VSAT Market Trends

by Bernardo Schneiderman, Contributing Editor

VSAT (Very Small Aperture Terminal) technology is now a mature satellite communications ground system technology with major players in the global market providing Internet connectivity for small and large corporate networks & ISP operators and backbones and cellular backhaul for telecom operators in the terrestrial segment providing services for consumers. In Maritime and Aeronautical segment VSAT technology penetration is growing in a large scale for both the consumer market (Cruise Ships) and Commercial Airlines and business operation.

This article will cover the following key points of VSAT technology: historic and current trends, the major players in the global market, How the market is evolving and segmentation now and beyond 2017

Historic and Current Trends

The first commercial VSATs were C-band receive-only systems using spread spectrum technology. More than 30,000 units of 60 cm antenna systems were sold in the early 1980s. C -and two-way system was developed during 1984-1985 and sold about 10,000 units using Star Topology.

In the early 80s the worlds' first Ku-band VSAT for oil field drilling and exploration units was developed. Following development of Ku-band VSATs for enterprise customers were implemented. These enterprise terminals made up the vast majority of sites for the next 20 years for two-way data or telephony applications reaching network with 100,000 terminals using Start topology and other using mesh topology.

In 2005 VSAT networks deploying Ka-band was implemented for consumers. Since 2005 millions of consumers in the USA and Europe are using Ka-Band VSAT technology for Internet connectivity using IP protocol.

Today we have VSAT platforms with C-Band, Ku-Band and Ka-Band in the commercial sector with X-Band for Defense.

C-Band VSAT are being used in the majority of segments where the availability of the link is critical for the applications because not impact with rain fade but required large antennas (1.8 meter or more)

Ku-Band is being used for the majority of enterprises worldwide and ISP and Telco Backhaul (requiring 1.2 meter antennas or more)

Ka-Band is being used for Consumer terminal in the majority of application but now is being implemented in some special project for enterprises too. (requiring 60 cm antennas or more).

During the last 20 years the price of the IDU (VSAT modem) went from a few thousand dollars to US$ 300.00 or less but the market is targeting lower price for mass market.

The VSAT terminal today is composed of Antenna, BUC and LNB (Usually Integrated for consumer market) and Modem (IDU – Indoor Unit)

The technology currently for all VSAT network is IP (Internet Protocol) but still have proprietary modem being used from each major VSAT vendor in the market. This means that a modem from vendor A will not talk with modem of vendor B, C or D. This issue never been resolved by the VSAT industry until now beside some efforts, like DVB-RCS was done in the past but only in regards of TX/RX.

The trends in speed of the link now depend more of Satellite Communications capacity used in the network. Ku-Band satellites with High Throughput Capacity and Ka-Band High Focus Beam could support Download of more them 150 Mbps and upload of 20 Mbps but the trends is reach higher data rate during the next 2-3 years with new satellites coming in the global market from existing carriers and new operators like Oneweb and others.

Currently among the main players in the VSAT market are in alphabetic order Advantech, Gilat, Hughes, Idirect and Newtec, among others. Follows are a profile of each company with the main VSAT platforms available with information supplied by each vendor.

Advantech Wireless

Advantech Wireless is a company based in Canada and was founded in 1988 and is a manufacturer of VSAT and Wireless Broadband Communication for Commercial, Critical Infrastructure, Government and Defense Clients. During the period of operations Advantech have deployed equipment over 150 countries.

