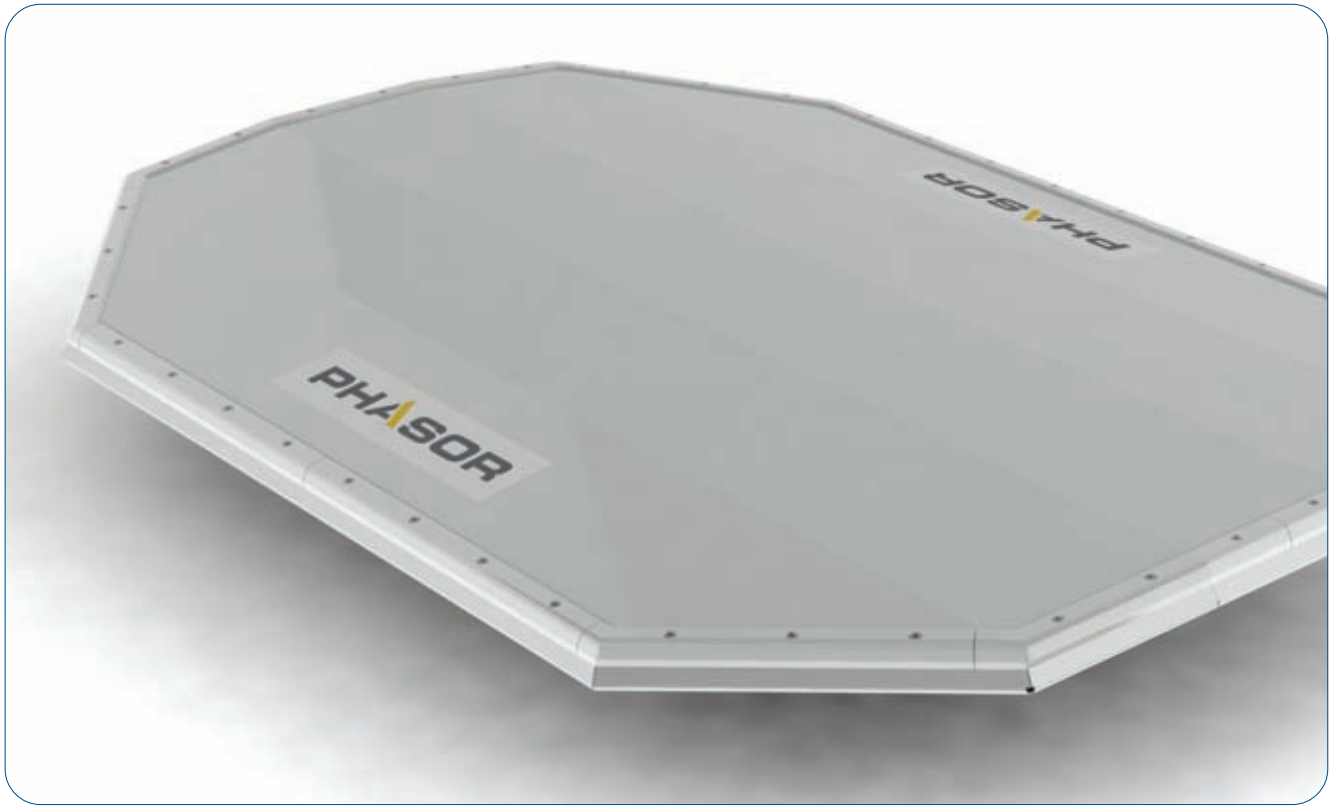

Maritime Quantum Aperture. Photo courtesy of Phasor

A successful, inflection-point year

Phasor was founded to develop innovative phased-array, flat panel antennas for the commercial mobile broadband services market. The modular, electronically steerable antenna (ESA) is expected to provide significant advantages for the aeronautical, maritime, land-mobile and defence communications sectors in terms of performance, flexibility, reliability and scalability. Amy Saunders spoke with David Helfgott, CEO at Phasor, to learn more about the company's most recent steps, and when we might see the first Phasor ESA hit the market.

Question: Phasor has achieved so much since we last spoke in 2016; can you sum up what the company has achieved in the last couple of years?

David Helfgott: It has been a very busy and exciting time for the team and we have taken some significant steps forward as we focus on the commercialisation of our ESA products. Technologically, we demonstrated the impressive performance of the antenna system through the transmission of live HD video over satellite with our partner, Omni Access.

We achieved an uplink performance of 25Mbps with an 8-module system from a moving platform which demanded rapid beam scanning. The Phasor antenna was able to transmit a full HD video stream using efficient MODCODs (Modulation and Coding techniques), avoiding the need for any form of inefficient spread-spectrum techniques and maintained perfect pointing with no adjacent satellite interference (ASI) throughout. These off-satellite tests have confirmed the performance characteristics of our technology.

Since then, we have continued to develop and perfect the capabilities of the system for the different user-markets we will target.

