Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Service Rules for the 698-746, 747-762 and 777-792 MHz Bands	)	WT Docket No. 06-150
	)	
Former Nextel Communications, Inc. Upper 700 MHz Guard Band Licenses and Revisions to Part 27 of the Commission's Rules	)	WT Docket No. 06-169
	)	
Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band	)	WT Docket No. 06-229
	)	
Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010	)	WT Docket No. 96-86

COMMENTS OF VANU, INC.

Vanu®, Inc. hereby files these comments in the above-captioned proceeding.

INTRODUCTION

About Vanu, Inc.

Vanu, Inc. grew out of DARPA-sponsored research on software radio initiated at the Massachusetts Institute of Technology. Following the proud tradition of American entrepreneurship, Vanu, Inc. was formed in 1998 to commercialize the research, and has deployed several software radio cellular networks in the United States and Canada. Along the way, Vanu has achieved many industry milestones, including being awarded the first FCC certification for a software defined radio system. The open architecture of Vanu, Inc. systems

moves wireless infrastructure from vertically-integrated hardware to a horizontally-layered industry model with open interfaces, similar to the computer industry.

DISCUSSION

Findings and Major Recommendations

Implementation of rules that ”commoditize” spectrum will unleash market forces that not only improve the efficiency of spectrum use, but speed innovation as entrepreneurial companies gain access to spectrum and rapidly bring to market new and innovative technologies and business models. For this reason, as general matter, Vanu, Inc. supports any rulemakings that can contribute to the goal of making spectrum a more accessible commodity, including, but not limited to, the concept of dynamic spectrum auctions.

In the past, wireless devices and infrastructure were locked to a single standard and band, severely limiting the benefits of dynamic spectrum access. Software radio has made many aspects of the flexible use of spectrum possible today, and we urge the Commission to ensure that the rules adopted for the 700 MHz band take into account the flexibility enabled by software radio by explicitly permitting dynamic auction techniques.

Background: Software Radio and Cognitive Radio

It is equally important to take into account that software radio does not solve all of the current spectrum flexibility issues, and we outline here what is possible today and what may be possible in the future. A useful division of capabilities along technological lines is to distinguish between *software radio* and *cognitive radio* technologies.

Software radio technology enables air-interface flexibility. Flexibility of the air-interface enables the wireless standard (e.g. GSM, CDMA, UMTS) to be changed by simply running different software, and also allows multiple standards to be run simultaneously on the same platform; this is the key attribute that enables more flexible use of the spectrum. A real-time auction can now enable devices using different air-interfaces to “bid” for the spectrum, and configure the network to support the device with the winning bid. For example, the Vanu

Anywave® Base Station supports GSM, CDMA and iDEN on a single platform, and has been deployed in several networks in the U.S. and Canada. In addition, prototype software for WiMAX, Project25, and other legacy standards has been demonstrated. Using the Anywave platform (or similar technology) increases the flexibility and liquidity of an auction by increasing the pool of potential bidders to include users of different technology standards.

Cognitive radio, on the other hand, can be thought of as an application which intelligently uses the flexibility of software radio to adapt dynamically to the current circumstances. Cognitive radio often involves the concept of dynamically sensing the spectrum environment and using this information to dynamically define the air-interface. While there has been excellent progress in cognitive radios recently, the notion of interference-sensing in a commercial environment is still problematic, especially when it comes to evaluating potential interference with legacy band allocations nearby. The FCC recently abandoned the proceeding on noise temperature, since the overwhelming majority of commenters felt this was not currently a workable concept.[1]

Viable Dynamic Auction Capabilities

Clearly software radio enables a more dynamic spectrum market than has previously been possible, but not necessarily the completely dynamic spectrum environment we all hope to be able to achieve in the long run.

The key to making dynamic spectrum access work today is having a single local mechanism for coordinating the real-time spectrum access. Since it is not yet technically feasible for a wireless device to compute the interference temperature in a meaningful way, there must be one entity capable of knowing, in real time, the allocations in the local band in order to accept or reject new requests based on the current set of band allocations. For example, if a device makes a "bid" on some spectrum, this request has to be considered in context with the other users already granted bids in that band, as well as with potential interference at adjacent sites. The network

[1] *In the Matter of Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands,* Federal Communications Commission, ET Docket No. 03-237, Order, FCC 07-78, released May 4, 2007.

could then accept the bid by reallocating existing users to accommodate the new request, or reject it as not being feasible from a frequency-planning point of view. This can be thought of as automating the manual frequency planning process that wireless operators often use today, and making aware the multi-standard process. Running these types of algorithms in real-time is well within the bounds of available computing power today and will result in far more efficient spectrum utilization, since the spectrum allocations are dynamically optimized, based on actual demand, rather than statically planned, based on expected demand.

This approach to enabling dynamic access to wireless services has several features that distinguish it from a spectrum access regime in which devices negotiate with one another to obtain access to spectrum. To begin with, centralized control from a frequency planning and interference prevention perspective means that the operator of the centralized control point is the appropriate party to bear the burden of compliance with the type of regulations currently applicable to CMRS operators. It is not clear this is true or that, even if true, it is appropriate, in the context where technical and service rules are implemented entirely in devices. In light of these matters, we believe the operator of the control point would be a more appropriate spectrum licensee than each of the device end users. As such, the operator of the control point could fulfill a role similar to that of a lessor of spectrum (and possibly network access services as well) to the device user-lessee.

We believe these characteristics would allow an incremental, but meaningful, step toward more dynamic access techniques. In this case, the dynamic access techniques could be implemented through dynamic access to a ***network*** controlled by a spectrum licensee, rather than dynamic access to ***spectrum***. We emphasize that we believe further developments in this arena will enable more dynamic ***spectrum*** access in the future. We would also encourage continued inquiry into the matter, specifically as it relates to ***spectrum*** access.

We ask the Commission to grant spectrum licensees the right to offer their spectrum to short term lessees in dynamic auction proceedings under the following conditions:

1. The spectrum licensee retains ultimate responsibility for compliance with Commission rules.

2. The spectrum licensee is responsible for administering a system that can be shown to cause mobile devices attached to the licensee's network to comply with FCC regulations within the Licensee's coverage area.

3. The spectrum licensee must demonstrate mechanisms by which devices capable of operating in the dynamic spectrum access environment can be temporarily or permanently removed from dynamic spectrum access mode via centralized control.

We believe the above proposal represents a practical starting point which is technologically feasible today and provides the necessary protection to users in nearby bands. Furthermore, this starting point provides a path forward to an increasingly fluid future spectrum market.

Software radio currently enables significant flexibility in spectrum access, and will result in more efficient spectrum utilization, rapid introduction of innovative new services, and opportunities for small business to enter the wireless business quickly. We urge the Commission to ensure that the 700 MHz band does not get locked into legacy allocations that do not take into account the new advances in technology, and specifically allow for dynamic real-time auction techniques in the band.

Respectfully submitted,

/s/ Andrew D. Beard

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