



Wireless Solution for Rural Broadband Access

As addressed to U.S. Department of Agriculture, Rural Utilities Service public meeting on Rural Broadband Access, June 27, 2002.

I would like to thank Administrator Legg and her staff for the opportunity to speak today. My name is Terry Williams. I am the Chief Technical Officer and a founder of AirNet Communications Corporation, a manufacturer of wireless infrastructure equipment. My comments today are to inform this panel of the wireless option for bringing broadband access to rural areas. Much investigation has been focused on providing broadband access the "last mile". For users without existing direct broadband wired or fiber connectivity, the wireless option provides the most cost effective and rapidly deployable method to provide broadband access, particularly to geographically disperse users in rural locations.

It is well understood that providing telecommunications and broadband data services to rural areas is financially challenging for network operators. The costs for deploying solutions commonly provided to suburban and urban areas are often prohibitive in rural locations due to the lower subscriber base, which is unable to support a reasonable return on investment for associated deployment expenses. Due to these challenges, financial support in the form of grants and low interest loans administered by the Rural Utilities Service is essential to bring the latest technologies to areas that would not otherwise be able to afford them and to narrow the gap that is commonly referred to as the "digital divide" for our citizens in rural areas.

However, expenses go beyond initial deployment costs, but also to those that continue indefinitely. These ongoing expenses include equipment maintenance, licensing, upgrades, facilities, etc. I am here to say that it is feasible for a network operator to provide telecommunications and data services in rural areas and achieve profitability. Many of AirNet customers are prime examples of service providers in rural areas providing wireless communications services. AirNet provides cost effective radio technology through our AdaptaCell® Broadband Software-Defined Radio product as well as our AirSite® Backhaul Free™

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Base Station for wide area coverage, lowering initial deployment costs as well as reducing recurring operating costs supporting wireless services to rural communities. In fact, one of the reasons that AirNet won the Best Technical Innovation award from the GSM Association was for bringing cost effective coverage to the rural areas. A rural wireless provider from Kentucky where AirNet first deployed its first wireless network nominated AirNet for this prestigious award.

Since our beginning, AirNet has focused on the underserved market of less populated areas. In May 1997, we deployed our first wireless network for Third Kentucky Cellular Corporation in Corbin, Kentucky. The network for our second customer, also in Kentucky, began deployment in the following months. The primary towns of both customers, towns that Administrator Legg is certainly familiar, have adult populations of less than 6,000 persons each according to the year 2000 census. Since then, AirNet has deployed numerous networks in the US and abroad. Our customers provide wireless services through the central US (tornado alley), having deployed or are currently deploying AirNet equipment in North and South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Other rural areas being provided wireless service with AirNet equipment are in the Michigan, Missouri, and Illinois. Many areas being provided wireless service are supporting populations of less than 10 persons per square mile. Several AirNet customers have commented that they would not be able to meet a viable business plan to provide wireless services without the AirNet solution.

Areas where AirNet wireless solutions are being deployed abroad include Guam, Asia, Africa, the Middle-East and most recently, AirNet is currently providing our wireless solution to the nation of Afghanistan, aiding to rebuild that nation's communications infrastructure, which has been completely destroyed by over 20 years of war and neglect.

The profile for the typical AirNet rural customer is one where our customer is also a local (wire line) exchange carrier. Also, they may be a cable provider as well as an Internet service provider. These customers have augmented their wired telecommunication services with mobile wireless and community cordless services. Frequently, wireless services are provided on a pre-paid basis. By providing integrated services our customers have kept their expenses low, sharing administrative and maintenance expenses among the services that they provide as well as sharing infrastructure among these services. However, among AirNet customers are those who provide only wireless communications services. Additionally, these operators have entered into

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roaming agreements with nation-wide wireless operators to supplement their revenue. In particular use of licensed frequency spectrum allows these customers to provide a high quality level of service due to lack of radio interference as well as utilize this spectrum to provide a variety of services, including mobile voice, community cordless, campus networks and can also provide wireless broadband data access. These customers have also taken advantage of the AirNet solution to provide wireless backhaul via their licensed spectrum, lowering their recurring operating expenses. This capability will be described further, shortly.

So what makes AirNet uniquely capable of supporting wireless operators in rural areas? As mentioned, AirNet's initial entry into the wireless infrastructure market was focused on underserved rural areas. AirNet core radio technology was originally developed from defense technology at Harris Corporation. This technology was spun out of Harris in 1994 to develop highly efficient, flexible, re-programmable wireless base station equipment. One of the benefits of this technology was the ability to provide a high call processing capability at a very low cost per channel. This capability is due to AirNet's broadband radio transceiver technology. Another benefit, is the software-definable characteristics of AirNet's technology. The initial introduction of AirNet's software-defined base station included voice only. However, this software-definable technology has allowed software upgrades to support high-speed packet data service, known as GPRS, requiring no hardware upgrades or modifications to our base station. AirNet's solution for GPRS provides packet data to wireless subscribers up to gross data rates of 170 kbps. This same equipment also allows software upgrades to support enhanced GPRS, also known as EGPRS or EDGE, with gross data rates up to 470 kbps to each subscriber. Today, AirNet markets our broadband software definable base station, as the AdaptaCell® Broadband SDR (Software Defined Radio) BTS (Base Transceiver System).

