



2019 State of the WAN Report:

The Continued Rise of Wireless in Enterprise Networking

The demands placed on today's networks are higher than ever. Employees now access an ever-increasing number of cloud-based applications. More and more organizations are adding Internet of Things (IoT) devices to their networks to stay competitive. And for companies with fleet vehicles, constant connectivity is a must.

In fact, as more traffic travels over the public internet, the requirements of enterprise networks extend beyond 24x7 reliability to networks that can scale, adapt, move, and grow as business needs evolve.

As a result, many organizations are turning to cloud-enabled, software-defined, and LTE-pervasive wide-area networks (WANs). Adept at connecting people, places, and things, wireless links can meet today's branch, mobile, and IoT requirements by adding LTE to existing wired connections as a failover, augmenting traditional WAN links with additional bandwidth, and extending network connectivity to fleet and public safety vehicles. In an effort to understand the rising adoption rate of LTE, its applications beyond the branch, barriers to deployment, and the emergence of Gigabit LTE and 5G, Cradlepoint partnered with IDG in late 2018 to do an online survey of 505 IT decision-makers (vice presidents, directors, and managers) in North America. This report delves into the survey's key findings to determine the changing role of LTE in the enterprise and what the future holds for network connectivity.

Methodology

The survey respondents were required to be in a role of influencing WAN connectivity solutions for their organization; approving network infrastructure purchases; and making evaluations, recommendations, and decisions. Additionally, their organization was required to have 500 to more than 10,000 employees. The respondents represented a wide variety of industries, including manufacturing, financial services, healthcare, and construction.

LTE Use in WANs on the Rise

Today's networks need to easily move beyond the branch in order to connect people, places, and things in a simplified, cost-effective, and flexible manner.

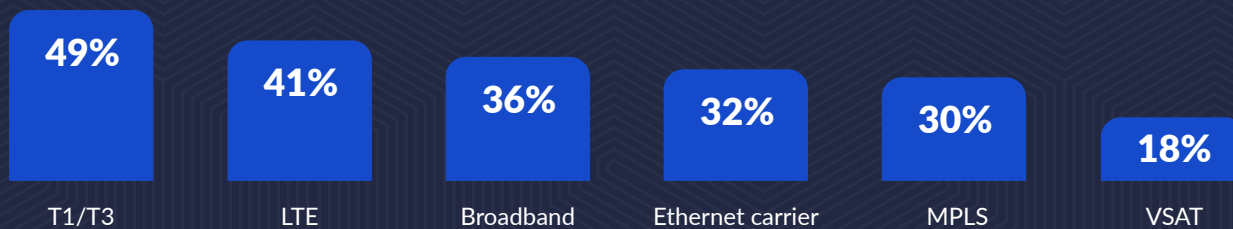
Retail chains must ensure that everything from POS devices to security cameras remains connected to networks at all times. Government agencies need always-on WAN links to keep IoT-enabled streetlights on — and citizens safe. Medical teams demand reliable wireless connectivity for videoconferencing to consult with colleagues on life-saving procedures. Even construction crews count on network connectivity to monitor and manage their fleets and the timely delivery of materials.

Connecting such remote offices, IoT devices, and fleets requires high-performance connectivity. Yet many WANs are decades old in design and ill-equipped to handle such diverse and distributed requirements.

In the past, standards such as X.25, frame relay, ATM, and MPLS helped tie systems together, enabling smaller networks at various locations to communicate with each other and users. But this low-bandwidth, high-cost approach no longer suffices, as organizations significantly increase the number of network endpoints they need in order to connect to more people, places, and things than ever. Bandwidth requirements are also on the rise as traffic migrates from private to public networks. The result is a whole new set of visibility, availability, security, and quality-of-experience challenges.

No wonder an increasing number of organizations large and small are turning to 4G LTE to address these challenges and create new opportunities to transform their business. 4G LTE offers several key benefits. For one, organizations with multiple geographically dispersed branches can deploy a nationwide network with just a couple of cellular carrier partnerships, rather

LTE as a Connectivity Solution



SOURCE: IDG, July 2018

than tens — or even hundreds — of wireline internet service providers (ISPs), for easier management and lower costs.

Additional advantages of relying on LTE for highly distributed branch networks include higher bandwidth, more pervasiveness and reliability, and shorter setup time. Hoping to capitalize on these benefits, 41% of the IDG survey respondents are currently using LTE — a figure fast approaching that of T1 (49% of the respondents). Most organizations have multiple WAN solutions in place (two on average). The most common WAN solutions in use include broadband (36%), ethernet carrier (32%), and MPLS (30%).

