

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

In the Matter of)
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)
 Authorization and Use of) ET Docket No. 00-47
 Software Defined Radios)
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)

REPLY COMMENTS OF THE SDR FORUM

The first-round comments in this proceeding were uniformly supportive of software defined radio (“SDR”) technology, and optimistic about its prospects. These reply comments highlight the many areas of agreement while suggesting preferable outcomes for the few points that are disputed.

I. The Proposed Regulatory Definition of SDR Requires Modification

Although the alternative recommendations vary, most commenting parties have made clear that the proposed regulatory definition of “Software Defined Radio” requires additional work. The SDR Forum continues to share the Commission’s goal of a definition that is both simple and focused on the aspects of SDR that have regulatory significance.

Many parties share the Forum’s concern that the definition not be so broad as to result in the regulation of user applications and other software that might reside on an SDR platform, but that do not directly affect the radio’s operating parameters.¹ Cingular Wireless, for example, is justifiably concerned that the proposed definition could be read to include radios that merely use software to switch between different modes of operation that have different hardware-defined

¹ See Comments of AT&T Wireless Services, Inc. at 3-4; Comments of Clearwater Technologies, Inc. at 4-5; Comments of Intel Corp. at 6.

power or frequency parameters.² This distinction is also reflected in Vanu’s proposal that the Commission focus on the types of software that control the critical transmitter functions.³

Other parties have echoed the Forum’s concern that the limitation of “a change in software without making any hardware changes”⁴ could be misread to exclude certain SDR devices—*e.g.*, those in which software reconfigures preexisting hardware or firmware logic.⁵ We continue to urge the Commission to clarify that software changes that reconfigure a radio’s preexisting hardware or firmware are included in the regulatory definition of SDR. And we concur in the comments from HYPRES that have explained in detail why an SDR must be able to demonstrate the ability to accommodate software changes to all three parameters of frequency, modulation, and power.⁶

Finally, Motorola and HYPRES have proposed definitions that include particularly useful changes.⁷ Motorola’s proposed definition clarifies that “SDR” denotes a radio that can be modified after the radio has been deployed in the field,⁸ while both Motorola and HYPRES seek additional text to clarify that software-driven changes in hardware would not disqualify what is otherwise SDR-based equipment.⁹

² See Comments of Cingular Wireless LLC at 4.

³ See Comments of Vanu, Inc. at 5-8; Comments of Clearwater Technologies, Inc. at 4-5.

⁴ See *Notice of Proposed Rulemaking, In re Authorization and Use of Software Defined Radios*, rel. Dec. 8, 2000, FCC 00-430, ET Docket No. 00-47 (hereinafter “Notice”), at ¶ 21.

⁵ See, *e.g.*, Comments of AirNet Communications at 3.

⁶ See Comments of HYPRES, Inc. at 7-8.

⁷ Motorola has also proposed a regulatory definition of “SDR technology.” Comments of Motorola at 5. The SDR Forum does not support the adoption of such a definition at this time.

⁸ See Comments of Motorola at 5-6.

⁹ See *id.*; Comments of HYPRES, Inc. at 8.

Having considered the range of comments on this crucial question, the SDR Forum proposes that the following text be adopted as the regulatory definition of a Software Defined Radio:

A software defined radio is a radio that includes a transmitter in which the transmitter operating parameters of frequency range, modulation type, and maximum output power can be altered *in the field* by making a change in software *without replacing hardware*.¹⁰

The SDR Forum believes that this definition best balances the competing interests of simplicity and certainty, and fairly reflects the concerns of the commenting parties.

II. The Comments Uniformly Support the “Class III” Proposal

The SDR Forum is encouraged to note near-universal support among commenting parties for the “Class III” streamlined-approval process. We also note significant support for the three Forum-suggested changes to the Class III mechanism:

- The Commission should not bar third parties from filing for “Class III” changes; original equipment manufacturers may very well decide not to open their platforms to such software, but that decision should be made in the marketplace rather than the regulations;¹¹
- The Commission should modify the text of 47 C.F.R. § 2.1043(b)(3) to apply to software modifications that “change” the radio’s frequency, modulation type, or power (including field strength);¹² and
- “Class III” applications need not be limited to one-time, software-only changes to equipment with pristine hardware.¹³

¹⁰ The highlighted text indicates additions to the definition proposed in the SDR Forum’s initial comments on this rulemaking.

¹¹ See, e.g., Comments of Intel Corp. at 3-5, 7-9; Comments of Elite Electronic Engineering at 2.

¹² See, e.g., NTIA Comments at 10.

¹³ See, e.g., Comments of Motorola at 9-10; Comments of Nortel Networks at 6.

The disagreements, on the other hand, are few but significant. For example, the SDR Forum strongly supports allowing telecommunications certification bodies (“TCB”s) to certify SDR equipment, eventually moving to manufacturer Declarations of Conformity as the Commission gains familiarity with SDR equipment. But NTIA suggests an absolute ban on TCB certifications for two years, while AT&T Wireless Services argues for an “indefinite” ban on TCBS.¹⁴ Both these parties misinterpret the FCC’s position, which is to restrict TCBS from certifying SDR equipment until such time as the Commission is comfortable with their involvement. Six months is simply a marker for reassessment,¹⁵ and the Commission clearly has reserved the right to extend the moratorium if need be. No change is warranted in this provision.

