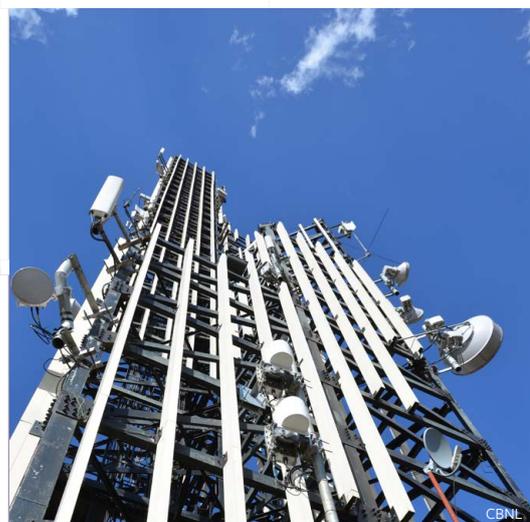
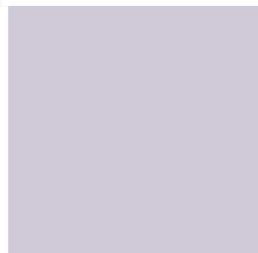


# Profile: Cambridge Broadband Networks Ltd



## Profile

### Cambridge Broadband Networks Ltd

Vodafonewatch spoke to Dr. John Naylor, Chief Technology Officer and co-founder of Cambridge Broadband Networks Ltd (CBNL), about development of the UK wireless equipment vendor's largely-Africa-centred account with Vodafone, and how it is evolving its high-band product portfolio as operators move towards general-purpose networks and 5G.

Table 1 CBNL overview

<b>Year established</b>	2000
<b>Headquarters</b>	Cambridge, UK
<b>Technology</b>	VectaStar: Licensed point-to-multipoint microwave and millimetre wave infrastructure and services.
<b>Product frequencies</b>	10.5GHz, 26GHz, 27GHz, 28GHz, 31GHz, and 39GHz.
<b>Use-cases</b>	Mobile backhaul, fixed-wireless (to the enterprise and home), surveillance, and smart-city networks.
<b>Countries active</b>	50+
<b>Global units sold</b>	150,000+
<b>Customer base</b>	100+ service providers, including Airtel, Deutsche Telekom, Etisalat, MTN, Orange, Telefónica, Vodafone, and Windstream.
<b>Activity within Vodafone</b>	Commercially deployed by Vodacom in Democratic Republic of Congo, Nigeria, South Africa, and Tanzania, as well as Safaricom in Kenya and Vodafone Ghana. 10,000+ radios deployed for Vodacom in total.
<b>Investors</b>	Accel Partners, Adara Venture Partners, Amadeus Capital Partners, Fidelity, TVM Capital, and Samsung Venture Investment.
<b>Website</b>	www.cbnl.com

Source: CBNL.

#### □ Could you provide a brief summary of CBNL's relationship with Vodafone?

Vodafone is one of CBNL's most active and longstanding customers.

CBNL currently sells to many of the Vodacom operating companies across Africa, including in South Africa, Nigeria, Tanzania, and Democratic Republic of Congo, as well as in Ghana for Vodafone Ghana, and Kenya for Safaricom.

Vodacom primarily uses CBNL solutions to serve enterprise access applications, with additional mobile backhaul networks in a number of locations. Since we started working with Vodacom, almost ten years ago now, we have supplied over 10,000 units and counting, so it's a real success story.

One of the key challenges for African operating companies is [gaining] access to a robust wired network infrastructure, especially in the dense urban areas that require it the most. These high density of demand areas are good conditions for wireless technology to thrive, particularly for the licensed point-to-multipoint (PMP) CBNL provides, so African cities are a hotbed for our technology.

Across these African territories, CBNL's VectaStar solution is deployed largely in urban centres, rather than rural areas. People sometimes have a misunderstanding that licensed PMP is most effective for rural deployments. It's really not. Licensed PMP is most effective for urban coverage as it provides a highly profitable solution to aggregate many sites within a single multipoint sector, be that enterprise access or backhaul sites.

## □ Does the system provide an enterprise-dedicated layer in the network?

The technology works a little differently to that. CBNL provides a very flexible, general-purpose network infrastructure, which is in line with how we've seen the unified communications market evolve. So, whether you are building a backhaul or enterprise access network, the radio hardware we provide is identical.

This enables operators, like Vodacom, to virtualise multiple services over a single physical infrastructure. In this example, you can offer both backhaul and enterprise access on a single network by virtualising services in the *VectaStar* software. As you can imagine this is much more efficient than running two physical networks, both in terms of cost, but also in providing a faster time-to-market, which is a significant selling point in the enterprise broadband market. As more operators start to broaden the number of services they offer, this technique is becoming more attractive and something we're seeing increasing demand for.

