Fastback Networks:
The radio that meets all line of sight conditions.

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Executive Summary

The Fastback Intelligent Backhaul Radio (IBR-1300) is a groundbreaking wireless connectivity solution designed to deliver high-performance, fiber-like capabilities in challenging environments. By leveraging innovative technologies such as patented interference mitigation algorithms, advanced beamforming, and flexible installation options, the IBR platform enables efficient and cost-effective connectivity for modern network demands.

With up to 860 Mbps symmetric throughput, ultra-low latency (<300 µs), and compatibility with non-line-of-sight (NLOS) scenarios, the Fastback IBR redefines how wireless backhaul addresses urban, rural, and industrial connectivity challenges.

This whitepaper outlines the technical capabilities, unique features, and real-world applications of the Fastback IBR platform, positioning it as a critical enabler of next-generation connectivity for smart cities, telecom operators, and enterprise networks.

Supported with a factual and evidence based proof of concept case study aimed to address key challenges in urban connectivity—dense interference, tree cover, and architectural obstructions—while providing fiber-like performance. Over a two-week period, the IBR-1300 achieved exceptional results, validating its role as a cost-effective and reliable complement to the city's fiber network.

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Technologies Overview

Performance Highlights

Frequency: Operates in the unlicensed 5GHz spectrum with FDD (Frequency Division Duplexing) for robust connectivity.

Capacity: Up to 860 Mbps symmetric throughput, delivering fiber-like speeds in a wireless solution.

Latency & Jitter: Ultra-low latency (<300 µs) and jitter (<50 µs) for time-sensitive applications.

Beamforming Technology: Adaptive signal optimization ensures consistent performance in challenging RF conditions.

Advanced Interference Mitigation: Fastback XIP™

Time: Sub-millisecond retransmission and adaptive modulation to address signal-to-noise ratio (SNR) fluctuations.

Space: Agile response across 8 spatial, directional, and polar Rx views to counter interference sources.

Frequency: Real-time frequency adaptation across 580 MHz spectrum with independent uplink/downlink optimization.

Cancellation: Advanced processing cancels dominant interferers, ensuring reliable connectivity in crowded RF environments.

Ease of Deployment

Compact design: 200x260x85mm, 3kg form factor for flexible mounting on towers, light poles, and urban structures.

Remote Management: Comprehensive GUI and CLI tools for configuration and monitoring.

Zero Alignment: Simplifies installation with auto-discovery and synchronization.

Carrier Ethernet Capabilities

The IBR-1300 doubles as a world-class carrier Ethernet switch, supporting:

802.1Q VLAN and Q-in-Q VLAN tagging.

Transparently Pass MPLS

Y.1731 PM, IEEE 802.1ag

Strict-Priority and WDRR

9600 byte Jumbo Frame Support

Port Mirroring

DSCP Classification

1588v2 Transparent Clock

DoS Protection

9600 Byte jumbo frame support

MPLS pass-through for secure and scalable network integration

Technical

Specifications

Hardware Compatibility: Backward and forward compatibility ensures future-proof deployments.

Mounting Flexibility Supports installations on a wide range of assets, from light poles to cell towers.

Ports: 1 RJ45 and 1 SFP for seamless integration with existing network infrastructure.

Lightweight & Small: Weighing only 3KG and dimensions of 200x260x85mm.

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Real World Applications

The IBR-1300 is versatile, addressing diverse connectivity scenarios:

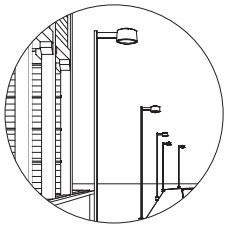
Smart City Networks: Supports connectivity for street-level assets, such as traffic signals, surveillance cameras, and public Wi-Fi.

Industrial and Enterprise: Extends metro Ethernet services and enables private networks for large enterprises.

