Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington DC 20554

In the Matter of	)	
	)	
The Spectrum Policy Task Force	)	ET Docket No. 02-135
	)	

To: Spectrum Policy Task Force

COMMENTS

BellSouth Corporation, on behalf of itself and its wholly-owned subsidiaries ("BellSouth"), hereby submits the following comments in the above-referenced proceeding.

I. Introduction

BellSouth commends the Commission for establishing the Spectrum Task Force. Radio spectrum is a key building block in our economy, and improved management of it will benefit all Americans.

BellSouth is affected by spectrum policy in several ways. It has a significant interest in Cingular, one of the nation's largest wireless service providers. It also operates or has authority to operate radio systems in the ITFS, MDS, MMDS and WCS bands and may acquire additional spectrum in the future through auctions or using other means. Developing services in these various spectrum bands has given BellSouth extensive experience with the problems and opportunities associated with entering new markets and using new technologies for wireless services. BellSouth also supplies other services, such as plain old telephone service (POTS) and high-speed digital subscriber line services (DSL) that are impacted by spectrum policy. For

example, better and more capable wireless LANs will increase consumer demand for BellSouth's DSL services.

Given these interests and activities, BellSouth submits the following comments.[1]

II. Background and Summary

Although the Commission's spectrum management policies are not without critics, radio spectrum policy is one area in which the Commission has had, on balance, substantial success.[2] In many areas—from color TV broadcasting to wireless LANs—innovation and market development in the United States led the world. Consider two recent examples of the success of the Commission's policies. The Commission gave cellular operators technical flexibility to choose a second-generation mobile digital standard for voice communications. The Commission's technical flexibility led both to the rapid deployment of digital wireless services in the United States and to the development of the advanced wireless technologies that lie at the heart of 3G wireless standards. In the case of PCS, the Commission adopted policies requiring that the costs of relocating microwave incumbents be borne by the new PCS firms (and ultimately users) that were to benefit from access to the spectrum freed up by the relocation. This relocation policy made the transition to PCS fairer and accelerated that transition—giving consumers faster access to expanded and improved wireless services.

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[1] Cingular is filing separate comments in this proceeding and BellSouth supports those comments. Further, BellSouth is addressing only specific questions in these comments as enumerated throughout the filing.

[2] For an example of the criticisms of the Commission's spectrum policies, see "The Spectrum Allocation System," by Tom Hazlett, available at http://www.aei.org/sp/sphazlett011102.htm.

Because spectrum is a limited resource and its technical characteristics vary from band to band, spectrum policy involves a challenging mix of technology, physics, international relations, market forces, and public policy factors. Under the current legal structure, the Commission is the institution best suited to reform and improve spectrum policy. State regulators and the executive branch can do little more than make recommendations. Congress cannot engage effectively with many of the detailed issues. Nor can it keep up with rapidly changing technology. Thus, it is quite appropriate for the Commission to reflect on spectrum policy generally.

As a starting point, the Commission should examine its record in spectrum policy, identify its successes and failures in that area, build on those successes, and avoid repeating the failures.[3] Staff members of the Commission have substantial experience and insight into spectrum policy. They should distill that experience and use it.

III. Market-Oriented Allocation and Assignment Policies

Question 1. What specific policy and rule changes are needed to migrate from current spectrum allocations to more market-oriented allocations?

Over the last two decades, the Commission and spectrum users have made substantial strides toward a more market-based approach to spectrum management. As one possible step in continuing this progress, the Commission could consider delineating spectrum licenses into different classes based on various factors (*e.g.*, technical characteristics, market forces). One possible class might be those licenses or portions of the spectrum for which the Commission

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[3] An example to avoid: *unsecured* installment payments for auction winners.

believes that it would be imprudent to rely on market forces. Public safety and distress signaling frequencies are good examples. Another possible class might be licenses for which the Commission is unsure of the extent to which market forces can be effective. Audio broadcasting in the MF band (traditional AM radio) might be a good example of this category. A third possible class might be those licenses and spectrum uses for which the Commission believes, as a policy, that market forces should be effective. Candidates for this category might include services such as PCS that are licensed over geographic regions and for which technical flexibility is now permitted.

