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**Special Concealment  
and Camouflage Issue**

*Creative Concealment Solutions*

*Camouflage Coming of Age*

*Portable Telescoping Masts*

*Tower Manufacturing Companies*

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April 2014 /// Volume 11 /// No. 04



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# *agl* Magazine™

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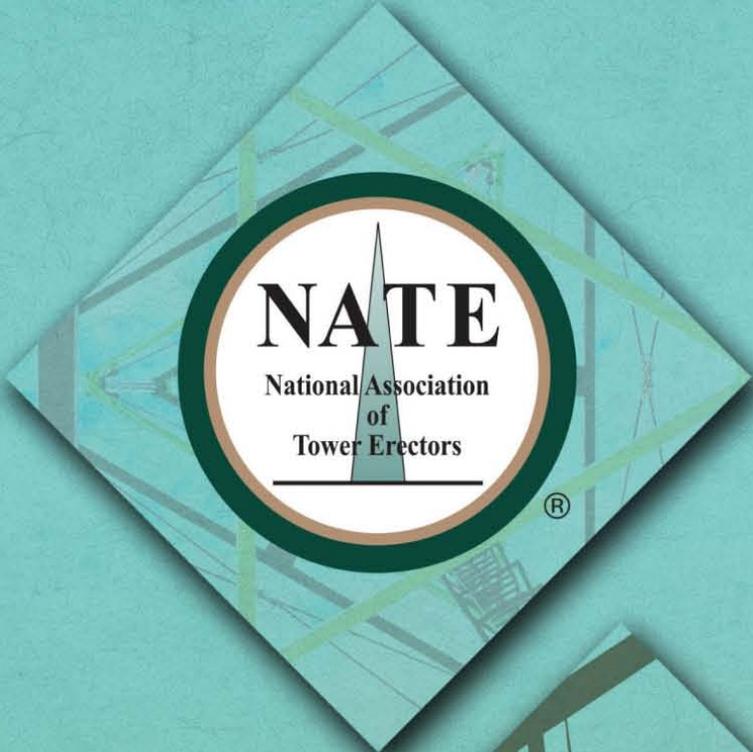
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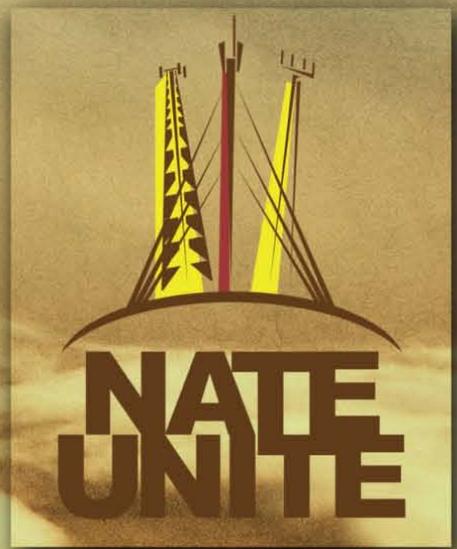


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AGL Magazine (Above Ground Level) is published 12 times a year by AGL Media Group Inc., 201 Loudoun St. S.E., Suite 202, Leesburg, VA 20175, and is mailed free to qualified individuals in the United States of America.

POSTMASTER: Send address change to AGL Media Group Circulation Department, 201 Loudoun St. S.E., Suite 202, Leesburg, VA 20175.

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# 100 Percent Tie-off



The mood at the NATE Unite 2014 convention was festive and celebratory — festive with three receptions (a luau, a beach party and a fiesta), and celebratory as the association marked its 20th year and gave a lifetime service award to Bill Carlson, who brought together the first group of tower contractors to form the National Association of Tower Erectors in 1995.

Dedicated to fostering safety through improved training, equipment and supervision, NATE has reason to be proud of its achievements. “I remember when the safety equipment was nothing more than a waist belt, and the training was someone saying, ‘Don’t fall off the tower,’” a tower construction company manager told me.

Today’s tower hands wear about 40 pounds of personal protective equipment intended to stop them from falling very far, should their grip or footing fail. Workers are trained in how to rescue one another from towers to save precious minutes that might be lost while waiting for high-angle rescue first-responders. Nevertheless, in 2013, 13 tower hands lost their lives to injuries sustained at tower sites, mostly from falls, and four have died this year.

The U.S. Department of Labor’s Occupational Safety and Health Administration, the main federal agency charged with enforcing safety and health legislation, continues to take notice of a high rate of illness,

injury and mortality associated with tower construction and maintenance and the services provided to wireless carriers and broadcasters at tower sites. Under the legislation, workers are entitled to working conditions that do not pose a risk of serious harm.

Although OSHA seems to recognize and to at least somewhat appreciate NATE’s safety programs, the federal agency focuses attention on employees through enforcement actions taken against their employers. Maybe OSHA signaled a heightened enforcement focus when it ended its partnership program with NATE, although the two organizations continue with a level of cooperation.

NATE is there to help employees with safety and to help employers deliver equipment, training and supervision necessary to protect employees while helping employers avoid OSHA violations. The safety objectives of OSHA and NATE may be the same, but they take paths that sometimes may be slightly different.

At its convention, NATE asked tower technician employers to commit to 100 percent tie-off, extending a campaign it started in 2009 that asked members to pledge to use 100 percent tie-off. Twenty-two employers affirmed their commitment, including manufacturers, general contractors, wireless carriers, tower owners and direct employers of tower technicians. OSHA could be happy with that.

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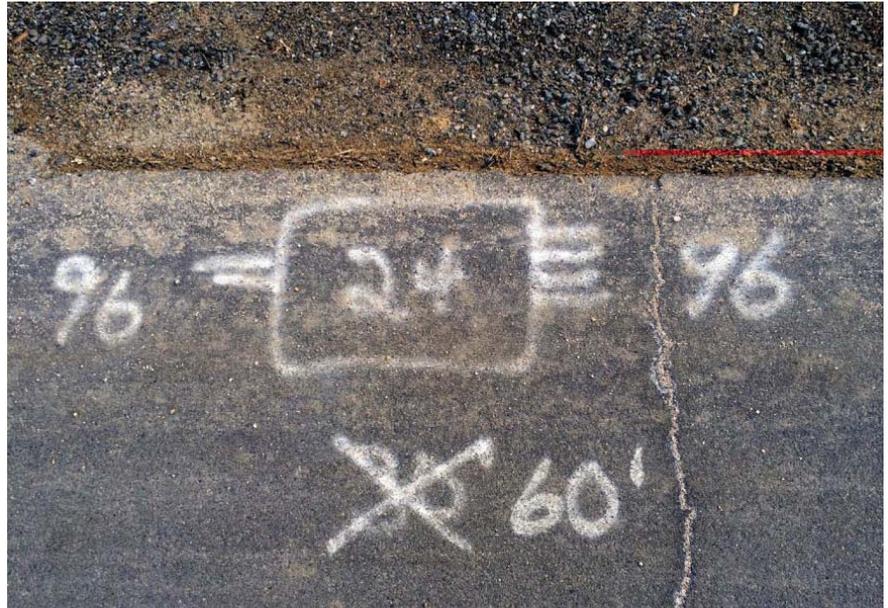
# Buzz for Backhaul and Capacity

As things continue to expand in our little industry, the buzz continues for backhaul and capacity. The more-urban areas are exploding with fiber projects and with finding

ways to take data traffic off of the macro network. If the way turns out to be pushing data traffic onto Wi-Fi one day, the carriers would be

happy, but that seems to be a technologist's solution, not one that the end users seem to be embracing. At least next-generation Wi-Fi standards will make authenticating much easier and will facilitate handing over the connectivity when devices move from the proximity of one Wi-Fi site to another. Using Wi-Fi will feel more like using cellular communications. And then, hopefully, it becomes almost insignificant which frequency or technology is delivering the bits to the devices.

We're beginning to hear rumors of 5G cellular service development. It is way too early to figure out what the waveforms and capabilities are truly going to be; however, in time we will see the turndown of 2G technologies. AT&T publicly stated a timeline for the turndown of GSM service. 5G is looking as though it won't be all that dissimilar to LTE in waveform and technology, and it will aggregate data traffic across multiple frequencies, possibly across carriers, and possibly across multiple technologies, all working toward delivering even more megabits of data to every device.



Alien landing pad? No, a sign of a pending fiber-optic cable drop.

The ability of wireless networks to consume, transmit and deliver orders of magnitude more data is a future that is not that far away.

I saw something that had been drawn on the pavement when I was out for my morning walk the other day (see photo on this page). At first, it looked like what an alien landing pad might look like, but closer inspection reveals the drawing indicates how many fibers should be dropped for customer access. It's very exciting to see a fiber drop coming to my neighborhood. I'm not sure we're going to need even as many as 48 fibers in my rural area, but it is good to know a fiber-optic cable is coming.

As I write this, we have just wrapped up the first 2014 AGL Regional Conference. I must say we're doing good and having fun. We're expanding our topics to include better coverage of small

cells, and we're able to cover some of the FirstNet topics, too. We've been lucky enough to have excellent speakers on these topics, and we've lined up another excellent slate of speakers for our June 19 conference in Maryland, very near Washington, D.C.

Make sure to join us for the PCIA Wireless Infrastructure Show, May 19-22, in Orlando, Fla. We'll be there in force, interviewing people, attending the sessions and having a great time. Please make sure to drop by our exhibit and let us know how we're doing.

**Rich Biby, Publisher**  
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# Wireless Industry, Municipalities Spar Over FCC Proceeding

By J. Sharpe Smith

Representatives of the wireless telecommunications industry applauded the latest FCC notice of proposed rulemaking (NPRM) about improving wireless facilities siting policies. Sometimes called the Mega-NPRM because of its extensive list of proposed actions, the NPRM set out an agenda to speed up zoning for small cells, tower modifications and collocations. The FCC received many comments in the proceeding on or near the filing deadline in early February. Among them were comments from associations representing local governments that expressed their opposition. The NPRM builds on the FCC's Broadband Acceleration Initiative, which was begun in 2011 to look at reducing the obstacles to wireless siting.

## Environmental Rules

The FCC expressed a desire to update its environmental rules to keep up with the evolution of wireless technology toward smaller, less intrusive siting. To reduce the cost and delay of deploying infrastructure, the FCC proposed expediting its environmental and historic property review process for small cells and Distributed Antenna System (DAS) networks that may have minimal effects on the environment. PCIA, a trade association that represents wireless carriers, wireless infrastructure providers and

professional services firms, filed a comment. "DAS and small cell installations have limited visual impacts, involve minimal ground disturbance and generally occur in existing public rights of way where

deployment does not occur as quickly as industry would like," NATOA's comment reads. "But not all delays are unreasonable nor are they necessarily the sole cause of local governments."

*The FCC expressed a desire to update its environmental rules to keep up with the evolution of wireless technology toward smaller, less intrusive siting.*

some ground disturbance is to be expected," PCIA wrote in its comment. "Because the environmental and historic preservation effects of such construction will be nonexistent or *de minimis*, a categorical exclusion is warranted."

## Local Government Warning

The National Association of Telecommunications Officers and Advisors (NATOA) represents local government jurisdictions and consortiums, including elected and appointed officials and staff who oversee communications, broadband and technology. In its comment, NATOA warned that proposed wireless deployments may have negative effects on the environment, historic properties and neighborhoods and should be left up to local zoning boards. "Commenters acknowledge that there may be some instances where

## Interpretation of Terms

The NPRM also proposes the long-awaited implementation of Section 6409 of the Middle Class Tax Relief and Job Creation Act of 2012. The FCC asked for interpretations of certain statutory terms in Section 6409(a), which stated "a state or local government may not deny, and shall approve, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station."

PCIA said that if the FCC fails to interpret and define the terms of Section 6409(a), a patchwork of regulations and ordinances would result that would ultimately slow the deployment process. "It is essential that the FCC establish consistent rules and avoid uncertainty by defining key terms in Section 6409(a)," PCIA wrote.



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Those terms include: “wireless,” “transmission equipment,” “wireless tower or base station,” “existing,” “collocation,” “removal,” “replacement” and “substantially change the physical dimensions.” PCIA said that the FCC should make clear that the statute’s “may not

deny, and shall approve” mandate requires approval of all eligible facilities requests without exception and without discretionary review.

NATOA urged restraint in interpreting the terms contained in Section 6409(a). The organization offered no definitions itself but

assured the FCC that it would provide guidance on definitions provided by the others. “Commenters believe that by adopting a narrow approach, such as that recommended by the FCC’s Intergovernmental Advisory Committee (IAC) and others, the Commission can strike a proper balance between increased wireless facilities deployment and local government authority and management over the public rights of way,” NATOA’s comment reads.

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### Definitions

PCIA, however, said that the FCC should take a broad approach to defining the terms, “wireless tower” and “base station.” The association disagreed with NATOA, saying the FCC should reject the narrow definitions of the IAC. “To encourage deployment on a broad variety of structures in lieu of new facility construction, the definition of ‘wireless tower or base station’ should not be artificially limited,” PCIA wrote. “For example, the FCC should adopt a definition of ‘tower or base station’ that can support any of the multiple types of wireless services.”

### Four-part Test

With regard to the controversial term “substantially change the physical dimensions,” PCIA urged the FCC to adopt the four-part test for a substantial increase embodied in the 2004 Nationwide Programmatic Agreement, which established a review process for communications towers proposed in historic areas. “To avoid the unlikely scenario where incremental and successive increases over time lead to a substantial increase in size, the FCC should limit any cumulative



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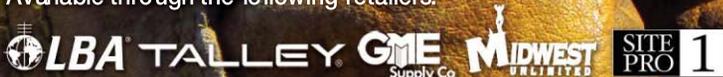
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increases to a combined total that does not exceed the guidelines," PCIA wrote. "For example, two modifications over an extended time frame that cumulatively increase the height of the tower by up to no more than 10 percent would remain an insubstantial

*NATOA urged restraint in interpreting the terms contained in Section 6409(a).*

modification." The association added that height, width and depth of additional equipment should be considered, but not color or weight.

In perhaps the most controversial item in this NPRM, the FCC requested comment on whether wireless siting applications should be "deemed granted" if the municipality or state does not act on them within a certain time frame. In particular, the FCC asked if the phrase "a state or local government may not deny, and shall approve" gives local governments any discretion to deny or conditionally approve applications beyond an administrative review. This is where the battle lines are distinctly drawn between the wireless industry and the local governments.

NATOA noted that the FCC had already rejected the idea of considering an application to be granted if the municipality had not processed it. In 2009, the FCC prescribed that wireless entities file lawsuits if a municipality fails to act within a certain time frame.

**Deemed Granted**

PCIA said it was clearly Congress's intent in Section 6409 to consider an eligible facilities request (EFR) "deemed granted" after a certain period because of the directive that states and localities "may not deny, and shall approve."

"Deemed granted is a reasonable and appropriate way of enforcing the statute when a locality violates the 'shall approve' mandate in Section 6409(a)," the association wrote. "The deemed granted remedy should, under the rules, take effect immediately upon the passage of the 45 days after an EFR application is submitted."

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# Tower Climbing and Workers' Compensation – A Crisis in the Making

By David Saul, AAI

As it often does, the start of a new year gives us pause and a chance to look back on the previous year. Unfortunately, the tower industry saw a major spike in the mortality rate for climbers in 2013.

