

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

In the Matter of )  
 )  
Comprehensive Review of Licensing and ) IB Docket No. 12-267  
Operating Rules for Satellite Services )

To: The Commission

**COMMENTS OF  
THE BOEING COMPANY**

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## SUMMARY

Boeing strongly supports the common sense reforms proposed in the Commission's Part 25 Further Notice of Proposed Rulemaking. At the heart of this proceeding's comprehensive review of the Part 25 rules is the recognition that, in order to promote competition, innovation, and investment in satellite services, the Commission's rules should not impose unnecessary delay, uncertainty, or administrative burdens on satellite operators. Many of the proposals in the *Notice* address and resolve such unnecessary barriers. Boeing herein identifies these proposals, and adds additional recommendations that are broadly supported by the satellite industry.

Boeing fully supports the Commission's proposal to accept satellite manufacturer affidavits as evidence of Critical Design Review ("CDR") milestone compliance. Boeing further recommends that this proposal be extended to formalize the milestone certification showing for both the CDR and the construction milestone, accepting standard language affidavits co-signed by both the licensee and the independent satellite manufacturer.

Although not included in the original Notice, Boeing concurs with the recommendation of SIA that, absent affirmative steps to remove it from streamlined processing, the Commission should deem a milestone showing compliant after 60 days. Such a shot clock would establish an expected upper bound on the processing time for most milestone showings, thereby promoting administrative efficiency and providing increased certainty for satellite operators

Another way to promote administrative efficiency is to maintain the surety bond amounts in familiar and easily calculated million dollar increments. Boeing does not agree with the proposal to index bond requirements to inflation because these changes would provide little additional assurance against warehousing while increasing the administrative burden and expense for applicants.

Boeing strongly supports the Commission's proposal to reform and integrate its milestone and bond requirements. The notice proposes to make interim milestones optional and reduce the initial bond requirement to \$1 million dollars. This initial bond would then escalate by \$1 million dollars each year, which a licensee could optionally prevent by demonstrating compliance with the relevant milestone. The Commission's proposal would allow good faith licensees to reduce their cost and increase their flexibility while providing strong incentive for speculative or unprepared applicants to surrender their licenses early. A lower threshold to entry and greater flexibility would also help promote innovation and new entrants in the satellite services industry.

Boeing strongly concurs with the Commission's proposal to bring its ITU notification process in line with the rest of the world. As the Commission recognizes, and the industry has explained at length, the Commission's current ITU notification process needlessly exposes U.S. applicants to regulatory risk that is not shared by their foreign competitors, potentially driving applicants and investment to countries with more favorable regulations.

Boeing agrees with the recommendation of SIA that the Commission should recognize the decade of interference-free operation of selective power systems by deleting the current requirement that such systems operate under a 1 dB reduction as compared to non-selective power systems. The history of successful protection of adjacent satellites by multiple operators—many of which are coordinated for power levels higher than the 1 dB reduction—demonstrates that the exceedingly accurate network control incorporated into modern selective power systems can reliably protect adjacent satellites without the need for an additional safety margin. As a result, the 1 dB reduction for selective power systems does not provide any measurable benefit, but does impose a significant reduction in performance capacity.

Finally, Boeing urges the Commission to modify its satellite end-of-life disposal rules to accommodate satellites that comply with the Commission's orbital debris mitigation policy, but are not designed to fully vent all stored pressure. Such alternative compliance is consistent with the standard practices of the U.S. Government and the European space agencies, and would promote administrative efficiency for the Commission and satellite operators while preserving the Commission's policy of orbital debris mitigation.

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The Boeing Company (“Boeing”) commends the Commission on the comprehensive revisions included in the Part 25 Further Notice of Proposed Rulemaking (“*Notice*”),<sup>1</sup> and in particular the Commission’s renewed attention to the need for reform of the Commission’s regulations applicable to satellite services. The proposals in the *Notice*, with minor modifications as detailed below, will improve the efficiency of these rules for licensees and for the Commission. As the comments in this proceeding uniformly state, the Commission’s policy goals can be fulfilled through more flexible and less burdensome procedures, which in turn will promote innovation, competition, and investment in satellite communications.

