



FibeAir[®] 640P

High-Capacity Wireless PDH/Ethernet Solutions



- **64 E1/T1 wireless transmission**
- **Full throughput Fast Ethernet**
- **Upgradeable capacities**
- **Fully redundant architecture**
- **Flexible network design**
- **End-to-end network management**

Enabling cellular operators to build their future networks today

To provide TDM capabilities, next generation IP or both combined, cellular operators require a scalable and cost effective wireless transmission solution. FibeAir 640P high capacity PDH radio was designed to answer 2G and 3G deployment challenges with flexible "pay-as-you-grow" connectivity for wireless access networks.

With the seamless capability of upgrading from medium to high capacity, and its built-in Fast Ethernet port, FibeAir 640P is ideal for migration from 2G to 3G cellular networks and beyond.

The FibeAir 640P is a carrier class solution that operates in the 6-38 GHz frequency range. This point-to-point system uniquely incorporates multiple TDM capacities from 32 to 64 E1s and from 28 to 64 T1s together with intelligent Fast Ethernet networking.

Delivering highly resilient native PDH transmission, FibeAir 640P is ideally suited for Base Station synchronization. With extremely low-latency and wire-speed native Fast Ethernet, FibeAir 640P meets emerging IP networking requirements, making it the perfect choice for cellular, fixed and broadband applications.

The ideal combination of TDM & Ethernet for cellular operators

Up to 64 E1/T1 and FE connectivity

Any combination of E1/T1 & Fast Ethernet capacities up to 155 Mbps

Pay as you grow

With simple capacity upgrades using license keys

Native PDH

For carrier-grade voice networks and synchronization capabilities

Native Ethernet

Lowest latency, full Layer 2 QoS support; Provides a versatile migration path for future IP services

Clear upgrade path to higher capacities with Ceragon's FibeAir SDH and IP systems

Simple re-use of system components

FibeAir family unified platform

Flexible network design and fewer spare parts

Full redundancy

Built-in Hot-Standby (HSB) protection for ALL active parts (power supply, traffic ports, radio, etc.)
With the fastest switch to protection

Optimal spectrum-efficient modulation techniques

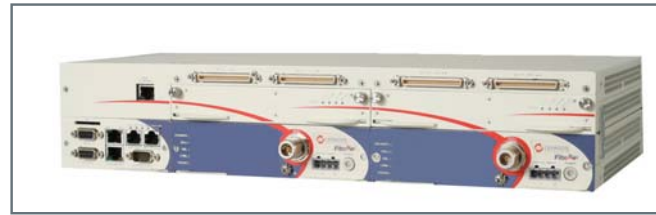
With multi-rate multi-constellation radio

Longer distances, smaller antennas

With FibeAir high power RF units

Additional 3 dB for 64 E1s/T1s

When using 64 QAM modulation versus 128 QAM in SDH/SONET radio links



System Overview

Ceragon's FibeAir 640P enables simultaneous native TDM and native Ethernet transmission with multiple frequencies, software selectable capacities, modulation schemes and configurations using a compact 2U IDU. Using FibeAir 640P "on-the-fly" upgrade method, network operators buy capacity only as needed, benefiting from savings on initial investments and OPEX.

The FibeAir 640P IDU (Indoor Unit) is optimized for mission critical protected configuration, and delivers up to 155 Mbps, in a typical point-to-point scenario.

Traffic capacity throughput and spectral efficiency are optimized with the desired channel bandwidth. For maximum user choice flexibility, channel bandwidth can be selected together with a range of modulations, from 16 to 128 QAM. The independent hot swappable Indoor Unit Modules (IDMs) are used for hot-standby hardware protection and diversity.

Your Choice for High Capacity PDH Transmission

TDM Voice Transmission with a 64 E1/T1 port chassis and capacity upgrades using software keys.

True native PDH Transmission with no circuit emulation and encapsulation. TDM traffic is transmitted separately, ensuring quality, service continuity and system synchronization.

Dynamic bandwidth allocation only enabled E1/T1 ports are allocated with capacity, while the remaining capacity is dynamically allocated to the Fast Ethernet port to ensure maximum Ethernet bandwidth utilization.

Unique Ethernet Networking Features

Wire-speed Fast Ethernet - Up to 100 Mbps full-duplex throughput with capacity upgrades using software-licensed keys, from 45 to 100 Mbps.