Two primary factors contributed to this, a large influx of work from the major wireless carriers for equipment upgrades and a workforce that did not possess the required experience to work safely.

Together with other factors, the influx of work and a lack of workforce experience caused a shortage of insurance companies willing to provide workers' compensation insurance policies for the industry. The shortage mainly affects small contractors with few employees and little experience.

When analyzing a new account, insurance companies use the following criteria:

- Length of time in business
- Geographic location
- Claim experience
- Premium size
- Safety protocol

If all criteria are not met, the account probably will be declined. Further complicating the issue are these insurance industry factors:

*“Safety First” must become the standard by which companies operate from now on.*

• **Tower climbing is a restricted classification.** This means that most insurance companies will not even entertain the risk.

• **The insurance industry as a whole is in a hardening phase.** Companies are looking to increase premiums on most renewals or cancel policies altogether for underwriting reasons. Regardless of the commercials you see on TV, insurance companies are looking out for profits and shareholders first.

• **In 2013, the National Council on Compensation Insurance adopted class code 7600 for use in most states for employees who climb and work on towers.** This code replaced codes 7612 and 7601. The problem with code 7600 is that it has a lower base rate than the other two codes. Although a lower base rate is advantageous for you the client, the reduced premium makes an account even less attractive to the limited number of companies still providing coverage to the industry.

• **Insurance companies are using industry websites such as [wirelessestimator.com](http://wirelessestimator.com) as a resource.** Upon viewing this

website, you will see not only positive news about the industry but the negative as well. Unfortunately, there are more than enough stories detailing fatalities and pictures that depict climbers using unsafe climbing practices.

I recently spoke with Scott Hermesmeier, underwriter for Tower Insurance Services. His agency specifically places coverage for tower contractors. Zurich, the insurance company that underwrites the program, is taking a hard line on underwriting any new business. This is a direct reflection of the number of fatalities that occurred in 2013.

“Safety First” must become the standard by which companies operate from now on. Failure to apply strict guidelines and failure to adhere to best practices will result in a decrease of potential insurance markets. Please use the past as a lesson, and let's all promote a safe work environment for our industry.

## About the Author:

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# OSHA Calls on Industry to Eliminate Climber Deaths

By J. Sharpe Smith

In light of the 13 deaths in 2013 and four deaths so far this year attributed to fatal injuries sustained by workers at telecommunications tower sites, the Occupational Safety and Health Administration sent a letter to tower industry employers, imploring them to follow procedures for keeping tower climbers safe. The letter said that penalties would be increased for OSHA rule violations and that investigations would look more closely at multicompany sites where the rules are violated.

## Lack of Fall Protection

“OSHA has found that a high proportion of these incidents occurred because of a lack of fall protection. Either employers are not providing appropriate fall protection to employees, or they are not ensuring that their employees use fall protection properly,” wrote David Michaels, assistant secretary of labor for occupational safety and health and the administrator of OSHA. “It is imperative that the cell tower industry take steps immediately to address this pressing issue. No worker should risk death for a paycheck.”

The National Association of Tower Erectors collaborated with OSHA on the drafting of the letter. NATE distributed the letter to its membership, which largely consists of companies that construct and maintain towers and the equipment

installed on them.

“Both NATE and OSHA have the same goals in terms of advocating for workplace safety and ensuring that workers in our industry are able to go home safely each and every night,” said Todd Schlekeway, NATE executive director.

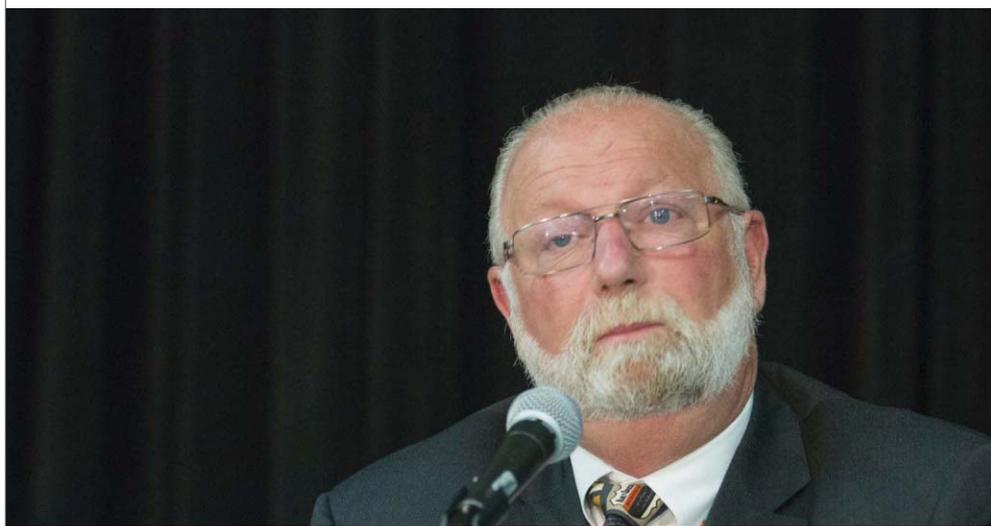
Jocko Vermillion, vice president of tower safety at Safety Controls Technology, said that he is “glad to see OSHA recognizing there is a problem and stepping up its enforcement.”

At Safety Controls Technology, Vermillion is a tower safety specialist and OSHA trainer. He spent 10 years working as a national tower expert with OSHA. Now that he is working in the private sector, Vermillion helps tower companies to improve

their safety programs, making sure they follow OSHA standards.

OSHA is increasing penalties by categorizing all citations as “willful violations of a standard,” which is the highest violation below a criminal charge. Vermillion, who is often hired to consult companies that have been cited by OSHA for safety violations, said he didn’t believe that most companies willfully disregard the fall protection standard. “The good thing about that is it requires the compliance officer do a more thorough investigation,” he said. “I think the results of the more thorough investigations will prove that companies are better than we think they are.”

SAFETY



Jocko Vermillion, vice president of tower safety, Safety Controls Technology, applauded OSHA chief Dr. David Michaels' effort to make companies accountable for the subcontractors they hire.  
Photo by Don Bishop

### Multiple Subcontractors

Cell tower construction is notorious for multiple levels of subcontractors and a lack of accountability for the contractors that hire the subcontractors. Michaels promised enforcement against subcontractors that break the rules under the Occupation Safety and Health Act along with companies that employ them.

### Contract Oversight

Michaels wrote, "During inspections, OSHA will be paying particular attention to contract oversight tissues and will obtain contracts in order to identify not only the company performing work on the tower, but also the tower owner, the carrier and other responsible parties

*Cell tower construction is notorious for multiple levels of subcontractors and a lack of accountability for the contractors that hire the subcontractors.*

in the contracting chain."

Vermillion applauded Michaels' effort to go up the chain of command and make companies accountable for the subcontractors they hire, but he said he doubted that increased enforcement would lead to increased citations. "OSHA's power is weak," he said. "I don't think they are going to be able to uphold a lot of the violations that they do issue. It is difficult when there is a contract signed by both companies. Additionally, the

burden of proof of the violation is on OSHA."

### Effect of Citation

However, once a company gets a citation, regardless of whether it can successfully defend against it, the citation will have the effect of increasing the company's culture of safety, according to Vermillion. "A company that gets a citation always becomes a better company, because they learn what they did wrong and then they fix it by stepping up their safety program," he said.



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SAFETY



## OSHA To Focus on Tower Safety

In a video address at the National Association of Tower Erectors national convention in February, the head of OSHA said the agency's tower inspections and enforcement activities have increased.

By Dr. David Michaels

In 2013, more communications tower workers were killed than in the previous two years combined. In the first few weeks of 2014, we have already seen four more fatalities.

We at the U.S. Occupational Safety and Health Administration are very concerned about this sharp rise. The fatality rate in your industry is extremely high, and tower workers have a risk of fatal injury perhaps 25 to 30 times higher than the risk for the average American worker. This is clearly unacceptable. At OSHA we're reaching out to educate industry and workers and providing

free small business consultations. We've already increased our inspections and enforcement activities in this industry.

Right now, we're investigating the recent tower collapse in West Virginia. It killed two tower workers as well as a firefighter who died while responding to the incident. Two other tower workers were hospitalized. We're still trying to figure out exactly what happened, but this clearly was a case of something that was not done properly.

In too many of our tower collapse investigations, we find the collapse occurred as workers were replacing

structural components or strengthening the tower to accommodate increased capacity. In some cases, too many diagonals were taken out without adequate bracing. And in other cases, workers weren't given clear direction about how to do the work and maintain structural integrity. So, before starting a job involving replacing a structural component, employers must develop and implement a plan to prevent collapse and ensure those workers are safe.

Most of the fatalities in this industry are due to falls. We found that many of the workers who are

killed were wearing harnesses that were not tied off. Employers are responsible for training workers and ensuring that their tower crews are consistently protected. By reinforcing their own safety policies, by training, and retraining workers, and by making sure subcontractors follow all safety rules, employers can create a culture of safety.

Here's something we all know but have sometimes forgotten or ignored: Appropriately used fall protection saves lives. A few months ago, a worker was doing maintenance on an antenna at the top of a water tower in Virginia Beach. When his descent control device failed, the safety line, connected to the D-ring of his harness, stopped his fall and saved his life. This is the type of ending we all would prefer to see — one in which the worker goes home safely at the end of the day. We must make 100 percent tie-off the norm in this industry.

Considering the tragic events of the last few months, we are extremely concerned that the 2013 rising trend will continue in 2014. As temperatures begin to rise, tower work will increase, and we cannot let that lead to more deaths. Every person in this industry needs to be vigilant to make sure workers are safe.

Here are some steps OSHA has taken recently. We told our field staff to pay special attention to investigating communications tower incidents. While we're at the site, our inspectors will collect more complete data about the job and what happened. This information will help OSHA to more fully understand and prevent these tragedies. Our inspectors are also going to be paying close attention

*We need everybody in the industry to do what they can to stop these senseless tragedies.*

to contracts and subcontracts to determine who's doing the tower work and what their qualifications are. We'll be taking a hard look at the safety requirements that flow down through the contracts, and how owners and contractors ensure that everyone meets these requirements. We sent a letter to communications tower employers, urging them to join us in preventing these needless deaths. I very much appreciate NATE helping by sending this letter to its mailing list and posting it on its webpage. We published a new fatal fact bulletin about a fatality that resulted from a failed ladder safety device on a 400-foot telecommunications tower. This publication examines the likely causes of the fatality as well as incident prevention.

We've also launched a new communications tower webpage, a one-stop shop for all of our information, including where we found violations and where we've issued penalties. Moving forward, we'll be issuing a revised communications tower directive, which is currently in the final stages of clearance. The directive tells our field staff how to enforce our standards when they inspect towers. The revised directive addresses safe access by hoist during all work activities and expands the coverage to maintenance work.

We also plan to do more inspections at communications towers and will ask our state partners to do the same.

As you can see, this is something we are taking very seriously at OSHA. I sincerely hope that together, we can turn this tide and get the message out. These tragedies should not be written off as the cost of doing business.

There is one way you can help us right now. If you have what you believe is particularly good contract language in terms of safety, or if you follow a process in which tower owners, contractors and subcontractors all work together to ensure no one is hurt, please send the language or description of the process or your best practices to us. We want to make sure these best practices are spread throughout the industry. The email address to send these to us is on our new communications tower webpage.

OSHA is very concerned and we're taking action. We need everybody in the industry to do what they can to stop these senseless tragedies. You can rest assured we will continue to do all that we can to improve safety in this industry — even new regulations, if necessary.

We appreciate your support in helping us to reverse this recent trend in tower deaths and we look forward to continuing our work with NATE to reach out to the industry.

**About the Author:**

*David Michaels, Ph.D., a U.S. assistant secretary of labor, heads the U.S. Occupational Safety and Health Administration. Photography by Don Bishop.*

# Rogue Supervisor: Court Rejects Attempt to Create Strict Employer Liability

A supervisor’s “unforeseeable or idiosyncratic behavior” or “rogue conduct” may negate an employer’s liability for the supervisor’s unsafe behavior, thanks to a federal court’s rejection of an OSHA interpretation.

By Mark A. Lies II and Kerry M. Mohan

It is well recognized that employer knowledge is required for OSHA to establish a violation. Under most circumstances, this element can be satisfied when a supervisor, manager or foreman, who is an agent of the employer, witnesses an employee exposed to a hazard but does nothing about it. But what happens when the supervisor, manager, or foreman is the individual violating OSHA’s regulations and the company’s rules? In the past, OSHA has tried to use the supervisor’s bad act to impute strict liability on the employer, arguing that the supervisor’s own knowledge of his bad act is sufficient to impute or infer knowledge of that bad deed onto the employer. The following information addresses a recent federal court of appeals’ decision rejecting OSHA’s interpretation and how that decision may affect OSHA’s ability to prove a violation in the first place or for the employer to prove an avoidable supervisor misconduct affirmative defense.

## OSHA Burden

In order to prove a violation of an OSHA safety or health regulation or the General Duty Clause, Section 5(a)(1), the agency must show by a preponderance of factual evidence at the hearing the following elements:

- The regulation or a generally recognized industry safety practice or the employer’s own safety policy applies to the safety or health hazard (e.g., fall, confined space, machine guarding, etc.) that OSHA observed at the worksite.
- The requirements of the regulation or industry practice or employer policy were not met at the worksite (e.g., there was no fall protection, no confined space program, no machine guards in place, etc.).
- One or more of the employer’s employees were actually exposed to the hazardous condition so that the employee could have been injured by the hazard. On multi-employer worksites, an employer may be liable for

exposure of another employer’s employee to the hazard if certain conditions are met.

- The employer knew or, with the exercise of reasonable diligence, should have known of the violative conditions.

Thus, “employer knowledge” is a critical element. Employers are not strictly liable under the Act or a particular OSHA standard simply because a violative condition exists or an accident has occurred.

Because many employers are legal entities such as corporations and are not individuals, it may be difficult to determine what a corporation “knows.” Therefore, the case law involving OSHA citations has established a general rule that the actual or constructive knowledge of an employer’s agent, such as a foreman or supervisor, can be imputed to the employer. In other words, if OSHA can prove that a supervisor or foreman knew or, with the exercise of reasonable



diligence, should have known that a violative condition exists, OSHA may be able to satisfy the employer knowledge element of its burden of proof in a contested case.

**Supervisor’s own bad deeds**

To satisfy its burden of establishing “employer knowledge,” OSHA has often tried to use a supervisor’s own bad deeds to impute direct knowledge to the employer. In essence, OSHA’s view is that because the supervisor engaged in the dangerous act, his knowledge of that dangerous act is sufficient to establish employer knowledge.

In a recent OSHA Review Commission decision, *ComTran Group, Inc.*, 2011 OSAHRC LEXIS 114 (O.S.H.R.C.A.L.J., Oct. 17, 2011), a supervisor was caught digging in a six-foot-deep trench with an unprotected five-foot-high spoil pile at the edge of the

trench. The administrative law judge found that because the supervisor “had dug the excavation and placed the spoil pile at the edge,” his knowledge of his own malfeasance was imputed to the employer. As a result, the administrative law judge found that the secretary had established its prima facie violation and affirmed the citation.

