

A quick guide: modern point-to-multipoint microwave networks

Understanding how point-to-multipoint wireless backhaul and access solutions improve telecommunication network capacity and efficiency





VectaStar is the market leading point-to-multipoint microwave platform which is proven across the globe for mobile backhaul, enterprise access and small cell networks

Introduction

Demand for mobile and fixed data connectivity is continuing to increase. How service providers efficiently scale backhaul requirements to tackle data capacity and provide the desired quality of service has become all the more important. The need for service providers to run backhaul at a lower cost per bit, achieve a higher ROI and improve spectral efficiency is also critical to a successful business case. Integrating these central elements not only enables service providers to build a successful monetary future but also supports the launch of innovative new services and business models.

Service providers can employ several different backhaul technologies to tackle this challenge which includes wired and wireless technologies. One technology which is increasingly being used to quickly improve the capacity and efficiency of next generation backhaul networks is point-to-multipoint (PMP) microwave. PMP microwave operates at multiple frequencies, although typically at 10.5, 26, 28Ghz. These frequencies benefit from high capacity, along with widely available and cost effective spectrum. PMP microwave can be used in Sub 6Ghz frequencies, although these are limited by the lack of freely available spectrum and associated lack of capacity. As such Sub 6Ghz is not covered within this guide.

This guide is an introduction to PMP microwave which is a market set to grow exponentially in the coming years.

We will provide the insight into what the technology is, how it is used and how it is challenging the status quo of traditional backhaul techniques and technologies.

The PMP microwave backhaul market is set for rapid growth and estimated to grow to over \$500 million by 2017 according to market analyst firm ExelixisNet. This growth will be driven by operators need for high capacity and efficient backhaul technologies for next generation mobile networks.

What is PMP microwave?

Point-to-multipoint (PMP) microwave, when used to backhaul mobile and data traffic, usually operates within licensed spectrum bands of 6-60Ghz and is a line of sight radio transmission technology.

The lack of available spectrum and the lack of capacity in sub 6Ghz solutions limits the technology for next generation backhaul scenarios and hereafter will not be referred to within this guide.

Unlike point-to-point (PTP), PMP microwave uses a single hub to create a sector of coverage that can backhaul multiple sites. PMP microwave uses area licenced spectrum, rather than on a link by link basis, allowing bandwidth to be shared across all sites in the sector. Due to this real-time allocation of spectrum, PMP microwave enables the ‘troughs’ of one cell site’s traffic demands to be filled by the ‘peaks’ of another, as shown in Figure 1. This aggregation reduces the total bandwidth required for a sector and has been proven to improve spectral efficiency by

at least 40% when compared to PTP¹. By reducing the spectrum needed to deliver an equivalent service to its PTP counterpart, PMP microwave saves on spectrum rental expenditure and becomes more efficient as networks get denser.

As network demand increases, or new locations are identified, more sites can be deployed within a PMP sector without a re-visit to the hub or need for additional spectrum. Efficiency on this scale, proven by independent testing by Senza Fili Consulting, allows PMP to

