

## VectaStar2

### INTELLIGENT BACKHAUL

VectaStar is a highly flexible Carrier Class Point-to-MultiPoint (PMP) transmission platform, offering a compelling alternative to Point-To-Point (PTP) radio and leased lines. VectaStar is the most widely deployed and technically advanced PMP platform and is used around the world to backhaul 2G, 3G, HSPA and WiMAX networks as well as to provide carrier-grade corporate access.

A single platform seamlessly supports Ethernet and TDM backhaul and has been proven to support the migration from TDM / ATM to all-IP backhaul. Typical VectaStar networks require less than half the hardware and have shown reductions in CAPEX of up to 50% and OPEX of up to 70% when compared to similar PTP networks. In addition, VectaStar helps operators maximise their return on investment by enabling fastest time to revenue, for example, cell site commissioning in an existing sector requires only one radio unit and no additional RF planning.

With its unique mix of features, VectaStar offers a competitive solution for medium and high capacity dense urban networks operating in the standard ETSI 10.5 GHz, 26 GHz and 28 GHz frequency bands.

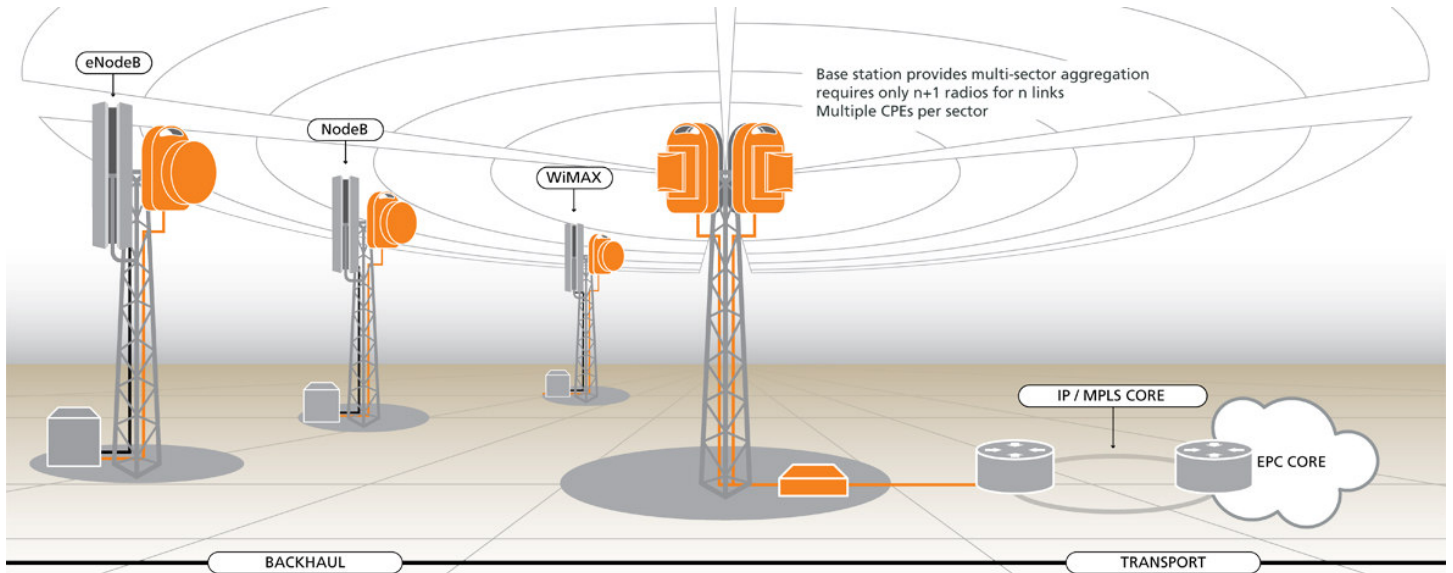


### KEY FEATURES

- **Over 150Mbps throughput per sector**
- **Class-leading spectral efficiency of over 5b/s/Hz**
- **Hitless adaptive modulation from QPSK up to 256QAM with Trellis Code Modulation (TCM)**
- **Full QoS support for IP/Ethernet, E1 and TDM services (including very low latency for delay-sensitive applications)**
- **Integrated optimisation for TDM (E1), 2G (Abis), 3G (Iub), CDMA and IMA services**

## SYSTEM OVERVIEW

VectaStar achieves superior infrastructure efficiency with its unique combination of PMP architecture and multi-frequency transmission combined with intelligent data optimisation and aggregation. VectaStar is highly cost-effective for Cellular, WiMAX & LTE backhaul and its scaling and future-proofing enable an operator to match the explosive growth in data traffic.



As the diagram above shows, traffic from the network edge (e.g. NodeB, WiMAX BS) enters any of the industry standard interfaces and is then optimised to minimise backhaul bandwidth usage. Within the sector, bandwidth is statistically multiplexed (dynamically allocated) across multiple CPEs in accordance with operator-defined QoS parameters. At the VectaStar Base Station, multi-sector traffic is aggregated before transmission to the core through SDH or Gigabit Ethernet connections.

