Wireless Technologies and Universal Service

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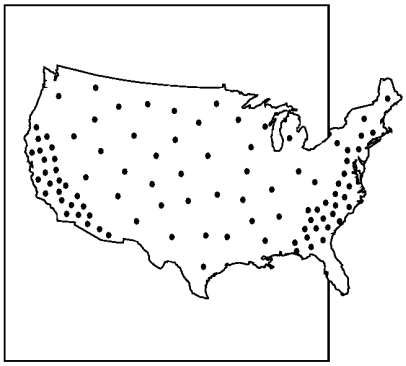
One of the most important contributions that wireless technologies can make to the emerging National Information Infrastructure (NII) is to support and extend the provision of communications services to all Americans. The main purpose of the Communications Act of 1934 was:

> to make available, so far as possible, to all the people of the United States a rapid, efficient, Nationwide and worldwide wire and radio communications service with adequate facilities at reasonable rates.[1]

The term "universal service" has come to mean widespread availability of basic telephone service at affordable rates. Today, 93.8 percent of U.S. households have telephone service, down somewhat from the all-time high of 94.2 percent, recorded in 1993.[2]

Policymakers are concerned with both providing telecommunications service to households that do not have it and with maintaining universal service during the transition to a more competitive market. Wireless technologies can contribute to universal service goals by providing unserved users with access to service and/or by allowing customers to be served at lower costs than with wireline technology. However, policymakers also recognize that the definition of universal service will evolve to include more advanced communication and information services. If wireless technologies are to play a continuing role in supporting



[1] 47 U.S.C. 151.

[2] Federal Communications Commission, "Telephone Subscribership in the United States," April 1995, table 2.

universal service, they will have to keep pace with the capabilities of wireline systems.

FINDINGS

- **Wireless technologies can provide access to telecommunications services in areas where wireline service is not available.** The first component of universal service is physical access—the availability of service regardless of location. Although most households in the United States have access to wireline telephone service, in some parts of the nation it is difficult or impossible to deliver service with wireline technologies because of high cost, difficult terrain, or geographic barriers. But radio waves can cross water, canyons, and other obstacles, providing telephone service to homes that would otherwise remain unserved. In addition, broadcast and satellite technologies are the only means available to deliver video programming and other advanced services to some parts of the nation.
- **Wireless technologies may be able to serve some homes at lower cost than wireline technologies.** With wireline technology, the cost to build a copper loop depends on the distance from the telephone company's *central office* to the home. In sparsely populated rural areas, where many homes are far from the central office, it can be very expensive to provide wireline telephone service. Wireless local loop systems, which connect homes to the telephone network through a radio link, may be less expensive than long rural copper loops. With wireless technology, the cost to serve a home is less dependent on distance from the central office.

  If wireless proves to be a lower cost alternative in rural areas, it would allow for a reduction in the industry cross subsidies currently needed to keep rural telephone service affordable. Federal policies have long supported the use of these subsidies to extend universal service to rural areas, and as a result, telephone penetration in rural areas no longer lags behind that of the cities. However, the system of subsidies is being threatened by the transition to a competitive telecommunications industry, in which consumer prices are expected to be driven closer to the actual cost of providing service. Deploying a less expensive technology would allow for a reduction in subsidies for rural telephone service while keeping prices affordable.
- **Despite the potential cost advantage of wireless technology, it is premature to conclude that it can eliminate the need for rural telephone subsidies.** Few households currently have wireless telephone service. The new digital technologies that will allow for low-cost wireless local loops are only now being introduced. Production economies have not been achieved, and final prices are not yet set. For this reason, determining the cost—both system capital cost and subscriber equipment cost—of different levels of wireless service (basic voice through interactive broadband) is difficult. Moreover, it is not clear whether wireless technology can maintain a cost advantage while providing the high-speed two-way video and data services that may be required as the definition of universal service evolves.