**I. THE COMMISSION’S RULES FOR MILESTONES AND BONDS SHOULD NOT IMPOSE UNNECESSARY DELAY, UNCERTAINTY, OR ADMINISTRATIVE BURDENS ON SATELLITE OPERATORS**

As the *Notice* acknowledges, the milestone and bond requirements in the Commission’s rules exist to deter warehousing of spectrum and orbital resources by satellite licensees and provide the Commission with assurance that satellite operators are diligently pursuing

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<sup>1</sup> See Comprehensive Review of Licensing and Operating Rules for Satellite Services, IB Docket No. 12-267, *Further Notice of Proposed Rulemaking*, FCC 14-142 (Sep. 30, 2014) (“*Notice*”).

construction and launch of their proposed satellites.<sup>2</sup> Boeing agrees that speculative applications and warehousing are harmful to the satellite industry as a whole because they introduce uncertainty, artificial scarcity, and increased prices.<sup>3</sup> The Commission’s mechanisms to prevent such warehousing, however, should be carefully calibrated to achieve this function without imposing unnecessary administrative burdens, delays, or uncertainty on satellite licensees. As many commenters in this proceeding have explained, the Commission’s satellite milestone and bond requirements can and should be streamlined to promote greater efficiency.<sup>4</sup>

In particular, the Critical Design Review (“CDR”) milestone has grown substantially beyond its original purpose as an initial, easily-verifiable checkpoint in the satellite development process. When the Commission adopted the CDR milestone, it indicated that it would not prescribe a particular method for licensees to show that they have met the milestone, instead providing examples of the kinds of evidence that such a showing could include.<sup>5</sup> In practice, however, anecdotal evidence suggests that the Commission staff now routinely specifies submission of the entire CDR documentation. Thus, what the Commission originally described as an occasional necessity appears to have become the norm.<sup>6</sup> Such an in-depth analysis of the CDR package not only requires disclosure of sensitive proprietary design documentation,

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<sup>2</sup> *Id.*

<sup>3</sup> *Id.*

<sup>4</sup> Comments of Comments of Echostar Satellite Operating Company & Hughes Network Systems, LLC, IB Docket No. 12-267, at 2-3, 5-7 (Apr. 1, 2014); *See, e.g.* Reply Comments of Inmarsat, IB Docket No. 12-267, at 2-3 (Feb. 13, 2013); Comments of SIA, IB Docket No. 12-267, at 14-15 (Jan. 14, 2013).

<sup>5</sup> *See* Amendment of the Commission’s Space Station Licensing Rules and Policies, IB Docket No. 02-34, *First Report and Order and Further Notice of Proposed Rulemaking*, 18 FCC Rcd 10760, ¶ 191 (2003) (“*Space Station Licensing Reform Order*”).

<sup>6</sup> *Id.*

creating a business risk for licensees, it also has a tendency to escalate the CDR milestone into a protracted review, significantly beyond its original function. The lengthy review of the CDR and other milestone requirements also forces licensees to pay for and maintain their performance bond at a higher dollar amount for a more protracted period.

Ultimately, as the Commission noted in its 2013 Part 25 Report and Order, the satellite licensing rules should strive to increase the flexibility of licensees and Commission staff with regard to milestone showings and bond requirements.<sup>7</sup> The *Notice* proposes several options for such reform that Boeing would support.

#### **A. The Commission Should Accept Satellite Manufacturer Affidavits for CDR Milestone Compliance**

Boeing agrees that the Commission should accept corroborative affidavits from independent satellite manufacturers and evidence of appropriate payment in addition to certifications from licensees as *prima facie* evidence of compliance with the year two CDR milestone.<sup>8</sup> The Commission has long acknowledged that such affidavits provide useful evidence to corroborate compliance with CDR requirements.<sup>9</sup> Boeing recognizes that self-certification alone provides insufficient assurance that a licensee has in fact met the spacecraft CDR milestone. Affidavits from independent manufacturers, however, are a very reliable indicator of whether the manufacturer has completed the milestone. The completion of a

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<sup>7</sup> See Comprehensive Review of Licensing and Operating Rules for Satellite Services, *Report and Order*, FCC 13-111 ¶ 47 (Aug. 9, 2013) (“*Part 25 Order*”).