## INTEGRATED INTELLIGENT OPTIMISATION

VectaStar is the only PMP backhaul technology to incorporate built-in optimisation techniques for ABIS, IuB and CDMA services. VectaStar's optimisation technology is a patented, transparent optimisation algorithm which removes unnecessary overhead from the data flows, thus enabling the PMP architecture to take full advantage of the inherent statistical multiplexing potential of variable data flows.

## BASE STATION CONTROL EQUIPMENT

A typical VectaStar base station comprises an indoor Base Station and four 90-degree sector radios. Each sector radio, or Access Point (AP), is an externally mounted antenna, radio, modem and network interface. Multiple sectors of any frequency are supported by the Base Station.

BSC indoor units are industry standard 19" rack-mountable modules designed for installation in weather-protected telecommunication equipment cabinets. BSC indoor units always include:

- a power distribution unit (PDU)
- a Multi-Protocol Aggregator (MPA)
- a Multiplexer (MUX) supported by
- a fibre optic Patch Panel
- and the Access Point Controller (APC)



The Multi-Protocol Aggregator (MPA) provides comprehensive connectivity to different backhaul networks such as Gigabit Ethernet, channelised SDH, etc. Optional E1 Concentrators can also be added, each providing 8 x 120Ω E1 ports for terminating structured/unstructured E1 and IMA services.

The BSC is truly scalable and therefore cost-effective due to its modular design, which allows additional modules (e.g. APs, E1 Concentrators, MPAs) to be added when increased capacity or coverage is required. Each AP aggregates traffic from the sector and the BSC in turn aggregates traffic from all sectors without the need for additional aggregation or optimisation equipment. The BSC indoor equipment terminates ATM, E1 and IP/Ethernet traffic, providing simultaneous support for both access and backhaul applications.

## CUSTOMER TERMINAL (CPE)

VectaStar2 CPEs offer class-leading throughput up to line rate Fast Ethernet full duplex or the available sector capacity. A typical VectaStar2 CPE comprises a single indoor unit which connects to the integrated outdoor unit using CAT-5 cable.

Indoor units range from a single Ethernet port wallbox to the top of the range 8E1 indoor unit, which also includes 4 VLAN-aware Ethernet ports.

All CPEs incorporate a "slip-fit" antenna design that allows replacement of the outdoor unit without disturbing the antenna alignment. Similarly, the same outdoor unit can be used with either a 30cm or 60cm parabolic dish, both of which are available for all frequency variants.



## VECTASTAR NETWORK MANAGEMENT SYSTEM

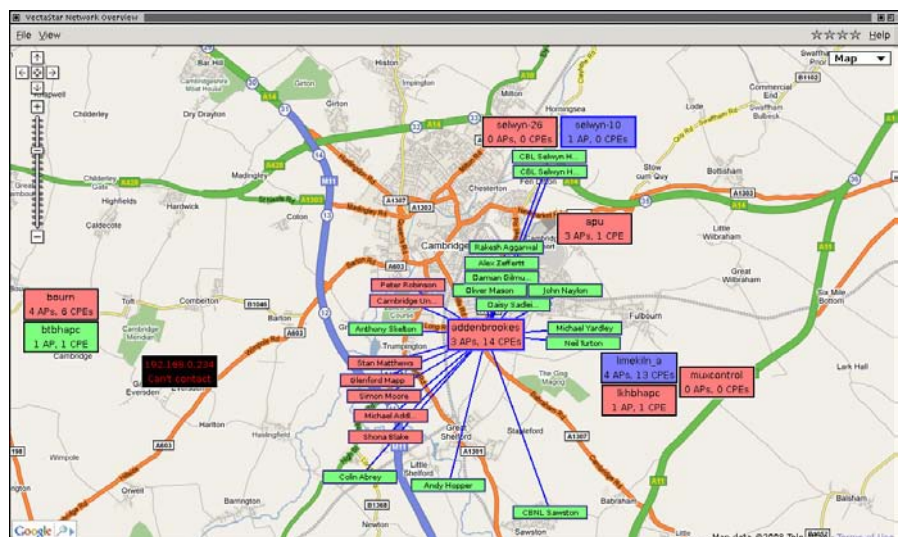
CBNL supplies a feature-rich Element Management System (EMS) as part of the system software. The EMS is a comprehensive suite of software tools and applications to configure and manage the VectaStar Network. The EMS is supported on Linux and Windows OS platforms.

For larger VectaStar networks requiring more unified management, CBNL has developed the VectaStar Network Management System (VNMS) which runs on a purpose-built server allowing for rapid deployment, efficient supervision and consistent management of a VectaStar network.

VNMS provides core FCAPS functionality, according to ITU-T standards and gives:

- a scalable, flexible and robust management system
- a comprehensive suite of software tools and applications to configure a VectaStar Network
- unified supervision of all VectaStar products
- Full Graphical User Interface

VNMS is industry standards compliant supporting SNMP V1, V2c and V3 and includes a northbound interface for connectivity to 3rd Party Management Systems.



