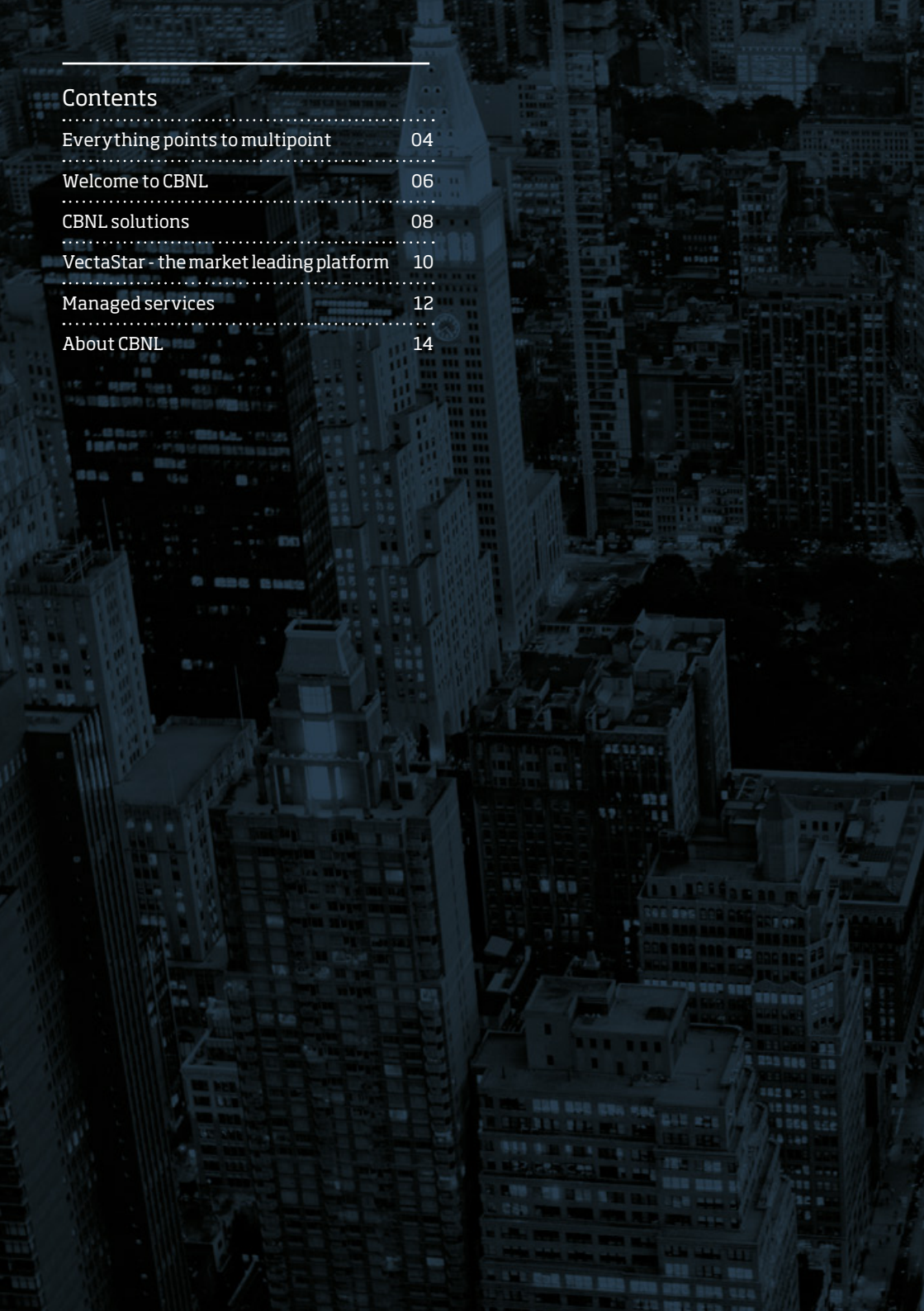


# New performance Proven technology



Market leaders in licensed  
point-to-multipoint microwave  
and millimeter wave.





