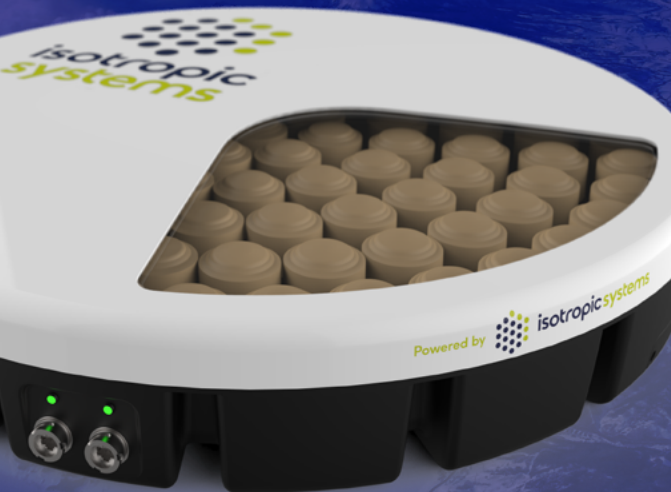




SATELLITE MOBILITY WORLD

Isotropic's New Multibeam, Multi-Frequency ESAs



| Mar 2021

With Brian Billman, V.P. of Product Development

Isotropic's New Multi-Beam, Multi-Frequency ESAs

The satellite industry has long been searching for the perfect antenna, an electronically steered, multi-beam terminal capable of simultaneously accessing both Ku- and Ka-band satellites. Isotropic Systems is on the verge of producing such an antenna and bringing a revolution in the satellite mobility market.

Along the way, in 2022, Isotropic will introduce the first Ka-band, ESA terminal able to connect to satellites in any orbit, GEO, MEO, or LEO, and in 2024, a Ku-Band iteration and potentially, the first multi-frequency ESA.

To find out more about Isotropic's revolutionary and highly disruptive technology and its progress in bringing it to market, we met with Isotropic's V.P. of Product Development, Brian Billman.

SMW: You recently announced you had secured over \$40 m in funding. Tell me about your recent funding round. Where does that take you? What is the timing of your next round?

Brian Billman (BB): Yes, our most recent round did secure \$40 million of funding. Led by SES,

our successful funding drive involved a broad range of Space investors, including Orbital Ventures, the U.K. government's Future Fund, and existing investors Boeing HorizonX Global Ventures, Space Angels, and Firmament Ventures.

In our next funding round, toward the end of this year, we will raise sufficient funding to complete our first product and provide the working capital to scale up the company to positive cash flows.

SMW: What is your first commercial product, and when will you launch it. What are your initial target markets?

BB: Next year, we will be taking our first product to market, the world's first full-performance multi-beam Ka-band antenna. Covering the full commercial and military frequency bands, it will be the first true multi-beam terminal to connect to satellites in any orbit – LEO, MEO, HEO, or GEO.

Our initial target market is military, fixed, and on-the-move communications applications. For the military, our antenna resolves several issues.

Affordability is one. Today, they use small, expensive parabolic antennas that can't keep up with off-road tracking requirements. That's why the army has only a tiny percentage of their vehicles equipped with satellite connectivity.

To resolve the problem, they seek rugged, cost-effective antennas capable of connecting to multiple networks and switching between them simultaneously. Our antenna is the perfect fit.

Another market suitable for our antenna technology is aero. Aero integrators are mostly interested in lightweight, low power consumption, good scanning performance – out to seventy degrees, with the ability to simultaneously enable TV and inflight connectivity. Multiple network access is also an important advantage, especially when shopping for the best connectivity option.



Lastly, we see a near-term opportunity on cargo ships, where reliability is crucial along with the ability to connect to low-latency LEOs or MEOs to enable mission-critical Cloud computing capabilities.

SMW: What is the status of your Ka-Band antenna? Where are you in the product development cycle?

BB: Leveraging our new financing, we have been able to accelerate the development process.

We recently opened up a new engineering facility and are in the middle of developing multiple hardware iterations to arrive

at a final design optimized design for high performance, ease of manufacture, and low cost. As we seek feedback from our partners and customers, we have kept them in the loop through live demonstrations of ground to satellite transmissions. As a result, by the time

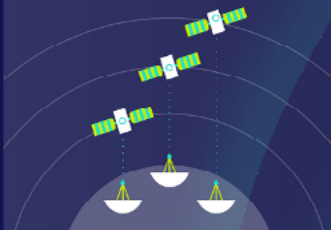
One Terminal. All Satellites.

Using ground-breaking innovation to empower customers to connect to multiple satellites through a single Isotropic terminal.



Today: Single Connections

- Satellites orbit the earth in three orbits: LEO, MEO & GEO
- Current terminals/dishes can communicate or receive from only one orbit of satellites at a time
- Terminals are used for global communications on land, in the air and at sea



A next generation ground terminal for next generation satellites from SES, Inmarsat, OneWeb, SpaceX, Amazon, Telesat and many, many more.