## TECHNICAL SPECIFICATIONS

### General

	10.5 GHz	26 GHz	28 GHz
Standards conformance	ITU-R F.1568 & CEPT ERC 12.05E	ITU-R F.748-4 Annex 1 & CEPT ERC 13.02E	ITU-R F.748-4 Annex 2 & CEPT ERC 13.02E
Duplexer Tx/Rx bands	10.15 – 10.3GHz / 10.5 – 10.65GHz	24.549 – 25.445GHz / 25.557 – 26.453GHz	27.5485 – 28.4445GHz / 28.5565 – 29.4525GHz
Duplex spacing	350MHz	1008MHz	
Radio access method	Single Carrier FDD Full Duplex, TDMA uplink and downlink		
Latency (Typical)	IP: <2ms, E1: 10ms, configurable, one-way		
Radio transmit power	+20dBm	+18dBm	
Channel sizes	7 and 14MHz	7, 14 and 28MHz	
Modulation	Hitless Adaptive Modulation (ACM) and fixed mode, QPSK up to 256QAM with Trellis Coding		
Sector throughput	Over 65Mbps Ethernet Over 75Mbps Ethernet and E1* (14MHz channel at 256QAM)	Over 130Mbps Ethernet Over 150Mbps Ethernet and E1* (28MHz channel at 256QAM)	
Range	Up to 22.6km <sup>†</sup>	Up to 7km <sup>†</sup>	Up to 6.4km <sup>†</sup>

\*Sector configuration with five CPEs configured for Ethernet and three E1s each with optimisation gain of 3:1

<sup>†</sup>Ranges calculated for Cambridge, UK rain region using 14MHz channel, standard AP and CPE (2-foot dish) antennas with 99.99% reliability

### Base Station

AP Antenna gain	15dBi (beamwidth: 90°x 8°)	17dBi (beamwidth: 90°x 6°)
Network interfaces	n x E1 (120ohm), n x 10/100/1000BaseT Ethernet, n x STM-1 (VC-4, VC-12)	
Power requirements	-48VDC; Non-redundant (1+0): 400W (typical), Fully redundant (1+1): 800W (typical)	
AP weight and dimensions (excluding antenna)	431x266x127mm (HxWxD), 8.5kg	431x266x139mm(HeightxWidthxDepth), 8.5kg
Indoor unit weights & dims.	MUX-8, PAT-8, PDU-7, E1CON-8, MPA: each 45x481x244mm (1U 19"), 3.0kg; APC: 90x481x260mm (2U 19"), 5.5kg	

### Customer Premises Equipment (Customer Terminal)

Antenna gain (horizontal x vertical beamwidth)	0.3m dish: 28dBi (6°x 6°) 0.6m dish: 33dBi (3°x 3°)	0.3m dish: 36dBi (2.5°x 2.5°) 0.6m dish: 40.5dBi (1.4°x 1.4°)	0.3m dish: 37dBi (2.3°x 2.3°) 0.6m dish: 42dBi (1.3°x 1.3°)
Network interfaces	Up to 8 x E1 (TDM or IMA) 120 Ohm, Up to 4 x 10/100BaseT (VLAN capable)		
Power requirements	-48VDC or 220V AC, 70W (typical)		
CPE outdoor unit weights and dimensions (excl. ant.)	431x266x127mm(HxWxD), 8.5kg	431x266x134mm(HxWxD), 8.5kg	431x266x139mm(HxWxD), 8.5kg
CPE IDU weights and dims.	CPE Wall box: 80x90x30mm, 0.5kg; IDU-4VL-4E1, IDU-4VL-8E1: each 45x481x244mm, (1U 19"), 3kg		
Throughput	65Mbps Ethernet, up to 8 E1s, sector capacity permitting	90 Mbps Ethernet, up to 8 E1s, sector capacity permitting	

### Services

Ethernet	Native Ethernet, VLAN support, 802.1pq, QinQ and IDU port filtering
E1	Optimised E1 (for ABIS, luB, CDMA and IMA), E1 structured (G.704) and unstructured (G.703)
ATM	ATM/IMA, RFC1483, E1CES

### Standards Compliance

Radio & antenna	ETSI EN 302 326
EMC	ETSI EN 301 489
Environmental	Class of indoor equipment required is 3.1 (temperature range**: +5°C to +40°C), as defined in ETSI EN 300 019-1-3. Class of outdoor equipment required is 4.1E and 4.2H (temperature range: -45°C to +55°C), as defined in ETSI EN 300 019-1-4.
Safety	EN 60950-1 and 60950-22
Storage	Class of storage of equipment is 1.3, as defined in ETSI EN 300 019-1-1
Transportation	Class of transportation of equipment is 2.3, as defined in ETSI EN 300 019-1-2
DC power supply	ETSI EN 300 132-2
RoHS and WEEE	VectaStar is compliant with RoHS and WEEE directives (see <a href="http://www.cbnl.com/support/recycling.html">http://www.cbnl.com/support/recycling.html</a> )

\*\*Upper temperature bound de-rated for humidity

To confirm the latest product information and to find your nearest Cambridge Broadband Networks representative, please contact our head office on [sales@cbnl.com](mailto:sales@cbnl.com) or visit <http://www.cbnl.com>

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