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Wireless REVIEW

The Light At the End of the Network

ADC is backhauling wireless traffic using free space optics from fSONA. Now it's hoping carriers with holes to plug will appreciate its enlightened solution. **By Kevin Fitchard**

Seeing the light: Gary Spedaliere of ADC

Photo by Raoul Benavides

It's a funny thing about fog. The molecules of water vapor that comprise your typical ground-hugging fog cloud have almost the exact same diameter as a photon of light. Fire a laser into that soup, and the light beams just scatter.

Therein lies the problem with free space optics and the reason for its lukewarm reception by the telecom industry. But now its atmospheric limitations are slowly diminishing—and the industry is starting to find niche applications for the laser-based technology.

ADC is one such vendor. Its Digivance microcell has been its bread-and-butter wireless coverage enhancement product for years, taking the wireless RF signal from an antenna, converting it into a beam of light and sending it over fiber to the most convenient base station. While Digivance historically relied on fiber optics to backhaul its cellular and PCS feeds, the densifying footprints of carriers and the limitations of fiber builds in small markets ultimately forced ADC to look elsewhere. That search was assigned to Gary Spedaliere,

director of global management for ADC's wireless business unit.

Spedaliere has been with ADC for six years, an industry veteran who joined the Minneapolis-based vendor in 1997 to guide the development of its core wireless product. ADC has always been a company better known for wireline rather than wireless solutions, and over time many of its other wireless product lines—such as MMDS—have fallen by the wayside, leaving Digivance as its most successful wireless product line.

Digivance is Spedaliere's baby, and he wasn't making any big leaps of faith when it came to expanding its capabilities.

"From our viewpoint, the primary solution will always be fiber," Spedaliere said. "But there are some situations where fiber may not be in one building or another, or it might be too difficult or expensive to deploy. We needed an alternative."

Enter fSONA Communications. fSONA isn't the biggest of companies, but what it lacks in numbers it makes up in brainpower. The Canadian firm's technical staff of 39 has a combined 600 years of experience in wireless and optics.

Using technology first developed by the U.S. military and later by Marconi, fSONA began experimenting with high-powered lasers in the 1550 nanometer wavelength—which, while still light, straddles the boundary between the infrared and visible spectrums. The significance of its SONAbeam technology is explained by the inherent problems with free space optics: To penetrate dense atmospheric conditions like fog and rain, lasers must be highly amplified, and highly amplified lasers tend to burn the retinas off any creature unlucky enough to cross their path. Light in the 1550 nm wavelengths, however, impacts the eye no differently than infrared radiation—it's simply absorbed by the cornea and lens, like ordinary visible light.

The result: fSONA can produce extraordinarily powerful lasers that penetrate inclement weather without the safety risks of other optics technology. SONAbeam can deliver OC-3 or Fast Ethernet capacity over 4 kilometers—and perhaps more importantly, fSONA says it can maintain that link in nasty weather conditions.

"We can give much higher capacity than microwave systems, and there's no cost for spectrum, as light is all unlicensed," said Michael Corcoran, senior vice president of sales and marketing for fSONA. "Plus, there are no interference issues. It's a perfect fit for Digivance."

The SONAbeam/Digivance hybrid is still a new technology, and the carriers deploying it are keeping their opinions to themselves. But Spedaliere believes adoption of the technology will grow as the uses for Digivance's pure fiber product—and microcells in general—grow in popularity.

The beauty of Digivance is that it expands network coverage without the need for a base station. Repeaters may seem like a logical alternative, but Spedaliere pointed out that repeaters use up as much spectrum as they transmit, while Digivance increases coverage without eating into a network's overall capacity.

"We believe the network is evolving to smaller and smaller cell sites, but at the same time carrying more and more traffic," Spedaliere said. "You can't put a base station under every cell site, and you can't depend on repeaters. Capacity is too valuable."

ADC is marketing the free space optics alternative for dense urban areas where putting microcells in ever-shrinking coverage cells can be pretty awkward if a fiber optic link isn't readily available. But the laser-based solution may find its ultimate use outside the big city. Adventis analyst Blaik Kirby said that it's in the spottier networks of the nation's Tier 3 and lower markets where free space optics will find its niche.

"If we want to deploy wireless beyond the Tier 2 markets, free space optics are a natural solution," Kirby said. "It's in those cities where you don't have a lot of fiber and you'll be paying a lot for capacity from carriers. The problem is that fiber tends to go where the business is. If you have a city that doesn't have a lot of fiber, chances are it's not that important of a market in the first place."

And while many carriers are looking at using broadband wireless for backhaul, the capacity demands of 3G wireless data will effectively nullify those plans. A solution such as fSONA's could make all the difference in the world when it comes to weighing the capacity vs. cost.

But Spedaliere remains cautious—in addition to experimenting with free space optics, ADC is looking into millimeter wave technologies for the backhaul component. "We're being careful to remain very neutral," he said, insisting that free space optics and other wireless technologies will always be "adjuncts" to Digivance's fiber solution. But it doesn't take a nutritionist to know it's hard to survive on a steady diet of nothing but fiber. ●