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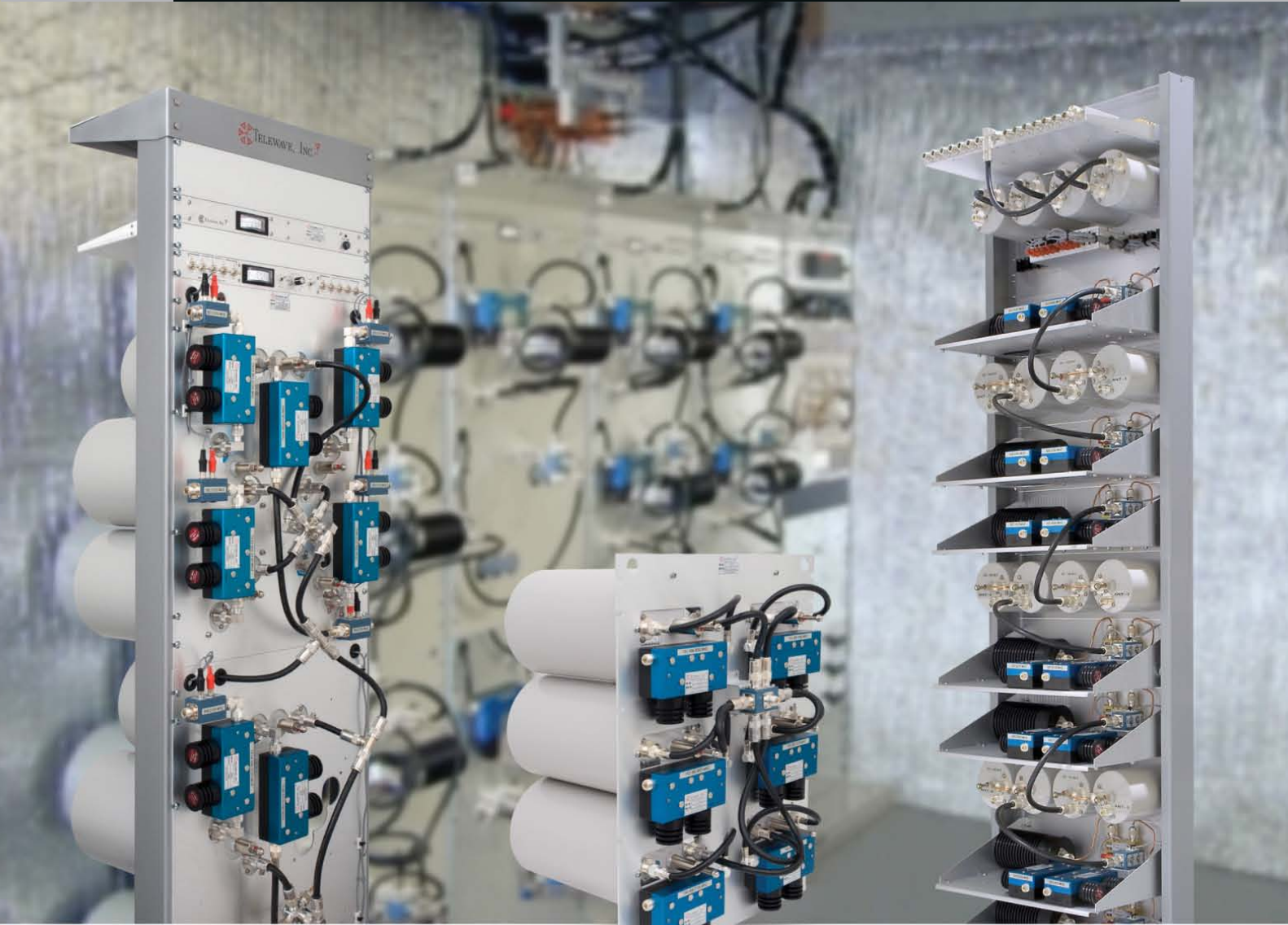


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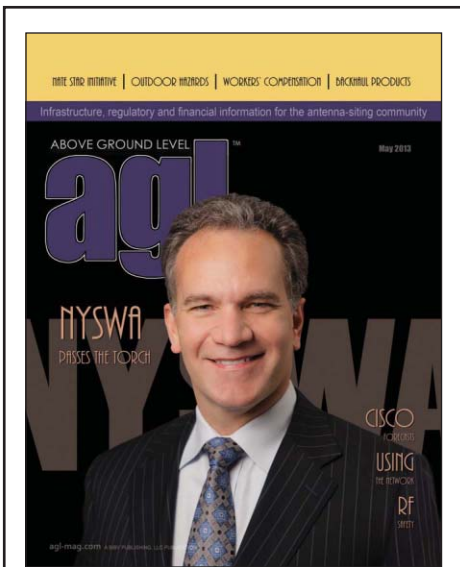
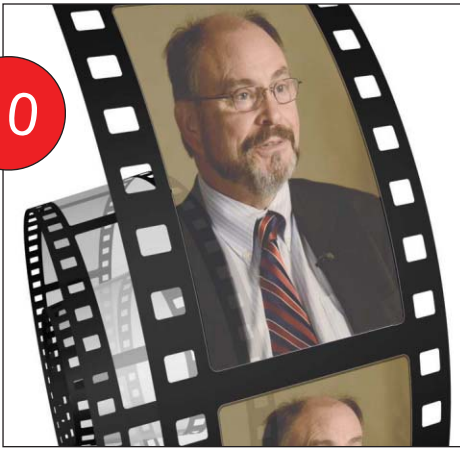
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**on the cover**

Pictured is Doug Dimitroff, the founding president of the New York State Wireless Association. See "NYSWA Passes the Torch" on page 64.

Cover photo courtesy of Phillips Lytle. Cover design by Scott Dolash.

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# Sold! ... Um, to Whom?

Sprint Nextel may be on its way to new ownership by the time this issue reaches print. At the moment of this writing, however, it isn't entirely clear



who that new owner will be. Sprint's board of directors announced that the company received an unsolicited proposal from Dish Network to acquire the company. Sprint said its board of directors would evaluate the proposal consistent with its fiduciary and legal duties and would comment no further until it decides to comment further. I guess that means, ask now all you want. We know you'll ask. We'll answer later. When we want to. Thanks for asking. No, really. Thanks for asking.

Kevin Smithen, an analyst with Macquarie Equities Research, said that a counteroffer from Softbank could be expected, given that the company previously demonstrated a willingness to bid

up the price when it acquired eAccess. "We believe the company would do so again," he said. "We expect Softbank will raise its bid for Sprint to \$7.50+ and tender for more than 55 percent of the stock currently proposed."

Other possibilities Smithen mentioned include Softbank and Dish Network collaborating in a way "that could help Softbank take its U.S. presence to a deeper level." He said the two companies might form a joint venture for the network and content, with Dish Network owning a minority stake and Softbank controlling.

He sees Softbank as prevailing, with Sprint and Dish Network moving on to look at T-Mobile USA.

RF safety

The FCC is taking a new look at RF safety in a combined rulemaking and inquiry announced March 29 and that allows at least three months for public comment. The result will affect tower owners and antenna space renters, so you would be well advised to give it a look or to have your legal counsel do so. Ugh. It's 200 pages. Search the FCC website for ET Docket No. 13-84 and ET Docket No. 03-137. ■

**By Don Bishop, Executive Editor**  
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Softbank and Dish Network are bidding for ownership of Sprint Nextel.



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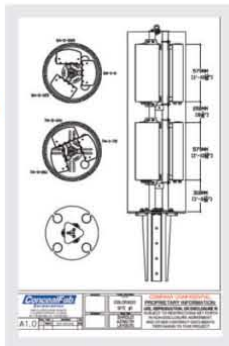
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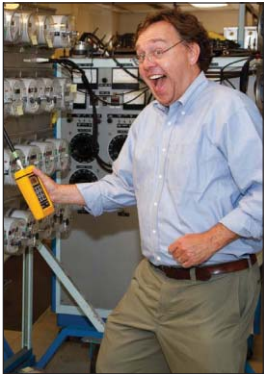
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**publisher's note**

# What's Going On

I don't often write much about what I've been working on, however, this month is a little bit of a high point in life, so I'll spend a minute in the limelight. Most everyone knows my background in towers, large cell sites, etc.; however, for more than a year, I've been CEO of CoverageCo, a company with a decisive commitment to small cells and just about everything that can be done with a smaller, less-expensive, quicker approach. Although you have to look at



Photograph courtesy of mikesfosterphotography.com

a lot more sites to cover the same area rather than just a couple of sites, the economics are compelling. The economics are particularly compelling when there are many areas inside the traditional macro-cell coverage area that you don't need to cover, areas where there are simply no people. Micro-sites with smaller, focused coverage corridors work great.

## Pico base station

So, a little about CoverageCo, since you asked. CoverageCo is a host-neutral, inbound roaming company. We have secured spectrum in the secondary market (you can probably figure out from whom, if you want to). We are using a dual-technology, software-defined pico base station, developed and manufactured by Dr. Vanu Bose of Vanu Inc. It's a 2G, voice-and-data, GSM and CDMA base station in something about the size of a ream of paper.

This truly impressive device has some wonderful characteristics, including very low power consumption (think of something close to a light bulb), and it works well with relatively high-latency

backhaul (e.g., DSL and cable modems for backhaul). Obviously, there are some things you have to give up to obtain all of these impressive features. The RF power is relatively low, as you would expect from a physically smaller device; however, we also do not require heating or cooling, keeping the capex and opex low. There is more than enough RF energy to cover most of what we need: a couple of miles in any particular direction. We're primarily targeting rural roadways—the only places where there are people! With sites about a mile or more apart in our initial deployment area, we're making use of those pesky utility poles next to the road, and we have a network that actually covers the needed area. The lower power is not a limitation when we're down in the nooks and crannies; we're limited by terrain, not power. On a flat, open roadway, with reduced elevations, we're still pretty good on distance.

## The first call

I've been learning the details of how to stand up a network and all of the back office and infrastructure that goes into placing phone calls. We're up and running and have completed roaming testing with a number of carriers. I've been fortunate enough to look over the shoulder of someone else who is responsible for all of those details, and to whom this is all routine. For me, it's exciting to watch it all come together. I had the thrill of placing the first phone call on the network a couple of weeks ago. We're looking at a commercial launch later this spring, and I'll be writing more about this, for sure. This is not where most people think of deploying small cells; however, it makes a lot of sense. Ultimately, small cells will also need to be deployed in the traditional carrier-centric model. Nevertheless, for right now, I could not be more thrilled to be involved with the details of this deployment, once again doing all kinds of things for the first time.

I'm lucky enough to have the flexibility to submit this article from whatever far-flung event, trade show or airport I happen to be in. This column is coming to you from the lobby of the Competitive Carriers Association (formerly the Rural Cellular Association) in New Orleans. I really love this association. This morning's keynote speaker was Dan Hesse, CEO of Sprint Nextel, who is really a fun guy to listen to. It's a little like Fred Rogers explaining something really complicated, but with a lot of funny business references. The takeaway points Dan discussed were Sprint's interests in special access (keeping some degree of fairness as the FCC rules move from TDM to all-IP networks), spectrum (not letting anyone get too much, and making sure there is some left for the little folks) and competitiveness (don't let anyone get too big, and making sure the FCC regulates some device compatibility).