**Eleventh Circuit Rejection**

Following the OSHA Review Commission’s decision in *ComTran*, the employer appealed the decision to the U.S. Court of Appeals for the Eleventh Circuit. *ComTran Group, Inc. v. DOL*, 2012 U.S. App. LEXIS 15023 (11th Cir. July 24, 2013). On appeal, the Eleventh Circuit addressed the issue of whether it is appropriate to impute a supervisor’s knowledge of his own violative conduct to his employer under the Act, thereby relieving the secretary of his burden

to prove the “employer knowledge” element of his prima facie case. The Eleventh Circuit found against OSHA, holding that if this approach were to apply, the secretary would only have to meet three of the four evidentiary elements of the prima facie case and would not have to prove the “employer knowledge” element.

Analyzing prior federal appellate court decisions, the Eleventh Circuit stated that:

We say that a supervisor’s knowledge is “generally imputed to the employer” because that is the outcome in the ordinary case. The “ordinary case,” however, is where the supervisor knew or should have known that subordinate employees were engaged in misconduct, and not, as here, where the supervisor is the actual malfeasant who acts contrary to the law.

Further, seeming to support the unavoidable supervisory misconduct

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defense, the Eleventh Circuit found that “[i]f a violation by an employee is reasonably foreseeable, the company may be held responsible. But, if the employee’s act is an isolated incident of unforeseeable or idiosyncratic behavior, then common sense and the purpose behind the Act require that a citation be set aside.” Finally, the court stated that a supervisor’s “rogue conduct” cannot be imputed to the employer merely because the supervisor is the violator. As a result, the Eleventh Circuit remanded the matter to the Review Commission to require the secretary to prove the “employer knowledge” element and permit the employer to establish its defenses to the citation.

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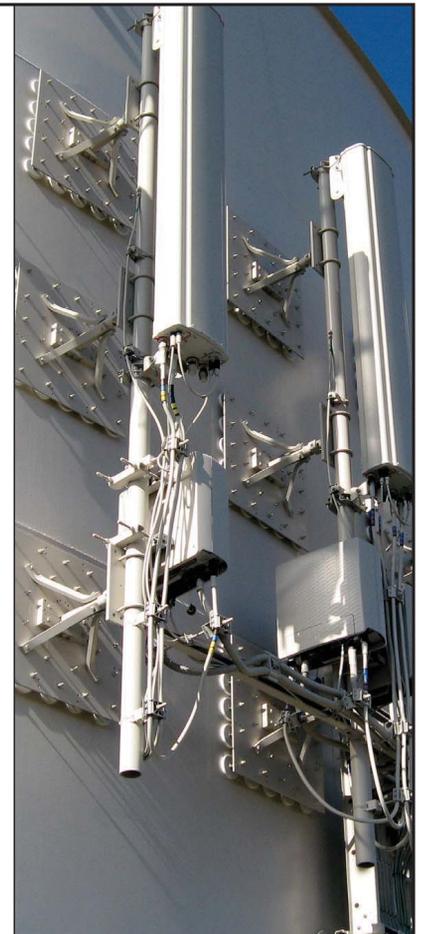
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### Unavoidable Supervisory Misconduct

The Eleventh Circuit’s decision has seemingly breathed new life into the often difficult to prove “unavoidable supervisor misconduct” employer affirmative defense. Under the typical “unavoidable employee misconduct” defense that applies to hourly employees, the employer must prove the following elements:

- The employer had a safety or health program and work rules that applied to the OSHA regulation contained in the citation (e.g., if OSHA has cited the employer for violations of the fall protection regulations, the employer had a specific program and work rules relating to fall hazards).
- The employees were effectively trained in such safety or health program and work rules. To prove this element, the employer will need documentation of training. This training requirement is often difficult to establish when employees are illiterate or can’t understand the language, typically English, in which the written and spoken training is being provided.
- The employer has effectively enforced these safety or health programs and work rules at previous times or jobs with discipline for violations. To establish this element, the employer must be able to produce documentation of verbal or written discipline given to employees for past violations, which requires that such documents be generated and maintained.
- The employer must prove that on the date when the violation occurred, the violation occurred in such a fashion (e.g., extremely short time frame, totally unforeseeable circumstances) that the employer could not have learned of and prevented the violation – hence the violation is due to “unavoidable” employee misconduct.

Because supervisors are expected to follow and enforce an employer’s safety rules, the “unavoidable supervisory misconduct” defense is



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often more difficult to establish. Specifically, the employer often must present more evidence to show the propriety of its safety programs, that it monitored and audited the supervisor more frequently than the hourly employees, that the supervisor has no history of engaging in any safety violations or unsafe behavior, and that the employer could not have anticipated that the supervisor would have engaged in the unsafe behavior.

Because the Eleventh Circuit's decision rejected OSHA's argument that an employer is strictly liable whenever a supervisor engages in unsafe behavior, an employer now has a more viable argument that it should not be held liable when a trusted supervisor engages in

"unforeseeable or idiosyncratic behavior" or "rogue conduct." Because the burden of proof for this affirmative defense will remain on the employer to show that the supervisor's bad deed was in fact "unforeseeable or idiosyncratic," it will be necessary for the employer to conduct audits or other evaluations of supervisor performance to establish that the supervisor was compliant in prior situations.

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# Solving Communications Challenges with Portable Telescoping Masts

Challenges facing today's cellular network infrastructure include large public events, technology upgrades and emergencies stemming from natural disasters. Portable telescoping masts come to the rescue.

By David Cotsmire

Several issues can stress the capacity and capabilities of a cellular network. The data requirements of smartphones have placed increasing demands on already strained networks that cannot afford additional pressure from natural and manmade disasters, temporary and localized increases in data demand, and temporary capacity reduction caused by technology upgrades or equipment maintenance. These problems are well documented, but they can be solved with the proper equipment, technology and mobile cellular site deployment strategy.

## Three Major Challenges

Natural disasters can disable cellular towers via high winds, fires, flooding or earthquakes. For instance, Hurricane Sandy that hit the highly populated East Coast disabled 25 percent of the cellular network. Manmade accidents or sabotage disrupt networks as well. Cellular demand increases dramatically during and after an emergency as people attempt to

connect with emergency services, family and friends. Disaster recovery agencies and the first responders that operate them will also add traffic to the crippled network. Depending on the nature of the disaster, the area affected can be localized or may stretch for miles, requiring multiple deployment strategies employing varying amounts of equipment.

Public events where thousands of people gather for hours or even days can overwhelm the fixed cellular network infrastructure designed for the permanent population of the area. Sporting events and other social gatherings bring together thousands of people eager to share their experience via their connected smart devices. The data load from this influx of people requires additional but temporary data transfer capacity.

Technology upgrades and periodic maintenance require strategies and tactics that enable users to remain connected during a period that can sometimes stretch to several months. The transition from analog to 2G, 3G and 4G technology requires

that users remain connected during a predetermined transition period that will often require doubling the number of cellular antennas needed for a location. Equipment must be available to support both the older and the newly deployed technologies. Periodic maintenance that requires a cellular site to be taken offline for repair or refurbishment requires a temporary solution that does not inconvenience cellular data users.

## Portable Sites

Portable, temporary cellular sites, whether COWs (cells-on-wheels) or COLTs (cells on light trucks), aid a communications provider in overcoming the challenges. These portable sites include the equipment, shelter and elevation solutions needed to supplement existing or replace lost data transmission capacity. Typically, portable cellular sites are trailer- or light truck-based and are designed for deployment periods that can last from a few days to several months of autonomous operation when equipped with electric generators.

*Mobile exchanges on wheels (MEOWs) for recovery from Typhoon Haiyan, known as Typhoon Yolanda in the Philippines.*



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A collapsed cell tower replaced with a portable cellular site with a telescoping mast.

One of the most critical components of any portable cellular platform is the antenna elevation provided by a telescoping mast.

Telescoping masts serve as the all-important elevation solution for cellular antennas deployed via a temporary platform. The optimal height of 60 feet provides clearance for most obstructions and is the most common height in use. Lower heights are typically sufficient when temporary capacity constraints arise due to an influx of users in a localized area. In some cases, temporary cellular platforms with masts achieving heights of 98 feet are deployed when a large, permanent cellular

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transmission site is offline because of maintenance or disaster.

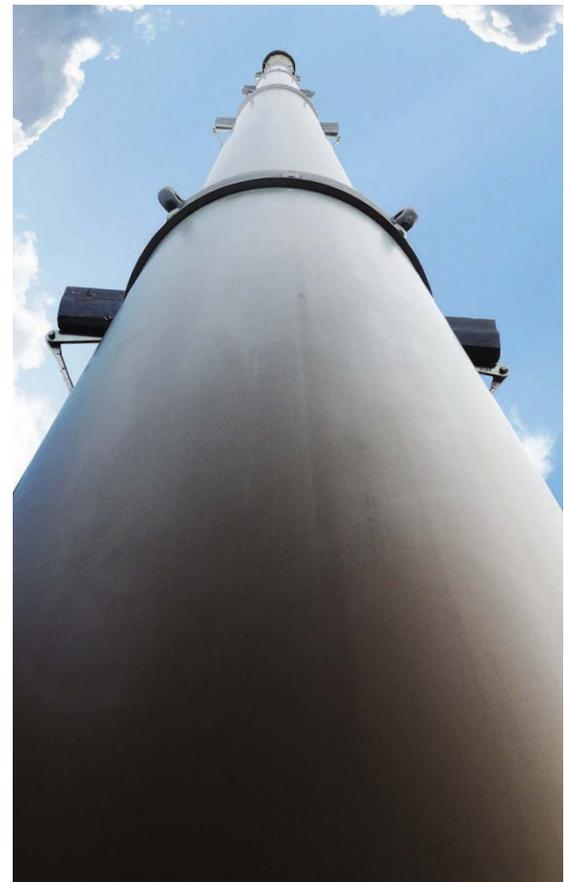
A mast must not only reach the necessary height to meet the defined objective, but also must safely elevate the antenna and significant cable payload while minimizing twist and deflection. Substantial movement can degrade the signal, minimizing the benefit of the deployment.

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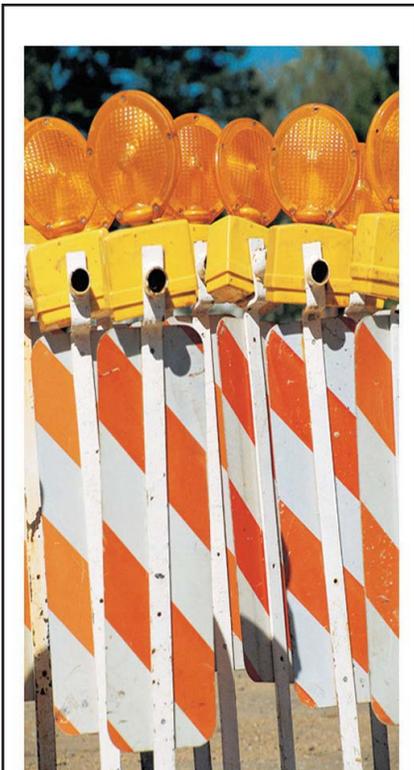
Pneumatic telescoping masts have been used as the primary elevation solution on COWs and COLTs for a number of years. These masts are lightweight compared with steel, require only compressed air for

elevation, not hydraulic fluid, and are extremely easy and safe to operate. Lightweight telescoping pneumatic masts that deliver a strong elevation solution that minimizes twist with dual keyways and that reduce deflection with strong anodized aluminum provide one of the most accurate and precise types of pointing masts available.

The recommended lightweight design does not require a heavy trailer or truck. This allows valuable payload capacity for other equipment that is not available when hydraulic or steel masts are installed. With the recommended design, no environmentally hazardous hydraulic fluid is required for elevation; pneumatic masts require only air. Multiple masts of this type can be installed on the same platform, which increases cellular data throughput without overloading the truck or trailer. This ultimately lowers the overall cost of equipment and deployment.



The Will-Burt Ultra Heavy Duty locking mast with locking mechanisms enables the mast to be deployed indefinitely without air pressure and to be easily taken down when it is time to move it to the next site.



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*Telescoping masts serve as the all-important elevation solution for cellular antennas deployed via a temporary platform.*

At IWCE 2014 (March 24–28), the Will-Burt Company introduced its latest and strongest mobile pneumatic mast, the Ultra Heavy

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pounds, which allows multiple cellular arrays to be deployed on a single mast. The strength of the mast reduces and sometimes eliminates the need for guying and further reduces deflection. The mast weighs less than 900 pounds, which frees up more payload space for the COLT or COW platform. The locking mechanisms enable the mast to be deployed indefinitely without air pressure and to be easily taken down when it is time to move to the next site. The locking mast can reach heights of 59 feet while achieving a stowed height of 11.6 feet, which eliminates the need for a tilt system for safe highway transport. Flexibility of design allows for various combinations of nested and extended heights to meet specific requirements.

Will-Burt manufactures its telescopic pneumatic masts in the United States using an ISO 9001:2008-certified quality system that delivers high-quality products time after time. Special design and program requirements that are not met with a catalog mast can be developed by the company's team of experienced and specially trained engineers.

**About the Author:**

*David Cotsmire is marketing manager at the Will-Burt Company. The company delivers elevation solutions for portable cellular sites that address the critical issues of capacity constraints, outages and technology upgrades. Cotsmire's email address is [dcotsmire@willburt.com](mailto:dcotsmire@willburt.com).*

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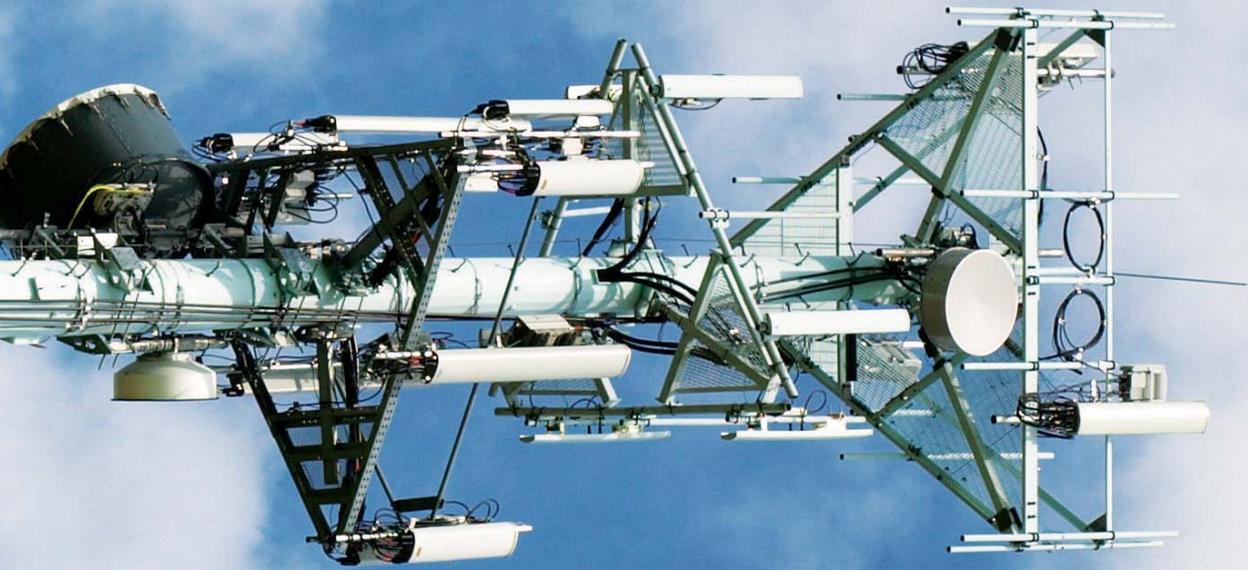
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# The Tower Companies' View of Small Cell Operations

Despite the small revenue contribution compared with macrosites, the large tower companies pursue small cell opportunities, although with distinct approaches. Small tower companies? No small cells.

