

EXECUTIVE SUMMARY

Navigating the Digital Future

Neutral Internet Exchanges as
Catalysts for Ecosystem Growth

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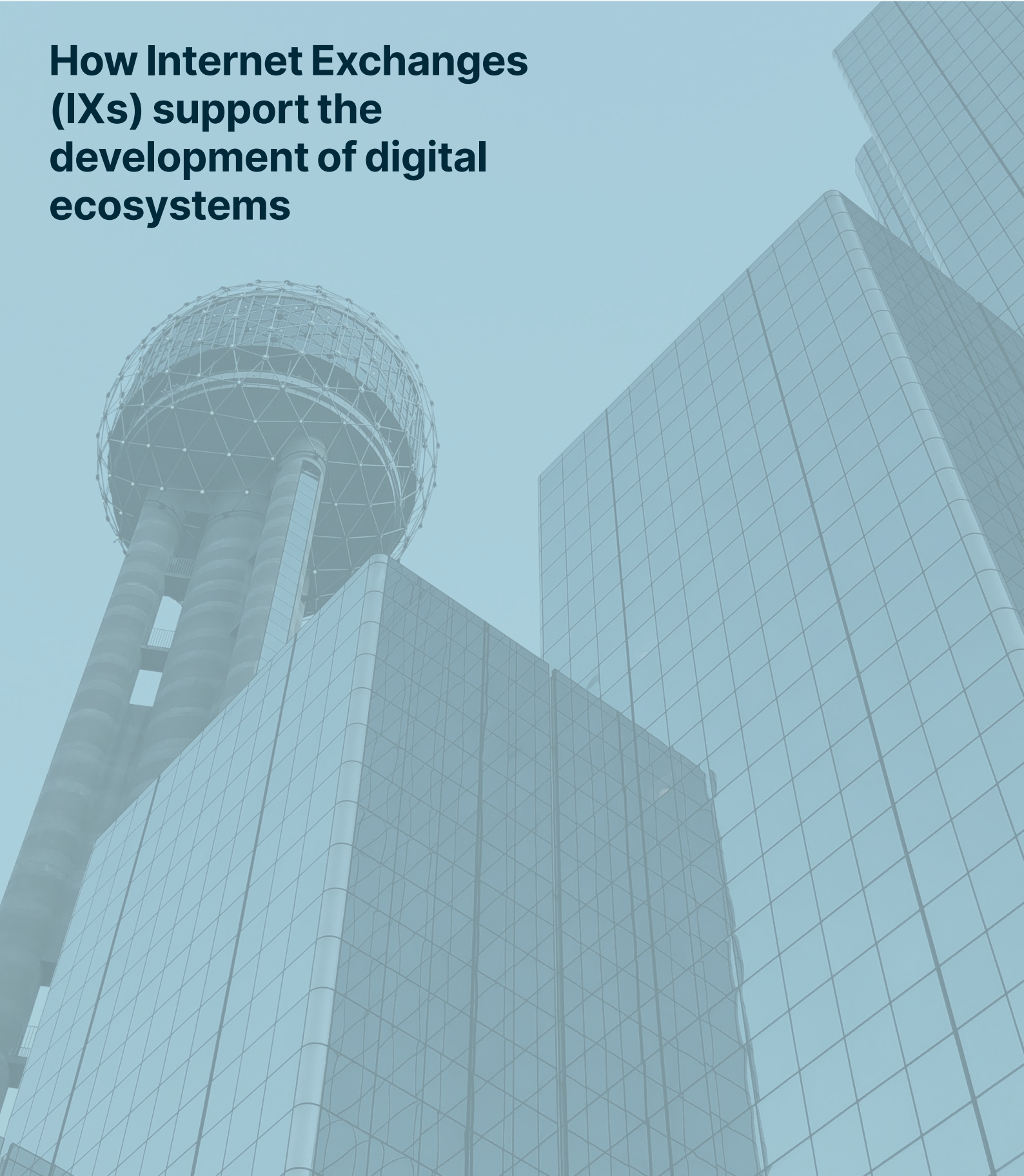
Introduction



In the last decade, we have seen an explosion of cloud-based services and applications, remote working options, smart factories, digital and VR content, mobility options, telemedicine, and most recently generative AI (Artificial Intelligence) based solutions. This technological evolution has resulted in increasing dependency on low-latency, resilient, and redundant connectivity, and having a range of interconnection options at one's disposal. These factors have become essential to ensuring functionality, compliance, and performance in the context of digital business and are, in turn, dependent on the existence of flourishing digital ecosystems.

