

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Extending Wireless	)	WT Docket No. 99-266
Telecommunications Services	)	
To Tribal Lands	)	
	)	

**COMMENTS OF THE DANDIN GROUP**

Dewayne Hendricks  
CEO  
Dandin Group  
43730 Vista Del Mar  
Fremont, CA 94539

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## **SUMMARY**

The Dandin Group believes the Federal Communications Commission and Commissioner Tristani are to be commended for their initiative to provide wireless telecommunication services to tribal lands. By changing regulatory requirements to enable the deployment of advanced wireless technologies, the Commission has the opportunity to ensure that Native Americans, as well as those in other underserved communities, have equal access not only to basic telephony, but to the full complement of telecommunication services now available to the majority of Americans.

The locations of tribal lands make them ideal candidates for wireless services, which are more cost effective than wired solutions in remote areas. They also offer a high degree of reliability and the opportunity to provide a high level of service, which can be scaled easily to meet the needs of a rural population.

Basic telephony is essential, but, if the FCC wishes to provide true equal access, it must enable the provision of a full complement of advanced telecommunications services, including Internet access. There are many innovative wideband wireless technologies emerging that would be appropriate for this purpose, including, but not limited to, the following: Part 15 spread spectrum devices, MMDS and LMDS microwave systems, and new ultra-wideband technologies.

The Dandin Group will address the following issues in its comments:

1. The Commission is tasked with ensuring that all Americans, including those living on tribal lands as well as other underserved areas, have access to affordable telecommunications services. Removing regulations that limit the deployment of advanced wideband wireless technologies is essential to this initiative. The Dandin Group, therefore, encourages the Commission to adopt a “tribal lands exception” to

enable best-case scenarios for affordable, reliable, wireless services. By quickly adopting a “tribal lands exception” to the current rules, the Commission would be assured that the tribal lands would have access to the most advanced telecommunications services available today. At the same time, adopting a “tribal lands exception” would provide a testbed for ultra-wideband and spread spectrum devices.

2. The Commission needs to look beyond basic telephony in providing telecommunications services to underserved populations. Equal opportunity can only come from equal access. Developments in Voice over Internet Protocol (VoIP) and Internet connected devices may render basic telephony services obsolete in the near future. Thus, underserved and remote communities have the most to gain from access to Internet enabled e-commerce, medical assistance, distance-learning opportunities, and numerous other online services. Online access provides an opportunity for full participation in the global community as well as connection with the rest of our nation.

3. Tribal lands are the natural location for the deployment of wireless technologies. Remote environments make the cost of providing wired services prohibitive. Wireless services have many advantages in these areas, including dramatically lower initial installation cost and reduced infrastructure maintenance costs. Relaxation of the Commission’s spectrum use rules would further reduce the overhead, as would modifications to the “height and power” rules, since they make little sense in remote areas.

4. Tribal lands offer an ideal environment in which to test new wireless techniques and technology. Deployment in these locations would provide an opportunity for the Commission to evaluate potential interference concerns and new models of spectrum allocation, while at the same time providing cutting-edge technology to a formerly underserved population. The Commission should also open a formal inquiry into the spectrum management ramifications of software-defined radios (SDR). By acting without delay to remove restrictions in its current regulations to the development and deployment of wideband and SDR technologies, which together with other more conventional approaches such as satellite and broadband wireless, could serve to enable unprecedented economic growth and new educational opportunities in tribal lands and underserved areas.

In combination, these steps would go a long way towards addressing Commissioner Tristani's concern that "...the first Americans, remain the last Americans to enjoy the wonders and benefits of the Information Age."

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**COMMENTS OF THE DANDIN GROUP**

The Dandin Group, Inc., a small entity focused on the development and deployment of advanced wideband wireless communications technologies, submits these comments in response to the Notice of Proposed Rulemaking in the above-captioned proceeding (the “*Notice*”). The Commission deserves praise for initiating this proceeding to extend wireless telecommunications services to tribal lands.

## I. INTRODUCTION

A recent Benton Foundation report regarding Native Americans and telecommunications services revealed how access to enhanced services could affect significant cultural, economic, and educational advances.

