



Closer, Faster: Data Centers Past, Present and Future

Luca Beltramo, CDO of Rai Way and Vice President of the Italian Datacenters Association (IDA), offers a comprehensive overview of the current landscape and future trends in data center market, technology and infrastructure.



by Luca Beltramo





Introduction: A Deluge of Data

The world is experiencing an unprecedented flood of data. This massive increase in information presents both opportunities and challenges.



Rapid Growth

Data generation is accelerating at an unprecedented rate globally.



New Challenges

Managing, storing, and analyzing this deluge of information creates new hurdles.



Opportunities

The data explosion also brings new possibilities for insights and innovation.



The Scale of Data

To comprehend the scale of modern data, we must understand new units of measurement.

1

Gigabyte

1 billion bytes, common in consumer devices.

2

Terabyte

1 trillion bytes, used for large storage systems.

3

Petabyte

1 quadrillion bytes, found in data centers.

4

Zettabyte

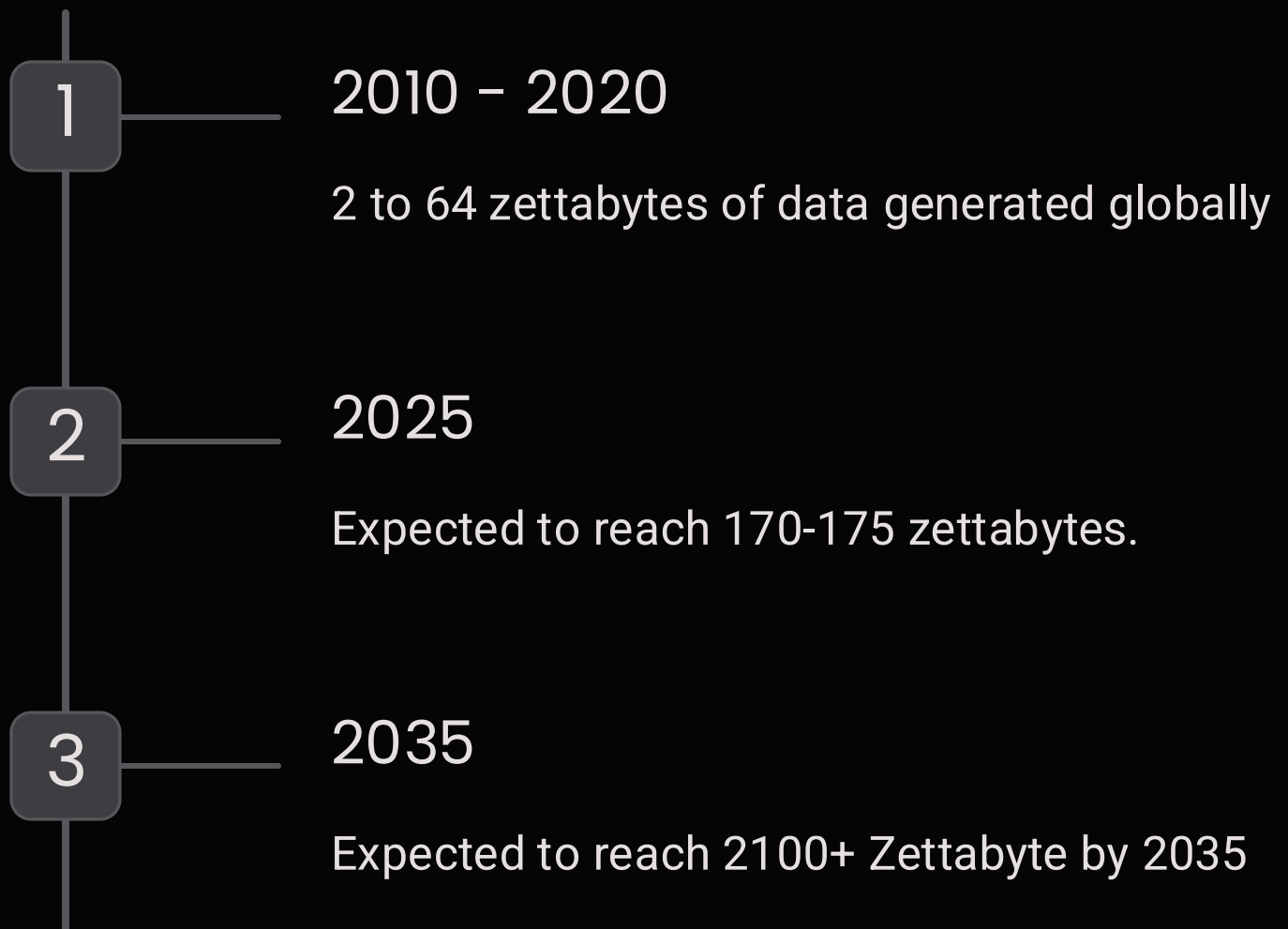
1 sextillion bytes, the scale of global data.





