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February 9, 2001

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FEDERAL COMMUNICATIONS COMMISSION
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HAND DELIVERED

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 445 12th Street, SW
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 Washington, D.C. 20554

Re: WT Docket No. 00-230
 Comments of Vanu, Inc.

Dear Ms. Salas:

Submitted herewith are an original and four copies of Comments of Vanu, Inc., for filing in the above-referenced matter.

Please date stamp and return the additional copy of this filing.

Should any further information be necessary, please call me.

Respectfully submitted,



Mitchell Lazarus
 Counsel for Vanu, Inc.

ML:deb

Enclosures

cc: Service List
 Andrew D. Beard, Vanu, Inc.
 John Chapin, Vanu, Inc.

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 2001

ORIGINAL

Before the
Federal Communications Commission
Washington DC 20554

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FEB 9 2001

**FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY**

In the Matter of)
)
Promoting Efficient Use of Spectrum)
Through Elimination of Barriers to the)
Development of Secondary Markets)

WT Docket No. 00-230

COMMENTS OF VANU, INC.

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Before the
Federal Communications Commission
Washington DC 20554

In the Matter of)
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Promoting Efficient Use of Spectrum) WT Docket No. 00-230
Through Elimination of Barriers to the)
Development of Secondary Markets)

COMMENTS OF VANU, INC.

Vanu, Inc. (Vanu) files these Comments in response to the Notice of Proposed Rulemaking in the above-captioned proceeding.¹

INTRODUCTION

A. Summary

Benefits of secondary markets. Vanu applauds the Commission's proposals to facilitate secondary markets in spectrum. By transferring idle spectrum to those who need it most, properly functioning markets will help the public to extract maximum value from a public resource. Spectrum markets will also foster the development of radios that can be upgraded and configured over the air. This advance will make it possible to deploy new spectrum-efficient technologies much more quickly than at present, and will generally improve quality of service, diversity of service offerings, and allocation of spectral resources.

"Safe harbors" for non-controversial spectrum leases. The Commission should promptly establish safe harbors for spectrum leasing transactions that raise no significant questions under Section 310 of the Communications Act. Candidates for this treatment include

¹ *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, WT Docket No. 00-230, Notice of Proposed Rulemaking, FCC 00-402 (released Nov. 27, 2000) (Notice).

leases of spectrum on existing facilities, short-term leases, and leases contracted through a band manager.

Predictable rules for more complex transactions. Vanu urges the Commission to develop rules for non-safe-harbor transactions specific enough that parties can negotiate with reasonable certainty of ultimate Commission approval. The rules should provide for reimbursement in cases of unjust enrichment, taking into account the duration of the lease. Conditional approval should be available in appropriate cases, subject to unwinding if the application is ultimately disapproved.

Joint responsibility for compliance. Licensees and lessees should be held jointly accountable for compliance with the Commission's rules. Rather than require contract language to accomplish this result, we think it preferable to establish the parties' obligations by rule. But the parties should be free to allocate by contract the consequences of non-compliance, such as forfeitures resulting from the lessee's unlawful acts or omissions.

Lessees subject to technical rules, but not service rules. Lessees must be subject to all interference-related rules, including those regulating transmitter power, stability, emission masks, and antenna height. Lessees must also be held to RF safety standards. Most service rules, however, are obsolete vestiges of an earlier, pre-market regulatory environment, and are no longer needed where spectrum changes hands in response to market forces. The Commission acknowledges as much by eliminating most service rules from newly auctioned spectrum. Making lessees subject to pre-existing service rules will only hamper the efficiency of the market. At the same time, however, imposing those rules on licensees, but not lessees, will also distort the market. The Commission should therefore modify its service rules to expressly allow

the provision of any lawful, non-interfering service in spectrum acquired at auction or via a secondary market.

Minimal administrative burdens. The Commission can help to keep transaction costs down, and hence promote an efficient market, by minimizing reporting requirements and other administrative burdens on licensees and lessees alike.

B. About Vanu, Inc.

Vanu was formed in 1998 to explore the feasibility of building software radios using object oriented computer languages running on general purpose processors. This approach to software radio was initially investigated by the founders of Vanu in the SpectrumWare Project at Massachusetts Institute of Technology, which began in 1995. Project participants recognized that the rapid rate of improvement in microprocessor speed would soon bring the implementation of complex signal processing software systems into the realm of software. We believe this paradigm shift in the implementation of wireless communications systems will enable more efficient spectrum use, interoperation between historically incompatible radio systems, and much faster acceptance and adoption of advances in digital communications.

