



THE FUTURE OF NETWORKING

AND THE NETWORK INFRASTRUCTURE

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Overview

Where are we in the digital age of networking

1 | Over 60% of enterprises

According to Gartner, by 2023, over 60% of enterprises will deem networking as core to their digital strategies, up from less than 20% today, deeming networking as a strategic enabler.

Dennis Smith, Dale Kutnick, Lisa Pierce, Invest in Networks to Achieve Digital Business Success, Gartner, May 2019

2 | Apps will increase 800%

By 2023, over 50% of new enterprise infrastructure deployed will be at the edge rather than corporate data-centers, up from less than 10% today. And, by 2024, the Number of apps at the edge will Increase 800%.

Sarah Murrey, IDC FutureScape Outlines the Impact "Digital Supremacy" Will Have on Enterprise Transformation and the IT Industry, IDC, October 2019

3 | 90% of enterprises

Infrastructure and operations leaders must shift to a strategic approach. By 2025, more than 90% enterprises will have an automation architect, up from less than 20% today.

Megan Rimol, Gartner Top 10 Impacting Infrastructure and Operations for 2020, Gartner, December 2019

4 | Wi-Fi 6 hotspots will grow 13-fold

Wi-Fi 6 hotspots will grow 13-fold from 2020 to 2023 and will be 11 percent of all public Wi-Fi hotspots by 2023.

Cisco Annual Internet report, (2019-2023) White Paper, March

5 | 48.9 billion devices

IDC estimate there will be 48.9 billion connected devices in use around the world by 2023.

IDC Worldwide Global DataSphere IoT device and Data Forecast, 2019-2023, IDC, May 2019

6 | 27.4 percent

By 2023, 27.4 percent of all WLAN endpoints will be equipped with 802.11ax (Wi-Fi 6).

Cisco Annual Internet report, (2019-2023) White Paper, March 2020

2.

Latest Wi-Fi 6 Standards and What It Means For You and Your Network Infrastructure

THE WI-FI 6 EVOLUTION

The long-awaited Wi-Fi 6 standard, also known as 802.11ax, is rapidly leading the technology trend in connectivity with many devices now upgrading to incorporate this standard.¹² Wi-Fi 6 has evolved a fair bit from 802.11ac in terms of innovation. It is now possible to connect more devices onto the network, expect more bandwidth and up to 40% faster transfers of data between devices.³ Less crowded airways enables a huge improvement in high-density deployments. Whether it be in stadiums, public Wi-Fi hotspots or café's, end-users can trust that their devices will be continually producing four times more speed than Wi-Fi 5 output.

The last upgrade to 2.4 GHz was over 10 years ago, so, if that's when your business last upgraded its network, it would be wise to plan an update, to catch up with the latest changes in technology. Today, we are more dependable on the network than we have been in prior years, and that dependency is growing exponentially. With Wi-Fi 6, you can expect to get more of what your business and end-users need. In comparison to 802.11ac Wave 2, Wi-Fi 6 is 4x faster in terms of delivery of speed and capacity. The Wi-Fi 6 standard, therefore, provides a seamless experience for end-users, and has you covered for the future of next-generation applications and devices like the emerging trends in 4k/8k streaming HD, virtual reality (VR), Augmented Reality (AR) and IoT capacity for high-density environments such as university halls, shopping centres and stadiums.

Wi-Fi 6 helps us to get ahead of the demand, with its additional features like greater reliability, improved power efficiency and reduced latency. It enables higher performance and connectivity for mobile devices, and IoT is supported on a huge scale.

On the security front, Wi-Fi 6 supports WPA3 encryption and has improved interference mitigation providing a better quality of experience. Ensure that your network is safe and up to date for your business and the end-user.

IS WI-FI 6 COMPATIBLE WITH 802.11AC WAVE 2?

Because Wi-Fi 6 is backwards compatible, it allows businesses and service providers to support and power-up new applications on the same Wireless Lan (WLAN) infrastructure, while delivering a higher grade of service to older applications.

Wi-Fi 6 connectivity is backwards compatible with Wi-Fi 5 and 4 devices. For instance, a Wi-Fi 6 access point will connect Wi-Fi 4 and 5 devices simultaneously, at lower supported rates, whilst Wi-Fi 6 traffic can use the higher rates.

