

# Delivering value in near and deep space

Goonhilly Earth Station Ltd acquired the Goonhilly satellite station in Cornwall, UK, from BT back in 2014, in order to realise the huge potential of the site. Plans for a multi-faceted space hub will see the firm forging ahead with a number of commercial and scientific endeavours. Ian Jones, CEO of Goonhilly Earth Station Ltd, talks about the future of Goonhilly Earth Station, and its role within the NewSpace sector.

**Question: Goonhilly Earth Station was only acquired relatively recently by Goonhilly Earth Station Ltd. What can you tell us about the company's capabilities and expertise?**

**Ian Jones:** Our background is first in designing specialist communications equipment for Earth stations and spacecraft, and second, in operating them. Our staff have a wealth of experience in space systems and communications systems engineering. The first opportunity to operate our own ground station came a few years before we even considered Goonhilly as a potential base. On that occasion (in a previous company), we set up an antenna in our office car park, kept the margins as low as possible and beat BT to win a satellite service contract. This gave us a taste for Earth station operations – and also showed us that the business was mature and highly competitive.

When I heard that Goonhilly was going to be closed, this previous experience made me think that the commercial teleport market might be too difficult, but that the antennas could be re-purposed for radio astronomy and deep space communications - an interesting and growing market. We looked at all the potential revenue streams that Goonhilly could support and realised that the site was a hidden gem - provided that these inter-related revenue streams could be opened up. We also realised that the space communication industry was changing, and we had the skills required to play a vital role. We received a lot of



Ian Jones, CEO, Goonhilly Earth Station

Image: Goonhilly Earth Station

unprecedented fibre connectivity, on-site power generation and a wide range of buildings, labs and offices underpin the business. They provide our experienced and energetic team with the strong foundations required to create exciting, world-leading projects. Because of our background in designing and manufacturing complex space communication systems, we understand the operations of a teleport and what's required from both the customer point of view and the systems engineering perspective. We immediately decided to focus on the more specialised and difficult parts of the market - such as telemetry, tracking and command (TT&C), deep space communications and low Earth orbit (LEO) tracking - and that's been our forte ever since.

Where there are difficult engineering processes that are only entrusted to teams with a lot of expertise, we've proved ourselves time and again, picking up contracts with all the big satellite operators: SES, Inmarsat, Eutelsat, Intelsat and Hughes. For example, they trust us to provide the vital communications required to fly and guide their satellites. That's been our unique selling point to date.

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**Question: Back in May 2018, Peter Hargreaves, the billionaire founder of the investment services company Hargreaves Lansdown announced he had invested UK£24 million into Goonhilly Earth Station. What can you tell us about this, and the opportunities it will bring?**

**Ian Jones:** Our previous investor, Downing, enabled us to buy the Goonhilly site and get some early wins under our belt. It was a great relationship that kick-started the new business. However, the investment vehicle was a Venture Capital Trust (VCT) scheme with a five-year fixed window. We wanted to find an investor with a longer-term view who would help us scale up the business, so we actively looked for a high-net-worth investor who shared our vision.

From the start, Peter Hargreaves' philosophy has been to provide us with the liquidity needed to realise a bold growth target. With the funding secured, we have

opposition for including radio astronomy in our plans, but we knew that the techniques involved would unlock the communication systems of the future.

The opportunities afforded by owning and operating Goonhilly are compelling: The fixed assets including large antennas, a secure site, proximity to

embarked on an ambitious business plan, which will see us open facilities in various parts of the world as part of our plan to build a truly global business. For example, over the last few months we have opened offices in Farnborough in the UK and in Australia.

**Question: We understand that Goonhilly Earth Station has released a new roadmap which will galvanise its position in the satellite industry and NewSpace economy of the future. Can you take us through the key points?**

**Ian Jones:** There are four main areas in our roadmap.

Our first growth area is *deep space*; namely, everything beyond geostationary orbit. We're planning to build a global network of deep space antennas. We've already started upgrading antennas at Goonhilly, and are actively looking at sites to build capabilities in Australia. We'll also be looking for sites in Northern America in the future.

The second area we're looking at is *near space*, so everything from geostationary orbit downwards. This will focus on the traditional GEO satellite market, where Goonhilly has always played a key role, but we're also interested in building capabilities that support other orbit configurations, especially LEO, for which we already host tracking antennas for a few customers. We are looking at how we can get into that market more broadly. We're developing a few different partnerships, but I think it's a business model that hasn't quite been fully bottomed in terms of how the market will actually work. To support a constellation of LEO satellites, you almost need a constellation of tracking antennas on the ground, and that's a difficult business model. We feel that we're the right size company, we're hungry, growing and capable of being disruptive in that market.

The third part of our roadmap is that Goonhilly, by nature of its geographic location, is at the end of many sub-sea cables which connect to the UK via Cornwall. We also have very good terrestrial fibre connectivity back to London, as well as lots of space and redundant power supplies. It's a great location for collecting and servicing data. We're investing approximately £1 million in a brand-new data centre facility to bring together the world's sub-sea cables, create an Internet exchange at Goonhilly, and have that link between terrestrial, sub-sea cable and satellite.

