

Cost-Benefit Analysis at the FCC: A Look at the 900 MHz Band

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A booming demand for wireless communications has the Federal Communications Commission (“FCC”) scrambling to repurpose spectrum for wireless broadband uses. While very large blocks of quality spectrum—such as the C-Band—grab most of the attention, in one proceeding the Commission is proposing to convert a 3×3 band of 900 MHz spectrum allocated to narrowband uses over thirty years ago to a broadband license (called the 900 MHz Broadband license).¹ This block lies within a larger 5×5 MHz block used by utilities, airlines, and other businesses for internal, narrowband communications and by commercial dispatch providers. Given its small size, this 900 MHz Broadband license is expected to be used for the internal broadband communications of utilities, critical infrastructure and businesses.

While many incumbents support the Commission’s plan and hope to use the new broadband spectrum to improve their communications services, a few do not. Florida Power & Light (“FPL”), for example, has resisted the repurposing plan, claiming the relocation effort flunks a cost-benefit analysis.² Competing cost-benefit analysis by the proponents of the repurposing claim the benefits are well in excess of the cost, generating billions of net benefits.³

This dispute regarding the costs and benefits of the repurposing warrants some attention. As detailed in this PERSPECTIVE, while cost-benefit analysis has its place in regulatory decision-

making, such cost-benefit tests are not performed for market transactions in spectrum, and for good reason: a regulatory cost-benefit test is satisfied by the repurposing itself, absent significant third-party effects or antitrust concerns. Even in more complex and relevant settings such as mandatory relocation of incumbents to comparable facilities at the new licensee’s cost (as proposed for the 900 MHz Broadband license), the willing participation of the new licensee in the transaction indicates the cost-benefit requirement is met.⁴

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Background

In its 900 MHz NPRM, the Commission is proposing to convert a portion of a 5×5 band of 900 MHz spectrum allocated to narrowband uses to a broadband license, or the 900 MHz Broadband license.⁵ Existing users of the band include utilities, airlines, and other businesses, who use the spectrum mainly for internal,

narrowband communications. Many incumbent users welcome the plan to convert all or a portion of the band for broadband use.⁶

Repurposing a portion of the 900 MHz band has seen a familiar set of challenges including interference claims and incumbent resistance (or indifference).⁷ While interference issues will be resolved by traditional means (e.g., power limitations, out-of-band emissions, and so forth),⁸ the question of what to do with incumbents remains open. For now, it is proposed that incumbents wishing to continue narrowband operations will be relocated to the residual 2x2 MHz narrowband blocks (or elsewhere), though how to motivate incumbents to make the move and how to compensate them remain open questions.⁹ Experience suggests relocation is straightforward for narrowband networks, often requiring little more than the retuning of radio equipment to new frequencies, so the problem is more about “strategy” than it is “technology.”

As a starting point for relocating incumbents, the Commission’s 900 MHz NPRM establishes a preference for voluntary transactions to clear enough spectrum for the broadband license.¹⁰ Given that the 900 MHz Broadband license requires an aggregation of multiple specific and unique licenses, there is a serious risk of a holdout problem. To address this concern, the Commission proposes that after a threshold number of voluntary transactions occurs (say, 80% of the channels in the proposed broadband segment, the “*threshold rule*”), remaining incumbents will be relocated to the narrowband segment at the expense of the 900 MHz Broadband licensee (the *compensation rule*). In prior work, we have shown that this *threshold rule*, which embodies an expiring transaction window, may be an effective means to address holdouts.¹¹

Analysis

Since the first spectrum auction was held in 1994, the Commission has all but abandoned the beauty contests and lottery schemes of its

spectrum policy past in preference for market-based transactions in spectrum licenses, either by auction or private exchange.¹² Maximizing the value of the nation’s spectrum resources is left to the market, where those that can produce the most value from spectrum are presumed to be those willing to pay the most for it.

While cost-benefit analysis is an important part of regulatory decision-making, the Commission normally does not conduct a formal cost-benefit calculation for licenses subject to market exchange for the parties involved, and for an obvious reason: if a prospective buyer values the licenses more than the licensee, then the exchange is surplus creating.