  Even if wireless systems can provide lower cost alternative telephone service in rural areas, a broader portfolio of policies will still be required to support affordable telephone service for low-income users in both urban and rural areas. Wireless technology may provide a way to keep rural telephone service

affordable, while reducing the subsidies, but there are still millions of users in both urban and rural areas who cannot afford telephone service even at current rates. If anything, cities with a large low-income population have a more acute universal service problem. The deployment of wireless technology is unlikely to make telephone service significantly more affordable for these low-income households. Special programs such as Lifeline and LinkUp America, which subsidize users directly, will likely have to be maintained.

In order to more fully explore the potential of wireless technologies in helping meet evolving NII and universal service goals, **Congress could support experimentation with wireless technologies by rural telephone companies.** The use of wireless to provide basic telephone service in rural areas is unproven, and there are many uncertainties. Pilot projects or demonstration projects could help to establish whether wireless is, in fact, a viable option and also help determine the applications in which wireless can be used most effectively.

Congress could also direct the Federal Communications Commission (FCC) to determine whether additional spectrum should be allocated to wireless loop service in rural areas. In the seven years since the Commission last examined this issue, wireless technology has advanced considerably and interest in rural wireless has grown. Some local exchange carriers believe that the current allocation is insufficient and have urged the Commission to allocate additional spectrum.

THE ROLE OF WIRELESS TECHNOLOGIES IN UNIVERSAL SERVICE

The current concept of universal service entails the provision of basic telephone service at affordable rates. Wireless systems, both terrestrial and satellite-based, have certain advantages, including coverage and a different cost structure, that may allow them to support universal service by improving access in areas that have no telephone service and/or by lowering the cost of service. Terrestrial "wireless local loop" systems broadcast from a tower to the homes in the surrounding area; the range can be up to 20 miles or more. The signals are received by an antenna mounted either on a pole near the house or on the outside wall of the house, and then connected by wire to a telephone inside the house. Telephone service can also be delivered via satellite, although satellite service is usually more expensive than terrestrial wireless service.

Extending Service to Unserved Populations

The first component of universal service is physical access—the requirement that service be available. In the United States, there are very few areas that have no telephone service. The long effort to bring telephone service to rural America has been largely successful. However, a small number of households remain unserved because the wires needed to provide service do not reach them.

Households without physical access are generally in areas where wireline technology is not viable, due to prohibitive cost, difficult terrain, or a geographic barrier such as a river or mountain. The data on unserved households is unreliable, but one group estimated that there were approximately 150,000 households in areas where there was no certified telephone company and about 330,000 households in areas where there was a telephone company but no service was available.[3] Another survey found about 500 to 2,000 unserved customers in Colorado, mainly in mountainous regions.[4]

There have been several estimates of the number of rural households that could be served with

[3] Rural Radio Task Force, comments before the Federal Communications Commission, "Petition for Rulemaking to Establish Basic Exchange Telecommunications Radio Service," CC Docket No. 86-495, May 9, 1986, pp. 14-16.

[4] George Calhoun, *Wireless Access and the Local Telephone Network* (Boston, MA: Artech, 1992), p. 185.

wireless technology, either because they have substandard telephone service or because they are without telephone service. The last time the FCC examined the issue of rural radio, in 1987, one survey found that 7,731 subscribers, scattered among 138 telephone companies, could be served or upgraded through radio loop technology.[5] However, the petitioners who initiated the FCC proceeding estimated the nationwide total of eligible subscribers at approximately 900,000 by counting households that were without telephone service or had four- or eight-party-line service.[6] Finally, a study by Bellcore estimated that 213,000 to 246,000 households could be served by radio.[7]

There is a clear role for wireless technologies in serving these remote and difficult locations. Bell Atlantic, for example, serves a household on an island in the James River with terrestrial wireless technology.[8] In Nevada, in the Antelope and Reese Valleys, 50 residential customers who did not have service will soon receive it from a cellular company.[9] Wireless technologies can also be used for temporary installations that do not justify the construction of a wireline network, for emergency restoration of service, and to provide interim service until wireline facilities have been constructed.

