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Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

In the Matter of	)	
	)	
Amendment of the Commission's	)	
Rules to Add Intelligent	)	
Transportation Services As a New	)	RM-9096
Mobile Service With Co-Primary	)	
Status at 5.850 to 5.925 GHz	)	

COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

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July 28, 1997

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## SUMMARY

The American Radio Relay League, Incorporated (the League), the national association of amateur radio operators in the United States, submits its comments in response to the Petition for Rule Making (the Petition) filed May 19, 1997 by the Intelligent Transportation Society of America (ITS America). The Petition seeks to create a frequency allocation and service rules to permit the operation of Dedicated Short Range Communication (DSRC) systems as part of the Intelligent Transportation System (ITS) architecture in the United States. ITS America anticipates the creation of a co-primary allocation of the 5.850-5.925 GHz band for DSRC, a new mobile service. DSRC functions are part of planned extensive ITS infrastructure, and consist of user services that require a short-range, wireless communications link between, generally, vehicles that travel at highway speeds and roadside systems.

The League takes no issue with the rather expansive public interest justification, contained in the ITS America Petition, for implementation of DSRC systems in some band. The League's concern at the present time, however, is that the compatibility between amateur uses of the band on a secondary basis, and the operation of co-primary ITS DSRC facilities in the same band, is as yet unexplored and unknown. By virtue of (1) the proposed Part 90 status, and (2) the applications planned for these devices, some of which have public safety implications, it would appear that "interference-free" operation is both anticipated and necessary.

The League's review of the Petition does not lead to the conclusion that alternatives to the 5.850-5.925 GHz segment have been adequately explored. Furthermore, it appears that ITS America's choice of frequency bands is inconsistent with the bands used for systems being developed in Europe and Asia.

The League urgently requests that, in any rulemaking proceeding based on the ITS America Petition, the Commission propose *at the same time* the amendment of the Table of Allocations domestically to make the Amateur Service and the Amateur-Satellite Service primary at 5.825-5.850 GHz (subject only to received interference from ISM devices operating under Part 18). Furthermore, the League requests that the Commission modify the Amateur and Amateur-Satellite allocation at 5.650-5.725 GHz to primary status. These actions are necessary to accommodate the reduction in utility that will result as a practical matter from the Unlicensed National Information Infrastructure (U-NII) authorization at 5.725-5.825 GHz and the proposed DSRC uses in the 5 GHz band, notwithstanding the retention of the amateur secondary allocations at 5.725-5.825 GHz and 5.850-5.975 GHz.

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**COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED**

The American Radio Relay League, Incorporated (the League), the national association of amateur radio operators in the United States, by counsel and pursuant to Section 1.415 of the Commission's Rules, hereby respectfully submits its comments in response to the Petition for Rule Making (the Petition) filed on or about May 19, 1997 by the Intelligent Transportation Society of America (ITS America). Public Notice of the Petition was given by the Commission on May 28, 1997 (*See, Public Notice DA 97-1106*), and comments were solicited thereon.<sup>1</sup> The Petition seeks to establish, first, a co-primary allocation at 5.850-5.925 GHz, a seventy-five megahertz segment, by amendment of Section 2.106 of the Commission's Rules (47 C.F.R. §2.106); and second, an amendment of Subpart M of Part 90 of the Commission's Rules, to permit the operation of Dedicated Short Range

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<sup>1</sup> The Public Notice called for comments to be filed on or before July 28, 1997, and reply comments to be filed not later than August 18, 1997. Thus, these comments are timely filed.

Communication (DSRC) systems as part of the Intelligent Transportation System (ITS) architecture in the United States. With respect to the impact of this proposal on incumbent users of the 5.850-5.925 GHz segment and adjacent bands, including the Amateur Service, the League states as follows:

1. The ITS America Petition anticipates the creation of a co-primary allocation of the 5.850-5.925 GHz band for DSRC, a new mobile service. DSRC functions are part of planned extensive ITS infrastructure, and consist of user services that require a short-range, wireless communications link between, generally, vehicles that travel at highway speeds and roadside systems.<sup>2</sup> As discussed at footnote 42 of the Petition, DSRC systems consist of three basic elements: a transponder (tag), transceiver (reader) and a transceiver antenna (beacon). The transceiver is a processor-controlled data transfer device which stores data. Transponders are located in the vehicle, presumably on the windshield or dashboard, or on the license plate or bumper. The transponder responds to communications initiated by the transceiver. The transceiver, which would be mounted in a cabinet alongside the roadway, with