This study puts the spotlight on the evolution of the US infrastructure market and key digital metro markets to better understand how digital ecosystems develop. It follows the development of existing hubs and the emergence of new ones and illustrates how digital ecosystems take root and prosper. It provides essential insights for national, regional, and municipal authorities seeking to better understand how to promote growth in their digital economies. It offers enterprise decision-makers and business consultants a better understanding of the importance of digital infrastructure and high-performance interconnection. And it offers data center operators insight into the value that interconnection platforms bring to data center investments.

How Internet Exchanges (IXs) support the development of digital ecosystems



To ensure the performance of the data flows that fuel digital business in the United States, increasing importance is being placed on Internet Exchanges (IXs) to exchange data in low latency and at high bandwidth. Even more so, importance is now being placed on distributed, data center and carrier neutral IXs operated by an independent entity. These act as a nexus point, aggregating networks and ensuring optimized, resilient, and lower cost connectivity for the end user.

This study differentiates between IXs that are owned and operated by the facility owner, either a data center operator or a carrier (= DC/Carrier-operated IX) and IXs that are operated by an independent entity according to the data center and carrier neutral Internet Exchange model. These are generally distributed across multiple facilities of different operators (= distributed, neutral IX), sometimes referred to as the “European model”.

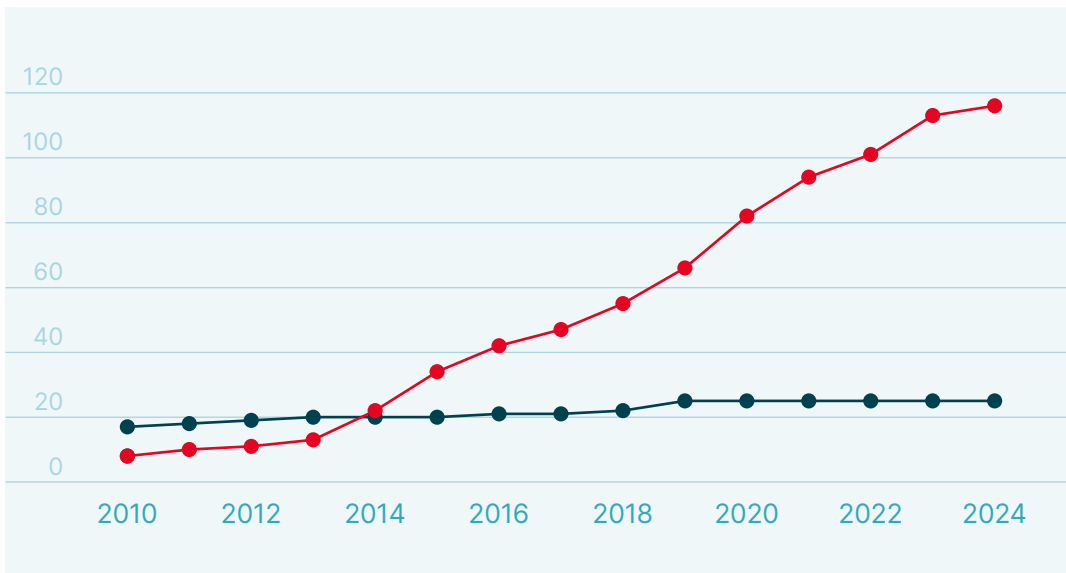
Through their distributed and neutral design, these IXs interconnect multiple data centers within their city or metropolitan area, serving the demand for redundancy and encouraging increasing network density. This, in turn, supports enterprises in ensuring the redundancy and resiliency of their connectivity, gaining greater control over their network and data flows, enjoying improved productivity both in-house and with a remote workforce, and offering their services to customers in lower latency.

The distributed, independently operated IX model has several significant advantages for building digital ecosystems. The neutral model can potentially be accessible from all colocation data centers within a metro area – and even from outside of the metro areas. By leveraging connectivity to multiple data center operators, an IX can be accessible to a larger selection of ASNs and enable much greater local network density than a DC/Carrier-operated IX can.

