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The Transformation of the workspace using Multigigabit Ethernet

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Abstract –*Enterprises that begin digital transformation programs quickly realize that their traditional networks are incapable of providing the experiences that modern users require, nor are they agile enough to meet changing requirements. These limits are exacerbated at the network's edge, where IoT and employee mobility are causing an exponential rise in the number of devices connecting to enterprise networks. Additionally, the volume of data at the edge is increasing by a magnitude. The majority of data will be generated and handled outside of a centralized data center or cloud, making it increasingly challenging for IT to reconcile data availability and security requirements. The smart digital workplace of today places crushing demands on networks. Multi-gigabit Ethernet saves the day because it offers 2.5GbE and 5GbE speeds. Increasing use of smartphones, tablets, and IoT devices, along with high-bandwidth workloads traversing wireless networks, necessitates the evolution of the network architecture to match these requirements. This transition necessitates that businesses enhance their WLAN infrastructure to accommodate rising traffic, performance, and security demands. As more mobile and IoT-Internet of Things devices use wireless access, networks must be able to support a wide range of device types, applications, and services. Enterprises have just one option to survive and expand in the digital age: to update their network infrastructure. Explore the key needs for designing and deploying an edge-ready, next-generation network as the initial step towards modernization. Digitalizing operations in the enterprise's periphery is essential to unlocking new growth potential. The information in this article will help network presales and decision makers design their networks and understand Multi-gigabit Ethernet technologies and their uses. And this research paper will explain how enterprises can outrun the competition by constructing an edge-ready network that is scalable and flexible enough to meet future requirements.*

***Keywords*:** Digital Transformation, Multi-gigabit Ethernet, IoT, 2.5Gbe, 5Gbe, Bandwidth, BYOD, WiFi 6, WiFi 6E, CAT5, CAT5E, CAT6.

1.INTRODUCTION

Organizations of all sizes do not show any sign of abating in the need to move ever-increasing amounts of data across networks. Significant performance gains are required due to the large amount of information transmitted over fixed and mobile networks. This is due in part to the widespread use of cloud hosting and server virtualization; the size and scale of modern data centers; and the deployment of large Wi-Fi networks. The demand for high-speed connections is increasing. In addition, as the use of complex video and graphics applications increases and the demand for fast backbone connections between local networks increases, low latency and improved

network performance are required. Overall, Internet traffic is growing at about 20% annually, as well as global IP traffic is likely to reach 5 zettabytes by 2023 [1]. Interestingly, enterprise bandwidth requirements are growing much faster than expected. Data center companies predicts that business-to-business personal data exchange will grow the fastest across all sectors by the end of 2022, reaching about six times the global IP traffic. Interconnected bandwidth increases at a compound annual growth rate. The rate is 48%. Because of these things, organizations that want to speed up their networks to keep up with rapidly growing demand and avoid bottlenecks in important areas need to use multi-gigabit networks.

2.OVERVIEW OF MULTIGIGABIT

In May 2015, the release of the first switches using Multi-Gigabit Ethernet technology marked a turning point in campus networking around the world. Using multi-gigabit modular cabling, campus network switches provide high-speed connectivity and power over Ethernet Plus, simplifying migration by eliminating the need to cut and replace cables. This innovative technology runs on regular CAT 5e cables, so customers don't have to deal with the cost and hassle of replacing cables to achieve speeds above 1GbE. Today's wired multi-gigabit switches enable speeds of 1, 2.5, 5, and 10 GbE, so the wired infrastructure is ready to accommodate faster devices as they become available [24]. This innovative new solution improves the performance, simplicity, and cost-effectiveness of campus wired network infrastructure. It is the foundation of your Mobile First Campus solution. Get ready for the IoT and Wi-Fi 6 with data center performance. Enterprises are experiencing an influx of IoT devices and bandwidth-intensive applications. With access points that can handle up to four times the bandwidth of their predecessors, legacy edge switches will always be overwhelmed. Modern networks require switches with a non-blocking architecture that provides a simple and reliable solution for wire-speed performance and high availability. These capabilities inherent in data center infrastructure are even more critical at the edge, where performance disruption is virtually unacceptable. By maximizing how each switch port is used, it takes full advantage of Wi-Fi 6 and the (IoT), eliminating bottlenecks and ensuring critical applications always have enough bandwidth. The multi-gigabit switch product line with multiple mGig switch ports and enhanced switching capabilities aims to help organizations prepare for the increased bandwidth demands of the 802.11ax wireless standard. Networks with many wireless connections, such as large public buildings such as hospitals, universities, as well as transportation hubs, can all use the extra bandwidth [24].

