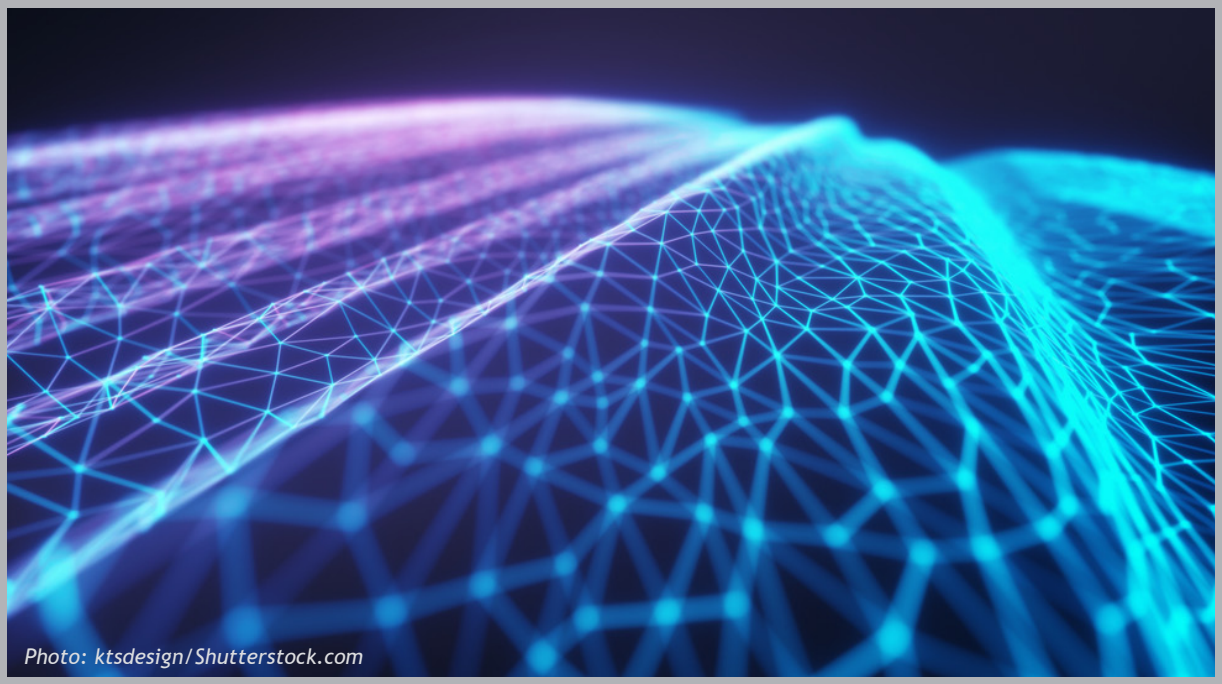
DATA CENTER Frontier Special Report

How Virtual Interconnection Supports Distributed Digital Business

Written by Paul Gillin



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Summary

Interconnection is a core service of most data center colocation providers that supports many-to-many connections between entities for rapid data exchange as well as an on-ramp to cloud services. It is the fastest-growing segment of the colocation industry. In this special report, Christian Koch, senior director of interconnection for DataBank, shared his organization's perspective on what will be the hub of the near-term future of software-driven IT infrastructure.

Introduction

Call it the Great Decentralization of business.

With digital transformation accelerating market dynamics across nearly every industry, businesses are under pressure to become more agile and responsive. The growth of software-as-a-service, edge computing, and high-speed 5G and Wi-Fi 6 networks enable businesses to go to market more quickly and to improve upon them in real-time in the field. The new breed of virtualized interconnection services from colocation providers enable unprecedented flexibility for businesses to distribute computing resources and move intelligence closer to the point at which decisions are made.

BY THE END OF 2022

25% — 30% Workforce

in developing economies will be working from home multiple days a week

Source: Global Workplace Analytics

The agility of small teams that was highlighted by the COVID-19 crisis will "hasten the progress to more decentralized global value chains," wrote three Boston Consulting Group executives in the Harvard Business Review. McKinsey recently agreed, noting that "a flatter organization that delegates decision making down to a dynamic network of teams is more effective" than a hierarchical one.

