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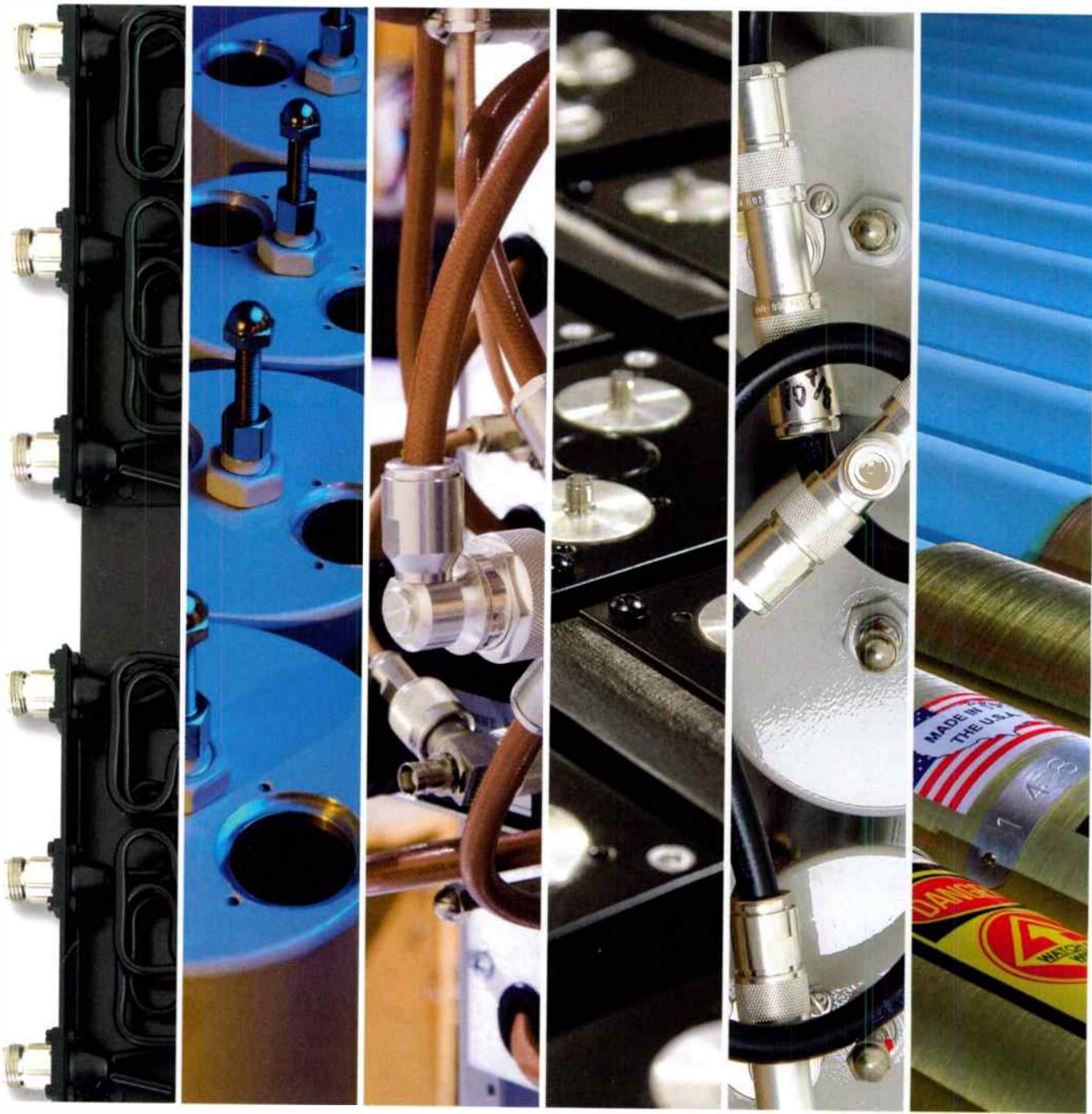
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on the cover

This month's cover story explores the dramatic effect that changing from coaxial cable to fiber-optic cable can have on tower design, how tower designs change to suit cell site requirements, and the unfulfilled promise of carbon fiber. See story on page 54.

Cover design by Scott Dolash

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Negroponte Switchback

Named for Prof. Nicholas Negroponte of the Media Lab at the Massachusetts Institute of Technology, the Negroponte Switch refers to a



changeover in the use of radio-frequency (RF) bandwidths and wired bandwidths to serve broadcasting and telecommunications purposes. Others may have posited the changeover a couple of decades ago as a prediction at the time, but Negroponte became known for the process. It refers to the idea that most TV broadcasting signals serve fixed locations — homes, mostly, and some business and office locations, unlike radio broadcasting signals that serve so many radios in moving vehicles. Meanwhile, many RF telecommunications signals serve devices in motion, whether in vehicles or in the hands of pedestrians. What is fixed should be served by wire, goes the idea, and what is in motion should be served by RF. Thus, according to the Negroponte Switch, TV broadcasting should vacate the VHF and UHF airwaves in favor of cable delivery, and wireless telecommunications services should receive those vacated bandwidths.

Some of the switch has taken place because of the bandwidth compacting made possible by digital TV. During the past few years, the broadcasters were forced to vacate UHF channels 52 to 69, having been evicted from UHF channels 70 to 83 long, long ago.

So far, none of the switch has taken place by taking TV stations off of the airwaves, but that idea is gaining momentum in the form of a proposal to compensate station owners with a portion of auction proceeds that the sale

of their bandwidths to wireless telecom service providers could bring.

Here comes the interesting twist.

After unstoppable growth, year over year, the number of cable TV subscribers has begun to fall. The reason is the availability and cost of video content from competing sources. Many people watch video using their Internet connections — by wire, at home, and wirelessly over a mobile communications network on their smartphones, tablets and computers. Plus, some consumers have returned to watching TV using sets and computers connected to antennas to pick up the over-the-air broadcast signals, saving the cost of the cable TV service.

That's the Negroponte Switchback — consumers returning to the use of over-the-air TV for their video preferences. This trend is not lost on the broadcasters, who defend their continued access to licensed bandwidths.

A March 25 *USA Today* story said that the TV broadcasting industry says broadcasting is a more efficient and economical technology for transmitting video than Web streaming.

"We're in video, and we do it for free," the story quotes National Association of Broadcasters CEO Gordon Smith as saying. "They want to be in video, and they'll charge you a fee," he said, referring to mobile carriers who covet TV bandwidths.

Aside from the TV broadcasting industry's legendary political power, the influence consumer preference has over government decision-making should not be discounted. If the Negroponte Switchback accelerates, and accelerates fast enough, maybe it will help the broadcasters to maintain their bandwidth positions in the face of calls for the FCC to reallocate it for use by mobile communications services.

Consumers may not care whether it is delivered by wire, by wireless service providers or by broadcasters, but it's for certain that they love their video. ■

By Don Bishop, Executive Editor
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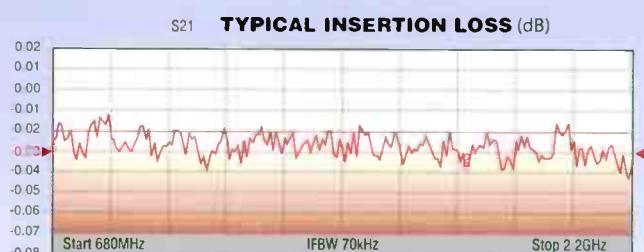
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Strike Two!

First come the lightRadio scare and the ensuing near-death experience the industry had in February, and now, here came the mega-merger of AT&T and T-Mobile. Kick us while we're down! What's next? Cell phones cause global warming and halitosis?



OK, seriously — it was pretty bad on Sunday, March 20, when AT&T made its announcement, and on Monday, as many of us were finding our way to Orlando, Fla., for Tower Technology Summit and CTIA Wireless, the market for tower company stock definitely freaked out a bit.

Most of the folks I know considered the drop in share prices to be a buying opportunity, and on Tuesday, prices rebounded a little. By the end of the week, people were confused about what the AT&T/T-Mobile merger will really mean, but stock prices had recovered, and most of us were reminiscing about mergers past and how what is old is just new again.

There is a tremendous amount of overlap between the two wireless carriers' networks, and it is a safe bet tower owners are going to lose some tenants — a lot of tenants, actually. However, read through stock analysts' reports and tower company statements carefully — for many of the public companies, the exposure to tenant loss phases in during a 5-year period.

Yes, the effect of LightSquared and other new entrants upon tower space rental should continue to play out. We'll have growth, and we'll have some losses. The AT&T/T-Mobile merger is going to cause one of the bigger losses, but it should not have a serious negative effect on the overall industry.

Some of my technically oriented friends are betting that things will not change much at all because the two companies have a hodgepodge of spectrum and existing hardware vendors.

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

Would saving the cost of site rental be greater than the cost of integrating the two networks? Terminating leases is not cheap, either. Think of all the engineering, permitting, additional transmission lines, tower crews, etc. Hmm... site leasing looks like it could be a bargain compared with combining two networks. We'll have to wait and see.

Tower Technology Summit/CTIA

Well, I hate to sound so darned happy all the time about conferences, but I think most everyone walked away happy from the Tower Technology Summit portion of CTIA Wireless. Again this year, AGL (primarily Sharpe Smith and Don Bishop) put together the conference portion of the Tower Technology Summit. The Summit had a great speaker lineup and excellent attendance. The vendor exhibition floor remains impressive in scope and size. Unfortunately, there is just not enough time to even walk through all of the aisles. It's a big show!

The buzz remains centered on backhaul and the unquestionable, increasing

number of bits flying out of each base station. It looks to me more and more like the cable TV guys are going to do well, no matter how you slice it. Strand-mounted picocells are beginning to come of age with LTE versions set to become available soon. In-building wireless and outdoor distributed antenna system (DAS) technologies continue to improve and are becoming a substantial part of the carriers' networks and a growth area for tower companies.

Much like the lightRadio announcement that resulted in headlines that trumpeted an end to towers, none of the emerging technologies are going to replace tower infrastructure. They will complement an outdoor macro system. If anything, traditional tower sites are likely to serve as overlay RF coverage sites and hubs for aggregating data for backhaul. Strand-mounted solutions and DAS are excellent ways to cover the nooks and crannies. We have many more towers to build — perhaps just a good bit shorter than the traditional 199-foot towers.

Times, they are a-changin'. ■



Kennedale, Texas, is collaborating with tower manufacturer FWT in the construction of the city's 9-11 Memorial to those who lost their lives during the Sept. 11, 2001, terrorist attack on New York's World Trade Center.

FWT will design and fabricate the base plate that will support the column for the memorial, which will include a recovered portion of the World Trade Center in the form of a 13-foot steel girder. The base plate will leave the girder intact and unaltered from the damage it sustained in the building's collapse.

The girder will be used as the center focal point of a sundial memorial. The column will be surrounded by five walls, each commemorating a different aspect of the tragic day. On Sept. 11 every year, the sun's shadow cast by the column will pass along the northwest wall, crossing points signifying events at the times they occurred.

Five-watt Fabric

By Ted Abrams, P.E.

In-building wireless (IBW) systems that serve first responders have proliferated since the 2003 building codes mandated coverage for firemen in large buildings.

Firemen with 5-watt, intrinsically safe (IS) handsets transmit signals to reach the network antenna on a distant tower. Existing towers are close enough together to receive those transmissions from most locations in each jurisdiction. RF experts describe that type of site geometry as the "5-watt mesh" or the "5-watt fabric" because site spacing correlates with the typical handset transmit power of 5 watts. Despite the 5 watts of power for their public safety handsets compared with the 0.6 watts of consumer cellular handset power, firemen in the stairways of big commercial buildings are often unable to transmit through the walls of the building and reach the network antenna.

That problem can be solved by placing towers closer to the buildings, placing distributed antennas system (DAS) network nodes on the street or by installing an IBW system. In a policy environment without change, that's the future — some additional sites to mend holes in the 5-watt fabric.

However, whether future firemen carry handsets enabled for P25, Tetra, DMR or one of the commercial protocols such as LTE or iDEN, after 2016, the handset transmit power may become more similar to the power of current commercial handsets, a half-watt to 1 watt, rather than 5 watts. In 1988, when the current IS standard was put in place, we weren't using digital wireless — all the handsets were high-power ana-

log devices. Factory Mutual's (now FM Approvals) decision in 2006 to replace the previous IS standard was postponed, but world standards are moving to a lower transmit power, less capacitance, lower inrush current and wider conductor spacing than the old standard.

States increases significantly.

Secure commercial wireless networks that serve 300 million subscribers in the United States, the networks that building occupants use to make 911 calls, suffer along with fire department networks the same radio-frequency challenges imposed by distance and the structure of buildings. The lawful right to transmit on a frequency is specific to the licensee. In large buildings, the coverage objective of the commercial wireless service providers may be generally similar to the coverage objective of the firemen — the interior of the building.

A rational, cooperative effort could achieve IBW designs that efficiently serve building occupants and first re-

sponders. Equipment to do that is already available. Simple boosters that hinge on a donor antenna for off-air capture may serve present technology needs for first responders. For multimodal, multiband, diverse network interoperability, more robust solutions are needed. In combination with the appropriate contractual arrangements, RF transport systems and compact split-architecture transceiver systems should be considered. With high-bandwidth connectivity to the core, solutions such as the lightRadio cube with separate baseband processing can be configured for both public safety and commercial service.

The next time the subject of resource planning and allocation comes up, remember that 9-1-1 calls are predominantly wireless. If the cell phones don't work, most Americans can't call for help. ■

Ted Abrams, P.E., is president of Abrams Wireless, Cary, N.C. His email address is ted@abramswireless.com.



Hydrogen explosions at nuclear reactors in Japan are unlikely to influence policymakers to keep U.S. handset transmitters at high, legacy power levels. These lower-power handsets will require more sites than high-power handsets, more towers, more DAS networks and especially more IBW systems.

Sites that support secure cell phones pay for themselves by focusing on specific frequencies licensed to the service provider, putting their capital at risk to better serve their customers. Commercial IBW systems that don't ever pay out aren't built. The building code doesn't pay for IBW. Building owners don't have surplus funds to pay for IBW systems; rising rates of foreclosure and bankruptcy give ample evidence of the fact that the real estate owners aren't swimming in extra cash. Do the municipal, county, state or federal budgets have surpluses to pay \$50,000 per large building to equip the venue with IBW for firemen? Not until the population of taxpayers in the United

Quick-Guide to Tower Construction and Service Companies

As a supplement to January's 2011 Buyers Guide, here is a list of tower construction and service companies, where they operate, the types of sites they build and additional information on the types of services they provide, which are listed below and represented numerically.

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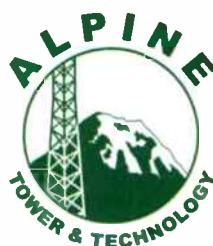
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Services: 1, 5, 6, 7, 8, 9, 10, 12, 13, 14


Allstate Tower

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Henderson, KY 42420
Kevin Roth
kroth@allstatetower.com

(270) 830-8512

www.allstatetower.com
Area served: National
Types of sites: Tower
Services: 1-14

See ad on page 62
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P.O. Box 870965
Wasilla, AK 99687
Huey Burnham
huey@alpinetowertech.com
(907) 336-9999
www.alpinetowertech.com
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Services: 1-14

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- 4) Lighting System Installation
- 5) Microwave Installation
- 6) Platform Installation
- 7) Power & Grounding Installation
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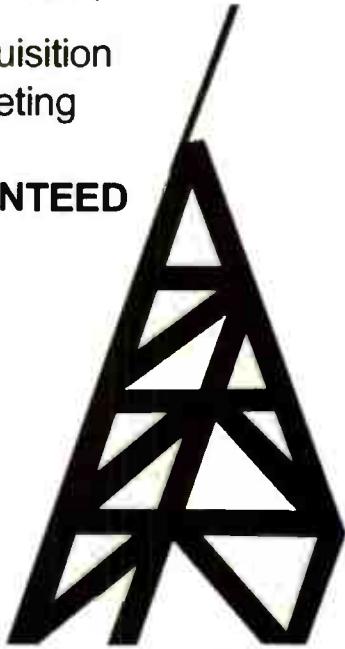
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Services: 1-14



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Types of sites: Tower, Rooftop, DAS
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See ad on page 15

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tonym@capitaltower.com
(402) 786-3333
www.capitaltower.com
Area served: National
Types of sites: Tower, Rooftop, DAS
Services: 1-7, 9-14

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Types of sites: Tower, Rooftop, DAS
Services: 1-14



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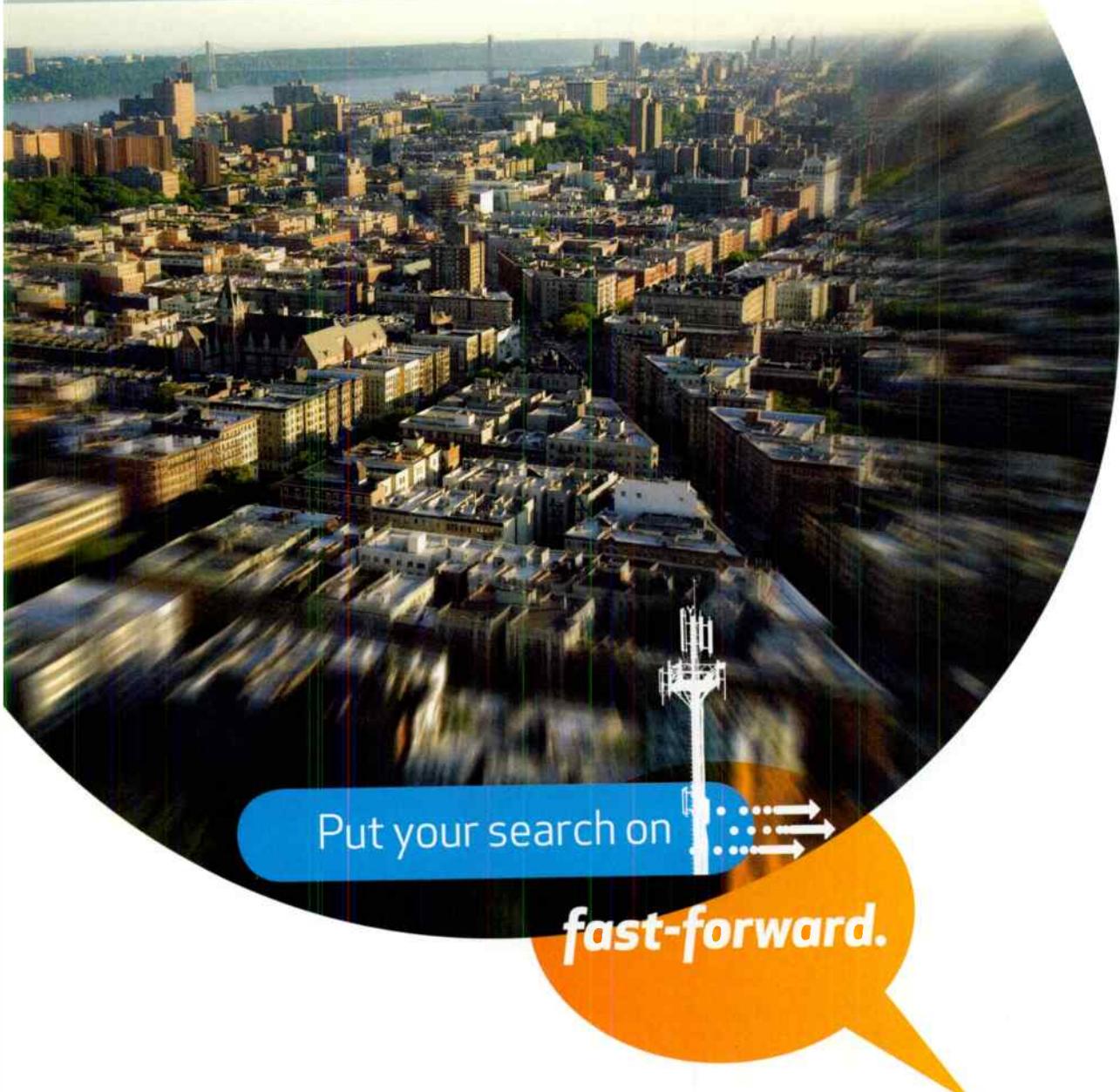
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Services: 1-14

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Types of sites: Tower, Rooftop

Services: 1-14

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Michael Mitchell

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(615) 595-8806

www.emftelecom.com

Areas served: Midwestern and Southern states

Types of sites: Tower

Services: 1, 4, 7-11



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scottsmith@excellcommunications.com

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Types of sites: Tower, Rooftop, DAS

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Five Steps for Speeding Your Next Site Installation

By Sean McLernon



We hear it every day: "I need a concealment solution, and I need it now."

