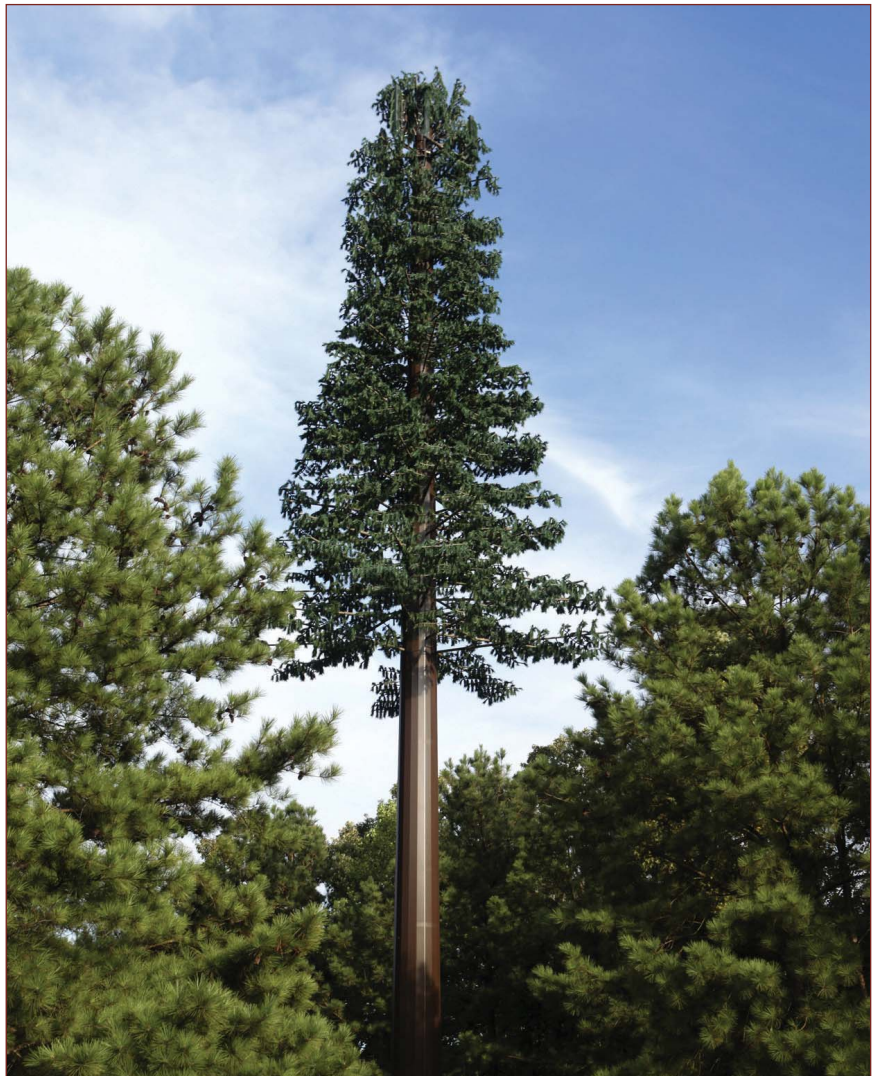


Photo 1. Made to look like a tree, this tower reveals its true nature when someone looks carefully enough to see the antenna elements. All photos in this article are courtesy of Stealth Concealment Solutions.

high-powered transmitters to cover large areas made placing antenna sites straightforward. They were generally located atop tall buildings, towers, hills and mountains, sometimes bunched together in antenna farms. Most people were unaware of potential RF hazards, so site developers faced fewer challenges of that nature to site construction. The proliferation of new technologies such as cellular and Wi-Fi, along with new demands for multiband service, began to change the landscape of site and equipment design and placement.

Consumer cellular was the first to affect that landscape. Monoliths of concrete and steel with dozens of antenna configurations rose in population centers. Most people seemed not to mind until the novelty of cellular telephony wore off and became just another convenient technology. But by then, the cat was out of the bag. Sites had become closer to, and moved into, residential areas, and people started to find the naked sites ugly and obtrusive.

Modern mega-antenna sites

Today, technologies such as satellite, fixed wireless, microwave backhaul, multiband cellular, Wi-Fi, WiMAX, Bluetooth, RFID, wireless metropolitan-area networks (WMANs) and wireless local-area networks (WLANs) are being deployed at a feverish pace. That means that modern mega-antenna sites could, potentially, have to accommodate frequencies from 150 MHz to 60 GHz or higher. Meanwhile, low-power, small cell sites could spawn another entire segment of microcosmic antenna deployments. Unless there is a sudden realignment of the laws of physics, it will be impossible for a single antenna site to handle all of the spectrum bands and technologies. Placing 500-watt and 1-watt radio transmitters on the same pole and close to the user isn't realistic. Nevertheless, cost, space and environmental considerations will cause sites to be made as efficient and multispectral as is possible, and surely strange marriages among disparate technologies may occur.

The consensus seems to be that wireless antenna sites need to be invisible.



Photo 2. A site designed to look like a clock tower conceals antennas placed above a building's roofline. Load-bearing limitations of a building's infrastructure may limit how much wireless communications equipment can be placed inside such a concealment to less than what may be possible with freestanding structures.

The use of cloaking has extended all the way down to home wireless networks. The pressure is on to cloak antenna sites, poles and equipment, no matter how small.

The big stuff

To step up to the challenge of large antenna site and tower cloaking, modern technology sports some elegant and in-

novative solutions. Manufacturers use two approaches to cloak RF-radiating devices and structures.

The first approach is to make towers and other antenna sites aesthetically acceptable by designing them to blend into a natural or manmade environment. They remain visible, but they are disguised. The tower shown in Photo 1 is made to resemble a tree, yet a close look

site concealment



Photo 3. As a freestanding structure, a silo has the potential to be constructed with more load-bearing strength than a rooftop or the side of a building may have.

reveals visible antenna elements. This approach is most applicable to towers and poles that are out in the open and that need to blend into the background.

The second approach used in cloaking is concealment that hides the antenna behind or inside a structure. Hidden-site components are invisible to observers, who only see the facade. Hidden sites enclose the equipment and are made to integrate into a specific aesthetic model (see Photo 2) or are designed as stand-alone sites that resembles something else, such as the silo shown in Photo 3.

Solutions come in all sizes, shapes and configurations. Rarely are two site designs, especially hidden sites, the same. Sites have few design characteristics that can be standardized, although they may have in common the materials used to make them. Installations vary from disguised to hidden, and it takes knowledge and skill to decide which will work best in any given location.

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Disguised sites

Tree and lamppost sites are simpler to develop, but they are subject to the same location, wind-loading, height and RF-propagation considerations as more obvious sites. Manufacturers and installers also have to consider the RF transparency of paint and other disguising elements such as fake tree branches. Tower-mounted amplifiers and cables have to be figured into the equation.

Concealed sites

Hidden or concealed sites present a different set of challenges. Unlike disguised towers or poles with limited types and numbers of radiators, hidden sites can have almost any number and type of radiators, sometimes limited only by weight-bearing restrictions of a rooftop or the side of a building. The bigger challenge with some of these sites may be to manage the electromagnetic compatibility among multiple users so their signals cause no mutual interference.

For example, the site shown in Photo 2, where the antenna tower and equipment are concealed inside of a clock tower, cannot bear nearly as much weight as the silo shown in Photo 3

The more complex the site, the more critical the design of the RF-sensitive materials and RF interference issues become.

can. With the clock tower, the amount of equipment that can be installed is restricted. Concealed sites placed upon or attached to buildings must take into consideration the load-bearing limitations of the buildings. Freestanding sites have fewer restrictions.