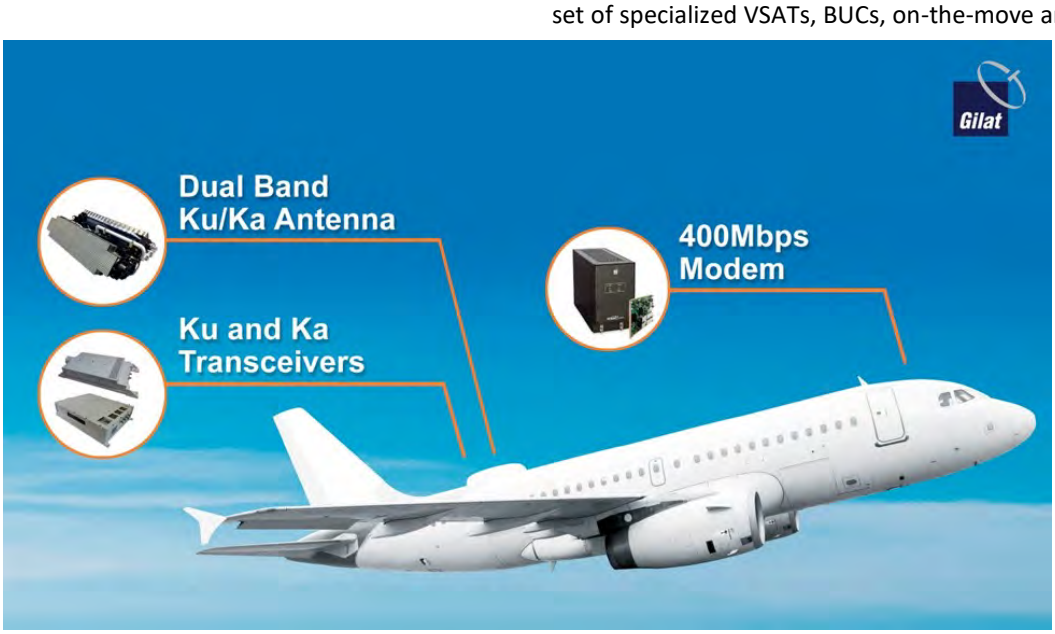
Advantech Wireless believes service and satellite operators today face, more than ever before, a mass of new applications and vertical market opportunities. To expand these new markets in the face of new economic forces, operators can't rely on traditional diverged and separate satellite network solutions. With that in mind Advantech Wireless released its ASAT II™ System - a true multi-service and multi-application satellite network platform. Driven by demand for broadband consumer, industrial IoT/M2M,

enterprise, trunk backhaul and mobile services for always higher throughputs with optimum efficiency, the ASAT II™ System from Advantech Wireless has been designed as a

U9000 VSAT Router with embedded Single Board Computer

scalable multi-service platform configurable to support tens to hundreds of thousands broadband terminals.

Satellites and VSAT platforms nowadays demand higher spectral efficiencies, on the other hand network-wide utilization is the next challenge. Satellite service providers struggle between spectrum-efficient SCPC platforms and the agility provided by MF-TDMA systems. With the ASAT II™ System there is no need to compromise. Using Advantech Wireless WaveSwitch™ technology, ASAT II™ manages 3 Return Link waveforms – RCS2 MF-TDMA, ASCPC – near-SCPC MF-TDMA, and SCPC – simultaneously and seamlessly all on shared Return Link resources. ASAT II™ bandwidth on demand radio resource manager automatically adapts each terminal's waveform to match the terminal application and traffic density. ASAT II™ is a true multi-service ready platform offering a range of VSAT Routers and terminals to meet market needs, all running and sharing same network resources and satellite space segment. This real-time on the fly waveform adaptation allows optimizing network utilization and providing true multi-service operation in today's versatile markets landscape.



ASAT II™ features VSAT Routers and terminals ranging from compact terminals designed for Industrial IoT / M2M and broadband consumer, to enterprise VSAT Routers and high-end terminals designed for trunk and cellular backhaul applications. ASAT II™ terminals go beyond optimizing waveform and the PHY layer (with traffic optimization capabilities such as caching and compression) and opening new possibilities with Multi-access Edge Computing (MEC) capable terminals allowing exciting localized value added services as well as drastically off-loading satellite traffic.

Advantech Wireless expects the same network utilization challenge to manifest in many aspects of modern satellite systems, as the case for beam hopping architecture demonstrates. Advantech Wireless already works with our partners to advance and materialize such new technologies to bring true multi-service and multi-application solutions to the market.

Gilat Satellite Networks

Gilat is a global company operating in ninety countries to provide satellite-based broadband communication since1987. Gilat delivers the ground segment equipment, comprehensive solutions and end-to-end services for both mobility and fixed applications, with a special focus and achievements for in-flight connectivity, consumer broadband and cellular backhaul.

