



Edge Computing in Telco Networks

Selective Local Breakout

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RTT fundamentals

Round Trip Time: main factors that can influence RTT in IP applications for consumer, industrial and corporate market

Low and Ultra-Low Latency Applications

Market perspectives and requirements

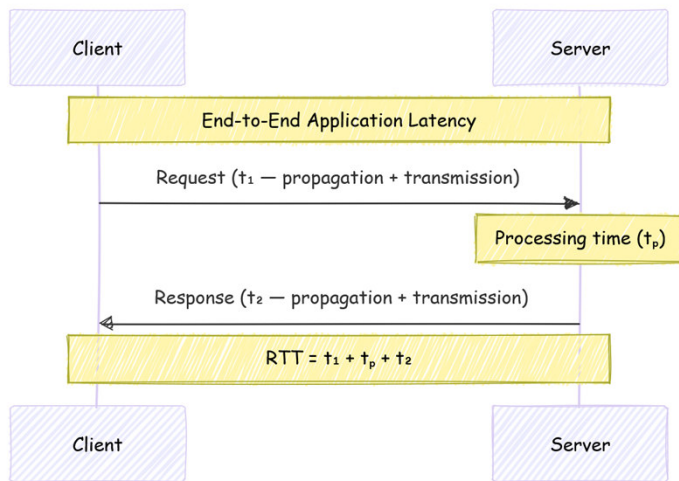
Edge Cloud computing in network

Selective Local Break at edge & FiberCop experience in laboratories

Why TelCo Operators should play a role in Edge Cloud



What is Round-Trip Delay



RTT is the sum of three distinct components:

- t_1 — forward path delay: every hop from the client to the server (CPE → access network → aggregation → core)
- t_p — server processing time: the application's time to generate a response (TTFB)
- t_2 — return path delay: the response travelling back from server to client

$$\text{RTT} = t_1 + t_p + t_2$$

Round-Trip Time (RTT) is the total time between a client sending a request and receiving the application's response, measured at the application layer not at the network level.

Network Factors Influencing RTT

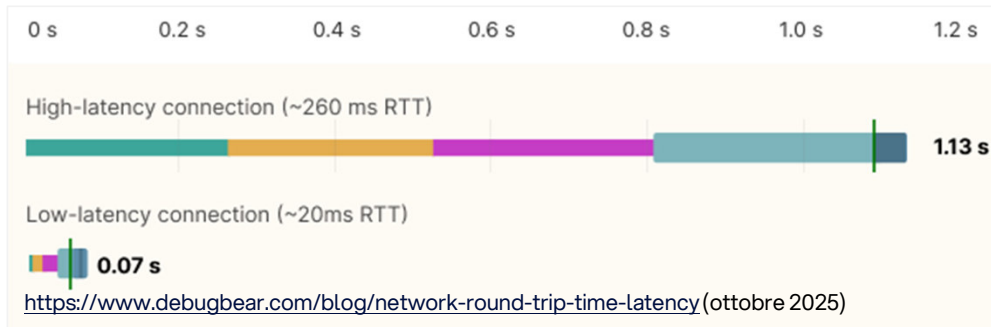
Physical Distance and Propagation Delay

Physical distance is the fundamental factor impacting RTT due to light speed limits in optical fibers. Physical distance is the primary factor affecting RTT, overshadowing bandwidth improvements for reducing delay.

Network Topology, Processing and Congestion Delays

adds delay through hops, backbone traversal, and aggregation layers causing cumulative latency. Traffic congestion generates packet queueing delay on shared resources

Reducing network RTT directly boost application responsiveness



Reducing Network RTT by 92% directly improve by 94% the time for the applications to respond

This evidence is driving in the last years the widespread deployment of Content Delivery Nodes across the network to ensure reduced response times on a global scale for web and video applications, even when content is generated in locations far from the end user

To load a single web resource, at least four network round trips are required:

- DNS lookup; TCP handshake; TLS handshake; HTTP request for the resource

even before considering server processing, time content download time and, for responses > 10 KB, additional round trips required by TCP Slow Start.

Roma | Milano | Torino | Napoli | Bari | Palermo | Venezia | Bologna



Rai Way S.p.A. – Content Delivery Network in Italy <https://www.raivay.it/it/servizi/content-delivery-network>

RTT is relevant in all segment market

Consumer

RTT affects QoE and user's engagement in applications like cloud Gaming and Extended Reality

Industry

Deterministic and low RTT for safety-critical control & automation

Enterprise

RTT is important for the productivity using tools such as virtual desktops and real-time collaboration

RTT optimization is critical across all markets since performance rapidly degrades beyond threshold RTT values.



