

The Secondary Spectrum Market: A Licensing & Leasing Primer

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Secondary Market Licensing & Leasing Primer

Scope and Purpose

This paper will describe how the Federal Communications Commission (FCC), the government agency tasked with managing commercial spectrum, licenses entities to use spectrum. A review how licenses are 'traded' today on the secondary market and the limitations of the current secondary market system follows. And finally, we will describe how a real time spectrum marketplace with a supporting ecosystem within the wireless value chain can dramatically improve the utility and revenue that can be derived from this important national spectrum asset.

Background

Spectrum is a term that describes the range of electromagnetic communications frequencies. In the context of wireless communications, the most desirable spectrum is located between 300MHz and 6 GHz. This is primarily due to the favorable radio propagation properties in this frequency range. AM and FM radio stations operate at frequencies lower than 300MHz, and various point-to-point and satellite technologies operate as high as 60GHz. Only frequencies typically associated with cellular telephone, two way radios and WiFi like devices will be discussed here.

All spectrum in the US is owned by the Federal government. Some spectrum is owned by government agencies such as the Department of Defense (DoD) and Aviation Agency (FAA). Other spectrum is leased to commercial entities, typically as long term leases that span many years.

Once an entity has acquired a license from the government, it is relatively easy to renew it as long as the holder can show they have provided substantial service during its past license term. "Substantial" service is defined as: "service which is sound, favorable, and substantially above a level of mediocre service."

In the early days of radio and wireless communications, licenses were typically issued to broadcast entities, such as radio and TV stations. Today, licenses are typically auctioned to the highest bidder. Because spectrum licenses are perceived as valuable commodities, they are rarely given up and Federal rules make reclaiming spectrum difficult. The result is that most of the useful wireless spectrum in the US (and worldwide) has been claimed by some entity.

With the conclusion of the 700 MHz auction in early 2008, all desirable spectrum for commercial mobile broadband applications will have been allocated or auctioned in the US. However, industry and government studies have shown that as much as 90% of this spectrum is not utilized at any given time and place. This results in the perception of spectrum scarcity, while in fact there is sufficient, underutilized spectrum available to serve most needs.

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Spectrum licensing

The Federal government, in conjunction with international standards bodies and treaties allocates spectrum to various government agencies including the DoD, FAA and Federal Communications Commission (FCC). The FCC awards a spectrum license to a commercial entity either by fiat or through a competitive auction process where interested parties bid against each other. The winning bidder is then known as a “Commission Licensee”. The license, in the form of a lease from the FCC, will dictate specific terms of its use. These terms include the geographic coverage area, transmission characteristics and, and a set of service rules.

Service rules, described in the Code of Federal Regulations (CFR) Title 47, dictate the operating characteristics and applications that can be used under the terms of the license. These rules are typically known by a part number, e.g., Part 15, Part 27 or Part 90. Equipment manufacturers design and build equipment to meet these rules and obtain certification from the FCC. The License holder is free to buy any equipment that has been certified to operate under the applicable rules for their license.

Recycling Spectrum

Occasionally, the government will reallocate spectrum from one agency to another when it is in the public interest. In the same manner, the FCC will occasionally reclaim spectrum when it is deemed to be underutilized in its current specified use. In general, these changes are instigated by improvements in radio technology that allow more efficient use of the spectrum.

An excellent recent example of radio technology improvements “freeing-up” spectrum can be found in the migration of television broadcasting stations from analog to digital transmissions. Older analog transmissions required 6MHz of spectrum to broadcast one channel, while upgrading to the new digital transmission technology can broadcast that same channel using only 1MHz of spectrum.

While the licensee (spectrum holder) only gets a “right to use” lease to the spectrum, and not full ownership, the FCC has instituted secondary market rules that allow many licenses to be transferred and “re-leased” to a secondary entity, provided proper procedures are followed and proper documentation is provided to the Commission. This has allowed wireless licenses and applications, such as TV stations and cellular systems to be bought and sold on the open market. However, many spectrum holders do not sell or lease their unused spectrum on the secondary markets, even though it could be put to better use and generate revenues.

Idle spectrum

The reasons that a majority of spectrum is idle at any given time are based on a combination of factors related to the competitive licensing strategy. First is that spectrum auctions are a

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rare and cumbersome exercise. Therefore companies that are actively involved in the provision of wireless services routinely acquire all the spectrum they can afford when it becomes available. This is driven by the belief that they might need it at sometime in the future and the spectrum may not be available again at that time. This leads to a speculative market where wireless operators and investors purchase licenses with the expectation that in the future they will be able to sell it for more, regardless of whether they use it or not. Subsequently, large amounts of idle spectrum are held for profit or "just in case".

Second, spectrum that remains underutilized is the inflexibility of the current licensing system. As an example, a utility company that schedules meter readings overnight must buy a full spectrum license that covers its service area for 24 hours, 7 days a week, even though it only needs the spectrum for a couple of hours a night. In another example, a local service may only require spectrum to cover a few hundred square miles, but the smallest available license is for several thousand square miles. In other words, the granularity of individual spectrum licenses tends to be very large and not designed to support multiple services or operating entities.