Other design considerations for concealed sites include construction methods and the materials to be used. Will a fabricated concealment be transported, or will the concealment be constructed on-site? What access to the site is available? Can scaffolding be used, or will a crane be required? Will the supporting structure require reinforcement?

Accommodations must be made to support electrical equipment such as power feeds and the equipment's associated hardware and must meet code requirements. Additional requirements may apply to active and passive equipment and cables. These are just some of the construction issues that face the concealed site designer.

The more complex the site, the more critical the design of RF-sensitive material and RF-interference issues become. All concealment material must be as RF-transparent as possible, regardless of frequency, while resembling the building facade. At frequencies up



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site concealment



Photo 4. In stadiums, signage can be used to conceal antennas used as part of distributed antenna system (DAS) networks.

to a couple of gigahertz or less, most material designed to pass RF will have similar attenuation parameters. Thus,

the installation normally can use the same material throughout, such as faux brick or wood.

For example, a site may include omnidirectional antennas for VHF, UHF and 800-MHz public safety repeaters, a utility company's 60-GHz point-to-point microwave hop for backhaul, antennas and possibly remote radio heads for cellular carriers, satellite and television antennas. Integrating concealment materials that are RF-transparent for all of the frequencies becomes challenging. Material placement becomes more critical. Power levels and beamwidths must be considered, along with path line of sight and signal propagation for the various frequencies that take into account the surrounding terrain.

Concealed site design

The more radio frequencies a site uses, the more problems there can be with intersignal interference, intermodulation interference and crosstalk. And even though devices are available to deal with these problems, the devices need real estate. Moreover, physical placement of hardware and antennas plays a significant role. More complexities need to be considered in concealed site design.

"Most of the easy sites are done," said Troy Nemeth, vice president of operations at Stealth Concealment Solutions. "New sites are becoming more and more challenging because they have so many nuances that have to be considered."

Using unlicensed spectrum

Although it's not as big an issue as licensed and cellular site proliferation, the use of unlicensed spectrum has spawned a Wild West of nano, pico and micro sites, both portable and fixed, often within spitting distance of one another. Today there is an emerging arena for equipment concealment for this segment — public venues.

Ball parks, concert halls, amphitheaters, museums, zoos, public and private office buildings, academic and other campuses, community parks and entire cities are deploying low-power, unlicensed technologies that may be susceptible to interference that diminishes the consumer experience. And consumer expectations are high.

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—Dorothy Hamill

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Public access to low-power wireless communications services presents challenges to antenna and site cloaking because the radio access points must be placed near the user. These sites and often their feedlines must be small and either hidden or obscure. Sometimes, potential vandalism is a consideration. In ballparks, fan enthusiasm and excitement can lead to unintentional damage of transmission sites or equipment.

DAS and small cells

With distributed antenna system (DAS) networks, multiple antenna deployments within small cell sites offer advantages. DAS increases communications reliability and data transmission speed, improves coverage and makes site management easier. Small cells achieve a lower cost of ownership by reducing redundant components. Small cells can offload traffic from the macro network, and they respond better to multiband

Wireless infrastructure will become increasingly obscure or invisible even as it proliferates.

integrated networks. Even so, DAS and small cells share many of the same constraints that their bigger, looming relatives, the macro sites, have.

DAS works well for in-building wireless and for sports and concert venues (see Photo 4). DAS also serves outdoor installations and has been deployed using disguised or concealed antennas, sometimes to reach into areas with neighborhood opposition to macro sites, and sometime to use small cells to increase network capacity (see Photo 5). Carriers and site managers alike are welcoming DAS and small-cell technology.

Conclusion

Wireless technology will be the great enabler of future omnipresent mobile data and voice communications. Wireless infrastructure will become

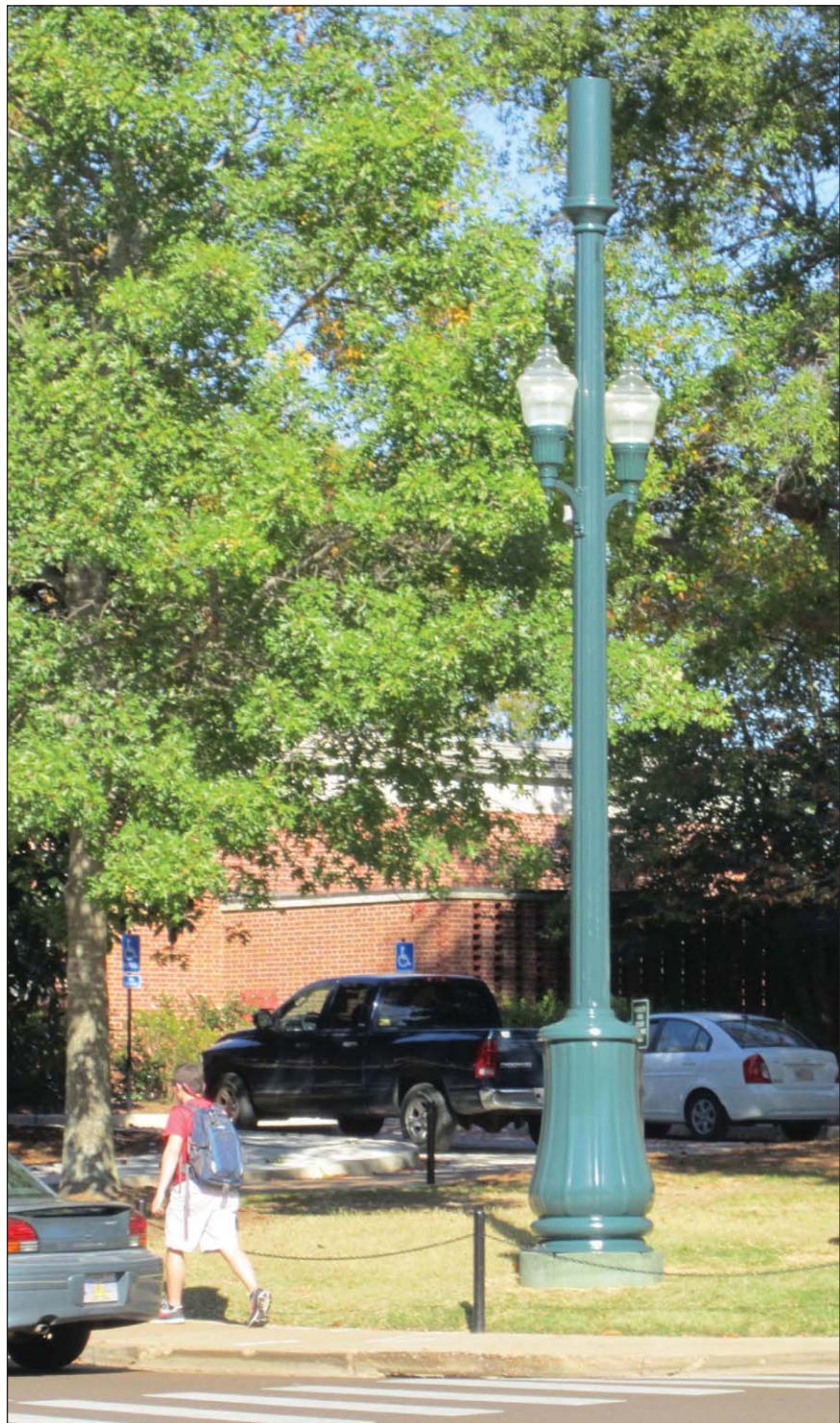


Photo 5. A light pole on the Ole Miss campus holds a canister at the top for a distributed antenna system (DAS) antenna that doesn't draw much attention.

increasingly obscure or invisible as it proliferates. Big, looming, naked infrastructure components are not likely to be accepted as the norm, even for those who haven't a clue as to what they are.

