The Space Data Association:
A New Model for International Cooperation in Space

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A New Model for Cooperation

The formation of the Space Data Association (SDA) represents an interesting model for international cooperation in space activities. The SDA is a not for profit organization incorporated in the Isle of Man, part of

the British Isles, and was formed by the world's three largest satellite operators, SES, Intelsat, and Inmarsat. What makes the SDA unique is that unlike other international organizations that are largely focused on the pursuit of either academic or scientific goals, the SDA is focused on directly improving the safety of the orbital operational environment by focusing on both radio frequency interference mitigation and collision avoidance. The SDA is also of interest in that it has been formed voluntarily by commercial interests to act as an industry self-regulating body whose beneficiaries are the customers, shareholders, and ultimately the general public which the satellite communications industry serves.

Although founded by the industry's three largest players, membership is open to every satellite and spacecraft operator in the world and at the time of the writing of this paper, the SDA has attracted a number of additional members. The SDA is not established as an exclusive organization, but rather as an inclusive one.

The Association was created as an organization that can embrace the various aspects of the commercial and governmental space markets. In this way it can cross international boundaries to better and practically encourage global cooperation for improvement in the use of the space environment crossing the industry/government divide. In essence the SDA has been established to provide the necessary legal framework for the sharing of specific data essential to the safe and efficient operation of spacecraft and for the identification of point sources of common interference to satellites. It meets its objectives by creating and maintaining a series of secure databases around the world that house critical operational data relating to two primary areas of space awareness: collision avoidance monitoring, and radio frequency interference reduction, but also supports points of contact data sharing and anticipates other types of data sharing such as Space Weather data.

The Isle of Man was chosen as the home jurisdiction because of its internationally recognized corporate legal system, high standing in the arena of international financial regulation with the OECD, IMF, US Government and others, the pro-space stance of its government, the advanced state of its satellite finance industry and associated space-based financial services markets, and the absence of an official space agency, allowing a neutral and level playing field to attract the greatest number of potential members. It also follows closely the UK Generally Accepted Accounting Practice, guaranteeing transparency for all members.

Evolution of the Industry

The advent of the SDA marks an evolution in the satellite communications industry with the industry voluntarily seeking to regulate itself and to provide a logical, and more importantly, formal solution to an issue that has existed since the satellite communications industry began. Prior to the SDA, the question of spatial awareness, as it pertains to collision avoidance in the geostationary arc, and radio frequency interference was handled on an ad hoc basis by the individual operators. Any sharing of the data necessary to avoid collisions or to address issues of interference had been handled by convention via a gentlemen's agreement. Every satellite operator would keep such data at significant cost to itself with no way of knowing for certain the accuracy of the data, aside from that in respect of its own satellites. No formal process existed. Interaction between operators was on a best efforts, manual basis. Existing regulations do not properly address the practicalities of the interactions required. The SDA is voluntarily codifying this prior convention to give greater clarity of process in an increasingly mature space environment which in turn aids new entrants into the industry and ensures the efficient use of resources. In this regard, the SDA embodies the growth and maturity of the industry in its approach to good governance, logical self-regulation and a new level of global corporate citizenship.

The first set of data submitted by members to the SDA databases relates to situational space awareness in order to prevent potential collisions in space. Where exactly are your own satellites in relation to those of your neighbors? What if you are moving a satellite? Can you do so safely? In the past answers to such questions, which are crucial for the safe operation of space assets, could come only via a series of meetings and calls with your competitors, probably facilitated through little more than personal relationships and informal networks within the industry. In the days of INGOs this might have been acceptable, but in today's commercial environment, given the nature of the assets employed, the many commercial players, new uses of the geostationary arc and the associated potential risk of lost business, this is simply unacceptable. Reliance on third parties such as the USSTRATCOM to perform a 'neighborhood watch' on behalf of the satellite industry has been an ill-fitting compromise which does not properly address the space industry's needs. Hence the logic behind the creation of the SDA.

The member operators voluntarily make their data accessible to all other members to enable what is essentially air traffic control in

geostationary orbit. Having such accurate and up-to-date data on file from the operators of the spacecraft themselves greatly increases the utility of the data. It reduces the risk of false or untimely data being used inadvertently, as was potentially the case with the former informal system. The need for maneuvers of existing craft is thus minimized thereby reducing their use of fuel and allowing costly assets to remain safely on orbit. There is also an incentive upon the members to ensure the data they provide is accurate. Any errors in the system can only adversely affect the operators themselves and hence a strong feedback loop is in place to ensure proper use and oversight by all members.