## 4G roaming

Hesse was convincing that these were areas of concern to all operators. Now, with my actually being in the field trying to build networks, I'm a believer in the importance of all three points. One thing that I'm going to be watching very closely is 4G roaming. At CoverageCo, we're first building voice access in rural areas that essentially every phone in the world can roam onto (with a proper agreement). We're host-neutral in that we're not being built by a particular carrier, and we're able to roam with all U.S. carriers. That's not the case, yet, with 4G, where the bands, phones and business relationships (billing, clearing and settlement) are not yet established. This ground war is unfolding before our very eyes. It will be years before these issues are solved, although their effects on rural America and competitive broadband access are significant. ■

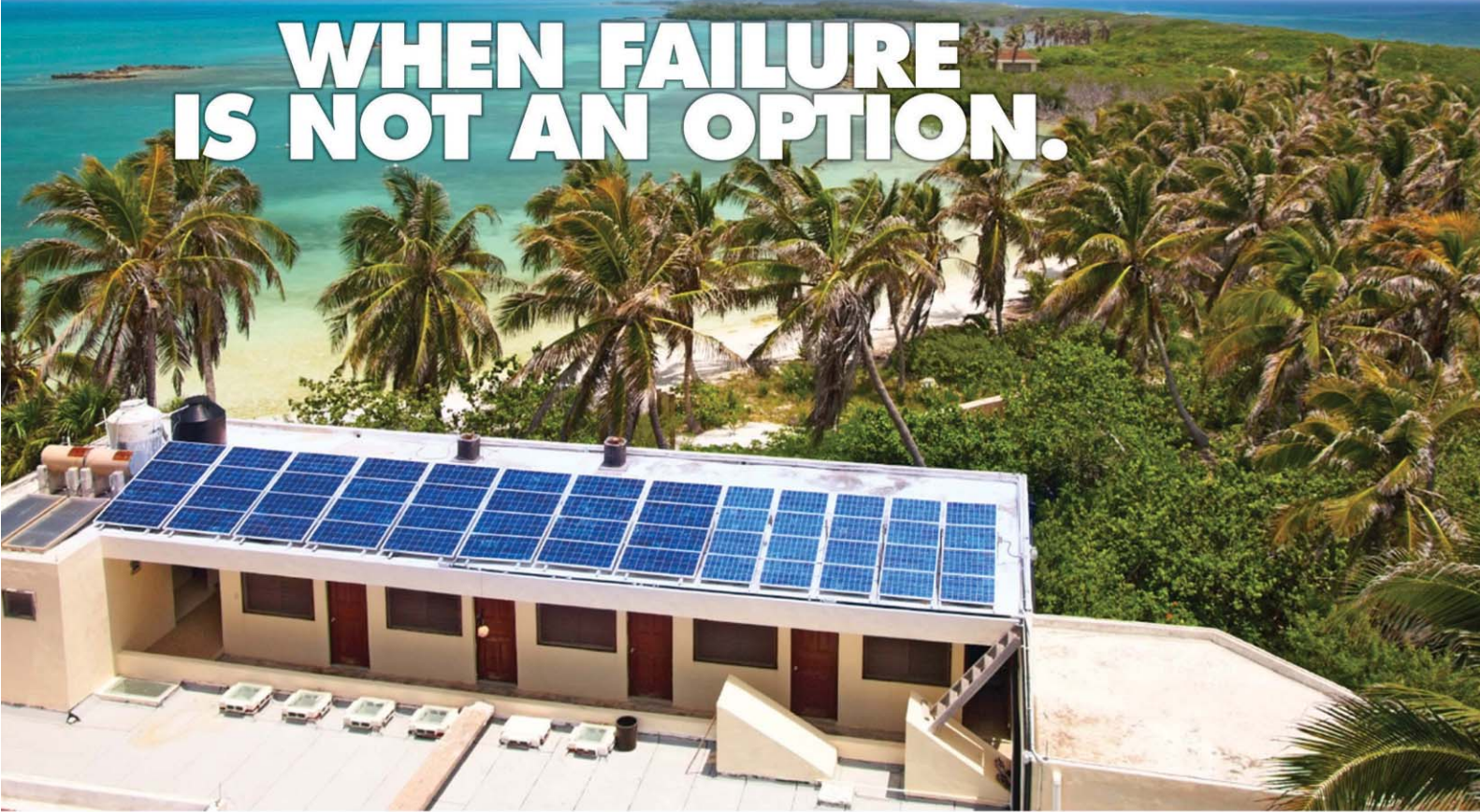
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risky business

# Executive Risk? — Opting Out of Workers’ Compensation Coverage

By David Saul, AAI

Today, company executive officers and company owners may choose to not elect coverage under statutory workers’ compensation benefits. This option is available in most states. Before choosing this option, are they aware that their health insurance may not cover work-

related medical claims? This especially becomes problematic if they are insured under a spouses’ health insurance plan. Most of those policies almost always have a work-related injury exclusion. If they have coverage through their own plan, they should arrange for coverage if

in fact they have opted out of Workers’ Compensation.

To give an example, let’s say you are seriously injured in a work-related at fault auto accident while on your way to a jobsite visit or business meeting. When you originally set up your workers’ compensation, you either elected to not purchase a policy because you had no employees or you opted out of coverage in order to save several hundred dollars. When your claim is submitted to your spouse’s health insurance carrier, they deny coverage. Your only monetary option is to collect under your auto medical payments coverage. Unfortunately, this benefit only averages \$2,500. You will be uninsured for the rest of your medical bills.

Hopefully, your agent has asked you these important questions and you will find out before it’s too late. In addition to health care benefits, the workers’ compensation will also replace lost wages. Although this benefit is capped, it will still cover at least a portion of your loss-of-income claim. If you have opted out, an individual disability policy may be the answer. Or, you could avoid all of the above and elect to be covered under your company’s workers’ compensation policy. Some things in life are easy. ■

David Saul is executive vice president of BB&T – Atlantic Risk Management, Columbia, Md., and is an accredited risk advisor in insurance (AAI). His email address is [dsaul@bbandt.com](mailto:dsaul@bbandt.com).



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# RF Safety with Towers and Handsets

By the AGL Staff

*During the AGL Wireless Infrastructure Conference in Seattle, AGL interviewed Ted Abrams, P.E., president of Abrams Wireless. The company offers consulting services to wireless infrastructure businesses. Abrams, a professional engineer, is a former senior vice president of American Tower and former chief technology officer of SpectraSite Communications. Here are his remarks, edited for length and style.*

**AGL:** Tell us a little bit about yourself and Abrams Wireless.

**Ted Abrams:** AWI serves customers in the wireless infrastructure industry who own spectrum or infrastructure, or technolo-

gies. We have clients across the board from those who are involved with large macro facilities to those who want to look at small-cell solutions.

**AGL:** Does the use of LTE make any difference in the exposure of RF?

**Ted Abrams:** RF or radio-frequency energy is involved in any untethered application. As we work with an iPod Touch or a KindleFire or the newest cell phone, there is technology and energy involved

to complete that airlink. LTE, or long-term evolution, is a standard promulgated by 3GPP, the international body that does such things. It creates the highest bit-rate connections of any technology that we've ever used in this industry.

Those very high-bit-rate connections work quite well when we manage noise. To a consumer, noise could be considered to be energy. For LTE to properly function at the highest levels of performance, the energy levels are minimized so — all other things being equal, a favorite phrase of engineers — LTE signalling exposes consumers to a lower level of energy than any other kind of signalling that we've used in the past.

**AGL:** Why should the public not be afraid of RF?

**Ted Abrams:** RF, radio-frequency

energy, electromagnetic energy, is not a source of energy that poses a risk to human health when we comply with the established standards for safety and exposure. The reason is that the energy



for radio-frequency transmissions is conveyed through a stream of photons. Those photons don't ionize cells the way that gamma radiation from an X-ray or from a nuclear source might.

The photon streams that convey information by radio frequency are streams that don't penetrate bone, for example. So the bone around our brain, the skull of a human being, shields that energy to protect our brain tissue. The only part of our body that's vulnerable in that area where we have so much nerve tissue is directly through the base of the eye socket. Just as we hear that the eyes are the window to the soul, so the eyes are the portal for passage of radio-frequency energy into the tissues of our brain, the most vulnerable part of our body.

**AGL:** Could you compare the dif-  
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## AGL Online Video

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ference between someone holding a handset to their ear from standing 100 feet from a tower?

**Ted Abrams:** There is no comparison. The energy coming from our handset while we

are in communication is many orders of magnitude stronger than the energy coming from the tower. Millions of times more energy approaches us from the cell phone in our backpack, our pocket or our hand than approaches us from all of the other sources combined, including satellites that beam music into our satellite receivers in our automobiles, satellites that beam television signals to V-sat dishes on apartment buildings, aircraft and military and civilian sources from police cars, highway patrol cars and everything else. You add all of that together, including the FM broadcast stations and AM radio stations and the cell phone in your hand creates many, many more times the level of energy in your personal space than all of those sources combined.

**AGL:** Is there a concern regarding RF and cell phones?

**Ted Abrams:** For the average consumer, the closer the cell phone tower is to their place of work or habitation, the lower the level of energy in their immediate personal space. With the antennas that are large in order to listen to the faint signals that come from our cell phones, the closer that infrastructure is, the longer the battery lasts in their handset. The closer that infrastructure is, the cooler the handset is when it is near their ear as they are talking because the heat that results from the battery discharging is less.

The good news is that as we bring those listening posts, those fixed network positions closer to the subscriber, the total energy balance in their personal sphere is diminished.

**AGL:** How conservative are the FCC standards in protecting the public from RF?

**Ted Abrams:** The FCC standards are very conservative, and they are based on exhaustive research on the subject. For many years, agencies of the U.S. government and private contractors have been tasked with the business of looking at the health effects of electromagnetic energy. It's been determined from many directions, over decades of study, that there is no evidence of adverse health effects from the non-ionizing electromagnetic energy we call RF. ■

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forecasts

# Cisco Slashes Forecasts — Numbers Still Look Too High

Along with revising its forecast cellular growth rates downward, Cisco has also indicated that it expects Wi-Fi offload to be much higher than it previously thought.

By Rupert Wood

Cisco published its latest mobile data traffic forecasts on Feb. 6. These show a significant downward revision for the United States and most other regions of the world, and a greater, more substantial downward revision of traffic volumes for 2012 for Western Europe. Moreover, projected growth rates to 2017 have been revised downward. Despite these downward revisions, the volumes for 2012 in North America and Western Europe still look much too high to us and imply growth rates of around 100 percent for 2012 over what we already know about 2011. This contradicts all the evidence we have seen for actual rates of growth last year in these regions.

## Data and forecasts

Analysys Mason uses the data published by CTIA in the United States and by most national regulatory authorities in Europe as primary source data for its annual wireless traffic forecasts. These we take in good faith. Cisco's preferred metric is petabytes per month for December. Our forecasts show total annual data and year average monthly data. This means we cannot compare our forecasts exactly with those of Cisco, but we can estimate year-end figures using a midway point between our year averages.

The CTIA recorded 867 petabytes for the whole of 2011 in the United States and has since indicated that mobile data traffic increased by 21 percent during the six-

month period between the second half of 2011 and the first half of 2012. On this basis, we estimate the December 2011 figure to be 102 petabytes for North America as a whole (rounding up for Canada). This is a little lower than Cisco's previous estimate for December 2011 of 119 petabytes per month.

However, Cisco now estimates that the figure for year-end 2012 was 222 petabytes, a growth rate of 87 percent over its own earlier estimate for year-end 2011, and a huge 118 percent over our own estimate based on CTIA figures. Cisco also retrospectively revised the 2011 figure (rather counter-intuitively) upward by 14 percent. Whichever way one looks at it, 222 petabytes implies an implausible acceleration of growth in the second half of 2012. Our estimate is that mobile data traffic increased by 53 percent from 102 petabytes to 156 petabytes between end-2011 and end-2012. Given CTIA's 21 percent growth figure for the first half of 2012 (which we did not have when we published our own forecasts), this 53 percent may be on the high side, although it may be true that traffic tends to increase more strongly in the second half of any given year.

## Western Europe

The discrepancies between published data and Cisco estimates are even starker for Western Europe. We can say within a 5 percent margin of error that total mobile data traffic in Western Europe in 2011 was

980 petabytes. Annualized growth rates for the first half of 2012 are varied. At the top end, Denmark has a 75 percent annualized rate; at the bottom end, Portugal has -7 percent. However, the average leads us now to believe that growth in Western Europe in 2012 was about 35 to 40 percent. Our published forecasts had 35 percent growth for the period, so part-year indications confirm our hypothesis. This leads us to calculate year-end traffic for 2011 at 96 petabytes, which we believe increased to 128 petabytes at year-end 2012.

## Cisco cut forecast growth rates

In last year's forecasts, Cisco estimated traffic in Western Europe at 366 petabytes at December 2012. It has cut this by more than 50 percent in this year's forecast to 181 petabytes, but it also indicated in the report that traffic in Europe increased by 44 percent in 2012, meaning that it has revised its earlier 2011 figure down by 30 percent from 180 petabytes to 126 petabytes. The growth rate looks about right to us, but the actual volumes — even after the dramatic 50 percent cut — still look far too high. For 180 petabytes to be true, growth would actually have to be 89 percent in 2012, a figure higher than any rate of which we are aware in individual Western European countries.

As well as revising its forecast cellular growth rates downward, Cisco has also indicated that it expects Wi-Fi offload to be much higher than it previously thought.