The bottom line is that few companies can afford the luxury of long decision cycles and rigid chains of command any longer.

Enterprises are increasingly delegating responsibilities to those closest to products and customers while shedding low-value non-strategic operations. Technology is enabling this shift by supporting high-speed communications between business stakeholders, suppliers and customers. It's also facilitating a more distributed workforce model with people working at home, on-site with customers, and in satellite offices. Global Workplace Analytics estimates that between 25% and 30% of the workforce in developed economies will be working-from-home multiple days a week by the end of 2021.

Finally, the rules of engagement are shifting. Success used to be defined by the ability of organizations to deliver a complete set of branded solutions. The winners in the new economy, however, are those that grow the entire market by building platforms upon which others innovate. Hierarchical corporate structures are being replaced by organic ecosystems of partners and suppliers.

Organizations are also learning to expose data to partners, contractors, and customers to foster alliances and generate new sources of revenue. Intellectual capital advisory firm Ocean Tomo has estimated that data now makes up more than 90% of the market value of S&P 500 companies. While some pundits have suggested the data is the new oil, the reality is that data is more valuable than oil because it can be reused, combined, and turned into insights that create a competitive advantage.

Cloud platforms create aggregation and distribution points for organizations to gather and expose data selectively, whether for a price or to enhance business partnerships. Flexible, open networks enable frictionless collaboration and commerce to occur at scale.

In short, the future of business will be distributed yet constantly connected, facilitated by cloud computing, intelligent devices, real-time data analytics, seamless collaboration, and high-speed networks.

The legacy impediment

Legacy IT infrastructure is poorly suited to accommodate the kind of fluidity that distributed organizations and market ecosystems demand.

- The cost and complexity of maintaining private networks based on physical infrastructure inhibit organizations' ability to scale and require expensive human resources to maintain and update. Repairs and upgrades that demand manual intervention throttle productivity.

Monolithic data centers can't provide the sub-second response times that today's consumers expect or that are needed to support future technologies like autonomous vehicles.

- The need to install, test, and maintain physical equipment in the field exacts penalties in time and cost. This is a particularly daunting obstacle for organizations that seek to expand operations into new geographies or take advantage of the new breed of remote intelligent devices.
- Onboarding productivity-enhancing technologies like robots, smart cameras, and sensors across a large organization is slowed by the need to integrate with aging physical infrastructure as well as bandwidth limitations.
- The latency inherent in legacy networks holds organizations back from deploying promising customer experience technologies like augmented reality and agile development tools like digital twins.
- Monolithic data centers can't provide the sub-second response times that today's consumers expect or that are needed to support future technologies like autonomous vehicles.
- Bandwidth-constrained legacy networks can limit the ability of organizations to use real-time analytics for such purposes as inventory management, fleet optimization, and customer recommendation.

Legacy infrastructure thus undercuts the innovation and agility that businesses need to thrive in a digitally transformed world.

The future is software-driven

To wean themselves from legacy infrastructure, organizations need to virtualize as much as possible.

Virtualization technology enables business agility by separating physical infrastructure from the applications that use it. This creates the foundation for software-defined infrastructure, in which hardware is treated as a single virtual pool that can be managed almost entirely in software, thus permitting automation to be applied at scale.

Virtualization technology has been used in data centers for many years to consolidate workloads on a small number of physical servers that operate at high capacity. Nearly any kind of infrastructure can now be virtualized, including storage, networks, desktops, and even data. Removing physical hardware dependence from the equation enables greater flexibility by allowing IT organizations to replace expensive proprietary hardware with low-cost commodity devices and to more easily accommodate peaks and valleys in demand.

Redundancy is built into software-defined infrastructure. If a piece of equipment fails, other resources can instantly be deployed to take over, often without any noticeable impact on performance.

Software-defined infrastructure is an evolution of virtualization in which the entire IT resource is managed as a single pool. This allows resources to be utilized more efficiently because they can be allocated as needed to accommodate demand. There are numerous advantages to this approach.

