



MARKET BRIEFS

**Executive summaries of market trends and opportunities
in key market segments and regions worldwide**

Customization in the Satellite Ground Market

Highlights



- **Satellite Ground Equipment** revenues rose by seven percent in 2016 to reach US\$ 113.4 billion.
- The Satellite Ground Equipment market has been consistently growing by an average of 10 percent per year according to the Satellite Industry Association's annual State of the Art report.
- The growth in the satellite ground equipment market is expected to continue as new High Throughput Satellites and Low Earth orbit constellations are launched in the next few years.

by **Virgil Labrador, Editor-in-Chief**
Satellite Markets and Research

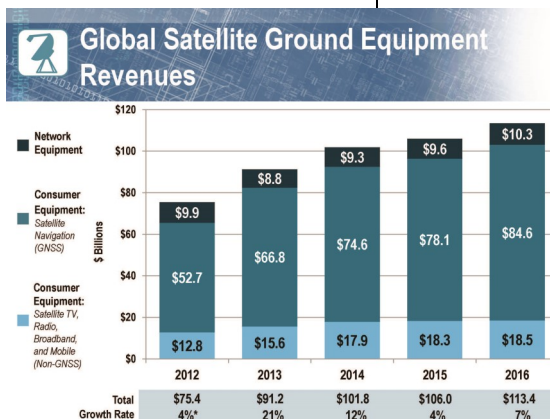
The satellite ground equipment market comprises nearly half (44%) of the total satellite industry revenues in 2016, according to the annual Satellite Industry Report issued by the Satellite Industry Association (SIA). In 2016, satellite ground equipment revenues rose by seven percent to reach US \$113.4 billion. The total revenues for the whole satellite industry in 2016 was US\$ 260.5 Billion.

Among the other satellite industry segments which included the ground segment, satellite manufacturing, satellite launch services, and satellite services markets covered by the SIA report, the ground segment market was one of the most consistent in terms of growth, posting positive growth almost every year since the SIA has been issuing the annual industry report 20 years ago. The global satellite ground station equipment market is projected to continue to post substantial growth in the coming years as new High Throughput Satellites (HTS) and Low Earth Orbit (LEO) satellite systems come on board. Some of the key drivers for these new satellite systems are demands for broadband ac-

cess, cellular backhaul, and mobility applications such as aeronautical and maritime connectivity. It is estimated that some 3.9 Billion people or approximately 60% of the world's population still do not have access to basic internet connections. Satellite technology aims to play a role in promoting broadband access in the near future.

Global shipments for commercial satellite ground equipment will surpass 57 million units by 2025 across all verticals and regions," said Lluc Palerm, NSR analyst and co-author of the report, "Commercial Satellite Ground Segment Report." "Technological transformations are greatly impacting all markets. The transition to HD, Ultra-HD and smart Set Top Boxes (STBs) are generating high growth in the dominant DTH vertical. HTS is the key transformational force, opening new markets while setting new performance requirements for satellite ground platforms," he added.

The increasing demand for connectivity has prompted users of satellite services to demand capable satellite network infrastructure. The global satellite ground station equipment market is highly competitive due to the presence of numerous well-established players. The vendors compete on the basis of technological advancements, low SWaP



7%
2015 - 2016
Global
Growth

The U.S. share of
ground equipment
revenue in 2016
was
42%

(size, weight, power efficiency) platforms, reliability, and economic factors. It is essential for the satellite ground station equipment providers to work closely with satellite operators in order to provide the necessary ground-based equipment suitable for a broad range of services.

“...Customers are continually wanting more power, smaller sizes, lighter weights, and higher power efficiency. Customers are demanding more efficient designs, especially in Communications-on-the-Move (COTM) applications such as airborne, land vehicle-based and maritime, where significant constraints are commonplace...”