Global Data Growth

The world's data is growing at an unprecedented rate, driven by AI, IoT, and cloud computing.





AI's Role in Data Growth

Artificial Intelligence is a major contributor to the data explosion.

1

Content Generation

AI creates vast amounts of text, images, and videos.

2

Automated Processes

AI-driven workflows generate detailed logs and insights.

3

User Interactions

AI-powered applications increase user-generated data.

4

IoT Integration

AI analyzes data from IoT devices in real-time.



Challenges of Data Growth

The rapid increase in data presents significant challenges for infrastructure and management.



Networking Network Congestion

Increased data strains network capacity.



Storage Demands

Huge amounts of data require massive storage solutions.



Processing Power

Analyzing zettabytes of data requires immense computing power.



What is a Data Center?



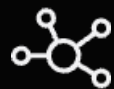
Data Processing

Data centers are designed to process large amounts of information and run applications.



Data Storage

Storage arrays securely store vast amounts of data, ensuring its protection from loss.



Networking

High-speed networks connect systems within the data center and to the outside world.





Anatomy of a Data Center

Core Components

Servers, networking equipment, and storage systems form the heart of data centers. These work in tandem to process and store vast amounts of information. **Install, Maintain, Manage**

Power and Cooling

Reliable electricity and efficient cooling systems are crucial. They ensure uninterrupted operation and prevent equipment failure due to overheating.

Security Measures

Both physical and cyber security systems protect valuable data. This includes **guards, cameras, firewalls, and encryption protocols.**



Types of Data Centers



Enterprise

Owned and operated by a single company. They cater to specific business needs and offer full control.



