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June 2010

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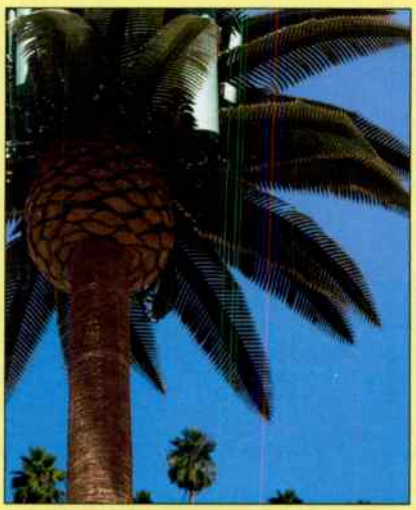

on the cover

Art Director Scott Dolash photographed a monopalm manufactured by Nello and located near Highway 515 in Henderson, Nev. Not one to brag, Dolash credited an affordable rental car, a dependable GPS, three bottles of water and an accurate list of site locations from the manufacturer for making the shot possible.

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Features

Departments

Femtocells: OKIMHOO

Let's see, if only there were a way to get users of wireless communications devices to pay for their use of the network infrastructure, then carriers would not have to pay tower companies and rooftop landlords so much money for the privilege of placing antennas on their properties. And if only there were a way to get users to pay for backhaul, then maybe carriers could reduce both capital expense and operating expense.

Maybe there is a way: femtocells.

AT&T, the company known to consumers for the Apple iPhone and known to the wireless infrastructure industry for its portfolio of nearly 10,000 towers, is taking orders for femotocells. These devices transmit and receive cell signals to a radius of about 40 feet. They then connect with the cellular network via the user's Internet connection using an Ethernet cable.

Home or office

Sometimes called a mini-cell tower, the femtocell is normally positioned near a window inside a home or office so it can pick up GPS signals. AT&T calls its product offering a MicroCell.

For iPhone users whose experiences with picture messaging and Web surfing have been less than optimal because the network capacity in their areas is insufficient or because parts of their homes or offices suffer from poor network coverage, the femtocell may solve the problem.

Some users may not want a macro tower in their backyard, yet they may be all too willing to place a MicroCell in their home. At least with the MicroCell, the decision is up to the individual. It might not be long, though, before one neighbor complains to another about the possible deleterious effects of whatever is emanating from that femtocell in the window.

Some envision a time when neighborhoods may be equipped with a femtocell in nearly every home, reducing the need for outside cell towers and perhaps even distributed antenna systems. The use of femtocells wouldn't eliminate the need for a wireless network, though, because users also will be spending time on their phones or using Internet connectivity while away from their homes or offices.

Reduced demand

A rise in femtocell use may reduce demand for antenna space on towers and rooftops, but it is unknown whether the amount of reduced demand would even be measurable.

And yet, when it came time for RBC Daniels to list in one of its research reports the factors that might lead to lower-than-expected demand for tower sites, it cited femtocells along with wireless network consolidation and widespread use of network sharing. RBC Daniels listed the factors in its May 4 share price target revision for American Tower.

For the past couple of years, speakers at conventions have mentioned increasing use of femtocells along with reduced-height sites such as light poles as changes to the wireless infrastructure that reflect the need for higher capacity and the need to place the network antenna as close as possible to the user device.

With many consumers already comfortable with having wireless networking equipment in their homes and offices to connect their computers with the Internet and enterprise networks, it seems likely that the uptake for femtocells will not face the kind of resistance that macro cells sometimes do. "Not in my back yard" (NIMBY) becomes OKIMHOO ("OK in my home or office"). All right. So it's not lyrical. agl

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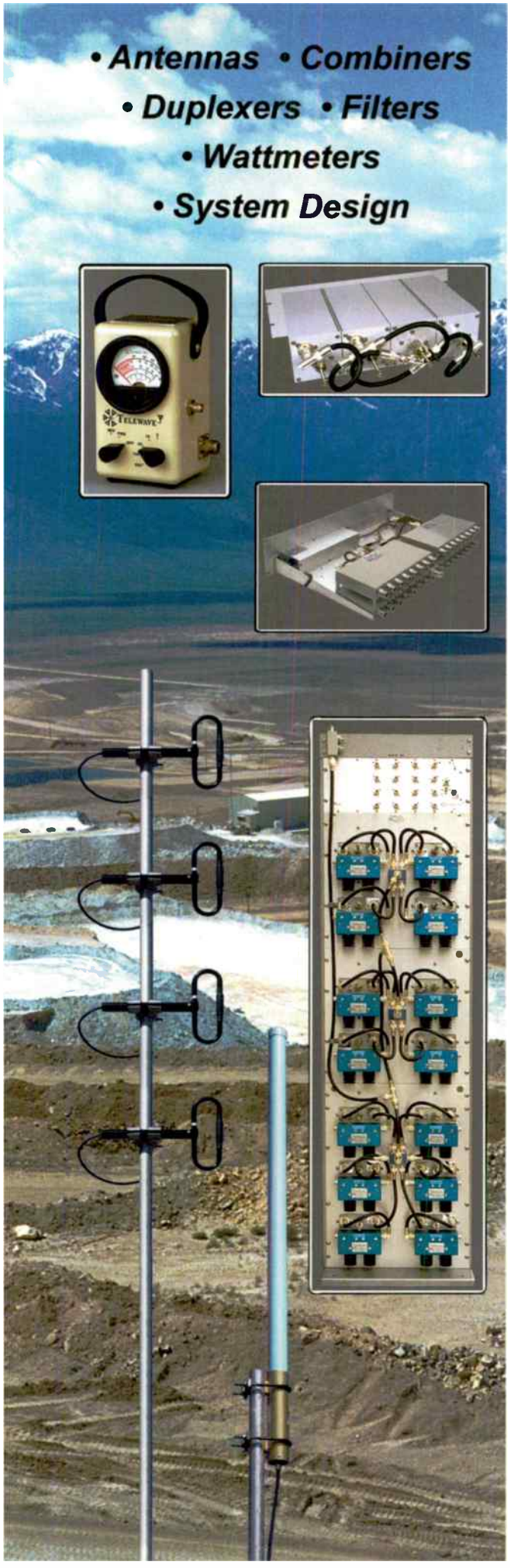

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Brevity

Friend or foe? I hate to admit my lifelong hatred of English, writing, editing and all things involving grammar. If you can figure out why I own a magazine, please give me a call.

I was recently reading an article by Eric Rhoads, publisher of *Radio Ink* magazine (I'm a former broadcast kind of guy, so I still read the industry rags). His basic point was that technology is changing very fast. We can't just stand back and decide that some new technology is not the old way of doing things — of course, it's not! And we can no longer afford to avoid/ignore/dislike technology because we dislike change. Change is here; change will always happen. Don't drag your feet! Engage!

I've been out trying to get us radio people to think more like IT folks for a bit. Last month, I presented an intro to IP (Internet protocol) for the radio person — the idea being how much easier it would be to teach IT folks about radio than the other way around. We need to find much better resources and educational opportunities for trying to fit radio engineering into the new IP/IT-centric world. We could all use a better understanding of backhaul, capacity, dynamic networking and so on because our tower sites are no longer just cellular sites, they are gateways to a vast IP network. Cell phones are no longer cell phones that "do" email. They are mobile IP routers, gateways and mobile computing terminals (check out an Android phone, if you haven't already).

I remain surprised at the number of people who still insist that they are smarter than the IT department and will spend considerable energy complaining about "them," rather than investing time in learning about IT themselves. So, find Eric Rhoads' article at *http://ericrhoads.blogs.com/ink_tank*, and look for "A moment of embarrassment" from May 2010. It struck a note with me.

I've embraced my enemy (English, in general) and gone so far as to launch and own this magazine.

Other fun things: I've been working on a DAS project here in D.C. and working with a utility company that has recently been a little anxious about RF safety for their line works — due at least in part to the relative explosion and anticipated future expansion of co-location on utility structures. Like any good utility, it's taking no chances with safety. After so many years of working with wireless carriers to minimize every aspect of compliance (and folks, I have to tell you, I think we are scraping the bottom of the compliance category with some of the shortcuts the industry has engaged in), it is nice to work with a top-down "let's get it done the first time, and get it done right" kind of attitude. I'm hoping for more utility work!

One side note: I really see a lot of development opportunities heating up in nontraditional markets (not the U.S. or Canada). I hope to have more on this next time, but there appear to be more and more opportunities outside of the U.S. for us all to consider.

Brevity – sometimes I'm not great at being concise, but I know I'm better than most. I have a strict word limit on this page every month, which is probably a good thing for all of us. Until next time. **agl**

By Rich Biby, Publisher
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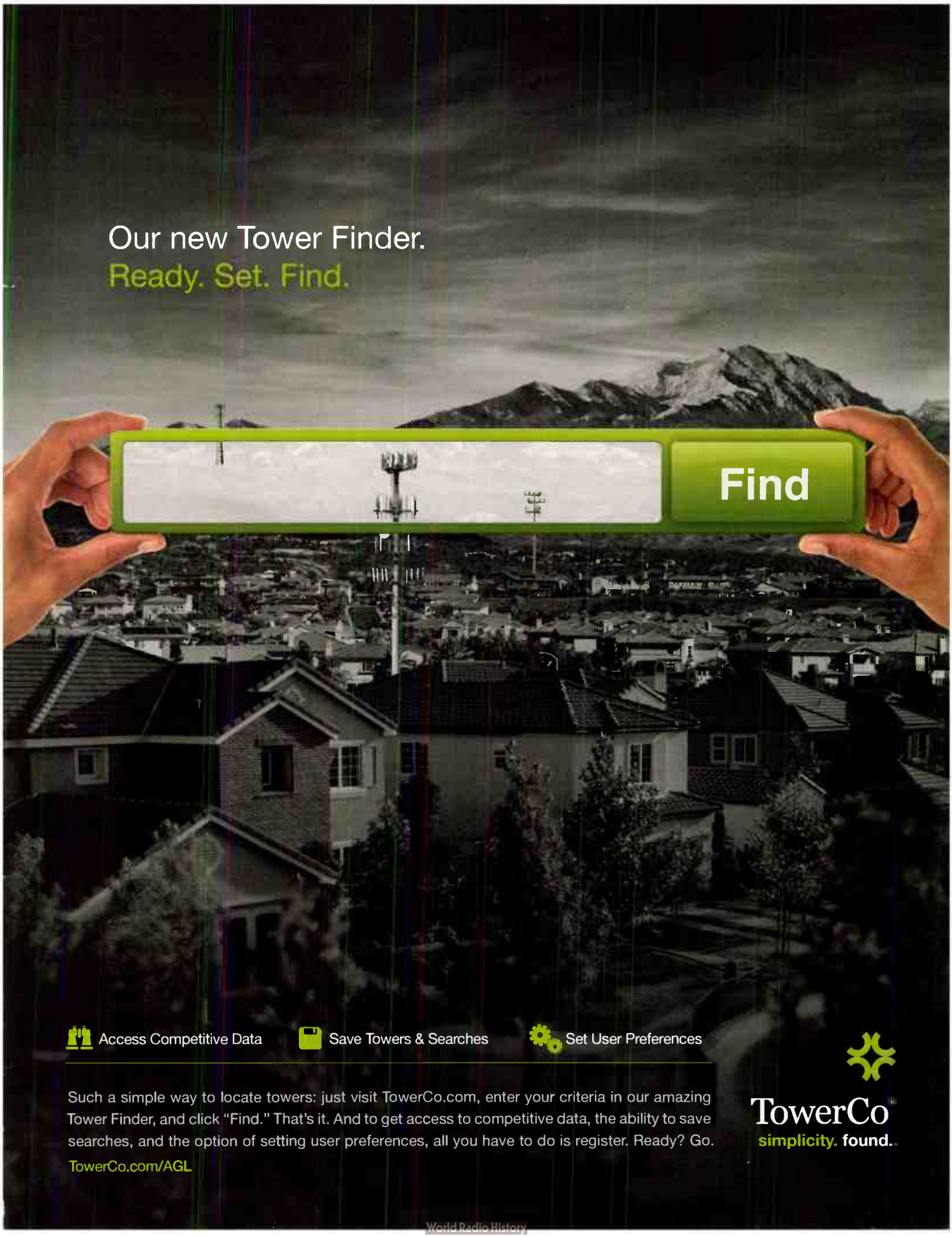
Photography courtesy of Waterford Consultants. Photo illustration by Scott Dolash.