<sup>8</sup> *Id.*, ¶ 29; 47 C.F.R. § 25.164(a)(1-2).

<sup>9</sup> See *Space Station Licensing Reform Order*, ¶ 191. The Commission also routinely uses independent affidavits to verify the factual circumstances of other complex situations. See, e.g., 47 C.F.R. § 73.3555 (accepting affidavits from independent broker affirming that active and serious efforts are being made to sell a station and that no reasonable offer has been received).

spacecraft CDR is usually coupled with contractual requirements for significant payments by the licensee to the manufacturer. An independent manufacturer therefore has no incentive to assert in an affidavit that a spacecraft CDR has been completed unless this is actually the case.

The Commission can easily incorporate the additional assurance of an independent manufacturer's CDR certification affidavit into its process by allowing or requiring a licensee to sign the affidavit as well, attesting to its accuracy. Such a procedure combines the reliability of certification by an independent, economically-motivated entity with the legally-enforceable statement of an entity that is under the Commission's jurisdiction. There is broad satellite industry support for this proposal, and Boeing has worked with others in the industry to prepare the following proposed standard elements for a manufacturer CDR milestone certification:

1. The CDR meeting agenda;
2. The CDR meeting minutes (in redacted form if appropriate), including identification of participants;
3. A statement of when and for how long the CDR team met;
4. A statement that the satellite's planned coverage area, orbital location, and frequencies conform to the licensed satellite;<sup>10</sup>
5. Signatures attesting to the accuracy of the certification from both the satellite licensee and the satellite's manufacturer.

Accepting this alternative or additional certification will give the Commission and licensees an administratively efficient and more secure way to provide the Commission with high confidence that licensees are proceeding on schedule.

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<sup>10</sup> This more limited technical information would be sufficient to show that the satellite being designed and constructed corresponds to the satellite system set forth in the licensee's initial license application. *FNPRM*, ¶ 24.

## **B. The Commission Should Formalize the Construction Milestone Compliance Certification**

In addition to the CDR milestone compliance certification, the Commission should also accept a similar certification as highly probative evidence of compliance with the year three commencement of construction milestone.<sup>11</sup> As with the CDR milestone, adopting a standardized set of clear, reliable, and easily verifiable indicators will promote administrative efficiency for the Commission and for licensees. In the case of the commencement of construction milestone, a few core elements can provide the Commission with high confidence without requiring the preparation of an extensive and potentially burdensome or critically confidential milestone showing package. In cooperation with other representatives of the satellite industry, Boeing proposes the following as a standard package:

1. A picture of the satellite's communications panel or primary structure;
2. A statement of the percentage of the satellite contract paid to date; and
3. Signatures attesting to the accuracy of the certification from both the satellite licensee and the satellite's manufacturer.

Boeing urges the Commission to incorporate both of the proposed standardized milestone showings packages into its rules as sufficient to provide *prima facie* evidence that the licensee has complied with its milestone requirements.

## **C. The Commission Should Deem Milestone Showings Compliant After 60 Days**

Boeing further agrees with the proposal of SIA that, absent affirmative steps by the Commission such as removing it from streamlined processing or issuing formal questions to the

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<sup>11</sup> 47 C.F.R. § 25.164(a)(1-2).

licensee, a licensee's milestone showings should be deemed compliant after 60 days.<sup>12</sup> Establishing an expected upper bound on the processing time for most milestone showings will promote administrative efficiency and provide increased certainty for satellite operators.

#### **D. The Commission Should Maintain Bonds Values in Million Dollar Increments**

Boeing does not agree with the proposal to index bond requirements to inflation because such changes would provide little additional assurance against warehousing while increasing the administrative burden and expense for applicants.<sup>13</sup> It is highly unlikely that a marginal increase in the existing multi-million dollar bond by basing it on the Gross Domestic Product Chain-type Price Index (GDP-CPI) would have any measurable additional deterrent effect on bad actors. It would, however, add unnecessary administrative complexity to manage constantly changing bond amounts. As the Commission has acknowledged, administrative burdens may deter new entrants.<sup>14</sup> Thus, the Commission should maintain the simple and familiar million dollar increments for satellite bonds.