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I will begin with the simplest case of a straightforward sale of a spectrum license and then move on to more complex transactions. Say, for instance, the prospective buyer values the spectrum at V_1 and the incumbent at V_0 . A voluntary exchange between the two, assuming a Nash Bargain (with zero threat points), renders the price,

$$P = \frac{1}{2}(V_1 + V_0), \quad (1)$$

where the surplus to the spectrum license is split between the two parties.¹³ The net benefit to the buyer of the transaction is $V_1 - P$ and the seller $P - V_0$. A voluntary exchange proceeds if these

net benefits are positive for both parties, or when $V_1 > V_0$. *Private parties conduct their own cost-benefit analysis.*

Absent third-party effects or antitrust concerns, the conditions under which a private exchange occurs match those that would be required to satisfy a cost-benefit test conducted by the Commission. The cost of this transaction is $P + V_0$ (V_0 is lost and the buyer pays P) and the benefits of it are $V_1 + P$ (V_1 is gained and the seller receives P). Benefits exceed the costs when $V_1 > V_0$, which is the same condition that holds when the voluntary transaction occurs. Thus, absent third-party effects and antitrust concerns, voluntary transactions involving spectrum licenses require no regulatory cost-benefit analysis—the transaction itself is all the evidence the Commission requires to deem the transaction beneficial.

Relocation Costs

In the simple exchange just discussed, the incumbent leaves the market, so V_0 is lost (a cost). In the 900 MHz proceeding, incumbents may move to the residual 2×2 MHz blocks (or other suitable spectrum) to get an equivalent level of narrowband services. Let this move involve cost K for the incumbent in the form of re-tuning costs, equipment purchases, and so forth. The incumbent receives spectrum that permits an equivalent level of service as before (V_0). To simplify, say the Commission grants the incumbent a new license for no fee and this license has no other known and valuable current use.¹⁴

Under a *compensation rule* where the Commission requires the new licensee to pay relocation costs, the Nash Bargain renders a price,

$$P_K = \frac{1}{2}[V_1 - K + V_0]. \quad (2)$$

Now, the net benefit to the buyer of the transaction is $V_1 - P_K - K$ and, since replacement spectrum is provided to the seller, the net benefit to the seller is P_K , both of which must be positive

for the voluntary exchange to proceed. The benefit-cost comparison is,

$$V_1 + V_0 + P_K > V_0 + P_K + K. \quad (3)$$

which simplifies to $V_1 > K$. If a market exchange for the license occurs, then this condition must be satisfied. In fact, the transaction occurs only when $V_1 > P_K + K$. Even with relocation costs, when a voluntary exchange leads to a license transfer, the regulatory cost-benefit test is satisfied and the regulatory agency need not conduct its own cost-benefit analysis.

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Mandatory Relocation

As we have detailed in prior studies, under some conditions market transactions for spectrum licenses may not secure a socially-valuable repurposing due to holdouts. That is, an incumbent licensee(s) may ignore the sunk costs incurred by the innovator in prior transactions and seek to extract the innovator's full value of the repurposing. The risk of holdouts leads innovators in other industries to discreetly purchase property rights to avoid the holdout problem. In spectrum aggregations, secrecy is often precluded by the public nature of regulatory proceedings.¹⁵ (Additionally, while not a holdup *per se*, when the spectrum licensee is not "in the market" for spectrum due perhaps to de minimis holdings and/or the temporary inconvenience of a retune, the incumbent may have low motivation to engage with prospective buyers.)

Present ownership of licenses in the 900 MHz band is diverse. With many incumbents and the

repurposing now exposed, the risk of holdouts is substantial. Indeed, under plausible conditions, a single license holder—which may in fact have just a single channel—could block the deployment of broadband in an entire geographic area, thus depriving society of the increased benefits of broadband deployment. Recognizing the holdout problem (as it has in the past on prior spectrum repurposings), the FCC has proposed a two-phase plan for the band.