Vanu continues to focus on object oriented software that is portable across multiple platforms, and that supports independent specification and download of software radio applications. But the extent to which Vanu uses software to implement signal processing distinguishes us from other radio developers. In the nomenclature of the SDR Forum, Vanu develops "software radios" as opposed to "software defined radios." Pushing the digitization closer to the antenna permits our products much greater flexibility to adapt the nature of the signal processing performed by the radio. Vanu is currently involved in commercial partnerships to develop software radio products and is participating in Step 2B of the armed services' JTRS

program. We are also engaged in a cooperative agreement with the National Institute of Justice to develop a prototype software radio interoperability device targeted at law enforcement needs.

Secondary markets and software-defined radios. Long term spectrum leases, including capacity leases, are fully practical using today's conventional radios. Short-term leases, in contrast, require a radio that can be quickly adjusted as to frequency band, modulation, bandwidth, and power, preferably by remote control from a central location. A true "spot market" in spectrum will require radios capable of being reconfigured on the fly, possibly even during an ongoing conversation or data transmission.

This degree of flexibility requires that a radio have its operating parameters under software control. Such software-defined radios are under development by several companies, including Vanu. With a few narrow exceptions, such as dual-band cellular/PCS phones, software-defined radios do not presently qualify for Commission certification, and hence cannot be marketed in the United States. The Commission has a proceeding underway that considers revision of these rules.² Its outcome will have a profound effect on the practical feasibility of short-term spectrum markets in the United States.

DISCUSSION

C. Secondary Markets Will Help to Make More Efficient Use of Spectrum.

Present licensing mechanisms result in large amounts of spectrum being idle for much of the time. Most licensees do not fill their bandwidth, yet the Commission's rules generally prohibit, or at least hinder, a licensee's making the excess capacity available to others. The

² *Authorization and Use of Software Defined Radios*, ET Docket No. 00-47, Notice of Proposed Rule Making, FCC 00-430 (released Dec. 8, 2000).

much-discussed spectrum shortage is not actually a lack of vacant spectrum, but rather a shortage of unlicensed channels.

The solution is a mechanism that lets licensees transfer the use of idle spectrum to those who need it. Everyone benefits. The licensee receives compensation, the lessee can provide service, end users can complete their communications, and the public extracts maximum value from a public resource.

Today's "capacity leases" help to bridge supply and demand in some services, but these are practical only for relatively long time periods, typically measured in years. Real gains in efficiency will require a "spot market" in spectrum that allows capacity to change hands for months, or even days. We may eventually have markets capable of trading in spectrum on an as-needed basis by the second or less.

Such markets will not only open the use of more spectrum, but will use it more efficiently, by promoting the development and marketing of equipment operable in a wide range of radio-frequency environments. Beyond enabling providers to offer service to many constituencies, including some that are underserved today, such equipment will be able to incorporate new advances in wireless technology very quickly. In contrast, for example, the Commission's ongoing effort to narrow Private Land Mobile Radio channels from their former bandwidth of 25kHz to an eventual 6.25kHz will have taken decades to complete.³ Most of that delay results from the need to let each generation of equipment wear out, or at least amortize its costs, before requiring the next generation. When narrower bandwidth technologies and other

³ See generally PR Docket No. 92-235 (Private Land Mobile "refarming").

improvements can be implemented by a simple software upgrade, downloadable over the air, spectrally efficient technologies can be adopted in days instead of years.

D. The Commission Should Immediately Establish "Safe Harbors" for Non-Controversial Leasing Arrangements.

Vanu recommends that the Commission immediately create "safe harbors" for spectrum leasing transactions that raise no significant questions under Section 310 of the Communications Act, and which on their face are plainly consistent with the public interest. These specifically include leases of spectrum capacity on existing facilities, which the Commission has long authorized in some contexts,⁴ short-term leases, whose consequences are inherently limited by their brief duration, and leases through a band manager.

Transactions that fall within the safe harbor criteria should not require prior Commission approval. The Commission may choose to require reporting after the fact.

Transactions most in need of safe-harbor treatment are the relatively small, short-term arrangements that cannot withstand high transaction costs, extended regulatory delays, or uncertainties of approval. The alternative -- case-by-case approvals -- would also open the way for competitors to impede the market by filing objections or petitions to deny. Without pre-approval by rule, many such transactions would be too slow, expensive, or uncertain to occur at all.