By Don Bishop

**T**he three large publicly traded tower companies take different approaches to operating small cell networks. Crown Castle International has invested the most. SBA Communications has a minority interest in a distributed antenna system (DAS) operator and doesn't have direct operations of its own. American Tower falls in between.

At the 2013 PCIA Wireless Infrastructure Show, Jonathan Atkin, managing director of RBC Capital Markets, asked executives of the three large tower companies for details about their small cell operations. He also asked an executive of a mid-size tower developer and an investment banker for their opinions. They are identified on this page. The following are their remarks, edited for length and style.

**Atkin:** Are you comfortable with your current small cell positioning? Where do you see the kind of growth in future investments being weighted?

**Brown:** Crown Castle International made its first investment in small cells almost 10 years ago with a system in an amusement park. It

was a self-build. We thought if it would work anywhere, it would work there.

It took a long time to convince the carriers that small cells were the right approach. And we started to see that change several years ago.

We first made an acquisition that was slightly larger than what we had done on our own. And then we made a significant investment when we bought NextG Networks for \$1 billion a little over a year ago.

Wireless operators are adopting small cells to fill the places that macro towers don't. We have a little over 10,000 nodes deployed, and

we're seeing significant lease-up on those assets that we either built ourselves or acquired through the two major acquisitions.

We're mostly in the major markets; about 40 percent of our nodes are in the Manhattan borough of New York. We have a lot of fiber there and an opportunity to continue to deploy sites there.

We've done some stadiums and indoor arenas, which represents about 5 percent of the business. We have significant assets in many places where macrosites won't serve the need. We've seen lease-up on the assets that's slightly faster

SMALL CELL OPERATIONS

## Small Cell Operations

In order of appearance in the article.

- Jonathan Atkin, managing director, RBC Capital Markets (moderator)
- Jay Brown, chief financial officer, Crown Castle International
- Brendan Cavanagh, chief financial officer, SBA Communications
- Rodney Smith, chief financial officer, U.S. Tower Division, American Tower
- Marc Ganzi, president, Digital Bridge Holdings and Mexico Tower Partners
- Ronald G. Bizick II, chief executive officer, Tarpon Towers
- Clayton Funk, managing director, Media Venture Partners



Jonathan Atkin



Brendan Cavanagh



Rodney Smith

than what we saw with the towers we acquired in 1999, regional assets that we acquired. We've seen the small cell model prove out, and it looks quite similar to the tower model where we put in the initial capital, we see multiple carriers come along and use the systems, and then as they pay additional rents, we don't see a rise in operating cost. The margins are similar and the margin growth is similar.

The acquisition is tracking well ahead of what we initially expected. We had high hopes for the \$1 billion that we invested in buying NextG Networks. We thought we could increase the adjusted EBITDA from that acquisition by five to six times over five years. We're well over double, already, at year-end, so it's gone very well. And we seem to have timed the market well. Right about the time when Verizon and AT&T were starting to spend significant amounts of capital, time and effort on deploying small cells, we had broadened the portfolio.

We're continuing to invest \$150

million to \$200 million a year in building new systems. We're constantly looking for new opportunities in places that meet our return thresholds. If we were ranking investments according to those that have been most accretive, small cells would be at the top of the list of opportunities we've found in the last several years.

**Cavanagh:** SBA Communications is very positive on the DAS business. It's a misunderstanding to believe that we're not. We believe it's a great business. That's why we invested in ExteNet Systems as our vehicle to invest in DAS. It comes down to where we see the best bang for our buck. In either towers or small cells, there are going to be great returns.

Our focus has been to stay in the tower space. We invested significant capital over the last couple of years in tower businesses, most of that domestically, but we've also invested in foreign markets. With the returns we see in the tower business, it clearly is a proven business. Everyone knows how well towers

have performed over the years. We see the same opportunities in new markets. Rather than taking our incremental available capital and putting it into other businesses, we chose to focus on the tower business and expand geographically.

That doesn't mean that we don't believe DAS is a good business. The reason we invested in ExteNet is because it's a great business. The investment gives us an opportunity to look at expanding further in that business.

DAS has proven itself to be complementary to the tower business as opposed to cannibalistic. We haven't seen situations that require carriers to choose one or the other. Generally speaking, they are using DAS and small cells in areas that are not right for tower sites. We don't feel like we're missing out on anything.

**Smith:** Jonathan, you said it right when you said American Tower is in the middle of the two other public company peers. In the United States

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Jay Brown



Marc Ganzi

where American Tower owns 30,000 communications towers and with the acquisition of GTP, we doubled our rooftop business and now have about 20,000 rooftops, we also have about 260 in-building networks. I believe that's the largest in-building wireless portfolio of any of the companies. The venues are primarily casinos, malls and other large venues with high population density. We also have some outdoor DAS networks.

As the four primary carriers in the United States continue to roll out LTE networks, and then when they come back in a second wave to make those networks more dense and much deeper for capacity reasons, the industry is still projecting that over the next five years, 70 percent of the network traffic will still go over macrosites. Thus, we believe that our macrosites, our towers, offer the best opportunity for revenue growth.

Nevertheless, there will be small cell deployments. Carriers will have capacity problems in urban centers

where the population is dense. Our in-building wireless networks and rooftop antenna sites are perfectly positioned to take advantage of that and obtain some lease-up.

We have outdoor DAS networks, and we've been in that business for a number of years. An outdoor DAS is a very complex network to build and to manage. Because of the complexity, the pricing tends to be somewhat higher than what carriers are willing to pay, unless you find an area where there's no alternative to DAS. Outdoor DAS is not the carriers' first choice because of the economics.

The other thing with outdoor DAS networks is the carriers are tending to move more toward having their own infrastructure. They want their own fiber. They want their own electronics. They want their own antennas. Thus, the model has been shifting away from a truly neutrally hosted network and more toward carriers having their own proprietary networks, and they may share some of the fiber bundle. But

they're getting their own electronics, their own antennas and even dedicated fiber. That drives the cost up as well.

We're shying away from the outdoor DAS business. We believe rooftops are valuable. We like the in-building wireless business, but we believe that most of the revenue growth that we'll see is going to be on our towers.

**Atkin:** Jay, do you own most of the backhaul serving your DAS networks? Maybe that's why there's a little bit of difference of opinion among the operators.

**Brown:** We do. Crown Castle thinks about the small cell networks as basically a tower laid on its side. We would control the space where the carriers would put in their base stations. The fiber would be representative of the vertical steel, and then we would have a cabinet or similar structure on a telephone pole or a light pole where the carrier would install their electronics on the site, and we will be broadcasting from that point. Thus, the asset we have is the control of the fiber and the control of the cabinet that the carrier can install their equipment on. Then we structure lease agreements similar to what you would see in the tower business, long-term leases with annual escalations.

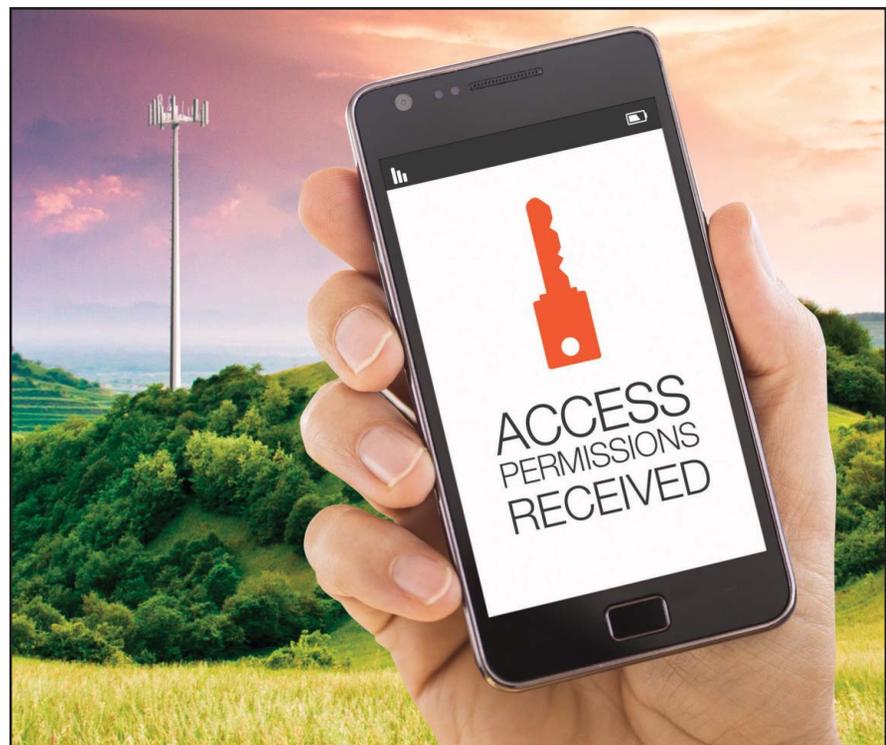
**Ganzi:** At Global Tower Partners [now a subsidiary of American Tower], we always took a pragmatic view of the marketplace, believing that we were in the site solution business. As a result, what we wanted to do was to construct a portfolio responsive to where we believe

carriers need to be, are going to be or are currently resident. We tried to build a unique set of assets that addresses where coverage needs are today and where future coverage needs will be.

A consistent theme for every piece of real estate that we controlled was privity and exclusivity, which

we believe were critical to our success. We didn't want to have investments in real estate where people could build over the top of us.

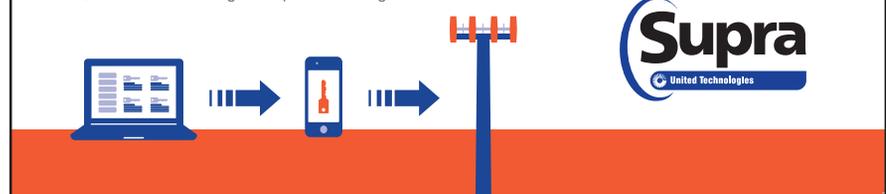
With relationships we formed with utility companies and rooftop owners and with investments we made in indoor and outdoor DAS,



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in those venues we always had exclusivity. Exclusivity allows us to have honest conversations with customers. We wanted to be in the site solution business, but we also wanted to be pragmatic about it and control the real estate. That's the business we're all in today; we are in the real estate business.

We focused on having unique locations and unique partnerships with property owners and utility companies that gave us the opportunity to have a unique conversation, a private conversation, with our customers about those locations.

**Atkin:** From the middle-market perspective and looking at some of the more rural portfolios, are people asking about small cells? Or are people just focused on macrosites?

**Bizick:** For small operators such as Tarpon Towers, going after any kind of small cell deployment is not in the cards. There are a couple opportunities to do some things on sort of a venue-specific basis: hospitals, maybe schools and campuses. But the economics for a small company like an antenna site developer to pursue small cell deployment doesn't make sense. Most of the focus for the small developer and the mid-size tower companies has been on macrosites and builds. We're not interested in operating a network.

**Brown:** A DAS network is a complicated, difficult build that takes a lot of time. If you look at the time it takes from first point of contact to something that is actually on the air,

the timeline is two to three years in many cases. The systems being built today are in the most difficult areas where small cells ever will be deployed. As we get outside the top 10, top 25, top 50 markets, if small cells will make it outside of those markets, it should become easier to deploy these systems. But now we're working in Manhattan, downtown San Francisco and colonial Williamsburg, Va., locations where aesthetics and other considerations take a long time to work through.

We've amassed an attractive portfolio of assets, but it's taken blood, sweat and tears. Building towers takes a certain level of skill. It takes a different set of skills to build small cells because of the way they're deployed, the way they're engineered, the way the equipment

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Clayton Funk



Ronald G. Bizick II

works and the interaction required with carrier operators as they design the networks. Both of the acquisitions that we made, NextG Networks and NewPath Systems, as important as they were for bringing us the right assets, they were equally important for bringing us the right talent and skill to install and operate small cells well. It takes a lot of investment on the people side as well as the investment on the capital side.

**Atkin:** Clayton, do Jay's comments echo the sentiment among some of your clients?

**Funk:** We have conversations with many tower developers, and they ask us about DAS. We tell them it's a hot space. People are looking at it. Clearly, there's a need. Once they dive down into the actual ownership and operation of DAS networks, they realize that although 90 percent of the DAS business might look like the tower business, the remaining 10 percent is really different. You're owning and oper-

ating a network. Before you start seeing more DAS deployed by smaller companies, the smaller companies may need to become more engineering-driven by entrepreneurs who really understand how to own and operate a network, versus someone who has been able to develop dozens of towers over the years in suburban or rural America.

I talked with a representative of a rural wireless carrier that has about 700 antenna sites in its region. I asked, "Would you ever look at DAS? It's a hot topic in the urban areas." And he quickly dismissed the idea, saying, "Everything I can do coverage-wise and capacity-wise, I can do it with a macrosite." For at least some of the more rural markets, if DAS ever gets there, it's going to take a while.

*The next Wireless Infrastructure Show will be held in Orlando, Fla., May 19-22, 2014. For information, visit [www.pcia.com](http://www.pcia.com). Photography by Don Bishop.*



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# Concealment and Camouflage



## ***It's a Unique Challenge.***

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## Antenna Concealment: The Need for Creative Solutions

Meeting the challenge of developing versatile concealment measures that mimic landscape elements should be explored with a partnership among design professionals, manufacturers and clients.

By Joanne Slaman, R.A.

**A**s a telecommunications design professional, I've participated in many discussions about telecommunications infrastructure at planning and zoning board meetings. Community interest and concerns about the installation of this equipment present an interesting challenge: Members of the public

clearly want strong, widespread coverage for cell phones and wireless devices, but they don't want to see it. Unlike equipment and wires for other utilities, which typically crisscross our neighborhoods, the equipment and antennas for wireless base stations continue to be the subject of much scrutiny and debate.

### Basic Steps

While the public's pushback has resulted in a broader range of options for concealing this type of infrastructure, I believe there is much more the telecommunications industry can do to develop creative yet cost-effective solutions for concealment and to improve upon the options that have

*More and more equipment is needed on-site to meet increasing user demands. At the same time, communities are becoming more discriminating as they seek aesthetically pleasing, sustainable solutions and a homogenous integration of technology into neighborhoods*

become standard for many carriers. Thoughtful planning, design and detailing can make a critical difference for even the most basic options.

**Towers**

Monopines, or tree poles, are frequently used as a means of concealing antennas and equipment. These can be effective, but they are certainly more successful if the tree shape is full and formed, unlike the frequently seen bottle-brush structure, and when used in wooded areas. Too often, faux trees can stand out like sore thumbs and draw negative attention. Flagpoles and unipoles are also used to camouflage antennas, but they can limit the number of antennas to the detriment of service in the area. The standard monopole is another option, but careful consideration should be given to the color of these and similar structures. The poles can be dark in color or simply left in their galvanized silver shade. Consider the basic principles of color and light when making this determination. White reflects about 80 percent of light, and black reflects only about 5 percent. The greater the light reflection, the more the eye perceives. Darker colors reflect less, which makes edges harder to discern and less visible. Black or dark brown may be the better option in some situations.

