

**BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C.**

**FEB 9 2001**

**FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY**

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

**COMMENTS OF THE SDR FORUM**

The Software Defined Radio (“SDR”) Forum is an open, non-profit corporation dedicated to supporting the development and deployment of flexible, adaptable wireless systems based on SDR technology. SDR is a combination of hardware and software technologies that allow manufacturers and operators to develop and deploy wireless networks, base stations, and user terminals that can operate across a range of existing voice and data services, and can adapt to support new services as they are developed. The SDR Forum supports the creation of robust secondary markets,<sup>1</sup> and commends the Commission for issuing this *Notice*.<sup>2</sup>

**I. Necessary Elements of Spectrum Leasing**

The SDR Forum has identified four major conditions (in addition to a sufficiently flexible regulatory regime) that must exist in order for secondary markets to fill the role

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<sup>1</sup> “The Commission should allow an operator with underutilized spectrum to make blocks of spectrum easily available to other operators with unfulfilled demand.” *In re Inquiry Regarding Software Defined Radios, Comments of the SDR Forum* at 22, ET Docket No. 00-47 (June 14, 2000) (“NOI Comments”).  
<sup>2</sup> *Notice of Proposed Rulemaking*, FCC 00-402, WT Docket No. 00-230 (rel. Nov. 27, 2000) (hereinafter “Notice”).

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that the Commission envisions for them. These conditions are:

(1) a sufficient number of licensees that are willing to lease underutilized and/or undervalued spectrum;

(2) a demand for leased spectrum from potential or existing operators that do not otherwise have access to sufficient spectrum;

(3) a system of prior frequency coordination, grounded in existing arrangements but adapted to serve the more flexible environment that will necessarily follow when licensees are given increased latitude to lease their spectrum rights; and

(4) communications infrastructure and equipment that are capable of supporting secondary market mechanisms.

The creation of market-regulated spectrum leasing rights will be greatly assisted by development and implementation of technological improvements, including SDR. The development of secondary markets will raise some challenging technological issues.<sup>3</sup> Solution of these issues will require advanced technical capabilities of exactly the sort that are provided by SDR.

## **II. SDR Will Be Able to Help Make Secondary Markets Work**

The SDR Forum concurs with the Commission's position that the secondary markets initiative is linked to its other efforts, including the promotion of technically agile SDR equipment. It is true that much of SDR's commercial promise lies in the future, and that, particularly for the commercial radio services, network infrastructure advances must be developed and implemented before SDR can reach its full potential.

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<sup>3</sup> To take one prominent example, secondary markets are very likely to complicate the detection and alleviation of interference problems.

Nevertheless, as the Commission has noted, SDR technologies hold great promise for facilitating the development of unfettered secondary markets for spectrum.<sup>4</sup> The Forum looks forward to working with the Commission to bring the technological promise of SDR into marketplace reality.

SDR technology enables secondary market use of spectrum by allowing wireless systems to adapt flexibly to the frequency, modulation, bandwidth and power requirements of various service rules. In addition, it will facilitate the introduction of new technologies, such as smart-antenna technology. The potential cost savings associated with secondary markets include:

- Faster return on spectrum licensing costs;
- Reduced costs and delays associated with reallocation and licensing;
- Better use of infrastructure equipment, including extending the lifetimes of legacy systems; and
- Better bandwidth utilization, creating new capabilities for bandwidth on demand rather than rigid allocations.

SDR technology is expected to permit wireless systems to contain the flexibility needed to realize the benefits associated with secondary markets. Furthermore, SDR technology can, in time, enable exactly the sort of flexible, timely adjustments that will be necessary for a leased-spectrum market to thrive.

### **III. Comments on Specific Items in the *Notice***

**Underserved Rural Areas.**<sup>5</sup> The SDR Forum shares the Commission's concerns regarding localities where services are not fully deployed and spectrum is not put to its fullest use. Deployment of SDR technology may help to address this problem. For

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<sup>4</sup> See *Policy Statement, In re Principles for Promoting the Efficient Use of Spectrum by Encouraging the Development of Secondary Markets*, FCC 00-401, ¶ 37 (rel. Dec. 1, 2000).

<sup>5</sup> See Notice at ¶ 7.

example, if an SDR-based infrastructure is deployed in a rural area, it may be used to provide a multiplicity of services rather than requiring construction of a separate infrastructure for each use. By leveraging multiband, multimode, multi-service capabilities, SDR-based infrastructures will accelerate the introduction of advanced telecommunications services at lower cost in rural areas.