To address the abundance of HTS capacity and the wealth of new satellite communication opportunities, Gilat has brought to market a scalable single platform, SkyEdge II-c, to serve multiple commercial and government applications. The platform is supported by Gilat's distributed X-Architecture based on Software Defined Networking (SDN) and Network Functions Virtualization (NFV) and includes a set of specialized VSATs, BUCs, on-the-move antennas and a centralized network management system.

To meet the demanding market needs of high throughput, enhanced and continuous user experience, bandwidth efficiency, operational advantages, and affordable consumer broadband, Gilat has brought to market several pioneering technologies to address broadband connectivity on land, sea and air.

- The SkyEdge II-c platform is being enhanced with the latest generation wideband DVB-S2X outbound stand-

ard. Gilat is introducing unique true real-time resilient adaptive LDPC inbound TDMA waveform, which enables significant savings of satellite bandwidth costs while delivering highest service availability. Gilat's innovative implementation delivers exceptional spread-spectrum transmission performance, enabling high on-the-move service availability even in the most extreme conditions.

- Patented embedded acceleration techniques that allow mobile network operators to achieve true LTE speeds while overcoming the inherent delay in satellite communications. (Capricorn)
- All outdoor, self-installable, VSAT-in-a-box technology, to reduce barriers to entry enabling affordable broadband to all. (Scorpio)
- Unprecedented throughput reaching up to 400Mbs while enabling transmission at supersonic speeds with Doppler timing compensation. (Taurus)
- Open platform dual-band (Ku/Ka) airborne satellite antenna for in-flight connectivity applications. This unique high bit-rate panel antenna is interoperable with any aero modem. (ER6000-A)

All-in-one terminal for small boats open an untapped market, making affordable connectivity at sea now possible for this underserved maritime segment. Service is now available in a joint offering with SES in the Caribbean. (MarineRay 60P)

Operational benefits are provided via Gilat's network management system, which includes a comprehensive set of mapping tools delivering mobility services to a configurable geographic service area, with automatic beam switching. Gilat's innovative Cloud Quality of Service (QoS) supports global bandwidth management, enabling service providers to provision and manage bandwidth across multiple teleports, satellites and user beams from a central NMS. (TotalNMS)

Hughes Network Systems

Hughes is a company based in the USA and was founded in 1971. Hughes is the world's leading provider of VSAT broadband for home and office, delivering innovative network technologies, managed services, and solutions for enterprises and governments globally. Hughes has manufactured and shipped more than 4 million terminals to customers in over 100 countries, and has consistently maintained a global market share of over 50 percent.

DVB-S2X is a key technology that enables service providers to realize significant improvements on bandwidth efficiency and promises to be rapidly adapted around the world. Hughes actually started shipping DVB-S2X systems in 2016 and to date we have shipped over 70,000 DVB-S2X remote terminals globally. These remote terminals include one important component, the Hughes JUPITER System on a chip, our own in-house designed ASIC (application specific integrated circuit). This innovative and powerful technology not only enables DVB-S2X but also powers all of our processing for the remote terminal and makes every Hughes remote capable of 200 Mbps of throughput. DVB-S2X will continue to play a critical role in satellite network efficiency, but not all DVB-S2X implementations deliver the same capabilities. In particular, the Hughes implementation uses a single stream which means any remote can receive the entire forward channel versus other implementations which require multiple streams or partitions. The DVB-S2X technology supports the trend of delivering higher speeds, and for this, the implementation is critical. The single stream DVB-S2X enables better statistical multiplexing performance and delivers a better end-user experience.

