

INSIGHTS

Issue THREE

Bringing High Quality, Cost Effective Broadband to the Seas - Maritime Sector a Major Opportunity for HAPs

Maritime Communications is one of the fastest growing segments of Ku band satellite services (satellite communications) with the amount of voice and data service provided to cargo ships, passenger ships and private vessels is increasing rapidly.

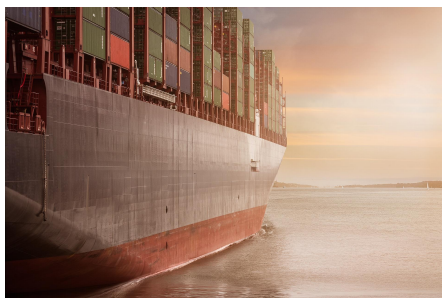
As the world continues to see exponential data and broadband growth every year, demand is also outpacing supply in the Maritime sector as vessels are increasingly using broadband communications to coordinate their activities and as an incentive to onboard employees.

“An insatiable demand for connectivity is driving the market today,” states Brad Grady, Senior Analyst and author of the report, *Maritime SATCOM Markets*, 6th Edition. “Be it adopting Broadband Connectivity to extremely high bandwidth demand found in some of the largest ocean-going cruise ships in the world, the impact of newer connectivity options in GEO and Non-GEO are having a profound impact on the market.”

Private vessels, including offshore fishing vessels, increasingly are installing small satellite transceivers to maintain communications while at sea. Passenger vessels now find that their customers expect to remain connected while on board. The provision of maritime communications is a fragmented business with many different Maritime Telecommunication Operators (MTOs) controlling portions of the market and ships are not evenly spaced in the oceans.

A majority of ships operate on designated “sea lanes” in large ports and at transportation junctions like the Panama Canal and Suez Canal. A Ku beam from a geosynchronous satellite (GEOSAT) can cover a large amount of territory, but only a fraction of the beam will cover an area with potential customers. A single High Altitude Platform (HAP) can cover a circular area around 480 kilometers (300 miles) in diameter over water where there are no obstructions. The platform can provide services at a substantially lower cost than existing satellite options, while providing a better quality, low latency link.

The existing transceiver equipment onboard a vessel has an antenna that can be pointed in any direction as needed. Typically, the Maritime Communication provider/operator selected by a ship controls the antenna on that vessel.



(Continued on Next Page)

issue three FOCUS

Avealto’s Mission: Avealto is developing lighter-than-air, solar-powered, uncrewed High Altitude Platforms (HAPs) to provide telecommunications infrastructure around the world.

Avealto will provide connectivity to unserved and underserved regions, mobile operators and the maritime industry. Each of Avealto’s HAP vehicles will remain in a stationary position at an altitude of 20 km to 22 km (65,000 to 80,000 feet).

Issue Three focuses on one of the primary and largest market opportunities for Avealto and HAPs, Maritime broadband connectivity and communications.

As with all Editions of Avealto INSIGHTS, we will be recording more in-depth interviews and summaries via the Avealto INSIGHTS Podcast. Thank you for joining us on our INSIGHTS journey and we look forward to your feedback and input.



“ The most significant factor fuelling the growth of the HAPs market is the large competitive advantages of HAPs over satellite systems.

HAPs offer lower system and maintenance costs than satellite systems. In addition, HAPs can be controlled more conveniently and require less installation time than satellite systems.”

- Transparency Market Research: *High Altitude Platforms Market*

Maritime a Major Opportunity for HAPs

(Continued from Page One)

The antenna is usually pointed to GEOSATs in which that Maritime operator holds capacity. It is just as easy to point the antenna towards a nearby HAP. A Maritime Telecommunication Operator can substantially reduce their costs by replacing a portion of high cost Ku band satellite capacity with HAP capacity that is at least 25% lower in cost and better quality.

The transceiver antenna on the vessel can be directly pointed to a HAP nearby with no disruption of communication service. Once connected via HAP, users will notice a much faster connection and they will no longer experience the latency on voice calls that you get from GEOSATs/LEOSATs. The HAP platform can also provide real time weather views from its high altitude location and other safety services to vessels at sea.

