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Ms. Donna R. Searcy  
Federal Communications Commission  
1919 M Street, N.W. - Room 222  
Washington, D.C. 20554

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

June 3, 1992

Re: Comments of CYLINK Corporation in ET Docket 92-9.

Dear Madam Secretary:

Transmitted herewith are an original and four copies of CYLINK's comments in the above referenced proceeding.

If you have any questions with regard to this matter, please do not hesitate to contact me.

Sincerely,

A handwritten signature in cursive script that reads "Lew Morris".

Lew Morris  
President and CEO  
CYLINK Corporation

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Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

In the Matter of )  
 ) ET Docket No. 92-9  
Redevelopment of Spectrum to )  
Encourage Innovation in the )  
Use of New Telecommunications )  
Technologies )

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COMMENTS OF CYLINK CORPORATION

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I. INTRODUCTION

CYLINK Corporation ("CYLINK") respectfully submits these comments in the above captioned proceeding. CYLINK, located in Sunnyvale Ca., is the leading U.S. manufacturer of data and voice security products. It was founded in 1984, and now dominates the U.S. market for commercial data encryption equipment. CYLINK is also actively involved in research and development in the field of spread spectrum communications and has developed both point-to-point and microcell based spread spectrum radios. Moreover, CYLINK has under development a unique approach to implementing code division multiple access (CDMA) called synchronous CDMA (S-CDMA). S-CDMA uses synchronization to eliminate intra-cell interference and thus improve capacity. Using this approach, microcell based, low powered PCS can support many more users in a given geographic area than can conventional CDMA or other multiple access techniques such as TDMA or FDMA.

## II. DISCUSSION:

In this Notice of Proposed Rulemaking (NPRM), the FCC proposes to reallocate 220 MHz of spectrum between 1.85 and 2.20 Ghz for new and emerging technologies. One of these new technologies will be the family of personal communications services. In fact the FCC said: "We anticipate that the first use of these emerging technology bands will be for the creation of a new personal communications service (PCS)." \* The specific frequencies proposed in the NPRM are 1.85 - 1.99, 2.11 - 2.15 and 2.16 - 2.20 GHz.

The 140 MHz contained in the 1850-1990 MHz band appears to be the spectrum of choice for PCS. It contains enough spectrum to fulfill the various needs of the diverse family of wireless services encompassed by the term PCS, while also allowing for a PCS spectrum reserve to accommodate future growth. Moreover it allows the various PCS applications to be authorized in contiguous spectrum thereby ensuring economies of scale in manufacturing. The resulting lower cost of wireless devices will bring about faster user acceptance and a larger customer base.

CYLINK concurs with the Commission's choice of spectrum. It provides adequate spectrum for launching PCS and adequate spectrum to grow PCS into a ubiquitous service. Initially however, PCS will be required to share the spectrum with fixed microwave users. The Commission's proposal to allow PCS licensees to negotiate with fixed licensees over the relocation arrangement

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\* NPRM, ET Docket 92-9, p.14.

is a good start but negotiations will take time. In the interim, PCS licensees will be required to operate in the vacant spectrum currently available in most large cities.\* To operate in vacant slices of spectrum, the technology used and the channelization of the band will be critical to the success of PCS during the transition period.

CYLINK proposed nearly 18 months ago a simple sharing concept which uses 5MHz channeling coupled with synchronous code division multiple access (S-CDMA). It should be noted at this point that S-CDMA differs from the more conventional Asynchronous CDMA. In an A-CDMA approach, all radios in a cell appear as noise (interference) to all other radios and sophisticated circuitry is used to distinguish the desired signal. In an S-CDMA approach, all radios are time synchronized and the signals are orthogonal to all other radios in the microcell; accordingly they provide no interference to other radios in the cell.

The CYLINK proposal was modeled after the regulatory approach used by the Commission in Docket 88-96. Cylink proposed that under an open entry regulatory approach, the Commission could allocate each licensee 5 MHz of spectrum on a co-primary basis with the fixed microwave users.