Similarly, NTIA is apparently alone in seeking full recertification after *every* Class III change.¹⁶ Contrary to NTIA’s representations, neither the SDR Forum nor Motorola has ever supported such a sweeping and cumbersome requirement. NTIA cites page 17 of the SDR Forum’s reply comments in the SDR *Notice of Inquiry* in support of this position, but those reply comments were seven pages long and in no way supported such an assertion. The Motorola *NOI* comments, also cited by NTIA, clearly distinguish between “minor” changes, such as are appropriate for a Class III procedure, and “significant” changes, such as would require a new certification. NTIA’s proposal for recertification following every permissive change is at odds with every other commenting party, unsupported in the record, and should be rejected.

¹⁴ See NTIA Comments at 6; Comments of AT&T Wireless Services at 6.

¹⁵ See Notice at ¶ 33 (proposing that TCBS not be permitted to certify SDR equipment or approve Class III changes “for *at least* six months after the effective date of final rules adopted in this proceeding”) (emphasis added).

¹⁶ See NTIA Comments at 4.

III. The Commission Should Adopt Electronic Labeling

The SDR Forum concurs with the overwhelming majority of commenters who support allowing the FCC identification number to be displayed electronically.¹⁷ As we have said repeatedly,¹⁸ this display mechanism will avoid the need for expensive and inefficient physical re-labeling without compromising the abilities of FCC enforcement personnel and others to verify the equipment's authorization.

IV. The Notice Rightly Proposes Not to Pre-empt Industry Efforts to Safeguard SDR Software

The SDR Forum recognizes that government regulators and all radio-spectrum users—whether in the public-safety, commercial, or any other service—have a common interest in preventing the unauthorized operation of SDR equipment.¹⁹ Forum members take such concerns very seriously, which is why so many member organizations not only are hard at work on authentication and security issues, they are also taking great pains to keep the Commission informed of their progress and goals.²⁰ The Commission is on the right track in encouraging these industry efforts, and they should not be preempted by inflexible and possibly counterproductive regulatory requirements that even NTIA opposes.²¹

Industry efforts to safeguard SDR are building on known technologies that have been proven to work in other sensitive environments. For example, the highest security level—“Not

¹⁷ See, e.g., Comments of AirNet Communications at 5.

¹⁸ See, e.g., SDR Forum Reply Comments at 5, *Notice of Inquiry, In re Inquiry Regarding Software Defined Radios*, rel. Mar. 21, 2000, FCC 00-103, ET Docket No. 00-47.

¹⁹ See, e.g., Comments of API at 5-9.

²⁰ See Comments of Motorola at 18-33; Comments of HYPRES, Inc. at 8-13; Comments of Intel Corp. at 9-10; Comments of Vanu, Inc. at 10-13.

²¹ See NTIA Comments at 5-6; see also Comments of Intel at 9-10; Comments of Nortel Networks at 8.

Feasible”²²—that is used today for highly sensitive information such as credit-card numbers, could be adapted for use in securing RF-related software downloads. The Commission can and should gain confidence in SDR’s security by monitoring these developments, rather than imposing regulatory strictures that could stifle the innovation that will make SDR as secure as possible. The competitive pressures of the marketplace will continue to provide manufacturers with the most powerful incentives to ensure that their equipment is compliant and secure.

V. “Rule-Based” Systems for Agile Frequency Selection Represent SDR’s Future Promise

The SDR Forum continues to believe that the Commission’s conclusions regarding cognitive-radio capabilities are on track; this technology is simply not likely to be introduced into commercial services in the near future. Regulatory consideration of these capabilities is thus premature.²³

VI. No Need Exists for SDR-Specific Enhanced Enforcement Capabilities

SDR simply does not call for enhanced enforcement capabilities. Moreover, the comments of parties that favor new enforcement mechanisms make clear the difficulties that those mechanisms will create. For example, AT&T Wireless Services argues for the imposition of fines against manufacturers who “negligently” market SDR equipment with “poorly designed” security features that can be “easily bypassed.”²⁴ If the Commission is nevertheless inclined to

²² See Comments of Motorola at 25-28; Comments of the SDR Forum at 11-14.

²³ See Comments of Cingular Wireless at 10.

²⁴ See Comments of AT&T Wireless Services at 4.

adopt this type of enforcement measure, it should ensure that a well-defined safe harbor exists for manufacturers that follow security and authentication procedures that are generally accepted by industry.

CONCLUSION

The SDR Forum enthusiastically supports the adoption of a regulatory definition for “SDR,” a Class III permissive-change procedure, and electronic-labeling. At the same time, these proposals could be improved at the margins. Specifically, the Commission should:

- clarify that the regulatory definition of “SDR” does not require regulation of software that resides on an SDR platform but that does not affect the radio’s operating parameters;
- clarify that the regulatory definition of “SDR” does not exclude radios in which new software reconfigures preexisting hardware or firmware logic;
- revise the regulatory definition of SDR to make clear that a software defined radio is one that can accommodate changes to all of the three relevant RF parameters; and
- revise 47 C.F.R. § 2.1043(b)(3) so that Class III changes are defined as software modifications that change one or more of the radio’s operating parameters.

In every other respect, this proceeding remains on the right track. No need exists for the Commission to mandate security procedures or enhanced enforcement capabilities, and the Commission rightly recognizes that spectrum-management or “rule-based” SDR regulations would be premature.

We look forward to continuing to work with the Commission as SDR technology matures, and the need for regulatory reform increases accordingly.

Respectfully submitted,

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