Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 2 of the Commission's Rules To Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems	)	ET Docket No. 00-258
	)	
Amendments to Parts 1, 2, 27 and 90 of the Commission's Rules to License Services in the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz Government Transfer Bands	)	WT Docket No. 02-8

To: The Commission

REPLY COMMENTS OF THE AEROSPACE
AND FLIGHT TEST RADIO COORDINATING COUNCIL

The Aerospace and Flight Test Radio Coordinating Council ("AFTRCC"), by its attorney, hereby submits its Reply Comments in the above-captioned proceedings. In particular, AFTRCC replies to the Joint Comments submitted by Sirius Satellite Radio Inc. and XM Radio Inc (the "Satellite Parties"). In addition, AFTRCC offers a brief comment relative to the filing by ARRL, the National Association for Amateur Radio ("ARRL").

BACKGROUND

In its opening comments AFTRCC took note of the discussion in the Fourth Notice of Proposed Rulemaking, FCC 03-134, released July 7, 2003 (the "Notice") to the effect that the Satellite Parties had requested Wireless Communications Service ("WCS")-type, out-of-band

emission ("OOBE") protections as against operations in 2360-2395 MHz. The Notice construed the Satellite Parties' request as being limited to "relocated aeronautical mobile users in the band 2360-2395 MHz" and to "Federal 'newcomers'" (id. at para. 50). Nonetheless, AFTRCC expressed some uncertainty regarding the Satellite Parties' proposal, and registered opposition to the extent it was meant to include, directly or indirectly, some new burden on flight testing.

DISCUSSION

The Joint Comments of the Satellite Parties appear to have resolved AFTRCC's uncertainties, but not in the manner we would have expected. To be sure, the Satellite Parties continue to express concern about potential interference from relocated Federal Government aeronautical operations. This is consistent with their views as expressed in their August 8, 2002 Joint Comments in ET Docket No. 00-258, cited in the Notice at note 115.

However, the Joint Comments filed November 3, 2003 suggest that some sort of new OOBE rule be imposed on all new aeronautical operations in the band 2360-2395 MHz, including flight testing, not just operations relocated from 1.7 GHz. For example, the Joint Comments reference "non-Federal Government flight testing and Federal Government aeronautical services" and "new aeronautical mobile transmitters in the 2360-2395 MHz band . . ." (id. at 6) as targets for a new rule.

AFTRCC does not presume to speak here for aeronautical telemetry generally, particularly any new non-flight test operations that might be allowed in 2360-2395 MHz under the terms of the Notice. However, AFTRCC is in a position to speak for Non-Government flight testing, and as to that community it is clear that there is no basis for the relief the Satellite Parties appear to seek. AFTRCC offers these additional comments to elaborate on this point.

Flight testing has used the band 2360-2390 MHz for many years and, save for 2385-2390 MHz where the Commission would restore the allocation which flight testing had enjoyed until just last year (and the possible addition of 2390-2395 MHz), the Notice proposes no changes whatsoever in the allocation. The Satellite Parties took their allocation at 2320-2345 MHz (which had been flight test spectrum before its re-allocation for DARS), and thereafter their authorizations, knowing full well that flight testing was conducted at 2360-2390 MHz. At no point did the Satellite Parties object to this, or otherwise seek to impose any new rules on, or constrain, flight testing. On the contrary, the Satellite Parties' only professed concern was that they not be overly constrained out of need to protect flight test telemetry from interference. This was the basis for the Coordination Agreements the Satellite Parties previously struck with AFTRCC.

But this is not all. There is no technical basis for the DARS' concern. As explained in the attached Engineering Statement from Daniel G. Jablonski, Johns Hopkins University Applied Physics Lab, a combination of factors, operational and technical, precludes the risk of flight test interference to DARS reception. Among other things, when an aircraft is visible during a flight test, such as at a higher altitude (say, 20,000 feet), an extremely high gain antenna (20 to 40 dBi) is required to pick up the telemetry signal. By contrast, DARS antennas are omnidirectional, that is zero gain, meaning that their susceptibility to a telemetry signal is virtually nil.

On the other hand, when an aircraft is at low altitude, ground attenuation and geographic separation between members of the general public and flight test operations ensures that the telemetry signal will be attenuated. In both scenarios, the flight test signal received in the DARS band will typically be far below the 55 dB plus 10log (P) level requested by the Satellite Parties for the flight test transmitter. Thus, the extra 55 dB of isolation that the Satellite Parties seek,

already exists. Moreover, none of these factors are characteristic of the WCS operations which the Satellite Parties reference as support for their proposed rule. Consistent with all of this, AFTRCC has received no complaint of interference to DARS.

Given this record, there is no basis for any new OOBE rules on flight testing relative to DARS. The Notice is entirely correct in proposing to simply continue with the long-established Rule 87.139 for Non-Government flight testing. Id. at para. 60.

* * *

With respect to ARRL, AFTRCC would note that, subsequent to the filing of the opening comments, discussions were initiated between the two groups relative to a possible accommodation of their interests. The parties will advise the Commission of the result of these discussions.

CONCLUSION

For the reasons stated herein and in its opening Comments, there is no basis for imposition of any new OOBE rule as to flight testing.