With wireless infrastructure construction, speed has become as important as price, if not more so. Concealing a cell site quickly has become so important that many companies have had to use new business strategies to meet the need. Speed is increasingly important to every aspect of wireless tower installation.

Given the market dynamics, concealment is more than an aesthetic issue. It is more than faux trees, silos and steeples. Wireless telecommunications antenna site concealment product manufacturers are increasingly becoming problem-solving partners with their customers.

Here are some concealment tips:

Focus on RF performance. Last-minute concealment decisions compromise RF. Watch out for designs that focus on everything but RF transparency, such as installing RF-blocking

structural steel in exactly the wrong spot. For the concealment shell, make sure designers don't forget RF. Do-overs cost time, which costs money.

Think concealment during site selection. Slogging around pastures and climbing on rooftops is not everybody's cup of tea. But it should be, because involving concealment designers early can help ensure the right site gets the right designs. That speeds the way through local zoning boards.

Introduce your concealment partner to your architect or engineer. And do it before the designs are complete. Introducing your concealment partner to your architect or engineer might seem unorthodox, but doing so will cut a lot of time out of your schedule. Why? Architecture and engineering firms specialize in built environments. People who specialize in wireless are uniquely qualified to provide the optimal RF solution. They can help to guide the architect's or engineer's early drawings into sustainable solutions.

Save money. Many sites probably are on the books for months before work commences. Nevertheless, site developers often approach conceal-

ment projects in a one-off fashion. Site developers can reduce concealment costs by 20 to 30 percent by bidding out multiple concealment projects at once. That way, they benefit from discounts their concealment partner can gain on materials, shipping and engineering. Moreover, the institutional knowledge from the first project extends to help all those that follow.

Don't forget Mother Nature: Made right, concealment sites can endure for many years. Made less than right, they will tend to deteriorate. Factor into your site plans the need for ongoing maintenance. Owners of concealed sites should budget annual inspections after two years of use. Faux trees require a particular focus and deserve a thorough going-over, given the number of parts involved. Catching problems early saves time — and money — down the line.

And that's it: five easy-to-remember rules that can help ensure a seamless installation and a long, happy operation. ■

Sean McLernon is chief executive officer of Stealth Concealment Solutions, North Charleston, S.C. His email address is seanmc@stealthsite.com.

Game Changer:

The New 6-inch Mini-cell Antennas May Be Just That

By Tom Engel

The transistor, digital cameras, the iPod, cellular technology and monopole towers all changed life and business dramatically. I'm old enough to remember massive radios and television sets with tubes; music that came on records, cartridges, cassettes and CDs; and telephone booths. Entrepreneurs who embraced the new technologies made money and their businesses prospered. Those who ignored the new technologies suffered financially.

The definition of game changer from the *Oxford Advanced Learner's Dictionary* reads, "a person, an idea or an event that completely changes the way a situation develops." A new technology introduced by Alcatel-Lucent at the 2011 Mobile World Congress in February in Barcelona, Spain, promises to do just that to the mobile telecommunications ecosystem.

Technology risk

Years ago, when I was still active in the cable television industry, I had dinner with a friend who transitioned from the recurring revenue streams of the cable television and broadcasting to owning an electronics manufacturing business. I remember him saying, "Now, every morning when I get up, I check the news to see if some company has come up with a new technology that does the things we do, twice as good for half as much." For the wireless infrastructure industry, this could be such a technology.

A Feb. 11 Associated Press news story about the development said, "As cell phones have spread, so have large cell towers — those unsightly stalks of steel topped by transmitters and other electron-

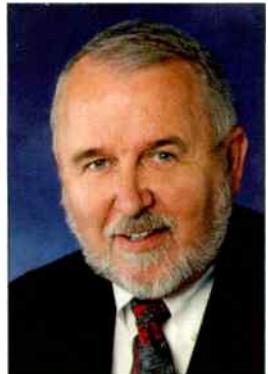
ics that sprouted across the country over the last decade. Now, the wireless industry is planning a future without them, or at least without many more of them. Instead, it's looking at much smaller antennas, some tiny enough to hold in a hand. These could be placed on lamp posts, utility poles and buildings — virtually anywhere with electrical and network connections. Rasmus Hellberg, director of technical marketing at wireless technology developer Qualcomm Inc., said smaller cells can boost a network's capacity tenfold, far more than can be achieved by other upgrades to wireless technology that are also in the works."

Tower values

This new technology could be good for mobile operators, consumers and environmentalists, but not so good for certain tower values. Tower owners and operators can either embrace new technology as an opportunity to grow and strengthen their business or they can ignore it and allow market changes to drive their business. Just as the digital camera

changed the photography business and the cell phone changed the pay telephone and paging businesses, this new small cellular technology could have a similar effect on the cell tower business.

If certain hurdles can be overcome, it is likely that mobile service providers will embrace this technology because it appears to go a long way toward reducing the capacity shortfall at a cost that is far less than other alternatives. I am not an engineer, and I am not offering an opinion as to whether this technology will work and how it would affect the carriers. My focus is on the effects it could have on the tower infrastructure industry, assuming that the technology works and that the carriers embrace it. The technology will have little effect on some sectors of the tower infrastructure industry, and it could have a highly significant effect on other sectors.



Possible Effects of lightRadio Technology

Reduced level of telecom tower manufacturing

Increased level of tower service and maintenance

Large tower company shift toward rooftop sites in urban areas

Small tower companies may sell cash flow while multiples are still high

Tower manufacturing — The effect on the current manufacturing sector will be negative. The future will not require a lot of steel in the air. The national RF communications infrastructure appears to be substantially built out, with the exception of dead spots, areas with low-density population, environmentally sensitive areas, extremely dense city centers and historical preservation zones. The demand for new towers will continue to shrink if this and other low-power technologies are implemented. The demand for the gigantic steel structures required to provide high-elevation transmit points has already diminished significantly. That demand was replaced with significant demand for the heavy, sturdy monopoles and self-supporting towers capable of accommodating large

with fiber, and electrical power is available everywhere. The size and weight of this new technology allow it to be easily blended into and onto existing structures. The small service areas and hand-off capability require minimal elevation.

Tower service and maintenance — The service and maintenance sector should continue to see positive growth. As technology moves away from high-elevation tall towers, the need for service and maintenance should increase. As fewer technologies require these sites, fewer towers will be built and replaced. Many of the existing users of the tall towers that will continue to require that technology will need increased maintenance service as existing towers age. Carriers will require a large outside labor force to construct the new sites and retrofit existing sites over



The effect on the current manufacturing sector will be negative as the the future will not require a lot of steel in the air.

antenna arrays for three to four carriers. With the proliferation of the small cell site using these mini antennas, which will vastly increase data capacity, the need for the “unsightly stalks of steel topped with transmitters and other electronics” (as the AP story put it) will also diminish.

The new cell sites will be accommodated on streetlights, traffic signals, utility poles, billboards and buildings, the major requirements being power and the capability of connecting to the network. Most urban areas have cable and telephone networks that cover the entire community

the next two to five years. Boom trucks and ladders will replace climbing gear and cranes. Crews will be working at lower heights with lighter equipment.

Large tower operating companies — The large tower companies might miss rate-of-return projections on some of their existing sites, but they should experience growth from the build out of the mini sites. Recognizing the technology trends and the urgent need for capacity, it appears that many of the large tower operating companies already have begun to shift some of their emphasis to rooftop antenna sites,

distributed antenna system (DAS) networks and shorter towers.

- Global Tower Partners' site inventory is 70 percent rooftops and 30 percent tower sites.
- InSite Wireless and Mobilitie have placed significant emphasis on the build out of DAS infrastructure.
- The three public tower companies (Crown Castle International, American Tower and SBA Communications) have begun to explore alternate site locations.

The larger tower site operating and management companies are in the cash-flow business tied to communications site services and are not wedded to “stalks of steel.”

Small tower companies and individual site owners — Potentially, this sector could experience the most significant effect. These assets can be divided into two separate categories: those that will continue to be operated with the current ownership and those that will soon be sold. The effects on value and strategy to maximize asset value differ between the two categories.

If an owner plans to sell tower assets soon, the strategy is simple and much the same as it would be for anyone currently selling tower assets, with one exception — *the sooner the better*.

- If the tower cash flow (TCF) is not derived from cellular carriers, the new technology should have no effect on the tower market value.
- If all or a portion of the TCF comes from cellular carriers, the market value will begin to fall soon. If this new technology is embraced, it will take two to five years before it begins to affect tower revenue; however, the effect on market values will be almost immediate. Sophisticated tower buyers purchasing broadband revenue are well aware of the effect that this technology could have on TCF, and they will begin to adjust purchase multiples to compensate.
- Although rural and large-area coverage sites will not be affected by this technology, the buyers of TCF will, more than likely, adjust their

financial models downward to reflect potentially lower returns from all broadband income.

- The multiples will fall slowly because a lot of demand remains for the dwindling supply of independently owned towers. But an owner with plans to sell tower assets should go to market in the next three to six months.
- A sale of tower assets can take two to 12 months. Asset sales that take longer than 90 days to close were not properly prepared to go to market. A lengthy sales process typically increases legal fees and sales costs and decreases tower value.
- Owners planning to sell tower sites that include cellular TCF should use the next 30 to 60 days to prepare the assets for market by reducing accounts receivable, documenting revenue and overhead, and executing long-term written agreements with all tower tenants. Easements should be memorialized, and the underlying land lease should be extended as long as possible with multiple renewal options.

Owners planning to continue to operate or grow their tower business long-term need to implement a different strategy related to the new technology to maximize ongoing income and future value.

- Owners should examine all of their existing cellular tenant license agreements and consider renegotiating them to include a long initial term with multiple renewal options and a market rate escalator.
- The license agreement should include a provision for the rates to increase if the tenant requires more space or loading with no provision for rate reduction in the event of space or load reduction.
- New tenant agreements should have a 10-year initial term.
- If there is a capacity limitation in urban areas, the value of government-agency RF usage may be worth more than broadband long-term.
- When developing or purchasing new

sites, consider how the new mini-cell technology could affect current and potential future cash flow.

- If any of the urban or densely populated area sites have revenue streams based predominately on cellular carriers, the owner should consider maximizing return by selling that cash flow while multiples are still near record levels. The capital gain can be used to expand and upgrade existing sites, build new

sites and acquire other towers. A 1031 like-kind exchange can be considered to defer tax obligations.

The opinions and advice provided in this article are my own and are intended to be general in nature. The advice may not be appropriate for all tower owners. ■

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



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lightRadio Challenges Wireless Infrastructure

Distributed antenna system hubs may become much smaller, almost invisible, from shelters and cabinets. Antennas on towers may at first be consolidated, a



Is There's Future

By Don Bishop

At cell sites, base transmitter station equipment may disappear and towers may later approach obsolescence.

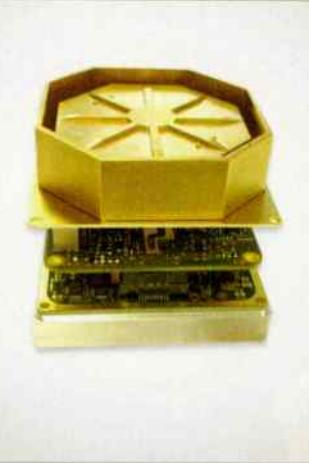


In their companies' earnings reports, the CEOs of the largest tower companies with shares that trade on public stock exchanges perennially express optimism that growth and cash flow — if not profit — may be expected to continue. Also perennially, they point to the risk that technological changes could reduce the demand for antenna space on towers, or the use of towers at all, although the reports go on to say that no such technological changes are in view.

The question is whether Alcatel-Lucent's new technology embodied in a tiny, integrated base station radio with an active antenna array and an equally tiny companion processing unit might represent a technology capable of disrupting the cell tower business model. Executives of the company, based in Paris and with operations in 130 countries, said the new technology called lightRadio would do just that, although perhaps not immediately.

Breakthrough technology

"Today's and tomorrow's demands for coverage and capacity require a breakthrough in mobile communications," said Alcatel-Lucent CEO Ben Verwaayen. "lightRadio will signal



About the size of a Rubik's Cube and weighing 10.5 ounces, the lightRadio base station cube is topped by an active antenna array seated on software-designed radio electronics using system-on-a-chip integrated circuitry. In use, the cube is positioned so the antenna faces to the side.

the end of the base station and the cell tower as we know it today."

Wim Sweldens, president of the company's Wireless Division, said, "We are not going to eliminate the need for all towers tomorrow. What

From left: Stephen Carter, chief marketing, strategy and communications officer, Alcatel-Lucent; Tod Sizer, vice president and head of wireless research, Alcatel-Lucent Bell Labs; Lisa Su, senior vice president and general manager, Networking Division, Freescale Semiconductors; Wim Sweldens, president of wireless activities, Alcatel-Lucent; Joe Weinman, general manager of communications, media and entertainment industry, Hewlett-Packard; Javier Garcia Gomez, the leader of the lightRadio program at Alcatel-Lucent.



Wim Sweldens, president of wireless activities, Alcatel-Lucent, held a lightRadio combination base station-and-active antenna array as he stood next to a rack of base transmitter station equipment that the new system-on-a-chip technology largely replaces.

we are saying is that as part of the evolution, you actually can take these things and stack them together into an antenna element, which will be a multiband element, which you can deploy on an existing tower that will simply replace two or three or four of the elements on that tower into one element."

Speaking in London on Feb. 7, Sweldens said that smartphones and tablets have become windows into a bigger and bigger cloud, "windows into a cloud of information, communication, education and entertainment. We have seen a dramatic shift that mobile technology has brought us in our daily lives, our work and how we communicate with friends, family and colleagues."

Data-hungry wireless devices

Sweldens said there is no end in sight to the proliferation of data-hungry wireless devices. "In the next four years, we expect the end-user demand for data to grow by a factor of 30," he said. "We have to recognize that with this tremendous growth, there is a downside. First, our industry uses more and more electrical power every day, putting more carbon into the atmosphere every day. By 2016, the mobile industry will put the same amount of carbon in the air as 15 million cars on the road do, every day. That is a heavy price to pay for all this growth. We are not very green."

"Second, as an industry, we are exclusive. Although we have done a phenomenal job of connecting billions of people around the world to mobile voice services, at the same time we are creating a digital divide between broadband



With base stations below and antennas on high, cell towers have supported the use of devices from bag phones to handheld "brick" portable phones to flip phones to smartphones to tablets and all manner of vehicular communications on wireless networks.

services. By 2016, there still will be 5 billion people who do not have any access to broadband capability, who do not have devices that are windows into the cloud, who do not have devices that connect them to information, education and entertainment, and who are excluded from this revolution.

"Third, we are an obstructing industry. We obstruct our view of city and landscape because we build more and more big towers. We make them bigger and heavier with more antennas

and make them uglier all the time. By 2016, there will be 3 million towers all over the world. You may wake up one day and look out of your window and instead of seeing a beautiful landscape or a city skyline; you may be looking at one of them," Sweldens said.

Power-hungry base stations

The Wireless Division head said that as the wireless industry moved rapidly to deal with growth, companies such as Alcatel-Lucent and its compet-

itors that built the mobile equipment had some responsibility because they were the ones who built the big towers and put the power-demanding base station equipment at the bottoms of the towers. He said base stations consume thousands of watts of power.

Sweldens said that to meet service demand, wireless carriers need to deploy more and more frequencies, which calls for deploying more antennas on the towers and more of the radio sections of the base stations. As the



Alcatel-Lucent estimates that between now and 2016, the demand for data on mobile wireless broadband networks will grow by a factor of 30, with present-technology wireless infrastructure consuming more and more electrical power and its operation putting as much carbon into the air as that produced by 15 million cars.

How lightRadio Started

The lightRadio project started three years ago when I was having lunch with one of my customers. We were having one of those Spanish lunches where you have a little wine. We had been discussing all the complexities of the network going into the future and considering where carriers would have to put all these new technologies, all these new radios.

I said, "The future doesn't have to be worse and worse." And I asked, "How are we going to manage all of these new technologies? The system is becoming so complex."

The customer raised his smartphone and said, "You know what? I would like the network to be like this. I would like the base station to be like this. I would like to have this put everywhere. I would like this base station to be able to listen to anyone, speak any standard, and be as light as my wall phone."

This idea was in my head for three years. Last year, we were doing our normal business, and I was looking at the configuration that we were going to build. I said,

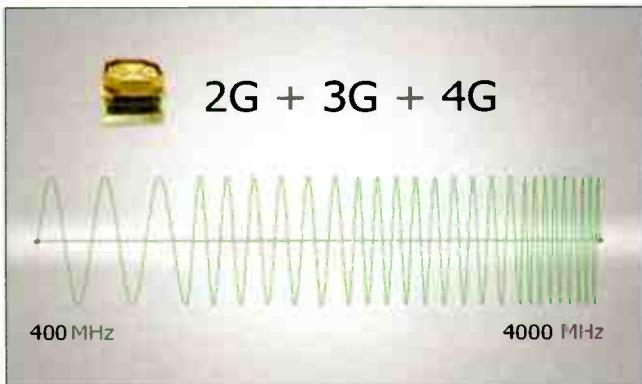
"It is too big. It takes too much power. There should be another way."

