



PRODUCT BRIEF



UPGRADE YOUR NETWORK PERFORMANCE

Carrier Grade E-band Solutions

More Capacity, Longer Range, Higher Reliability

Millimeter wave (mmW) wireless transport is an attractive, lower-cost alternative to the traditional microwave (MW) technology for delivering data for fronthaul, backhaul, or wireless access. The use of E-band within the mmW range enables getting high-capacity with low latency at a lower cost, coping with the shortage of available spectrum on microwave frequencies. This combines to make mmW a strong alternative for a variety of scenarios that until recently could only be addressed by MW connectivity.

LEVERAGING THE SPECTRUM

Deploying mmW technology in support of a variety of applications offers significant advantages, stemming primarily from its high-frequency spectrum. Leveraging this spectrum, mmW can transmit large amounts of data at a very high speed, a crucial capability in the age of 5G, where data demand is skyrocketing. Furthermore, the high frequency also means that mmW has a large number of available bandwidths, which reduces the risk of network congestion.

Reliability and Flexible Capacity

At Ceragon, we harness the strengths of mmW to deliver superior wireless transport solutions. Ceragon's mmW solutions are smaller and lighter than any similar carrier grade equipment in the market, a fact that enables easier installation and reduces shipping and tower rental costs. Finally, and most important, our advanced mmW systems are designed to address the key challenges of modern networks - to provide high-capacity, reliable, and cost-effective connectivity, empowering our clients to stay ahead in the fast-evolving digital landscape.

Overcoming E-band Limitations with Ceragon's E-Stabilizer

E-Stabilizer is Ceragon's unique antenna stabilizer, developed to enable easy and accurate installation of 3ft antennas to deliver higher range and availability. The antenna stabilizer solves the biggest challenge of short-range E-band links – i.e., the fact that 70Ghz – 80Ghz links typically have a range of only a few kilometers. By using Ceragon's E-Stabilizer antenna you can get a 45% increase in range over traditional mmW solutions due to the higher system gain of the 3 ft antenna. In addition, the E-Stabilizer's combination of sophisticated hardware and software deliver automated link alignment even in the harshest weather conditions. This avoids system gain loss that might happen due to antenna movement.



THE PRODUCTS



MEET THE **MILLIMETRIC WAVE FAMILY**

Up to 20Gbps capacity that meets your needs

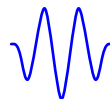
Ceragon offers carrier grade E-band solutions with up to 20Gbps capacity - top-of-class in the market. The solutions are smaller and lighter than any other similar equipment, a fact that enables easier installation and faster deployment, helping to reduce operational costs. These innovative solutions consist of high-capacity point-to-point links (complementing our lower capacity line of products) that operate in the E-band spectrum. We have the flexibility to meet your link requirements and link budget needs while delivering optimal bandwidth and modulation for your transport requirements.

As one of the most experienced companies in the industry Ceragon understands the needs of mobile operators. We deliver carrier grade features that assure high capacity and high availability for your 5G access, helping you maintain low TCO.