Low Latency - Typical 0.2 msec. for 100 Mbps.

Fast Recovery Time to Support RSTP when combined with a switch/router that supports RSTP (Rapid Spanning Tree Protocol), enabling fast recovery time.

Highest Priority Level for BPDUs supports optimal operation of spanning tree protocols.

Built-in QOS - Provides priority support allowing QOS different classes of service, according to VLAN priority (802.1p) and DiffServ / IPv4 TOS or IPv6 TC bit values. All use 4 levels of prioritization with user-selectable options between strict priority queuing or weighted fair queuing, with 8:4:2:1 strict weights.

Applications

FibeAir 640P is ideal as a high capacity PDH trunk, and was designed with cellular backhauling in mind.

FibeAir 640P in Cellular Networks

The introduction of 3G cellular networks and the huge increase in Node-B data traffic has resulted in a high demand for transmission of data-related E1/T1s from Node-Bs and BTS (Base Transceiver Station) sites to the RNC/BSC layer. In many networks, the need to carry this traffic, securely, resiliently and effectively, has led to the creation of an intermediate transmission layer in the radio access network with strict requirements.

FibeAir 640P, as an optimized network element was designed with the intermediate layer challenge in mind. FibeAir 640P offers a straightforward migration path, from mid-capacity PDH links of 32/28 E1s/T1s to high capacity links of 48 and 64 E1/T1s. In addition, FibeAir 640P provides the cellular operator with Fast Ethernet connectivity. For optimized traffic flow when both Ethernet and TDM traffic are converged, FibeAir 640P governs the traffic using dynamic bandwidth allocation.

FibeAir 640P provides the network planner with the most flexible and efficient solution for 2G and 3G deployment challenges. Its dynamic mixing of TDM and packet traffic, and its clear migration paths from mid-capacity PDH/Ethernet to high-capacity PDH/Ethernet, and to SONET/SDH asymmetrical network access, make it the best choice for cellular network building.

FibeAir 640P High Capacity PDH Trunk

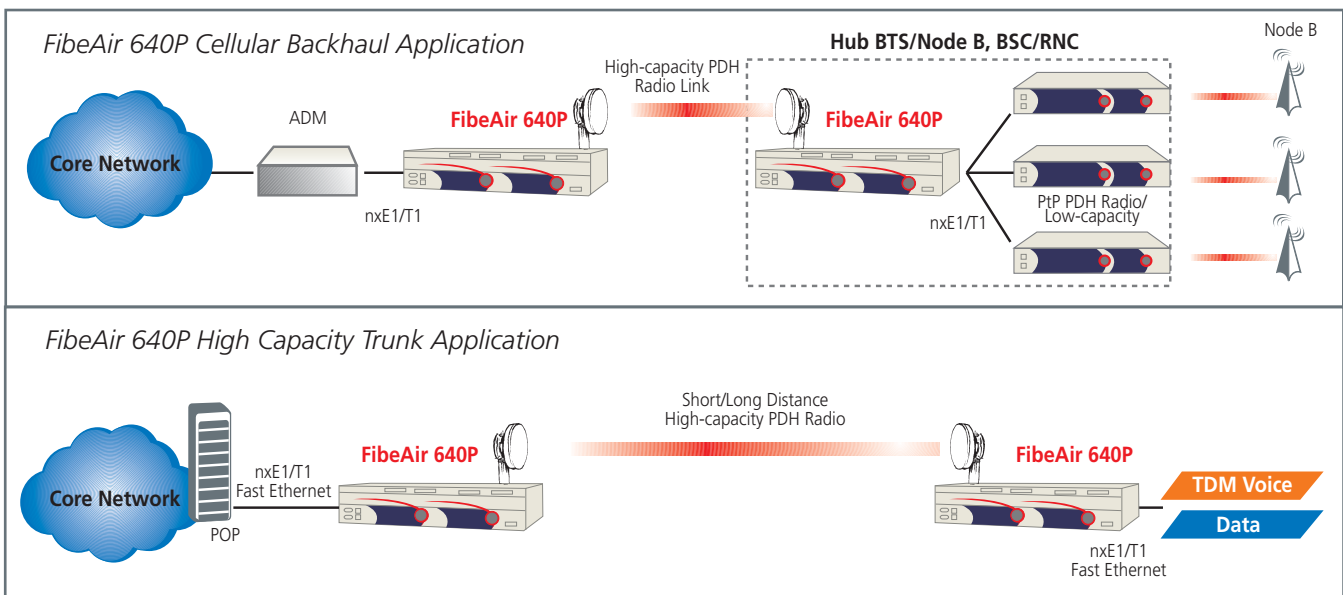
With a variety of "SDH-like" networking and management features, and simple and economic deployment and operation, FibeAir 640P is the best comprehensive choice for a PDH radio.