Although most installations of wireless local loops have relied on terrestrial technology, satellites may offer another option in especially remote areas. Universal access is inherent in the use of satellite technology—once the satellite has been launched, any location within its footprint can get service. In Alaska, satellites have played a key role in delivering service to remote villages for many years. US West has launched a trial in which Very Small Aperture Terminal (VSAT) equipment is used to provide telephone service to 43 Wyoming customers.[10] New mobile satellite services may offer telephone and more advanced services to fixed users in isolated areas. (See chapters 3 and 5.)

Finally, wireless could provide service to those who have no permanent home. For example, four to five million migrant farmworkers, who usually have limited acces to a telephone, could use wireless—if service was less expensive.[11] Currently, the Census Bureau's statistics used to measure telephone penetration do not count the use of mobile telephone service if it is used instead of wired service to a home.[12] But a small number of people may already be using a mobile phone as their primary phone.

Increasing Affordability

Physical availability is only one component of universal service. Service must also be affordable. In some applications, wireless technologies could support universal service goals by delivering telephone service at a lower cost than wireline technologies. Until recently, this would have seemed unlikely—there are no more than a few thousand households in the United States that get their tele-

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[5] Federal Communications Commission, *Basic Exchange Telecommunications Radio Service*, Report and Order, CC Docket No. 86-495, 3 FCC Rcd 215 (1988).

[6] Federal Communications Commission, *Basic Exchange Telecommunications Radio Service*, Notice of Inquiry, CC Docket No. 86-495, 2 FCC Rcd 326 (1987).

[7] Federal Communications Commission, *Basic Exchange Telecommunications Radio Service* Report and Order, op. cit., footnote 5.

[8] Personal Communication, Donald Brittingham, Bell Atlantic, Mar. 20, 1995.

[9] "Nevada PSC OKs Programs for Service to Remote Areas," *Telecommunications Reports*, vol. 61, No. 1, Jan. 9, 1995, p. 11.

[10] "US West Deploys USATs for Rural U.S. Telephony," *Telecommunications,* Americas Edition, vol. 28, No. 4, April 1994, p. 8.

[11] Some of these workers already spend $40 or more per week on long distance calls to their families, but the added cost of wireless subscriptions put cellular out of their reach. Based on OTA interviews with migrant workers and migrant health professionals.

[12] Jorge Schement, Alex Belinfante, and Larry Povich, "Telephone Penetration 1984-1994," in Proceedings of the 22nd Annual Telecommunications Policy Research Conference, p 4.

phone service over a wireless link, mainly in remote and hard-to-reach areas. According to some published figures, however, the cost of a wireless local loop has dropped to between $800 and $1,200, which is comparable to the average cost of a copper loop in the United States.[13] And in areas that are sparsely populated or have difficult terrain, the cost of a copper loop can easily reach as high as $2,000 to $5,000, making wireless solutions much more attractive.[14]

New digital technologies are the primary driver behind low-cost wireless loops. (See chapter 3.) Reductions in the cost of wireless local loop systems are also being driven by the explosive growth in demand for mobile telephone service. Because the equipment used to provide fixed wireless service is similar to that used for mobile service, fixed users can piggyback on the technology advances and declining cost of mobile technology. As mobile service becomes more widely used and the price of equipment drops due to economies of scale, fixed wireless services will also become less expensive.[15]

Impact of Wireless Technology on Rural Subsidies

Background

Wireless loops may play an important role in reducing the cost of providing telephone service in rural areas. One of the characteristics of wireless technology is that the cost to serve a home does not depend on whether the home is close to the transmitter or far away, as long as it is within range. With wireline technology, on the other hand, the cost to serve a home depends directly on its distance from the central office. In sparsely populated rural areas, homes are located further apart, requiring long, expensive loops dedicated to each customer. For the most remote customers, even terrestrial wireless technologies may be too expensive—if a cell site serves a very small number of households, for example. In such cases, satellite technology may be the only cost-effective option.

