

Before the
Federal Communications Commission
Washington DC 20554

In the Matter of)
)
Revision of Part 15 of the Commission's Rules) ET Docket No. 98-153
Regarding Ultra-Wideband Transmission)
Systems)

**OPPOSITION TO PETITION FOR RECONSIDERATION
OF THE SATELLITE INDUSTRY ASSOCIATION**

June 30, 2005

Mitchell Lazarus
FLETCHER, HEALD & HILDRETH, P.L.C.
1300 North 17th Street, 11th Floor
Arlington, VA 22209
703-812-0440
Counsel for Freescale Semiconductor, Inc.

Before the
Federal Communications Commission
Washington DC 20554

In the Matter of)
)
Revision of Part 15 of the Commission's Rules) ET Docket No. 98-153
Regarding Ultra-Wideband Transmission)
Systems)

**OPPOSITION TO PETITION FOR RECONSIDERATION
OF THE SATELLITE INDUSTRY ASSOCIATION**

Pursuant to Section 1.249(f) of the Commission's Rules, Freescale Semiconductor, Inc. hereby opposes the Petition for Reconsideration of Satellite Industry Association (SIA).¹

**THE ATTACHED TECHNICAL STATEMENT IS NOT AN
APPENDIX, BUT IS AN INTEGRAL PART OF THIS PLEADING.**

A. SIA's Petition is Barred on Procedural Grounds.

1. *The Petition must be summarily dismissed because it is three years late.*

SIA recites that its petition seeks reconsideration of the Commission's Second Report and Order.² That is incorrect. *Nothing in the petition challenges any decision made in the Second*

¹ Petition for Reconsideration of the Satellite Industry Association (filed March 11, 2005). Freescale Semiconductor, Inc. began operations in 1953 as the semiconductor products sector of Motorola, Inc. It is a leading global semiconductor company with 10,000 end customers serviced and supported by 22,000 full-time employees in over 30 countries. Prior to spinning off Freescale as a separate company, Motorola acquired substantially all of the assets and intellectual property of XtremeSpectrum, Inc., a pioneering developer of ultra-wideband technology and active participant in the Commission's ultra-wideband rulemaking proceeding. Freescale now holds the assets and intellectual property Motorola acquired from XtremeSpectrum, and employs many former XtremeSpectrum key staff.

² *Ultra-Wideband Transmission Systems*, 19 FCC Rcd 24558 (2004) (Second Report and Order and Second Memorandum Opinion and Order) (Second R&O). Despite the nomenclature, this is the Commission's *third* Report and Order in the proceeding. See *Ultra-Wideband Transmission Systems*, 17 FCC Rcd 7435 at para. 66 (2002) (First Report and Order); *Ultra-Wideband Transmission Systems*, 18 FCC Rcd 3857 (2003) (Memorandum Opinion and Order and Further Notice of Proposed Rule Making) (MO&O & FNPRM).

Report and Order. SIA's sole request concerns the ultra-wideband emissions limits. These were adopted in the First Report and Order in 2002 and have been unchanged since.³ Petitions for reconsideration on that issue were due June 17, 2002, 30 days after publication in the Federal Register.⁴ SIA filed this petition on March 11, 2005, almost three years too late.

The Commission lacks jurisdiction to set aside the 30-day time period for filing reconsideration petitions. Congress established that cut-off in the Communications Act,⁵ and it will take another act of Congress to change it. "The Commission has consistently held that it lacks authority to waive or extend, even by as little as one day, the statutory thirty-day filing period for petitions for reconsideration in rulemaking proceedings . . ." ⁶ The U.S. Court of Appeals has reversed the Commission for taking up a petition for reconsideration filed only two days late.⁷

³ First Report and Order at para. 222-25. The Commission has since granted a waiver relating to the procedures used for establishing compliance with the emissions limits, but did not change the limits themselves. *Petition for Waiver of the Part 15 UWB Regulations*, 20 FCC Rcd 5528 (2005). SIA has sought reconsideration of the waiver as well. *Petition for Reconsideration of the Satellite Industry Association* in ET Docket No. 04-352 (filed April 11, 2005) (listed under "PanAmSat Corporation" in the FCC's ECFS database).

