

Photo courtesy of Shutterstock.

Geolocation, geolocation, geolocation

SAT Corporation, a wholly owned subsidiary of Integral Systems, continues to focus on the RF measurement, interference detection and signal analysis business. With twenty years experience, the company has developed a great understanding of the RF measurement, interference detection and signal analysis business. Helen Jameson spoke to Bob Potter, President of Sat Corporation and John Friedman, Product Manager satID® products RT Logic to find out more about their satID system.

Question: How is business currently for Integral Systems, Inc., and where in the world are you doing most of your business at the moment?

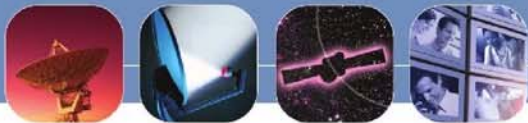
Bob Potter: We are a global company with customers in every region of the world. Our core business is solid and we continue to see

growth in international markets. In fact, over the last six months we have announced new contracts with NATO, Japan's Broadcasting Satellite Corporation (B-SAT), and Mitsubishi Electric Corporation.

In February, we acquired satID® products and technology, and we see a strong demand

for both geolocation systems in the international market and satellite command and control solutions.

It is worth noting that in July, Integral Systems was ranked in the top 40 on Fortune's prestigious "100 Fastest-Growing Small Public Companies in the US" list.



Question: Have you, as a provider of geolocation systems, seen any impact of the current global economic situation?

Bob Potter: The economic situation has impacted every market sector; however, aerospace, particularly satellite communications, has not experienced the dramatic decreases seen elsewhere. In fact, according to the 2009 Space Report, "...the space industry managed to maintain and increase its revenues in 2008."

Integral Systems has continued to maintain its strong presence because we offer a significant value proposition to all our customers. Our comprehensive product suite and turnkey solutions allow our customers to optimize their operations. We can easily expand their core ground segment capability with intelligent enhancements in signal interference, geolocation, frequency management, and network management.

Signal interference can result in lost bandwidth and degraded quality of service leading to lost revenue. Today's economic environment simply does not allow any missed opportunities for revenue generation or efficiencies in operation. Our integrated interference detection and geolocation products – Sigmon®, Monics®, and satID® – enable Integral Systems' customers to maintain and improve their quality of service and revenue stream. As a result, we continue to see strong growth in this market.

Question: From which market sectors is most demand for the satID system? Is it coming from the commercial or more military side?

John Friedman: Both commercial and military systems are exposed to an increasing amount of interference. Thus, there continues to be high demand in the both market segments for interference detection and analysis using Monics and interference geolocation using satID®.

Monics' unique ability to analyze multiple signals occupying the same frequency space provides satellite operators and users with timely alarms and accurate interference measurements. satID delivers the fastest, most accurate, and simplest geolocation system available today. Together, these benefits make Monics® and satID® the most widely used tools within the commercial and military markets, and demand is always increasing.

When discussing demand, it is important to distinguish between systems and services. Commercial (Satellite Operators and large satellite users) and Military customers place a very high priority on being able to perform its missions without relying on vendor support. For example the US military has found it possible for entry-level technicians to be very effective with the Monics® and satID® systems without requiring significant Integral Systems technical support. Monics® and

satID®'s ease of use is one of the major reasons why US military customers approach us even after procuring competing systems. On the commercial side, we are seeing a significant demand for on-call services to address interference issues for customers that do not want to procure their own geolocation systems. Monics® and satID® technologies have a global presence supporting these services, and we are actively growing our support capabilities in regions where we see increasing future demand.

Question: The satID intellectual property and other assets have recently been acquired by Integral Systems, Inc. What was behind the decision to take this step?

Bob Potter: Monics® is the interference detection and analysis tool of choice for satellite operators and users. Independent studies by experts familiar with geolocation products have shown that satID® is the fastest, most accurate, and feature-rich geolocation solution available for dealing with complex signals and interference scenarios. Combining the two offerings meets the growing marketplace demand for an integrated interference detection, analysis, and geolocation solution.

Question: How is QinetiQ involved in the acquisition?

Bob Potter: Integral Systems was very aware that we should not lose institutional knowledge and expertise for geolocation systems built up over 20 years at QinetiQ. The acquisition plan ensured that Integral Systems engineers have access to that knowledge and development expertise. A core team of QinetiQ key staff with more than 60 years of cumulative experience in the field, are contracted for the next 12 months to transfer the technology, IP, know-how, and most importantly help provide a seamless transition of service to existing satID customers. Integral and QinetiQ engineers are already working on the next generation of algorithms together to enhance and improve our product.