There is something to be said for having the world of all-inclusive inter-

connect at your fingertips, whenever and wherever you want it. Cloaking towers and other antenna sites helps to make that world just a little bit prettier. ■

Ernest Worthman is the owner of Worthman & Associates. His email address is ernest_worthman@ieee.org.



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With carbon-fiber tower technology and hybrid renewable power sources, a reduction in antenna-site capital and operational costs can be made, better quality can be achieved, and more robust networks result.

By Tom Andrews

The deployment of equipment and systems using the LTE (long-term evolution) wireless communications standard is a huge undertaking. The development of the digital signal processing and modulation technologies that form LTE is truly remarkable when compared with how far the actual base stations, network core and even actual antenna systems have advanced since the early, basic GSM rollouts.

However, one crucial area has not changed substantially. In fact, it could be argued that it has not changed at all — that is, the passive infrastructure for antenna sites. This is particularly the case for the actual towers. Most of today's towers are essentially the same towers built 25 years or so ago (see Photo 1).

At the moment, cost savings are achieved by tower sharing, with many examples of successful tower companies. But more limiting for LTE has been cost reduction by economy of material costs, which means weaker, less-profitable towers that may not accommodate LTE as well as existing services.

A second key aspect of the passive infrastructure is power. When the mo-



Photo 1. Tower technology has been stagnant for 20 years. Reducing cost means reducing capacity. For backup power, many sites rely on diesel generators. The capex and opex of passive infrastructure remain high.

bile phone industry becomes one of a nation's top-five consumers of diesel fuel, as is the case in India, clearly there are huge and variable sums of money going into keeping the antenna sites up and running.

The result of these factors is that with LTE comes a huge opportunity

to change many things with the latest technology, but with a passive infrastructure that is outdated, capex-intensive and opex-inefficient.

In a fashion similar to the way 3G technology did it about 10 years ago, LTE has brought a tremendous focus on wireless technology and what it delivers, such as initiatives in remote education, mobile banking solutions, health care and agriculture. These are a few of the beneficiaries of what is essentially a huge data capacity being built into a network. The use of this capacity will require the use of many more antenna sites as subscriber numbers and data traffic increase. The use of smartphones and mobile broadband features already show the increase of data traffic on 2.5G and 3G mobile communications networks.

The good news is that the vendors see this increased need for sites and are already offering low rates for radio access network and core equipment. Healthy competition is driving those costs down while maximizing technological growth.

An important aspect of any LTE strategy will be the reuse of existing network infrastructure. Ironically,

antenna site technology



Photo 2. Achieve a lower and predictable opex with outdoor base station units with fans and ventilation, heat-ruggedized base stations and batteries, and mixed renewable energy sources in the form of solar and wind power.

some of the measures taken to save money spent in earlier tower construction will now restrict what can be

erage in favor of using less-expensive sites where it wouldn't be necessary to build access roads capable of support-

done to accommodate new rollouts on existing sites. With multi-operator towers, this may mean that the LTE equipment will have to be placed farther down on the tower or the tower will need to be extended, and many towers are simply not strong enough to be extended. This is the same for rooftops where the additional weight of stub towers cannot be supported.

Many previous and current tower build methods have also resulted in the rejection of some sites with superior RF cov-

erage in favor of using less-expensive sites where it wouldn't be necessary to build access roads capable of support-

ing the heavy plant, like cranes, that would have to be moved onto the site to stack the steel.

Let's look at what can be done to reduce some of the costs while ensuring the highest quality for networks that are built. This must include looking at ways to reduce both capex and opex, with a focus on how sites are powered. The cost of providing electrical grid connections to sites is variable, and it can be expensive as more remote sites need more post and wire to connect them. In urban areas, an increasing number of sites need primary power upgrades to accommodate further telecommunication infrastructure. In areas where diesel gensets are the principal power source, the opex is also high and variable, with the cost being affected not only by the price of diesel fuel but also by the distribution network required to maintain the fuel supply. In today's highly competitive market where call rates are low and under downward pressure, opex needs to be minimized and needs to be predictable.

Several steps can be taken to achieve a lower and predictable opex. First, adopt outdoor base station units with fans and ventilation. Second, only deploy heat-ruggedized base stations and batteries.

Steps to take to achieve a lower, predictable opex

- Adopt outdoor base station units with fans and ventilation.
- Only deploy heat-ruggedized base stations and batteries.
- Include mixed solar and wind renewable power sources in the site build or refitting.
- Use shade — its free, and the heat saving obtained by putting solar panels on a frame above the outdoor unit to keep it in shade is notable.

Steps to take to achieve a lower capex

- Logistics — A 100-foot GeoStrut carbon-fiber communications structure weighs 1,250 pounds to 1,550 pounds, reducing the cost of transporting it to the antenna site by 70 to 80 percent compared with a steel tower.
- Foundations — The open structure of carbon fiber has a high ratio of strength to weight that allows the use of smaller foundations. Sometimes screw-pile technology can be used with suitable ground conditions, reducing the foundation cost even more.
- Build costs — The carbon-fiber structure's light weight and ease of assembly bring installation cost down as much as 45 percent compared with steel towers.



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antenna site technology



Photo 3. A carbon-fiber structure is so lightweight that a compact excavator is sufficient to move it about and stand it erect.

Third, include mixed renewable energy sources in the form of solar and wind power in the site build or refitting (see Photo 2). Fourth, use shade. It's free, and the heat saving obtained by putting solar panels on a frame above the outdoor units is notable.

Properly designed, a site can derive its power from renewable sources. Using two or more lower-rated wind plants is better than using a single 10-kilowatt wind plant because low-wind-speed performance is superior. Other notable developments include the use of hydrogen cell technology, which is fast becoming understood as a valuable tool in telecommunications networks. Mobile network operators have quality-of-service requirements, especially with LTE, so on key sites, the use of a backup electrical grid connection or diesel generator may give them reassurance.

As much as the selection of a power source can affect opex, the selection of

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the antenna support structure, whether it is a rooftop, a monopole or a lattice tower, can affect capex. But before getting into the capex savings, there are other aspects to consider besides the cost and strength.

First, the appearance is important. Public awareness and sensitivity to wireless infrastructure is growing. The strongest reaction comes from urban areas. People in rural areas tend to tolerate towers to receive the communications services delivered into their villages or townships. Urban complainers almost always refer to the perceived ugliness of the cell tower more than any other issue. The rollout of LTE may also trigger more network infrastructure sharing, which will mean larger, multiband antennas or simply more antennas. Careful consideration should be given to including camouflaged site solutions as part of the design. In Australia, even the government's national broadband network has had some of its regional wireless sites rejected by towns that would benefit greatly from being connected, simply because of the way the antenna towers look.

Second, the effect the tower may have on the natural environment is important. Some jurisdictions are paying increasing attention to the carbon footprint or environmental impact of major infrastructure projects. Steel production and recycling combined with the galvanizing process are processes that have a large carbon footprint.

Capex

One answer to reducing capex is to use alternative materials in towers and support structures. Stronger towers can and should be built more quickly and easily. A 100-foot GeoStrut carbon-fiber communications structure weighs 1,250 pounds to 1,550 pounds, reducing the cost of transporting it to the antenna site by 70 to 80 percent compared with a steel tower.

