CERAGON networks®

FibeAir® 1500P Family

Broadband Wireless Network Solutions

FibeAir® 1500P for versatile high-capacity point-to-point backhaul solutions

FibeAir® 1500P Family

Whether it's 2G, 3G, WiMAX, triple play converged services or legacy networks, today more than ever, operators are looking for a solution that will cover the most modern telecommunications trends.
Based on a deep understanding of operator requirements and with future evolution in mind, Ceragon created the FibeAir 1500P family of products, which answers the need for a future-proof, efficient wireless networking solution and ensures backhaul profitability. State-of-the-art technology and a common hardware platform supporting multiple capacities, frequencies and configurations, make the FibeAir solution ideal for a broad range of network applications.

Optimizing operator costs and reducing risk were the foundations of the FibeAir 1500P system design. With its rapid deployment and maximum equipment efficiency, Ceragon's field proven solution allows operators to leverage their investments and OPEX by simplifying migration to higher capacity multi-service systems.

Maximum Versatility, Maximum Choice

FibeAir 1500P is a versatile solution with the most comprehensive combination of advanced features and capabilities in a single platform. From 155 to 622 Mbps SDH/SONET and 50 to 800 Mbps Fast/Gigabit Ethernet throughput, a frequency range of 6 to 38 GHz and modulation schemes including QPSK, 16, 32, 64, 128 and 256 QAM over 10-56 MHz channels, FibeAir 1500P is an essential building block for any network.

FibeAir includes a variety of interfaces such as Gigabit Ethernet, nxDS3 and nxE1/DS1. The system can be installed in split-mount and all-indoor configurations, for long, medium and short haul transmission, with multiple protection schemes.

With optimal versatility, reliability and efficiency, FibeAir is a guaranteed solution for all your current and future backhaul scenarios.

Integrated Solutions

TDM

Delivering high-capacity SDH/SONET (nxSTM-1/OC3) and medium to high PDH traffic (nxE1/DS1,1xDS3, and 3xDS3), FiberAir 1500P radios constitute the power behind your transport network.

Ethernet

For IP-based traffic, FibeAir 1500P is a flexible and robust fiber-like solution with Fast Ethernet and Gigabit Ethernet options.

Converged

Both TDM and Ethernet traffic interfaces can be provided within the same radio carrier. Each carrier allocates capacity for nxE1/DS1 traffic utilizing the remaining bandwidth for Ethernet traffic. This method, known as dynamic bandwidth allocation, is available for Fast & Gigabit Ethernet solutions.

Long-Haul

FibeAir 1500HP (High Power) is the first split-mount radio to be optimized for long-haul applications. Ceragon's unique embedded space diversity protection, with dual receiver architecture, extremely high transmit power and IF combining algorithm, guarantee superior performance and errorless transmission. For operators, this means a carrier-grade solution that uses less equipment and smaller antennas, resulting in substantial savings on initial investments and operational expenditures.

Security

Ceragon's secure solutions with advanced encryption are based on the AES algorithm. When encrypted links are essential for applications such as those in government or military facilities, FibeAir 1500P ensures that data will be encoded, so that only authorized users are able to send or receive it over the link.

Key Advantages

- Incomparable cost-effective performance, with the latest XPIC and modulations
- A single IDU supports:
  45-622 Mbps TDM capacities or
  50-800 Mbps Ethernet throughput
- Fast service provisioning
- Smaller antennas, lower installation costs
- Modular, "expand-on-demand", scalable and future-proof architecture
- Long, medium and short reach using the same indoor unit
- Built-in space and frequency diversity
- Assured interoperability with standard SDH/SONET and IP equipment
- End-to-end network management
- Split-mount and all-indoor installations

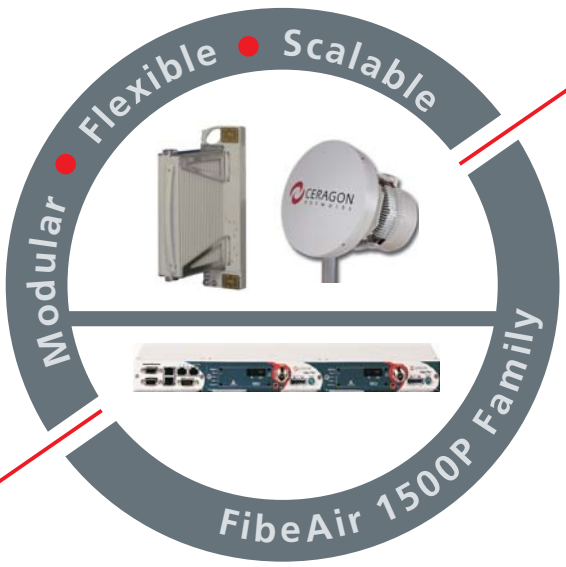
Multiple Network Configuration In Ultra Compact Platform

