Network Monitoring:

The Key to Establishing Data Center Visibility and Embracing New Technologies

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Evolution of IT and the Inception of New Technologies

Historical IT Impacts to the Modern Corporation

Traditionally, the IT department operated in a vacuum. It was about supporting the internal needs of the organization, focused on the back-office, end-user support, and perhaps some level of network management or managing applications.

Today, information technology has a huge impact not only on the business itself, but the business model that the organization is propagating in the market. The traditional concept of the data center is long gone, as are the basic customer demands of the past. Data centers must operate as the gateway to compute and assume the role of an outsourced operations team simultaneously. The traditional, siloed data center model doesn't apply anymore.

In addition, the role of software is incontrovertible. Creating software-driven services around backups, IP address management, IaaS, PaaS – essentially any service you can conceive of, is a major component of modern data center infrastructure. Ultimately, the interface between the business and the data center will be software driven. The consumerization of IT has created the need for businesses to empower end users and customers to engage services the way they prefer: quickly, conveniently, and digitally.

It's impossible to take a closer look at the modern data center without considering how the COVID-19 crisis has impacted the technology sector. The pandemic resulted in a near-overnight transition to almost entirely remote workforces, as well as a massive uptick in BYOD devices. Security and software-defined solutions were adopted with intensified frequency. As organizations have progressively used the network in ways it wasn't planned for, the world of information technology was reminded of its critical importance.

> **"IT has stepped out from behind the dusty 'management information systems' curtain. Now, they're driving digital business."**
>
> - Paul Mercina, Director of Product Management, Park Place Technologies

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What Digital Transformation Really Means Today

Digital transformation has come on the heels of the evolution of IT. It's been taking place for well over a decade, but the tech world named it and brought it to the forefront of discussion in recent years. Since digital transformation is often reduced to a buzzword, it can be easy to disassociate it from what it truly means, how it's impacting information technology, and by extension, how business is done. In fact, according to Gartner, 91% of organizations are engaged in some form of digital initiative, while 40% of organizations have reached scale for their digital initiative.[2]

What digital transformation comes down to in consideration of IT is the reality that there is increasingly less reliance on hardware and concurrently more reliance on software (and the possibilities it brings). Software is in many ways the catalyst that's enabling digital transformation and introducing disruption to every industry – because IT now has the power to do things that simply weren't possible without hardware in the past. Virtually every business is going from a world of data centers that relied on the performance of hardware, servers, storage, and networking gear, to a world where the specifics of hardware are irrelevant, and software is determining new technology capabilities.

Regardless of product, service, or industry, DX always comes back to the consumerization of IT. Customers want self-service, digital mechanisms to get what they need, and businesses are in various stages of the process of answering their demands: digital transformation.

Gartner Top Strategic Technology Trends for 2021

"Digital should be the default at all times. That's not to say physical space doesn't have its place, but it should be digitally enhanced, for example, contactless check-out at a physical store, regardless of whether its physical or digital capabilities should be seamlessly delivered."

- Gartner [1]

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Network Impacts of the Primary Game-changing Technologies in IT

With the many changes which have taken place in the realm of information technology, naturally a myriad of technological innovations has sprung forth. From hyperautomation and robotics to the Internet of Behavior (IoB) and distributed cloud, some emerging technologies remain in the early stages of the hype cycle while others have already become part of our everyday lives. We've identified five of the most influential emerging technologies to examine how they have impacted modern IT, and as a result, the network.

1 Edge Computing

The edge computing market is growing rapidly. The forecast global revenue is set to reach $9 billion by 2024 (Statista).3 It's been adopted more widely in industries such as manufacturing or financial services, while other businesses are still evaluating whether it's a valuable pursuit.

Edge computing is allowing organizations to consume services close to their source, designed to maintain low latency while reducing data costs and accommodating for any compliance requirements that call for data to remain in a particular geographic location.

From a network perspective, the drivers for edge computing are directly related to digital transformation. Bandwidth can be expensive and latency high. Moving data closer to its source eases the burden. On the other hand, it introduces complexity as IT assets become increasingly disparate. Regardless, the importance of the network becomes arguably greater in the context of the edge as the demand for localized network infrastructure and computing power increases. The network also bears a greater burden because more data is being generated at endpoints. There is an undeniable need to centrally manage disparate IT assets, and without ongoing connectivity, trouble ensues.

2 IoT

"IoT is regarded as one of the top five game-changing technologies due to its ability to create new sources of data, provide real-time performance updates and create new value propositions."

- Gartner [4]

Closely related to edge computing is the Internet of Things; after all, it does rely on localized compute. IoT is not a general-purpose technology; rather, its use cases are very vertical specific. In like manner, a Fujitsu research study indicated that organizations are deploying IoT for a wide range of reasons, from safety as cited by 47% of respondents, to revenue generation as cited by 45%.

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2 IoT (Cont.)

