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

In The Matter Of	)	
	)	
Unlicensed Operation in the TV Broadcast Bands	)	ET Docket No. 04-186
	)	
Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band	)	ET Docket No. 02-380

To: The Commission

COMMENTS OF QUALCOMM INCORPORATED

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SUMMARY

QUALCOMM applauds the Commission for the issuance of the First Report and Order and Further Notice of Proposed Rule Making ("First R & O & FNPRM") in this proceeding, and QUALCOMM is pleased to offer its Comments in response to the Further Notice of Proposed Rule Making ("FNPRM"), which seeks comment on a number of issues concerning the possible use of the so-called "TV White Space," the vacant spectrum in TV Channels 2 to 51. QUALCOMM's Comments focus on two issues: 1) the Commission's laudable efforts to ensure that any devices authorized to operate in the TV White Space not cause substantial interference to existing licensed services, and 2) the questions posed in the FNPRM as to whether, if the interference questions can be satisfactorily resolved, operations in the TV White Space should be authorized on a licensed or unlicensed basis.

QUALCOMM's interest in this proceeding stems from its work in developing and proliferating new wireless communications technologies, some of which are optimally deployed on an unlicensed basis, such as 802.11n wireless local area network ("LAN") technology, and others of which require licensed spectrum, such as the wide area mobile wireless 3G CDMA technologies (CDMA2000 and WCDMA/HSPA) that wireless operators in the United States and around the world utilize. Moreover, as the First R & O & FNRPM notes, QUALCOMM has participated in the IEEE 802.22 group, which is developing a standard for fixed wireless operations in the TV White Space to be implemented after the conclusion of the DTV transition in February 2009. First R & O & FNPRM at para. 12. QUALCOMM continues to believe that the unlicensed model works for short range, local technologies, and that wide area wireless networks that support fully mobile devices, such as those contemplated by many appearing in this proceeding, require licensed spectrum.

Turning to the issue of harmful interference, QUALCOMM supports the Commission's prudent efforts to gather reliable test data, to conduct its own tests, and to assemble a fully developed record before deciding whether to authorize mobile devices to operate in the TV White Space. QUALCOMM looks forward to reviewing the test results that will be filed, as well as the results of the Commission's own testing. QUALCOMM remains skeptical that the interference from mobile devices to existing licensed services can be eliminated or limited to minimal levels, and in particular, that any "spectrum sensing" technology for mobile devices will actually work. Nevertheless, QUALCOMM believes that the Commission is taking the correct approach in seeking test data from the private sector and conducting its own tests before deciding how to proceed.

On the issue of whether to authorize licensed versus unlicensed operations in the TV White Space, QUALCOMM believes that the Commission should use the licensed model for this prime spectrum band, which is inherently well suited for wide area, mobile services due to the favorable propagation of radio signals in these bands. QUALCOMM agrees with the statement in the FNPRM that the Commission has tried to strike an appropriate balance between the licensed and unlicensed model, as exemplified by the recent reallocation of 255 MHz for unlicensed operations in the 5 GHz band and the recent auction of the first 90 MHz of AWS spectrum in the 1.7/2.1 GHz bands. FNRPM at para. 27. Moreover, QUALCOMM agrees with the FNPRM that the licensed model is "more efficient in many cases" and that the licensed model works best when spectrum rights are: (1) clearly defined, (2) exclusive, (3) flexible, and (4) transferable. Id.

Wide area wireless networks that support mobile devices require exclusive licensing to prevent insurmountable interference problems and to ensure that operators have sufficient

economic incentives to fund the substantial investments necessary for the construction and operation of such networks.

In addition, QUALCOMM believes that the Commission should use the licensed model rather than the unlicensed model for the TV White Space because it will promote innovation and, as QUALCOMM has noted previously in this proceeding, it will result in the public reaping full value from the highest and best use of this prime spectrum, such a valuable public resource. In a companion filing, Dr. Dorothy Robyn, an economist, and Dr. Charles Jackson, an engineer, provide a comprehensive analysis of these and other economic and technical reasons why the Commission should opt for the licensed model with respect to the TV White Space. QUALCOMM looks forward to working with the Commission in this proceeding.

