

Before the  
**Federal Communications Commission**  
Washington DC 20554

In the Matter of	)	
	)	
Amendment of the Commission's Rules	)	
Regarding Dedicated Short-Range	)	WT Docket No. 01-90
Communication Services in the	)	
5.850-5.925 GHz Band (5.9 GHz Band)	)	
	)	
Amendment of Parts 2 and 90 of the	)	
Commission's Rules to Allocate the	)	ET Docket No. 98-95
5.850-5.925 GHz Band to the Mobile Service	)	RM-9096
for Dedicated Short Range Communications	)	
of Intelligent Transportation Services	)	

**COMMENTS OF INTERSIL CORPORATION**

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**COMMENTS OF INTERSIL CORPORATION**

Intersil Corporation comments on the above-captioned Notice of Proposed Rulemaking and Order concerning Dedicated Short-Range Communication Services (DSRC).<sup>1</sup> Intersil is a manufacturer of complete wireless chipsets, with worldwide sales in 2002 of 22-24 million radios (most sold in the U.S.), expected to double in 2003. Intersil expects to participate in the market for DSRC devices.

**A. Summary**

DSRC is a highly promising technology that offers substantial benefits to the public. Intersil is interested in contributing to that promise. We make these specific suggestions to help maximize DSRC's success.

Intersil urges the Commission to define DSRC so as to admit the broadest range of applications, limited only by the general scope of intelligent transportation services. Early forms

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<sup>1</sup> *Dedicated Short-Range Communication Services in the 5.850-5.925 GHz Band*, 17 FCC Rcd 23136 (2002) (Notice).

of DSRC have been a great success, but specific future services remain unknown. The Commission should avoid closing off possibilities unnecessarily. If the Commission wishes to exclude particular services, such as Commercial Mobile Radio Service, it should do so simply by naming them, as more general limiting language may also eliminate valid applications.

Intersil likewise opposes limitations on eligibility. There can be no eligibility restrictions for on-board units, which will be operated by consumers. Road-side units might, at most, be limited to Part 90 eligibles.

Opening DSRC to broad applications and eligibility will directly benefit the core users in public safety. As radios shift increasingly to silicon, their development costs go up and the per-unit production costs go down. This makes the ultimate price tag highly dependent on the number of radios sold. A radio made for use in only a limited market, such as public safety, will tend to be expensive. Expanding the market to include commercial and other users brings down the cost for all, including public safety agencies. The technical rules provide for a high level of frequency re-use, so that one class of users will not crowd out another.

Intersil urges the Commission to adopt the ASTM E2213-02 standard for DSRC. This will set a high degree of technical compatibility in the band, and thus help to control interference. Moreover, by establishing interoperability at the MAC and PHY layers, the standard offers manufacturers an incentive to produce radios in sufficient quantity to keep down end users' equipment costs.

Intersil strongly opposes auctioning geographic licenses, as doing so will only add an extra layer of obstacles to deployment. Instead, for RSUs, we suggest license by rule, subject to prior coordination using an automated website. This arrangement maintains the advantages of

site-by-site licensing, without involving the Commission in day-to-day administration. OBUs should be regulated as unlicensed devices under Part 15.

Finally, to help expand the range of available applications, the Commission should increase permitted output power, while leaving maximum EIRP unchanged.

**B. The Commission Should Adopt a Broad Definition and Flexible Eligibility Standards for DSRC.**

The Commission seeks comment on whether the current definition of DSRC is still appropriate in light of the broad range of DSRC-based Intelligent Transportation System (ITS) applications envisioned by the ITS community.<sup>2</sup> The Commission asks specifically whether the present limitation to data would exclude the video and audio components of planned applications,<sup>3</sup> and whether the limitation to "non-voice" would exclude audio warnings to drivers.<sup>4</sup>

Intersil urges the Commission to draft the widest possible definition consistent with DSRC's basic mission, rather than adopt language that could inadvertently exclude useful applications not yet imagined. Voice, video, audio, etc, will all be transmitted in the form of data. It makes little sense to pick and choose among types of data depending on the medium they encode. We advocate omitting such distinctions.