INDUSTRY SECTOR FOCUS: CARGO SHIPPING

The port of Rotterdam for example, is a major transportation junction. At any moment in time hundreds of large vessels are entering or leaving the port or are at a dock loading or unloading. Hundreds of additional support vessels provide necessary services and each of these vessels also require communication services.

These concentrated scenarios, repeated in ports the world over, are a natural fit for HAP platforms. No new infrastructure needs to be purchased by ship owners and the Maritime Telecommunications Operators (MTOs) can purchase capacity where HAPs are deployed and to continue to use higher cost Ku band capacity in areas where HAPs are not present.

In the wider expanse of the ocean, Avealto's core Maritime strategy includes also providing seamless coverage of all major sea lanes. Hundreds of HAP vehicles will be needed to accomplish this coverage and initially HAP coverage will be provided in areas with the highest concentration of vessels.

Where Avealto HAP service is available, a Maritime operator can offer his customer lower cost, higher quality & more capacity while making a much higher margin of profit. Access to a lower cost, higher quality service from a HAP will be huge strategic benefit to MTOs who were previously at the mercy of traditional satellite operators.



EFFECTS OF COVID-19 ON MARITIME

As the effects of Covid-19 have been felt in almost every sector, Maritime and SATCOMs are no exception, but these markets have been impacted less than most. Ocean and River Cruise Operators are already announcing a near-term resumption of cruises – albeit with less passengers and crew aboard, and focused on shorter out and back voyages rather than extensive country-hopping itineraries found in recent years. In Merchant and other segments, vessels continue to see a changing macro-economic environment but crews remain aboard.

THE BOTTOM LINE AND MARKET PREDICTIONS

“Significant numbers of under- and un-connected vessels will adopt satellite solutions over the next ten years, with another large number of new builds and existing MSS customers adopting or migrating towards VSAT-based solutions. However, just as the inertia of maturity will enable the maritime satcom sector to ride out the near-term ‘COVID-dip’ better than its aero counterparts, it will remain on the slow(er) path to revenue growth. Overall, the Maritime Markets will yield “only” \$34.5B in cumulative revenues from 2019.” - Northern Sky Research

One trend that has been building is that vessels are adopting VSAT connectivity and higher bandwidth demand. By 2029, retail revenues will yield a cumulative \$34.5B with broadband connectivity accounting for over 80 per cent. Capacity demand continues to grow by 24% and the addressable market will expand to over 500K vessels (NSR) - all signs that the long-term fundamentals remain strong.

from the HEADLINES

Cloud Computing: Ratcheting the Satellite Industry Forward

(NSR) Cloud computing represents an important technological shift that has been underway across industries since the turn of the century, impacting the bottom lines and business models of various players in the ICT sectors.

Over the past decade alone, adoption of “the cloud” has surged forward with major legacy software vendors orchestrating efforts towards the emergence of on-demand self-service, rapidly elastic solutions on the so-called cloud. Digitization strategies today are less about the blanket “adoption of cloud-based services” and more about understanding exactly which services need to move on from on-premise, and their associated costs and value-add.



The satellite industry in comparison to the wider ICT sectors has lagged significantly in its true cloud adoption. The three cloud service models as defined by the NIST – SaaS, PaaS and IaaS, each come with their own pros and cons.

On the other hand, the advantages of incorporating the cloud into satellite businesses, whether earth observation or communications related are clear: a reduction of upfront capital expenditures and operational costs, ease of development and ubiquitous accessibility. In other words, less CAPEX and more predictable OPEX.

NSR's Cloud Computing via Satellite report forecasts a \$16B cumulative revenue opportunity for cloud-based services in the satellite/space industry through the coming decade.

