

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

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FEDERAL COMMUNICATIONS COMMISSION
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In the Matter of)
)
Amendment of Parts 2, 21, and 94) RM-7981
of the Commission's Rules to)
Accommodate Private Microwave)
Systems in the 1.71-1.85 GHz Band)
and in Bands Above 3 GHz)

To: The Commission

REPLY COMMENTS OF SPATIAL COMMUNICATIONS, INC.

Spatial Communications, Inc. ("SCI") hereby submits reply comments on the above-captioned petition for rulemaking of the Utilities Telecommunications Council ("UTC").^{1/} The UTC petition arises from Commission proposals to allocate 220 MHz of spectrum in the 1.85 - 2.2 GHz band for new telecommunications services, including Personal Communications Services ("PCS").^{2/} In anticipation of a compulsory relocation of existing 2 GHz private microwave operations to higher frequency bands resulting from the establishment of new allocations, UTC maintains that the

^{1/} See Amendment of Parts 2, 21, and 94 of the Commission's Rules to Accommodate Private Microwave Systems in the 1.71-1.85 GHz Band and in Bands Above 3 GHz, RM-7981, FCC Public Notice, Mimeo No. 22934 (rel. May 1, 1992) ("UTC Petition"). On June 4, 1992, the Commission extended to June 23, 1992, the filing deadline for reply comments on the UTC petition. See FCC Public Notice No. DA 92-694 (rel. June 4, 1992).

^{2/} See Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, 7 FCC Rcd 1542 (1992) ("Emerging Technologies rulemaking"). In addition to PCS, the Commission identifies "generic" mobile satellite service, low-Earth orbit satellite service, and digital audio broadcasting as candidates for accommodation in the new 2 GHz allocations.

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Commission should suspend proceedings in the Emerging Technologies rulemaking until new rules for the operation of private microwave systems in alternative bands are adopted in a separate proceeding. As discussed more fully below, SCI supports efforts to ensure the ongoing availability of spectrum for services provided by 2 GHz microwave operators. Contrary to the assertions of UTC and some of the comments on the UTC petition, however, there is no need to delay the Emerging Technologies rulemaking and related ongoing allocation proceedings, or to initiate separate proceedings to achieve the goals set forth in the UTC petition.

Background

SCI was formed to develop and commercialize a full range of personal communications service ("PCS") technologies utilizing Spatial-Division Multiple Access ("SDMA"), a revolutionary spectral management technology, developed by principals of SCI.^{3/} SDMA combines phased array antenna technology, state-of-the-art digital signal processing equipment, and proprietary signal processing software to make possible for the first time dynamic exploitation of the spatial dimension in the channel assignment

^{3/} See Request of Spatial Communications, Inc. for a Pioneer's Preference in the PCS Licensing Process, (Gen. Docket No. 90-314), File No. PP-73, (filed May 4, 1992) ("SCI PCS Pioneer's Preference Request").

process of mobile communications systems. SDMA is a "front end" technology that is fully compatible with systems using all current spectrum access techniques (i.e., Frequency-Division Multiple Access, Time-Division Multiple Access, and Code-Division Multiple Access).

SDMA-equipped radio communications systems locate and track multiple users in a given service area on a real-time basis. SCI's SDMA processing software utilizes this user location information to generate concentrated "pencil beam" transmissions that actually follow the movements of the mobile terminal. The SDMA system uses the same tracking information to focus the RF signal reception capabilities of a base station's phased antenna array. The resulting improvements in base station receiving capabilities facilitate substantial decreases in the required signal output power of mobile user terminals, while requiring no modification of existing handset designs. The ability of SDMA equipped systems to generate very narrow transmission and reception paths allows mobile communications systems to use the same communications channel within a given system service area for as many as ten simultaneous users, translating to a potential tenfold increase capacity increase.

SDMA also affords several other significant benefits. Most importantly, in the context of the UTC Petition and the Emerging Technologies rulemaking, use of SDMA will dramatically decrease the impact on incumbent 2 GHz microwave users of new service

allocations. The capacity increases afforded by SDMA will expand substantially the available spectrum for new 2 GHz services. Additionally, SDMA's capability to spatially direct transmissions, and to spatially detect transmission from other sources (e.g., microwave systems) will allow SDMA-equipped PCS systems to operate on a co-channel basis with microwave systems with separation distances much smaller than those required by PCS systems not using SDMA.