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<sup>2</sup> These applications, according to Appendix H to the Petition, which is entitled *Spectrum Requirements for Dedicated Short-Range Communications (DSRC), Public Safety and Commercial Applications* (ARINC, July, 1996), at Page 7, include the following:

In-vehicle signing; International Border Clearance; Electronic Clearance; Safety Inspection; Fleet Management; AEI and Freight Management; Off-line verification; Electronic License Plates; Traffic Network Performance Monitoring; Intersection Collision Avoidance; Emergency Vehicle Signal Preemption; Transit Vehicle Signal Priority; Transit Vehicle Data Transfer; Traffic Information Dissemination; Automated Highway System-To-Vehicle Communications; Electronic Toll Collection; Parking Payment, Access Control and Drive Through Payments.

an antenna mounted on or within a structure overlooking the roadway (perhaps within road signs), controls all communications sessions and would incorporate a more powerful transmitter than would the transponders. Operational distances of such devices would be on the order of 30 to 90 meters, according to ITS.<sup>3</sup> Functions to be provided by these systems would vary widely, from automatic toll collection and safety inspection of vehicles to smart warning signs and collision avoidance systems. There is no adaptive power control proposed. ITS America describes the power levels as 4 watts EIRP except for "limited applications" in which 40 watts EIRP would be necessary.

2. The band 5.850-5.925 GHz is allocated on a primary basis to the fixed satellite (Earth-to-space) service for non-government operations, and as well to the Radiolocation service for Government operations (military only). In ITU Region 2, the band is part of the 5.650-5.925 GHz allocation to the Amateur Service, on a secondary basis. The segment 5.850-5.875 GHz is part of the band 5.725-5.875 GHz designated for use by Industrial, Scientific and Medical (ISM) devices. That segment is also used by relatively high-powered Part 15 devices, pursuant to Section 15.249 of the Commission's Rules. There are substantial government radar operations in the 5.850-5.925 GHz band, which would presumably involve substantial limitations on shared uses of the band. The Amateur-Satellite Service is authorized to use the segment 5.650-5.670 GHz (Earth-to-space) and 5.830-5.850 GHz (space-to-Earth)

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<sup>3</sup> It is noted, however, that its own frequency re-use studies assume 50 to 100-foot ranges of the devices. See Exhibit H, Appendix A, Page 24, *et seq.*

on a secondary basis.<sup>4</sup> The Amateur Service allocation at 5.850-5.925 GHz is in ITU Region 2 only. In Regions 1 and 3, the Amateur allocation is confined to 5.650-5.850 GHz.

3. The League takes no issue with the rather expansive public interest justification, contained in the ITS America Petition, for implementation of DSRC systems in some band. It would appear that DSRC applications constitute a significant part of the ITS framework domestically, and Congress and the Federal Highway Administration, Department of Transportation have invested much in the concept. Nor does the League believe at the outset that the DSRC applications discussed in the Petition are necessarily incompatible with incumbent and future amateur uses of the segment 5.850-5.925 GHz. The League's concern at the present time, however, is that the compatibility between amateur uses of the band on a secondary basis, and the operation of co-primary ITS DSRC facilities in the same band, is as yet unexplored and unknown.

4. ITS America asserts at page 50 of its Petition that representatives of the Federal Highway Administration and ITS America are "currently working" with the League's representatives to examine jointly any potential interference issues between amateurs and DSRC-based systems. That is partially correct, and the League hopes that empirical testing of DSRC devices and typical amateur station configurations will

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<sup>4</sup> See, 47 C.F.R. §2.106, notes 664 (now reclassified in the Radio Regulations as S 5.282) and 808 (which, after WRC-95 is now in the table of allocations, and no longer a footnote); also 47 C.F.R. §§97.207, 97.209.

begin shortly. To date, League representatives have indeed met with ITS America representatives and agreed to pursue technical studies and tests of compatibility. That one meeting has been the extent of the matter to date, though the ITS America representatives have exhibited good faith and have pledged cooperation, and the League looks forward to the conclusion of compatibility testing before the Commission concludes the public comment period on any Notice of Proposed Rule Making premised on the instant Petition.