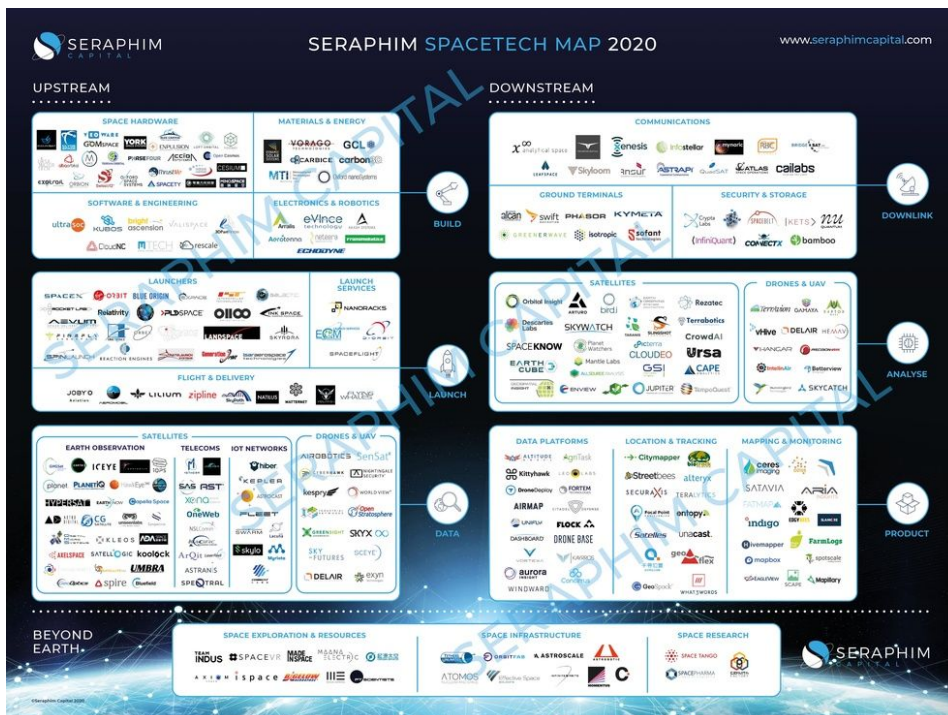
Of the market segments studied NSR describes how the delivery of cloud services via satcom represents by far the largest revenue potential throughout the forecast period, from nearly \$200M in 2019 to more than \$1.8B in 2029.



2020 SpaceTech Sector Map representing the most promising startups in the domain

(Source: Seraphim) Following is a great breakdown of the new space tech and startup map (detail of companies in the graphic below). Focus here is on the most promising venture backed startups in the space domain and they segment the Space Tech ecosystem into the following 7 categories:

- **Build** - Building and selling satellites and drones. We look at both the hardware (sub-systems, complete platforms and novel sensors) and software (i.e. mission control, cybersecurity). New and novel materials that can make platforms lighter, cheaper and more efficient.
- **Launch** - Building and launching rockets, offering launch aggregation and services. We also consider autonomous flight such as drone delivery.
- **Data** - Satellite constellations, high altitude pseudo satellite (HAPS) platforms and drones collecting and communicating proprietary data, across the three main applications of earth observation, communications and navigation.
- **Downlink** - Technologies facilitating the transmission and storage of data from space and aerial platforms back down to earth. This includes phased-array antennas, laser communications, inter-satellite data relay systems, quantum security, data storage, and ground stations.
- **Analyse** - Changing low level processed data into valuable insights, offering a subscription service to enterprise customers. Includes the analysis of data from space and aerial platforms using machine learning techniques.
- **Product** - Packaging of different data streams (fusing space and terrestrial sources), tailored to specific use cases in discrete verticals. This includes data platforms such as space and drone traffic management, mapping platforms and precision location & tracking.
- **Beyond Earth** - Technologies and infrastructure to enable in-space services for satellites and launchers, furthering space exploration efforts and research in microgravity environments.