By dividing spectrum into classes, the Commission would provide a useful analytical framework within which to resolve the difficult issues involved in this proceeding. This would help the Commission reduce existing regulatory uncertainty—and provide equipment manufacturers, consumers, and licensees with a clearer vision of the future environment.

> *Question 2. Should current, restrictive service and operating rules applicable in many bands be changed to provide licensees with greater flexibility? If so, in which bands and how?*

BellSouth supports flexibility in those situations in which it appears likely that flexibility can improve service or create new options for consumers. BellSouth believes that the most appropriate bands or services for such flexibility are those for which the transmitters and the receivers that interoperate are controlled by the same entity. Point-to-point microwave, most satellite systems, satellite television, and PCS/cellular all provide examples of such systems. Systems for which many separate entities control transmitters and receivers that must interoperate are less well-suited for flexibility. Aeronautical radio and traditional radio and

television broadcasting are good examples of systems in which ownership and control of the distribution system is spread among many entities and, therefore, flexible use would be impractical.

Question 3. Should spectrum policy be different in different portions of the spectrum or in different geographic areas?

As a general proposition, BellSouth believes that there is little justification for *geographic variations* in spectrum policy. Rather, the rights assigned to licensees should create reasonable incentives and opportunities for licensees to match their system designs and investment to topography and subscriber density. A study by Commission staff found that, in a region of the spectrum in which such incentives existed, spectrum efficiency was higher in a crowded urban area than in a less dense area.[4]

In contrast, BellSouth believes variations in spectrum policy in *different bands* of the spectrum are not only appropriate, but necessary to reflect the differing technical characteristics of the various bands. The Commission has recognized this need for variations in spectrum policy in its practices over the years. The Commission's licensing policies and service rules have always taken into account variations in radio wave behavior at different frequencies.

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[4] See "Private Frequency Coordination in The Common Carrier Point-to-Point Microwave Service," John R. Williams, OPP Working Paper 21.

Question 5. Should more spectrum be set aside for operating unlicensed devices? Should the kinds of permissible unlicensed operations be expanded? What changes, if any, should be made to the rules to accomplish this? Because of the commons aspects of unlicensed use, is there concern that, as congestion rises, spectrum may not be put to its highest valued use? If so, what policies might be considered to anticipate this problem?

The major bands used by unlicensed devices today, at 900 MHz, 2.4 GHz, and 5 GHz, total slightly more than 400 MHz—significantly more than is allocated to cellular/PCS. In addition, 5 GHz of spectrum is available for unlicensed use in the 60 GHz region. Although BellSouth believes that unlicensed devices can make substantial contributions to the economy and are a sound use of the radio spectrum, unlicensed devices already have access to large blocks of spectrum.

With regard to the issue of the commons, BellSouth believes that, whenever possible, unlicensed devices should continue to use mechanisms to automatically select frequencies to minimize interference and to set power at the minimum levels needed.[5] It may be desirable and necessary to set more stringent emissions limits on unlicensed devices that are widely deployable and not capable of minimizing interference through frequency selection and power control.

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[5] The characteristics are called *dynamic frequency selection* and *transmit power control*. See the ongoing IEEE 802.11h standardization effort described at http://grouper.ieee.org/groups/802/11/.

Question 6. How can the Commission better facilitate the experimentation, innovation and development of new spectrum-based technologies and services through, for example, changes in its experimental licensing rules, increased use of developmental authorizations or promoting demonstration projects?

BellSouth and other wireless licensees could evaluate new wireless products more efficiently, effectively and quickly, if the Commission established rules that allow manufacturers to obtain nationwide developmental authorizations on specific frequencies within a band under limited conditions as rules for new bands are established. Those conditions should include reasonable low power levels commensurate with the technology, appropriate adjacent channel filtering, etc. This would permit potential service providers to test and/or run trials of new technologies in their markets without unnecessary delays caused by filing individual, case-by-case applications. (See, *supra*, answer to Question 1.)

