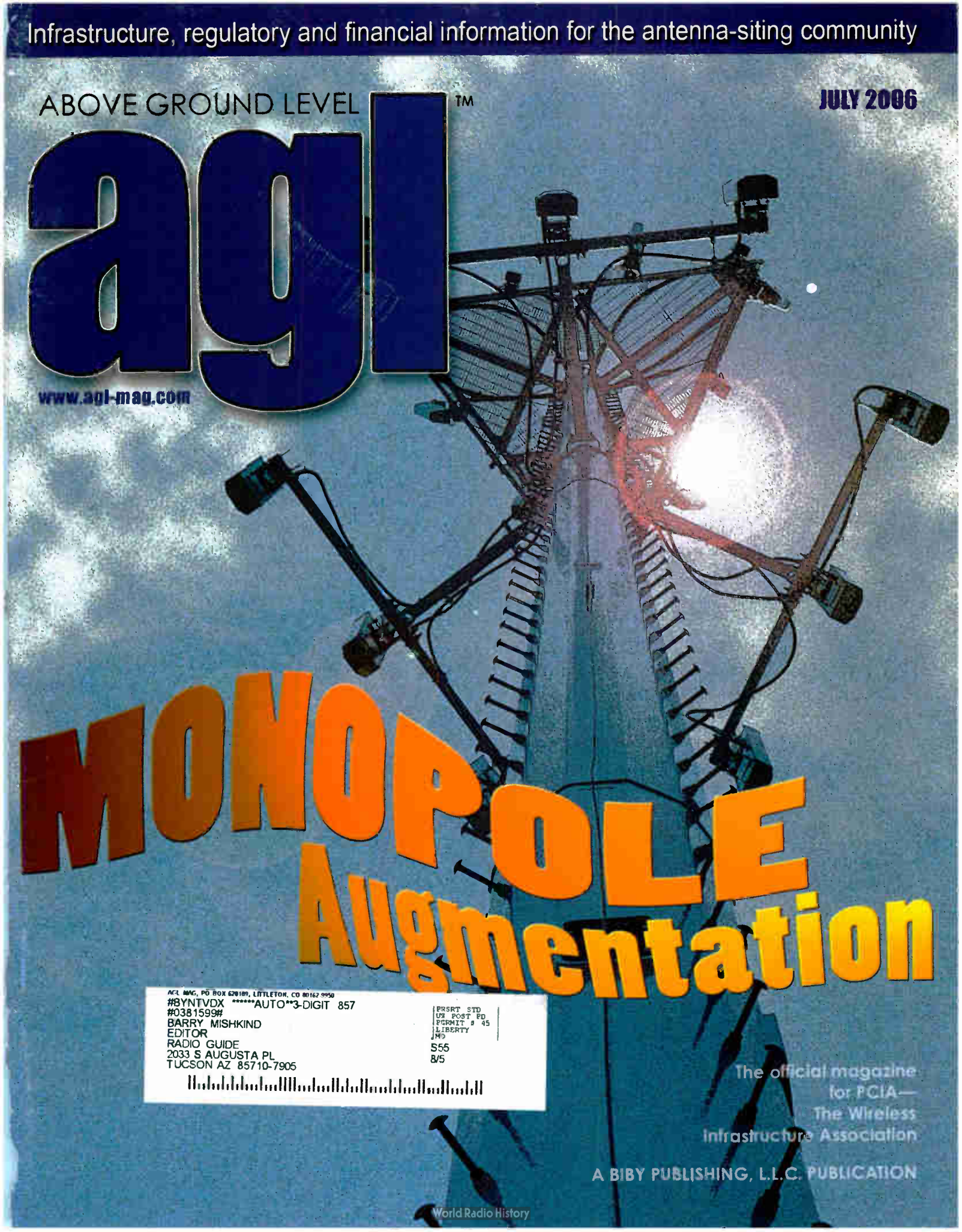
Infrastructure, regulatory and financial information for the antenna-siting community

ABOVE GROUND LEVEL™

agl

www.agl-mag.com

JULY 2006



MONOPOLE Augmentation

The official magazine for PCIA—The Wireless Infrastructure Association

A BIBY PUBLISHING, L.L.C. PUBLICATION

WE UNDERSTAND EVERY TOWER OWNER FACES UNIQUE RISKS.

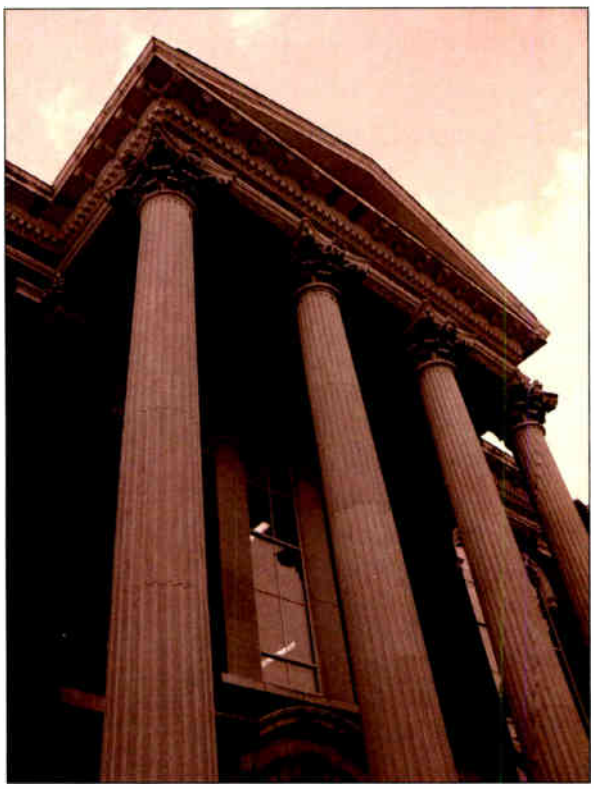
Atlantic Risk Management is a large independent insurance agency and an expert in protecting tower owners from unexpected risks. We offer complete, competitively priced programs, endorsed by PCIA and tailored to suit your specific exposures, including: self-supporting, guyed, or monopole towers; support equipment; shelters and fencing; plus general liability, business auto, workers' compensation, umbrella and more. **Find out why we protect more tower owners than any other agency, call 866-226-0555, visit towerinsurance.net or e-mail Zabrina Kelly at zkelly@atlanticrisk.com or David Saul at dsaul@atlanticrisk.com**

Atlantic Risk Management
CORPORATION

Endorsed by:
PCIA

Backed by the underwriting and claim excellence of CNA

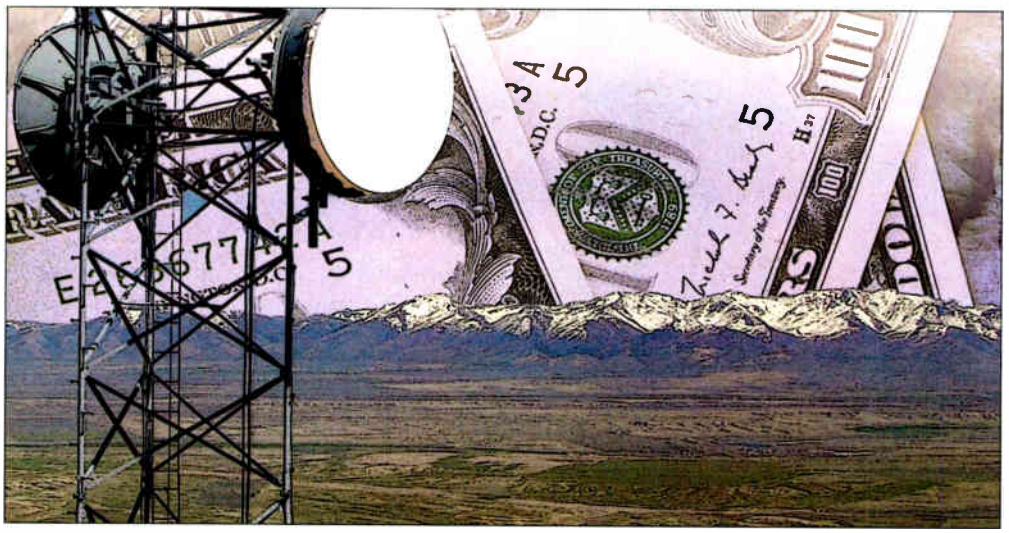
30



28

Features

Departments



14

on the cover

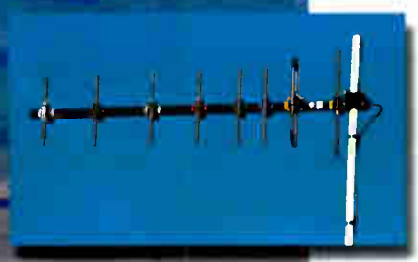
Siting towers has never been easy. Yet the battle is being won every day. Using the right strategy, it is possible to secure siting approvals for even the most controversial towers. *See related story on page 24.*

Photography by Thomas Gibson Studio. Art and Design by Scott Dolash.

AGL (ABOVE GROUND LEVEL) is published eight times a year by Biby Publishing LLC, P.O. Box 284, Waterford, VA 20197, and is mailed free to qualified individuals.
POSTMASTER: Send address change to *AGL* Circulation Department, P.O. Box 620189, Littleton, CO 80162-9950.

"COMING THROUGH LOUD AND CLEAR ..."

- Antennas
- Combiners
- Wattmeters
- Duplexers
- Filters
- System Design



FORMER WACOM CUSTOMERS:

Telewave can support Wacom commercial and amateur products. Many Telewave products share a common design heritage with Wacom, and most of our cavity and isolator products are drop-in replacements for Wacom. We can repair, rebuild, and expand most existing Wacom items or systems without a complete change-out.

Telewave, Inc. delivers high performance ... everywhere, everytime.

We bring 33 years of product engineering and system design expertise to the table for every customer, large or small.

With a full line of standard products, and the ability to quickly create custom designs for special projects, Telewave provides unmatched support for Public Safety, Government, and Business radio systems.

Call us today at 1-800-331-3396 or +1 408-929-4400 and discuss your requirements with our expert sales engineers, or visit us at **www.telewave.com**

Telewave, Inc.
660 Giguere Court
San Jose, CA 95133

TELEWAVE, INC.®

Wireless Communications Manufacturers Since 1972

Dave Hawkins (left), co-author of this issue's monopole base plate article (page 30), is Monopole Department manager at Paul J. Ford and Company, Columbus, OH, and also chairs the monopole subcommittee of the TIA TR14.7 Structural Committee. Ford and Company has designed and analyzed thousands of towers and monopoles throughout the United States. A registered professional engineer in 11 states, Dave has over 21 years experience in structural engineering. His co-author, **Brian Reese** (right), is vice president of Operations at Boulder, CO-based AeroSolutions, which specializes in optimizing tower infrastructure and design-build services. Brian also serves as vice-chairman and secretary of the TR14.7 committee. A registered professional engineer, he has worked with engineering and tower infrastructure for 15 years.

PCIA Manager of Industry Affairs and AGL Editorial Advisory Board member **Anne M. Perkins** throws a little light on problems that arise when local governments get involved with—light (page 12). Before joining PCIA, Anne was regulatory affairs director at the Satellite Broadcasting and Communications Association. She also understands how the FCC works, having served as a special assistant to FCC Commissioner Jonathan S. Adelstein. At PCIA Perkins builds and maintains industry relationships with partner and government agency staff, interacts with the FCC, FAA, state and local governments and other federal agencies. She earned a JD from the Columbus School of Law at Catholic University in Washington and has a BA in Government and Philosophy from the College of William and Mary in Williamsburg, VA. She is a member of the Federal Communications Bar Association and the Maryland Bar.

Providers of goods and services for telecommunications and wireless infrastructure face challenges to protect the intellectual property associated with their businesses, including patents, trademarks and trade dress, copyrights and trade secrets. Attorneys **John Bradshaw** and **Delaney DiStefano** begin mapping out this ground this issue with a discussion of trademarks (page 28). **Bradshaw** is a patent and trademark attorney with Woodard Emhardt Moriarty McNett & Henry, Indianapolis. He received a BS in chemical engineering in 1994 from the University of Notre Dame and an MS in chemical engineering in 1996 from the University of Florida. John received his JD, summa cum laude, in 1999 from the Indiana University School of Law where he was also editor for the Indiana Law Review. **DiStefano** is a principal of Higgs Law Group, Rockville, MD. She received her BA from St. Lawrence University in Canton, NY and her JD from The George Washington University School of Law in Washington. Delaney has extensive experience in formal complaint proceedings before the FCC representing both complainants and defendants. She has prepared contracts for such varied purposes as telecommunications tower and rooftop leases, radio system operating agreements, reseller agreements and ITFS build-out agreements. Delaney is a member of the New York State Bar and District of Columbia Bar. She is also a member of the Federal Communications Bar Association and the Radio Club of America.

Successful approaches to overcoming obstacles to siting are outlined this issue (page 24) by attorney **Robert D. Gaudioso,** a partner since 2000 with the New York-based firm of Snyder & Snyder, which he joined in 1994. Rob provides tower-siting guidance on a national level. He is also chairman of Snyder & Snyder's telecommunications land use practice. Rob graduated summa cum laude from Stony Brook University in 1990 (BA, Anthropology) and cum laude from Pace University School Law School (JD, 1993). He also has a Masters of Laws in Environmental Law from Pace University School of Law (1994). Rob is admitted to practice in New York and the U.S. District Court for the Southern District of New York.

ABOVE GROUND LEVEL

agl

TIME to SUBSCRIBE... FOR *FREE!*

Become a qualified subscriber to the **only magazine** devoted exclusively to site infrastructure and management: *AGL (Above Ground Level).*

Fax the subscription form below to **(303-972-1653)**, or subscribe online at www.agl-mag.com/subscribe.htlml, to receive an entire year of *AGL* magazine **free of charge!**

Complete all items, sign and fax this form today, or go online to*www.agl-mag.com/subscribe.html* for your FREE subscription to *AGL*.