The fourth area we're exploring, because of our heritage and background in design engineering, is system design - particularly software defined radio and smart antenna systems - that can be built in medium to large scale for supporting ground terminals.

Our new office in Farnborough will lead the charge here, housing our design and engineering teams. We are actively recruiting more talented engineers to get

involved with these exciting projects. We're particularly looking at phased arrays - being able to connect lots of antennas together using electronics so they can beam-form and be steered electronically. This is particularly important as the constellations of orbiting satellites start to come into play.

We work closely with a group of universities, including Oxford, Manchester, Leeds and Hertfordshire, and we have proposals to create a factory facility at Goonhilly working with those universities. That programme is coming together very quickly too.

**Question: The NewSpace sector is the place to be right now, with mega-constellations, small satellites, reusable launchers and off-world settlements all a key focus. What's your take on the NewSpace movement, and the opportunities available for businesses?**

**Ian Jones:** The whole space industry started off with the superpower nations, followed by international



Image: Goonhilly Earth Station

Image: Goonhilly

organisations like Intelsat and Inmarsat. When they were established, they were international collaborations between nations; they were later privatised, and the status quo prevailed for decades. The only people able to get into space were the people with multi-hundred million-dollar budgets. In parallel, from the late 1980s/early 1990s, smaller companies like Surrey Satellites have been slowly piggy-backing on launches; this model of smaller companies gaining access to space has taken hold, but it has taken a long time to prove itself.

Today, organisations like SpaceX are significantly lowering the cost of getting into space, and are publishing their prices too. This is really significant, because entrepreneurial companies can go to investors and say: "This is the cost of getting into space," rather than it being an open-ended unknown. It's changed the whole paradigm. Now we have disruptive companies like Planet, who have been able to go out and get funding for constellations with all the costs known up front.

In the past, a 1:1 ratio of rocket launch to payload launch was typical. Today companies like Planet are tearing up the rule book, ushering in an era of multiple

payload launches from a single rocket. Up until now, the aim of the game was to get a large mass into (usually) equatorial orbit, which meant utilising big rockets from launch near the equator. But if you're going to have a constellation, you need to be in a roughly polar orbit. And you need to get a small mass, very frequently, into orbit. This dramatically changes the whole launch dynamic and opens up a wealth of opportunities.

The whole idea of the UK getting its own launch facilities is very interesting and marks another milestone in the burgeoning new space sector. Here at Goonhilly, we're very excited to be involved with Spaceport Cornwall's plans to provide Virgin Orbit with a strategic Western European location at Newquay for horizontal launches. We will provide the all-important tracking services for this new venture.

**Question: Goonhilly Earth station is reportedly involved in several exciting new off-world projects, from the ESA's Commercial Lunar Mission Support Services, the Lunar Pathfinder programme, through to the world's first deep-space communications system. Can you provide an update on these projects?**

**Ian Jones:** Goonhilly and Surrey Satellite Technology (SSTL) signed a collaboration agreement with the European Space Agency (ESA) for Commercial Lunar Mission Support Services back in April 2018. This commercial partnership aims to develop a European lunar telecommunications and navigation infrastructure, including the delivery of payloads and nanosats to lunar orbit.

What's unique here is that we did not ask for funding from ESA; instead these missions will be funded by payload customers wanting to take a piggy-back ride to the Moon on the Lunar Pathfinder spacecraft. ESA really likes our entrepreneurial thinking and the fact that

we will be addressing a real gap in the market for commercial endeavours.

We've already succeeded in getting quite a few payload commitments from customers for the first flight and are now working on getting commitments to fulfil our payload quota and make it a commercially viable mission.

In parallel, ESA promoted a competition to send missions to the Moon. Several missions were selected, which should get funding approval at the next ESA ministerial meeting. Once that happens, the partners will start building the hardware - including the Lunar Pathfinder spacecraft.

Last but not least, we've also won a £8.4 million contract with ESA to upgrade Goonhilly 6, our 32m antenna, to make it fully compatible with the Deep Space Network. It will then become one of ESA's deep space nodes.

**Question: What are your expectations for Goonhilly Earth Station in 2019 and beyond?**

**Ian Jones:** We want to be an industry disruptor and believe we are really well placed to realise this vision. We have funding in place, we are profitable, and we are already on a strong growth trajectory.

At the start of 2018, we had 20 people, and by October we were up to 33 - and counting. We expect headcount to double during 2019 as we ramp up our activities in our four key areas.

The key now is to hire talented people who are enthusiastic and passionate about working for Goonhilly and helping to shape the next wave of satellite communications.

At the end of the day, space exploration is of little value unless you can get the data back down to the ground. And that is Goonhilly's sweet spot. ■



Image: Goonhilly Earth Station