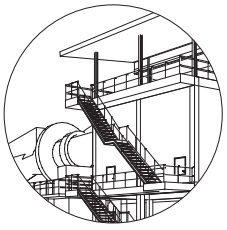
Temporary Installations: Ideal for events and disaster recovery with rapid deployment and reliable performance.

Urban Backhaul: Overcomes dense tree cover and NLoS challenges, delivering high throughput in urban environments.

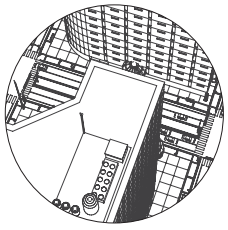
Mounting Flexibility



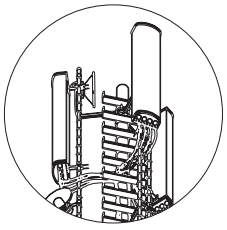
Light Poles



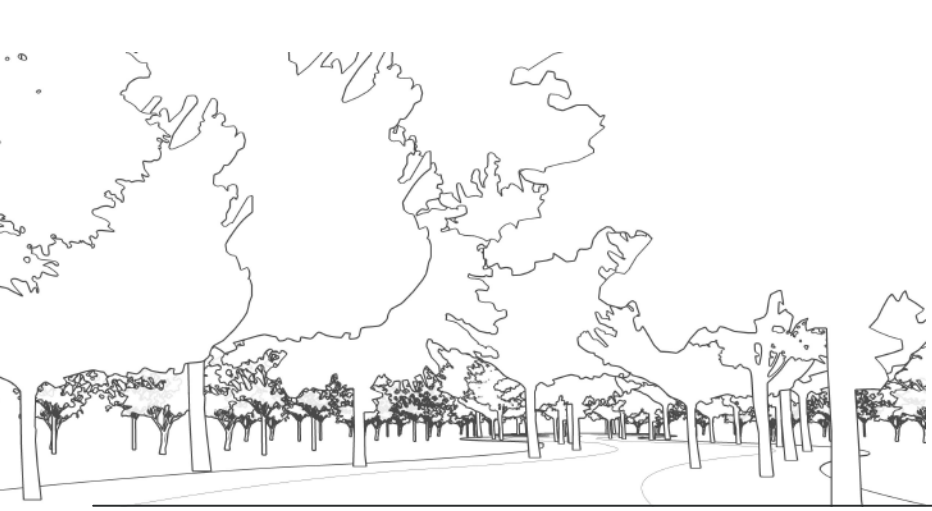
Buildings