‘Access to communications technology can impact whether individuals acquire the skills needed for success in today’s job market, whether aging or medically ailing individuals can contact health care providers or access essential health information; and whether parents have a channel of communication with their children’s school and teachers.’<sup>1</sup>

As set out in Section 706 of the Communications Act, the Commission has been charged with encouraging universal advanced telecommunications capability. The Commission should, therefore, with this rulemaking and future rulemakings, continue to examine how it might best encourage the deployment of advanced wireless communication systems to Native Americans. Although basic telephony can address some of the concerns listed above, the Commission should take a forward-looking approach and consider the consequences of the “digital divide” and the need to promote the provision of advanced services. Advanced services include basic telephony as part of the package, but also must include higher bandwidth services such as video and high speed Internet access.

America is beginning to move at Internet speed and Internet access is becoming an essential service. E-commerce, e-mail, research, distance-learning opportunities, online medical services, online news services, financial transactions, personal and family advice, discussion groups, online government filing and assistance are just a few

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<sup>1</sup> Anderson, Rachel. (1999). Native Americans and the Digital Divide. The Digital Beat v.1. no. 15. Benton Foundation. <<http://www.benton.org/DigitalBeat>>

examples of the access opportunities missed by people in remote areas who have only basic telephone service. The Commission can best promote the long-term development of advanced telecommunications capability in tribal lands by altering rules and by adopting a “tribal lands exception” to allow further development and deployment of wideband wireless technologies.

## II. BACKGROUND AND STATEMENT OF INTEREST

Established as a small business in 1999, the Dandin Group provides high speed Internet access to remote locations using advanced wideband wireless technologies. Our goal is to develop and deploy products and services that provide high quality Internet access for people in remote, underserved locations. Although the company is young, its members have many years of experience in wireless communication and the deployment of wireless technologies. The scope of their experience includes involvement in Part 15 and Part 97 Spread Spectrum regulatory issues; working with NSF grants to bring Internet access to Mongolia<sup>2</sup> and rural schools in Colorado<sup>3</sup>; participation on the FCC’s Technology Advisory Council (TAC); and work with the Four Directions Project.<sup>4</sup>

Dandin Group is currently involved in two projects that are particularly relevant to the issues raised in the *Notice*. The first is a recent National Science Foundation Grant awarded to an EDUCAUSE project entitled “Advanced Networking Project With

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<sup>2</sup> "Wireless in Ulaan Bataar," Dewayne Hendricks, WA8DZP, Proceedings of the 16th ARRL and TAPR Digital Communications Conference, 1997

<sup>3</sup> NSF Wireless Field Test Project<<http://wireless.oldcolo.com/course/mongol.htm>>

<sup>4</sup> The Four Directions Project utilized a Bureau of Indians Affairs (BIA) and Department of Education (DOE) grant for the training of Indian school educators to better use technology and the Internet in their schools. The Access Native America, a project of the Bureau of Indians Affairs (BIA), helped to facilitate



Minority-Serving Institutions (AN-MSI).”<sup>5</sup> EDUCAUSE has enlisted Dandin Group to assist in outlining and defining the technology segments of their grant for providing satellite and wireless communications. We are also investigating new networking technologies to help lower the price/performance ratio for these institutions.

The other project relevant to this proceeding is Dandin’s project to provide advanced wireless telephony and data services to the Kingdom of Tonga. An underserved and remote location, the Crown Prince has decided that, in order to move his people and country into the 21<sup>st</sup> century, the entire kingdom should have reliable, symmetrical, high-speed wireless communications and Internet access. In Tonga, we will be able to deploy technology that current regulatory constraints prohibit in the United States. Several high technology firms have expressed interest in working with Dandin on this project and new models for wireless communication practice and deployment will result.

The *Notice* covers several areas of interest to the Dandin Group. These include allowing changes to the regulations limiting the deployment of ultra-wide band, spread spectrum and in general, broadband wireless technologies where range/distance and coverage is an issue, thereby allowing new types of wireless systems to be tested and deployed. On tribal lands the possibility of interference to existing wireless systems is greatly reduced. Products developed and proven not to interfere on tribal lands could be permitted wider use later for educational and economic purposes.

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the procurement and installation of infrastructure to connect BIA schools to the Department of Interior’s Internet backbone. project installed infrastructure to connect these schools to the Internet.