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It's time your challenges  
met our solutions.

Whether you're operating a backhaul, enterprise access or residential ISP network, you're no stranger to the challenges of meeting technical and commercial imperatives.

So, welcome to our world.  
And welcome to your way forward. Because we thrive on driving performance and profits for your organisation.

Everything points to multipoint



Your network is creaking under the pressure of data. Your commercial targets are tight and the competition is fierce.

You need a solution. Hello licensed PMP.



Licensed PMP's sector coverage uses half the radios required by PTP - reducing costs and time to market whilst still delivering carrier grade services.

<sup>1</sup> Real Wireless (2016) Total cost of ownership and time to breakeven of last mile data transport for MNOs and ISPs.

For backhaul, enterprise access and residential ISP networks, licensed point-to-multipoint (PMP) is ready and waiting.

Our advanced PMP solutions are an innovation in wireless, giving you not just capacity, quality of service and a quick time to market, but delivering cost savings which accelerate return on investment (ROI).

We're about everything you need.

#### Backhaul issues we solve:

- You need to increase capacity and quality of service to meet customer expectations and support new LTE services
- You need to get new services to customers before the competition
- You need to make cost savings to hit commercial targets.

#### Enterprise access issues we solve:

- You need to offer carrier-grade services which support business critical activities
- You need to connect new sites quickly and offer leading capacity/price packages to remain competitive
- You need to achieve a quick time to revenue from new customers to hit aggressive financial targets.

Increasingly fibre and alternative wireless technologies don't create a business case to warrant investment.

The reasons why are clear. With fibre and point-to-point (PTP), the drawbacks are higher cost and slower deployment time; with sub 6GHz, it's the lack of quality of service and scalability.

You need a new approach.

#### Hello licensed PMP.

Alternative wired and wireless technologies simply cannot compete with licensed PMP's business case. Offering an unparalleled price: performance ratio, it's a technology operators simply can't afford to ignore. Here's why...

#### High capacity

- Up to **1.2Gb/s per link**, up to **1.2Gb/s per sector**, up to **14.4Gb/s per hub site**.

#### Guaranteed quality of service

- Utilises area licensed spectrum.
- Operates in microwave and millimetre wave frequencies.

#### Lower costs and increased ROI

- **Saves up to 50% CAPEX, 50% OPEX and 50% TCO** compared to fibre and PTP<sup>1</sup>
- For the same investment over a five year period, **PMP can generate a 1.8x higher return** on investment than PTP<sup>1</sup>

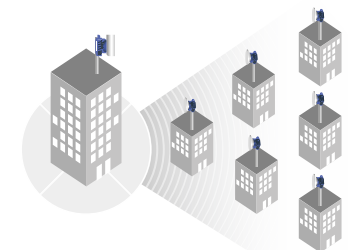
#### Long range

- **Up to 20km.**

#### Half the radios required by PTP

- **Twice as fast to deploy**
- **Less space, less power consumption, less environmental impact.**

Licensed PMP connects multiple sites from a single hub.



Leading the market is CBNL.



We're about driving innovation in everything we do; from developing advanced technology, to channeling our industry leading expertise and experience into each deployment.

It's what makes us unique. It's what makes us the market leaders.



Licensed PMP offers up to 50 per cent total cost of ownership savings and increases ROI compared to fibre and PTP technologies<sup>1</sup>.

Welcome to CBNL

When advanced technology is developed by experts who understand your market, competitive pressures and business imperatives, a new world of opportunities opens up.