To maximize the high call processing capability of the AdaptaCell® SDR BTS for rural areas, AirNet developed a new technology. This technology effectively distributes the high call processing capability of the AdaptaCell® SDR BTS over very large geographic areas. Marketed as the AirSite® Backhaul Free™ Base Station, this technology replaces expensive T1 leased lines with an RF link to the AirSite® base station utilizing radio spectrum already licensed by the operator to provide mobile services. Leases for T1 connectivity can be as much as 40% of a wireless network operator's recurring expenses. For connections crossing LATA boundaries, T1 expenses can triple.

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Signals from a mobile subscriber are backhauled via RF from an AirSite® base station to a serving AdaptaCell® BTS. A single AdaptaCell® SDR BTS may serve as many of twelve AirSite®s or a total of eleven AirSite®s and the local coverage of an AdaptaCell® BTS®, itself. Depending upon terrain and other factors, this combination of an AdaptaCell® and AirSite®s may cover over 1,000 square miles utilizing only one T1 leased line from the AdaptaCell® to a base station controller and eventually the public switched telephone network (PSTN). In addition to the wireless backhaul capability, primary differentiators of the AirSite® from competitive products is its full macro-cellular coverage capability and the ability to support E911 Phase I and Phase II location services providing its own unique cell identity. Additionally, the AirSite® is not required to be deployed geographically adjacent to its serving AdaptaCell® BTS. AirSite®s may be deployed as far away as 24 miles from its serving AdaptaCell® BTS at PCS 1900MHz frequencies and 27 miles at cellular 850MHz frequencies. As such, an AdaptaCell® BTS serving the capacity of a small rural town, may also serve five or six AirSite®s covering up to 60 miles of highway or roadway. This coverage not only provides wireless services to local customers living and working in the vicinity of the highway or roadway, but also can draw additional revenue from roaming traffic traveling through the area.

Another factor contributing to the low deployment cost of the AirSite® is its small size and rugged design. The AirSite® is packaged in its own compact environmentally hardened package. The AirSite has withstood cold winters in the upper peninsula of northern Michigan, the heat and humidity of central Florida, the corrosive salt conditions near the Dead Sea, and a severe earthquake on the Pacific island of Guam. Because of its rugged design, the expense of a separate environmental enclosure is eliminated.

Likewise, due to its compact size and low operating cost, AirNet's customer have been innovative in their methods of deploying the AirSite base station. AirSite's have been deployed on light poles at local sporting venues, a church steeple, water tanks, smoke stacks, billboards, as well as traditional cellular towers. One innovative customer deployed AirSites on telephone poles where the deployment expense per cell site including AirSite equipment was less than \$40,000. Recurring expenses were less than \$5 per month for electricity. Another customer deferred leasing space expenses by offering unlimited free local wireless phone service the property owner where the equipment is deployed. These are just some examples of the

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innovative ways that rural operators have been able to provide wireless services to their customers. As previously mentioned, due to our enabling technology, one of AirNet's rural Kentucky customers nominated AirNet for a world award. In 1998, the GSM Association, an organization comprised of over 400 GSM network operators world-wide, providing wireless voice and data services to more than half a billion subscribers in over 165 countries, awarded AirNet for Best Technical Innovation. This was the first time this prestigious award was awarded to a U.S. company as well as the only time awarded for wireless base station infrastructure.

So how can AirNet support broadband access in rural areas? As mentioned, in addition to voice services, the same AirNet base station technology may provide high speed packet data services. Today, AirNet base station infrastructure equipment can provide GPRS packet data up to gross data rates of 170 kbps. This same equipment is software upgradeable to support EGPRS packet data of gross speeds up to 470 kbps exceeding the broadband access definition for proposed RUS funding of 200 kbps per second. The advantages of GSM/GPRS/EGPRS provided by AirNet infrastructure products is the wide-area coverage capabilities providing broadband access to more people over a larger geographic area with less equipment, the ability to support other services such as voice on the same infrastructure equipment as broadband data, reducing operating expense by using licensed spectrum for backhaul rather than T1 or microwave, and the ability to generate further revenue through roaming traffic with equipment that is compatible with nation-wide network operators such as Cingular, AT&T Wireless, and Voicestream Wireless.

To summarize my comments today:

- It is possible for a service provider to support a business plan providing broadband data services in the rural market.
- To defer the initial expense of deployment of broadband services, support is needed for rural areas in the form of grants and loans from RUS.
- Options exist for service providers to minimize initial deployment expenses as well as recurring operating expenses through unique wireless solutions.
- Service providers may also offer a variety of broadband data and telecommunication services, both wireless and wireless to lower the common expenses associated with each type of service.

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- Wireless access via licensed frequencies provides a cost effective method to support broadband access by sharing infrastructure capable of supporting other services such as voice communications.
- Additional revenue may be generated for rural network operators by entering into wireless roaming agreements with large nation-wide network operators.

I want to again thank Administrator Legg and her staff of RUS for the opportunity to speak and for your attention.

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