Respectfully submitted,

AEROSPACE AND FLIGHT TEST RADIO
COORDINATING COUNCIL

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December 1, 2003

Engineering Statement regarding
Joint Comments of Sirius Satellite Radio, Inc. and XM Radio, Inc.

ET Docket No. 00-258

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26 November 2003

This engineering statement is submitted in connection with the reply comments of the Aerospace and Flight Test Radio Coordinating Council.

The fundamental complaint by Sirius and XM is that flight test is permitted a 55 + 10 log(P) dB out-of-band emissions roll-off, as opposed to an 80 + 10 log(P) or a 110 + 10 log(P) dB roll-off, as required for fixed and mobile Wireless Communications Services (WCS), respectively. In their joint filing, XM and Sirius claim that flight test is thus getting an unwarranted 55 dB of relief with respect to the requirements placed on mobile WCS transmitters. However, the filing does note that XM and Sirius have not taken into account that aircraft are typically much farther away than WCS transmitters of concern.

For an aircraft transmitting 10 watts in a 2 MHz bandwidth at an altitude of 20,000 feet, the maximum received power density is -80 dBW/m^2/MHz.[1,2] Using the 55 + 10 log(P) roll-off requirement that flight test transmitters currently obey, the signal into the Digital Audio Radio Satellite (DARS) band is below –145 dBW/m^2/MHz. This is 35 dB below the amplitude of the received DARS signal at the "edge of coverage", as specified in the XM/Sirius joint filing. Thus, for typical flight profiles, there will be no discernable impact on the noise floor seen by DARS receivers.

The joint filing further notes that DARS receivers typically use ~3 dBi antennas mounted on automobile rooftops. In order to successfully receive flight test telemetry signals, high gain

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[1] The maximum power received by a DARS unit will occur when the DARS receiver is directly beneath the aircraft (i.e., when the distance to the aircraft is equal to the aircraft's altitude). Since the slant range to the aircraft will always be greater than or equal to the aircraft's altitude, the power levels seen by a DARS receiver will typically be much lower than this conservative estimate.

[2] For modulated bandwidths greater than the 2 MHz cited above, the in-band power flux density (PFD) for a fixed transmit power will decrease in proportion to the increase in bandwidth. The out-of-band PFD will also decrease, as the out-of-band emissions will be spread over a correspondingly wider bandwidth.

parabolic dish antennas (G = 20 – 40 dBi) must be used. One way to look at the issue is that, if interference to DARS reception were a realistic possibility, flight test ranges would be able to use roof-top automobile antennas instead of large dishes. But of course, this is not the case.

The received power, measured at the antenna terminals of a DARS receiver, is the power flux density given above multiplied by the effective area of the receive antenna, which is $\lambda^2 G/4\pi$. For a 3 dBi antenna the gain G is, in non-logarithmic units, equal to 2. Thus, the effective area of a DARS receive antenna is approximately 3×10^{-3} m^2, or –25 dB-m^2. This yields a received DARS signal power of –135 dBW/MHz, as stipulated in the joint filing. A flight test telemetry signal, measured at the same point in a DARS receiver, will be –170 dBW/MHz. This yields the same 35 dB interference margin cited above.

Furthermore, DARS satellites are often augmented by terrestrial repeaters. Thus, in many situations, the signal power available to a DARS receiver will be considerably higher than the power level available from the space segment of the overall DARS system architecture.

For the flight test telemetry characteristics provided above, typical transmissions will not rise above the noise floor of a DARS receiver until the distance between the aircraft and the DARS receiver is less than approximately 1400 feet. Separation distances as low as 1400 feet between aircraft and DARS receivers are theoretically possible during low level flight or take-off and landing operations. However, under these circumstances, public access to areas where flight test operations are conducted will be restricted.

For example, runways at Edwards AFB are 10 miles or more from the base perimeter. Even at the Patuxent River Naval Air Station, the public is not allowed within 1 – 3 miles of the nearest runways. Under these circumstances, ground attenuation effects and line of site limitations further reduce the possibility of interference to members of the public who happen to be using DARS during off-base activities.

(Parenthetically, it might be noted that, during operation of an XM radio unit in close proximity to flight-test aircraft (i.e., at aircraft/DARS separations less than 1400 feet), the author has never experienced reception problems. A likely reason is that in order to meet the 55 + 10 log(P) requirement in the 15 MHz band immediately adjacent to the flight test band at 2360 – 2385 MHz, the roll-off in the "further-away" 2320 – 2345 MHz band is many dB higher than the required 55 + 10 log(P).)

In summary, the joint Sirius/XM filing claims that "it makes no sense to permit greater spurious <u>emissions</u> from one service than another…". In the present context, this is flawed logic. A logically sound statement would be that "it makes no sense to permit greater <u>interference</u> from one service than another". As shown above, the existing 55 + 10 log(P) requirement meets this condition.

/s/ Daniel G. Jablonski

CERTIFICATE OF SERVICE

I, William K. Keane, hereby certify that I have caused to be deposited the attached Reply Comments in the U.S. Mail, first class postage prepaid, this 1st day of December 2003, addressed as follows:

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