A growing share of user activity now depends on latency staying low and stable, not just on fast speeds

Ookla: "Idle Ping measures the response of a request on your network as if it is not in use."

| Region | Idle Latency (ms) |
|----------|-------------------|
| Sicily | 41,13 |
| ... | ↑ |
| Lombardy | 14,25 |

Ookla Speedtest measures latency under load (download and upload) and shows that **download-loaded latency can exceed 300–500 ms** on congested connections

As more applications depend on real-time responsiveness, **latency will play an increasingly important role in shaping overall user experience**
Source: Ookla Research – Introducing a Better Measure of Latency

Large-scale infrastructures are mainly concentrated in the Milan area, with smaller infrastructures distributed across the national territory

In Italy, in 2021 there were 59 players in the national market and now **70 operators projected for 2025**.

Data Center Observatory, Department of Management Engineering, Politecnico di Milano - © Politecnico di Milano



Source: Politecnico di Milano – School of Management, Osservatorio Data Center (estratti da Ingenio, 2026)

Moving towards low and ultra-low latency

Industrial Automation and Monitoring

Automation and AI inference require tight latency bounds and minimal jitter for safety and reliability. Real-time video analytics and AI inference.

Healthcare and Public Safety

Telemedicine and emergency systems depend on predictable response times and rapid reaction. Smart cities and critical infrastructure monitoring.

Logistic and Transportation

Milliseconds can mean the difference between success and failure in sectors like logistics and transportation. Smart surveillance with real-time video analytics.