1. **YES** please send me a free annual subscription to ***AGL***.

Signature (required for subscription) Date

2. Please check the box next to your company's or agency's **primary** activity (check only **ONE**):

COMMUNICATIONS SITE SERVICES

01 ❑ Tower/Site Owner/Management
02 ❑ Site Construction Services
03 ❑ Systems Integration
04 ❑ Maintenance
05 ❑ Engineering/Consultation
06 ❑ Legal Services
07 ❑ Site Acquisition
08 ❑ Tower Crew
09 ❑ Other (describe) _____

SERVICE PROVIDER

10 ❑ Cellular/PCS System Operator
11 ❑ SMR/ESMR System Operator
12 ❑ TV/Radio Broadcaster
13 ❑ Wireless ISP
14 ❑ Paging Operator
15 ❑ Community Repeater
16 ❑ Other (describe) _____

BUSINESS/INDUSTRIAL USER

17 ❑ Utilities 18 ❑ Transportation/Railroads 19 ❑ Other _____

GOVERNMENT — Non-public safety

20 ❑ Local 21 ❑ State 22 ❑ Federal/Military 23 ❑ Health/Emergency

PUBLIC SAFETY — Police, Fire and Emergency Medical

24 ❑ Local 25 ❑ State 26 ❑ Federal/Military 27 ❑ Health/Emergency

OTHER PRIMARY BUSINESS (describe): 98 ❑ _____

28 ❑ Manufacturer

Please provide all information requested above to qualify for your **FREE subscription!**
The publisher reserves the right to serve only those who meet the publication qualifications.

Dear Wireless Infrastructure Professional,

Wireless communications site specialists need in-depth information about technical, regulatory and financial issues affecting towers, rooftop sites and in-building systems. *AGL (Above Ground Level)*, produced in cooperation with PCIA—The Wireless Infrastructure Association, is the only magazine devoted *exclusively* to this industry.

Complete and fax us this qualification form to receive this valuable resource *free of charge*, or subscribe online at *www.agl-mag.com/subscribe.html*.

Thank you,

Richard P. Biby, P.E.
Publisher

3. My occupation/title is (check only **ONE**):

01 ❑ Corporate Management (Owner, President, CEO, VP, Partner, General Manager); Government Agency Head; Attorney
02 ❑ Operations/Administrative Management
03 ❑ Technical and Engineering
04 ❑ Finance
05 ❑ Sales/Marketing Management
98 ❑ Other (describe): _____

If the name or address above is incorrect or needs updating, please **PRINT** the complete correct information below:

Name Title

Company

Address

City State/Prov. Country Zip/Postal Code

Telephone Fax

E-mail address for future renewal notices (Confidential; *AGL* does not allow third-party access to your e-mail information.)

To send by mail: **P.O. Box 620189, Littleton, CO 80162,** or call: **303-979-0621**

JUL 06

Adding a Little Artistry

Most of my friends now hate me. They say that summer vacations now include a mental note of the location, design and number of cell towers. They say that before getting to know me, cell towers used to just fade into the background. But now, of course, I am to blame for their heightened visual identification skills and decreased relaxation on their vacations.

In early June, I was wandering around rural Virginia during a VHF amateur radio contest (Yes, I am a real nerd—*N3UW www.biby.net/N3UW*), taking note of visually appealing antenna-support structures (the politically correct way to say "tower"). I was impressed with the number of innovative designs I saw. Some of my favorites are silos. A few I had to take a careful look at to realize they were antenna sites. The GPS antenna usually gives it away. Of course, the fact that I've not seen a newly constructed *real* silo east of the Mississippi in my lifetime kind of gives it away, too. I was also surprised to see what appear to be many counties, including Albemarle County, VA, that must have severe restrictions on towers. Carriers appear to be limited to wooden poles at about tree height.

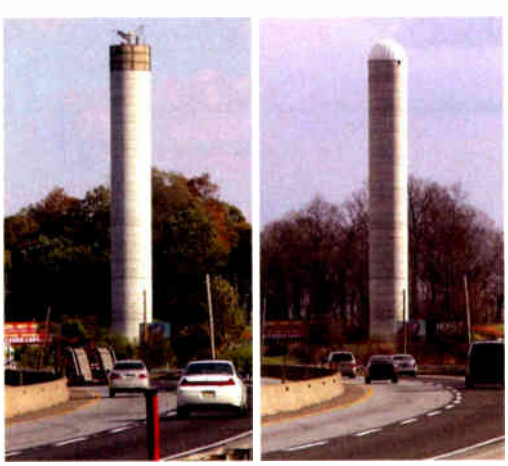
Now, this may limit my time in this industry, but *wow*, what a nice visual installation this results in. This area is extremely forested, scenic and mountainous, and the poles blend in well. The height restriction obviously has negative impacts on coverage. Nevertheless, where the sites can be placed atop hills, those negatives are reduced.

Conversely, I was almost upset with our industry for the installation of two self supporting towers, also in a beautiful, scenic area, where natural height advantages could have greatly reduced the need for the rather tall towers. Because of their heights, the towers, unfortunately, required dual strobes. This was unattractive and most likely not truly needed.

So, why is this life-long RF engineer (*and* publisher of a tower industry magazine) bashing the industry? I'm not so much bashing as I am encouraging that we not always take the easy road. Let's try to find the *appropriate* road.

Of course, this gets into the argument about fiduciary responsibilities that most of us have to have, being public companies. We can't waste money. However, consider citizen opposition, speed to market, resale of the asset and how shorter or simpler structures might offset land and construction costs.

I'm not suggesting we toss money away to make pretty sites, but I do think we may be able to do better with a little bit more time and energy. One size fits all pretty well in the flatlands of Kansas, but where we are building structures that have an impact on the view shed, a little time to find the right solution may endear us to the public a little more. agl



Camouflaged structures, such as this site near Philadelphia disguised as a grain silo, are one alternative for avoiding siting delays, disputes or controversy. *Photo courtesy of Sollenberger Silos.*

by Rich Biby, Publisher
rbiby@agl-mag.com

ABOVE GROUND LEVEL ™
agl
www.agl-mag.com

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

Published eight times a year: February/March, April, May/June, July, August/September, October, November and December/January

PUBLISHER/CEO
Richard P. Biby, P.E.
rbiby@agl-mag.com

EXEC. EDITOR/ASSOC. PUBLISHER
Don Bishop
dbishop@agl-mag.com

MANAGING EDITOR
David A. Keckler
dkeckler@agl-mag.com

ART DIRECTOR
Scott Dolash
sdolash@agl-mag.com

ADVERTISING MANAGERS
Mercy Contreras
mcontreras@agl-mag.com
Karen Clark
kclark@agl-mag.com

MARKETING MANAGER
Diane Weidenbenner
dweiden@agl-mag.com

CIRCULATION MANAGER
Karen Clark
kclark@agl-mag.com

CORPORATE OFFICE:
Biby Publishing L.L.C.
P.O. Box 284
Waterford, VA 20197
540-882-4290

PRESS RELEASES AND ADVERTISING MATERIALS MAILING ADDRESS:
Biby Publishing L.L.C.
P.O. Box 1578
Liberty, MO 64069-1578

SUBSCRIPTION INFORMATION: *AGL (Above Ground Level)* is mailed free to qualified persons in the United States working in the antenna-siting industry and related services.
To subscribe online, go to:
http://www.agl-mag.com/subscribe.html
To subscribe by mail:
ATTN: Circulation Department
AGL magazine
P.O. Box 620189
Littleton, CO 80162-9950

A subscription form is provided on page 7.

IT'S YOUR LAST CHANCE TO VOTE FOR

The agl 'Towering Achievement' Industry Awards

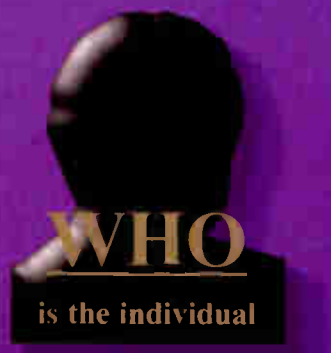
NOMINATIONS CLOSE JULY 14!

MAIL IN YOUR NOMINATION OR VOTE ONLINE NOW!

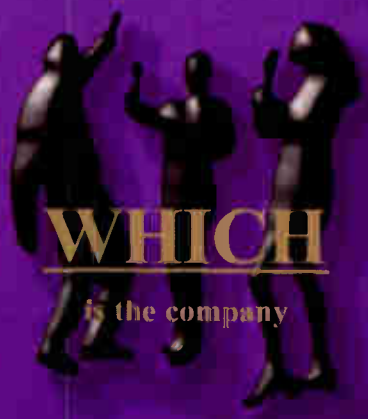
Nominations can be submitted either on our Web site: ***www.agl-mag.com/awards.html*** *or* by mail (see the form on the reverse of this page)

VOTE NOW! ☞

Presentation of the 'Towering Achievement' awards will take place at the PCIA Wireless Infrastructure Show at Gaylord Opryland in Nashville, Sept. 19–21.



WHO is the individual



WHICH is the company

WHERE is the project

WHAT is the vendor achievement

that **DESERVES** one of these?

AGL 2006 'Towering Achievement' Industry Awards Nomination Form

Mailed nominations must be received by **July 14, 2006.** Nominators may use this page, a photocopy of this page or a letter including the information requested on this page to submit their nomination. Nominations may also be filed electronically at ***www.agl-mag.comlawards.html*** before **July 14, 2006.** Nominators may submit nominations in more than one category, but please submit only **one** nomination **per** category. The staff of *Above Ground Level (AGL)* magazine and members of its editorial advisory board are ineligible for these awards. Nomination information is subject to verification by the judges, who may wish to directly contact nominators of those persons and companies chosen as finalists to obtain further information.

SUBMITTED BY (No anonymous nominations will be accepted, but nominators' personal information will be held in confidence):

YOUR NAME _____ YOUR JOB TITLE _____

YOUR COMPANY _____

ADDRESS _____

CITY _____ STATE/PROV. _____ COUNTRY _____ ZIP/POSTAL CODE _____

YOUR TELEPHONE _____ YOUR EMAIL ADDRESS _____

NOMINATING CATEGORY (check only **ONE**):

☐ ***Individual Achievement Nominee*** (A **person** who has shown personal excellence "above and beyond the call of duty" in improving, expanding, serving or representing the antenna-siting community and the wireless infrastructure industry.)

☐ ***Corporate Achievement Nominee*** (A **business-entity** nominee [sole proprietorship, partnership, corporation, etc.] whose longstanding corporate career demonstrates excellence in improving, expanding, serving or representing the antenna-siting community and the wireless infrastructure industry. Self-nominations from company employees will not be accepted.)

☐ ***Site Achievement Nominee*** (A *specific* recent siting case, **awarded to the business entity that owns or manages the site,** wherein the nominee creatively accomplished or facilitated establishing a wireless telecom site by working effectively with carriers/tenants, state or local government, and the neighboring community.)

☐ ***Vendor Achievement Nominee*** (A specific outstanding **product or service** provided by a business entity, preferably of recent creation, which has been uncommonly useful in supporting the work of antenna site owners, managers, operators or technical personnel. The name of the nominated company and its specific product or service should both be submitted.)

I WOULD LIKE TO NOMINATE (please supply as much information as known):

NAME (FOR INDIVIDUAL ACHIEVEMENT AWARD) _____ JOB TITLE (FOR INDIVIDUAL ACHIEVEMENT AWARD) _____

COMPANY _____

ADDRESS _____

CITY _____ STATE/PROV. _____ COUNTRY _____ ZIP/POSTAL CODE _____

TELEPHONE _____ EMAIL ADDRESS _____

SITE INFORMATION AND LOCATION (FOR SITE ACHIEVEMENT AWARD) _____

SPECIFIC PRODUCT OR SERVICE (FOR VENDOR ACHIEVEMENT AWARD) _____

This individual/company should be recognized for the following accomplishments (If more room is needed, please add addtional sheets or an accompanying letter. Mention dates of nominee's activities and your business relationship to the nominee, if relevant):

_____

_____

_____

_____

_____

_____

_____

_____

Mail completed forms/letters to: Awards Program, *AGL* magazine, P.O. Box 1578, Liberty, MO 64069-1578.

Going Underground

Maybe another title for this column is "a good toupee." A hair ... piece.

My friends—and yours, too, probably—ask whenever they see a large cell tower, "Why can't they just use *satellites*? Or bury it *underground*? Or *hide* it, or make it *look* like something else or *put* it somewhere else?

Hiding antennas often is a good idea. Sometimes the space available for a hidden antenna isn't enough to serve multiple carriers, so more than one site might be needed. The materials used to hide the antennas might be more costly, and the expense of multiple sites ... well, "multiplies" the costs, but ... *sure* ... antennas *can* be hidden.

Have you ever seen a bad toupee? Of course you have. And if you're talking with someone who is wearing a bad toupee, you can't seem to keep your eyes focused on his eyes, can you? Your eyes stray to the hairline. Yes, they do.

Have you ever seen a good toupee? Of course you have. You just didn't know it. And a well-camouflaged antenna, and especially a skillfully hidden antenna, is like a good toupee. It's there, but you would never know it.

Some antennas are placed behind or inside structures made of RF transparent material and crafted to replicate a familiar object, such as a boulder, smokestack, chimney, stovepipe, cupola, steeple or dormer.

We know what our friends mean when they say antennas should be put underground. It's not the same as what we mean when we say it. Distributed antennas go underground to serve auto and train tunnels, pedestrian malls, sub-basements and parking garages. Underground, where services from the macro wireless networks may fail, and anywhere there are large crowds, the field is ripe for the installation of a distributed antenna system, whether carrier-specific or neutral host.