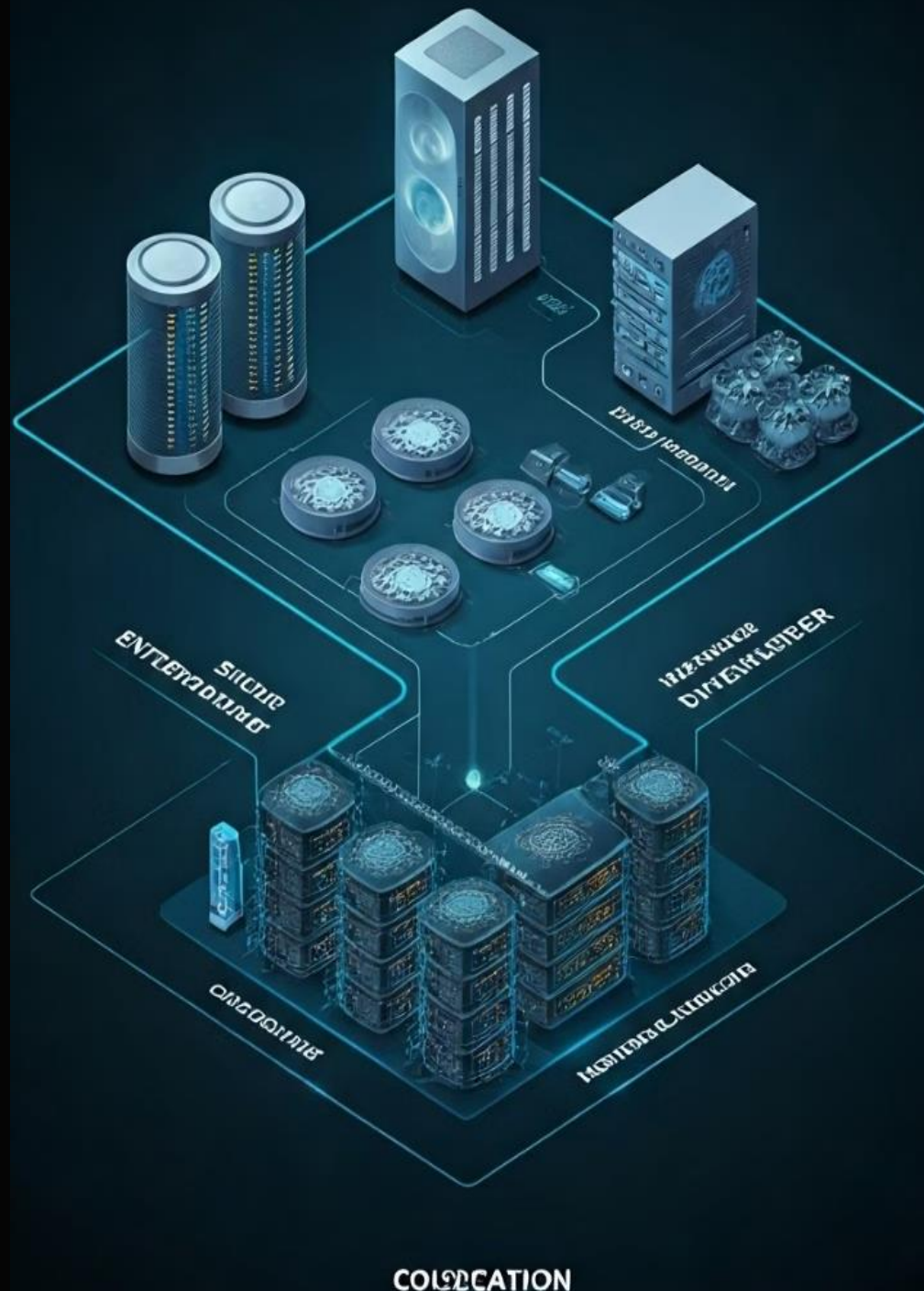
Colocation

Shared facilities where businesses can rent space. They offer cost-effective solutions for smaller companies.



Hyperscaler

Massive facilities operated by tech giants. They support cloud services and global-scale operations.



COLOCATION



The Future of Data Centers

Addressing the data deluge requires innovative approaches to data center design and management.

Edge Computing

Bringing data processing closer to the source.

AI-Driven Optimization

Using AI to manage data centers more efficiently.

Quantum Computing

Exploring new paradigms for data processing and storage.

Sustainable Design

Creating energy-efficient data centers for the future.



Edge and Edge Data Centers





Drivers of Edge Data Centers

QoS & Customer Experience

Edge data centers provide low latency and high-speed connections, enhancing the customer experience for demanding applications like gaming, streaming, and AR/VR.

Network Congestion

Edge data centers reduce network congestion by bringing data processing closer to the end user, leading to improved network performance and efficiency.

Real-Time Response

Data processing and delivery are significantly faster with edge data centers, critical for applications requiring real-time data analysis and decision-making.

Security & Reliability

Edge data centers can enhance security by offering localized data storage and processing, reducing reliance on centralized infrastructure and improving overall system reliability.