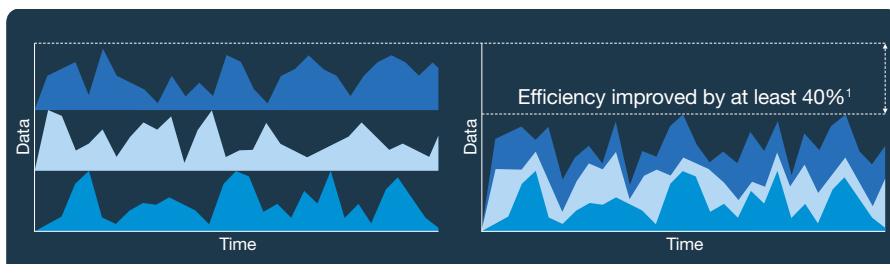


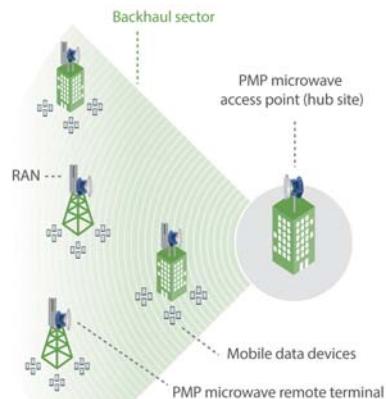
Figure 1

1. Naylor, J. (2011) *The effect of system architecture on net spectral efficiency for fixed services*.

What is PMP microwave? continued ...

deliver total cost of ownership savings of up to 50%² over fibre and point-to-point microwave. This allows service providers to lower costs and achieve a higher ROI within their backhaul ecosystem.

2. Senza Fili. (2011) Crucial economics for mobile data backhaul



Ten myth busting facts

- 1** PMP microwave is an established infrastructure technology in use within 7 of the top 10 largest global operator groups
- 2** PMP microwave is by far the dominant wireless network paradigm. All mobile radio access technologies from GSM to LTE, and every flavour of Wi-Fi and Bluetooth are inherently PMP in architecture
- 3** Compared to equipment available at the time of the LMDS auctions (1999), modern PMP microwave has far higher capacity (VectaStar, the market leading PMP microwave solution, offers 600MB/s) and dramatically lower cost of ownership
- 4** PMP microwave is especially well suited to the majority of urban backhaul and enterprise access deployments which typically have a high proportion of short (<2km) and mid-range (5km) links
- 5** PMP is 50% quicker to deploy than PTP for the second and subsequent links in a sector making it one of the simplest and fastest backhaul technologies to deploy
- 6** PMP microwave is field proven to have capacity for mature and fully loaded LTE networks and exceeds the NGMN's LTE backhaul provisioning guidelines
- 7** Modern PMP microwave systems can backhaul more than a dozen loaded LTE tri-cell eNodeBs in a single sector, with a hub capacity of up to 4.8Gbps
- 8** Large amounts of hub site equipment are not required – VectaStar operates in zero footprint mode with no indoor equipment needed
- 9** PMP microwave needs as little as two links to become more cost effective than microwave PTP; very expensive hub equipment that must be amortised over very large numbers of links is a thing of the past
- 10** TCO savings of up to 50% can be achieved with PMP microwave when compared to alternative forms of backhaul

How PMP microwave is used

PMP microwave is used by mobile network operators and internet service providers across the globe to quickly deploy cost-effective and carrier-grade wireless backhaul and enterprise access networks. With the enormous promise of LTE and small cell networks, the increase in data traffic and contrasting deployment scenarios is demanding operators to review their approach to backhaul. PMP microwave has been developed specifically to take advantage of the characteristics found in these

data dominated networks, delivering a high capacity, efficient and sustainable backhaul solution.

Uses cases include:

- Wide area (macro) mobile backhaul
- Small cell (metro) mobile backhaul
- Enterprise access networks
- Private access networks (corporate, government utilities, municipal services)
- Mixed mobile backhaul and access networks



CBNL has live PMP microwave deployments across 41 countries, including seven of the top ten mobile operators, which backhaul 2G, 3G, LTE, enterprise access and converged networks.