Indeed, LTE is rapidly becoming the connection of choice for primary and failover links, with the strongest growth projections. More than three in five (62%) of the respondents plan to increase their LTE usage in the deployment of WAN solutions in the next three years. This trend is expected to accelerate as Gigabit LTE and 5G fixed and mobile services penetrate commercial markets.

LTE in Action

The reliability, performance, flexibility, scalability, and cost-effectiveness of cellular-based broadband enable enterprises to confidently deploy 4G LTE as a trusted WAN source. This is evidenced by the wide variety of endpoints and applications for 4G LTE.

Many of the survey respondents have more than one type of endpoint (2.7 on average), including branch locations (77%), IoT devices (68%), fleet vehicles (51%), and pop-up networks (50%). Nearly a quarter — 22% — of the respondents have all these endpoints. Driving multiple endpoint usage are factors including the global economy, smart technology, and the highly competitive commercial vehicle and retail sectors.

Equally diverse is LTE's wide usage among the respondents and strong applications across the board. More than half — 52% — of the respondents use LTE as a primary connection, and 29% plan to in the near future. Similarly, 48% currently rely on LTE as a backup connection. Other popular uses include augmenting MPLS (38%), digital signage (37%), in-vehicle networks (35%), IoT (34%), no wired connections (34%), and air-gapped networks (32%).

Real-world examples span multiple industries. Consider, for example, police departments whose vehicles are equipped with laptops, tablets, sensors, and/or dash cameras. Commercial vehicle fleets traveling to remote locations or in places where no wired infrastructure has been laid can rely on LTE for reliable connectivity — and business continuity. In lower-income communities, school buses

equipped with LTE routers with Wi-Fi can keep students connected during their ride. That's because LTE extends the network to where it's needed, when it's needed, providing reliable connectivity even in the most challenging environments.

The future bodes well for LTE. A sizable 41% of the respondents plan to use LTE for out-of-band management (OOBM) — an uptick that highlights enterprises' growing need to manage multiple locations remotely. LTE can help by building a highly resilient network infrastructure. In this case, the cloud is key: Of the 11% of LTE users in the survey whose organization uses OOBM to manage truck rolls, almost all use a cloud solution to support OOBM.

Security concerns are driving respondents to explore the use of LTE for air-gapped networks, which create an independent or parallel network alongside a primary network solution, thereby providing greater protection against advanced threats. Using LTE for air-gapped networks enables the creation of a fully separate network where not even the transport layer is shared between networks.

Popular Uses for LTE



People, Places and Things

Respondents have an average of 2.7 types of endpoints per organization, including branch locations (77%), IoT devices (68%) and fleet vehicles (51%). Nearly a quarter (22%) have all these endpoints.

SOURCE: IDG, July 2018

Comfort levels play an important role in LTE usage. Respondents currently using LTE rely on it for air-gapped networks (57%), OOBM (42%), and day-1 connections (43%). They would also consider using LTE for primary or backup network connections and for cellular M2M communications and IoT.

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Other changes afoot: Many LTE use cases now center on the needs of mobile customers and staff. Mobile offices, such as those found in police patrol cars and ambulances, currently rank as the most popular application of LTE, according to 45% of the survey respondents. That's because LTE routers that are ruggedized and purpose-built for fleets can provide secure, reliable wireless connectivity.

Challenges Ahead

businesses have been slower to implement LTE in their networks than midsize organizations, likely due to cost considerations. In fact, cost concerns are on the rise; only 30% of the respondents cited cost as a WAN connectivity challenge in IDG/Cradlepoint's 2017 State of the Network Business Intelligence Report.

However, cost concerns are poised to dissipate, especially given the carriers' ongoing plans to implement fixed-cost data plans. Even with pay-per-bit plans, costs can be significantly reduced by processing more data at the edge of the WAN and by leveraging intelligent, cost-optimized network solutions.

Regarding security, the perceived deficiencies of LTE are more myth than fact. Cellular service operators use private virtual networks called Access Point Names (APNs) to isolate traffic across the network, use an authentication layer to prevent unauthorized access, and can provide IP-layer encryption.