-Brian Donnelly, VP-Sales & Marketing, Norsat



Customer Demands

With the increasing demand for connectivity, applications have become more complex where customizations play a key role in manufacturing satellite ground equipment. The industry now expects flexibility, reliability, and innovative designs. With the increased competition in the global satellite ground station equipment market, customer demands generate custom requirements that drive product roadmaps and product design. The key trends with customizations in the ground equipment market include the following:

- Customers are demanding customized solutions to be completed on-time and on-budget.
- Customers are looking for fast deployment of customized solutions at near Off The Shelf prices.
- Design engineers are constrained by requirements such as limited space and weight, leading to more customized projects.
- Customers are requesting product to be built to rigid standards and certification programs such as MIL-STD-810, DO-160, MIL-STD-461, MIL-STD-167, MIL-STD-901 for environmental and emissions.
- Customers are looking for multi-band capability such as Commercial and Military Ka, Standard, Extended, and Low Band Ku
- Customers want very rugged products for harsh operating conditions such as extreme temperatures and climates.

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tions such as airborne, land vehicle-based and maritime, where significant constraints are commonplace,” said Brian Donnelly, Vice-President, Sales and Marketing, Norsat International

As the industry grows, it is essential for satellite ground equipment providers to work closely with their customers to provide the customized equipment needed for each unique application. It is the industry expectation that manufacturers build satellite communication equipment exactly to customers’ specifications. However, like all projects, there are technical restrictions and limited resources available, making it essential for manufacturers and customers to work together in a cooperative and open manner. Successful customization often means negotiating on a compliance matrix and discussing what specifications are critical versus what specifications are not essential in order to meet budget considerations. With so many choices of ground equipment providers competing in the market today, buyers of ground equipment need to make informed decisions in choosing the right provider.

Application Design

Customized satellite ground equipment can often be narrowed down to three critical attributes: size, weight, and power, often shortened to SwaP. These custom designs are essential for applications that are limited in space, weight tolerance, and power budget as opposed to fixed applications where these considerations are not as critical. A manufacturer who has industry experience and the technical capabilities to do customizations make all the difference when designing for SwaP.

Case Study: Thinking Outside of the Box

A North American military organization required an extremely low-profile

block upconverter (BUC) for a COTM application. The BUC had strict specifications on size and weight as the application required a lightweight, small, and inconspicuous design. The design needed to be low profile and discreet as radomes have become a target to military enemies. Norsat International, the chosen vendor, worked together with the military organization to ensure the finished project would be designed exactly as the customer envisioned. Communications commenced early even before the project officially started with technical specifications and initial proof of concepts.

The specified dimensions were flat and the design would be based on Norsat’s 40-Watt ATOM Ku-band BUC. The ATOM BUC was reconfigured and redesigned to fit the customer’s specifications by taking the vertically stacked board layout and separating them, lying them side by side. This layout took a breadbox form factor and turned it to a pizza box form factor. Norsat and the military organization cooperated to ensure that the product completed was what was expected, including revalidating the environmental certifications. Having clear requirements and open communication resulted in project success with the first two units shipped to the customer ahead of schedule. The customer tested the product and provided feedback to Norsat’s engineering team. Norsat then worked with the customer to tweak the design for the final product, which included a high temperature range option beyond the typical 60 degrees Celsius. The customer was thrilled with the end-product and the project moved to volume production.

It was evident from this experience that having clear, well-defined requirements and an open dialogue at the start of the project allows for realistic expectations and a successful partnership.

Engineering Capabilities

Industry experience is not built overnight. There have been many instances where customized end-products are not up to the customer's specifications and this result could be due to various reasons. This overreach could be due to shortness of funding, lack of engineering/production capability, lack of technical skill, and/or overall lack of application expertise. Worse, the customized product could not be completed to specification and fails when deployed in the application. Given some of these programs are over one year in duration a last-minute failure can set a program back by a year and countless dollars. Therefore, it is important to work with a satellite ground equipment provider that can deliver a quality product and not one with little experience and promises the lowest price.