5. At the time of the League/ITS America meeting, it was assumed for the purpose of the meeting that there would indeed be compatibility between a primary allocation for DSRC systems and continued secondary Amateur station operation in the segment 5.850-5.925 GHz.<sup>5</sup> In fact, the Petition (which was filed subsequent to

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<sup>5</sup> Indeed, at pages 49-50 of the Petition, ITS America states that:

Non-government uses of the 5.850-5.925 GHz band include fixed satellite Earth-to-space uplinks and ISM, along with amateur radio operators authorized on a secondary basis and Part 15 devices. Interference studies indicate that DSRC systems can co-exist with all existing users with employment of currently available mitigation techniques...Finally, the use of mitigating techniques, such as roaming channel selection, can greatly minimize DSRC-based interference potential with ISM devices and other in-band and out-of-band users (footnote omitted).

Further, at page 51:

Technical measures can greatly minimize any potential interference from (in-band) users. For example, filtering devices added to DSRC transceivers can reduce or eliminate out-of-band interference. (footnote omitted). In addition, a multi-stage transponder wake-up scheme can be incorporated to reduce activation from out-of-band emitters. Transponders operating in the 902-928 MHz band currently employ this technique. Finally, the ability to select an alternative channel for

the meeting) makes no proposal for change in the allocation status of the band, save for the additional co-primary allocation for DSRC operations. Thus, the League is willing to continue to presume that ITS America proposes, and will propose, no restriction on amateur operation at 5.850-5.925 GHz, pending the outcome of the empirical testing proposed by ITS America's representatives to the League.

6. However, notwithstanding the foregoing assurances from ITS America of compatibility, the ARINC study, Appendix H to the Petition, is silent on the issue of compatibility between amateur stations and DSRC systems. It states, at Pages 81 and 82 thereof, that:

The currently allocated LMS band [902-928 MHz] does not have the bandwidth or authorization for operation that will allow all DSRC functions to be effectively implemented. The new applications (In-Vehicle Signing [Hazard Warning], Emergency Vehicle Signal Preemption, Transit Vehicle Signal Priority, Transit Vehicle Data Transfer, Off-Line Verification, ELP, Intersection Collision Avoidance, and Automated Highway System-to-Vehicle Communications) must operate on interference-free frequencies . An allocation of bandwidth must also be made for those DSRC applications that migrate from the 902 to 928 MHz band to the 5.850 to 5.925 GHz band... Therefore, to provide sufficient bandwidth to operate properly and to foster nationwide interoperability, the 5.850-5.925 GHz band should be allocated to DSRC services as co-primary with fixed-satellite services, which are already in the band.

(Emphasis Added)

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operation when located near a disruptive source ensures that DSRC systems can avoid interference from in-band and out-of-band users. ITS America realizes that the potential for interference may decrease DSRC system reliability and user acceptance. We fully support the ongoing efforts of FHWA, DoD, the Fixed Satellite Service, and Radio Amateurs in their efforts to identify and alleviate all potential interference concerns.

By virtue of (1) the proposed Part 90 status (*vice* the possibility of unlicensed operation under Part 15 of the Commission's Rules, which would appear to be a more appropriate regulatory framework for ubiquitous, relatively low-power, unattended, short-range, intentional radiators) and (2) the applications planned for these devices, some of which have public safety implications, it would appear that "interference-free" operation is both anticipated and perceived as necessary by ITS America. This brings into serious question the compatibility between DSRC systems and other incumbent users of the band. The ARINC study, Appendix H to the Petition, is therefore plainly at variance with the calm assurances of ITS America at pages 49-51 of the Petition, that there is in fact compatibility, based on apparently unreleased interference studies. The urgency of conducting compatibility studies prior to conclusion of any allocation decisions in response to the Petition is thus significant.<sup>6</sup>