3.MULTI-GIGABIT ETHERNET SWITCHES AND ACCESS POINTS BOOST ACCESS SPEED AND FLEXIBILITY

As network technology has improved in recent decades, there have been many improvements in the bandwidth available for new networks. With digital transformation, there is an urgent need for higher speeds and increased connectivity throughout the organization. New trends such as (BYOD)Bring Your Own Device and the next generation of open workplaces are exponentially increasing the need for bandwidth and putting enormous pressure on access networks. But help is on the way. Wi-Fi 6 (802.11ax), the next generation of Wi-Fi, enables a new generation of workplaces and transforms the network. Wi-Fi 6, the latest Wi-Fi standard, offers four times the bandwidth of the previous Wi-Fi standard 802.11ac [2]. With the flexibility and range of Wi-Fi, but with LAN speeds of over 6.8 Gbps, it can be a game changer for your business. This is a true paradigm shift in networking, delivering a better user experience at scale. However, there is a barrier that prevents many companies from taking advantage of these opportunities. Ready-to-use cable infrastructure Most Ethernet cables in use around the world today are only 1 Gbps per 100 meters. So, companies have to fix a lot of cables and deal with new Wi-Fi traffic as it affects existing access infrastructure. Upgrade rates for access points and switches can quickly

exceed wired upgrade cycles. How can companies overcome this hurdle and unlock the revolutionary potential of Wi-Fi 6? Until recently, businesses had two options, but neither was ideal. Switch to 10GBASE-T cable: It is possible to disconnect the Category 5e cable and replace it with a new Category 6 (Cat6a) cable, but this is very difficult and inefficient. First-generation Cat6 cables have a much shorter range than traditional multi-gigabit access cables[2,3]. If they use PoE for 100m switching access points (as many companies do today), they will need to fully configure the workstation. Although the new Cat6a cable has a range of 100 meters, it is more expensive, thicker, more flexible and no better suited for existing cable ducts than Cat5 cables.

In both cases, removing the access cables to transition to 10GBASE-T would require major building renovations and major operational disruptions. Additionally, ripping out and replacing existing Ethernet cables can be expensive. Adding a second Cat5e cable: This option costs a lot. For campuses with thousands of access points, that quickly adds up to hundreds of thousands of dollars. It may also require a disruptive repair, such as disconnecting the cable completely[4]. Tech companies offer great options. Multi-Gigabit Ethernet switches and access points allow them to significantly increase access speed and flexibility in the workplace without upgrading existing access cables and without disrupting operations.

4.WHERE IS MULTIGIGABIT NEEDED

It supports large and powerful Wi-Fi networks. Providing a Wi-Fi connection in a small environment, such as a small office or a coffee shop, is a very simple process. However, since the requirements for increasing mobility continue to expand, there are more and more media used for Wi-fi large-scale networks. For example, university campuses, stadiums, large employment, increase in public areas and a large part of the growing general areas and networks of the company (managed by high flexible working conditions, and more users choose laptops and tablets as their favorite devices) [4]. It is clear that all these environments require strong, reliable, and high-speed Wi-Fi networks. In other words, business-class Wi-Fi connectivity is essential. Today, business-grade access points (APs) typically have gigabit LAN ports, giving the access point the raw bandwidth needed to support multiple simultaneous wireless device connections without degrading performance. Clearly, large Wi-Fi networks require multiple access points, and as the Wi-Fi network scales, it becomes clear that the want for a multi-gigabit connection to meet the significant bandwidth requirements of the combined load is quickly emerging. In addition, the connection speed of access points (AP) to the LAN network is growing rapidly and reaching the multi-gigabit range [5].