The open structure of carbon-fiber has a high ratio of strength to weight that allows the use of smaller foundations. Sometimes screw-pile technology can be used with suitable

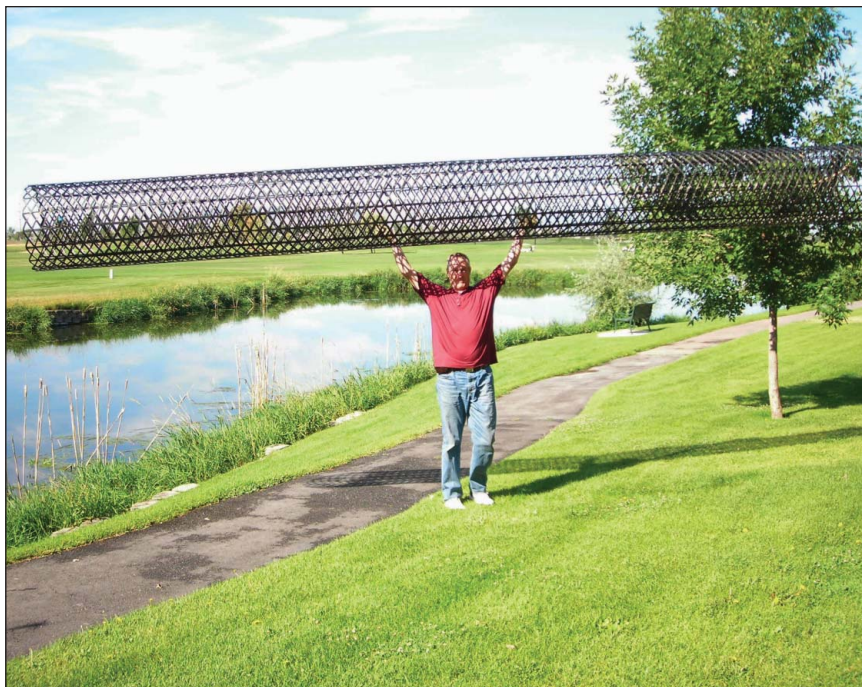


Photo 4. A 20-foot section of the carbon-fiber structure is light enough for an individual to lift.

ground conditions, reducing the foundation cost even more.

The carbon-fiber structure's light weight and ease of assembly bring installation cost down as much as 45 percent compared with steel towers. That translates into something like 1.8 to 2.1 sites built for the same cost as a comparable steel tower. Not only does this almost double the number of deployed sites for the money, but also there is a similar dramatic decrease in the time taken to build the sites.

Because the carbon-fiber tower is comprehensively stronger than steel, it has the potential to serve multiple carrier installs, which should appeal to tower owners.

For existing sites or on rooftops, the carbon-fiber structure is available in a reduced diameter. It also offers an effective way to extend the height of existing towers or monopoles, allowing more profitable use of sites.

Photos 3 and 4 show how much easier and less expensive the carbon-fiber structure is to handle compared with a steel tower.

For LTE, updating the technology used in the passive infrastructure leads to a reduced network cost with

improved product and site quality. It reduces and improves time to market. The carbon-fiber structure gives a better return on investment and maximizes RF propagation by allowing previously uneconomical sites to be built. This results in better revenue for network operators and tower companies alike.

Reducing costs

By taking a whole-of-site and whole-of-life approach that includes hybrid renewable power sources and consideration of sharing the radio access network, a real reduction can be made in capital and operational costs, better quality can be achieved, and more robust networks will result.

The choice of passive infrastructure is equally as important as the choice of radio access network equipment. No operator would allow 20-year-old wireless equipment to be part of its key asset, the network, so why would an operator allow it for the passive infrastructure? ■

Tom Andrews is the owner of Entire Network Solutions in Australia and is also the Australian distributor for Geostrut. Email: tandrews@entirenetworksolutions.com. Contact GeoStrut in the United States at (801) 356-1311, or visit www.geostrut.net.

q&a

Deployment Promises Growth in a World of Small Cells and DAS

By the AGI Staff

During the AGI Wireless Infrastructure Conference in Dallas, AGI interviewed Lou Olsen, president of 180 Logistics. Here are his remarks, edited for length and style.

AGL: Tell us a little bit about 180 Logistics.

Lou Olsen: Our company was formed to focus on the deployment aspects. We build ground furniture, we integrate and we do the deployments. We focus on a niche of small cells and DAS, both indoor and outdoor.

AGL: Tell us something about your background.

Lou Olsen: I've engineered systems all over the world. I've deployed systems all over the world. I got my start in the industry with a company called LCC when it was small, at the beginning of the industry when propagation was a critical piece of the equation. I've been chief technology officer for some of the wireless companies. Now, I'm on the deployment side. This

is the right place to be — deployment and integration are the right places. They are where some of the more critical thinking needs to occur. I don't think deployment and integration have been addressed like some other parts of the industry. Tremendous engineering has been applied to the way the networks are laid out and the way the networks carry data and voice, and the deployment phase has always been left after the fact and kind of thrown over the fence for somebody else to deal with. The time is now for the industry to focus more on the deployment aspects.

AGL: What does 180 Logistics do that makes it different?

Lou Olsen: We are attached to a massive manufacturing capability. We have a small group of mechanical and RF engineers, and we customize



the products. The result then goes into the massive manufacturing capability, a Tier 1 manufacturer for other industries, and we bring that type of capability to the wireless industry.

We offer some unique features. For example, we offer a 14-day turnaround. For a custom product, a custom enclosure, an outdoor antenna bracket, doing that in 14 days is pretty amazing. Small cells, an architecture that, compared with towers, is more building-focused, and it uses light poles and telephone poles. Small cells lack the standardization that we enjoyed in the past with towers where

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you have a couple of tower legs with coax going up them. That doesn't occur with light poles, telephone poles and buildings. With small cells, everything is unique. The industry has to be able to support that, and that's where we are different.

AGL: Who are the principals in the company?

Lou Olsen: Patrick Cochran, who is a talented mechanical engineer, Jimmy Thompson, who owns a large manufacturing facility, and me.

AGL: Give us an idea of the types of things you're putting into boxes.

Lou Olsen: What we're putting in boxes ranges all the way from battery backup units to electronics, to HVAC systems, to antennas.

AGL: Do you do the installation of the equipment at your facility and the turn-up and commissioning?

Lou Olsen: Absolutely. We found that when you have the product, it requires a lot of integration, and shipping products back and forth becomes ex-

pensive. We created the capability to do the integration in our facilities, so we manufacture the ground furniture, the housings, and we purchase all the materials, the electronics, and we integrate it all together, test it, and if needed, we can deploy the equipment.

It is interesting the kinds of things we end up putting into the boxes and integrating. So many times we are building an outdoor box to house someone else's outdoor box. It's funny when you think about it, and unless you deploy a lot of things, you don't really notice this, but manufacturers create these boxes that are designed to go outdoors. They take power and antennas and all of that. But you still have to have power systems and network monitoring, and in the small-cell environment, you can't have those components located all over the place. They all need to be in one place. So we find ourselves, many times, in a single housing or configuration, integrating the power, network monitoring and

the outdoor electronics all into another outdoor box.

AGL: How do you see the services side of the industry unfolding with

Services are a great place to be. The traditional infrastructure markets of the manufacturers of infrastructure are becoming — and LTE is key to this, and smaller cells — a real commodity.

increasing the number of sites out there? It would seem services would be the place to be.

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Lou Olsen: Services are a great place to be. The traditional infrastructure markets of the manufacturers of infrastructure are becoming — and LTE is key to this, and smaller cells — a real commodity. LTE is available from a number of places. It is very standardized. There is going to be a massive shift to the services side. The carriers are stepping away from the infrastructure. They're now willing to hand off their services to other companies.

are engineered so they can be built with aluminum or stainless steel, they can be powder-coated any color. It's the same with antenna brackets. A lot of flexibility is engineered in as we go through the design process.

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AGL: Coming off of Hurricane Sandy, it was evident the industry had many of the same problems it had with Hurricane Katrina. Have we learned any lessons? Where are we going?

Lou Olsen: As far

as the reliability of the network is concerned, it is amazing how many cell sites failed. We hear 25 percent, maybe more. A big number is attributed to electrical power failure, and some to backhaul failure. When you think how long the wireless industry has dealt with power and backhaul reliability problems, you would think that we would have learned our lesson. But unless there is a concerted effort or the carriers are forced into it, improvement will not happen.