#### **E. The Commission Should Reform its Milestone and Bond Requirements**

The *Notice* correctly observes that the milestone and bond requirements are closely linked, and proposes several useful reforms that would streamline and harmonize their related functions.<sup>15</sup> Although Boeing expresses support herein for certain modifications to the

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<sup>12</sup> Comments of SIA, IB Docket No. 07-114, at 4 (Jan. 29, 2015) (“*SIA Comments*”).

<sup>13</sup> *Notice*, ¶ 31.

<sup>14</sup> *See, e.g., id.*, Statement of Commissioner Clyburn at 1; Comprehensive Review of Licensing and Operating Rules for Satellite Services, IB Docket No. 12-267, Notice of Proposed Rulemaking, FCC 12-117 ¶ 3 (2012).

<sup>15</sup> *Notice*, ¶¶ 21, 34.

Commission's milestone and bond requirements that Boeing believes may be particularly beneficial, Boeing also recognizes that some suggestions made by others within the satellite industry may also have considerable merit. Boeing therefore believes that the goal of adopting clearly recognizable improvements to the Commission's milestone and bond requirements should not be deterred by a lack of complete consensus within the industry on which improvements to make, or the details of their implementation. Some experimentation may be necessary and appropriate to implement reforms that provide the most appropriate balance between the goal of deterring warehousing of spectrum and orbital resources and the critical need for administrative efficiency to encourage commercial investment.

#### **1. The Commission Should Make Interim Milestones Optional**

Boeing strongly supports making interim milestones optional. Optional milestones would significantly increase the flexibility for operators, incentivizing new entrants and innovative satellite systems by reducing the risk if technical or business factors prevent an operator from precisely adhering to the Commission's milestone schedule. The Commission's primary concern is that licensees proceed steadily toward the final, and mandatory, launch and commencement of operations milestone. Optional interim milestones, with an escalating bond provision, as discussed below, would still retain significant weight because they would impose a regular, clear, and expensive decision point for operators that were not fully committed or technically prepared to proceed with an application.

## 2. The Commission Should Start the Bond at \$1 Million and Escalate the Bond Value Only Upon Missing a Milestone

Boeing strongly supports the Commission's proposal to reduce the surety bond requirement, and tie the bond value to the individual licensee's milestone performance.<sup>16</sup> Under the proposal described in the *Notice*, the bond value would start at \$1 million dollars and increase by \$1 million dollar each year. The licensee would then have the option of preventing this increase by demonstrating compliance with the next optional milestone requirement. This arrangement correctly captures the relationship between the assurance provided by the milestone process—that is, directly demonstrating an operator's diligence and progress—and the alternate avenue of assurance provided by the bond process—that is, indirectly demonstrating an operator's commitment by creating a clear and substantial negative consequence to failure.

Ultimately, a surety bond functions both as a visible indication of an operator's confidence and, upon default, as a punishment on the operator for imposing on the industry the uncertainty and inefficiency created by warehousing spectrum and orbital resources that could be put to productive use by a committed and capable operator. Bonds that are relatively high, however, such as the current bond amount of \$3 million for GSO stations and \$5 million for NGSO stations,<sup>17</sup> significantly increase the business risk of new satellite services, potentially deterring new entrants or innovative new services.<sup>18</sup>

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<sup>16</sup> *Id.*, ¶ 34.

<sup>17</sup> 47 C.F.R. § 25.165.

<sup>18</sup> *See, e.g.* Amendment of the Commission's Space Station Licensing Rules and Policies, IB Docket No. 02-34, First Order on Reconsideration and Fifth Report and Order, FCC 04-147 ¶ 35 (2004) ("*Fifth Report and Order*").