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<sup>2</sup> Notice at paras. 14-16. The present definition reads: "The use of non-voice radio techniques to transfer data over short distances between roadside and mobile radio units, between mobile units, and between mobile and portable units to perform operations related to the improvement of traffic flow, traffic safety, and other intelligent transportation service applications in a variety of public and commercial environments. DSRC systems may also transmit status and instructional messages related to the units involved." 47 C.F.R. Sec. 90.7.

<sup>3</sup> Notice at para. 14.

<sup>4</sup> Notice at para. 15.

The Commission also asks whether the phrase "in a variety of public and *commercial* environments" should be replaced with "in a variety of public and *private* environments," or simply "in a variety of environments."<sup>5</sup> Parties objecting to the word "commercial" apparently fear it would open the band to services similar to Commercial Mobile Radio Service (CMRS), such as wireless telephone or paging.<sup>6</sup>

We believe the best way to prevent an unwanted use, such as CMRS, is simply to prohibit that use, rather than adopt ambiguous language that might later be misconstrued. With that prohibition in place, the "environment" language becomes redundant, and precise definitions of "public safety," "private services," etc. become unnecessary.<sup>7</sup>

Accordingly, Intersil supports amending the current definition as follows:

The use of ~~non-voice~~ digital radio techniques to transfer ~~data~~ information of any kind over short distances between roadside and mobile radio units, between mobile units, and between mobile and portable units to perform

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<sup>5</sup> Notice at para. 16.

<sup>6</sup> The Commission defines CMRS as

A mobile service that is:

(a)(1) provided for profit, *i.e.*, with the intent of receiving compensation or monetary gain;

(2) An interconnected service; and

(3) Available to the public, or to such classes of eligible users as to be effectively available to a substantial portion of the public; or

(b) The functional equivalent of such a mobile service described in paragraph (a) of this section.

47 C.F.R. Sec. 20.3.

<sup>7</sup> See Notice at paras. 19 & 23.

operations related to the improvement of traffic flow, traffic safety, and other intelligent transportation service applications ~~in a variety of public and commercial environments~~. DSRC systems may also transmit status and instructional messages related to the units involved, but may not provide Commercial Mobile Radio Service.

Questions in the Notice on eligibility raise similar issues. Again, because it is difficult to predict what applications might ultimately emerge, Intersil opposes any limitation on eligibility. At most, if Commission finds it necessary to exclude consumers from operating road-side units (RSUs), it could limit RSU eligibility to Part 90 eligibles. There can be no such restriction on on-board units (OBUs), which will be operated by ordinary motorists.

Additional limitations on eligibility are neither necessary nor desirable. They are unnecessary because the low power limits for DSRC will result in short operating ranges, which provide for a high level of frequency re-use and accommodate large number of users. There is no need for eligibility restrictions to avoid crowding in the band. And limitations on eligibility are undesirable because a broad range of users and applications will speed the development and deployment of inexpensive equipment. A service restricted to public safety, and perhaps limited private use, can attract only limited investment for hardware design and manufacture.

As radios become increasingly embedded in digital silicon, development costs increase, while per-unit costs go down. This trend has made mass-market devices inexpensive, while raising the prices on equipment of limited applicability. Opening the band to diverse applications and users will directly benefit public safety users by spreading the development costs, and hence providing a greater variety of equipment at lower prices. For example, police departments routinely purchase laptop computers for a few hundred dollars; but if laptops were made only for

the police, they would be far more expensive -- if indeed they were available at all. Similarly, widespread use of DSRC will reduce costs for the most critical applications.