Physical Interfaces

nxSTM-1/OC-3
STM-4/OC-12
nxDS3, nxE1/DS1
nx100BaseT
Gigabit Ethernet
100BaseT + 8xE1/DS1
Gigabit Ethernet + 8xE1/DS1

Capacities & Throughput

TDM: 45-622 Mbps
Ethernet: 50-800 Mbps



Frequency Bands

6-38 GHz

Modulation

QPSK, 16-256 QAM

Integrated Solutions

Spectral efficiency-XPIC
Space/frequency diversity
Errorless and hitless switching
Split-mount and all-indoor
Long-haul applications
Add-Drop Multiplexer
Element & network management
AES encryption

2G/3G | WiMAX Backhaul | Triple Play | Converged Services

A single powerful platform for multiple services and applications

System Overview

FibeAir 1500P provides wireless high-capacity digital transmission over short, medium and long distances, in a variety of network capacities, frequencies and modulation schemes.

Distances

FibeAir 1500P Outdoor Units (ODUs) are used for short to medium haul applications and operate in the entire frequency range of 6-38 GHz. FibeAir 1500HP RFUs (RF Units) are used for long haul applications, operate in the frequency range of 6-11 GHz and can be installed outdoors in a split-mount configuration or all-indoor in a standard rack.

Configurations

A typical FibeAir 1500P configuration includes an Indoor Unit (IDU) consisting of a compact 1U chassis with two independent traffic modules, a single control unit for both modules, an ODU and an antenna.

The two independent, hot-swappable carriers can be used for protection, diversity or double capacity. High spectral efficiency is ensured by choosing the same frequency for double the capacity, whereby both carriers are used for vertical and horizontal polarization, implemented by the built-in XPIC mechanism. A 2U IDU that can host up to four carriers is available for optimized protected configurations using XPIC and space diversity.

Capacities

The FibeAir 1500P system can easily upgrade TDM capacities of 45 to 622 Mbps or Ethernet throughput from 50 up to 800 Mbps, using the same 1U IDU. The two independent modules in the 1U chassis can each deliver 45 to 311 Mbps for PDH/SDH/SONET or 50 to 400 Mbps throughput for Ethernet traffic, optimizing the solution for every network topology and configuration.

Topologies

Supported topologies include point-to-point, ring, star, mesh and cascaded chain. In East-West configurations (ring and cascaded topologies) one carrier is directed to the East and the other to the West, reducing equipment and resource requirements in each node, which in turn, increases network efficiency.

Protection

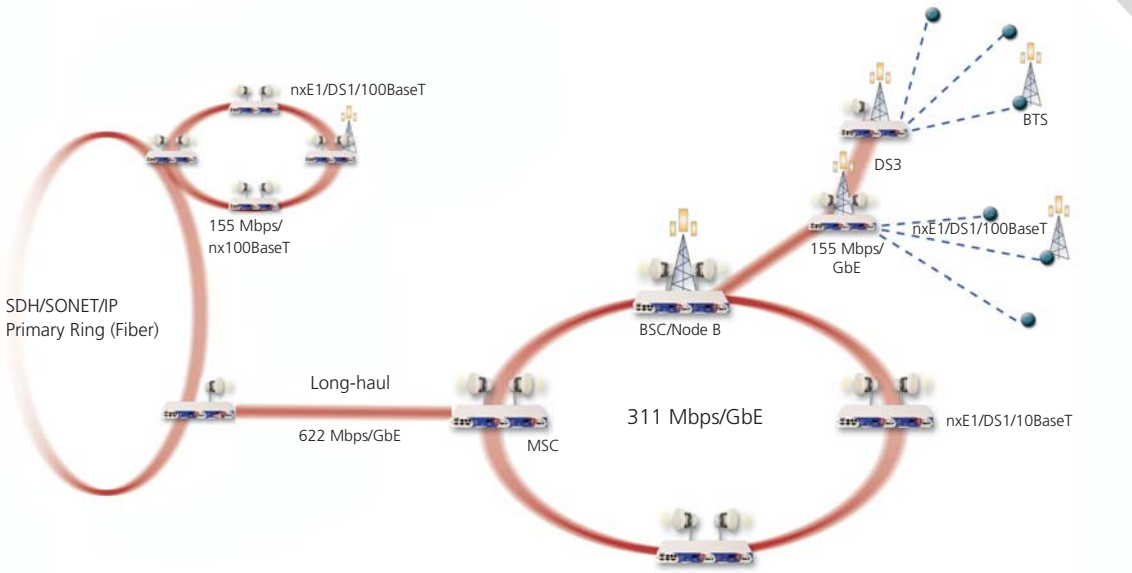
Protected configurations for FibeAir 1500P include 1+1/2+2 HSB and 1+1 HSB with space or frequency diversity and with optional XPIC, Cross Polarization Interference Canceller mechanism. The hitless/errorless protection mechanism, provides superior resilience. Network protection schemes include SNCP/UPSR (e.g. 2+0 East-West configurations) and MSP 1+1. All traffic-affecting circuitry has inherent redundancy.