IV. Interference Protection

Question 7. Are new definitions of "interference" and "harmful interference" needed? If so, how should these terms be defined?

The existing definitions of *interference* and *harmful interference* are appropriate as far as they go. Interference is defined in technical terms, and harmful interference is defined by the economic or social consequences of the interference. Interference protection must address the interfering energy in the affected channel and, therefore, must take into account the cumulative impact of *all* interfering sources.

However, BellSouth has two problems with the current approach to defining interference. First, in a world in which flexibility is permitted and modern, large-scale systems are shared by many different types of users, determining when interference creates harm is difficult. An occasional dropped syllable might be acceptable in a voice conversation between two teenagers but might be completely unacceptable when a physician is talking to one of those teenagers. Thus, the Commission needs to define harmful interference for such services in such a way as to protect such essential emergency communications concerning safety of life and property.

Second, BellSouth is concerned that some sources of radio energy may have the characteristic that, although each single source by itself is relatively benign, the combination of many such sources will be harmful. Several categories of devices raise such concerns—including the widespread deployment of personal electronic devices, the widespread deployment of personal radio equipment, and the potential deployment of ultra-wideband radio systems. Individually, it may be the case that no one device harms the radio environment significantly. Operation of millions of such devices in an urban area, however, threatens to degrade the utility of the radio spectrum by creating constant background interference. This is not just a theoretical concern. Both the AM band and the lower VHF TV channels have been the victims of such incremental degradation. In this regard, more than ten years ago, broadcast interests filed a petition for inquiry asking for, among other topics, inquiry and analysis of the impact of multiple small sources of interference on television service.[6] The current controversy over the impact of lighting devices in the DARS service is another example of this concern.

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[6] See *Petition for Inquiry*, In the Matter of Degradation of Broadcast Service, Association for Maximum Service Telecasters, Inc., October 4, 1989. This petition can be

Question 8. What is the impact, if any, of increased flexibility on how harmful interference should be defined and understood?

As noted above, flexibility makes it somewhat more difficult to define harmful interference. Nevertheless, BellSouth believes that an agreed-to fundamental definition of harmful interference as "radio energy, whether from a single source or multiple sources, that degrades, obstructs, or repeatedly interrupts a wireless service operating properly under a license from the Commission," is still appropriate.

Question 10. Does defining power limits (in-band and at service area boundaries) and coordination procedures in the Commission's rules provide sufficient control over interference as new uses are introduced by licensees? What other regulatory measures are needed, if any?

The power levels along the geographic boundaries of a service area are an important factor in determining the potential for, or existence of, interference. Other factors, however, may also have a significant influence on the actual level of interference that will occur in an adjacent area. The assigned band and communication channel widths of the operators on each side of the boundary are important factors. Other factors include the height and radiation patterns of the antennas involved, the modulation schemes used by the parties, the use of portable or mobile units by either party, and the potential for time-varying propagation conditions that may cause interference to either party.

The Commission's rules constraining power levels at the boundary of PCS and cellular service areas have been reasonably successful in managing interference. Several factors have

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found among the documents from the first term of the TAC at the TAC's SWG website. See http://www.fcc.gov/oet/tac/focusgroups.html.

contributed to this relative success. First, the broad geographic areas controlled by individual PCS and cellular licensees mean that relatively little of a typical system's service area is close to the border. Second, the PCS and cellular licensing rules tended to put the system boundaries in less populated areas where service demand was lower. In addition, the parties on either side of a geographic boundary use either identical systems or roughly similar systems. However, if the systems were to be quite different—say an AMPS cellular system on one side of the boundary and a highly susceptible data transmission system using inefficient protocols on the other side—there might be many instances of interference. In addition, all the cellular and PCS systems were designed to support cellular reuse which helps the carriers reduce interference—something not necessarily present in other applications of wireless technologies.

Question 11. Does defining power limits and other measures in the Commission's rules designed to protect against harmful interference affect innovation?

Defining strict power limits alone may affect innovation by eliminating the potential for some services or technologies. For this reason, the Commission should permit proponents of innovative services to propose alternate power limits—or other clearly defined restrictions--so long as they bear the burden of clearly demonstrating that other parties (*i.e.*, persons operating in adjacent spectrum bands or geographical regions) will not suffer harmful interference.

