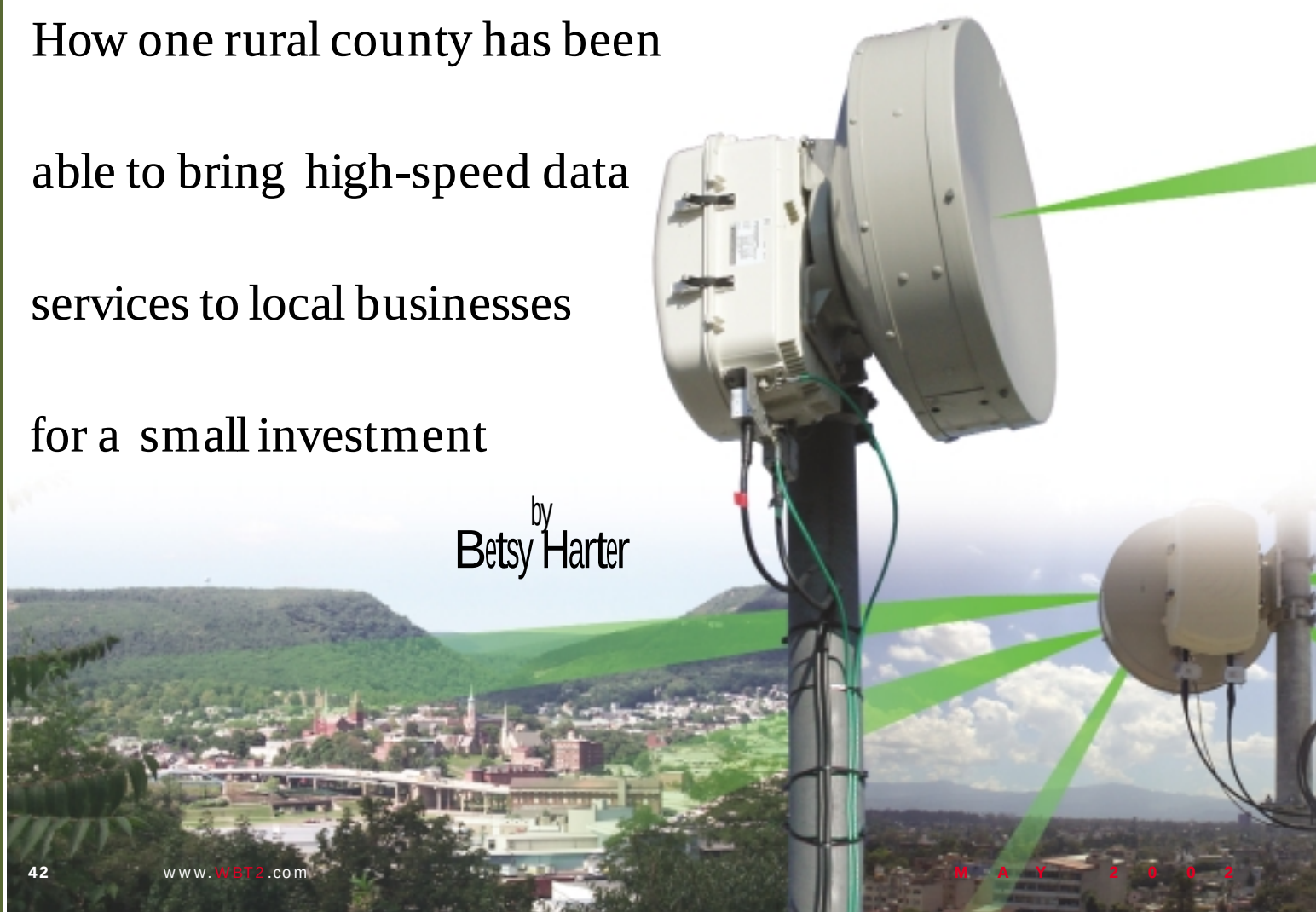
MICROWAVE IN MARYLAND

Rural America GOES BROADBAND

Every month, more and more Americans are able to enjoy the benefits of broadband Internet access through technologies such as DSL and cable modems. However, outside of the nation's cities and suburbs, access to these types of broadband networks isn't always possible. Thanks to an easily deployable wireless broadband solution, one rural county has been able to bring high-speed data services to local businesses and residents for a fraction of the cost of other broadband technologies.

