With KVH CEO Brent Bruun...

Multi-Orbit Solutions and The Future of Maritime Connectivity

The maritime VSAT market is in transition, catalyzed by the introduction of Starlink and OneWeb, and the evolution of multi-orbit solutions.

KVH, one of the best-known maritime SAT providers, has reshaped its offering to meet the changing market, and in doing so, has sketched a blueprint for managing the rise of NGSO services.

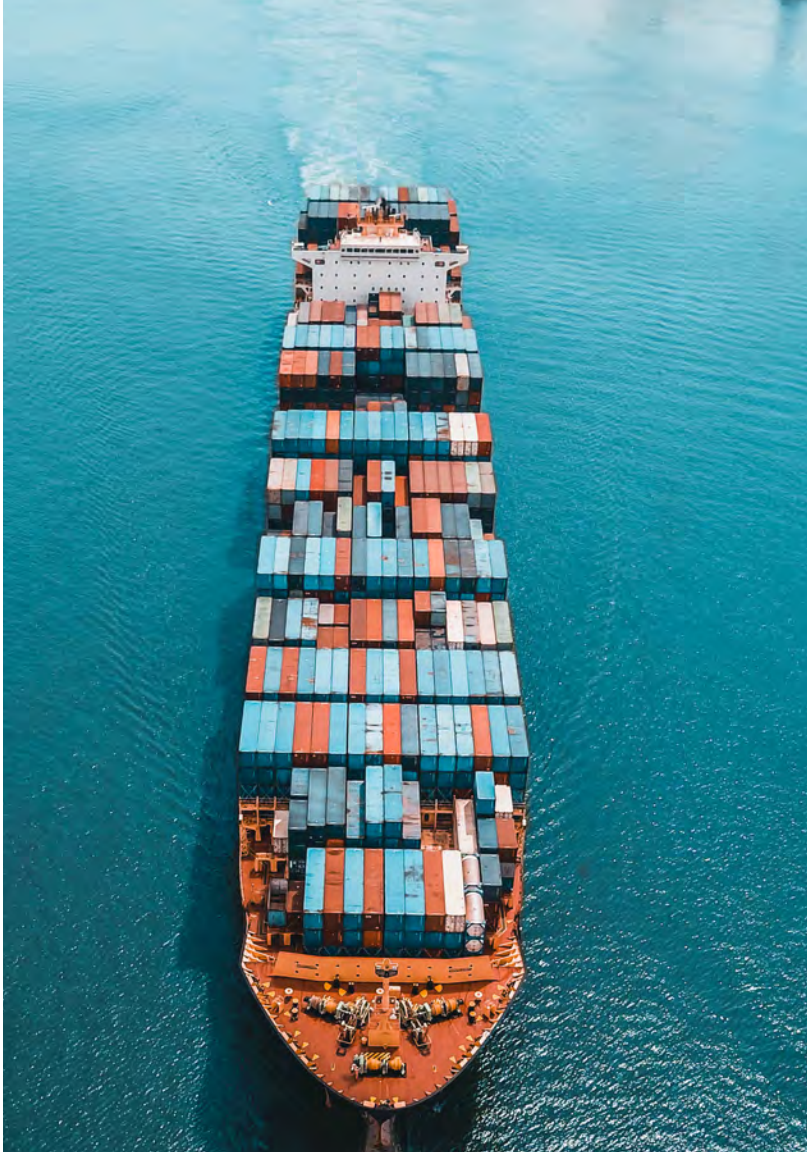
To learn how KVH has addressed the challenge and reshaped itself and its offerings to accommodate the shift to multi-orbit, we met with CEO Brent Bruun.

SMW: According to your Feb 13th press release, KVH is "winding down" its antenna manufacturing business and becoming an agnostic, value-added integrator. Can you discuss LEO's impact on KVH and how it has influenced the change in KVH's strategic direction?

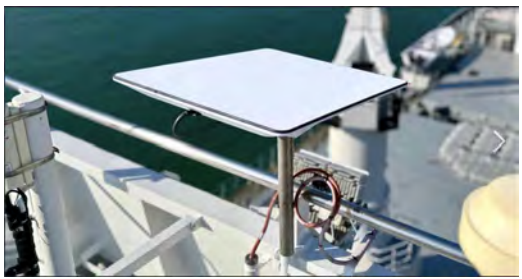
Brent Bruun (Brent): KVH has consistently evolved its offerings to meet market demand. Historically, we have been an integrator, but with our own VSAT products.