Multiple antennas can be distributed throughout a facility, connected with long cables. Sometimes these antennas are hidden or camouflaged, especially the ones I've seen—or that I *haven't* seen—in Las Vegas casinos. By the way, I found it amusing that the distributed antenna system isn't extended to the adjacent hotel rooms. The rooms are equipped with telephones, and at the more expensive hotels, they *charge* for using the telephone.

In the casino, there's a benefit to the hotel owner in keeping guests in place when they want to use their cell phones. There's no such benefit to offset the cost of antenna installation once the guest enters the lodging area. The hotel's shopping mall? We're back to cell coverage, again. Don't make customers leave the area to place and receive calls.

Hiding antennas often is a good idea, although sometimes they don't need to be entirely obscured from view to become unnoticed. I'm pretty good at spotting antennas configured to blend in with their environment—at least, I *think* I am—and you probably are, too. Have you observed a change in individuals when they come into the industry with no previous involvement? They begin noticing antennas that always were there, but they never paid attention to them before.

Even without being screened from view or specially prepared to blend in with the environment, sometimes ordinary equipment can be installed with a creative eye toward reducing the visual effect.

The idea that antennas need to be completely hidden to be unnoticed might be slightly overblown, at least in some instances.

Until the time comes when all antennas go underground or satellites replace towers, antenna spotters can continue to amuse themselves ... looking at hairlines. **agl**

Picture of the Month:

It's a long way from the highway where this picture was taken, but that's a fairly tall tower—say, 400 feet to 600 feet. The owner is flying one of those giant flags you sometimes see on commercial property, whether in a display of patriotism or in an effort to draw attention where signage is restricted. You have to wonder about the windloading, don't you?

by Don Bishop, Exec. Editor
dbishop@agl-mag.com

A Not-so-enlightened Zoning Trend

Local communities are imposing lighting requirements beyond FAA recommendations and requirements.

by Anne M. Perkins

PCIA—The Wireless Infrastructure Association is dedicated to facilitating consistent and certain siting regulations in local communities across the country. Despite many successes, local communities continue to find ways to challenge this effort. The newest area of discord at the zoning level is lighting regulations.

Several communities have recently proposed or have adopted additional lighting requirements that extend beyond the FAA's recommended requirements. Three local entities of note are Beaufort County, SC, Jefferson Davis Parish, LA and Sussex County, DE. Both Beaufort County and Sussex County have proposed lighting changes. Jefferson Davis Parish has passed ordinances that mandate additional lighting requirements specifically requiring tower companies to either add lighting or to change out current lights. These acts raise both legal and economic concerns as tower companies face uncertain regulations and additional costs.

Legal concerns

Federal tower-lighting regulations are specified in the FCC rules, which incorporate and mandate the recommendations of the FAA's Advisory Circular (AC) 70/7460-1K, *Obstruction Marking and Lighting*. In its AC, the FAA recommends that tower owners generally use one of four systems for lighting communications towers:

- a combination of flashing or steady-state red lights.
- flashing medium-intensity white lights.
- flashing high-intensity white lights.
- a dual-lighting system consisting of steady-state or flashing red lights and either medium- or high-intensity white lights.

The minimum requirements for employing these methods are dependent on structure height and type, daytime/nighttime operation and proximity to aviation facilities. While the FCC's rules make compliance with these FAA recommendations mandatory for towers built since July 1, 1996, the FAA's AC is still only a *recommendation* and does not in itself create permanent rules.

The indecision by the FAA to create permanent rules regarding tower lighting is one possible contributor to the recent desire of local zoning authorities to mandate additional lighting requirements. Furthermore, there is legal uncertainty as to tower companies' abilities to challenge additional requirements that do not clearly conflict with federal law.

For example, what happens when a local zoning ordinance requires that a 100-foot monopole be lit with flashing medium-intensity white lights? This clearly exceeds FAA lighting recommendations, but the FAA's AC does recommend medium-intensity white flashing lights as a *type* of lighting system.

While a *conflict-preemption argument* (where there is an actual clear conflict between the requirements of state—or local—law and federal law) may not be the best argument for tower companies to challenge additional lighting requirements by local zoning authorities, there are still other grounds for dispute. Tower companies can argue that additional tower-lighting requirements frustrate the efforts of Congress, the FAA and the FCC to ensure aviation safety.

The regulations recommended by the FAA and mandated by the FCC have been implemented to create a single, *uniform* federal approach to tower lighting, and this is consistent with Congressional efforts to enhance safety. Therefore, these regulations preempt state and local law.

While the above-proposed arguments are persuasive, there is still no clear legal precedent on the subject, and this uncertainty only intensifies the problem.

Economic concerns

For a tower company to retrofit lights for existing towers would be an extremely costly endeavor. For example, the average lighting system cost for towers shorter than 499 feet is about $13,000. The average cost for towers 500 feet and higher is about $38,000. Individual beacon costs might range from $10,000–$17,000.

Here is how the aforementioned local governments are going beyond FAA rules and regulations with their own lighting requirements:

Beaufort County, SC — The county is considering an amendment to its existing wireless telecommunications ordinance that would require all towers 100 feet and higher to be lit within nine months with white lights during the day and red lights (non-strobe) at night. The amendment stems from concerned Mosquito Control Division pilots who allege that a number of vertical obstructions, including towers, pose potential flight safety hazards.

Jefferson Davis Parish, LA — An amendment passed in 2000 requires that all towers 100 feet and higher be lit. In addition, an amendment to the lighting ordinance passed in April 2006 indicates that a backup power supply be in place. This change stems from some of the power outages caused by Hurricane Katrina.

Sussex County, DE — The county is proposing, as a condition of approval on a collocation, that a tower be lit at 50-foot intervals, starting at 100 feet.

Federal clarification

Regulatory uncertainty only continues to exist as local communities find alternative ways to impose siting regulations on communications towers. In these cases, they exceed uniform federal recommendations.

While tower-siting companies continue to fight these challenges on the local level, ultimately it is up to the federal government to clarify its relationship with local and state governments and to establish permanent tower-lighting requirements that uphold aviation safety and do not frustrate the deployment of wireless facilities. agl

---

Perkins, who is also a lawyer, is manager of Industry Affairs for PCIA.

AGL magazine is the official commercial magazine for PCIA—the Wireless Infrastructure Association, sponsoring commentary, news and information for that trade group. Opinions, policies and information submitted to the magazine by PCIA do not necessarily reflect the opinions or news judgment of Biby Publishing LLC, the publisher of *AGL* magazine. Likewise, independent news items, product information, commentaries and feature articles presented in *AGL* magazine do not necessarily represent the opinions, policies or endorsements of PCIA.

Money Never Sleeps

by R. Clayton Funk

Synopsis: "Johnny Multiple," although wildly successful as a tower entrepreneur in his previous business venture, is clawing his way through an attempted turnaround of the misfortunes of his new "20× TCF Tower Company." The need to keep his investors, "Flush With Cash Capital," happy imposes urgency on his efforts. Faced with a bleeding cash-flow situation, Johnny has creatively negotiated short-term fixes with his ground owners and insurance underwriter. Fortunately, he also secured a local WiFi service provider as a tenant to provide a steady short-term stream of revenue.

Johnny realizes his work is only half done, and he begins to focus on the key to any successful tower company: generating revenue through new customers.

Johnny goes back to the three primary carriers in the "State of No Zoning" and offers them steep discounts on initial rental rates and additional rent reductions to the first and second tenants. Johnny's reasoning is that if he can convince one carrier to lease a site, then the others will collocate to offer similar coverage and not be at a competitive disadvantage.

Johnny's efforts are successful. He persuades "Plural Wireless" to lease 20 of his sites at an initial rent of $1,500 per month, with rental reductions down to $1,000 per month if, ultimately, three carriers go on a site.

While wildly underpricing his sites, Johnny is not in a position to negotiate from a position of strength, and the carriers start to take advantage of the opportunity to save some money. After hearing that Plural Wireless is going to collocate on 20 of Johnny's towers, "Walk Push-to-Talk" commits to going on 15 of those sites in addition to another five of Johnny's towers.

For the next three months Johnny is incredibly busy processing site agreements and signing leases with the carriers, something that has investor FWCC extremely excited.

One year after the founding of the company, the situation isn't ideal, but Johnny has kept the company alive. His portfolio of 47 sites, 25 of which have revenue, is generating roughly $330,000 in annual tower cash flow. This is a significant improvement from a negative "cash burn" situation just one year prior. Working nonstop for the past three months to control expenses, but also to creatively generate revenue, Johnny has his investors excited again and the company is financially healthy.

But Johnny continues to burn the candle at both ends. Conducting rigorous site audits after each of the carriers has completed its installation, Johnny realizes that both Plural Wireless and Walk Push-to-Talk have collocated more lines and antennas, including generators, at all the compounds than were contractually agreed to in their initial below-market rental agreements.

Johnny hustles quickly to get site lease amendments signed with each of the carriers, both of which claimed to have simply misunderstood the lease terms with 20× TCF Tower Company. The tireless work of our favorite tower entrepreneur ends up generating another $75,000 in revenue, all of which falls to the bottom line.

Just as Johnny wants to take a break to relax and polish his hobby collection of miniature monopoles, he gets a call from his buddy "Ernie Engineer" at "Perfect Coverage Wireless."

"Johnny, good news! I just spoke with our CFO, 'Betty Budget,' and

Tower photography by John Fertic. Art by Scott Dolash.

because we improved our ARPU through increasing MOUs and annoyingly obnoxious ring tones, we are restarting our build plan ASAP.

"Is that OK?"

Johnny nearly faints when Ernie Engineer gives him site rings that match up with the remaining 22 towers without tenants. Perfect Coverage *knows* about the reduced site rental rates being offered by 20× TCF. It signs leases for economics lower than originally anticipated in the tower company's business plan, but to Johnny and his investors it doesn't matter. The additional revenue, despite being offset by ground leases that restart after Perfect Coverage's installation, brings the company's tower cash flow to over $500,000 per year.

The turnaround is complete.

What was Johnny's formula for rescuing 20× TCF Tower Company? Hard work, a creative approach to business—and a little bit of luck, which never hurts. But where do Johnny and 20× TCF Company go from here? What is the future of the wireless world and how does it affect our tower entrepreneur?

Next up: Johnny and his investors decide on a strategy to maximize the value of the business. **agl**

Funk is vice president of Media Venture Partners, San Francisco.

Wireless Lights Up!

Optical fiber opens up wireless backhaul for increased voice and data traffic. In the same way it revolutionized long-haul and metropolitan communications, fiber is poised to enable wireless' move to the next level.

by Allen Dixon

The wireless revolution is over, and wireless is the new king. In the last several years, two remarkable things occurred.

One, the number of minutes of use on wireless lines of service surpassed the minutes of use on wireline lines of service. *(See Figure 1 below.)* More than the revenue generated and the lines of service sold, this is a truer measure of the U.S. public's adoption of mobility as a lifestyle choice.

Two, the number of laptop computers sold surpassed the number of desktop systems. This signals a sea change in the data environment. Although the mix change is partially related to the success of Wi-Fi in the home, it also reflects the growing desire in the marketplace to connect any device, any time, anywhere. Taken together, these two facts make it clear Americans have cut the cord and are living their lives on the go.

As more and more users take to the airwaves, it creates pressure on the wireless infrastructure to support the additional bandwidth. The addition of 3G-networking equipment supports additional voice calls and data services, and uses spectrum more efficiently. To ensure users receive consistent broadband performance from 3G systems, however, it is necessary to reduce the distance from the center of the cell and the number of users in each cell. This translates to a requirement for additional cells carrying more traffic.

	2000	2001	2002	2003	2004	CAGR
Wireless Interstate MOU (per user)	41	84	111	132	154	**39.4%**
Average Residential Wireline Toll Minutes	116	105	90	71	60	**–15.2%**

Figure 1. Wireless vs. wireline minutes of use.

Optical fiber provides immediate benefits to wireless communication by opening up the wireless backhaul for increased voice and data traffic. In the same way it revolutionized long-haul and metropolitan communications, fiber is poised to enable wireless' move to the next level. Revolution, though, requires change. The following information highlights fiber's role in the change necessary to create a new backhaul and provides those tasked with installing and maintaining the wireless network with a basic introduction to optical fiber.

Optical communication has been around since the beginning of time. Paul Revere's midnight ride to Lexington was triggered by the appearance of two lamps in the tower of Boston's Christ Church. U.S. Navy signalmen still signal to each other using lamps in daylight and darkness. *(See Figure 2 on page 17.)* Modern optical telecommunications relies on the same principle but dramatically speeds up the signal rate and confines the signal to a narrow path: an optical fiber.

Optical-fiber construction is easily described by the three C's: *core, cladding*, and *coating*. *(See Figure 3 on page 17.)* The *core* contains the light signal. The *cladding* surrounds the core and confines the optical signal. The *coating* provides protection, flexibility and handleability to the hair-thin glass fiber.

The core and cladding are created when the glass is drawn at the factory and cannot be separated from each other. The core has a slightly different glass composition, which allows the light signal to reflect off the core-cladding interface and travel the length of the fiber using a concept called *total internal reflection. (See Figure 4, page 18.)*

First, let's set a sense of scale. A typical fiber used in telecommunications cables has a diameter of about 250 micrometers (μm). To make that number more definable, it's one-fourth of a millimeter or, as it is more commonly described, about the thickness of a human hair. The coating makes up about half the total size of the fiber. The actual glass (the core and cladding) is only 125 μm in diameter. *(See Figure 5, page 18.)*

There are two types of optical fiber: *multimode* and *single mode*. A *mode* is an allowed propagation path in the fiber's core. The number of modes a fiber supports is chiefly a function of core size and optical wavelength.

Single-mode fiber, allowing only a single optical mode, is used in most telecommunications networks. Single-mode fibers have extremely high information-carrying capacity and use laser light sources to accommodate the small core size. Single-mode systems can easily reach 20 kilometers or more without

Figure 2. U.S. Navy signalmen signal each other using lamps in daylight and darkness.

signal conditioning or regeneration.