Forecasts show that the growth of Wi-Fi networks will not only be driven by demand due to increased mobility (the use of laptops, tablets, and smartphones). Industrial Wi-Fi is undergoing a massive rise, which should support rapid growth in areas such as the Internet of Things, video surveillance, and M2M communications [6]. This is going to further increase traffic on the network as well as increase the need for multi-gigabit infrastructure. Conclusion is that Wi-Fi-traffic is increasing as the ease and flexibility of unlimited wireless access (WA) continues to drive deployment. The high volume of Wi-Fi traffic increases the demand for switches that provide bandwidth of 10 gigabytes or more for wired networks.

5.MULTI-GIGABIT A NEW ERA OF CONNECTIVITY

The digital workplace places enormous capacity demands on campus networks. The proliferation of mission-critical wireless access, cloud-based services, and bandwidth-intensive multimedia and collaboration tools creates the conditions for performance bottlenecks that affect employees, customers, and business productivity [7]. Wi-Fi

technology continues to advance with multi-gigabit 802.11ac and 802.11ax access points, and now the wired campus must be upgraded to a foundation that takes full advantage of this increased performance capability. Today's cabling systems were designed for 1 Gigabit Ethernet and moving to 10 Gigabit Ethernet has often required significant cabling upgrades [8]. Fortunately, the IEEE 802.3bz standard for multi-gigabit Ethernet offers both high speed and performance for high-speed access points such as 802.11ax and 802.11ac access points, while using paired cabling current CAT5e and CAT6 twisted cables, removing the cost and difficulty of tearing down and replacing new cabling infrastructure. The most common term used by network companies to describe this technology is multi-gigabit Ethernet.

6.MULTIGIGABIT ETHERNET: A NEW GENERATION OF CONNECTIVITY AND FLEXIBILITY FOR ENTERPRISES

A new era of corporate connectivity and flexibility The Multigigabit Ethernet portfolio, which is based on the 802.3bz standard, includes support for next-generation workspaces that are more flexible, collaborative, and productive; a future-ready access network that provides the organization with 6.8 Gbps Wi-Fi speeds today and even greater speeds later. With the flexibility to incorporate multi-gigabit Ethernet switches and access points into your existing access infrastructure, this will secure the investment. A solution that can scale with your business (supporting both new and existing deployments) with multi-gigabit Ethernet technology that works with both existing Cat5e cabling and new Cat6/6a cabling and delivers speeds ranging from 100Mbps to 10Gbps with up to 60W of power [15,16]. Multigigabit Ethernet switches and access points provide the performance, dependability, scalability, and feature set you demand. This helps an organization get ready for the future without reducing infrastructure investment or efficiency.

7.MULTI-GIGABIT TECHNOLOGY

Multigigabit Technology Supports Power Over Ethernet(PoE) Forms: Multigigabit technology enables intermediate data rates of 2.5 and 5 Gigabit per second to ease the transition from traditional rates of one Gigabit per second to 10 Gigabit per second. The intermediate rates are compatible with most installed cables while retaining all UTP wiring. The technology too supports power over ethernet(PoE) forms such as PoE+ and 60-watt PoE.

Multigigabit Ethernet Switches - Fast Ethernet (FE) Vs Gigabit Ethernet (GE): Multigigabit Ethernet switches eliminate the need for multiple cables to be run between switches and access points, allowing your network to accommodate next-generation traffic speeds and data rates. Fast ethernet(FE) and gigabit ethernet (GE) variants are offered, and both types of ethernet support layer 3 features, high-level security, and a highly efficient bottom line.

With multigigabit technology, multiple speeds can be auto-negotiated: Multigigabit technology auto-negotiates switch port speeds. Cat 5e cable supports speeds of 100Mbps, 1Gbps, 2.5Gbps, and 5Gbps, while Cat 6a cable supports speeds of up to 10Gbps [10]. This protects customers' and partners' existing cabling and connector investments.