We were looking at it from a wireless-only perspective. I was talking with very brilliant people, very smart people, and we were trying to solve it from a wireless-only perspective. Then we thought, the answer is not here. The answer has to be wider than that.

I started talking to other people — people from out of wireless, people from our wireline, from our IP, from our partners, from IT and from the industry — and I realized there were other ways.

There was a fantastic amount of research being done in separate pieces. What I did, the only thing I have done, is that I connected those pieces, I put those pieces together, and we have lightRadio.

—Javier Garcia Gomez, wireless program leader, Alcatel-Lucent



The antenna in its frequency band can address 2G, 3G and 4G technologies, evolving among them with the click of a button, or handling all three at the same time. Also with the click of a button, the base station can address any mobile frequency from 400 MHz to 4 GHz.

wireless technologies evolve from 2G to 3G to 4G and beyond, more processing electronics equipment needs to be added to the base stations.

"All of that expansion makes it expensive to own and operate base station equipment, to find places for it, to provide power for it, to maintain it, to send people to upgrade it and to service it," Sweldens said. "Mobile operators all around the world spend \$200 billion owning, maintaining and operating base station equipment. It has become too complex."

Incremental change not enough

Sweldens said that many companies try to incrementally evolve the technology to make it better, faster

and cheaper. But because of industry growth, incremental changes to the technology are not enough.

In contrast, Sweldens said that the integrated, miniaturized base station and antenna combination, an invention of Alcatel-Lucent's Bell Labs, has a small version of the big antennas seen on towers and a small version of the base station radio equipment. "The antenna in its frequency band can address 2G, 3G and 4G technologies," he said. "It can evolve between them with the click of a button, and it can do all three at the same time."

Meanwhile, the base station section can, with the click of a button, address any mobile frequency used by any mobile operator in any part of the world

in the entire radio-frequency spectrum from 400 MHz to 4 GHz.

Rack and stack

Sweldens said that the RF power output of a single cube is only 2 watts, so it can't do everything by itself. "You do not scale it by building bigger versions" he said. "You scale it by using more of them. You can put them anywhere you want, spreading them out. Or you can rack and stack them in any configuration that fits your needs. You can add intelligence to it to adapt the real-time radio power to the changing need of the user. That is how you save power with this small piece of equipment replacing the radio and the antenna."



The capability of the 2-watt RF output base station cube is scaled up by using more of them in a combination, instead of making the individual base station cube bigger. For example, 20 could be placed in columns of 10 each inside a radome to form a multicarrier base station-antenna combination on an existing tower.

Base Station System-on-a-chip from Freescale Semiconductor

Our new system-on-a-chip technology integrates all the functions of a base station in a single chip. It is possible with advanced technology and optimizing each piece of IT. This is a phenomenal time for us working with Alcatel-Lucent's technical team.

—Dr. Lisa T. Su, senior vice president and general manager, networking and multimedia, Freescale Semiconductor



Made by semiconductor manufacturer Freescale, another part of the lightRadio technology is a chip that contains the processing power that in other manufactured configurations is part of rack-mounted base station equipment. As with the combined base station-antenna cube, the chip can perform network processing for 2G, 3G or 4G technology, evolve among them, or do all three at the same time.



An Alcatel-Lucent partner, Hewlett-Packard, will bring expertise in IT capability, IT servicing, cloud technology and virtualization. H-P has do-it-yourself offers for private and public cloud services. An H-P representative said the end-to-end architecture can provide a globally optimized distributed processing fabric.



As mobile network operators enter their regular upgrade cycle for antennas, small cells, radios, controllers and processors, every six months Alcatel-Lucent will have more capabilities of lightRadio ready to connect to existing networks to create more value and get to lightRadio step by step.

Made by semiconductor manufacturer Freescale, another part of the technology is a chip that contains the processing power that in other manufactured configurations is part of rack-mounted base station equipment. As with the combined base station-antenna cube, the chip can perform network processing for 2G, 3G or 4G technology, evolve among them, or do all three at the same time.

Sweldens said the cube and the processor would be placed wherever a mobile network operator could lever-

age its existing infrastructure to reduce cost. "You will put the cube on the side of a building, a house, a billboard, a bus station, a lamp post, a light pole, very unobtrusively. You will barely see it," he said. "The processing and base station chip processing capability can be put right next to the cube or it can be placed much farther away using cloudlike architecture."

The reason behind the name

Optical fiber connects the components. Sweldens said that Alcatel-

Lucent customers already have fiber in the ground, ready to use, and that the use of optical fiber was yet another reason the product was named lightRadio.

"With this technology, in the next three years, by 2014, we can cut the total cost of owning and operating networks by more than a factor of two," he said. "That is a big deal. That will drive a wave of growth and expansion. It means that the total amount of power consumed can be cut in half. It means we can take the equivalent of

Hewlett-Packard Sees lightRadio as a Crucial Breakthrough

The lightRadio technology is transformational. This is the same as going from the vacuum tube to the transistor. We're moving into a world with an enormous number of endpoints that are bandwidth hungry and that are connecting with cloud services. On the mobile endpoint side, it is clear that what Alcatel-Lucent has done is stunning. It means more ubiquitous endpoints. Some people have coverage problems with wireless, and by creating a ubiquitous fabric for wireless, lightRadio technology means coverage problems can be potentially resolved.

Second, the bandwidth multiplier effect of growing wireless use means that, as we move from 2.5G to 3G to 4G/LTE, all those endpoints are becoming video endpoints. It's not just smartphones taking video and uploading it or anything less dramatic than real-time, synchronous video conferencing across immersive, room-sized endpoints all the way down to mobile video.

Trying to handle that explosion of endpoints, coupled with that massive increase in bandwidth, is just mind-

boggling, and lightRadio technology can go a long way toward resolving that.

From Hewlett-Packard's perspective, we announced a range of cloud software systems and solutions so our cloud service automation capability for end-to-end management, cloud system and enterprise cloud-service compute — which provide for very flexible, hybrid delivery models that let enterprise data centers tie in with services — tie in with public cloud service providers in complete solutions. So lightRadio technology really is the missing link.

We have the endpoint explosion. We now have the cloud services on the back end. The lightRadio technology helps bridge them and address what otherwise would have been a bottleneck. In my mind, it is an absolutely crucial breakthrough.

—Joe Weinman, general manager of communications, media and entertainment industry, Hewlett-Packard

Bell Labs: lightRadio Enables Active Antenna Array Program

Bell Laboratories is the research arm of Alcatel-Lucent. Inside of the lightRadio concept are several areas where new ideas from Bell Labs have been brought — from the Internet cloud, with its flexibility and power and ability to dynamically grow and shrink along with the needs of our customers, to the access technologies that connect Freescale Semiconductor's chip to the active antenna array, to the lightRadio cube.

The lightRadio technology draws from our entire research and product portfolio in optics and wireless and copper and IP — all of that innovation in the access space. Bell Labs brings compression technologies

to the table to really advantage and make unique the lightRadio concept.

Finally, we see the cube as an enabler for a much larger active antenna array program where active antennas offer a way to reach the dream that we all have had of getting to invisible antennas, or at least as invisible as possible, to really bring broadband to everyone without adding to the visual clutter.

—Tod Sizer, vice president and head of wireless research at Bell Labs

7.5 million cars' production of carbon out of the atmosphere. We no longer become a power-hungry industry and we make a big step toward becoming a green industry."

Sweldens said the lightweight base station-antenna combination could be further combined with microwave backhaul together with alternative energy sources such as solar and wind to bring mobile broadband to anyone, anywhere in the world, as long as either sun or wind is available.

"These small, unobtrusive devices almost make the big, heavy, mobile network that we have today invisible,"

With the advent of new devices and machine-to-machine capability, wireless networks will be serving more than 1 trillion devices.

he said. "lightRadio can bring more capacity and coverage to deal with the factor-30 of anticipated data growth over the next four years in a way that is economical for our customers. We are going to work in a way that we co-create, co-develop, co-market, and co-organize our capability, all focused on our customer."

IT expertise

In addition to Freescale, Hewlett-Packard is another Lucent-Alcatel partner in the lightRadio technology.

Sweldens said H-P brings expertise in IT capability, IT servicing, cloud technology and virtualization.

Joe Weinman, general manager of communications, media and entertainment industry at H-P, said, "From H-P's perspective, we are big believers in the cloud. We feel that we have the widest range of solutions in terms of do-it-yourself offers for private clouds, as well as public cloud services, as well as pulling all of that together. And part of that, which may be a little subtle and different from the traditional cloud model, is incorporating some of those capabilities — virtualization, standardization and dynamic resource allocation — in the back-end processing infrastructure behind all this. The end-to-end architecture demonstrates the value of the partnership. It can provide a globally optimized, distributed processing fabric that can usher in this new age."

Sweldens said that as mobile network operators enter their regular upgrade cycle for antennas, small cells, radios, controllers and processors, every six months Alcatel-Lucent would have more capabilities of lightRadio ready to connect to existing networks. "As we connect them every six months, it will create more and more value," he said. "That is how, together with our customers and our

partners, step by step we will get to lightRadio."

\$1 trillion industry

Sweldens said that in the next couple of years, the mobile wireless industry is expected to become a \$1 trillion industry. With the advent of new devices and machine-to-machine capability, wireless networks will be serving more than 1 trillion devices. "All of that demand in end-user devices will require radical changes in how we build this technology," he said.

In addition to co-creating the technology with Bell Labs, Freescale and Hewlett-Packard, Alcatel-Lucent is co-creating the technology with the help of the biggest mobile operators in the world.

"We have already shown this technology, this cube, to many of the biggest mobile operators in the world," he said. "Every one of them has asked us to work with them and introduce these capabilities with them. We have five mobile operators signed up for when we have the first alpha product of this technology later this year to trial this technology with them. Three of them are Verizon, Orange and China Mobile. With these customers and many more, we will co-create technology, and bring this to life and generate the network."

Summing up

Sweldens summed up the lightRadio technology, saying the first important aspect of the development is that it makes

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SITE NAME
MonoEucalyptus

SITE OWNER
T-Mobile

SITE ENGINEER
Solar Communications
International

BUILT
2009

TOWER TYPE
Patented Multi-trunk
MonoEucalyptus Structure

HEIGHT
60 feet

LOCATION
Highland, Ca.

lightRadio Cubes May Need Placement on Cell Towers

Once the Alcatel-Lucent lightRadio base station cubes have been placed into useful configurations, including multiple-input, multiple output (MIMO) configurations inside radomes, their best positioning may be in commercial positions on towers.

By Ted Abrams, P.E.

At the AGL Regional Conference in Herndon, Va., on March 4, Ted Abrams, P.E., president of Cary, N.C.-based Abrams Wireless, a technical consulting service, described how the Alcatel-Lucent lightRadio integrated base station-and-active antenna array technology may be deployed. The description, edited for length and style, follows.

Alcatel-Lucent said that we have these new little gizmos and you can put a basket of them on the seat beside you in the car and just roll down the window and start throwing these things out and they would self-organize and self-optimize, and suddenly, you would have a network and you wouldn't need any more cell phone towers. Is that kind of what we heard? At first blush, that's what it sounded like, right?

The lightRadio cube is a marvelous invention. I commend Alcatel-Lucent for having a clever, efficient design. The form factor is excellent.

It is a 400-gram (14-ounce) cube, 60 millimeters (2.36 inches) on a side. There are three sections. The first is the antenna and its stop-sign-shaped octagonal surface. In the middle of the sandwich is a duplexer that lets the antenna both transmit and receive. On the bottom are the amplifier and the cooling section.

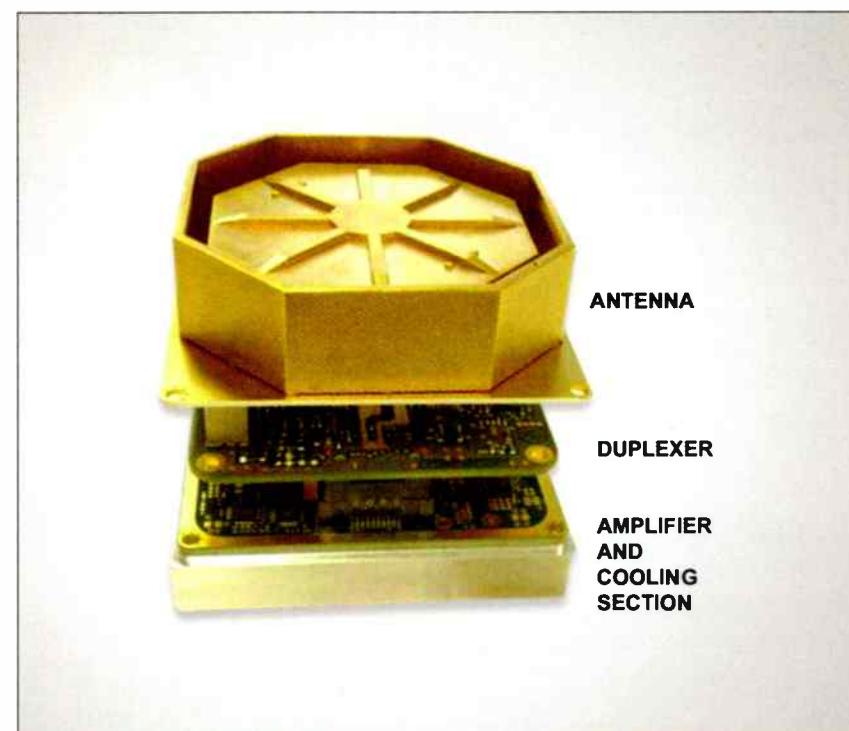


Figure 1. The lightRadio base station-and-active antenna combination is a 400-gram (14-ounce) cube, 60 millimeters (2.36 inches) on a side. There are three sections. The first is the antenna and its stop-sign-shaped octagonal surface. In the middle of the sandwich is a duplexer that lets the antenna both transmit and receive. On the bottom are the amplifier and the cooling section.

the base station small, with a small antenna and a small radio. "The second part of the breakthrough is to make sure that by the click of a button, you can turn it from 2G to 3G to 4G," he said. "And with the click of a button, you can start addressing any mobile frequency in the world with this part of the technology. That is the breakthrough. That, connected to the system on fiber with the base station capability that Freescale Semiconductor brings, is lightRadio."

The Alcatel-Lucent executive said, "We are not going to eliminate the need for all towers tomorrow. What we are saying is that as part of the evolution, you actually can take these things and stack them together into an antenna element, which will be a multiband element, which you can deploy on an existing tower that will simply replace two or three or four of the elements on that tower into one element. As you

look at the six-month steps that we intend to make, that is one of the steps. We are going to use existing towers to deploy it. That will make it easier. Just imagine the towers will become a lot prettier, a lot less heavy, and more and more of the antenna and base station elements will be combined into a single-element kind of capability."

Statistical multiplexing

Hewlett-Packard's Weinman said that the more a wireless carrier can take active, intelligent processing elements, consolidate them, centralize them, and move them to a place where they are not only more manageable, but also facilitate a statistical multiplexing game, carriers then can even potentially lower the cost of overall infrastructure. "The reason is because where you have a flash crowd at a particular event, if you can grab all

of those text messages, downloads, video streams, what have you, and then process them on a dynamically allocated resource, that really provides some additional advantages that this architecture then enables," he said.

"One issue with wireless deployment is the challenge of placing towers in local communities," Weinman said. "What we're finding is that intelligent network processing, such as the processing that enables content delivery and opens the network architecture up to mobility, doesn't have to reside in an unsightly tower that may require a multiyear lease agreement and an extensive regulatory process. It has the potential for placement at intelligent nodes that could allow wider deployment, maybe within a neighborhood. The ease of deployment combined with carriers' coverage requirements maximum use of their bandwidth fit together in the lightRadio technology." ■



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the antenna and its stop-sign-shaped octagonal surface. In the middle of the sandwich is a duplexer that lets the antenna both transmit and receive. On the bottom are the amplifier and the cooling section. (See Figure 1.)

Your cell phone is a partial-duty device, and it cools off in between uses. A 100 percent duty-cycle device doesn't have a chance to cool down. Radio transmitters are inefficient. Their efficiency is about equivalent to that of a toaster at 10 to 12 percent dynamic efficiency, so 90 percent of the energy that goes into a radio comes out as heat.

What do you do with a lightRadio cube? You rotate it so the stop sign faces out. If you throw it out of the car window and it falls on the ground and the antenna is facing down, it is not going to work. You have to rotate it so the antenna faces out. (See Figure 2.)

Then, you have to give it DC power. It doesn't have a built-in power supply or a transformer, so it has to have DC power.

Next, you have to connect it to backhaul. The cube needs an Ethernet connection to your cable modem. It doesn't mysteriously acquire that backhaul link in-band, so it needs a connection to backhaul. With the use of another device, it could be a wireless connection. The cube has no built-in microwave backhaul connection.

The cube needs cooling. How are you going to cool it? Fins, maybe. With one cube standing alone, fins will work just fine.

What else do you need? You need to put it in the right location. One cube by itself would cover a location the size of an auditorium, but one cube by itself is not going to do much good outside in a park-size area.

One cube by itself could be an excellent femtocell after adding power and backhaul, providing cooling and locating it at the right position near the coverage objective. It would be able to support any mode, any band and any brand: Verizon Wireless, T-Mobile USA, AT&T Mobility, Sprint Nextel. (See Figure 3.)

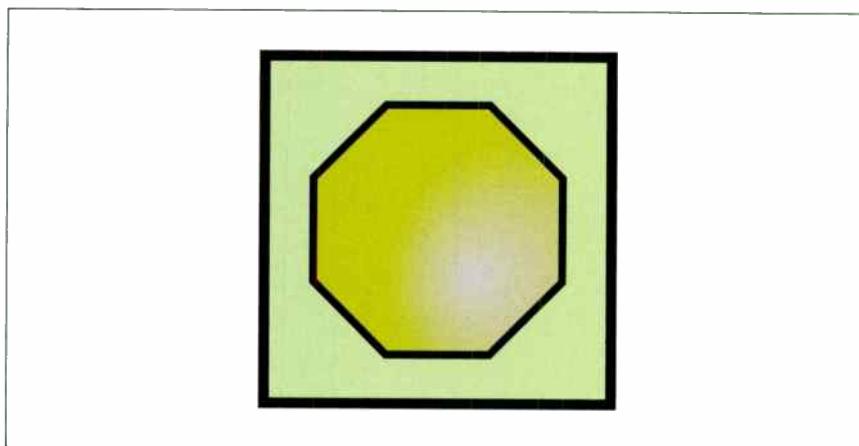


Figure 2. The lightRadio cube must be rotated so the stop sign faces out.