Quick-Guide to Site Acquisition Companies

As a supplement to the January Buyers Guide issue, a list of site acquisition companies offers more detail to help you choose a vendor for your projects

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David Yacoub
dyacoub@sitelinkwireless.com
P: (410) 913-8442
F: (410) 309-4995
www.sitelinkwireless.com
Services
Provides tower, rooftop and DAS site acquisition nationally.
Rental/Collocation, Legal and Regulatory Services, Site Selection, Site Design, Site Survey, Lease Acquisition, Zoning/Permitting, Site Prequalification, Right of Way Procurement, Land Acquisition/Real-Estate Project Management, Construction Services (including tower climbers), Construction Management
Company Description
Site Link Wireless is a full-service site-development firm, which was formed in 2002. Our highly trained staff is comprised of attorneys, MBAs, engineers, project managers, con-

struction managers, tower climbers and crews, real estate specialists, and zoning experts. We believe a high-quality team requires not only individuals of exceptional professional capacity but also profound character. We look forward to earning your business.

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49357 Pontiac Trail, Suite 103
Wixom, MI 48393
Lee Burlison
leeburlison@smj-llc.com
P: (231) 301-5653
Services
Provides tower, rooftop and DAS site acquisition nationally.
Site Selection, Legal & Regulatory Services, Lease Acquisition, Zoning/Permitting, Site Prequalification, Right of Way Procurement, Land Acquisition/Real-Estate

Spectrum Surveying & Engineering
8905 W. Post Road, Suite 100
Las Vegas, NV 89148
Margaret Cefalu
mcefalu@spectrumse.com
P: (702) 367-7705
F: (702) 367-8733
www.spectrumse.com
Services
Provides tower, rooftop and DAS site acquisition services in one or more states.
Zoning/Permitting, Site Prequalification, Right of Way Procurement, Land Acquisition/Real-Estate, Site Selection, Site Design, Site Survey, Lease Acquisition, Rental/Collocation

SRP Telecom™

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1521 N. Project Drive
Tempe, AZ 85281-1298
Angela Castellano
angie.castellano@srpnet.com
P: (602) 236-2856
www.srpnet.com/telecom
Services
Provides tower and DAS site acquisition in one or more cities/counties.
Rental/Collocation, Site Selection, Zoning/Permitting, Title Service, Site Design, Site Prequalification, Site Survey, Right of Way Procurement, Legal & Regulatory Services

Company Description
SRP Telecom is a communications network infrastructure provider to telecommunications carriers, service providers and enterprise customers operating in Phoenix. SRP Telecom provides a wide range of telecommunications services from dark fiber to wireless site location, design and construction services.

Subcarrier Communications
139 White Oak Lane
Old Bridge, NJ 08857
John Paleski
john@subcarrier.com
P: (732) 607-2828
F: (732) 607-1390
www.subcarrier.com
Services
Provides tower and rooftop site acquisition nationally.
RF Propagation Studies, Site Selection, Title Service, Zoning/Permitting, Site Design, Site Prequalification, Environmental Assessments, Site Survey, Lease Acquisition, Land Acquisition, Geotechnical Analysis, Construction Planning, Tower Mapping, Site Security Evaluation, Grounding Design,

Construction Management, Tower Construction, Sweep Test, System Installation, Right of way Procurement, NEPA Checklist, Tower Purchasing and Sale/Lease-back

Company Description

Subcarrier Communications has been providing rooftop and tower site management for more than 25 years, bringing together a team of professionals to offer comprehensive site acquisition, development and long-term management services. We also provide building and tower owners with planning and design services, lease negotiations, installation, and maintenance of telecommunications sites.

See our ad on the back cover.

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F: (845) 534-5999
www.tectonicengineering.com

Services

Provides tower, rooftop and DAS site acquisition nationally.
Rental/Collocation, Environmental Assessments, Site Selection, Site Design, Site Survey, Lease Acquisition, Zoning/Permitting, Site Prequalification, Right of Way Procurement, Engineering (Structural/Geotechnical), Tower Analysis

Company Description

ENR top 20 Telecommunications firm specializing in site acquisition, municipal planning/permitting and civil, environmental, geotechnical and structural engineering. All services provided by in-house staff, coast to coast.

Telecom Realty Consultants, LLC

Telecom Realty Consultants
3864 W. 75th St.
Prairie Village, KS 66208
Paul Wrablica, III
pwrablica@me.com
P: (913) 449-4774
F: (913) 901-2435

Services

Provides tower, rooftop and DAS site acquisition in one or more states.
Zoning/Permitting, Site Selection, Lease Acquisition, Title Service, Site Prequalification, Right of Way Procurement, Land Acquisition, Build to Suit/Collocation

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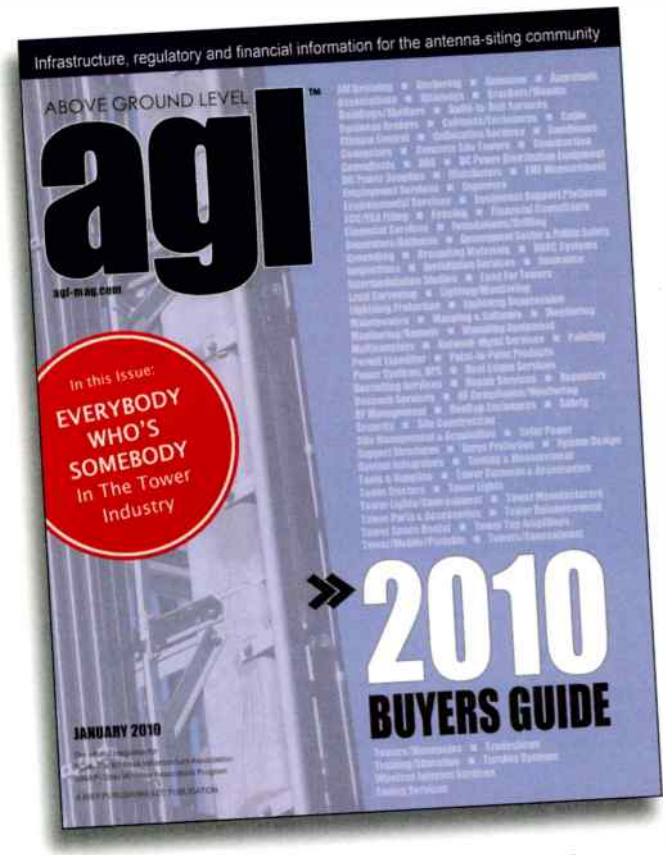

Addendum to January 2010 Buyers Guide

Here are companies to add to the list as an update to this year's buyers guide

Carpenter Consulting Group
168 N. Water St.
Rochester, NY 14604
Don Carpenter
don.carpenter@carpentercg.com
(P): (585) 360-2733
(F): (585) 360-2735
www.carpentercg.com
Service: Consulting

Eupen Cable
5181 110th Ave. North
Clearwater, FL 33760
(P): (800) 419 5100
(F): (727) 528-0751
Contact: Shannon Harrison
www.eupen.us
Product: Cable
Eupen Cable is the quality leader in 50-ohm and 75-ohm copper coaxial cable for radio frequency transmission. The company also provides premium connectors, jumper cables, cable installation accessories, site steel components, radiating cables and elliptical waveguides. Eupen has four warehouse logistic facilities strategically located throughout the United States.

Rosenberger Site Solutions
P.O. Box 8817
Lake Charles, LA 70606
(P): (337) 598-5250
(F): (337) 598-5290
rlss@rlss.us
www.rlss.us
Products: Antennas, Brackets/Mounts, Cable Grounding Material, Test and Measurement, Tower Parts and Accessories
Rosenberger Site Solutions is an industry-leading supplier of coaxial cables, connectors, tower components, installation tools, jumper assemblies, surge arresters, test and measurement equipment and accessories, grounding materials and antennas.

Solar Communications International
8885 Rio San Diego Drive, Ste. 207
San Diego, CA 92108
(P): (619) 243-2750
(F): (619) 243-2749
rrenfro@rftransparent.com
www.rftransparent.com
Solar Communications International 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.

Summit Services
604 Fox Glen
Barrington, IL 60010
(P): (847) 277-0070
(F): (847) 277-0080
jauriema@summitservices-llc.com
www.summitservices-llc.com
Service: Construction

SSC
8500 W. 110th St., Ste. 300
Overland Park, KS 66210
(P): (913) 438-7700
(F): (913) 438-7777
dblaha@ssc.us.com
Services: Consultants, Engineers, Permit Expeditor, Site Management and Acquisition, Zoning Services
SSC is a leading provider of services to the telecommunications, development and construction industries. Our full range of in-house services and abilities make us uniquely capable of handling all aspects of the most challenging projects. We strive hard to serve our clients, solve their problems, and communicate effectively.

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Santa Fe Springs, CA 90670
(P): (800) 949-7079
Jessica Soto
jsoto@talleycom.com
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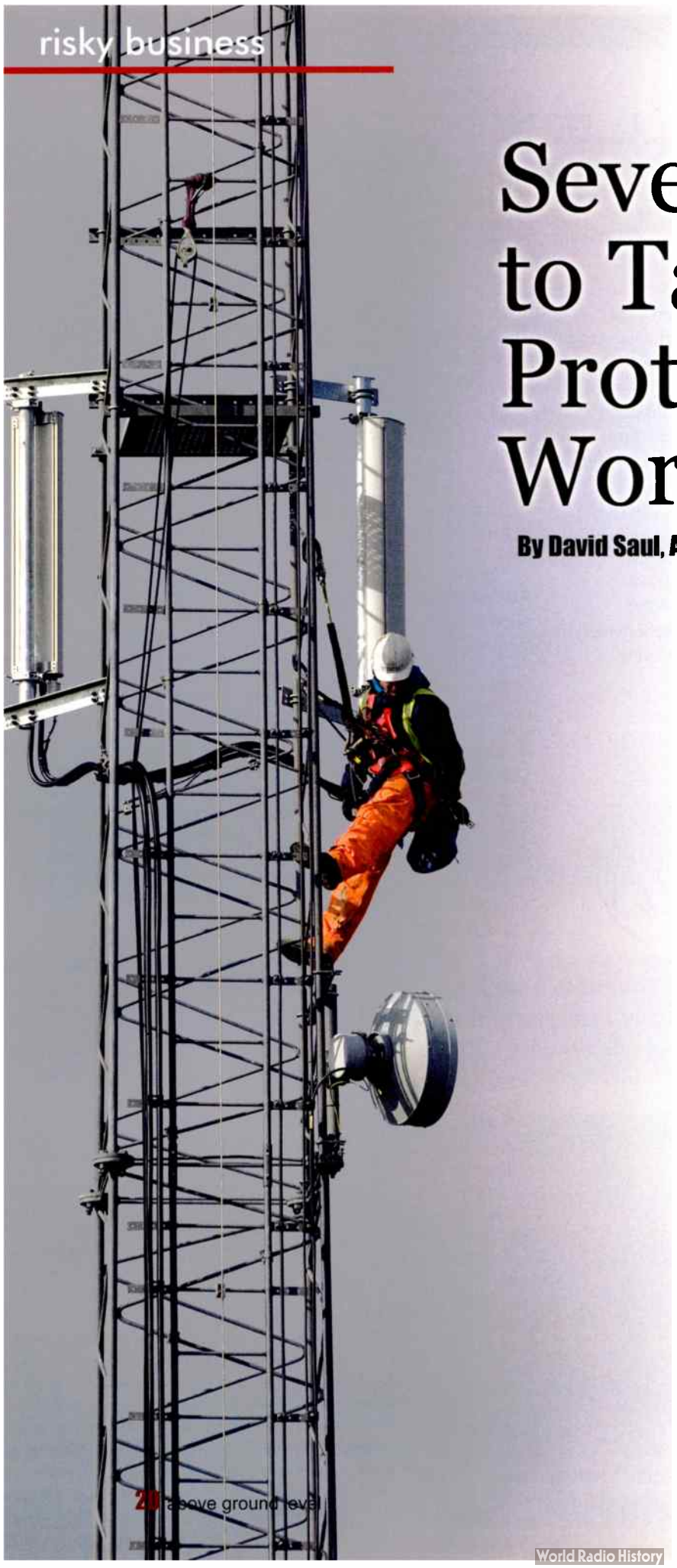
Westchester Services
604 Fox Glen
Barrington, IL 60010
(P): (847) 277-0070
(F): (847) 277-0080
jauriema@westchesterservices.com
Service: Engineering

Pick up the 2010 Buyers Guide at these industry events

APCO
August 1-4, 2010
George R. Brown Convention Center
Houston, Texas

PCIA
October 4-7, 2010
Westin Diplomat Resort and Spa
Hollywood, Fla.