We recently announced that we successfully closed an oversubscribed B-round funding with US$16million, which was raised from a group of leading satellite communications mobility companies, financial investors and shareholders. The round closed in July 2017. This was an important step forward, and now we are fully engaged in the commercialization-phase, preparing to bring our technology to market. The funding has enabled us to expand our team and facilities, and to progress our Release 1 products towards commercial launch. In terms of core technology maturity, we are now moving to Technology Readiness Level (TRL) 8, which means that we are currently preparing for beta test activities. Upon completion of successful field tests, we will release the first maritime and land mobile ESA products, followed by our initial products for the aviation sector. We look forward to keeping the momentum up as we move into the commercial phase.

David Helfgott, CEO at Phasor

Question: Can you tell us about your technology? How does it work, how does it scale, and which use cases do you have the greatest hope for?

David Helfgott: Phasor's mission is to empower mobile broadband access across all commercial use-cases and markets. Phasor is dedicated to meeting the growing, underserved and unmet needs of today's network-centric travellers, who require broadband access everywhere, whether that is in-flight, at sea or over land.

Our electronically-steered antenna system (ESA) consists of multiple, interconnected 'core modules,' each a functioning flat panel antenna. The combined modules create a system that can be scaled from quite small to very large, dependent upon the use-case requirements. The ESA is a software defined antenna which provides unmatched features, flexibility and agility to the system, and will not only meet, but also exceed the requirements of the market. Its sleek and extremely compact design (under two inches high), will allow it to conform to the roof of a train or coach, in line with a ships superstructure or along an aircraft fuselage.

Each core module itself comprises an array of tiny omni-directional antennas. Each element has Phasor's proprietary microchip behind it, containing the entire RF chain. Using an embedded microprocessor, the antenna is able to dynamically control the signal phase and amplitude of each element to steer transmit and receive beams in any direction. It can therefore track any satellite with no moving parts.

High-throughput geosynchronous satellite capacity (HTS-GEO) is being deployed today to serve enterprise and government mobility markets, but the current state of the art of wideband access technology for mobility use-cases is woefully inadequate. The second wave of SATCOM mobility will be the introduction of non-geosynchronous wideband communications satellites (NGSOs). These new wideband NGSO constellations, such as OneWeb, LeoSat and Telesat, will reinforce and accelerate adoption across the market for enterprise mobile broadband connectivity. So, broadband connectivity markets for aeronautical, maritime and land-mobile use-cases, which received a recent boost from the 'first wave' of activity around HTS-GEO, will see another great boost as the 'second wave' of wideband NGSO systems come online. These will improve latency, global coverage and the user-economics of mobile connectivity.

Phasor ESAs will not only communicate with each kind of satellite system, (GEO or NGSO), but will be interoperable between them from a single aperture. This is currently impossible with the state-of-the-art in mechanically-steered SATCOM antennas.

The Phasor ESA system will be introduced commercially in several iterations and frequency bands over the next several years, all designed around the same core technology. For example, there are some customers that want Rx (receive) only. There are some who have requested Tx (transmit) only. There are many more that want a fully duplex (Rx/Tx) ESA system. Our Release 1 products will address each of these requirements in our target markets and use-cases. We are already designing and developing our Release 2 products which will demonstrate even more feature functionality, to be offered in the future.

In terms of target markets, we will be focusing on those that require enterprise grade connectivity. The aeronautical market will be key in terms of the delivery of IFEC services to passenger jets and connectivity for business jets. The maritime segment is also a very important market, with the geometric growth of demand for broadband at sea for cruise ships, ferries and superyachts. The land-mobile market is also growing, so we are looking at commercial coaches and high-speed rail, where reliable and high-quality broadband connectivity for passengers is becoming a critical requirement.

Question: We saw recently that aeronautical is expected to be, by far, the largest source of revenue for flat panel manufacturers, but that the market is challenging because most inflight connectivity providers aren't turning a profit right now. What's your assessment of this news?

David Helfgott: The aeronautical IFC market is the most 'pure-play' for SATCOM connectivity, and the race is on between airlines and between IFC services providers to offer the best, most-reliable, high bandwidth experience to passengers, whilst minimizing the operational cost impacts of drag, weight and inefficient use of satellite spectrum. Therefore, an ultra-thin, low-weight, high-gain and high-performance ESA is clearly best suited.

However, there are far more commercial maritime vessels, across all segments, than there are airframes. Maritime markets were early adopters