We introduced TVRO products in the 1990s and VSAT in the late 2000s, which worked on the Viasat ArcLight platform. In 2017, we transitioned to an iDirect Velocity platform supported by Intelsat Flex with supplemental capacity from Sky Perfect JSAT. During the last two years, we decided to focus on our core offering, airtime. We're now seeing LEO enter the market and a trend toward multi-orbit solutions.

LEO is affecting the entire market but, so far, we have seen the most impact on our 37-cm antenna business – leisure boats less than forty feet in length, work boats, light commercial vessels, Offshore Supply Vessels (OSVs), and fishing vessels are installing it in place of VSAT. In response, we're now selling Starlink to our customers and will soon introduce a 5G service.



We offer a fully integrated GEO-LEO service on larger vessels with 60 cm and larger antennas, transitioning existing customers from a stand-alone VSAT service to a multi-channel, multi-orbit solution. Relying on our new Commbox Edge NMS network management platform, which is designed for onboard management of multi-orbit networks, we're enabling an easy hybrid connectivity transition. In addition to offering our own terminals, we're also buying and reselling Starlink and Iridium expect to to the same for OneWeb.



SMW: Are you seeing a lot of commercial vessels adding LEO to their existing VSAT infrastructure?

Brent: It depends on the location. It's a lengthy decision-making process. We see more LEO additions in the U.S., followed by Europe and Asia, but it's accelerating everywhere. Users want more capacity. We have transitioned from L-band to Ku-band VSAT and now to LEO. It's a natural evolution driven by the desire for lower prices, higher speed, and lower latency, in that order.

SMW: Starlink has significantly impacted the maritime segment. Given the advantages of LEOs and flat panel antennas – ultra-low cost, low maintenance, and easy and low-cost installation, - is there still a long-term role for GEO services? If so, in which segment or segments - tankers, containerships, or bulk carriers – will GEO be deployed and in what applications?

Brent: There will be a strong demand for GEO well into the future. GEOs are proven, reliable, and provide layered coverage. Additionally, VSAT pricing is becoming more affordable and can be used to fill gaps where LEO coverage is unavailable, or where ships can't use it due to regulatory restrictions or licensing. It's the backbone of the services we offer today, and we will use it to provide

more channels onboard a vessel. However, in the future, multi-orbit could be more than GEO-LEO. It could be LEO-LEO, LEO-MEO, or any of these plus 5G.

SMW: Is there still a home for GEO VSAT in military markets, or will they transition to all-NGSO markets?

Brent:I think GEO will still be relevant in military and commercial markets. However, LEO-LEO or LEO-GEO combinations could ultimately be the primary source of capacity.

SMW: Some NGSOs are sold by Maximum Information Rates, and others, under SLAs, guaranteeing minimum bandwidth (CIR) and uptime. Do your customers still prefer SLA-backed services, or are they willing to accept best efforts services if the price is right? Which vessel segments will pay a premium for SLAs?