Because of these high costs, telephone penetration rates in rural areas of the United States were much lower than in the cities for the first half of this century. To remedy this situation, federal and state regulators developed policies designed to make rural telephone service more affordable. The Rural Electrification Administration (REA—now the Rural Utilities Service) offered low interest loans, provided technical support, and also helped with the formation of cooperatives in areas where commercial companies chose not to provide telephone service. But the more important policy tool was the subsidization of rural telephone service with revenues transferred from customers in lower cost urban areas. It has been estimated that about $5.5 billion flows from urban to rural users to maintain rural telephone rates comparable to those in urban areas.[16]

One subsidy mechanism that is used to keep rural telephone rates low is rate averaging, by which regulators require that carriers charge both urban and rural customers the same rate. As a result, rural users are charged less than it costs to serve them, while urban users pay more in order to pro-

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[13] Terry Sweeney, "Lenders Backing Wireless Loops," *CommunicationsWeek International*, Dec. 12, 1994, p. 3. See also, Bruce Egan, "Economics of Wireless Communications Systems in the National Information Infrastructure," unpublished contractor report prepared for the Office of Technology Assessment, U.S. Congress, Washington, DC, November 1994.

[14] A. Javed, P. O'Kelly, K. Dick, and M. Lucey, "Wireless Technology Evolution and Impact on the Access Network," in Proceedings of the 1994 Conference on Personal Wireless Communications, p. 12.

[15] In general, systems developed specifically for wireless loop applications provide a higher level of voice quality than those based on modified versions of mobile technologies. Many of today's mobile technologies are designed to deliver voice quality lower than that of wireline systems, trading off quality for the advantages of mobility and increased capacity. Achieving better voice quality adds to the cost of the system.

[16] Telecommunications Industries Analysis Project, "Apples and Oranges: Differences Between Various Subsidy Studies," Oct. 10, 1994, p. 2.

vide the necessary subsidies. Rate averaging is the primary tool used by the larger local exchange carriers, the Bell Operating Companies, to provide affordable service in their rural territories. These companies serve a diverse customer base of rural and urban customers and can successfully transfer costs from one group of customers to another.

Most of rural America, however, is served by small independent telephone companies—some serving only a few hundred households—that operate only in high-cost areas and have few offsetting low-cost loops. The FCC tries to ensure that these small companies can deliver affordable telephone service by subsidizing them with revenues from a Universal Service Fund. The money paid into this fund comes from the long distance carriers, who contribute about one cent of every dollar of their revenues. All local telephone companies with loop costs more than 15 percent above the national average are eligible to withdraw from the Fund. The higher their loop costs, the more funds they can withdraw. In 1993, about $750 million was transferred from the long distance carriers to high-cost local telephone companies.[17]

Proposed changes to the Universal Service Fund could encourage small telephone companies to look for lower cost loop technologies. Under current rules, telephone companies withdraw from the Universal Service Fund in proportion to their loop costs. As a result, they make an adequate return on investment, regardless of whether they have used the most efficient technology. The FCC is currently examining whether it is possible to base subsidies on a projected reasonable cost to serve an area, based on *proxy factors* such as population density or terrain type.[18] In the past, high-cost assistance based on proxy factors was rejected in part because the data was more difficult to assemble or verify than simple loop cost.[19]

The system of subsidies has largely been successful; telephone penetration rates in rural areas no longer lag behind those in urban areas. However, there is a concern that the subsidy flows will be more difficult to maintain in a deregulated and competitive environment. For example, a Bell Operating Company that priced urban service above cost in order to subsidize rural users could find its rates undercut by a new competitor that served only the urban market. As competition drives prices closer to cost, those who have benefited from the existing system of cross-subsidies—primarily rural users—may see their rates rise. One organization of rural telephone companies estimated that their subscribers' monthly bills would increase by about $12 per month.[20]

Although there is ongoing debate about the extent to which higher rural prices would cause users to drop off the network, Congress has indicated a desire to maintain a balance between urban and rural rates. Both S.652 and H.R. 1555, the telecommunications bills currently being debated in Congress, state that consumers in rural and high-cost areas should have access to telecommunications services at the same rates as urban consumers. One way to achieve this objective would be to find a subsidy scheme that is compatible with a competitive market. Mechanisms to accomplish this have been the subject of much discussion, but there is, as yet, no consensus on the best solution.