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QUALCOMM Incorporated ("QUALCOMM") hereby submits its Comments on the Further Notice of Proposed Rule Making, FCC 06-156, released October 18, 2006 ("FNPRM"), in which the Commission sought comments on a number of issues relating to the possible use of the TV White Space, the vacant spectrum within TV Channels 2 to 51.[1]

I. The Proliferation of Wide Area Wireless, Fully Mobile Networks on Licensed Spectrum and Local Area Networks on Unlicensed Spectrum

QUALCOMM is actively involved in developing and proliferating new wireless communications technologies, some of which require licensed spectrum, such as the wide area mobile wireless 3G CDMA technologies (CDMA2000 and WCDMA/HSPA) that wireless operators in the United States and around the world utilize, and others of which are optimally deployed on an unlicensed basis, such as 802.11n wireless local area network ("LAN")

[1] QUALCOMM is pleased that the First R&O provides that the Commission will not authorize devices to operate on Channels 52 through 69, the spectrum which has been reallocated for other commercial and public safety wireless services and which will no longer be part of the TV Bands at the conclusion of the DTV transition in February 2009. First R & O & FNPRM at para. 2.

technology. With respect to the former, QUALCOMM is the inventor and developer of the essential technologies that underlie the preeminent 3G wireless broadband technologies, 1xEV-DO and WCDMA/HSDPA, which operate on licensed spectrum to deliver ubiquitous, fully mobile wireless broadband service.

The 3G CDMA technologies are proliferating at a very rapid pace, here in the United States and around the world. In the United States, there are three nationwide 3G networks operated by Verizon Wireless, Cingular Wireless, and Sprint. T-Mobile USA is constructing a fourth nationwide 3G network. Regional wireless carriers, such as ALLTEL, have also deployed 3G networks. All told, as Chairman Martin recently observed, EV-DO is now available to nearly two-thirds of the U.S. population, a footprint which includes many rural areas.[2] The scope of that footprint is increasing on a daily basis as the existing networks continue to expand. Moreover, WCDMA/HSDPA is now available in more than 165 metropolitan areas, a footprint that is also expanding each day. The number and variety of mobile devices that use these networks, ranging from phones to PDAs to embedded laptops, is growing exponentially.

In short, most of the United States can now enjoy fully mobile wireless broadband services from competing providers, and those who cannot now will be able to do so very soon. The Commission's policies in licensing spectrum for competing wide area wireless broadband networks that support mobility have made this success possible, and the Commission should not change course now.

Wide area wireless broadband networks that support mobility require licensed spectrum to avoid causing and receiving interference. CDMA technology uses licensed spectrum in the

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[2] See Separate Statement of Chairman Martin, Eleventh Report, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, FCC 06-142, released September 29, 2006.

most efficient manner possible, to create as much capacity as possible for voice communications and the greatest speed and throughput for data. The power control inherent in CDMA networks and mobiles ensures that each mobile always transmits exactly enough power to provide satisfactory call quality, but not more than enough.

Although these wide area wireless broadband networks have been expanding at a rapid pace, local area networks, which operate on unlicensed spectrum, have also expanded, as the Commission has recognized. To support that expansion, the Commission allocated an additional 255 MHz of spectrum in the 5 GHz band, a substantial new allocation. Although QUALCOMM is perhaps best known for its work on the 3G CDMA technologies, QUALCOMM is also actively involved in developing technology for local area networks, most notably the 802.11n technology, the next generation of Wi-Fi. This technology enables high speed transmission over a relatively short range, and, it is inherently suited for unlicensed spectrum.

With respect to the TV White Space, as the First R & O & FNRPM notes, QUALCOMM has participated in the IEEE 802.22 group, which is developing a standard for fixed wireless operations in the TV White Space. First R & O & FNPRM at para. 12. By limiting transmissions to fixed transmitters, the source of any interference can be readily identified so that the interference can be remedied easily and effectively.

II. The Commission Is Taking the Correct Approach with Respect to Interference by Requiring Testing and Engaging in Testing of Its Own Before Deciding Whether and How to Proceed with Mobile Devices in the TV White Space

QUALCOMM agrees with the Commission that the current record in this proceeding does not support a conclusion that mobile/portable devices can operate in the TV White Space without causing substantial interference to the presently authorized services now operating in the bands. First Report & Order & FNPRM at paras. 2-3, 25. The Commission asked for additional

comments on theoretical approaches to the mitigation of interference, but the Commission also stated that it recognizes the importance of conducting tests of these approaches. Id. at para. 15. As a result, the Commission has both invited private parties to submit test data, and it is conducting tests of its own. Id.

QUALCOMM supports the Commission's careful efforts to ensure that the interference will truly be minimized if not eliminated, before the Commission decides whether to authorize mobile/portable devices in the TV White Space. QUALCOMM looks forward to reviewing the test results. At this juncture, QUALCOMM remains highly skeptical that interference from mobile devices that would operate on an unlicensed basis, as many have advocated, can truly be mitigated through spectrum sensing technology. It is essential that the Commission not act in this proceeding on the basis of supposition, but instead on hard, empirical, and reliable test data. QUALCOMM is very encouraged to see the Commission taking precisely this approach.