Digital finance and trading

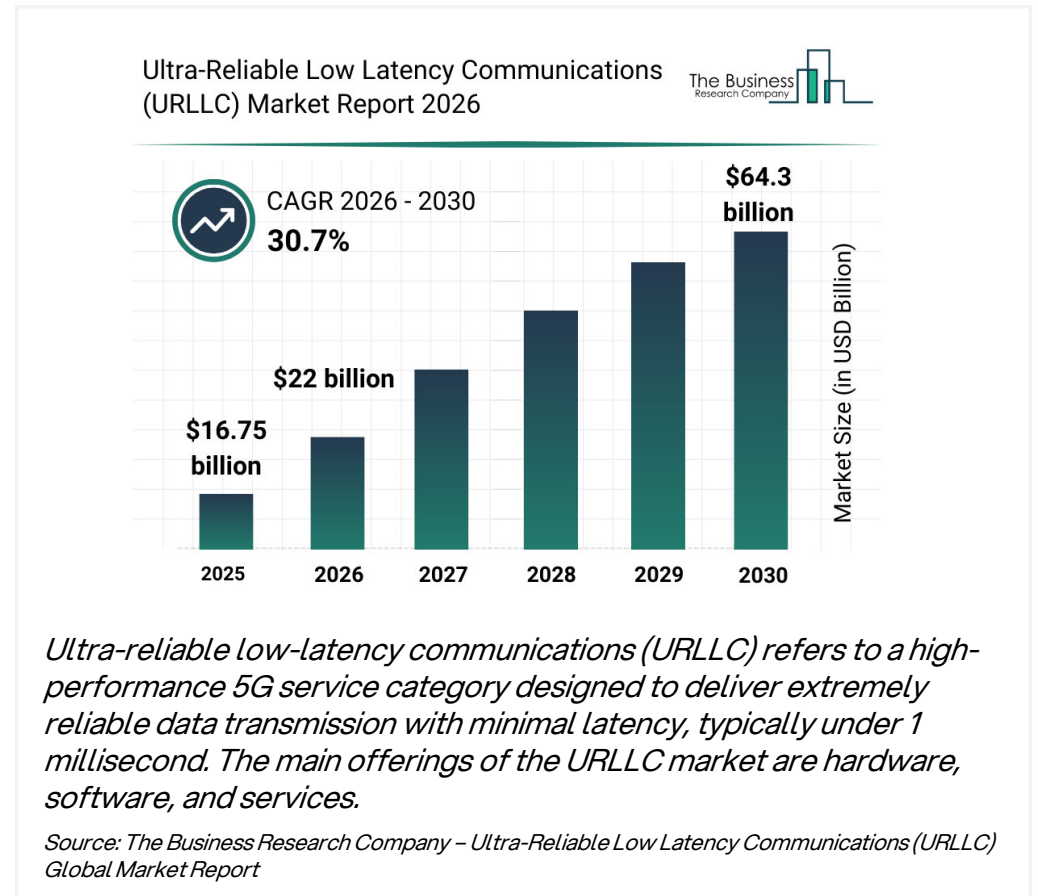
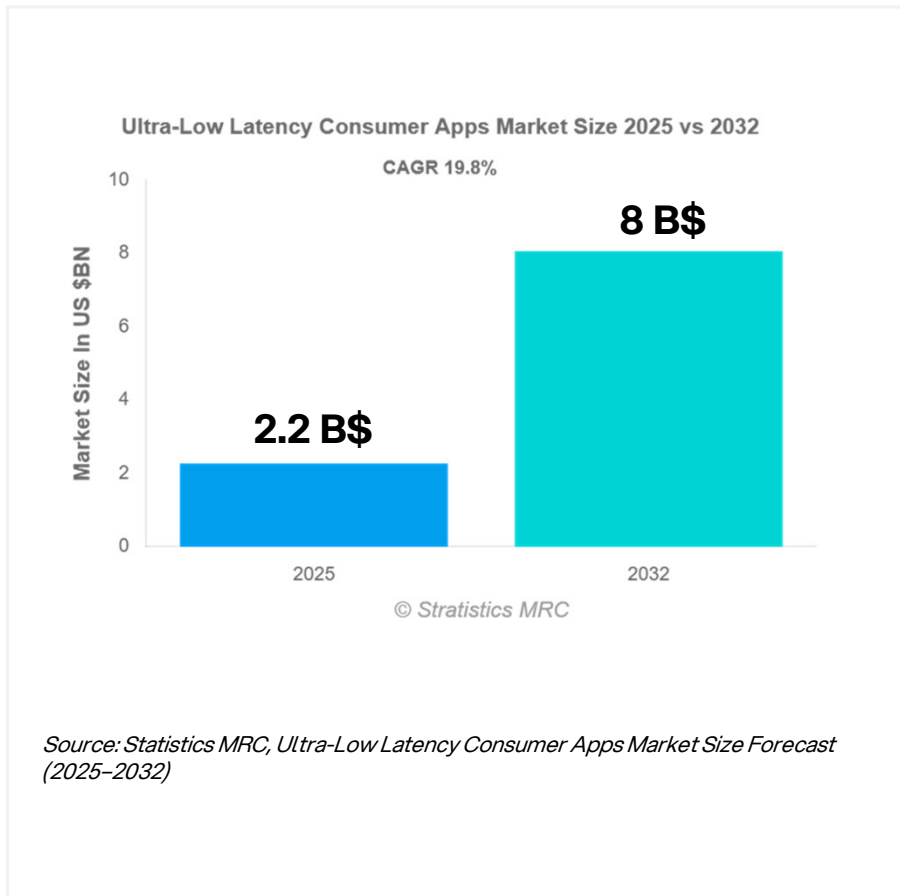
Essential for High-Frequency Trading, advanced retail investors, and Decentralized Finance.

Agriculture and Energy

Optimization of crop growth and harvesting, monitoring of animal welfare, efficient management of energy resources, telecontrol using measures from IoT telemetry.