<sup>5</sup> The Advanced Networking Infrastructure and Research division of NSF’s Computer and Information Science and Engineering directorate has awarded a four-year, \$6 million grant (ANI-9980537) to EDUCAUSE entitled, “NSF Advanced Networking Project With Minority-Serving Institutions (AN-MSI).” The overall goal of this project is to

### III. TECHNICAL COMMENTS

A number of existing and future technologies should be encouraged by the Commission as technologies to serve the advanced communications needs of persons living on tribal lands. We will discuss several of these technologies and the potential benefits they might provide and then turn to the regulatory issues.

There is not one “magic bullet” solution to providing enhanced communications to remote areas; the solution is a combination of technologies, including current Part 15 spread spectrum technologies, MMDS technology, point-to-point microwave, VSAT terminals, with future technologies using Ultra-Wide Band (UWB) and laser communications. The first step in this process is getting to the remote area. Figure 1 provides some examples of the basic approaches. These include VSAT, Point-to-Point (which can include microwave, laser, Part 15 devices, etc.), and in some areas the existing telecommunications infrastructure. These are all methods that have been proven over time (although changes in the rules to allow more power and better antennas for Part 15 devices will allow them to cover more distance for tasks such as these). The real challenge, however, is getting these connections across the first mile to the end-user once the signal is delivered to the remote community.

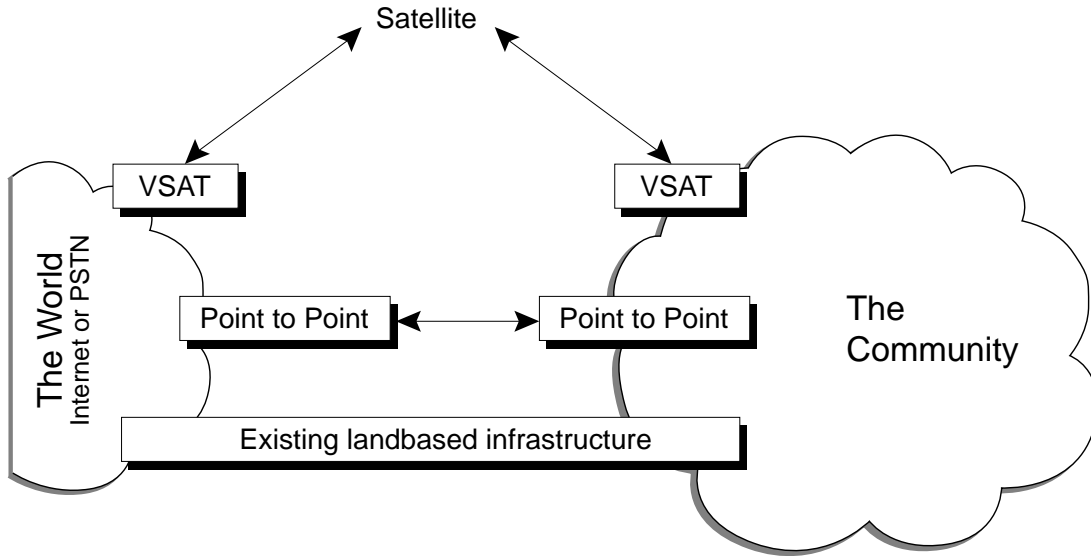


Figure 1

There are a number of methods for reaching the end-user and the outcome of this *Notice* could have an impact on all of these potential solutions. New types of employment and access to new commercial avenues can be made possible with the selection and installation of the appropriate technology. These systems must have significant bandwidth from the user to the world so that the new paradigms of education, commerce, and employment can occur. Further, there is potential for more than wireless technology to be provided. In order for these new paradigms to take effect, “Total Cost of Ownership” must be observed. Total Cost of Ownership in this case is ensuring that people with access to these new information pipelines are educated, trained, and provided with basic equipment to take advantage of this information revolution. Without both the technology and the understanding of what it brings, the technology will be underutilized.