How one rural county has been able to bring high-speed data services to local businesses for a small investment

by Betsy Harter



Underserved Areas

Cahners In-Stat Group estimates that approximately 19% of U.S. households (180 million) are not served by DSL or cable. Some of these areas are so remote that it would cost millions to bring in the necessary fiber to provide them with broadband access. Others are in the midst of rough geographical terrain that also discourages incumbent service providers from building out broadband networks.

According to Blaik Kirby, vice president and leader of the carriers practice at Adventis Corporation, while most RBOCs (Regional Bell Operating Companies) and cable companies are deploying DSL or high-speed cable modem access to 80% of its customers, the remaining 20%, who are mostly rural, don't yet have an economic broadband technology solution.

"When you include the rural ILECs (Incumbent Local Exchange Carriers) and small independents, the percentage of the total U.S. market that has no access to broadband jumps to 23% of the population," he adds. "This is based on the assumption that broadband will be largely available to all urban and suburban areas, which represent 77% of the U.S. population, based on access lines (173.1 million). The rural market, which represents 23% of the U.S. population (51-million access lines), will likely be delayed in getting high-speed services, since the current economics are extremely prohibitive."

Microwave in Maryland

Wireless, however, brings a whole new opportunity to these rural areas. By turning to microwave for broadband access, these remote counties are able to compete in the broadband era – and Allegany County, a rural area in western Maryland, is one such county.

Situated in the Appalachian Mountains, roughly 150 miles outside of Washington, DC, and Baltimore, MD, it felt the devastating effects of the digital divide. "We were struggling to attract new businesses because we did not have an advanced telecommunications infrastructure," says Jeff Blank, supervisor of microcomputing and networking for AllCoNet, the county's intranet (jblank@allconet.org). With the support of Caspar Taylor, speaker of the Maryland House of Delegates, the county began seeking a way to ease the transition from an economy based on light manufacturing, tourism, and customer-service centers to one based on technology, which required a higher level of telecom capacity.

Through funding from the state of Maryland, Allegany County will soon be able to breach the digital divide by deploying a combination of licensed and unlicensed microwave technology. The county began deploying a wireless broadband solution at the end of April that will create a network with carrier-grade reliability for a very small investment.

Allegany County began experimenting with unlicensed microwave technology in 1995 to connect 4,000 workstations in 90 buildings throughout the county and the City of Cumberland via AllCoNet. But the county wanted an even more robust network. It hoped to retain and attract businesses by working with Internet Service Providers (ISPs) to offer a carrier class broadband network – to be called AllCoNet 2 – to both business and residential customers. The county watched as others began using unlicensed microwave networks to work toward the same goal.

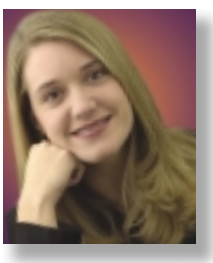
"While these networks were good, they had no real backbone to support them," Blank says. "We wanted a real backbone, a real SONET infrastructure, so we could extend the unlicensed microwave from that backbone."

A fiber SONET ring was out of the question for several reasons. First, the incumbent local telco provider's infrastructure was old and outdated. "When the incumbent provider looks for where to invest its money, it isn't in rural America, it's in Washington and Baltimore. We're left with the old infrastructure," Blank says.

Second, the county's rocky terrain was an additional barrier, making it doubly expensive to run fiber. Third, charges for access to the local provider's fiber are more than the county could afford. For instance, it costs roughly $28,000 per month for a DS3 in Allegany County, compared to $8,500 per month in Northern Virginia. And, since access charges are based on mileage, the county would have to pay a pretty penny to backhaul its traffic all the way to Washington or Baltimore.

Network Design

Soon, the idea for a wireless SONET solution came to the forefront. Using a combination of 311Mbps licensed microwave equipment from DMC Stratex Networks, 3Mbps unlicensed microwave from Alvarion in the 2.4GHz band, and 60Mbps unlicensed microwave from Western Multiplex in the 5.7GHz and 5.8GHz bands, the county has been able to design a mature network for its AllCoNet 2 offering.



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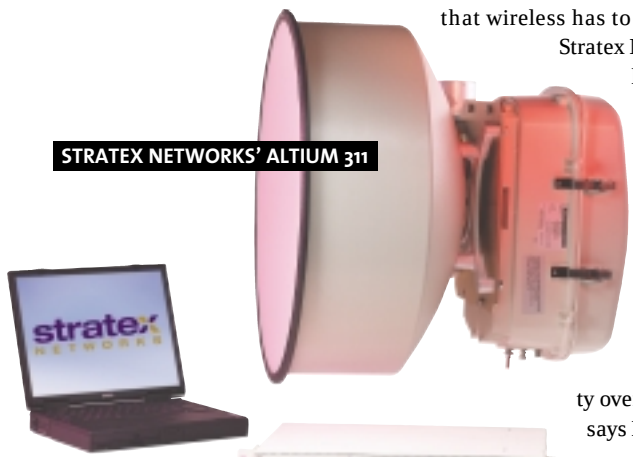
"Through the use of superior backbone technology and the impressive coverage ability of unlicensed microwave, entire geographic areas can be 'wired' for broadband and wideband with minimal financial resources and rapid deployment schedules," Blank explains.