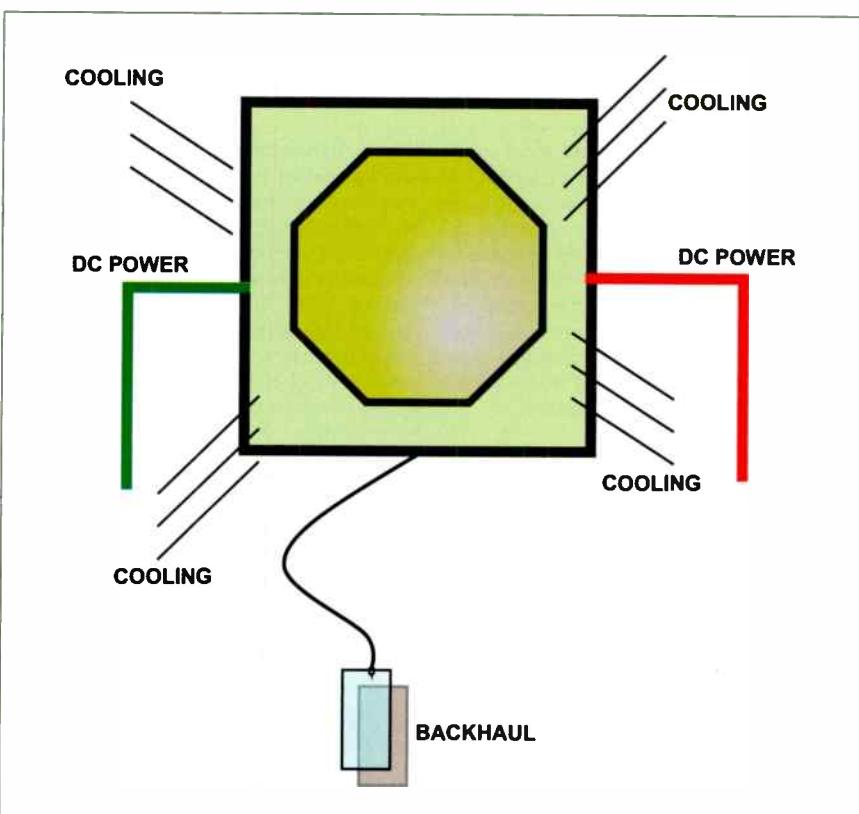


Figure 3. The lightRadio cube requires DC power, a connection to backhaul with an Ethernet connection to your cable modem or wireless link, and cooling. One cube by itself could be an excellent femtocell after adding power and backhaul, providing cooling and locating it at the right position near the coverage objective. It would be able to support any mode, any band and any brand: Verizon Wireless, T-Mobile USA, AT&T Mobility, Sprint Nextel.

What else could you do with it? It could be used as part of something else. Because of its form factor, it is symmetrical. Alcatel-Lucent may have been thinking about another use. Step away from the cube so that it appears

smaller, stack the cubes into a column, align the antenna faces, and a column of cubes working in conjunction with one another could provide usable coverage at a distance of 2 miles — so long as the target wasn't moving.

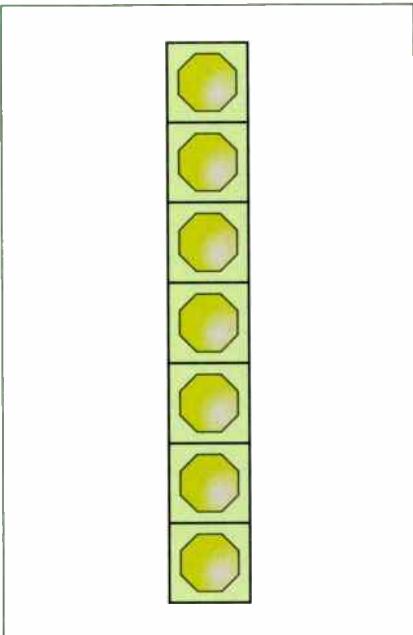


Figure 4. Stack the cubes into a column, align the antenna faces, and a column of cubes working in conjunction with one another could provide usable coverage at a distance of 2 miles — so long as the target wasn't moving. This configuration has the ability to form a beam and in a vertical shape or pattern, to concentrate that beam at the horizon. So, this configuration has built-in, remote electrical tilt (RET). This column of cubes is an RET antenna.

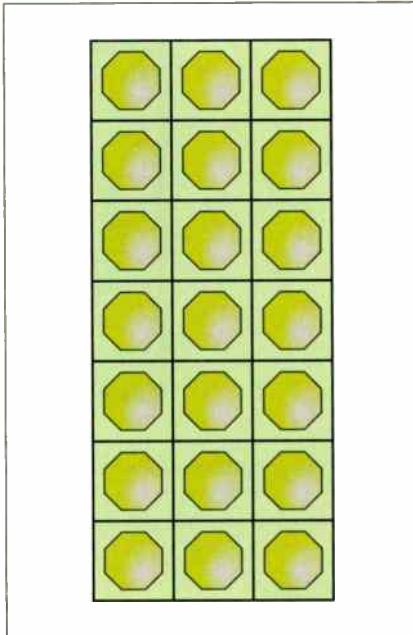


Figure 5. Combining three columns of the stacks shown in Figure 4 allows you to aim the beam not only up and down, but also left and right so fast that whereas the gain of the configuration by itself might be 15 decibels referenced to an isotropic source (dBi), because of its ability to dynamically adapt to the circumstance, it might be able to give the benefit of 30 dBi sensitivity if only one customer has an active wireless device in the cell sector.

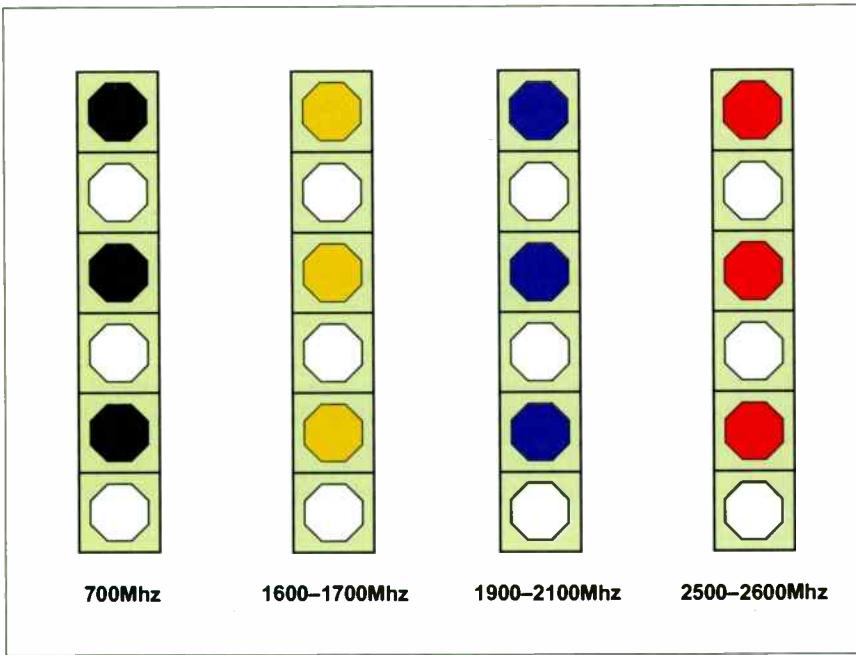


Figure 6. These stacks of lightRadio cubes are assigned on a frequency basis. One stack is soft-coded for 700 MHz, and the others for 1600 MHz, 1900 MHz, 2.5 GHz and 2.6 GHz. The cubes are oriented according to the physics of propagation.

This configuration has the ability to form a beam and, in a vertical shape or pattern, to concentrate that beam at the horizon. So, this configuration has built-in, remote electrical tilt (RET). This column of cubes is an RET antenna. It has a nicely shaped pattern aimed at the horizon. Or it could be placed at the bottom of a hill and aimed up the hill without having to have any physical vertical up-tilt. Its dynamic, phased-array beam-tilt-forming antenna concentrates sensitivity, minimizing wasted energy or back-lobe energy that would be focused toward the sky. (See Figure 4.)

What if we combine three columns of those stacks? Now, not only can we aim the beam up and down, we can aim it left and right so fast that whereas the gain of the configuration by itself might be 15 decibels referenced to an isotropic source (dBi), because of its ability to dynamically adapt to the circumstance, it might be able to give the benefit of 30 dBi sensitivity if only one customer has an active wireless device in the cell sector. (See Figure 5.)

As that customer might be moving along, the antenna would follow him, keeping track of the wireless device, and that customer would receive the benefit of all of the gain of all of the antenna elements working in concert.

Coverage Distance

In that circumstance, the configuration of lightRadio cubes could reach a coverage distance of 2 miles. But it cannot do that if there are 1,000 subscribers active in the sector and they all are moving at the same time because then it has to average those out. So, it won't serve 1,000 people in a sector at a distance of 2 miles, but it very well could serve one subscriber at that distance.

What if we take a stack of these and we assign them on a frequency basis? What if we soft-code a stack of them for 700 MHz and soft-code a stack for 1600 MHz, 1900 MHz, 2.5 GHz and 2.6 GHz, and we orient those cubes according to the physics of

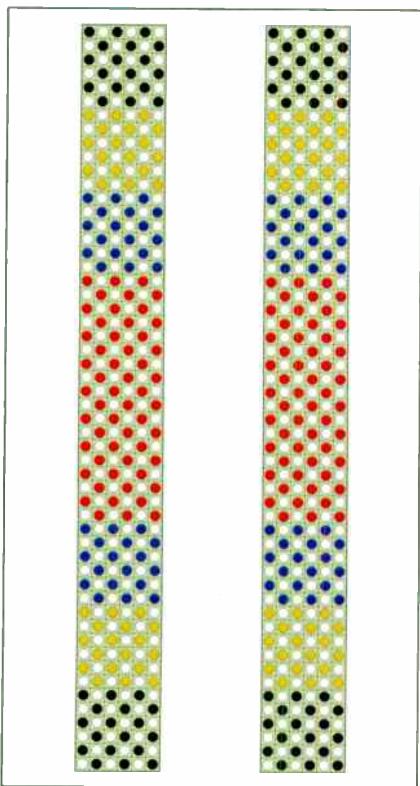


Figure 7. To achieve multiple-input and multiple-output (MIMO) functionality in addition to assigning lightRadio cubes on a frequency basis and soft-coding them by frequency band, it might make sense to use dual panels for physical, horizontal separation across the platform. That would mean using two 8.5-foot-tall panels about 12 to 15 inches wide supporting two carriers, all modes, all bands.

propagation? In the early days of cellular, the antenna panels for 800 MHz were 8 feet tall. It has to do with the half-wavelength of the frequency and the efficiency of propagation. Does a 4-foot 800-MHz antenna work as well as an 8-foot antenna? No.

So what size antenna is needed for the new 700-MHz band? About 100 inches — little more than 8 feet. That is what is needed for optimum performance at 700 MHz. Shortening the antenna stack is a false economy. The 700-MHz antennas will be at the top and bottom of a 100-inch stack. The 1600-MHz LTE elements for the ancillary terrestrial components for lightSquared will be next. Then there will be the uplink elements for the Advance Wireless Service (AWS). Next

in line will be elements for Personal Communications Service (PCS), and then will come the 2.6-GHz elements in the middle. (See Figure 6.)

The three columns will be able to steer and aim the beam. With two pairs of three columns, you would have Verizon and AT&T under the same radome in a 100-inch-tall antenna, and they could independently steer and form their beams to support LTE, CDMA, GSM, WiMAX — it will do it all.

If you want multiple-input and multiple-output (MIMO) in addition to that, you can compromise this functionality and get MIMO in the same panel, but it might make more sense to have another panel doing the same thing so you have some physical, horizontal separation across the platform. That would mean two 8.5-foot-tall panels about 12 to 15 inches wide supporting two carriers, all modes, all bands. (See Figure 7.)

Where are we going to position them? If we put those panels on top of the tower, it all begins to make sense. It is a good solution. (See Figure 8.)

But if you just hold the cube up and say, "This is going to eliminate the need for everything else out there," that probably is not the best way to tell the story.

So, what is it going to do? All modes, all frequencies, all operators, one platform level, two panels per face, but you can add panels per face as need be for more operators. You need power on the tower, backhaul, cooling (because these things get hot), and most of all, you need a commercial position at the right location. You need contracts in place to protect the right of the carrier to have access for maintenance and optimization. You can't just hang these in a residential neighborhood. You can't put them in a position that is not secured and protected; it has to be a commercial position with a basis in contract law that gives the commercial operator control over its network. ■

Ted Abrams, P.E., is president of Abrams Wireless, Cary, N.C. His email address is ted@abramswireless.com.

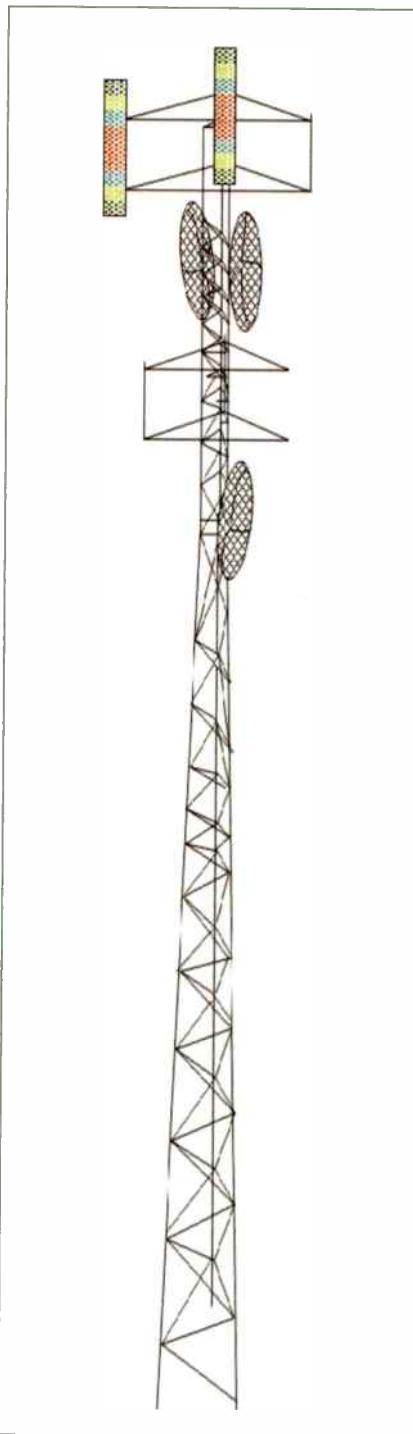


Figure 8. Once the lightRadio cubes are configured in 8.5-foot panels with MIMO functionality and horizontal separation, where are they going to be positioned? If the panels are positioned on top of the tower, the use of the integrated base station-and-active antenna array technology begins to make sense. And the lightRadio cubes may not eliminate the need for towers after all.

China Offers Growth Pote.

The addition of a third Chinese mobile carrier in 2008 boosted the prospects for a pioneer in China, Q-TZG Telecom, continues building relationships with the carriers.

The Chinese market for wireless antenna collocation has enormous opportunity for growth. It remains on a rapid growth curve in comparison with the United States, which is a much more mature collocation market.

China has 1.33 billion people; the United States has about 300 million. But what really boggles the mind is the number of mobile users in China: 823 million at last count. That is more than 2.5 times the entire population of the United States.

Despite the big number, there is still a lot of opportunity for growth in China. The wireless market penetration in China is only about 60 percent. The country has three major mobile carriers: China Mobile, China Unicom and China Telecom.

The Chinese market mobile services revenue is about \$90 billion compared with the United States, which is \$160 billion. The average revenue per user (ARPU) in China is only about a fifth the ARPU in the United States, \$10 versus \$50.

Growth rate

What excites people about China and what excites people about many other international markets is the growth rate. The growth rate in China, despite having slowed down a lot from a decade ago, remains 2.6 times faster than the United States.

Wireless service revenue in China



is about 57 percent that of the United States in terms of value.

Part of the challenge for Q-TZG Telecom in building a collocation company in China is to identify the dynamics of the three carriers that would encourage them or excite them about collocation. China Mobile, for example, has 620 million subscribers. The company's return on equity is 25 percent. That is double the ROE of AT&T. China Mobile's cash capital expense (capex) spending last year was \$19 billion. Its capex this year will be \$18 billion. Its projections for the next two years are \$14 billion and \$12 billion, respectively. The company's cash balance is \$39 billion.

In contrast, the No. 2 and No. 3 carriers, China Unicom and China Telecom, are just a little bit weaker, and that is part of where opportunity lies. Part of the challenge for us is being attractive to all three carriers, because to be a successful tower provider, we need to service all of the potential customers.

More than 1 million sites

China Mobile has 640,000 cell sites. Among the three operators, there are more than a million sites. The challenge for us is to get them to understand that owning sites is not necessarily strategic anymore. Part of our challenge is helping them to see how we can add value in this value chain and that the tower part of the value chain is worthy of being an industry in and of itself.

That is something that the United States has already gone through. Many other countries have been through that or are going through that. China is at that part of the curve. That kind of

evangelism and that kind of mentality is something that many of them will understand, but there is still a lot of momentum to achieve or inertia to overcome to get the Chinese carriers to the point where they see independent ownership of towers is beneficial.

Part of what is making international business exciting to so many is seeing the amount of attention being paid to international markets elevating, including the acquisitions overseas by American Tower and the acquisitions and expansions overseas by SBA Communications. Representatives of those companies always mention several characteristics that make international business attractive: more competition among carriers, protected land leases and land rights, and sufficient legal protections overall. Those dynamics exist in China today in better form than they did several years ago. Yet China is still a communist country. The carriers are still state-owned enterprises with big parent companies.

3G licenses

During the past several years, 3G licenses have been issued in China. The wireless industry had a restructuring that took it from two main mobile carriers to three. This is a major change for a collocation company such as ours.

Many other factors point toward collocation and more attention to saving capex. For example, ARPU is decreasing and minutes of use (MOU) are increasing.

The regulatory factors and the market factors both point toward increased attention to collocation.

ntial for Tower Collocation



or the tower collocation business. The collocation carriers and regulators.

From a presentation by Tony Lo

Not unlike going into any new market, part of the challenge for us, having spent almost four years in China trying to build a collocation company, is how do you crack the code? How do you incentivize all of the different stakeholders to want to work with a new concept or a new idea?

Wireless antenna collocation

Some of the challenges we have faced are similar to the challenges that would be faced in other places. How do you incentivize wireless carriers to collocate their antennas? Maybe they have the wrong budgeting process, one in which they think about capex and operating expense (opex) in independent silos. How do you help them cross over into thinking about renting versus buying?