In defending its bond amounts of \$3 million and \$5 million, the Commission has observed that such amounts are nominal compared to the price of a satellite,<sup>19</sup> which is true. Satellite licensees, however, do not pay the entire cost of a satellite immediately upon receiving a license. Instead, such costs begin once a satellite construction contract is executed and continue through an escalating process of increasing payments as the satellite components are designed, ordered, manufactured, and assembled. Even as this process continues, a satellite licensee that is subject to a non-contingent satellite construction contract often can still cancel the contract at any point in the process subject to the payment of a significant cancellation penalty.<sup>20</sup>

Thus, the financial risk faced by satellite licensees escalates throughout the design and construction process, and the Commission's bond requirement should do so as well if a licensee fails to show adequate diligence. Consistent with this, a starting bond of \$1 million would be appropriate and less cost prohibitive, permitting even small businesses or new entrants to cost-effectively begin the satellite licensing process. The provision for annual escalation would rapidly deter unprepared or speculative applicants from continuing the process, while the provision for offsetting this increase through \$1 million dollar reductions for demonstrations of milestone compliance would reward diligent good-faith applicants by allowing them to carry a smaller bond throughout the process, reducing their overall costs.

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<sup>19</sup> See, e.g., *Part 25 Order*, ¶ 40; *Fifth Report and Order* at 31.

<sup>20</sup> See, e.g., *EchoStar Satellite Corporation, For Assignment of Direct Broadcast Satellite Orbital Positions and Channels*, 7 FCC Rcd 1765, 1768-69 (1992) (approving a satellite construction contract that permitted the licensee to terminate the contract for any reason at the licensee's convenience because the licensee would have been required to pay substantial termination penalties); *United States Satellite Broadcasting Company, Inc.*, 3 FCC Rcd 6858, ¶ 16 (1988) (observing that "no contract guarantees completion of construction").

## **F. The Commission Should Adopt Integrated Reforms to its Milestone and Bond Process**

Finally, Boeing agrees with the majority of the Commission's multi-point proposal on how the reforms to the milestone and bond requirements might interact.<sup>21</sup> Combined with the additional recommendations discussed above, the integrated bond and milestone process would significantly reduce the costs and administrative burdens on good-faith licensees and the Commission while providing adequate deterrent against speculative or unprepared operators. Below, Boeing summarizes its recommendations for changes to the satellite licensing process, which are broadly in accord with the Commission's proposal in the Notice:

1. Streamline compliance review with the CDR milestone by accepting manufacturer affidavits and evidence of payment in lieu of CDRs;
2. Streamline compliance review with the commencement of construction milestone by accepting manufacturer affidavits and photographic evidence of construction;
3. Deem milestone showings compliant after 60 days;
4. Make all but the final milestone optional;
5. Set the initial bond requirement for satellite licenses at \$1 million; and
6. Increase the bond requirement by \$1 million each year unless the licensee demonstrates compliance with optional interim milestones.

These integrated milestone and bond requirement reforms together provide a scalable, proportional, and flexible framework that incentivizes an unprepared or speculative applicant to surrender its license early while providing good faith applicants with expanded flexibility as to how to provide the Commission with the necessary assurance that the applicant is proceeding diligently with the construction and launch of the proposed satellite.

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<sup>21</sup> Notice, ¶¶ 30, 34.

## II. THE ITU FILING PROCESS SHOULD PROTECT THE CONFIDENTIALITY AND COMPETITIVENESS OF U.S. OPERATORS

Boeing strongly concurs with the Commission’s recognition, expressed in the *Notice*, that the current satellite space station licensing process needlessly exposes U.S. applicants to regulatory risk that is not shared by their foreign competitors.<sup>22</sup> Accordingly, Boeing supports the Commission’s proposal to modify its International Telecommunications Union (“ITU”) filing process to be consistent with the approach followed by most other administrations throughout the world.

As the *Notice* explains, the Commission’s current process is to delay the submission of Advance Publication of Information (“API”) and Coordination Request filings to the ITU until after a complete and public technical application has been submitted in the International Bureau Filing System (“IBFS”).<sup>23</sup> This conservative and deliberative practice may be laudable from the perspective of ensuring the highest confidence that U.S. licensees are capable and committed. In practice, however, it creates the potential for U.S. licensees to be pre-empted by competing applicants filed through administrations that do not require public disclosure of applications prior to the submission of APIs and Coordination Requests.<sup>24</sup>

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<sup>22</sup> *Id.*, ¶ 7.