By combining a licensed microwave SONET backbone with an ATM sublayer, Allegany County was able to inexpensively create carrier-class service. The county implemented a SONET ring in order to create a self-healing architecture. In the event of a radio link failure, automatic ring reversal occurs within 50 milliseconds. For the SONET backbone, AllCoNet chose Stratex Networks' Altium 311 radios and Fibrenex add/drop multiplexers (ADMs). These wireless access products combine ultra-high capacity and high-bandwidth efficiency into a single radio platform and provide information transport at 311Mbps for simultaneous OC-3 and ATM transmission.

According to Stuart Little, Stratex Networks' director of solutions marketing (stuart_little@dmcwave.com), Altium 311 is built to address the demand for large data bandwidths over wireless networks. Altium 311 also provides higher bandwidths for operators building fixed wireless access networks to backhaul more information and offer more services to customers with all the flexibility, low cost, and time-to-market advantages that wireless has to offer.



STRATEX NETWORKS' ALTIUM 311

Stratex Networks also provided links to remote base stations that weren't on the SONET ring, via its XP4Plus digital wireless radios. These radios are ideal for networks such as AllCoNet 2 that require quick and easy installation, low network life-cycle costs, and increased availability over longer path lengths, says Little.

1 Backbone and services areas

"We looked at a lot of licensed microwave providers and found that Stratex Networks had the highest speed radio in a single radio unit, as well as low cost and good manageability," explains Blank.

Allegany County then added an ATM layer to the network to provide multi-ISP interoperability and ATM quality of service. Here, Stratex provided ATM switch equipment, sourcing the ASX-200BX ATM switches from Marconi.

Although there's a lot of current market interest in the IEEE 802.11a and 802.11b standards, AllCoNet 2 was built using other technologies. Residential and small business access are provided by placing four multipoint transceivers operating at 2.4GHz on each tower. The transceivers chosen for this implementation were not 802.11b but rather frequency hopping spread spectrum (FHSS) transceivers. According to Blank, FHSS provides better collocation and the ability to locate more than three 2.4GHz transceivers per tower.

High-bandwidth access for large businesses, enterprises, and ISPs is implemented by placing six multipoint transceivers that operate at 5.7GHz on each tower. The transceivers chosen for this implementation layer were not 802.11a, but rather TDMA transceivers. Access speeds can be scaled from 20Mbps to 60Mbps.

Network Advantages

According to Blank, this network design offers Allegany County a plethora of benefits, including cost savings, fast deployment, and high reliability. As a government entity, the county was naturally interested in saving as much money as possible. For a fiber installation, Blank was quoted $30,000 to $300,000 per mile. However, AllCoNet was able to cover a 10-mile area with licensed 311Mbps microwave for only $50,000. In all, the entire wireless SONET network could be built for $3–5 million, compared to the $180 million that building a SONET network with traditional fiber would have cost the county.

Blank explains that due to the recent dramatic cost reduction in licensed microwave equipment, a licensed microwave backbone is now within the financial and managerial scope of today's network administrators. Single radio units with distances of up to 11 miles and speeds of 311Mbps now cost as little as $25,000 per end.

"SONET is expensive if you go with fiber topology, and licensed microwave used to be very expensive, as well. It was only for the big boys," Blank says. "But Stratex Networks has pushed this technology so it's easier to use and cheaper to get. Today, licensed microwave is very reasonable."

Quick deployment was another benefit that appealed to Allegany County. Microwave equipment can be installed and operational in as little as one day. As a result, time-consuming local government or third-party property right-of-way negotiations can be avoided. Plus, no trenching or heavy construction is required for microwave equipment installation.

Another important benefit that this network configuration offers is reliability. These radio

units are easily managed through a Web management platform, and they provide five-nines reliability, Blank says.

"Licensed microwave radios of this caliber are known as 'wireless fiber' units, meaning that they are indistinguishable from fiber on the ADM equipment level," he continues. The ADMs are connected to the Altium 311 radios to provide the SONET ring protection switching. The Marconi ATM equipment is then connected to the ADMs to provide ATM over SONET.