ADN



AGVs



Cloud gaming



Connected car



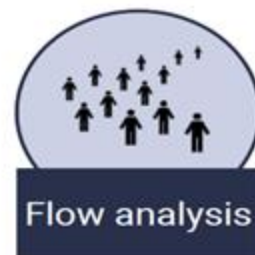
Contextual advertising



Drone inspection



CDN



Flow analysis



Live video / broadcast



MR for worker safety



Patient monitoring



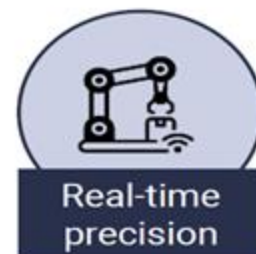
Predictive maintenance



Real-time XR design



Remote monitoring



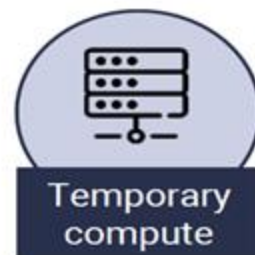
Real-time precision



Security video analytics



Smart city traffic mgmt.



Temporary compute



(Ind.) Video analytics



VR/AR for training

Source: STL Partners



Future of Edge Computing

1

5G and Beyond

Next-generation wireless networks enable faster data transfer and lower latency, driving the expansion of edge computing.

2

AI and Machine Learning

AI-powered applications require real-time data processing, making edge computing essential for their deployment and optimization.

3

Internet of Things (IoT)

The proliferation of IoT devices generates vast amounts of data, requiring edge processing to reduce network congestion and latency.



Data Center Market Overview





Data Center Demand

Digital Transformation

Data centers are a **key pillar for digital transformation**, as businesses are rapidly migrating to the cloud and demanding faster data processing.

Cloud Services

The growth of cloud computing is a major driver of data center demand, as cloud providers need more data centers to support their growing customer base.

Edge Computing

Edge computing is growing rapidly, as businesses are looking to **reduce latency and improve performance by bringing computation closer to users.**

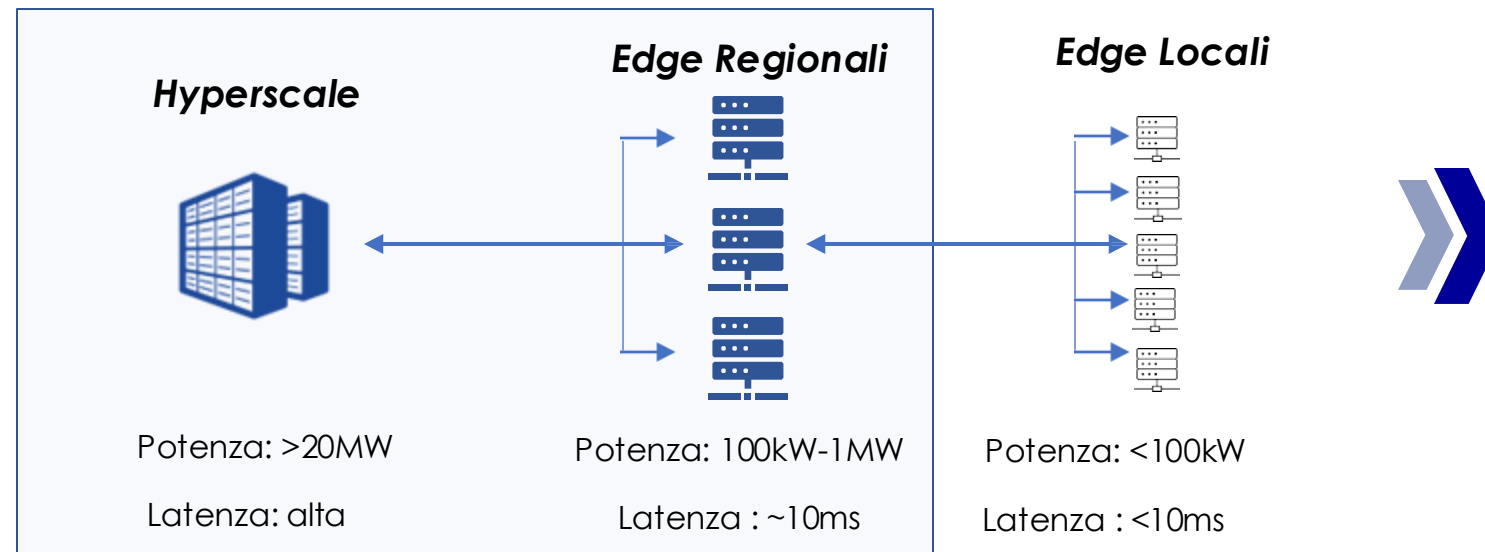
New Technologies

Emerging technologies like **AI, IoT, and 5G** are driving demand for more powerful data centers with greater capacity and processing power.