- Centralized, policy-based controls accelerate deployment and updates, in most cases eliminating the need for manual intervention.
- Redundancy is built into software-defined infrastructure. If a piece of equipment fails, other resources can instantly be deployed to take over, often without any noticeable impact on performance.
- Major upgrades and refreshes are less frequent because new equipment can be slipstreamed into production without downtime or disruption.

Just 30% of organizations had virtualized networks as of last year but adoption is likely to grow at double-digit annual rates going forward. Organizations that act quickly to adopt network virtualization can steal a march on their competitors.

- High levels of automation are enabled because most functions that previously required manual intervention can be implemented in software. This yields vast productivity benefits by enabling infrastructure to be deployed and managed as part of automated workflows, reducing provisioning times from days to minutes, and eliminating the need for manual intervention in most routine management functions.
- Many services can be deployed and modified without costly field visits. This can save weeks of time in a scenario such as setting up field offices or onboarding new employees.
- Software-defined infrastructure is less vulnerable to a physical attack because single points of failure are all but eliminated.
- Cloud-based identity-management tools support automated and centralized administration of users and access controls at a granular level.
- The risk of vendor lock-in is reduced because the software virtualization layer abstracts away underlying dependencies. That lowers costs and provides organizations with more choice.

Server virtualization is a mature technology that is now used by 92% of businesses, according to Spiceworks research. Other categories are still moving up the adoption curve. For example, the study found that just 30% of organizations had virtualized networks as of last year but adoption is likely to grow at double-digit annual rates going forward. Organizations that act quickly to adopt network virtualization can steal a march on their competitors.

Virtualizing interconnection

Interconnection is a core service of most co-location providers that supports many-to-many connections between entities for rapid data exchange as well as an on-ramp to cloud services. The need for interconnection is growing in lockstep with the move toward digital business as constant connectivity becomes an essential element of partner, supplier, and customer relationships. It is the fastest-growing segment of the colocation industry, with worldwide bandwidth more than quadrupling between 2017 and 2020 to 5,000 terabits per second.

Interconnection virtualization is a relatively new technology frontier that is rapidly gaining acceptance by colocation and cloud service providers. It permits businesses to create virtual cross-connects between customers, workloads, clouds, data sources, and applications, allowing data center workloads to become more distributed and flexible while also distributing processing and data more economically and efficiently. Slow, manual provisioning gives way to instant and programmable management.

75% of Enterprises estimated to use some form of as-a-service consumption this year

3-Fold Increase in demand for on-premises infrastructure delivered on a pay-as-you-go basis

Source: IDC

IT managers can self-administer infrastructure instead of paying carriers to do it. They can also better adjust and align infrastructure with the demands of their applications in real-time, reducing the need to overbuild and leave expensive equipment running idle.

Interconnection virtualization is growing in response to several major trends sweeping the IT industry:

One is the as-a-service model that offers the appeal of flexible subscription-based pricing, scalable capacity and OpEx predictability. IDC estimates that 75% of enterprises will use some form of as-a-service consumption this year, led by a three-fold increase in demand for on-premises infrastructure delivered on a pay-as-you-go basis.

This rapidly growing technology delivery model requires agile network infrastructures that can adapt to sometimes unpredictable changes in network traffic flows. As business operations become more dependent upon services hosted in the cloud, resilient and scalable networks will be table stakes for businesses.

The second driving factor is edge computing, an evolution of cloud infrastructure that moves data collection, processing, and services closer to the point of value. The market for edge products and services is poised for hypergrowth, with expansion expected to proceed at 37% annually through 2027, according to Grand View Research.

There is a common myth that edge computing is all about managing small devices. While that so-called "far edge" component is an important part of the market, the definition of edge computing is more expansive. "Near edge" and "middle edge" architectures are typically built in the vicinity of data centers in tier 1 and tier 2 markets to serve large populations of users or to support latency-sensitive compute requirements. These regional hubs support applications that can't practically be served by central clouds.

Trends Driving the Growth of Interconnection Virtualization

- ✓ **As-a-service model**
  Offers the appeal of flexible subscription-based pricing, scalable capacity and OpEx predictability.
- ✓ **Edge computing**
  An evolution of cloud infrastructure that moves data collection, processing, and services closer to the point of value.
- ✓ **Rapid deployment of 5G networks**
  One billion 5G subscriptions are expected to be in use worldwide by 2022 and an estimated half of all mobile connections could be 5G-enabled by 2023.