The emergence of Wi-Fi 6 is still relatively new, but the trend is picking up as more Wi-Fi 6 certified devices are released. This trend was similar when Wi-Fi 4 and 5 was first introduced. From a historical technology point of view, we can be prepared for the future and begin the process early on by upgrading any devices that are five years of age and older.

HOW DOES WI-FI 6 AFFECT YOUR BUSINESS?

More and more devices are now supporting Wi-Fi 6 connectivity. End-users are upgrading their devices at a rapid speed, with a desire to be connected to the very latest Wi-Fi standards. Nevertheless, this will mean that most IT departments will also encounter new Wi-Fi 6 devices that need to be connected onto the network infrastructure, whether it's for IoT, physical security or even new applications. Therefore, Wi-Fi 6 standards are expected to shortly become the norm, just like Wi-Fi 4 (2009) and 5 back in 2014. New technologies have evolved rapidly within the last five years, and it can become difficult to keep up with the demand. Ageing infrastructures struggle to give the best output. Businesses are also relying on new technologies to be connected onto their ageing network infrastructure; new upgraded security systems, digital signage, computers and printers, for example. This is not always possible and eventually, an upgrade is inevitable.



¹ Broadband Tech Report, [WiFi 6 chipset shipment to triple in 2020](#), 1st January, 2020

² Network Computing, [Wi-Fi 6 Adoption: It's All in the Timing](#), 16th September, 2019

³ CommScope, [Evaluating 802.11ax Wi-Fi standard and What It Will Mean for Enterprises](#), August 2018



5 Key Wi-Fi 6

BENEFITS FOR YOUR BUSINESS

- OFDMA (Orthogonal Frequency Division Multiple Access), increases network capacity, by allowing frequencies to be divided into subcarriers so that traffic can be coordinated to serve more packets from more devices.
- Increased speed and bandwidth: Achieve speeds of up 4x faster than previous Wi-Fi 5 speed and performance per station in 2.4 and 5 GHz bands.
- Increased capacity and 'Multi-User' MIMO (uplink and downlink) supports multiple client data transmissions upstream to access points, helping Wi-Fi connectivity in high-density environments.
- Security - WPA3 – provides and delivers a secure and reliable connectivity that is up-to-date.
- Improved power efficiency – TWT (Target Wake Time) saves battery efficiency stations to “wake up” at specific times. The stations and AP reach a TWT agreement that defines when a station is awake to receive and send data.

3.

Importance of Upgrading Old Infrastructure

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Is Your Business Ready?

WHAT IS CONSIDERED AN AGEING NETWORK INFRASTRUCTURE?

Most vendors will consider any infrastructure that is more than 5 years old as ageing.¹ The reason behind this is with growing innovation and new devices being released every year, more demand is being placed on bandwidth, data and speed. Users expect to be able to stay ahead with robust and reliable connectivity which will not slow down their productivity or online experience. Outside of the end-user experience, without an up-to-date infrastructure, IT managers could experience an inability to deploy new applications which can have a major impact on business growth.²

Old network infrastructures were built to deal with the landscape and requirements of their time. Today, we expect much more and now need to perform different functions online such as, video conferencing, streaming and simultaneously running many more applications.

5 SIGNS THAT YOUR NETWORK INFRASTRUCTURE NEEDS AN UPGRADE:

1. HAS YOUR NETWORK SLOWED DOWN?

If your business has or is experiencing slow networking speed, it is most likely due for an upgrade. Older networks were not designed to support the technology demand of today, let alone the future. In the current environment, wired and wireless technology allows businesses to function anywhere at high speed. For instance, there are now access points that can deliver a speed of up to 5.9 Gbps, which is much faster than the previous generation Wi-Fi speed of up to 2.5 Gbps.

¹ Spiceworks, [The State of IT: The Annual Report on IT Budget and Tech Trends, 2020](#)
² Deloitte, [Tech Trends 2019, Beyond the Digital Frontier, 2019](#)

2. SECURITY THREATS TO THE NETWORK INFRASTRUCTURE

Cybersecurity threats have become more sophisticated and prone to target businesses that have old network infrastructures, especially targeting personal data. Therefore, the older your infrastructure, the easier it is to hack into the network. However, updated Wi-Fi 6 standards include WPA3 encryption that superceeds WPA2 encryption.