**Concealment Structures**

False chimneys have proven to be successful, depending on the quality and what the passerby can see. A false chimney that has a large gap between the enclosure and the building component or one that allows the superstructure to be clearly visible is not as appealing. False penthouses and bulkheads can also be effective. Care should be taken to ensure that adjacent surfaces are matched in pattern and texture. On a brick building, for example, consider painting the antennas in the same tone and color of the darkest brick in the pattern — again following basic principles of color and light.

**Hidden in Plain Sight**

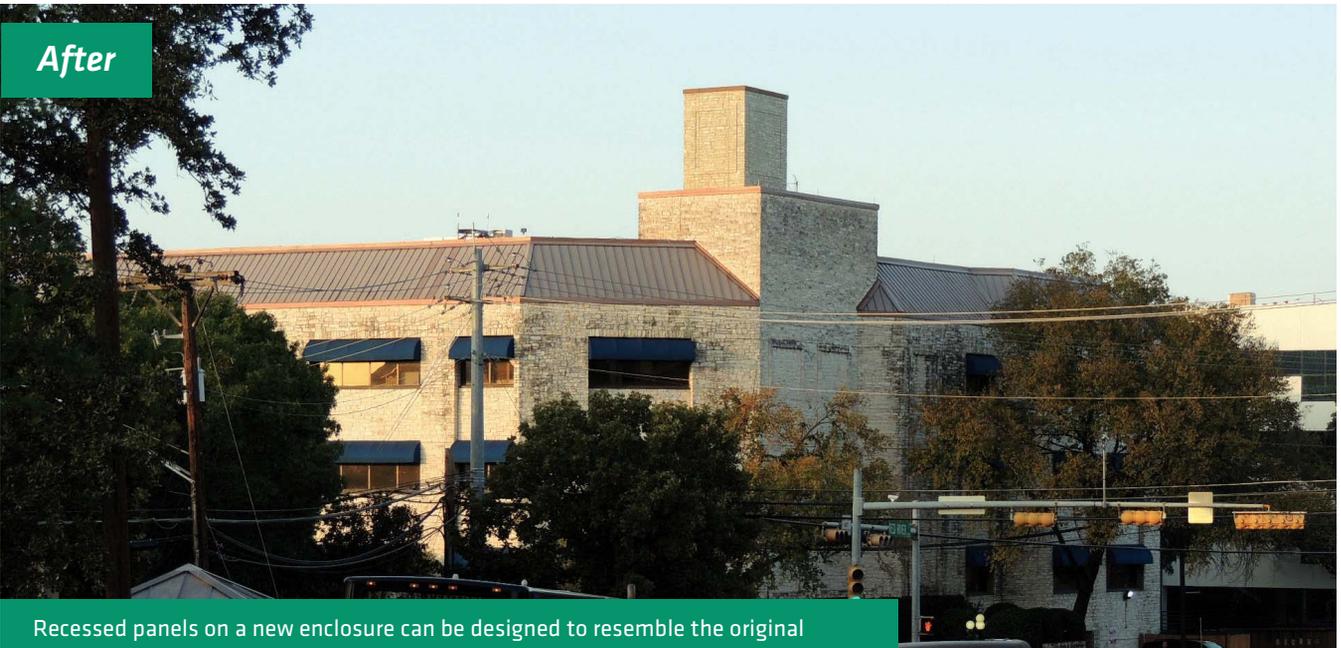
Church steeples and other existing structures can allow for equipment installation with replacement materials that closely match facades. Although these solutions are often the most successful, they can also be the most challenging. Too often, these enclosures are poorly designed and are constructed with little consideration for long-term aesthetics.

Unfortunately, the fact that so many of these concealment efforts have been poorly carried out will continue to mean more scrutiny and public pessimism as we seek future



A standard option involves mounting antennas and equipment boxes on a light pole. Photo courtesy of Dewberry

/ SPECIAL SECTION /



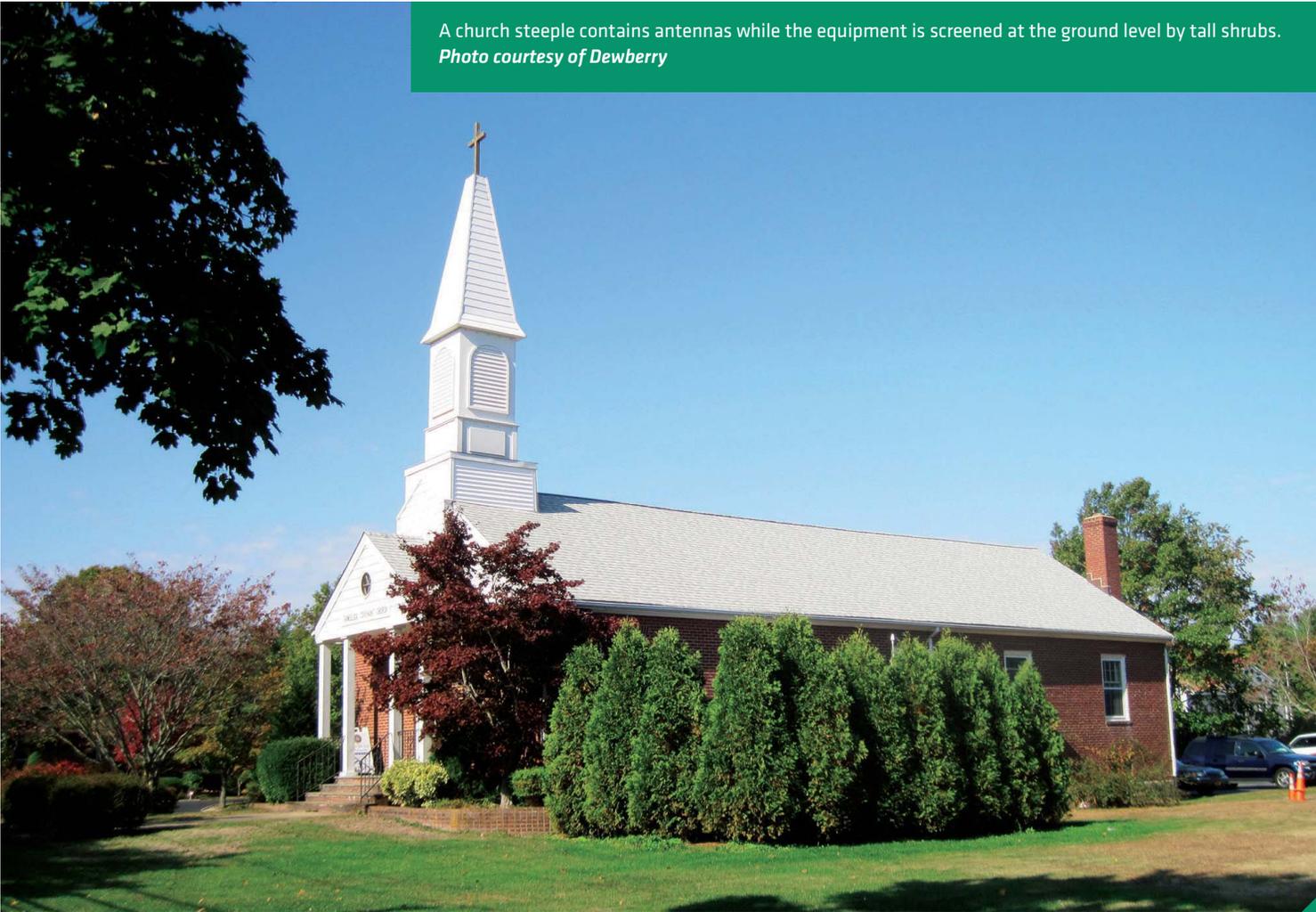
Recessed panels on a new enclosure can be designed to resemble the original building façade. *Photos courtesy of Stealth Concealment Solutions*

CONCEALMENT

permit application approvals. Our ability to raise not only the quality of concealment measures but also the creativity of approach may help to sway a public that seeks increased coverage. The demand for greater coverage and faster, reliable service, as well as the exponential increase in mobile devices, means fewer easy solutions

for network base stations. More and more equipment is needed on-site to meet increasing user demands. At the same time, communities are becoming more discriminating as they seek aesthetically pleasing, sustainable solutions and a homogenous integration of technology into neighborhoods.

**Creative, New Alternatives**  
I recently visited a rooftop garden at an urban hospital. It was a wonderful little haven in the middle of a busy city. Benches, plants, walking paths and even a small community garden were visible and accessible for patients and visitors, providing a natural setting to view and experience. I noticed adjacent



A church steeple contains antennas while the equipment is screened at the ground level by tall shrubs.  
*Photo courtesy of Dewberry*

buildings with green roofs — tended garden spaces high above the city. This particular hospital is now considering the installation of a wireless base station. Integrating the technological components within this appealing garden setting will be an important challenge and an opportunity to consider landscape-type concealment measures in the form of small trees and shrubs that can

house antennas. These artificial trees are a good alternative to standard paneled boxes while providing durability and accessibility. With green roofs now becoming a common building feature, in part due to LEED standards, the development and specification of versatile concealment measures that mimic landscape elements should be explored. Meeting this challenge

requires a strong partnership among design professionals, manufacturers and industry clients. We must work together to develop more options and thoughtful solutions. New perspectives on the old design standards should be considered, along with better ways to provide a reliable yet appealing product.

**About the Author:**

*Joanne Slaman, R.A., is a project manager focused on the telecommunications market. She is based in Dewberry's Parsippany, N.J., office. Visit [www.dewberry.com](http://www.dewberry.com).*

*New perspectives on the old design standards should be considered, along with better ways to provide a reliable yet appealing product.*



Cacti-disguised antennas at Dove Mountain in the town of Marana, Ariz., are on the golf course where the Accenture Match Play golf tournament is played. Photo courtesy of Larson Camouflage

## Camouflage Coming of Age

The demand for concealment is likely to spread to more rural areas and take increasingly creative forms.

By Mike Breslin

It's amazing how far the art of camouflaging cellular antennas has progressed in just a little more than 20 years. Larson Camouflage, working with Valmont Industries, lays claim to having built the first cell tower camouflaged as a pine tree in Monument, Colo., in December 1992.

"You cannot compare pine trees we were building in the '90s with what we're building now," said Tom Feddersen, general manager at Larson. "They just look completely, dramatically different."

To see the startling improvement, one has only to compare the old bottle-brush towers, which often drew more attention than they

deflected, with the long-limbed monopole trees of today that blend seamlessly into landscapes.

The business of visual deception has become big business for nearly a dozen companies specializing in antenna concealment along with tower companies offering camo as part of their full-service packages.

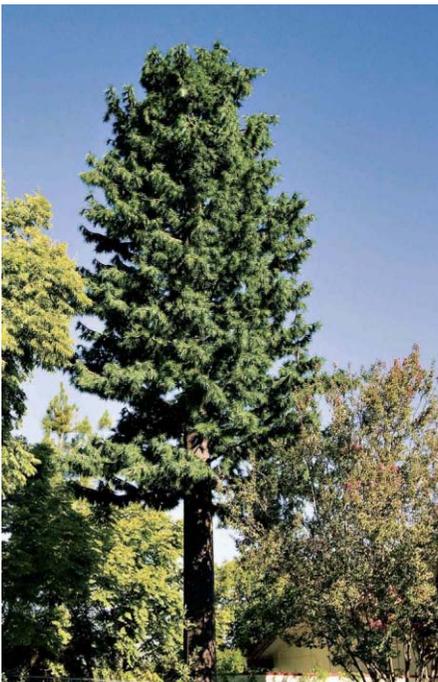
It's no mystery why camo has grown so significantly. Feddersen summed it up: "The number one reason the tower owners do it is because the jurisdictions and landlords require concealment. It also expedites permitting, improves aesthetics and makes the cellular industry good neighbors."

According to the Telecommunications Act of 1996, local governments can't ban new cell towers, but they can regulate the placement and construction of new facilities while considering historic factors and property values. Many jurisdictions, especially in densely populated urban and suburban areas where carriers most want to increase capacity, can delay or regulate new antenna installations if plans do not meet local zoning and permitting requirements.

This helps explain the use of many real and simulated architectural features such as rooftops, cupolas, steeples and farm silos to conceal antennas and supporting electronics.

*As the camo industry has grown it has spawned vigorous competition, not only in design creativity, but also in price.*

Feddersen explained that, historically, his industry has focused on hiding antennas on monopoles disguised as trees, or behind fiber-reinforced plastic (FRP) panels on a building. The panels have RF transparency. “Now we’re becoming much more robust in our offerings and are providing options for electrical equipment cabinets and integrating them as a feature of our product,” he said. “That can include cooling and ventilation in some cases. Antennas, by and large, do not generate much heat, but they do when you have electronic equipment consuming power. The ability to dissipate heat is very important these days, especially in warmer climates.”



An example of a 50-foot tower disguised as a pine tree. Photo courtesy of Larson Camouflage.

### Competition

As the camo industry has grown it has spawned vigorous competition, not only in design creativity, but also in price.

“We are constantly updating and improving our product line to offer the best quality at the best price, because customers are very focused on price and it’s a very competitive marketplace,” said Feddersen. “The balance between the two is the great challenge these days. We are constantly refining, whether it’s the materials we use or the way we use them. One thing we’ve been working on is greening our products by using more environmentally friendly and sustainable materials.”

Larson Camouflage is particularly proud of its line of towers disguised as cacti. The company found that carriers could not offer good coverage in some southwestern regions because some jurisdictions would not allow towers and in some cases would not allow towers disguised as trees. Their cacti filled black holes with limited coverage in urban and suburban areas.

“The requirement to use cacti camouflage is interesting, especially when it opens a market that had dismal coverage,” Feddersen said.

Most Larson cacti are 24-feet tall with a base diameter of about 28 inches and typically contain three antennas. But the company has built them as tall as 50 feet. Built of steel and FRP, the disguised towers fool some people who cannot tell whether

they are real. Feddersen related a story about a woman walking a dog past one. She heard the faint buzz of fans cooling the electronics. She later reported to the town that the cactus had a bees’ nest in it, in her mind a potential hazard, but gave no thought to the possibility that the cactus was not natural.

“The deployments of small cells and distributed antenna system (DAS) networks are major trends, so we have developed a whole line of products around small cell and DAS requirements where the structures are much smaller and contain fewer antennas, but there are additional electronic requirements that did not used to exist that have to be accommodated. So the old conventions don’t work anymore,” said Feddersen.

For macrosites, Larson offers its slim-line products, a range of pine, palm, broad-leaf trees, canisters and monopoles. Slim-line canisters can be installed on the tops of light poles. Smaller slim-line monopoles generally hold no more than three antennas per radiation center. Large slim-line monopoles, which are 150-foot high with a base diameter of 42 inches, can accommodate five or six carriers.

Larson uses DAS trees in the 20- to 35-foot height range in more urban, densely populated areas. “In certain areas, the palm tree works amazingly well because of its tuft of foliage at the top,” Feddersen said.

### DAS Footprint

“One of the unique things that differentiates our DAS line is the capacity to put the electronic equipment in the tower and have it easily serviceable,” he said. “If you can relieve the customer of the

requirement of having a pedestal with the equipment in it and a tower with antennas on it, and put it in one package that helps and reduces the footprint.”

Environmental Integration (EI) has more than 25 years of camo experience in integrating antennas in contemporary structures with naturalistic environments or with existing structures for industries, educational institutions and historical sites nationally and abroad.