The Future: Multiple Connections

- Breakthrough optical technology terminals can communicate with multiple satellites simultaneously
- 'Multibeam' terminals combine the power of many existing terminals into one
- Providing limitless bandwidth for global connectivity
- 'Multibeam' terminals ready for future satellites launching in 2022 and beyond



we get to product launch, the antenna will be optimized for their satellite networks.

SMW: I understand you will be launching a Ku-band in 2024 and possibly a multi-frequency product. Can you tell us more about these products?

BB: Our Ku-band optical beamformers are already proven. The development of a dual Ku and Ka-band ASIC is well underway.

That means our transition to the Ku line will be much smoother than the original Ka terminal development.

However, our Ka-band solution will be the first to market to meet huge demand and serving the operators and partners that have supported us both technically and financially.

Soon, GEOs, MEOs, LEOs, and HEOs, operating in both Ku and Ka-bands, will orbit the earth. Established players Inmarsat, Telesat, and SES operate across all four orbits and both bands, driving the need for ESAs with multi-orbit and

"We'll deliver a single antenna capable of accessing any network at a price point competitive with antennas that support only a single frequency. That's a truly unique competitive advantage."

frequency capability. In this highly competitive market, we'll deliver a single antenna capable of accessing any network at a price point competitive with antennas that support only a single frequency. That's a truly unique competitive advantage.

SMW: What would be the most logical market for the multi-frequency, multi-beam product?

BB: This antenna will be a popular product in many markets because it will enable users to shop multiple networks for the best value.

For example, aircraft equipped with our antenna could access any provider. This feature allows airlines, cruise companies, or cargo vessel owners the complete freedom to select the best network for their performance and pricing requirements.

SMW: What about the Mobile Backhaul market?

BB: It is also a key market for us. Satellite operators and MNOs value an antenna capable

of addressing multiple satellite constellations, regardless of orbit or frequency.

Today, if a mobile operator has turned to the satellite ecosystem, they have exhausted every other option. They have long viewed satellite as a tax on network performance, differentiation, the total cost of operation, and returns.

Tomorrow, operators will access next-gen satellite bandwidth across multiple orbits. Isotropic's Ku-band terminals will enable MNOs' to redefine the routing of traffic across the network and drive rural services' profitability.

For the first time, MNO's are developing a real appetite for deploying new satellite services where in the past, fiber would have been the only option. We are looking forward to deploying many thousands of our Isotropic



Systems' antennas to mobile towers around the world.

SMW: What is the Isotropic antenna's major differentiator?

BB: Without question, it's the achievement of seamless multi-orbit and multi-network connectivity without compromise in performance or scaling cost.

Even with our initial products, you can access satellites in multiple networks operating in the same frequency, not just a single network, light up additional links

and establish a full performance link onto a completely different network. Besides, you can also switch whenever you want or link to multiple beams simultaneously. For example, you could maintain a link with a GEO while also linking to a LEO or MEO.

Because our antenna generates multiple full performance beams without cutting the antenna aperture in half or sharing the hardware, there is no performance degradation when you turn on multiple beams. It's full-duplex and fully scalable with full access to the entire aperture and no beam usage restrictions.

We are not aiming to deliver incremental gains in performance. Instead, we will be offering a technological leap forward. There is a real sense of excitement within our engineering teams that we can put new and unrivaled solutions into the marketplace.

SWM: What about Starlink and Kuiper? They have just released new ESAs. Do you see them as competitors or customers?

BB: We view those operators as emerging opportunities, not competitors. While we view each of these new constellations as innovative in their own way, each operates as a "walled garden," locking in end-users. Isotropic takes down the "walls," allowing users to pick and choose, combining each constellation's best features to meet their own special needs. That's where we will play our part, enabling a new world of choice and flexibility for the consumer.



Brian joined Isotropic Systems in its early days in 2017 and currently leads the Product Team ensuring successful productization of Isotropic's ground-breaking technology. His expertise in the design and development of mmWave communication, radar, and electronic warfare systems, cultivated during his years at Northrop Grumman, has helped Isotropic push the envelope in solving their customers' most challenging requirements.

Most recently, at L3Harris Specialty Applications Division, Brian led the hardware design team in successful delivery of a wide variety of unique, rapid turnaround specialty products for government customers.

Brian received his B.S. in Electrical Engineering from Bucknell University and his M.S. in RF Electrical Engineering from Johns Hopkins University.



Multi Beam



Low Power



More Bandwidth



Scalability



Interferer Resilient

Let's talk Terminals

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Powered by  isotropic systems



Universal Modem Bays



Digital Beamforming



Simultaneous LEO + MEO + GEO



Isotropic Systems is developing the world's first multi-service, high-bandwidth, low power, fully-integrated range of high throughput terminals to support the satellite industry to "reach beyond" traditional markets.



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