Multimode fiber, which allows multiple propagation paths, is most commonly used in private-network applications. Compared to single-mode fiber, it is characterized by a much larger core, lower information-carrying capacity and the ability to use low-cost, low-powered LEDs as transmission sources. Multimode system lengths are usually less than 2 kilometers and are most commonly found in private-network applications. As an aside, it is nearly impossible to tell single-mode from multimode fiber with the naked eye.

Manipulating the light

There are many terms used in discussing single-mode fiber, but the three most important for our discussion are *wavelength*, *attenuation* and *dispersion*.

Wavelength refers to the position in the spectrum of the light used in system operation. *(See Figure 6, page 19.)* Visible light is made up of a blend of many wavelengths; we call the discrete component wavelengths "colors." At the lower end, "violet" light has a frequency of about 400 nanometers (nm). "Red" is at the upper end of the visible spectrum and has a wavelength of about 700 nm.

The wavelengths used in optical communications systems are outside our visible range (in the infrared region) but it can still be helpful to think of the operating wavelengths as "colors." Single-mode systems operate primarily in two windows, or low-loss regions, one centered on 1310 nm and another centered on 1550 nm. The usable wavelengths can extend as far as

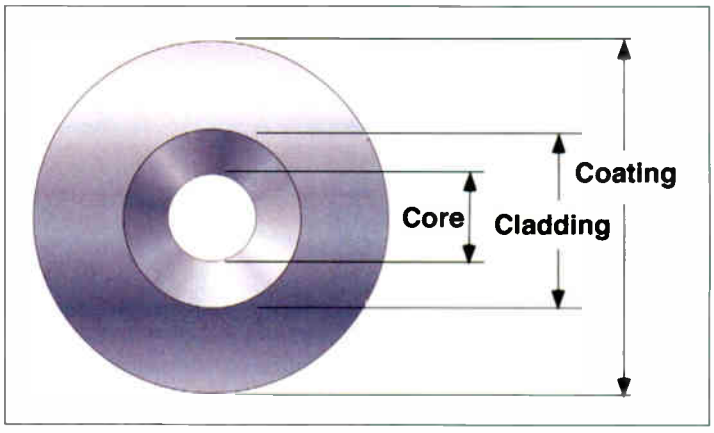


Figure 3. A cross section of fiber.

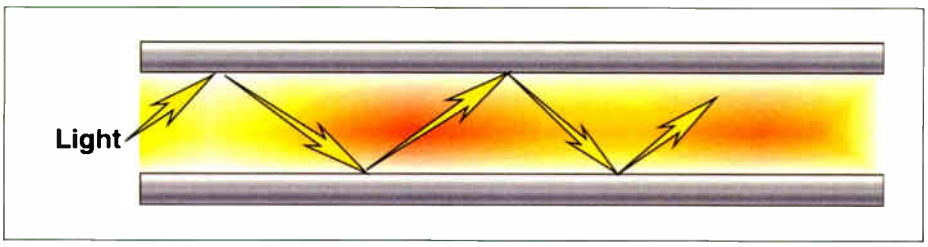


Figure 4. Intrinsic attenuation.

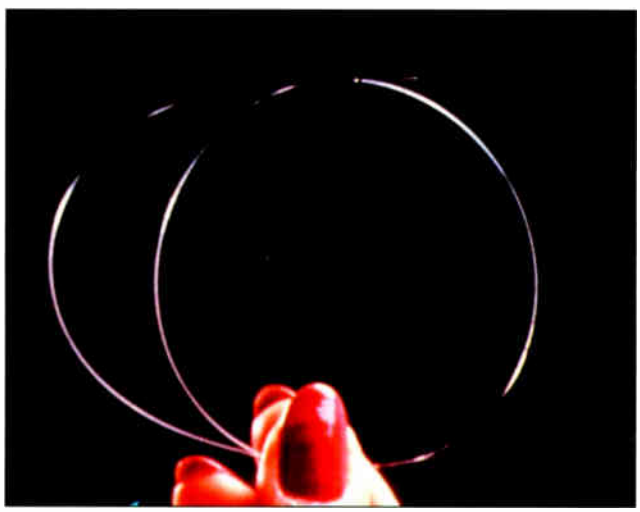


Figure 5. Fiber size is commonly described as having about the thickness of a human hair.

50 nm on either side of the center-window wavelengths. A laser used for 1550 nm operation can have an actual operating wavelength of anywhere from 1500 nm to 1600 nm. These windows are important because attenuation and dispersion values are different in each window.

Attenuation in the fiber is simply the optical signal's loss of power as it moves the length of the fiber. Attenuation is the result of two phenomena: *scattering* and, to a much lesser extent, *absorption*. *Scattering* is caused by imperfections in the fiber and the glass structure of the fiber. These imperfections redirect the path of the incoming signal-causing portions to be lost. *Absorption* is caused by hydroxyl ions (broken water molecules) and other impurities which are unavoidably trapped during the glass-manufacturing process. These hydroxyl ions absorb portions of the incoming signal.

We measure the power in the optical network using decibels (dB), a unit common to coax and other networking media. Because optical fiber has extremely low attenuation values, the attenuation is expressed in dB/kilometer (dB/km). Commonly available single-mode optical fibers have attenuation values of less than 0.5 dB/km in the 1310 nm window and 0.4 dB/km in the 1550 nm window. *(See Figure 7, page 20.)* Premium-grade products can reduce the attenuation to 0.35/0.25 dB/km

(1310/1550 nm). These loss characteristics allow optical-fiber systems to easily carry a signal 32 kilometers or more without requiring expensive amplification or regeneration.

No attenuation variance

Besides its extremely low attenuation values, another important feature of optical-fiber attenuation is its flatness. In most other transmission media (twisted pair cable, coaxial cable), the attenuation is a function of the RF frequency and, often, the ambient temperature. As the frequency and temperature change, so does the attenuation. Optical-fiber attenuation does not vary with modulation frequency or with temperature, easing the burden on network planners.

In addition to decreasing in strength, light pulses also broaden as they travel the length of a fiber. This broadening is called *dispersion*. Dispersion and attenuation together determine how far a signal can travel before requiring amplification or regeneration. *Dispersion* in single-mode fibers is mainly a function of the spectral width of the optical source and is a key indicator of its information-carrying capacity, or *bandwidth*.

An optical source is characterized by several attributes. *Center wavelength* and *spectral width* are just two of the many attributes used to compare sources. The center wavelength describes exactly what wavelength the source is transmitting on within the two operating windows. As already mentioned, higher wavelengths have better attenuation characteristics.

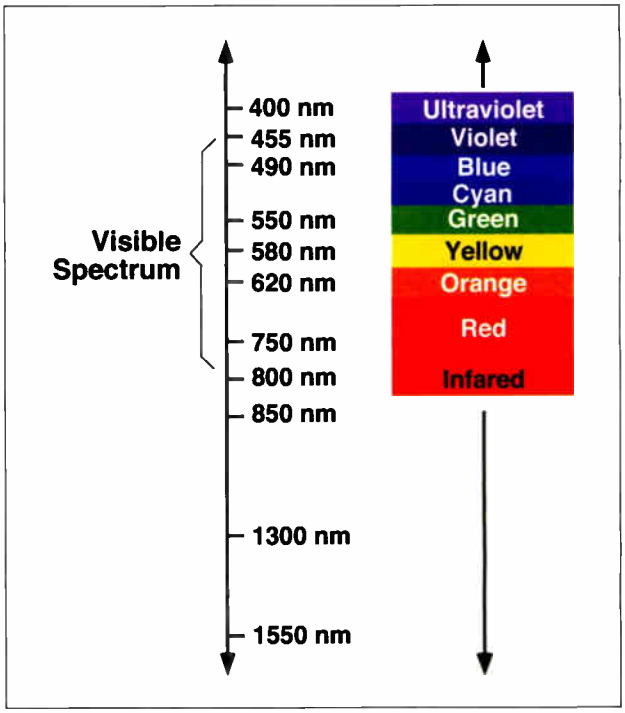
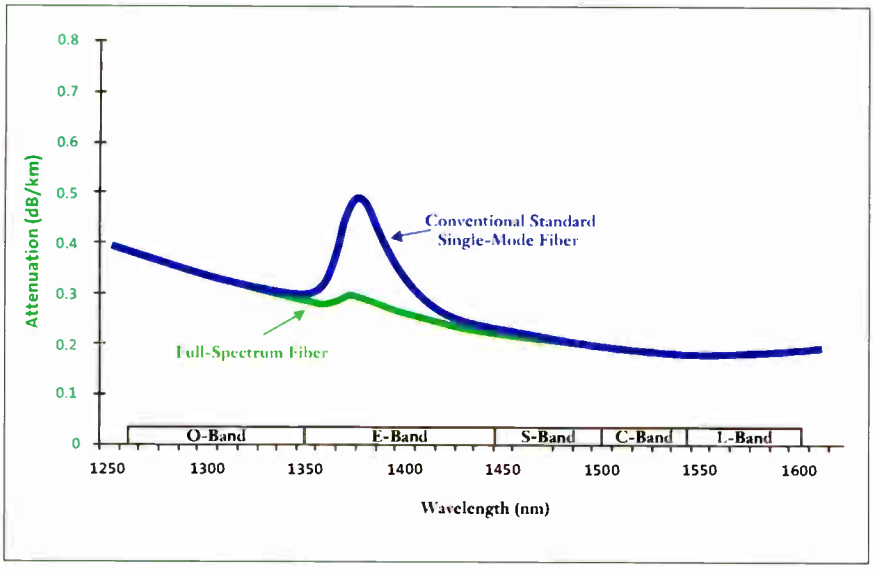


Figure 6. Wavelengths of light by color.



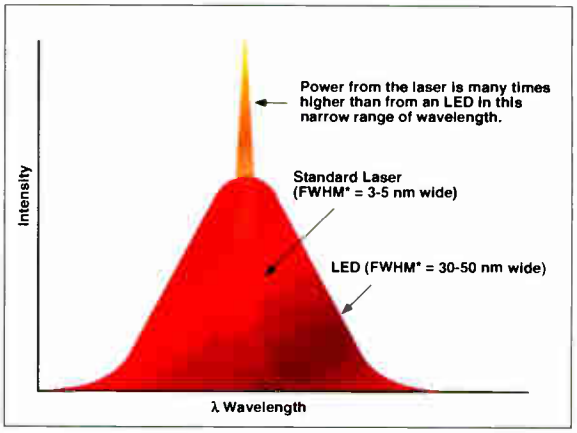


Figure 7 (left). Attenuation values for two types of fiber across several wavelength windows. Figure 8 (above). Spectral width is a measure of a source's 'cleanliness.'

Spectral width is a measure of a source's "cleanliness." *(See Figure 8, above right.)* A source with a center wavelength of 1315 nm, for example, will incorporate a range of actual wavelengths, depending on the spectral width. If the source has a spectral width of 20 nm, wavelengths from 1305 nm to 1325 nm will be included. If the source has a spectral width of 2 nm, only wavelengths of 1314 nm to 1316 nm will be included.

Think of each wavelength as a different color. Each color travels through the glass core at a different speed. Because each pulse is made up of all the colors in the spectral width, portions of the pulse will travel faster than others. Over the length of the fiber, this causes the pulse to broaden. Eventually, the leading edge of one pulse will

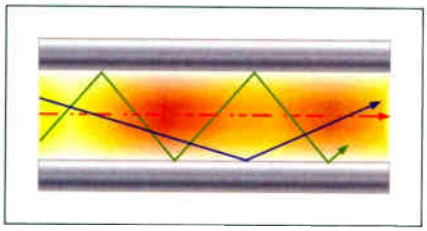


Figure 9. The higher a fiber's dispersion value, the more quickly pulses begin to overlap, reducing the system's bandwidth.

overtake the trailing edge of the previous pulse and, if the path is long enough, it can become impossible to differentiate the pulses. *(See Figure 9, above.)* The higher a fiber's dispersion value, then, the more quickly the pulses will begin to overlap, reducing the system's bandwidth.

Single-mode fiber can carry enormous amounts of information. A single strand of this fiber can easily carry 10 *gigabits* of information every second (Gbps). Donald Sterling Jr., author of *Technician's Guide to Fiber Optics*, does an excellent job of helping us appreciate this. Sterling notes that:

"A 10 Gbps signal has the ability to transmit any of the following per *second*:

- 1000 books.
- 130,000 voice channels.
- 16 high-definition television (HDTV) channels or 100 HDTV channels using compression techniques."

The combination of low attenuation and high bandwidth make fiber a logical choice for wireless backhaul systems, whether serving a conventional tower or a remote node in a distributed-antenna system. There are other benefits to optical-fiber systems. The small fibers lead to small, lightweight cables. As many as 288 fibers can fit into a one-inch cable structure weighing less than two pounds for every 10 feet of length. Glass fibers are also immune to electromagnetic interference (EMI) and the crosstalk that plagues twisted-pair cabling.

Optical fiber is being viewed favorably by every player in the wireless network food chain. Wireless carriers appreciate its high bandwidth and immunity to interference. Backhaul providers value those same characteristics and the reduced "opex" associated with fewer truck rolls.