**C. The Commission Should Facilitate Interoperability by Adopting the ASTM E2213-02 Standard.**

The Notice asks whether the rules should require DSRC equipment to be interoperable, and if so, whether interoperability should extend only to public safety, or to all applications.<sup>8</sup>

This question arises in part because the present definition of interoperability applies only to public safety and public service systems.<sup>9</sup>

Considering the large number of potential DSRC applications, it is unlikely they can all be interoperable, at least at the application layer. Separately, Intersil respects the Commission's general reluctance to impose specific technical standards.<sup>10</sup> In most cases, we agree, that is a wise exercise of discretion. But this is not such a case. It is important to provide for coexistence without interference, especially with different services expected to operate in close proximity. And that requires a common specification for the MAC and PHY layers. After careful study, Intersil believes the ASTM E2213-02 standard is best suited to accomplishing that purpose, and urges the Commission to incorporate it by reference in the rules.

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<sup>8</sup> Notice at para. 31.

<sup>9</sup> "Interoperability. An essential communication link within public safety and public service wireless communications systems which permits units from two or more different entities to interact with one another and to exchange information according to a prescribed method in order to achieve predictable results." 47 C.F.R. Sec. 90.7.

<sup>10</sup> Notice at para. 32.

The primary stakeholders in the ITS industry are in unanimous agreement that the ASTM standard is the best choice for the DSRC band.<sup>11</sup> That decision was not reached quickly or easily. The committee went through a long selection process -- first to select 802.11 as the basis for DSRC standards, and then to arrive at ASTM E2213-02. (ASTM is now considering moving E2213 into the IEEE 802.11 body of standards.) The committee studied extensive simulations and tests to ensure that the standard has the appropriate technical characteristics and performance needed for DSRC applications. The Commission can adopt the standard with full confidence in its technical support.

Exclusive adoption of the ASTM standard will encourage manufacturers to tool up for volume production, and thus reduce equipment costs to end users. Experience in the spread spectrum bands is instructive in this regard.<sup>12</sup> Although the Commission first authorized spread spectrum in 1985,<sup>13</sup> and industrial applications had appeared by the mid-1990s,<sup>14</sup> the major explosion did not occur until just a few years ago. That recent growth is due in large part to the establishment of the IEEE 802.11b standard, popularized as "Wi-Fi," and the later spread of Bluetooth. The acceptance of Wi-Fi by businesses and consumers alike fueled large sales volumes and resulting competition, which have reduced equipment prices by a large fraction over just a few years. To be sure, Wi-Fi was chosen by the market, not the Commission. Yet it took

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<sup>11</sup> Notice at para. 34.

<sup>12</sup> See 47 C.F.R. Sec. 15.247. The Commission also permits other modulations in these bands.

<sup>13</sup> *Spread Spectrum and Other Wideband Emissions*, 101 F.C.C.2d 419 (1985).

<sup>14</sup> *Allocation of Spectrum Below 5 GHz*, 10 FCC Rcd 4769, 4786 (1995) (listing power utility applications, video conferencing, health care, pipeline monitoring, traffic light control, etc.)

fifteen years from the authorization of spread spectrum for industry and the public to develop the Wi-Fi standard and deploy it to the point where products became easily affordable.<sup>15</sup> The Commission can greatly accelerate the same outcome for DSRC by incorporating the ASTM standard into its rules.

Over the long term, a multiplicity of standards will only fragment the market. That increases the risk for a manufacturer, which must try to guess which standards will survive. That translates into fewer choices in the marketplace as manufacturers minimize their exposure. In the short term, non-compliant devices risk causing excess interference into those that comply. Overall, standardization of the MAC and PHY layers on ASTM E2213-02 will help to assure a manufacturer that its new products can coexist -- and in some cases, interoperate -- with those already in the field. That will encourage rapid manufacture in high quantities, with consequent lower prices for all users.

Some may fear that an FCC-mandated standard will freeze a technology into eventual obsolescence. That concern is groundless. Modern technical standards evolve along with the underlying technology. As one prominent example, the 802.11 standards have gained enhancements and extensions, and spun off related standards, in direct response to new technological capabilities. Indeed, because ASTM E2213-02 is based on 802.11, we expect the continuing enhancements in 802.11 to result in improvements to ASTM as well.

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<sup>15</sup> On the other hand, it is unclear whether the Commission's rules as interpreted before 1995 would have permitted certification of an IEEE 802.11b device. *See Guidance on Measurements for Direct Sequence Spread Spectrum Systems*, Public Notice No. 54797 (released July 12, 1995).

