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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
The Portals
445 Twelfth Street, S.W.
Washington, DC 20554

Re: ***Notice of Ex Parte Communication: WT Docket No. 99-168***

Dear Ms. Salas:

This letter is being filed on behalf of Cisco Systems, Inc. ("Cisco"). On October 29, 1999, Christine Hemrick, Greg Raleigh, Bruce Mehlman, Michael Pollack, Dan Lang, and Ender Ayanoglu of Cisco and the undersigned attorney had a conference call with Stagg Newman of the Office of Engineering and Technology and Tom Stanley of the Wireless Telecommunications Bureau to discuss issues raised in the *Notice of Proposed Rulemaking* issued in the above-referenced proceeding.

In this conference call, Cisco expressed the view that the 746-806 MHz band is perfectly suited for the provision of high-quality Internet access services by terrestrial fixed systems. Such services would provide additional competition to the broadband Internet market currently being developed using cable modem and DSL wireline technologies, and offers the potential for reaching those currently unserved or underserved in remote areas due to the comparative efficiencies of a wireless access solution. Accordingly, using this spectrum to provide high-speed, high-quality fixed wireless Internet access would offer a valuable complement to existing service options.

Cisco argued that any proposed allocation of this spectrum should be evaluated by the extent to which it can:

1. be deployed with low-cost customer premises equipment;
2. maximize coverage area;

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3. maximize the number of subscribers per megahertz who receive high quality Internet service; and
4. achieve a level of Internet quality that is sufficient to accommodate not only services available today, but also those high-bandwidth services that are likely to arise over the next few years.

Fixed systems in the target band can achieve all of these goals because they are so spectrally efficient. Fixed systems can use directive antennas, enabling them to increase frequency reuse and improve spectral efficiency by a factor of between 2 and 8 as compared to mobile systems. Fixed systems also offer better efficiency at the media access control layer, which enables them to offer peak bandwidth that is large enough to employ statistical multiplexing techniques to provide consumers essentially "bandwidth on demand." Fixed systems also offer a more robust physical layer that is capable of providing high data rates despite the multipath problems inherent in this band – and in fact Cisco's Vector Orthogonal Frequency Division Multiplexing fixed technology uses multipath to *increase* capacity. Customers would be able to use standard Yagi UHF antennae to receive signals from a range of up to 20 miles in a rural, line-of-sight environment or over 3 miles in an urban, non-line-of-sight environment. Thus, consumers will have a low cost, readily available, and easily installed option for receiving the proposed high-speed Internet access.

Last week, Cisco and ten other leading companies announced an alliance to promote open standards for broadband wireless Internet services.[1] The alliance includes manufacturers of not only wireless carrier equipment but also of low-cost customer premises equipment and integrated chips in order to facilitate an environment with multiple supply sources. The result should be a dramatic acceleration in the development and availability of the kind of low cost, high quality consumer fixed wireless Internet access services for which this spectrum is ideally suited.

Although some have argued that frequencies under 3 GHz should be reserved for mobile services, such arguments overlook a crucial consideration – market differentiation. The fixed access market is not a single monolith, but rather should be viewed as having three separate tiers. The first tier is comprised of small units such as the individual consumers, small offices/home offices, telecommuters, schools, and libraries. The second tier includes small- and medium-sized businesses and multiple dwelling units, where users are more aggregated. The third tier is comprised of big businesses, the heaviest users of fixed services. Both the second and third tiers are most likely to be found in urban settings, and these are the types of customers that at present have the option to receive service from wireless operators using millimeter wave frequencies. However, such high frequencies are not suitable for covering the

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[1] See http://www.cisco.com/warp/public/146/october99/26.html for a press release describing this alliance.

longer distances involved in serving rural and ex-urban communities. UHF frequencies, such as those involved in this proceeding, are ideal for such service and would bring a new competitor within reach of small users – including those in outlying areas and local schools and libraries seeking access to the Information Superhighway. These frequencies will also provide an alternative for local access in urban and suburban communities that is both cost-competitive and spectrally efficient. While mobile services certainly deserve consideration for additional spectrum, Cisco believes that the Commission would be ill-advised to adopt a policy of allocating all newly available spectrum below 3 GHz to mobile services because such a policy would virtually ensure that small and rural consumers would never receive high-speed fixed wireless service. The fixed services need both higher and lower frequencies to provide the full range of offerings required by all levels of the American public.