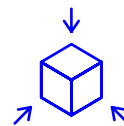
OUR mmW PtP FAMILY ADVANTAGES



Multi-gigabit
capacity



Abundant
available spectrum



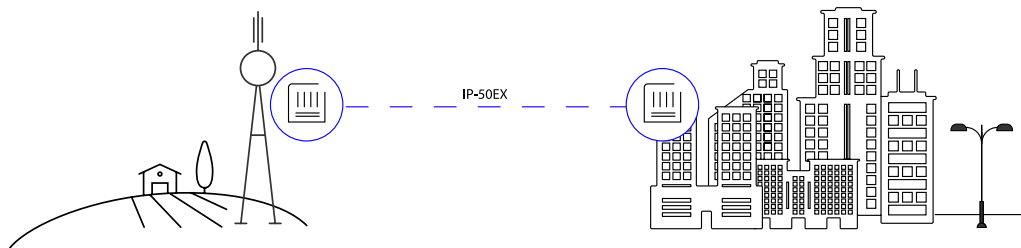
Small form factor
and easy installation



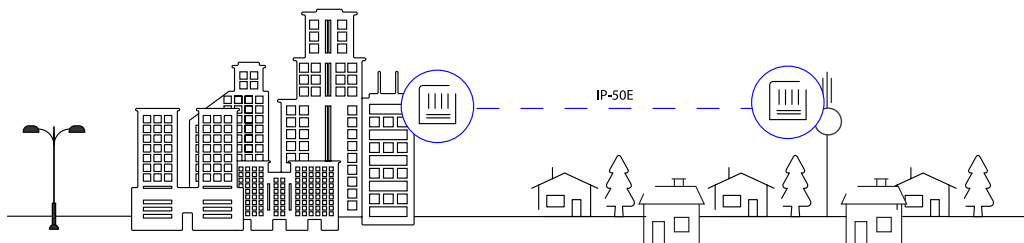
USE CASES

The following diagrams and product details provide an overview of the use case implementations enabled by our mmW portfolio which consists of our IP-50 E-band series of products.

Enterprise Connectivity High-capacity 10Gbps



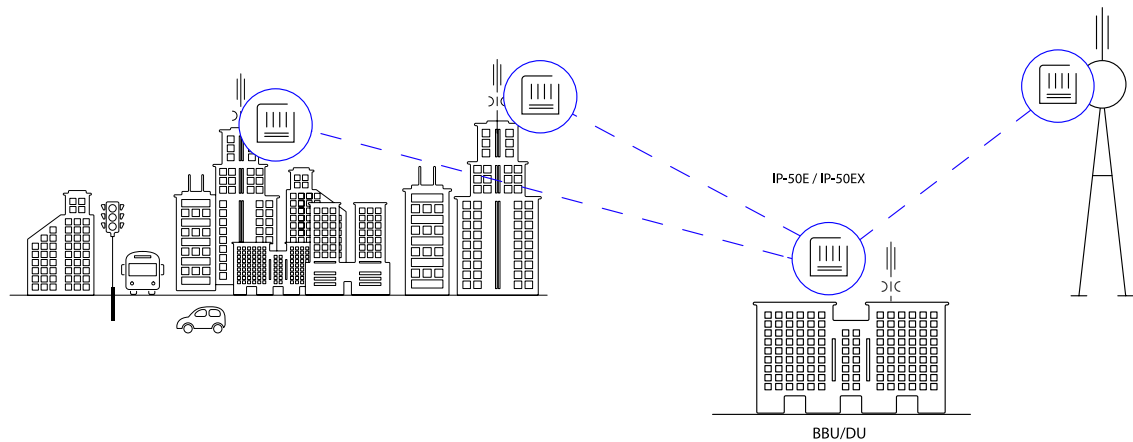
5G Macro Cell Backhaul High-capacity, up to 20Gbps