3. IT MANAGERS SPEND MOST OF THEIR TIME MAINTAINING NETWORK INFRASTRUCTURE

Whenever new and updated technology is introduced and added to an older infrastructure, it puts a strain on performance. This leads to more time and resources spent on managing the network and troubleshooting issues. In the long-term, this costs the business a lot more than simply updating. Simplify network deployment and management for IT departments by moving over to a new and modern infrastructure.

4. CAN'T UPGRADE TO POWERFUL APPLICATIONS THAT COULD ENHANCE BUSINESS GROWTH?

Most applications that are released today, including streaming content and video conferencing are heavily reliant on bandwidth and good connectivity across the network. For this reason alone, many businesses are avoiding updating to Cloud and even mobile solutions, due to the fear of the network crashing.^{3 4}

5. DOES THE CURRENT INFRASTRUCTURE SUPPORT REMOTE WORKING?

In recent changes, many companies have had to adapt to facilitate a work from home environment. This has been a challenge for some businesses who've been unable to meet the requirements of simplified management, such as having cloud based applications, or mobile solutions on their network. However, by updating the infrastructure, applications can be shared on the Cloud, and employee productivity can be increased.⁵

³ Cisco, [Preparing Your Network for The Digital Age, 2018](#)

⁴ CommScope, [Switching to a New Era: Why Enterprise Network Are Moving Towards 100 GbE, May 2019](#)

⁵ Uctoday, [Video collaboration Trends 2020-The Rise of Video, April 2020](#)



TODAY'S 3 CONSEQUENCES OF HAVING AN AGEING ACCESS POINT/SWITCH

SECURITY: Firmware updates are crucial and often include the latest security features and upgrades. Older access points and equipment may not support these necessary updates and also miss an opportunity to optimise for improved performance. Not having the latest software path on an AP or switch could result in transmitting over insecure channels that could leave sensitive data exposed to others, especially hackers and other malicious attacks on the network infrastructure.

To reinforce security on an access point, it's best to have WPA3 authentication with AES-gcm-256 encryption on all your devices, as older devices may not support the advancement of WPA3 encryption Wi-Fi standards. By not having the latest security standards, the effects on the business could be substantial. Networks that have been designed five years ago or older do not keep up with the fast-moving malware, worms, viruses and other malicious attacks that stop the network from functioning. The same ageing switch must keep up with the explosion of email opens and messaging, instant chats, video calls and web downloads. As these continue to grow in the coming years, it's essential to consider what type of security your network infrastructure has on the access points. For security, switches can be enabled with 802.11x authentication on all ports which means you can plug any port and it will automatically segment all known users.

SPEED: Applications have developed majorly over the years and continue to grow at a speedy rate. The requirement for more bandwidth, has created the need to upgrade older switches and access points, in the LAN and WLAN, as the number of web interactions has grown beyond a simple email, instant messaging and downloads. Today businesses need to be able to have a network that supports 4k/8k video, face-to-face web conferencing, live webinars, cloud services and applications. Current servers, therefore, need to deliver a greater amount of traffic per link than ever before. This situation is growing alongside the number of users, and an increase in the number of applications that each individual is using. At the same time, a trend has emerged where end-users are collaborating on projects across many applications. This puts immense strain on the switches and most often, they cannot cope with the required speeds because the switch is simply too old.

VPN REMOTE ACCESS: Recent circumstances have proved challenging and unpredictable. Businesses have had to close their offices, and many employees have had to work from home. This transformation has led to many businesses depending on IT teams to provide scalable remote access for rapidly increasing numbers of staff. In order to provide the connectivity to work from home, the core and campus routers, switches and security infrastructures need to be robust, resilient and scalable to manage VPN access. With an ageing access point or switch, this connectivity is near impossible to enable. Now is the time for businesses to review how their current infrastructure could be improved, now and in the future. Businesses must remain flexible and adapt to the changing needs of the new landscape, and security infrastructures need to be robust, resilient and scalable to manage VPN access. With an ageing access point or switch this connectivity is near impossible to enable.