Seamless Integration

FibeAir can seamlessly integrate in any SDH/SONET, IP and ATM network, while supporting a wide variety of Ethernet and TDM interfaces, including nxE1/DS1, nxDS3, nxSTM-1/OC-3, STM-4/OC-12, nxFE and GbE. This enables network designers to meet growing market needs, including integration of current and next generation technologies, using the same radio equipment.

Winning Combination

Combining unparalleled spectral efficiency, hardware efficiency, modularity, flexibility and upgradeability in a single, compact and cost-effective system, the FibeAir 1500P family is a breakthrough in the wireless point-to-point market.



Applications

The FibeAir 1500P family enables rapid and cost-effective high-capacity connectivity for carriers, both in the cellular and fixed operator markets as well as for private networks.

Mobile Cellular Infrastructure

Ceragon's FibeAir 1500P is an optimal solution for mobile cellular networks, which require higher capacity due to an increase in subscribers, cell sites and data rich applications. FibeAir enables fast and efficient network expansion and as an intelligent network element, offers a smooth migration path from existing PDH to SDH/SONET network functionality and to next generation ATM and IP.

Fixed Networks

To bridge the broadband access gap between end-user demands and the core network infrastructure, FibeAir offers high-capacity wireless metropolitan ring/mesh/chain and PTP solutions in the core network. Ceragon's FibeAir delivers Internet access and integrated high-speed data, video and voice traffic in the most optimum cost-effective manner whether across a city or far into the suburbs.

Private Networks

Easy to install and operate, the modular FibeAir design is ideal for private networks, wide spread educational campuses, financial institutions, utility companies, governmental and corporate facilities providing direct carrier-class connections for ATM, IP and IP+TDM traffic.

End-to-End Network Management

Ceragon provides state-of-the-art management based on SNMP. Our management applications are written in Java code and enable management functions at both the element and network levels. The applications run on Windows 2000/2003/XP and Sun Solaris.

CeraView® is Ceragon's SNMP-based EMS (Element Management System) that enables the operator to perform element configuration, RF and SDH performance monitoring, remote diagnostics, alarm reports and more. CeraView integrates with different NMS (Network Management System) platforms, such as Ceragon's NMS, HP OpenView® and SNMPc, to provide more comprehensive system management.

PolyView™ is Ceragon's NMS that includes CeraMap™, its friendly yet powerful graphical interface. PolyView can be used to update and monitor network topology status, provide statistical and inventory reports, define end-to-end traffic trails, download software, and configure elements in the network. In addition, it can integrate with Northbound NMS platforms, to provide enhanced network management.