Seven Steps to Take to Protect Young Workers

By David Saul, AAI

The complex and ever-changing work environment in telecommunications presents multiple safety hazards. Overall, more workers are killed in the United States working in construction than in any other industry. Construction workers risk injury from a wide range of exposures including falls; electrical shock; being struck by equipment, collapsing structures and falling objects; being caught in machinery or moving parts; and being involved in motor vehicle collisions.

Young workers between the ages of 18 and 24, because of their biological and social characteristics, have unique risks for work-related injuries and illnesses. Developmental factors in young workers and the nature of their employment may increase their risk of injury and illness on the job:

- Young workers may be unfamiliar with work requirements and safe operating procedures for certain tasks.
- Young workers commonly perform tasks outside their usual work assignments for which they may not have received training.
- Young workers may lack the experience and the emotional and physical

maturity needed to perform certain job tasks.

Risky behaviors

Comparing young workers with older workers reveals a correlation between injuries and age. *Young workers are at greater risk.*

High-risk industries, such as telecommunication, tend to create unfamiliar hazards for young workers.

Some young workers consider themselves invincible and may exhibit more frequent risky behavior than older workers.

Surveys conducted by the Workplace Safety and Insurance Board of Ontario and other organizations reveal potentially dangerous thoughts and attitudes that some young workers may possess:

- "I'll do almost anything my employer asks me to."
- "I trust my employer not to make me do anything that is unsafe or dangerous."
- "I assume the equipment and chemicals I work with are safe."
- "I don't want to ask too many questions. I may lose my job."
- "I don't want my boss to think I complain about hazards too much."

- "I'll make do with whatever tools and equipment they give me."
- "Protective equipment isn't cool. I won't wear it unless someone makes me."

Young workers understand and follow instruction better when shown realistic situations, cause-and-effect examples, shock events and thorough demonstrations of how to perform tasks properly.

Whether you have seasonal or part-time help or hire young workers for permanent positions, the best strategy for reducing the risk of injury and making the workplace safer for young workers is a combination of education, training and observation.

Learning by trial and error can be dangerous. When young workers have questions about equipment, materials or work procedures, they should be comfortable asking their supervisors for answers. Likewise, encourage workers to report concerns or issues that they may have on the job.

Understand how young workers think. Know what works with young workers to make them understand. And encourage young workers to ask questions. agi

David Saul is executive vice president of Atlantic Risk Management, Columbia, Md., and is an accredited risk advisor in insurance (AAI). His email address is: *dsaul@atlanticrisk.com.*

Seven Steps to Protect Young Workers

1. **Make sure young workers receive clear instruction for each task they are to perform.** Set a firm rule that young workers may only work on tasks for which they are trained.
2. **Ask young workers to demonstrate that they understand instructions.** Do not assume that young workers understand what they have been told.
3. **Train young workers in methods of safe lifting, with an emphasis on using lifting devices.**
4. **Provide young workers with the appropriate and properly sized personal protective equipment (PPE).** Do not give young workers PPE that may not be designed for smaller youth proportions.
5. **Provide adequate supervision.** Do not allow young workers to work alone. Observe performance to ensure the proper procedures are understood and followed.
6. **Correct mistakes immediately.** Statistics show that the greatest percentage of injuries occur to workers within their first 90 days on the job, highlighting the importance for training and orientation, especially for young workers.
7. **Stress safety to supervisors.** Encourage supervisors to set a good example for safety attitudes and safe work habits. More than 70 percent of workers follow the lead set by their supervisors.

Bringing Advocates into the Cell Site Development Process

Site-development challenges loom large for carriers and tower companies. To learn steps to take to increase permit application approvals, *AGL* asked Esme Lombard, T-Mobile's senior manager of national external affairs-engineering, for advice.

AGL Report

AGL: The site-development community continues to encounter significant challenges to site development at the local level. Why is that?

Lombard: There are two reasons. First, most of the easier locations have already been secured. We're pretty much saturated in terms of placing sites within industrial zones. In order to keep up with increasing customer demand, coverage has to move into residential areas. So as a result — and here's the second reason — we're seeing pushback from residents who are not comfortable with the idea of having a cell site in their neighborhood, regardless of what it might look like. The primary arguments against new sites have not changed much, namely perceived negative health effects, aesthetics and a decline in property values. What has changed is the increasing sophistication among the opposition.

AGL: Talk about that increasing sophistication for a moment. What are you seeing?

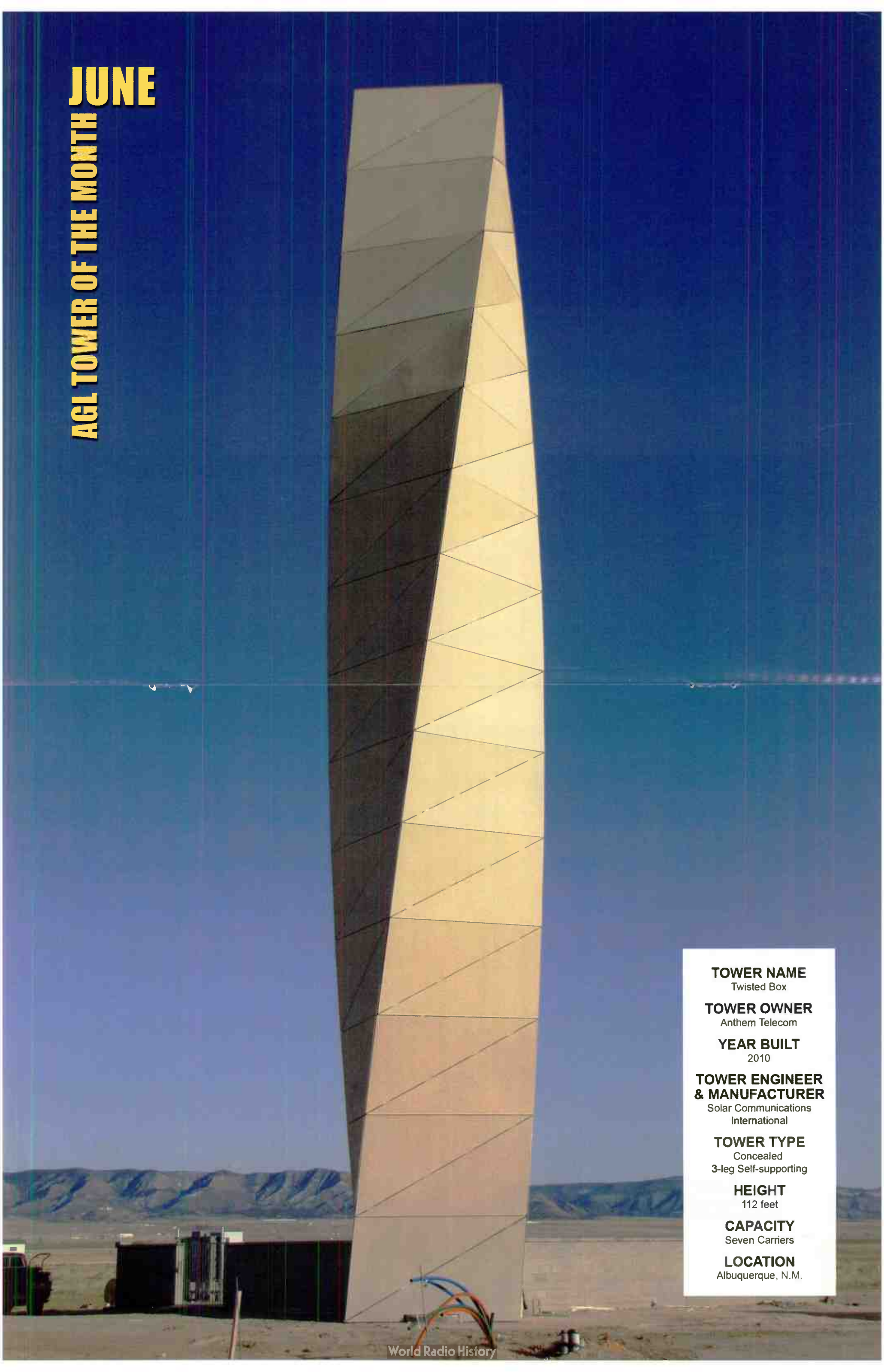
Lombard: Siting opponents are becoming much more sophisticated in how they raise awareness and mobilize a community or neighborhood to get engaged. There are still the T-shirts, signs and petitions at a hearing. But behind that, for example, is a growing use of localized websites. Social media is becoming a key tool for opponents — everything from blogs to videos posted on YouTube. These tools are great for quickly disseminating information and misinformation to a target audience. It's taking grassroots activism to a higher level.

In the meantime, wireless site developers essentially continue to do business as usual, especially in jurisdictions we know are difficult. We show up at a hearing where the opposition has rolled out and we give the same song and dance: "There are no negative health effects and the FCC says you can't deny based on health concerns. The site is needed for better coverage; we've complied with all local requirements; and you should approve the application." It's us versus them. It's the big wireless industry versus the local residents who, by the way, vote for the local officials deciding whether our application is approved.

AGL: So what can be done to change the landscape? Is the scenario you just described the driving force behind what your company is now doing?

AGL TOWER OF THE MONTH

JUNE



TOWER NAME
Twisted Box

TOWER OWNER
Anthem Telecom

YEAR BUILT
2010

TOWER ENGINEER & MANUFACTURER
Solar Communications International

TOWER TYPE
Concealed
3-leg Self-supporting

HEIGHT
112 feet

CAPACITY
Seven Carriers

LOCATION
Albuquerque, N.M.

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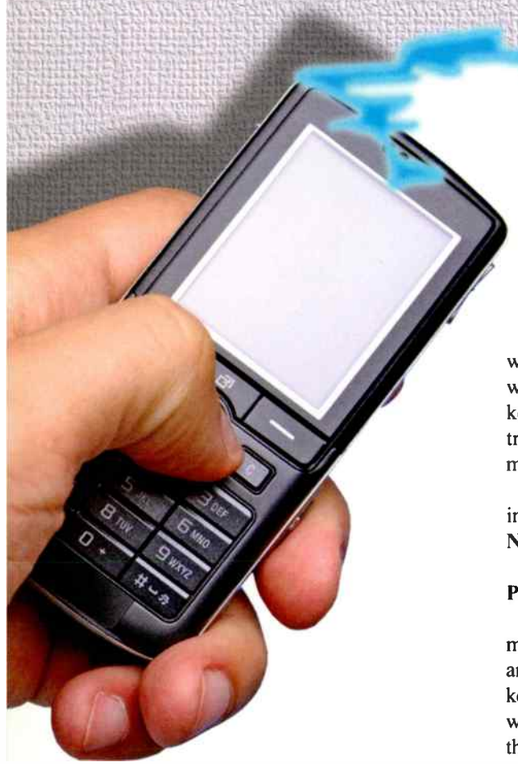
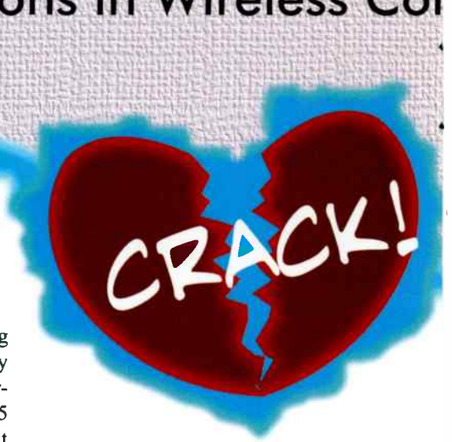
Lessons in Wireless Co





By Steve Caplan

When asked if they had ever used their mobile phone to break up with someone, 57 percent of respondents said yes, with 48 percent of those ending their relationships by text message. (Source: Feb. 4 Valentine's Day Love survey by mocospace.com).

According to the reality of our constantly connected mobile world, the youngest generation of Americans will think of wired landlines the way all Americans think of the telegraph and Morse code — dated technologies that have been replaced.

Wireless connectivity and the network infrastructure needed to support mobility for more than 280 million people are changing the way people live, work, play — and love.

A few years ago, text messaging was a feature just being dreamt of by wireless engineers and mobile marketers. Last year, Americans sent 1.5 trillion (that's 1,500,000,000,000) text messages.