First, incumbent licenses may exchange licenses to the innovator through voluntary transactions. Second, recognizing that holdouts may impede the repurposing of the band, the Commission proposes to relocate residual incumbents to comparable spectrum once voluntary transactions have reached a threshold share of the total number of channels needed for repurposing the band (e.g., 80%).¹⁶ Such a rule may guard against holdouts, though there is no guarantee it will.¹⁷ As determined in a recent theoretical analysis of the proposed plan: “the Commission’s proposed transaction threshold is supported by economic theory and thus would permit the socially-valuable repurposing of spectrum to occur.”¹⁸

Under mandatory retuning, let the price for the residual incumbent’s license be P_R (which may be zero) and relocation costs again be K . Under the compensation rule, the incumbent receives spectrum providing V_0 and its relocation costs are paid by the innovator. Under the “comparable facilities” requirement, the net benefits of the relocation to the incumbent are zero. The innovator secures net benefits of $V_1 - P_R - K$, the value of the spectrum less the price paid (if any) and relocation costs. If the innovator pursues the relocation at early stages (knowing this threshold relocation may occur), then it must be true that the expected net benefits of the aggregation are positive. With the incumbent’s relocation costs covered, satisfaction of the cost-benefit test manifests in the license-aggregation activity of the innovator.

Necessary, but Not Sufficient

When using market transactions and mandatory retuning at the expense of the new licensee, a repurposing of spectrum requires no regulatory cost-benefit analysis—the cost-benefit test performed by the parties to the exchange is sufficient. Still, a successful market-driven repurposing is a necessary but not sufficient condition for a socially-valuable repurposing, since (for a variety of reasons) market transactions may fail to secure a socially-valuable repurposing.

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By using market transactions, the Commission is relying on the comparison of private costs and benefits to repurpose the band. Social benefits and costs, however, may alter the cost-benefit analysis, but are typically ignored by the parties to the exchange.¹⁹ For instance, if a transaction has antitrust concerns, then the Commission may block a privately-valuable transaction from occurring.²⁰ Resistance to the Sprint/T-Mobile merger is a good example of such action.²¹

Or, society might benefit from a transaction that private parties refuse to make, since repurposing a band may create consumer surplus that does not enter in the cost-benefit calculus of private parties.²² A shift from a narrowband to broadband license may create substantial

consumer benefits. A study commissioned by CTIA, the wireless industry's trade association, claims that the consumer benefits of wireless spectrum are ten-to-twenty times larger than the price paid for a spectrum license.²³

Let the third-party benefits of a repurposing be S_B and the third-party costs be S_C . Looking back to Equation (3), the benefit-cost comparison with third-party effects is,

$$V_1 + S_B > K + S_C. \quad (4)$$

For the 900 MHz band, the social costs are expected to be small (if not zero) for two reasons.²⁴ First, the relocation process is straightforward, and scheduling can avoid predictable problems in the timing of the retuning of radios. Second, incumbents can provide the status-quo value of service on new spectrum, so the consumers of the incumbents are unaffected by the relocation.²⁵ If the incumbent has all retuning costs paid, and through a grant of spectrum can provide functionally equivalent service, then there are few, if any, third-party costs to the repurposing.

The social benefits may be large, however. The 3x3 MHz band is being shifted from narrowband to broadband use, enhancing the capabilities of the networks that use the spectrum. Also, portions of the band that have not been used for over thirty years will be removed from inventory to produce valuable services. If the social benefits are some factor λ larger than the transaction price for the license, then the benefit-cost condition is,

$$V_1 + \lambda P_K > K, \quad (5)$$

which is easier to satisfy than the condition in Equation (3) as long as $\lambda > 1$. Still, only when market transactions fail is such a regulatory cost-benefit analysis required to determine whether a more aggressive approach to the repurposing is warranted. If the transaction occurs, then the regulatory cost-benefit test is satisfied.

Cost-Benefit Analysis in the Record

Parties submitted two cost-benefit analyses to the Commission's record in this proceeding. First, proponents of the repurposing plan submitted an analysis by former FCC Commissioner Harold Furchtgott-Roth.²⁶ Second, Florida Power & Light ("FPL"), a utility serving portions of Southern Florida, commissioned Coleman Bazelon of the Brattle Group to conduct a cost-benefit analysis of the repurposing of FPL's licenses.²⁷ Like many utilities, FPL operates a narrowband network in the 900 MHz band. The company is one of the more vocal critics of repurposing of band (as proposed). The authors of both studies are economists with extensive experience in telecommunications policy.