'By 2022, more than 50% of enterprise data will be created and processed outside the data center or Cloud, up from less than 10% in 2019. Infrastructure and Operation leaders must plan for the accompanying data impacts. As data is increasingly distributed, Infrastructure and Operation teams can struggle to provide the protection and management needed.'

Gartner

Meghan Rimol, Gartner Top 10 Impacting Infrastructure and Operations for 2020, Gartner, December 2019



Is your business ready for the new next-generation upgrade?

THERE IS NO BETTER TIME TO UPGRADE A NETWORK INFRASTRUCTURE THAN TODAY.

01

Do you have a business that is set to grow and expand? If your network infrastructure is five years or even older, there is a very high chance that it wouldn't be able to support your needs for growth.

02

Network issues?
Are there on-going network issues or related new technologies, frequently requiring an infrastructure upgrade.

03

Many mid to large-sized businesses in specialised industries like law-firms, the public sector and banks, are obliged by law to meet the latest security standards. The big question is: is your network secure for the end-user?

04

Spending too much time on troubleshooting and fixing network issues? In most cases, it becomes more cost-effective to simply upgrade the network infrastructure.

4.

How To Deal With Traffic Growth

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Get Ahead Of The Demand

Network Traffic



is only going to continue increasing at a rapid speed. It is expected that IP traffic will grow to **4.8 zettabytes of traffic per year by 2022**. In other words, more traffic will be created in 2022 than in the first 32 years since the internet started, (note: that an exabyte is 1 billion gigabytes and a zettabyte is a thousand exabyte).¹²

¹ Cisco Annual Internet Report (2018-2023), 9th March, 2020

² Cisco Predicts More IP Traffic in the Next Five Years Than in the History of the Internet, 2018

3 TOP KEY CHALLENGES BUSINESSES FACE AND IS THERE A SOLUTION?

NETWORK AUTOMATION

One of the best ways to deal with getting ahead of the demand, apart from improving core networking infrastructure, is to simplify the management of network operations through automation. This allows IT teams to automate the planning, management, configuration, testing, deployment and optimisation of networks and their services. Network automation solutions allow manual duties to be executed automatically through controlled software applications. Manual duties that can take up more than 90% of the existing workload, can be directed onto an automated system and IT teams can focus on other developments within the IT department.³ Network automation often means everything can be viewed and managed from a single pane of glass saving time in the IT department.

A network that provides a converged management solution, offers a single pane of glass view across the whole infrastructure. Therefore, it enables greater visibility on how the whole network is functioning, with the ability to view end-users' devices right through to the core of the system. This allows problems to be managed and solved on the spot, and reduces future networking issues, allowing IT teams to focus on developing revenue.

ONE VITAL AUTOMATION TOOL THAT COULD HELP: CLOUD MANAGEMENT PLATFORMS

Having a complex network infrastructure and meeting end-user expectations can be challenging, especially within the IT department. There are various network automation tools that can enhance the load from the IT department into specialised cloud software that can take care of optimisation and troubleshooting.

Some cloud platforms, use advanced AI features and machine learning to assist IT teams in troubleshooting, with tools that enable them to react quickly to any issues that could arise on the network. The smart tool within most good cloud platforms, also classify and prioritises the issues in order of severity, be it connectivity or a hardware issue.

ZERO-TOUCH PROVISIONING

A huge advantage with having a cloud service is that you can automatically configure access points simply by scanning the serial number through a mobile app, without any manual data entry required. It then automatically configures and updates any firmware upon registration, all through a simple scan. Zero-touch provisioning is an important feature that many switches and access points now have integrated into the management systems or on the hardware itself.

³ Cisco, [What is Network Automation?](#), 2020

5. How To Obtain The Latest Technology With Cost-Effective Solutions

FUTURE PROOF YOUR NETWORK

In times of uncertainty and when budgets are getting cut, some businesses wouldn't think to update their network infrastructures. As a result, there could be missed opportunities. Networks are crucial in delivering robust, secure and fast connectivity across the business. A route to investment in digital transformation is to modernise network infrastructures that are easily upgradable and future proof. Without an up-to-date network infrastructure, there is very little point in upgrading devices that will not fully function or support the latest wireless technologies.