As well as the operators, the insurance companies are beneficiaries since they have a greater surety of reducing the risk of collisions. Similarly governments that, along with the operators, would ultimately be financially responsible for such accidents under the UN Outer Space Treaty and Conventions.

The establishment of the SDA database brings other advantages. A single standard is applied to the data meaning it can be read accurately at any time by any user of the system thus removing errors inherent in using data provided in differing formats. Member data is more current and accurate than that held by, and required by, national governments and international governmental organizations whose operations are not intended and, therefore, not properly suited to serve the needs which the SDA is seeking to fulfill. The SDA member data is standardized and supports all users. With the big three establishing the SDA as a non-commercial not for profit organization and fronting the costs, the industry's largest players have, at their own expense, voluntarily subsidized the creation of this vital facility for all players in the industry. A remarkable example of co-opetition: competitors acting together for the common good.

The SDA database will support any commonly used orbit regime: GEO, MEO, LEO and is currently supporting both GEO and LEO members' Conjunction Assessment processing

US Government data on orbital positioning, via ground-based radar from NORAD for example, and others are still crucial and still of use, most especially in the tracking of dead or drifting satellites and debris. In fact, the SDA database complements the existing military information sources. A logical step is to utilize the best available data sources, including redundant sources where available, to ensure the highest confidence in data accuracy. Accordingly, the SDA intends to utilize multiple data sources and expends considerable efforts, through its technical adviser, Analytical Graphics, Inc (AGI) and the Center for Space Standards & Innovation

(CSSI), in evaluating the accuracy of different data sources and the data of its members data. Once accepted as fit-for-purpose, the SDA's Space Data Center (SDC) system automatically validates data supplied by its members.

With regard to the tracking of point source interference to the radio frequencies operated by the worlds' satellite fleets in geostationary orbit, the SDA also plays a key role.

Radio frequency interference is a constant issue for those operating satellites. Radio interference can prevent the use of specific or, in some cases, all of the transponders of satellites operating from geostationary orbit and hence impact adversely on the quality and availability of services to customers with the consequent effect on revenues. It is estimated that the approximate cost of such interference impacts the global satellite industry by millions of dollars annually. Individual operators and companies can experience the same source of interference. Each would often find themselves spending many man-hours and revenues solving the same interference issue leading to orders of magnitude of needlessly duplicated efforts and costs. Often they would also find themselves in different stages of solving such interference issues: what one operator would be solving today another might have solved a month or more prior, more duplicated effort. Also, each operator would have to keep their own databases of past events and their solutions. More duplication and worse, duplicated cost that in turn causes prices to rise and profits to decline to shareholders.

Measurement techniques for identifying the sources of interference signals require accurate, up-to-date data on the satellites in the neighborhood of a satellite being interfered with; and any delay in obtaining the data will extend the service degradation or outage caused by the interference. The SDC provides a repository for this data to be available immediately when a member has need. Accurate information on radio frequency interference requires many sets of differing data, which in turn meant that many operators would manage their own data to different data protocols and data standards. The SDA now provides one standard for al operators. In the past such data would be shared on an ad hoc basis by the operator, if at all. There has also never been a standard agreement to protect commercially sensitive data, all of this adding to cost and risk.

However, with the SDA database the operators now have one source for all such data, drawing from the now combined historical databases of the members and up-to-date data provided in near-real-time. The data is now continuously available in a timely and uninterrupted fashion along with solutions. All members of the SDA sign up to data management controls to ensure that this data is used appropriately and not for

commercial gain. The SDA membership legal framework resolves issues of risk and liability, protecting its members from undue liability but also providing significant penalties for misuse of the data.

At present, membership of the SDA is open to all commercial satellite operators. Additionally, relationships with commercial entities will be entered into when it is in the best interests of the members; members will choose which activities they are involved in and to which they provide their data. The authors can envisage a time when membership will also be open to governments and government agencies working in space, specifically in the case of the civilian agencies such as NASA, ESA, NOAA and others who also utilize the geostationary orbit. This is equally true for those agencies and statutory bodies who regulate the use of radio frequencies in Earth Orbit such as the ITU, Ofcom, and the FCC.

In regards to other government users of the geostationary orbit, most specifically the military (USAF and NATO) the author can envisage a special membership where they could have access to the commercial data available, but without having to list the position or status of their space assets. Using the analogy of a very crowded harbor, the SDA is in essence placing navigation lights on all of the commercial traffic in that harbor so the others users of the harbor can note their positions and avoid them.

There could be a time when launch vehicle service providers and insurance companies are also invited to join, perhaps as observing or associated members. This is logical given the need for insurers to calculate risk in terms of orbit insertion and collision avoidance thus seeing membership of the SDA as a means to reduce insurance premiums, for example with members getting better rates than those who are not members. In the case of launch service providers, understanding the geostationary asset and debris environment is crucial to ensure clean windows for orbital insertion either directly, with the case of the Proton launch vehicles, or GTO with others.