AGL: Do you think a previously proposed 8-hour backup requirement will be revisited?

Lou Olsen: I suspect it will be discussed in the coming months. But what is interesting about that is when the 8-hour requirement first was proposed, many carriers reacted rapidly and heavily. Then six to 12 months into it, the FCC seemed to back off slightly. And it just stopped. All the generator builds, all the deployments that were focused on reliability backed off.

Part of it is the mindset of the industry. We've always built our networks, and we know in a cellular network with frequency reuse and a huge number of cell sites, you can afford

to lose a cell site. You don't want to, and there are negative consequences. But you can afford to lose a cell site. The industry has relied on that as the reliability factor.

With massive storms such as Sandy, you take out huge swaths, and the network was not designed for that. It was not intended to resist that type of failure.

AGL: We're going to have an explosion in the number of points transmitting RF energy. Can you reflect on where things are going?

Lou Olsen: The number of points that are transmitting is going up massively. It's great. There are some real challenges to it. Backhaul is a big problem. Also power. Getting power and backhaul to all these new sites is going to be a real challenge and a real opportunity. As we're lowering the rad centers and getting things closer to where individuals are, where the demand is for data and voice, it is going to significantly improve the quality of the network.

The massive ramp-up of data is real. The only way to address that is with more transmission points. It will happen. It will happen relentlessly. There will be many opportunities and many creative approaches to providing that capacity.

For 180 Logistics, it's a great opportunity because as you lower the rad centers, you start getting into tremendous variation in the type of structures the antennas are on. It could be a billboard. It could be a bus stop. It could be a telephone pole. It could be a light fixture or light pole. It could be the side of a building. The variation is huge, and that creates new demand.

AGL: Give us a prediction.

Lou Olsen: The term "small cells" will never be defined. Small cell always is a relative term. There were always boomer sites, and there were always small sites. The terminology for a small cell will always be the same — it's a smaller version of a macro cell. The capabilities are the same; small cells just cover smaller areas. It's just a matter of dimensions. ■



AGL Online Video

Watch Lou Olsen's interview online at www.agl-mag.com/aglvideos.

The industry has overlooked the engineering that should be applied to deployment.

So, services and deployment both are exciting.

AGL: Do you compete on quality, delivery time or price?

Lou Olsen: We compete on two things. Pricing, because we are competitively priced with N1. We're a U.S.-based manufacturer, but we have massive capabilities to manufacture. We leverage that massive capability to keep our prices down. The other area is high speed with customization, because we offer a 14-day turnaround from the time the purchase order is cut until we deliver. That's almost unheard of. Even standard, off-the-shelf products are hard to get in 14 days.

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AGL: Are you using different materials, or are you using what everyone else uses, and it's just how you integrate it that is the secret sauce?

Lou Olsen: Many of our enclosures



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Company description:
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Newbury, OH 44065
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Types: monopoles, Camouflaged

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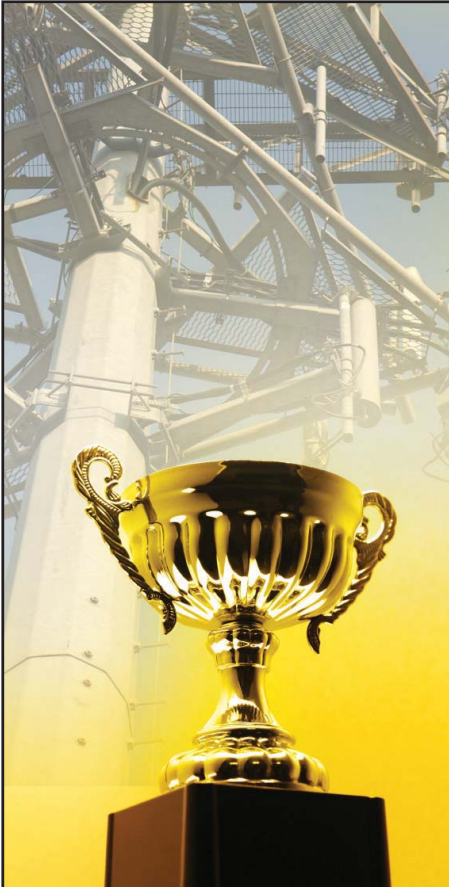


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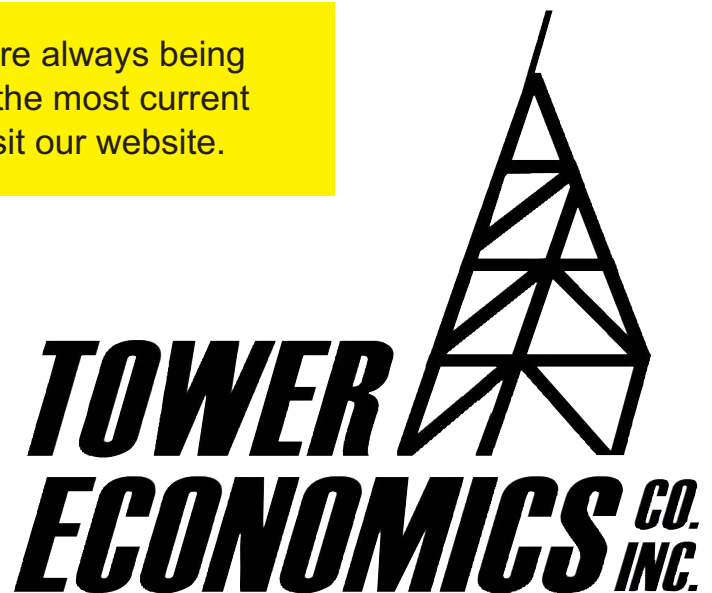
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jtallman@towereconomics.com



www.towereconomics.com

(856) 786-7200

Fax: (856) 786-7450

700 Professional Plaza, Suite 204

700 Route 130 North

Cinnaminson, NJ 08077

buyers guide

LARSON

Larson Camouflage

1501 S. Euclid Ave.
Tucson, AZ 85713
Tom Feddersen
(520) 792-1686
info@larsoncamo.com
www.larsoncamo.com

Types: camouflaged, concrete/silo, water tower, rooftops

Company description:

Larson pioneered cellular camouflage with the first monopine cell tower in 1992 and has been leading the industry ever since. Product offerings include pines, palms, elms, cypress, cacti and rooftops. Larson also refurbishes trees with field installed bark, branches and fronds.



Nello

211 W. Washington St., Suite 2000
South Bend, IN 46601
Kevin Goggins
(574) 288 3632
sales@nelloinc.com
www.nelloinc.com

Types: guyed, self-supporting, monopoles, transportable, camouflaged



Peabody RFTC Concealment

13435 Estelle St.
Corona, CA 92879
Mark Peabody
(951) 734-7711
sales@peabodyconcealment.com
www.peabodyconcealment.com

Types: self-supporting, monopoles, camouflaged, concrete/silo, water tower, rooftops, cupolas, brick walls, steeples, clock towers, Spanish rooftops

Company description:

Peabody RFTC Concealment is the leader in prefabricated cell site concealment enclosures, offering design, engineering and fabrication of custom-built antenna screening products. Large prefabricated sections install in hours versus traditional build-on-site enclosures that take

days or weeks, saving you thousands in installation costs. Peabody will build to match existing architecture to help pass zoning and siting regulations for easy permit approval.

See ad on page 52



Pepero

671 Colbert Ave.
Oil City, PA 16301
Kelly Lander
(814) 676-5688
klander@peprollc.com
www.peprollc.com

Types: self-supporting, monopoles, transportable

Company description:

Pepero is the leading manufacturer of patented shielded enclosure and tower systems for stationary and mobile applications. Pepero's patented, unguyed, articulated tower allows for vertical separation of antennas and easy deployment and meets TIA/EIA-222-G wind load standards. Pepero is a veteran-owned, small business in Oil City, Penn.