### Product Warranty

Thor Holbek, EI's chief executive officer, said that one of the latest advancements in concealment technology is the ability to warrant the product. “We generally warrant it for 10 years against failure or defect of the material itself and the fabrication, especially the branch canopies for monopines,” Holbek said. “If it has an ultraviolet (UV) light stabilizer in the plastic, it will prolong the life, but it should be repainted now and then. We have had installations for more than 10 years with no need to be repainted, but eventually they need to be touched up.” Holbek said the trend is to no longer treat concealment as an afterthought, but instead as an essential part of the installation design from the early planning stages. That requires his company's close coordination with the cellular engineers.

### Early Involvement

Holbek said the most successful way to approach a camo project is to become involved from the beginning. For example, on a large project EI did in Canada for Bell Mobility for 22 sites at one time, EI became involved early during the permitting

process, and concealment was considered from the beginning. “As soon as the engineers started their design work, we were involved and worked together as part of their team,” he said. “This was very important to success.”

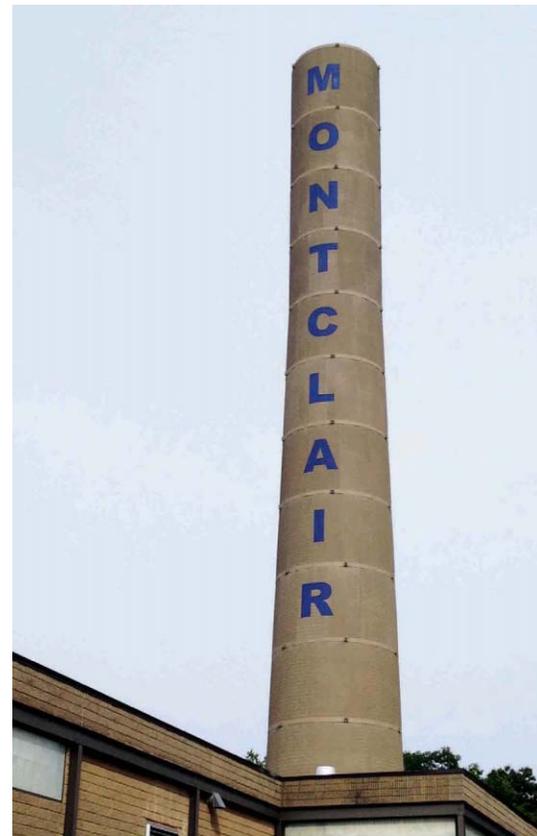
EI is providing concealment for more and more DAS networks. “Some rooftops can be complicated because of the roof conditions or because of how the building structure adapts to concealment,” Holbek said. “The more ornamental a building is, the more challenging it becomes. Just about anything can be rebuilt or copied, but it can become costly when you get into ornamental details.”

### Clever Concealment

Holbek pointed out a clever architectural concealment his company accomplished for St. Paul's Church in Cranston, R.I. Four religious sculptures were cast in fiberglass to hide four antennas and enhance the architecture of the building façade.

“There is price competition, but with our services, customers tend to like the quality we are doing and they are willing to invest in a better product,” Holbek said. “For example, with trees such as monopines, we offer branches up to 17 feet long, which creates a much nicer taper than the bottle-brush design that has been typical for a long time and which people don't like. We are able to create a nice taper like a white pine or fir tree that looks more realistic. The limbs and branches are made of fiberglass-reinforced polyester.”

AGL Magazine also spoke with Ken Wedholm, the global sales manager for Stealth Concealment Solutions. Based in South Carolina, Stealth has



In Montclair, N.J., a fake smokestack goes through one of the sanitation department's historical buildings. The town specified that it had to accommodate a certain number of antennas. Photo courtesy of Stealth Concealment Solutions

concealed more than 10,000 sites over 20 years and services the cellular industry worldwide.

“Right now, the majority of concealment is created mostly to meet regulations, to obtain approvals from architectural review boards and to meet municipal planning and zoning requirements,” said Wedholm. “In some markets, it's driven by resident concerns, and in more affluent areas, it tends to have more political punch.

“One of the trends we are seeing is that the carriers are having a harder and harder time building unconcealed sites,” Wedholm continued. “In some markets, the planning, zoning and approval processes are getting

dragged out longer. If the plans submitted to the town include concealment provisions, you sometimes move to the head of the line and often get faster approvals. In many towns they will not allow unconcealed towers.

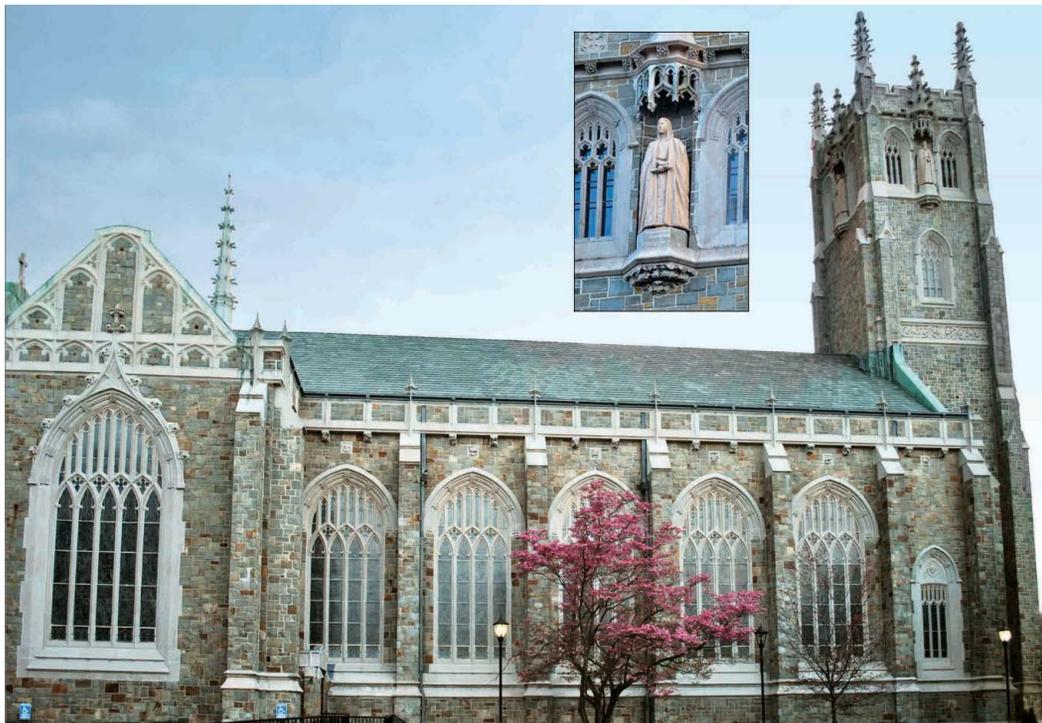
“What you don’t want to happen is having the town or local planning board kick out a poor proposal and presentation. If a carrier goes in with us, we can show a very attractive, aesthetically pleasing design that fits the community and expedites approvals. The earlier the carrier gets us involved, the faster and more economical it is in the long run,” Wedholm said.

Wedholm pointed out that one of the biggest challenges his company faces is the difficulty in obtaining all of the project information, data and digital files needed to start a project and expedite approvals. As part of the process for obtaining approvals, Stealth submits photo simulations and physical samples of materials to be used on-site.

Getting it right makes a difference. Take, for example, a concealment in Montclair, N.J. This area was once sprinkled with tall, masonry smokestacks, most now long gone. To recreate one of these historical icons, Stealth designed a 125-foot-tall replica smokestack with room to contain as many as six elevations of antennas. The smokestack has a 15-foot base diameter and tapers to 12 feet at the top. The concealment, featuring radius brick panels, is next to a municipal playing field and provides a historical, mill-like landmark for the town.

### Concealment Projects

In Branford, Conn., Stealth built a



Four sculptures conceal antennas at St. Paul's in Cranston, R.I. Religious sculptures cast in fiberglass are examples of architectural enhancement. Photo courtesy of Environmental Integration

faux retro redwood water tank to hide antennas. This past summer, the company built a simulated farm silo in Long Valley, N.J. The company is working on a large rooftop site in downtown Newark, N.J., which is part of the resurgence of the city. The installation is atop the long-vacant Bamberger's department store. There, window panels and curtain walls are used to screen antennas installed on the roof and upper floors of the building.

As are many concealment companies, Stealth is actively fabricating concealments for DAS. “We are especially busy with DAS installations in college and professional football stadiums and arenas,” Wedholm said. “Typically, we use side-mounted boxes for DAS, but for several college football stadiums, we designed a flagpole that holds a

medallion featuring the school logo with DAS antennas hidden inside.”

### Increasing Demand

We’ve seen how far antenna concealment has come during the past 20 years. As more and more jurisdictions pass more stringent zoning regulations, the demand for concealment is likely to spread to more rural areas and take increasingly creative forms. Concealment professionals appear ready to meet these new challenges. Concealments that hide antenna arrays in plain sight and that support electronic equipment at reasonable prices are the ultimate goal.

### About the author:

Mike Breslin is the owner of Breslin Productions, Midland Park, N.J. His email address is [mbrez@aol.com](mailto:mbrez@aol.com).



The low profile of Parallel Infrastructure's downtown Miami site allows carriers to cover event-goers, shoppers, park users and mobile traffic.

## Unique Cell Tower Heats Up Downtown Miami

A cell site on a railroad right of way in Miami is highly active. It is particularly useful during the more than 100 events conducted each year at the American Airlines Arena.

By Ed Myers

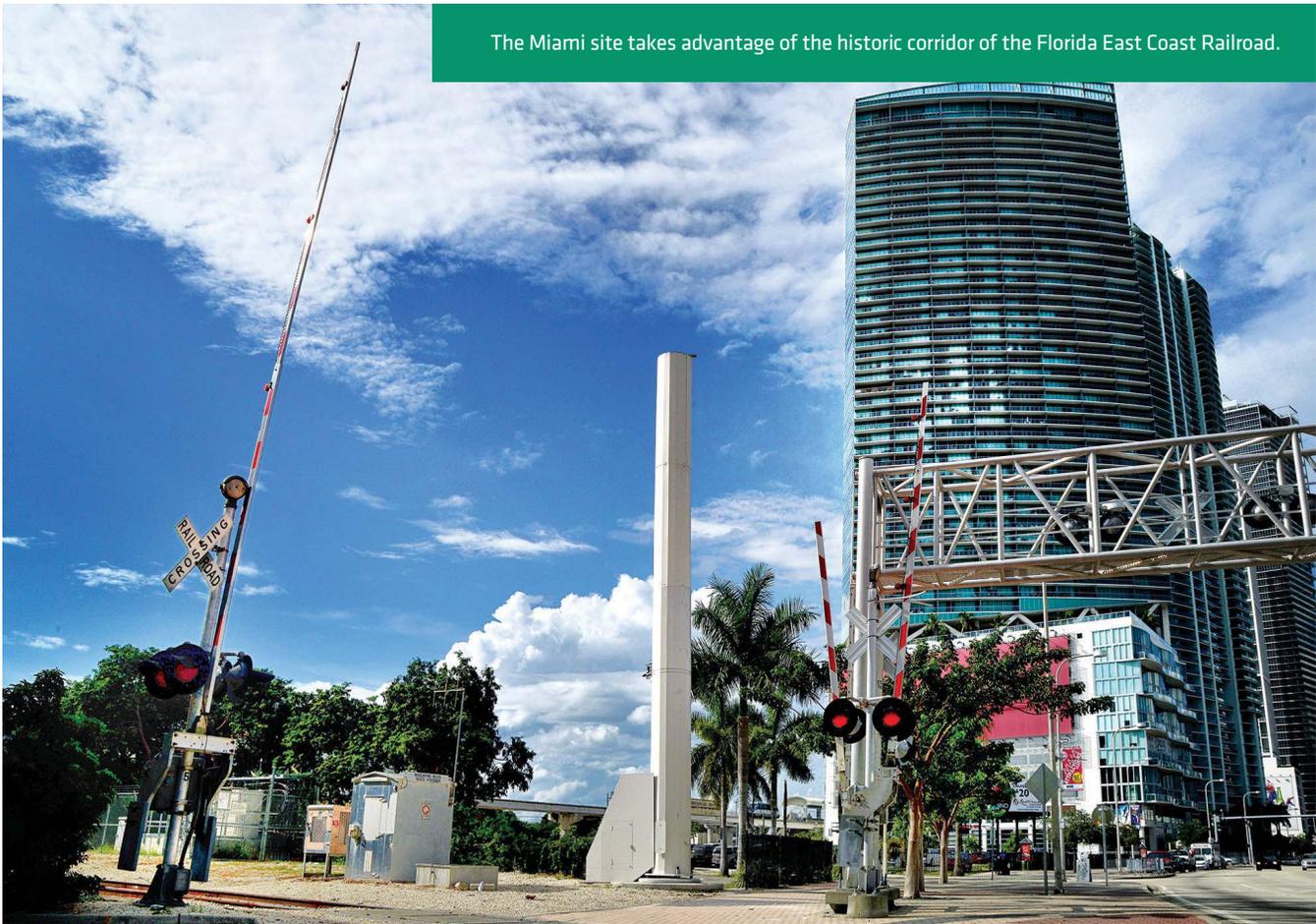
**W**hat is the most-seen stealth cell tower in the United States? It could be a flagpole site on the downtown Miami waterfront. The site is steps from the Bayside shopping district, heavily used city parks, municipal office buildings, Biscayne Bay, the cruise and shipping docks at the Port of Miami, and the American Airlines Arena and its marquis tenant, the Miami Heat. This site was seen on worldwide television every night the Miami Heat played a home game during the 2013 NBA playoffs. You

probably never noticed it. That's because it's located in a seemingly impossible spot. Parallel Infrastructure developed the site. Specializing in communications tower development, Parallel Infrastructure maintains telecommunications development and marketing rights to thousands of miles of transportation rights of way, municipal properties, commercial rooftops and cell towers. Perhaps its most exclusive properties are the rights of way it manages for railroad companies.

### Florida East Coast Railroad

The Miami site takes advantage of the Florida East Coast Railroad historic corridor, originally developed by Henry Flagler, which shadows Route 1 and Interstate 95 for the length of the state. Forty percent of Florida's population lives within five miles of the railroad and the 100-foot-wide transportation corridor.

The fact that the right of way runs through downtown Miami, a few city blocks from the Network Access Point of the Americas, was especially



The Miami site takes advantage of the historic corridor of the Florida East Coast Railroad.

intriguing to the wireless carriers as they attempted to engineer solutions for the sophisticated, highly mobile and data-centric end-users who frequent downtown Miami.

This particular section of Miami is representative of the wireless carriers' network densification requirements. The need to bolster their networks' capacity and coverage has escalated. Tower sites in urban areas are in high demand. Especially desirable are those sites that have 50-foot or greater heights available, that have been engineered for full antenna deployment and that have ready access to utilities and fiber-based backhaul.

This area of the city has plenty of

consumer demand for wireless service and few options for the wireless carriers. The surrounding buildings are too tall to be useful as antenna sites. The distributed antenna system in the American Airlines Arena may be operating at capacity. It offers limited coverage, and it's expensive for carriers to join the system. The City of Miami, the port authority and the railroad control most of the usable real estate in the area.