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<sup>6</sup> Appendix H to the Petition, the July, 1996 ARINC study, at Section 6.2, sets forth the "Coexistence Plan" for DSRC, as follows:

Almost all of the nation's roadways will be free of interference to DSRC in the 5.850 to 5.925 GHz band. In those small pockets where either weather radars or satellite stations have the potential for interference, DSRC installation design adaptations should be implemented to compensate for the unwanted signals. These adaptations could include installing highly directional antennas, filters, and signal absorption or reflection devices. The DSRC operations are low power and pointed down toward the roadway or horizontal to the roadway. Therefore, the DSRC operations are not expected to interfere with weather radar operations. The INTELSAT operations are Earth-to-space uplinks so they have no receiver for DSRC operations to influence. In the 5.850-5.925 (GHz) band, individual frequency allocations for the eight DSRC channels can be moved around to avoid spurious out-of-band radar, INTELSAT operations, and other transmission peaks. The lower 25 MHz of the band contains some ISM band activity, INTELSAT and radar activity which could be avoided by using the middle part of the band for DSRC where

7. The League's review of the Petition does not lead to the conclusion that alternatives to the 5.850-5.925 GHz segment have been adequately explored. For example, it is not clear from the petition, (other than rather vague inferences about the need to keep costs of the devices low), why the bands above 40 GHz are unsatisfactory for the proposed DSRC uses. Those bands are largely undeveloped, they have short-range communications capability, and they are perfectly useful for, as an example, anti-collision vehicular radars.<sup>7</sup> The millimeter-wave bands provide significant frequency reuse opportunities, and do not suffer the potential for harmful interference to public safety applications because of the relative absence of commercial use at present.

8. Furthermore, it appears that the size of ITS America's proposed allocation is inconsistent with those currently in use for the same purpose in Europe. According to the Petition, at page 45, a ten megahertz segment at 5.795-5.805 GHz has been

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necessary. Also, the upper 6 MHz of the band could be used as a guard band between the high-power operations just above 5.925 (GHz). Therefore, since this room can be used to facilitate sharing the band with other services, the full 75 MHz in the band should be allocated to TIRS (Transportation Information Radio Services) for the DSRC function in a co-primary status with Earth-to-space satellite communications.

There is no mention of DSRC/Amateur Radio compatibility whatsoever. More ominously, at page 84 of Appendix H, the ultimate conclusion is that "(t)he 5.850 to 5.925 GHz band is generally free of interference and would provide a protected place for DSRC applications, many of which are safety-critical or safety-enhancing, to operate."

<sup>7</sup> See, e.g. the *First Report and Order and Second Notice of Proposed Rule Making* in Docket 94-124, FCC 95-499 (released December 15, 1995).

selected by the *Comite Europeen de Normalisation* (CEN), the governing body for European Telecommunications Standards, as the band for DSRC systems. The European prestandard thus includes only 10 MHz and accommodates two, 5 MHz channels and short frequency reuse distances. To the extent that the 75 MHz requested in the instant Petition is necessary in order to allow interference mitigation techniques, such as roaming channel selection in DSRC systems, the League is supportive of the proposal. Otherwise, however, the allocation of 75 MHz of spectrum at this point appears premature.

9. The effect of the proposed ITS America allocation on the Amateur Service cannot be properly examined only from the perspective of the addition of a protected sharing partner at 5.850-5.925 GHz. Amateur use of the entire 5.650-5.925 GHz band has been and will in the future be significantly affected by recent Commission actions, and a more broad allocation planning perspective is immediately necessary. As noted above, in ITU Region 2, the amateur allocation at 5 GHz (secondary to Government radiolocation and the Fixed Satellite Service, and subject to interference from Part 18 devices in a portion of the band), is 5.650-5.925 GHz. Amateur uses of the band are generally divided as follows:

5650-5670 MHz:            Satellite Uplinks

5668.35-5668.80 MHz: Amateur Phase 3D uplink segment<sup>8</sup>

5760.0-5760.1 MHz:    Earth-moon-Earth operation

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<sup>8</sup> Phase 3D is a new generation amateur satellite to be launched in the immediate future.