When there were only two carriers, all of the infrastructure they would build was strategic: "If it is not mine, it is yours." But with three carriers, the mentality is different.

Figuring out how to get each of the carriers to want to work with a collocation company was part of our challenge in building a local team, finding the right people, and testing different ways of communicating with all the different stakeholders to the point that we now are excited about our high-speed growth.

As the tower-sharing pioneer and leader in China, we do a lot of educating, helping people understand what collocation means, why it makes sense for the carriers, why we are not a threat, and how the intricate partnership between a collocation company and a carrier works, all of which are already

well understood and mature in places like America.

Government appointment

Part of the effort involves generating national-level credibility. The Ministry of Industry and Information Technology, the main regulatory body for the wireless industry, appointed Q-TZG to one of its committees as a collocation expert. We are also a research partner of the Academy of Telecommunications Research. We help to steer a lot of the policy and a lot of the specifications around collocation.

Many business challenges remain. It continues to be difficult to attract the right attention. Each Chinese province is like a state, and each state is in some ways like its own company.

The wireless carriers make decisions through fairly complex processes. To sell equipment to them requires a lot of testing with many people involved in the decisions.

Many of the executives in state-owned enterprises behave more like government officials in the sense that a lot of their position and power are almost assigned to them. When the industry was restructured at the end of 2008, the CEO of one wireless carrier became the CEO of one of the others, and vice versa.

When something like that happens, the mentality that they have is, "I'm going to fight hard, and I'm going to fight fair, but I'm not going to kill the other guy." So the competitive spirit has that kind of limitation.

Executive mobility

The executives tend to be in their positions for two or three years and then

they are moved to another jurisdiction or another province. For our sales process, a change in executives means we have to start the education process over again or we have to build relationships up and down the entire chain, or both.

In China, many things are based on relationships. That's not too different from many other places. At the end of the day, you want to do business with people you know and like.

Part of the team building for companies wanting to do business in China involves selecting people with existing relationships that help to jump-start the process, especially when you're trying to pitch something that people are not familiar with.

If a company is represented by someone the customer already trusts, even though the company may be doing something that sounds unusual, such as collocation, at least the process begins with a higher element of faith. For us, building that team with insiders, folks who came from carriers and equipment vendors, has been essential. That certainly will make our endeavors significantly easier.

For other tower collocation companies that want to do business in China, we hope that they come to us first and figure out if working with us is the right way to enter the market. ■

This article includes remarks made by Tony Lo, co-founder of Q-TZG Telecom, at the PCIA convention in October. His remarks were edited for length and style. Lo's email address is tony@tzgpartners.com. He spoke at the session "International Opportunity: No Longer a Foreign Concept," led by Jeanine Niyonzima-Aroian, president of JN Partners. Her email address is jniyonzima@jnpartnersinc.com.

How Tower Designs Change to Suit Cell Site Requirements

Steel rules as the promise of carbon fiber remains unfulfilled. Changing from coaxial cable to fiber-optic cable can have a dramatic effect on tower design. Engineers and manufacturers offer their insights.

By Mike Breslin

My tower is taller than your tower. It is a claim that cities of antiquity used to distinguish their predominance over other cities. As a symbol, the tower was a city's most visible material manifestation of technical proficiency as well as wealth.

A cellular tower today, however, is not judged by size, but rather by how it contributes to the success of a network — largely determined by location and transmission capacity, but the tower technology employed is a vital factor in its value over time.

In the old days, tower engineering was trial and error. If a stone tower did not fall down, it was a good tower. If the design held up for a couple of centuries, it set the standard for a great design.

Iron lattice designs of the late 1800s also benefited from experience and evolved into the lighter-weight steel structures seen today, towers that are pushing the limits of material efficiency versus structural integrity in a relentless design competition to maximize carrying capacity while minimizing construction costs.

Design standards

The most recent, significant development in tower design occurred in 2006 with the adoption of the ANSI/TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas. In 2006, this Telecommunications Industry Association initiative was also adopted by the International Code Council (ICC) as a reference standard for consideration in building codes by ICC chapters across the country. Addendums to TIA-222-G

were made in 2007 and 2009. Addendum 2 of revision G is the latest iteration. Today, TIA-222-G is referenced by building departments across several states as well as by many ICC jurisdictions such as counties and major cities. "It took a while to be adopted by ICC chapters simply because the acceptance of building codes is a slow, thorough process by nature," said Mark Malouf, president of Malouf Engineering International in Dallas.

Malouf runs a structural design and engineering firm of about a dozen people that specializes in towers and consults with Verizon Wireless, AT&T and Metro PCS, among other wireless carriers, and some broadcasters. He is also a TIA committee member and one of the primary writers of the TIA-222-G standard for tower design and the TIA-1019 standard for the construction of towers.

Malouf highlighted a few benefits of the new standard. "The TIA-222-G standard that came out in 2006 was a major departure from the original 222-F standard dating back to 1996 and includes much more sophistication," he said. "Today, most of the new towers are built to that standard. It provides more detailed information regarding wind loading and changed the way we approached ice loading on towers because we had access to a lot of new research on icing."

"The whole philosophy is different, the way we calculate the loading on towers from antennas to mounts. Now, we have a whole section about that. Before, it was really not prescribed; people were doing their own interpretations and ap-

proximations. Now, we design towers for extreme wind and then for extreme ice that escalates with height with reduced wind in combination with it. Before, there was a simplified approach. We used to use a figure for extreme wind and then factor that wind velocity when combined with radial ice, which turned out not to give accurate results. We introduced seismic loading. On the capacity side, we went to limit-state design. Now we have factored loads and ultimate strength on the capacity side."

These new standards require the use of more sophisticated software tools to achieve more appropriate loading. This has resulted in safer, more structurally integral towers. Besides using basic mechanical engineering principles, tower designers today are relying upon wind and ice mapping programs as well as tools like Google Maps and other terrain programs. Seismic factors are now incorporated, and a seismic map is included in the standard. Engineers are prompted to check the location for the seismic characteristics for the specific site.

"There was no soil testing requirement in the 222-F standard," Malouf said. "Engineers generally relied on what we call normal soil. In the 222-G we discourage using presumptive soil factors and strongly encourage actual soil borings and geotechnical studies."

Migration to fiber-optic cable

Sean Gallagher, national sales manager for wireless structures at Valmont Industries, a company with \$2 billion in



annual sales and one of the major tower designer-manufacturers, offered a wider view of tower technology.

"In terms of methods, materials and design approaches, I don't know if there's anything really new going on with tower technology from where we are sitting," Gallagher said. "We are still using steel and not moving to carbon fiber or anything like that. I would say that the changes we continue to react to are technology changes that we see in antennas, or more importantly the changes that may happen with coaxial cable in the United States over the next year or so."

Replacing coaxial transmission lines with fiber-optic bundles has already be-



come a widespread practice in Europe. Such replacement has a high adoption rate in Canada, and it is beginning to penetrate the U.S. market, both to conserve space on existing, crowded, multicarrier towers and to reduce weight and wind load for new tower designs.

"For example, if you have four carriers on a tower and each has 12 runs of coax, you have big walls of coax that have to be accounted for in the design of a lattice tower," Gallagher said. "The coax not only adds weight to the tower, but largely adds wind load. If 12 lines of coax get replaced with one 2-inch fiber conduit for a single carrier, it takes a lot of load off the tower. If you have 12 1-5/8-inch lines running from the top down to the bottom, that creates surface area that has to be accounted for in the design. On a five- or six-carrier tower, you could be removing 60 to 72 lines of coax. That makes a big difference in weight, but mostly wind load. A single bundle of fiber removes a lot of loading, so conceivably the tower design could be lighter, or carry more equipment."

Malouf is just starting to see the move to fiber-optic cable. "As sites get more crowded and more tenants become involved, we are seeing some movement to smaller, fiber-optic cables instead of adding all these big coaxial cables," he said. "In the past year, we've begun to use fiber on special sites where there are space limitations on the towers. To reduce the wind loading, they go that route."

A chief engineer at a manufacturer of guyed towers, self-supporting towers and monopoles told us that he is not yet seeing much fiber in design requests from customers for new towers. "Most all are still going with 7/8-inch or 1 5/8-inch Heliax transmission lines," he said.

Aside from shedding weight and wind load, fiber-optic tower transmission could save carriers bundles of money. Jim Dupont, manager at Rosenberger Site Solutions, estimated that fiber saves one-third of the cost of coax. Rosenberger offers a family of mobile communications cable connectivity products for radio base stations and for installation from the antenna down to the base station.

"We supply a lot of fiber in Europe for various communication systems," Dupont said. "They've used some in Canada and some in the States. In the United States, it is mostly used in upgrading the systems in urban hubs. The bandwidth and attenuation characteristics of fiber are much superior to coaxial cable to the extent that a fixed fiber length can accommodate a broad range of tower heights with virtually no performance compromise. Our standard-length fiber cable assemblies are high quality with precision, factory-fitted connectors. Carriers can use standard-length fiber assemblies to accommodate tower height and routing." Prespliced assemblies avoid the problems of splicing on site.

Trends in tower design

"Towers still are going to be made of steel, whether out of pipe, solid rod, angle or plate, but where we see things changing is on the application side," Gallagher said. "The actual towers themselves are not changing very

much, just how big they have to be to accommodate the new technologies that are being hung on them, both in height and width. As we've gone from 3G to 4G and/or LTE, in many cases we are seeing larger antennas that tend to drive the sizes of the towers we have to design. Some of the carriers are putting out configurations that may have 12 8-foot-by-2-foot panel antennas on them, which create larger loads."

According to several industry experts, towers being built in the United States are about 30 percent monopoles and 70 percent lattice towers, with indications of a trend toward monopoles. As LTE progresses, many are forecasting the use of more poles and shorter towers in higher quantities because of the proliferation of microcells.

Jeff Grassman, supervisor of engineering for Valmont Microflect, summed up the trend in siting. "If there are no restrictions, we generally recommend a lattice tower," he said. "If space becomes an issue, we recommend a pole. If they don't like a pole, we recommend a tree-pole or another type of disguised tower."

Grassman mentioned another recent development. "We're getting more engineering-only requests," he said. "Rather than build a new structure, the first thing a lot of folks want to see is whether there may be an existing structure that could handle more antennas. So we do a lot of re-analysis work of our own structures. We have all of our drawings, a record of every structure we've built since 1956, and we know what every structure is made of. Re-analysis is a growing business for us."

"Over the past year we saw a stronger orientation toward monopoles as carriers are going back into more densely populated urban and suburban areas," Gallagher said. "It's becoming harder to put lattice towers into those places, not only for aesthetic reasons, but for ground-space issues as well. You can fit a monopole into a tighter physical location than a lattice tower. There's a general trend toward an ever-increasing number of disguised sites of some version. We are starting to see requests for disguised sites from regions that we have not seen

previously because of concerns about zoning. It's spreading beyond traditional areas like California and Arizona."

Malouf agreed. "We are seeing more and more requests for aesthetic towers," he said. "Now, you have to disguise more because of zoning issues. Towers are also smaller because of smaller microcells. Most of the towers now are either monopoles in urban and suburban areas or disguised towers or smaller self-supporting towers in the outlying areas. And you have shorter towers in the range of 75 to 200 feet; before, we used to do 400- and 500-footers."

An engineer at another tower manufacturer concurred. "In general, we are seeing more monopoles in densely populated areas," he said. "Whether that's true across the broad industry, I don't know, but because that's something we do well, we get more of them. We have done 250-foot monopoles with base diameters of up to 8 feet. We're seeing a lot more camouflage poles, especially in California. In fact, the

majority of structures we do in California are camouflage monopoles, mostly palm trees. Over the last few years, we've done camouflage in New York and Florida. Not so much camouflage in the Midwest, because zoning restrictions tend to be not as strict as the ones on the coasts."

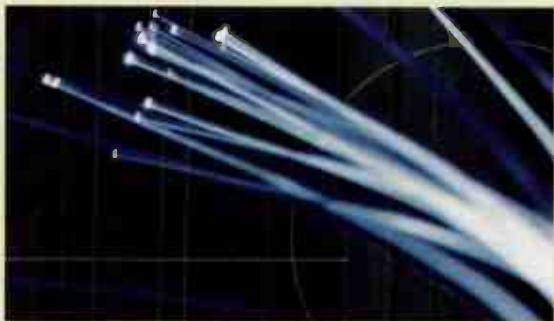
How's the tower business?

"2010 was a very good year for us; we did a lot of work for the LTE and 4G technology on existing towers, adding equipment," Malouf said. "Our outlook for 2011 should be similar to 2010 or even better."

Everyone AGL interviewed in tower manufacturing has seen a recovery in business from 2010 and is optimistic that business will improve for 2011. All agreed that competition has sharpened. A few voiced concerns that there may be too many manufacturers vying for too few sites.

Customers for new towers have

also become increasingly aggressive at purchasing, many holding online



reverse auctions, or putting out national bids to drive down bids or gain volume discounts. There's nothing unique about squeezing margins in the telecom business. Those manufacturers who best respond to thinning margins with creative designs and innovative construction models will stand the test of time. ■

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Toweronomics: How to Live, and Maybe Prosper, with Antenna Collocation

With acknowledgement of Levitt and Dubner's *Freakonomics* and an apology to the authors, a telecom attorney explores the interplay between federal regulation and antenna collocation with his self-styled "Five Laws of Toweronomics."

By William J. Sill

Once upon a time, in a galaxy far, far away, towers were sited and constructed with minimal state and federal regulation. As new builds increased, tower regulation both at the federal and local levels increased as well. Today, before a new tower can be built, the tower owner may come into contact with a staggering number of government agencies, including but not limited to the FCC, the Federal Aviation Administration (FAA), the U.S. Fish & Wildlife Service (USFWS), the National Park Service, the Federal Emergency Management Agency, State Historic Preservation Offices (SHPOs), local zoning agencies, Tribal and Native Hawaiian offices, state environmental agencies, and the state and federal judiciaries.

The Five Laws of Toweronomics demonstrate that federal regulation directly and indirectly affects both new builds and collocations of wireless telecommunications antennas on existing infrastructure in many ways. To the extent that new builds become more challenging and the FCC continues to promote collocation, the prospects for collocation will continue to brighten.

Five Laws of Toweronomics

1. Ya Gotta Take the Good with the Not-so-good
2. The More Challenging It Is to Build New Sites, the More Attractive Collocation Becomes
3. Never Make Predictions, Especially about the Future
4. The Future's So Bright, I Gotta Wear Shades
5. When New Tower Siting Gets Tough, the Smart Collocate

Section 1.1307 of the FCC rules contains impressive obligations that a tower owner or licensee must consider in order to comply with the National Environmental Policy Act (NEPA), Section 106 of the National Historic Preservation Act, and the FCC's radio-frequency (RF) emission limitations.

The First Law of Toweronomics is, "Ya Gotta Take the Good with the Not-so-good."

The good part is that the FCC actively encourages collocation because it is the agency's belief — and the belief of many others — that every time antennas are collocated on an existing tower, it saves the need to build another tower. Collocation is therefore a win-win-win strategy for the FCC, local government and those who seek to preserve historic properties. The FCC encourages collocations by excluding them from many environmental review obligations save for ensuring the facility will not adversely affect historic properties or expose the public to hazardous RF emissions.

Accordingly, unlike a new build, the issues of whether a facility is in a flood plain, a wilderness area or a wildlife preserve, or otherwise near the habitat of threatened or endangered species, do not come into play with a collocation. Even with respect to historic properties, the FCC has further streamlined the environmental review process for collocations with the adoption of the 2001 Nationwide Programmatic Agreement (2001 NPA), which created useful categories of collocations that do not normally require a formal Section 106

review, such as when collocating on a tower that has already completed the Section 106 review process.

The not-so-good part is that collocations that are not exempted by the 2001 NPA must undergo SHPO consultation as part of the Section 106 review process, a step that further extends a tower owner's siting and construction timelines. In addition, collocators are subject to the same RF emission limitations imposed on FCC licenses proposing to build a new tower.

Although the 2001 NPA is a prime example of the FCC's direct efforts to promote collocation, other FCC regulation indirectly promotes collocation.

Beauty: Thy name is collocation?

The Second Law of Toweronomics is, "The More Challenging It Is to Build New Sites, the More Attractive Collocation Becomes."

The Second Law explains the direct relationship between the challenges faced by those building new towers and the attractiveness of collocations. Siting of new builds is already challenging given the gauntlet of federal, state and local review through which each site proposal must pass. Anyone proposing a new tower today must find a site that will meet its RF coverage requirements and that: a) will be environmentally acceptable to local, state and federal authorities; b) will not adversely affect historic properties; c) will not raise objections from neighbors; and d) will meet local zoning requirements. The tower owner will have expended significant amounts of time and capital fruitlessly if the proposed site fails to either provide the service the public demands or receive the requisite governmental approvals.

Although new builds are challenging, the FCC's tower-siting shot clock was intended to give tower owners whose local zoning approvals have become stalled a clear path to redress in the courts. Before the FCC issued a declaratory ruling (an order) setting presumptive deadlines (a so-called shot clock) for resolving applications for siting wireless telecommunications facilities, there was no clear point at which a carrier or tower company could go to court for relief

when a local zoning authority failed to act. As a result, many building and zoning applications remained in limbo for extended periods, in some cases for more than a year.

To break this logjam, the shot clock provides that if a zoning board has not acted within 90 days on the permit for a collocation or 150 days for a new tower build, then the tower owner can go to court. The different time periods reflect, in part, the fact that new builds are more complicated, requiring additional time to process. They have the added benefit of encouraging collocation.

Local and state agencies have mounted a counterattack against the shot clock because they believe the FCC lacks the jurisdiction to put restrictions on a state's ability to regulate the public safety and health aspects of tower siting. Five organizations representing local governments sought reconsideration of the shot clock order. The FCC denied their petitions. Others, including the City of Arlington, Texas, challenged the order in the Fifth Circuit Court of Appeals. The city, the FCC and interveners have submitted briefs. The petitioners have submitted their replies, and the case is pending. The shot clock could be shattered if the court concludes the FCC lacked the requisite jurisdiction to establish the shot clock.

Migratory birds

Usually, when an agency revises its processes, it does so to streamline them. However, with respect to a pending revision of the current FCC Antenna Structure Registration (ASR) system, the opposite will occur. The current ASR system is a paragon of federal efficiency. If an antenna structure is more than 200 feet tall, or if it is within an FAA-regulated aviation glide slope, then an FAA determination of compliance is required, and the tower must be registered with the FCC. Registration is automatic. The ASR application is filed online and within 24 hours the FCC issues a grant, clearing the way for tower construction or modification unless additional regulatory or local zoning approvals are required.

However, as a result of the 2008



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remand order by the U.S. Court of Appeals for the D.C. Circuit, *American Bird Conservancy, Inc. v. FCC*, 516 F.3d 1027 (D.C. Cir. 2008), the FCC is required to overhaul its tower-siting process to consider migratory birds. The FCC is focusing on two fronts: a) developing a revised interim ASR process; and b) conducting a programmatic environmental assessment (PEA) of the effect of future tower builds on migratory birds.