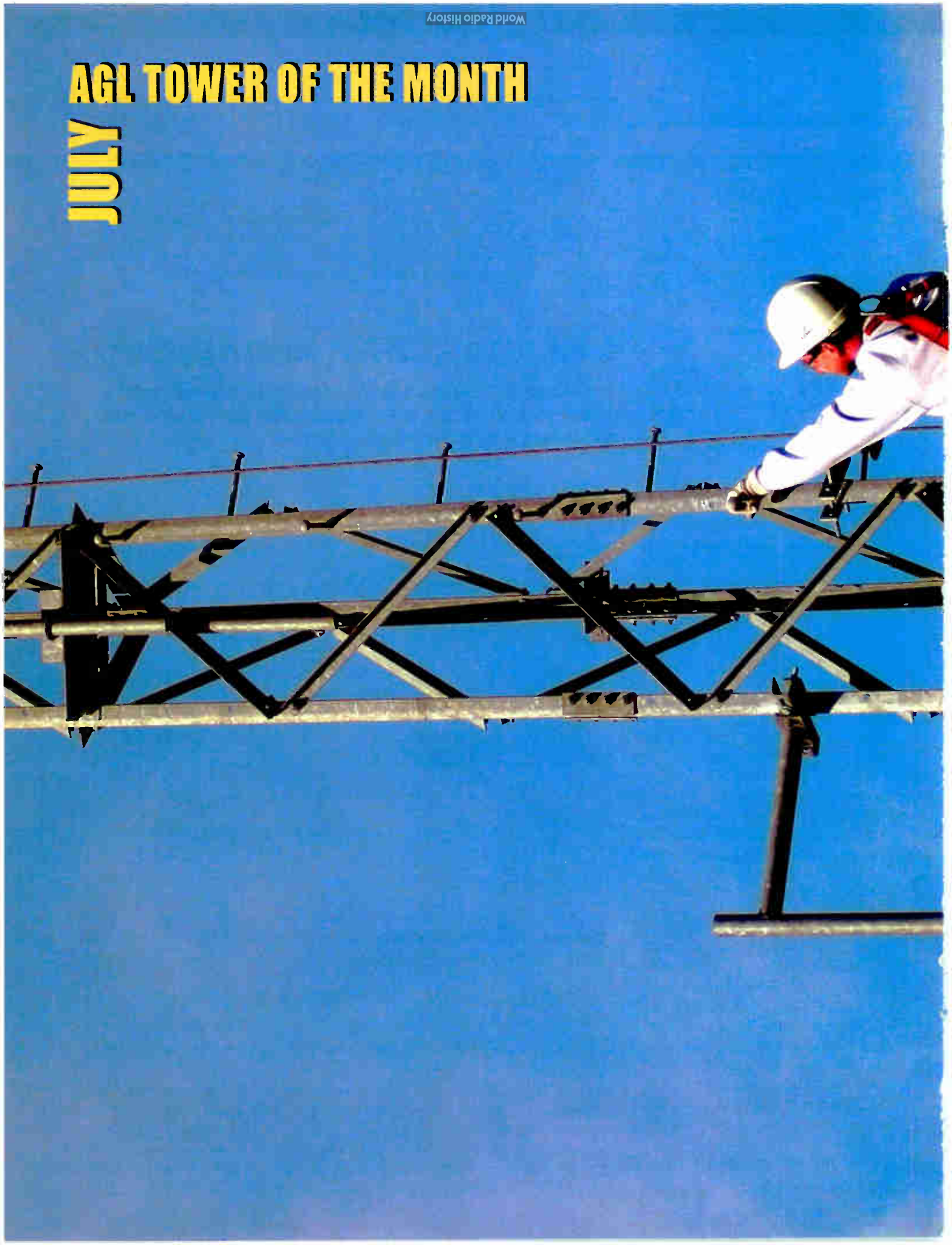
Changing of the guard

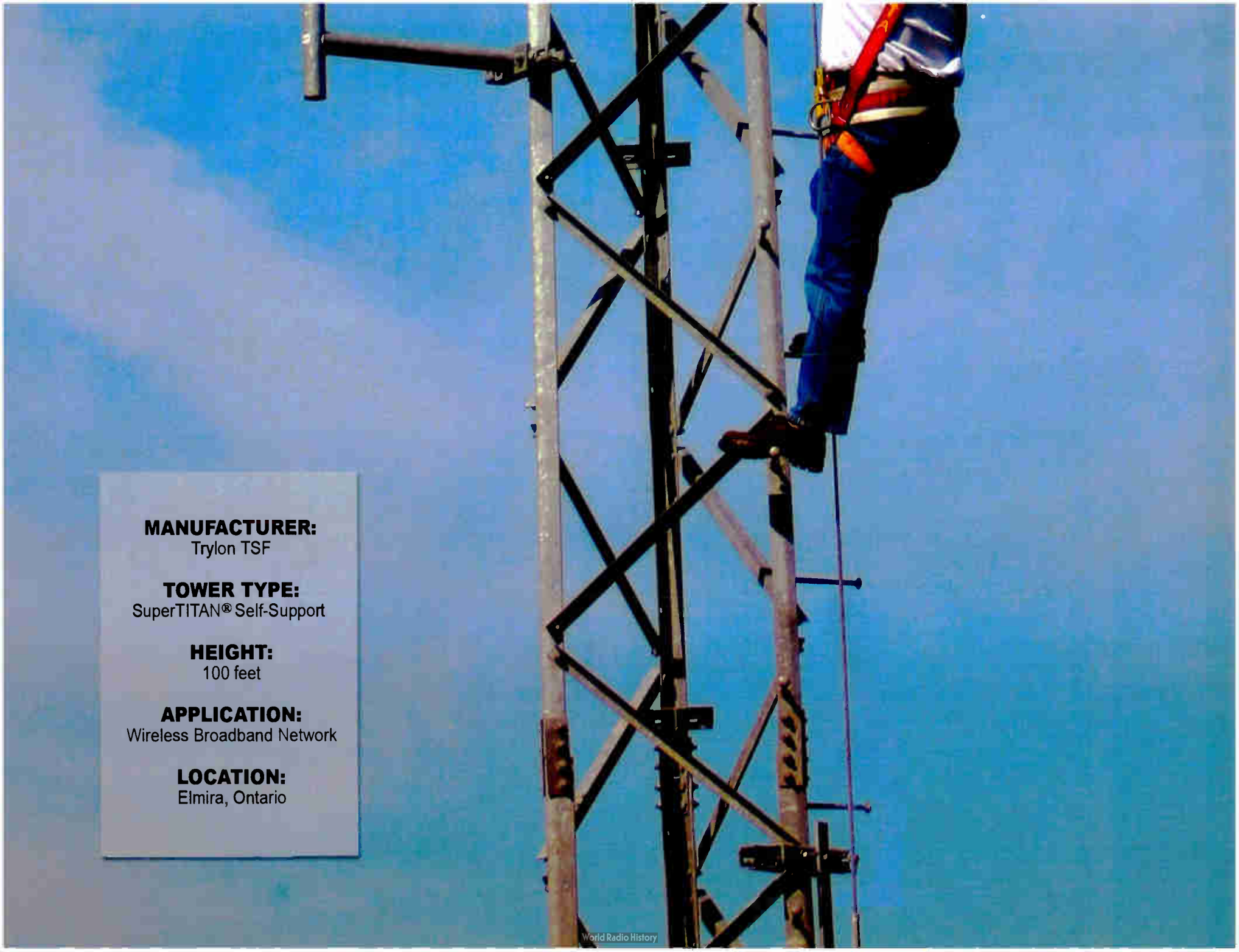
There's an old adage: "Everyone likes *progress;* no one likes *change.*" Wireless network infrastructure must change if progress toward the dream of anytime, anyplace voice and broadband connectivity is to advance. In the same way optical fiber revolutionized long-haul and metro wireline communications, it is ready now to enable the change. Viva la revoluciòn! **agl**

Dixon is the market development manager for Wireless at Corning Cable Systems. His email address is *allen.dixon@corning.com.*

AGL TOWER OF THE MONTH

JULY





MANUFACTURER:
Trylon TSF

TOWER TYPE:
SuperTITAN® Self-Support

HEIGHT:
100 feet

APPLICATION:
Wireless Broadband Network

LOCATION:
Elmira, Ontario

Successful Tower Siting: The Proactive Approach

Victory in securing antenna sites comes harder when you approach zoning authorities reactively or with aggression. 'Honey' is superior to 'vinegar'. The best way to create that honey is by keeping 'Three Bs' in your bonnet.

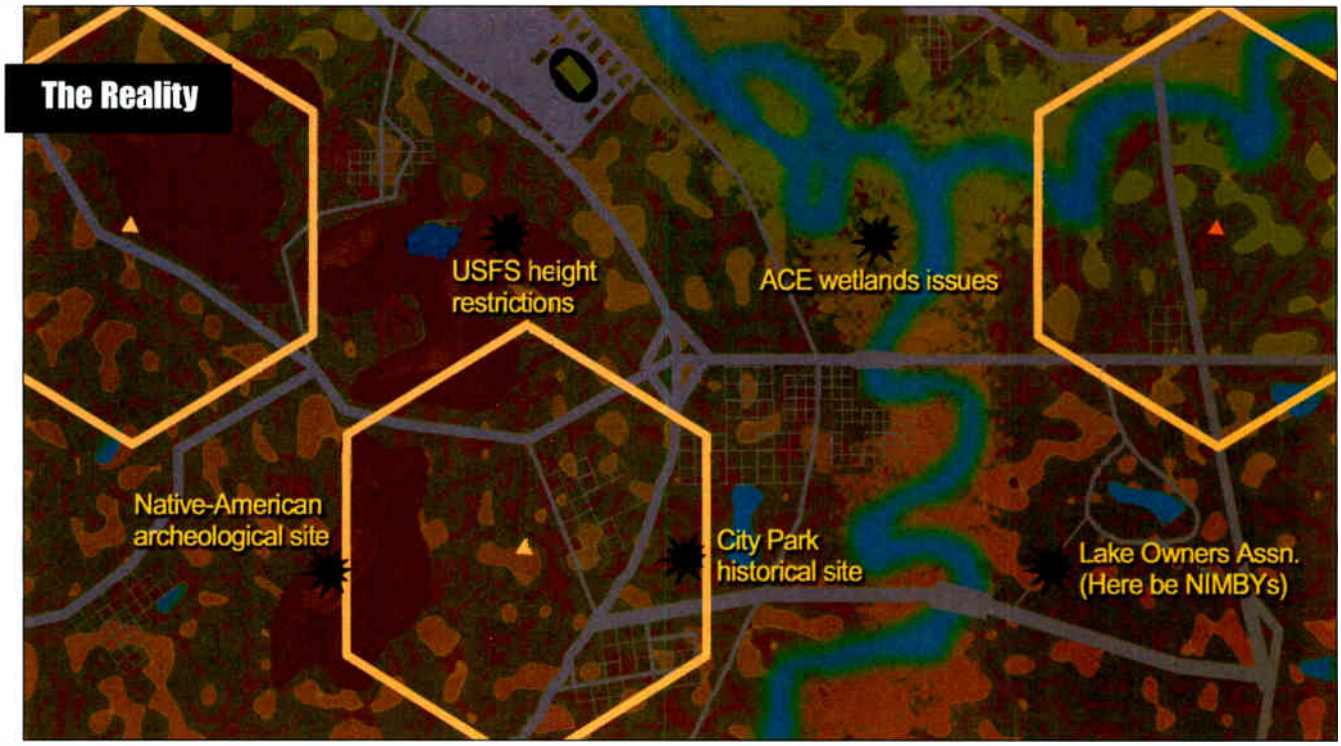
by Robert Gaudioso, esq.

Siting towers for wireless services, high-definition television or point-to-point microwave communication has never been easy. Yet with a proactive approach to siting, the battle is being won every day. Using a strategy based on the "Three Bs" (Best Site, Best Design and Best Record), it is possible to secure siting approvals for even the most controversial towers.

This strategy has been used successfully to secure siting approvals for towers located in protected watershed property, in designated landmark or historic districts and even in upscale neighborhoods where it would be difficult to site a flower shop.

Select the best site

Finding the best site is critical to prevailing. The site defines and drives the process, establishing the baseline characteristics that a tower sponsor will confront during the permit-approval process. Each site will be defined by its zone, its proximity to interested parties and by the nature of the entity that owns it.



Picking a site where each characteristic is orchestrated for success determines whether an approval is secured easily or after a lengthy battle—or just dies a long, painful and costly death.

Obviously, the best site will be located where towers are permitted. Persons responsible for finding tower sites must be mindful of zoning. Simply finding an open field or a willing landowner is not enough. Tower siting is difficult even when the tower would be located in a "hospitable" zone. But when a zone does not permit tower construction and a "use variance" is required, this extends and vastly complicates the process.

The flip side of this consideration is to look for sites where towers may be located "as of right." As-of-right sites permit tower construction with a building permit only, without the need for a lengthy land-use-review process. Such sites are rare, but they definitely exist—if you know where to look. Although municipal-siting *requirements* are clearly illegal, in many parts of the country municipal- or state-owned sites (excepting parks) may be exempt from zoning. Sites owned by police departments, fire districts, parking authorities and publicly owned colleges are also a good source for "soft zoning" locations.

The best site will also have a built-in user constituency. A tower located on property owned by a fire district may garner support from full-time firefighters or volunteers who need reliable radio coverage to serve the public. The revenue that a tower may generate can also mobilize a constituency that needs this revenue to further a public purpose.

Tower revenue has helped pay for ambulances, fire trucks, police cars and other public benefits. Tower revenue has helped struggling churches pay for improved day-care facilities and helped parking authorities purchase new security cameras to safeguard commuters who use their facilities. Sites such as these come with a built-in constituency that may be willing to publicly support a tower project.

Finally, do a bit of due diligence early on. A site that is ideal in all apparent outward respects may actually be infirm due to hidden conditions that may come to light with a title search.

A title search examines legal documents, including deeds, mortgages and other documents, that establish the history of a project site. Sites with otherwise-ideal pedigrees have gone down in flames when a title report revealed a restrictive covenant that precluded commercial use of the land or imposed other "covenants running with the land" that made the site unsuitable.

In addition to a title search, due diligence should also involve an inquiry into potential historic resources which could be affected, however tangentially, by a tower site. If the shadow that a tower may cast on an historic site can be avoided, or if a small change in tower height can avoid a major anthropological review, these design considerations should be identified and implemented early in the tower-development process.