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The analysis of Dr. Furchtgott-Roth, filed on behalf of a proponent of the repurposing, appeared early in the proceeding and does not incorporate many of the details of the Commission's current proposal. He concludes that the net benefits of the transaction are perhaps in the tens of billions, mostly in the form of consumer surplus as spectrum is more efficiently and more broadly used. Private transactions are sufficient evidence, he argues, since the third-party effects and implications for the "rule of law" are small or absent. The costs of the repurposing are assumed to be low given that the incumbents are relocated to spectrum capable of providing an equivalent level of service.

Dr. Bazelon, representing an opponent to the repurposing, contests this finding and concludes, based on a comparison of relocation costs to the

market value of spectrum, the benefits are less than the cost. Specifically, the Brattle Group's filing provides an estimate of the (present value) of relocation costs (K) to FPL within its service region. These costs sum to \$97 million, including both transition and ongoing costs to the company. Since the data used for the analysis is proprietary (and presumably based on engineering studies), I am in no position to either confirm or contest the estimate. Acknowledging the compensation rule, the Brattle Group observes, "these costs will be covered by 'the [broadband] licensee.'"²⁸

On the benefits side of the ledger, the Brattle Group assumes the full benefits of the repurposing are equal to \$83 million, where the benefits are equal to the market value of the spectrum licenses based on past spectrum transactions. According to the Brattle Group, the benefits are thus \$15 million less than the costs, so the repurposing flunks the cost-benefit test.

There are a few problems with the Brattle Group's analysis, and I will focus on four of them.

First, the Commission's plan is to rely on market transaction (even for complex systems such as FPL's). If the value of the new broadband license is less than the relocation costs (as Dr. Bazelon concludes), then the transaction will not occur. The Commission need not prohibit transactions where there is no willing buyer and seller. Certainly, the Commission should not make policy based on estimates of costs and benefits by third-parties but should rely instead on the estimates of net benefits made by actual market participants.

Second, the repurposing of the 900 MHz band involves many licenses across many geographic areas. The repurposing of the 900 MHz band is thus an *aggregation problem*. An innovator wanting a large footprint must buy many licenses, the aggregate value of which is important. The value of the different licenses is going to vary by location. Relocation costs also

have a distribution and may sometimes be high and other times low. When the aggregation is the increment, it is the comparison of costs and benefits across multiple licenses that matters. Looking at any single transaction, or any single incumbent's relocation cost (especially estimates by one opposed to the plan), provides little to no insight into the net benefits of the repurposing.

Say, for example, there are two licenses. The value to the innovator is 100 units if both are acquired (zero otherwise). Relocation costs are 60 for one license and 10 for the other. The innovator has no interest in obtaining a single license, but if we say that the value of one license is 50 (one half the full value), then the relocation costs exceed the value for one of the two licenses. Yet, that is not the calculation the innovator is making. The innovator is comparing the 100 value to the 70 in relocation costs and would proceed with the transactions if the price paid plus the relocation costs are less than and equal to 100.

If the costs of accommodation exceeded the benefits of the repurposing, then voluntary transactions would not occur. Yet, transactions have occurred in this band, and many incumbents are on board with the Commission's plan. In contrast to the Brattle Group's claims, the costs of relocation cannot exceed the benefits of the repurposing in some general sense.

Third, the analysis ignores third-party benefits (third-party costs are presumably small), which may be important if market transactions fail to repurpose the band. The Brattle Group has estimated in the past that the consumer benefits of spectrum are 10-to-20 times larger than a license's market value.²⁹ Here, the comparison is between the value of broadband and narrowband use (or the introduction of idle licenses into service), though most of the narrowband services will continue to be provided. Even using the Brattle Group's estimates, the third-party benefits need not be very large to satisfy the cost-benefit test.

Fourth, the Brattle Group's measure of value is some approximation of what is presumed to be the market clearing price for a single license. This approach assumes there are substitutes for the spectrum, though that is not the case. The 900 MHz Broadband innovator must buy specific licenses.³⁰ Thus, there is a bargain between a buyer and a seller rather than a centralized market where the buyers can pick the lowest priced license that meets its needs. If this approach was legitimate, then the buyer would not pay \$83 million for a license with \$97 million in relocation costs but would simply find a comparable license with no or lower relocation costs. With voluntary transactions, the value of the aggregated licenses is expected to exceed the prices paid for the spectrum and the relocation costs. So, the "price" of the spectrum is not a valid measure of benefits.