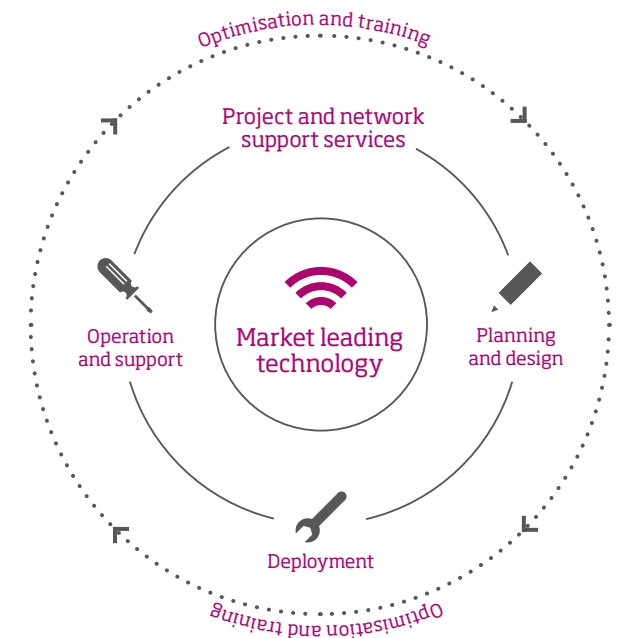
At CBNL we've developed the industry's market leading licensed PMP platform - VectaStar®. But uniquely, we see the bigger picture – leveraging our expertise and experience to give customers peace of mind that each deployment meets immediate and long term goals.

We channel our advanced technology, intelligent software and consultancy services into bespoke solutions – offering performance and price benefits over alternative technologies.

Why CBNL lead the market:

- We offer the market leading carrier-grade licensed PMP platform - offering up to **1.2Gb/s per link**, up to **1,2Gb/s per sector**, up to **14.4Gb/s per hub site** and up to **50 per cent TCO savings**
- We work closely with customers to provide **expert consultancy services and bespoke software** to ensure all aspects of network design and deployment bring commercial success
- We hold over **15 years' experience** and a track record of successful references unmatched by other vendors
- Crucially, we combine the industry's leading mix of technology and professional expertise to **offer customers an unsurpassed business case of transformational capacity and revenue prospects.**

The CBNL approach





VectaStar has opened up a new world of opportunities to operators where performance is no longer at the expense of efficiency.

Whether deploying backhaul, enterprise access, or residential ISP networks.



VectaStar has the capacity to handle the most data dominated networks and is already proven in backhauling the world's most modern LTE services.

Our VectaStar portfolio offers operators a proven solution to deliver carrier-class backhaul, enterprise access or residential ISP networks.

By creating one or more sectors of coverage at a single hub site, VectaStar can provide connectivity to many remote sites. Through our intelligent software, operators can define custom profiles for each site to run multiple services within a single sector.

By aggregating bandwidth across all sites, operators can deliver the optimum quality of service with outstanding efficiency – reducing costs, spectrum resources and time to market.

Solutions

Macro backhaul

- 3G, HSPA+, LTE
- 2G - 3G IP backhaul migration
- Last mile fibre extension
- Support special events with transportable cell sites.

Small cell backhaul

- Independent small cell network
- Mixed macro/small cell network.

Enterprise access

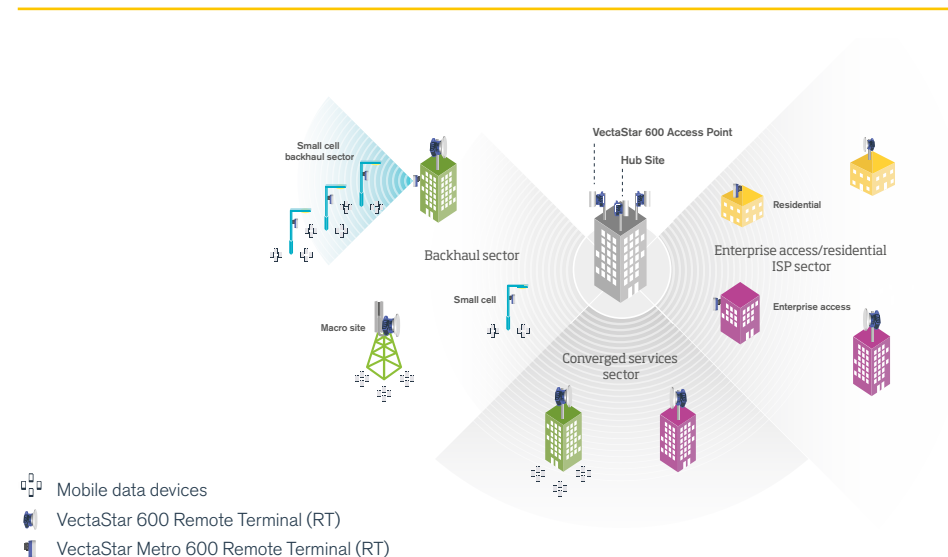
- Small, medium and large corporates
- Utility companies
- Government
- Security and surveillance
- Smart city applications.

