

February 17, 2006

The Honorable Kevin J. Martin
Chairman
Federal Communications Commission
Washington, DC 20554

Re: *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands – WT Docket No. 03-66*
WRITTEN EX PARTE COMMUNICATION

Dear Chairman Martin:

The Commission presently has before it a proposal by some within the Educational Broadband Service (“EBS”) community to limit the maximum permissible term of any lease of EBS spectrum (including all automatic renewals) to fifteen years. That proposal has been vigorously opposed by the Wireless Communications Association International, Inc. (“WCA”) and a wide range of 2.5 GHz broadband system operators and EBS licensees who argue that such a limit will undermine the Commission’s efforts to promote both commercial and educational broadband use of the band. Our point, in a nutshell, is that a fifteen year term is too short to allow an adequate return on the multi-billion dollar investment needed to fully develop the 2.5 GHz band, and that adopting a fifteen year EBS lease term limit will have the result of driving investment to other spectrum bands. And that, in turn, will deny educators the benefits that accrue from a vibrant market for leased EBS spectrum.

Today, the Phoenix Center for Advanced Legal & Economic Public Policy Studies has released a Policy Bulletin authored by George S. Ford, PhD, and Thomas M. Koutsky, JD entitled “Unnecessary Regulations and the Value of Spectrum: An Economic Evaluation of Lease Term Limits for the Educational Broadband Service.”¹ A copy of that document is

¹ The Phoenix Center is an international, non-profit 501(c)(3) organization that studies broad public-policy issues related to governance, social and economic conditions, with a particular emphasis on the law and economics of regulated industries. Dr. Ford is widely considered to be one of the leading economists in the telecommunications industry, is widely-published, and his work is frequently cited by the Federal Communications Commission. Dr. Ford currently serves as an Adjunct Professor of Economics at the University of South Florida, and had served as Senior Economist of the Commission’s former Competition Division. Mr. Koutsky has substantial experience as a telecommunications lawyer, both in private practice and with the Commission’s former Competition Division.

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attached. As you will see, based on a technical analysis of the relationship between lease terms and investment, the authors of the Policy Bulletin agree in full with the position of WCA and the commercial operators, *i.e.* that:

applying a 15-year lease limit to EBS licenses is not in the public interest and threatens the efficient use of that band. . . . Under plausible conditions, the lease term limitation reduces investment in the EBS band and would therefore undermine the Commission's goal of achieving full utilization of the EBS spectrum.²

In addition, Dr. Ford and Mr. Koutsky confirm a point made repeatedly by WCA and commercial system operators, that there is "no evidence of a market failure or defect that justifies regulatory intervention."³ Responding to paternalistic arguments that EBS licensees require Commission intervention to protect their interests, the authors conclude that:

There is no reason to think that a nonprofit licensee, absent the 15-year lease limitation rule, does not have the bargaining power to insist on periodic revisiting of the lease terms. There is no market defect—such as market power or information advantages on the lessee's behalf—that prohibits or even limits an EBS license holder from self-imposing a lease-term limitation. Indeed, given that spectrum is a scarce resource, one would expect that license holders would be in a relatively strong (or at least equal) bargaining position *vis* private entities. Regardless of idiosyncratic preferences, it is their spectrum and their decision to make regarding the lease term, as they know best what will suit their needs. In some cases that lease term will be long, in others it will be short.⁴

In short, today's Policy Bulletin supports fully the Commission's decision in the *Report and Order* in this proceeding to eliminate the former limit on the maximum term of an EBS lease. A maximum lease term will reduce investment in the band, and is totally unnecessary as each EBS licensee can protect its own interests (while maximizing its own benefits) through negotiations with prospective lessors.

² Ford and Koutsky, Phoenix Center Policy Bulletin No. 14, "Unnecessary Regulations and the Value of Spectrum: An Economic Evaluation of Lease Term Limits for the Educational Broadband Service," 2 (dated Feb. 2006).

³ *Id.* at 3.

⁴ *Id.* at 12. Dr. Ford and Mr. Koutsky also rebut the contention (one strangely made by EBS licensees, but not by any of the new commercial entrants) that a lease term limit will actually promote new commercial entry. *See id.* at 13-14.

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Pursuant to Section 1.1206(b)(1) of the Commission's Rules, a copy of this letter is being filed electronically through the Electronic Comment Filing System.