The neutral model provides network operators and enterprises with more choice of data center operators where they can access the IX, eliminating the risk of vendor lock-in and making it easier to establish redundant connections to the IX from multiple data center facilities. It also enables data center operators to house multiple IXs, providing networks with opportunities for further redundancy options. Increasing the number of data centers where an IX is accessible also brings interconnection services closer to end-users to enable extremely low latency connectivity for critical current and future use cases.

In today’s top 50 US-based IXs, the distributed and neutrally operated IXs have an average of 11 connected facilities operated by a minimum of two independent data center operators within a metro area. In comparison, the DC/Carrier-operated IXs have an average of three facilities operated by a single operator within a metro area. Certainly DC/Carrier-operated IXs can create a geographically distributed interconnection platform by connecting their data centers in different metro areas, as can neutral IXs. However, neutral IXs have greater potential to create a distributed local peering ecosystem.

In 2010, the majority of IXs in the US were operated according to the country’s prevailing model of DC/Carrier-operated IXs, only accessible in the facilities of the given operator. Independently operated IXs achieved parity with the prevailing model in 2014 and since then, this has taken off as the dominant model. In early 2024, more than 80% of IXs in the US were operated according to the neutral or a hybrid neutral model.



← **Figure 1:**
Development of neutral vs. DC/Carrier operated IXs

- Neutral
- DC/Carrier Operated

New York as the trailblazing interconnection capital

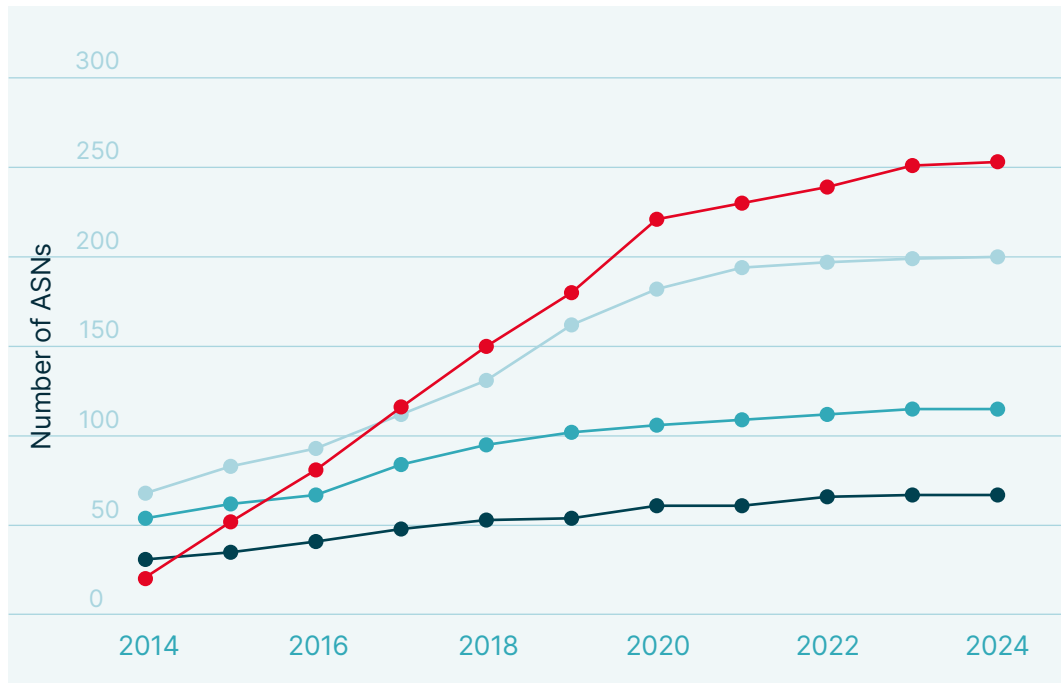


Of the top 10 US cities for ASNs (Autonomous Systems = networks) connected to IXs, as of early 2024, New York stands out as a clear leader. The city has the highest number of large IXs (counting more than 50 ASNs) and the largest number of aggregated ASNs connected to IXs. New York also has the highest average number of ASNs per IX: 134, almost double the average of 70 ASNs across the top 10 cities. This outstanding network density goes hand in hand with New York’s standing as an unrivalled global business hub.