The Commission might also consider setting aside a small portion of various bands for developmental uses for a defined period of time in an effort to foster innovation. For example, channel H4 in the MMDS band is already subdivided into response channels that, for the most part, are unused. The Commission could issue developmental authorizations to various manufacturers for testing and trials. The Commission could also define a specific band for

developmental purposes that would not require manufacturers to obtain any further authorizations—a simple notification to the Commission at the beginning and end of a use would suffice.

Question 12. As technology advances, should what the Commission defines as unacceptable or "harmful" interference correspondingly change in the future? How should rights and obligations of spectrum users be defined to facilitate such changes as well as innovation?

BellSouth believes that any changes in the definition of interference should match changes in economic forces and technology. However, such changes may lead to uncertainty and therefore should be held to a minimum. The Commission should mitigate the impact of such uncertainty by making changes known well in advance to those who have invested or made other commitments predicated on the basis of rules existing at the time their licenses were granted.

Subsequent changes to rules in the band or adjacent bands that increase interference to an existing service could decrease the existing carriers' ability and willingness to deploy new and innovative services and could impair consumers. This would not serve the public interest or result in spectral efficiency. The Commission should ensure that existing licensees are able to deploy their equipment under the terms of their licenses without the threat that "new" interference rules will make their services unusable by customers or require massive new investment to cure harmful interference created by new rules.

Question 13. If the Commission adopts new policies to address interference, should the rights of new spectrum users be defined differently from those of the present incumbents? If yes, how?

The Commission should clearly establish the responsibilities of new spectrum users at the same time it creates their rights. And, one of the primary responsibilities of the new spectrum users should be to avoid creating additional interference to existing users in the same or adjacent bands. While the Commission should monitor technological advances that may improve receiver resistance to interference, it should not license new spectrum users on the mere hope that some unproven future technological improvement in incumbents' equipment may eliminate interference caused by the new spectrum users. Rather, the Commission should provide incumbent users with unfettered use of their spectrum free of future harmful interference.

Question 14. Should the Commission consider developing receiver standards or guidelines for each radio service that would be used in judging harmful interference? For example, should such standards or guidelines aim to protect receivers that meet or exceed the standards or guidelines, but allow users to use less robust receivers at their own risk?

BellSouth believes that the general application of receiver standards is unsound policy that would impose the largest harms on consumers and manufacturers. Judging interference to be harmful should not be based solely on receiver standards. Not only will the standard be out of date most of the time, the Commission will have to commit significant resources to this futile task.

Harmful interference is the sum of several technical factors, including transmitter power, filtering, spectrum assignment, and the economic realities of receiver and network designs.

Improving a receiver's performance always comes with a cost, even if it is only the cost of installing an additional filter in the receiver. Such increases can effectively raise the cost of deploying a technology to a level the market (*i.e.*, consumers) will not sustain.

While the Commission may establish some minimum, generic standards for new receivers, the Commission should be aware that creating a Standard Receiver Reference—or some facsimile thereof—poses a very real risk of stifling innovation. The Commission will have to constantly modify the standard to keep pace with technological advancements. For example, the current standard FCC antenna used for interference analysis associated with MMDS/ITFS applications does not represent the actual discrimination performance of antenna technology currently deployed by MMDS/ITFS licensees, rendering the rule useless at best and harmful in reality.

> *Question 15. In lieu of, or to complement, technical rules related to interference, are there processes that the Commission could consider that would allow private parties to more expeditiously resolve interference issues and disputes, for example, through negotiated agreements, mediation, arbitration or case-by-case adjudication?*

Private discussions and negotiations often facilitate the more rapid development of solutions to interference issues to the mutual benefit of the parties and the Commission. Because these negotiated resolutions of interference issues may impact many existing and future spectrum users, the Commission should consider implementing such negotiated resolutions through rules and policy statements.

Question 17. What mechanisms or policies might be considered as a means of promoting a proper level of spectral efficiency either through regulatory mandates or economic incentives? Are there mechanisms that other countries use that should be applied in the United States as well?