Respectfully submitted,

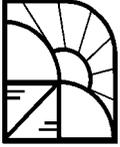
/s/ Paul J. Sinderbrand

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Counsel to the Wireless Communications
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Attachment

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PHOENIX CENTER POLICY BULLETIN NO. 15

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February 2006

UNNECESSARY REGULATIONS AND THE VALUE OF SPECTRUM: AN ECONOMIC EVALUATION OF LEASE TERM LIMITS FOR THE EDUCATIONAL BROADBAND SERVICE

Abstract: Licensed to nonprofit educational entities, the 2500-2690 MHz band of spectrum has been plagued by overly intrusive governmental policy since its inception over forty years ago. As a consequence, this spectrum is woefully underutilized. In 2004, the Federal Communications Commission recognized that private sector investment will help fulfill the educational mission of this spectrum and took several important steps to create a “secondary market” for leases of this spectrum. However, some organizations have now proposed that the Commission limit the length of those leases to 15 years. In this BULLETIN, we find that a lease term limitation may lead to reduced private sector investment in and inefficient use of this important band of spectrum.

I. Introduction

An important component of the Federal Communication Commission’s current spectrum policy is the promotion of “secondary markets” for spectrum. The Commission has written rules to facilitate leases of spectrum by private parties that would create a free market. The rules aid this creation by allowing those private parties to exchange access to spectrum and grant considerable flexibility in the uses and trading of spectrum rights.¹ The purpose behind

¹ For a summary of many of these approaches, *see generally*, Federal Communications Commission, Wireless Broadband Access Task Force, *Report*, GN 04-163 (rel. Feb. 2004) (hereinafter “Wireless Broadband Access Task Force Report”).

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the Commission's spectrum leasing policy is to improve the efficient use of spectrum; a lease helps ensure that spectrum will be employed for the highest-value purpose. In 2003, the Commission's so-called "secondary market" rules for the Wireless Communications Service were finally adopted²—forty-four years after Nobel Laureate Ronald H. Coase first proposed similar private ordering measures in a seminal article published in *THE JOURNAL OF LAW AND ECONOMICS*.³

The Commission's secondary market rules are broad. Licensees of the Wireless Communications Service were provided the flexibility to "lease any or all of their spectrum usage rights (*i.e.*, in any amount of spectrum, in any geographic area covered by the license, and for any period of time during the term of the license) to third-party spectrum lessees."⁴ In 2004, the Commission extended aspects of the secondary market rules to two additional services: the Broadband Radio Service (BRS) and the Educational Broadband Service (EBS), which share the 2500-2690 MHz band.⁵ An interesting development in spectrum policy is that some organizations have asked the Commission to reconsider these secondary market rules for EBS licensees and instead adopt a new rule that would limit the maximum term of spectrum leases (including automatic renewals) to 15 years.

In this POLICY BULLETIN, we show that applying a 15-year lease limit to EBS licenses is not in the public interest and threatens the efficient use of that band. We present a theoretical argument illustrating the relationship between lease term limitations and investment. Under plausible conditions, the lease term limitation reduces investment in the EBS band and would therefore undermine the Commission's goal of achieving full utilization of the EBS spectrum.

² Federal Communications Commission, *In the Matter of Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, WT Docket No. 00-230, Report and Order and Further Notice of Proposed Rulemaking (rel. Oct. 6, 2003) (hereinafter "Secondary Markets Order").

³ R. H. Coase, *The Federal Communications Commission*, 2 *JOURNAL OF LAW & ECONOMICS* 1-30 (1959).

⁴ Secondary Markets Order at ¶ 39. The Commission's Wireless Broadband Access Task Force has stated that secondary markets for spectrum would "provide spectrum users with the maximum possible flexibility to determine the uses or services to be provided on the spectrum," and has noted that policies should let "parties enter into a variety of 'dynamic' leasing arrangements." The Task Force concluded that "[f]acilitating the ease with which parties may enter into these types of arrangements will significantly aid in the deployment of wireless broadband service." Wireless Broadband Access Task Force Report at 51, 64, 66.

⁵ *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 14165 (2004) (hereinafter "EBS Order") at ¶ 179. To advance the Commission's objective of promoting the use of EBS spectrum for educational and instructional purposes, the Commission deviated from its general secondary market rules by requiring EBS licensees to satisfy "substantial use" requirements set forth in Section 27.1214 of the Commission's Rules. 47 C.F.R. § 21.1214.

Licenses in the EBS band are nonprofit entities who are to use the spectrum for educational and cultural purposes, and the Commission envisions that private sector leases of this spectrum will help these entities construct new and innovative educational networks. Further, we find no evidence of a market failure or defect that justifies regulatory intervention. Intervention, by nearly any theory of regulation, is justified only when there is some market defect rendering private agreements incapable of reaching an efficient solution.