<sup>23</sup> *Id.*

<sup>24</sup> *See, e.g.*, Comments of DIRECTV, LLC, GN Docket 14-25 at 9 (“DIRECTV Comments”); Comments of The Boeing Company, IB Docket No. 14-25, at 7-8 (Mar. 31, 2014); Comments of EchoStar/Hughes, GN Docket No. 14-25, at 10-11 (April 1, 2014); Comments of Intelsat License LLC, GN Docket No. 14-25, at 4 (March 31, 2014); Comments of SES Americom, Inc., GN Docket No. 14-25, at 2 (March 31, 2014); Comments of ViaSat, Inc., GN Docket No. 14-25, at 2 (March 31, 2014).

By exposing applicants to uncertainty and “claim jumping”<sup>25</sup> by competitors or speculators, the current process has the effect of incentivizing satellite operators to secure licenses from other administrations to avoid these risks. The availability of a more favorable regulatory process through other administrations may incentivize operators to also purchase satellite hardware, ground station network equipment, and launch services from suppliers in these countries, further disadvantaging U.S. satellite industry competitors and harming the U.S. economy. Thus, Boeing fully supports the Commission’s proposal to unify its ITU coordination procedures with those of the rest of the world.

### **III. THE COMMISSION SHOULD ELIMINATE THE 1 dB REDUCTION FOR SELECTIVE POWER FIXED SATELLITE SERVICE SYSTEMS**

Boeing is pleased that the *Notice* acknowledges the need to maximize the efficiency available from selective power systems through a proposal to remove the existing 1 dB reduction currently required for selective power systems.<sup>26</sup> Given that such systems have now operated for well over a decade without any publicly-reported complaints of interference, Boeing urges the Commission to act on this principle by removing the 1 dB reduction, which is no longer warranted and dramatically impairs the efficiency of selective power satellite communications systems.

As the *Notice* explains, many earth station networks have the ability to dynamically control the radiated power of individual stations to maximize the effectiveness of the network by accommodating factors such as earth station antenna sizes, atmospheric attenuation conditions,

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<sup>25</sup> *DIRECTV Comments* at 9.

<sup>26</sup> *Notice*, ¶ 71.

and satellite receive beam gain contours.<sup>27</sup> When these systems were first developed, the Commission attempted to craft rules that would facilitate the efficient use of the variable power capability while maintaining a margin of error to ensure reliable protection of adjacent satellites from these largely untested systems. Unfortunately, the compromise of a 1 dB reduction for selective power systems has not kept pace with the development of satellite technology and now imposes a substantial and unnecessary performance limitation on these networks.

As SIA explains in its comments, the 1 dB rule may have made sense when selective power allocation was not widely deployed and the Commission had no operational history on which to evaluate it.<sup>28</sup> Today, selective power has been used for a decade by multiple operators with no complaints of interference, many of which have coordinated with adjacent satellite operators to operate without the 1 dB reduction. This history of successful operation demonstrates the exceedingly accurate network control incorporated into modern selective power systems. As a result, adjacent satellites are well protected and the 1 dB reduction for selective power systems does not provide any measurable benefit, but does impose a significant reduction in performance capacity. Boeing therefore supports the recommendation of SIA and others that it is time to remove the 1 dB reduction for selective power systems from the Commission's rules.<sup>29</sup>

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<sup>27</sup> *Id.*

<sup>28</sup> *SIA Comments* at 8.

<sup>29</sup> *See Notice*, ¶ 71 n.98 (listing the rules sections containing the 1 db reduction requirement).

#### **IV. THE COMMISSION'S ORBITAL DEBRIS POLICIES SHOULD PERMIT A *DE MINIMIS* RESIDUAL PRESSURE AT SATELLITE END OF LIFE DISPOSAL**

Boeing supports SIA's recommendation that the Commission modify its satellite end-of-life disposal rule to permit satellites that retain a *de minimis* residual pressure in sealed vessels at the end of life.<sup>30</sup> The current rules require that "all stored energy sources on board the satellite are discharged, by venting excess propellant, discharging batteries, relieving pressure vessels, and other appropriate measures."<sup>31</sup> Boeing concurs that changing the phrase "and other appropriate measures" to "or other appropriate measures" would better align with actual practice, preserve the Commission's goals of orbital debris mitigation, and promote consistency with U.S. federal and European satellite policies. As a practical matter, this change would reduce the administrative burden for satellite operators and entities that wish to communicate with such satellites, which today must make repetitive applications to the Commission seeking a waiver for each affected satellite.