**Railroad Communications**

There was another need. The Florida East Coast Railroad had just kicked off a \$40 million track reconditioning and modernization project to extend rail service over

the causeway to Dodge Island and the Port of Miami. The communications requirements of the railroad would be expanding. Parallel Infrastructure's proposed solution to use the right of way for a new tower was the correct one for the railroad, the wireless carrier, the community and the end-users. Having gained agreement from the railroad that the location was right for its needs, Parallel Infrastructure was able to pursue the site for a new tower.

Working with the City of Miami to meet zoning and historic preservation rules, Parallel Infrastructure gained concurrence that the tower was permissible and that it offered the types of

CAMOUFLAGE

/ SPECIAL SECTION /

technology benefits visitors to the area required and expected. After gaining railroad support along with carrier tenant support and commitment, Parallel Infra-structure developed a non-invasive tower design, a flag-capable pole, and then went about constructing and populating the site. Within 45 days the site was complete and ready for occupancy.

“The downtown Miami site is a great example of what the company can do,” said Frank Chichile, Parallel Infra-structure’s chief executive officer. “Blending land assets, carrier demand and Parallel Infra-structure’s capital model helped fill a need that benefits both the carriers and the community.” Today, the site is highly active. It’s particularly useful during

*Tower sites in urban areas are in high demand. Especially desirable are those sites that have 50-foot or greater heights available, that have been engineered for full antenna deployment and that have ready access to utilities and fiber-based backhaul.*

the more than 100 events conducted each year at the American Airlines Arena. The 15 million tourists Miami hosts every year are better able to send pictures of the world-famous Biscayne Bay and to communicate with home. And the railroad is able to future-proof its communications capabilities for trains that pass through this corridor that is so highly used by pedestrians.

**About the Author:**

*Ed Myers is vice president of telecommunications infrastructure and sales at Parallel Infra-structure, where he is responsible for communications tower and fiber infrastructure sales, emerging technology ecosystems and new right of way development. Visit [www.parallelinfrastructure.com](http://www.parallelinfrastructure.com).*

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Tower  Xchange

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# Quick-Guide to Tower Manufacturing Companies

As a supplement to *AGL Magazine's* January Buyers Guide, a list of tower manufacturing companies offers more detail to help you choose a vendor for your next project. Where shown, logos and company descriptions were provided by and paid for by each company.

## Advanced Tower Components

4740 Ridge Drive NE  
Sale, OR 97301  
Josh Turner  
503.540.0777  
[jturner@advancedtowercomponents.com](mailto:jturner@advancedtowercomponents.com)  
[www.advancedtowercomponents.com](http://www.advancedtowercomponents.com)  
*Types:* guyed, self-supporting, monopoles, transportable, camouflaged, water tower, rooftops



## Allstate Tower

P.O. Box 25  
Henderson, KY 42420  
Kevin Roth  
270.830.8512  
[kroth@allstatetower.com](mailto:kroth@allstatetower.com)  
*Types:* Guyed, self-supporting, monopoles, water tower, rooftops, tilt-over.

Allstate Tower (AST) fabricates a full line of self-supporting, guyed, agriculture and specialized steel structures engineered specifically for the demanding requirements of its clients.

See ad on page 66



## Ambor Structures

8766 Pinehurst Bay  
Woodbury, MN 55125  
[www.amborstructures.com](http://www.amborstructures.com)  
Jeremy Smith  
651.414.1728  
[jeremy.smith@amborstructures.com](mailto:jeremy.smith@amborstructures.com)  
*Types:* Monopoles, transportable, rooftop



## Bell Tower

P.O. Box 110 Chelsea, OK 74016  
918.789.9020  
[belltowersales@sbcglobal.net](mailto:belltowersales@sbcglobal.net)  
[www.belltowercorp.com](http://www.belltowercorp.com)  
*Types:* Guyed, self-supporting, monopoles.

For 22 years, Bell Tower has been providing tower products and services to customers throughout the United States and abroad. With their primary focus on tower design for climbers' safety, they have succeeded in meeting all the buyers' loading criteria and construction challenges without a single fatality.

## Cell Trees

5401 S. Canada Place  
Tucson, AZ 85706  
[www.celltreesinc.com](http://www.celltreesinc.com)  
David Weekley  
520.730.7750

[david.celltrees@verizon.net](mailto:david.celltrees@verizon.net)  
Michael Elias  
520.663.1330 Ext. 2  
[michael.elias@celltreesinc.com](mailto:michael.elias@celltreesinc.com)  
*Types:* Monopoles, camouflaged.

Cell Trees builds over 150 new Mono-Trees each year. They modified over 100 MonoTrees in 2013 with their own crews. Cell Trees builds their own product and can modify any manufacturer's MonoTree with new branches, fronds or bark on-site. They are members of NATE and are ComTrain-certified.



The best is hard to find

## Chameleon Engineering

711 S. Carson St.  
Carson City, NV 89701  
Stuart Hawkes  
775.434.8733  
[stuart@chameleonengineering.com](mailto:stuart@chameleonengineering.com)  
[www.chameleonengineering.com](http://www.chameleonengineering.com)  
*Types:* Monopoles, camouflaged, concrete/silo, water towers.

From water towers and oil derricks to various tree varieties including elm, oak, eucalyptus, fir and pine (maple coming soon), Chameleon Engineering has the technology, skill and experience to conceal

any project. Additionally, their advanced 3-D modeling allows customers to see exact models of their projects prior to fabrication.

## COMMSCOPE®

### CommScope

4 Westbrook Corporate Center, Suite 400  
Westchester, IL 60154

Dale Heath  
817.864.4166

[dale.heath@commscope.com](mailto:dale.heath@commscope.com)  
[www.commscope.com/andrew](http://www.commscope.com/andrew)

Types: Monopoles, camouflaged.

CommScope has played a role in virtually all the world's best communication networks. They create the infrastructure that connects people and technologies through every evolution. CommScope's solutions span the entire RF landscape, helping wireless carriers manage increasing cell site complexity and optimize network planning, capacity, coverage, and performance.

## CommStructures™

INCORPORATED

### Commstructures

101 E. Roberts Road  
Pensacola, FL 32534

Jim Hobbs  
850.968.9293

[jhobbs@commstructures.com](mailto:jhobbs@commstructures.com)  
[www.commstructures.com](http://www.commstructures.com)

Types: Guyed, self-supporting, monopoles, transportable.

## ConcealFab®

Corporation

### ConcealFab

3265 Fillmore Ridge Heights  
Colorado Springs, CO 80907

Mike Slattery  
719.599.3400

[msslattery@concealfab.com](mailto:msslattery@concealfab.com)  
[www.concealfab.com](http://www.concealfab.com)

Types: self-supporting, monopoles, transportable, camouflaged, water tower, rooftops.

ConcealFab manufactures DAS and microwave backhaul concealment solutions using patented ultra-RF-transparent PVC materials and designs. ConcealFab utility

pole-toppers, side-arm radomes and R.O.W. monopoles are both lightweight and maintenance free. The ConcealFab production-friendly designs solve internal space and diameter challenges in a rapidly changing DAS landscape. Hide in plain sight with ConcealFab.

### Eastpointe Industries

4020 Tull Ave.  
Muskogee, OK 74403

Martin Halliday  
918.577.2017

[mhalliday@ep-id.com](mailto:mhalliday@ep-id.com)  
[www.ep-ind.com](http://www.ep-ind.com)

Types: Guyed, self-supporting.

Eastpointe Industries is a tower and structural components manufacturer. They are located in Muskogee, Okla., and have been supplying the telecom industry with quality self-support and guyed towers since 1997. Eastpointe Industries is currently manufacturing a wide range of tower modifications for many contractors nationwide.

## EDISON

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### Edison Carrier Solutions

4900 Rivergrade Road, 2B-1  
Irwindale, CA 91706

Brian Ryan  
800.634.7999

[carriers@sce.com](mailto:carriers@sce.com)  
[www.edisoncarriersolutions.com](http://www.edisoncarriersolutions.com)

Types: Monopoles

## EHRESMANN

ENGINEERING INC.

### Ehresmann Engineering

4400 W. 31st St.  
Yankton, SD 57078

605.665.7532  
[info@ehresmannengineering.com](mailto:info@ehresmannengineering.com)

[www.ehresmannengineering.com](http://www.ehresmannengineering.com)  
Types: Guyed, self-supporting, monopoles, camouflaged, water tower, rooftops, tower mounts, modification materials.

Ehresmann Engineering is a tower engineering and manufacturing company. Its engineers have over 100 years of communication tower experience. They design and manufacture self-supporting (3- and 4-legged)

and guyed towers, monopoles, flagpoles, monopines, slick sticks, crosses, bell towers, panel covers, replacement pine branches and other concealment products.

## ENGINEERED ENDEAVORS

### Engineered Endeavors

10975 Kinsman Road  
Newbury, OH 44065

Diane DiLauro  
440.564.5484 ext. 231

[ddilauro@engend.com](mailto:ddilauro@engend.com)  
[www.engend.com](http://www.engend.com)

Types: Monopoles, camouflaged.

Engineered Endeavors is a leader in the design and manufacture of antenna structures including monopoles, flagpoles, disguised monopoles and disguised towers. The company is the next-generation wireless company with a culture that emphasizes being entrepreneurial and getting things done right, no matter what it takes.

See ad on page 38

### Environmental Integration

18 Chase Court  
Orange, MA 01364

Thor A. Holbek  
413.219.9547

[taholbek@environmentalintegration.com](mailto:taholbek@environmentalintegration.com)  
[www.environmentalintegration.com](http://www.environmentalintegration.com)

Types: Monopoles, camouflaged, rooftop.

Environmental Integration (EI) has developed a wide range of industry-standard concealment products as well as unique integrations that provide natural and architectural solutions: monopine extensions, cupolas, penthouses, steeple components, fiberglass tree bark, fiberglass chimneys, fiberglass flagpoles, panels and facades, supportive structures, ventilation structures, and novelty concealments. The products are made of fiber-reinforced polyester (FRP) and paints and foliages proven for their durability. All of the products match or surpass industry standards for radio-frequency transparency.

### FWT

5750 E. Interstate 20  
Ft. Worth, TX 76119

Bill Sales

/ DEPARTMENTS /

817.907.0060

[info@fwtinc.com](mailto:info@fwtinc.com)

[www.fwtinc.com](http://www.fwtinc.com)

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

**GlenMartin**

1604 A Business Loop 70 West

Columbia, MO 65202

800.486.1223

[info@glenmartin.com](mailto:info@glenmartin.com)

[www.glenmartin.com](http://www.glenmartin.com)

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



HI-TECH COMPOSITE STRUCTURES

Design, Engineering, Fabrication, Installation

**Hi Tech Composite Structures**

P.O. BOX 609

Redmond, OR 97756

David Ullrich

[dcu@hitechcomposites.com](mailto:dcu@hitechcomposites.com)

[www.hitechcomposites.com](http://www.hitechcomposites.com)

Types: Camouflaged, water tower, rooftop.

Hi Tech Composite Structures provides innovative custom-designed RF-friendly concealment systems with professional service. HTCS can develop the best solution for your project based upon requirements, schedule and budgeting. They have a full design, engineering and manufacturing facility capable of accommodating any size or application. Call them today to learn more.



Tucson, AZ 85713

520.792.1686

[feddersen@larsoncamo.com](mailto:feddersen@larsoncamo.com)

[www.larsoncamo.com](http://www.larsoncamo.com)

Types: Camouflaged, water towers, rooftops.

Larson pioneered cellular camouflage with the first monopine cell tower in 1992 and has been leading the industry ever since. Products include pines, palms, elms, cypress, cacti, rooftops, water towers and steeples, DAS implementations, etc. Larson also refurbishes trees with field-installed bark, branches and fronds.



N E L L O  
CORPORATION

**Nello**

211 W. Washington St., Suite 2000

South Bend, IN 46601

Kevin Goggins

574.288.3632

[sales@nelloinc.com](mailto:sales@nelloinc.com)

[www.nelloinc.com](http://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](mailto:sales@peabodyconcealment.com)

[www.peabodyconcealment.com](http://www.peabodyconcealment.com)

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

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 23**

**Pepero**

671 Colbert Ave.

Oil City, PA 16301

Jeff Kahle

814.676.5688

[sales@peprollc.com](mailto:sales@peprollc.com)

[www.peprollc.com](http://www.peprollc.com)

Types: Self-supporting, monopoles, transportable



**Porter Site Concealment**

164 Malbert St., Building B

Perris, CA 92570

Porter Sales

951.940.9090

[info@porterrf.com](mailto:info@porterrf.com)

[www.porterrf.com](http://www.porterrf.com)

Types: Camouflaged, concrete silo, water tower, rooftops.

Porter Site Concealment is working hard to get their products noticed ... so yours aren't! Porter creates quality concealment solutions including rooftop structures, monument signage, clock towers, radome systems, monotrees and many other custom designs. They uniquely prefabricate their structures at their facility to optimize shipping and installation efficiencies. Engineering service is available.

**See ad on page 7**



**Sabre Towers and Poles**

2101 Murray St.

Sioux City, Iowa 51111

Mike Coghlan

800.369.6690

[towerinfo@sabreindustries.com](mailto:towerinfo@sabreindustries.com)

[www.sabretowersandpoles.com](http://www.sabretowersandpoles.com)

Types: Guyed, self-supporting, monopoles, transportable, camouflaged, rooftops.

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

**See ad on page 25**



**SOLAR COMMUNICATIONS INTERNATIONAL**

**Solar Communications**

8885 Rio San Diego Drive, Suite 207  
San Diego, CA 92108

Robert Renfro  
619.243.2750

[rrenfro@rftransparent.com](mailto:rrenfro@rftransparent.com)  
[www.rftransparent.com](http://www.rftransparent.com)

*Types:* Camouflaged, water tower, rooftops. 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 9**



**STEALTH<sup>®</sup>**  
FIRST IN CONCEALMENT<sup>™</sup>

**Stealth Concealment Solutions**

3034-A Ashley Phosphat Road  
North Charleston, SC 29418

Cindy Wishart  
800.755.0689 ext. 124

[cindywishart@stealthsite.com](mailto:cindywishart@stealthsite.com)  
[www.stealthconcealment.com](http://www.stealthconcealment.com)

*Types:* Camouflaged, concrete/silo, water tower, rooftops.

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 15**

[aglmediagroup.com](http://aglmediagroup.com)



**STEELHEAD**  
METAL & FAB, LLC

**Steelhead Metal & Fab**

3958 Boone Road  
Salem, OR 97317

Kevin Raddatz  
[Kevin@steelheadmetals.com](mailto:Kevin@steelheadmetals.com)  
[www.steelheadmetals.com](http://www.steelheadmetals.com)

*Types:* Monopoles, camouflaged, water tower, rooftops. Standard site steel and accessories.

Steelhead Metal & Fab is an AISC-certified fabricator with in-house design and engineering. Steelhead engineers, designs, fabricates and supplies pole, towers, concealment structures, equipment platforms, antenna mounts and custom products and has a full line of coax support hardware for the wireless, utility, government, commercial and railroad industries.



**US Tower**

1099 W. Ropes Ave.  
Woodlake, CA 93286

Bob Swiney  
559.564.6000  
[bswiney@ustower.com](mailto:bswiney@ustower.com)

[www.ustower.com](http://www.ustower.com)  
*Types:* Guyed, self-supporting, monopoles, transportable, camouflaged, rooftops.