⁴ *Ultra-Wideband Transmission Systems*, 67 Fed. Reg. 34852 (May 16, 2002); 47 C.F.R. Sec. 1.429(d).

⁵ 47 U.S.C. Sec. 405(a).

⁶ *Pay Telephone Reclassification and Compensation*, 18 FCC Rcd 7615 at para. 3 (2003). The sole exception arises where the Commission fails to provide an affected party with timely notice of the challenged action. *Gardner v. FCC*, 530 F.2d 1086 (D.C. Cir. 1976). That cannot occur in a rulemaking such as this, where notice is given through publication in the Federal Register.

⁷ *Reuters, Ltd. v. FCC*, 781 F.2d 946, 951-52 (D.C. Cir. 1986). *See also, e.g., Virgin Islands Telephone v. FCC*, 989 F.2d 1231, 1237 (D.C. Cir. 1993) (upholding dismissal of reconsideration petition filed one day late).

SIA alleges that the information it presents became available only recently.⁸ But that does not excuse a late-filed petition. The Commission's Rules allow a *timely* petitioner to rely on facts not previously provided to the Commission, if those facts arose only after the previous opportunity to present them.⁹ But the mere existence of new facts does not mean a petition for reconsideration can be filed at any time.

SIA is not without a remedy. If SIA believes that new facts show the present ultra-wideband rules are inadequate, its appropriate course is to file a petition for rulemaking.¹⁰

2. *SIA's Petition should be summarily dismissed as repetitious.*

This is SIA's third Petition for Reconsideration that argues the ultra-wideband emissions limits in the fixed satellite service (FSS) bands are set too high.

The first time SIA raised this argument on reconsideration,¹¹ the Commission weighed it carefully and denied it on the merits.¹²

SIA sought reconsideration of that order as well, adding an argument that the emissions limits are based in part on an inappropriate interference-to-noise (I/N) ratio.¹³ The Commission responded:

⁸ SIA Petition at 2.

⁹ 47 C.F.R. Sec. 1.429(b).

¹⁰ See 47 C.F.R. Sec. 1.401.

¹¹ Petition for Reconsideration of the Satellite Industry Association (filed June 17, 2002).

¹² MO&O & FNPRM at paras. 124-131.

¹³ Petition for Reconsideration of the Satellite Industry Association (filed May 22, 2003).

The Commission did not make any changes in [the first order denying reconsideration] that affect the levels of the emissions that may appear in the FSS frequency bands. Rather, SIA continues to dispute the issue of a relative I/N ratio that was addressed in the 1st R&O. The time is long past for filing a petition for reconsideration of that decision.¹⁴

Now SIA is back yet again on the same issue of emissions limits and I/N ratio. As it did the last time, the Commission should dismiss the current petition as repetitious.¹⁵ This "brings finality to [the] decision making process and eliminates uncertainty."¹⁶ Otherwise, the Commission "would be involved in a never ending process of review that would frustrate the Commission's ability to conduct its business in an orderly fashion."¹⁷

The policy against entertaining repetitious petitions may be waived only when "the arguments that petitioners proffer in support of their requests [are] so compelling that they

¹⁴ Second Report and Order at para. 94.

¹⁵ "Any order disposing of a petition for reconsideration which modifies rules adopted by the original order is, to the extent of such modification, subject to reconsideration in the same manner as the original order. *Except in such circumstance, a second petition for reconsideration may be dismissed by the staff as repetitious.* 47 C.F.R. Sec. 1.429(i) (emphasis added).

¹⁶ *37.0-38.6 GHz and 38.6-40.0 GHz Bands*, 14 FCC Rcd 12428 at para. 9 (1999), citing *MTS and WATS Market Structure*, 99 FCC 2d 708, 711, 712 (1984); *MTS and WATS Market Structure*, 97 FCC 2d 834, 879 (1984).

¹⁷ *Competitive Bidding Procedures*, WT Docket No. 97-82, Second Order on Reconsideration of the Third Report and Order and Order on Reconsideration of the Fifth Report and Order, FCC 03-98 at para. 48 (released April 22, 2003), quoting *Warren Price Communications, Inc.*, 7 FCC Rcd 6850 (1992) (other citation footnotes omitted). See also *Regulatory Flexibility in the 218-219 MHz Service*, 17 FCC Rcd 8520 at para. 15 (2002) (similar).

warrant departure from this policy."¹⁸ Nothing in this most recent SIA Petition is remotely "so compelling" as to justify a third look. The Commission should dismiss the petition forthwith.