See ad on page 44



Sabre Towers and Poles

2101 Murray St.
Sioux City, IA 51111
Mike Coghlan
(800) 369-6690
towerinfo@sabreindustries.com
www.sabretowersandpoles.com

Types: guyed, self-supporting, monopoles, transportable, camouflaged, rooftops

Company description:

Sabre Towers and Poles designs and manufactures guyed towers, self-supporting towers, monopoles and concealment structures. In addition, the company provides turnkey construction, and tower and monopole modifications including structural analysis, modification design, fabrication and installation. Sabre Site Solutions, the company's components division, offers a full line of tower parts and accessories.

See ad on page 15



SOLAR COMMUNICATIONS
INTERNATIONAL

Solar Communications

8885 Rio San Diego Drive, Suite 207
San Diego, CA 92108
Robert Renfro
(619) 243-2750

rrenfro@rfrtransparent.com
www.rfrtransparent.com

Types: camouflaged, water tower, rooftops

Company description:

Solar Communications offers an array of concealment products and services for integrating wireless infrastructure into the community character, making SCI products the ideal choice in any setting.

See ad on page 39

Sollenberger Silos

5778 Sunset Pike
Chambersburg, PA 17202
Bob Francis
(717) 816-4592

silobob@yahoo.com
www.sollenbergersilos.com

Type: concrete/silo



Stainless

1140 Welsh Road, Suite 250
North Wales, PA 19454
Ed Deetscreek
(215) 631-1323

ed.deetscreek@stainlessllc.com
www.stainlessllc.com

Types: guyed, self-supporting, monopole

Company description:

Stainless provides design, engineering, fabrication and installation for a complete line of guyed and self-support towers and monopole structures, under extreme conditions. Stainless also offers analysis, modification, maintenance, repair, mapping and inspections to upgrade existing structures, as well as 24-hr service for emergency situations with its own experienced, safety-trained crews.

When you join the Wisconsin Wireless Association, you help to make a difference.



Through donations to the General Federation of Women's Club's Wisconsin chapter, the Wisconsin Wireless Association helps to purchase pediatric jump bags for use by Wisconsin ambulances. Pediatric jump bags help to save the lives of small children because medical requirements for small children often differ from those of adults. The right equipment optimizes the care that the responding team is able to provide.

Wisconsin Wireless Association

Promoting awareness

The Wisconsin Wireless Association helps to promote positive awareness about the wireless infrastructure industry by representing the industry at the Municipal Treasurers Association Annual Conference and the League of Wisconsin Municipalities Annual Conference.

The Wisconsin Wireless Association is participating in the Public Service Commission of Wisconsin's development of a statewide broadband plan, "Wisconsin's Playbook for Broadband Progress."



Wisconsin Wireless Association

wisconsinwireless.org

ACTIVITIES

- April 11** Annual Telecom Education Conference in Madison
- June 26** Brewers-Cubs Tailgate Fundraiser in Milwaukee
- Sept. 19** AGL Regional Conference in Chicago
- Oct. 16** League of Wisconsin Municipalities in Green Bay
- Dec. 5** Holly Jolly Trolley Tour Fundraiser in Milwaukee

A public service ad from AGL
Photo courtesy of R&B Fabrications

buyers guide



STEALTH® FIRST IN CONCEALMENT

Stealth Concealment Solutions

6549 Fain Blvd.
North Charleston, SC 29406
Cindy Wishart
(800) 755-0689 ext. 124
cindywishart@stealthsite.com
www.stealthconcealment.com

Types: camouflaged, concrete/silo, water tower, rooftops

Company description:

In 1992, Stealth Concealment Solutions engineered and constructed the wireless industry's first antenna concealments. Stealth's architecturally sound and aesthetically pleasing antenna concealment systems assist you in receiving quicker zoning and building owner approvals. Speedy approvals translate to faster site revenues. The company's extensive product line offers a disguised solution for any wireless carrier, landlord, zoning board and community. Stealth solutions are literally out of site.

See ad on page 13

Swager Communications

501 E. Swager Drive, P.O. Box 656
Fremont, IN 46737
Dan Swager
(260) 495-2515
dan@swager.com
www.swager.com

Types: guyed, self-supporting, rooftops

Company description:

Swager Communications specializes in the design, manufacture, installation and maintenance of communications towers while considering each site's unique requirements. Turnkey site construction means customers receive fully functional, finished products. Swager Communications is a HUBZone-certified small business and holds GSA Contract # GS-03F-0105Y.

Tower Solutions

1150 Holstein Drive NE
Pine City, MN 55063
Allen Karson
(480) 315-8830
akarson@towersolutionsinc.com
www.towersolutionsinc.com
Types: guyed, monopole, rooftops

Company description:

Tower Solutions creates totally automatic self-erecting towers. Included in the Tower Solutions inventory are an 80-foot (24-meter) tower with a 2,000-pound (907-kilogram) payload capacity, a 40-foot tower with a 250-pound (113-kilogram) payload capacity (available by the end of 2013) and a 20-foot tower with a 150-pound (68-kilogram) payload capacity.



US Tower

1099 W. Ropes Ave.
Woodlake, CA 93286
Bob Swiney
(559) 564-6000
bswiney@ustower.com
www.ustower.com

Types: guyed, self-supporting, monopoles, transportable, camouflaged, rooftops

Company description:

US Tower is a leading designer and manufacturer of mobile and fixed towers including, SSTs, telescoping towers, and monopoles. The company is ISO9000- and AWS-certified. US Tower has supplied towers globally for military and commercial purposes for almost 30 years. It has in-house design and structural engineering capabilities. Contact US Tower today.

Valmont Industries

28800 Ida St.
Valley, NE 68064
Sean Gallagher
(503) 589-6616
towers@valmont.com
www.valmont-towers.com

Types: guyed, self-supporting, monopoles, transportable, camouflaged, water tower

See ad on page 29



Vector Structural Engineers

9138 S. State St.
Sandy, UT 84070
Roger Alworth
(801) 990-1775
roger@vectorse.com
www.vectorse.com

Types: self-supporting, monopoles, transportable, camouflaged, concrete/silo, water tower, rooftops

Company description:

Vector Engineers provided engineering services for over 1,000 telecommunication structures in 2012. Vector Engineers understands the design criteria, the materials and the methods of construction unique to the industry. With its main focus being customer satisfaction, and being licensed in 50 states, it is a leading designer in the telecommunication industry.



WESTERN TOWERS

Western Towers

320 W. 26th St.
San Angelo, TX 76903
James Bird
(325) 658-6539
james.bird@westerntowers.com
www.westerntowers.com

Types: guyed, self-supporting, monopoles, rooftops, tilt-down and custom designed



World Tower

1213 Compressor Drive
Mayfield, KY 42066
Brent Walker
(270) 247-3642
brent@worldtower.com
worldtower.com
Types: guyed, self-supporting, transportable, rooftops

New Jersey Wireless Association donates fundraising proceeds to the Wounded Warrior Project



New Jersey Wireless Association members pose with a \$10,000 check for the Wounded Warrior Project.

From the left: Jim Kudless, Rob Ivanoff, Matt Bartlett, Peter Broy, Dominic Villecco, Tony Suppa, Gail Goldman, Michael Lee Foster

The mission of the Wounded Warrior Project is to honor and empower wounded warriors. The purpose is to raise awareness and to enlist the public's aid for the needs of injured service members, to help injured servicemen and women aid and assist each other, and to provide unique, direct programs and services to meet their needs. Thousands of wounded warriors and caregivers receive support each year through Wounded Warrior Project programs designed to nurture the mind and body, and encourage economic empowerment.

