Communications and E-commerce

WILMERHALE

FCC to Permit Wireless Broadband Operation on Unused Digital Television Channels

For many years, the FCC has maintained strict limits on secondary uses of the valuable radio spectrum below 1 GHz allocated to television broadcasting. Because these lower frequency bands are subject to less signal attenuation, wireless Internet access providers (WISPs) and others—including companies such as Intel, Microsoft and Motorola—have been urging the Commission to permit new uses of television channels in areas of the country (so-called "white spaces") where particular channels are not being used for digital television (DTV).

On October 18, 2006, the FCC released an order opening up these frequencies for use by WISPs and other fixed users, beginning after the February 2009 transition to all-digital television service, together with a further rulemaking notice seeking to establish transmission standards for these new users and their equipment to avoid harmful interference to DTV reception. The Commission also strongly suggested that it may permit portable transmitting devices in this band as well, such as WiFi-like cards in laptop computers and wireless LANs, operating under more restrictive interference protection rules. It has proposed to permit these various fixed and portable uses on an unlicensed, or perhaps a "hybrid" licensed-but-shared, basis, either of which would avoid the need to compete at auction for mutually exclusive use of this valuable spectrum.

This recent DTV white spaces order is consistent with the recommendations of the FCC's Wireless Broadband Access Task Force last year, and with the views of many in Congress, supporting new uses of radio spectrum as a way of providing broadband access in areas that still do not have DSL or cable modem service, or as a competitive "third pipe" in areas served by these other broadband providers. The order is also another illustration of the FCC's policy of accommodating increasing demands for radio spectrum by looking to "smart radios," with various kinds of "listen-before-talk" features, as a way of avoiding harmful interference to incumbent users. In 2004, for example, the Commission authorized unlicensed high-data-rate mobile and fixed operations at lower power in the 5 GHz band (referred to as "Unlicensed National Information Infrastructure" or "U-NII" devices) using dynamic frequency selection (DFS), one type of listen-before-talk technology. Last year, the Commission authorized WiMax and other new wireless broadband services and technologies in the 3.65 GHz band to operate on a licensed-but-shared basis (thereby again avoiding statutory auction requirements), subject to power limits and a registration database system designed to avoid interference not only to incumbents in that band but also among WISPs themselves.

The goal in this proceeding, launched by the FCC almost four years ago, is to permit low-power devices to operate in areas where broadcasters cannot use some DTV channels because their need for much higher power would result in co-channel or adjacent-channel interference with other DTV facilities, and in areas with few television licensees. The Commission has not yet determined how to achieve this goal, which is challenging because of the widely dispersed locations of DTV receivers. It has nevertheless adopted the somewhat unusual approach of deciding to permit new uses (at least on a fixed basis) before finalizing the interference protection criteria that will be associated with them. The Commission's plan is to conduct interference testing studies leading to final technical requirements for new devices by fall 2007, in time to permit the design, production and rollout of new services by the end of the DTV transition in February 2009.

The FCC still has a way to go in addressing the interference concerns of the broadcast industry and other incumbent users of this band, which include low-power TV stations and broadcast and cable networks that use wireless

microphones to cover sports and other entertainment events. Among the issues yet to be resolved:

Spectrum-Sensing Techniques

The Commission recognizes that the listen-before-talk technology used by U-NII devices to avoid interference with government radars in the 5 GHz band will require some adaption to the broadcast environment, given the widely dispersed locations of DTV receivers. It suggests requiring the new devices to (1) incorporate a very low signal detection level (-116 dBm) coming from DTV or other incumbent users before permitting transmissions, (2) address the "hidden node" problem (the possibility that spectrum sensing will be unable to pick up DTV signals available at DTV receiver locations but not at the location of the device), (3) perform DTV channel rechecks every 10 seconds, and (4) employ dynamic controls to avoid unnecessary power. It may prove difficult to detect a -116 dBm DTV signal over the full 6 Mhz of bandwidth permitted for such signals. The FCC invites further comment on what bandwidth is appropriate for this sensing capability.

Locating the New User

The Commission suggests that it may not rely solely on a spectrum-sensing requirement to protect against interference to DTV and other incumbents. Two other measures it continues to study both involve using a database of incumbent users to ensure that new devices do not operate within the protected service areas of these incumbents. The first would correlate that database to a GPS capability in the device, or a professional installation service. The second would condition transmission on receipt of a control signal identifying the channels that are appropriate for use. The Commission has asked whether and how such a database could be maintained, and how DTV stations' protected service areas should be defined.

Sharing Protocols Among WISPs

Given the boom in wireless Internet use, the FCC continues to focus on the potential problems of sharing among WISPs. Citing the prior success of WiFi and Bluetooth, the Commission is looking once again to private standards organizations to develop a protocol for operation in this new band that will permit their shared use. The IEEE 802.22 working group, which has broad representation that includes the broadcast industry, is already working on such a protocol for fixed users.

Portable Users

The Commission has recognized that portable devices pose more of an interference challenge than fixed devices because they generally operate indoors with less sensitivity to incumbent transmissions, and their changing location makes it more difficult to identify the DTV stations that need protection. Broadcasters have also argued that the use of portable devices in multi-dwelling buildings could result in interference for other residents. In the past, the Commission has proposed more stringent power limits (100 milliwatts) and antenna characteristics for portable devices, a ban on their transmission until receipt of a control signal verifying a channel's availability, and a requirement that they transmit a unique identification signal. The use of portable devices will be subject to further review by the Commission. However, it also determined not to permit portable uses of channels 14–20 (470–512 MHz) anywhere in the country. While these channels are devoted to public safety and land mobile use only in 13 specific metropolitan areas, the Commission has concluded that monitoring interference to such intermittent users from devices that may be transported anywhere in the country would be problematic.

Comments on the interference and other issues raised by the FCC will be due early next year. Its resolution of these issues promises to have a major impact on both the DTV transition and the competitive structure of the broadband market. That resolution will also serve as a key indication of how the Commission's spectrum management policy accommodates the increasing demands for valuable spectrum while addressing the concerns of incumbents about interference that may jeopardize their substantial investments.

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