The importance of careful site selection to the ultimate success of tower siting cannot be overemphasized.

Create the best design

Want to *doom* your chances for success? Design a tower that does not meet the zoning requirements, including setback, height, landscaping, lighting and other design requirements.

Towers disguised as trees, clock towers, church steeples, flagpoles, cacti and other "camouflaged" structures are increasingly being required by local zoning ordinances. Such requirements add

to the cost of a tower, but this cost must be weighed against the potential for avoiding delay, disputes or controversy.

For sites not already exempt from zoning, pursue a design that limits the number of land-use approvals, such as "area variances." Most zoning jurisdictions impose requirements on how close a tower may be to a road, to property lines or to other structures. These so called "bulk requirements" should be kept in the forefront of site design when a tower plan is in the early stages of development.

Moving a tower site a few feet in one direction or the other may bring the site into compliance with a locality's bulk requirements and thereby avoid public notices, public hearings and adjudicatory proceedings that will often be required when the failure to meet bulk requirements triggers an area variance.

Likewise, significant delays resulting from additional regulatory reviews can be avoided through careful site design. For example, how to avoid effects to wetlands or construction in floodplains (including the tower's access road and utility run) should be considered early.

The goal of a careful design study is to review the applicable land-use and environmental requirements to create a design that consciously seeks to avoid as many permits and approvals as possible. Applying this strategy to tower builds can pay enormous dividends in terms of time and cost savings.

Build the best record

Sadly, some tower-siting approvals are not granted without a court battle. Although litigation and involvement with courts should be avoided at all cost, it is sometimes inevitable. In some cases, the lawsuit is predestined because local politicians do not want to be "blamed" for approving a tower. When this mind-set prevails, politicians decide early on that they want a court to "take the heat" for deciding a tower-approval case. This provides the type of political cover that politicians thrive on. It leaves them free to claim that "We did everything we could to stop the tower," and to pass the buck with the all-too-common explanation, "The judge sold us out."

When political expediency is not the motivation for a trip to the courthouse, it may be that there is a legitimate, though misguided, disagreement over the need for a site, the appropriateness of its location or the level of service it will provide. When these disagreements surface, the tone of the siting process changes. As soon as it is apparent that the parties are in fundamental disagreement on key aspects of a tower-development project, the sponsor must go "on a war footing."

When this perspective defines the process, the project sponsor must be especially vigilant in developing a written record supporting its tower application. A carefully constructed record can provide the reviewing court with the basis to conclude that the denial of land-use approvals for a tower was, in fact, unlawful.

When a project is on a war-time footing, it is imperative that all emails, correspondence, documents, studies and minutes from land-use board meetings be carefully preserved. In addition, when hostility to a project is palpable, it is good practice to hire a stenographer to create a verbatim written transcript of all comments and exchanges that take place during the public review of the tower.

It is surprising how often unabashed bias, profound misunderstanding and lack of attention to project details by the reviewing board will shine through in a hearing transcript. This can ultimately be the basis for a successful legal appeal should approvals be denied.

Of course, the applicant must also be careful to construct a record that is meticulous in presenting its case in the best possible light. Our firm has found that the best way to do this is through a process known as *pre-filed direct testimony*. This constitutes the written statements of the various experts that will testify in a tower-siting case, all reduced to a neatly bound statement and filed as part of the record.

By using pre-filed testimony, the project sponsor can carefully craft and polish exactly what the experts are saying for the record.

Pre-filed direct testimony avoids the risk that an expert will have a bad night or otherwise get rattled or flustered when presenting "live testimony" to a board. When pre-filed direct testimony is used by an engineer, radio-frequency consultant, traffic analyst or any other expert, it is anticipated that the expert will briefly summarize his or her written remarks in "real-time," while relying on the pre-filed direct testimony for the complex calculations, analyses and studies that become the bedrock of the record. With pre-filed direct testimony, the tower sponsor essentially controls the development of the record and crafts the nature, tone and level of detail that best supports the project.

Pre-filed direct testimony is *so* useful, in fact, that we recommend its use in *all cases*, whether there is opposition or not. This strategy is prudent because there are instances when litigation is not looming until *after* an approval has been granted and one or more opponents later "come out of the woodwork." In these cases, a record built around pre-filed direct testimony provides the best assurance that the record before the reviewing court will sustain the approval granted for the tower.

Finally, an important part of developing the best record is to be sure that all alternative sites have been identified, assessed and rejected *for valid reasons*. All too often, siting disputes become bogged down in a ridiculous tail-chasing exercise where land-use boards demand that a tower sponsor explain why sites "X," "Y" or "Z" cannot serve as alternatives. To avoid this needless distraction, persons responsible for site acquisition should be sure that all possible alternate sites such as water tanks, rooftops, existing electric utility poles and similar structures or locations have been examined and deemed unsuitable for legitimate reasons.

For example, if the property owner controlling a nearby rooftop has no interest in doing a deal, keep a *record* of this rebuff in writing. If a water tank does not have sufficient ground space to accommodate equipment cabinets, then *document* this fact.

The *applicant* must be prepped to deflect the examination of impracticable alternatives that some boards will attempt to use to delay or derail a project.

The 'Three Bs' obtain the best results

Tower siting is not an easy process. But it is not impossible. A thoughtful approach to finding the *best site*, creating the *best design* and building the *best record* will maximize the chances for a favorable outcome. This is a strategy that has worked in the past and that will continue to work in the future. **agl**

Gaudioso is an attorney and partner in the New York-based law firm of Snyder & Snyder and chairman of its telecommunications land use practice. His email address is *rgaudioso@snyderlaw.net*.

Trademarks —an Ounce of Prevention

Profiting from innovations in wireless infrastructure equipment or services requires using trademarks, copyrights and patents to protect the intellectual property you create. This time we examine 'trade dress': packaging, labeling and advertising of goods and services used to present them to potential customers.

by John Bradshaw, esq., and Delaney M. DiStefano, esq.

A business' intellectual property can be its most valuable asset. The four types of intellectual property are: *patents, trademarks, copyrights and trade secrets.* For example, within the past year, TowerTEX Composites introduced an easy-to-install device that keeps tower lights visible to aircraft while shielding the light from being a nuisance at ground level. To protect their design, materials selection and manufacturing techniques, the company obtained a *patent.* It decided to name the product "TowerSHADE," and that name, and the logo created for it, became the product's *trademark.* If there is a manual on how to use The TowerSHADE, the contents of that manual would be *copyrighted.* Finally, TowerTEX's customer list, as long as it takes steps to protect it, could be considered a *trade secret.*

This article focuses on the *trademarks* component of intellectual property. Any good business realizes that its customers have other options and need a reason to choose it over its competitors. The familiarity with, and loyalty to, a particular brand is often a significant component of purchasing decisions. Building such loyalty can be a major driver to value creation in your business. Your trademarks are your brand and consist of the words, phrases, symbols, or logos that identify your goods and services and distinguish them from those of your competitors.

Prior to their use by a business, trademarks have no inherent value. They *acquire* value as they become associated in the minds of customers with the product or service—even if the customers don't know the name of the company. This association develops through the consistent use of a mark in packaging, labeling and advertising.

Unlike patents, where one's rights are determined solely by registering the patent with the federal government, rights in a trademark can be established through simple day-to-day use.

However, it is a common coincidence that different businesses may start using similar marks without initially creating a conflict. This can happen where the businesses are in different geographic markets or are in sufficiently different lines of business. Unfortunately, the absence of a problem at the time of mark adoption does not guarantee continued rights to use the mark because conflicts inevitably arise as businesses inevitably expand.

Conflicting interests

For the vast majority of trademark cases, a *conflict* is when there is a "likelihood of confusion" among the relevant customers. Courts will evaluate a variety of factors to determine whether there is a likelihood of confusion, such as the similarity of the marks, the similarity of the goods or services with which the marks are used and the channels of trade in which the goods or services are marketed. Proof of actual confusion in the marketplace is typically strong evidence that two marks are in conflict.

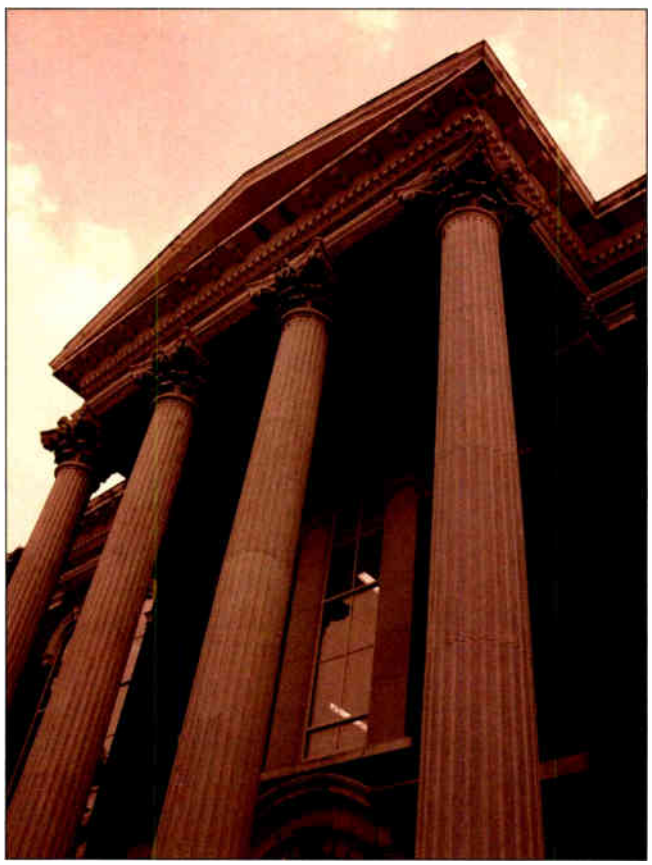
When there is a conflict, the rights to continue using a particular mark in a particular market go to the user who has *priority* in that market. Determining priority is often highly fact sensitive and difficult to resolve because it may turn on both the particular characteristics of the market at issue (*who* the consumers are, how they *act* and what their *expectations* are) and the historical conduct of the parties (who did *what* and *when*). The ultimate resolution may be that each party retains rights to their marks in the respective markets where there was no conflict, whereas only the winning party gets the rights to the market in which the conflict arose. Such a resolution may make even the "winner" unhappy because it does not have unfettered use of the mark.

One way to head off these types of conflicts, or at least to increase your chances of being the winner when there is one, is to *federally register* a trademark. Everyone is familiar with a federally registered trademark because it bears the ® symbol.

A federal registration provides significant procedural and evidentiary advantages in a trademark infringement action, and it is *prima facia* evidence of the exclusive right to use the mark on the listed goods or services. It also

provides *constructive notice* of the ownership claim, which prevents subsequent users from adopting the same, or a confusingly similar, mark in good faith.

Another advantage of the federal registration process is that you can file your application *before* you actually start to use the mark. Because the filing of an application establishes a nationwide priority date, this can be a advantage. You might expend significant time and expense preparing to use a mark (selecting the mark, clearing it, developing marketing materials and printing product labels).



However, until a priority date is established, either through filing a federal application or by putting the mark into actual use in commerce, you are at risk of someone else beating you to the punch by adopting or filing on a confusingly similar mark. Promptly filing a federal application to stake your claim to a mark, once it has been selected, can provide valuable insurance against the loss of your upfront investment.

Of course, part of this upfront investment is selecting a mark that is both appropriate for the business and clear from conflicts with the existing marks of others. In evaluating the appropriateness of a word mark, it is important to understand that not all marks are treated equally. Human nature being what it is, there is a natural tendency to choose words or phrases that immediately convey a favorable attribute of your product or service. However, doing so might result in a trademark that is afforded a narrower scope of protection than one that is less "descriptive."

More specifically, word marks are classified along a continuum of *distinctiveness*. At one extreme are "arbitrary" or fanciful terms. These are words that, prior to your adoption of the mark, bear no relation to the goods or services. Once established, these are considered the strongest marks. "KODAK" as a mark for film or "VERIZON" for communication services would be considered "arbitrary" marks.

The next category is *suggestive*. These involve terms that suggest a feature, characteristic or quality of the goods or services but do not directly describe that feature. "SPRINT" would be considered "suggestive" for telecommunications services because it suggests, but does not describe, speed in communications. Both arbitrary and suggestive terms are inherently capable of being trademarks and of being federally registered as such.

The final category of word marks encompasses those that are descriptive of the goods or services. Depending on your viewpoint, "Tall and Beautiful" might be considered descriptive for telecommunications towers (unless you live in La Cañada Flintridge, CA).

Protection or registration of descriptive terms as trademarks is not always possible and may require proof of acquired distinctiveness; in other words, that customers actually view the descriptive terms as a trademark. This can be proved directly *via* survey evidence, and courts and the trademark office will generally infer that distinctiveness has been acquired once a mark has been in exclusive use for five years.

Generic terms that merely identify the goods or services are never protectable as trademarks. Thus, it is unlikely that anyone could claim "Telecom Tower" as a trademark for telecommunications towers.

The aforementioned categories apply to the words of a mark. Design elements, such as logos, colors, graphics or a special font, can all make up part of a mark, or may independently function as a mark. Significant design elements, even if used in connection with generic or descriptive terms, usually function as a trademark and can be registered as such.

Once a viable candidate mark has been identified, it is advisable to follow the adage about "an ounce of prevention" and conduct a search to identify any similar or potentially conflicting marks. Trade journals, the Internet and other obvious sources should be checked. For the do-it-yourselfer, the U.S. Trademark Office has an online searchable database at *www.uspto.gov*.