NEW JERSEY WIRELESS ASSOCIATION

Activities

June 18

7th Annual Charity Golf Outing
Forsgate Country Club, Monroe Township

September 19

Quarterly Educational Luncheon

Important Contribution

The New Jersey Wireless Association was instrumental in the enactment of New Jersey collocation legislation.

Award

The New Jersey Wireless Association received the Gold Medal in the 2012 State Wireless Association Program Olympic Games, a program created to encourage participation, communication and unity among state wireless associations.



newjerseywireless.org

A public service ad from AGL

product showcase — site concealment and camouflage



Concealment Product Line

Sabre Towers and Poles designs and manufactures concealment products that improve upon the design of the company's slimline poles to provide increased capacity and reduced costs. Featuring internal, bolted connections with antennas hidden inside the structure, the poles can be disguised as cross poles, light poles, stadium lights or flagpoles. The concealment products are designed to meet the client's requirements and to assist in the zoning approval process. www.sabretowersandpoles.com

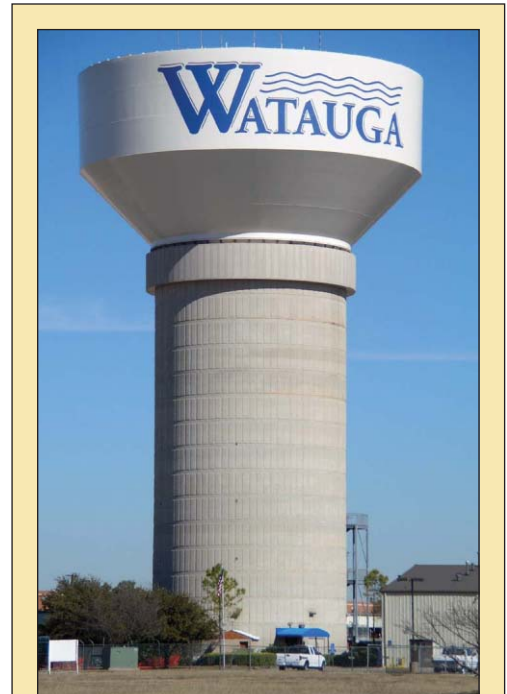
Camouflage and Concealment Products

Environmental Integration has developed a wide range of industry-standard concealment products and unique integrations to solve clients' problems. The products resemble natural and architectural elements. Examples include monopines, monopine extensions, cupolas, penthouses, steeple components, fiberglass tree bark, fiberglass chimneys, fiberglass flagpoles, panels and facades, supportive structures, ventilation structures and novelty concealments. Using fiber-reinforced polyester, paints and foliage proven for their durability, EI uses fabrication methods that result in products that match or surpass industry standards for RF transparency. www.environmentalintegration.com



PVC RF-transparent Enclosure

ConcealFab RF-transparent shelters and enclosure systems are engineered from polyvinyl chloride (PVC) materials and construction methods that are prefabricated and assembled into common-looking architectural shapes that blend into any rooftop. RF-driven designs provide a greater clear-span between structural members to increase RF-transparency. All structures are built in the factory prior to shipping to ensure a proper fit and trim. The result is a low-cost, knockdown product that is customized to meet site requirements. www.concealfab.com



Camouflaged Antennas on Working Water Tower

As the tallest structure in the Watauga, Texas, area, this 2-million-gallon water tower had become encrusted with wireless antennas, affecting the structure's aesthetic appearance. **Stealth** designed 88 RF-transparent panels from its proprietary **StealthSkin V** material. Designed to mimic poured concrete, the resulting edifice hides the hardware without impeding the wireless communications signal. www.stealthsite.com

Clock Tower

Camouflaged communication towers and monopoles by **Valmont** provide customers with comprehensive data coverage while preserving natural vistas and accenting themes for property owners. Shown here is an 11-foot-wide and 40-foot-tall clock tower built by Valmont and designed for three carriers. It has a 4-foot-diameter working clock. It was installed at Westminster, Colo., in the fall of 2011. www.valmont-towers.com





Come to the Carolinas Wireless Association's

8th Annual Charity Golf Tournament

Thursday, May 16

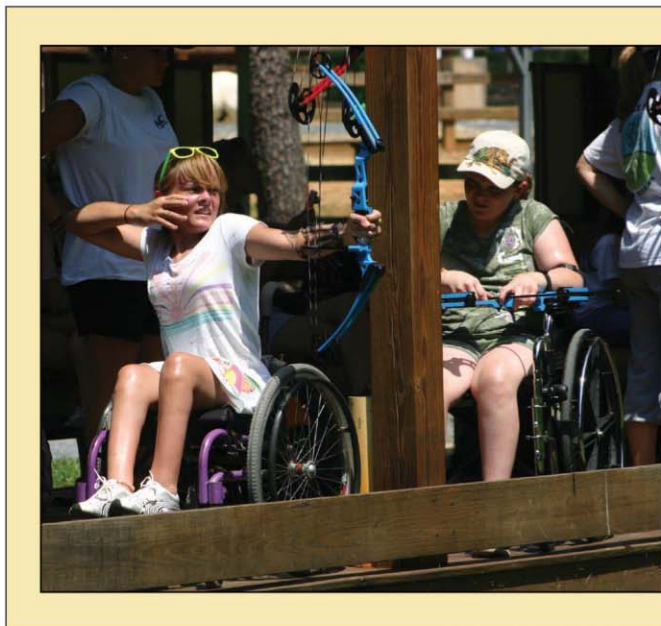
Pinehurst Country Club, home of the 2014 U.S. Open

Proceeds go to benefit Victory Junction



Carolinas Wireless
ASSOCIATION

carolinaswirelessassociation.com



Victory Junction

Victory Junction is a year-round camping environment for children, ages six to 16, with chronic medical conditions or serious illnesses. Founded by Kyle and Pattie Petty, in honor of their son Adam, the camp is located in Randleman, N.C. Victory Junction offers programs for a range of disease groups and maintains strong relationships with more than 30 partner hospitals.

Victory Junction's mission is to provide life-changing camping experiences that are exciting, fun and empowering, in a safe and medically sound environment, always free of charge. As a not-for-profit organization, the camp operates solely through the support of generous individuals, foundations, organizations and corporations to provide this experience at no charge to children and their families.

Since the camp's inception, more than 17,000 children and families have received not only a circle of support but experiences thought to only be possible by healthy children.

A public service ad from AGL

product showcase — site concealment and camouflage



RF-Transparent DAS ConcealFab's RF-transparent utility Poletoppers, side-arm radomes and breakaway monopoles are designed for use in public rights of way to protect and conceal DAS node equipment from harsh environments and public detection. The company handles the complete process making standardized RF-transparent DAS concealments designed around the latest RF component equipment, from schematic design to factory fabrication.
www.concealfab.com

Hybrid Power System Technologies Caterpillar offers a wide range of hybrid telecom systems that provide power solutions incorporating renewable resources, including solar photovoltaics, wind turbines, batteries, diesel or gas generator sets and power electronics. By using available renewable resources and operating the generator set at peak efficiency points, hybrid power systems provide reductions in total owning and operating costs, decreasing fuel consumption and maximizing system reliability.
www.cat.com

Monotree Concealment
The patented MonoEucalyptus design from **Solar Communications International** provides monotree concealment that allows the carrier to achieve horizontal diversity. This design has become popular with city planners and zoning managers.
www.rftransparent.com

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Architectural Concealment

Peabody Concealment designed and engineered this RF-transparent concealment for a customer in Santa Rosa, Calif. It was built to match the existing building's architecture and includes faux stained-glass windows. The concealment was prefabricated as one piece for ease of shipping and installation. Prefabricated concealments save on installation costs compared with traditional build-on-site solutions. Peabody Concealment offers custom-designed cupolas, clock towers, parapet extensions, brick walls, roof tiles and radomes.

