



October 5, 2007

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Unlicensed Operation in the TV Broadcast Bands, ET Docket No. 04-186

Dear Ms. Dortch:

Cisco Systems, Inc. has long been at the forefront of technology innovation for low powered devices built in IEEE™ 802.11 technology, by leading and participating in the standards process, and by developing new technology to bring to market. Cisco was proud to be the first vendor to have certified devices equipped with dynamic frequency control to avoid U.S. radars in the 5.25 -5.35 and 5.47 – 5.725 GHz bands. Cisco strongly believes that our industry segment is leading the way toward the cognitive radio technologies of the future, with improved capacity to utilize spectrum that has not been fully utilized by its current primary users. For that reason, we have closely followed, and support, the efforts of various companies to craft radio technology that would operate in the television white spaces, provided that the devices do not cause harmful interference to current users of that spectrum. In addition, we are interested in assuring a satisfactory technical resolution of these important interference issues because we do not want to introduce harmful interference to cable set top boxes manufactured by our Scientific-Atlanta subsidiary in a way that would degrade the viewing experience of cable consumers.

The Commission has correctly recognized that a rigorous engineering examination of the operation of devices in the TV white spaces is essential to understanding how to write rules and equipment test procedures to ensure that incumbent users are protected. We agree that such examination should include not just possible effects to broadcast reception and licensed Part 90 users, but also to cable set top boxes, cable head ends that receive over-the-air broadcasts, and wireless microphones. Cisco is encouraged that the Commission's engineering staff specifically examined the set top box issues in its Direct Pickup study released this past summer. Harmful interference, even if intermittent, should not be permitted to degrade existing operations in the band, or the consumer's experience in watching video programming. We encourage the Commission, and its engineering staff, to take time to assure themselves that the relevant technical issues have been identified prior to writing rules for the use of white spaces, and for certification of devices that will be deployed there. The Commission should not hesitate to postpone its planned October action on final rules to the extent staff need some additional time to address the complex engineering questions presented by this docket.

Cisco has not participated in the effort to develop a prototype device for the TV white spaces, and we have not been at the center of the advocacy debates on issues such as the level at which to require spectrum sensing, the use of personal portable devices (in addition to fixed devices), power levels, emissions masks, and what feature functionality should be required on the devices themselves. Our hope is that the Commission will be able to identify a solution set from its own engineering inquiry, and/or from the comments filed, that will allow use of white spaces to proceed promptly, without harming existing users of the band.

That said, Cisco has reviewed the record and seeks to offer an opinion on two issues. First, the Commission should consider notching the frequencies (and adjacent frequencies) used by cable set top boxes to ensure cable consumers are not harmed by the introduction of low power devices in the band that might otherwise utilize the lower VHF band if a television broadcaster is not present. While we are encouraged by recent press reports from the White Spaces Coalition that its members do not intend to manufacture devices cable of using frequencies below TV Channel 20, we would prefer the FCC to bar use of the lower VHF band unless further testing by Commission engineering staff conclusively demonstrates that, under a set of rules to be crafted, no harmful interference will be caused to cable reception. The Direct Pickup report noted that for the few tested devices, it appears that interference exists even at very low power levels. Unless the Commission can satisfy itself that rules and certification processes can be written to protect cable reception through other means, Cisco recommends that the Commission consider notching VHF Channels 3 and 4 from 60-72 MHz, as well as surrounding channels, e.g., Channels 2 through 6 from 54 MHz to 88 MHz, to protect against adjacent channel effects. In making this recommendation, we note that cable set top boxes are deployed wherever there are cable systems, and therefore are utilizing Channels 3 and 4 even in areas where there are no broadcasters on those frequencies.

Second, while there has been much discussion in the docket about the relative merits of personal portable devices versus fixed devices, the record does not appear to reflect all possible technology choices available to the Commission as it considers its final rules. The proponents of IEEE 802.22 have outlined a proposal for a geospatial database that could manage fixed devices. However, there are other management tools available to IEEE 802.11 users, such as the IEEE 802.11y standard which is nearing completion.

That standard, which was more fully briefed to the Commission's engineering staff in the context of the 3650 MHz decision, essentially puts call signs on every radio, including client devices, and charges operators with resolving interference in a manner similar to the Part 90 bands. Significantly, the beacon system adopted in 802.11y allows the operator to shut down devices, such as interfering devices. Specifically, 802.11y requires that the registered location of the enabling station be present in every beacon frame of every station operating in the band. This ensures that any device which receives a beacon frame receives sufficient information to allow a licensed operator to identify another licensed operator. In addition, 802.11y makes it mandatory that all devices become enabled by a station controlled by a licensed operator, and act on commands to

change frequency, transmit power or to cease operation. Of course, the standard takes no position on the licensing process itself, and Cisco notes that there are various examples of light licensing regimes in the Commission's rules that could be considered for bands where 802.11y technology is deployed. Finally, 802.11y requires that all enabled devices listen and report registered locations to the enabling station, when listening is requested by the enabling station. In sum, 802.11y provides new and interesting management tools that could be brought to bear on complex sharing environments.

In addition, work on the IEEE 802.11k Radio Resource Measurement standard could also potentially contribute to the resolution of the issues before the Commission. That standard adds radio measurement by mobiles and base stations (access points) so that additional information about hidden nodes can be gathered. IEEE 802.11k includes beacon reports, frame reports, neighbor reports, channel load and noise histogram reports. Access points can schedule measurements so they do not interfere with normal operation.

We are not suggesting that the development of this latest IEEE 802.11 technology constitutes a resolution of the issues that the Commission must address in this proceeding. However, knowledge and understanding of these recent improvements to IEEE 802.11 may provide a useful path forward to the extent there remains some uncertainty in the decisional environment for white spaces because it allows operators to take actions based on more information than simply the prior "listen-before-talk" protocols.

If there is additional information that the Commission would find helpful on any of the matters discussed herein, Cisco would be pleased to provide it. As both a manufacturer of IEEE 802.11 equipment and set top boxes, Cisco offers its assistance to the Commission as it further explores these important matters. Thank you in advance for your consideration of Cisco's views.

Respectfully submitted,

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