Conclusion

Cost-Benefit Analysis is (or should be) an important part of regulatory decision-making,

though such an analysis is often agonizingly complex and rarely determinative. There are cases, however, where satisfying a cost-benefit test requires no formal, regulatory cost-benefit analysis. For instance, when market transactions determine the outcome, it may be presumed, in the absence of large third-party effects or antitrust concerns, that the benefits of the transaction exceed the costs. Additionally, when all costs are covered, if the transaction occurs it can be assumed that the benefits exceed the costs.

In the ongoing 900 MHz proceeding, where parties seek to repurpose a 3x3 MHz block from narrowband to broadband licenses, the Commission aims to rely on market transactions to shift ownership of the licenses from incumbents to innovators. Successful transactions imply, at least based on private values, that the benefits of such deals exceed their costs. No regulatory cost-benefit analysis is necessary. The same holds true if the retuning is mandatory when incumbent relocation costs are paid.

NOTES:

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¹ *In the Matter of Review of the Commission's Rules Governing the 896-901/935-940 MHz Band*, FCC 19-18, NOTICE OF PROPOSED RULEMAKING, __ FCC Rcd. __ (rel. March 14, 2019) (hereinafter "900 MHz NPRM").

² See C. Bazelon, *The Economics of the 900 MHz Rebanding Proposal: A Cost-Benefit Analysis*, THE BRATTLE GROUP (hereinafter "Brattle Group Study"), attached to letter from Bryan N. Tramont & Timothy J. Cooney, Counsel to NextEra Energy, Inc. to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Sept. 14, 2018) (available at: https://ecfsapi.fcc.gov/file/1091474189648/TBG%20Report%20for%20NextEra%20WT%2017-200_09.14.2018.pdf) (hereinafter "Brattle Group Study").

³ H. Furchtgott-Roth, *A Cost Benefit Analysis of Proposals to Restructure the 900 MHz Band*, Utilicom Advisors Inc. (October 2017), attached to letter from Elizabeth R. Sachs, Counsel, pdvWireless, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (November 9, 2017) (available at: <https://ecfsapi.fcc.gov/file/1109918007883/PDV%20Ex%20Parte%20Utilicom%20Study%2017-200%20%2011-9-17.pdf>) (hereinafter "HFR Study.")

⁴ In this 900 MHz proposed rulemaking, incumbents are not selling their spectrum licenses as in the 600 MHz incentive auction. Instead, incumbents are merely relocating to alternative channels in the same spectrum band. After retuning to their equipment to these alternative channels, the incumbents can continue to operate on their new comparable facilities.

⁵ 900 MHz NPRM, *supra* n. 1.

⁶ See, e.g., Comments of Utilities Technology Council, WT-Docket No. 17-200 (available at: [https://ecfsapi.fcc.gov/file/10604580916794/Comments%20of%20UTC%20\(final\).pdf](https://ecfsapi.fcc.gov/file/10604580916794/Comments%20of%20UTC%20(final).pdf)); Comments of Southern California Edison, WT-Docket 17-200 (available at: [https://ecfsapi.fcc.gov/file/10603183212010/SCE%20Comments%20\(Final\)%206-3%20\(01320170xB3D1E\).docx](https://ecfsapi.fcc.gov/file/10603183212010/SCE%20Comments%20(Final)%206-3%20(01320170xB3D1E).docx)); Comments of Duke Energy, WT-Docket 17-200 (available at: <https://ecfsapi.fcc.gov/file/106031913304973/Duke%20Energy%20900%20MHz%20NPRM%20Comments.pdf>).

⁷ T.R. Beard, G.S. Ford and M. Stern, *Addressing Spectrum Holdouts With A Transaction Threshold: A Theoretical Analysis*, PHOENIX CENTER POLICY BULLETIN NO. 46 (July 2019) (available at: <http://www.phoenix-center.org/PolicyBulletin/PCPB46Final.pdf>); G.S. Ford and M. Stern, *Addressing Holdouts in the Repurposing of Spectrum for Broadband Services*, PHOENIX CENTER POLICY PERSPECTIVE NO. 18-10 (December 19, 2018) (available at: <http://www.phoenix-center.org/perspectives/Perspective18-10Final.pdf>); T.R. Beard and G.S. Ford, *Expediting Spectrum Repurposing Through Market Transactions*, PHOENIX CENTER POLICY PERSPECTIVE NO. 18-08 (October 12, 2018) (available at: <http://www.phoenix-center.org/perspectives/Perspective18-08Final.pdf>).