Despite their small size, however, these transactions in the aggregate can free up significant spectrum resources. Capacity leases and short term leases in particular have a disproportionate potential to influence apparent supply, by shifting capacity to meet spikes in

⁴ The Commission has authorized long-term capacity leases between ITFS and MMDS providers, unlimited-duration leases of FSS spacecraft transponder capacity, and sharing with unlicensed users in the Private Land Mobile Radio Service. *See* Notice at para. 16.

demand. The ability to procure additional spectrum to meet demand during certain periods (such as commuting hours) or at certain times and locations (such as major conventions or sporting events) would allow providers to serve their customers without having to acquire additional spectrum that would lie idle at other times. This would also enable a licensee that recently acquired new spectrum to put it into service while building out infrastructure.

Multiple-lessee transactions are particularly good candidates for intermediation by a band manager.⁵ We foresee three scenarios. First, the band manager may be the initial licensee, as contemplated in the 700 MHz Guard Band proceeding.⁶ Second, a licensee with excess spectrum who anticipates multiple takers for short times, small areas, or limited bandwidth might lease it (perhaps temporarily) to a band manager, who in turn subleases it to providers. Third, the band manager might act as a third-party broker having no rights of its own to the spectrum. In any of these formats, the involvement of a band manager may help to reduce the risks of harmful effects of spectrum transactions. (For example, the band manager is well positioned to assign frequencies in such a way as to minimize interference among lessees.) Transactions between band managers and lessees are thus good candidates for safe harbor treatment, as they should need little or no Commission review.

No subleases. Subleases should not ordinarily be entitled to safe harbor treatment, as the interposition of an extra entity between the licensee and the sublessee will make it more difficult for the licensee to control the sublessee's compliance with the Commission's rules. (See Part F,

⁵ Notice at para. 22. Where the volume of transactions relating to spectrum is low, a band manager may be superfluous.

⁶ *Service Rules for the 746-764 and 776-794 MHz Bands*, 15 FCC Rcd 5299 (2000).

below.) Such transactions should be permitted only after Commission review, and should be predicated on a showing that the licensee will be in a position to ensure compliance.⁷ There is an exception, however. Where a band manager is the prime lessee, subleases from the band manager to third-party service providers should qualify for safe harbor treatment. The prime lease from the licensee to the band manager, however, might be subject to Commission review and approval, as discussed below.

E. The Commission Should Develop Specific Rules for Larger and More Complex Transactions.

Vanu acknowledges that more complex and farther-reaching transactions may require prior Commission approval, especially if the present language of Section 310 remains in force. At the same time, however, a properly functioning market will require low transaction costs, minimum delay, and highly predictable outcomes from the regulatory process. Vanu urges the Commission to enunciate the general principles set out in the Notice into very specific rules, so that parties can enter into larger transactions with reasonable certainty of Commission approval. Vanu also urges the Commission to set a very high threshold for third-party objections and petitions to deny, so that competitors cannot easily exploit the regulatory process to delay and distort operation of the market.

Finally, Vanu urges the Commission to adopt rules that permit a transaction to go forward on a conditional basis while the application is pending. Conditional licensing has proved very successful in the private land mobile and fixed services.⁸ The applicant is permitted to operate after filing its application, subject to other requirements that establish pre-grant operation is

⁷ See Notice at para. 30 (enforcement of Commission rules against sublessees).

⁸ See 47 C.F.R. Secs. 90.159, 101.31(b).

unlikely to harm the public interest. Vanu suggests the Commission establish parallel criteria for pre-grant transactions in the spectrum market, subject to unwinding if the application is ultimately disapproved.

Unjust enrichment. Transactions that raise issues of unjust enrichment may be among those requiring prior Commission approval.⁹ Vanu agrees in principle that a lease between a bidding-credit licensee and a non-eligible lessee should trigger a required reimbursement to the Government for unjust enrichment. But the calculation should include reference to the duration of the lease. We propose that the reimbursement be proportional to the lease duration divided by five years.¹⁰ A one-year lease would thus result in a reimbursement of 20% of the applicable bidding credit. If the lease is for less than all of the geography or frequency specified in the license, the pro rata calculations of Section 1.2111(e)(3) would also apply.

Amendment of Section 310. Over the long run, the Commission's vision of a fully flexible spectrum market -- one capable of responding to shifts in supply and demand in real time -- may be incompatible with the present form of Section 310. Vanu applauds the Commission's artfulness in finding mechanisms that achieve needed pliancy without running afoul of Title III. These include, for example, conditional licensing, SMR end-user authorization, Part 90 sharing, unlicensed operation under Part 15, and band managers. But all such mechanisms have inherent limitations. The Commission may ultimately have to share its vision with Congress, and request a statutory amendment that will make practical spectrum markets easier to implement.