Nuova Infrastruttura Digitale Rai Way

Il progetto infrastrutturale



Fattori a valore aggiunto

Rete Multi Edge Data Center

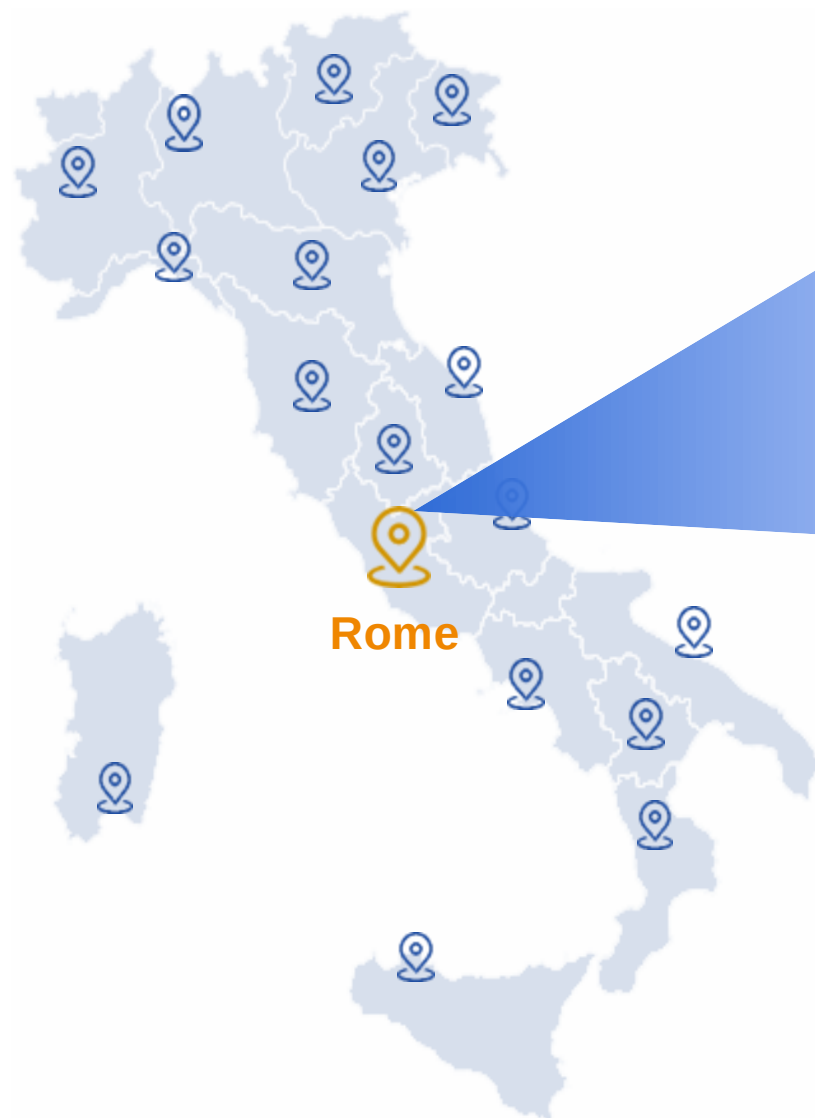
1 Hyperscale Data Center nell'area di Roma TIER-IV (ca. 35MW potenziali, IT load scalabile e distribuito su 4 edifici)

Interconnessione attraverso il backbone proprietario

Chiara **value proposition** per clienti / partner:

- Indipendente, affidabile e carrier-neutral
- Rete integrata di Edge DC per rispondere alle esigenze di bassa latenza
- Computing Continuum