While many businesses find themselves amid IoT adoption, others see the potential but are still trying to answer the question: "How can we play?" Though significant prospective value exists, deployment isn't without its challenges, particularly where the network is concerned. In fact, 23% of organizations say network connectivity is the biggest obstacle to the successful deployment of IoT today.[5]

The reality is that IoT introduces several complications when it comes to the network. Reported by Gartner, "Most enterprise IoT projects driven from outside of IT often fail to identify and remediate the IoT implementation's impact on network elements, creating headaches for networking leaders."[6]

First, the IoT attack surface is multidimensional and risk laden. Asset discovery, network visibility, security analytics, and identity management and authentication are all critical security measures. Further, the IoT will continue to develop, which means it will continue to impact future enterprise network architecture. Consequently, meeting the demands of the IoT continuously requires a network well-equipped to monitor performance, scalability, security, device connectivity, and interoperability.

3 Microservices

• 28% of organizations have been using microservices for at least three years. 61% have been using microservices for a year or more.

• 29% of organizations are migrating or implementing most of their systems using microservices (O'Reilly Media).[7]

Microservices first became popular among forward-thinking application development organizations, but today they're part of the mainstream. Breaking apps down into condensed services has the potential to improve resilience and quicken time to market, not to mention vastly improve scalability, enable continuous delivery, and make debugging and maintenance in general easier.

Though microservices can bring to bear many benefits, they also depend on excellent network visibility and control. After all, although automation increases the speed of a given process, it also increases the speed at which mistakes can be made.

Microservices are a far cry from traditional architecture. As a result, forcing preexisting monitoring tactics onto cloud-native processes causes major headaches in IT. It is incumbent upon network analysts and administrators to ensure the proper network monitoring system is in place for a dynamic environment – complete visibility into every corner of the network is crucial.

Furthermore, network communications speed is also important to consider. Performance becomes more critical because microservices aren't aware of the physical network as a performance constraint. Additionally, though microservices are designed to provide scalability benefits, sometimes they grow too large too fast and impact the network negatively.

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4 Hybrid IT

• 72% of businesses describe their cloud strategy as hybrid-first or private-first (Everest Group).[8]

It's a common prediction among industry analysts that hybrid IT is going to be the dominant method of deployment going forward, and research seems to support the notion. Mega-cloud providers have rolled out their own on-prem cloud offers to extend the advantages of the public cloud in private environments. Most companies are evaluating which workloads can and should be moved to the cloud, and many have already completed migrations.

Much of the decision making is based on cost optimization. IT decision makers conduct the exercise of determining which assets should be kept on-prem, have bursting or scaling needs that justify the cloud, or can be replaced with SaaS or edge solutions.

Every hybrid IT environment is different, but the ensuing challenge is the same: complexity. With many enterprises using multiple cloud providers while maintaining assets in disparate locations, full network visibility is necessary for keeping tabs and making management as simple as possible.

5 SD-WAN

• The global SD-WAN market size stood at $1.4 billion in 2019, and is expected to reach $43.0 billion by 2030 (P&S Intelligence).[9]

For many years, copper strands between two locations was the only (very expensive) way to enable inter-device communication. MPLS followed, managed by third-party telecom service providers; a model that remains dominant in connecting multi-sites today. There's also the option of basic VPNs, though scalability tends to be an issue beyond a couple of sites.

Fast forward to today and SD-WAN is thriving, offering a cost-effective way to make multi-internet connections previously reserved for the high-end. The resulting opportunities include considerable cost savings and increased services for businesses.

It's also worth noting as IoT is closely related to edge, SD-WAN is closely related to hybrid IT. Hybrid is contributing to the demand for SD-WAN in the market, as it's quite difficult to manage with traditional networking. SD-WAN makes it more cost effective, easier to manage, increasingly agile, and can enable the ability to fine tune application performance.

The problem is that SD-WAN is driven by mass cloudification and doesn't follow traditional models on the network, making your environment opaquer. Thus, establishing network visibility to ensure the network is operating as it should has to be part of SD-WAN adoption. Ideally, a monitoring and management solution will allow the network team to eliminate excessive point tools and freely enjoy the benefits of SD-WAN.

> "Remember: software-defined is just an abstraction, so operating systems still have to run on hardware and hardware still has to run in a data center. That data center still needs the network – the same copper wires. If you lose the ability to control uptime, performance, or visibility, you can't see network problems proactively."
>
> -Jordan MacPherson, Program Manager, Park Place Technologies

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Implications to the Construct and Boundaries of the Traditional Data Center

Innovation Challenged the Traditional Data Center.

During a time that seems an eternity ago, servers were commonly located in the office. IT assets were all local in office buildings on-premises, and data connections were excessively expensive.

As time went on, connections became more affordable. Enterprises began moving their IT assets into colocation environments. It was more reliable and resulted in a large perimeter around the traditional data center, perhaps in a physical colocation facility in the case of larger companies. All operated safe and sound inside the wall.

Then, new methods of deployment like cloud and hybrid IT entered the mix, effectively shrinking the wall and bringing forth the concept of zero trust. Suddenly, the company network was closer to a public network than a traditional corporate one.