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](mailto:towers@valmont.com)

[www.valmont-towers.com](http://www.valmont-towers.com)

*Types:* Guyed, self-supporting, monopoles, transportable, camouflaged, water tower

**See ad on page 12**



**Vector Structural Engineers**

9138 S. State St.  
Sandy, UT 84070

Roger Alworth  
800.558.0013

[roger@vectorse.com](mailto:roger@vectorse.com)  
[www.vectorse.com](http://www.vectorse.com)

*Types:* Self-supporting, monopoles, transportable, camouflaged, concrete/silo, water tower, rooftops.

Vector Engineers provided engineering services for over 1,300 telecommunication structures in 2013. 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.



**Will-Burt Company**

169 S. Main St.  
Orrville, OH 44667

Travis Powell  
330.347.9154

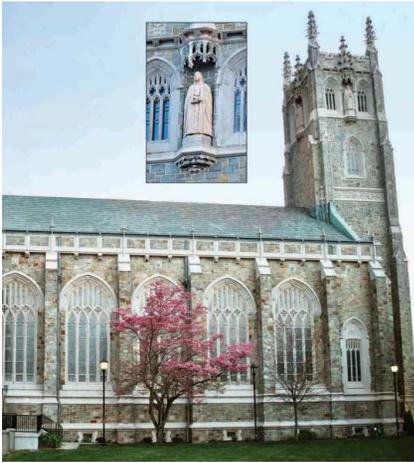
[tpowell@willburt.com](mailto:tpowell@willburt.com)  
[www.willburt.com](http://www.willburt.com)

*Types:* Transportable.

Will-Burt and sister company ITS, both ISO 9001:2008-certified manufacturers, are recognized as the premier OEM sources for rapid-deployment mobile tower and mast systems, COWS and COLTS, and integrated mobile command and communication centers. They support emergency response, temporary and long-term communications, surveillance, test and other requirements of a global clientele.

# Product Showcase

## Concealment and Camouflage



### TOWER AND POLE DISGUISES

Product applications from **Engineered Endeavors** include pine poles, flagpoles and architectural towers. The structures are designed to fit unique geographies, weather conditions and visual demands. The structures are adaptable to any environment and feature easy installation. Camouflage and concealment products include cupola cellular, monopine cellular and novelty disguised cellphone towers. [www.engend.com](http://www.engend.com)



### CONCEALMENT PRODUCTS

**Stealth Concealment Solutions** specializes in rooftop-antenna concealment. The company disguises or camouflages antennas by topping a structure with a screen-wall

concealment, side-mounted box concealment or pod- or penthouse-style concealment. The manufacturer provided a roof replacement for St. Luke's Presbyterian in Dunwoody, Ga., as shown in the accompanying photo. The roof is composed of 0.09 FRP shingles that resemble an asphalt finish. Stealth also designs water tank and clock tower concealments and can provide aesthetically pleasing antenna concealments for any type of application. Also available are DAS concealments, tree and pole concealments, and silo concealments. [www.stealthconcealment.com](http://www.stealthconcealment.com)



### FABRICATION FOR INSTALLATION

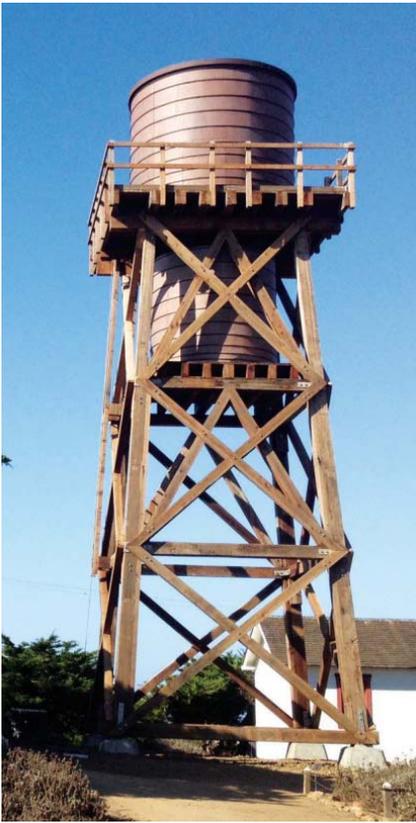
**Porter Site Concealment** produces custom concealment structures in-house to meet individual conditions prior to shipment. The structures are broken down only to the dimensions required to facilitate shipment and crane picks. Construction dimensions, fabrication accuracy, texture application and paint color are verified prior to shipment. This method delivers the structure to the

site ready to install quickly, reducing crane costs and installation time. On-site work such as initial material sorting and verification, the cutting down of bulk stock, assembly, and applying texture and paint is eliminated. Porter Site Concealment's fabrication method offers an alternative to receiving unassembled projects on shipping pallets and in cartons. [www.porterrf.com](http://www.porterrf.com)



### RF ANTENNA ENCLOSURES AND SHELTERS

Proprietary RF-transparent antenna enclosures and shelters from **ConcealFab** provide environmental protection and public concealment for high-frequency communications infrastructure. The Hide in Plain Sight structures use patented RF-transparent polyvinyl chloride materials and construction methods. The products have completed extensive radio-frequency, wind-loading and fire-rating testing at the Southwest Research Institute in San Antonio, Texas. RF chamber testing results are available for frequencies up to 100 GHz for use in C-band, X-band, Ku-band, Ka-band and EHF point-to-point operating frequencies. [www.concealfab.com](http://www.concealfab.com)



### RF-TRANSPARENT CONCEALMENT

**Peabody Concealment** creates custom-made RF-transparent concealment for antenna cell sites. Its design and engineering service, CAD drawings and quick-shop drawing are intended to ensure that critical project needs are met. In one application, an expert design team collaborated with park rangers of the Piedras Blancas Light Station water tower to create a historically accurate 18th-century appearance. The concealments come with a variety of surface textures and treatments. Products are shipped already painted and ready to install quickly and easily on-site. Class I fire retardant resin is used in the panels, which are designed to exceed RF performance requirements for cellular antenna screen walls.

[www.peabodyconcealment.com](http://www.peabodyconcealment.com)

[aglmediagroup.com](http://aglmediagroup.com)



### RF CONCEALMENT PRODUCTS

**Atlantic Concealment** offers RF concealment products that cover a frequency range from DC to 80 GHz. Products include replacement steeples, vent stacks, microwave covers (fabric-based and solid) and tower projects. The company

recently introduced the WavePortal series of microwave antenna concealment solutions, which are antenna and equipment shelters fabricated of microwave RF-friendly composite materials. The series addresses the issue of aesthetics and complies with architectural standards and zoning ordinances that pressure carriers and private network operators to conceal communications equipment installed on urban or metroplex tenant rooftops.

[www.atlantic-concealment.com](http://www.atlantic-concealment.com)

### TOWER CONCEALMENT SOLUTIONS

**Ehresmann Engineering** offers concealment solutions including light poles, flag poles, cross poles and artificial trees. The structures use the latest RF-transparent materials available. The company offers designs and engineering to meet the user's exact needs and specifications.

[www.ehresmannengineering.com](http://www.ehresmannengineering.com)

### DISGUISED AND CAMOUFLAGED TOWERS

Disguised cell towers and camouflaged wireless communication towers are available from **Valmont Structures**. As a pioneer in disguised cell towers and camouflaged wireless towers, the company offers solutions designed to blend in with the landscape and surrounding environment. The product line includes Valmont's popular camouflaged flagpole, pine-tree pole, palm-tree pole and related cell phone towers designed to provide an aesthetically pleasing appearance with the latest technological advancements.

[www.valmontstructures.com](http://www.valmontstructures.com)

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**NATURAL AND ARCHITECTURAL CONCEALMENT PRODUCTS**

**Environmental Integration** has developed a range of concealment products that provide natural and architectural solutions, such as monopines, monopine extensions, cupolas, penthouses, steeple components, fiberglass tree bark, fiberglass chimneys, fiberglass flagpoles, panels and facades, supportive structures, ventilation structures and novelty concealments. The products are made of fiber-reinforced polyester, and paints and foliage proven for durability. The products are designed to match or surpass industry standards for radio-frequency transparency. [environmentalintegration.com](http://www.environmentalintegration.com)

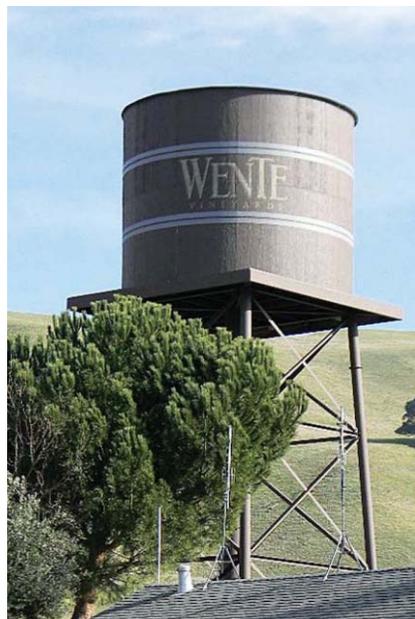


**CUSTOM CONCEALMENT PRODUCTS**

**Sabre Towers and Poles** custom designs and manufactures concealment products. In one application, a four-legged, self-supporting tower was disguised as a base tower for a Boy

Scout reserve in West Virginia. Sabre's slip-sleeve monopoles can be disguised in a variety of replica trees or flagpoles. The Slimline pole, featuring internally bolted connections with the antennas hidden inside the structure, can be disguised as cross poles, light poles or stadium lights.

[www.sabretowersandpoles.com](http://www.sabretowersandpoles.com)



**CONCEALMENTS WITH UNIVERSAL TOP HAT**

**Solar Communications** RF-transparent Height Systems concealments are intended to blend seamlessly into any environment from natural park space to shopping malls and busy urban settings, to residential neighborhoods and places of worship. The systems have a universal top hat that accommodates cellular or PCS antenna arrays, supports horizontal-diversity or polarization-diversity antennas and meets TIA/EIA-222 wind load requirements. They are customizable to meet specific technical and site requirements.

[www.rftransparent.com](http://www.rftransparent.com)

**CELL-TOWER CAMOUFLAGE**

Products that transform unattractive cell towers into part of the scenery are available from **Larson Camouflage**. The company disguises cell towers to look like pine trees, palm trees, cacti, flagpoles, chimneys, water towers, crosses or grain silos, depending on the surrounding environment. The manufacturer reproduces the iconic American water tower as a remnant of a bygone era to enhance areas requiring a nontraditional site concealment solution.

[www.larsoncamo.com](http://www.larsoncamo.com)



**RF ARCHITECTURAL CAMOUFLAGE**

**Hi Tech Composite Structures** offers concealment products with architectural camouflage for antenna equipment that might look unappealing to the general public or that local or other regulatory agencies may require to be concealed. The exterior appearance can be tailored to match existing surfaces such as brick, stucco, wood and corrugated materials. The nonmetallic materials provide years of maintenance-free service. The manufacturer maintains an inventory of structural and shrouding fiber-reinforced plastic components, allowing prompt turnarounds on orders.

[www.hitechcomposites.com](http://www.hitechcomposites.com)

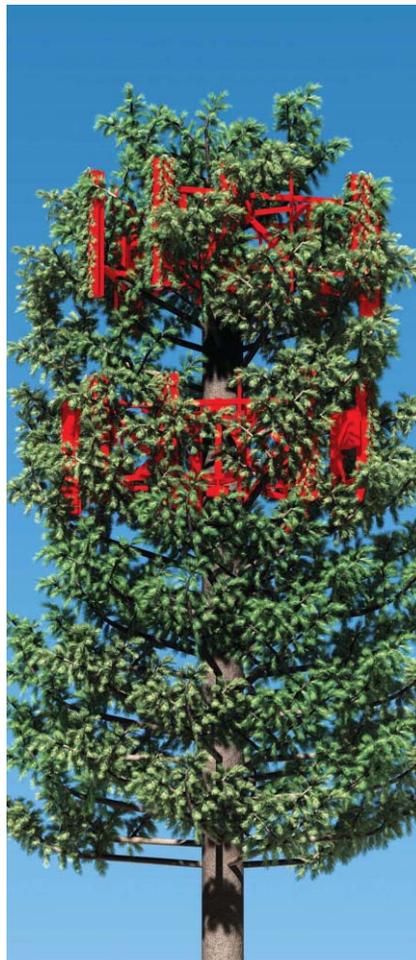


### CAMOUFLAGE UPGRADES FOR LTE

LTE is causing antennas to grow and massive equipment to be added to the towers. Trying to make tree poles look more natural and realistic is a challenge. The accompanying photos show a before and after view of an LTE antenna installation with a **Cell Trees** camouflage upgrade. Cell Trees has custom branches and other products to help blend the equipment in with the tree pole while maintaining RF transparency. The company performs upgrades on-site with its own crews. The Cell Trees product comes with the necessary design and equipment.

[www.celltrees.com](http://www.celltrees.com)

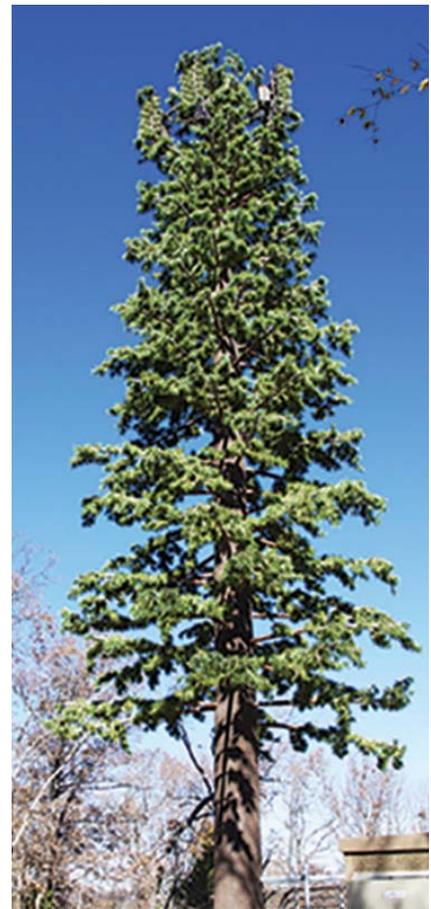
[aglmediagroup.com](http://aglmediagroup.com)



### CONCEALMENT MODELING

One of the greatest concerns when it comes to concealment, especially with trees, is whether the antennas will actually be concealed enough to please the local jurisdiction. With LTE upgrades, the antennas, equipment and mounts are larger and wider, making them increasingly difficult to conceal with a tree tower. To reduce the risk of erecting a tower with inadequate branching, **Chameleon Engineering's** CAD-CAM-formed digital models give multiple angles, zooms, and views of the antennas and branching in order to guarantee satisfactory concealment and are accurate to within inches to the finished product.

[www.chameleonengineering.com](http://www.chameleonengineering.com)



### MONOTREES FOR CELLULAR CONCEALMENT

**Porter Site Concealment** offers monotrees for cellular concealment. Monopines, palms, broad leaf, cypress, oaks and frond skirts are available. Bark cladding is applied using molds taken from living trees, which yields a seamless texture. Branches have been engineered and approved for 120 mph wind, 70 pounds per square foot of ground snow load and ice up to 1 inch thick. Performance results were calculated for a branch elevation of 125 feet above ground level. Porter Site Concealment also provides replacement tree components and offers help with navigating through the requirements of older monotrees produced by other concealment companies.

[www.porterrf.com](http://www.porterrf.com)

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