Wi-Fi 6 (802.11ax) - Increased Network Bandwidth is Being Demanded by Wireless Devices: With the expected growth of Wi-Fi 6 (802.11ax) Increased network bandwidth is being demanded by wireless devices due to the widespread adoption of 802.11ac and the advent of new wireless applications. The entire cabling infrastructure must be capable of supporting speeds greater than 1 Gbps.

Multigigabit Technology - Achieves Five-Fold Increase in Wireless Bandwidth From Wave 1 to Wave 2: Businesses can easily prepare their networks for the five-fold increase in wireless bandwidth from 11ac Wave 1 to Wave 2 with the help of multigigabit technology. It covers the typical difficulties they'll experience when updating their networks for 802.11ac Wave 2 [11]. In addition to this, it

offers customers who are transitioning to Wave 2 tremendous cost savings.

8.THE MULTIGIGABIT SOLUTION- REDEFINING THE NETWORK TO MEET DEMAND

The rising use of smartphones, IoT devices, and tablets, combined with high-bandwidth wireless workloads, requires campus network infrastructure to evolve. Due to this change, businesses must update their WLAN Infra to support rising traffic, performance, as well as security demands. Since more and more mobile and Internet of Things (IoT) devices need wireless access(WA), networks must support a wide range of device types, services, as well as applications[9]. This is evidenced by the emergence of high-performance access points (APs), such as 802.11ax access points (AP), as well as the rapid adoption of these APs. Several important factors are driving the transition to Wave 2. i) Internet of Things gadgets, Bring Your Own Devices, and unified communications: a growing mobile traffic problem (UC) WLAN bandwidth needs will continue to rise as more devices are added. ii) Access Capacity: The bandwidth capacity requirements for supporting switch cabling infrastructure have increased significantly with new high performance devices, approaching 5Gbps.

Ethernet Cabling Infrastructure - The Bottleneck :The capacity of enterprises' WLANs will immediately increase after the replacement of legacy access points (APs). However, there's still a bottleneck that could stop many businesses from taking advantage of these innovations. This bottleneck is the existing cabling Infra, as well as the speed of the switch port that the AP is connected to. Most Ethernet cabling deployed today is 1Gbps at one hundred (100)meters. Expanding data transfer rates has traditionally necessitated expensive new cable installations. The Multigigabit solution helps overcome this bottleneck by reshaping the network to meet customer needs.

9.MULTIGIGABIT LANS TRANSITION

At the moment, most multigigabit network installations are in the data center. Enterprises see the most value in the data center (DC) because it houses the servers, which typically consume massive amounts of bandwidth as they serve users spread across the organization and on the Internet. However, multigigabit networking is starting to move from the data center and onto the campus network because of networking trends. The looming deployment of technology that supports 802.11ac wireless networking standards is one of the major forces pushing multigigabit networking out to the access layer. This technology realizes multigigabit wireless and necessitates the use of multigigabit wired networks to support new access points. Organizations are beginning to upgrade their access layer to support 40-gigabit uplinks as they plan for 802.11ac-enabled deployments.

Access layer switches from the upcoming generation offer a lot of functionality. The improved power delivery capability and support for multigigabit interfaces are two of its most notable features. While PoE) PoE) The original PoE standard could only deliver 15.4 watts of DC power; the enhanced PoE+ standard can deliver 25.5 watts. Universal PoE (Cisco) (UPOE) standard increases the maximum to 60 watts. This increased capacity for power delivery is going to be absolutely necessary in order to support the power-hungry 802.11ac wireless access points. There are still many businesses whose outdated cabling infrastructure prevents them from deploying multigigabit networks at the access layer [10]. Operating a 10-gigabit-per-second network necessitates cabling upgrades, which may incur substantial construction expenses. If the company is in this predicament, consider upgrading to a 2.5Gbps or 5Gbps network over the current infrastructure as a stopgap measure before you replace your cabling and implement a 10Gbps network on your local area network.

