

## **Request for Information**

*from Organizations Interested in Providing Last Mile Access  
to the Internet in Specific North Carolina Counties*

***Please describe the last mile connectivity solution you would propose, and identify specific counties or regions to be served.***

MAIN is proposing a "last-mile" wireless deployment in the counties of Mitchell, Yancey, Madison, Swain, Graham and Polk. [NOTE: Graham, Swain and Yancey are Tier 1 counties. Mitchell and Madison are Tier 2. Polk is Tier 3].

These counties account for more than half (2,700) of MAIN's total subscriber base of approximately 5,000 dial-up users. These counties also account for \$427,480 of MAIN's total annual operating expenditures of \$765,545.

MAIN's "brain trust" for last-mile wireless is considerable. Don Davis, founder of Skyrunner.Net, was a founding member of MAIN's Board of Directors. Jane Hatley, former president of Skyrunner.Net, is a current member of MAIN's board. Tim Sanders, the former general manager of Skyrunner.Net, is MAIN's lead wireless consultant.

Sanders is also the founder and principal partner in TheFinalMile.Net, one of the nation's leading wireless consulting firms (<http://www.thefinalmile.net>). Sanders' recent articles include "*Blueprint for Broadband: Minnesota's Xtratyme Builds a Strategy To Serve the Underserved With Broadband Wireless.*" <http://www.shorecliffcommunications.com/magazine/volume.asp?vol=29&story=272>

### ***What technology would be used?***

Specifically, we propose to deploy two types of direct-sequence spread spectrum (DSSS): 902-928 MHz and 2.4-5.8 GHz.

For homes and businesses, we will deploy a 902-928 MHz technology perfected by WaveRider Communications Inc ([www.waverider.com](http://www.waverider.com)). Because this wireless technology does not operate with 802.11 protocols, it is less subject to interference and security breaches. Network security is also enhanced by WaveRider's proprietary protocols, which encode user-data and employ registration tables to prevent hacking.

This technology has a range of approximately 8 miles for line of sight (LOS) delivery to an exterior antenna, and 3 miles LOS to an indoor antenna. In most cases, this technology is not subject to interference from 900 MHz cordless phones. In rare cases where cordless phone use is a problem, an external antenna eliminates the interference.

A special feature of this 902-928 MHz technology is that it is capable of non-line-of-sight (NLOS) delivery — over hills, around buildings, and through leaf-cover — in ranges of 2-3 miles to an exterior antenna, and 1.5 miles to an indoor antenna. This functionality is perfect for mountain communities, where populations tend to be concentrated well within this 2-3 mile range. This NLOS capability is due to the fact that lower-frequency signals lose less energy than higher frequency signals when traveling through the air or passing through leafcover, walls, and RF cable. Also, lower frequency signals have superior reflection and diffraction characteristics, which allow them to bend around obstacles to reach their targets.

Meanwhile, we intend to employ 2.4-5.8 GHz wireless for our point-to-point bridges between primary towers and secondary relay sites. This higher frequency wireless has greater range (up to 20 miles) and greater capacity (10 Mbps). Since we are using it only in point-to-point applications, it is less subject to interference and network security breaches.

***Has your organization deployed this technology before?***

MAIN has employed unlicensed spread-spectrum wireless since 1996. Our first deployment was in Graham County, where we created an "air bridge" between the Tri-County Community College facility in Robbinsville (which housed our server) and the Graham County Public Library, where we installed the county's first public access terminal. Later in 1996, we used the same technology to create a wireless bridge between our offices in downtown Asheville and our server co-location several blocks away. This wireless bridge continues to serve our 8-person office. We also provide a wireless relay to the Jubilee! community center in Asheville in exchange for the use of their meeting hall for MAIN's public events.

In 1998, we deployed unlicensed spread-spectrum wireless in Polk County in collaboration with Isothermal Community College-Polk Campus, the Polk County Public Library, and the Town of Tryon. We subcontracted this project with our longtime private-sector partner, the Asheville-based Skyrunner.Net. This project brought a landline T-1 to the ICC-Polk campus computer classroom. From this location, a wireless relay was created to a municipally-owned tower on Tryon Peak. This tower, in turn, allows us to provide last-mile broadband Internet service to the public library and town hall. Meanwhile, Skyrunner operates a commercial wireless service over this infrastructure.

***At what bandwidth? If asymmetric, please define up and down speed.***

MAIN will offer bandwidth rates up to T-1 speed (1.5 Mbps). MAIN's wireless service is not asymmetric.

***If this is a wireless solution, what spectrum? Is it licensed or unlicensed?***

MAIN will use 902-928 MHz direct-sequence spread spectrum (DSSS) for "last mile" connections, and 2.4-5.8 GHz DSSS for bridge relays. This spectrum is unlicensed.

***Would the proposed service be available for resale?***

Absolutely. We would especially welcome — and encourage — value-added commercial services (e.g., last-mile broadband packages that include network and database management, etc.).

***What infrastructure would be used to support your last-mile solution and access to an Internet Service Provider?***

This project builds on MAIN's aforementioned experience with a three-year-old wireless collaboration among Isothermal Community College, Polk County Public Library, Town of Tryon and Skyrunner.Net, the mountain region's oldest commercial WISP (wireless Internet service provider).

The wireless network will be deployed on top of MAIN's existing infrastructure in each county. In each of these six counties, MAIN co-locates servers on the premises of a local public agency (e.g., community college, EMS office, 911 call center, health clinic, town hall, etc). MAIN's existing landline T-1s will take wireless traffic to the Internet and will be upgraded as needed as part of MAIN's matching outlay (with demand-aggregation over 14 counties, MAIN has negotiated favorable "middle-mile" T-1 rates with our backbone provider).