Before investments are made, it is vital to consider the following. Comparing the cost of different solutions, each business must evaluate their application needs and consider the various advantages of each solution type along with their relative importance.

- The cost
- Ease of installation
- Expected life span of the system
- How installations effect the business – maintenance

The best model to approach would be a pay-as-you-grow model. By selecting a scalable infrastructure, businesses can benefit from conserving CapEx (cost of deployment, materials and installation—actives and passives) with high performance solutions and reduce OpEx (cost of network maintenance, leasing and franchising, along with the cost of sourcing and licensing content or developing services). To reduce OpEX the complete solution would be to undertake converged management – network automation.



6. The Future of Networking and Infrastructure — Where Are We Headed?

Fibre. What Is All The Fuss About?

Trends show there is a rise in the adoption of newer technologies such as the Internet of Things (IoT), Cloud, and 5G. End-users expect superior connectivity which works and connects devices whenever needed. Therefore, the need for high-bandwidth, future-proof networks and low-latency is growing fast and is becoming a must-have for Network Managers.

An overall and complete solution would be optic cabling. This solution accommodates superior connectivity for today and tomorrow's demands. The capacity of what fibre-optic can offer is versatility across different networks like the Internet, telephone/mobile, cable TV, businesses and data centres. Fibre accommodates every bandwidth-hungry application, such as video streaming which currently accounts for 70% of internet traffic.¹ With fibre, the end-user can expect reliable and robust connectivity.

¹ CommScope, [Fiber To the X Fundamentals](#), 2018



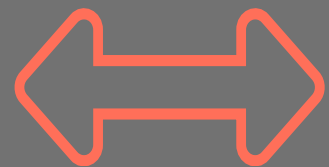
Very high Bandwidth

means tons of data can be transported at a high speed with low latency which allows real-time data access without any delays. This is essential in many verticals like banks, financial sectors and many more.



Applications always run smooth

without any disruptions so there is no noticeable delay in data transfer.



Works across long distance

anywhere from 65 kilometer or more, without any signal difficulties.