The impact of wireless systems

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[17] Federal Communications Commission, *Amendment of Part 36 of the Commission's Rules and Establishment of a Joint Board*, Report and Order, CC Docket No. 80-286, note 4, Dec. 23, 1993.

[18] Federal Communications Commission, *Amendment of Part 36 of the Commission's Rules and Establishment of a Joint Board*, Notice of Inquiry, CC Docket No. 80-286 (1994), p. 22.

[19] Ibid., p. 23.

[20] OPASTCO, "Keeping Rural America Connected," p. ES-4, 1994.

The promise of wireless technology is that it would provide a way to keep rural rates affordable while at the same time reducing the reliance on subsidies from urban users. Because of its cost structure and the advent of digital technology, wireless technology may be able to serve some sparsely populated rural areas at about the same cost per household as a densely populated urban area. The objective of equal urban and rural rates could then be achieved without cross-subsidies.[21] For those who see no simple way to continue the rural subsidies in a competitive environment, or view the continuing debate over universal service as an impediment to the transition to a more competitive telecommunications industry, the prospect of a technological fix is attractive.

Even if wireless were found to be a lower cost option, however, it would probably be deployed on a piecemeal basis. Nearly all households, even in rural areas, already have wireline telephone service. Wireless technology would be used initially to bring service to the small number of households that currently have none or to provide for new growth in rural areas. It may also be used to upgrade substandard loops, but only about 3 percent of the existing copper loops are rebuilt each year. As a result, it will take some time before the cost structure of the rural telephone network would change enough to allow for a reduction in subsidy requirements.

Most studies that show wireless making a dramatic impact on the cost of rural telephone service assume that the network is being built from scratch.[22] In fact, in countries that are building their telecommunications infrastructure for the first time, wireless is often the technology of choice. Fixed cellular access systems have been deployed in over 40 countries,[23] primarily in developing countries such as Indonesia, India, and the Philippines, but also in Spain and in central Europe. The market for wireless local loop equipment has been estimated at about $4 billion over the next three years, and provides an important export opportunity for U.S. manufacturers.[24]

Low-Income Populations

Among the 6.2 million Americans who do not have telephone service, low income is the primary predictor. For example, of households on welfare, 27.9 percent lack telephones.[25] Now that policymakers have succeeded in bringing telephone service to rural America and in equalizing urban and rural rates, they are beginning to concentrate on bringing telephone service to these low-income populations. If anything, universal service concerns are at least as great in urban areas with significant low income populations as in rural areas—the focus of universal service policy initiatives in the past.

Despite its potential cost advantages, however, wireless technology is unlikely to lower the cost of telephone service sufficiently to make it more affordable for low-income populations. It may help keep rural telephone rates close to urban rates at lower subsidy levels, as noted above, but it will not dramatically lower the average cost of telephone service in the United States. Although wireless probably has a cost advantage over copper when used for rural or longer suburban loops, it is, at best, comparable in cost to copper when used for the much larger number of short urban

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[21] ". . . .the public interest is unquestionably served when basic telephone service can be provided in a more cost effective manner — particularly in rural areas which generally require universal service subsidies to keep rates for local service affordable." US West comments before the Federal Communications Commissison, *Allocation of Spectrum Below 5 Ghz Transferred from Federal Government Use* , ET Docket 94-32, Dec. 19, 1994, p. 6.

[22] See, for example, Hatfield Associates Inc., "The Cost of Basic Universal Service," July 1994.

[23] Jean-Philippe Haag, "Fixed Cellular Solutions for Wireless Access," *Telecommunications,* vol. 28, No. 12, December 1994, p. 57.

[24] Sweeney, op. cit., footnote 13.

[25] Schement, op. cit., footnote 11.

loops. In addition, any savings from a reduction in rural subsidies paid by urban users would be spread across a very large number of households and reduce the average urban bill only slightly.