Because the landscape is seldom perfectly clear, legal counsel should routinely be consulted for final approval that a mark is reasonably clear for adoption and use. Following these guidelines, and promptly filing for federal registrations to cover all intended uses, can help ensure that your business is able to establish and to grow what may become one of its most valuable assets. **agi**

Bradshaw is a patent and trademark attorney with Woodard Emhardt Moriarty McNett & Henry, Indianapolis (*www.uspatent.com*). His email address is *jbradshaw@uspatent.com*.
DiStefano is a principal of Higgs Law Group, Rockville, MD. Her email address is *ddistefano@higgslawgroup.com*

PROTECT INVEST

WHAT **EVERY** TOWER OWNER SHOULD KNOW ABOUT UPGRADING A MONOPOLE'S **MOST IMPORTANT CONNECTION**.

BY BRIAN R. REESE, P.E., AND DAVID W. HAWKINS, P.E.

Monopoles are a popular form of antenna support. The reinforcement of existing monopole structures has allowed the industry to increase load-carrying capacity, thereby realizing more revenue per structure by adding carriers. Often in the upgrading of a pole, the base of the pole needs to be strengthened because this is the area of a cantilever structure where the stress is relatively higher than on other parts of the pole.

The base plate is shop welded to the monopole shaft in the manufacturer's facility. This weld is the *only* connection between the monopole shaft and the base plate.

All of the load from the pole above accumulates at the base and must be transferred from the shaft to the base plate into the foundation through the anchor rods. The connection of the base of the pole to the base plate is a critical, non-redundant structural connection. Invest the appropriate attention to this critical connection, and you will prolong the lifespan and ensure the long-term performance of your monopole assets.

The elegance of monopoles

Tubular steel poles have been used as a support structure in the electric utility and transportation industries for nearly a half-century. In the telecommunications industry, tubular steel poles, commonly referred to as *monopoles*, have been in service since the growth of the cellular industry in the late 1980s. Fueled by demand for communications services, monopole use by both carriers and tower owners exploded in the late 1990s. While the industry experienced explosive growth, public opposition to the placement of new sites increased.

In response, the industry sought to optimize the load-carrying capacity of existing structures. *Reinforcement* has become a common alternative to installing a new monopole. Upgrade methods include bolt-on structural members, carbon-fiber reinforcement, structural adhesives and welded structural members.

With more than 3,000 monopoles in its portfolio, Crown Castle International (CCI) has taken a proactive approach to managing the upgrade and optimization process of its monopole structures. Jim Kyriacopoulos, CCI's director of engineering, said, "Having investigated most of the common methods for strengthening monopole structures, we prefer bolt-on-type designs for the shaft because we believe they are solid from a performance and reliability perspective, generally the simplest and among the least expensive to install, and nearly maintenance free."

By increasing the structural capacity and use of existing antenna support infrastructure, the industry has slowed the proliferation of "rawland" sites and the deployment of new structures.

Monopole base-plate connection

A critical aspect of monopole reinforcement is the upgrade of the base connection. A monopole base plate connects the structure via anchor bolts to the foundation. The monopole base connection is fabricated by shop welding the base plate to the shaft in the manufacturer's facility. This weld is the only connection between the monopole shaft and the base plate, which makes this type of connection non-redundant. The structural adequacy and integrity of this connection is crucial

YOUR

Fueled by demand for wireless services, monopole use by carriers and tower owners exploded in the late 1990s.

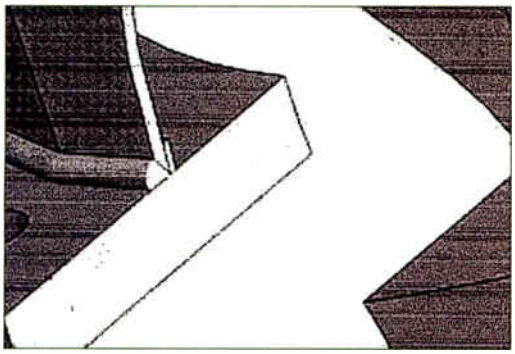


Figure 1. CJP joint cut-out showing butt-welded connection between the base plate and the pole wall.

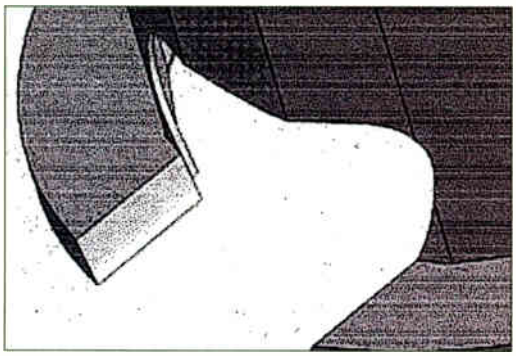


Figure 2. The fillet weld is in the outside-base plate/pole-wall intersection and on the bottom base-plate/pole-wall intersection.

to the monopole's structural performance. A non-redundant connection means that if a complete failure were to occur at this joint, the result would be almost certain catastrophic collapse of the structure. The connection detail of the monopole shaft to the base plate can vary depending on the type of monopole (multi-sided polygon vs. pipe) or the original manufacturer.

Various base details

- *Complete joint-penetration groove weld* — The base plate is butted against the bottom of the monopole shaft and consists of 100-percent-complete weld penetration. In other words, the connection zone is all weld material. *(See Figure 1, upper left).*
- Socket base-plate connection (base plate sleeves over outside of pole wall) with double fillet welds — The fillet weld is in two places: the outside base-plate/pole-wall intersection and on the bottom base-plate/pole-wall intersection. *(See Figure 2, left.)* Although other joints are possible, including the use of stiffeners, the majority of monopoles manufactured generally fall into one of these two categories.

Base-plate reinforcement

When a monopole structure is upgraded for additional load-carrying capacity, a structural analysis is performed to identify where the existing structure may have overstress. The overstress may occur in the monopole shaft, in the base plate or in both. In addition, the anchor rods or foundation may be overloaded. Although one or multiple components may require reinforcement, this article focuses on the

Base plate with stiffeners.

base-plate connection, specifically.

As part of a structural analysis, the engineer calculates the loads and stresses in the base plate. Bending stresses that exceed the allowable stress require reinforcement. Typical base-plate reinforcement consists of field-welded, high-strength, steel stiffener plates.

The stiffeners reduce the bending in the base plate to an allowable level. The stiffeners also reduce the relative joint rotation between the existing base plate and the pole shaft. This helps to reduce stress risers and fatigue at the existing joint. Also, the stiffeners provide a stronger load path from the pole shaft to the anchor rods.

Stiffener design and welding

For reliable results, the design of this stiffened-joint reinforcing must be done by qualified and experienced professional engineers. The installation of the stiffener reinforcing must be performed by qualified welding personnel certified to American Welding Society criteria.

The general design philosophy for the stiffeners is to provide a positive load path with ductile transfer of the forces from the shaft into the base plate and the anchor rods. This is achieved by sizing the stiffener to carry the appropriate calculated forces and to detail it having a fairly large height-to-length ratio, such as 3:1. The tall stiffeners, which are tapered, help to reduce the concentration of stress in the pole shaft at the top of the stiffener.

The field welds between the new stiffeners and the existing shaft and base plate are designed to carry the calculated forces in the stiffener. Generally, the vertical welds between the stiffener and shaft are *fillet welds*. Depending on the dimensions and the magnitude of the loads, the horizontal welds between the bottom of the stiffeners and the top of the base plate might be fillet welds or *partial-* or *complete-penetration* welds.

The new vertical and horizontal field welds should not intersect the existing base-plate weld. The new welds should stop short of the existing weld so that any undetected flaws or cracks in the existing weld do not *migrate*, or flow, into the new welds. Of course, after the new field welds have been completed, they too must be inspected and approved by an American Welding Society-certified weld inspector.

"We recognized, early on, the significance of base-plate connections and have developed programs to ensure structural integrity," Kyriacopoulos said. "We regularly clean, inspect and photograph the baseplates as part of our field maintenance and to keep a running log for reference. A team of engineers has worked to standardize base-plate analysis and stiffener designs to drive for consistency. Part of the process to reinforce a pole shaft includes the existing weld connections to be critically inspected with non-destructive test methods, since even greater load will be carried through the connection. Finally, new welds must be accepted by a certified weld inspector (CWI) before the engineer of record completes the post modification report. This effort is an example of our systematic, long-term approach to the

Figures 4a and 4b. A magnetic particle test reveals an exposed crack.

structural process and illustrates how Crown Castle is able to provide safe, reliable structures to the telecom market."

Base-plate connection cracks

It is imperative to investigate the integrity of the base-plate weld connection when upgrading a monopole structure. Existing cracks in this connection must be properly identified and repaired during the reinforcement process. A crack in a weld or base metal is a fracture or break in a material that was previously *solid* and then *separated* because of stress. Cracking occurs in a weld and base metal when the localized stresses at the connection exceed the ultimate strength of the steel material. Left in place without repair, existing cracks will enlarge and propagate over time with loading cycles and are detrimental to structural adequacy. The *AWS Structural Welding Code D1.1 (Table 6.1, Part 1)* does not allow a crack to remain after inspection. The crack *must* be properly repaired.

Base-plate connection crack repair

The *AWS Welding Code (Section 5.26)* addresses repair of welded connections, and Section 8 addresses the strengthening and repairing of existing structures. To ensure the long-term, reliable performance of a monopole structure, the diagnosis and repair of cracks at monopole bases should be accomplished as follows:

1. *Identify base connection detail*:
   a) complete-penetration joint.
   b) socket base-plate connection.
2. *Visual inspection* — Visual identification, by a Certified Welding Inspector or an inspector with AWS Code qualifications, of joint deviations from *American Welding Society D1.1 Table 6.1* criteria. However, a *visual* inspection may only detect aggravated conditions with *pronounced* defects. This is not sufficient for conclusive results.
3. *NDT Magnetic Particle Testing* — Conducted by an inspector with American Society for Non-destructive Testing (ASNT) Level II certification, this nondestructive test assesses surface cracks in joints that are not 100 percent complete-penetration joints (i.e., socket base-plate connections). Defects hold magnetic particle material applied during the test, identifying the presence of a crack. *(See Figures 4a and 4b above.)*
4. *NDT Ultrasonic Testing* — Also conducted by an ASNT Level II inspector, this method is used for testing of joints that are 100 percent complete-penetration joints. The test uses ultrasonic waves that are interrupted by any inconsistencies (cracks) in the joint.
5. *Assessment of defects* — Assess the extent of cracks, their length and position. Cracks typically require installation of welded base-plate stiffeners designed on a case-by-case basis.
6. *Defect repair* — The last stage is to repair the weld, or to reinforce the monopole base connection, or both. The scope of the strengthening stage depends on the results of the diagnosis and structural analysis. Significant

An ASNT inspector ultrasonically tests a base-weld connection. In the last frame, the defect is revealed at the toe of the weld on the pole bend line.

cracks may require drilled terminations. In addition, stiffeners may be part of the recommended repair.

The monopole base-plate connection is critical. It is imperative that it is inspected by qualified, experienced personnel with CWI and ASNT credentials.

In a comprehensive monopole upgrade, the existing monopole base-plate connection must also be inspected. Even if the base does not need strengthening, it is still important to perform regular inspections of the base-weld connection.

The proper weld inspection, diagnosis, design and reinforcement of monopole base-plate connections is critical to the proper performance and maintenance of antenna structure assets. Using experienced and qualified personnel for these services is essential.

Proper management of your monopole assets will ensure the revenue stream of your investment.

Properly inspected, designed and installed reinforcement for additional load-carrying capacity will also avail you of reliable infrastructure to support revenue growth. **agl**

Installation, by a certified welder, of reinforcing base-plate stiffeners to strengthen the base plate.

Reese is vice president of Operations for AeroSolutions, Boulder, CO. Hawkins is Monopole Department manager for Paul J. Ford and Company, Columbus, OH.

Tower collision takes four lives

Aviation accident leads to collateral damage to second tower, days later


Wright


Erberich


Hall


Meeks

Source: http://www.nightstalkers.com/memorial/wall.html

DOERUN, GA — A training exercise turned into tragedy when a U.S. Army helicopter struck WXFL-TV's 1,000-foot broadcasting tower in this small southwestern Georgia community on June 2. The helicopter broke apart, fell and burned, killing four of its five crew members. The surviving crew member escaped with minor injuries.

The crew was taking a routine training flight from Savannah's Hunter Army Airfield to Fort Rucker, AL. The collision with the tower occurred during daylight. Visibility was 10 miles with light winds and a 1,300-foot ceiling in Albany, GA, the nearest reporting site (about 20 miles north of Doerun), according to an Associated Press report.

The Army identified the soldiers who died as a pilot, Chief Warrant Officer Michael L. Wright, 41, of Indiana; Sgt. Christopher M. Erberich, 25, of Oceanside, CA; Sgt. Michael D. Hall, 30, of Little Rock, AR; and Sgt. Rhonald E. Meeks, 28, of Weatherford, TX. The Army did not identify the surviving crew member, another pilot.

The soldiers were members of the 3rd Battalion, 160th Special Operations Aviation Regiment, known as the "Night Stalkers." The Night Stalkers fly Special Forces commandos behind enemy lines at night.

Hall was deployed four times in Iraq and twice in Afghanistan. Meeks was deployed three times in Afghanistan. Erberich was deployed six times in Iraq and once in Afghanistan. Wright was deployed twice in Iraq and four times in Afghanistan.

The Army is investigating the cause of the collision.

Recovery effort accidentally razes neighboring tower

Struck near the top, the WXFL-TV tower was damaged beyond repair. It was evaluated as unsafe for tower hands to climb it to replace a severed guy wire. Structural damage impeded salvaging the TV antenna by helicopter.

An attempt to collapse and demolish the tower without affecting another nearby tower serving WALB-TV went awry—very awry. On June 7, explosives were used to cut the remaining guy wires on the damaged tower. As it fell, a guy wire from the first tower wrapped around a guy wire on the second tower 60 feet away and pulled the WALB-TV tower down with it. Both stations continued broadcasting from a back-up tower at WALB-TV's studio facility.