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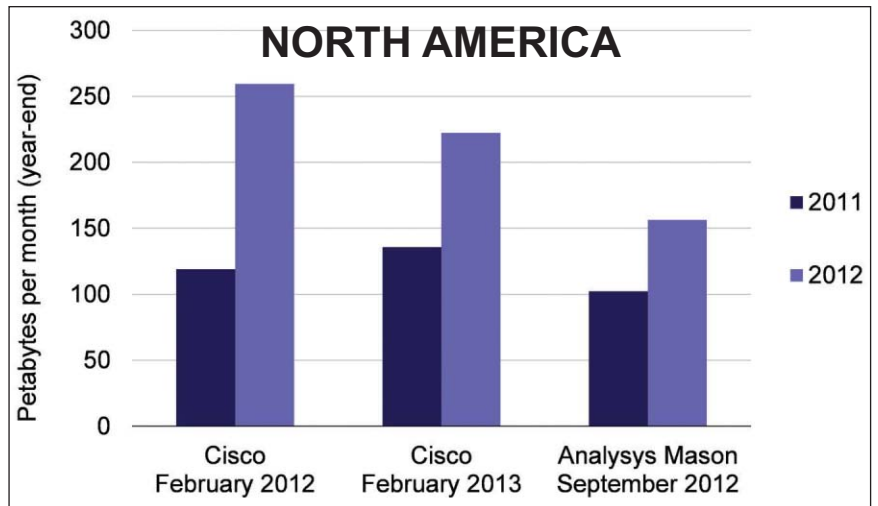
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## forecasts

However, 2012–2017 compound annual growth rates (CAGRs) of 56 percent for North America and 50 percent for Western Europe still look much too high to us. The increase in traffic brought about by subscriber growth tends to be offset by a dilution of average usage by later adopters. This makes growth charts have a broadly linear shape rather than an exponential one. We would expect that annual growth rates, averaged out over whole regions, would decline year-on-year. By our latest estimates, annual growth in 2012 (40 to 50 percent in North America and 35 to 40 percent in Western Europe) is already lower than these CAGRs. This, combined with a difference of opinion about the actual volumes of data in 2011 and 2012, means that our forecasts for these two regions and those of Cisco continue to diverge dramatically. Analysys Mason forecasts 4.5-fold growth in North America (as opposed to Cisco’s 9.4-fold) and 3.6-fold growth between 2012 and 2017 in Western Europe (as opposed to Cisco’s 7.6-fold). The result is that Cisco’s forecast



Cisco Visual Networking Index 2011–2016 (February 2012), Cisco Visual Networking Index 2012–2017 (February 2013) and Analysys Mason’s Wireless Traffic Forecasts (September 2012), year-end cellular mobile data, North America. Source: Cisco Systems and Analysys Mason, 2012 and 2013.

of the volume of traffic in 2017 in each of these regions is more than three times that of Analysys Mason. Forecasting data traffic is riddled with

uncertainties, and when the explicit or implicit warnings in forecasts are taken seriously, it involves feedback loops that will contradict the trend forecasted. We

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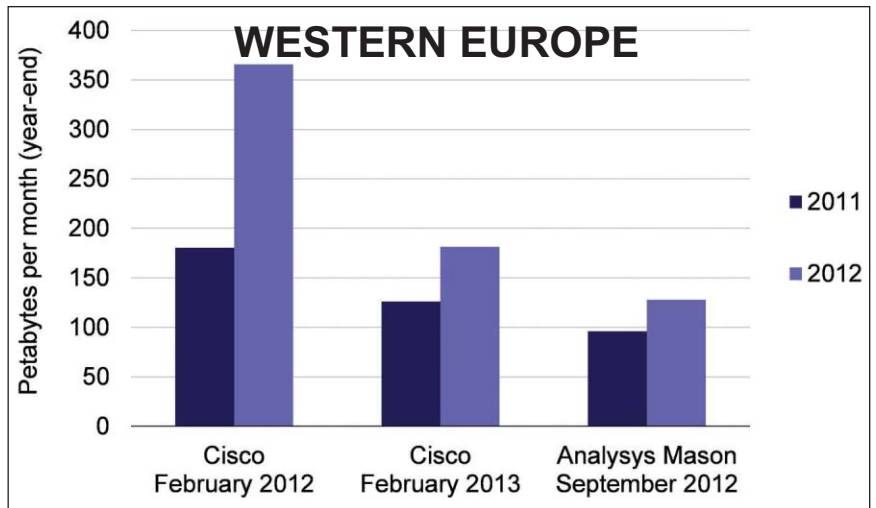
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## forecasts

certainly get things wrong. For example, we have probably underestimated future traffic generated by LTE FMS-type services, and we underestimated 4G take-up in parts of Asia-Pacific. There is nothing wrong with retrospective revisions; new evidence comes to light all the time. However, trying to get it right by assessing the available evidence is important. The future growth of mobile data traffic should influence the rate of build-out of LTE and LTE-A networks, and it will determine the timing of any spectrum crunch. In October 2012, when challenged about the CTIA's interpretation of its own data, CTIA director Robert Roche said, "Dismissing a so-called 'spectrum crunch' ignores not just a consensus in the United States, it neglects the global nature of the analysis that calls for more commercial spectrum allocation around the world, to accommodate growing numbers of users and increasingly complex uses." We would not want to dismiss out of hand the idea of a spectrum crunch anywhere. However, we would challenge



Cisco Visual Networking Index 2011–2016 (February 2012), Cisco Visual Networking Index 2012–2017 (February 2013) and Analysys Mason's Wireless Traffic Forecasts (September 2012), year-end cellular mobile data, Western Europe. Source: Cisco Systems and Analysys Mason, 2012 and 2013.

any consensus view (if this consensus still exists) that predicts the timing of a crunch on questionable analysis of the robust data that is already publicly available. ■

Rupert Wood is principal analyst at Analysys Mason, a global consultancy and research company specializing in telecoms, media and technology. His email address is [rupert.wood@analysismayson.com](mailto:rupert.wood@analysismayson.com).



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mobile internet

# Using the Network To Engage the Customer

The next big innovation cycle in wireless communications will reflect the collision of two worlds, cellular mobile voice and Wi-Fi mobile data.

**By Bob Friday**

**B**ob Friday, chief technology officer of Cisco Systems' wireless network business, manages strategic wireless initiatives of the company's Wi-Fi and WiMAX broadband business. His career has been focused on developing unlicensed wireless networking technology and products for 25 years. He spoke to an audience at PCIA's Wireless Infrastructure Show. The following are his remarks, edited for length and style.

I've spent most of my career watching two large mobile worlds build tension between them. On one side is the mobile cellular voice world. The inhabitants of this world have spent 20 years building a wireless network that has reliability and capacity that have freed us from our fixed voice networks. On the other side is the world of the Internet, of Wi-Fi. This is the world where most of us got our first taste of the mobile

Internet on our laptops with Wi-Fi. This is the world where you connected in your homes with Wi-Fi. This is the world where you took your laptops on trips, and you connected at the coffee shops, the airports and the hotels. And this is the world where you eventually brought all your Wi-Fi access points into the workplace.

I used to call the inhabitants of the other world to see if they had an interest in unlicensed spectrum, to see if they wanted to talk about Wi-Fi. I did not get any calls returned. I did not think I would live long enough to ever get a call from the inhabitants of this other world. But I did live long enough. And we have the iPhone to thank for that. Still, the inhabitants of the mobile voice cellular world remain skeptical about delivering a wireless service on unlicensed spectrum they don't own or control.

The iPhone started the next

innovation cycle, mobilizing the Internet to dramatically change the mobile voice business. The mobile Internet is becoming a necessity on par with light, water and power. Three years ago, I heard at the Mobile World Congress that Tier 1 network operators knew something was up and they had an interest in Wi-Fi. In 2012, I went to my first hotel hospitality conference and my first retail conference. And what I heard there was that mobile Internet was becoming a necessity in their customers' lives. Executives at the hospitality conference said the surveys they were getting from their customers indicated that getting access to the social networks and their video content had become a business-critical issue to consumers coming into their hotels. How many of you choose your hotel based on mobile Internet connectivity?

At the retail conference, I



heard that their customers, when they come in to buy products, want stores to connect via mobile networks. Retailers want to interact and to be able to deliver services in new and different ways.

In the health care space, I'm now dealing with executives with new titles such as vice president of digital, digital health care or mobile health care. They are looking at how to deliver health care in new and different ways to consumers compatibly.

When you talk about infrastructure, you're seeing a convergence of distributed antenna system (DAS) networks and Wi-Fi systems in large venues.

Cisco's visual networking index (VNI) data reflects the pain you feel. It took 20 years to achieve enough capacity to disconnect us from mobile voice networks.

Now, we're trying to mobilize the entire Internet. When you look

**It took 20 years to achieve enough capacity to disconnect us from mobile voice networks. Now, we're trying to mobilize the entire Internet.**

at the scope of the effort necessary to take all the traffic off the Internet and put it on a wireless network, you start to appreciate



## mobile internet

### The Collision of Two Worlds



Two large mobile worlds have tension between them. On one side is the mobile cellular voice world. The inhabitants of this world have spent 20 years building a wireless network with reliability and capacity that freed us from fixed voice networks. On the other side is the world of the Internet, of Wi-Fi. This is the world where most people received their first taste of the mobile Internet on laptop computers with Wi-Fi. This is the world that connected homes with Wi-Fi. This is the world where people took laptops on trips and connected at coffee shops, airports and hotels. And this is the world that eventually brought Wi-Fi access points into the workplace.

the size and the scope of the problem we have in this innovation cycle.

The inhabitants of this new world are not mild herbivores, grazing on short messaging services, email or browsing the Internet. They are serious carnivores of video. If they do not get their daily fix of YouTube, Netflix or their favorite high-def sports entertainment, you have some upset carnivores that tend to want to call your support teams or who tend to be executives of a mobile operator who want to call their IT guys and ask why their phones are not working at some stadium.

Mobile operators are at the point of the spear when it comes to mobilizing the Internet. They stuck the iPhone into the hands of nice, short messaging data customers, and now they're mobile Internet carnivores overnight. These customers have gone from being low data users to 100 percent duty-cycle video data users.

The speed at which this is happening caught most of them off guard. The mobile device is going to become a standard-issue device when you're born. We're going to get up to where a giga-

byte is a normal data usage. I'm at 400 to 500 megabytes. When I checked my kids' use, they're up to multi-gigabytes. They are the true video connoisseurs of our future.



**Bob Friday:** "I pay my mobile operator \$100 a month for Wi-Fi access, and they give me the cellular for free."

Most of us got our first taste of mobile Internet on Wi-Fi. And we've grown accustomed to having it on our laptop computers. Now, Wi-Fi has become a key point usage on iPads and our iPhones to the point where even the most ardent LTE mobile operator I know has finally given in and is starting to see Wi-Fi become the standard future on our smart mobile devices.

Although we still need to build more LTE networks, and we need more LTE infrastructure on towers, and we need more LTE infrastructure inside of our buildings, we also need to converge the mobile Internet experience that we have gotten used to on our cellular and Wi-Fi devices with the mobile cellular experience we've become dependent upon in our voice world. We're going to be seeing both Wi-Fi and cellular become a key part of the mobile Internet experience.

Some mobile operators and service providers with both a mobile infrastructure and a wired infrastructure are finding that they both go better together, because as we mobilize the Internet, we're headed from macro architecture



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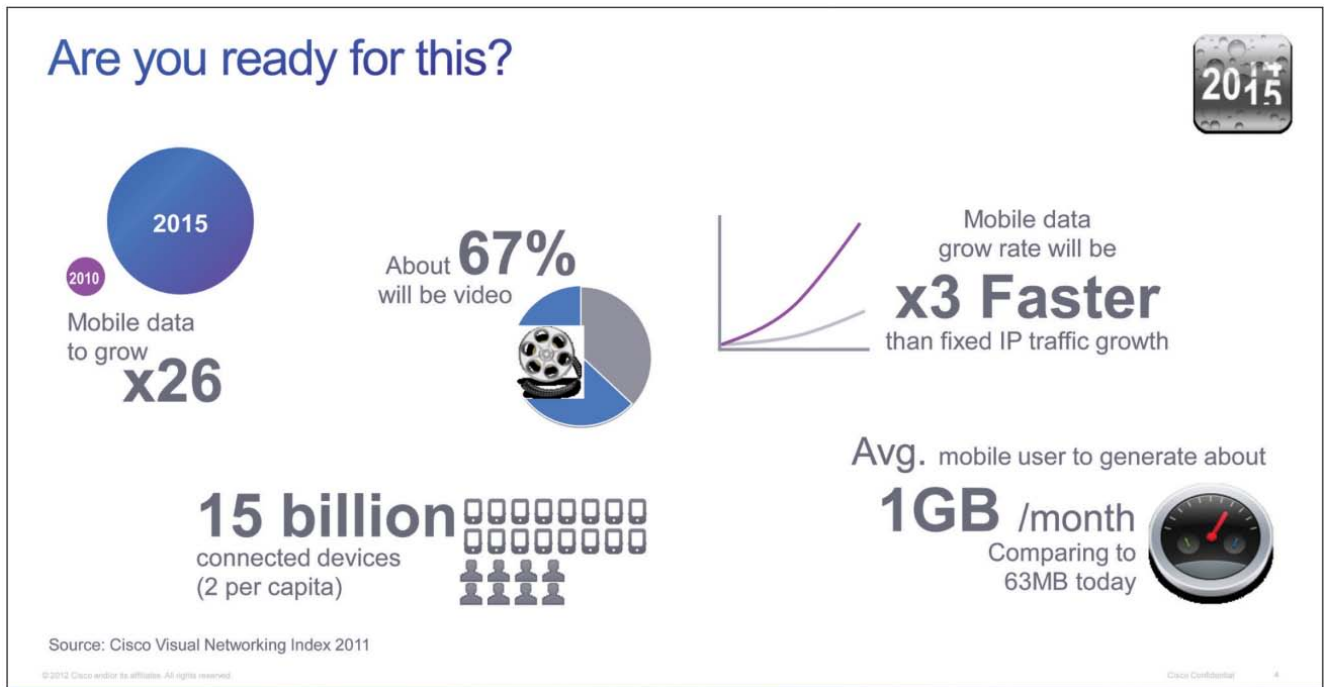
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Mobile operators stuck iPhones into the hands of nice, short messaging data customers, and now those customers are mobile Internet carnivores. They went from being low data users to 100 percent duty-cycle video data users. The speed at which this happened caught most of the mobile operators off guard. By 2015, the normal data usage is likely to rise to 1 gigabyte per month. Some school-age children already are using multi-gigabytes per month. They are the true video connoisseurs of the future who will be calling support teams if they cannot obtain their daily fixes of YouTube, Netflix or their favorite high-def sports entertainment.

to a smaller, small-cell architecture. Behind all those small cell architectures you need some sort of wired infrastructure.