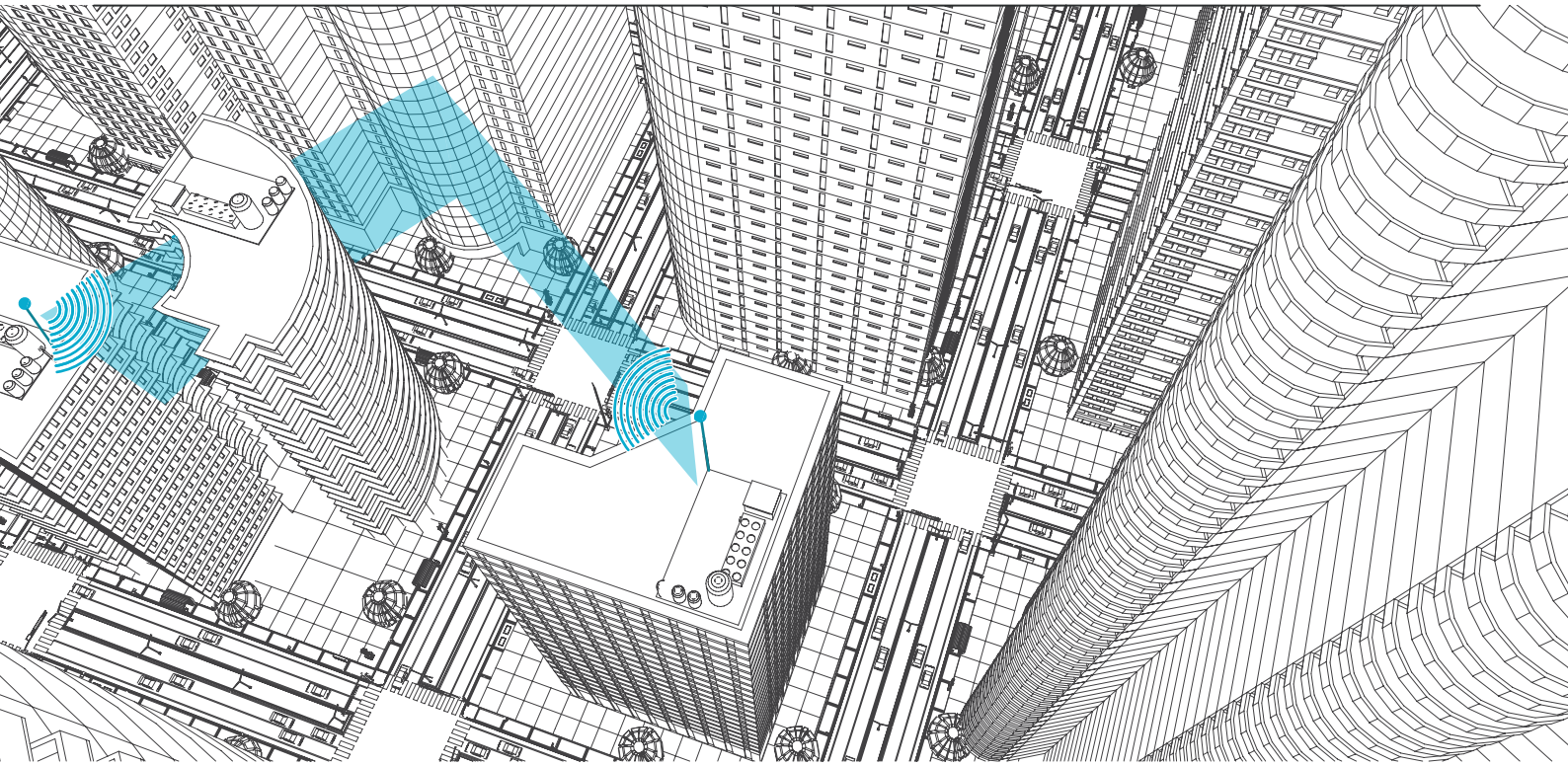


Roof Top



Towers





The above diagram simulates and models the feasibility of wireless connection using the IBR radio. By assessing the environmental conditions, the radio can determine whether a reliable link will be achievable irrespective of the possible obstructions. Using geographic and topographic including terrain and foliage data, the system will generate reliable and meaningful data.