Spectral Efficiency is a hard-to-define term that is a surrogate for the important underlying issue of economic efficiency. The Commission should not have to concern itself with spectrum efficiency in applications for which the licensee has obtained spectrum rights at auction or has the opportunity to resell or subdivide spectrum rights. Consider satellite television broadcasting as an example. DBS system operators make a range of system design tradeoffs. For example, a DBS operator can trade off the energy in each bit against the bit rate transmitted. At higher bit rates, the DBS signal appears to be more spectral efficient—that is, the satellite channel carries more TV channels, but the signal also becomes more susceptible to noise and interference. Consumers and DBS system operators are best suited to make this tradeoff—weighing the number of channels, the robustness of signals, and equipment costs. A similar analysis applies to most other radio services. There are some exceptions. For example, the public safety community faces weaker incentives to adopt the most spectrum efficient technologies. It may be appropriate to impose spectrum efficiency requirements on public safety applications.

Question 18. Do any existing Commission rules inhibit efficient use of the spectrum? If so, how should they be changed?

Question 19. What new technologies exist that, if deployed, could improve spectral efficiencies and utilization? What are the barriers to their deployment?

Any new rule or new technology applications covered in the Commission's Rules can have the cumulative effect of causing harmful interference and, thus, may stifle and inhibit efficient spectrum use. This is due to the fact that any RF energy from a transmitter--however low-powered--adds to the cumulative interference received by other equipment. Thus, the Commission must consider the additional level of interference that any "new" technology will impose on existing users before licensing the new technology.

Question 20. Should the Commission consider ways to quantify or benchmark spectral efficiency in a way that permits fair and meaningful comparisons of different radio services, and if so, how would such comparisons be used in formulating spectrum policy?

BellSouth believes that any attempt to quantify spectral efficiency across different technologies or applications will ultimately fail and that pursuing such a quantification task would waste resources. How can one compare the efficiency of a highly reliable emergency communications system with the efficiency of a local area network used to play video games? How can one compare the efficiency of a radio broadcast station in New York City, capable of transmitting emergency information to millions of people, with the efficiency of a PCS system in rural Mississippi used by a motorist to call for help after an accident?

Question 21. How, if at all, can the Commission provide incentives for operators to use spectrum efficiently? For example, how could the implementation of fees (e.g., on the basis of Hz per square mile per minute or Hz per population coverage) or receiver standards affect spectrum efficiencies?

The Commission can best create incentives for efficient spectrum use by permitting operators and users to enjoy the benefits flowing from that more efficient use.

V. Public Safety Communications

Public safety communications are an essential use of the radio spectrum. The Commission should ensure that public safety agencies have access to the spectrum they need to perform their duties. BellSouth believes that the Commission's recent actions allocating significant spectrum at 700 MHz to public safety will serve public safety needs for mobile voice and data communications for the foreseeable future.

BellSouth notes that the nature of public safety wireless communications is changing. Historically, public safety agencies had to operate their own wireless systems—there were no commercial alternatives. Today, some public safety agencies have found that CMRS providers offer better combinations of cost and coverage than can the purpose-built systems used by public safety agencies—many public safety agencies currently use commercial data services. As one public safety source put it, "Commercial wireless data services can deliver invaluable information to public safety personnel in the field while, at the same time, conserving the limited amount of spectrum that each agency must share."[7]

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[7] See *Commercial Services Report #2: Wireless Data Communications Assessment,* Public Safety Wireless Network (PSWN), December 2001, p. 5. Available at http://www.pswn.gov/library/pdf/wireless_data_comm_assessment.pdf. (Note, the document

BellSouth expects public safety use of CMRS services to expand, albeit slowly. The public safety community has special needs for coverage, building penetration, and dedicated capacity that CMRS providers often do not or cannot meet today. On the other hand, as CMRS systems expand, technologies advance, and economies of scale in the production of terminal equipment increase, the shared networks offered by CMRS service providers will become increasingly attractive to the public safety community—both in terms of cost and capabilities. If a small fire department two years from now wants a data link capable of megabit-per-second performance to a few command vehicles, CMRS providers offering 2.5 or 3G services will be a far more economical alternative than building such capabilities into the fire department's existing voice dispatch system. Similarly, if the FBI wants to give an agent wireless voice communications that will work *from any geographic location* in the United States, the only real option today is a satellite phone from Iridium or another satellite service provider. The alternative with the next best geographic coverage is a dual-band, multi-mode CMRS phone.

