



September 29, 2004

Via Electronic Filing

Ms. Marlene Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

RE: ET Docket No. 04-352

COMMENTS ON MB-OFDM WAIVER REQUEST

1. Introduction

In 2003, the commercial satellite industry generated approximately US\$90 Billion in revenues, enabled over US\$1 Trillion in global economic activity, and facilitated hundreds of thousands of jobs. On a daily basis, our national economic activity depends on the voice, video, and data services provided by commercial satellites to fixed and mobile end users, corporations and governments in the U.S. and overseas. Commercial satellites deliver critical services for emergency responders and the armed forces – both mission critical and logistical. Satellites also provide the telecommunications backbone for domestic and international television, radio, and print media distribution. Over 20 million households in the U.S. and over 60 million households worldwide subscribe to direct broadcast satellite services for their television programming, while community cable systems receive nearly all their video feeds from satellite distribution.

The Satellite Industry Association (SIA)¹ supports the development of innovative products and technologies, but such development should not come at the expense of other products and services that also benefit consumers, small businesses and established enterprises. In particular, the SIA has expressed on several occasions its concern with the

¹SIA Executive Members include: The Boeing Company; Globalstar LLC; Hughes Network Systems, Inc.; ICO Global Communications; Intelsat; Iridium Satellite LLC, Lockheed Martin Corp.; Loral Space & Communications Ltd.; Mobile Satellite Ventures LP; Northrop Grumman Corporation; PanAmSat

potential for UWB devices, which may be deployed widely and on an uncontrolled fashion, to interfere with satellite earth station receivers, which are extremely sensitive.

The design of satellite links involves trade-offs between cost and performance. To minimize costs and to be able to deliver services to customers at the lowest possible price, satellite operators design links based on ITU-R Recommendations that indicate allowances for interference caused by co-frequency transmissions employed by other telecommunication services and on link margins needed to compensate for propagation effects and other link degradations (e.g. equipment aging and implementation losses). Any sources of uncoordinated interference, such as UWB, that go beyond the levels of co-frequency interference envisioned in ITU-R Recommendations, have not been taken into account in satellite operators' link budgets. These sources of interference, therefore, have the potential to degrade service below what satellite operators have committed to in their agreements with their customers or to disrupt service entirely.

In these circumstances, merely considering whether a new source of interference will cause "harmful interference" to satellite receivers is inadequate. For example, even if UWB devices do not, by themselves, cause harmful interference, they nevertheless eat into the margin that satellite operators have set aside, based on allowances set in ITU-R Recommendations to cope with interference from co-frequency sources. If UWB devices, in the aggregate, exceed these allowances, they will, in combination with propagation effects and other link degradations, expose satellite systems to higher levels of interference than the levels for which they have been designed. For this reason, satellite operators have objected previously to the Commission's use of harmful interference as a benchmark, for example, in comments on the Interference Temperature NPRM².

Corporation; SES Americom, Inc., and Verestar Inc. SIA's Associate Members include Eutelsat, Inmarsat, and New Skies Satellites Inc.

² See Comments of Globalstar, L.P., ICO Global Communications, Inmarsat Ventures Ltd., Intelsat Global services Corp., Lockheed Martin Corp., Loral Space & Communications Ltd., New Skies Satellites, Northrop Grumman space Technology, PanAmSat Corporation and SES Americom, Inc. in ET Docket No. 03-237, April 5, 2004:

Clearly harmful interference cannot be used as a standard for authorizing new users under an interference temperature approach. Harmful interference is an extreme level of interference that "seriously degrades, obstructs or repeatedly disrupts" the operations of a communications system. Harmful interference is rarely seen when properly functioning radio equipment is used in a frequency band by services or systems that operate on a co-primary basis. At the same time, it is clear that just because interference between such services or systems in a band does not rise to the

Moreover, compatibility studies of necessity are based on a wide variety of assumptions about UWB deployment (e.g. density of UWB devices, activity factors, indoor-outdoor ratio, and propagation losses) that may prove incorrect in practice. For this reason as well, the Commission needs to proceed cautiously until there is more experience with the interaction between UWB devices and satellite systems under real world conditions.