Apparently, a number of these texts included messages where breakN ^ S **NOT** hrd 2 do.

Partnership opportunities

Wireless connectivity is bringing massive change, and local community and government leaders who do not keep up with the connected revolution will be scrambling to compete during the next two to five years. In fact, they will be rightfully scrambling to compete for voters who are demanding coverage. Without question, parallels exist to the competitive situation that we — America's wireless service providers — face: If we do not keep up with technology changes, we will be scrambling to compete for customers.

There is another common reality that we share with city halls, planning departments and zoning commissions. When it comes to a portion of the constituents and community members who show up at cell site permit hearings, the lack of trust in local government is almost as palpable as the lack of trust in the wireless carriers seeking local government approval for new or expanded cell sites.

Yet, township and city business operations, utility infrastructure, emergency response systems, hospitals, businesses large and small, and day-to-day activities — not to mention a large majority of the country's population — are increasingly dependent on wireless infrastructure, connectivity and data.

This electronic waterfall of communications requires infrastructure. Without approvals from countless numbers of local and regional jurisdictions, wireless networks won't be built in some of the most difficult-to-reach places — residential neighborhoods where demand is the strongest.

These are some of the reasons T-Mobile has a long-standing practice of working closely and creatively with municipalities to address common challenges and responsibilities. This is the mindset and approach that T-Mobile has taken for several years.

Likeminded approaches have been taken by PCIA, which worked with government leaders on the National Association of Telecommunications Officers and Advisors (NATOA) publication *Local Government Official's e-Guide to Communications Facilities Siting* and the California Wireless Association on its video that teaches the concept that consumers can't have mobile phone connectivity without network infrastructure. Clearly, everyone in the wireless industry must do more, while remembering that 90 percent of the American public owns and uses wireless devices.

Lombard: Oh, absolutely. A few years ago, we decided it was time to really pay attention to how the local siting landscape is changing. We knew that something had to be done to at least balance the equation in the local decision process, if not shift it entirely into our court. We recognized that in order to successfully site new infrastructure, especially in challenging jurisdictions, we needed to build relationships with local decision makers and, at the same time, it required wrapping our customers into those relationships.

AGL: How are you wrapping customers into the siting process?

Lombard: We're communicating directly with them. Early in the site-development process, we contact customers and let them know about our plans in their community. We educate them about the proposed infrastructure and invite them to get involved by engaging local decision makers via easy-to-use tools.

Last year, T-Mobile launched a program called "TakeAction" to engage customers and mobilize them to become advocates for improved wireless coverage in their communities. The TakeAction Web page enables our advocates to share their wireless stories with us and with their local officials, offering up their personal account of how wireless impacts their lives.

These customer testimonials are used in outreach efforts with local officials, which can be quite valuable in the siting process. Not only are they wireless customers, but also more importantly, they are voters and constituents. It's beneficial for elected officials to hear from their constituents, not just the carriers and opponents.

AGL: Is it working?

Lombard: Yes, we're definitely moving the needle. We're continuing to expand the advocate database, and our markets are using the program to provide a cost-effective way to bring siting advocates into the picture at the local level.

It's important to keep in mind that our advocacy programs are not used for every application. The prime markets to employ advocacy resources are communities with onerous ordinances, tough municipal consultants or a history of siting opposition.

We have found that using transparency in how we communicate with communities about siting can produce very positive results. Educating the public and decision makers early in the process is essential.

AGL: Is it a challenge to get advocates to show up at hearings?

Lombard: Getting people to attend hearings seems to be the holy grail of site-development advocacy. Participation by supporters is greater at the evening hearings versus daytime because of the difficulty in leaving work to attend the hearing. We make it easy for advocates to weigh in with local decision makers through email, postcards and letters.

AGL: But it's still a numbers game, right? Isn't it about how many vocal opponents are in the room shouting against a site application that can win or lose the day?

Lombard: No, our strategy is to not let them get by that easily. There's no question that in order to deflect heat from the audience, some local decision makers will approach controversial applications from a numbers game and vote accordingly. But look, if the industry continues to stand back and let that happen, we'll keep racking up denials. For us at T-Mobile, it's a new day. We're bringing the voices of our customers — their constituents — into the discussion, and we're doing it early and often. We're making certain local decision makers understand that because people can't attend a hearing on a particular night does not devalue their input. The record of support is then quite clear.

AGL: So having emails and postcards in support of a site application can help win the day on application approvals?

Lombard: Yes. But those aren't the only tools we use. We have a great neighborhood or town meeting toolkit that our markets use to educate neighbors and other community residents about a proposed site. Being transparent in all communications is the key. Addressing misinformation and fears about cell sites in a straightforward way makes a huge difference.

Local outreach and advocacy is a never-ending process, with so many opportunities popping up to educate government officials. Sometimes the opportunity to educate comes about when new legislation is passed, whether at the local, state or national level. We saw that with the Telecommunications Act of 1996, and it will definitely be the case with the new "Shot Clock" order. That's going to give us a chance to sit down and discuss how the order will affect the way we'll be seeking siting approvals.

AGL: Starting a dialogue, perhaps?

Lombard: A dialogue and a partnership. Whether we like it or not, the burden is on all of us to work closely with local decision makers and communicate our plans in a clear, transparent way. Part of that communication has to involve the end-users — our customers. Showing how improved coverage in their neighborhoods is going to be beneficial to them is the first step in bringing residents to the table as advocates for new sites. Local officials need to see that the industry isn't the only group asking for site approvals. We have to get their constituents involved.

hrd 2 do*:

nectivity, Education and Infrastructure Approval

Civility and education

Friction is good. But sometimes, friction in the public policy arena gets out of hand. A case in point was the nation's recent discourse on health care reform. As with the national debate, many jurisdictions and communities are facing a brand of public discourse that devolves into who can shout the loudest, or command the floor the longest, or hijack a meeting's focus.

The demand for wireless connectivity — especially in residential neighborhoods — may result in friction. In the case of wireless infrastructure, it makes people, government and businesses more efficient and more responsive. People want wireless phones to work everywhere they go. This means coverage at home is increasingly important. For more than 20 percent of American households with no landline service, wireless coverage is critical for reasons of personal and public safety. With nearly every American owning and using a wireless device, the population has spoken: Wireless connectivity is needed and is here to stay.

Many people are taking notice that social networking is being used more and more by activists against mobility. These small groups are raising questions and sharing tactics from enclave to enclave. Although we continue to focus on our community outreach and deployment of new technologies, bear in mind that this small minority of people should be respected.

We should also be aware of their work. Case-in-point: Take a look at a trailer from the movie *Full Signal* that was released on Dec. 1, 2009. With woeful-sounding music in its soundtrack, *Full Signal* is increasing anxiety among some viewers and some public officials. The trailer can be viewed at *http://fullsignalmovie.com/*.

Rather than working to win them over, our duty should be to constantly refine our messages to broader audiences in a manner that handles the activists' questions. Given the growing level of local activity, together with a groundswell of not-in-my-backyard protestors, our local efforts are bound to become more difficult.

Don't forget: Healthy discussion and friction are more than common, they are desired in towns and cities across the country. People have opinions and have emotional responses to changes that affect their neighborhoods. We in the wireless industry should not be frightened or apologetic about these realities; rather we must be proud of our work, our permit applications, the sites that we are proposing and the wireless services we are providing.

Legitimate answers

When it comes to the infrastructure required for wireless connectivity, citizens opposed to a cell site who attend community meetings commonly ask questions about property values, cell site aesthetics and the health effects of radio waves. From T-Mobile's perspective, these straightforward and reasonable questions deserve consideration and direct answers.

Providing the proper response begins with educating employees and consulting companies. Give them answers and messages that address the three prominent issues raised by the opposition.

There are two additional recommendations that we should all embrace.

First, go forth and meet people. Meeting with residents, neighborhood associations, local businesses, city council members and planning board members is just as important as meeting planning staff. These are all people who are curious about our work in their community and they

deserve to hear from us and speak to us.

Second, provide an education. When you meet with elected officials, consumers or residents, have a plan that helps them become educated. Take the fear out of siting by answering questions they are bound to ask. Handling this proactively — rather than reactively — will go a long way toward solidifying relationships even if a permit is denied.

Wireless technology is local

Like politics, all wireless technology, to a degree, is local.

Clearly, handshakes must happen among community members, but technical "handshakes" also must happen between cell sites, as well as between companies, jurisdictions and technologies in order for wireless services to be effective.

With tens of thousands of new antennas and cell sites needed during the next few years, the wireless industry would do well to consider the challenges that communities and jurisdictions face when approving, denying or delaying our permit applications. We have as many challenges to successfully deploying our technology as local communities have to successfully accepting this technology.

It is always good counsel to partner effectively with local jurisdictions. We should do this in a manner that both analyzes and appreciates the effect we are having on local communities and neighborhoods. Failure on our part to understand the consequences our network infrastructure has on local communities will lead to increased scrutiny, increased regulation and a much longer lead time to respond to our customers' demands.

For the foreseeable future, the challenge for the wireless industry will continue to involve keeping up with the demand for coverage and capacity, which has always been done with creative technologies and increased capital investment.

Meeting the demand for infrastructure at the local level means the wireless industry must tremendously improve its outreach to community members and its education of public and elected officials. We will have to do this in creative ways and with increased investment in our community activities.

If we do all these things correctly, then we can only hope that when it comes to the place where text messages mingle with personal relationships that breaking up will still be really hard to do. agl

Steve Caplan is senior manager, national external affairs, for T-Mobile USA. His email address is *steven.caplan@t-mobile.com*.

Photography courtesy of NextG Networks

DAS Comes of Age

Time was when outdoor DAS was seen only as coverage fill-in and indoor wireless was a "nice-to-have." Not anymore. Outdoor DAS now is critical for handling increasing wireless data capacity demands and indoor wireless deployments have become the "fourth utility."

By J. Sharpe Smith

The "Deploying DAS" session conducted during the March 23-25 Tower Technology Summit collocated with CTIA Wireless 2010 in Las Vegas, moderated by *AGL*'s executive editor and associate publisher, Don Bishop, featured industry executives with experience in providing in-building wireless and outdoor DAS in addition to macro tower sites. Their comments outlined both the obstacles and promise that face the DAS industry as wireless communications continues its build out toward ubiquity.

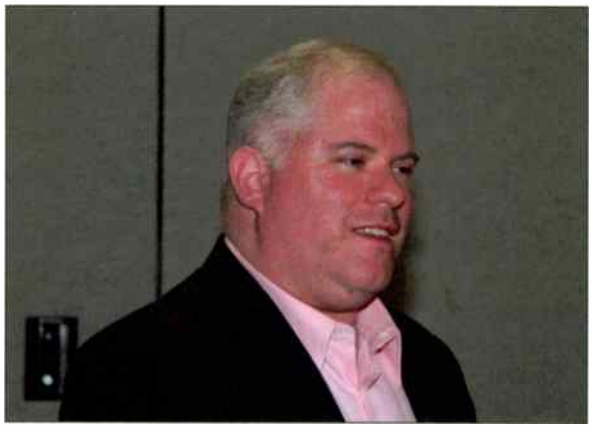
David Cutrer has a wealth of knowledge in both indoor and outdoor DAS. Cutrer co-founded in-building wireless system provider LGC, which was subsequently acquired by ADC Telecommunications, before co-founding an outdoor DAS concern, NextG Networks.

"The early days of DAS were filled mostly with special projects like putting coverage in an airport terminal or a casino or a shopping mall," Cutrer said.

LGC worked with an in-building DAS provider, SpectraSite, building wireless systems and leasing access to the carriers, before SpectraSite merged with American Tower.

When SpectraSite went with American Tower, Cutrer said, "It really opened my eyes, showing me the tower economic model could be applied to outdoor DAS networks."

American Tower joined the DAS industry purely on the in-building side from 2001 to 2008. The company has 200 indoor neutral host systems around the country, and it has increased its focus on outdoor DAS networks in the last couple of years, targeting customers' coverage needs in areas where tradi-



David Cutrer, CEO of NextG Networks: "The extent the tower companies get into DAS is yet to be seen. There are a number of pure-play DAS companies that continue to pioneer the industry, but I view it as one sector, and the pie is going to continue to grow for all of us."

Larry Fischer, director of engineering and research for ADC's network solutions business unit: "Traditionally, tower companies have viewed the towers as their primary asset and wanted to fully load them. They would put in DAS if they had to."