Tower collapse takes life of Oregon man

NORTHERN CALIFORNIA — A Klamath Falls, OR, man died May 14 when a tower in Northern California on which he was working fell to the ground.

Ron J. Spears, 44, was dismantling an amateur radio antenna near the top of the tower, a structure reported to be between 160 and 200 feet tall. Accounts of the accident differ. Alternative reports say either the antenna struck a guy wire and started the tower swaying until the wire broke, or the antenna fell and broke the wire.

Spears had been secured by personal protection equipment to a section near the top of the tower. The property owner, a California Highway Patrol officer, told authorities that Spears apparently was killed instantly upon impact with the ground.

Spears was said to be an experienced in working on towers. He had constructed the tower for a previous property owner and had installed the antennas on it. He was working alone on the tower at the time of the accident, with observers on the ground.

Three tower workers die in 1,100-foot fall

OAKLAND, IA — Three tower hands died when they fell an estimated 1,100 feet to the ground in an accident that occurred when they were ascending the tower, with perhaps all three riding the line, according to witnesses.

The deaths occurred at the site of a 1,500-foot tower near this western Iowa community, about 25 east of Council Bluffs, on the afternoon of May 31. The sheriff of Pottawattamie County, Jeff Danker, identified the victims as Leo Deters, 57, of Norwalk, IA; Jason Galles, 27, of Des Moines; and Jon McWilliams, 19, of Cumming, IA. Deters was the owner of Deters Tower Service in Grimes, IA, near Des Moines.

A fourth member of the work crew was operating the hoist. The hoist was using rope, which lay tangled on the ground after the accident. The sheriff said that the rope was broken. An investigation may reveal the cause of the fall, although the sheriff said a firm conclusion may never be found. The Iowa Occupational Safety and Health Administration is also investigating the accident.

The crew was replacing flash tubes in the tower's aviation-obstruction-lighting system. The tower has five levels of strobes, three lights per level, along with a top-mounted beacon. The crew was into its second day on the job.

Deters' company is 22 years old and serves customers in eight states, a statement on the company's Web site reads. The company is a member of the National Association of Tower Erectors (NATE), an organization that Deters helped to found and that promotes safety measures for tower hands.

Fall from cell tower claims tower hand

EBENSBURG, PA — An employee of Sting Communications of Lebanon, PA, died when he fell from a point about halfway up a 150-foot cell tower here on May 5. Michael Sellers, 25, of Lebanon, died of massive internal injuries and was pronounced dead at the scene. He landed on the tower's concrete foundation. Ebensburg is in Western Pennsylvania, about 20 miles west of Altoona.

The Cambria County coroner, Dennis Kwiatowski, said that Sellers wore safety equipment that was not attached to the tower. The coroner's information was that Sellers was unable to tie off to the tower while climbing. Sellers was working with another tower hand to install an antenna on the tower. The second worker was on the ground.

Tower painter dies in 50-foot fall

VICKSBURG, MS — An Indiana worker subcontracted to paint a cell tower fell about 50 feet to his death in an accident here. Jack Pellow, 48, of Dale, IN, had been subcontracted for the painting assignment by National Tank and Tower of Evansville, IN. Pellow's partner, Dennis Dean, who was on the ground, saw Pellow fall. He said a knot on a rope came loose, causing the fall.

Pegasus Tower forms $20 M partnership

On June 2, Pegasus Tower, a Richlands, VA-based wireless tower developer and manager, announced the formation of a strategic partnership with Peppertree Capital Fund and Primus Capital Fund V, both of Cleveland, Ohio. The two investment firms have committed $20 million in equity to finance this joint venture.

An associated firm, Pegasus Tower Development, will subsequently fund wireless communication sites developed and acquired throughout the United States.

"This partnership further strengthens our market position as a leading tower developer," said Gary Hearl, Pegasus Tower president & CEO. "Our pipeline of site opportunities provides the basis for achieving our partners' goal of building a substantial portfolio," Hearl added. The venture already has begun development of its first towers.

Prior to the new partnership, Pegasus Tower had already developed over 80 new wireless communication sites.

Hearl founded Pegasus Tower in 1999 to develop, acquire and manage wireless telecommunications structures. Pegasus thus already oversees an inventory of wireless locations and alternate communications structures over a 31-state area.

"This new funding will allow Pegasus to respond to the ongoing tower-site-development needs of wireless carriers whose objectives are to improve and expand their network coverage," said Jeff Milius, managing director of Peppertree. "Increased wireless voice and data demand is driving significant carrier capital spending and investment in their wireless networks and infrastructure."

Jonathan Simmons, vice president and chief financial officer of Pegasus Tower, said, "This new partnership and the substantial capital it brings to bear for developing a quality and sizable portfolio of towers means a significant step forward for Pegasus.

"Our financial partners also possess considerable experience in the tower and wireless industries. Therefore, their commitment to provide such financial resources to accomplish the joint venture's goal is a real testament to Pegasus Tower Company, itself," Simmons said.

Pegasus Tower is a privately held tower company focused on third-party management of sites and the development, operation and ownership of wireless communication towers.

Chesapeake Towers secures 1st-round funding

Chesapeake Towers Holding, a Washington, DC-based company, signed a joint venture agreement in late May with Ridan Industries, a Florida-based company that owns and develops wireless communications towers, to develop a large portfolio of towers in the Southeastern United States.

The companies utilize a proprietary real estate system that anticipates the future growth needs of the wireless carriers. Ridan President Kevin Barile said, "Our approach is unique and provides our wireless carrier customers speed-to-market while freeing up their capital and resources from the real estate and infrastructure portion of their network expansion so they can concentrate on product and service development."

Chesapeake was founded to foster regional tower development in several select regions of the country. Chesapeake is seeking partners, like Ridan, that are skilled in working with local jurisdictions and have relationships with the wireless carriers' regional offices. Chesapeake provides capital for site development and construction along with "back office" support, while the partner focuses on site development and local marketing with the wireless carriers.

Chesapeake CEO Clark Madigan, one of the founders of TeleCom Towers and a pioneer in creating the modern tower industry said, "We are excited about joining forces with Ridan. Our goal is to add our operational experience and financial support to allow Ridan and our other regional partners to grow their businesses faster.

"We think that our partnership concept can be repeated in other growth markets. Our financial partner, MCG Capital, provides a creative financial model that allows us to move quickly into rapidly evolving opportunities," Madigan said. agl

editorial index

LMR®

The complete package!

The Times ***LMR®*** product line includes everything you need for a ***complete RF Interconnect System.*** High quality components engineered to work together provide the unmatched performance, dependability and ease of installation you need for your system.

LMR® cable is manufactured on state-of-the-art equipment to provide low VSWR and low attenuation at frequencies up to 6 GHz and higher. ***LMR®*** 'EZ' no-solder connectors are designed to work perfectly with ***LMR®*** cable and, together with our simple ***LMR®*** cable prep tools, provide quick and reliable field installation every time. ***LMR®*** accessories are custom designed for use with ***LMR®*** cable to provide long term, dependable installations.

Benefit from the performance and value of the ***complete LMR®*** package!

TIMES MICROWAVE SYSTEMS

ISO 9001

Talley COMMUNICATIONS

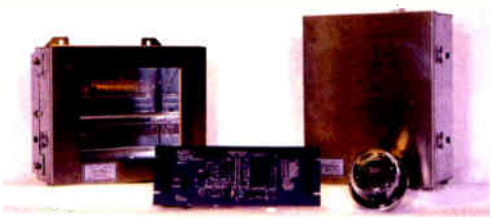
smiths

For more information contact Talley at 800-949-7079

Fax: 800-530-8821 • www.talleycom.com • sales@talleycom.com
Los Angeles • Kansas City • Phoenix • Sacramento • Seattle

professional directory

High-intensity lighting



The Skystrobe 8000 series high-intensity obstruction-lighting system from **Skytec** uses a pulse-forming network to extend strobe component life. The stainless-steel-enclosed system is designed to withstand temperatures ranging from –55° to +55°C, as well as windblown rain, 150 mph wind speeds, and salt and fog conditions. The ETL-certified system meets FAA AC 70/7460-1K specifications and uses laser-cut optics to improve beam visibility and minimize ground scatter. The system is available with L-856 and L-857 strobe types.
www.skytecinc.com

Lightning-protection system

Rabun Labs' EPS-500 lightning-protection system allows equipment-protection system tests with the flip of a switch. Whether during manual test or when activated by lightning, users can observe critical equipment being switched to isolated and protected power sources. By detecting the presence of atmospheric charge build-up, or actual lightning, the system automatically switches equipment to a protected and isolated standby-power source, such as a UPS or generator. The system typically reacts to the threat of equipment damage while the storm is still one to two miles away.
www.rabunlabs.com

NOC map-graphic monitoring module

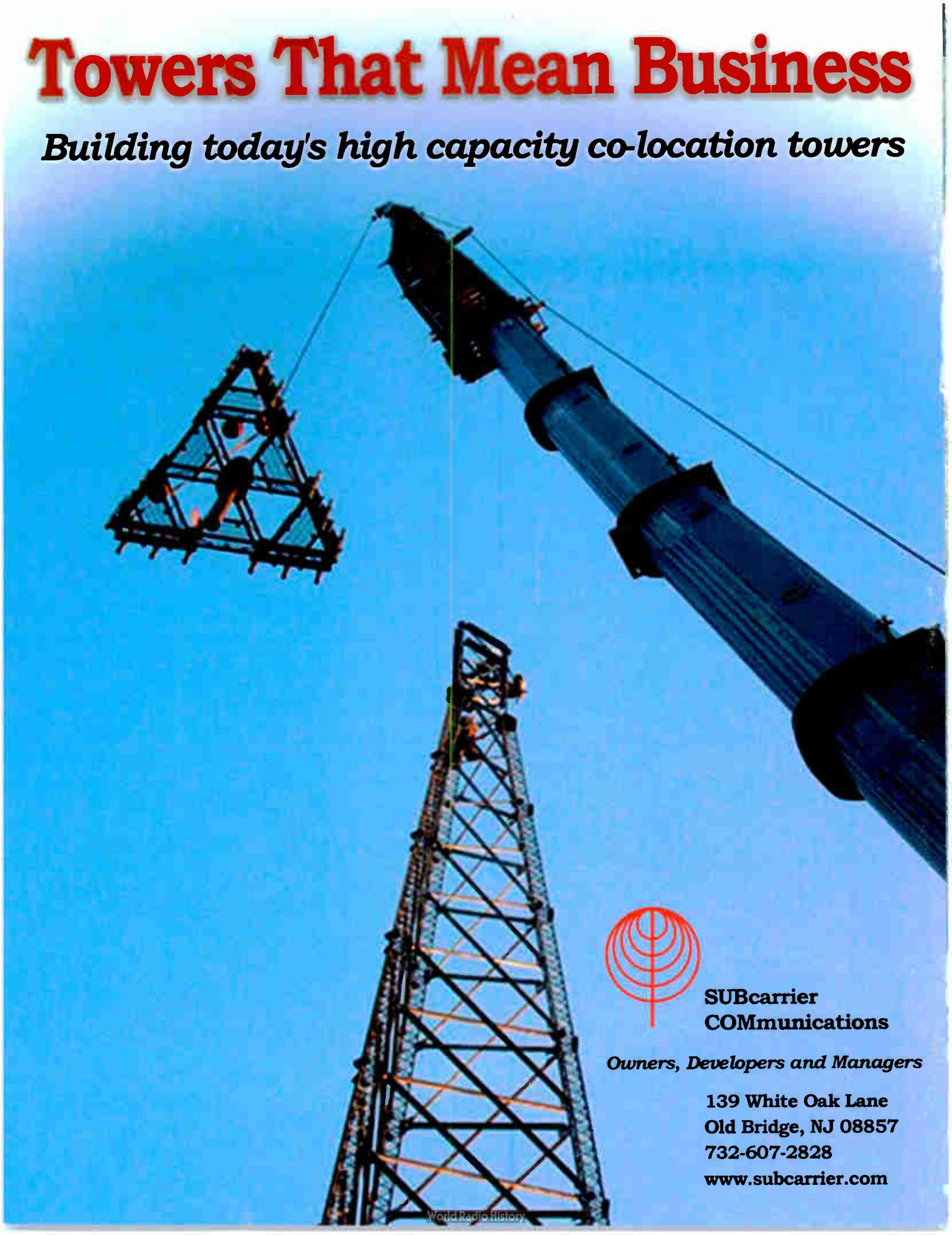
Hark Tower Systems' MapNOC software module for its Network Operations Center software provides an overview of tower-site alarm status and general site information. Users can zoom in to show location and street details based on latitudes and longitudes stored in the NOC database. Contact information, such as local maintenance shops and local FSS information, can be viewed at the click of a mouse. The MapNOC can display towers on the map filtered by state or current tower selected in the database. Towers with alarms are highlighted in red for easy identification of trouble spots.
www.harksystems.com.

PEM fuel-cell systems for backup power

IdaTech's ElectraGen3 and ElectraGen5 backup power systems are among the first proton-exchange membrane (PEM) fuel-cell systems in the 3 kWe and 5 kWe ranges to achieve certification to the FC 1 standard. The systems are designed for critical backup power needs, ranging from about 2 kW to 15 kW, and provide an alternative to valve-regulated lead-acid (VRLA) batteries. The PEM-integrated hydrogen fuel-cell systems are designed to provide more than 10 years of reliable power with minimal maintenance. When paired with IdaTech's ElectraGen XTR Module, a fuel reformer that converts liquid fuel into pure hydrogen as needed to avoid bulky and costly onsite storage, the systems are capable of providing backup-power runtimes of days or weeks.
www.idatech.com

Towers That Mean Business

Building today's high capacity co-location towers



SUBcarrier COMmunications

Owners, Developers and Managers

139 White Oak Lane
Old Bridge, NJ 08857
732-607-2828
www.subcarrier.com