Edge environments can span multiple servers and even encompass small data centers. Over time, those facilities can become quite large as new applications and user populations are added. Edge computing also encompasses data center infrastructure that is provisioned to meet regulatory requirements for data locality or data sovereignty as well as application-specific uses such as support for retail outlets.

It is impractical for regional cloud data centers to provide the sub-second response times that many new applications require. Edge computing will support latency-sensitive applications like augmented reality, personalized video streams, remote vehicle control, and real-time recommendation engines that will fuel future business growth.

By 2022
One Billion Subscriptions
expected to be in use worldwide

Source: Statista

A third trend driving the growth of interconnection **virtualization is the rapid deployment of 5G networks.** One billion 5G subscriptions are expected to be in use worldwide by 2022 and an estimated half of all mobile connections could be 5G-enabled by 2023. The high-band mmWave service that delivers wireline speeds to untethered devices is expected to support entire new categories of applications:

- Factory and warehouse robots will be able to roam more freely without the constraints of network cables. Real-time data streams will let manufacturers and utility companies apply predictive maintenance to repair and replace equipment in the field before it fails.
- Advanced transportation infrastructure such as sensor-equipped traffic controls, smart lighting, and smart meters will make urban environments safer and more efficient.
- Drones equipped with image recognition capabilities will take over inspection tasks that are too dangerous or impractical for humans to perform.
- Sports teams and stadium owners will deliver video feeds customized to each fan's preferences.
- The quality and sophistication of remote health delivery like robotic surgeries and diagnoses will expand.
- Immersive classroom experiences will give each student a personalized journey down the Amazon River or the Martian landscape.

5G services will also change the way network topology is designed. Data-intensive applications will require more compute power to be located at the edge. New sites will be needed that operate at shorter distances and higher speeds.

Rethinking interconnection

Data centers must evolve to become points of connectivity between cloud servers, endpoint devices and partner ecosystems. Software-defined IT infrastructure can meet the demands of new applications at the edge. Automated provisioning and management reduce the burden on existing IT staff and smoothly accommodate changes to the business.

Local availability zones provide access to fiber networks and carrier-neutral interconnection hubs to connect metro regions to each other and to link local zones to those in other regions.

In the digital business age, networks must be 100% available and able to accommodate unpredictable capacity needs. Virtualized networks are evolving to incorporate application awareness features that automate traffic routing decisions based on the needs of the application rather than the decisions of human operators.

Major cloud computing providers are rolling out edge strategies, but most are not yet able to support a global network of local data centers. They will rely upon interconnection services provided by local colocation providers and telecommunications providers for some time to come.

Regional providers already have the facilities and relationships to support edge build-outs and interconnection. Their data centers can scale to meet capacity demands and, in most cases, are fully compliant with local regulations. Local availability zones provide access to fiber networks and carrier-neutral interconnection hubs to connect metro regions to each other and to link local zones to those in other regions.

Hyperscale cloud providers and large enterprises looking to build out distributed networks should look for the following features:

- broad geographic scope and open interconnect access for maximum flexibility,
- flexible infrastructure that supports a wide variety of scenarios, including small and mid-sized regional data centers and ruggedized micro platforms in the field,
- instant connectivity on the fly to temporary branches outposts at events and on customer sites and
- the ability to leverage partner networks for additional capacity and services where needed.

Interconnection virtualization will be an increasingly vital part of distributed infrastructure. It will permit such capabilities as limitless scale, automated workload migration between data centers and cloud services, the flexibility lets customers choose the best service providers for each use case scenario, instantly upgradable bandwidth, automated initiation of connections with new partners and services, data exchange at the edge without the need for round-trips to a central cloud and a managed services framework that combines all these features into a platform deployed with cloud-like simplicity.

The organizations that lead the Great Decentralization of business will be those that can most swiftly effectively free themselves from the shackles of legacy infrastructure and embrace data-driven decision-making. Interconnection and virtualization will support the agility they need to build the platforms upon which ecosystems can flourish.