I've seen mobile operators in Asia combine their wired and mobile businesses. Other large mobile operators

whether it's LTE or Wi-Fi. The value for them is access to video and social networking.

Infrastructure costs money, whether it's Wi-Fi or cellular. Wi-Fi is on a collision course with the cellular world. Apple AirPort Wi-Fi base stations started the trend back in the late 1990s with the first mobile Internet connectivity at our home or in coffee shops. Next, Intel put Wi-Fi on the laptops, which brought Wi-Fi into the enterprise and security to Wi-Fi.

Then came the iPhone, the catalyst of the next innovation cycle. It is also what I called "starting the era of network-device-selects-Wi-Fi." In the previous years, it's what I called "users select Wi-Fi." That was when you and I went around and found hot spots we wanted to connect to and decided whether the connection was good enough. We brought our own security to the Wi-Fi hotspot.

We're now entering the era when the network and the devices will decide

which network to run your video content on. I will have cellular and Wi-Fi connectivity at the same time. My device and my network will decide which one to use, depending on performance and cost. Wi-Fi networks are beginning to become trusted networks living beside the cellular networks.

Enterprises are basically service providers that are building wireless infrastructure that looks very similar to what wireless network service providers would build. Microsoft is deploying thousands and thousands of wireless access points, and they're being asked to take care of tens of thousands of laptops and wireless users. It makes enterprises look even more like service providers.

Enterprise IT departments are going through an identity crisis. Employees are bringing consumer mobile devices into their space, what we call "bring your own device," or BYOD. On one side, we have IT departments that take care of telecom contracts, including mobile voice. On the other side are the IT guys who take care of building networks inside the enterprises. With this new innovation cycle around mobile devices,

**What people value is connectivity to the Internet. They are no longer concerned whether it's LTE or Wi-Fi. The value for them is access to video and social networking.**

have bought wired assets because they know they're going to need wired infrastructure to build small-cell networks.

A question I'm often asked is, "Hey, Bob, how can we monetize something that is free? Isn't Wi-Fi something that people expect to be free?" My answer is that I pay my mobile operator \$100 a month for Wi-Fi access, and *they give me the cellular for free*. The point is that what people value is connectivity to the Internet. They are no longer concerned



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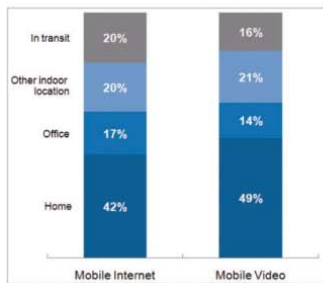
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## mobile internet

### Wi-Fi is a User-Driven Trend

**80%** of the time users are within Wi-Fi coverage

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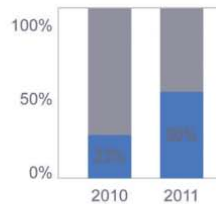


Sources: Cisco Visual Networking Index, 2011; Bango Inc., February 2011; North Carolina State University, Cisco IBSG 2011

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**50%** of smartphone usage is already on Wi-Fi



**19 out of 20** smartphones support Wi-Fi



What people value is connectivity to the Internet. They are no longer concerned whether it's LTE or Wi-Fi. The value for them is access to video and social networking. The era is beginning in which the network and the devices will decide which network on which to run a user's video content. Users will have cellular and Wi-Fi connectivity at the same time. The device and the network will decide which one to use, depending on performance and cost. Wi-Fi networks are beginning to become trusted networks, living beside the cellular networks.

IT departments have to decide what to outsource and what to build. For the most part, the IT department is becoming a broker of services. And when they became accustomed to outsourcing their managed mobile voice business, they started looking for ways to outsource

have built DAS and they're also trying to build Wi-Fi systems in parallel with DAS. And to some extent, I don't think they really care which they have. What they really care about is the need to provide mobile Internet connectivity in a neutral-host way to the customers coming indoors.

There's an operational involvement with using wireless infrastructure to help with solving those problems.

### Mobile operators want seamless connectivity between their cellular and Wi-Fi services. They want to get customers on and off their networks easily and quickly.

Enterprises want to know who's on their network. They want to know whether they have loyal customers

Mobile operators want seamless connectivity between their cellular and Wi-Fi services. They want to get customers on and off their networks easily and quickly. The most important part may be how they engage customers.

their managed mobile data business. The other trend that makes enterprises look more like service providers is business-to-consumer (B2C) communications, also called "connect to consumer." It involves enterprises that must deal with consumers inside their venues, such as hospitality, retail and health care customers for whom mobile Internet has become a necessity, much like water and electric utility service. The trend is reaching into government and into institutions of higher education. These are customers that typically

who have opted in to a loyalty program — they want to be able to help that customer before he actually approaches the venue entrance. They want to help customers with geolocation on the cellular side and let them know when they're about to enter the store, and they want to help them with Wi-Fi when they start to enter.

With the mobile Internet, people are able to find data in a much more efficient and quicker way, and they're expecting the network to help them do that in context. For example, when I'm in a particular venue, I should not have to search the whole Internet for the information I need. The information I need should be rolled into my hands and to my preferences. And the network should be able to deliver that information to me, or at least it should make certain the pile of information I need to find is a lot smaller.

For operational reasons, airports with DAS and Wi-Fi want to know how people are moving about. It is expensive for a plane to make a late departure and for a doctor to be late for an appointment.

In my job, I spend half of my time with enterprise customers and the other half with service-provider entities (SPEs). On the enterprise side, I spend more time with marketing specialists who are trying to find some mobile experience inside their venues. On the



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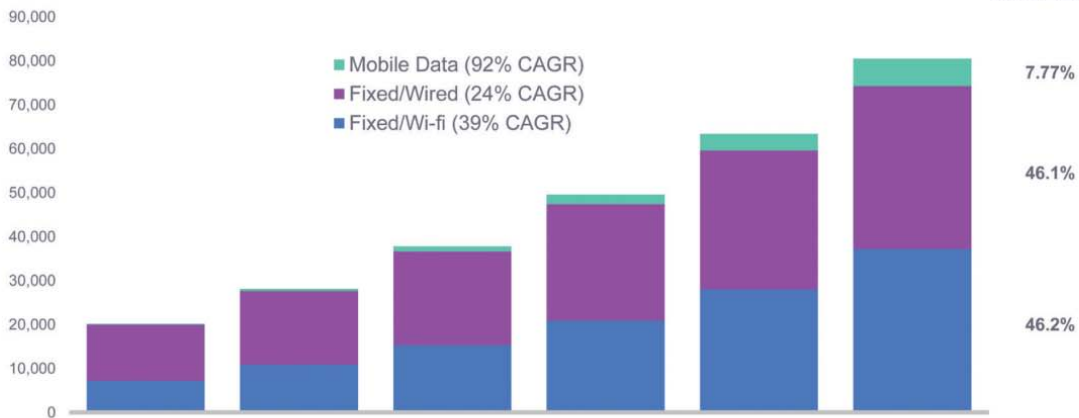
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mobile internet

Global IP Traffic by Local Access Technology

By 2015, fixed/wi-fi traffic surpasses fixed/wired traffic

32% CAGR  
2010–2015



Source: Cisco Visual Networking Index (VNI) Global IP Traffic Forecast, 2010–2015

Some mobile operators in Asia have combined their wired and mobile businesses. Other large mobile operators have bought wired assets because they know they’re going to need wired infrastructure to build small-cell networks. Cisco Systems’ visual networking index for global IP traffic forecasts that by 2015, the fixed/Wi-Fi traffic will surpass the fixed/wired traffic. Data use on the mobile networks will continue to grow, but Wi-Fi will become all the more important to support the high-bandwidth Internet experience to which consumers are growing increasingly accustomed.

service provider side, I spend more time with the product management team that’s trying to find some sort of differentiated indoor mobile experience.

Meanwhile, I usually have some IT specialists who look like deer in the headlights because the marketing department asked for something impossible or ridiculous. On the enterprise side, marketing asks the IT department for a strange mobile experience never seen before. On the SPE side, a product manager asks for a new location-based experience to give to consumers on the cellular network.

**With 100,000 people inside a stadium, an enterprise or service provider needs as much spectrum as possible, and it needs DAS, cellular and Wi-Fi.**

Here’s an example to differentiate between context mobile advertising and useful local information. When I’m in a stadium, telling me that hot dogs are on sale there for half price is useful information, and I’m grateful to

have it. Telling me that hot dogs are on sale for half price at Safeway is annoying. Please do not bother me with that information.

We’re trying to get the network to deliver a useful consumer experience, like when you get off your plane, you should be able to automatically check into your hotel room, set the temperature in your room, and have dinner waiting for you at the hotel. When you walk into the hotel, you should be able to be notified of a video upgrade to watch your favorite video on your iPad and head up to your room and use your phone to unlock your door. When you walk out of that hotel while on your WebEx conference call, you should not have to transfer from Wi-Fi to 3G or 4G. That should happen automatically.

In this new world, when you receive a message from your wife to say that your kid is at school that evening, you should be able to remotely limit your kid’s connectivity at the school so he

or she can no longer watch a favorite video when arriving home. These are the new things that the marketing guys both at enterprises and SPEs are starting to develop. Some of this is already happening. If you look at your latest Apple iPhones, they’ve already started to make your connection manager smarter, so when it decides that Wi-Fi is not good enough, it will automatically switch you over to LTE.

Some of the new mobile Internet experience will require new industry initiatives — Hotspot 2.0, for example — to bring the Wi-Fi user experience on par with cellular for authentication and roaming. Enterprises that look like SPEs are going to have to form roaming partnerships with other enterprises and with SPEs near them.

One of the key technologies enabling the new mobile Internet experience is 802.11 multi-user, a technology that allows the mobile device to communicate with the network before it associates and authenticates. This allows the network to tell the mobile device what services are available at the location and the credentials necessary





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## mobile internet

to connect. It also enables the monetization beyond the roaming.

The network is in a good position to help with local service discovery that tells you what services are available locally. This is the key that brings reliable, secure, seamless connectivity to the Wi-Fi cellular experience. The Wi-Fi Alliance received the local service discovery specification in early 2012. The specification was opened to testing in June and July 2012. Several devices have been certified and authenticated, the Samsung Galaxy 3 among them. We are going to start seeing local service discovery in our mobile experience.

Stadiums may be the point of the spear when it comes to both licensed and unlicensed spectrum. With 100,000 people inside a stadium, an enterprise or service provider needs as much spectrum as possible, and it needs DAS, cellular and Wi-Fi. With seamless connectivity to allow the user to move among DAS, cellular and Wi-Fi, we saw 20 percent of the people offload onto these networks and move significant data.

In the old days of mobile employees, it was easy for the mobile operators to tell Nokia exactly what they wanted. In this new world, there are many more stakeholders to line up, such as the likes of Apple. Apple represents the consumer. Apple represents you and what you want. So if you want your mobile devices to work in stadiums, you need to let them know. Mobile operators have a stake in the game. Operating system vendors like Google

have a stake in the game.

When I deal with these stakeholders, mobile device vendors tell me they're waiting for the mobile operator to do something. Mobile operators tell me they're waiting for the mobile device vendors to do something. We need to be able to break that stalemate so the stakeholders can deliver the mobile user experience that we all want in this new world.

This is a great time to be in the mobile wireless industry, because when you step back from the day-to-day pains of actually making all that stuff work, you realize the effect that wireless communication is having on our world. The mobile Internet is becoming on par with power, water and light. It's becoming a key part of our economic foundation and energy. When you talk with other governments around the world, the mobile Internet or some sort of broadband connectivity usually is a key part of their economic plans.

The mobile Internet is making our world smaller. It is more difficult for a dictator to maintain control of a country when everybody is connected in that country and when everybody knows what's going on, and they communicate. The mobile Internet is moving our world in new and different ways. As the world population grows, connectivity among smarter devices is helping with carbon and pollution problems. ■

Bob Friday's email address is [bfriday@cisco.com](mailto:bfriday@cisco.com). For information about PCIA's next Wireless Infrastructure Show visit [www.pcia.com](http://www.pcia.com). Photography by Don Bishop.