II. Background

In 2003, the Commission adopted broad “secondary market” rules that opened a new path toward the deployment of new wireless services. These rules were designed to tear down prohibitions or strictly limited leasing of spectrum rights by a licensee to another entity. After extensive review by the Commission’s Spectrum Policy Task Force, the Commission concluded that open, secondary markets for spectrum will: (a) “enable existing providers and new facilities-based entrants to gain more ready access” to spectrum; (b) allow parties to “be better able to design arrangements that meet their respective business plans and thereby enable them to bring additional wireless services to the public”; (c) “help achieve fuller utilization of the spectrum resource”; and (d) promote other Commission goals, including “encouraging the availability of broadband services for all Americans; promoting increased, facilities-based competition; ensuring the provision of spectrum-based services by small businesses; and, enabling development of additional and innovative services in rural areas.”⁶

The Commission’s rules for the Wireless Communications Service permit broad leasing of spectrum—as noted above, licensees now have the “right to lease any or all of their spectrum usage rights (*i.e.*, in any amount of spectrum, in any geographic area covered by the license, and for any period of time during the term of the license) to third-party spectrum lessees” pursuant to Commission rules.⁷ The Commission expected that licensees would “enter into a wide range of leasing arrangements . . . anything from a small amount of spectrum in a small area for a short period, to a large amount, over a large area, for up to the term of the license.”⁸ However, the Commission has made clear that while the term of a lease may not exceed the term of the

⁶ Secondary Markets Order at ¶¶ 42-43.

⁷ *Id.* at ¶ 39.

⁸ *Id.* at ¶ 42.

license, spectrum leases may provide for renewal terms that will commence automatically, subject only to renewal of the license by the Commission.⁹

The Commission's open spectrum leasing rules present a sharp break from the past. For most of its history, the Commission awarded exclusive licenses to commercial firms to use spectrum for specific tasks after writing extensive service rules and reviewing applications. The Commission's old rules did not generally permit leases of spectrum, and the Commission had the authority to approve or reject transfers of control of spectrum licensees. Approved uses for spectrum sometimes bordered on the absurd—the use of one band was actually limited to ice delivery companies. This command and control approach was criticized by a number of commentators, including Nobel Laureate Ronald H. Coase in 1959, but significant change in Commission spectrum policy, including spectrum auctions, did not happen until the 1990s.¹⁰

In addition to spectrum auctions and flexible use policies, the Commission's spectrum leasing rules are an important component of contemporary thought regarding spectrum policy. But the transformation brought about by the Commission's new spectrum policy has not taken hold over the all wireless services, and vestiges of the prior, rigid approach remain. In particular, 2500-2690 MHz (now called the "Educational Broadband Service" or "EBS" band) has stood as a veritable poster child for the antiquated command and control approach first criticized by Coase.

Policymakers have continually tinkered with the spectrum now comprising the EBS band. It was first established in 1963 for the purpose of transmitting instructional video programming to schools and colleges, but digital uses of this spectrum were not permitted until 1996; two-way services were not permitted until 1998; and mobile services were not permitted until 2001. While private-sector leases of EBS spectrum were first permitted in 1983, over the subsequent two decades, such leases were subject to extensive regulation (including lease term restrictions) that often precluded efficient use of the spectrum. In 2004 the Commission stated that "the regulatory history of the band has been marked by changes and sometimes conflicting policy goals, which have tended to suppress investment, innovation, and responsiveness to changes in wireless technology and demand for services."¹¹ The Commission found that the band was

⁹ *Id.* at ¶ 39. For example, if a 10-year license expires on December 31, 2007, the parties can enter into a lease with an initial term that expires on December 31, 2007, and an additional term of 10 years that automatically commences on that date, subject only to the Commission renewal of the license.

¹⁰ Bruce M. Owen and Gregory L. Rosston, *Spectrum Allocation and the Internet*, (Stanford Institute for Economic Policy Research, 2001) (available at: <http://siepr.stanford.edu/papers/pdf/01-09.pdf>).

¹¹ EBS Order at ¶ 9.

underutilized and “plagued by instability, uncertainty, filing freezes, and burdensome rules”¹² As a result, in 2004 the Commission made important changes to the EBS rules and moved dramatically to give licensees greater flexibility in using this spectrum. Some organizations oppose one particular aspect of this market-oriented spectrum policy and have called for limitations on the length of leases to EBS licenses.¹³

Re-imposing lease restrictions on the EBS band could undermine the Commission’s vision for enhanced and more-efficient use of this band. The Commission recognized that fulfilling the “educational” purposes of the band requires the expertise of the private sector.¹⁴ In addition, the Commission maintained its requirement that only non-profit educational institutions be eligible licensees because it believed that its secondary market rules “are sufficiently flexible to allow market forces to push the [EBS] spectrum toward its highest value use.”¹⁵