III. When and If the Commission Authorizes Mobile Services in the TV White Space, It Should Use the Licensed, Not Unlicensed, Model

QUALCOMM believes that if the interference concerns can be adequately overcome, the Commission should use the licensed model for the TV White Space, rather than giving away this valuable public resource for free. The TV White Space is a prime spectrum band, inherently well suited for wide area, mobile services due to the favorable propagation of radio signals in these bands. Rather than simply assuming that the TV White Space should be used on an unlicensed basis, QUALCOMM agrees with the careful approach laid in the FNRPM by which the Commission will weigh the plusses and minuses of whether to authorize operations in the TV White Space on a licensed or unlicensed basis. See FNPRM at paras. 26-32. QUALCOMM believes that when the Commission weighs all the relevant factors, it should conclude that the licensed model is the best one to use for the TV White Space.

Several factors support this conclusion. In the first place, as the Commission itself notes in the FNPRM, the licensed model is "more efficient in many cases," and QUALCOMM believes that this is one of those cases. White Space licensees would have powerful incentives to negotiate agreements with potentially affected TV stations, to use the White Space spectrum for its highest and best use, to innovate, and to make the investments necessary in network infrastructure. With an unlicensed regime, these incentives simply do not exist in large part because of the free rider problem—why should anyone invest substantial sums for network infrastructure if anyone else can come along and use the same spectrum in the same area, potentially causing interference to the first party's infrastructure? Similarly, why should a company negotiate an agreement with a TV station if others can reap the benefits of the agreement without being burdened by the obligations in the agreement? The licensed model is vastly more efficient because under the licensed model, there are no free riders. Each licensee can be sure that no one else will win a free return on the licensee's investments and efforts.

The FNPRM states that the unlicensed model "may" promote technological innovation. FNRPM at para. 29. To the contrary, the licensed model will promote technological innovation far more than the unlicensed model. Under the unlicensed model, the innovator has no way to ensure that it, alone, will reap the benefits of its innovations. Only with the licensed model can the innovator be certain that it alone will reap those benefits. The Commission will promote innovation by applying the licensed model to the White Space.

In addition, the public interest will be furthered by use of the licensed model for the White Space because the public would itself earn a return on the use of the spectrum in the form of auction proceeds. Some of the most ardent advocates for use of the White Space for mobile

devices are large companies, who can more than afford to pay for spectrum. There is no good reason to give these companies any spectrum for free.

Moreover, as the FNPRM notes, the Commission attempts to strike a balance between licensed and unlicensed spectrum. The record of this proceeding is devoid of any evidence that unlicensed operations actually require more spectrum. The Commission recently allocated another 255 MHz of spectrum for unlicensed. Such a large amount of spectrum, more than double the amount of spectrum that the Commission will auction in the 700 MHz band almost three times the amount of spectrum that the Commission auctioned last year in the AWS-1 auction, should be more than ample for unlicensed operations now and well beyond the foreseeable future. There is simply no documented need for additional unlicensed spectrum.

The FNPRM states that the amount of usable White Space spectrum will vary from market to market and could change over time as TV stations are licensed or change channels. FNRPM at para. 28. These factors should not weigh against licensing the spectrum. The Commission can certainly auction different amounts of spectrum in different markets, and as White Space spectrum becomes available over time, additional auctions can be conducted. The Commission also notes that White Space licensees could lose their ability to operate on some or all of the spectrum if a currently authorized DTV station was permitted to change channels in a given market. But, the best way to take account of that risk is to let the market decide. In other words, the price that a bidder would be willing to pay for the White Space spectrum would necessarily take such risks into account. For the same reason, if transaction costs are going to be high to deploy a wireless broadband system in a rural area on the TV White Space, as the FNPRM speculates at para. 29, that is all the more reason why the Commission should use the

licensed model—licensees have an economic incentive to incur such costs because they can be certain that they alone will earn a sufficient return after incurring such costs.

Further, by auctioning the White Space spectrum, licensees would have the economic incentive to reach agreement with a DTV station that wished to expand in a way that might limit the White Space licensee's operations. The Commission states that if protection of incumbents is required, the permissible power levels for White Space licensees would be lower than are typical than many licensed services. FNPRM at para. 28. But, the advocates of mobile operations in the White Space seek to deploy wide area wireless systems, the same kinds of systems that the Commission regulates today under the licensed model, and these same advocates, like all existing Commission licensees, wish to use power as high as the Commission will permit. That is no reason to opt for the unlicensed model for the White Space.

The Commission can and should develop rules that specify the geographic area and bandwidth of White Space licenses, just as the Commission has done in countless other licensed frequency bands. New White Space licensees could have the obligation to avoid interfering with existing authorized service on co-channel and adjacent channels, again just as the Commission has done for countless other licensed frequency bands.

In sum, there are powerful reasons, spelled out in greater detail in a companion filing by Dr. Dorothy Robyn and Dr. Charles Jackson, why the public interest would be advanced if the Commission uses the licensed, not unlicensed, model for the TV White Space.

Respectfully submitted,

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