In the meantime, the FCC is expected to issue interim processes soon. My crystal ball predicts that the interim ASR process will require all ASR applications for new or modified towers to be placed on public notice prior to grant, not just those ASR filings that include an environmental assessment (EA). This step will permit the public to file objections to every ASR application based on environmental grounds — including concern over migratory birds — even where the applicant has previously determined that no environmental issue exists.

This significant change would further slow construction because a tower owner will not be able to construct a new tower that requires FCC registration until the FCC first determines whether any objections were filed. And if an objection was filed, the FCC would need to act on the petitions or objections before the applicant can proceed with construction. If the interim ASR process fails to contain a specific timeline for disposing of petitions or objections, the mere act of filing against an ASR application could delay the ability to construct indefinitely. This additional extension of the siting process, coupled with the uncertainty as to its end point, should enhance the desirability of collocations.

PEA findings

The FCC intends to conduct a nationwide PEA as required by the court of appeals. The agency will determine whether migratory birds would be affected enough by future towers that the FCC would be required to prepare a programmatic environmental impact statement (PEIS). Not only will this be the first time the FCC has performed a PEA, but also the FCC has decided to

consider the effect of future towers on migratory birds on a nationwide basis. The FCC hired an environmental consultant to conduct the study, which is a massive undertaking.

The FCC's migratory bird rulemaking proceedings, of which the PEA is a part, contain calls from conservancy groups and the USFWS that would have the effect of requiring tower owners to file EAs in many situations — including tower sites near parks, recreation areas, farmland and drinking water aquifers — that currently do not require EAs. This would have two undesirable effects: a) it would act as a *de facto* prohibition on siting towers in these areas; and b) to the extent a tower owner wanted to build there, it would significantly extend the time required to obtain FCC approval. At a time in which the build out of broadband telecommunications service is being strongly encouraged by the administration and Congress, it would seem counterintuitive to adopt regulations that would further hinder the deployment of wireless broadband services in rural and underserved areas.

The FCC said the draft PEA would be issued in the spring with the final PEA due in October 2011. Industry representatives should participate in the PEA process because its results will influence the FCC's final rules for the ASR program and migratory birds.

The future of collocation

People who ask for a forecast of the outcome of pending regulation for new towers and collocations should consider the Third Law of Toweronomics, "Never Make Predictions, Especially about the Future," a quotation attributed to baseball player and manager Casey Stengel. However, taking precedence over the Third Law is the Fourth Law of Toweronomics, which says, "The Future's So Bright, I Gotta Wear Shades." (This also is the title of a 1986 recording by the timeless troubadours, Timbuk3.) I would suggest you not only wear shades but also apply SPF 50 suntan lotion when assessing the immediate future of collocations. Paul Roberts, vice president of compliance at American Tower, said, "Collocation is and will remain

an important part of American Tower's portfolio as it allows American Tower to offer what can often be a quick and regulatory-friendly siting solution."

The FCC's future migratory bird efforts, coupled with continued local resistance to new tower builds, has the potential to both significantly slow new tower construction and further limit the locations at which new towers can be built. The simultaneous slowdown of new tower builds and the constriction of available site locations would only increase the desirability of collocations. Although there is no "app for that" the Fifth Law of Toweronomics does explain it: "When New Tower Siting Gets Tough, the Smart Collocate." The Fifth Law takes on added gravamen if we factor in the FCC's rules and policies directly and indirectly encouraging collocation, and that most SHPOs and local zoning boards would rather see an additional set of antennas on an existing tower than approve a new tower.

Seemingly, the only cloud in the collocation sky is that its growing popularity may strain its availability. Many older, existing towers were designed without collocation in mind and, therefore, the additional vertical space and increased wind loading required for collocation were not integrated into these towers' designs. In addition, many new towers that otherwise could have been designed to incorporate multiple collocators instead had their proposed heights reduced in order to receive local approvals. As a result, the number of potential collocators that can be accommodated on the older, existing towers is not as robust as many would like. Thus, as the demand for collocations continues to increase, the forecast could change to: cloudy with a chance of rain. ■

William J. Sill is a partner at Wilkinson Barker Knauer, Washington, D.C., where he is chairman of the law firm's Tower Group. His email address is wsill@wblkaw.com. This article is based in part on his presentation at the Utilities Joint Use and Wireless Collocation Summit 2011 conducted on Jan. 12-14 in Dallas by the UtiliSite Council, a part of the Utilities Telecom Council, Washington, D.C. Sill spoke at the session, "Regulatory Update — Joint Use Issues." For more information about UtiliSite conferences, visit www.utilisite.org.



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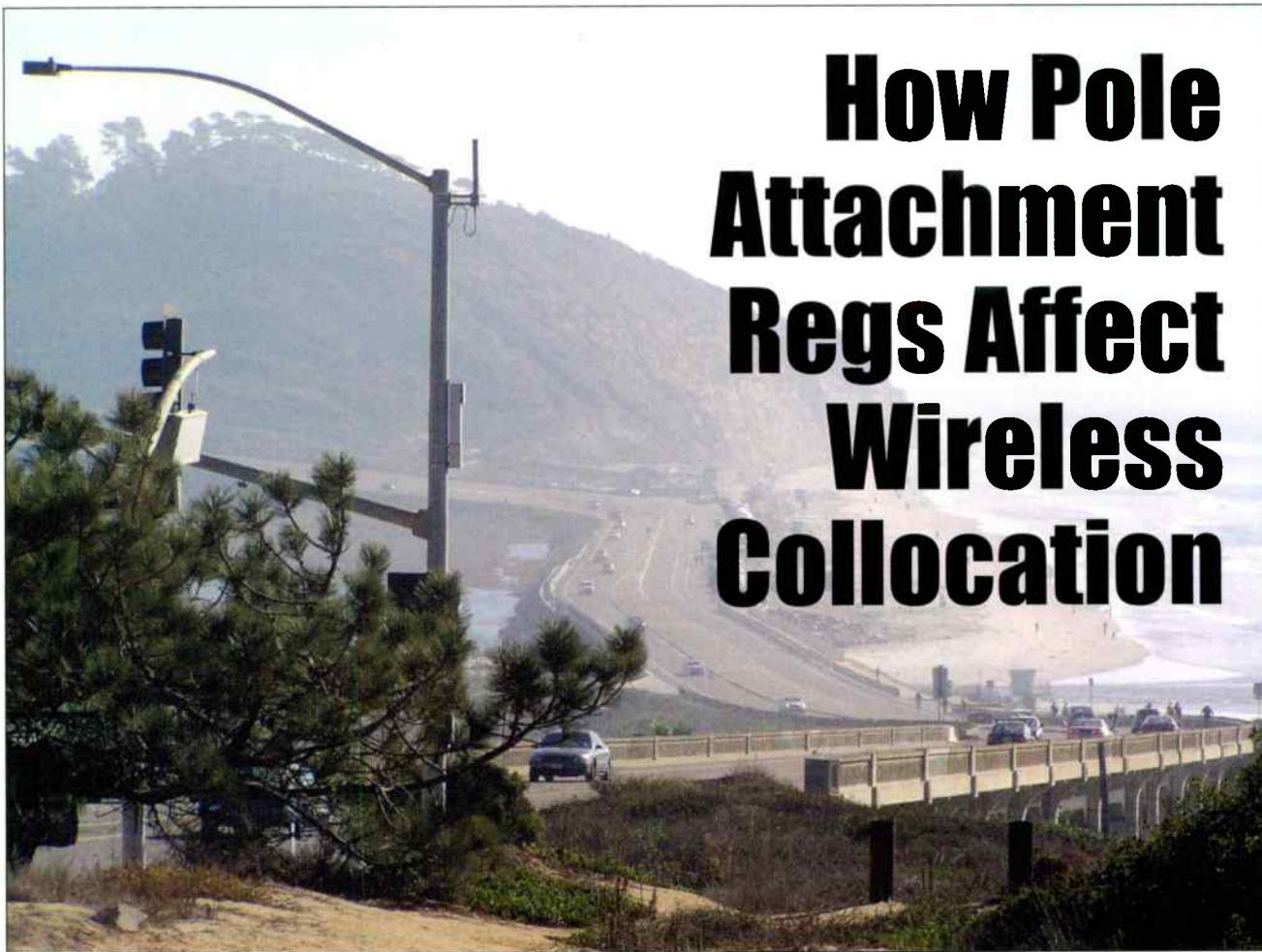
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How Pole Attachment Regs Affect Wireless Collocation

DAS photography courtesy of NextG Networks

Some wireless carriers use pole attachment regulations to access utility infrastructure at discounted rates, and many utilities are displeased. But the FCC seems poised to mandate access for utilities now exempt and to impose low rates, too.

From a presentation by Shirley S. Fujimoto

When it comes to attaching wireless telecommunications equipment to utility poles, which pole attachment rules apply, what is to be attached, what kind of carrier is involved, and what entity or facility is to receive the attachment are all important factors.

Location plays a role, too, because the states may reverse or preempt federal regulation of pole attachments. That means if a state has asserted that it wishes to regulate pole attachments,

the FCC will step down. In that event, the state pole attachment regulations govern, not the federal regulations.

Federal regulations

Utility facilities covered by federal regulations are owned by investor-owned utilities (IOUs) or the incumbent local exchange carriers (ILECs). The FCC does not regulate utility facilities owned by a municipality or a cooperative. If the state hasn't asserted jurisdiction over municipally or cooperatively owned utilities, then there is no regulation over attachments to those facilities, and whatever seems reasonable or just will apply.

The types of facilities covered by federal regulation are poles, ducts, conduits and rights of way. Attachments to these facilities generally are made by two types of entities, telecommunications carriers and cable TV systems. Arrangements made between IOUs

and ILECs are not covered by FCC regulations.

Current regulations evolved from the Pole Attachment Act, enacted in 1978, as amended, along with subsequent FCC pronouncements, court decisions and FCC decisions.

FNPRM

On May 20, 2010, the FCC issued a Further Notice of Proposed Rule Making (FNPRM) involving pole attachments. In response, the FCC received comments from various parties, and the result of the proceeding is expected as early as the first or second quarter this year, although it could come later.

Back in the day, the utilities said, "Really, Section 224, the pole attachment statute, doesn't cover wireless attachments. It's a competitive field. Distribution facilities are not an essential facility. Wireless attachments can go on buildings; they can go on antenna structures. So Congress did not intend to cover wireless attachments."

And utilities won the first round in court with a favorable decision from the U.S. Circuit Court of Appeals. But when the Appeals Court decision was appealed to the U.S. Supreme Court, the highest court decided that indeed wireless attachments are covered by Section 224 because "any" attachment means "any," and a wireless attachment is "any."

The court also was persuaded that what was important from the statute is who is doing the attaching. So, the word "by" became very important. If a wireless attachment is being made "by" a wireless telecommunications provider or a cable provider, it is covered by the statute.

So, Section 224 governs wireless attachments.

Facilities covered

Courts also have spoken with regard to the type of utility facilities that are covered. Electrical transmission facilities, according to the Eleventh Circuit, are not covered by Section 224. In the time frame of appeals involving the 1996 Act, the decision in the Court of Appeals that excluded transmission fa-

FCC Pole Attachment Order and Further Notice of Proposed Rulemaking

Statutory Background

- Section 224 of the Communications Act
 - Section 224(b): ensure that the rates, terms, and conditions for pole attachments are just and reasonable
 - Section 224(f): utilities must provide a cable television system or any telecommunications carrier with nondiscriminatory access to its poles
- Key exclusions
 - Section 224(a): railroads, government-owned entities, or cooperatives
 - Section 224(c): states that have certified to the FCC that they regulate pole attachments (20 states and Washington, D.C., so far)

Pole Access and Broadband

- The FCC's 2007 Pole Attachment NPRM recognized a link between pole attachments and broadband, and sought comment on certain pole attachment rate and access issues.
- The National Broadband Plan recommended that:
 - The FCC should establish rental rates for pole attachments that are as low and close to uniform as possible, consistent with Section 224 of the Communications Act of 1934, as amended, to promote broadband deployment.
 - The FCC should implement rules that will lower the cost of the pole attachment "make-ready" process.
 - The FCC should establish a comprehensive timeline for each step of the Section 224 access process and reform the process for resolving disputes regarding infrastructure access.
 - The FCC should improve the collection and availability of information regarding the location and availability of poles, ducts, conduits and rights of way.
- Order
 - Clarifies that the statutory nondiscrimination requirement allows attachers to use space- and cost-saving pole attachment techniques where practical and consistent with pole owners' use of those techniques.
 - Establishes that the statutory right to just and reasonable access to poles includes the right of timely access. The details of a timeline are left to the FNPRM.
- FNPRM
 - Access (e.g., timelines, use of outside contractors)
 - Enforcement (e.g., informal dispute resolution, ensure that FCC complaint rules get incentives right)
 - Rates (e.g., reinterpret telecom rate formula, regulation of incumbent LEC attachments)

—Source: FCC

cilities was one of the utility industry's small victories among various court appeals.

So, for wireless attachments to be regulated, they need to be made to distribution facilities by a wireless telecommunications provider or a cable TV

provider. If it is a transmission tower, it is excluded from section 224 regulation and all the different things that come with that.

In the court's rationale, poles, ducts and conduits really are distribution system facilities, not transmission

facilities. If Congress had intended to cover transmission, they would have used the words "towers" or "structures" or something similar. And they did not.

So, we move on. The courts have spoken to say wireless attachments are covered. Wireless attachments to transmission facilities, though, are not.

Rate formula

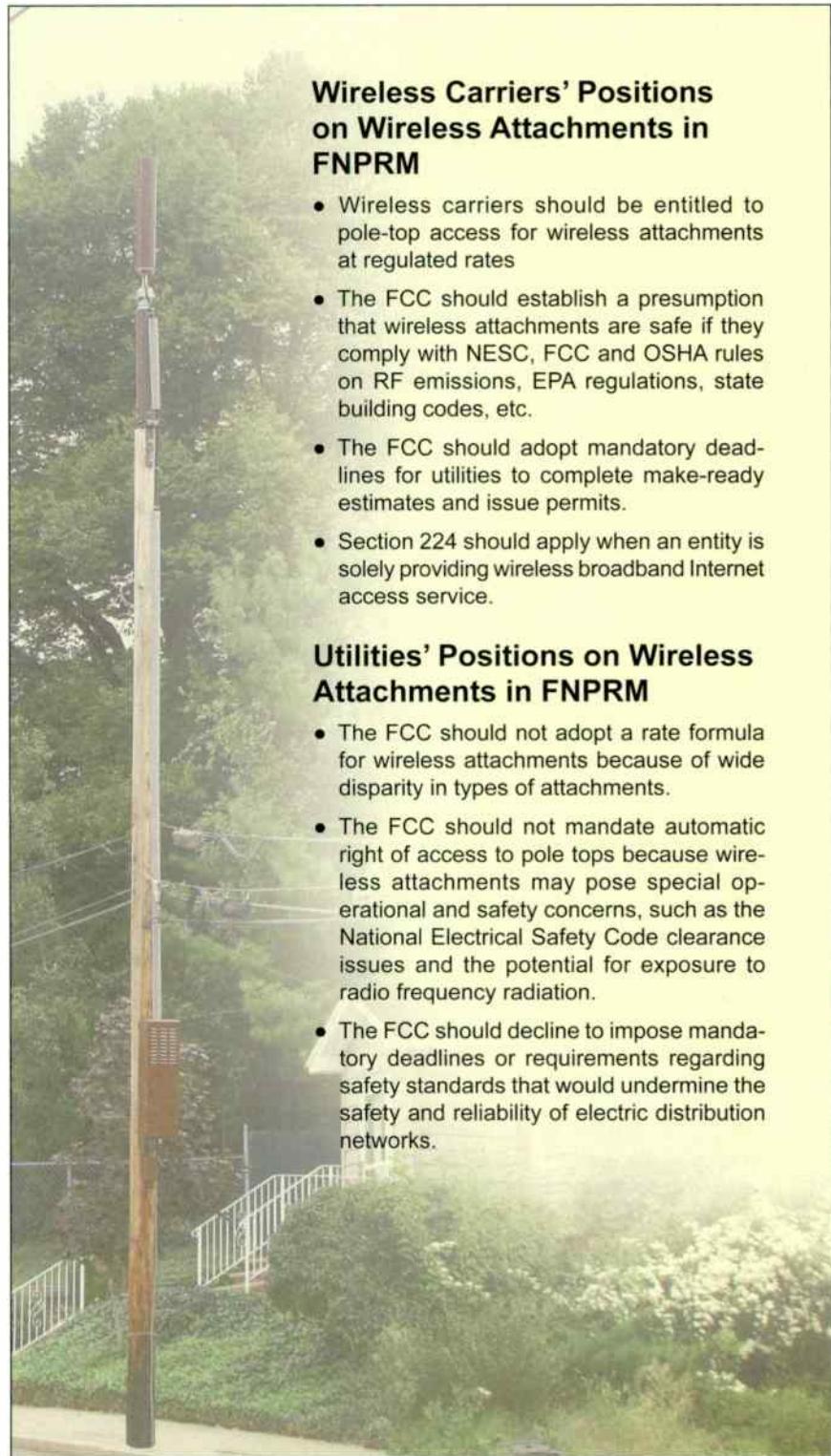
The FCC seems to have a vision of where rates should go. With regard to wireless, the FCC hasn't promulgated a specific rate formula as it has for wire-line attachments. There is a so-called cable TV rate formula.

There is a variation on that theme with the telecommunications rate formula, and in the FNPRM, the FCC wants to take those rate formulas into an entirely new world. But the FCC hasn't proposed anything specific with regard to how to calculate a wireless attachment rate under the pole attachment statute. It said that for a rate to be reasonable, it needs to be based on historical cost data. To the extent that the FCC comes out with a revised rate for cable and telecommunications, there could be a bootstrap into the wireless arena.

Section 224(f)(2) has statutory language that allows pole owners to deny access for insufficient capacity or for reasons of safety, reliability and generally applicable engineering purposes. This part of the statute has a constraining effect on the duty that pole owners owe telecommunications providers and cable TV providers when they are trying to attach to distribution facilities. It says that if these concerns exist for a particular arrangement that the wireless attacher is proposing, the pole owner can deny the application for these reasons.

A Public Notice the FCC issued in 2004 said utilities cannot reserve pole-top space for themselves. The FCC also said that utilities could not double-charge. They couldn't charge a pole attachment rental rate and something on top of that because a wireless carrier wanted to put an antenna on the distribution facility.

As far as the FNPRM is concerned,



the agency spelled out specific time frames for utility responses to wireline attachment requests, including the time for make ready. The agency did not include wireless equipment in its time frame. But the agency asked whether the same time frame discussed yesterday in a number of presentations should apply to wireless attachments.