The difficulty of detecting and correcting UWB interference if it does occur presents an additional reason to proceed cautiously. Interference from UWB devices is likely to be intermittent, and could be caused by any of a large number of unlicensed devices, many of which will be operated as portable or mobile stations. Pinpointing the source of interference in these circumstances is at best extremely costly and may well prove impossible.³ It is perhaps not surprising, therefore, but nevertheless is highly disturbing to the satellite industry, that the FCC does not have a defined strategy of what to do if UWB devices do interfere with satellite transmissions. It is against this background that MBOA-SIG's waiver request should be considered.

2. MBOA-SIG Request for a Waiver

In the case of the present request for waiver of measurement procedures for OFDM ultrawideband devices, the rationale used to justify the waiver is mostly based on the inadequacy of the current measurement procedures, which MBOA-SIG claims were developed specifically with pulse-based systems in mind. However, if the technology used for OFDM ultrawideband devices was not taken into account in the development of the FCC measurement procedures, it is important that appropriate measurement

high level of "harmful interference" it cannot be reasonably concluded that the interference is subjectively acceptable or tolerable to the victim service or users. For these reasons, harmful interference cannot be used as a benchmark to define the conditions for introducing additional spectrum sharing in licensed bands. More specifically, when defining the aggregate level of interference that unlicensed devices can produce to a licensee of the same spectrum, the use of harmful interference as a reference is completely inappropriate. A licensee cannot be expected to accept interference from unlicensed devices that places its operation at the threshold of being seriously degraded, obstructed or repeatedly disrupted.

³ Cf. *Review of Part 15 and other Parts of the Commission's Rules*, First Report and Order, ET Docket 01-278, FCC 02-211 (July 19, 2002) ("However, identifying each individual source of interference from radar detectors is not practical for a satellite operator because these devices are mobile and therefore interfere intermittently. Further, these interference sources are not under the control of the satellite operator, so in

techniques and objectives (masks) be developed in substitution for the current ones, so that the interference potential can be adequately determined and controlled.

Simply waiving the current test procedures will not accomplish this objective, because a waiver does not guard against the possibility that the interference potential of OFDM ultrawideband devices is greater than that of pulse-based systems. A waiver of the current measurement procedures without additional assurances concerning the interference potential of this new class of devices, therefore, would only exacerbate a situation that already poses a threat to the satellite industry.

The most important issue at stake here is the impact on co-frequency licensed services, rather than the ability of a particular UWB technology to compete on a “level playing field”. For the reasons discussed below, SIA asserts that the waiver request has not satisfactorily addressed this point and that approval of the waiver would actually increase the risk of unacceptable interference to FSS earth stations.

A. Justification for the waiver of the frequency hopping test procedures based on the fact that such procedures are not intended to apply to MB-OFDM devices is not convincing

The argument that the RMS average measurements would not factor in the transmission during the “off” intervals and therefore should not be applicable to MB-OFDM devices is not convincing. This holds true for any frequency hopping device, and yet all of them are subject to the same test procedure.

Furthermore, the objectives against which the measurement results are to be compared have been established in association with the test procedure, which requires that “measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.”⁴ There is no basis for exempting MB-OFDM devices from this requirement.

The argument that the three bands used by the MB-OFDM devices are sequenced according to deterministic patterns as opposed to “random” patterns and therefore MB-OFDM devices do not meet the criteria of Part 2.1 is not persuasive either. There is no true randomness in the frequency changing patterns for frequency hopping devices, and

most cases it is not possible for the satellite operator to remedy the interference even if the source could be identified.”)