With a technical standard in place, a specific definition of "interoperability" becomes unimportant. Details in the standards provide a more precise and useful definition than any rule language could. Intersil suggests the Commission adopt the ASTM E2213-02 standard and exclude DSRC from the existing definition of interoperability.

**Channelization.** Intersil supports the channelization plan set out in ASTM E2213-02.<sup>16</sup> The plan is well thought out, and will meet the needs of a wide range of DSRC users.

**D. The Commission Should Adopt Frequency-Coordinated Licensing by Rule for RSUs, and Unlicensed Operation for OBUs.**

Intersil strongly opposes geographic licensing for DSRC.<sup>17</sup> Putting this valuable spectrum into a few hands would only stifle growth of the service. Geographic licensing works best when the character of the service and its facilities naturally favor a small class of providers, as in the case of PCS. But when a service attracts large numbers of operators, as will likely be the case with DSRC, requiring them to buy spectrum rights from licensees only adds an unneeded layer of obstacles to deployment.

Moreover, geographic licensing presupposes auctioning the spectrum. But the Communications Act authorizes auctions only for mutually exclusive applications.<sup>18</sup> Because DSRC users will often be able to share spectrum, and any remaining conflicts can be resolved through automated frequency coordination (described below), mutually exclusive applications need not arise. The statutory trigger for auctions would fail.

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<sup>16</sup> Notice at paras. 35-39. Note the minor typographical error at para. 37: the reference to 200 microseconds should be 200 *milliseconds*.

<sup>17</sup> Notice at paras. 48-49.

<sup>18</sup> 47 U.S.C. Sec. 309(j)(1).

We acknowledge the Commission's concern about the administrative burdens of licensing RSUs individually.<sup>19</sup> An effective way to address those concerns would be adaptation of the mechanism proposed by the Fixed Wireless Communications Coalition for the millimeter-wave bands: *frequency-coordinated licensing by rule*.<sup>20</sup> Using a commercially-operated private website, an RSU applicant would enter the proposed station data (coordinates or area of operation, power, center frequency, bandwidth, etc.), together with a fee payment to cover the costs of coordination. The website software and its associated database, which contains all earlier-coordinated stations, would either clear the requested station immediately, or else email the data automatically to potentially affected users, who would have a short time in which to object. (Users can be invited to delegate approval decisions to the website operator, which would speed coordination even more.) Once coordination is complete, the applicant can begin transmission immediately under a license-by-rule regime. Individual sites would not be licensed; users would not have a call sign; and the Commission would keep no record of the station data. In lieu of license renewal, we suggest a requirement that the coordinator contact each user periodically by automatic email to seek confirmation that the station is still operating. Users that do not respond, after follow-ups, would have their stations dropped from the coordination database.

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<sup>19</sup> Notice at para. 46.

<sup>20</sup> See Comments of the Fixed Wireless Communications Coalition in *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, WT Docket No. 02-146 at 11-12 (filed Dec. 18, 2002). We take up below the legality of licensing by rule.

Intersil believe such an arrangement would preserve the advantages of site-by-site licensing, while automating much of the administrative overhead and shifting what remains to the private sector.

This form of licensing also eliminates the legal problems that could arise if public safety licensees were to operate in auctioned spectrum. The Commission is barred by statute from auctioning licenses for public safety services.<sup>21</sup> But having licenses who paid for their spectrum sharing with those who did not will inevitably raise questions of equity. Holders of auctioned licenses often argue that their expenditures entitle them to a degree of exclusivity.<sup>22</sup> Although the courts have rejected the general form of this argument,<sup>23</sup> a plan that requires sharing between auctioned and public safety licenses appears to be a recipe for controversy.

This approach also eliminates questions about the need to subdivide the spectrum for licensing purposes.<sup>24</sup> Allowing any user access to any part of the spectrum (subject to frequency coordination, if needed) maximizes flexibility and spectrum efficiency.