- **Offerta di sola infrastruttura:** co-location (spazio, energia, sicurezza) e connettività
- **Grande sinergia con gli asset societari:**
 - Footprint capillare, con spazi disponibili in aree rilevanti e asset nuovissimi e di qualità
 - Backbone proprietario
 - Possibilità di upselling per i clienti attuali
 - Vantaggio del First mover su edge



Hyperscale DC in Rome Area



Ready **1Q 2026**



Target **40 MW IT Load** (4 buildings)



Target **PUE 1,2-1,3**



Compliant **rating 4/Tier IV**



Infrastructure compliant with **highest sustainability standard**



Rai Way prevede un roll-out progressivo

■ Fase 1 ■ Fase 2 ■ Fase 3

2024: 5 Edge



Attivazione di 5 EDC ~1.6MW a:

2025-26: 10 Edge



- Attivazione di 5 ulteriori EDC a:

Oltre: fino a 18 Edge + 1 HS DC¹



- Attivazione dei rimanenti 8 Edge in base alla domanda del mercato
- Attivazione del primo modulo da 8.8MW dell'HS DC a Roma

Posizionati nelle aree di interesse anche per soddisfare la domanda di DC di prossimità (Regionali)

1. Attivazione del primo modulo (di quattro) da 8.8MW

Una prima fase dell'implementazione della rete Edge DC è prossima al completamento

Torino

Sala data center di
118 mq
39 rack
Fino a 280 kW IT



Genova

3 container di 105
mq per sale dati
32 rack
Fino a 204 kW IT



Firenze

Sala data center di
185 mq
60 rack
Fino a 432 kW IT



Milano

- 2 sale data center di 230 mq
- 60 rack (+28 di espansione fredda)
- Fino a 450 kW



Venezia

- Sala data center di 185 mq
- 60 rack
- Fino a 432 kW IT.