MULTIGIGABIT 100GBE ON YOUR NETWORKING

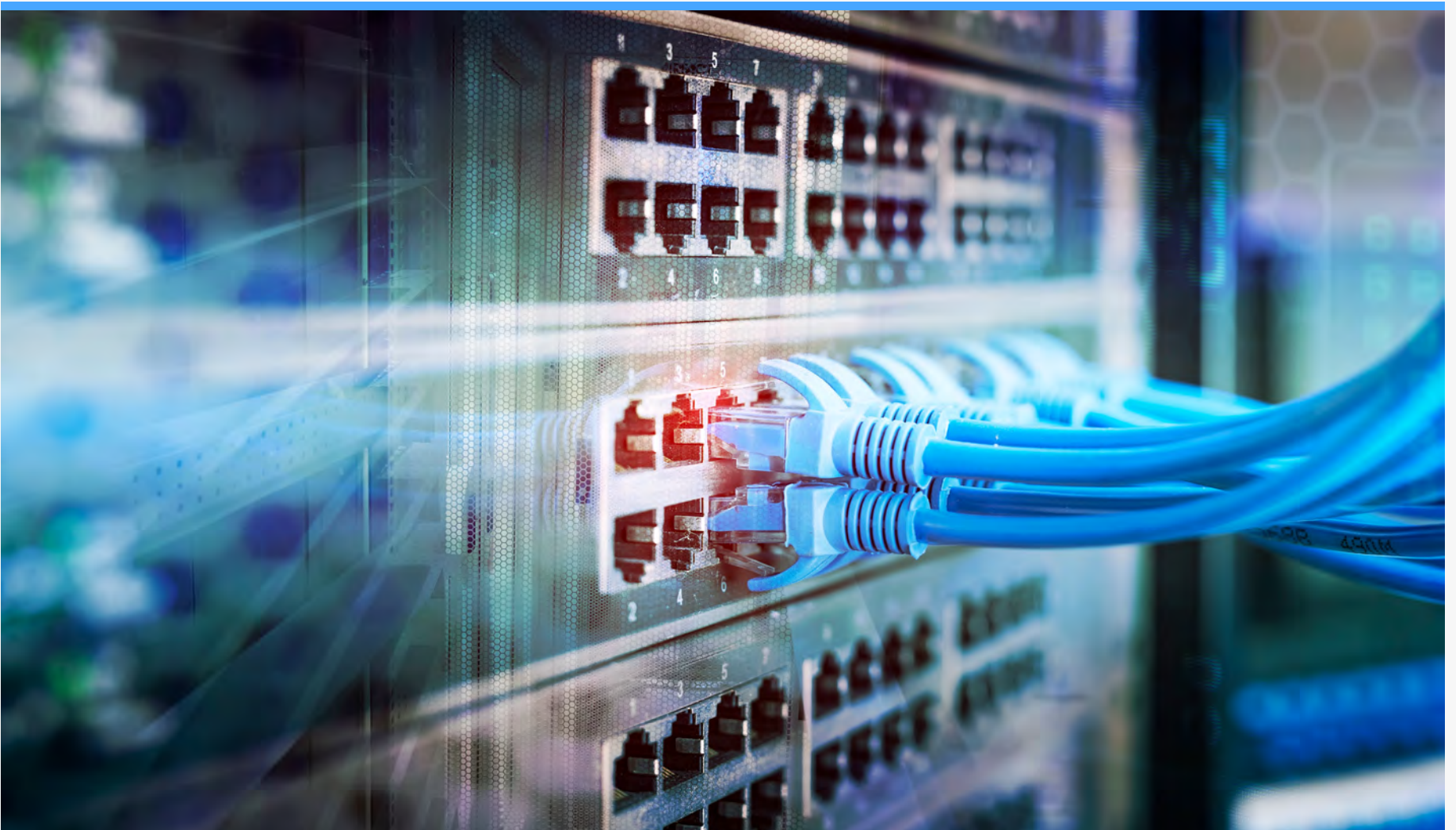
There is no doubt that in the near future, almost every business will be functioning on a 100 Gigabit Ethernet (100GbE), that enables the transfer of Ethernet frames at 100 gigabits per second (gb/s). The 100GbE standard is for core switching.² The main advantage of having a switch that can run on 100GbE speed, is that this easily solves the issue of slow connectivity. Firstly, network managers need to decide what their requirements are now and what they are likely to be in the coming years. An infrastructure must be prepped and ready to meet the challenges of tomorrow. Considering 100GbE now can ensure that the network is future proofed for an inevitable increase in demand.

Many businesses have a standard 10GbE or 40GbE core and 1GbE aggregation network, however today's network devices and bandwidth-intensive applications increasingly require speeds of up to 100GbE.³ To keep up with the advancements, business have to consider a handful of big advantages in upgrading:

- The 100GbE are backward-compatible - which makes connectivity simple.
- Existing cabling can be reused by installing new transceivers or modules on the cables.
- Cost-effective switching solutions available with pay-as-you-grow model.

An issue that IT technicians should be aware of when aiming to upgrade to 100GbE, is using multiple vendors and integrating different switches together. This could result in having clocking issues and increase latency and packet loss. Having one vendor could solve many issues and headaches in the long run. Switches from one vendor will guarantee that all software, firmware and security features are working coherently and supporting a robust and smooth connectivity across the network infrastructure and that all the switches are running at the same capacity.

2-3 CommScope, [Switching to a New Era: Why Enterprise Network Are Moving Towards 100 GbE](#), May 2019



UPCOMING TRENDS IN NETWORKING-IOT

How to make the internet of things (IoT) work for your business

Organisations are looking at ways to streamline operations across their businesses and enhance the customer experience. The total installed base of Internet of Things (IoT) connected devices is projected to amount 75.44 billion worldwide by 2025, a fivefold increase in ten years. The IoT, enabled by the already ubiquitous Internet technology, is the next major step in delivering Internet's promise of making the world a connected place.⁴

How can different verticals take advantage of IoT

- **Hospitality**
- **Cities**
- **Multi-dwelling units**
- **Education**
- **Retail**
- **Healthcare**
- **IoT access**

⁴ Statista, [Internet of Things \(IoT\) Connected Devices Installed Base Worldwide From 2015 to 2025](#), 27th November, 2016

CITIES

Local cities are adopting IoT applications to run their city services.