To meet operator needs for mid to high capacity PDH trunks, FibeAir 640P offers split-mount and all-indoor installations, and software upgrades beginning with 28 T1s/32 E1s, and up to 64 E1s/T1s.

The typical FibeAir 640P PDH trunk application consists of a chained point-to-point wireless link, which carries E1/T1 traffic and bridges the capacity gap between PDH and SDH networks. The FibeAir 640P design allows operators to upgrade their links without costly additional investments in equipment. Its dynamic operation ensures that available bandwidth matches the actual demand.

The same FibeAir 640P hardware supports a Fast Ethernet port with flexible bandwidth allocation between TDM and Ethernet traffic.

FibeAir 640P is a highly resilient carrier-grade radio due to its 1+1 HSB (Hot Standby) protection capability for radio and all traffic-affecting circuitry. The protection configuration also provides an economic advantage as it significantly reduces maintenance and operation costs.





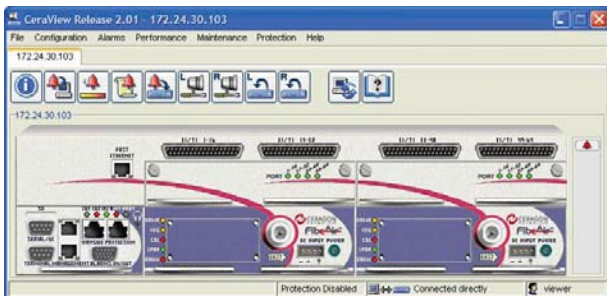
Comprehensive Network Management

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 and powerful graphical interface. PolyView can be used to update and monitor network topology status, provide statistical and inventory reports, download software and configure elements in the network. In addition, it can integrate with Northbound NMS platforms, to provide enhanced network management.

Third party management systems can take advantage of two software-selectable User Channels that provide asynchronous V.11/RS-232 at 9.6 kbps or synchronous V.11 co/contra directional at 64 kbps, in order to distribute their management messages.



PolyView and CeraView screens

Key Features

- Multiple capacities of from 32 to 64 E1s, at 16, 32, 64 or 128 QAM modulation, and from 28 to 64 T1s at 16, 32, 64 or 128 QAM modulation.
- The system operates in the frequency range of 6-38 GHz
- Flexible bandwidth allocation of TDM and Ethernet traffic – any unused E1 or T1 contributes its bandwidth to the Ethernet port
- Software configurable Multi-Rate Multi-Constellation (MRMC), for bandwidth and system gain optimization
- Software capacity upgrade path (all with Fast Ethernet):
32 x E1 → 48 x E1 → 64 x E1
28 x T1 → 40 x T1 → 64 x T1
- Configurations: 1+0 or built-in 1+1 Hot Standby protection for all traffic-related parts (radio, Mux and traffic ports), hitless space and frequency diversity, IF combining (with FibeAir 1500P RFU)
- Modular compact IDU (2U) with hot-swappable modules and fast & easy split-mount or all-indoor installation
- Auxiliary channels: Ethernet 10BaseT wayside channel, engineering order wire, two software-selectable serial user channels

Ceragon Networks Ltd.

Ceragon Networks Ltd. is a leading provider of high-capacity Carrier Ethernet and TDM wireless solutions for cellular and fixed wireless operators, enterprises and government organizations.

Ceragon's modular FibeAir product family is recognized as the gold standard for backhaul transmission and is the selection of choice for service providers. A scalable, future-proof solution for wireless transport of broadband services, FibeAir operates across multiple frequencies for Ethernet and SONET/SDH protocols, supporting the emerging needs of next-generation networks that are evolving to all-IP based services. It leads the market in IP backhaul, offering a unique, native Ethernet solution that provides efficient, robust connectivity.

Ceragon supports its growing base of more than 200 customers in 85 countries by operating an extensive sales network comprised of multiple offices and numerous partners located around the world. More information is available at www.ceragon.com

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