As the Commission recognized in the Secondary Markets Order and the Wireless Broadband Access Task Force Report, expanded availability and improvements in advanced wireless services are important to consumers and the economy. Education is important, too. Since license holders of the EBS spectrum can lease portions of their spectrum without harm to their educational mission, it seems that these lease arrangements are a win-win for the U.S. economy. Certainly, society as a whole gains from the expanded use of limited spectrum resources, and these lease arrangements allow for expanded output in some markets (e.g., advanced wireless services) without output reductions in others (e.g., education). The ability to produce a greater quantity of services from a scarce resource (spectrum) is, of course, highly desirable. It follows, then, that rules that would effectively limit the use of spectrum resources would be detrimental.

¹² *Id.* at ¶ 156.

¹³ Catholic Television Network and National ITFS Association, Petition for Reconsideration in FCC WT Docket No. 03-66 (filed Jan. 10, 2005), 20-21. We note that there is a dispute among the parties as to whether the Commission adopted a 15-year lease limitation by means of some language in paragraph 181 of the 2004 EBS Order, while Commission Rule Section 27.1214 actually adopted by the Commission in that order contain no such limitation. *See* Sprint Corp., Consolidated Opposition to Petitions for Reconsideration in FCC WT Docket No. 03-66 (filed Feb. 22, 2005), 6-7. We take no position on this dispute, as it does not affect our analysis. Because NIA/CTN have filed for reconsideration on this issue, the Commission has an obligation to decide whether such a 15-year lease limitation would be in the public interest.

¹⁴ EBS Order at ¶ 154.

¹⁵ *Id.* at ¶ 160.

III. Lease Terms and Investment: A Theoretical Analysis

Below, we provide a detailed technical analysis of the relationship between lease terms and investment. But first, we summarize the intuition of this theory for those not interested in the technical details of the problem.

A. Overview of Theoretical Model

Proponents of a lease limitation essentially want the government to mandate that EBS spectrum leases be renegotiated at least every 15 years, even if the project envisioned by the licensee and the lessee has a longer time horizon. This limitation has an impact on the bargaining positions of a potential private sector lessee that is considering whether to engage in a long-term project and what the price for leasing the EBS spectrum from the licensee will be. A rule that mandates that renegotiation happen at least every 15 years will clearly have an impact on the bargaining behavior and strategies of both the licensee and the potential lessee. We are interested in whether this change will ultimately have an impact on investment and output. Stated another way, will the mandated renegotiation adversely affect private investment into and use of the band?

Our theoretical model approaches this question as one of game theory. We consider the decisions that two entities (the EBS license holder and the private sector lessee) will make in two time periods, t_1 and t_2 .¹⁶ The lease contemplates a payment of some sorts from the lessee to the EBS licensee. This price will vary in the two time periods. In the first time period, the license holder can charge price P that covers the lease over both periods. Alternately, the license holder can charge price P_1 in t_1 and price P_2 in t_2 . In this scenario, renewal of the lease in t_2 is not automatic, and we assume that P_2 will be negotiated at the end of t_1 and prior to t_2 .¹⁷ Additionally, allow there to be uncertainty (for both parties) regarding the contribution of the lease to the profitability of the lessee. This uncertainty is resolved at the end of t_1 by observing the lessee's profits. We are interested in the level of investment, so assume that the lessee must make (partially) sunk investments of K dollars in assets with useful lives longer than t_1 .

It is incorrect to consider these investments merely in terms of physical plant. Rather, these investments will also include such items as training of personnel (human capital), brand image,

¹⁶ It is certainly possible to evaluate more periods with a more complex model, but our findings are unaffected so we limit the analysis to two periods.

¹⁷ This is the situation in which many potentially lessees may justifiably fear and seek to prevent—that the price for leasing the EBS spectrum will increase once the initial lease term expires. Renters have the same concern over their landlords.

and a firm's commitment to network evolution or particular related services. These assets may have exceedingly long economic lives. Also, our analysis applies to physical assets with economic lives shorter than the lease term. For example, say you have two lease terms of 12 years and the investment is solely in an asset that has an 8-year economic life. At the end of the first life, the firm must make a decision about re-investing in a second asset to cover the remaining four years of the lease term. To some extent, we can think of this as an asset with an economic life of 16 years.¹⁸