Source: Seraphim - click [here](#) to view full map of companies.

avealto development IN ACTION



Maritime communications on brink of transformation

DIGITAL TRANSFORMATION GROWS

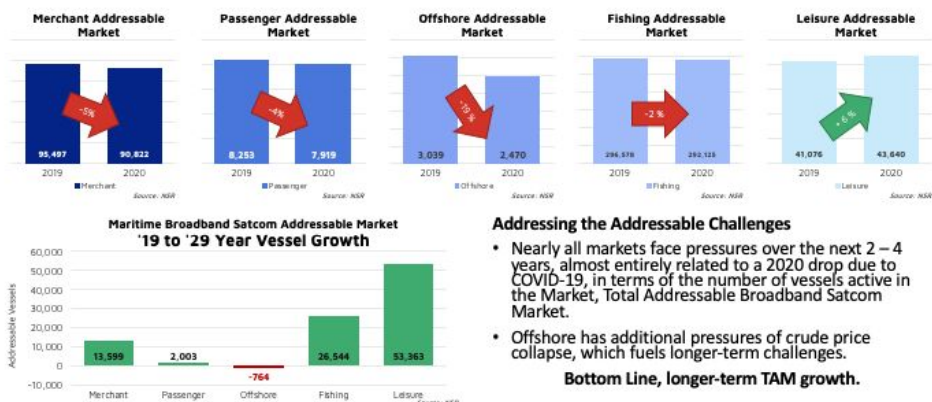
(Source: The Triton) Despite reticence toward wireless adoption, emerging marine-specific software applications are helping spur the digital transformation. Team communications apps like Slack and Zello are just two of many on the market today.

The need for more robust communications technologies is also being driven by the big data requirements of “smart ships,” such as crewless boats, remote-controlled tugs, and oceanographic exploration, research and training vessels. Next generation solutions are being developed to handle large volumes of information for intelligence gathering, live video streaming, etc., as well as the internet-of-things (IoT) to support sensors for real-time cargo tracking, predictive maintenance, routing optimization, vessel performance, digital fleet management and the like.

The escalating demand for maritime digital services has prompted many industry collaborations to improve connectivity, deliver high-speed data rates and extended coverage. Wireless service providers are expanding infrastructure for cellular, voice, data, text, Wi-Fi and IoT at sea. Maritime wireless mesh networks (MWMNs) are also on the near horizon, while artificial intelligence (AI)-based predictive positioning system trials have demonstrated excellent potential for vastly improved situational awareness.

A case can be made for both analog and digital communications in the maritime environment. However, more and more benefits of mobile wireless are surfacing daily, from immediate access to information and more efficient operations, to better vessel performance, cost savings and higher levels of safety. Transformative mobility technologies present captains and crew with a world of new opportunities.

Maritime Satcom Markets: Addressable Markets



Addressing the Addressable Challenges

- Nearly all markets face pressures over the next 2 – 4 years, almost entirely related to a 2020 drop due to COVID-19, in terms of the number of vessels active in the Market, Total Addressable Broadband Satcom Market.
- Offshore has additional pressures of crude price collapse, which fuels longer-term challenges.

Bottom Line, longer-term TAM growth.

Maritime Satcom Markets, 8th Edition
Northern Sky Research



the next wave of CONNECTIVITY

As more capacity across more beams and overlapping service areas are coming online, global bandwidth management is becoming increasingly important — and future requirements call for expanded capabilities.

VSAT networks rule the seas. The question is no longer whether VSAT is the right choice for onboard connectivity, but how will maritime operators get the most value from their connectivity investment as they manage larger deployments and support a growing range of applications.



With the popularity of VSAT, more vessels are coming online than ever before. Northern Sky Research forecasts that 173,000 vessels will be added to the addressable maritime market over the next 10 years, with demand for capacity soaring. Already, VSAT maritime services have grown at a rate of 40% or more annually over the past five years (COMSYS). Market growth of fishing and yachts will top 100,000 by 2026.

Here's what the picture looks like today: commercial shipping vessels sending diagnostic data back to shore, cruise ships connecting floating communities, yachts streaming live TV for passengers who can't miss a play, oil rigs supporting video surveillance to keep people and operations safe. And across these sectors, the goal is a fully connected operation that accommodates passengers, crew and business operations.

- ST Engineering White Paper



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