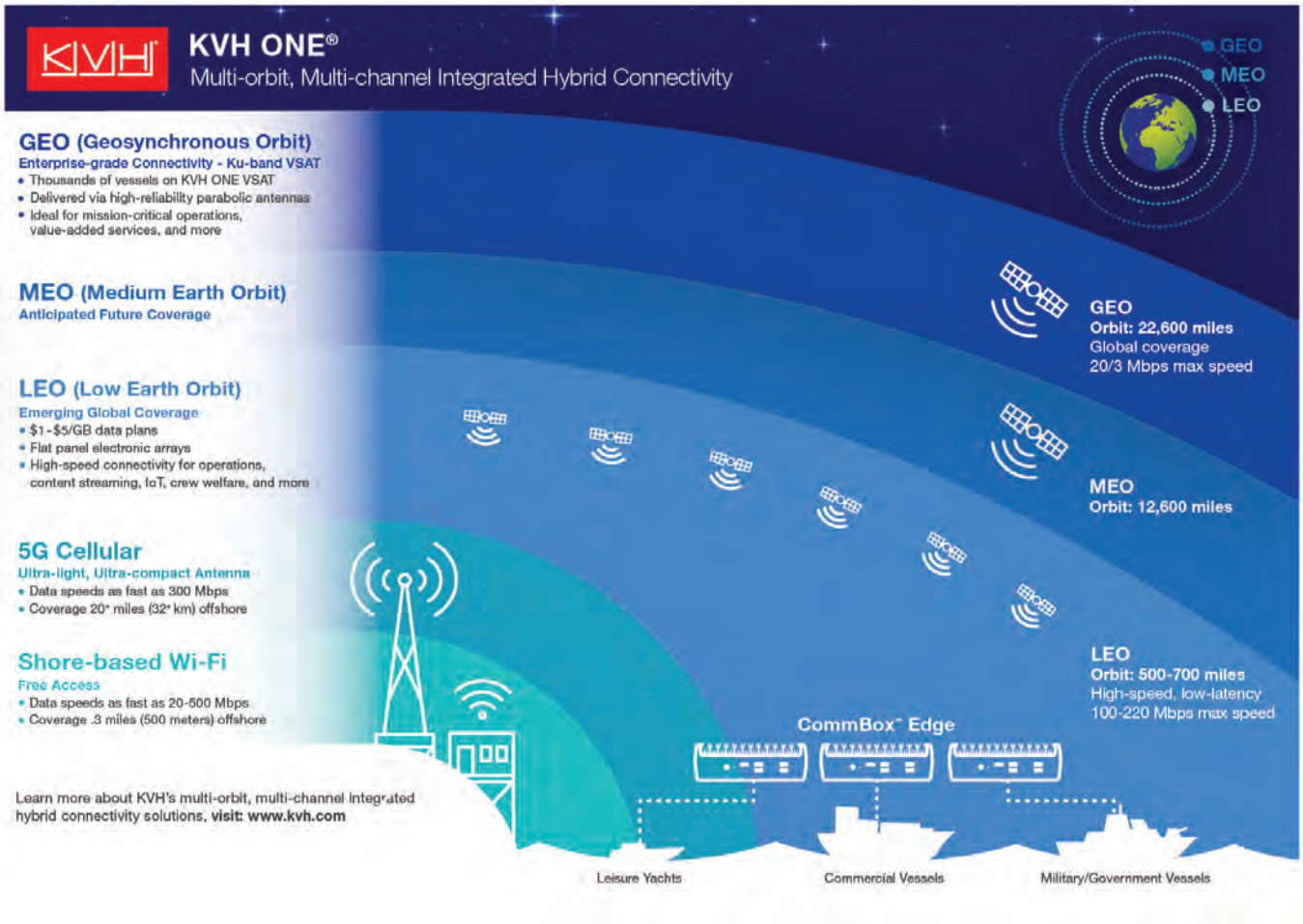
Brent: Commercial vessels typically mandate SLA-backed services. While not yet available on today's LEO offering, we can offer them by combining GEO and LEO in a hybrid configuration. High-end commercial vessels likely insist on SLAs guaranteeing higher CIR vs. Bulk Carriers. However, any vessel that's "blue water" needs to be assured that it can maintain connectivity. That's why an SLA is important.

SMW: LEOs will bring much higher speeds and lower latency to vessels than previously available via VSAT. Will the new LEOs generate opportunities for new value-added services?

Brent: Today, we support crew morale and provide voice services, first-run movies, TV shows, and news from home via digital newspapers and TV News, using our GEO service.

LEO affordability and speeds will

"There will be a strong demand for GEO well into the future. GEOs are proven, reliable, and provide layered coverage. Besides, VSAT pricing is becoming more affordable and can be used to fill gaps where LEO coverage is unavailable, or ships can't use it due to regulatory restrictions or licensing. It's the backbone of the services we offer today, and we will use it to provide more channels onboard a vessel."


KVH ONE®
Multi-orbit, Multi-channel Integrated Hybrid Connectivity
GEO
MEO
LEO
GEO (Geosynchronous Orbit)
Enterprise-grade Connectivity - Ku-band VSAT
• Thousands of vessels on KVH ONE VSAT
• Delivered via high-reliability parabolic antennas
• Ideal for mission-critical operations, value-added services, and more
MEO (Medium Earth Orbit)
Anticipated Future Coverage
LEO (Low Earth Orbit)
Emerging Global Coverage
• $1-$5/GB data plans
• Flat panel electronic arrays
• High-speed connectivity for operations, content streaming, IoT, crew welfare, and more
5G Cellular
Ultra-light, Ultra-compact Antenna
• Data speeds as fast as 300 Mbps
• Coverage 20* miles (32* km) offshore
Shore-based Wi-Fi
Free Access
• Data speeds as fast as 20-500 Mbps
• Coverage .3 miles (500 meters) offshore
GEO
Orbit: 22,600 miles
Global coverage
20/3 Mbps max speed
MEO
Orbit: 12,600 miles
LEO
Orbit: 500-700 miles
High-speed, low-latency
100-220 Mbps max speed
CommBox™ Edge
Learn more about KVH's multi-orbit, multi-channel integrated hybrid connectivity solutions, visit: www.kvh.com
Leisure Yachts
Commercial Vessels
Military/Government Vessels