**Meeting the Three Goals For Secondary Markets.**<sup>6</sup> The Commission hopes secondary markets will encourage licensees to: (1) transfer spectrum rights to those who value the spectrum the most and who will use it most productively; (2) migrate to less congested frequencies; and (3) upgrade to more spectrum-efficient technologies as they become available.

SDR facilitates the achievement of these goals, which cannot be fully met unless incumbents are able efficiently and inexpensively to transition from one frequency band to another. As we noted in response to the *SDR Notice of Inquiry*, SDR technology can ease the migration of network operators and service providers to new technical standards and even to new frequency bands.<sup>7</sup> Specifically, SDR can facilitate transitions in various ways, among them: by bridging between air interfaces (*e.g.*, in public safety systems); by software download of items ranging from individual parameters to full protocol stacks; or by allowing operators to select and retrieve software modules from local storage.

**Responsibility for Compliance with Commission Policies and Rules.**<sup>8</sup> The SDR Forum concurs with the Commission's tentative conclusion that licensees should retain ultimate responsibility for rule compliance and frequency coordination. It also

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<sup>6</sup> See *id.* at ¶ 11.

<sup>7</sup> See NOI Comments at 19-20 (discussing ways in which SDR capabilities might have eased the Private Land Mobile Radio re-farming effort).

<sup>8</sup> See Notice at ¶ 27, *et seq.*

supports the Commission's view that licensees' ultimate responsibility should not relieve lessees of a corresponding responsibility for compliance with the Act and the Rules.

In addition, one aspect of secondary-market rule compliance has particular importance for SDR. If secondary-market leasing results in the sort of dynamic marketplace that the Commission envisions, then it is likely that radio equipment will be reconfigured in the field—to adapt to changing transmission standards, for example. For such changes, the SDR Forum urges the Commission to enact changes, such as the Class III Permissive Change procedures proposed in detail in the Commission's concurrent rulemaking on Software Defined Radio,<sup>9</sup> in order to facilitate rapid deployment of these new technologies.

**Interference Concerns.**<sup>10</sup> The Forum shares the FCC's concerns regarding the potential for increased interference, and urges the Commission to allow industry to continue to take responsibility for compliance with the respective service rules and not add regulations that may lack the flexibility needed to address particular cases. Moreover, further developments in SDR may enhance industry's ability to avoid leasing-related increases in interference. For example, should a wireless operator offer new services on leased spectrum, only to find that its transmissions unexpectedly cause adjacent-channel interference, SDR technology might resolve the problem by allowing an immediate change in the system's modulation and filtering characteristics. In short, it may be possible for SDR-enabled upgrades to alleviate the interference.

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<sup>9</sup> See *Notice of Proposed Rulemaking, In re Authorization and Use of Software Defined Radios*, ET Docket No. 00-47 (rel. Dec. 8, 2000), at ¶ 25 (“SDR NPRM”).

<sup>10</sup> See Notice at ¶ 37, *et seq.*

**Service Rules.**<sup>11</sup> The notion of using established bands for new purposes or with new technology is at the heart of SDR technology. The SDR Forum fully supports the proposal to expand appropriately the range of permissible uses within any given service and believes that this proposal will go a long way toward creating a functional, useful market for leased spectrum.

**Underserved Consumers.** Underserved consumers may be found anywhere. Rural and urban areas alike may find themselves spectrum-constrained, and may find relief if one operator is able to lease underutilized spectrum from another. SDR technology will be instrumental in enabling the marketplace to make such arrangements work.

### **Conclusion**

The Forum agrees completely with the FCC's goal of flexible, market-oriented policies and encourages the Commission to continue to seek opportunities to remove regulatory impediments and give the marketplace as free a hand as possible, regulating only where necessary. It is important that manufacturers and operators have as much information as possible regarding which bands are likely to be made available for leasing and to which service types.

SDR is one of the stimulating technologies that can help make secondary markets successful. We encourage the Commission to continue to focus its attention on the

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<sup>11</sup> See Notice at ¶ 90, *et seq.*

elimination of regulatory barriers to the development of secondary markets. The SDR Forum congratulates the FCC on its resolve to create functional secondary markets for spectrum and believes that this effort will prove worthwhile.

Respectfully submitted,

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