MAIN will make optimum use of existing water and telecom towers in each of these counties. Most of these towers are either owned by participating local governments or reside on U.S. Forest Service land. The office of U.S. Senator John Edwards has already intervened with the USFS to ensure MAIN's access to towers on federal lands.

For more remote communities beyond our central tower's LOS/NLOS range (e.g., Buladean, Snowbird, etc.), the project will create a "dog-leg" relay from the tower to a strategic location with LOS/NLOS access to the community. We will train community volunteers to assist in planning and

mapping these relay paths, thereby enhancing local "buy in" and cooperation from strategically important property-owners. This grassroots-based "self-help" approach will ensure the maximum deployment to the county's homes and businesses which desire broadband. [PLEASE NOTE: These communities are SO REMOTE that it will take years — if ever — for them to be reached by cable or DSL services.]

This project will also employ a unique community-based strategy for end-user installations at homes or businesses. Instead of MAIN having to hire and train a team of wireless installers, we will work with local computer firms, technical consultants, and our technical volunteers to train a corps of installer-subcontractors. [NOTE: The Waverider (LOS/NLOS) wireless solution we have chosen is simple enough to self-install, yet we realize that some citizens and businesses will still want to hire an installer.] These installers could then be subcontracted by MAIN, or by the end-user, to install their wireless connection in cooperation with MAIN wireless network staff.

This decentralized staffing strategy not only lessens the staffing and operations burden for MAIN, it invests wireless technology know-how in each county and supports local employment, thereby laying the groundwork for future entrepreneurial innovation around wireless technology.

Finally, reports from the wireless trade press state that access to an existing subscriber base is a critical factor in a successful wireless ISP business model. MAIN's existing subscriber base and nonprofit business model will ensure affordable rates, faster and wider adoption, and long-term sustainability. Moreover, MAIN's six-and-a-half year track record of sustainability further enhances the prospects for success. MAIN's locally-accountable nonprofit mission also ensures that the RIAA's investment will remain at work in these communities. There is no possibility of MAIN being sold or shut down due to business decisions by an absentee owner.

All of the above will be implemented in consultation with a wireless steering committee in each county comprised of local technical professionals and volunteers. This wireless steering committee will be formed in collaboration with the e-communities steering committee in each county.

***Provide a profile of your company and define the relationships with any potential partners. Describe previous experience in providing last mile broadband solutions.***

The Mountain Area Information Network (MAIN) was founded in 1995 as a nonprofit ISP and community network serving the mountain counties of North Carolina. In early 1996, via a grant from the U.S. Department of Commerce, MAIN began offering last-mile, dial-up Internet access in 12 counties of western N.C. Today, we offer last-mile, dial-up service in 14 counties (Mitchell, Yancey, McDowell, Madison, Buncombe, Henderson, Polk, Haywood, Jackson, Swain, Macon, Graham, Cherokee, Clay and Qualla Boundary). As noted previously, we have been using unlicensed wireless technology since 1996, and our commercial partner, SkyRunner.Net, has been a last-mile broadband provider since 1997.

In the six counties for which we are proposing a last-mile wireless deployment, our partners include community colleges, a public health clinic, county government agencies, and economic development commissions.

***What is the estimated total cost of the proposed solution?***

We estimate the cost to be approximately \$194,000 per county, for a total project cost of \$1,164,000.

[NOTE: This cost includes the purchase of the first 300 units of customer premise equipment (CPE), at an average cost of \$695 per unit. The relatively high CPE cost reflects WaveRider's superior

NLOS delivery capability, network security, and network management features. For example, WaveRider's "grade of service" software enables a network manager to adjust a subscriber's bandwidth remotely, just as a cable TV technician can make "grade of service" changes without a site visit.]

***What would be the estimated price you would charge the residence or business for service, including equipment, installation and recurring charges?***

**Residential:**

128 Kbps — \$30

256 Kbps — \$40

512 Kbps — \$75

1 mailbox

5 email redirects

5 MBs personal webspace

Burstable to 1 Mbps

**Business Class:**

256 Kbps — \$65

512 Kbps — \$100

T-1 (1.5 Mbps) — \$200

5 mailboxes

10 email redirects

10 MBs personal webspace

1 back-up dial-up account

Burstable to 2 Mbps

Installation: Self-install, no charge; Indoor antenna — \$50; Outdoor antenna — \$100 minimum. MAIN would retain ownership of CPE.

***How much investment would your company be prepared to make? Would your proposal be conditioned upon the award of incentive funds from the RIAA, or funding from investors, lenders, or any other source?***

MAIN is currently projecting an investment of approximately \$435,000 for 2003 in these six counties. In addition, MAIN is prepared to cover the costs of additional bandwidth required by this wireless deployment. We estimate that cost at \$65,000 for a 12-month period. This proposal is contingent on RIAA funding.

***What is the estimated time required for deployment?***

Given our existing partnerships and infrastructure in each county, we estimate a six-week ramp-up period for each county. On this basis, we estimate that service can be initiated in all six counties in 9-10 months.

***What would be the total number of households (sorted by county, if possible) that could be served by this solution?***

*Mitchell:* 85-90 percent

*Polk:* 80-85 percent

*Graham:* 80-85 percent

*Yancey:* 85-90 percent

*Swain:* 80-85 percent

*Madison:* 70-75 percent

[NOTE: These estimates are based on a comparison of 1998 Census Data with our tower viewshed analyses, coupled with our firsthand knowledge of the terrain of each county — plus our understanding of the non-line-of-sight (NLOS) capabilities of our last-mile wireless technology.]