The FCC went on to ask whether there should be anything special in its complaint process for wireless attachments. The agency said where there is no master agreement between the attaching entity and the pole owner, then the utility can respond based on any concerns regarding capacity, safety and the like.

Wireless carrier positions

What are the various parties saying in the FCC proceeding? The wireless carriers have taken the position that there should be mandated pole-top access for wireless attachments at regulated rates, which many utilities would say would be substantially lower than most parties pay in the market environment.

Wireless carriers also are saying that the FCC should establish some presumption that wireless attachments are safe based on the National Electrical Safety Code, OSHA rules and RF emissions.

They also want the FCC to adopt mandatory time frames similar to what the FCC is proposing for wireline attachments.

Wireless carriers want a declaration that the pole attachment statute would apply when an entity is providing only wireless broadband Internet access service. The reason for this last point is important because there is a lack of clarity on whether an entity providing solely wireless broadband Internet access service is a telecommunications provider. The status is somewhat uncertain because the FCC hasn't pronounced or categorized this type of service.

Utility positions

Utilities are saying there should not be a standard rate formula for wireless attachments because there is a disparity in

types of wireless attachments. "You can't have a one-size-fits-all rate," they say.

Utilities also are arguing there shouldn't be an automatic right of access to pole-tops for wireless antennas because of concerns related to safety and reliability, and the utility should have the right, individually and on its own, to declare whether that installation is going to be safe and whether it would affect the electrical distribution system's reliability.

Also, the utilities don't want mandatory deadlines for make ready and for other types of determinations because there are too many permutations.

FCC decision pending

The FCC will issue its FNPRM and other decisions this year, and whichever side doesn't get its way will appeal to the FCC on a reconsideration request, or various parties will take cases to the Courts of Appeal, challenging what the FCC will have done. This is one matter for which we have certainty: Someone will be on the losing end, and someone will take a court appeal.

Thus, the answers to some of these questions may not be known for a few years. We will see an agency decision in 2011, but as far as finality and having the courts speak are concerned, those

We will see an agency decision in 2011, but as far as finality and having the courts speak are concerned, those probably won't happen for several years.

probably won't happen for several years. Pole attachment issues have taken utilities to the Supreme Court twice in the past. It is hard to believe, because issues of this nature typically do not go to the Supreme Court for a decision, and certainly not as often as twice. This is likely to be a third time. ■

Shirley S. Fujimoto is a principal at Fish & Richardson, Washington, D.C. Her email address is fujimoto@fr.com. This article is based on her presentation at the Utilities Joint Use and Wireless Collocation Summit 2011 conducted on Jan. 12-14 in Dallas by the UtiliSite Council, a part of the Utilities Telecom Council, Washington, D.C. Fujimoto spoke at the session, "Regulatory Update — Joint Use Issues." For more information about UtiliSite conferences, visit www.utilisite.org.

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FCC and States Move on Pole Attachment Regulation

The Utilities Telecom Council offers an update on federal and state regulation of utility pole attachments. Wireless carriers and distributed antenna system (DAS) operators are among those affected.

By Brett Kilbourne

The FCC is being heavily criticized for falling behind on the National Broadband Plan, making it likely that the agency would move quickly to tackle the issues involved with pole attachments.

The FCC is promoting wireless broadband. Wireless is one of those few segments of the communications industry that is really doing well right now. The FCC is trying to stimulate the economy in any way it can, so you can expect that the FCC will try to do as much as possible to promote wireless broadband, most likely including something having to do with wireless communications-related attachments to utility poles. Examples include antennas used for cell sites by wireless carriers, and antennas, equipment and fiber-optic cable used by distributed antenna system (DAS) networks that in turn are used by wireless carriers.

As for regulation at the state level, almost every state is suffering from budget deficits. There is a real question as to what issues they can take on, let alone what they want to take on. At the same time, they are fighting for more of their jurisdiction than ever before.

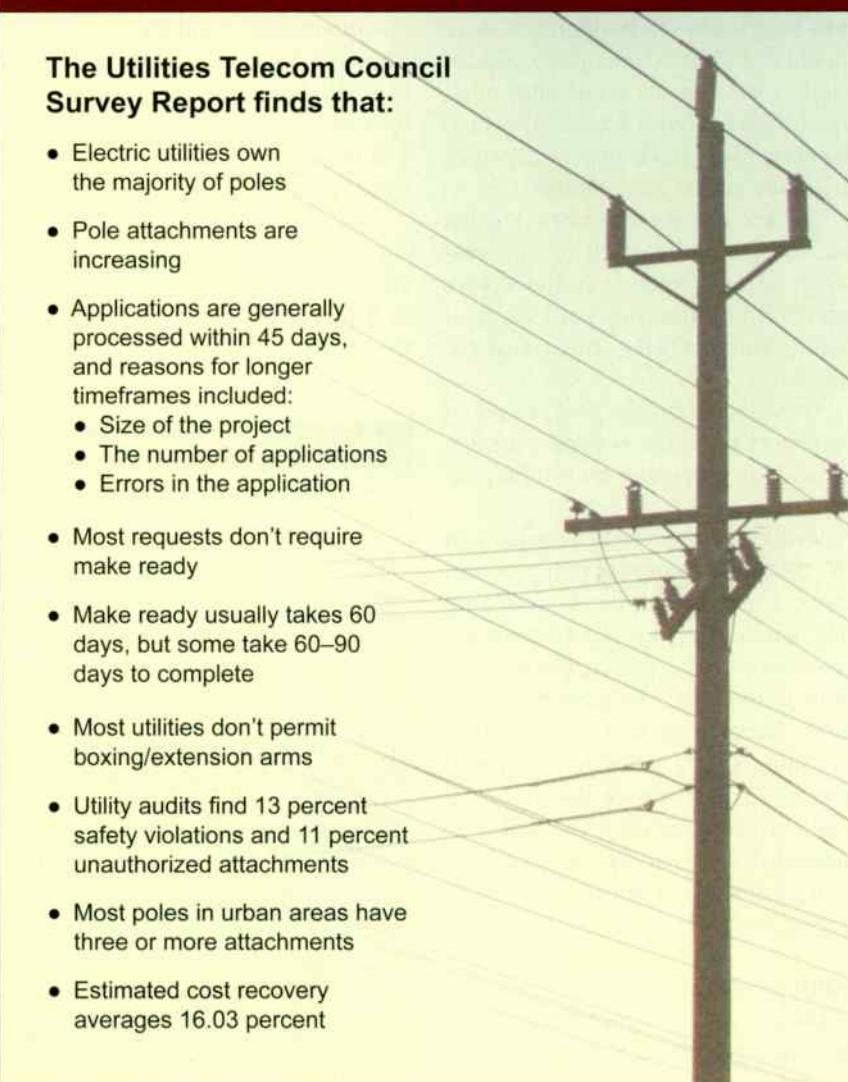
UTC Report

The Utilities Telecom Council put together a pole attachment report that we filed with the FCC. The idea was to give the FCC real-world facts about the state of pole attachments. To a large extent,

State of Pole Attachments

The Utilities Telecom Council Survey Report finds that:

- Electric utilities own the majority of poles
- Pole attachments are increasing
- Applications are generally processed within 45 days, and reasons for longer timeframes included:
 - Size of the project
 - The number of applications
 - Errors in the application
- Most requests don't require make ready
- Make ready usually takes 60 days, but some take 60–90 days to complete
- Most utilities don't permit boxing/extension arms
- Utility audits find 13 percent safety violations and 11 percent unauthorized attachments
- Most poles in urban areas have three or more attachments
- Estimated cost recovery averages 16.03 percent



the report fell on deaf ears. The FCC had its own policy agenda and didn't really want to hear the facts.

The report finds that utility companies generally process pole attachment applications on a timely basis, with some exceptions. Utilities usually complete make-ready projects within 60 days, with some taking as much as 90 days.

The report contains a lot of good information, and I think the FCC read it. But it was hard to find where anything from the report was incorporated in the National Broadband Plan.

National Broadband Plan

Section 6 of the National Broadband Plan has six recommendations about pole attachments and wireless collocation. The FCC wants to keep pole attachment rates low, lower the cost of make ready and set deadlines for every step in the process. The agency wants to improve the collection of information on the location and availability of poles, ducts, conduits and rights of way. It wants to amend Section 224 of the Communications Act to establish harmonized access for all pole attachments. What that may mean is that the FCC wants to have rates for incumbent local exchange carriers (ILECs) as well as the access they currently get under joint use.

The last recommendation is for a joint task force to look at poles as public rights of way at the state and local level. That recommendation may target municipally owned utilities along with cooperative utilities that currently are not subject to FCC pole-attachment jurisdiction.

Order and FNPRM

Since the FCC's May 20, 2010, "Order and Further Notice of Proposed Rulemaking" was issued, comments and replies have been filed. Four petitions for reconsideration also are pending.

On Sept. 28, 2010, the FCC invited state regulators to a pole attachment workshop. That workshop was important in revealing that many of the proposals in the FNPRM bubbled up from various state regulations.

The utility industry recognized that

The FCC National Broadband Plan

The plan recommends:

- Pole attachment rates should be as low and uniform as possible (6.1)
- Lower costs for make ready (6.2)
 - Schedule of charges for most common categories of work
 - Require the use of space-saving techniques, such as boxing and extension arms, where practical and consistent with pole owners' use of such practices
- Allow attachers to use certified, approved contractors to perform engineering assessments and make ready, as well as independent surveys, under the joint direction and supervision of the pole owner and the new attacher
- Require that existing attachers take action within a specified time frame (e.g., 30 days) to accommodate the new attacher
- Link the payment of make ready with performance, rather than requiring upfront payment
- A comprehensive timeline for each step in the process and dispute resolution reforms (6.3)
- Improve the collection of information on the location and availability of poles, ducts, conduit and rights-of-way (6.4)
- Amending Section 224 to establish harmonized access for all pole attachments (6.5)
 - All poles, ducts, conduits and rights of way be subject to a regulatory regime addressing a minimum set of criteria established by federal law
 - All broadband service providers, whether wholesale or retail, have the right to access pole attachments, ducts, conduit and rights of way based on reasonable rates, terms and conditions
 - Infrastructure access be provided within standard timelines established by the FCC, and that the FCC has the authority to award damages for noncompliance
- Establishing a joint task force with state, tribal and local policymakers to craft guidelines for rates, terms and conditions for access to public rights of way (6.6)

it had some ground to make up. UTC organized a giant meeting with the FCC where we provided them with the real-world facts. Many representatives from the utility industry spoke about their real-world issues.

The Edison Electric Institute, an association of investor-owned electric companies, conducted an economic study and filed it with the FCC in December.

New concept of nondiscrimination

The FCC order that came out of the May 20 decision institutes a new concept of nondiscrimination. Basically, it can be boiled down to the gospel, "Do

unto others as you would have others do unto you."

Some lingering questions as to what nondiscrimination means led to the filing of several petitions for reconsideration. On the one side, utility companies still want to have a little flexibility so they don't have to provide the same type of access to communications providers that they do for their own utility attachments. They also want to be able to change their practices in the future. They don't want to be locked in, ad infinitum, whenever they provide boxing or extension arms, for example. ("Boxing" refers to having attachments, such as coaxial cables,

The FCC Order

The Order provides for nondiscriminatory use of attachment techniques. Key statements in the Order:

- "We now clarify that utilities must allow attachers to use the same attachment techniques that the utility itself uses in similar circumstances, although utilities retain the right to limit their use when necessary to ensure safety, reliability, and sound engineering. Our conclusion here is consistent with the interpretation of the Act in prior bureau orders."
- "Accordingly, we conclude that, where a pole can accommodate new attachments through boxing, bracketing, or similar attachment techniques, there is not 'insufficient capacity' within the meaning of section 224(f)(2)."

The Order provides for timely access to pole attachments. Key statements in the Order:

- "We thus hold that, pursuant to section 224 of the Act, the duty to proceed in a timely manner applies to the entirety of the pole attachment process. Make ready or other pole access delays not warranted by the circumstances thus are unjust and unreasonable under section 224."
- "We clarify ... that utilities must perform make ready promptly and efficiently, consistent with evaluation of capacity, safety, reliability, and generally applicable engineering practices, whether or not a specific rule applies to an aspect of the make-ready process."

fiber-optic cables and telephone wires, on both sides of a pole, which requires line workers to cross over them when climbing the pole. —ed.]

On the other side, the attachers want to push the limits of the FCC's Order. They say the nondiscrimination requirement means that the utility companies must change poles for them as the utilities would for themselves.

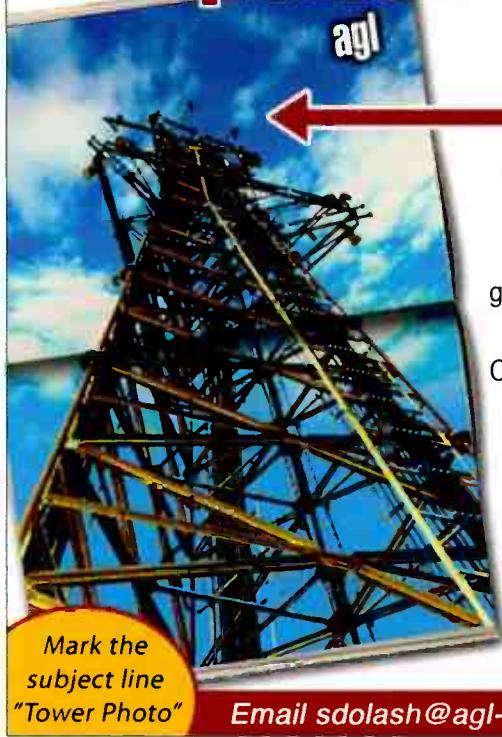
Make ready

The FNPRM proposes deadlines for make ready and the use of contractors for make ready. The FCC has rules to allow attachers to use contractors to make their own attachments. The FNPRM proposal differs because it covers contractors who perform engineering surveys. A lot of discretion is involved with that sort of work, and it affects the utility infrastructure to a great extent.

Other access proposals in the FNPRM are administrative, such as one that seeks

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to improve the availability of data via an access database. The database would be intended to help attachers map out where to put attachments by revealing which poles were fully loaded and which weren't. Not only would the creation of the database require a lot of work on the part of the utilities, UTC doesn't believe it would offer much benefit.

The FCC also wants to streamline the pole attachment enforcement process.

The FCC recognized some utility industry issues with respect to unauthorized attachments.

The FCC wants to modify the sign-and-sue rule, which has been a big issue for utility companies for years. But attachers told the FCC that they should not have to address every potential issue in a pole attachment agreement up front. If you run into a problem down the line, you can still file a complaint as applied against a provision of the rules that only later you realize is actually invalid.

With proposed rates in the FNPRM, the FCC wants a revised telecom rate that would be lower than the existing cable rate.

Utility opposition

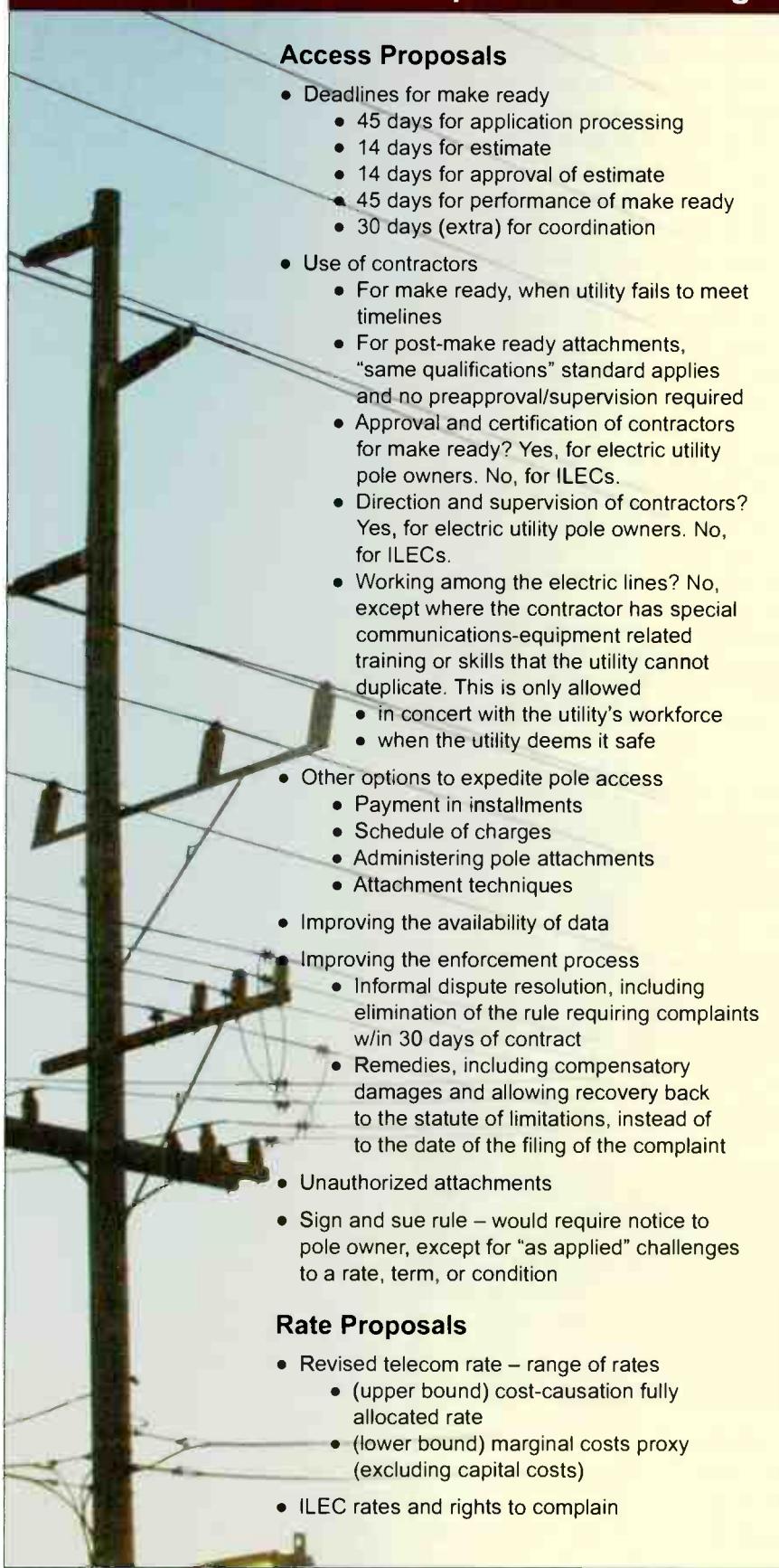
None of the FCC proposals are good for the utility companies.