Harry Wolle, director of business development, American Tower: "Playing in this space has changed. It is no longer good enough to provide coverage. You have to manage a system that will augment the carrier's existing macro-network and meet service level agreements."

tional wireless tower sites were not an option.

"A lot of our involvement in DAS comes through bringing on SpectraSite, which has been aggressive in terms of in-building DAS," said Harry Wolle, American Tower's director of business development, who has managed RF system deployments over a wide variety of air link technologies.

"Our rationale for getting into the outdoor DAS business came from having customers come to us asking for an outdoor DAS solution," he said. "To continue to establish ourselves as a total solutions provider, we want to provide an array of siting solutions for our customers including an alternative siting solution."

In the last couple of years, outdoor DAS ceased to be only a coverage remedy as increasing wireless data demands began pushing the capacity limits of the networks.

"Playing in this space has changed. It is no longer good enough to provide coverage," Wolle said. "You have to manage a system that will augment the carrier's existing macro-network and meet service level agreements."

With carriers looking for increased capacity in areas where tower sites have already been built, DAS growth was seen by the panel as inevitable.

"Where do you go next after towers?" Cutrer asked. "To scale DAS, you need an economic model that works. I think that has come a long way in the last couple of years. That is why you see the volume increase."

Cutrer noted that whether it is a major tower company, an in-building wireless firm or an outdoor DAS provider, the goal of enhancing the carrier network is the same.

"The extent the tower companies get into DAS is yet to be seen," he said. "There are a number of pure-play DAS companies that continue to pioneer the industry, but I view it as one sector, and the pie is going to continue to grow for all of us."

Larry Fischer, director of engineering and research for ADC's network solutions business unit, has overseen both indoor and outdoor DAS deployments during his 17-year tenure with the company. He believes the tower sector and DAS networks will remain separate for some time into the future.

"Traditionally, tower companies have viewed the towers as their primary asset and wanted to fully load them. They would put in DAS if they had to. That model has changed slightly because the DAS companies have made DAS economically viable. The biggest problem with DAS in the past was the lack of an economic model. It was a model of necessity," Fischer said.

Ed Cantwell disagreed. The president and CEO of InnerWireless, which specializes in in-building wireless deployments in hospitals, high-end gaming and hospitality venues, believes that inevitably the walls dividing the coverage sectors must fall.

"The ultimate killer app is ubiquity, which will drive behavior to consume the majority of data," Cantwell said. "We are trying to be the pioneers to establish a business model that attracts investors and return on investment. In five to 10 years, all you will care about is revenue per megahertz per unit area against the lifecycle cost of doing it."

Smaller companies will experience barriers to entering the DAS industry, however, because of the risk and capital demand, according to Wolle.

"You don't just get into the DAS business. There is a significant investment you have to consider operationally: the right staff from an engineering standpoint, from a permitting and regulation standpoint and from a construction standpoint," Wolle said.

Historically, DAS systems have evolved similarly to cell towers. In the 1990s, DAS systems were carrier-owned and there was no sharing of infrastructure, similar to the first towers.

In the first decade of the 21st century, neutral host companies began to manage DAS systems. Major tower companies also entered the DAS industry.

"We will see a carrier build out a DAS system on their own and then realize that the asset is in better hands of a third party, which can then lease it up," Cutrer said. "Both NextG and its competitors have done sale lease-back deals."

The critical component to the tower industry has been its high multiple return. American Tower is an example with roughly $1.7 billion in revenue, and it is traded at about an $18 billion market cap, Cantwell noted. On the other hand, the largest telecom providers, such as ADC and Commscope, have around $4 billion in revenue and yet only a $200 million market cap.

In order to compete for investors' dollars, DAS providers must make that same recurring revenue. NextG has thousands of sites that it will be leasing to multiple carriers, dramatically increasing its recurring revenue.

"We are going into a 10-year span where recurring revenue is the only highly valued (10X multiple) return," Cantwell said. "So, the shareholder return is more important than a customer value return."

Nurturing the enterprise market

In-building wireless providers face their own set of unique roadblocks to becoming similar to the recurring revenue-driven cell tower and outdoor DAS industries.

"Investors love the multiples, the long-term contracts, the high renewal rates and the high cash flow of the tower industry," said Wolle. "If you look at in-building and outdoor DAS, the technologies are quite similar from a profit-and-loss perspective. But beyond that, they really are different."

The key difference is the customers. In-building providers cater to building owners and real estate investors, not carriers, which alters the economics significantly.

Although wireless access has become expected in a facility or building as with other utilities, the industry is in an awkward period because of uncertainty as to who should pay for the DAS system, Wolle said. This uncertainty severely affects the development of a recurring revenue model similar to the tower industry.

"Our mission is to get the enterprise to value wireless as much as it does electricity, water, heating or cool air," Cantwell said. "The building owner becomes the first tenant, perhaps the only tenant. For us to expect the carriers to pay for a building's wireless infrastructure is nonsensical. Does the electric company pay for a building's wiring or does the water company pay for the pipes?"

Ed Cantwell: "Our mission is to get the enterprise to value wireless as much as it does electricity, water, heating or cool air. The building owner becomes the first tenant, perhaps the only tenant. For us to expect the carriers to pay for a building's wireless infrastructure is nonsensical. Does the electric company pay for a building's wiring or does the water company pay for the pipes?"

Wolle is optimistic about future investment in indoor wireless. A significant amount of money is invested in base utilities, according Wolle, and wireless is actually less expensive than the other utilities.

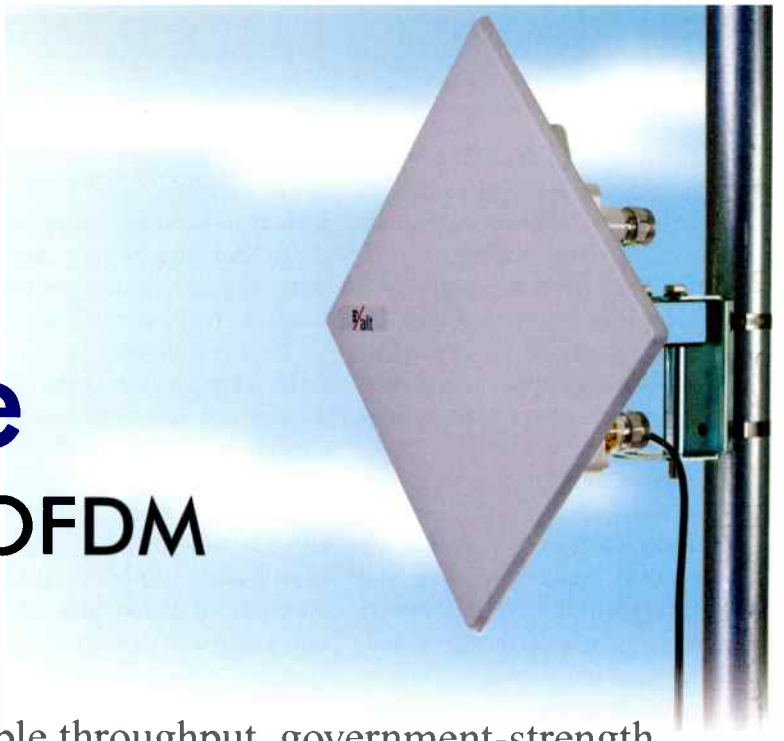
"We are seeing the perfect storm forming. If you can create a hybrid business model, where everyone contributes, it works quite nicely," Wolle said.

Conclusion

An ecosystem for ubiquitous wireless is taking shape. Outdoor DAS and in-building wireless systems are now key to augmenting cell towers. Outdoor DAS providers will see growing revenues as 4G systems roll out carriers to collocate on their systems. And the niche for in-building wireless will grow, with hospitality venues leading the way.

Stadiums and college campuses will demand coverage combined with increased capacity and the line between indoor systems and outdoor DAS will blur, requiring hybrid wireless systems and increased carrier financial support.

The result of this triumvirate will be wireless systems with fewer dead zones, better signal strength and greater capacity. agl



Economy Microwave

Displaces Wi-Fi/OFDM Bridges

With carrier-class reliability, scalable throughput, government-strength security and native TDM and Ethernet support, microwave radio technology eliminates barriers that kept organizations of all types from using wireless links to solve connectivity problems.

By Mark Davis

Expanding backhaul capacity is a growing challenge for mobile network operators and private network owners alike. Point-to-point microwave has long been seen as a more reliable transport technology than Wi-Fi/OFDM Ethernet bridges and, consequently, it has seen widespread use in mobile operator networks. However, its cost has limited its use in private enterprise networks. Now, a breakthrough in microwave radio technology is making it possible to obtain the carrier-class performance, reliability and manageability of microwave at the same cost as radios based on Wi-Fi or OFDM (orthogonal frequency-division multiplexing).

New apps need better networks

The explosion in the use of wireless networks of all types has created a need for a new class of microwave backhaul system. A range of applications and scenarios drives this need.

- Carriers need to split their existing cells and expand their backhaul capacities at existing base stations, as well as provide high-capacity backhaul connections to new sites.
- Wireless Internet service providers (WISPs) must provide high-capacity last-mile connections to new subscriber locations.
- Governments, public safety organizations and utilities are deploying video surveillance systems that require high-capacity backhaul; additionally, public safety organizations must provide backhaul to P25 base stations.
- Education districts, universities and enterprises want to improve connectivity in campus settings, or among isolated buildings spread around cities.
- Carriers, government and private organizations want to replace T1 lines for a wide range of applications.

Using microwave technology for backhaul makes sense because microwave networks can be deployed much more quickly and inexpensively than fiber or T1 lines, and the network operator subsequently owns the link rather than leasing it from another operator (that might also be a competitor). In addition, it may simply be physically or economically impractical to use fixed lines for backhaul.

Yesterday's backhaul can't keep up

Traditionally, network builders hoping to deploy wireless links for distances of 1 to 10 miles have chosen radios based on Wi-Fi technologies for the most basic of reasons: cost. These radios cost $5,000 per link or less, so they fit within the budgets of most organizations.

Unfortunately, radios that use Wi-Fi or Wi-Fi-derived technologies suffer from significant problems that limit their utility. Although they may work fine in specific situations where limited bandwidth is needed over a short distance in a relatively interference-free environment, they cannot perform when network operators need greater reliability or higher functionality. There are several reasons:

	802.11a	802.11g	802.11n	ExtendAir
Channel plan	Fixed	Fixed	Fixed	1 MHz tuning
Non-overlapping channels (20 MHz)	19	19	19 7@40 MHz	26@16/20 MHz 12@32/40 MHz
Channels BW	20 MHz	20 MHz	20 MHz 40 MHz (2x20 MHz)	8/10, 16/20, 32/40 MHz
PHY bit rate (aggregate) @ 20 MHz	54 Mbps	54 Mbps	a/g: 54 Mbps n:~150 Mbps (2x20 MHz)	81 Mbps@16/20 MHz 120 Mbps@32/40 MHz
User throughput (aggregate)	~27 Mbps	~27 Mbps	a/g: 54 Mbps n:~100-110 Mbps (best case@2x20 MHz)	81 Mbps@16/20 MHz 120 Mbps@32/40 MHz

Table 1. Technical comparison of Wi-Fi and ExtendAir microwave radios

- **Nonguaranteed throughput** — Many applications demand guaranteed throughput, or at least a guarantee of *minimum* throughput, but Wi-Fi and OFDM radios are best-effort systems. Wi-Fi-based links display wide fluctuations in the throughput level delivered; it varies based on interference, packet size, distance and the security method in use.
- **Lower-than-expected performance** — Wi-Fi-based radios are usually rated for their peak performance, yet they never achieve this peak and typically operate at somewhere between half and two-thirds of that rating. This mismatch between rated and actual performance occurs in both throughput and range.
- **IP traffic only** — Wi-Fi-based systems carry IP traffic only, so supporting time-division multiplexed (TDM) voice requires conversion from TDM to Ethernet and back at either end of the link. This adds to the inherently high and variable latency of Wi-Fi, and it significantly reduces TDM call quality.
- **Interference** — Wi-Fi uses public, nonlicensed frequencies, and there are millions of Wi-Fi networks in use. With a limited number of channels available for 802.11-based systems, the potential for interference is high. Unfortunately, Wi-Fi radios use fixed channel plans and cannot be tuned to avoid this interference; their inherent resistance to interference is low.
- **Poor security** — Wi-Fi-based radios typically do not support 128- or 256-bit AES encryption, and must make do with Wi-Fi Protected Access (WPA) or Wired Equivalent Privacy (WEP) schemes, both of which can easily be cracked by determined hackers.