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Business Development Manager — Acela Technologies

*"I really liked the one-on-one discussion panel which was led by leaders in the industry. They opened questions to the crowd and I thought that was quite interesting. I liked the speakers' presentations, the relevance of what's happening within the industry as it's applicable to real world applications. I really enjoyed it! The subject matter was relevant. The speakers were extremely knowledgeable and the information they gave us was both high-level and detailed."*

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# Belong at The Next AGL Conference™ in St. Louis on June 6

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—Jackie Horvath  
President and Owner — Horvath Communications

*“I’ve been to four AGL conferences. They focus more on different areas of the country...more region-specific (than the national conferences). There was a panel on local zoning in Michigan. They brought up both sides of the issue...very interesting and enlightening. The speakers did a very good job...there are several opportunities to network. I like that I learned a little more about financial trading networks...how the other companies are handling (the aspect of) how to get them onto our towers. I could afford to send members of my staff as well as myself.”*





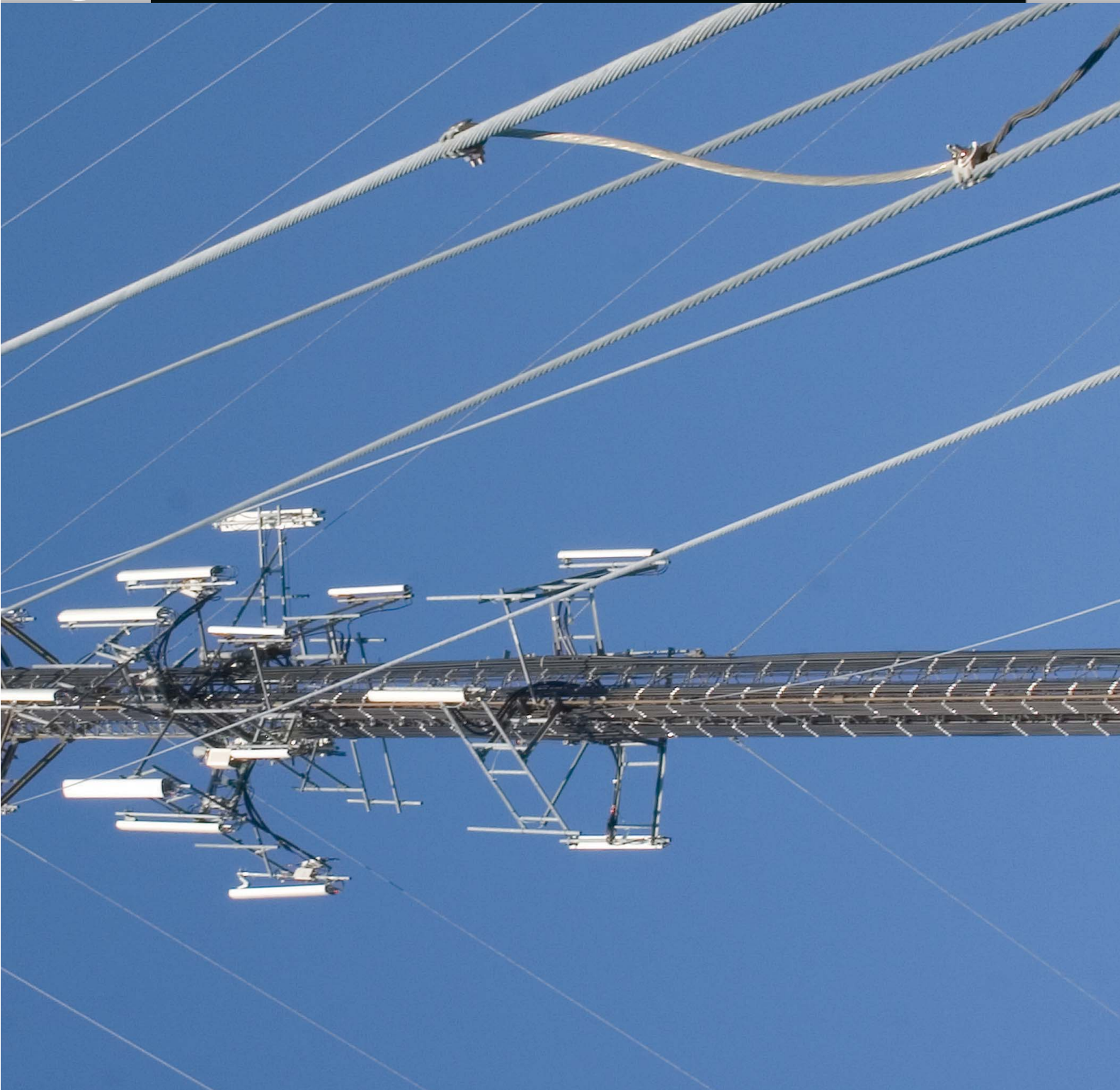
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safety

# NATE STAR Initiative Pays Off with Safety and with OSHA Penalty Avoidance

STAR members saved themselves \$270,000 that contractors normally would be charged in an average OSHA citation. Thus, there is a benefit to members doing their own safety audits.

**By the AGL Staff**

*Todd Schlekeway, the executive director of the National Association of Tower Erectors, conducted a session at the NATE Conference and Exposition about the association's safety, training, accountability and reliability (STAR) Initiative. The program, which requires NATE member companies to go above and beyond requisite levels of safety, has shown steady growth over the course of two years.*

*Panelists included Don Doty, chief executive officer of Stainless, co-founder of Doty-Moore Tower Services, and former chairman of NATE; Pat Cipov, president of Cipov Enterprises and a NATE board member; and Kevin Dougherty, president of Millennia Contracting. The following are their remarks, edited for length and style.*

**Kevin Dougherty:** The STAR Initiative helps to set aside contractors that want to take an extra step in safety and awareness for their crews and their customers. What was the emphasis for it? Why did we do it?

**Pat Cipov:** NATE was formed in 1995. A tower task force was formed in 1996. Don Doty, Rob Medlock, who was with OSHA Region 5 as we started, and Terry Sharp were part of it. They worked together on the compliance directive (CPL) called

Riding the Line. The CPL was formed in 1999 and updated in 2002. Region 5 formed a partnership with NATE in 2001 and it ran through 2005. Then NATE obtained a national partnership with OSHA that ran from 2006 to 2009.



**Jeremy A. Collins, MasTec Network Solutions Group:** "Being a member of the STAR program has been beneficial for our company. ... We discovered and corrected so many potential safety violations by conducting site audits that the avoidance of OSHA citations was significant."

Because of the change in administration OSHA's focus changed. We were not able to renew that partnership, yet many NATE members still wanted to be part of a partnership, so NATE formed its own. We call it the STAR Initiative. That stands for safety, training, accountability and reliability.

NATE is mostly made up of small companies that don't have anyone to spare to send out to do audits. Fortunately, a competent person within your company can do the audit.

**Don Doty:** In 2012, there were 78 STAR members and they conducted 1,915 site safety audits. The number of hazards identified and corrected was 235. Yesterday, in a NATE session, Bill Donovan, an OSHA official, gave a figure of an average \$2,000 fine per incident cited by OSHA. Based on that figure, STAR members saved themselves \$270,000 that contractors normally would be charged in an average OSHA citation. Thus, there is a benefit to members doing their own safety audits.

Forty-five of the 78 companies gave NATE statistical information that was used to extrapolate the figures. Some of the numbers are staggering. The number of employees affected is 2,049. The number of employees trained to the OSHA 10-hour





From the left: Kevin Dougherty, president, Millennia Contracting; Pat Cipov, president, Cipov Enterprises, and a NATE board member; and Don Doty, co-founder of Doty-Moore Tower Services, president of Stainless, and a former NATE chairman. They spoke about the NATE STAR Initiative during a session in the exhibit hall at the NATE Conference & Exposition in February in Fort Worth, Texas.

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## safety

entry-level construction and general industry safety course is 1,759. The number of employees trained to the OSHA 30-hour general industry safety course for supervisors, managers, foremen, architects, engineers and planners is 624. The number of

First of all, our employees actually got into it. They liked the idea that they have a say about safety and that they can be involved. The training makes them aware that management has taken another step to raise safety awareness, starting with the company

president. Safety is the first thing we talk about every day; it's what we talk about the most during the day; and it's the thing that we wrap up with at the end of the day.

The NATE STAR Initiative requires members

to implement a safety and health management program that meets or exceeds the requirements that were established by NATE's accident-prevention safety and health program, which requires a 100 percent fall protection when employees

are working at or above heights of 6 feet. Members must provide all tower climbers with tower climbing training that meets or exceeds the training of the NATE Tower Climber Fall Protection Training Standard prior to putting them to work at heights over 6 feet. Members must hold all employees responsible for following company health and safety policies. They must have a competent person on-site at all times. A competent person must conduct regular safety audits. Members must hold daily tailgate safety sessions and weekly safety meetings. They must follow applicable best practices found in the telecommunications and broadcast tower inspection checklist.

Our company also has a rigging plan for every project where we're rigging a tower when we're putting up even the smallest thing. And that's reviewed by a competent person.

Becoming a NATE STAR Initiative member has helped our company, and it's given our people a chance to have a say in everything that we do. Even the most

**Don Doty: "Becoming a NATE STAR Initiative member has helped our company, and it's given our people a chance to have a say in everything that we do. Even the most junior member of the crew can raise a question without feeling embarrassed by asking a dumb question."**

employees trained to the OSHA 500 trainer course for the construction industry was 37. The total number of training hours provided to employees was over 200,000.

From our company's perspective, the training helped us in a number of ways.

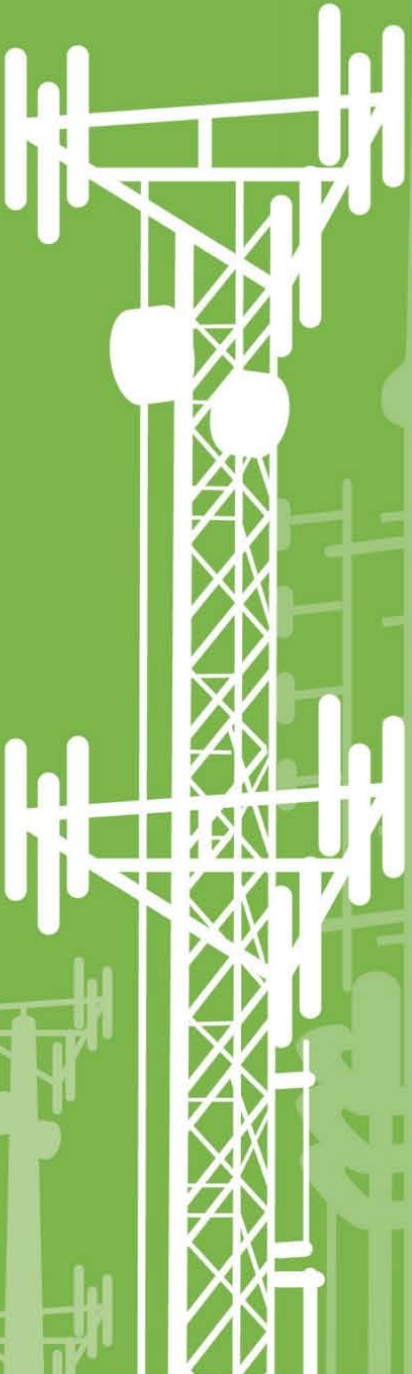
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## safety

junior member of the crew can raise a question without feeling embarrassed by asking a dumb question. Of course, I've always said that there's no such thing as a dumb question.

**Kevin Dougherty:** Those wanting to become a NATE STAR Initiative member fill out an online form that asks 10 questions of general contractors. A general contractor or tower erector must be in business for at least three years to qualify. The tower erector's portion of the online form asks 25 to 30 questions. It asks for insurance modification rates for the past 3 years, and some of the information would be in the applicant's OSHA log. Applicants accepted into the program are given membership that starts in October.

Tower-erector members submit online quarterly reports for 10 percent of their jobs or two per month. Other than the person at NATE who receives the report, no one else sees it, so members don't have to worry about someone critiquing your company based on the information in the reports.



**Rob Medlock, Safety Controls Technology:** "The more audits you do, do you find fewer repeated hazards?"

It's simple to do the one- to two-hour site audit, which involves 50 to 60 questions. The first part documents site conditions and the use of personal protective

equipment. The audit covers everything being done on the site. It has a place to list violations or problems found and for a review of the audit with the crew members. And that's the end of it.

There's no expense to join the program. Other than your time, it doesn't cost you anything. It's a good way to raise safety awareness with employees in the field.

**Don Doty:** Audits filed with NATE identified 160 different categories with deficiencies. The largest quantity of deficiencies, 22 incidents, found and corrected involved site signage. Either the sites didn't have signage or the signs weren't posted. There were 22 incidents of that. The second largest quantity involved hard hats with 15 reported instances where workers either didn't have hard hats or weren't wearing them.

The next category was 11 incidents of trash that created an on-site hazard. Some people forget that as antennas, and transmission lines and connectors are removed from crates and boxes soon you have a

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## safety

problem with nails sticking out of wood or you have tripping hazards. Plus, sites are not always perfectly clean when we arrive. But we have to take care of our sites because hazardous trash is citable.

There were eight incidents of safety glasses not being worn or being unavailable. Most of the time, it's not that workers intend not to wear safety glasses, they just forget. Five incidents were related to the RF monitors not being used or being unavailable.