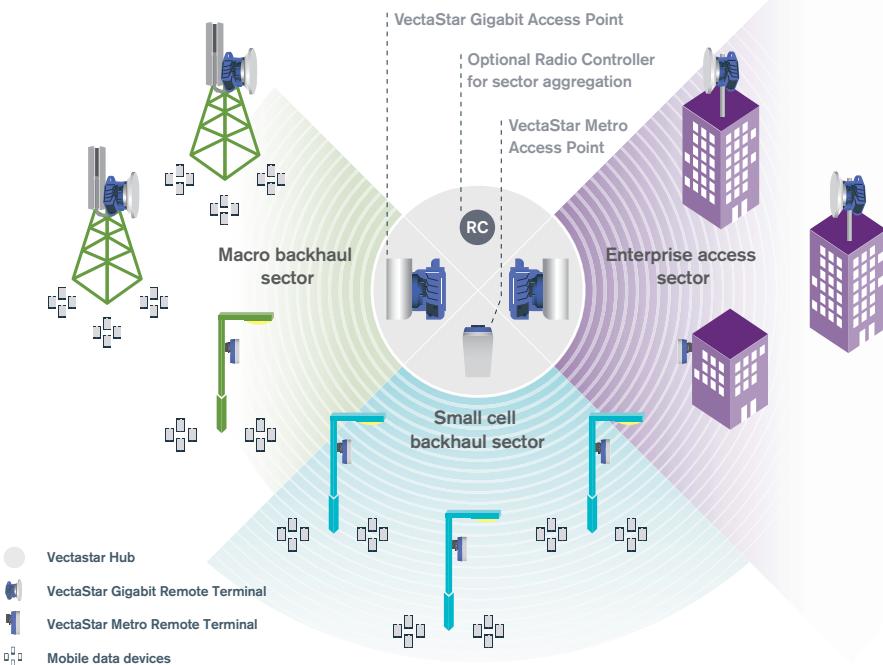
Why do service providers deploy PMP microwave?

The increase in network data traffic, caused largely by the proliferation of smartphones, tablets and new technologies such as M2M, is demanding service providers invest in expanding their network capacity and coverage to maintain the high quality of service demanded by their customers.

The cost and performance of mobile backhaul is a paramount factor in running

and launching new services. There is a need from service providers to run backhaul at a lower cost and ensure a rapid time to market if they are to satisfy customer demand and grow revenues.

With these considerations in mind, PMP microwave enables service providers to provide a consistent service, maintain revenues and ultimately increase profitability.



CBNL's PMP microwave VectaStar portfolio offers operators a carrier-class backhaul, enterprise access and small cell network solution, or any mixed configuration.

Additional key reasons service providers deploy PMP microwave:

Benefits of PMP microwave	Significance of PMP microwave
<i>PMP microwave offers up to 50% total cost of ownership savings over alternative forms of backhaul – saving on equipment, spectral and deployment costs¹</i>	To deploy, run and expand backhaul networks at a lower cost and achieve a much higher return on investment over the life of the network
<i>PMP microwave sectors containing two or more links can be deployed in a fraction of the time and cost compared to PTP due to using almost half the equipment</i>	To rapidly roll out backhaul networks and quickly draw revenues from new services
<i>PMP microwave's sector aggregation improves spectral efficiency by at least 40% when compared to PTP²</i>	To save on spectral resources allowing the roll out of additional profitable services (like enterprise access services on top of mobile), whilst leaving headroom for future growth
<i>Sites can be added to a PMP sector without a re-visit to the hub or need for additional spectrum</i>	To provide a flexible infrastructure which can be quickly, easily and cost effectively expanded as network demand grows
<i>PMP microwave provides the high capacity (VectaStar offers 600MB/s) needed to handle the data demands from the proliferation of LTE networks and exceeds the NGMN's LTE backhaul provisioning guidelines</i>	To provide infrastructure which more than meets the capacity requirements of next generation mobile backhaul and access networks
<i>Technological advances have ensured that PMP microwave installation, deployment and commissioning tasks are non-specialist; saving time, resources, and costs for service providers</i>	To quickly and easily roll out upgraded services to customers, before competitors, enabling service providers to reduce churn and maintain revenues