SONET technology naturally has a lot of redundancy built into it in order to promote reliability, says Steve Corbett, Marconi account executive (steve.corbett@marconi.com), and the ATM layer is also extremely reliable due to its guaranteed service level agreements that the county can program into the network. Businesses and residents then know how much bandwidth they can expect, and the service should not fluctuate.

Blank explains that this network design also employs remote monitoring of radio performance using the Stratex Networks' Provision Management platform. Provision allows AllCoNet to monitor the performance of the SONET radio system 24 hours a day, seven days a week, via SNMP (Simple Network Management Potocol). This allows key radio functions to be monitored, such as bit error rate and receiver signal level, enabling AllCoNet to deploy a maintenance team to fix a problem, often before it can become an outage. This management system is also connected to a paging system, which AllCoNet has configured to raise an alarm to signal administrators in the event of early-warning alarms.

"Control is very important to network administrators," says Little. "When you lease a line from the incumbent, you're beholden to that company and often don't know the line has gone down until after the fact. But by monitoring the network itself, AllCoNet can keep tabs on the network and pinpoint potential problems before they become outages."

The most important benefit to Allegany County, however, is that this network design has made it possible to offer the same class of service that major cities provide, Blank points out.

"To be able to offer this bandwidth and broadband services to a residential population and existing businesses," he adds, "and to pull new businesses in is a significant form of economic development."

Corbett agrees that wireless is ideal for allowing a scattered population to get large bandwidth capability into relatively remote sites. In a densely populated area, a carrier might take cable into one part of the city and hit a number of homes at once, but that's harder to do in rural environments.

"Running cable and fiber is more difficult in areas such as Allegany County," he says. "The county was able to get more complete coverage with wireless in less time at a lower cost."

Once completed, AllCoNet 2 will provide Internet access to approximately 85% of residents, 95% of businesses, and 100% of government offices and industrial parks in Allegany County. The county plans to partner with local ISPs in the area, which will in turn provide Internet access.

"We'll pick up businesses on the unlicensed microwave, wrap them around the wireless SONET ring, and drop them off at the ISP of their choice like the local telco does," Blank explains.

Because AllCoNet is not using the incumbent telephone provider, its partner ISPs will be able to make 100% profit. Conversely, in situations where an ISP runs on an incumbent provider's network, half of the monthly service charge that customers pay goes to the local telco.

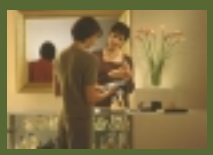
Blank hopes that in the future, other rural counties can learn from Allegany County's experience. This county's redeployable model could be dropped into any town in order to provide reliable broadband coverage.

"The licensed microwave equipment is the best, most cost-effective means of providing Internet access in our rural areas," Blank concludes. "We're extremely hopeful that this model will be repeated in other communities struggling to gain fast, reliable Internet access."

What you'll see Next Month in WBT...

TECH UPDATE: WHAT'S HOT IN WIRELESS

Tally up the ballots and – according to a cross-section of industry heavyweights contacted by ***Wireless Business & Technology*** – we can look forward to tangible, near-term gains that will change how and where we use wireless technologies in 10 key areas. Want to know which?

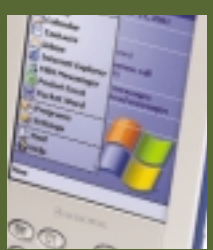


RETAILERS CHECK OUT PORTABLE POINT OF SALE SYSTEMS

Wireless terminals such as PalmPilots can emulate the cash register and enable credit card customers to skip the lines. Portable POS has all the trappings of a great idea, and now the technology is there to make it happen. What's holding it up?

THE WIZARD OF WIRELESS

Applications such as voice-activated dialing, voice portals, and handsfree conferencing may help the wireless industry in its quest for killer apps.



IP: CHANGING THE MOBILE PARADIGM

The evolution to All-IP has solved the operators' challenge of how to drive down the cost of producing and transporting each data bit to below the level of revenue it generates, so that network profitability can be improved.

WIRELESS LAN STANDARDS AND WHICH IS RIGHT FOR YOU

As the industry eagerly discusses the capabilities of "a", "b", and "g", there's a lot of confusion. Find out which wireless standards are out there, what their compatibilities are with other technologies, and which ones make the most sense in a given environment.

MOBILE BROWSER ROUNDUP

If your IT department is planning to offer remote users enterprise access via a mobile browser, you need to know what's available and the unique characteristics they offer.

a look ahead...