The question is: How does the investment level differ between the one-price and two-price regimes? The theoretical analysis that follows reveals that there is less investment in the two-price regime, and this is true because the re-negotiated price P_2 is used by the license holder to extract surplus from the lessee. Surplus sharing is possible only in the two-price regime, because the uncertainty regarding the lessee's profitability of the lease is observed at the end of t_1 . The standard economic reasoning applies – by reducing the lessee's marginal benefits from investment by extracting its surplus, a reduction in investment naturally follows. Thus, the term-limit may reduce investment below its socially optimal level. Investment is below the social optimal because the extracted surplus is not merely a transfer, but actually reduces total surplus by reducing investment at the margin.¹⁹

B. *Technical Analysis*

While this presentation is technical, the idea discussed here is very simple. When the lease term is less than asset life and some assets are (at least partially) sunk, then at such time as the initial lease expires, there will be re-negotiation caused by the governmental mandate. At re-negotiation, the license holder now has the opportunity to capture some of the profits produced by the investment, lowering the marginal return on the initial investment, and thereby discouraging such investment. Thus, the theoretical analysis below shows that re-negotiation lowers investment relative to a longer lease term and that the investment is sub-optimal from the social point-of-view.²⁰

¹⁸ In such cases, it may be that a lease term limitation will affect only the investment for the second asset, but this more narrow impact is not assured.

¹⁹ By socially optimal, we mean between the buyer and seller in the lease market. End-users are not incorporated into this analysis.

²⁰ Such problems are not new to economic theory, and this analysis is a simple application of the basic contracting model of Oliver Hart, *FIRMS, CONTRACTS, AND FINANCIAL STRUCTURE*, ch. 2 (1995). Our use of the term "social" here relates only to the parties of the transaction. We do not, for example, evaluate the impact on consumer welfare. Empirical evidence somewhat related to this problem is presented in P. Joskow, *Contract Duration and Relationship-Specific Investments: Empirical Evidence from Coal Markets*, 77 *AMERICAN ECONOMIC REVIEW* 168-85 (1987).

(Footnote Continued....)

We have a two-stage game, with two players including the lessee (B) and the license holder (H). In the first-stage of the game, the license holder leases the spectrum to the lessee for some price P . In the second-stage, the lessee selects its investment level K , and then market conditions (θ) and payoffs $[\pi(K, \theta)]$ are revealed. At the end of the lease term, either re-negotiation of the lease occurs or it does not. The payoff π is the variable profit (excluding K) made possible by the investment K in the leased spectrum and by the general market conditions that determine profitability in the lessee's product market (θ). Market conditions are unknown in Stage 1, but all players know that θ is a random variable with a probability distribution function $f(\theta)$ and cumulative distribution function $F(\theta)$ on $[\underline{\theta}, \bar{\theta}]$. That is, there is uncertainty regarding the profits of the lessee prior to signing the lease.

Now, consider two possible pricing scenarios under these conditions. First, P_1 is the price for the first lease term, and P_2 is the price for the second lease term. For present purposes, we can think of these lease terms as two consecutive terms of length chosen by a regulator (or the parties). Alternately, the price P covers both lease terms (50 years). The price P_2 is selected at the end of the first lease term after both K and θ are determined (though θ need not necessarily be determined prior to re-negotiation).

There are various models describing how π is formulated and how P_2 is negotiated, but all these possibilities have a basic mechanism. First, consider the determination of P , the single price covering both lease periods. Let \bar{P} be the "competitive market" value of P ; then $P = \bar{P}$. Surplus to the lessee B is

$$S_B = \max_K \left\{ \int_{\underline{\theta}}^{\bar{\theta}} \pi(K, \theta) f(\theta) d\theta - K - \bar{P} \right\} \quad (1)$$

with associated investment level

$$K^* \in \arg \max_K \left\{ \int_{\underline{\theta}}^{\bar{\theta}} \pi(K, \theta) f(\theta) d\theta - K \right\}. \quad (2)$$

Eqs. (1) and (2) merely state that the firm's objective is to maximize its surplus (or profit), where surplus is the gross margin from the service (π) minus the capital investment in the project (K)

In this paper, Joskow finds that contract lengths were longer, and repeated bargaining less frequent, when relationship specific investments are more important.

and the lease price (P), but choosing the appropriate level of capital investment (K). The gross margin is a function of the level of investment (K) and market conditions (θ). Eq. (1) is maximized when the optimal level of investment K^* is chosen (across all potential values of K). Notice that K^* is not a function of \bar{P} (in Eq. 2), so long as the lessee actually leases the spectrum.²¹

To continue, assume the following:

$$\frac{\partial \pi}{\partial K} > 0 \quad \forall K, \forall \theta; \quad (3)$$

$$\frac{\partial \pi}{\partial \theta} > 0 \quad \forall K, \forall \theta; \quad (4)$$

$$\frac{\partial^2 \pi}{\partial K^2} < 0 \quad \forall K, \forall \theta. \quad (5)$$