B. SIA Has Presented No Technical Information that Justifies Reducing UWB Emissions Limits.

Even if the Commission considered SIA's petition, it would find no grounds for changing the ultra-wideband limits. The attached Technical Statement explains why. Some salient points:

- SIA requests emissions limits based on an interference-to-noise (I/N) ratio of -20 dB (*i.e.*, total aggregate UWB emissions at least 20 dB below the FSS receiver noise floor). But SIA does not say why this unrealistically low level is needed to prevent harmful interference.
- SIA seeks to rehabilitate the Alion Report, following the Commission's rejection: "The Alion study is based on multiple worst-case assumptions, most of which simply are not realistic."¹⁹ Although SIA disagrees with the Commission's characterization of the study's underlying assumptions,²⁰ it does not lay out a reasonable set of assumptions, and also show that UWB emissions based on those assumptions causes harmful interference to FSS receivers.
- SIA also asks the Commission to rely on a study submitted to the ITU by the United Kingdom. The documentation SIA provides is insufficient to permit replication of the study. Moreover, the study reproduces many of the unrealistic assumptions the Commission criticized in the Alion Report.

In short, SIA fails to justify the requested relief, even if its petition were properly before the Commission.

¹⁸ *Id.*

¹⁹ Second Report and Order at para. 96. *See also id.* at paras. 95-99.

²⁰ SIA Petition at 16-20.

CONCLUSION

SIA seeks reconsideration of the ultra-wideband emissions limits almost three years too late. This third attempt is two times too often.

SIA's technical arguments seek to reinstate a study the Commission has disapproved, without adequately answering the Commission's objections, and offer a similar study apparently subject to many of the same problems.

The Commission should dismiss the petition on procedural grounds or, in the alternative, deny it for failing to justify reconsideration.

Respectfully submitted,

Mitchell Lazarus
FLETCHER, HEALD & HILDRETH, P.L.C.
1300 North 17th Street, 11th Floor
Arlington, VA 22209
703-812-0440
Counsel for Freescale Semiconductor, Inc.

June 30, 2005

TECHNICAL STATEMENT

We respond here to the two primary technical claims made by SIA:

- that the FCC rules do not provide adequate protection for FSS earth station receivers, and
- that new analysis submitted with the SIA petition shows that UWB at FCC-authorized emissions levels will lead to interference to FSS systems.

As we show below, both claims are incorrect. By reviewing both the text of the SIA petition and its attached Exhibit 3 (a report submitted to the ITU by the United Kingdom¹), we show that mistaken analysis and unrealistic assumptions about UWB deployments and propagation conditions lead SIA to overestimate the levels of interference by a wide margin.

There is no basis for SIA's claim that the FCC's use of 0 dB interference-to-noise ratio (I/N) does not protect FSS earth stations.

SIA insists that UWB emission limits be based not on preventing "harmful interference," as the FCC rules require, or even on preventing any noticeable degradation to the link.² Rather, they suggest that UWB emissions are a problem simply because they may slightly reduce the margin of the link, even if no other interference or noticeable effects ever occur. This level of protection is based on the assumption that all of the worst-case conditions anticipated in the link budgets occur simultaneously. At the same time, SIA disregards many real-world effects and conditions that impact FSS earth station operation.

To achieve the requested protection, SIA says the FCC's limits for UWB should be based on ensuring a I/N ratio of -20 dB -- that is, that the total aggregate UWB emissions should remain more than 20 dB below the noise floor of the FSS receiver. SIA does not provide any new data supporting the claim that emissions at or above this level will ever affect the operation of FSS receivers, or would cause harmful interference. SIA simply states that other groups have considered this level of protection and requests that the FCC do likewise.

SIA justifies the request for -20 dB I/N protection based on what it calls "new data" from European regulatory deliberations indicating -20 dB I/N protection for FSS, particularly CEPT (ECC TG-3 Report 64) and ITU recommendations and deliberations. But SIA ignores the significant technical problems with the studies presented to these other bodies, and it overlooks the critical analysis of these studies submitted by other participants that was summarily rejected on political grounds.