1. Senza Fili. (2011) Crucial economics for mobile data backhaul

2. Naylor, J. (2011) The effect of system architecture on net spectral efficiency for fixed services.

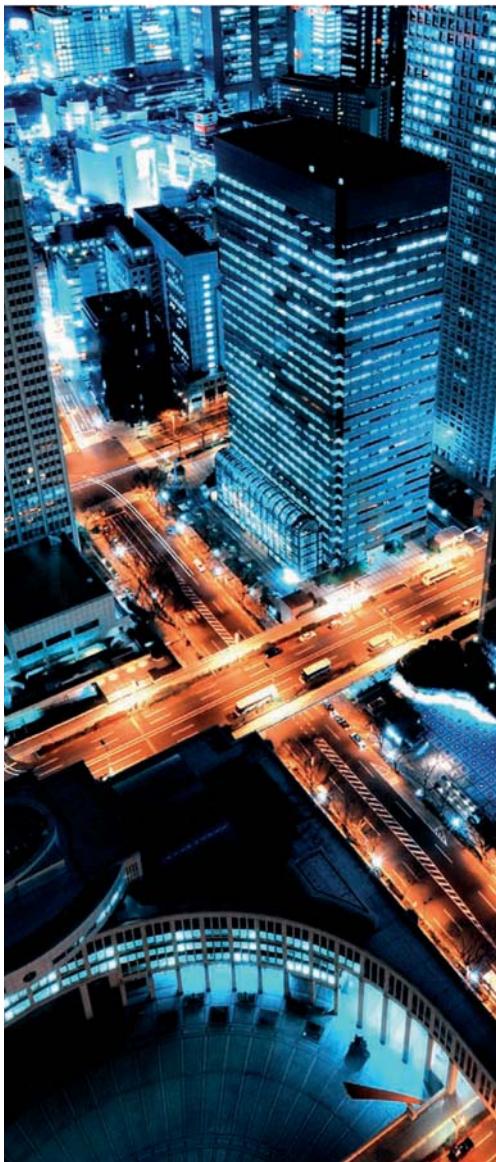
The future for PMP microwave backhaul?

The PMP microwave wireless backhaul equipment market is expected to rapidly grow over the next four years. The growth, driven by the need for high capacity and efficient backhaul technologies for next generation mobile networks, will take the market to over \$500 million by 2017 according to specialist wireless market research firm ExelixisNet.

In addition, the dawn of the LTE and small cell era is demanding a fresh approach to backhaul. Enthusiasm from service providers across the world for these type of networks is gaining momentum with the consumer and business benefits evident for all to see.

PMP microwave solutions suit the evolving landscape of these next generation networks owing to its high capacity, rapid deployment and cost efficiency structure. Due to the nature of the technology, NLOS solutions and PTP approaches cannot provide both the performance and efficiencies needed to make a meaningful business case.

Now and in the future, service providers can maximise efficiency in their backhaul and access networks with increased capacity which PMP microwave brings, as well as compelling TCO benefits which far outstrip other solutions.



Glossary of terms

PMP	<i>Point to multipoint</i>
PTP	<i>Point to point</i>
LMDS	<i>Local Multipoint Distribution Service</i>
TCO	<i>Total cost of ownership</i>
RT	<i>Remote terminal</i>
ARPU	<i>Average revenue per user</i>
CAPEX	<i>Capital expenditure</i>
OPEX	<i>Operating expenditure</i>
ROI	<i>Return on investment</i>
NLOS	<i>Non line of sight</i>
LTE	<i>Long Term Evolution</i>
M2M	<i>Machine to machine</i>
NGMN	<i>Next Generation Mobile Networks</i>

Further reading

White papers:



*Small cell backhaul:
the big picture*



*The effect of system architecture
on net spectral efficiency for
fixed services*



*Crucial economics for mobile
data backhaul*

www.cbnl.com/resources/white-papers



Cambridge Broadband Networks

Welcome to next generation thinking

Welcome to CBNL

Pioneering the development and deployment of next generation microwave transmission equipment since 2000, CBNL is the global market leader in point-to-multipoint microwave backhaul and access solutions. Our carrier-class VectaStar platform serves over 70 communication providers across 40 countries, including 7 of the top 10 world's largest mobile operators.

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