Residential ISP network

- Last mile residential internet access
- Middle mile residential internet access.

Converged

- Monetise spare sector capacity by deploying virtualised enterprise access services within a backhaul sector.



## VectaStar - the market leading platform

### VectaStar ODU-S series

VectaStar ODU-S is the market leading Licensed PMP platform which is proven in backhauling wide area 2G, 3G, LTE, Wi-Fi and enterprise access networks.



Pictured: VectaStar ODU-S 28GHz (ETSI) RT 20cm antenna

<b>Frequencies</b>	10.5GHz, 26GHz, 27GHz, 28GHz
<b>Capacity</b>	300Mb/s per link, 600Mb/s per sector, up to 7.2Gb/s per hub site
<b>Sector Antennas</b>	30 and 90 degree
<b>RT Antennas</b>	20, 30, 60 and 90cm
<b>Range</b>	10.5GHz: up to 28.6km, 26-28GHz: up to 5.8km (typical ranges at 99.99%)

### VectaStar 600 series

VectaStar 600 is the latest evolution in the platform which supports 56MHz channels and channel bonding to offer higher capacity and greater flexibility.



Pictured: VectaStar 600 28GHz (ETSI) RT 20cm antenna

<b>Frequencies</b>	26GHz, 27GHz, 28GHz, 31GHz, 39GHz
<b>Capacity</b>	600Mb/s per link, 1.2Gb/s per sector, up to 14.4Gb/s per hub site
<b>Capacity</b> (channel bonded)	1.2Gb/s per link, 1.2Gb/s per sector, up to 14.4Gb/s per hub site
<b>Sector Antennas</b>	30 and 90 degree
<b>RT Antennas</b>	20, 30, 60 and 90cm
<b>Range</b>	26-28GHz: up to 5.8km, 31GHz up to 6.4km, 39GHz: up to 4.8km (typical ranges at 99.99%)

### VectaStar Metro 600 series\*

Designed for quick, discreet and easy installation on street furniture, VectaStar Metro 600 provides coverage through urban canyons backhauling multiple small cells.



Pictured: VectaStar Metro 600 28GHz (FCC)

<b>Frequencies</b>	26GHz, 27GHz, 28GHz, 31GHz, 39GHz
<b>Capacity</b>	600Mb/s per sector or up to 14.4Gb/s per hub site
<b>RT Antennas</b>	Fully integrated access point and remote terminal antennas
<b>Range</b>	Up to 1km (typical)