□ **Five of the six operating companies you mentioned are fully-fledged mobile operators, but Vodacom Business Nigeria is not, and has always been quite an intriguing business within the Vodafone stable. It was a small operation, inherited from Gateway Communications [bought by Vodacom Group in December 2008 — *Vodafonewatch*, 2009.01], and does business in a market where Vodafone has highlighted greater interest in the past.**

## Can you tell me about how your business has developed with that unit, and what are the typical use-cases for the technology you provide to them?

We were actually a supplier to Gateway at the time of the acquisition, and Vodacom Business Nigeria remains a business-focused access provider in Nigeria today.

CBNL's licensed PMP technology provides Vodacom Business Nigeria with high-speed area coverage that serves the major metropolitan areas in Nigeria with carrier-grade business broadband. Area coverage is achieved through deploying *VectaStar* access points at Vodacom hub sites. It's a similar network architecture to Wi-Fi, but instead of Wi-Fi access points covering a few hundred metres, *VectaStar* covers several square kilometres (or even tens of square kilometres) in range. Anywhere within these sectors of coverage, you can place multiple *VectaStar* remote terminals, co-located at the enterprise site. In fact Vodacom is now able to connect up to 63 enterprise sites from a single *VectaStar* access point radio, and each site may be serving multiple independent customers, so you can see the business case starts to look very attractive when deployed in areas that hold a high concentration of customers.

Providing enterprise access in the tens or hundreds of Mbps has really been the core use-case of *VectaStar* with Vodacom. CBNL has just launched a new solution that delivers up to 1.2Gbps to a site, which we expect to attract attention for very high bandwidth enterprises in the near future. That said, services at the tens or hundreds of Mbps really cover the vast majority of businesses requirements in Africa, not only for [small- and medium-size enterprises], but also for large corporates.

On top of the physical *VectaStar* infrastructure is a highly intelligent software platform that allows operators to create agile and responsive services. Vodacom Business Nigeria has actually always been one of the most creative customers in terms of coming up with interesting value-adds. One of the services they deliver is a 'boost package' where corporates are offered a standard service, 20Mbps for example, which increases overnight. As many corporates, like banks, conduct overnight backups, Vodacom came up with the idea of saying 'what we could do for a very small additional monthly sum is quadruple your data rate overnight, and that would let you do your backups much more efficiently'.

This is just one example of how flexible *VectaStar* is in terms of letting the operator not just vary the services offered on a customer-by-customer basis, but even on an hour-by-hour or minute-by-minute basis. It's possible to change the provisioning to each customer and offer quite creative packages like that.

### □ What about the Vodafone account outside of Africa? How has that been developing?

It's in a development stage and we are in ongoing discussions. The recent evolution of *VectaStar* to deliver 1.2Gbps to a site has certainly aligned the platform to the higher bandwidth needs of the European and global markets — both from an enterprise access and mobile backhaul perspective. When you combine this bandwidth with the inherent cost saving and time-to-market benefits of a PMP architecture it's a very compelling business case. We expect this to create more traction and are in talks to support a growing number of 'Tier 1' operators, like Vodafone, with their network growth.

One of the most interesting territories we are looking at is India. We certainly see some of the same ground and economic conditions as parts of Africa and believe more innovative wireless solutions, like licensed PMP, have a significant role to play in driving wide-ranging socio-economic benefits. So, it's certainly on our radar as a near-term development.

Europe has historically been a heavy user of microwave, so the spectrum landscape is more fragmented than other territories, but we are still in discussions with several Vodafone operating companies. We see a strong fit for *VectaStar* to play an important role in driving greater value from Vodafone's 26GHz and 28GHz spectrum as we move forward, particularly with 5G on the horizon and the potential of harmonising and unifying some of these spectrum bands.

I think what's interesting for CBNL is that we've worked with Vodacom Group for almost ten years and over that time the bandwidth of our technology has improved by two orders of magnitude. This has really strengthened our position as the market leader in PMP microwave and kept pace with market demands, not just in Africa but across the world.

### □ How do you see enterprise access trends shifting in more mature markets?

We see more and more pressure on operators' budgets, so whereas ten years ago it was quite sustainable to deliver point-to-point (PTP) connectivity to enterprises on a case-by-case basis, it's a very expensive approach to take now. When you compare the increased roof rates, hardware and installation resources of a PTP architecture compared to PMP, you can start to understand the financial considerations that have caused operators to look at alternative methods of connectivity.

There is also increased interest from many operators in having more efficient and universal strategies for ubiquitous area coverage, which will be central to 5G. This is why we are seeing increased interest in leveraging under-utilised millimetre wave spectrum, typically between 26GHz and 39GHz, which offers the availability and wider channels needed to deliver multi-Gigabit services. This is certainly the case in the USA and in Europe where the European Union has identified 26GHz as a 5G pioneer band.

One of the most interesting enterprise access trends of late has been the fact that major telcos in the USA have gone on record to state fixed-wireless broadband will be one of the first use-cases to be offered when 5G comes to market. This will offer huge benefits to enterprises who still find themselves on the wrong side of the digital divide, or require a more competitive broadband service.