One of the future solutions for the end-user will be Ultra-Wideband communications (“UWB”). We commend the Commission for its inquiry into Ultra-Wideband Transmission Systems,<sup>6</sup> and urge the Commission to act quickly to encourage the deployment of this technology. UWB has excellent potential to meet the telecommunications needs of those living in isolated areas such as tribal lands. Moreover, tribal areas make a perfect evaluation environment for these new types of wireless communication technologies. The potential for harmful interference to existing systems is significantly lower during development and implementation in tribal lands, and such operations would also allow the Commission to determine whether or not UWB poses an unreasonable interference risk to other operations. Thus, the Commission could permit commercial providers to test safely various equipment and architectures while at the same time promoting the advanced telecommunications capability of underserved areas.

Another method is Multichannel Multipoint Distribution Systems (MMDS), which can serve remote areas while providing significant bandwidth so as to empower end-users as discussed above. MMDS systems, combined with current VoIP technology, make the deployment of such systems particularly promising for the support of both high-speed data transmission and telephony. The ability to increase power, antenna gain, and antenna height add to the potential extended coverage of MMDS technology.

This *Notice* particularly affects the potential for Part 15 devices to be widely deployed for first mile connectivity. Unlicensed spread spectrum devices for telecommunication interconnections continue to proliferate and at the same time the

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<sup>6</sup> *Notice of Inquiry*, Revision of Part 15 of the Commission’s Rules Regarding Ultra-Wideband

price, range, and communications speeds of these technologies continue to improve. With an increase permitted in both transmit power and antenna gain in remote areas, the potential of these systems to provide communications to smaller communities where MMDS or other "denser" technology might not appropriately fit can be greatly enhanced.

The Commission has emphasized the need to provide basic telephony in this *Notice*. VoIP technology is more widespread today than even a year ago. Solutions for easy to use end-user to end-user calls should be a reality within the next six months to a year. Lucent and others currently are in the process of making available chipsets for VoIP technology that will significantly reduce the cost of basic handsets and other parts of the basic infrastructure.

Dandin Group believes that today's communications technology is moving towards a world of all digital transmitters and receivers. These advances in technology, combined with the swift evolution of cell based transmission and switching protocols, is opening up a new set of possibilities for unique new services utilizing intelligent networks. These will contain smart transmitters, receivers and switches. Today's Internet is perhaps the best example of a self regulating structure that embodies these new technological approaches to communications in the networking domain. However, to date, many of these innovations have not moved into the wireless networking arena. We feel that the radio networks of the future will involve a mixture of links and switches of different ownership, which terminate at the end-user in the first mile via relatively short distance links. What will then be required is a built-in, distributed, self governing set of protocols to cause the network's behavior to make

more efficient use of a limited, common shared resource, the radio spectrum. Creating such a self-regulating structure for the optimal sharing of spectrum will require much effort. One of the major problems which stands in the way of these new approaches today is the current FCC regulatory environment and the manner in which spectrum is managed and allocated under its rules.

One of the major hurdles that a wireless entrepreneur encounters who wishes to develop innovative new communications products which involves radio is access to the requisite amount of spectrum. This process makes the involvement of the wireless entrepreneur with the government mandatory, which immediately puts the entrepreneur at a disadvantage when compared to entrepreneurs in the computer sector where government involvement is minimal. As a result, innovation has occurred at a much slower pace since the use of technologies such as spread spectrum require the use of more spectrum and not less in order for their advantages to become apparent when it is used for high-speed data transmission.

Historically, the current regulatory approach to radio has been based upon the technology that was in use at the time the the Communications Act of 1934 was framed, basically what we would call today, dumb transmitters speaking to dumb receivers. The technology of that time reserved bandwidths to be set aside for each licensed service so that spectrum would be available when needed. Given this regulatory approach, many new applications cannot be accommodated since there is no available unallocated spectrum to 'park' new services. However, given the new set of tools available to the entrepreneur with the advent of digital technology, what once were dumb transmitters and receivers can now be smart devices which are capable of exercising greater judgement in the effective use and sharing of spectrum. The more

flexible the tools that we incorporate in these devices, the greater the number of uses that can be accommodated in a fixed amount of shared spectrum.

One of the most promising regulatory actions by the Commission in recent times was the move in 1981 to permit the use of spread spectrum technology in unlicensed devices with the release of landmark NOI<sup>7</sup>. This NOI eventually resulted in a new type of device that operates under Part 15 regulations and are deployed in what are called the industrial, scientific, medical (ISM) bands. More important, these devices are forbidden to operate at power levels greater than 1 watt and their transmissions must be spread a minimum amount across the assigned spectrum.