⁹ See Notice at paras. 52-55.

¹⁰ Five years after licensing is the period during which a non-eligible assignee or transferee must compensate the Government for unjust enrichment. See 47 C.F.R. Sec. 1.2111(d)(2)(i).

F. The Licensee and Lessee Should Be Jointly Responsible for Compliance with the Commission's Rules.

A licensee must always be held accountable for its licensed spectrum.¹¹ Vanu's main candidates for safe harbor treatment -- capacity leases, short-term leases, and band manager transactions -- present the lowest risk of rule violations by lessees, and so are safest for the licensee. In the case of a capacity lease, the licensee or its agent often fulfills the role of network operator, and hence is well positioned to ensure compliance. The limited duration of a short-term lease ensures that the licensee, through threat of non-renewal and other available remedies, will have adequate leverage over the lessee. Band managers will make a business of dealing with and supervising lessees. These arrangements should give licensees sufficient influence over lessees to ensure compliance with Commission rules.

Nevertheless, Vanu believes it is also reasonable to hold lessees jointly responsible for compliance, even in safe harbor cases. The Commission should establish its right to proceed directly against lessees. Moreover, licensees and lessees should be free to allocate by contract the consequences of non-compliance. For example, careful licensees may insist on provisions requiring the lessee to reimburse the cost of Commission forfeitures resulting from the lessee's unlawful acts or omissions.

There is precedent for this kind of joint responsibility in the Commission's rules on marketing of devices subject to certification requirements. If a noncomplying device reaches a consumer, everyone in the marketing chain -- manufacturer or importer, wholesaler, and retailer -- can each be held responsible for the infraction.¹² When drafted by knowledgeable counsel, the

¹¹ See Notice at paras. 27-34.

¹² 47 C.F.R. Sec. 2.803.

contracts among these parties typically shift the burden of enforcement penalties to the manufacturer or importer, who is in the best position to ensure that the product complies. Similarly here, all parties should be responsible for compliance, but should be permitted to assign the consequences by contract to the party best able to ensure compliance.

No required contract language. The Commission asks whether it should require spectrum lease contracts to include language by which the lessee agrees to comply with applicable Commission rules, accept Commission oversight and enforcement, and cooperate fully with investigations by the Commission or the licensee.¹³ Although Vanu agrees that lessees must be subject to all of these obligations, we foresee problems in requiring specific contractual provisions. For example, a contract might also contain conflicting provisions, so the ultimate construction of contractual terms may not serve the Commission's goals. We think it is preferable to establish these obligations by rule, thus eliminating problems in construing individual contracts.

G. Lessees Should Be Subject to Interference-Limiting Technical Rules, but Not to Service Rules.

Vanu agrees that lessees must be subject to all technical rules aimed at minimizing interference to other users, including geographic neighbors, spectral neighbors, and protected incumbents.¹⁴ These rules include such matters as transmitter power, stability, emission masks, antenna height, and interference contours. Lessees must also be held to RF safety standards.

On the other hand, service rules -- eligibility, permissible communications, common carrier status, spectrum cap, aggregation limits, build-out requirements, etc. -- should *not* be

¹³ Notice at para. 30.

¹⁴ See Notice at paras. 35-40.

applicable to lessees.¹⁵ Most such rules are obsolete vestiges of a Government-controlled regulatory environment, in which the Commission handed out licenses free of charge to those who could establish eligibility. The rules were necessary to exclude ineligible parties, forestall market power, and minimize the warehousing of unused spectrum. All of these functions (except prevention of market power) have since been transferred to the market, and the Commission is considering dropping even the spectrum cap.¹⁶ The distinction between common carrier and private status, although still a qualifying characteristic for some frequencies, otherwise retains little practical significance in the radio-based services. The Commission has implicitly acknowledged the obsolescence of service rules by virtually eliminating them in newly available spectrum, except where they are needed to avoid causing interference.¹⁷

In short, subjecting lessees to pre-existing service rules will have no beneficial effect, and will serve only to hamper the efficiency of the market. It would also place a near-impossible burden on licensees to control their lessees' compliance.¹⁸

We also note, however, that imposing outdated service rules on licensees, but not lessees, will deform the market by making spectrum less valuable to the licensee than to others. The

¹⁵ See Notice at paras. 41-59.