The Commission should, in considering the spectrum needs of the public safety community, take into account the growing use of commercial systems by public safety agencies and the strong economic forces that will push for continuation of this trend. In addition, the spectrum needs of the public safety community will be met more effectively when it adopts improved coordination and interoperability among all public safety users.

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cover says "Final," although the individual pages say "Draft Do Not Quote or Cite." BellSouth assumes that the information on the cover is controlling.

VI. International Issues

Question 25. What role should international/global considerations play in spectrum policy in the United States? And conversely, how should U.S. preparations for regional and international meetings on spectrum policy take into account domestic spectrum policy decisions?

BellSouth believes that the Commission should be attentive to several international/global factors when developing spectrum policy. Such factors include international comity, control of interference, support for naturally international communications systems, and the development of world markets for equipment. Some radio systems, especially those operating on frequencies below about 30 MHz and satellite systems, are naturally international in nature—the radio signals travel far beyond national borders. Some communications systems—for example, those used by aircraft and ships—must operate in many nations. When developing policies concerning these categories of systems, the Commission should consider carefully the international ramifications of any proposed policy.

Policies that facilitate worldwide equipment and service markets may also provide benefits for consumers. For example, the AM and FM broadcast bands are used in an almost identical fashion around the world. A consumer can take his or her portable radio on a trip and listen to local radio broadcasts anywhere around the world, and manufacturers of radio receivers or of chips that go into radio receivers know that their designs can be sold in a massive world market. However, the Commission should proceed with care before attempting to facilitate world markets or expand opportunities for economies of scale. Technical standards often have been used to protect national markets and to prevent innovators in one country (often the United

States) from exporting their successes into other countries.[8] Agreeing on world-wide technical standards and harmonized band plans can create excessive delay. Europeans often, and rightly, tout the success of GSM as an example of the benefits of international harmonization. But those voices become faint when HyperLAN or OSI is discussed. HyperLAN was an attempt to develop a high-speed, short-range local digital radio service—optimized on providing ATM connectivity—but it was outrun by the wireless LAN technologies such as 802.11, and the Arpanet/Internet's TCP/IP protocols subsequently filled the need that OSI was to meet. Waiting for OSI to be implemented might have delayed the Internet half a decade!

VII. Conclusion

The Commission has raised numerous, very specific questions in this proceeding regarding spectrum policy issues. While BellSouth herein addresses several of those specific questions, it is concerned that the Commission will become bogged down in the weight of all of the detailed responses to those questions and attempt to provide detailed solutions to each issue or question. Rather, the Commission should: identify its core responsibilities and powers as guardian of the non-governmental spectrum; develop a set of guiding principles to promote the innovative and efficient use of spectrum (*e.g.*, exclusive flexible allocations of spectrum); and, apply these principles in a clear and consistent manner so that existing and future spectrum users will know what their rights and responsibilities are for the duration of their license. By creating

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[8] See Crane, Rhonda H. *The Politics of International Standards: France and the Color TV War*. Norwood, N.J., Ablex Pub. Corp., c1979. The inability of the international standards process to agree on a single modulation format for 3G systems (two standards were ultimately adopted WCDMA and CDMA2000) illustrates some of the limits of international harmonization.

such a framework and stable environment, the Commission not only will answer many of the questions raised in this proceeding, but will create a road map for identifying and resolving spectrum issues in the future.

BELLSOUTH CORPORATION

By: Charles Featherstun

James G. Harralson
Charles P. Featherstun

Its Attorneys

Suite 1800
1155 Peachtree St., N.E.
Atlanta, GA 30309-3610
(404) 249-3855
(404) 249-5901 (Fax)

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