Using microwave technology for backhaul makes sense because microwave networks can be deployed much more quickly and inexpensively than fiber or T1 lines.

Because of these drawbacks, using Wi-Fi-based radios can often be a recipe for disappointment to network planners, who do not get the performance, the reliability or the security they need. Moreover, in many cases, Wi-Fi simply cannot support a given application.

Economy microwave outperforms

Microwave radio systems have been used for decades in carrier networks to transport both TDM and IP data reliably and securely for distances of dozens of miles, but the cost of these systems has limited their use primarily to mobile carriers and well-heeled utilities or government organizations. Now, the Exalt ExtendAir microwave radio platform delivers the traditional advantages of microwave for less than $5,000 per link. The microwave radio platform overcomes the drawbacks of Wi-Fi-based systems while remaining within budget for most organizations.

Unlike Wi-Fi-based systems, the microwave radio platform is designed for point-to-point radio applications and offers these important advantages:

- **Higher throughput** — Up to 120 megabits per second (Mbps) of Ethernet data and up to four T1 lines (TDM) simultaneously.
- **Guaranteed throughput** — Guaranteed "5 nines" throughput availability, replacing Wi-Fi's "best-effort" performance with carrier-grade reliability.

	ExtendAir	Best Effort
Design criteria	Uncompromised performance	Best Effort
Application	LOS PTP	WLAN, PMP, and NLOS PTP
Bands	Tri-band 5, 18, 23 GHz	2.4, 4.9, and Tri-band 5 GHz
Capacity	Dedicated with no overhead	Shared with overhead
Modulation	Single carrier	Multi-carrier OFDM
Throughput	Fixed modulation rates with predictable user throughput	Variable modulation rates with unpredictable user throughput
Latency	Low and fixed, independent of offered load and packet size	High and variable, dependent on offered load and packet size
System gain	High power and high receiver sensitivity	Low power and low receiver sensitivity
Native TDM	Supported	Not supported
C/I	<10 dB = resilient transmission in presence of interference	>20 dB = very sensitive to noise and interference
Range at 100 Mbps	>20 miles	Up to 5 miles
List price	<$5K	<$5K

Table 2. Feature comparison of Wi-Fi and ExtendAir microwave radios

- **Longer range** — Reliable, high-throughput operation at distances up to 30 miles, compared with a maximum practical range of 5 miles for Wi-Fi.
- **Frequency tuning** — May be tuned in 1 MHz increments to maximize performance and minimize interference.
- **Spectrum agnostic** — Includes models that cover both licensed and license-exempt parts of the spectrum from 2 to 40 GHz. Wi-Fi-based systems are limited to the license-exempt bands of 2.4 GHz and 5 GHz. In certain congested environments, moving to a licensed band may be the only way to avoid interference and provide a reliable connection.
- **Native TDM and Ethernet** — Supports native TDM and native Ethernet simultaneously, making it possible to support traditional voice and IP data applications with a high quality of service.
- **High security** — Supports 256-bit AES encryption for government-grade security, and maintains this level of security at all throughput levels.
- **Low TDM and Ethernet latency** — Uses discrete channels and supports all packet sizes equally well to deliver much lower and more predictable latency than Wi-Fi.

Beyond overcoming the drawbacks of Wi-Fi-based radio systems, microwave radio systems offer key advantages that make it easier to adapt the radio link to the specific demands of any application and to deploy it anywhere.

- **Scalable throughput** — With the microwave radio platform, users can start out with a lower-capacity link (e.g., 27 Mbps) and then use license key upgrades to expand as needed.
- **Throughput symmetry control** — The microwave radio platform enables network operators to control the amount of traffic moving in upstream or downstream directions to better support highly asymmetric applications such as video surveillance. With microwave license-exempt systems, up to 80 percent of total aggregate throughput can be dedicated to either the upstream or the downstream direction.
- **High-density collocation** — Although it is nearly impossible to deploy many Wi-Fi radio systems in the same location (as a way to reduce maintenance or real estate costs, for example), microwave systems can use GPS or internal synchronization to enable deployment of multiple radios on the same mast or building location without interference.

Deployment considerations

The more robust and flexible technology of the microwave radio systems enables users to address a variety of deployment challenges. Still, there are other factors to consider.

- **Line-of-sight deployment** — All microwave systems require line-of-sight propagation for proper operation. Although virtually impervious to rain, snow and other environmental factors, microwave signals can be blocked by buildings or geographical features. Near line-of-sight (NLOS) deployments are possible. However, when deployed in an NLOS scenario, no microwave system can provide guaranteed performance or link availability.
- **Antenna choice** — Microwave radio systems are available as fully integrated units (electronics, radio and antenna) for all-outdoor mounting. Depending upon distance and throughput requirements, users may use either an integrated antenna or an external antenna for longer-range applications.

Microwave radio systems offer key advantages that make it easier to adapt the radio link to the specific demands of any application and to deploy it anywhere.

- **Channel selection** — When using microwave radios with license-exempt frequency bands, it is important to tune the radio to the optimum frequency within the band in order to optimize performance and minimize potential interference. This is easily accomplished using the microwave radio platform's built-in spectrum analyzer and the ability to finely tune to the center frequency of choice.

Expanding connections

With carrier-class reliability, scalable throughput, government-strength security and native TDM and Ethernet support, Exalt ExtendAir microwave radio technology eliminates the barriers that have kept organizations of all types from using wireless links to solve connectivity problems. By offering microwave capabilities at a competitive price, the microwave radio platform opens up a new era of expanded radio connections for users of all types and sizes. **agl**

Mark Davis is senior director of product marketing for Exalt Communications, Campbell, Calif. His email address is *mdavis@exaltcom.com*.

Designing Substations for Commercial Collocation

Utilities that design electrical substations with collocation for wireless telecommunications antennas in mind do their residential customers a favor while adding a revenue stream that requires little management.

By Klaus Bender, P.E.

The U.S. Department of Homeland Security lists 17 critical infrastructure and key resource sectors. Among them are communications and energy. The communications sector is made up of both wireline and wireless commercial carriers, along with broadcasters. The energy sector consists of water, natural gas and electric utilities.

The wireless portion of the communications sector is a major user of so-called vertical real estate, which includes antenna towers, building rooftops and distributed antenna systems in shopping malls and office buildings. Meanwhile, the electric portion of the energy segment is one of the largest owners of infrastructures in the country. The generation and transmission fraction of the electric network deploys thousands of large transmission towers, and the distribution network consists of substations and millions of poles.

One could conclude that these two industries would find this common ground beneficial to both, but to date there have been challenges that have made commercial collocation on utility facilities difficult.

Despite the economic downturn in the United States, commercial wireless carriers and utilities both are expanding their networks. Carriers are adding broadband wireless coverage to existing areas and initiating new service in areas of heavy real estate development, especially as consumers abandon landlines for wireless service. Utilities seek to fortify aging infrastructure with new facilities to support communications needed for the smart grid. And utilities also need to support new real estate development by building new distribution facilities. When utilities and carriers need to build infrastructure in the same area, cooperation can benefit both entities.

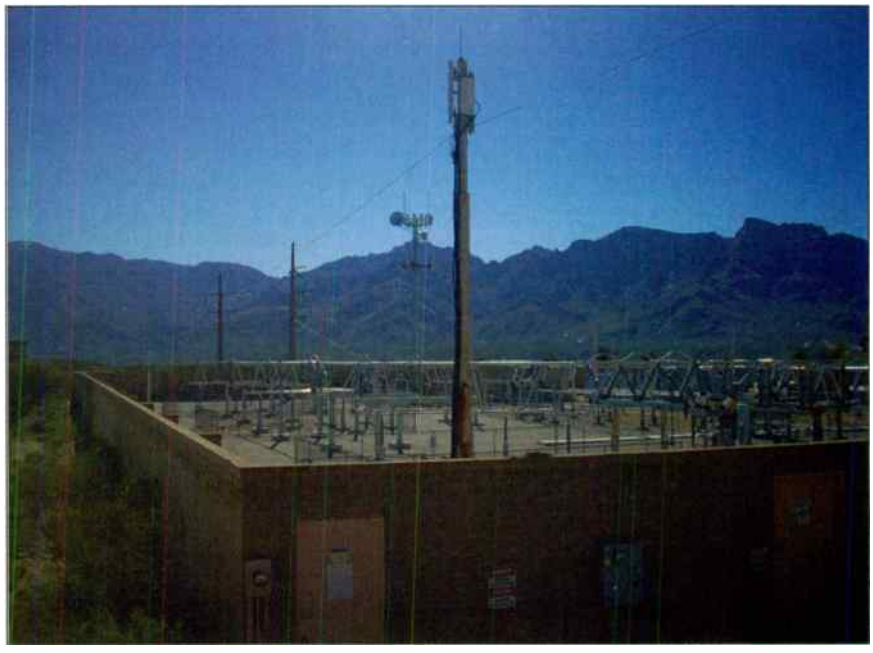
Commercial carriers often find it difficult to work with electric utilities on collocation projects. Lengthy contract negotiations, safety concerns on the part of both the utility and carrier personnel and the utility engineering resources needed to approve collocation can pose problems.

Companies are working through these challenges in several ways. The use of standard contracts and safety training helps, but utilities that are successful in the collocation business commit management and engineering resources to it. Commercial wireless engineers are beginning to understand the difficulties that opening up utility facilities present to the energy provider, especially when renting antenna space is not their primary business.

The reverse situation is also true: Utility designers and engineers understand that the carriers need a speedy construction rollout and consistent contract language. This understanding

is resulting in synergies worth sharing and supporting for the benefit of both industries.

Electricity is generated at a very high voltage in order to facilitate distribution across hundreds of miles to where the power is consumed. An electric substation steps the voltage down to levels suitable for neighborhood distribution and final consumption. Substations include voltage transformers, circuit breakers and switchers, regulators and reclosers, all of which are needed to ensure safe electricity delivery. A substation is located on property that the utility owns, or for which the utility has a right of way. Substations can range in size from a small, 100-square-foot fenced area in a neighborhood to huge, multiple-acre plots.



This view shows two of the four towers located on the substation property. One is outside the concrete fence and the other is inside.

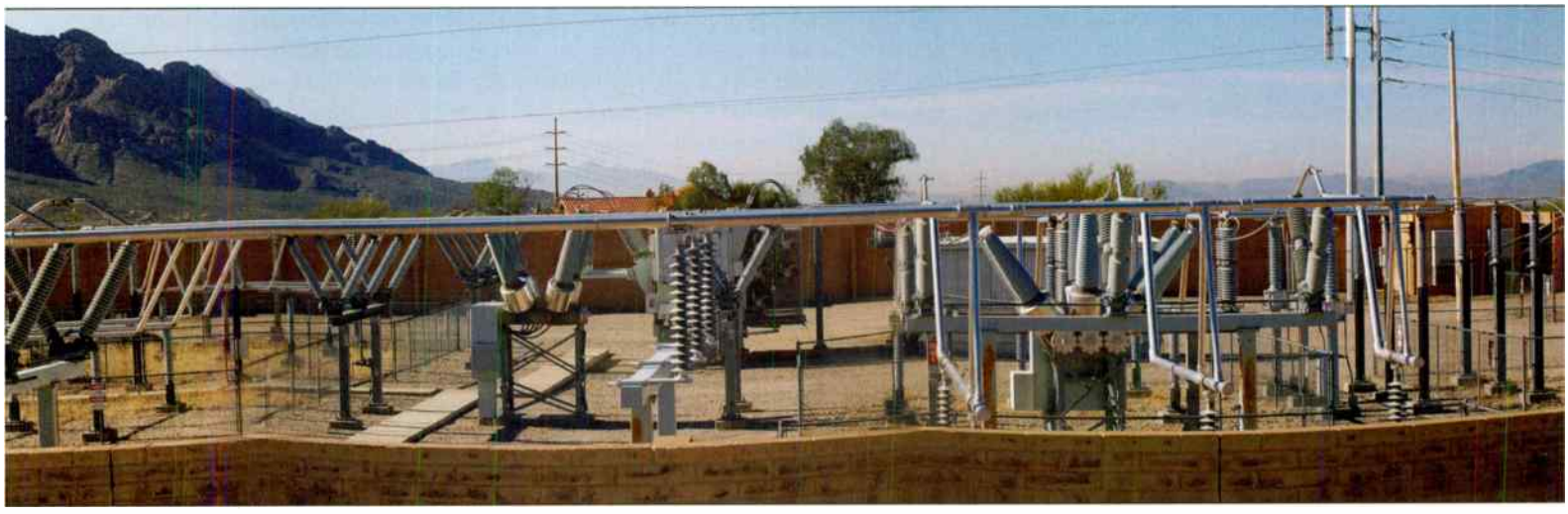
Security and safety

Most utility distribution engineers can recite the problems associated with adding wireless collocation to existing substations, especially when the substations have seen years of upgrading with additional new devices without allocating more space. Perhaps the most common concern is security and access to the substation in view of the damage that could be inflicted by terrorists. At the same time, there is a real safety concern when a wireless carrier's technicians have unsupervised access to transformers with the potential to kill on contact. Supervising technician visits takes valuable time away from day-to-day utility activities.