USE CASES

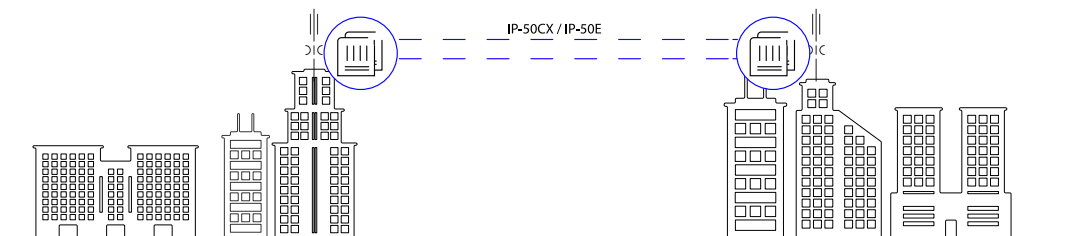
5G RRH Fronthaul

High-capacity, up to 20Gbps



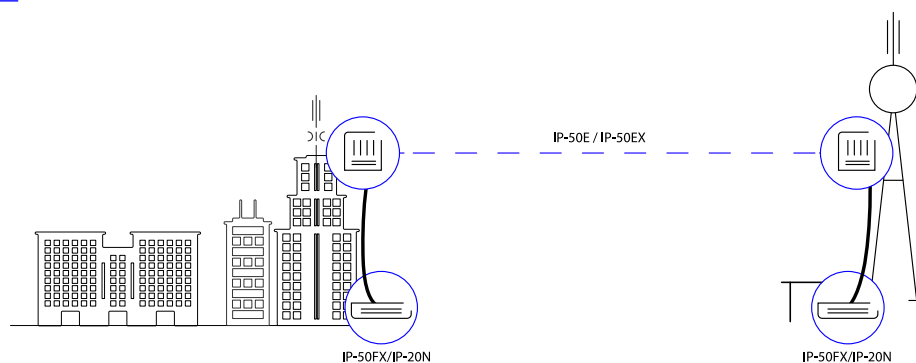
Multiband High Availability

Up to 14 Gbps



Fiber Replacement / Backup

Multi-carrier with IP-50FX/IP-20N 30Gbps 3+0



THE PRODUCTS



IP-50EX

THE SMALLEST CARRIER GRADE MMW RADIO

IP-50EX is an ultra-compact high-capacity E-band radio. The incredibly small footprint of the IP-50EX with its integrated antenna, low power consumption, and easy installation make it ideally suited for a variety of use cases, especially when small size and low OPEX are priorities.



Cost effective, High Capacity with Carrier Grade Performance

IP-50EX provides up to 10 Gbps capacity in 1+0 configurations. In a 2+0 XPIC configuration, IP-50EX provides up to 20 Gbps, with seamless traffic distribution and improved link survivability. As a carrier-grade solution, it comes equipped with an integrated Carrier Ethernet services switch that includes a 25GbE traffic interface, making it easier to connect to similar interfaces. The Carrier Ethernet services switch also complies with MEF CE 2.0 and SLA requirements for essential services applications.

Additionally, the IP-50EX features Adaptive Coding Modulation and Bandwidth (ACMB), providing hitless transmission and efficient modification of the radio's modulation as well as its channel bandwidth, to cope with fading conditions. IP-50EX's versatile design makes it a great candidate for a diverse range of networking requirements, including everything from macro site backhaul to small cell connectivity and building-to-building connections.

Its dependable performance and advanced features make the IP-50EX an excellent choice for networks requiring enhanced capacity and efficient, compact deployment options.



THE PRODUCTS

IP-50EX | Products Specifications

RADIO

- Supported frequency bands: 71-86GHz
- Radio capacity: 10 Gbps / 20 Gbps*
- Supported channel spacing: 250-2000MHz
- ACM steps: 11, 1/2 BPSK-1024QAM
- High TX Power
- Antenna options:
 - Parabolic
 - Integrated flat panel
 - E-Stabilizer

NETWORKING

- IEEE 802.1d transparent bridging
- Supports XPIC and Multiband
- Networking: Integrated Carrier Ethernet switching capabilities, MEF Carrier Ethernet 2.0 compliant | carrier-grade service resiliency (G.8032, MSTP) | SyncE and 1588 synchronization | ITU-T Y.1731 fault and performance management (MEF 35) | SDN | Layer 3 (using IP-50FX)
- Security: AES radio encryption | Secured protocols and management interfaces (HTTPS, TLS, SSH, SNMPv3) | Secured architecture and software design | Advanced authentication and identification management

INTERFACES

- 2 x 1/10/25GbE traffic interface (SFP28)
 - 1/10GbE traffic interface (SFP+, eCPRI)
 - 1GbE management/PoE port
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THE PRODUCTS



IP-50E FIBER-LIKE ULTRA-HIGH CAPACITY

The IP-50E universal E-band radio delivers ultra-high capacity of up to 20Gbps. This supports a pay-as-you-grow strategy with up to two units in XPIC configuration with layer-1 carrier aggregation over a single cable. Wherever you need fiber-like capacity for backhaul or wireless access applications, the IP-50E is your cost-efficient, easy-to-deploy fiber-replacement solution.