These conditions are intuitive. Eq. (3) states that gross profits rise as investment rises, and Eq. (4) states that gross profits rise as market conditions improve. Finally, Eq. (5) implies a declining relationship between changes in investment and profits, so that π is concave in K . Under these assumptions, K^* , the socially optimal investment level, is unique and solves

$$\int_{\underline{\theta}}^{\bar{\theta}} \frac{\partial \pi}{\partial K}(K^*, \theta) f(\theta) d\theta - 1 = 0. \quad (6)$$

Eq. (6) merely states that for all possible values of K , it is K^* that maximizes the firm's expected payoffs.

Now consider the alternative case where the price is re-negotiated at the end of the first lease term, with P_1 the price for the first term and P_2 the price for the second. P_2 is determined

²¹ In essence, the lessee maximizes its gross profits by choosing K (P is not set by the lessee), then evaluates whether or not these profits are larger than the sum of K and P .

after both K and θ are observed (or, at least π is observed). Using the bargaining solution set forth by mathematician John Nash,²² P_2 will be selected to maximize the product

$$(\pi(K, \theta) - P_2 - \bar{\pi})(P_2 - \bar{P}). \quad (7)$$

Equation (7) essentially is a “sharing rule” between the lessee and license holder, where net surplus is the difference between surplus with a bargain and the threat point payoffs (i.e., $\bar{\pi}$ for the lessee, \bar{P} for the license holder).²³ The threat point is the value at which one or the other party refuses to enter the agreement. Put simply, Eq. (7) states that the lessee and license holder, both now knowing π , will attempt to divvy up π at the re-negotiation.

In essence, what we learn from Eq. (7) is that P_2 is a linear function of π , so that we can write $P_2 = a + \lambda\pi$, where λ is independent of π and $0 < \lambda < 1$. Effectively, λ represents the surplus sharing rule, meaning the share of surplus extracted by the license holder when re-negotiation occurs at the end of the first period. In a Nash Bargaining Solution, $\lambda = 0.5$, but what really matters is that $\lambda < 1$, whatever the bargaining solution. The Nash Bargaining Solution is a commonly used assumption in non-cooperative bargaining situations, and it based on a set of axioms that should be satisfied by any reasonable agreement. In effect, the Nash Bargaining Solution holds that parties equally share the benefits of an agreement. Other theoretical bargaining solutions exist, but adopting one of these alternatives provides no additional information for this problem. As mentioned, what really matters is that $\lambda < 1$, which is true for any bargaining solution.

With re-negotiation at the end of the lease term, the lessee selects an investment level K' to solve

$$\max_K \left\{ \lambda \int_{\underline{\theta}}^{\bar{\theta}} \pi(K, \theta) f(\theta) d\theta - K - P_1 \right\} \quad (8)$$

and

²² J. Nash, *The Bargaining Problem*, 18 *ECONOMETRICA* 155-162 (1950); E. Rasmusen, *GAMES & INFORMATION* (1990) at 229-31. Alternate bargaining solution may render a different solution, but the differences will be slight. The subsequent analysis is not meaningfully altered by such differences.

²³ Formally, the threat point is the combination of outcomes in a cooperative game when no cooperation occurs among the players of the game.

$$K' \in \arg \max_K \left\{ \lambda \int_{\underline{\theta}}^{\bar{\theta}} \pi(K, \theta) f(\theta) d\theta - K \right\}. \quad (9)$$

Eqs. (8) and (9) are nearly identical to Eq. (1) except for the addition of the λ term that enters due to the re-negotiation of the lease agreement prior to the second term. Under our assumptions listed above, K' solves

$$\lambda \int_{\underline{\theta}}^{\bar{\theta}} \frac{\partial \pi}{\partial K}(K^*, \theta) f(\theta) d\theta - 1 = 0. \quad (10)$$

Now, compare Eq. (10) to Eq. (6). These two expressions represent the condition for the optimal choice of K under the two regimes. The two equations are nearly identical with the exception of the preceding λ in Eq. (10). Since $\lambda < 1$, it must be true that $K' < K^*$ (investment is less than the optimal investment K^*). So, investment declines below the optimal level K^* with re-negotiation because some of π is expropriated by the license holder at the end of the first lease term and prior to the second. K^* is more socially desirable than K' because the extraction of surplus at re-negotiation is not merely a transfer, but actually reduces K , thus rendering less total surplus than the case with a longer lease term. In other words, our analysis shows that mandating a re-negotiation does not simply shift the economic surplus from private uses of the spectrum from the lessee to the licensee—it actually *reduces* this economic surplus by reducing the optimal level of investment. By injecting itself into the licensee/lessee negotiation process, there is a large risk that the government policy will reduce output and private sector investment in the band.