As Boeing, SIA, and others have explained to the International Bureau, a wide range of industry-standard satellite bus designs may be technically incapable of fully venting residual propellant or pressurant.<sup>32</sup> These designs often use a pyrotechnic valve that is fired at the end of initial orbit raising, isolating portions of the propellant system. This isolation itself is a safety feature that ensures reliable operation of the propulsion system, and pyrotechnic valves are a highly consistent mechanism that reduce complexity and increase reliability of satellite systems.

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<sup>30</sup> *Id.*, ¶ 199.

<sup>31</sup> 47 C.F.R. § 25.283(c).

<sup>32</sup> *See, e.g.* Comments of the Satellite Industry Association, PS Docket No. 12-267, at 30 (Jan. 14, 2013).

Designing spacecraft to have full venting capability would remove these safety features and add unnecessary uncertainty and risk to the satellite design both during operation and at end of life.

Any residual pressure remaining in sealed vessels at the end of satellite life does not pose a risk of explosion because by design it is almost entirely depleted prior to isolation. A typical value for such designs is residual pressure of no more than five percent of maximum expected operating pressure, which is already far below the burst pressure of the vessel. Modern pressure vessels are designed with a range of safety systems, including protection from exterior impact and “Leak-Before-Burst” construction.<sup>33</sup> Thus, residual pressure systems are designed to provide the same high degree of orbital debris mitigation as systems that can be fully depleted.

Furthermore, the isolation of unnecessary systems and the *de minimis* residual pressure at end of life is consistent with U.S. and international standards. The U.S. Government’s Orbital Debris Mitigation Standard Practices specify that “[a]ll on-board sources of stored energy of a spacecraft or upper stage should be depleted *or safed* when they are no longer required for mission operations or postmission disposal.”<sup>34</sup> The depletion and isolation of all but *de minimis* residual mass of propellant or pressurant, stored in protected, burst-resistant containers, satisfies the goals of this policy. The European Code of Conduct for Space Debris Mitigation provides similar latitude to operators when it comes to passivation, providing a specific pair of alternative

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<sup>33</sup> See Standard: Space Systems — Composite Overwrapped Pressure Vessels (COPVs), ANSI/AIAA S-081A-2006.

<sup>34</sup> U.S. Government Orbital Debris Mitigation Standard Practices at Section 2-2 (emphasis added) (available at [http://www.nesdis.noaa.gov/CRSRA/files/USG\\_Orbital%20Debris\\_Standard\\_Practices.pdf](http://www.nesdis.noaa.gov/CRSRA/files/USG_Orbital%20Debris_Standard_Practices.pdf)) (last visited Jan. 22, 2015).

measures to be employed for satellite designs that retain residual pressure.<sup>35</sup> Boeing therefore encourages the Commission to make this minor modification to its rules, which will increase the efficiency of satellite system licensing while preserving the Commission's orbital debris mitigation policy.

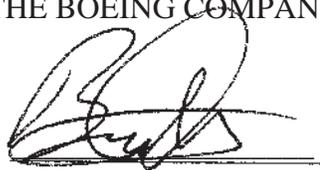
## V. CONCLUSION

For the reasons discussed herein, the Commission should adopt the proposals to streamline its milestone and bond requirements, eliminate unnecessary power reductions, permit safe residual pressure at satellite end of life, and conform its ITU notification practices to international standards. These reforms will more closely match the Commission's rules to its dual policy goals of ensuring the safety and efficiency of satellite operations while promoting investment and innovation in the satellite industry.

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<sup>35</sup> European Code of Conduct for Space Debris Mitigation, at Section 4.2.1 (p. 9) (June 28, 2004) (available at <http://www.unoosa.org/pdf/spacelaw/sd/2004-B5-10.pdf>) (last visited Jan. 22, 2015).