The IP-50E also allows extended E-band reach with no compromise on availability, thanks to its unique multiband capability.



Mitigate Availability Issues With Multiband Peace Of Mind

Using layer-1 carrier aggregation, the IP-50E enables you to combine this high-capacity carrier with any additional microwave, fiber, or leased line connection, ensuring your high-priority service offering meets its SLA target.

Combined with Ceragon's IP-50C, IP-20C, or 3rd party radio - and a multiband antenna - you can achieve a compact, all-outdoor, direct-mount 3-carrier solution (single-carrier E-band + two-carrier microwave). This saves on tower load and shelter requirements while simplifying installation, allowing faster time to market, and enhancing operational efficiency.



THE PRODUCTS

IP-50E | Products Specifications

RADIO

- Supported frequency bands: 71-86GHz
- Radio capacity: 20Gbps (2+0 XPIC configuration utilizing two units)
- Supported channel spacing: 62.5-2000MHz
- ACM steps: 10, 1/2 BPSK-512QAM
- Hitless multiband
- Antenna options:
 - Parabolic
 - Integrated flat panel
 - E-Stabilizer

NETWORKING

- Layer-1 carrier bonding: Supports XPIC and multiband with any additional layer-1 connection
- Networking: Integrated Carrier Ethernet switching capabilities, MEF Carrier Ethernet 2.0 compliant | Up to 30% more capacity using header deduplication | Carrier-grade service resiliency (G.8032, MSTP) | SyncE and 1588 synchronization | ITU-T Y.1731 fault and performance management (MEF 35) | SDN | Layer 3 (using IP-50FX)
- Security: AES radio encryption | Secured protocols and management interfaces (HTTPS, TLS, SSH, SNMPv3) | Secured architecture and software design | Advanced authentication and identification management

INTERFACES

- 4 x 1/10GbE or 40GbE traffic interface (QSFP+)
 - 1/10GbE traffic interface (SFP+, CPRI, eCPRI)
 - 1GbE traffic interface (SFP) or 1/2.5GbE multiband port
 - 1GbE management/PoE port
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SUMMARY

Ceragon's family of mmW radios introduces cutting-edge technological innovations, utilizing the most compact radios and providing the highest bandwidth support. These advanced solutions are meticulously designed to deliver optimized performance with low latency, high availability, and high capacity. Embrace these flexible solutions to maintain a competitive edge in the era of digital modernization.

3 MAIN VALUES



ABOUT CERAGON NETWORKS

Ceragon Networks Ltd. (NASDAQ: CRNT) is the global innovator and leading solutions provider of end-to-end wireless connectivity, specializing in transport, access, and AI-powered managed & professional services. Through our commitment to excellence, we empower customers to elevate operational efficiency and enrich the quality of experience for their end users.

Our customers include service providers, utilities, public safety organizations, government agencies, energy companies, and more, who rely on our wireless expertise and cutting-edge solutions for 5G & 4G broadband wireless connectivity, mission-critical services, and an array of applications that harness our ultra-high reliability and speed. Ceragon solutions are deployed by more than 600 service providers, as well as more than 1,600 private network owners, in more than 130 countries.

Through our innovative, end-to-end solutions, covering hardware, software, and managed & professional services, we enable our customers to embrace the future of wireless technology with confidence, shaping the next generation of connectivity and service delivery. Ceragon delivers extremely reliable, fast to deploy, high-capacity wireless solutions for a wide range of communication network use cases, optimized to lower TCO through minimal use of spectrum, power, real estate, and labor resources - driving simple, quick, and cost-effective network modernization and positioning Ceragon as a leading solutions provider for the "connectivity everywhere" era.

For more information please visit: www.ceragon.com