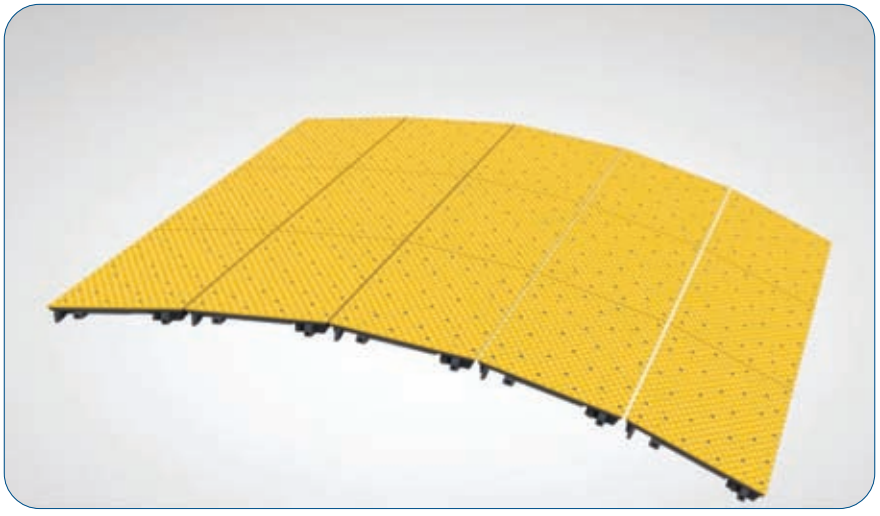

Photo courtesy of Phasor

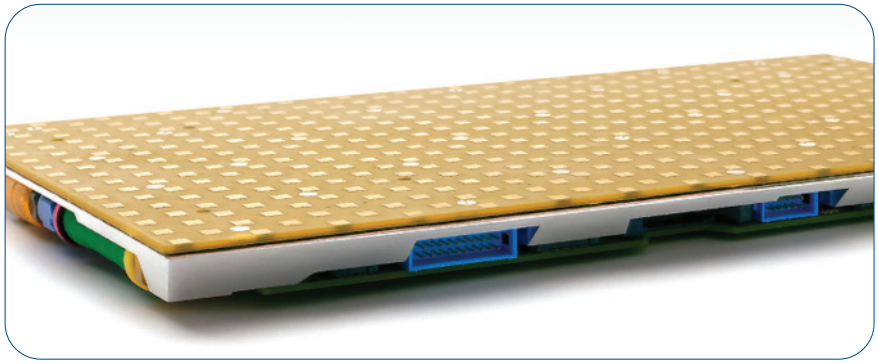

Photo courtesy of Phasor

of VSAT services, (albeit with domed, bulky, 3-axis stabilized mechanical parabolic antenna systems). Today, the combination of scalability, reliability, operational efficiency (and I would add interoperability with LEO and GEO constellations), have put ESAs to the front of the conversation on the future of the connected ship. Additionally, many markets have a requirement for either inconspicuous or aesthetically attractive antenna systems, and again ESAs come to the fore.

Commercial land-mobility has the highest number of vehicles, but also the greatest number of substitute technologies for access. Wideband SATCOM can work in cooperation with 4G and 5G networks to ensure ubiquitous coverage in remote or in over-subscribed regions.

Question: In June 2017, Phasor announced that it had teamed up with DSM to develop a unique radome for electronically steerable antennas (ESAs). Can you tell us more about this project, and will the end products be compatible with competing ESAs?

David Helfgott: The radomes that we are developing in partnership with Dyneema will feature exceptional properties designed to achieve optimal performance across all satellite mobility use-cases.

Radomes are essential to shield satellite communications antennas from adverse weather and harsh conditions but are often bulky, heavy, difficult to manage, and can reduce an antenna's efficiency. The companies are working together under a long-term agreement to leverage Phasor's unique knowledge in the field of ESAs, and DSM's extensive experience with advanced Ultra High Molecular Weight PolyEthylene (UHMWPE materials) for use in radio frequency (RF) applications.

Dyneema has developed its Crystal technology, which facilitates near-zero signal loss, and this will help Phasor to optimise our technology due to its electromagnetic transparency. Dyneema's technology also offers superior protection of sensitive equipment in harsh outdoor environments and it is extremely lightweight which is critical for commercial mobility applications.

Question: September 2017 saw Phasor name OmniAccess as its commercial launch partner in the superyacht sector and related maritime broadband service markets. What can you tell us about this partnership?

David Helfgott: Phasor had been working closely with OmniAccess for a while. OmniAccess is Phasor's exclusive development-partner for the super- and mega-yacht markets. In 2017, this relationship was expanded, and OmniAccess became our commercial launch partner in the superyacht and related maritime broadband services markets. We have teamed up over recent years at the Monaco Yacht Show, where the Phasor system was showcased and demonstrated. With OmniAccess, Phasor aims to provide the best technical solution to the super yacht market, with our Quantum Aperture maritime antenna system, which is very low profile, bandwidth efficient, aesthetically attractive, and scalable to accommodate a range of connectivity requirements. It has the potential to become a real game-changer, particularly when used to provide demanding high bandwidth services such as those provided by OmniAccess. It has no rival in terms of performance from any other very low profile, wideband maritime ESA.

Question: The first of Phasor's ESA products was, last we spoke, due for launch in the second half of 2017. What caused the delay, and what is the expected timeline now?

David Helfgott: Phasor has made great progress over 2017, in commercial, technical and financial terms. In every way it was a successful, inflection-point year.

We have broadened our scope to include fast-moving, adjacent opportunities in enterprise mobility, and that (in combination with fund raising), has added to our launch calendar. We are always aware that product launch is subject to successful beta testing campaigns, so the actual date of commercial release is dependent upon completing those tasks. And that is the primary focus of Phasor in 2018. ■

Photo courtesy of Phasor

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