HughesNet Terminal

Airlines around the world are implementing inflight broadband for their passengers and these services are best delivered by VSAT based systems. For Hughes, enabling powerful and flexible aeronautical mobility is a key element of our service and product strategy. The recently announced JUPITER Aero solution offers one of the industry's fastest in-flight Internet connectivity, capable of supporting speeds in excess of 400 Mbps and operates on both Ka- and Ku-band frequencies. These technological strengths make it the ideal solution for commercial air routes throughout the world. The dual-band JUPITER aeronautical terminal is based on ARINC 791 and incorporates a highly advanced Modem Manager (MODMAN) along with an option for a dual Ka- and Ku-band antenna. The terminal is fully compatible with both wide-beam and spot-beam satellites, and supports rapid switching between beams and satellites without loss of session while aircraft traverse the coverage area. Passengers benefit from this flexible technology, enjoying uninterrupted high-speed connectivity around the globe.

In developing parts of the world, we are seeing the development of "community VSATs" or VSATs that are shared amongst many people. This trend is growing as not every consumer in these regions can afford to have a VSAT at their house. A great example of this concept is the deployment of 4G/LTE cell sites which provide high-speed data to

many user terminals. To effectively support this, Hughes has introduced the JUPITER System HT2500 terminal, a next-generation satellite terminal that has native support for accelerating LTE protocols and enabling community VSATs. With support for over 7,500 simultaneous TCP sessions, the terminal is able to deliver accelerated performance for many devices connected simultaneously to the LTE eNodeB. Speeds of 200 Mbps enable the HT2500 to deliver the LTE performance required by mobile operators around the world. The HT2500 with LTE acceleration enables MNOs and governments to bridge the digital divide in a cost-effective way

Idirect EVOLUTION X7 Satellite Remote Router Modem

IDirect

VT iDirect, a subsidiary of VT Systems, is a global leader in IP-based satellite communications providing technology and solutions that enable iDirect partners worldwide to optimize their networks, differentiate their services and profitably expand their businesses. For more than 20 years, the VT iDirect organization has focused on meeting the economic and technology challenges across the satellite industry.

VT iDirect iDirect serves +1600 networks worldwide and +400 Beams of HTS and has sold over 3,500 Hubs and 350,000 Remotes to over 350 network operators remaining to be the world's largest TDMA enterprise VSAT manufacturer. In addition, it is the leader in key industries including mobility, military/government and cellular backhaul.

iDirect's technology provides one of the most scalable, flexible and bandwidth-efficient products in the industry, while also providing iDirect partners with the lowest total cost of ownership for a complete broadband VSAT solution. iDirect's technology will allow to customers to create and implement multiple service plans, each with their own requirements, at the lowest cost of operation, while still meeting their Service Level Agreements (SLAs).

With iDirect's solution, customer will benefit from innovative development culminating in a carrier-class infrastructure platform based on iDirect's Commercial off the Shelf (COTS) technology. This offering leverages industry-leading technology in the key areas of DVB-S2/S2X ACM, Group Quality of Service (GQoS), and Management Systems. The combination of these technologies is critical to executing customer's overall vision for their projects.

Thanks to iDirect long experience in commercial, military and government projects, customers can benefit of the following key features of iDirect Intelligent Platforms:

- Extreme flexibility of the Hub platform: star, SCPC Return, and mesh topologies can be supported from the same hub, addressing up to 5 satellites or 5 different satellite networks from the same hub chassis
- High system efficiency enabled by DVB-S2, DVB-S2X, ACM and Adaptive TDMA, 2D 16-state coding and PCMA combined technologies.
- Superior Group QoS features in order to satisfy even the most complex bandwidth management scenarios
- Tight coupling between ACM / Adaptive TDMA and Group QoS
- Advanced security features such as Link Encryption, FIPS 140-2 Level 3 and TRANSEC
- Native support of mobility and Comms On the Move (COTM) through advanced features such as Global NMS, Automatic Beam Switching, Spread Spectrum, Doppler compensation, Fast Beam Switch, and Fast Re-acquisition
- Leading Network Management System, based on iDirect iVantage software suite, IDirect Pulse Web Management System and complements by SatManage tools.

This year, iDirect is launching DVB-S2X Hub and Remotes designed to unlock the power of High Throughput Satellites (HTS).

To gain the greatest advantage from DVB-S2X, customers need ground infrastructure that supports the full scope of the standard. With iDirect's next-generation DVB-S2X product suite, iDirect is delivering just that – everything from best-in-class remote performance, to a new cost model, to scale infrastructure to support for coming industry advances like intelligent payloads.