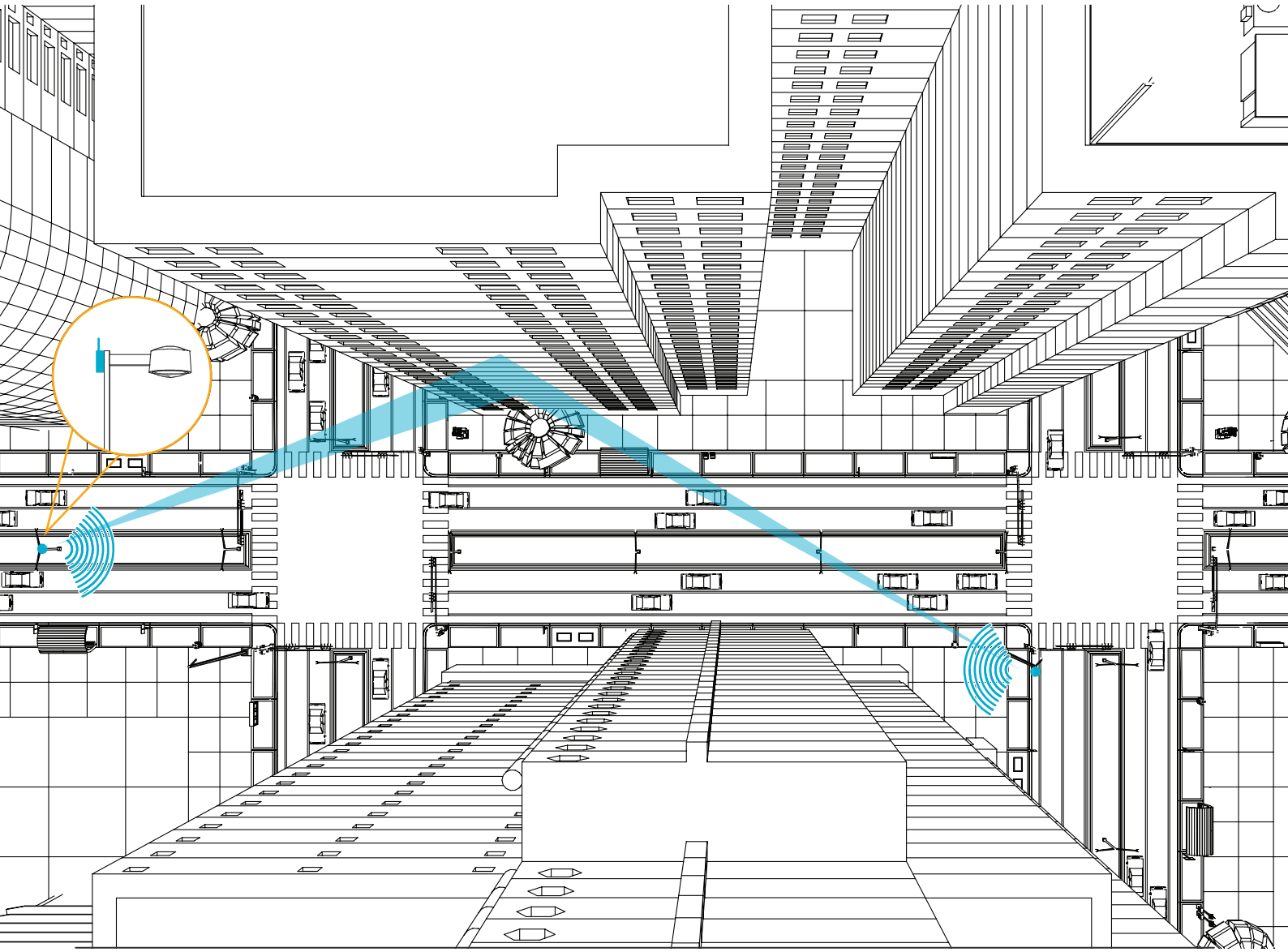
Application Testing

Urban Special Event Site (NLoS): A 600m obstructed path was completed with 425 Mbps symmetric throughput under high interference conditions.

Urban Rooftop Sites (NLoS): Successfully established 950m links in highly obstructed environments, achieving 250 Mbps throughput.

Application at Street Level

The IBR-1300 is uniquely suited for street-level connectivity, offering a compact, lightweight design that can be easily installed on light poles, traffic signals, and other urban infrastructure. Its true Non-Line-of-Sight (NLoS) capabilities ensure high-speed, reliable connectivity even in environments with dense trees, buildings, and other obstructions—challenges typical of urban streetscapes. With gigabit throughput, sub-millisecond latency, and advanced interference mitigation technologies, the IBR-1300 delivers the robust performance required for supporting small cells, smart city applications, and metro Ethernet services at the street level. Its ease of deployment and zero-alignment setup enable rapid installation, minimizing disruption while maximizing efficiency and coverage.



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Proof of Concept & Analysis Testing

Objectives

The City of Montreal sought to address gaps in its existing urban infrastructure, focusing on areas where fiber optics were infeasible. Objectives for the Fastback IBR-1300 deployment included:

1. **Reliable Connectivity in Challenging Environments**: Prove the ability to deliver consistent, high-throughput connectivity in Non-Line-of-Sight (NLoS) and Obstructed Line-of-Sight OLoS (OLoS) conditions.