C. Why Re-Regulate the EBS Band?

The theoretical model above shows that adoption of a 15-year lease restriction for EBS licenses could result in lower private investment in the band. This reduction is concerning, because the Commission has recognized that the educational community requires the expertise of the private sector to realize fully the potential for this band.²⁴ The EBS band is significantly underutilized by its nonprofit sector licensees, and the only reason the Commission maintained its rules (that only permit nonprofit institutions to hold these licenses) was its view that its leasing policies would be “sufficiently flexible to allow market forces to push the ITFS spectrum toward its highest value use.”²⁵ But our model shows that a 15-year lease limitation would

²⁴ EBS Order at ¶ 154.

²⁵ *Id.* at ¶ 160.

undercut this justification and essentially undermine the business case for private sector investment.

Of course, such a reduction in investment by a government mandate might be acceptable if another countervailing purpose were advanced by that mandate. However, our analysis of the purported justifications for the 15-year lease limitation uncovered no valid justification for regulatory intervention. Normally, one would expect an agency to regulate only in order to remedy some market imperfection that renders parties to an exchange unable to reach an efficient outcome. But no such “market failure” or “market defect” argument has been articulated by the Commission itself or those who support a 15-year limit on the term of an EBS lease.

1. *Is a Lease Limit Needed to Protect Licensees from Themselves?*

A length-of-time limit on EBS leases essentially requires that nonprofit licensees and private firms renegotiate terms at least every 15 years. Proponents of such a lease limit argue that this mandated renegotiation would ensure that the nonprofit licensee have “an opportunity for educators to reevaluate their educational use and leasing activities on a periodic basis.”²⁶ This is essentially a paternalistic argument—those that make it must hold the nonprofit licensees in such low esteem that the licensees essentially cannot be trusted to protect their own interests.

There is no reason to think that a nonprofit licensee, absent the 15-year lease limitation rule, does not have the bargaining power to insist on periodic revisiting of the lease terms. There is no market defect—such as market power or information advantages on the lessee’s behalf—that prohibits or even limits an EBS license holder from self-imposing a lease-term limitation. Indeed, given that spectrum is a scarce resource, one would expect that license holders would be in a relatively strong (or at least equal) bargaining position *vis* private entities. Regardless of idiosyncratic preferences, it is their spectrum and their decision to make regarding the lease term, as they know best what will suit their needs. In some cases that lease term will be long; in others it will be short. Indeed, the entire purpose of a “secondary market” for spectrum is for buyers and sellers to act independently and to establish “market clearing” prices and terms. A 15-year lease limitation would intrude on that bargaining process without any market power or market defect justification.

Why policymakers should reject the paternalistic aspect of the 15-year lease term was articulated best by the Diocese of Lafayette (La.):

²⁶ Letter to Marlene Dortch, Secretary, Federal Communications Commission, from Todd Grey, Dow, Lohnes & Albertson, Ex Parte Presentation in FCC WT Docket No. 03-66 (Dec. 19, 2005).

[By considering a 15-year maximum term,] the Commission is indicating to the EBS industry that EBS licensees are not able to make the business decisions that they believe are the most appropriate to meet a licensee's individual needs and educational mission. We know how to best utilize our spectrum, and craft our leases with commercial operators to do just that. As long as we continue to meet the educational needs of our students and remain in compliance with the EBS rules, we do not believe that a regulatory restriction on lease terms is necessary.²⁷

Like the Diocese of Lafayette (La.), not all EBS license holders feel that they need regulatory intervention in order to make decisions customized for their own needs. For these licensees, the lease term restriction reduces the ability to satisfy their educational mission.

2. *Will Lease Limits Promote Competitive Entry?*

One might consider whether a lease term limitation would be pro-competitive because it would periodically give new firms access to the spectrum.²⁸ Government restrictions on lease terms would prevent one group of private sector firms from locking up EBS spectrum through long-term leases so that no new company would be able to provide services over this band.

Once again, though, this position fails to articulate a market defect or failure. For better or worse, licenses granted by the Commission are, in practice, essentially perpetual. For example, while the Commission is required by law to review the qualifications of broadcast license holders every eight years, that review process “is a slam-dunk.”²⁹ Accepting the argument that competition requires that spectrum leases be of short duration would dictate that the Commission not grant *any* spectrum license for a period of more than 15 years. Quite simply, there is nothing unique to the EBS band to warrant this concern.