The incidents that the members found and corrected mean that the site audit is doing its job. It's helping companies be more aware of safety.

**Jeremy A. Collins, MasTec Network Solutions Group:** Being a member of the STAR program has been beneficial for our company. We conducted over 450 site audits last year, and I conducted 350 of them. We discovered and corrected so many potential safety violations by conducting site audits that the avoidance of OSHA citations was significant. During 2011 and 2012, we

conducted over 220,000 hours of training for our employees and general contractors with over 700 employees attending the OSHA 10-hour course. The STAR Initiative has helped a lot. It's a good checklist to follow. If you can use it, I recommend doing so.

**Rob Medlock, Safety Controls Technology:** The more audits you do, do you find fewer repeated hazards?

**Don Doty:** Yes. Every year the number of reportable incidents has gone down.

In 2013, we've gone from 78 NATE STAR Initiative members to 96 members. That's a 20 percent increase this year. We would like more people to join because the more information and the more awareness that we get out there, the better. I would ask everyone that hasn't given it a try to do so, and see if there is some benefit to you.

**Rob Medlock:** Do you use the same auditors all the time?

**Don Doty:** Yes. And by the way, all the information is kept confidential. NATE doesn't know where the information comes

from; it only knows the roll up numbers. People at the NATE office put the information together without giving us any names. None of your information is shared with anybody. The information is just gathered at the NATE office. None of us is entitled to see any audit forms. We just see the culmination of the data. With the data, we can extrapolate good information.

Some of the information is just what I was talking about, where our reported incidents are and what hazards or potential violations were corrected on-site. When OSHA gave us some insight about the average cost of an OSHA citation for a business, we were able to extrapolate that NATE Star Initiative members saved themselves a quarter of a million dollars in OSHA penalties.

There's a real benefit to NATE STAR Initiative membership, and I encourage you to give it a try. It's worth the extra effort. It's important. ■

For information about the NATE STAR Initiative, visit [www.natehome.com](http://www.natehome.com). Photography by Don Bishop.

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# Readers Converse about



Illustrations by Scott Dolash



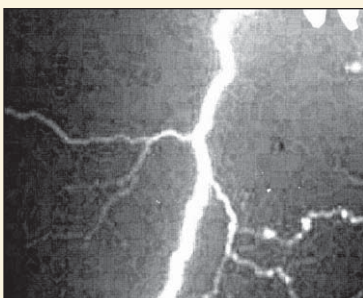
# Go about Outdoor Hazards



Join our *AGL* site on **LinkedIn** to join the conversation — or start a new one!

Moderated by **Jim Fryer**

What is the strangest, maybe most dangerous, outdoor hazard that you have encountered on a job site? If another worker were to confront the same problem, how would you advise coping with it safely?



avoided it. Snakes aren't typically aggressive as long as you don't startle them or get too close.



**Rick Jones** — Back in the '90s, we had a Harris SX5 transmitter catch on fire, and we were running on an old BC1h. I went to the airport to pick up some parts, and when I got back, the old Gates was stinking to beat hell. Well, I opened the back door, and a 5-foot rat snake had gotten into the tuning network and fell down right in my face. I about messed my britches. It really wasn't dangerous, and it was pretty funny,

**Tyler Booth** — Not a personal experience, but one of our climbers encountered a Joger's carpet viper coiled 15 feet up on the leg of a microwave tower in Africa as he was climbing. He took the best possible approach and

**Ron Mayes, Lavern, Okla.** — Opened up the door to the tower shack and a black widow spider had its web in the middle of the opening, awaiting our entry. Fortunately, we looked before entering.

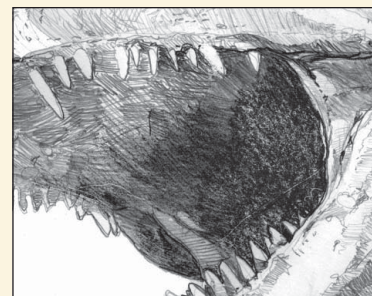
actually, after I got over the initial shock.

**Paul Reynolds, San Antonio** — Several years ago, one of my project manager's crew was responsible for adding back-up batteries for an AT&T mobile central office trailer.

Unfortunately, he failed to properly bolt the batteries to the floor — well, in other words, the idiot did not bolt them down at all. From time to time, AT&T would take these trailers out for a test scenario. When this trailer showed up after making a 1,500-mile journey, the batteries were scattered or hanging from everywhere. We're talking about a rack of batteries taller than 6 feet. Some were still tied to the terminals; others were on the other side of the trailer. What a mess. The only thing that was properly terminated on that project was the employee.

**Lawrence Behr** — Thanks for the great comments! Here's one for you, Rick: Some years ago, I stepped through a door into an equipment shed and went through the floor! Fortunately, only a foot or so, but scared the bejesus out of me.

**Michael T. Neville** — I saw a small bird sitting on a guy wire as I climbed upward. When I got to the middle of the tower, the bird became extremely agitated. I slowed the climb to a very deliberate count of about



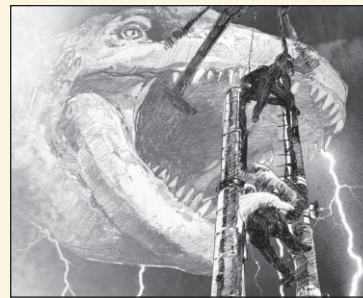
## the thread



two seconds per step on the ladder to see what she was going to do, only to have that bird start to attack me in a swooping dive coming inches from my helmet. Not that she was ever a threat to me, but the curiosity

over her actions cleared up as I came upon the next joint section of the tower. There in the corner was a wee nest with three eggs. I completed my work at the top about an hour later, and as I approached the nest on my descent, I noticed that all three eggs had hatched and the newly hatched chicks were already straining their heads with beaks wide open to be fed. Mama bird wasn't too far away, and probably realized that I was not a threat. She seemed resigned to wait it out until I moved past before going back to feed her babies.

**Curt Hannah** —While in Australia for a product concept trial, we were greeted by the local constructors. They advised us that before we started to work, we should be aware that they just removed a 3-meter viper from the



bridge. The snake had been sunning himself, lying right with lying right with the inch-and-five. Makes you realize you're not in New York anymore.

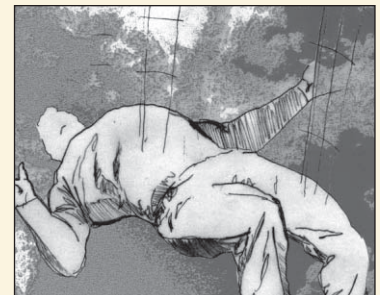
**John Paleski** —

While up at the 225-foot level of a tower in New Jersey, I got stung by about a dozen wasps in the face neck and hands. Climbing down was a real bitch!

**Arlin Bleclile** —

Last year, while working in a shelter, we opened the door only to find a million stink bugs lining the doorjamb, walls, ceiling, everything. What a mess.

Recently, a homeless person was sleeping in the compound where we were running Innerduct



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



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

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

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

## NEW JERSEY WIRELESS ASSOCIATION

### Activities

**June 18**

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**September 19**

Quarterly Educational Luncheon

### Important Contribution

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

### Award

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



[newjerseywireless.org](http://newjerseywireless.org)

A public service ad from *AGL*

## the thread

raceway corrugated tube and installing ground vaults. When asked to move so we could put rocks in the ground vault and install mule tape, the lady was not happy and dropped her pants and did her business on and in the ground vault. Weird. My guys were not happy, to say the least.

**John Paleski** —Well, that really stinks!



**Michael T. Neville** —There is an assumption (dare I say what it means when you assume things) and a trust that the safety hardware on a tower is intact and serviceable. One tower I climbed to remediate a storm-damaged

antenna was also found to have the safety-climb cable not properly fastened at the top. Unless you know for a fact (or at least to the best of your knowledge) that the tower is safe, always climb with the utmost of care and be vigilant for any telltale signs of missing, broken or loose hardware.

Years ago, I came upon a site in the California desert and

found a body on the doorstep. I called the sheriff's office. When a deputy arrived, it was determined that the corpse was probably that of a thief bent on stealing the radio inside the building. With multiple break-ins and previous thefts of radios, the sheriff's office saw fit to reinforce their shelters by including bulletproof doors and a steel enclosure for the padlock. It seems the robber attempted to shoot the lock while bent down to watch, and the ricochet found its mark on his face and killed him. Death by stupidity!

One site in the Philippines required the local guide and porters (we had to manually trek and haul the microwave radio equipment) to create a makeshift vine ladder to climb the 100 feet to the top. It would have been an undesirable outcome if one of these fellows carrying radio parts (we broke down the equipment rack to a manageable size) weighing as much as 40 pounds had a fall. It was the only time being last up was an uncomfortable situation while always looking up to see how the chain of porters was doing as they made their way up. OSHA would have had a field day, writing up the infractions on that day.

**Lawrence Behr** —Michael, looks like your site thief is a great candidate for a Darwin Award! I bet a lot of people would like coper thieves to follow his lead. ■

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FCC Commissioner

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- In-depth conversations with tower owners
- Trends in mobile backhaul
- Spectrum Acquisitions
- Small Cell Evolution
- Disaster Preparedness for Towers
- LTE Build-Outs
- Small Cell Strategies for High Usage Areas
- Future Opportunities in Wireless Infrastructure

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buyers guide

# Quick-Guide to Tower Construction Companies

As a supplement to January's 2013 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. Where shown, company descriptions (edited for length and style) and logos were provided by and paid for by each company.

- |                                 |                                     |                         |
|---------------------------------|-------------------------------------|-------------------------|
| 1. Antenna installation         | 6. Platform installation            | 11. Site maintenance    |
| 2. Build-to-suit                | 7. Power and grounding installation | 12. Site modifications  |
| 3. Foundation installation      | 8. RF equipment installation        | 13. Tower construction  |
| 4. Lighting system installation | 9. Shelter installation             | 14. Tower reinforcement |
| 5. Microwave installation       | 10. Site construction               |                         |

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[dennis.beck@aflglobal.com](mailto:dennis.beck@aflglobal.com)  
(615) 595-9904  
[www.aflglobal.com](http://www.aflglobal.com)  
Area served: national

Types: tower, rooftop, DAS, small cell  
Services: 1, 5-10, 12-14  
AFL provides installation, material furnish, detail engineering, construction and maintenance solutions, allowing wireless communications companies to maintain satisfied customers by offering ever-increasing bandwidth, technology and service performance. AFL plans, designs, implements and maintains communication networks for service providers, working in all communications markets offering network, cell site and enterprise solutions.

**Atlantic Tower Services**  
2544 E. Landstreet Road, Suite 600  
Orlando, FL 32824  
Wayne Busby  
[wbusby@accessats.com](mailto:wbusby@accessats.com)  
(407) 423-9071  
[www.accessats.com](http://www.accessats.com)  
Area served: national  
Types: tower, rooftop  
Services: 1-14

**Bay Communications**  
733 Pomona Ave.  
Albany, CA 94706  
Greg Brazil  
[baycomm@earthlink.net](mailto:baycomm@earthlink.net)  
(510) 527-6600  
[www.baycommunications.net](http://www.baycommunications.net)  
Areas served: CA, HI, OR  
Types: tower, rooftop, DAS, small cell  
Services: 1-13



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**Black & Veatch**  
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[bukatyk@bv.com](mailto:bukatyk@bv.com)  
(913) 458-7967  
[www.bv.com](http://www.bv.com)  
Area served: national  
Types: tower, rooftop, DAS, small cell  
Services: 1, 3-10, 12-14  
B&V network infrastructure deployment and upgrade solutions include program and project management, site acquisition, A and E engineering, zoning and permitting, tower structural analysis and modifications, procurement, logistics, construction and construction management, small cell and DAS, and decommissioning.  
*See ad on page 43*

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**buyers guide**



**Caltrop Construction Services**

5186 N. Blythe Ave.  
Fresno, CA 93722  
Neil Brown  
[nbrown@caltrop.com](mailto:nbrown@caltrop.com)  
(209) 298-7808  
[www.caltrop.com](http://www.caltrop.com)

Areas served: CA, CO, MT, NM  
Types: tower, rooftop  
Services: 1, 3, 6-14

**Capital Tower & Communications**

13330 Amberly Road  
Waverly, NE 68562  
Tony Martin  
[tonym@capitaltower.com](mailto:tonym@capitaltower.com)  
(402) 786-3333

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

Areas served: national  
Types: tower, rooftop, DAS, small cell  
Services: 1-14

**Cell Blocks**

277 Sumption Drive  
Columbus, OH 43230  
Phil Colflesh  
[philcolflesh@cellblocksinc.com](mailto:philcolflesh@cellblocksinc.com)  
(614) 800-0534  
[www.cellblocksinc.com](http://www.cellblocksinc.com)  
Area served: national  
Types: tower, small cell  
Service: 3

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HUBER+SUHRNER INC.  
Essex Jct. VT 05452, USA, [www.wireless-infrastructure.com](http://www.wireless-infrastructure.com)



**CIS Communications**

749 Old Ballas Road  
St. Louis, MO 63141  
Brick P. Storts IV  
[brick@ciscomm.com](mailto:brick@ciscomm.com)  
(314) 569-2275  
[www.ciscomm.com](http://www.ciscomm.com)  
Area served: St. Louis County, MO  
Types: tower, rooftop, DAS  
Services: 2, 11, construction management  
CIS Communications is based in St. Louis and provides site development, (site selection, lease space and purchase negotiation, architectural and engineering drawings, due diligences, zoning approval and permit coordination including UMTS and LTE upgrade coordination) construction management and rooftop management services.