www.peabodyconcealment.com



Tree Camo Rehab

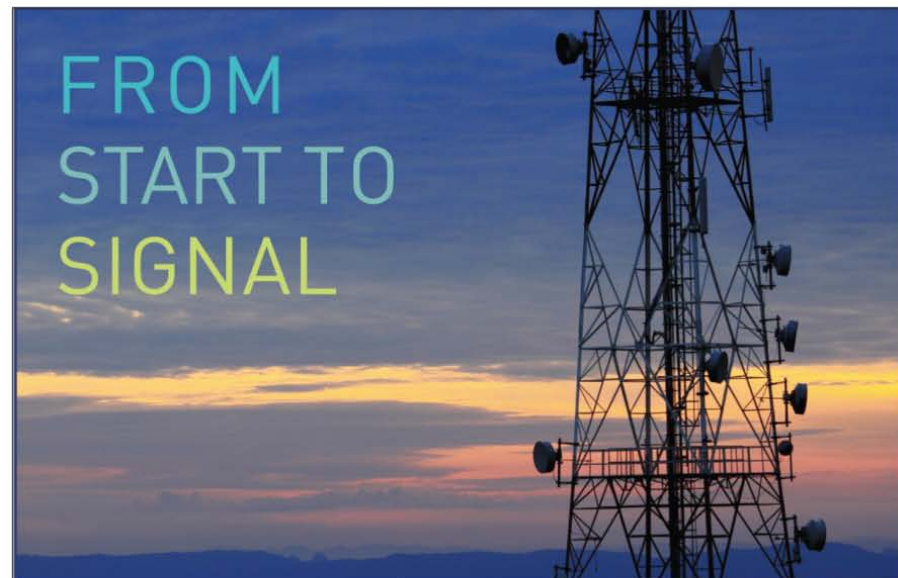
Cell Trees rehabilitates existing camouflaged sites, either for adding more carriers' antennas, upgrading the sites or simply giving them a facelift to satisfy requirements of local jurisdictions. In this before-and-after comparison, the company removed old branches, welded on 46 new branch receivers, and installed 158 new branches, 26 pine antenna covers and 60 pine antenna-tip branches.

www.celltreesinc.com

Structural Disguises

FWT has developed a host of concealment products that include the Tree-Cell tree-shaped cell site, flagpoles, bell towers, towers with cladding, and multileg concealment structures. Increased coax capacity is achieved by using multileg designs, which are capable of supporting up to six carriers. The structures can be custom-painted. Internal platforms feature grating and handrails to make antenna installation easy and safe. The RF-transparent panels disguise the multiple levels of antennas and are available blank or printed with company or school logos. FWT's engineering professionals can custom-design a structure.

www.fwtinc.com



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advertiser index

AGL Bulletin.....	35	Metal and Cable	45
AGL Wireless Infrastructure Conferences.....	30-33	National Association of Tower Erectors	inside back cover
Allstate Tower	70	New Jersey Wireless Association.....	65
AnchorGuard	70	OSHA.....	26
AT&T.....	11	Peabody RFTC Concealment.....	52
Auto Alliance.....	40	Pepro	44
BB&T – Atlantic Risk Management.....	12	Raycap	51
Black & Veatch	17	Sabre Industries	15
Cancer Project.....	46	SBA Communications.....	back cover
Carolinas Wireless Association	67	Shulman Rogers.....	70
Cell Trees	25	Slatercom-WCD.....	70
ConcealFab.....	5	Solar Communications	39
Dynamic Environmental Associates	55	Specialty Tower Lighting.....	44
Ehresmann Engineering.....	40	Stealth	13
Engineered Endeavors.....	35	Telewave.....	inside front cover
Federal Emergency Management Agency	68	Tower & Small Cell Summit	57
Flash Technology.....	41	Tower Economics	61
FWT.....	26	Trojan Battery.....	7
Hughey & Phillips	28	Valmont Structures	29
ITL.....	52	Waterford Consultants.....	69
MasTec.....	21	White Buffalo Environmental	70
Media Venture Partners.....	27	Wisconsin Wireless Association	63

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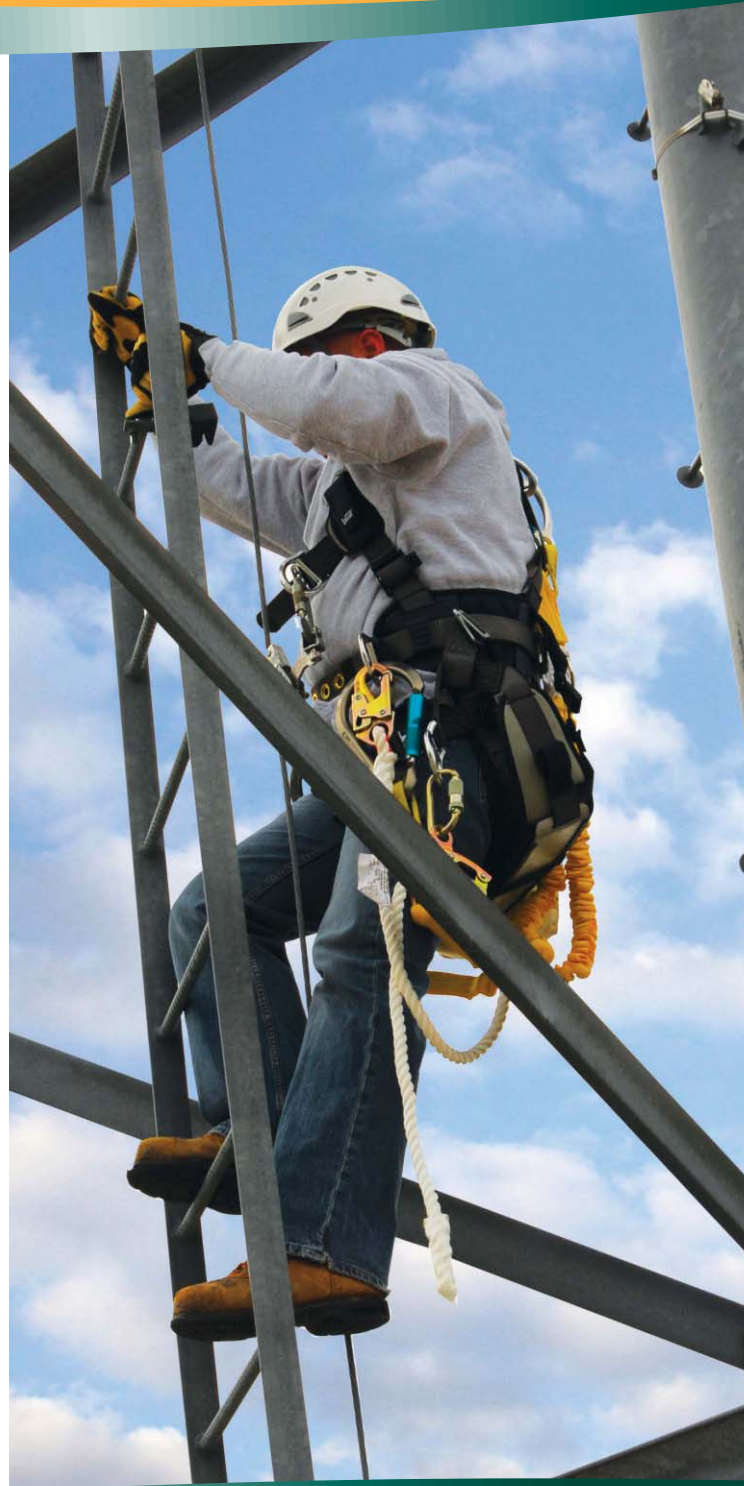
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