Because wireless technology will make telephone service more affordable only in a limited number of applications, it cannot, by itself, dramatically increase current levels of penetration. The lack of telephone service among low income groups is a complex problem whose solution will almost certainly require the continuation of federal and state programs that address the affordability question more directly. One such program reduces monthly subscriber charges (the Lifeline Service program), while another provides for reduced installation charges (the LinkUp America program). Over the past decade, states that have pursued aggressive federally supported assistance policies have shown the greatest increase in penetration among households below the poverty level.[26]

POLICY ISSUES

Wireless has considerable promise as a tool for maintaining and expanding universal service, especially in rural areas. But the use of wireless technologies in fixed applications is still rare; OTA was unable to determine the number of households whose telephone service is provided with wireless technologies, but it is probably no more than a few thousand. It is premature to assume that the deployment of wireless technology can eliminate the need for a rural subsidy program. Moreover, it is uncertain whether wireless technology can maintain a cost advantage while providing the high-speed two-way video and data services that may be required as the definition of universal service evolves (see below). However, federal policy should make available sufficient spectrum for the potential of wireless in rural areas to be explored.

Wireless Technology and the Evolving Definition of Universal Service

Wireless technology can provide today's definition of universal service—"basic" voice telephone service. As technology advances and users' needs change, however, the requirements for universal service are expected to broaden; perhaps to include high-bandwidth services such as image transfer and video. The telecommunications bills currently being debated in Congress, for example, define universal service as an evolving level of services. Both S.652 and H.R. 1555 envision that the FCC would periodically determine which services should be provided at affordable rates to all Americans, including those in rural areas.

Wireless technology already plays an important role in providing one-way video services, although they are not part of the current definition of universal service. For example, while 96 percent of U.S. households currently have access to cable television, 4 million households remain unserved. Most of these are in areas where constructing cable systems would be prohibitively expensive.[27] By contrast, at least one or two channels of broadcast television is available in 99.5 percent of households, and over 1 million households in areas without cable service get service from large C-band satellite dishes. Most recently, high-powered direct broadcast satellites (DBS) have brought multichannel video to unserved areas at a price that is competitive with cable rates in urban areas.[28]

In the future, the definition of universal service is likely to include two-way data communications capability that would allow subscribers to access the Internet or online services. Most terrestrial wireless access systems currently allow data to be

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[26] Schement, op. cit., footnote 11, p. 11.

[27] Federal Communications Commission, "Broadcast Television in a Multichannel Marketplace," June 1991, p. 71.

[28] Beth Murphy, "Rural Americans Want Their DirectTV," *Satellite Communications,* March 1995, p. 30.

transmitted at 9,600 bits per second, the speed of a moderately good wireline modem, to access online services and for other applications. Some of the newer systems designed specifically for wireless local loop systems offer even higher fax and data transmission rates. In some respects, wireless may be better able to provide advanced services than the existing wireline network. In rural areas, deteriorating copper loops may not be able to support high-speed fax and data transmission, and it may be less expensive to install a new wireless loop than to rebuild an aging copper loop.

It is unclear, however, whether wireless will be able to match all of the new services that will be provided over advanced wireline networks and still maintain its cost advantage in more than the most difficult to reach locations. Both S.652 and H.R.1555 would require that the services available to urban and rural users be reasonably comparable. In the cities, there is growing interest in a wireline technology known as Integrated Services Digital Network (ISDN) that offers a 128,000 bit per second data stream to and from the home. Both telephone companies and cable companies are also beginning to upgrade urban networks with fiber and coaxial cable to provide high-bandwidth services. No existing wireless access technology can match these capabilities, although the proposed Spaceway and Teledesic satellite systems would provide high-speed data communications services. (See chapter 5.)