- By connecting public car parks, users are able to book parking slots in advance, check if the car park is empty or full and then make the booking when it suits them.
- Other ways IoT is also utilised is through security cameras and sensors that help improve public safety: IoT sensors can monitor the air quality or water and waste management. This can be used to improve public health and lowers costs, enabling a city to run efficiently and coherently.

The power of IoT applications is an emerging trend that will continue to develop in the coming years.

HOSPITALITY

There is a huge opportunity for the hospitality industry, to realise a personalised guest experience through IoT, differentiating their brand from others. For instance:

- Enabling customers' mobile devices to act as digital key cards.
- Using a mobile app to make reservations and bookings.
- Mobile devices can also be used to control the amenities in the room, for instance, to control lighting or open/close window blinds. This would provide a seamless and exceptional level of customer service and a superior experience.

EDUCATION

The use of IoT in education is an emerging trend and there have been many ways that schools have adopted the technology:

- IoT-enabled classrooms can provide students with a more engaging experience through personalised 1-to-1 learning to support their progress, digitalised curriculums and automated attendance taking.
- IoT can support building maintenance and utilities throughout campus, making the environment safer and more efficiently run.

MULTI-DWELLING UNITS

Owners of multi-dwelling units are using IoT applications to attract new residents by providing digitalised, modern and up-to-date accommodation that stands out:

- Smart lighting, heating control, and connected security helps to reduce energy consumption and costs and at the same time increases the value of the property.

IoT access network

An IoT access network connects both Wi-Fi, and non-Wi-Fi IoT endpoints over a converged, multi-standard, physical network. This eliminates the need to deploy independent, stand-alone networks to support different IoT technologies.

HEALTHCARE

A converged access network is the foundational supporting unit for all of the devices and services that deliver a healthier, safer and more responsive client experience.

- Health care professionals can monitor patients' health and track their wellbeing through IoT applications, and book or arrange appointments more efficiently.

RETAIL

Retailers can also leverage the advantages that IoT has to offer. Some of these include:

- Automated checkouts, which save shoppers time by automatically calculating their total spend via a mobile app as they leave the store or personalised shopping for returning, loyal customers.

7. Conclusion

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Where Do
We Go
From
Here?

Coming into 2021 and beyond, innovation in technology will continue to advance. In this report, we have outlined the most fundamental trends that every business can utilise and take advantage of to optimise their business, working practices, processes and their overall offerings.

Upgrading infrastructure needn't be intimidating or involve budget-busting one-off outlays, rather, it can be realised over a manageable period of time with pay-as-you-grow models.

IT and network managers need to realistically assess the current and likely future demands on their networks in order to make the right decisions with regard to application, hardware, architecture and security.

The key drivers could be, Cloud adoption, automation through industrial IOT applications, the emergence and application of Big Data to streamline operations and create greater customer loyalty through personalised experiences.

Ultimately the bigger picture demonstrates an increase in demand and complexity. How will businesses manage those multigigabit requirements coming from high-bandwidth, business critical services and applications, and the widespread use of VoIP and video, paired with the very current challenge of unpredictable environments?

With a workforce more remotely distributed and an influx of devices being used during home-working, the question is, will your network cope? And will your IT team be able to manage and deliver the user-experience necessary?

Wi-Fi 6 is a piece of the puzzle in meeting the increased efficiencies needed for the networks of today and tomorrow, and it is underpinned by a multigigabit infrastructure that works as a complementary enabler. All of this needs to be delivered at a cost palatable to businesses, with many moving to OpEX and financed models to get the performance needed today at a cost the business can manage and balance.

KEY CONSIDERATIONS SHOULD BE:

- Wi-Fi 6
- Ongoing, significant growth in traffic
- Increase of new bandwidth intensive applications and devices
- More Cloud management and computing
- Automation to streamline management and workloads
- Converged management to optimise working processes
- Cabling and fibre for optimum performance at the edge
- Security in the ever-evolving threat landscape
- Pay-as-you-grow financial models to enable gradual managed investment

A forward thinking and innovative business will save a lot of unnecessary burdens not just on the IT teams but end-users too and will be able to transition seamlessly through the next significant leap in the evolution of connectivity and networking.

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