\* Subject to roadmap

Features	Benefits
<b>Cost</b> <ul style="list-style-type: none"> <li>Compared to fibre and PTP<sup>1</sup>, PMP delivers up to:           <ul style="list-style-type: none"> <li>50 per cent CAPEX savings</li> <li>50 per cent OPEX savings</li> <li>50 per cent TCO savings.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Create a leading business case to invest in new and upgraded networks</li> <li>Accelerate return on investment when connecting new sites</li> <li>Maintain revenues across the network lifecycle.</li> </ul>
<b>Deployment and scalability</b> <ul style="list-style-type: none"> <li>Sector coverage</li> <li>Almost half the radios compared to point-to-point</li> <li>Unique zero indoor footprint covering both access points and remote terminals.</li> <li>Up to 63 RTs in a sector</li> </ul>	<ul style="list-style-type: none"> <li>Deploy networks in almost half the time of PTP</li> <li>Achieve a fast time to market</li> <li>No indoor hub equipment enables quick deployment</li> <li>Connect new sites quickly by a single installation team, without a visit to the hub site or the need of additional spectrum</li> <li>Reduce network power consumption and environmental impact.</li> </ul>
<b>Alignment</b> <ul style="list-style-type: none"> <li>Simplified web-based alignment</li> <li>Real time data displayed during alignment</li> </ul>	<ul style="list-style-type: none"> <li>Reduces technical requirements and time to install new sites.</li> </ul>
<b>Capacity</b> <ul style="list-style-type: none"> <li>Up to 1.2Gb/s per link, 1.2Gb/s per sector, up to 14.4Gb/s per hub site</li> <li>Software defined capacity provisioning.</li> <li>By re-using spectrum VectaStar's dynamic <math>\mu</math>-TDMA offers 4.8Gb/s enterprise grade sellable capacity from just two 56MHz channel pairs, and serves over 1,400 residential subscribers from a single hub.</li> </ul>	<ul style="list-style-type: none"> <li>Deploy capacity which can handle the most data dominated networks with headroom to scale for future requirements</li> <li>Create custom Quality of Service profiles for each site. This provides the ability to define tiered services for enterprise access customers, including dedicated bandwidth.</li> </ul>
<b>Latency and synchronisation</b> <ul style="list-style-type: none"> <li>&lt;1ms round-trip latency</li> <li>SyncE 1588.</li> </ul>	<ul style="list-style-type: none"> <li>Critical for LTE services.</li> </ul>
<b>Power</b> <ul style="list-style-type: none"> <li>40W typical.</li> </ul>	
<b>Quality of Service (QoS)</b> <ul style="list-style-type: none"> <li>Utilises licensed spectrum.</li> </ul>	<ul style="list-style-type: none"> <li>Provide guaranteed QoS to users and carrier grade services to enterprises</li> <li>Supports eight levels of QoS.</li> </ul>
<b>Coverage</b> <ul style="list-style-type: none"> <li>10.5GHz: up to 28.6km at 99.99% (typical)</li> <li>26-28GHz: up to 5.8km at 99.99% (typical)</li> <li>31GHz: up to 6.4km* (typical)</li> <li>39GHz: up to 4.8km at 99.99% (typical)</li> </ul>	<ul style="list-style-type: none"> <li>Deploy a variety of flexible network solutions, ranging from targeted high capacity to wide area coverage.</li> </ul>
<b>Spectral efficiency</b> <ul style="list-style-type: none"> <li>Sector aggregation improves spectral efficiency by at least 40 per cent when compared to point-to-point.<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>Reduces operator expenditure on spectrum.</li> </ul>
<b>Network lifecycle software</b> <ul style="list-style-type: none"> <li>VectaStar Network Management System.</li> </ul>	<ul style="list-style-type: none"> <li>Remotely manage equipment and services via a simple web interface.</li> </ul>
<ul style="list-style-type: none"> <li>VectaStar Lifecycle Tool - combines traditional RF planning, real time NMS data and maps to plan, audit and optimise networks.</li> </ul>	<ul style="list-style-type: none"> <li>Deploy networks faster and maintain optimum performance</li> <li>Perform accurate auditing</li> <li>Continuously optimise and increase profitability.</li> </ul>

<sup>2</sup> CBNL (2011) The Effect of System Architecture on Net Spectral Efficiency for Fixed Services



Too often, the building blocks of networks are insufficiently managed to ensure they are fit for purpose - both today and come what may.

Who is being rigorously forensic about ensuring networks are designed, deployed and optimised for immediate and long-term satisfaction?

We are.



CBNL has experience in deploying networks across 50+ countries, including seven of the world's largest ten operators.

We're about the big picture. With over 15 years field proven experience of deploying Licensed PMP, CBNL is unique in the knowledge and expertise it holds. Experience we pass to our customers, guaranteeing each deployment benefits from a proven track record of success.

Our professional consultancy and suite of services accelerate our customer's time to market, reduce risk, increase ROI and ensure long term success.