Question: What are the key features that differentiate satID from the rest of the field?

John Friedman: In the past, there have been a number of instances that show a lack of understanding of the problems and serve only to confuse the market of which features are important in a repeatable, fast accurate geolocation system. Below we clear up those misunderstandings and describe some essential features that should be present in any credible geolocation system.

Knowledge of satellite ephemeris data (gives satellite position in space) is a fundamental requirement for any geolocation system. It is usually the dominant source of error, as uncertainty of the position of the two

satellites leads to greater uncertainty of the frequency and time measurements giving inaccurate geolocation estimates. As with our competitor products, satID® can use two-line element (TLE) ephemeris data – publicly available for most satellites – to generate a relatively coarse geolocation estimate. The problem with TLE data is that it is not very accurate and is typically updated every couple of days, so it can often be quite stale. To address this, satID® has the unique ability to correct TLE data. This patented capability, termed Ephemeris Error Compensation (EEC™), produces corrected TLE data several orders of magnitude more accurate than the original, thereby increasing the accuracy of the geolocation estimate often to the sub-kilometre range. EEC is a capability not found elsewhere in the marketplace, and is a major discriminator between satID and its competitors.

It has been reported in the past that FDOA is either not accurate or not needed for geolocation. Both statements are inaccurate and show a lack of understanding of interference occurrences and/or a lack of ability to measure frequency difference accurately. There are many interference occurrences caused by signals with no timing information, such as unmodulated Carrier Wave (CW) signals or periodic signals (sweepers), which are either impossible or impractical or slow to geolocate with TDOA only.

Fast, accurate FDOA measurement capability is a must have to locate the complete set of interference scenarios that occur in geolocated satellites. Our EEC capability gives us the ability to make highly accurate Frequency Difference of Arrival (FDOA) measurements.

Relying on TDOA only requires that either measurements from three satellites be taken, or that several hours pass between measurements from two satellites. With the ability to mix TDOA and FDOA measurements, the operator can obtain instantaneous geolocation estimates using only two satellites. This expands the number of scenarios where geolocation is possible to include those where TDOA alone is impossible or impractical. For example the fact that FDOA lines vary on the earth's surface over a relatively short time is a distinct advantage (and not a problem as has been reported elsewhere) as it allows signals with no time signature to be located accurately and quickly.

For older satellites, the second-most dominant error source (after ephemeris error) is often phase noise on the transponder. The satID system uses patented techniques to eliminate the effects of this noise, and produce corrected TDOA and FDOA measurements. This dramatically increases geolocation estimate accuracy. The accuracy of FDOA results without EEC and phase-



Photo courtesy of US Army.

noise correction are severely reduced, often to the point of uselessness.

Finally, from its beginning, satID® was designed to be an operator-friendly system that can be used by technicians to quickly produce useful results. The feedback from our customers tells us that competing solutions tend to have a more engineering-centric Graphical User Interface (GUI) and lend themselves more to the PhD-level operator than to the technician. With satID, extensive use is made of a "Wizard" interface to automate processing and guide users through the geolocation process. satID's software suite incorporates many tools designed to make the non-expert operator effective with the system. We believe that usability and capability go hand-in-hand, and this is reflected in how we present the satID® system to users.

Question: What will this step mean for

satID and how will it help the product line to develop?

John Friedman: Integral Systems invested in the acquisition of the satID product and continues to invest in all of its products through significant internal research and development. Integral is determined that its products remain best-in-class and is actively working on new algorithms and features to meet the challenges of new frequency bands, more complex multi-beam satellites, and new types of services. For example, Monics now has features that allow users to monitor for interference within a double carrier service (two RF carriers with the same power, centre frequency, and bandwidth).

Question: What will Integral Systems' objectives be for the coming 6-12 months?

Bob Potter: Integral Systems and its subsidiaries – Integral Systems Europe, SAT Corporation, Newpoint Technologies,

Lumistar, and RT Logic – will focus on bringing to market a distinctive set of Commercial-Off-the-Shelf (COTS) products, solutions, and world-class systems engineering services, that will uniquely position us to continue supporting our customers around the globe.

We see the increasing demand for bandwidth driving satellite operators to squeeze more efficiency from their current fleets. Integral Systems' products and services help operators achieve significant operational efficiencies.

We are also well positioned to continue expanding our international footprint. In particular, we see an opportunity to build on our record of success in the Asia-Pacific region where we currently support Intelsat, SES, Eutelsat, Telesat, SingTel/Optus, SKY Perfect JSAT, B-SAT, AsiaSat, NSPO of Taiwan, THAICOM, Mitsubishi Electric Corporation, and MEASAT. ■