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# A secondary market for the trading of spectrum: promoting market liquidity

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## Abstract

The development of a successful secondary market for the trading of spectrum is not a foregone conclusion. The multi-dimensional nature of radio spectrum, which requires that a bid to buy and an offer to sell conform across the multiple dimensions, suggests that the market may be very “thin.” In addition, existing commercial users of spectrum have little incentive to sell excess spectrum if such spectrum will be employed by the buyer to provide a service that competes with the service provider by the seller. This paper discusses several steps to enhance market liquidity. One approach involves obtaining participation from federal spectrum users. Another step involves developing a market that both enhances market liquidity and provides participants the opportunity to incorporate a call option in the traded asset.

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*Keywords:* Spectrum management; Spectrum trading; Market liquidity; Call option

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## 1. Introduction

The ability of government authorities to successfully auction radio spectrum has led some governments to consider the desirability of promoting the development of a secondary market for the trading of radio spectrum.<sup>1</sup> In broad terms, by transferring spectrum from a lower to a higher value user, a secondary market may enhance the efficiency with which spectrum is assigned.<sup>2</sup> If

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<sup>1</sup>Both the Radiocommunications Agency of the Department of Trade and Industry (UK) and the Federal Communications Commission (US) have solicited comments on the development of a secondary market for the trading of radio spectrum. See [Radiocommunications Agency of the Department of Trade and Industry \(UK\) \(1998\)](#) and [F.C.C. \(2000\)](#).

<sup>2</sup>Commercial users obtain the right to use spectrum through the FCC’s license assignment process. We assume for discussion purposes that this process grants commercial users the right to trade their spectrum in exchange for a payment from a commercial or a government entity. We assume that government users of spectrum possess the same property right.

conducted through a transparent process, spectrum trading may impose a clear, market-based opportunity cost upon current users, thereby providing them with the correct incentive to conserve spectrum. Such a market may also assist the debt and equity markets in valuing a firm's spectrum assets.

Despite its theoretical appeal, the development of a market for the trading of spectrum is not a foregone conclusion. Spectrum is multi-dimensional in that it is defined in terms of frequency, geographic location, and time. For a trade to occur, the needs of the buyer and seller must coincide across all three dimensions. In addition, existing commercial users of spectrum have very little incentive to sell excess or unused spectrum if the buyer will use its acquired spectrum to provide a service that is currently provided by the seller.<sup>3</sup> Consequently, the number of participants in a spectrum market may be very low. Such market "thinness" decreases the likelihood that a trade will take place. If a trade is conducted, it may occur at a price that is substantially higher (lower) than the buyer (seller) desired. Both outcomes create a "liquidity risk" for market participants. High liquidity risk may discourage market participation and, in so doing, may reinforce a market's illiquidity. A "thin" spectrum market may prevent current and prospective spectrum users from receiving the price signals they need in order to make decisions on how best to allocate their resources. However, policymakers can increase market liquidity by adopting policies that create the opportunity for and enhance the willingness of spectrum users to conduct a trade. In addition, market mechanisms vary in their ability to minimize problems associated with market thinness. The adoption of the wrong mechanism may make the development of a liquid secondary market for the trading of radio spectrum problematic.

## **2. Encourage government spectrum user participation**

Because of the large number of spectrum assignments they hold and their evolving spectrum needs, government users of radio spectrum represent an important potential source of market liquidity. To create the proper incentives, government spectrum users must be able to retain the revenue generated from completing a sale. In addition, they must be required to pay for the spectrum they acquire from other users.<sup>4</sup> Permitting government users to participate in a spectrum market would have the added benefit of lessening the incentive they have, given current spectrum management procedures, to misrepresent their spectrum needs and requirements. Their incentive to misrepresent such requirements can be demonstrated through a simple example. Suppose the

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<sup>3</sup> For purposes of this discussion the terms "excess" or "unused" refer to spectrum from which society would obtain more value if it was in the hands of a different user.

<sup>4</sup> An alternative framework for achieving the efficient allocation of spectrum between government and commercial spectrum users is contained in the [Strom Thurmond National Defense Authorization Act for Fiscal Year 1999](#) ("Strom Thurmond"). See [Strom Thurmond National Defense Authorization Act for Fiscal Year 1999](#) Section 1064(c)(3)(B), 47 U.S.C. Section 923(g)(1) (1999). This act requires private entities to reimburse federal spectrum users for the cost of relocating or for implementing system modifications arising from a spectrum reallocation. This framework is substantially different from one in which government spectrum users are provided the opportunity to trade their spectrum with commercial users via a secondary market. For example, Strom Thurmond relies on existing administrative processes to determine the amount and type of spectrum that is reallocated for commercial use. Under a secondary market approach, the type and amount of spectrum reallocated for commercial use would depend on the willingness of federal users to trade their spectrum in exchange for a known financial payment.

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