**CommStructures**  
101 E. Roberts Road  
Pensacola, FL 32534  
James Hobbs  
[jhobbs@commstructures.com](mailto:jhobbs@commstructures.com)  
(850) 968-9293



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

Area served: national

Type: tower

Services: 3, 6, 10-14

CommStructures offers construction services throughout the country for the commercial, utility, federal and international markets. CommStructures specializes in site, tower, foundation and platform installation, tower reinforcement, and site modifications. Years of experience provides CommStructures with the ability to complete projects quickly, and cost efficiently, never compromising on quality.



**ComSites West**

2555 Third St., Suite 200

Sacramento, CA 95818

Charlie Feick

[charlie@comsiteswest.com](mailto:charlie@comsiteswest.com)

(530) 414-4376

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

Areas served: CA, NV

Type: tower, rooftop, DAS, small cell

Service: 2

ComSites West develops, owns and operates wireless communications sites in Northern California and Nevada, including tower and rooftop communications facilities. The company also develops towers jointly with land owners and acquires towers through outright purchases and through purchase leaseback programs.

**Day Wireless Systems**

4700 SE International Way

Milwaukie, OR 97222

Kevin Hunter

[khunter@daywireless.com](mailto:khunter@daywireless.com)

(503) 659-1240

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

Area served: national

Types: tower, rooftop, DAS, small cell

Services: 1-14

**Deep South Communications**

17555 George O'Neal Road

Baton Rouge, LA 70817

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[wayne@dscnetworks.com](mailto:wayne@dscnetworks.com)

(318) 229-2888

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

Areas served: AL, AR, FL, GA, KY, LA, MS, MO, NC, OH, OK, PA, SC, TX, WV

Types: tower, DAS

Services: 1, 3, 5, 7, 10-14

**Dietz Brothers**

12185 51st St. NE

Spicer, MN 56288

Alan Dietz

[alan@dietzbros.net](mailto:alan@dietzbros.net)

(320) 894-5957

[www.dietzbros.net](http://www.dietzbros.net)

Areas served: IA, MN, ND, SD, WI

Type: tower

Services: 1-14



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Gillen Design Systems, LLC  
[Glenn@GillenDS.com](mailto:Glenn@GillenDS.com) / 604.512.3770

For Quote Requests: Martin Reulet, Sales  
Hanson Pipe & Precast  
[martin.reulet@hanson.com](mailto:martin.reulet@hanson.com) / 800.733.5806

## buyers guide

### Excell Communications

6247 Amber Hills Drive  
Trussville, AL 35173  
Scott B. Smith  
[scottsmith@excellcommunications.com](mailto:scottsmith@excellcommunications.com)  
(919) 771-1961  
[www.excellcommunications.com](http://www.excellcommunications.com)  
Areas served: AL, FL, LA, MS, NC, SC, TN, VA  
Types: tower, rooftop, DAS, small cell  
Services: 1-14

### Georgia-Carolina tower

2278 Wortham Lane  
Grovetown, GA 30813  
Mark Barinowski  
[markbarinowski@comcast.net](mailto:markbarinowski@comcast.net)  
(706) 309-9670  
Areas served: AL, FL, GA, MS, NC, SC, TN  
Types: tower, rooftop  
Services: 1, 2, 4, 5, 12-14



### GlenMartin

1604 A Business Loop 70 W.  
Columbia, MO 65202  
Greg Ira  
[greg.ira@glenmartin.com](mailto:greg.ira@glenmartin.com)  
(800) 486-1223  
[www.glenmartin.com](http://www.glenmartin.com)  
Area served: national  
Types: tower, rooftop, DAS, small cell  
Services: 1-14

GlenMartin offers a strong background in turnkey construction services and integrated build-to-suit. Its team of qualified professional engineers and project managers is ready to tackle your difficult sites. GlenMartin's goal is to minimize your cost and optimize your deployment plans through integrated service offerings.

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Area served: national  
Types: tower, rooftop, DAS, small cell  
Services: 1, 5, 8-10, 12, 13

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*See ad on page 57*

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Gibson City, IL 60936  
Mark Sizemore  
[msizemore@hi-techtowers.com](mailto:msizemore@hi-techtowers.com)

(217) 784-5212  
[www.hi-techtowers.com](http://www.hi-techtowers.com)

Area served: national  
Types: tower, rooftop, DAS, small cell  
Services: 1-14

(404) 541-1300  
[www.mastec.com/communications](http://www.mastec.com/communications)

Area served: national  
Services: 1-13

MasTec Network Solutions is a division of MasTec that provides comprehensive services and turnkey solutions required to design, build, optimize and maintain telecommunications networks. The company's services cover both the wireline and wireless industries .

*See ad on page 39*

Types: tower, rooftop, DAS, small cell  
Services: 1-14

Metro RF Services is a premier full-service contractor providing project management, civil and electrical solutions covering all aspects of today's rapidly evolving telecommunications industry. With offices located in California and New Jersey, Metro RF Services has managed infrastructure implementation projects for both the public and private sectors, from San Diego to Seattle and from Philadelphia to Buffalo.



**MasTec Network Solutions**  
2859 Paces Ferry Road, Suite 600  
Atlanta, GA 30339  
Shauncey Mashia  
[shauncey.mashia@mastec.com](mailto:shauncey.mashia@mastec.com)



**Metro RF Services**  
2320 S. Archibald Ave.  
Ontario, CA 92882  
John Rogers  
[john.rogers@metrorf.com](mailto:john.rogers@metrorf.com)  
(909) 230-4920  
Areas served: CA, NJ, NY, OR, PA, WA



**MidAmerica Towers**  
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Gainesville, GA 30504  
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Type: tower

Services: 1-7, 8-14, tower management, consulting



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[sales@mutionline.com](mailto:sales@mutionline.com)  
(217) 819-3040  
[www.mutionline.com](http://www.mutionline.com)  
Area served: national

Types: tower, rooftop, DAS, small cell  
Services: 1-14



### NORTHERN PRIDE COMMUNICATIONS, Inc.

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20 Center Park Road  
Topsham, ME 04086  
Lincoln Erhard  
[lerhard@northernpridecommunications.com](mailto:lerhard@northernpridecommunications.com)  
(207) 798-5540  
[www.northernpridecommunications.com](http://www.northernpridecommunications.com)

Areas served: MA, ME, NH, VT  
Types: tower, rooftop, DAS, small cell  
Services: 1, 3-14

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(888) 373-8886  
[www.sabreturnkeysolutions.com](http://www.sabreturnkeysolutions.com)  
Area served: national

Types: tower, rooftop, DAS, small cell  
Services: 1, 3-14, turnkey site development

*See ad on page 27*





**SBA Communications**

5900 Broken Sound Parkway NW  
Boca Raton, FL 33487-2797  
[information@sbsite.com](mailto:information@sbsite.com)  
(800) 487-SITE  
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Area served: national  
Types: tower, rooftop  
Services: 1-14

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*See ad on the back cover*



**Stainless Doty-Moore**

1140 Welsh Road, Suite 250  
North Wales, PA 19454  
Ed Deetscreek  
[ed.deetscreek@stainlessllc.com](mailto:ed.deetscreek@stainlessllc.com)  
(215) 631-1323  
[www.stainlessllc.com](http://www.stainlessllc.com)  
Area served: national  
Types: tower, rooftop  
Services: 1-8, 10-14

Stainless Doty-Moore provides design, engineering, fabrication, and installation for towers of heights to 2,000 feet to customer specifications for durability and dependability under extreme conditions. Stainless Doty-Moore offers existing tower analysis, modifications, maintenance, repair, inspections, and construction plus 24-hour service for emergency situations with its own experienced, safety-trained crews.



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(800) 755-0689

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

Area served: national  
Types: tower, rooftop, DAS, small cell  
Service: concealment  
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## buyers guide

solutions for any wireless carrier, landlord, zoning board or community.

*See ad on page 19*

### Tower Economics

700 Route 130 N., Suite 204  
Cinnaminson, NJ 08077  
Leonard B. Stevens  
[len@towereconomics.com](mailto:len@towereconomics.com)  
856-786-7200 Ext 301

Area served: national

Types: tower, rooftop

Services: 1, 2, 4, 5, 8, 10-13

### Tower Sites

17640 W. National Ave.  
New Berlin, WI 53146-3727  
Terry Michaels  
[tmichaels@tower-sites.com](mailto:tmichaels@tower-sites.com)  
(262) 786-8330

[www.tower-sites.com](http://www.tower-sites.com)

Areas served: IL, WI

Type: tower

Services: 1, 2, 4, 5, 10-13

**Trilogy**   
COMMUNICATIONS, INC.

### Trilogy Communications

2910 Highway 80 E.  
Pearl, MS 39208  
Edmund Lee  
[elee@trilogycoax.com](mailto:elee@trilogycoax.com)  
(601) 933-7522

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

Area served: national

Types: tower, DAS, small cells

Services: 1-8, 10-13

Trilogy Communications is the leading U.S. manufacturer of advanced air-dielectric cable technology for the wireless market. Trilogy's AirCell transline, radiating, and plenum cables eliminate water migration and offer the best attenuation. Trilogy offers PIM-certified jumpers. Trilogy also provides complete turnkey construction services for operator network deployments. AirCell cable is made in the United States.

 **TRM**  
Convergent Network Solutions

### TRM

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Foxboro, MA 02035  
Justin Leland  
[jleland@trmcom.com](mailto:jleland@trmcom.com)  
(617) 510-1115

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

Areas served: New England and Mid-Atlantic

Types: tower, rooftop, DAS, small cell  
Services: 1-14, backhaul connectivity and services



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Quarterly AWA meetings offer you the opportunity to network with customers and suppliers while learning ways to improve your business.

# Alabama Wireless Association

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[www.alwireless.org](http://www.alwireless.org)

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## buyers guide



### UniTek Global Services

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Annette Hellmich  
[info@unitekgs.com](mailto:info@unitekgs.com)

(267) 464 1700

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

Area served: national

Types: tower, rooftop, DAS, small cell  
Services: 1-14, scoping and audits, preventive maintenance testing

Company description:

Pinnacle Wireless, a UniTek Global Services company, connects the wired and wireless worlds via advanced technologies. It provides turnkey construction services solutions, based on the company's motivation to perform with operational excellence to the wireless

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

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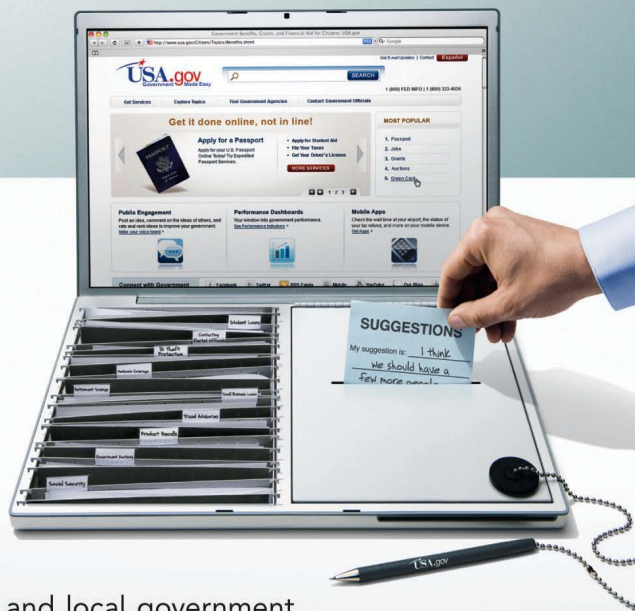
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**The Pennsylvania Wireless Association** has been an active player not just for the state's wireless industry and its agenda but for charities that impact us here in the Commonwealth. One of our favorites, (others being, the Boy Scouts, Toys for Tots and the Pittsburgh Food bank) is the Penn State Hershey Children's Hospital. Recipient of our annual golf tournament proceeds from generous participants and sponsors alike.

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**Pennsylvania**  
wireless association

[www.pawireless.org](http://www.pawireless.org)

state wireless association

# NYSWA Passes the Torch

By Pat Tant

It is probably safe to say that almost every wireless industry professional has either heard of or is a member of a local state wireless association. The genesis of the state wireless association movement was 13 years ago when Tennessee launched the first association as a vehicle to further the wireless community's need for representation at the municipal government level.



I have always felt privileged to have been involved in forming the first state wireless association in Tennessee in 2000, which was followed by the formation of associations in Alabama in 2001 and in Georgia in 2003. Forming the first three associations revealed the amount of time and resources it would take to expand the movement to other states. I formed the State Wireless Association Program to undertake the formation of additional associations.