¹ "FSS/ULTRA-WIDEBAND COMPATIBILITY – AGGREGATE INTERFERENCE STUDIES IN THE SPACE-TO-EARTH DIRECTION", ITU Document 1-8/152-E, dated June 2, 2004. Provided as Exhibit 3 in the Petition for Reconsideration by SIA dated March 11, 2005.

² See Petition for Reconsideration by SIA dated March 11, 2005, page 7.

As further means of justifying its request for 20-30 dB lower emission limits for FSS systems, SIA also submits an example of a report that was submitted to the ITU. Although the report is far from complete, it does provide enough detail to show significant technical flaws.

The UK Simulation Study of Interference to FSS Receivers

The UK document presented to TG 1/8, provided here by SIA, is a simulation study of many UWB devices randomly scattered around a satellite dish. The simulation adds up all the emissions of the different emitters and concludes that the levels of aggregate interference are too high. (Again, "too high" is not based on any computed or actual degradation of performance, but only on exceeding the -20 dB I/N that SIA argues should be the protection level).

The UK paper does not provide enough documentation to allow replicating the results. Typically it gives brief descriptions of the simulation with only ranges of parameters used (e.g. 5 to 25 degrees antenna elevation), but plots of individual results often do not indicate specific parameter values used to compute the results.

The UK report appears to take a general approach similar to other studies that have been shown to contain significant flaws, in particular the Alion Report previously submitted by the C-band Coalition,³ which claimed to show significant interference potential from UWB devices to FSS receivers. The Second Report and Order criticized the Alion Report and dismissed its results as incorrect. The FCC summarized: "The Alion study is based on multiple worst-case assumptions, most of which simply are not realistic."⁴

In addition to offering up the UK report, SIA also urges the FCC reconsider its views on the Alion Report. But nothing in the petition explains why the specific problems the FCC found in the report are mistaken -- problems that we think are likely to infect the UK report as well. For example, SIA claims that the Gaussian distribution might result in a reasonable device density, but reports only the average density over the entire 78 km² region, not the extremely unrealistic high density very close to the victim created by the unnatural device distribution technique. Even the claim of interference due to uniform distributions is based on flawed results for just one of the three receivers modeled. The result in question shows clearly anomalous behavior -- a small non-zero error rate at UWB device densities 20x lower than for the other two receivers modeled.

Some criticisms made by the FCC are either addressed superficially or are not addressed at all: the assumption that all UWB devices have maximum emissions at 4 GHz and are pointed toward the victim receiver with maximum antenna gain; the assumption of purely line-of-site propagation losses for most UWB devices at ranges of hundreds or thousands

³ "Evaluation of UWB and Lower Adjacent Band Interference to C-Band Earth Station Receivers," (Alion report), dated February 11, 2004.

⁴ Second Report and Order at para. 96

of meters; and the assumption of large numbers of UWB devices at close range to the victim antenna main beam.

In the end, however, the severe overestimation of interference in the Alion study results primarily from a simulated random deployment of UWB devices that places a small number of UWB devices (less than a few percent) high in the air (up to 100 m above the ground) for which only free-space path loss is assumed. UWB devices cannot hover alone in mid-air. *This tiny fraction of the modeled UWB devices is responsible for the vast majority of the interference power seen by the C-band receiver in the simulations.* If this small set of the simulated UWB devices is disregarded, the levels of aggregate UWB signal power at the C-band receiver drop to levels far below those required to cause interference as measured and reported in the Alion study.⁵

Nowhere does SIA (1) lay out a set of assumptions on UWB density, height above ground, duty cycle, propagation, etc. that are in reasonable accord with reality; and (2) show that the resulting UWB emissions cause harmful interference to FSS receivers. The FCC's original criticism of the Alion study remains sound.