¹⁶ *2000 Biennial Regulatory Review Spectrum Aggregation Limits for Commercial Mobile Radio Services*, WT Docket No. 01-14, Notice of Proposed Rule Making, FCC 01-28 (released Jan. 23, 2001).

¹⁷ *E.g., The 3650-3700 MHz Government Transfer Band; the 4.9 GHz Band Transferred from Federal Government Use*, ET Docket No. 98-237, First Report and Order and Second Notice of Proposed Rule Making, FCC 00-363 (released Oct. 24, 2000).

¹⁸ The Commission asks if it should impose "due diligence" requirements on licensees to ensure lessees' compliance. Notice at para. 30. In the case of service rules, it is far from clear how any reasonable exercise of diligence could consistently accomplish this goal in practice. Nor could the exercise of due diligence excuse the licensee from the consequences of a lessee's violations.

Commission therefore should consider amending its rules to allow spectrum to be used for services other than that for which it was originally licensed.¹⁹ As a general rule, the Commission should permit licensees (and lessees) to introduce any non-interfering uses into their bands.

The advent of wireless communications infrastructure that is software-upgradeable over the air will permit fast, low-cost improvements to wireless networks. These have the potential to improve spectrum efficiency, quality of service, diversity of service offerings, and allocation of spectral resources. But the availability of investment to accomplish these improvements will turn on some degree of certainty that licensees and lessees will ultimately have flexible use of their spectrum.

Vanu agrees a licensee should be able to rely on the activities of its lessees to meet service or construction requirements.²⁰ Implicit in the move toward secondary markets is an assumption that markets can better identify and allocate spectrum resources than can the Commission via rulemakings. It follows that licensees should be permitted to satisfy service or construction requirements through any compliant use of their spectrum that the market will support.

H. The Commission Should Minimize Administrative Burdens on Spectrum Leases.

One key to a smoothly functioning market is low transaction costs. On this principle, we agree with the Commission that spectrum leases should not generate additional reporting

¹⁹ See Notice at paras. 95-97.

²⁰ See Notice at para. 50.

requirements.²¹ The dissemination of information on available spectrum should be left to the private sector, where presumably it will be handled on a wholly voluntary basis.²²

Vanu also agrees that licensees and lessees should be required to maintain copies of their contracts, and to make them available to the Commission on request.²³ This is a necessary concomitant to our proposal that lessees be held jointly responsible for compliance, for the lease contract is the only means of establishing the lessee's accountability for particular frequencies in a given area. Because a prudent operator will always retain copies of agreements, even without a Commission mandate, the requirement does not add significant burdens. But information on the terms of spectrum leases provided to the Commission should not be made available to the public without the parties' consent.²⁴ Nevertheless, the Commission may find it expedient to maintain a database identifying spectrum licensees and spectrum lessees in order to facilitate enforcement, and to provide greater certainty for market participants as to the rights held by a prospective lessor.

In regulating spectrum leases, the Commission should make every reasonable effort to minimize administrative burdens on the parties. This will help to keep transaction costs down, and hence promote the free flow of spectrum resources to those who can use them best.

CONCLUSION

Secondary markets in spectrum will bring fundamental and badly-needed changes to the processes for distributing bandwidth.

²¹ See Notice at para. 51.

²² See Notice at paras. 98-100.

²³ See Notice at para. 33.

²⁴ See Notice at para. 51.

Secondary markets are the inevitable second phase of a two-step regulatory evolution. First came spectrum auctions, which place bandwidth in the hands of those who think they can use it best. But auctions have two significant limitations. First, they necessarily hand out spectrum in pre-established slices, and over predetermined geographic areas. These may not best suit users' needs. Second, auctions reflect market valuation at a particular moment in time, even though changing conditions may later change the relative value of spectrum among would-be users. Although the Commission's rules on partitioning and disaggregation help to address the first problem, they rely on assignment and transfer-of-control procedures that are relatively slow and cumbersome.

Secondary markets solve both problems. In effect, they extend the one-time social benefits of auctions into an ongoing process.

Secondary markets will have an additional, indirect benefit as well. They will create a market for flexible radios that can be remotely reconfigured as to frequency band, modulation, and other characteristics. These in turn will facilitate the rapid deployment of spectrum-conserving technologies as they become available, thus increasing the value of all spectrum.

Vanu urges the Commission to move forward expeditiously with this proceeding. It should strive for a set of rules that protect users against interference, but otherwise leave the operation of the market free of unnecessary encumbrances.

Respectfully submitted,



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