Consider the following scenario: A utility needs to build a new substation to serve newly constructed homes. The substation will need to supply several neighborhoods, so the utility acquires a property large enough to ensure future growth. Many new homeowners factor wireless coverage into their buying choices, so developers seek assurances from wireless carriers that they will construct new antenna sites as necessary. If the utility already has a collocation business unit (or is considering the possibility of one), the obvious question is why not build the substation with collocation support?

At a new substation that turned out to be a shining example of collocation concepts, Waterford Consultants engineers were contracted to take routine radio-frequency measurements in areas outside the substation and verify that RF levels from the wireless network antennas fell within the maximum permissible emission limits for public exposure. I like taking an opportunity to visit a substation, so I accompanied the field engineer. We found a beautifully designed substation that met the utility's needs and that provided telecommunications towers for wireless carriers to use.

The substation is operated by Tucson Electric Power (TEP) in a residential area under development north of Tucson, Ariz. Several planned communities



have been completed and the homes are occupied. Restaurants, shopping centers, grocery stores and a golf resort and spa are already operating in an area that also supports light industry. New homes appear to be selling despite the difficult economy. The area offers classic desert scenery: The red earth and brown mountains along with the variegated cacti and succulent plants make the area popular.

TEP's site is large enough to support current and future distribution hardware, and at least four monopole-type towers with associated equipment shelters. The gated property is adjacent to a planned community with nearly a hundred homes. To drive their vehicles onto the property, technicians use a key to open a padlocked gate.

Instead of a chain-link fence, the perimeter has a block fence painted the color of desert sand. The fence is high enough to prevent scaling, while hiding most of the transformer equipment from view.

Utility workers access the site through the locked gate seen here in the block wall. In the distance, behind the tree, Crown Castle's tower is visible extending from a position outside the substation perimeter wall, protected by a short wrought-iron fence. The shelter is adjacent to the perimeter wall.

From the access road, utility workers use the entrance on the right side of the facility. The inside of the substation is fenced and cross-fenced in a classic pasture design. Chain-link fencing surrounds transformer and switching equipment on the right side of the substation. Gates to the various utility components are locked and have the required safety alert signage.

The center of the property is empty and fenced off, presumably reserved for future utility use.

The remaining portion of the site is designed to support wireless carrier access. The property is divided roughly into thirds — one-third for use by the utility, one-third for carrier access and a final third reserved for expansion. We noticed a separate Crown Castle tower enclosure adjacent to and outside of the perimeter block wall. The enclosure is made of similar block and is painted to match the wall. A monopole tower stands inside the enclosure.

The carrier portion of the substation is also fenced and cross-fenced in six-foot chain link. Each carrier section is adjacent to the outside block wall and has enough room for a 100-foot monopole and an equipment shelter. Each carrier section has a lockable heavy steel door in the concrete perimeter wall allowing access from the outside. An electric meter mounted next to each entry door measures the carrier's power use.

From within each wall's boundaries, wireless service technicians may be able to see competitors' equipment shelters and towers, but a six-foot-high chain-link fence topped with barbed wire controls access. More fencing and barbed wire control access to the utility's substation equipment.

Each carrier secures access to the space it leases. Some use padlocks and others use combination locks. Some carriers post their Federal Communications Commission (FCC) call sign outside the substation and display the appropriate RF safety signs. Others choose not to post signs.

Designing for collocation

Utilities are often willing to modify existing substations to allow for carrier collocation and there are many examples of successful installations. TEP solved the security and safety concerns associated with wireless service technician access to a new substation by designing the facility with this function in mind from the first stages of the project. Although utility engineers need to be present to hook up new tenants, further tenant access does not require the utility to roll a truck to the site. Short of someone scaling the block wall, the utility's critical infrastructure is safe from tampering from inside the substation and the carriers' equipment also is safe.

TEP's model new substation was well received. There are three monopoles inside the substation and the Crown Castle facility has several carriers as well, supporting most major carriers along with Clearwire. The facility serves as an example for any utility seeking to combine new substation construction with collocation business activities. The RF levels measured outside the facility were no more than 1 percent of the general population safety limit, so nearby residents enjoy excellent wireless coverage while remaining safe. agl

Klaus Bender, P.E., is director of standards and engineering for the Utilities Telecom Council where he supports utility engineering and policy issues. He has more than 25 years of telecom experience. Prior to joining UTC, Bender was vice president of RF engineering for Sitesafe, Arlington, Va.

Q&A: Sale and Acquisition of Telecom Tower Assets

Should you look to sell towers this year or wait until next year? What steps lead to a quick sale and the highest price? What are the implications of coming changes in tax rates?

By Thomas H. Engel

I recently had the privilege of participating on a panel at the 2010 Tower Technology Summit in Las Vegas. The subject of discussion was mergers and acquisitions (M&A) in the communications tower market. Prior to participating on the panel, I asked several tower owners to provide me with their questions. I also had one of my associates in the audience making notes of the questions asked during the session. During my three days at the conference, I had several meetings before and after the panel in which other questions were presented to me as well.

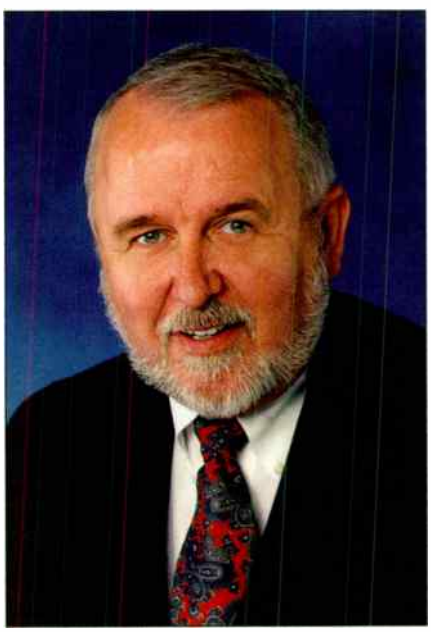
After having time to reflect upon the number of questions being asked at this year's conference, I decided to write this article knowing that many of these questions are significant to the majority of tower owners. I have included a Q&A series that touches on those that were most frequently asked.

Q: You recently authored a piece in *AGL* describing your views on the tower M&A marketplace. The article stressed the importance of cash flow. Is all cash equal?

A: The article stressed the quality of tower cash flow (TCF). Sites that are dependent primarily on narrowband services, paging, microwave and broadcast will continue to diminish in value whereas the opposite is true for sites that serve the broadband sector.

Q: What do you see as the future of M&A trends?

A: Based on the consumer's insatiable appetite for data, the recent FCC broadband spectrum plan and evolving technologies, I see long-term demand for more transmitting and receiving locations. This will fuel high multiples for broadband TCF and sites that have an upside in this area.



This is the hottest tower market that I have seen since consolidation began in the early '90s. There is almost a frenzy level of activity in the current tower market. Prices are at an all-time high. A lot of cash is pouring into the market and there are a lot of buyers. Many of the buyers are executives who made cash when their companies consolidated, and they are out to replicate their prior success. In my opinion, it will stay hot until the first quarter of 2011. Rising interest rates and inevitable tax increases will intensify the activity between now and year-end. There will be a last-minute rush to close deals before the end of the year. January will also be busy with closings that just couldn't get done in December, but that, unfortunately, will be done at higher tax rates. We will begin to see a drastic drop in deal activity and values come February while buyers digest a record number of acquisitions, sellers face lower prices and higher taxes, and lenders evaluate the economic effects of record-high prices and rising interest rates.

Q: Do you see the demand for deals increasing?

A: Yes I do. It's definitely a sellers market. Many new buyers have entered the race, and we are seeing multiple offers early on, even on small transactions with less-than-perfect numbers.

Q: What do you think will happen to valuations over the next nine months?

A: I see multiples remaining high and possibly even continuing to increase, at least until the end of the year. The current market will continue into the first quarter of 2011.

Q: How about over the next few years?

A: That is much harder to predict because values are affected by so many variables, which include: interest rates,

taxes, consolidation of the carriers, regulatory changes, rapidly changing technology, consumer confidence and the stability of the carriers.

Q: What do you suggest tower owners do now to maximize the value of their tower assets even if selling isn't in the near future?

A: First, sell when you don't have to sell and when the market is good.

Second, groom the bride. Get your contracts in order to maximize revenue, minimize OPEX and get due-diligence files in order.

Third, maximize the value of your tower space. Use space for high-quality tenants. Remember that capacity for future growth is valuable to the purchaser. Don't waste it.

Maximize the value of your tower space. Use space for high-quality tenants.

Fourth, timing is important. If buyers are busy with larger transactions when you go to market, some may pass on a smaller transaction or not give it adequate time. Also the fourth quarter is always hectic. Take your assets to market before September, especially if closing prior to year-end is important.

Fifth, consider tax impact, asset allocation, ownership entity, purchase price allocation and impending changes in federal and state tax rates.

Sixth, the parts may be more valuable than the whole. When selling, maximize asset value by segregating and separating assets. Most tower buyers are not interested in property value, only sustainable cash flow.

Seventh, use experienced professionals to get the deal done and maximize value. This includes: your broker, legal counsel and accountant.

(Each of these points needs extensive elaboration, which I will provide in a separate article.)

Q: In a previous article in *AGL*, you referred to mountaintop tower sites as the "dinosaurs of the past." Will values continue to decline, and is there a strategy to preserve or enhance value?

A: In my opinion, values will continue to decline rapidly, but there are things that can be done to enhance and sustain values.

New and rewritten leases should have at least a five-year term, with a 3 to 4 percent escalator, and no early termination provision.

Watch new technology. Seek out the new tenants early on, such as MediaFLO and Clearwire.

Reduce OPEX whenever possible by using pass-through provisions and common-area maintenance charges. Minimize lighting, maintenance, monitoring, tax and utility expenses.

Q: Is it a fair assumption that fiber-optics (e.g., distributed antenna systems) will eliminate the need for towers in the not-too-distant future? If so, how long can we expect before these changes have a major impact on tower owners?

A: I don't believe that DAS will replace towers for a long time. DAS offers many advantages. But it is expensive. Currently, towers are a less-expensive form of delivery in most cases. DAS may be more practical and less expensive in environmentally sensitive areas such as theme parks, ski resorts, beach communities and historical areas.

Q: There seems to be a very wide range of values being paid for towers in today's market. Why is that?

A: Most buyers in the current market would like to buy small towers, on small parcels, in high-growth, high-traffic areas, capable of serving four to five carriers, with no competition, with two national telephone carriers in place on long-term leases at competitive rates, with good escalators, no utilities, minimal taxes and minimal maintenance. (The bigger the package, the higher the multiple). As these factors change, the multiple goes down.

Q: If I'm considering the sale of my tower assets in the near future, is there anything I should be doing to prepare the assets for sale?

A: Find a good broker who you can trust and relate to. Check references. Talk to your accountant about structure and taxes. Find a good business attorney who understands real estate issues (the broker can help with tower issues). With the broker's help, begin to put your due diligence in order. Get your accounts current. Extend ground and tenant leases.

Q: Does a standby generator improve the value of a site?

A: It may make the site easier to rent and may even allow the tower owner to charge higher rent, depending on the nature of the tenants and the location of the site. On the other hand, any buyer will recognize that it will add to the OPEX, and for every dollar of anticipated annual OPEX, the purchase price will fall by the multiple being paid.

Q: If I were going to build a new site for eventual sale, what should I be building?

A: Currently, tower sites have little value without tenant revenue, so the first consideration is whether or not you have a tenant in mind or you have confidence that you can attract one to the site. Capacity, low maintenance and growth potential are all important.

Q: How do you see the economy affecting tower values?

