ASTROME

E-Band: Revolutionising Wireless Broadband

What is E-Band?

The superhighway of wireless spectrum — operating at ultra-high frequencies (71-76 & 81-86 GHz) with massive 1000+ MHz of clean, wide-open bandwidth.

Why choose E-Band ?

- Blazing-fast speeds: Think 10 Gbps and beyond — fiber like connections!
- Lightning-low latency: in microseconds, Perfect for 5G and real-time operations.
- Small antennas, huge power: Compact, focused beams that cut through interference like a laser.
- No more spectrum crunch: Tons of space to breathe in crowded cities.
- E-Band is not just wireless broadband — it’s a revolution that’s breaking barriers and redefining connectivity.

Executive Summary

- E-band (70-86 GHz): A critical wireless backhaul solution for 5G networks.
- Key Capabilities: Delivers fiber-like throughput with ultra-low latency, essential for 5G services (eMBB, mMTC, URLLC).
- Distinct from Traditional Microwave: E-band offers ultra-high capacity over shorter links due to expansive spectrum, while traditional microwave (6-42 GHz) provides robust propagation over longer distances.
- Benefits: Faster deployment, lower cost compared to fiber, and smaller antenna sizes.
- Challenges: Shorter propagation range and susceptibility to rain fade.
- Mitigation: Increasingly addressed by innovative multiband solutions combining E-band with traditional microwave.
- Market Outlook: Robust growth driven by 5G rollout and increasing mobile data traffic .

E-band's Strategic Role in 5G Network Densification

- **Enabling Small Cell & Macro Cell Backhaul:** Essential for the dense network infrastructure required by 5G, providing high-speed connectivity over short ranges in urban environments.

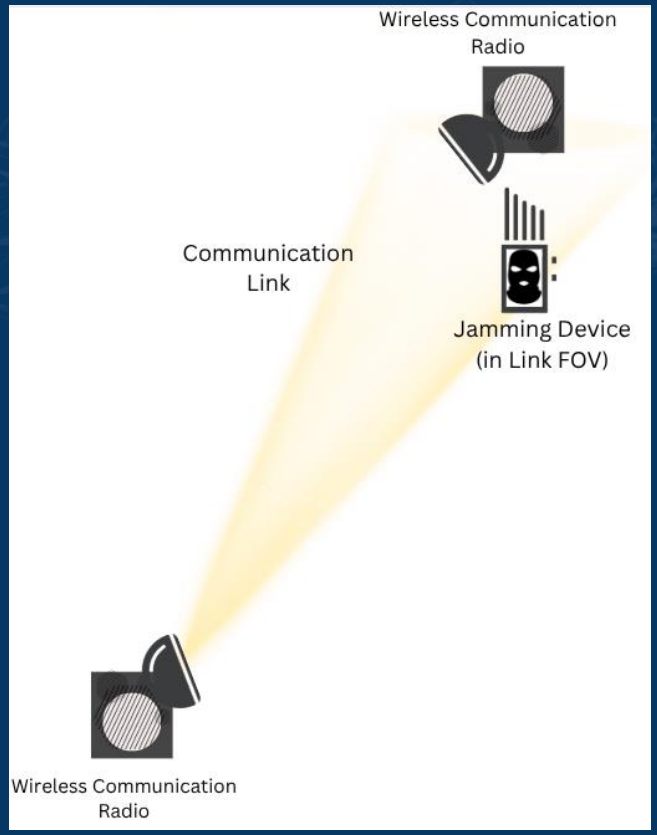
- Integration with Fiber & Multiband Solutions:
  - Complements fiber where fiber deployment is impractical or costly.
  - Multiband architecture (Super Dual Band) combines E-band's high capacity with traditional microwave's robust propagation for extended reach and resilience, ensuring high availability.

- Addressing Diverse 5G Use Cases:
  - eMBB: Ultra-high capacity supports high-definition video, AR/VR.
  - URLLC: Ultra-low latency is crucial for critical applications like industrial automation and autonomous vehicles.

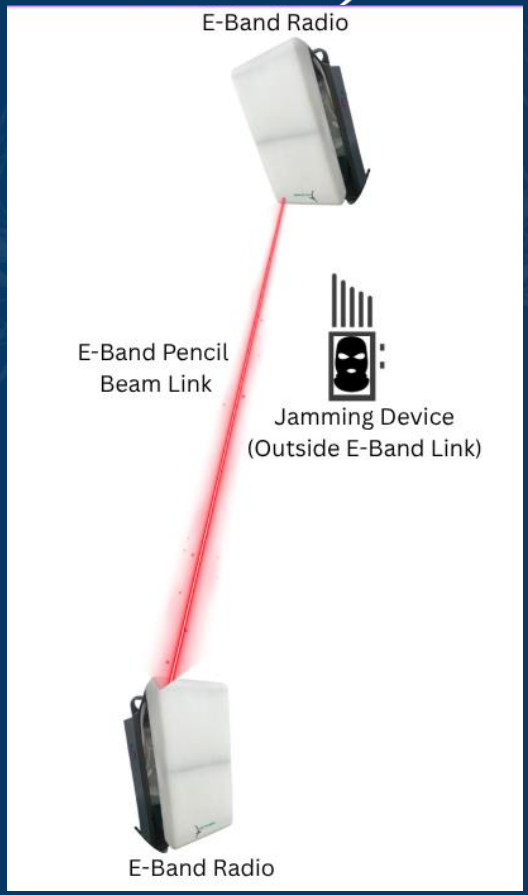
Precision. Power. Protection.
The E-Band Advantage

- E-Band radio’s customizable waveforms and ultra-narrow pencil beam transmission allows highly secure, mission-critical communication that’s mostly impossible to intercept or jam - redefining electronic warfare.
- Tight beam width ensures signals stay locked in their intended path, making it exceptionally resistant to hostile jamming and interference.
- Phased antenna array and beam forming technologies make it possible for easy self alignment.

