An Update with CEO, John Finney

Isotropic Systems: An ESA That's Different & Uniquely Promising

In the race to develop electronically steered antennas, not all antennas are the same. While most developers have incorporated traditional flat panel configurations, their designs have a variety of disadvantages. Characteristically, they perform poorly at low look angles, have high levels of power consumption, generate excessive heat, and many have limited scalability.

So, when we find a new design that overcomes most of these disadvantages, that's news. In the quest for such a design, Isotropic Systems is unique.

Unlike other developers, their design relies on optical beamforming technology, implemented in a honeycomb-like assembly of individual beamforming modules.

To find out how the technology works, why it offers unusual promise, and how its development has progressed since our 2018 interview, we set up a follow-up call with CEO, John Finney.

SMW: In your last interview with Satellite Mobility World in April of 2018, you were well into the development of a Ku-band antenna and planning for a Ka-band unit. Could you update us on the status of both antennas? What progress have you made, and when do you anticipate the commercial release of each type of antenna?

We will be doing a demonstration in Q3, which will showcase true digital beamforming. It will be multi-beam, without sharing the aperture across the links, and it will feature “true time delay,” and closed- loop tracking.

It will confirm that we have reached a very solid Technology Readiness Level (TRL) “seven." While “nine” is the level when you are actually in the market with a Beta,“seven” is when you have demonstrated all of the features in an operational environment.

You will recall that originally, we started with Ku-Band. At that time, most of the market opportunity was in that Band. Later on, based on the emergence of Ka-Band LEO and MEO constellations that targeted at enterprise markets, Telesat, Inmarsat, and mPower, we made the strategic decision to shift to Ka-Band.

Even though the consumer-focused, mega-constellations, OneWeb, and SpaceX and even Amazon are moving very quickly, their systems are not yet fully funded to the operational level.

While we hope there are more and more such constellations, we want to be sure that we are delivering a product to a market that we know with certainty exists. Consequently, we look at SES, Telesat, and Inmarsat for a number of reasons.

They are built for and are targeting enterprise markets. They will likely be operational within an 18-month widow and will deliver massive amounts of capacity. However, there is very little competition for the multi-beam ground terminals required for their wide-scale deployment.

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From a competitive standpoint, none of the ESAs or the emerging flat panel antenna companies have a fully funded Ka-Band development program. We also think that their technology is limited in higher frequencies, especially in terms of power consumption and digital signal processing. When they try to scale up in Ka-Band, it won't be easy.

Because our development program is well funded, and we perform well at low power levels and at high frequencies, we aim to be the market leader.

SMW: Can you tell us more about your approach to hardware development?

Unlike some companies who have gone down the path of developing their own ASIC in house, we decided to take full advantage of the generic IP that is available from some of the biggest design houses in the world.

Our ASIC will leverage their development efforts and be able to switch from Ka-Band to Ku-Band within the same beamformer. Our strategy essentially supports a fully software-defined radio with the ability to work across a number of frequencies, Ka and Ku, in particular, from the same ASIC.

That means a couple of things.

One is we don't have to develop a second beamforming ASIC, which enables a rapid transition to our Ku-Band product line. Ultimately, our mission is to be the first to deliver multi-frequency, multi-beam capability – the

“Holy Grail” for any service provider that wants to arbitrage all of the available capacity from all the available satellite operators in all orbits.

SMW: What about scalability?

From the very beginning, we designed the terminals with modularity in mind, meaning they can be scaled in both planer and non-planar configurations without any limits at all.

However, it’s not just about adding more modules. It’s about dimensioning the array to fit the customer’s specific requirements. Relying on our modular design, we can custom configure our antenna for symmetric or non-symmetric transmission.

For example, we can populate an antenna platform with a much larger number of receive modules in an environment where most of the traffic is in the receive direction.

SMW: Compared to other ESAs, how does the Isotropic antenna compare in terms of scan angle?

If we look at the specs of typical competitor and compare their antennas to ours with in planar configuration, their antennas go to 30-degrees elevation, our optical design allows to scan out to 20-degrees elevation, and we are optimistic we could improve on that.