↓ **Figure 2:**
Top 10 cities for ASNs
connected to IXs in 2024

	Aggregated ASNs	Total No. Of IXs	Average ASNs per IX	IXs with 50+ ASNs locally
New York	672	5	134	4
Seattle	488	5	98	1
Los Angeles	484	6	81	2
Chicago	425	8	53	2
Fremont	417	11	38	3
Ashburn	398	5	80	1
Dallas	375	6	63	2
Miami	367	5	73	2
Kansas City	263	4	66	2
Atlanta	254	4	64	1
Total (Top 10)	4143	59	70	22

New York is unique in the US interconnection landscape for having four IXs each with more than 50 connected ASNs. The two neutral IXs, DE-CIX New York and NYIIX, dominate the market, with a significant gap between them and the DC/Carrier-operated IXs. DE-CIX New York has experienced the strongest growth since its establishment in 2014 to take a significant lead in the market. Interesting to note here is that NYIIX, despite being neutral in its mode of operation, is owned by the data center operator Telehouse. It is nonetheless distributed across multiple data centers run by various operators, one of the hybrid neutral models identified in the study. This idiosyncrasy allows the analysis of network operator preferences, with a clear tendency towards interconnection via neutral IXs.



← **Figure 3:**
ASN count of IXs in New York (50+ ASNs)

- DE-CIX New York
- NYIIX New York
- Equinix New York
- Digital Realty New York

The value of interconnection for data center operators



But what impact does interconnection via an IX have on the data centers where the platforms are housed? Value-adding can occur regardless of the IX operating model. Connectivity increases the attractiveness of a colocation data center and can directly impact the core business and growth potential. As a result, there is estimated to be a 20% revenue add-on potential for a retail colocation data center, for example, by ensuring high performance connectivity in the form of a significantly sized IX within the facility.

However, it should be noted that having a neutral IX within the facility can reduce long-term risks. This is because there is less dependency on one part of operations, offering the advantage of making the data center assets more liquid and easier to sell to a third party without vendor lock-in risk.

Moreover, the analysis of the New York market in this study reveals that networks show a greater preference for connecting to a neutral IX, even when their chosen colocation provider also offers their own DC-operated IX within the facility. Therefore, there are clear advantages for data center operators to incorporate additional neutral IXs into their service offering.

Powering the growth of digital markets



The analysis demonstrates that the addition of a distributed neutral IX into a market dominated by DC/Carrier-operated IXs brings a complementary offering to metro area markets, providing options for network operators to improve their resiliency and redundancy, and encouraging greater growth in the local interconnection ecosystem. In this way, the advantages of both the DC/Carrier-operated and the neutral IXs can contribute to ecosystem development.

IXs, in particular distributed and neutral ones, thrive in a collaborative environment, enabling other infrastructure players in the ecosystem to flourish. A market featuring complementary offerings from two or more established IXs will grow faster than a market dominated by a single IX. This is because choice, resiliency, and redundancy are powering the growth of digital markets, collectively benefiting the entire Internet ecosystem. Diversity through neutral IXs on the market provides benefits for all members of the ecosystem.

Advantages of the neutral IX model for network operators:

- Vendor-neutral services and the avoidance of vendor lock-in

- Ability to reach other networks that are not a customer of your data center operator

- Greater geographical distribution through presence in a larger number of data centers

- Potential for creating additional redundancy

- Dedicated expert operating the IX

Advantages of the neutral IX model for data center operators:

- Value-adding to the service portfolio

- Offering customers expanded reach

- Making the facilities more attractive to potential customers

- Freeing up resources – not required to operate an IX themselves

Conclusion



This study investigates the evolution of the IX and data center markets in the US over the last ten years. It examines the drivers for new investments in IX and data center infrastructure and looks at emerging hotspots. It demonstrates the changing designs of data centers and interconnection infrastructure as a response to new needs and recent developments in business applications, such as generative AI. It follows the changing technological landscape of the US, and explores the characteristics needed for a city or region to emerge as a new data center or interconnection hub. It demonstrates why the inclusion of a neutral IX in interconnection strategies makes network operators, data center operators, and enterprises fit for the digital future.



About DE-CIX

As the leading Internet Exchange operator and interconnection provider, we help companies to realize new opportunities and future-proof their connectivity needs to manage growing data volumes and new applications. From easy and secure cloud connection to creating interconnection ecosystems, we make interconnection easy. Anywhere.

Find out more at de-cix.net.

Contact us

Phone: +49 69 1730902-12
Email: marketing@de-cix.net

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