Top Perceived Barriers to LTE Deployments



SOURCE: IDG, July 2018

The steady pace of wireless adoption shows no signs of slowing down, as enterprises need to become more agile. MPLS, traditional virtual private networks (VPNs), and other legacy network elements can't keep pace with the rapidly changing needs of today's lean and flexible connected enterprises. Fortunately, an enterprise-grade LTE solution can help organizations connect more people, places, and things securely while minimizing costs and increasing reliability.

The Features and Functionality of SD-WAN

Organizations are increasingly recognizing software-defined WAN (SD-WAN) for its ability to improve and secure connectivity, either augmenting or replacing expensive legacy WAN technologies such as T1 or MPLS.

That's because SD-WAN provides branch and mobile networks with secure, flexible, and resilient connectivity, using a hybrid of wired and wireless internet broadband links as well as legacy MPLS. SD-WAN manages these multiple connection types intelligently, using available bandwidth to maximize application reliability and performance.

Easier management is another key benefit of SD-WAN. With SD-WAN, troubleshooting can be performed through a single interface and devices can be configured from a central location, thereby eliminating the need to dispatch a technician to each location.

The result is a new architecture for the cloud era — creating an easier-to-manage, secure, and agile network that utilizes less-expensive, public, best-effort connectivity sources to increase reliability and bandwidth.

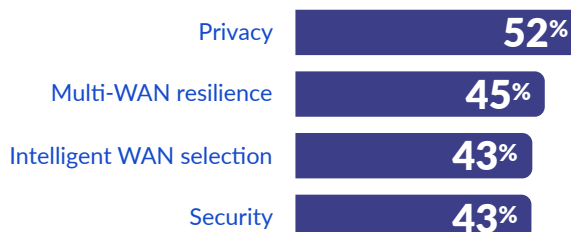
Fewer than one in five organizations represented in the survey (17%) have deployed SD-WAN, but there are signs of a changing tide. A quarter of the respondents — the majority of whom are from midsize companies — indicated that their company plans to deploy SD-WAN within the next six months. Midsize companies appreciate SD-WAN for intelligent WAN selection, such as traffic steering, which can improve network efficiency and agility. In fact, interest

in intelligent WAN selection has increased from 32% to 39% over the past year.

A quarter of the respondents (25%) plan to deploy SD-WAN within the next seven to 12 months. Many of them work in large enterprises looking to improve the security of their expanding networks.

Several key features are driving greater SD-WAN adoption, including privacy (52%), multi-WAN resilience (45%), intelligent WAN selection (43%), and security (43%). The most-sought-after features vary by company size. For example, 55% of the respondents from large enterprises cited security as a key feature, compared to 39% of those from midsize companies. Conversely, 48% of the midsize-company respondents pointed to intelligent WAN selection as a popular feature, compared to 36% of those from large enterprises.

The Most Valued SD-WAN Features



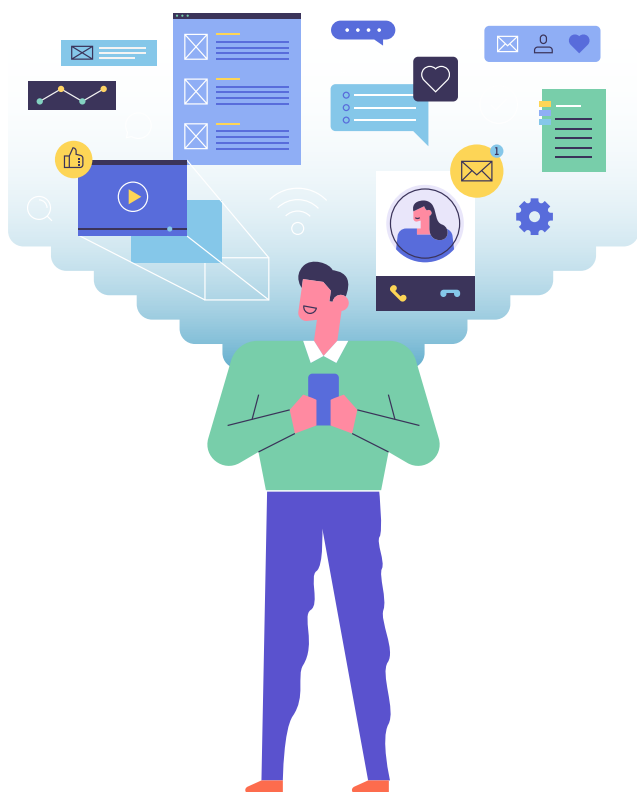
SOURCE: IDG, July 2018

These priorities closely mirror the findings of IDG/Cradlepoint's 2017 report, in which IT professionals cited security (57%), multi-WAN resilience (39%), and privacy/VPN (39%) as an SD-WAN solution's most desirable features.