catalyze demand for value-added services that support new digitalization efforts, expand crew connectivity options, facilitate streaming, enable IoT-based applications, voyage optimization, and more.

SMW: KVH is positioning itself as an agnostic player. Is KVH open to reselling any new LEO or MEO offerings?

Brent: We're focused on multi-orbit, multi-channel solutions. As new services become available, we will assess their merits. We are selling Starlink and Iridium today and have announced that we will soon sell OneWeb.

Beyond our initial two providers, we will determine if it makes sense to expand our service offerings further. KVH products and GEO VSAT service are the core elements of our service, but we will assess any service that could meet customers' needs.

SMW: KVH has recently signed a reseller agreement with Kognitive Networks. Why are you upgrading to their platform, and what new features and capabilities does it offer?

Brent: Our CommBox system, developed more than ten years ago, has been deployed on thousands of vessels. However, market demands are changing, increasing the need for dynamic network and bandwidth management. The advent of multi-orbit networks creates an environment best served by an advanced, network management platform such as Kognitive Networks Edge. That's why we are excited about our partnership with them.

We are branding their technology as CommBox Edge. It's the core of our multi-orbit network integration and management solution, and we are also making it a stand-alone tool for use by other solution providers.

Some of its key features include:

- Simple Prioritization of WAN Connectivity.
- Support for as many as 12 WANs and capacity to create and manage up to 30 LANs aboard ship.

- Channel balancing and bonding between networks.
- PEP WAN optimization to boost speeds and efficiencies.

SMW: How do you make money from the software platform in addition to licensing fees? Can you generate additional revenue streams from software installation, network management, and 24/7 monitoring and support?

Brent: In addition to the licensing fees for stand-alone installations, we offer a comprehensive, integrated solution that includes hardware, installation, airtime, 24/7, 365-day tech support, and field service on a monthly subscription basis. We also have an expert Application Engineering Department that works with our customers on a contract basis to design custom network configurations to meet a fleet's unique needs.

SMW: KVH's no-commitment AgilePlans have been popular. How will the addition of LEO and multi-orbit affect the AgilePlans?

Brent: We already offer LEO services options within our AgilePlans, which eliminate the CAPEX for fleets and covering shipping and installation with month-to-month subscriptions. You sign up for the service. We ship you the equipment, install and activate it.

SMW: How will 5G cellular impact the commercial maritime market?

Brent: Depending on a number of factors, 5G/LTE cell service can be available up to 15 Km or more offshore. Commercial RFPs often ask for supplemental 5G solutions to take advantage of the expanding 5G networks, speeds equivalent to or better than LEO, and competitive pricing.

SMW: Starlink is the only LEO service currently available, and OneWeb will soon be coming online, followed by Kuiper,

Telesat, and others. What does the LEO supply-demand balance look like over the next three years, and do you expect LEO capacity prices to fall significantly?

Brent: Anytime multiple competitors are in the market, there are always opportunities for price reductions. However, bandwidth demand will continue to increase. The bandwidth demand in the market will be sufficient to support multiple LEO and MEO providers.

Bandwidth demand has risen consistently every quarter for the last decade, and I think it's going to accelerate now that vessel operators can buy more bandwidth at a lower cost per bit. Increased use of video conferencing, streaming, digitalization, and IoT applications will continue to drive the demand for more bandwidth as satellite capacity becomes more affordable. ■

Brent C. Bruun was appointed to the KVH Board of Directors in addition to assuming the positions of President and Chief Executive Officer in June of 2022 after previously holding the position of Interim President and CEO . Prior to that, he held the roles of chief operating, executive vice president of mobile broadband, senior vice president of global sales and business development, and vice president of global sales and business development from 2008 to 2022. Mr. Bruun's experience in