Comments filed by utility companies in response to the FNPRM show them disagreeing with almost every proposal except for the unauthorized attachment proposal. With that proposal, the utilities believe the FCC should put some teeth into it instead of merely asking rhetorical questions about whether unauthorized attachments are a real problem.

The most important part of the FNPRM for the cable TV companies and competitive local exchange carriers (CLECs) is a proposal to lower the broadband rate. They want that rate to be as low as possible and, to the extent they can, also get certain conditions for access tightened up.

For wireless attachers, it's all about pole-top access, for the most part. They also support a lot of the other FNPRM proposals that the CLECs and cable TV companies support.

FCC Further Notice of Proposed Rulemaking



Access Proposals

- Deadlines for make ready
 - 45 days for application processing
 - 14 days for estimate
 - 14 days for approval of estimate
 - 45 days for performance of make ready
 - 30 days (extra) for coordination
- Use of contractors
 - For make ready, when utility fails to meet timelines
 - For post-make ready attachments, "same qualifications" standard applies and no preapproval/supervision required
 - Approval and certification of contractors for make ready? Yes, for electric utility pole owners. No, for ILECs.
 - Direction and supervision of contractors? Yes, for electric utility pole owners. No, for ILECs.
 - Working among the electric lines? No, except where the contractor has special communications-equipment related training or skills that the utility cannot duplicate. This is only allowed
 - in concert with the utility's workforce
 - when the utility deems it safe
- Other options to expedite pole access
 - Payment in installments
 - Schedule of charges
 - Administering pole attachments
 - Attachment techniques
- Improving the availability of data
- Improving the enforcement process
 - Informal dispute resolution, including elimination of the rule requiring complaints w/in 30 days of contract
 - Remedies, including compensatory damages and allowing recovery back to the statute of limitations, instead of to the date of the filing of the complaint
- Unauthorized attachments
- Sign and sue rule – would require notice to pole owner, except for "as applied" challenges to a rate, term, or condition

Rate Proposals

- Revised telecom rate – range of rates
 - (upper bound) cost-causation fully allocated rate
 - (lower bound) marginal costs proxy (excluding capital costs)
- ILEC rates and rights to complain

As far as incumbent local exchange carriers (ILECs) go, their responses to the FNPRM are interestingly split. Yes, they want the same low rates as their competitors, but they're also pole owners, so some of their positions are actually similar to those of the electric utility companies.

Finally, among the groups that commented on the FNPRM, the state public utility commissions generally agree with some of the FCC's proposals, including its proposal on sign and sue. These comments help to provide the FCC with the backup it needs to implement its proposals.

State regulation

A number of regulatory items are pending at the state level. A bill introduced in the Virginia legislature would regulate pole attachments on coop poles.

Photography courtesy of NextG Networks



Currently, coops are exempted from any FCC jurisdiction. Some efforts were made during the past two years, especially by ILECs, to push legislation and regulation at the state level against

cooperative utilities and the municipally owned electric utilities. In some states, they succeeded in getting bills and regulations passed. It may be something that bubbles up, as these other state matters have, at the FCC.

In Maine, an ongoing pole attachment complaint is blossoming into a full-fledged investigation of the ILEC Fairpoint's pole attachment practices. This issue mostly has to do with boxing, but it could go into other access requirements.

One bit of good news involves the problem electric utilities have had with putting wireless attachments into the electric space. The Connecticut Department of Public Utility Control decided that, at least for poles with primary lines, there won't be any requirement for wireless attachments. But poles carrying nonprimary lines are subject to access for wireless attachments. So that was a split decision, but at least it is better than what electric utilities have been getting in most jurisdictions, which is basically across the board access to all utility infrastructure.

Finally, a proceeding starting to boil in California involves the California Cable TV Association, which challenged a rate that San Diego Gas & Electric charged for pole attachments.

Outlook for 2011

The FCC has a policy agenda partly driven by the economic downturn. The agency wants to stimulate the economy as much as possible. If the FCC's initial decisions are any indication, the stimulus will go to companies that are not utility companies.

It is unfortunate, but the reality is that pole attachments are a hidden subsidy. Everyone thinks it's great. Nobody has to see that they are actually incurring costs from this. That has been our message all along, but trying to get that message out into the public is difficult.

The FCC probably sees pole attachments as an easy win, something that they can claim credit for, in terms of "promoting broadband." As a practical matter, it probably isn't going to make any difference to broadband deploy-

ment. The only areas where it is going to make a difference are areas that are already served, not areas that are unserved.

Nevertheless, the FCC has an obligation to recognize some real-world

The FCC has an obligation to recognize some real-world issues. A minority of staff members at the FCC get it. The problem is that those who get it are not in a position to trump the others who make policy.

issues. A minority of staff members at the FCC get it. The problem is that those who get it are not in a position to trump the others who make policy. UTC still has its work cut out for it at the FCC, and we will continue going to the FCC to educate them on our issues.

As far as Congress goes, I don't expect any major legislation this term. If there is a major telecom rewrite, I can almost guarantee you that pole attachments would be included. I doubt that many in Congress would understand that it is a big issue. The utility industry's Washington representatives need to be aware of the pole attachment issue, especially with respect to ILEC rates. ILECs will be pushing for a rate, and I suspect that they will try to eliminate the exemption that currently applies to municipal and cooperative utilities. ■

Brett Kilbourne is director of regulatory services and associate counsel for the Utilities Telecom Council (UTC). This article is based on his presentation at the "Pole Attachments — An Overview" conference session during the Utilities Joint Use and Wireless Collocation Summit 2011 conducted by the UtiliSite Council, a part of UTC, on Jan. 12–14 in Dallas. For more information about UtiliSite conferences, visit www.utilisite.org.

Utility Pole Attachments and the FCC Rulemaking

The Edison Electric Institute expresses its concerns about the FCC's plans to expand its regulation of pole attachments used by distributed antenna system (DAS) network operators and wireless telecommunications carriers, among others.

By the AGL Staff

Speaking at the Utilities Joint Use and Wireless Collocation Summit 2011 conducted on Jan. 12–14 in Dallas by the UtiliSite Council, a part of the Utilities Telecom Council (UTC), Aryeh Fishman, director of regulatory and legal affairs at the Edison Electric Institute, gave an overview of pole attachment regulations from the perspective of electric utilities. EEI is an association of investor-owned electric companies.

Fishman said that the electric industry is moving toward the end game for pole attachment regulations, and as it does, attention paid to the electric industry's development of the smart grid is bringing attention to critical infrastructure, the layers of communications involved with the electric system, and the relationships between the electric industry and the telecommunications industry.

Historical relationship

"Pole attachment is one of the longest-standing, historical relationships that the electric industry has had with the communications industry," Fishman said. "On Nov. 20, 2007, under Chairman Kevin J. Martin, the FCC issued a Notice of Proposed Rulemaking in WC Docket No. 07-245 in the matter of Section 224 of the Communications Act, looking to amend the FCC rules and policies governing pole attachments. The NPRM had 150 questions, zero proposals and maybe

one tentative conclusion that the pole attachment rate needed to be a little higher. I had never seen something like this."

Visiting commissioners

Fishman said that the NPRM asked electric utilities to respond in detail, but it offered no clarity about a possible future FCC action. In response, the electric industry began a program to advocate its position. Fishman said that the Utilities Telecom Council's director of regulatory services and deputy counsel, Brett Kilbourne, and he made visits to the five FCC commissioners and their staffs.

"I heard time and time again from the various commissioners that they had no clue as to what was going to happen at the FCC," Fishman said. "The various commissioners don't talk to one another."

Fishman said it wasn't possible to learn what the staff or commissioners thought about pole attachments. Nevertheless, he said the Edison Electric Institute developed 700 pages of comments and conducted numerous written and oral communications with individual commissioners. Such communications are called *ex parte*, and they require public disclosure after the fact. The EEI attorney said that someone filed an *ex parte*

notice to call attention to the utility industry's advocacy, saying, in effect, "Here you go: The electric industry has been over to the FCC something like 15 to 20 times about pole attachments. These guys are bad."

Utilities: the away team

Fishman said it seemed to him that meanwhile, advocates for telecommunications interests made a hundred visits to the commissioners, perhaps one every day. "For those of us representing the electric industry, the sense of being the away team persisted while we were over at the FCC," he said. "The electric industry submitted arguments about operational issues, rates and statutes. Then, on Jan. 20, 2009, Chairman Martin departed without a new pole attachment rule being issued. Many electric industry representatives

Fishman: "Pole attachment is one of the longest-standing, historical relationships that the electric industry has had with the communications industry."

breathed a sigh of relief, thinking maybe the pole attachment rulemaking effort would end."

The EEI attorney recounted a series of events that led to the next step. Barack Obama became president on Jan. 20, 2009, and signed into law the American Recovery and Reinvestment Act of 2009 on Feb. 17, 2009. The ARRA directed the FCC to create a plan

to expand broadband telecommunications lines across America that would be capable of 100 megabits per second of data speed. Appointed by President Obama, Julius Genachowski became FCC chairman on June 29, 2009.

On Nov. 10, 2009, the FCC asked for comments about broadband adoption, giving three weeks for response. Electric utilities provided feedback and EEI made more visits to the eighth floor. EEI assembled experts from the industry to explain to the FCC staff how problematic the operational issues involving pole attachments would be for the industry with respect to line worker safety and electric grid reliability.

National Broadband Plan

On March 16, 2010, the FCC published "Connecting America: The National Broadband Plan." Utilities found it extremely frustrating; that is no secret. The electric industry saw little in the broadband plan that did much for utilities regarding pole attachments. The plan said, "Let's drive the rates down and push for speed of access." The plan gave short shrift to the issue of unauthorized attachments, which EEI had emphasized.

"EEI was surprised that the plan didn't seem to reflect our industry," Fishman said. "It reflected the view that speed to market and speed to access are where value is to be found, whereas the values the electric industry put forth in terms of safety and reliability, and allocating costs in a full and reasonable manner, were not reflected in the plan. It is fair to say that the electric industry was disappointed with the National Broadband Plan."

Although Fishman said it seemed to him that the National Broadband Plan

The electric industry saw little in the broadband plan that did much for utilities regarding pole attachments

was merely an aspirational document, he said that aspirational documents have a way of getting new life. And he said new life was breathed into the plan with the FCC's May 20, 2010, "Order and Further Notice of Proposed Rulemaking." In the rulemaking pro-

ceeding, the FCC seeks to revise "pole attachment rules to lower the costs of telecommunications, cable, and broadband deployment and to promote competition, as recommended in the National Broadband Plan."

Incremental cost

Fishman said the FNPRM makes proposals to redefine the telecom rate for pole attachments, to exclude a great number of the capital costs, and to drive what would not represent the full distributed cost, but instead an incremental cost.

"It includes a number of operational proposals," he said. "Highlighted would be the make-ready deadlines that, in particular, caused a lot of people a great deal of heartburn. The FNPRM proposes that a database of utility poles be established, and whether the database was to be established by the FCC or by utility companies was left unclear. The FNPRM contained proposals that the electric industry viewed as going far beyond the jurisdiction that the statute, Section 224 of the Communications Act, had granted to the FCC."

Fishman said that working with UTC, EEI developed comments to submit to the FCC about the proposed rulemaking. Because under Genachowski, the FCC emphasized its use of data in decision-making, the two associations spent much time and energy documenting pole attachment costs and presenting the FCC with an economic study.

Ex parte presentations

"Utility companies made *ex parte* presentations and, as a group, spoke to the FCC in November 2010, giving a practical rundown between perception and myth on pole attachments in the sense that there is myth that pole attachments would be easy if the utilities just didn't pay so much attention to rules and safety," he said. "In their presentation, representatives from utility companies demonstrated what the safety problem is when you have a line worker down up on a pole and you have a boxing problem, and you are trying to get your line worker down." ["Boxing" refers to having attachments, such as coaxial

cables, fiber-optic cables and telephone wires on both sides of a pole, which requires line workers to cross over them when climbing the pole. —ed.]

The EEI attorney said advocacy has to make these safety issues real to people. "It is one thing for FCC staffers to be thinking of this as a matter of subsidies, and that gets my ire up," he said. "But it is more meaningful when they understand that it probably is their cousin who is a line worker who is going to be jeopardized. That possibly the safety and reliability involves putting first responders at risk. That it may in fact involve starting fires as a result of problems with pole attachments."

Real-life issues

Fishman said that when the FCC chooses to regulate pole attachments based on what the utility industry believes are unsound jurisdictional grounds, the agency needs to understand that it is affecting real-life issues, not just dollars and cents. He said that many times, the issue of pole attachments gets improperly reduced to dollars and cents. He said that the National Broadband Plan has an inherent conflict, and it should have balanced the interests of safety and reliability along with the idea of creating ease of access for communications attachers.

In addition, Fishman said, contrary to apparent FCC assumptions that attachers — those who want to use utility poles to support TV cable, Internet fiber, telephone wires, distributed antenna system (DAS) cable and wireless telecommunications antennas — are similarly situated, they are not. He said that because they are not similarly situated, giving them access to poles on a similar basis would not increase competition.

"The FCC seeks to regulate poles owned by investor-owned utilities (IOUs) — something the agency cannot now do because of an exemption given to IOUs in federal law — to promote broadband deployment in rural and underserved areas," he said. "But IOUs generally do not provide electric service in those areas. Making IOUs subject to regulation would do little to advance

the FCC's goal. Nevertheless, it would reduce the IOUs' pole attachment rates in metropolitan areas, where what you're really talking about is a transfer of wealth. EEI tends to view the FCC effort to regulate IOUs as an industry cross-subsidy situation."

Fishman said that EEI believes when it comes to the cost of poles, everyone making use of the poles should be paying a fair share. He said that there is an underlying sense from the electric industry that it recognizes that critical infrastructure is going to be a platform for other industries, but the electric industry is not keen on having ratepayers subsidize the development of new business models.

FCC jurisdiction

EEI's attorney explained that Section 224 of the Communications Act limited the FCC's jurisdiction to act based upon a complaint alleging unjust and unreasonable rates, terms and conditions. He suggested that anyone who reads the FNPRM should ask whether the FCC's proposals are based on rates, terms or conditions. "Is a database a rate, term or condition?" he asked. "It probably is not. So how does the FCC have jurisdiction to require the establishment of a database?"

He said that the FCC's proposed make-ready deadlines offer another example. "Generally speaking, make-ready activities do not fall within the purview of the FCC until a complaint is made," he said.

Fishman described unauthorized pole attachments as an epidemic that represents a competitive advantage for the attacher who doesn't have to pay the cost and who doesn't go through the approval process. He said the easiest way for an attacher to obtain pole access is to go ahead and place the attachment on the pole and forget about paying for it. An unauthorized attachment wouldn't necessarily be made in a manner that follows all of the utility's guidelines, and the installer might use its own contractors. He said utilities see it as a problem when contractors are beholden to the attacher, not the utility, because the contractor lacks an incentive to follow the

utility's guidelines and our rules, and to preserve its critical infrastructure.

Managing utility

The FNPRM includes a proposal to create a managing utility for jointly owned poles, a proposal Fishman described as folly. "Each owner has its own interest in the infrastructure," he said. "Each owner has to protect that infrastructure. It is going to be very difficult for one owner to cede its rights for management of its poles to another owner."

The FNPRM proposes a standardized schedule for charges. Fishman said he could not understand how electric utilities ever would arrive at a standardized schedule because every make-ready project seems to be different. He said it appeared as though the FCC

was trying to make utility charges for make-ready into a tariff. He said Section 224 does not make utilities into common carriers such that they would be subject to a tariff.

In short, Fishman said that the FNPRM contains many proposals that go far beyond what the FCC can legally do, "not to mention that we don't think it is such a hot idea from a policy standpoint," he said.

Cable TV subsidy

Fishman said that in its earlier NPRM, the Martin commission seemed to indicate that it understood that the idea behind the statute that set pole attachment rates was that, one day, the subsidies for cable TV would end. "In the Genachowski commission's FNPRM, you really don't see that acknowledgement," he said. "The FNPRM basically says, 'Reflecting the National Broadband Plan, we're going to drive rates to as close as possible as incremental costs can be.' I think that's where they essentially ended up on rates."

He said that the idea in the FNPRM was that the FCC would redefine pole

costs to be incremental costs, not fully distributed costs. "The basic law school proposition is that you don't read the statute in a vacuum," Fishman said. "You need to read the whole statute. And the statute says 'the cost of the space being provided.' It looks as though the FCC is manipulating the statute in a fairly unreasonable manner to arrive at a certain result, and that is something that EEI does not agree with."

No unified rate under the statute

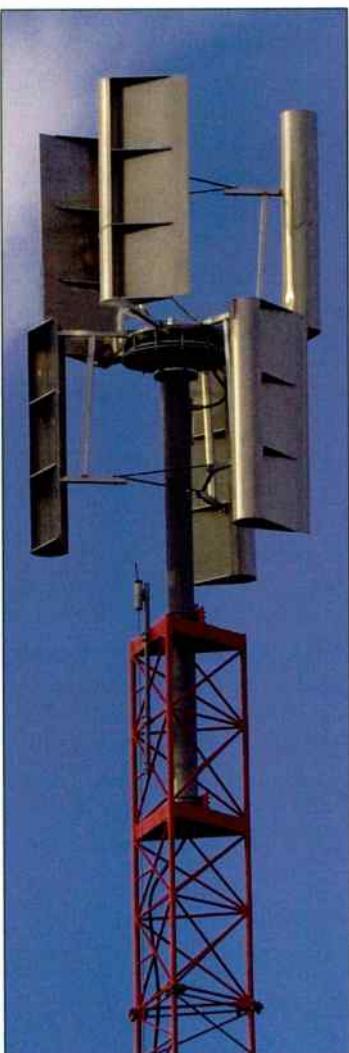
Fishman said that EEI does not believe that the statute allows the FCC to create a unified rate. He said the statute

There is an underlying sense from the electric industry that it recognizes that critical infrastructure is going to be a platform for other industries, but the electric industry is not keen on having ratepayers subsidize the development of new business models.

creates one rate for cable TV providers and another rate for telecommunications service providers. He said that EEI continues to object to the notion that incumbent local exchange carriers (ILECs) are somehow similarly situated with competitive local exchange carriers (CLECs) and the idea that they should receive a regulated rate and come under the jurisdiction of the statute.

"The original intent of the statute was to support CLECs and cable TV providers in the sense that they were competing against the ILECs, so it seems very strange that the FCC suddenly would bring CLECs in when Congress clearly did not intend for CLECs to be a part of the regulated rate," he said. "EEI does not believe ILECs are similarly situated with CATV companies and CLECs."

Fishman said that he doesn't believe the electric industry will see an order result from the FNPRM that it will like. "The electric industry is going to be figuring out whether it wants to take the matter to the circuit court," he said. "More interestingly, it is likely that electric utilities will go to their state regulators and perhaps entertain notions of reverse preemption." ■



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