Case Study: Customizations Require Expertise

An example of a customized solution that required high engineering capabilities was provided to Kratos ISE, a leading national security solutions provider. Kratos ISE required a multi-band ground satellite terminal that would work with its existing geolocation system that operated within a larger overall system. The satellite terminal would need to work with Ka (commercial and military), Ku, X, C, and low Ku bands and be easy-to-use and deploy.

Working closely with the customer throughout various design stages, Norsat customized its GLOBETrekker portable 1.2-meter satellite terminal to meet the customer's requirements, adding two extra bands to its existing four band functionalities. Updates to its mechanics were also made to optimize the performance of the GLOBETrekker to meet the customer's specifications, specifically meeting the harsh wind load test to meet Eutelsat requirements for an auto acquire terminal.

Norsat worked with a tight timeline to complete the product and successfully passed the Factory Acceptance Test. Kratos ISE had a great experience with Norsat and acknowledged the high-quality manufacturing that went into the custom engineered GLOBETrekker design. The GLOBETrekker with LinkControl, Norsat's intu-



Norsat's **GLOBETrekker™** is the world's most intelligent fly-away satellite terminal. With a modular architecture that enables easy component swapping in the field, a simple one touch interface, and intelligent LinkControl™ software for automatic satellite acquisition, the GLOBETrekker is both powerful and easy-to-use. Currently deployed by militaries around the world, the GLOBETrekker includes sealed equipment (IP66 compliant) for all-weather use and digital levelling technology for deployment in uneven terrain. Tested to meet MIL-STD 810G standards, and packaged for IATA compliant airline transportation, the GLOBETrekker is ideal for short notice military and commercial deployments, anywhere in the world.

itive and powerful software that stores mission profiles, successfully geolocated C-band and Ku-band signals and acquired satellites in all bands from Oman, a country in the Middle East. Kratos ISE and the end-user were very pleased with the GLOBETrekker terminal.

In this case, it is evident that choosing an experienced vendor with unique engineering capabilities was the reason for project success. The vendor asked the right questions at the start of the project which made the customization process flow smoothly.

Flexible Designs

Often, a customized piece of satellite ground equipment is signs of a bigger, overall project. Choosing a vendor who can design for flexibility and change is essential when a larger project is present. The custom equipment should be intended to work with all the various components and fit seamlessly into the system. In this case, it is extremely important for satellite ground station equipment providers to work closely with the customer to provide the necessary hardware suitable for the project.

Case Study: Designing for the Bigger Picture

The Finnish Army deployed troops to Africa and required a reliable but cost effective SATCOM system that could be installed, operated, and maintained by the Army's own personnel. The Finnish Army and Norsat began co-operating by building a Hub station in Finland and two remote VSAT systems in Africa. Since then, the cooperation grew and developed, resulting in the constant use of the SATCOM net-

work.

The Finnish Defense Forces is now using several land-based remote VSAT systems and maritime systems. Additionally, the HUB station includes multiple 3.8-meter antenna systems, including VMS. These systems were designed, installed, and initially managed by Norsat. Norsat also trained the customer to operate and manage the network over time, a key capability that the customer requested.

From this case, it is important to find a trusted partner with a strong reputation for quality products and services that will save valuable time and resources. Partnering with a manufacturer who has a broad range of products saves time and money if the customer decides to expand on their existing system.

Conclusion

Choosing the correct satellite ground equipment provider depends on many conditions, including, but not limited to: industry expertise, application expertise, production capability, technical skill, communication skills, project management skills and quality programs (e.g. ISO 9000), among others. Though most manufacturers say they can customize your product, many of them do not have the capability to do so for small quantities at a reasonable price point. It is important to thoroughly research the manufacturer and ensure that they have a track record of innovation. Choosing the right manufacturer is essential in meeting the many challenges and complex requirements of the new satellite systems coming in the next few years and the key applications driving these systems.



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