Anti-Jamming Advantages

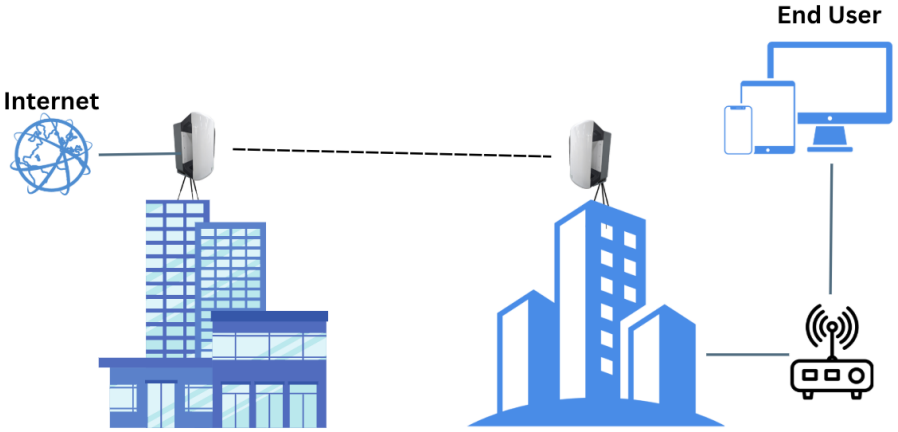


Traditional wireless radio links



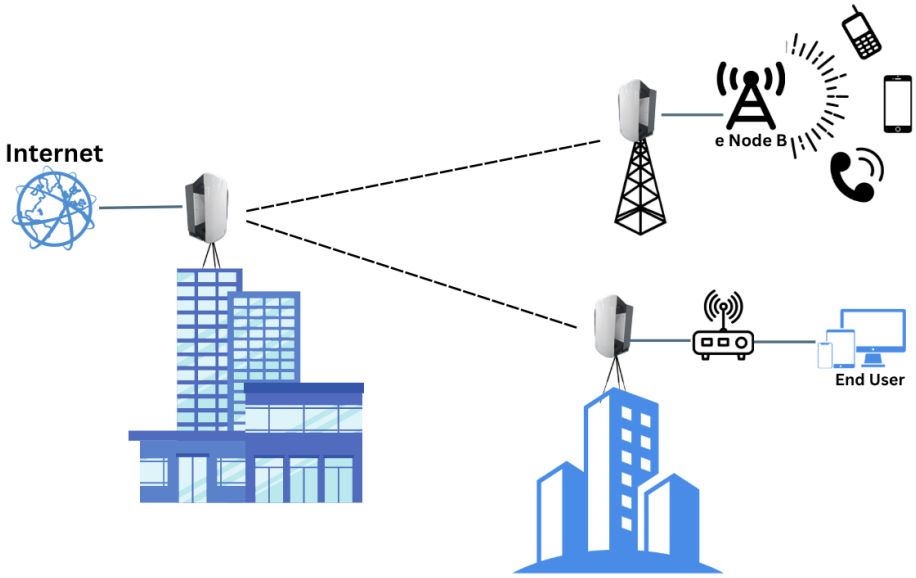
E-Band radio links

Deployment Use Cases



Point To Point Link

Point To Multi-Point Links



E-band Challenges & Mitigation Strategies

Primary Challenge: Range Limitations & Rain Fade

- E-band's higher frequency makes it highly susceptible to atmospheric conditions, especially heavy rain, which limits practical transmission distances.

Mitigation Strategies:

- Multiband/Hybrid Solutions: Combining a high-capacity E-band link with a more robust, lower-frequency traditional microwave link

- Adaptive Modulation and Coding (AMC): E-band radios dynamically adjust modulation and bandwidth based on real-time link quality (e.g., during rain), allowing the link to gracefully reduce throughput rather than experience a complete outage. High-priority traffic can be seamlessly switched to the traditional microwave link.

Comparative Summary

Feature	E-band Backhaul (70-86 GHz)	Traditional Microwave Backhaul (6-42 GHz)
Frequency Range	71-76 GHz / 81-86 GHz (E-Band)	6-42 GHz 2
Jamming Proof	Pencil beam ensures Jamming resistance	Difficult to make it Jamming proof.
Typical Range	Short: 1-3 km for high availability; extended with multiband	Long: 5-20+ km, suitable for long-haul
Latency	Ultra-low latency	Generally higher latency than E-band
Licensing	Often "lightly licensed" or "self-coordinated," simplifying processes	Typically requires individual, more coordinated licensing
Primary 5G Use Case	Dense urban areas, small cell backhaul, last-mile connectivity, fiber backup	Suburban/rural areas, long-haul links, robust complement in multiband solutions
Weather Susceptibility	High susceptibility to rain fade	Less impacted by weather conditions
Custom Waveform	Possible with programmable baseband	Not possible with the standard of-the-shelf SoC