Argument

The UTC petition asserts that the Emerging Technologies rulemaking should be suspended pending the completion of a separate proceeding to establish rules governing relocated 2 GHz microwave operations in a range of possible alternative bands, including the 1.71-1.85 GHz, 4 GHz, 6 GHz, and 11 GHz bands.^{4/} UTC contends that the proposal in the Emerging Technologies rulemaking for a blanket waiver of existing technical rules for microwave operations in the 4, 6, and 11 GHz bands is insufficient.^{5/}

^{4/} UTC Petition at 22. SCI believes that Commission investigations of possible shared government/non-government use of the 1.71-1.85 GHz band should consider use of the subject band for both non-government microwave operations and for new telecommunications services such as PCS.

^{5/} Id. See also, Emerging Technologies NPRM at paras. 20-21.

SCI agrees that blanket waivers of existing technical rules for 4, 6, and 11 GHz microwave operations may not be the most effective way of facilitating an orderly migration of 2 GHz microwave operations. SCI strongly disagrees, however, with the contention that the Emerging Technologies rulemaking must be suspended while a separate proceeding to develop rules for relocated 2 GHz microwave operations that are acceptable to UTC and the 2 GHz microwave user community at large.

The Emerging Technologies NPRM envisions a ten to fifteen year period for the migration of 2 GHz microwave users.^{6/} Additionally, and of equal or greater importance, is the role that will be played by technologies such as SDMA in the process of establishing new 2 GHz telecommunications services.

As discussed above, the dramatic capacity increases afforded by SDMA will expand the spectrum available for new 2 GHz services and delay the need for co-channel operations with microwave systems in many areas of the country. In the event that co-channel operations are necessary, SDMA can serve reduce the size of "exclusionary zones" for new services and help to alleviate the impact of co-channel operations on microwave users.

Specifically, systems using SDMA will be able to locate base stations closer to co-channel microwave facilities by a factor of 20-25 over base stations not equipped with SDMA. The separation distance for mobile terminals (e.g., PCS handsets) of SDMA-

^{6/} Emerging Technologies NPRM at para. 24.

equipped systems operating on a co-channel basis with adjacent microwave systems will be reduced by a factor of 4-6 over non-SDMA equipped systems.^{7/} Use of SDMA will clearly reduce the impact of new service operations on microwave users.

In an effort to explore the solutions that technologies such as SDMA may provide with regards to sharing in the 2 GHz band between microwave systems and new services, SCI has initiated informal discussions with principal 2 GHz microwave operators. These meetings have resulted in interest on the part of all parties involved to establish an "Ad Hoc" industry committee to explore technical and procedural solutions to co-primary sharing of the 2 GHz band between microwave users and new telecommunications services. SCI believes that industry cooperation will help to alleviate the concerns that resulted in the filing of the UTC petition.

Conclusion

SCI is in full agreement with UTC with regards to the need to ensure the ongoing availability of spectrum for services provided by 2 GHz microwave operators. When applied to systems operating in the 2 GHz band, the interservice interference

^{7/} Microwave systems can also be equipped with SDMA to further reduce potential interference from new 2 GHz services. The cost of equipping microwave systems with SDMA could possibly be borne by operators of new 2 GHz services. SCI will provide a more detailed discussion of the benefits that can be derived from using SDMA technology in the 2 GHz operating environment in its June 25, 1992 reply to comments on the SCI PCS Pioneer's Preference Request.

avoidance aspects of technologies such as SDMA can extend the timetable or possibly eliminate the need for relocation of 2 GHz microwave operations. For this reason, migration of microwave users to alternative bands, if necessary at all, is not likely to be required for a number of years after initial implementation of new 2 GHz services. For the above-stated reasons, there is no need to delay the Emerging Technologies rulemaking or initiate separate proceedings to achieve the goals set forth in the UTC petition. Accordingly, SCI requests that the Commission address the concerns of incumbent 2 GHz users within the context of the Emerging Technologies rulemaking, and related proceedings to establish allocations for new telecommunications services.

Respectfully submitted,

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June 23, 1992

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I, Walter H. Sonnenfeldt, hereby certify that copies of the foregoing "Reply Comments of Spatial Communications, Inc." were sent this 23rd day of June, 1992, by first-class United States mail, postage prepaid to:

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