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\* Several studies have identified large blocks of unoccupied spectrum in the 1850-1990 MHz band. APC investigated 11 cities and found at least 50 MHz of unoccupied spectrum. CYLINK studied the San Francisco Bay area and found 79 MHz of spectrum available in San Francisco and 66 MHz of spectrum available in San Jose. These findings of large areas of unoccupied spectrum in the 1850-1990 MHz band were confirmed by studies conducted in five cities by Telesis Technology Laboratory (TTL) and NTIA's Institute for Telecommunications Sciences (ITS).

The key elements of the proposal are an FDMA channeling plan coupled with the use of interference resistant CDMA technology.\*

Additionally to limit the number of license applications, CYLINK proposed a process of issuing a construction permit (CP) which would not be turned into an operating license until after a specified period of operation. In this way, the value of the CP is diminished. Speculators would have no incentive to file for a CP as the applicant would be held to constructing what was proposed in the application. The CP would only have value if the PCS system was operating and the operating license was granted. Also because it is open entry, there would be little value in a barren CP. Value would only be found in operating a successful PCS system.

To preclude spectrum hogging spectrum efficiency minimums were also proposed. The proposal included access to additional spectrum on a real time basis based upon achieving certain spectrum efficiencies. In this manner, spectrum is provided to the most efficient, but only on an as needed and temporary basis.

The attractiveness of the CYLINK proposal lies in its capacity to deal with the spectrum and licensing issues without requiring long drawn out licensing or band clearing as a preface

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\* It should be noted that once an FDMA channelization scheme is adopted, the technology implemented could be any appropriate technology. CYLINK believes that S-CDMA optimizes capacity and interference-free operation for PCS. However, the FDMA channelization will allow the FCC to leave the technology decision to the marketplace.

to authorizing PCS. In the long run however, its clear that a plan must be drawn-up to accommodate the current fixed microwave users in the 1850-1990 MHz band.

The CYLINK proposal further recommended that the FCC and NTIA work together to relocate the fixed users from the 1850-1990 MHz band to the government controlled 1710-1850 MHz band.\* This proposal was given added impetus by the recently published NTIA report on usage in this band.\*\* The report identifies the primary users and by inference the geographic location where the heaviest use occurs. The report notes that 87% of the band is used for fixed service. It further identifies the Department of Agriculture as the majority user. This means that a great deal of government use is in rural not urban areas. The few non-fixed government users are located in a portion of the band that can be placed "off-limits" for relocation of non-government licensees.

Accordingly, using this band for the relocation of fixed non-government users would require only a coordination procedure to allow NTIA spectrum managers, through the IRAC coordination process, to provide the FCC with site specific locations that could accommodate urban microwave links. The cost of relocation would be borne, of course, by the PCS licensee(s) that benefits from the relocation.

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\* PCS, at least in its early stages will be an urban phenomenon. PCS in less urban areas will be slow to develop and then only in niche markets. As a result the need to relocate will occur first and most heavily in urban areas and there will be no need to clear the band throughout the country.

\*\* NTIA Report, TR 92-285, March 1992.

The costs to relocate microwave users from the 1850-1990 MHz band to the adjoining 1710-1850 MHz government band has been estimated to be as low as \$10,000 per link. Estimates to relocate to higher bands above -- 3 GHz -- are reported to be at least an order of magnitude higher. The resultant cost savings will be reflected in a abbreviated negotiation period -- between the PCS and Part 94 licensees -- which in turn will accelerate the deployment of PCS. Moreover, the reduced transaction costs will be ultimately reflected in lower cost PCS and wider customer acceptance.

III. CONCLUSION

Adoption, by the FCC, of the proposed spectrum -- 1850-1990 MHz -- for PCS will accelerate the provision of PCS to the American public and provide U.S. telecommunications manufacturers with a domestic market upon which to build a global wireless business in competition with European and Asian competitors.

Cooperation between the FCC and NTIA to make underused government spectrum -- in urban areas -- available for relocation of urban microwave users will accelerate the development of the U.S. domestic PCS market and dramatically lessen the transaction costs inherent in relocating existing users.

Respectfully submitted,



Lew Morris  
President and CEO

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June 3, 1992