Spectrum Availability

Spectrum allocations determine the viability of wireless services—whether they can be offered at all, their capabilities, and the cost of the service. For example, the amount of spectrum allocated determines whether fixed wireless service is limited to basic telephony, or can also carry high-bandwidth information-age services such as interactive multimedia or video. The band in which the spectrum is allocated also affects the economics of the service. Lower frequencies are especially useful because the signal propagates further, allowing more households to be covered from the same tower and decreasing the cost per household.

For wireless to provide the services that constitute the universal service package, sufficient spectrum must be made available. Today, only a limited amount of spectrum is available for fixed voice services—almost all of the spectrum that is allocated for wireless telephony is restricted to mobile applications. The only spectrum available to serve fixed users is allocated to a service called BETRS (Basic Exchange Telecommunications Radio Service), which was established in 1987 by the FCC. But because demand for the service was uncertain, the FCC did not create an exclusive frequency allocation and allocated only a small number of channels.[29] In addition, the FCC only allows carriers with Personal Communications Service (PCS), cellular, or Specialized Mobile Radio (SMR) licenses to serve fixed users on an "incidental" or "ancillary" basis.[30] Their customers may choose to employ their mobile phones in a fixed application, but the network has to be designed primarily to serve mobile users.

In large part, the restrictions on the provision of fixed services by mobile service providers are due to concerns about competition. Competition in the provision of local telephone service has historically been limited by the belief that such service was actually a natural monopoly most effectively pro-

[29] The FCC allocated 26 frequencies in the 450 megahertz band to BETRS on a co-primary basis. In the cities, these frequencies are used for a mobile telephone service, but the FCC reasoned that in rural areas, where BETRS would be more useful, they are often vacant. BETRS *Report and Order*, op. cit., footnote 5. In 1988, the FCC also permitted the use of cellular frequencies for BETRS, but in practice only the 450 megahertz band has been used.

[30] "There is only a limited amount of spectrum for these new PCS services, and fixed service uses generally can be accommodated by other means or in other frequency bands. Therefore, the primary focus of PCS will be to meet communications requirements of people on the move." Federal Communications Commission, *Amendment of the Commission's Rules to Establish New Personal Communications Services*, Notice of Proposed Rule Making and Tentative Decision, ,7 FCC Rcd 5689 1992.

vided by only one carrier. Most states still limit competition in the local telephone service market (although this is changing), and a broad grant of permission to cellular or PCS carriers to provide fixed as well as mobile service might have been seen as sanctioning competition in the local exchange market. In creating the BETRS service, the FCC was careful to note that it would only grant authority to provide BETRS to companies that were either certified local exchange carriers or had some other form of permission from the state to provide local exchange service.[31]

As state barriers to local exchange competition begin to come down, the FCC has the option to allow mobile services providers to provide fixed service. In one survey of small telephone companies, 32 percent believed that wireless would be a competitor.[32] Noting that the PCS frequencies are unlikely to be fully utilized for mobile services in rural areas, the FCC recently indicated that it is willing to consider waiver requests to use PCS frequencies to provide fixed services.[33] However, this position was stated in passing in an unrelated proceeding, and there is still considerable uncertainty about which uses of the PCS spectrum are permitted. The FCC will need to clarify its position regarding wireless fixed telephone services before full competition can emerge in the local telephone market.

The FCC also has the option to allocate additional spectrum specifically for wireless local loop applications.[34] Several local exchange carriers recently requested that the FCC allocate spectrum transferred from the federal government to wireless local loops. However, under most of these proposals, the wireless local loop spectrum would only be available to the incumbent local exchange carrier. As the telecommunications industry becomes more competitive, it is unlikely that the FCC could exclude other carriers from competing for this spectrum.

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[31] Federal Communications Commission, *Basic Exchange Telecommunications Radio Service*, Report and Order, op. cit., footnote 5, p. 217.

[32] Western Alliance, *Universal Service in the Nineties*, p. 14.

[33] Federal Communications Commission, *Allocation of Spectrum Below 5 Ghz Transferred from Federal Government Use*, First Report and Order, op. cit., footnote 20.

[34] United States Telephone Association comments before the Federal Communications Commission, ET Docket No. 94-32, Dec. 19, 1994, p. 3.