Today there are millions of VSAT terminals in operation worldwide. Market estimates project continued growth as devices trend smaller and cheaper, coupled with an increasing deployment of Internet of Things (IoT) and mobility applications. But, the impressive growth history and rosy projections for further VSAT growth should be tempered by potential storm clouds on the horizon: VSAT systems are already responsible for the majority of all interference, according to the Satellite Interference Reduction Group (IRG). Arguably, VSAT networks are one of the most challenging satellite environments to manage, especially with respect to interference, defying traditional monitoring techniques, taking operators weeks to months to find the offending terminals. Continued VSAT growth complicates the interference picture for the industry. Fortunately, recent innovations in detecting and mitigating VSAT interference have arrived to tackle this challenge. These advances are being used by some of the largest operators, such as SES, who are now able to resolve VSAT interference in minutes as opposed to months, as well as proactively monitor VSAT interference. In this article, we'll address the unique interference challenges presented by VSATs and the game-changing solution for solving this problem.

The major challenge with VSAT interference is the operation in TDMA mode, where many terminals share the same frequencies. A mis-pointed terminal will normally operate flawlessly; otherwise the problem would be detected and corrected. The misalignment is not affecting normal operations, but can disturb services on the opposite polarization or adjacent satellites. Traditional tools cannot tackle the TDMA nature of VSATs efficiently, making it very difficult to determine which terminals are the sources of interference.

The only way to identify an offending VSAT has been to isolate terminals in groups through binary search; narrowing down the group size until eventually the interfering terminal was found. This is a lengthy troubleshooting process, especially for large networks that also disturbs user traffic. As a result, interference can continue for weeks or months on end, or, an interfered segment might simply be left unused.

The growth of VSAT interference has been fueled by reduced equipment cost, reduced installation costs, and relaxed procedures for bringing terminals online. The major cause, however, has been the inability to police and monitor VSAT terminal interference with efficient, automated tools. This has allowed improper installations of VSAT terminals to remain undetected until problems that affect other services are spotted by a satellite operator. When the problem is detected, it is complex to solve without suitable monitoring solutions.

No more woes from VSAT interference

VSAT networks have enabled incredible connectivity capabilities, and as such are growing at a rapid rate. While this is fantastic for consumers, enterprises and governments around the world, VSAT networks are one of the greatest sources of interference today. Petter Amundsen, General Manager at Kratos Norway, outlines how VSAT interference can be effectively mitigated in a matter of minutes, solving a key global connectivity challenge.

![Satellite Interference](image)

**Figure 1. SatGuard identifies the source of interference (ASI and XPOL) by the VSAT terminal ID**
“What is impossible today will be possible tomorrow”
—K. Tsiolkovsky

NOVEMBER 4
50 years since RSCC was founded

Visit RSCC stand at CommunicAsia Show, stand 1VI-07
www.rscc.ru
**Existing approaches**

Current carrier monitoring systems perform RF characterization and detect the interference, but RF characterization cannot provide any insight or actionable intelligence as to which specific terminals are causing the problem.

The introduction of the SatGuard solution from Kratos changes this situation. For the first time, it is possible to monitor the level of interference AND identify the responsible VSAT by its terminal ID. This ID is the same identifier used in the VSAT hub station for managing the terminals. SatGuard extracts this ID from the operational link bursts, analyzes and correlates the links and the power levels of each burst, generating a list of all the terminals causing interference by power level and terminal ID. It can measure levels of XPI/ASI for each terminal as low as -10dB SNR. Martin Coleman, Executive Director of the Satellite Interference Reduction Group, an industry consortium dedicated to reducing global interference, observed that “the SatGuard solution is widely regarded in the industry as a game changer.”

**In action**

SES, a leading satellite operator, has been using SatGuard operationally for more than 24 months with systems deployed across its global network. “Issues caused by MF-TDMA systems contribute to almost 50 percent of all of our interference events,” explained Chris Grogan, Senior Vice President of Customer Service Delivery at SES. “SatGuard has transformed our capability in dealing with these problems, and we routinely work with adjacent satellite operators and service providers, giving them specific terminal information in order to expedite resolution of any problems. We have had cases whereby the time taken from receipt of a complaint, through the analysis and escalation phases to permanent resolution of the problem has taken less than 10 minutes.”

**Proactive and pre-emptive**

Once an interfering terminal is identified by its specific ID, it can be remotely switched off by the network operator or other remediation measures can be initiated such as re-aligning the antennas. The ability to identify VSAT interference in minutes rather than weeks or months is generally experienced as a great boost to workforce productivity. Staff time spent mitigating VSAT interference can now be used on more productive activities. Customer satisfaction benefits as well. With issues resolved quickly, quality of service can be maintained with fewer service penalties. Even better, operators can monitor VSAT interference proactively in real-time, in the same way continuous carriers are monitored. By measuring and reporting when terminals levels might be approaching interference, problems can be prevented and network performance optimized.

**Autonomous**

SatGuard operates independently of the VSAT network it is monitoring, requiring no interaction with the VSAT hub equipment. After the offending terminal IDs have been found, the network operator is informed about which terminal IDs are causing interference and can then do the required actions to resolve the interference. SatGuard supports open standard VSAT technologies such as DVB-RCS/RCS2 along with major proprietary VSAT technologies, and can be adapted to specific VSAT technologies at request (Figure 2).

**Geolocation**

Prior to SatGuard, geolocating a VSAT system had been difficult due to the TDMA signal nature, with many terminals sharing the same frequency. With the SatGuard technology incorporated into satID, Kratos’ geolocation product, precise geolocation of an interfering VSAT is now possible, with the same accuracy as for continuous signals. This capability can be used to verify the location of terminals, or to allow operators or regulators to validate whether the terminals are being used in the licensed areas.

**New VSAT interference monitoring capabilities**

Kratos is adding the ability to demodulate GSM carriers caused by VSAT retransmission, enabling the operators to find the base station position by demodulation of the GSM carrier contents. Together with the geolocation ability of VSAT terminals being introduced in satID, the terminal causing the GSM retransmission can then be identified.

Given this newly introduced VSAT interference monitoring technology complementing other Kratos satellite communication monitoring solutions, satellite operators, service providers and network operators around the globe are now able to perform comprehensive VSAT monitoring, including automatic classification of TDMA carriers in real-time, VSAT interference management, and geolocation of VSAT terminals by terminal ID. When utilizing this technology, VSAT interference is minimized and operations improved for all satellite industry participants.

---

*Figure 2. SatGuard has been tested for multiple platforms, and supports over 90 percent of deployed VSATs.*
The World’s Leading
Original Equipment and Design Manufacturer
of Communication Antennas

www.jonsa.com.tw

JONSA Technologies Co., LTD.
No. 206 Cheng-Kung 3 Rd.,
Nan Kang Industrial Park Nantou, Taiwan
Tel: 886-49-2260666 Fax: 886-49-2260675
E-mail: saccount@jonsa.com.tw