Compounding innovations in IT challenged and eventually dismantled the traditional data center, calling its dominion into question. Though many discussions have and will continue to take place regarding the role of the data center today, with over 175 zettabytes of data expected by 2025, it's clear that data centers will remain vital in the ingestion, computation, storage, and management of information (CB Insights).10 The data center is the backbone of the internet, and it will continue to communicate, transport, and store the hordes of information we produce daily. Though the data center has changed, its vitality is unquestionable.

Data Center Perimeters Fell, and IT Islands Formed.

The data center used to extend into corporate networks. In some cases, it still does. But we don't see the data center as a fortress with a perimeter wall anymore. Now we see the data center as an island, as its boundaries have expanded while its center has diminished. Virtualization, cloud computing and software-defined networks have fundamentally changed the perimeter.

The Modern Data Center Network Emerged: Software-Defined, Hyperconverged, and Automated.

"Many organizations are supported by a "patchwork" of technologies that are not lean, optimized, connected, clean or explicit. At the same time, the acceleration of digital business requires efficiency, speed and democratization. Organizations that don't focus on efficiency, efficacy and business agility will be left behind.

– Gartner [1]

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As the data center changed, so too did the network that supported it. The modern data center network is software-defined, converged, and automated.

- **Software-defined**
  The physical attributes of available resources used to create limitations in hardware-defined data centers. Today, the applications that run on an SDDC's network can create, provision, and deploy network resources in real time as the need arises.

- **Hyperconverged**
  Hyperconverged infrastructure goes hand-in-hand with the SDDC. HCI combines all traditional data center elements into a unified system, replacing hardware with software and x86 servers. This allows for decreased complexity and increased scalability.

- **Automated**
  Automating the workflow and processes of the data center eliminates the need for operators to manually carry out tasks like maintenance, management, and monitoring, ultimately saving time and reducing risk.

As the data center changed, so too did the network that supported it.

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How Network Monitoring Gives IT the Power to Embrace Innovation

A New Network Introduces New Challenges to Analysts and Administrators.

With so much technological change having taken place, network analysts and administrators are finding themselves faced with new challenges when it comes to interacting with the data centers and networks of today.

First, as mentioned, many modern data centers are software-driven, if not entirely software defined. As a result, network professionals who were accustomed to interacting with a CLI interface must learn Python or programming. It's essential to be able to interact with APIs and work in a different way from a practical skills perspective.

Visibility is also a significant challenge, as many network tools and platforms supporting the data center are self-contained and not built with interoperability. Previously reliable protocols like SNMP have become less so, making the ability to stitch together disparate network views absolutely essential.

Finally, a significant skills gap for managing new technologies has developed. Many organizations are finding themselves upgrading internal skills or searching the market for experts who can help them ramp up emerging technologies from an organizational standpoint.

Network Monitoring Creates the Path for New Tech.

Stay with us on this one. Despite the many technological convergences happening presently, the data center and the network are often still discussed in silos. Technical professionals don't generally think of network monitoring and associate it with rich opportunities for innovation and advancement.

But you should.

> " If you're flying blind, you're more likely to fail at a new IT initiative. Without visibility into your network, you won't make it to the cloud or the edge."
>
> - Jordan MacPherson, Enterprise Operations Center Program Manager, Park Place Technologies

Having complete confidence that the network is up, secure, and performing allows for smart investments in the influential technologies we've discussed in this paper, as well as those that are making their way into the market. Consider an example: if your IT team has an edge deployment on the horizon, but you can't guarantee that the network will be able to handle it, how might that deployment go? Don't worry, it's a rhetorical question.

From a business perspective, network monitoring clarifies capacity and performance. From a network team perspective, network monitoring provides the wherewithal for successful delivery. In today's on-demand, customer-first business environment, there must be controls in place to support new infrastructure and network components, as well as ensure availability and performance for the consumption model in question. Simply put, network monitoring is an enabler for accelerating and deploying new technologies.

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Network Monitoring Creates the Path for New Tech. (Cont.)

Plus, deploying new technologies typically results in expanding the breadth of the network. Network monitoring also helps to reduce complexity in an environment with more points of integration, failure, and complexity. Being able to monitor each critical point will bridge the gap between environmental growing pains and the actual adoption of technology solutions designed to ease them.

The bottom line is this: the only way to adopt new technologies coherently and defensibly is with strong network monitoring and management. Without understanding today's performance, pursuing future plans is equivalent to hoping for the best – an approach that's never recommended in the network or data center worlds.

Though network monitoring establishes visibility into the data center and clears the path for embracing new technologies, it's not always easy. One way to lessen the pressure is to forego trying to build the talent internally and seek an as-a-service network monitoring solution that will support the experts you already have on-staff. Furthermore, the as-a-service model affords your internal experts the opportunity to use the data and insights provided by network monitoring services to facilitate adoption of new technologies and identify systemic

> **The bottom line is this: the only way to adopt new technologies coherently and defensibly is with strong network monitoring and management.**

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