

Development of Best Practices for the Sustainability of Space Operations

October 2018

- The Global VSAT Forum and a number of space industry organizations (Space Organizations) have led the formation of a comprehensive endorsement of best practices for the sustainability of space operations for satellite systems.
- Development of these practices was spurred by concerns regarding the space community's potential unpreparedness for the impending proliferation of Non-Geosynchronous Orbit (NGSO) large constellations.
- The assembled best practices span all phases of spaceflight (mission design, launch, checkout, space operations and disposal). "Endorsement of Best Practices for Sustainability of Space Operations" would commit the signatories to endorsing, promoting and striving to implement these specified best practices to ensure the safety and commercial viability of current and future space activities and to preserve the space environment for current and future generations.

Major components to the document are:

- I. Space industry endorsement of and planned adherence to current international best practices and standards, to include IADC and UN guidelines for international space debris mitigation, as well as ISO TC 20/SC 14 standard 24113: "Space Systems - Space Debris Mitigation"
- II. Endorsement of additional best practices not captured in current IADC, UN or ISO documents that are seen as critical to maintaining safe space operations in all orbital regimes (both NGSO and GSO), including:
 - a. **Operator exchange of information** relevant to safety-of-flight and collision avoidance with other space operators and stakeholders in accordance with each operator's country export regulations;
 - b. Satellite operator **selection of launch vehicles** with due consideration of sustainability of the space operating environment;
 - c. Responsible **mission and constellation design** to make space safety for spacecraft and constellations a priority;
 - d. Commitment to **spacecraft designs** that facilitate successful disposal, actively avoid collisions, minimize casualty risk, mitigate the risk of post-mission fragmentation, ensure sensor trackability and facilitate spacecraft servicing and eventual removal;
 - e. Commitment to **space operations** that actively avoid collisions, properly passivate satellites either upon end-of-mission or after a suitable active collision avoidance phase has been completed, dispose the satellites within 5 years of end-of-mission for manoeuvring spacecraft and maintain accurate spacecraft positional knowledge.

Adoption of these best practices in the near term by Space Organizations will advance the safety of the space environment. We plan to begin unveiling this document publicly in the fall of 2018, including at upcoming international meetings, to obtain additional support. Current status:

1. Participating operators reached initial technical consensus in mid-September 2018
2. Space Organizations are currently completing internal review
3. Have not formally opened the document up for signature
4. Already received many verbal commitments (potentially a quorum) to sign the document
5. Want to make a first public announcement of this activity at IAC as part of the Space Debris session

Global VSAT Forum Limited

Headquarters: Fountain Court, 2 Victoria Square, Victoria Street, St. Albans, Hertfordshire AL1 3TF, U.K.

Registered Office: Suite 1, 3rd Floor, 11-12 St. James's Square, London, SW1Y 4LB, U.K.

Headquarters Telephone: +44 (0)1727 884 513

U.S. Office: 51 Louisiana Avenue N.W., Washington D.C. 20001, U.S.A.

A Not-for-Profit Company Incorporated in the United Kingdom & Limited by Guarantee

Company Number: 03414971 VAT No. GB695 1439 05

The GVF logo is registered with the United States Patent & Trademark Office – No. 5 433 273

Relevance to Long-Term Sustainability (LTS) consensus guidelines

Many of the best practices for space sustainability summarized above are directly relevant to and consistent with the Long-Term Sustainability of Space Activities (LTS) consensus guidelines developed by members of UN COPUOS during their deliberations. The following is a quick assessment of the endorsed best practices and their harmonization of with and contributions to meeting consensus LTS guidelines.

Guideline	Guideline Title	LTS Year	GVF Endorsement Doc
Policy and regulatory framework for space activities			
1	Adopt, revise and amend, as necessary, national regulatory frameworks for outer space activities	2016	
2	Consider a number of elements when developing, revising or amending, as necessary, national regulatory frameworks for outer space activities	2016	
3	Supervise national space activities	2016	
4	Ensure the equitable, rational and efficient use of the radio frequency spectrum and the various orbital regions used by satellites	2016	
6	Enhance the practice of registering space objects	2018	Endorses spacecraft owner, operator and stakeholder exchange of information relevant to safety-of-flight and collision avoidance with other space operators and stakeholders
Safety of space operations			
11	Provide updated contact information and share information on space objects and orbital events	2018	Endorses data sharing relevant to orbital debris mitigation and collision avoidance
12	Improve accuracy of orbital data on space objects and enhance the practice and utility of sharing orbital information on space objects	2016	Endorses accurate orbit solutions and data sharing
13	Promote the collection, sharing and dissemination of space debris monitoring information	2016	
14	Perform conjunction assessment during all orbital phases of controlled flight	2018	Endorses performing Active Collision Avoidance so long as it remains possible for the spacecraft to do so
15	Develop practical approaches for pre-launch conjunction assessment	2018	
16	Share operational space weather data and forecasts	2106	
17	Develop space weather models and tools and collect established practices on the mitigation of space weather effects	2016	
30	Design and operation of space objects regardless of their physical and operational characteristics	2018	Endorses practices are generally independent of size/form factor/function.
31	Take measures to address risks associated with the uncontrolled re-entry of space objects	2018	Advocates for design for demise and 1.e-4 casualty risk per spacecraft
32	Observe measures of precaution when using sources of laser beams passing through outer space	2018	
International cooperation, capacity-building and awareness			
23	Promote and facilitate international cooperation in support of the long-term sustainability of outer space activities	2018	Promotes industry awareness
24	Share experience related to the long-term sustainability of outer space activities and develop new procedures, as appropriate, for information exchange	2018	Promotes industry awareness
25	Promote and support capacity-building	2016	Promotes industry awareness
26	Raise awareness of space activities	2016	Promotes industry awareness
Scientific and technical research and development			
27	Promote and support research into and the development of ways to support sustainable exploration and use of outer space	2016	
28	Investigate and consider new measures to manage the space debris population in the long term	2016	

Global VSAT Forum Limited

Headquarters: Fountain Court, 2 Victoria Square, Victoria Street, St. Albans, Hertfordshire AL1 3TF, U.K.

Registered Office: Suite 1, 3rd Floor, 11-12 St. James's Square, London, SW1Y 4LB, U.K.

Headquarters Telephone: +44 (0)1727 884 513

U.S. Office: 51 Louisiana Avenue N.W., Washington D.C. 20001, U.S.A.

A Not-for-Profit Company Incorporated in the United Kingdom & Limited by Guarantee

Company Number: 03414971 VAT No. GB695 1439 05

The GVF logo is registered with the United States Patent & Trademark Office – No. 5 433 273