Those restraints notwithstanding, the 1985 Part 15 ruling and later additions and changes to those rules have already spawned the development, manufacture and marketing of a wide range of 'no license required' products. Because mass manufacturing has yet to occur, spread spectrum products for data transmission from the sixty or so current vendors carry premium price tags that have limited the technology mainly to large organization, such as businesses, schools and libraries. Today a radio that can handle near-Ethernet traffic (10 Mbps, suitable for high speed computer communications) up to a distance of about 40 Kilometers (25 miles) costs \$4000. Devices with lower capability, operation at T1 speeds (1.5 Mbps) to a range of 25 kilometers or so, cost \$1,500. For very short ranges, such as for communications within a building, wireless local-area network (LAN) cards for PC's are priced as low as \$250.

There is every reason to believe that these prices will drop as manufacturing volumes increase to meet the growing market demand for higher bandwidth and secure wireless connections from PC's to the Internet. In the future, people may, for example,

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<sup>7</sup> "Authorization of spread spectrum and other wideband emissions not presently provided for in the FCC Rules and Regulations" Gen Docket No. 81-413

routinely rely on wireless transmission to reach a central systems that would then connect to a traditional network of ground-based lines. We predict that reliable, secure unlicensed data radios operating at T1 or higher speed to a range of more than 30 kilometers will soon cost less than \$500 each.

The Internet today represents the best example of the self-regulating mechanism that will be necessary in the new radio environment that we envision. The creation of a similar, decentralized structure for the optimal sharing of the radio spectrum will require a substantial effort by a combination of telecommunications experts and entrepreneurs working with the various regulatory bodies around the world. We believe the deployment and growth of such a system is achievable through increasingly 'smart' electronics, and we envision a self-governing set of protocols that are built into these intelligent devices. Packet radio operations as currently deployed in the Amateur Radio Service is a good existence proof of what is possible today. As advanced radios are deployed, society must tackle the crucial issue of incorporating both positive and negative incentives within the network infrastructure itself to make the best use of a shared common resource, the radio spectrum

#### **IV. REGULATORY COMMENTS**

The Commission should act to encourage the sensible and productive deployment of innovative technologies in tribal lands and other underserved areas. Dandin Group agrees that the Commission should implement a “underserved area exception” for wireless devices (*i.e.*, Part 15, MMDS, etc.) to allow them to transmit with more power and use higher gain antennas. Increasing these limits will increase the viability of providing telecommunications services to individuals on tribal lands by expanding the



reach of existing systems and allowing newer systems to cover more area with less equipment.

We agree that there is potential on many tribal lands for alternate frequency utilization for system deployment. These might include MMDS, Point-to-Point backbones, and putting certain Part 15 devices on alternate frequencies to allow further range and coverage than might be expected on the high frequency bands.

As to UWB technology, the remote nature of tribal lands and other remote underserved areas make such regions ideal for the testing and implementation of UWB radio systems. The Commission should, therefore, allow and promote the deployment of UWB technology in these underserved areas where the potential for harmful interference is low and the true interference potential of these new systems may be evaluated. The Commission should allow commercial providers to test various equipment and architectures and thus examine different modes of implementation, as well as the benefits of various architectures and protocols.

With respect to Software Defined Radios (SDR), the Commission should immediately issue an NOI to examine how the use of such devices could enable the usage of different spectrum management schemes than are possible today. By the use of 'dynamic sharing' and 'adaptive spectrum management', SDR devices together with wideband technologies such as spread spectrum and UWB could cause a true 'paradigm shift' in spectrum management policy at the Commission in the new millenium.

**V. CONCLUSION**

The Dandin Group trusts that the Commission will act promptly to encourage the development and deployment of advanced wideband wireless communications systems. Utilization of this technology will satisfy the telecommunications needs of Native Americans living on tribal lands while creating a new era of opportunity based on access to the Information Age.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Dewayne Hendricks". The signature is written in a cursive, somewhat stylized font.

Dewayne Hendricks, CEO  
Dandin Group, Inc.  
43730 Vista Del Mar  
Fremont, CA 94539