5760.1-5760.150 MHz: Weak-signal operation

5760.3-5760.4 MHz: Beacon subband

5830-5850 MHz: Satellite Downlinks

In addition to the foregoing, the segment 5850-5925 MHz is necessary for future development of wideband amateur digital transmissions and video. The Commission, in ET Docket 96-102, amended Part 15 of the Rules to make available 300 MHz of spectrum, including 100 MHz at 5.725-5.825 GHz, for unlicensed equipment known as Unlicensed National Information Infrastructure (U-NII) devices.<sup>9</sup> These will provide short-range, high-speed wireless digital communications on an unlicensed basis. These include wireless local area networks (LANs) and access to the National Information Infrastructure (NII). These devices are limited in terms of range and power density, but they are ubiquitous devices, as would be the DSRC devices sought to be accommodated by the instant Petition. Thus, of the 275 MHz of spectrum that is available to radio amateurs on a secondary basis, 175 MHz of that stands to be rendered significantly less useful to radio amateurs than heretofore, by the combination of the Commission's action in Docket 96-102 and the instant proposal.

10. As noted above, the segment 5.830-5.850 GHz is utilized for amateur-satellite downlinks. As well, the segment 5.650-5.725 GHz will be necessary to reaccommodate displaced weak-signal narrowband amateur uses from the range 5.760 GHz because of anticipated noise from the U-NII devices at 5.725-5.825 GHz,

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<sup>9</sup> See, the *Report and Order*, FCC 97-5, released January 9, 1997.

and portions of it are necessary for amateur-satellite uplinks now. Given the small residual segment between the upper end of the U-NII band and the lower edge of the proposed DSRC band, consisting of 25 MHz, and the critical nature of the 5.830-5.850 GHz segment to the Amateur-Satellite Service, the League urgently requests that, in any rulemaking proceeding based on the ITS America Petition, the Commission propose *at the same time* the amendment of the Table of Allocations domestically to make the Amateur Service and the Amateur-Satellite Service primary at 5.825-5.850 GHz (subject only to protecting Government Radiolocation from interference, and to received interference from Government Radiolocation, and from ISM devices operating under Part 18). Furthermore, the League also requests that the Commission modify the Amateur and Amateur-Satellite allocation at 5.650-5.725 GHz to primary status. These actions are necessary to accommodate the reduction in utility that will result as a practical matter from the U-NII allocation and the proposed DSRC uses in the 5 GHz band, notwithstanding the retention of the amateur secondary allocations at 5.725-5.825 GHz and 5.850-5.975 GHz.

Therefore, the foregoing considered, the American Radio Relay League, Incorporated, requests that the Commission: (1) consider alternatives to the 5 GHz allocation proposed, such as the millimeter-wave bands; (2) require the completion and submission of compatibility studies between DSRC devices and incumbent radio services prior to the conclusion of any rulemaking proceeding initiated in response to this Petition; and (3) review the allocation status of the entire 5.650-5.925 GHz band, and, in conjunction with the creation of any co-primary allocation for DSRC systems

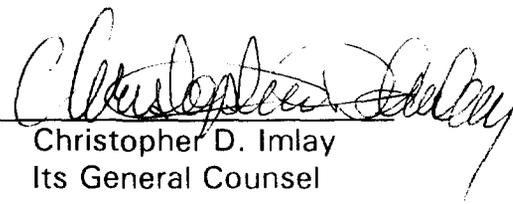
at 5.850-5.925 GHz, elevate the Amateur allocations at 5.650-5.725 GHz and, most especially, 5.825-5.850 GHz, to primary status.

Respectfully submitted,

**THE AMERICAN RADIO RELAY  
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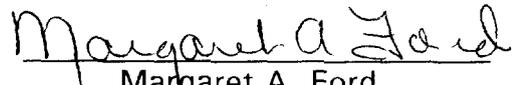
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July 28, 1997

CERTIFICATE OF SERVICE

I, Margaret A. Ford, Office Manager of the law firm of Booth, Freret Imlay & Tepper, P.C., do certify that copies of the foregoing COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INC. were mailed this 28th day of July, 1997, via U. S. Mail, postage prepaid, first class, to the offices of the following:

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