The UK study appears to raise similar issues:

- **Random placement of emitters:** The UK simulation again uses "random placement" of large numbers of UWB devices around a victim receiver. The interference power from all devices is added up and the statistical result is apparently based on a large number of repeated simulations. The vast majority of simulated UWB devices probably have reasonable placements, and those will have minimal impact on the computed aggregate interference. A much smaller number of devices are simulated either unreasonably close to the victim receiver or as having improbably good propagation characteristics. These few skew the aggregate calculation and dominate the interference effects.
- **Poor attenuation model:** In the UK study, the attenuation due to buildings or other objects is random instead of deterministic, based on a log-normal distribution with 10 dB mean and 5 dB standard deviation.⁶ In some number of cases for indoor UWB emitters, there can actually be *negative attenuation* (< 0 dB), effectively *amplification*, supposedly due to obstructions by buildings or other objects. The physics does not work that way. For outdoor emitters, there is apparently no attempt to allow for attenuation due to blockage.
- **Unrealistic placement of UWB devices:** All but one of the plots in the UK report were made with 0 meters exclusion zone, so devices placed unrealistically close to the FSS receiver will dominate the aggregate effects. Figure 8 clearly shows that even the smallest exclusion zone significantly reduces the "worst-case"

⁵ For a detailed critique of the Alion study, including revised results based on more realistic assumptions indicating no danger of harmful interference, see comments filed by Motorola, dated April 9, 2004.

⁶ "FSS/ULTRA-WIDEBAND COMPATIBILITY – AGGREGATE INTERFERENCE STUDIES IN THE SPACE-TO-EARTH DIRECTION", ITU Document 1-8/152-E, dated June 2, 2004, Exhibit 3, page 1.

(0.1%) I/N ratio, evidence that a close-in emitter is dominating the aggregate effect.

- **Unrealistic device densities:** The UK report avoids the inclusion of a duty factor by assuming the real distribution of devices is much higher than that calculated in the simulation. For example, the study justifies a density of 1000 UWB devices per km² with 100% emissions by saying this represents 100,000 UWB devices per km² at a more reasonable duty cycle for outdoor use of 1%⁷. The simulation does not use realistic densities and realistic duty cycles simultaneously.
- **Cascaded combinations of worst-case conditions:** In many cases the UK study's effort to vary parameters over a range of values amounts to holding all but one at worst case value and varying only the one (*e.g.*, modeling antenna elevation sensitivity while holding exclusion zone and device density at worst-case values).

With more realistic assumptions and conditions, the UK approach would probably validate the current FCC rules. Certainly the study is inadequate as a technical basis for amending the rules.

In summary, the SIA's claims that the FCC limits for UWB operation do not protect them remain unsupported. SIA provides no additional data or measurements. SIA cites other groups that have claimed the need for -20 dB I/N protection, as SIA does, but again cites no technical support for those levels. SIA provides a study from the UK showing the analysis considered in the ITU deliberations, but as shown above, this contains serious flaws that almost certainly lead to serious over-estimates of interference levels.

SIA has not provided any basis for changing the UWB emissions limits.

Respectfully submitted,

Matthew Welborn
Wireless System Architect
Freescale Semiconductor, Inc.

⁷ "FSS/ULTRA-WIDEBAND COMPATIBILITY – AGGREGATE INTERFERENCE STUDIES IN THE SPACE-TO-EARTH DIRECTION", ITU Document 1-8/152-E, dated June 2, 2004, exhibit 3, page 4, footnote 1.

CERTIFICATE OF SERVICE

I, Deborah N. Lunt, a secretary for the law firm of Fletcher, Heald & Hildreth, P.L.C., hereby certify that a true copy of the foregoing “Opposition to Petition for Reconsideration of the Satellite Industry Association ” was deposited this 30th day of June, for delivery via first class, United States mail, postage prepaid to the attached Service List, except by hand delivery and e-mail as indicated.

/s/
Deborah N. Lunt

***Denotes By Hand Delivery and E-mail**

SERVICE LIST

- * Chairman Kevin J. Martin
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554
- * Commissioner Kathleen Q. Abernathy
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554
- * Commissioner Michael J. Copps
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554
- * Commissioner Jonathan S. Adelstein
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554
- * Bruce A. Franca, Acting Chief, OET
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554
- * Julius P. Knapp, Deputy Chief, OET
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554
- * James D. Schlichting, Deputy Chief, OET
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554
- * Karen E. Rackley, Chief
Technical Rules Branch
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554
- * John A. Reed
Technical Rules Branch
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554
- * Ron Chase
Technical Rules Branch
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554
- David Cavossa
Satellite Industry Association
1730 M Street NW
Suite 600
Washington DC 20036