The product lineup features powerful Universal Line Cards, a next-generation S2/S2X remote series that integrates a DVB-S2X ASIC chipset that can achieve higher level modcods, aggregate throughputs of 500 Mbps (forecast to increase to 1 Gbps in the future) and greater processing capabilities; And higher hub density and processing capabilities.

With iDirect new product suite, customers can manage migrations from DVB-S2 to DVB-S2X with minimal interruption to business operations, while gaining rapid access to continual technology innovation.

Newtec

Newtec is a company based in Belgium and was founded

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Newtec VSAT modem

in 1985. Newtec has developed satellite communication equipment and technologies for broadcast, government and defense, IP trunking, mobility and consumer and enterprise VSAT.

Newtec's portfolio of satcom products and technologies meet the highest operational requirements for professional reliability and service availability. They can be applied in a wide range of markets such as Broadcast, IP Trunking & Backhauling, Consumer & Enterprise VSAT, Government & Defense, Mobility and their respective applications.

Newtec Dialog supports multiple satellites, multiple frequency bands, regular and spot beam satellites. Scalable from 5 to +100.000s of terminals. With highly efficient DVB-S2X ACM in the forward link, choice between SCPC, MF-TDMA and patented Newtec Mx-DMA® as return link technology a unique range of markets and applications can be covered.

Newtec VSAT terminals are able to transmit 4CPM (Quarternary Continuous Phase Modulation) with TDMA, HRC (High Resolution Coding) with Mx-DMA, DVB-S2X with SCPC and receive a common DVB-S2X ACM waveform. The terminals can be mixed and matched with the application requirements.

Newtec Dialog Release 2.1 gets the most out of High Throughput Satellite capacity, unleashing the power of DVB-S2X and provinding return rates upto 75 Mbps using shared capacity.

Main advantages are: Supporting wide range of applications and services on a single platform. 30% forward efficiency improvement using DVB-S2X, 50% bandwidth saving with Newtec Mx-DMA return link technology and easy OSS/BSS integration using extensive open API.

Conclusion

Trends are to have hubs flexible that can cover all the market segments (backhaul, broadband, mobility etc..) just adding specific software or simple hardware modules. All the remote terminals will be small and cheap due to the new chipsets with SDR (Software Defined Radio) to implement via satellite link all the upgrades.

All the technologies will implement DVB S2X for increasing the throughput in the available transponder bandwidth and will be easy expendable adapting the Hub to the number of transponders to be used in each HTS satellite.

Another major trend in the VSAT market is the antennas that are coming Flat instead of typical Parabolic Antennas for both terrestrial, maritime and aeronautical market.

Base in the last study of NSR below we can see the market share among the main vsat vendor and market segments.

NSR's VSAT and Broadband Satellite Markets 15th Edition forecasts the global installed base for fixed VSATs to increase by 12.2 million by 2025, generating over US$ 133.7 billion in cumulative Service Revenues over the 2015-25 period. Despite near term challenges, insatiable data demand and HTS capacity will ignite long term growth.

The Fixed Enterprise VSAT market also had another challenging year. Developed regions continue to face strong competition from ground networks and market saturation. Additionally, poor macroeconomic factors like currency exchange rates or commodity prices limited growth in emerging economies.

However, NSR sees some positive signs of a turnaround. Cheaper capacity prices are unlocking new markets like Mobile Backhaul, which will become the major driver for growth in the coming years generating over a Tbps of demand by 2025. Despite not returning to the number of shipments pre-slow down, most VSAT ground vendors are now back on a growth track. NSR forecasts the installed base for Fixed Enterprise VSATs to incorporate more than 1 million new sites generating US$ 4.5 billion in net growth for annual service revenues.

This article was written in collaboration with Claudio Mastroianni – Senior Consultant of Telematics Business Consultants, specializing in the VSAT ground segment. He can be reached at cmaistroianni@gmail.com

Bernardo H. Schneiderman is the Principal of Telematics Business Consultants. He can be reached at : info@tbc-telematics.com