PolyView and CeraView screens

Technical Specifications

Band	6 GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
General											
Standards	ETSI; FCC	ETSI	ETSI; FCC	ETSI	ETSI	ETSI; FCC	ETSI; FCC	ETSI; FCC	ETSI; FCC	ETSI; FCC	ETSI; FCC
Operating Frequency Range	5.925-6.425 6.425-7.1	7.1-8.5	10.7-11.7	12.75-13.25	14.5-15.35	17.7-19.7	21.2-23.6	24.25-26.5	27.5-29.5	31.8-33.4	37-38.4,38.6-40, 37-39.5
Tx/Rx Spacing (MHz)	240, 252.04, 260, 266, 340, 300	119, 154, 161, 168,182, 196, 245, 311.32	430, 490, 520, 530	266	315, 420, 490, 728	1010, 1120; 1560	1008, 1232; 1200	1008, 800 1009, 900	1008; 350 500	812	1000, 1260; 700
Frequency Stability	+0.001%										
Frequency Source	Synthesizer										
RF Channel Selection	Via NMS										
System Configurations	Non-Protected (1+0), Protected (1+1), Space Diversity, Frequency Diversity, Co-Channel Dual Polarization (2+0 / 2+2 XPIC)										
Receiver Overload (BER=10^{-6})	Better than -20 dBm										
Unfaded BER	Less than 10^{-13}										
Tx Range (Manual/ATPC)	Manual: -10 dBm to max Tx Power, Automatic: for ODU, up to 30 dB; for HP RFU, up to 20 dB										
STM-1 / OC-3 / 3xDS3, 155 Mbps, 16/64/128 QAM, Single Carrier											
RF Channel Spacing (MHz) 16 QAM	-	-	-	-	56	55, 80	56, 60	56	56, 50	56	56, 60
64 QAM	40	40	40	40	40	-	-	-	-	-	-
128 QAM	28, 29, 29.65, 30	28, 29, 29.65, 30	28, 29, 29.65, 30, 40	28	28	27.5, 40	28, 50	28	28, 50	28	28, 50
Tx Power (dBm) 16/64/128 QAM	-/26/26	-/25/24	-/23/22	-/22/22	23/22/22	21/20/20	20/20/20	20/20/20	20/19/19	20/18/17	19/17/16
Rx Sensitivity (BER=10^{-6}) (dBm) 16/64/128 QAM	-/-71/-69	-/-71/-69	-/-71/-69	-/-70/-68	-75/-70/-68	-75/-70/-68	-75/-70/-68	-75/-70/-68	-74/-68/-67	-74/-68/-67	-73/-68/-66
HP Tx Power (dBm) 16/64/128 QAM	-/30/29	-/30/29	-/28/27	-	-	-	-	-	-	-	-
HP Rx Sensitivity (BER=10^{-6}) (dBm) 16/64/128 QAM	-/-71/-69	-/-71/-69	-/-71/-69	-	-	-	-	-	-	-	-
2xSTM-1 / 2xOC-3, 311 Mbps, 128/256 QAM, Single Carrier											
RF Channel Spacing (MHz) 128/256 QAM	-	-	-	-	56/-	55/-	56/50	56/-	56/50	56/50	56/50
Tx Power (dBm) 128/256 QAM	-	-	-	-	20/-	18/-	17/17	17/-	17/17	17/17	16/16
Rx Sensitivity (BER=10^{-6}) (dBm) 128/256 QAM	-	-	-	-	-65/-	-65/-	-65/-61	-65/-	-64/-60	-62/-60	-63/-56
DS3, 45 Mbps, 16/64 QAM, Single Carrier											
RF Channel Spacing (MHz) 16/64 QAM	-/10	-	-/10	-	-	20/-	20/-	-	20/-	-	20/-
Tx Power (dBm) 16/64 QAM	-/26	-	-/21	-	-	21/-	20/-	-	20/-	-	19/-
Rx Sensitivity (BER=10^{-6}) (dBm) 16/64 QAM	-/-76	-	-/-76	-	-	-80/-	-79/-	-	-78/-	-	-78/-
HP Tx Power (dBm) 16/64 QAM	-/30	-	-/28	-	-	-	-	-	-	-	-
HP Rx Sensitivity (BER=10^{-6}) (dBm) 16/64 QAM	-/-77	-	-/-77	-	-	-	-	-	-	-	-

All values are typical. For additional Tx/Rx schemes, please contact your Ceragon representative.
Stated transmit power is for split-mount installation, whereas High Power (RFU) all-indoor installations deliver additional 3 dBm Tx power.

Ethernet Configurations, Single Carrier

Interface	Traffic Throughput	Modulation	Channel Bandwidth (MHz) (ETSI, FCC)
GbE with up to 8xE1/DS1	400 Mbps	256 QAM	56, 80
	300 Mbps	256 / 128 QAM	50 / 56
	150 Mbps	16 / 64 / 128 QAM	56, 50 / 40 / 28, 30
2xFE with up to 8xE1/DS1	200 Mbps	32 / 256 QAM	56, 50 / 30
	150 Mbps	16 / 64 / 128 QAM	56, 50 / 40 / 28, 30
FE with up to 8xE1/DS1	100 Mbps	32 QAM	25, 28, 30
	50 Mbps	QPSK / 16 / 32 / 64 QAM	28 / 20 / 14 / 10

Note: Effective traffic throughput depends on modulation and packet size.