As for OBUs, their low power and large numbers seem well suited to either license by rule or unlicensed operation under Part 15.<sup>25</sup> The Commission states that licensing by rule is limited to the Citizens Band Radio Service (CB) or the Radio Control Service (RC) (and two

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<sup>21</sup> 47 U.S.C. Sec. 309(j)(2)(A).

<sup>22</sup> See, e.g., comments of various incumbent PCS licensees in ET Docket No. 98-153, *Ultra-Wideband Transmission Systems*.

<sup>23</sup> *AT&T Wireless Services, Inc. v. FCC*, 270 F.3d 959, 964 (D.C. Cir. 2001) ("AirCell" case).

<sup>24</sup> Notice at para. 39 (questioning whether to license DSRC spectrum as one block or more).

<sup>25</sup> Notice at para. 53.

other services not relevant here).<sup>26</sup> On that basis the Commission assumes that OBUs not associated with a fixed system must fit into one category or the other to be licensed by rule.<sup>27</sup>

We respectfully dispute the premise that only CB and RC can be licensed by rule. True, Section 301 of the Communications Act generally requires transmitters to be licensed;<sup>28</sup> and Section 307(e) enumerates four categories that can be licensed by rule: CB, RC, and two others.<sup>29</sup> The Commission apparently takes this list to be exhaustive. But Intersil sees convincing legal arguments that the Commission can expand the list of services licensed by rule. This question was not squarely raised in the Notice. If the Commission sees value in licensing RSUs or OBUs by rule, and has doubts about the legality of doing so, we ask that it issue a public notice seeking comment on the question. Intersil will be pleased to provide a detailed legal analysis.

In any event, whether licensed or not, any OBU must be allowed to communicate with any RSU and any other OBU. Indeed, we foresee a category of OBUs not related to any RSU. While the operator of a particular RSU may choose not to respond to communications from non-affiliated OBUs, that should be the operator's choice, not one imposed by the Commission.

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<sup>26</sup> Notice at para. 54.

<sup>27</sup> Notice at para. 54.

<sup>28</sup> 47 U.S.C. Sec. 301.

<sup>29</sup> 47 U.S.C. Sec. 307(e).

**E. The Commission Should Adopt the Mark IV Proposal for Power and EIRP Limits.**

Intersil supports the changes to the technical rules recommended by Mark IV.<sup>30</sup>

The present rules limit output power to 750 mW (28.8 dBm) and EIRP to 30 watts.<sup>31</sup>

Mark IV proposes raising the maximum output power to 4 watts (36 dBm), while leaving the maximum EIRP unchanged at 30 watts.<sup>32</sup> The amendment will allow the 30 watt signal to be achieved with a less directional antenna (approx. 8 dBi vs. 16 dBi), and hence to cover a wider range of azimuths.

Many applications will need omnidirectional or low-gain antennas, which must be able to use enough power to achieve the required range and coverage area. In practice, we are confident that most devices produced in high volume for end users will use far lower power, in order to keep costs down. As one analogy, spread spectrum and digital modulation devices are allowed a maximum peak output power of one watt,<sup>33</sup> yet the vast majority of devices on the market operate at only a few tens of milliwatts. We think a similar distribution will appear for DSRC devices. But the rules should not arbitrarily preclude the higher output power for those applications that need it.

**CONCLUSION**

Intersil favors authorizing DSRC to the greatest number of users for the greatest variety of purposes. This approach will not only make best use of the spectrum, but will dramatically

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<sup>30</sup> Notice at para. 68.

<sup>31</sup> 47 C.F.R. Sec. 90.2305(m).

<sup>32</sup> Notice at para. 68.

<sup>33</sup> 47 C.F.R. Sec. 15.247(b).

reduce equipment costs for public safety and other critical users of the service. The only constraint we favor is incorporation of the ASTM E2213-02 standard for the MAC and PHY layers, to minimize interference and maximize interoperability. Consistent with our support for broad use, we favor a simple, flexible licensing scheme that gets users on the air with minimum cost and delay.

The public needs DSRC services. We urge the Commission to adopt rules as soon as possible.

Respectfully submitted,

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