10.MULTIGIGABIT TECHNOLOGY- WHAT PROBLEM DOES MULTIGIGABIT TECHNOLOGY SOLVE

Gigabit Wi-Fi Access Points are becoming more popular, and 802.11ac Access Points are helping. (AP) In the preceding year, penetration increased nearly tenfold. Enterprises are getting ready to take advantage of the increased wireless bandwidth and the ability to run multiple wireless streams simultaneously on the same access point as the industry awaits the shipment of 802.11ac Wave 2 APs and the future 802.11ax. This is happening as the industry anticipates the shipment of 802.11ac Wave 2 APs and the future 802.11ax[12].

11ac Wave 2 - How to Enable 6.8G Wireless Speeds: 11ac Wave 2 presents an incredible window of opportunity; however, it also presents some difficult obstacles. 11ac Wave 2 promises 6.8G wireless speeds, but its wired port only supports 1G due to its Cat 5e connection? [12,13] If the cables support higher bandwidth, how does it deliver PoE to the wireless APs? Is it possible to do this without replacing the cabling?

The Multigigabit Technology Accelerates Wireless Broadband Upgrades :The Multigigabit technology enables businesses to effortlessly prepare their networks for the fivefold increase in wireless bandwidth from 11ac Wave 1 towards (Wave 2)[12]. It addresses the typical obstacles they will encounter when upgrading their networks to Wave 2 802.11ac. Here are some of the highlights:

Wave 2: Tremendous Cost Savings for Customers Migrating to Wave 2 : Customers migrating to Wave 2 will realize significant cost savings: a large number of current access switches are connected to APs via Cat 5e cabling, which is limited to 1Gbps speed. As soon as the traffic from the wireless access point (AP) gets to the access switch, it will hit a bottleneck. However, according to NBASE-T specifications, the innovative technology delivers 1G, 2.5G, 5G, and 10G speeds over existing Cat 5e / 6 cabling. As a result, this will save a ton of money by negating the need to upgrade existing cabling. In accordance with industry experts, the cost savings can range from $200 to $1,000 per port, as this is the estimated cost of pulling a new cable, which varies by country, installation complexity, regulatory compliance, as well as other variables [12,13].

Flexible Network Power: Wave 2 APs on Multigigabit Ports : Endpoints can now receive Power over Ethernet (PoE), PoE+, and UPOE over multigigabit ports. Will be able to use the existing cables to power Wave 2 access points without having to change the way the cables are laid out or add new electrical circuits in the ceilings or walls.

Protection for investments: The technology allows for compatibility with current access switches. Multigigabit models can be stacked with 1G Copper and Fiber [12].

Network Wide Performance Improvement: New Line Cards Deliver Uncompromised Network Services. To avoid shifting the bandwidth bottleneck from the access ports to the backbone, the 10G density on the backbone switches was doubled by installing new, higher-density line cards. In addition to being compatible with the 100 of thousands of switches already in use by customers, the line cards also feature the same uncompromised network services that have become the product line's hallmark. From access switches to the backbone, these innovations broaden the possibilities for enterprises to delight users with connected experiences while not breaking IT budgets and extending existing investments in wireless infrastructure into the future[14].

11.HIGH -SPEED LOCAL AREA NETWORK BACKBONES

There are high-speed networks. Both wired and wireless users demand high-speed connections more than ever. In light of the fact that Office PCs are now equipped with Gigabit Ethernet ports, a backbone must be capable of supporting more than Gigabit connectivity in order to avoid bottlenecks [20,21].

Backbones of local area networks that are blazingly fast: Demand for high-speed LAN connections is at an all-time high among both wired and wireless users. Simple math shows that in order for a backbone to support more than one Gigabit

connection, it needs to support more than one Gigabit connection. If it doesn't, bottlenecks can quickly form in the network. In offices, Gigabit Ethernet ports are now standard. Multi-Gigabit Ethernet Switches - Achieve Better Performance: It is prudent in any reasonably sized network to monitor performance and identify bottlenecks so that higher speed, multi-Gigabit switches can be strategically used to improve overall performance. It is possible to solve server problems with multi-gigabit Ethernet and to increase the speed of all user connections with this technology.