A: When tax rates and interest rates increase, tower values will fall. Tenants need capital to expand and improve their infrastructure, so availability of capital is important to sustain growth. Interest rates have an effect on growth, on OPEX and on the prices that potential tower buyers can pay. Mergers and acquisitions affect tenant redundancy. Unemployment, consumer confidence and consumer spending affect the bottom line of advertisers, retailers and service providers, which, in turn affects the ability of your tenants to grow and meet their current obligations.

Q: What impact will taxes and interest rates have on the tower industry and tower values?

A: Tax: If the capital gains tax rate increases by 10 percent, taxes will eat

up an additional $100,000 on each $1 million of gain. States have deficit problems. They will be looking for ways to increase their tax revenue. Congress has recently talked about a modified Medicare tax and a value-added tax. Estate taxes are scheduled to go back up. Increased taxes decrease cash flow, which reduce market value. So the answer is *yes*. Anyone considering the sale of tower assets should discuss that potential sale with an accountant or tax advisor.

Interest: Rising interest rates will hurt the tower business. Higher interest will slow growth, increase costs and decrease the market value of tower sites, and reduce the ability of tenants to meet current obligations.

Q: The FCC is allowing distributive transmission systems (DTSs) for low-power TV stations. How will that affect the industry?

A: DTS will allow for the use of cellular architecture to maximize the efficiency of digital broadcast spectrum for the delivery of voice, data and entertainment. If new companies such as CTB, Sezmi and others are successful, it will create the need for many new cell-site-type locations in major markets.

Q: The FCC is considering the possible redistribution or reallocation of 500 MHz of broadcast and other spectrum. How would that affect the tower business?

A: According to published reports, mobile data usage is increasing 100 percent per year. The reallocation of spectrum for broadband use will provide capacity for this growth. New and improved cell sites will also be required.

Q: How long does it take to sell a tower and close the transaction?

A: Most buyers will put a timetable of 60 to 75 days in their letter of intent. That works if the lawyers can agree on the asset purchase agreement, if the due diligence is in order with few major defects, and if the defects that exist can be cured quickly. It is more likely to require 90 to 150 days. If a quick closing is important, choose the right attorney and get your records in order.

Q: Are there specific tax strategies that will positively affect the gain from a tower sale?

A: Every seller should discuss the potential sale of their tower assets with a tax advisor or certified public accountant as early in the process as possible. How the ownership of the assets is held, the allocation of the purchase price and the possibility of a 1031 exchange are all factors that could be considered. But most importantly, sell before the tax rates go up — and they will go up.

Q: A contractor has approached me about trying to renegotiate my existing tower leases. Should I lower the rate for a long extension?

A: Probably not. It would depend on the terms of your existing leases, available competitive sites and the CAPEX required for the tenant to move.

Q: I realize that additional tenants add value to my site. How can I attract them?

A: There are a number of marketing services available. Find out who owns spectrum that covers your area and make contact with those companies, letting them know the availability of your sites and that the terms and conditions of your agreements may be more favorable than those of your competition. Build a relationship with the zoning board to encourage referrals to collocate as opposed to new construction. Register your site with the FCC (even if it is less than 200 feet above ground level) and list it in the public tower databases. agl

Thomas H. Engel is managing partner of Milestone Media, *www.milestonemediallc.com*.

WiMAX Enclosure

DDB Unlimited's outdoor WiMAX enclosure model OOD-54DX-GP-42 is designed for both large-scale build-outs and single-cabinet applications. Constructed of 0.125-inch-thick aluminum, the cabinet can be pad-, pole- or wall-mounted. Thermal options include 4,000-Btu air conditioning or direct-air cooling.
www.ddbunlimited.com

Energy-efficient Shelters

The intelligent buildings energy shelter program of **Thermo Bond** integrates energy management solutions into internal shelter environment management with air-to-air heat exchangers, economizers and modulating HVAC systems. Also, the products feature architectural enclosure concepts, including upgraded foam insulation and reflective exterior coating packages and lower solar gain. Additionally, the alternative energy solutions include solar, wind and fuel cell technologies. A combination of these solutions can reduce operating costs at the site by as much as 30 percent. The conservation initiative includes new shelters as well as a renovation of existing sites that embrace environmental awareness.
www.thermobond.com

HVAC Security Cages

Fibrebond has introduced air conditioner security cages made of powder-coated steel for 5-ton and 6-ton heating, ventilation and air conditioning (HVAC) units to help prevent copper theft. Two options are available: a single-door and a double-door design for access in tight spaces. The cages come in three sizes: 96 inches tall, 51 inches wide and 28 inches deep (5-ton HVAC); 96 inches by 51 inches by 34 inches (5-ton HVAC); and 108 inches by 51 inches by 28 inches (6-ton HVAC).
www.fibrebond.com

Steel, Aluminum Shelters

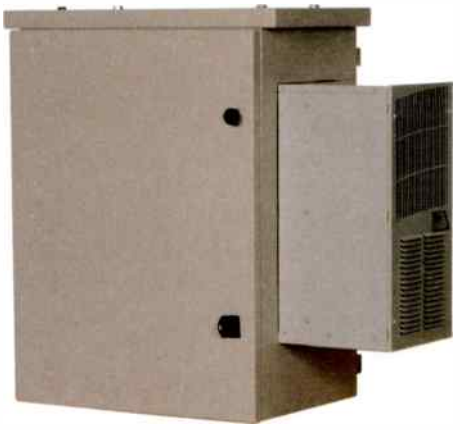
CellXion manufactures a wide range of shelters and building systems for all applications and solutions. Concrete shelters offer cost-effective intrusion, ballistic and fire resistance. For sites with specific requirements, standard exposed aggregate shelters can be made with alternate finishes such as stamped brick/CMU, stucco and vinyl siding. In addition, CellXion offers structural steel, ultra-light aluminum shelters and Envolock building systems that are easy to assemble on-site.
www.cellxion.com

Lightweight Shelters

Telecom shelters from **Tuff Shed** are lightweight and can be delivered by a hydraulic trailer with no crane required for off-loading. No concrete foundation is required. Manufactured in nearly 50 U.S. locations, the shelters are designed to be aesthetically appealing, not industrial.
www.tuffshed.com

Temperature-managing Equipment Enclosures

Eltek Valere has upgraded its 3030 family of temperature-managing equipment enclosures. The cabinet is both front- and rear-accessible and front- and rear-mountable, featuring an optional separate battery chamber that enables carriers to minimize the footprint necessary for their equipment.
www.eltekvalere.com



Nonpenetrating Precast Foundations

Oldcastle Precast has introduced Cell Blocks, a series of precast concrete foundations designed specifically for the wireless communications industry. Cell Blocks' foundation systems are non-penetrating precast concrete blocks that are assembled in various configurations and post-tensioned together, providing a secure and stable foundation for buildings, shelters, equipment cabinets and telecommunication pedestals. Because they are deployed at grade level, Cell Blocks can also be used at contaminated and environmentally or archeologically sensitive sites.
www.oldcastleprecast.com

Enclosure Seals

Roxtec's UL/NEMA enclosure seals and UL 1479 firestops simplify cable sealing into shelters and enclosures and allow future upgrades, while protecting equipment from water, gas, smoke, dust and vibrations. The enclosure seals increase the reliability of telecom networks by protecting equipment from water, fire and rodents.
www.roxtec.com

Concrete Telecommunication and Equipment Shelter

Steel-reinforced, precast concrete buildings from **Reliant Shelters** are designed for use as ground-mounted telecommunications and equipment shelters. Because the floor structure is concrete, it can be placed directly on the ground without concern for deterioration resulting from damp conditions.
www.reliantshelters.com

Shelter Foundation
Kenner Innovative Design Systems is offering a ground-level or elevated precast concrete foundation for expediting the installation of telecommunication shelters on-site. The Kenner Chain Wall allows both the concrete foundation and prefabricated shelter to be installed in hours. The foundation can be custom made to fit various shelter sizes and to provide shelter elevations from on-grade to 20 feet above ground level.
www.kennerchainwall.com

Prefabricated Shelters
Prefabricated shelters from **Precision Quincy** offer the telecommunication industry strong, yet lightweight shelter design. Designed for diverse, inclement working environments, the shelters provide a long-term solution to equipment protection problems and can be customized to meet unique specifications.
www.precisionquincy.com

All-Aluminum Buildings
FWT all-aluminum buildings resist corrosion, making them a long-term, low-maintenance investment. The lightweight design lowers transportation costs and provides a barrier to incoming and outgoing radio frequencies to ensure dependable performance of RF-sensitive communications equipment. Options and accessories include bullet resistance, noncombustible construction and customized exterior surfaces.
www.fwtinc.com

(continued from page 17)

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See ads on page 44 and 46

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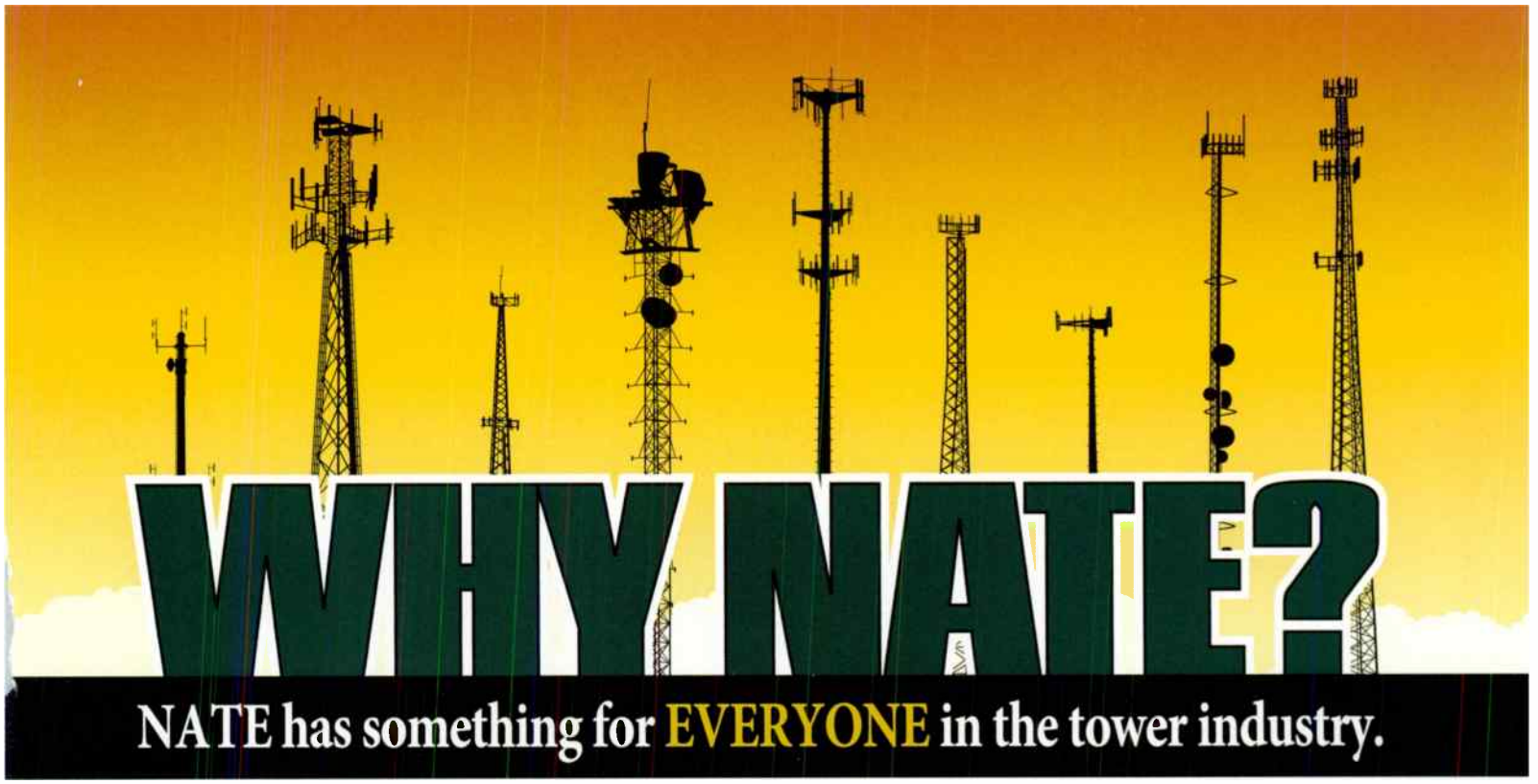

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