⁴ Part 15.31(c).

the fact that the recommended measurement techniques were derived based on a specific type of modulation technique does not necessarily mean that it is not equally fit or applicable to similar types of techniques.

The fact that the existing measurement procedures may not have predicted new technologies does not necessarily mean that the procedures should be waived. In fact, what is needed is the establishment of better measurement procedures and objectives, rather than waiving requirements. After all, the most important goal of measurement procedures is to ensure that the potential for interference is limited to a pre-defined effect.

B. The claim that, because MB-OFDM devices also feature “digital modulation” techniques, the rules for frequency hoppers are inapplicable, is unsound.

The waiver request suggests that the FCC has already addressed the issue of the applicability of the frequency hopping rules to systems using digital modulation. However, the request for clarification quoted by MBOA-SIG in footnote 16 of their petition was specific to devices covered by Part 15.247, i.e., devices operating within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz. It would be premature to extrapolate the Commission’s decision to MB-OFDM devices that cover bands beginning at 3168 MHz.

Furthermore, the FCC’s clarification to the consultation mentioned above allowed for demonstration of compliance with either the FHSS or the DTS standards, which is different than saying that the FCC clarified that the FHSS standards were inapplicable.

C. The claim that MB-OFDM systems under normal operating conditions pose no greater threat of harmful interference than pulsed UWB systems permitted by the rules is questionable and the waiver of the requirement to have the gating function turned on while doing the measurement should not be granted.

SIA believes that gating during the measurements will ensure that the results will reflect the actual interference levels encountered by the licensed communications providers’ equipment, as opposed to the measurements done with pulse gating disabled, which will show lower values because of the quiescent period.

The argument developed on pages 7 and 8 of the Petition for Waiver (see in particular footnote 19) implies that, since blanking intervals of a pulse train are included in the power measurements associated with pulsed UWB systems, the time intervals during which the signal of MB-OFDM systems has hopped outside the measurement bandwidth should likewise be included when testing with these systems. SIA strongly disagrees. Under this interpretation, pulse duration for MB OFDM is approximately 240 ns and as a result several symbols of the FSS transmissions will be subject to full power interference. A few subsequent pulses would then be free of interference from this particular UWB emission but the overall effect cannot be assessed by averaging out the interfering power over time.

What is different for pulsed UWB systems is that pulse durations are much smaller and in many situations several pulses will be present within one-symbol duration. For this reason averaging over blanking intervals becomes acceptable under these circumstances. However, even for pulsed UWB systems averaging is not acceptable if long quiescent periods were to be included. The basic fact is that if some symbols are subject to high levels interference while others are subject to a lower level (or no interference), interference effects cannot be assessed by averaging interference power over time.

In a recent presentation by a proponent of the competing technology (pulsed UWB devices) to the Satellite Industry Association, the results of tests comparing the interference potential of MB-OFDM and DS-UWB concluded that MB-OFDM can cause 5 to 9 dB more interference than DS-UWB⁵.

SIA recognizes that results of tests and their comparison depend on assumptions, procedures and objectives, and they may vary among proponents of competing technologies. However, without endorsing the quantitative results cited above, SIA notes that they confirm the reasoning developed above showing that if measurements for MB-OFDM systems are conducted with “gating on”, these systems have the potential for causing more interference than pulsed UWB systems that have been tested including blanking intervals between successive pulses in the train.

⁵ Document IEEE 802.15-03/483r2 of November 2003.

3. Conclusion

Given all the above, the Satellite Industry Association has strong concerns that granting the waiver requested by MBOA-SIG would generate an unwarranted increase in the potential for the interference from UWB devices to FSS receive earth stations. Therefore, SIA strongly opposes grant of such a waiver.

Very truly yours,

A handwritten signature in black ink, appearing to read "David A. Cavossa". The signature is fluid and cursive, with a long horizontal stroke at the end.

David A. Cavossa
Executive Director
Satellite Industry Association

cc:

Paul Margie
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