The SDA databases specifically in regards to interference issues could also be opened up to the users of satellites, for example those who purchase and utilize VSAT and other networks from satellites, as they will have a vested interest in identifying and preventing radio frequency interference to the satellites they depend upon for their businesses.

Conclusion

Ultimately the entire space sector is benefiting from the creation of the

Space Data Association and this proactive voluntary move by the founding satellite operators, not only in terms of the enhanced and now formalized orbital situational awareness, point source interference identification and resolution, reducing costs and increasing safety, and efficient use of resources throughout the space sector, but also in providing a viable model for international cooperation. The SDA's formation and work also stands as proof of good corporate governance in space: public good from private resources ensuring the most efficient use of the most limited natural resource known to humanity, radio frequencies. Its founders are to be commended.

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Stewart Sanders

Stewart Sanders is responsible for the SES fleet planning activities, including procurement of new satellites and associated launch vehicles; this role also has responsibility for SES's technical innovation activities. Prior to this role, Stewart was SES's SVP for Customer Service Delivery, responsible for the monitoring and control of all real-time customer operations on the SES fleet. Having studied electronics and telecommunications in the UK while working for British Telecom International (BTI), Stewart joined Intelsat in 1987, initially working in Japan. Since then he has travelled extensively during his more than 30 years' experience in the satellite communication industry, having fulfilled various satellite and payload operations roles for BTI, Intelsat, ICO, NEW SKIES SATELLITES and SES. Stewart was actively involved in setting up the Space Data Association, working with industry colleagues from Intelsat and Inmarsat in particular, and is a Director and the Chairman of the data sharing organisation. He also worked closely with other industry bodies such as sIRG, WBU-ISOG, GVF, EUI and other satellite operators in a number of initiatives targeting RF Interference. Stewart has an MBA from the University of Liverpool and lives in Luxembourg with his wife and three well-travelled children. In his spare time he enjoys music, reading and sports, in particular rugby.

Christopher Stott

Mr. Christopher Stott is Chairman and Chief Executive Officer of ManSat, the global orbital frequencies and regulatory services company headquartered on the Isle of Man with offices in London, Houston, and Cape Canaveral. Founder of the Space Industry on the Isle of Man, Chris has also served as the Manx Government's Honorary Representative to the Space Community, and in 2010 was named Celton Manx Isle of Man Business Person of the Year.

In addition to his work with ManSat, Chris is passionate about space education and serves on the Main Boards of the Society of Satellite Professionals International (SSPI) where he is Vice President of Education, the International Institute of Space Commerce (IISC), and the International Space University (ISU) where he is also on Faculty and is Co-Chair of the School of Management and Business, the United Space School Foundation, the Conrad Foundation, and the Challenger Centers.

Chris is also presently the Chairman of the Manna Energy Foundation and serves on the Board of the Amar Appeal, working in clean water, clean energy, clean telecoms, and human rights in Africa and the Middle East. Working with Google's TIDES Foundation, the Manna Energy Foundation's Geeks Without Frontiers program recently completed the world's first open source 80211s aimed at bringing over one billion people more to the Internet.

Chris is one of the Founders of Odyssey Moon, the first entrant to the Google Lunar X Prize, and serves on its Main Board. Formerly of Lockheed Martin Space Operations and the Boeing Company, Chris has also worked extensively in British and American politics. In London working in the British House of Commons and House of Lords, and Washington DC working in the US Senate and on the Chairman's Staff of two US Presidential Campaigns.

Prior to his work in space, Chris was Special Projects Director with Life Education International, a children's health education and drug prevention program, a United Nations Non Governmental Organization (N.G.O.), working with fifty million children in over 27 nations around the world.

Educated at Millfield School in Somerset, England, Chris attended the University of Kent, Canterbury where he obtained a Bachelor of Arts Degree, with Honours, in American Studies Politics and Government. Chris also received a Diploma from the University of California, San Diego in International Relations and Marine Policy (Scripps Institute of Oceanography). Chris holds his Masters Degree in Space Sciences (Msc) from the ISU.

A published Fellow of the Royal Astronomical Society, the International Institute of Space Commerce, and a member of the International Institute of Space Law, Chris was the co-author of Europe's first work on space privatization and commercialization, "A Space For Enterprise; the aerospace industries after government monopoly", Stott & Watson, Adam Smith Institute, London, 1994. Chris has also contributed to a number of other publications, most recently Space Commerce, the previous volume in this series.