Cisco stated its view that the entire 36 MHz available for allocation should be assigned to licensees as a single package. Dividing this spectrum into smaller pieces would impair performance by decreasing both the data rates and the number of subscribers that could be supported. As a single 18x18 MHz block, the spectrum would be comparable to that available to other terrestrial fixed service providers. For example, although MMDS operators may use up to 200 MHz of spectrum in the 2.1 and 2.5 GHz bands, the propagation characteristics of the lower frequencies available in this proceeding not only provides a comparable capacity for data transmission but also provides greater coverage and reach in rural areas. Without all of the spectrum available in this proceeding, a licensee would have great difficulty providing a viable competitive alternative to wireline broadband technologies such as cable modems and DSL, and those who are unserved or underserved by those technologies would be denied the full benefits of high-speed Internet access. Cisco undertook to prepare and submit additional information that would better quantify the consequences of disaggregating this spectrum.

Just as consumers will be able to use familiar Yagi antennas to receive service, operators should have a ready and competitive base of supply for transmitting equipment for fixed services in this band. Most manufacturers of MMDS equipment, including Cisco, use a downconversion stage to frequency shift the MMDS signals to UHF frequencies for simplified processing. Since the spectrum available in this proceeding is already within the UHF band, manufacturers will likely be able to reconfigure their MMDS equipment by either removing the downconversion stage entirely or employing a much simpler and less expensive downconversion stage than required for MMDS use. Moreover, existing MMDS equipment provides operators with a great deal of flexibility in determining their desired channel spacing – with 1.5, 2, 3, and 6 MHz options available – which would allow operators in the UHF band the freedom to optimize their systems for Internet access services using the entire 36 MHz of available spectrum.

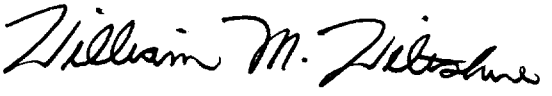
Cisco recognizes that public safety systems have been allocated contiguous spectrum in this band and that such systems must be assured of protection against harmful

interference from commercial services. Clearly, the Commission can and should set spurious emission limitations at levels that will guarantee the integrity of public safety operations. The greater use of directional antennas and the fact that the radiation sources are not moving provide additional safeguards to public safety systems when contiguous spectrum is allocated to fixed rather than mobile operations. Cisco also recognizes that private mobile radio services ("PMRS") are also seeking additional spectrum in this band. Unfortunately, the statutory mandate for this spectrum includes a directive that it be reallocated for *commercial* licenses.[2] Moreover, the presence of PMRS would limit the ability of a fixed system to employ frequency reuse techniques to maximize the number of users who could be serviced on a given frequency. Cisco believes, however, that as all systems increasingly evolve to run applications over the Internet protocol, commercial operators will increasingly have the ability to offer service to current PMRS users in an efficient and economical manner.

The spectrum at issue in this proceeding is likely to be unavailable in many areas for at least six years as the transition to digital television reaches completion. Over that period of time, the Internet will continue to move to applications that require increasing amounts of bandwidth and increasing demand for quality of service. Moreover, the growth of voice and interactive media traffic is likely to decrease the asymmetry in traffic flow patterns that currently characterizes the Internet. Without sufficient bandwidth and data rates to accommodate this inexorable growth, no operator will be able to provide the American public the kind of service it expects and demands. The fixed service envisioned by Cisco for the available UHF spectrum would have the spectral efficiency necessary to ensure that this bandwidth can provide a robust service offering with sufficient throughput to meet the next generation of applications.

Please direct any questions regarding this notification to me.

Respectfully submitted,



William M. Wiltshire

cc: Stagg Newman
Tom Stanley

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[2] See 47 U.S.C. § 337(a)(2) and (b)(2).