**Our services include:**

Engineering

- Bespoke radio design and development across microwave and millimetre wave frequencies
- Consultancy covering design, regulatory, manufacturing and supply chain expertise
- Collaborative projects at CBNL's world-class R&D labs.

Project support

- Planning and design
- Installation materials supply
- Project management
- Installation and commissioning.

Network support

- 1st line support
- Network management
- Technical support and software maintenance
- Spare parts management
- Extended warranty.

Training

- Held at CBNL Centre's of Excellence or customer premises.

We understand no two networks are the same. In fact, each and every customer has individual requirements which must be met to achieve success.

Through this knowledge, we offer customers partial or fully outsourced services and have the flexibility to tailor these to bespoke local requirements. The examples below highlight two typical approaches:

**Complementary model**



Our flexible complimentary model dovetails closely with customers internal resources. Customers can reduce costs and add value to their network through deploying CBNL services in specific areas of their deployments, securing a fast time to market, technical stability and commercial success.

**Outsourced model**



Our fully managed services are commonly delivered for mobile virtual network operators (MVNO) and operators migrating towards an outsourced model.

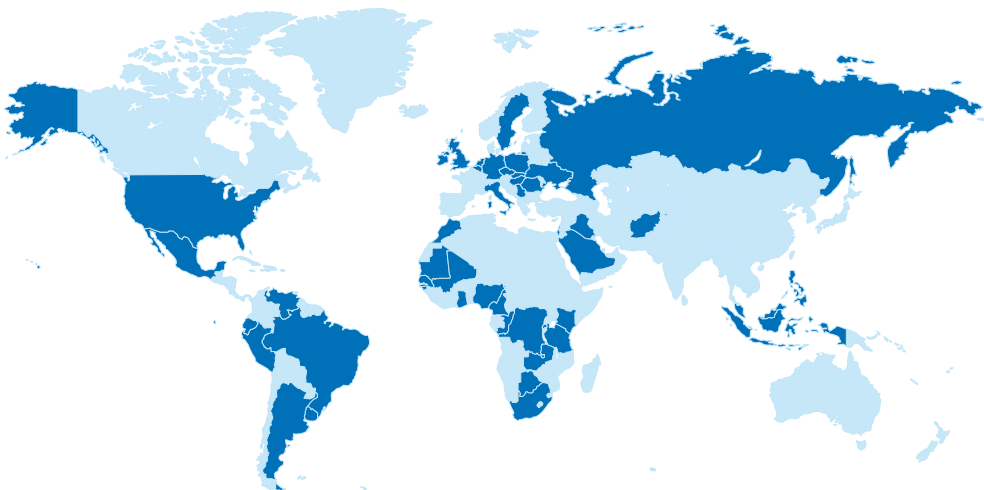
This releases operators to concentrate on focused areas of activity and make significant cost savings compared to maintaining dedicated services teams.

CBNL is the global market leader in licensed PMP, with offices in the UK, South Africa, Nigeria, Kenya and Dubai

#### CBNL key statistics

- Over 15 per cent of revenue spent on R&D
- Strong IP portfolio with all R&D performed in-house
- More licensed PMP deployments than any other vendor
- Live VectaStar networks in 50+ countries
- Serving 100+ service providers
- Serving seven of the world's largest top ten mobile operators
- Multiple networks deployed which connect 5,000-10,000 links.

CBNL has customers in over 50 countries



All information contained within this document is subject to change without prior notice.  
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**CBNL** - The global market leaders in  
licensed point-to-multipoint

Pioneering next generation microwave transmission equipment since 2000, CBNL is the global market leader in licensed point-to-multipoint (PMP) backhaul and enterprise access solutions.

CBNL's carrier-class VectaStar® platform serves over 100 communication providers across over 50 countries, including seven of the world's top ten largest mobile operators.

Offering the industry's leading PMP technology and services, CBNL provides customers with transformational performance, unparalleled cost savings and a track record of success unmatched by other vendors.

+44 1223 703000  
info@cbnl.com  
cbnl.com