⁸ See, e.g., Comments of Ericsson, WT Docket No. 17-200 (May 31, 2019) ("Ericsson believes these technical rules are appropriate to ensure successful operation of broadband devices in the 900 MHz without causing interference to narrowband operations.") (available at: https://ecfsapi.fcc.gov/file/10531104130545/Ericsson%20900%20MHz%20NPRM%20Comments_05312019.pdf).

⁹ See, e.g., 900 MHz NPRM, *supra* n. 1 at ¶¶ 37-38.

¹⁰ *Id.* at ¶¶ 9, 26.

¹¹ *Supra* n. 7.

¹² <https://www.fcc.gov/auctions>.

¹³ J. Nash, *The Bargaining Problem*, 18 *ECONOMETRICA* 155-162 (1950). More generally, the $\frac{1}{2}$ parameter could be replaced with a share parameter γ , which allows for a different division of the surplus depending on relative bargaining power and other considerations.

¹⁴ Another approach would be for the Commission to extract some portion of the negotiated price for the incumbent's existing license.

¹⁵ *Supra* n. 7.

NOTES CONTINUED:

¹⁶ 900 MHz NPRM, *supra* n. 1 at ¶ 38.

¹⁷ *Addressing Spectrum Holdouts With A Transaction Threshold*, *supra* n. 7.

¹⁸ *Id.* at p. 1.

¹⁹ *HFR Study*, *supra* n. 3 at p. 7 (“Three factors that private parties would not consider stand out: the rule of law and property rights, externalities, and economic welfare of society.”); *Brattle Group Study*, *supra* n. 2 at p. 32 (“There are also costs resulting from the proposal that would fall on parties who are not directly involved in the proposed rulemaking...”); *see also*, T.R. Beard, G.S. Ford and M. Stern, *Skin in the Game: Interference, Sunk Investment, and the Repurposing of Radio Spectrum*, PHOENIX CENTER POLICY BULLETIN No. 40 (March 2017) (available at: <http://phoenix-center.org/PolicyBulletin/PCPB40Final.pdf>).

²⁰ *See, e.g.*, T.R. Beard, G.S. Ford, L.J. Spiwak and M. Stern, *Taxation by Condition: Spectrum Repurposing at the FCC and the Prolonging of Spectrum Exhaust*, 8 HASTINGS SCIENCE AND TECHNOLOGY LAW JOURNAL 183 (2016) (available at: <http://phoenix-center.org/papers/HastingsSTLJ-TaxationbyCondition.pdf>).

²¹ *See, e.g.*, E. Lee, *T-Mobile-Sprint Merger Wins Approval of FCC Chairman*, NEW YORK TIMES (May 20, 2019) (available at: <https://www.nytimes.com/2019/05/20/business/dealbook/sprint-tmobile-merger.html>).

²² *HFR Study*, *supra* n. 3 at p. 11 (“the consumers using those services benefit as well through consumer surplus – how much more they would have been willing to pay for the services relative to what they actually paid.”)

²³ C. Bazelon and G. McHenry, *Mobile Broadband Spectrum: A Vital Resource for the U.S. Economy*, Prepared for CTIA by The Brattle Group (May 11, 2015) (available at: https://api.ctia.org/docs/default-source/default-document-library/brattle_spectrum_051115.pdf).

²⁴ The third-party costs would include the value of the spectrum in the 2x2 MHz band, but I suspect these costs are quite low.

²⁵ *HFR Study*, *supra* n. 3 at p. 14, fn. 19 (“The relocation to comparable facilities would mean that a relocating licensee would experience no reduction in system capacity, coverage, or signal strength within the licensee’s coverage area.”).

²⁶ *HFR Study*, *id.*

²⁷ *Brattle Group Study*, *supra* n. 2.

²⁸ *Id.* at p. 24.

²⁹ *Supra* n. 23.

³⁰ *See, e.g.*, T.R. Beard, G.S. Ford and L.J. Spiwak, *Market Definition and the Economic Effects of Special Access Price Regulation*, 22 COMM.LAW CONSPECTUS 237 (2014) (available at: <https://scholarship.law.edu/commmlaw/vol22/iss2/10>).