1,6 MW
Potenza IT

249
rack

747 mq
Sale dati

Ca. 27
M€
Capex*



I prossimi 5 Data Center Edge e 1 Hyperscale in pipeline





Proprietary Distributed Infrastructure



A **proprietary** infrastructure widely **distributed** throughout Italy



Guaranteed high quality, low latency times and high reliability



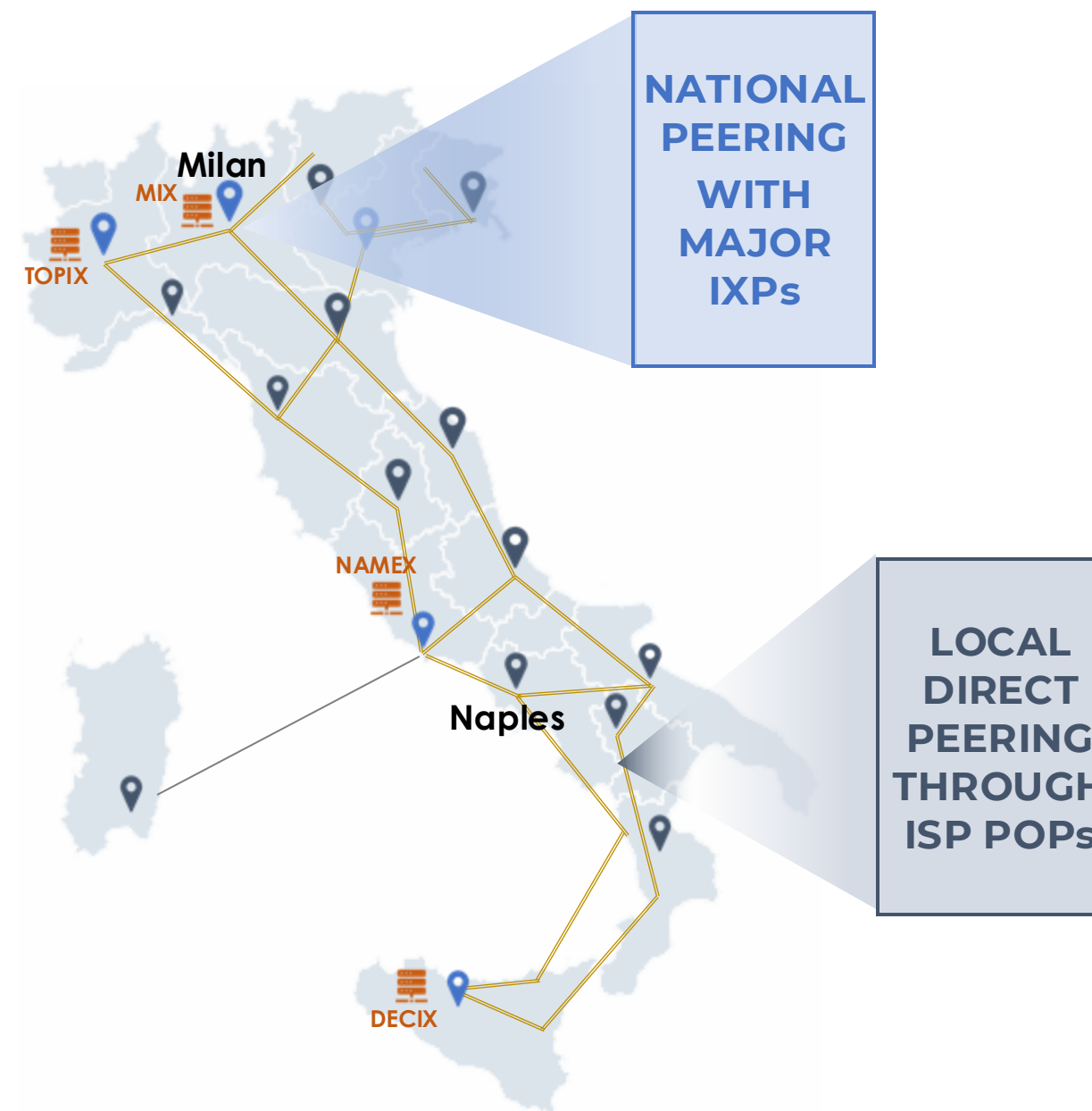
Carrier neutrality guaranteed by private and public peering with most of the main Italian ISPs



National And Local Direct Private and Public **Peering with ISPs and Mobile providers**



Both **NOC** and **Customer Care** dedicated in Italy



RAI WAY WILL PROVIDE PURE COLOCATION SERVICES

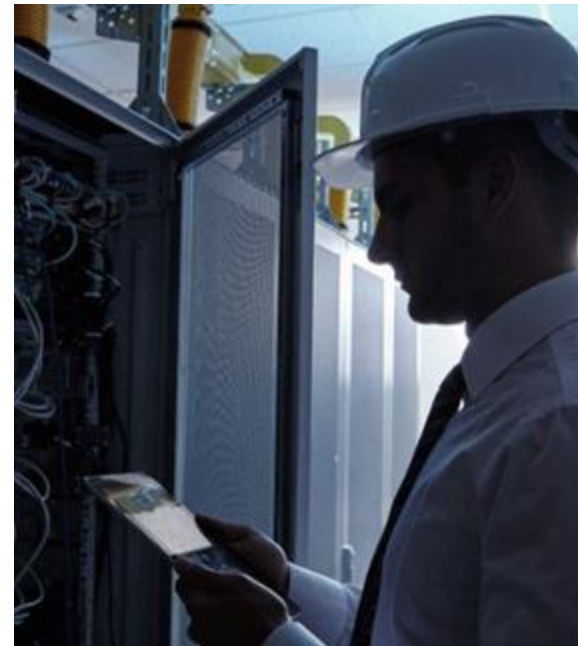
CORE SERVICES



Housing

- Shelf / Rack / Cage / Data Hall / Multiple Data Hall
- Proprietary fiber backbone and internal private network
- Connectivity: Dark Fiber and/or Lit Fiber
- Connection vs main ISPs / IXPs

ADDITIONAL SERVICES



Smart Hands support

- Configurations
- Troubleshooting
- Hardware Management



BareMetal

- Hardware rent and housing (e.g., Server, ...)



Thank you.



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