Secondary markets

A "secondary market for spectrum" initiative was first introduced by the FCC in 2000 and further refined and expanded over the following years, culminating in a second Report and Order issued in 2004. The express goal of this initiative and rule making was to enable "spectrum to flow more freely among users and uses in response to economic demand." This was to be achieved by:

- Further defining spectrum holder and secondary spectrum user rights
- Enabling flexible use of spectrum across various dimensions (time, space and frequency)
- Reducing regulatory overhead and delay.

As part of this effort, the FCC defined and encouraged the practice of "Dynamic Spectrum Leasing." The principal mechanisms for achieving this are short-term or long-term de facto transfer and spectrum manager leases. In short, secondary market leases permit a license holder to temporarily allow a lessee to utilize the owners licensed spectrum pursuant to the overarching rules and regulations of the FCC (Service Rules).

It is important to note that the FCC also made it much easier for spectrum holders to effectively break up a spectrum license into smaller parts. In fact, the new rule making allows them to time share, partition and disaggregate a license along one or all of the time/area/frequency dimensions of the lease. This means that spectrum can be offered to secondary users for any length of time, time of day, size of coverage area, and frequency or number of channels up to the full capacity of the original license.

Market impediments

While all these incentives and capabilities have been in place since 2005, very little advantage has been taken of these new leasing and disaggregation rules. A number of reasons can

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rare has been taken of these new leasing and disaggregation rules. A number of reasons can be cited for this.

First, many license holders believe they will not get a big enough economic benefit from secondary markets to offset its perceived risk of “losing their spectrum”. In fact many believe that offering their unused spectrum on the secondary market will somehow devalue their spectrum or limit their options in how or when they can use it.

Second, today’s secondary leasing process still requires significant effort and understanding to complete a transaction. The process remains highly manual and the minimum cost is several hundred to thousands of dollars in legal and FCC filing fees which makes very small and short term leases uneconomic for business and enterprise users.

Finally the system is geared towards “spectrum experts,” which means small enterprises and new entrants cannot easily specify, find and compare spectrum in terms that they understand. Most users know they simply need bandwidth in a certain area and do not understand emission masks and complex service rules.

SpecEx.com: The Spectrum Bridge Solution

Spectrum Bridge describes the past leasing model as a “Wholesale” model. This term comes from the fact that most secondary market transactions are for entire spectrum licenses that cover thousands of square miles and last for a decade or more. These wholesale (i.e. entire) spectrum licenses come at a high price, ranging from millions to billions of dollars. This model works for a few major players with deep pockets and significant technical understanding of spectrum issues. However, the current state of secondary markets and lack of infrastructure makes it impractical for a true mass market of users to participate.

In addition to the cost issues, spectrum leasing can be daunting to potential users due to complex rules and regulations that are difficult to understand. Unless the secondary user has a wealth of wireless expertise in-house, it can be difficult to determine which spectrum can be used for a particular application. And because of the cost and complexity issues, secondary leases are typically inflexible and tend to be long-term in nature to justify the investment of time and capital.

Spectrum Bridge has leveraged the secondary market and disaggregation concepts enabled by the FCC to create a sophisticated, easy to use, on-line marketplace for secondary spectrum trading: SpecEx.com.

SpecEx.com is an online searchable database dedicated purely to available licensed spectrum. Providing a common platform, a fixed set of trading rules and standardized agreements, SpecEx.com makes leasing, purchasing and selling spectrum straight forward, transparent, and cost effective. Among other things, the site provides visitors:

- Access to real-time pricing on licensed spectrum
- Available licensed spectrum based on geography & license type
- An online platform to buy, sell and lease spectrum assets
- Research tools to help make informed business decision

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SpecEx.com's simple, secure, and collaborative solution enables anyone to instantly search through thousands of available licensees to find the right spectrum at the right price. Buyers and lessees are able to search for the spectrum they need by location, application, frequency, service rules or any combination thereof, then make an offer, buy or lease it immediately or participate in an auction. The SpecEx.com platform also enables them to file FCC applications.

SpecEx.com enables spectrum sellers to disaggregate unused and partially used spectrum and profitably offer them to retail users. The system can be used to create spectrum offerings that do not interfere with, or impact, current operations in adjacent spectrum, or hamper future operations or deployments.

Sellers can also research their holdings and market demographics and leverage custom spectrum valuation services and market data, including the SpecEx Spectrum Index, the market's only market indicator of the current and historical value of licensed spectrum to help determine their pricing strategy.

Industry professionals who utilize SpecEx.com span many markets and are focused on leveraging spectrum opportunities to advance their business. Equipment manufacturers, system integrators, consultants, regulatory attorneys, financial analysts, spectrum brokers, license holders and engineers have quickly made SpecEx the industry's leading destination for available licensed spectrum.

Solution summary

The SpecEx online marketplace provides a simple to use interface for spectrum holders and users for trading spectrum. It facilitates rapid transactions where entire spectrum licenses, or licenses that have been geographically partitioned, frequency disaggregated or offered on a time shared basis can be bought, sold and leased.

The Spectrum Bridge retail model reduces complexity, time, and cost associated with spectrum acquisition, expands finite spectrum resources to create more available and cost-effective spectrum choices, reduces spectrum waste and delivers a better ROI for buyers and sellers alike.