The program began in 2005 with the objective to form state wireless associations throughout the country. Today, a national trade association for the wireless infrastructure industry, PCIA, facilitates the formation of new associations and devotes staff resources to support existing associations. I quickly realized there was an incredible amount of talent willing to step into leadership roles. It was easy to identify people who wanted to make a difference. The State Wireless Association Program leadership at the time was introduced to Doug Dimitroff, an attorney in New York, and everyone involved quickly became confident that he would be the right leader for the large

and complex undertaking to launch a wireless association in New York state. One of the State Wireless Association Program's great successes has been the New York State Wireless Association (NYSWA).

Dimitroff, who is a partner in the Phillips Lytle law firm's Buffalo, N.Y., office, became a founding member of NYSWA and its first president. Other Phillips Lytle attorneys have served as board members. Dimitroff said Phillips Lytle has contributed much time and has made financial investments to support NYSWA.

"We have accomplished so much in these past six years," Dimitroff said. "Not only has Phillips Lytle supported my efforts all along the way, but everyone involved in NYSWA has given so much of their time, talent and resources to make this a leading association for the State Wireless Association Program."

During Dimitroff's tenure, NYSWA was the first state wireless association to host a comprehensive trade show and conference targeted at both the wireless industry and those outside who work with the industry, including municipalities and government officials. NYSWA also developed an outreach program for organizations outside of the wire-

less industry and made presentations to the Association of Towns of the State of New York, the New York State Association of Counties, the New York Planning Federation and county and local governments.

On behalf of NYSWA and the wireless industry, Dimitroff has spoken in towns and villages across New York at public meetings and hearings, including the New York City Council. Ongoing positive communication with municipalities has led to modified local laws and greater municipal government receptivity to the construction of wireless infrastructure.

At the request of the FCC, NYSWA and other state wireless associations have spoken out about the FCC's various broadband initiatives. NYSWA has partnered with New York state emergency responder organizations to offer educational programming. The association has made continuing contributions to the American Red Cross.

After six years, Dimitroff stepped down as president and said he was pleased to announce his successor, Chris Fisher, an attorney at the Cuddy & Feder law firm. Fisher was also a founding NYSWA board member, and he has served as an officer since the

## New York State Wireless Association

- First state wireless association to conduct a trade show
- Outreach program for organizations outside the wireless industry
- Speakers at public meetings
- Communication with municipalities leading to modified local laws
- Support for FCC broadband initiatives
- Educational programming with emergency responders
- Contributions to the American Red Cross





**Doug Dimitroff, former NYSWA president (center), delivers a check to representatives of the American Red Cross for the state wireless association's donation of \$5,000.**

association was formed.

"I am fortunate to have partners at Cuddy & Feder who believe in giving back to the community and who have supported NYSWA," Fisher said. "Several of my colleagues within the firm volunteer time and serve in other leadership roles at NYSWA."

In Manhattan during NYSWA's annual holiday party conducted in December 2012 and on behalf of the NYSWA board, Fisher thanked Dimitroff for his years of service to the association and presented him with the NYSWA Award of Distinction of Founding President. Fisher said he was honored to have been elected to lead the association, was excited to serve in the new capacity, and was looking forward to adding his voice to those engaged in advancing the interests of the wireless community.

"NYSWA is off to a quick start in 2013, having already provided testimony to the New York City Council on wireless industry responses to Superstorm Sandy," Fisher said. "NYSWA is collaborating with wireless carrier members on several other statewide initiatives." He said the association is pre-



**Doug Dimitroff, former New York State Wireless Association president:** "Everyone involved in NYSWA has given so much of their time, talent and resources to make this a leading association for the State Wireless Association Program."

paring for its annual conference, which for the first time will be held in New York City. The conference is set for June 13-14 at Chelsea Piers. "We promise to deliver a venue in the heart of Manhattan with keynotes, educational content,



**Chris Fisher, New York State Wireless Association president:** "NYSWA is off to a quick start in 2013, having already provided testimony to the New York City Council on wireless industry responses to Superstorm Sandy."

exhibitors and networking opportunities unparalleled for any volunteer trade association," Fisher said. ■

Pat Tant is president of Solution Seven. Her email address is [pat@solutionseven.net](mailto:pat@solutionseven.net).

## product showcase — point-to-point products (backhaul)

### Sub-6 GHz Broadband Solution

**DragonWave** has added Harmony Radio Lite to its product line. The product is specifically tailored to provide reliable and affordable connectivity for public safety, education, health care, oil and gas organizations and utilities, and to support growing mobile backhaul demand in rural and sub-urban communities. With a form factor of 7.5 square inches, including antenna, the sub-6 GHz point-to-point microwave radio supports licensed and unlicensed spectrum and is suited for non-line-of-sight (NLOS) use where obstructions are found between link endpoints. The unit offers scalability and is designed within rugged outdoor specifications to ensure reliable performance and longevity in the field. The unit is a single, all-outdoor unit and includes standard Ethernet interfaces and an integrated antenna. It can easily be configured and monitored remotely with DragonWave's comprehensive network management system.



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

### Ultra-high-capacity Backhaul

The next-generation version of **NEC's** iPasolink EX high-capacity, all-outdoor packet radio operates in E-band spectrum. It covers the 70-GHz to 80-GHz frequency band and is designed to deliver multi-gigabit capacities with high spectral efficiency in dense urban applications, including mobile backhaul, distributed radio access fronthaul and last-mile broadband access.

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

### Optical Spectrum Analyzer

The OSA-500RS in-band optical spectrum analyzer from **JDSU** accurately validates optical performance, helping to optimize transmission networks for any system test scenario. It improves field operations by obtaining true in-band OSNR results 40 percent quicker and ensures reliability with accurate measurements for any xWDM or ROADM network and guaranteed wavelength calibration for life, which can reduce maintenance cost by 50 percent. The system offers automated tests and pass/fail analysis at the push of a button to ensure reliable measurements.

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

### Cell-site Equipment Cabinet

**Charles Industries** makes a weatherproof cabinet that houses Ethernet equipment and other electronics for wireless backhaul applications at cell sites and remote locations. Designed for outside mounting, Cube-RL2003 equipment cabinet meets NEMA 3R or 4X standards and Telcordia GR-487 specifications for electronic equipment cabinets. It measures a compact 37.5 inches high by 20 inches deep and features AC and DC powering options with an isolated battery chamber available for AC configurations. Various thermal management options are also available.

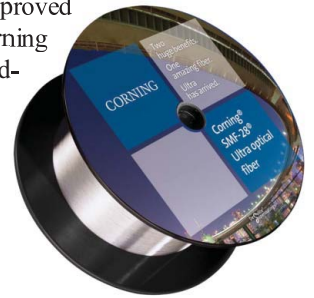
[www.charlesindustries.com](http://www.charlesindustries.com)



### Ultra Optical Fiber

**Corning** makes a single-mode optical fiber cable with best-of-class attenuation parameters and improved macrobend performance. The Corning SMF-28 Ultra fiber provides an additional margin that can be used to extend spans, lengthen the distance between regenerators, increase the allowable number of cable cuts, or allow for the broader use of preconnectorized solutions.

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



### 42-GHz Microwave Antenna

The **Radio Waves** 42-GHz antennas, including the HPCPE-42 and HP2-42, cover the 40.5-GHz to 43.5-GHz band. The HPCPE-42 discriminator offers 40 dB of gain, and the HP2-42 offers 45 dB of gain. Both antennas have very high front-to-back signal ratios to mitigate interference.

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



### Point-To-Multipoint Solution

**Radwin** has upgraded its 5000 series point-to-multipoint product line. The enhancement includes series 5000 base stations in the 5-GHz band that deliver 250 Mb/s net throughput. The upgraded base stations provide greater bandwidth per given range and higher spectrum efficiency of more than 6 b/s per hertz. The base stations are optimized for backhaul, corporate access and video transmission applications and serve multiple market segments, including carriers, service providers, enterprises, utilities, transportation companies and government entities.

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## product showcase — point-to-point products (backhaul)



### LTE-Ready Backhaul

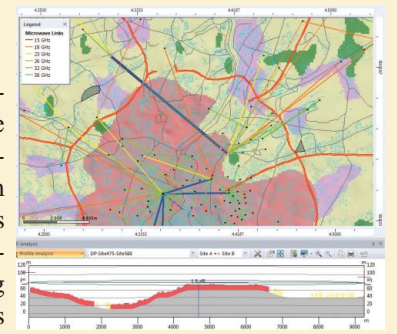
**Siklu's** EtherHaul E-band radios deliver an LTE-ready backhaul solution that reduces the cost of wireless backhaul while future-proofing backhaul throughput. The all-outdoor system includes advanced timing synchronization for reliable backhaul connectivity. The units offer gigabit capacity in FDD or TDD with asymmetric capacity configuration. The devices feature an all-silicon design for greater reliability and significantly lower prices. They offer a plug-and-play installation and full-featured, MEF-compliant and standards-based carrier Ethernet capabilities for easy integration into existing operator networks.

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

### Microwave Planning Software

**Forsk's** Atoll Microwave software version 3.2 for microwave link design and analysis includes a new backhaul capacity planning module that allows network operators to model backhaul network topologies and to dimension backhaul links according to the mobile network traffic. Full integration of Atoll Microwave with Atoll radio planning modules allows immediate sharing of radio planning and optimization data for backhaul dimensioning.

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



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

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


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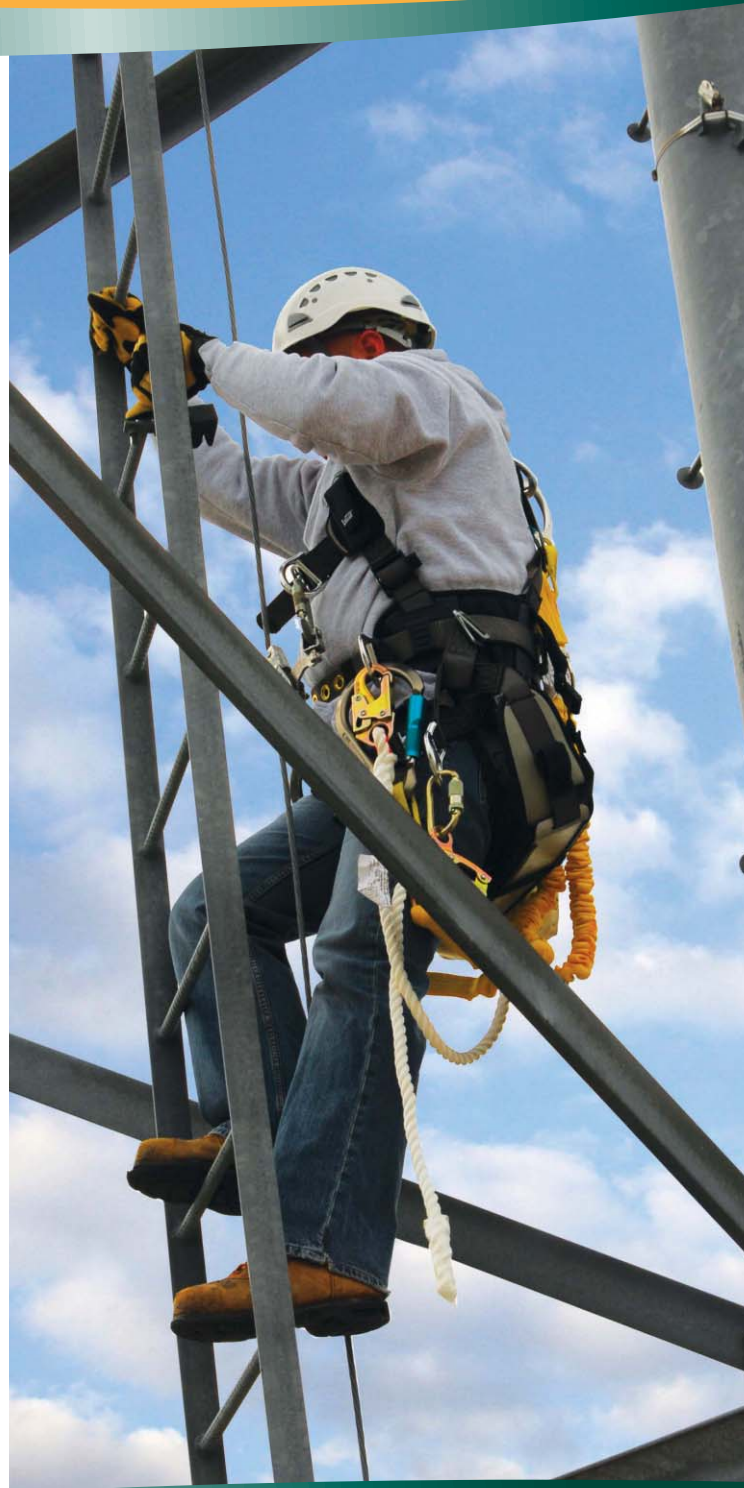
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