Boosting Network Performance :As an illustration, if 100 PCs were simultaneously connected to a 1 Gigabit LAN backbone and sharing the bandwidth, their average connection speed would be 10 Megabits per second. Add in some heavy users or bandwidth-hungry applications, and network performance will quickly deteriorate to the point where a backbone upgrade is required. Moving to Gigabit Ethernet Clients Will Increase Network Traffic Significantly: Gigabit ports are often underutilized on computers.) based on apps) Moving from network clients with Fast Ethernet to network clients with Gigabit Ethernet does not necessarily result in a tenfold increase in network traffic. Upgrading to Gigabit Ethernet clients, however, will significantly increase network traffic, which may cause backbone performance issues. VLANs can segment traffic or aggregate Gigabit links to boost bandwidth in such cases. Performance will be improved by moving to a multi-gigabit backbone, and a longer-term solution will be provided [21,22].

The Need for Higher Network Performance : Real-time applications that make use of voice and video running concurrently and other business-critical processes that require fast transactional responses and low latency are what drive the need for higher network performance. This need is driven not only by backbones that have enough bandwidth to support the sheer number of wired and wireless network users, but also by real-time applications that make use of voice and video running concurrently. It is important to have spare bandwidth in the core and on the server, where most traffic originates, because no competent network manager would operate a network close to capacity. Upgrades to LAN Backbones to Support Multi-Gigabit: As standards have evolved and gained industry support, LAN backbones have been upgraded to support multi-Gigabit speeds for a few years. Although many of the largest organizations have already upgraded their LAN backbones, many more are realizing that moving to multi-Gigabit is a realistic and sensible option [22,23].

12.THE CAT5E CABLE LIMITATIONS HAVE BEEN BROKEN

Cat 5e is the most widely used data transfer rate for legacy Ethernet cables in corporate networks [24]. To take advantage of the speed benefits of 802.11ac-capable APs, many cables must be replaced with newer Cat 6 cables that support data transfers of up to 10 Gbps. In addition, Cat 6 cables can only transmit data up to 100 meters. Then the speed drops below 1 Gbps. However, newer and more expensive Cat 6a cables have a longer range. Reconnecting large networks can be expensive in labor and cabling. This is why technology companies are developing switching equipment that accelerates faster data transfers, enabling maximum coverage in existing Cat 5e cable infrastructure with wireless access points in large networks [25].

13.DEPLOY MULTI-GIG WHERE NEEDED TODAY TO AVOID BOTTLENECKS

Deploy multi-gig where necessary today to reduce bottlenecks and provide a clear path for future expansion. There are no indications that the need for greater Ethernet speeds and performance will diminish in the near future. As more servers are linked through 25, 40, or 100 Gigabit Ethernet, this has an effect on the network infrastructure required to handle the load in the present and the future. It is more essential than ever to prepare for the future

evolution of networks in order to keep pace with the development and evolution of technology.

When determining the upgrade path beyond 10 Gigabit Ethernet, the following step is often either 25 or 40 Gigabit Ethernet. On the surface, 40 Gigabit may seem the superior (i.e., quicker) alternative; nevertheless, cost per bit, power usage, and server rack density must be addressed. For instance, when upgrading the top-of-rack switches in data centers from 10 Gigabit Ethernet to 40 Gigabit Ethernet, the step increase is no longer cost-effective or energy-efficient. A transition to 25 Gigabit with its single-lane configuration is preferable than 40 Gigabit with four lanes. Data center operators can save money by upgrading from 10 Gigabit Ethernet to 25 Gigabit Ethernet due to backwards compatibility, reduced power usage, and a lower cost per gigabit. 25 Gigabit Ethernet switches offer a quick and simple performance improvement by utilizing the existing cabling and reducing cooling costs as a result of power savings. In other cases, upgrading to 40 Gigabit Ethernet (4 x 10 Gigabit lanes) or switches that support the more recent 50 Gigabit Ethernet standard may be the optimal choice (2 x 25 Gigabit lanes). With 25 Gigabit, 50 Gigabit, and 100 Gigabit networking infrastructures in mind, the standards have been modified to provide flexibility and a clear route for future upgrades to 200 Gigabit and 400 Gigabit when necessary.