In mobility applications requiring operation at high latitudes, aero, and maritime, our low scan angle capability puts us significantly ahead of any other phased array developer with the exception of ThinKom, which we expect to equal in terms of scanning and outperform in terms of gain.

SMW: Can you give us some examples of what these advancements mean to the satellite operator?

For example, let’s look at SES. mPower is going to be able to deliver a quality of service that will address very high bandwidth customers with ease. We think that the unique features we are building into our product, when added to mPower and other constellations, will allow satellite operators to tap into market opportunities that we were previously unreachable.

SMW: Can you give us a better idea of the advantages of your antenna in mobility markets?

When it comes to mobility for maritime, land, sea, and air, apart from our advantages compared to conventional, flat-panel ESAs, against parabolics, we offer multiple link connectivity in a single terminal, which includes fully integrated power, BUCs, LNBs and modems.

SMW: Power required, and heat generated always been significant barriers to the use of ESAs in aircraft

applications, especially in mid-sized and small business applications. Given the low power configuration of you design, are you planning to target aviation markets?

We are fully committed to aero, but we are doing it differently. The big industry news is that we are planning to license our technology to proven integrators, and share the benefits across the ecosystem. We are aware of our competitors' experience in pursuing the aero antenna space, and we think that when you are a pre-revenue company trying to start out with an aero product, it is a sure-fire way to put your company at risk.

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For example, as the time required to certification of an aero antenna is beyond your control, developing an antenna on your own can backfire unless you get everything right the first time.

So what we have decided to do is to effectively "share the pie." We are going to license our optical multi-beam modules, both transmit and receive, to selected aero and defense integrators for commercial and government aircraft. By doing so, we are going to avoid the heavy resource burden and financial risk that our competitors are facing by developing an aero terminal by themselves.

SMW: Will you target the consumer market at some point?

We know how to deliver a consumer broadband terminal a few hundred dollars. The challenge is how much time, and money do we invest bringing such a product to market when the networks are not available today.

SMW: If you had to compete against a parabolic antenna of 60 cm, how would your antenna compare in terms of performance?

If we compare our antenna with an Intellian V65, and we match their bore site performance, which I believe is 16.7 dBk, we would be roughly the same in terms of the antenna footprint.

Of course, you would need a minimum of two separate parabolic antennas to work effectively in a LEO or MEO environment, while we can support multiple beams from a single unit. So, the cost and real estate savings are readily apparent.

Have you tested with either Telesat or O3b or any of the other operators?

Our recent Hylas 4 test was to confirm that we had met a certain TRL level and that we had mastered the mass production of the optics to a very high quality and tolerance level.

The conditions of the test itself were very challenging since we were located at the edge of the satellite beam, yet we proved to our customers that we could send e-mail and high-quality video over the link. In that regard, the test was a resounding success.

SMW: In January of 2019, you announced a $14 million Series A round of funding led by Boeing HorizonX Ventures, with participation from WML, Space Angels, and Space Capital. I have heard that the development of an ESA can cost as much as $100 million. How do your capital requirements compare with that estimate?

$100 Million is probably the average development cost across the sector, although we are confident we will come in well below that number. However, in deep tech, the more important question is who is providing the funding. Is all the funding coming from outside the industry equity, or is a substantial amount being raising from development contracts, thereby assuring a better product to market fit?

The development work we have done with Inmarsat and SES is a good example. We get an enormous amount help from these and other leading Ka-Band operators in the world, who continue to invest not just money in us but a great deal of time. Their highly qualified technical teams have worked with us all along the way.

However, even with such assistance, it does take tens of millions of dollars to produce a product line of Electronically Steered Antennas that can access all segments – maritime, aero, government, enterprise, and consumer broadband. So far, we have secured over $45 million, and we plan to complete our next round within the next 6-12 months.

About John Finney:

A satellite and telecoms industry veteran with over $2 billion in new revenue creation directly attributed to his leadership, John Finney pioneered significant success for start-ups Huawei (founded Huawei in Europe) and O3b (founding employee and Chief Commercial Officer) along with other