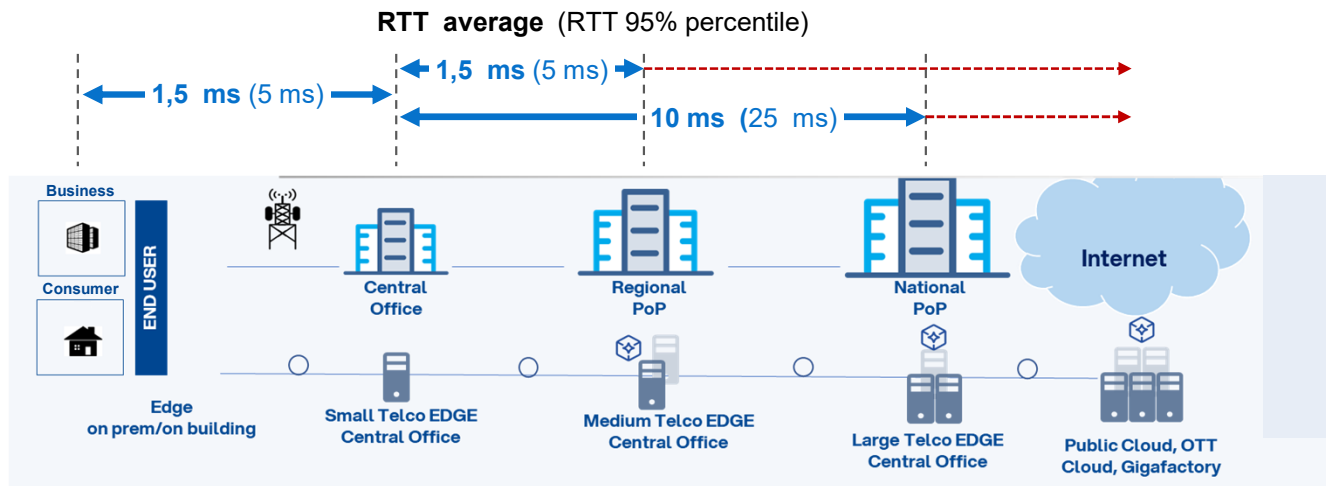


Worldwide revenues associated to applications with Low and Ultra-Low latency will grow consistently



Edge Cloud in telco networks will be a key enabling factor to stabilize and reduce latency

Each “communication hop” introduces significant **extra-latency**



To meet Ultra Low Latency Requirements, Edge Cloud has to be close and directly connected to Customer Premises

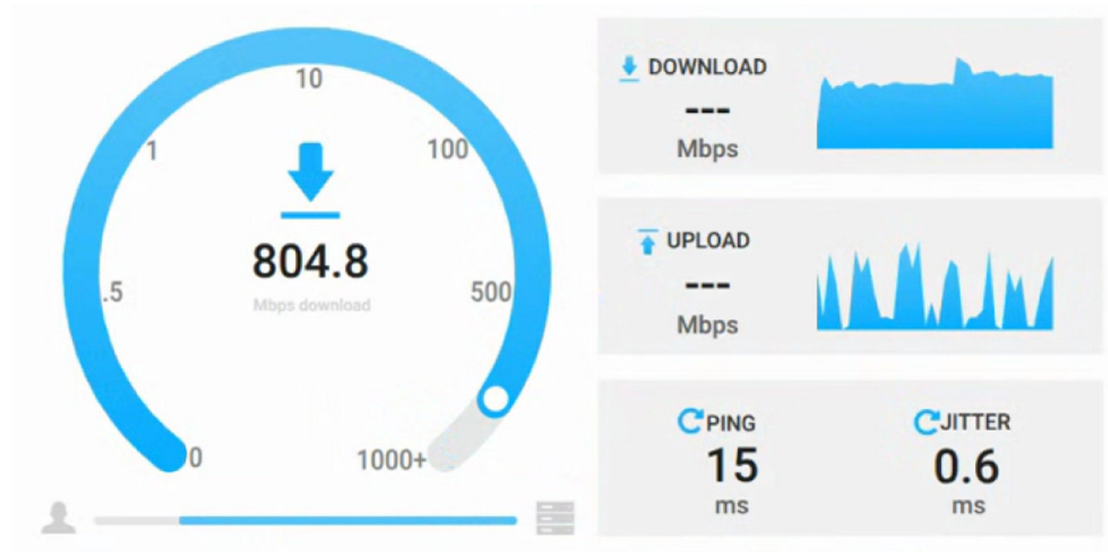
By integrating computing resources with the network topology and extending them to the network edge near the user, the quality of experience remains consistent and reliable across the geographic zones

Selective Local Breakout (SLBO) in Edge Cloud

FiberCop's testing has been carried out in cooperation with Microsoft, Dell Technologies and 6WIND

