

Before the
Federal Communications Commission
Washington DC 20554

In the Matter of

Allocations and Service Rules for the 71-76
GHz, 81-86 GHz and 92-95 GHz Bands

Loea Communications Corporation Petition
for Rulemaking

WT Docket No. 02-146

RM-10288

COMMENTS OF ENDWAVE CORPORATION

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Endwave Corporation hereby comments on the Notice of Proposed Rulemaking in this proceeding.*

About Endwave

Endwave is a leading manufacturer of millimeter wave and microwave subsystems and components for commercial broadband radio companies. We supply transceivers, up and down converters, and YIG and VCO based oscillators and synthesizers, as well as outdoor units, from 10 GHz to 60 GHz, and we perform research and development at higher frequencies. Endwave expects to play a major role in manufacturing for the frequencies addressed in this proceeding.

Endwave was a member of the LMDS Negotiated Rulemaking Committee, and has served on several Commission panels and forums. We have been active in the Wireless Communications Association International committee on spectrum issues above 40 GHz, and helped to organize an industry forum on 92 GHz spectrum issues to stimulate interest in the spectrum and to evaluate various rulemaking options.

* *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, 17 FCC Rcd 12182 (2002) (FCC 2-180) (Notice of Proposed Rulemaking) ("Notice").

Discussion

At the outset, Endwave commends the Commission for taking the initiative in opening these important new blocks of spectrum. The engineers and managers at the Commission's Office of Engineering and Technology have worked tirelessly to capture the interest of engineers in the Nation's technical community. And we commend Loea Communications Corporation for taking on a leadership role in developing market interest and a portion of the technology base vital to opening this new market.

The spectrum addressed here is critical to improving telecommunications capabilities for the U.S. economy. It is particularly important for computer-to-computer communications in the business enterprise. While America enjoys the finest voice wireline communications in the world, that system is woefully unsuited to high-speed data transmission. Although improvements to the legacy copper system, such as DSL (for the limited infrastructure that can support it), significantly improve human-to-Internet communications, they are thousands of times too slow for modern computer communications.

Ethernet computer communications currently operate at a minimum of 100 Mbits, and are quickly increasing to 1000 Mbits (1 Gigabit). Computer prototypes now run at 10 GHz-plus speeds, and units are under development to operate much faster. Maintaining improvements in the Nation's economic productivity requires that we continue upgrading the performance of computer-to-computer networks beyond the local area network to handle the coming data flow. That requires first- and last-mile connections to the fiber optic backbones and metro rings at gigabit-plus speeds. Fiber optics alone cannot do the job. The limitations are not in the fiber itself, but in the tremendous cost of digging trenches for local connection -- the "backhoe

problem." That is easily solved by using radios for the first- and last-mile links, if they can support gigabit-plus transmission speeds in relatively low-cost hardware. The blocks of spectrum addressed here are ideal for these purposes.

To wire the 5.5 million major business locations in America with fiber optics would cost on the order of \$800 billion. Millimeter wave radios at 71-76 GHz, 81-86 GHz, and 92-95 GHz can provide the first 1 to 10 Gigabits to each of these locations for 3-5 percent of that cost.

Endwave and other innovative manufacturers, in Silicon Valley and elsewhere, make it our job to anticipate the needs of the computing and communication markets, and to invent systems that address those needs. Our heroes include Dr. Moore, famed for "Moore's Law," which states that processor speed and capacity double every 18 months; Dr. Metcalfe, inventor of Ethernet, who deemed the value of the network to be the number of processors on it, raised to a power; and George Gilder, who declared that the value of the network is further increased by the speed of the network, raised to a power. But we must also contend with "Doug's Law," formulated by Endwave founder Doug Lockie: "Backhoes don't follow Moore's Law." Taking these together, it follows that the radio systems contemplated in this Notice will greatly advance the value of the network in return for relatively little investment.

Engineers and policy-makers alike debate the question of how much bandwidth is enough. The answer is straightforward: to continue making economic progress with increased computer productivity, we will need first- and last-mile connectivity that can take advantage of the incredible computing power coming on line over the next few years. This means data speeds on the order of a gigabit/second per business location in the near term, growing to 10 gigabits/second/location within the next few years. The only practical, cost-effective way to

accomplish this is through radio. And the only available spectrum that can deliver these speeds reliably are the bands at issue in this proceeding.

Specific Recommendations

Except as noted, Endwave supports recommendations filed in this docket by the Wireless Communications Association International (WCAI) and the Fixed Wireless Communications Coalition (FWCC). We will not burden the record by repeating their recommendations here.

Transmitter/antenna improvements. Endwave encourages the Commission to implement rules that reward higher antenna gains, lower antenna sidelobes, and active power control. Each of these is technologically feasible today, and will improve frequency reuse, and hence spectrum efficiency.

Interference prevention. Endwave encourages the Commission to adopt rules that provide a minimum assurance of interference-free operation. Even though very narrow receiver antenna beamwidths may reduce the probability of interference from uncoordinated operations, interference can occur nonetheless from ill-considered antenna site engineering and installation. Our market research shows that users of high-speed systems are understandably reluctant to base critical computer telecom infrastructure on spectrum shared with uncontrolled devices. But software well within the state of the art can reduce most, if not all, of the traditional problems and delays in point-to-point licensing procedures. In this respect, Endwave believes the proposals of the Fixed Wireless Communications Coalition concerning frequency-coordinated licensing by rule are worth close attention.

Site-by-site licensing. We ask the Commission to avoid rules that lock up major blocks of spectrum within a single company. That puts an entire region of the country at the mercy of an

entity that may not be competent to administer the spectrum to best economic advantage. While the investment in an auction payment may create the incentive to use spectrum efficiently, experience shows it does not always confer the ability to do so. In any event, geographic licensing is unnecessary here. The frequency reuse capabilities at these wavelengths will support a great many users, both individual economic units and major service providers, even in a crowded metropolitan area.

Power levels. Endwave urges the Commission to consider a higher limit on EIRP: a maximum of 65 dBW, with suitable limits on antenna gain. We acknowledge that radiation hazards may extend to a few meters in the main beam, and hence require limits on physical access, but that is a small price to pay for reliable operation. The power levels we request will be needed within a few years to meet the needs of 10 Gigabit data links (plus 1 or 2 gigabits for overhead) operating at high reliability in rain.

CONCLUSION

Endwave commends the Commission's action in this docket. We believe this spectrum has the potential to provide major improvements in the telecommunications infrastructure for the nation by resolving the long-standing major bottleneck at the first and last mile. These improvements will promote U.S. economic activities by delivering computer-to-computer communications beyond the local area network, at speeds commensurate with modern processor capabilities.

We ask the Commission to act expeditiously to make this spectrum available.

Respectfully submitted,

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