14.MULTI-GIGABIT BARE METAL SWITCHES INCREASE OPTIONS AND DECREASE COSTS

Another area of growing interest is bare metal network switches (BMS). Bare metal switches(BMS) take the SDN philosophy a step further by decoupling the network hardware from the software, with no pre-installed network operating system[18]. This allows the purchaser to install and run any network operating system. Network switch vendors shipping bare metal switches have adopted initiatives such as ONIE-Open Network Install Environment, an open source installer, to make it easier for buyers to install their network operating system (NOS) of choice[18,19]. As part of network provisioning, ONIE allows installation of the network operating system (NOS) of choice. This is like the way servers are configured with a chosen operating system in data centers, service providers, and large enterprises. Bare metal approaches take benefit of economies of scale when making, deploying, and storing network switches. They also get rid of the cost of operating systems that come pre-installed and the need to stick with one vendor[19].

15.PLAN AHEAD OF TIME TO SEE WHAT THE FUTURE HOLDS

Being over the number of ports and protocols is not enough for future network reliability. It is necessary to consider where the organization is going and what this means for the future needs of the network, and to develop a strategy that will help the network grow and adapt. Additionally, it is vital to stay up to date with vendors' future product strategies and make sure that the technology direction is clearly identified. As Wi-Fi is already prevalent and playing an increasingly key role at the network edge, it becomes even more important. Further growth in this area and in the use of multi-gigabit Ethernet for backhaul and interconnection must be planned. With the new 802.11ax Wi-Fi standard already beginning to be implemented (with a throughput of 10 gigabits per second), Wi-Fi will continue to drive increased network traffic for many. Deployments in SDN continue to grow and are likely to drive network automation and network orchestration, a policy-based approach to automating the way network requests are executed, eliminating or reducing the need for human intervention in the provision of applications or services. This requires a powerful, centrally managed and controlled multi-Gigabit switch-based network infrastructure. Hyper-Converged Infrastructure is an emerging and expanding field (HCI). HCI refers to an almost entirely software-defined IT infrastructure consisting

of virtualized computing, software-defined storage, and SDN operating on commercially available servers [17]. This combines processing, storage, and networking into a single, high-speed network fabric-based system.

16. CONCLUSIONS

Over time, the Internet has made it possible for Ethernet to become the most widely adopted networking technology in the world. Many of the world's data transfers begin and end with an Ethernet connection. Today, everyone is experiencing a renaissance of Ethernet. This is due to the growth of E-Business and the need for low-cost IP services. This has opened the door to questioning traditional networking doctrine. The demand for enhanced network performance does not show signs of the slowdown. With continually increasing volumes of data being transmitted, an explosion in the use of video, increased use of cloud computing and virtualization, and more mobility, the network infrastructure will continue to be under growing pressure. The network needs to be developed to provide support to the demands of a highly mobile workforce and the anticipated increase in internet of things devices. The multi-gigabit Ethernet provides the needed bandwidth capacity for constrained wired networks and will provide investment protection for IT departments who want to futureproof their network infrastructure as new wireless technologies emerge. The New technology supports data rates of 1, 2.5, 5 and even up to 10Gbps with PoE power over existing twisted pair wiring and is available. The future of networking is multigigabit networking. Whether it's 10, 40, or 100 Gbps. Companies looking to adapt to this change must first turn to the data center, where they will find the greatest value at the lowest cost. To build networks that are futureproof and cost effective, redesigns that can include top-of-rack switch and software defined networks are needed. Once organizations have built out multi-gigabit Regardless of whether the speed is 10Gbps, 40Gbps, or 100Gbps. Moving forward, they should focus on the LAN, where the faster 802.11ac wireless networking standard promises to create demand for multigigabit networking at the access layer. Balance the current performance requirements and building an infrastructure that can evolve cost-effectively, it is possible with careful planning, the use of standards-based switches, and effective infrastructure management.

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