If you consider what's proposed for 5G, it's a PMP system similar to the 3G and 4G base stations of today. CBNL has been very active in supporting carriers with their future 5G strategies and have already deployed 25 pre-5G fixed-wireless networks in the USA, which have connected over 35,000 homes and businesses. We're seeing lots of interest in these solutions from global operators and are very excited about the potential.



□ **There have been some recent sceptical comments by the likes of Johan Wibergh, Vodafone Chief Technology Officer, and Bruno Jacobfeuerborn, Deutsche Telekom Chief Technology Officer, about propagation and cost challenges relating to millimetre wave-based 5G services (Vodafonewatch, #153). What are your thoughts on that?**

It definitely depends how you do it. It strikes me that some of the models, for example those with indoor terminals, may struggle to be economically feasible, even in urban areas. On the other hand, we know from our own experience that there are approaches that can be done very cost effectively.

If you think about Tanzania, Ghana, and Nigeria, you have countries with low ARPUs [average revenue-per-user] that have successfully rolled out profitable area coverage using millimetre wave. This is a nice proof point that you can deploy licensed fixed-wireless and backhaul coverage in a cost-effective way, assuming intelligent choices are made.

I think where Deutsche Telekom may be coming from is that deploying blanket coverage of millimetre wave, as operators have done with 1800MHz for example, will be completely unaffordable. However, deploying in a much more targeted way, or in a slightly different style, will overcome these financial concerns and provide a highly profitable route. For example, supplementing millimetre wave with an unlicensed wireless layer is an innovative approach that would increase coverage depth and drive the network's economic strength.

A complementary strategy, such as this, really enables an operator to get the best of both worlds. Operators get some of the propagation benefits of low frequencies — building penetration in particular — but you get the capacity and SLAs of millimetre wave. This appears to be a very intelligent approach from my perspective, orchestrating resources from multiple spectrum bands to get benefits that are more than the sum of their parts.

□ **Tower outsourcing has been a live trend in Africa for several years, and now some European operators have become more willing to look at efficiency opportunities in the tower space. Is that something that affects or influences the way you go about rolling out your technology?**

Not directly. There's a reluctance to build new tower sites in urban areas across a lot of Europe and one of the problematic areas is tower loading, because of municipal authority related reasons. One of the ways that CBNL has been able to help operators overcome this has been by reducing the number of radios required per tower. If you have a PMP system serving twelve LTE base stations, for example, there's only one PMP access point on the tower, instead of twelve in the PTP scenario, so it's solving tower congestion.

## □ What trends are you seeing in terms of virtualisation in your area of access networks?

[This is] an area of real interest to CBNL. Whether operators deploy CBNL equipment for enterprise access, mobile backhaul, smart-city services or residential access, it's all the same *VectaStar* equipment, so we're quite accustomed to running multiple applications over the same hardware.

Over the last few years, we've not only seen different operators vary in their application of CBNL's technology, but also the same operator deliver new and varied services over a single *VectaStar* network. Typically, this has been transitioning an existing network from having just one application (say, backhaul) to multiple applications, often introducing additional enterprise access services. What makes the transition all the more compelling is the fact it's a relatively simple process, managed centrally from the *VectaStar* software.

We would typically work closely with operators during such a process, helping them identify hub sites that have the excess capacity and locations where new enterprise access sites can be served. Following that, it's a relatively quick and inexpensive process to connect new sites. As area coverage already exists there isn't a requirement to physically visit the hub site when connecting new sites so the time-to-market and payback for the operator is very quick.



We also see more and more operators setting out to build a general-purpose network. Over the last twelve months we've seen at least half a dozen operators explicitly say 'I have a strategy to deliver mobile backhaul and enterprise access, but I actually only want to build a single network that has the flexibility to add new services as and when needed'.

This agile network virtualisation technique is becoming essential in modern day unified communications and it is one that will grow as we move towards 5G and the new and exciting use-cases that will bring.

## □ Where else is the company heading in terms of product and technology strategy?

For a number of years CBNL has been the market leader in PMP microwave and millimetre wave and has significantly more references and deployed equipment than any other vendor... Our *VectaStar* platform has been able to offer high capacity, carrier-grade connectivity at a price that's becoming ever more attractive year-by-year. We think we're onto something with our technology strategy, and our R&D facility [is] continuing to increase the technology's data rates and improve the price-performance ratio even further.

CBNL is also broadening the spectrum bands covered by the technology. We will be supplementing our existing... product line with new variants to widen their geographic applicability.

## □ You're operating in what's obviously a very fast-moving space and one where there's constant pressure to expand your portfolio. Have you ever considered floating the company?

CBNL is really focused on working alongside our existing investor team to continue to provide customers the very best solutions on the market and continuing to grow the company's global presence. This is our primary goal so we are not considering a flotation at this time. We have a very sophisticated and supportive investor team, including Accel Partners, Amadeus Capital Partners, and TVM Capital, so are extremely well placed to deliver this plan.