2. **Complement Existing Fiber Network**: Provide a wireless backhaul solution capable of supporting the city's smart city initiatives and high-bandwidth requirements.

3. **Scalability**: Demonstrate ease of deployment to facilitate broader implementation across the city.

4. **Operational Efficiency**: Test the radios' self-organizing capabilities to dynamically adapt to interference and maintain link reliability.

Detailed PoC Methodology

Site Selection: The PoC spanned 12 strategic sites within Montreal's Griffintown area. These locations were selected based on their potential to reflect typical urban challenges, including dense tree cover, interference from existing Wi-Fi devices, and obstructed pathways.

Testing Methodology Highlights

Radio Configuration: Radios were pre-configured to their maximum capacity of four streams, using 40 MHz channel bandwidth in both horizontal and vertical polarization.

Mounting Techniques: Radios were mounted on telescopic masts, boom trucks, and pre-approved street furniture to simulate real-world deployments.

Performance Validation: Throughput was measured using a Viavi Test Unit to inject constant bit-rate UDP traffic. Performance under varying environmental conditions was assessed.

Performance Analysis of Test Results

Link No	Distance (m)	LOS Conditions	Aggregate Capacity (Mbps)	Tested Throughput (Mbps)	Observations
1	170	Clear/LoS	1,395	771	Stable connection in low-interference zone.
2	154	NLoS	1,323	700	Trees caused blockage; throughput exceeded expectations.
3	353	NLoS	720	240	Dense trees affected link performance but remained operational.
4	135	Clear/LoS	1,584	794	Maximum throughput achieved with high availability.
5	229	NLoS	370	300	Strong NLoS performance despite heavy interference.
6	373	NLoS	832	742	High reliability with dynamic interference mitigation.

Key Findings

1. **Interference Resilience**: The patented XIP™ technology mitigated the effects of interference by dynamically adapting to changes in the RF environment. This enabled the radios to deliver reliable throughput even in high-interference zones.

2. **Tree Obstructions**: Links obstructed by dense tree cover demonstrated better-than-expected performance. The radios' beamforming and multi-path capabilities overcame first Fresnel zone obstructions with minimal throughput loss.

3. **Deployment Speed**: Mounting, configuration, and commissioning of each radio were completed in less than 90 minutes per site, underscoring the solution's suitability for rapid deployments.

4. **Reliability**: Despite operating in unlicensed 5 GHz spectrum, the radios maintained consistent availability of 99.9998%, demonstrating robust operation under real-world conditions.

Extended Analysis of Griffintown Test

Case Study: Link 9 (Midpoint INT 247 – INT 815)

Distance: 229 meters

Environment: Urban, NLoS, obstructed by buildings and trees

Throughput: Achieved 300 Mbps tested throughput out of an aggregate capacity of 370 Mbps.

Analysis:
This site exemplified the versatility of the IBR-1300. Despite significant obstructions, the radio maintained consistent performance through advanced signal processing and spatial agility. The link demonstrated strong reliability, critical for high-availability applications such as surveillance or public Wi-Fi backhaul.

Operational Efficiency:
The radios dynamically adjusted to environmental conditions without manual intervention. This capability proved invaluable in mitigating the impact of temporary obstructions, such as moving vehicles or changing weather conditions.

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Competitive Advantages

The Fastback Networks IBR-1300 stands as a market leader in wireless backhaul solutions, offering a unique and unmatched combination of features that address the most challenging connectivity scenarios. Its competitive edge is rooted in its superior performance in Non-Line-of-Sight (NLoS) environments—a capability that sets it apart as **The Only True Point-to-Point Non-Line-of-Sight (NLoS) Solution in the market**. This distinction, alongside its innovative technologies, positions the IBR-1300 as the optimal choice for urban, suburban, and rural deployments.