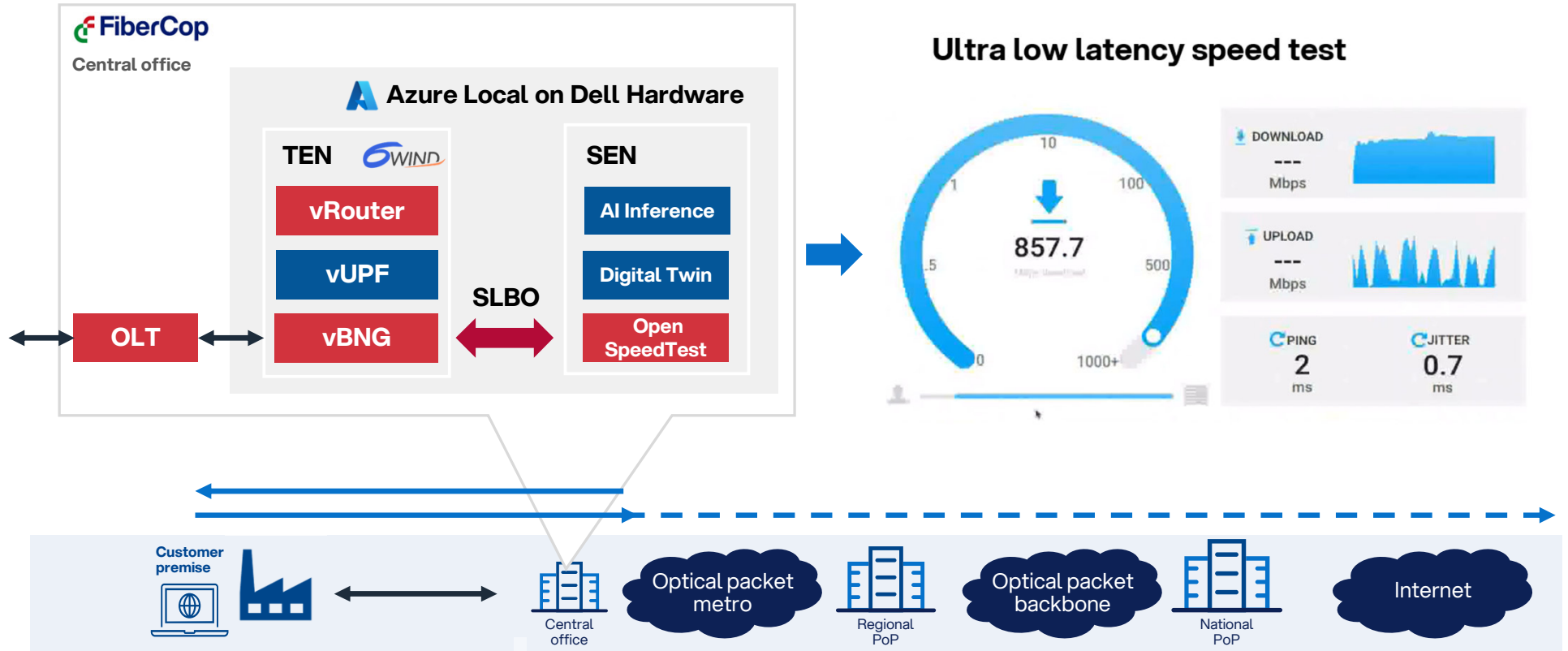
Internet speed test

Reference latency speed test
exploiting high speed fiber
connectivity with remote
server (e.G. Public cloud)

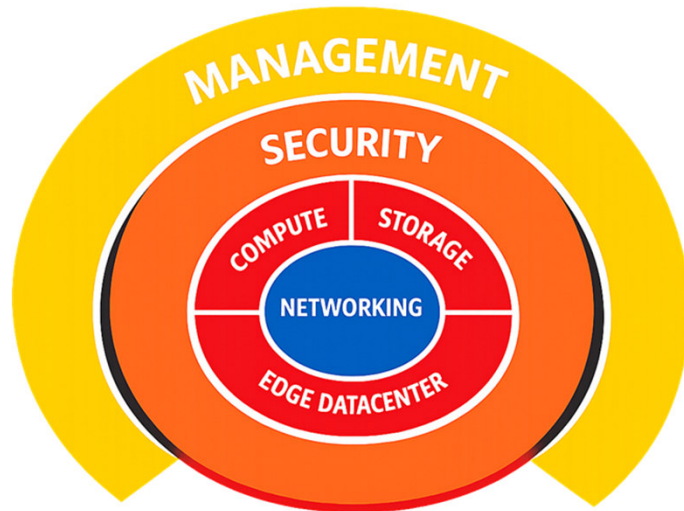


Selective Local Breakout (SLBO) in Edge Cloud

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TelCo Operators can play a central role in Edge Cloud