System Specifications	
Payload Types	SDH: STM-1 and 4, SONET: OC-3/STS-3, OC-3C/STS-3C, OC-12/STS-12, ATM: ATM over SONET/SDH, IP: Fast Ethernet and Gigabit Ethernet, PDH: DS3, E1, DS1
Interface Modules	STM-1/OC-3: Electrical - CMI/BNC, Optical - SM/MM, Fast Ethernet: 100BaseT, 2x100BaseT Gigabit Ethernet: 1000BaseFx, PDH: DS3, 3xDS3, 8xE1, 8xDS1
Wayside channels	E1/DS1, bridged Ethernet 10BaseT per carrier
User channels	V.11 or RS-232, 10BaseT or G.703 (optional)
Engineering Order Wire	CVSD audio channel (64 Kbps)
Compatible Standards	ITU-T G.703, G.707, G.783, G.823, G.957, G.958, ITU-T I.432, ATM Forum, ETSI ETS 300 147, ETS 300 417, ANSI T1.105, ANSI T1.102-1993, Bellcore GR-253-core, TR-NWT-000499, IEEE 802.3, 802.3u, 802.3z, 802.3ac, 802.3i
Protection switching	Space/frequency diversity, 1+1/2+2 Hot Standby, hitless, errorless

Network Management	
Type	SNMP, in compliance with RFC 1213, RFC 1595 (SONET MIB)
Local or Remote	PolyView, CeraView with advanced GUI for Windows 2000/2003/XP and Sun Solaris, integrated with HP OpenView
NMS Interface	Ethernet bridge 10Base-T, RS-232 (PPP, SLIP), built-in Ethernet hub
Local Configuration & Monitoring	Standard ASCII terminal, serial RS-232
In-Band Management	Uses standard embedded communications channel, dual port built-in Ethernet hub
TMN	Ceragon NMS functions are in accordance with ITU-T recommendations for TMN
External Alarms	5 inputs: TTL-level or contact closure to ground, 3 outputs: Form C contacts, software configurable
Performance Monitoring	Integral with onboard memory according to ITU-T G.828

Environment	
Operating Temperature	ODU/RFU: -35°c to 55°c, IDU: -5°c to 45°c
Relative Humidity	ODU/RFU: up to 100% (all weather operation), IDU: up to 95% (non-condensing)
Altitude	Up to 4,500 m (15,000 ft)

Power Input	
Standard Input	-48 VDC
DC Input range	-40.5 to -72 VDC (up to -57 VDC for USA market)
Optional Input	110-220 VAC

Power Consumption	
Maximum ODU Power Consumption	For 1+0: 40W, For 1+1: 63W
Maximum RFU Power Consumption	For 1+0: 80W, For 1+1: 130W
Maximum IDU Power Consumption	For 1+0: 25W, For 1+1/2+0: 40W

Mechanical	
ODU	27 cm diameter x 14 cm depth (10.8" diameter x 4.5" depth), Weight: 8 kg/18 lbs
HP RFU	49 cm height x 14.4 cm width x 28 cm depth (19" x 6" x 11"), Weight: 7 kg/16 lbs
IDU (1U)	4.4 cm height x 43.2 cm width x 24 cm depth (1.7" x 17" x 9.4"), Weight: 5 kg/11 lbs
IDU (2U)	8.9 cm height x 43.2 cm width x 24 cm depth (3.5" x 17" x 9.4"), Weight: 10 kg/22 lbs
IDU-ODU/RFU Coaxial Cable	RG-223 (100 m/300 ft), Belden 9914/RG-8 (300 m/1000 ft) or equivalent, N-type connectors (male)

All specifications are subject to change without prior notification.

Ceragon Networks Ltd.

Ceragon Networks Ltd. (Nasdaq and TASE: CRNT), a leader in broadband wireless networking systems, enables rapid and cost-effective high-capacity network connectivity. Ceragon's FibeAir product family was designed with network evolution and technology in mind, to benefit mobile cellular infrastructure, fixed networks, private networks and enterprise applications. For all modern telecommunication trends, whether it's 2G, 3G, WiMAX, triple play converged services or legacy networks, FibeAir answers the demand for future-proof backhaul connectivity.

FibeAir covers a wide frequency range from 6-38 GHz and supports integrated high-capacity SDH/SONET, ATM and IP services. FibeAir is easily upgradeable for TDM networks from 45 to 622 Mbps, and for IP networks, from 50 to 800 Mbps, with Fast Ethernet and Gigabit Ethernet interfaces.

The FibeAir product family offers innovative built-in multiplexing and encryption functionalities to meet the growing demand for value-added broadband services. Ceragon's product family is installed with over 160 customers in more than 75 countries. More information is available at **www.ceragon.com.**

BM-0079-0/ 26

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