²⁷ Letter to Marlene Dortch, Secretary, Federal Communications Commission, from Gerald M. Dill, Director, Diocese of Lafayette, Office of Human Resources, Ex Parte Presentation in FCC WT Docket No. 03-66 (Dec. 21, 2005).

²⁸ For example, the IFTS Alliance has stated that regulating the length of leases would give “new entrants . . . a constant supply of spectrum due to expirations.” Letter to Marlene Dortch, Commission, from J. B. Schwartz, Director, IFTS Alliance, Ex Parte Presentation in FCC WT Docket No. 03-66 (Jan. 10, 2006).

²⁹ Broadcast licenses are the only spectrum licenses in which Congress has mandated a particular license term and renewal process. FCC Commissioner Michael J. Copps has said that broadcast “[l]icense renewal has become a slam-dunk,” noting that the process is “one wherein companies now need only send us a short form every eight years and their renewal wishes are granted.” Remarks of Commissioner Michael J. Copps, FCC Hearing on Localism and License Renewal, San Antonio, Texas (FCC, Jan. 28, 2004) (available at: http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-243336A1.pdf).

Moreover, there is no indication that long-term leases would deter more entry or “new uses” than short-term leases. The purpose of a secondary market spectrum leasing policy is to promote the highest-value use of spectrum. If a new entrant has a higher-value use for the EBS spectrum, then it would have the ability to negotiate with the licensee and the current lessee to propose to use the license in that particular, higher-value way. If the new use of the license indeed has a higher value than the current use, then these negotiations should result in a new lease and the entrant using the spectrum (with the higher profits being divided between the entrant, licensee and lessee). This process would happen in virtually the same way if the original lease were 6 years as opposed to 16 years.

Neither of these arguments for a lease-term restriction suggests any market defect—such as disparate bargaining position, market power, or externalities—that would result in inefficient lease terms. Indeed, the license holder can impose any lease term restriction it prefers. In such a situation, prohibiting a lease longer than an arbitrary period of time would seem only to have adverse results. If a licensee desires a shorter term, the lease restriction has little effect. But if a licensee desires a longer term (perhaps to ensure a flow of revenue and capital to a long-term educational project), then the rule prevents it from locking in a source of private capital. The artificial lease limit would seem to have little, if any, benefits but certainly has costs. If the lease term reduces investment in the spectrum, as our analysis shows above, then the rule reduces the efficient use of the scarce spectrum resource.

IV. Conclusion

In the last decade, the Federal Communications Commission has taken a number of steps to adopt a market-based spectrum management policy. In order to promote more efficient utilization of spectrum, the Commission has auctioned licenses and granted licensees greater flexibility in using spectrum. An important component of this policy has been the creation of a “secondary market” for spectrum, which involves free and open leasing of spectrum from licensees to private firms. The Commission has found that it is in the public interest for licensees and private firms to “enter into a wide range of leasing arrangements . . . [ranging] from a small amount of spectrum in a small area for a short period, to a large amount, over a large area, for up to the term of the license.”³⁰

These actions are a direct departure from the past, in which the Commission undertook a strict, command and control attitude toward spectrum uses and licensees. Critics of this approach can hold up the Educational Broadband Service (EBS) as a poster child for the failure

³⁰ Secondary Markets Order at ¶ 42.

of this approach—over forty years from its inception, this large swath of spectrum remains a vastly underutilized resource.

In 2004, amid a flurry of publicity surrounding the potential of wireless broadband service, the Commission took several actions to reform the EBS band. However, some now want to roll back the clock and re-impose a lease term limit on EBS licenses that harkens back to the Commission's former command and control regime. As we show in this BULLETIN, reverting to the policies of the past once again threatens the development of services that use this spectrum. For example, the Diocese of Lafayette (La.) has noted that, "without such long-term leasing arrangements, a commercial operator will be much less likely to invest capital, and take the risk of construction and operation of a wireless system."³¹

However, until now, the relationship between investment and the lease term has been merely an assertion. The theoretical analysis presented above provides a description of the mechanism linking investment decisions to the lease term limitation. Theory shows that lease term limitations may lead to reduced investment and inefficient use of the scarce spectrum resource. Combined with the lack of an affirmative case for regulatory intervention, a lease term limitation for spectrum seems to undermine the Commission's goal for the EBS band.

³¹ Letter to Marlene Dortch, Secretary, Federal Communications Commission, from Gerald M. Dill, Director, Diocese of Lafayette, Office of Human Resources, Ex Parte Presentation in FCC WT Docket No. 03-66 (Dec. 21, 2005).