NETWORKING AND INFRASTRUCTURES ARE CORE COMPONENTS IN EDGE CLOUD

Telecommunication Operators play a crucial role in the widespread deployment of Edge Cloud across the territory

- **NETWORKING** – They manage networks across the territory ensuring adequate and diverse levels of performance at all network levels (access, metro, core).
- **INFRASTRUCTURE** – Their sites are equipped with power and cooling systems, that can be adequate also for Edge Cloud nodes.
- **SECURITY** – They operate NOCs and SOCs to oversee both site security and cybersecurity/network security, with personnel distributed across the territory.
- **MANAGEMENT** – They have, via their NOCS manage hundreds of distributed nodes. Thanks to their technological maintenance services, they can leverage end users to have their own IT and Network departments spread in different locations
- **COMPLIANCE** - Established operator relationships facilitate compliance with data locality and security regulations, ensuring trust and adherence.

Edge Cloud: powering a unified ecosystem to unleash the full potential of Low and Ultra Low Latency applications

TELCO OPERATORS



HARDWARE VENDORS

AT&T, Dell Technologies and NVIDIA collaborated on the Telco AI Cloud Pilot
SK Telecom collaborates with NVIDIA on Edge AI and distributed AI infrastructure

SYSTEM INTEGRATORS

Accenture supports AT&T in deploying Edge-enabled 5G enterprise solutions
NTT with IBM Consulting & Red Hat to deploy Edge-ready platforms enabling distributed application deployment close to end users

HYPERSCALERS

AT&T and Microsoft launched Azure Edge Zones
Telstra and AWS signed a strategic agreement to integrate AWS edge computing services with Telstra's multi-access

FiberCop Telco Edge approach

Joining our network with edge computing as enabling platform for new digital local applications

Different Connectivity for different Business

- Speed from **10 Mbps up to 100 Gbps**
- Connectivity on **single and double fiber**
- Guaranteed bandwidth accessible in **> 400 delivery points**
- **24/7 assistance**

Large business

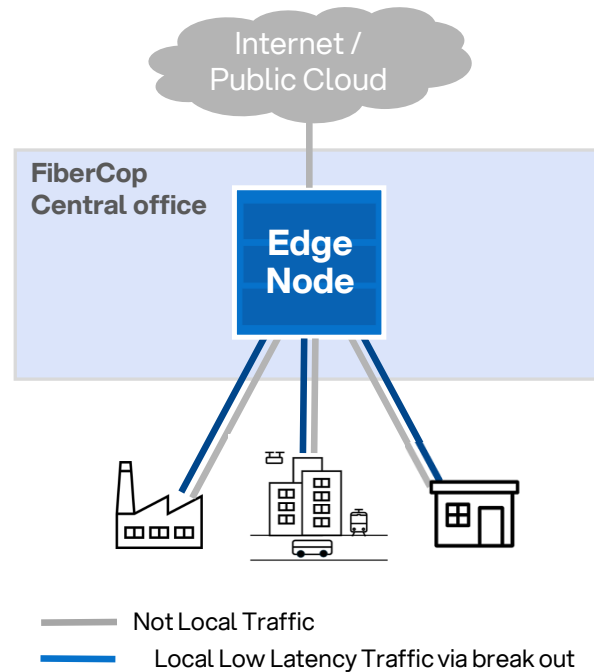
Nationwide WDM network

Geographic ethernet/IP Network

P2P fiber to the office

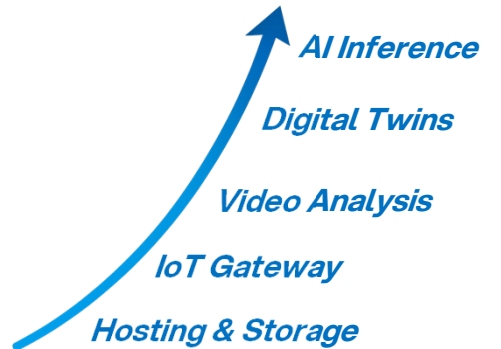
GPON

Micro business



Different Edge sizes for different needs

| Extra-small node | | Large node |
|--------------------|---|------------|
| 1-2 sqm | → | 500 |
| 200 CPU cores | → | 30000 |
| 4 GPU | → | 300 |
| 62 Storage US. TB | → | 9000 |
| kW Energy capacity | → | MW |





Thank you

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