The Only True Point-to-Point Non-Line-of-Sight (NLoS) Solution in the Market

True NLoS Capability: Unlike competitors that claim NLoS performance but rely on partial or obstructed Line-of-Sight (oLoS) – Obstructed Line-of-Sight (OLoS), the IBR-1300 delivers robust connectivity even when major obstructions—like buildings, trees, or urban clutter—completely block the signal path.

Patented XIP™ Technology: The radio's ability to optimize signals in real-time across time, frequency, and spatial domains ensures connectivity in areas where other solutions fail.

Market Gap: Other solutions rely heavily on optical alignment or clear Fresnel zones, making them impractical for many urban and suburban scenarios. The IBR-1300 overcomes these limitations, redefining what is possible in wireless backhaul.

Fiber-Like Performance Without Fiber Costs

The IBR-1300 offers up to 860 Mbps symmetric throughput, which is comparable to traditional fiber connections, but at a fraction of the cost and deployment time.

Advantages Over Competitors:

Cost-Effective Alternative to Fiber: Traditional fiber deployments are capital-intensive, time-consuming, and often impractical in dense urban environments or remote locations. The IBR-1300 bridges this gap by delivering high-speed performance without the need for physical cabling.

Rapid ROI: The combination of low deployment costs, minimal maintenance, and scalable throughput ensures a faster return on investment compared to competing solutions.

Scalability for Smart Cities and Emerging Needs

The IBR-1300 is designed to meet the growing demands of urban connectivity, aligning perfectly with smart city initiatives and next-generation wireless applications.

Competitive Benefits:

Flexibility Across Use Cases: While many competitors are optimized for a single use case (e.g., point-to-point or point-to-multipoint), the IBR-1300 excels in point-to-point for multiple diverse scenarios, including:

Public safety networks

CCTV and video surveillance backhaul

Municipal Wi-Fi backhaul

Temporary or emergency connectivity

Future-Proof Design: Unlike competitors that face obsolescence as bandwidth requirements increase, the IBR-1300's modular design supports future scalability, ensuring compatibility with next-generation standards and applications.

Additional Advantages

Discrete: ideal for urban planning, smaller and lighter radios are easier to install, reducing labor and time costs. Less obtrusive, blending well into urban and residential environments.

Embedded AI engine: proficient at learning from similar installation and environmental conditions. They efficiently provide targeted coverage and capacity in areas with high interference.

Small Environmental impact: reduced radio size has a reduced ecological footprint, from manufacturing to deployment and operation.

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Conclusion

The Fastback IBR-1300 is a groundbreaking wireless backhaul solution that addresses the most demanding connectivity challenges with unmatched precision. As the only true Point-to-Point Non-Line-of-Sight (NLoS) solution on the market, it provides the unique ability to deliver high-speed, reliable connectivity in environments where direct line of sight is obstructed by buildings, trees, or terrain. Its capability to seamlessly operate across Line of Sight (LoS), Near-Line of Sight (nLoS), and complete NLoS conditions ensures unparalleled installation flexibility, making it ideal for urban, suburban, and remote deployments.

By delivering gigabit throughput with sub-millisecond latency, the IBR-1300 meets the stringent requirements of 4G and 5G networks, even in challenging environments. Advanced technologies like beamforming and Extreme Interference Protection (XIP™) further solidify its competitive advantage, ensuring consistent performance in areas with high RF interference.

These features not only address critical market gaps but also position the IBR-1300 as a cost-effective alternative to traditional fiber, enabling municipalities, enterprises, and network operators to deploy high-performance connectivity rapidly and at scale.

The Fastback IBR-1300's ability to deliver fiber-like performance without fiber infrastructure, its ease of deployment on existing structures, and its proven resilience across diverse conditions make it the premier choice for next-generation backhaul solutions. It is the definitive answer for urban connectivity, smart city initiatives, and any deployment requiring reliable, high-speed communication in challenging environments.

Ready to operate in non-line-of-sight? Speak to our sales and technical team.

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