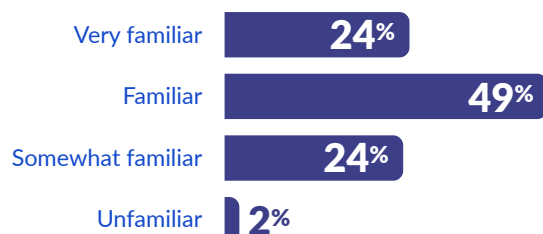
The Road Ahead Is Paved with Gigabit LTE and 5G

Heralding the next generation of mobile networks, 5G offers greater networking efficiencies, increased speeds, and a responsiveness of just milliseconds. But although many of the survey respondents are familiar with 5G, it is still widely considered an emerging technology.

Nearly one-quarter (24%) of the respondents are very familiar or actively working toward 5G, 49% are researching 5G but not actively pursuing it, and 24% are only somewhat familiar with the technology.



Familiarity with 5G



SOURCE: IDG, July 2018

One-third of the respondents believe it's very likely that 5G will impact their business or technology road map in the next one to three years. Also, one-third (33%) of the respondents said they are actively working toward using 5G, which may include "active research" into how to deploy solutions. About two in five (42%) said they have done some research but are not yet actively pursuing 5G solutions, and a scant 19% are taking a wait-and-see approach to the technology.

5G promises to revolutionize networking by delivering greater bandwidth, lower latency, improved connection density, more spectrum in higher-frequency ranges, and network slicing. 5G enables diverse use cases, from enhanced mobile broadband to mission-critical control and massive IoT applications that aren't possible with 4G LTE systems alone. Lifesaving telehealth applications,

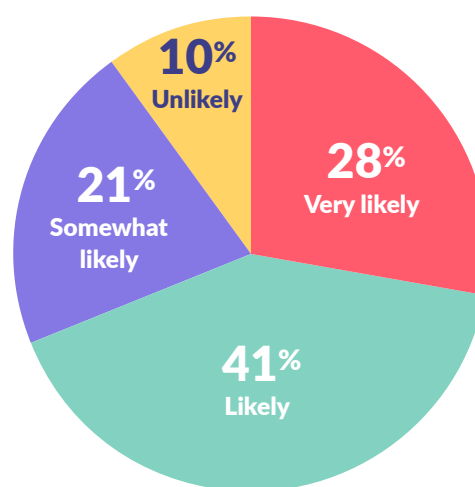
remote-controlled robotics, autonomous driving, virtual reality, augmented reality: They are all possible applications once 5G reaches its full potential.

Another upside: 5G allows for the connection density to support billions of devices. That's critical, given Gartner's prediction that there will be more than 20 billion connected things by the year 2020. Possible use cases range from smart cities that rely on embedded sensors to control traffic to connected cars that come equipped with internet access. 5G is expected to be scalable and energy-efficient enough to power all these connections. According to the survey respondents, the key drivers of 5G adoption include cost/price (17%), speed (11%), and reliability (6%).

Familiarity with Gigabit LTE is also growing. More than one-quarter (28%) of the respondents said they are very familiar with or actively working toward using Gigabit LTE. Among the respondents, 40% have conducted some research but are not yet actively pursuing solutions and more than one-quarter (28%) have only a cursory understanding of the term.

Gigabit LTE, an expansion of 4G LTE, uses technologies that make it a foundational piece along the pathway to 5G. Thus, it offers many benefits — increased speeds and network resilience, along with lower latency — that are similar to 5G. Respondents already anticipate that Gigabit LTE will have an impact on their company's business or technology road map in the next one to two years.

How likely is Gigabit LTE technology to impact your technology road map?



SOURCE: IDG, July 2018

Gigabit LTE promises to reshape enterprise networking in several key ways:



The increased speed and throughput of Gigabit LTE provide high-bandwidth failover, allowing enterprises to protect a much larger percentage of their applications during primary WAN outages.



With the speed of wireless approaching that of wired broadband, organizations are more likely to cut the wires altogether at widely distributed branch sites — and even able to support higher-bandwidth applications such as AR and VR.

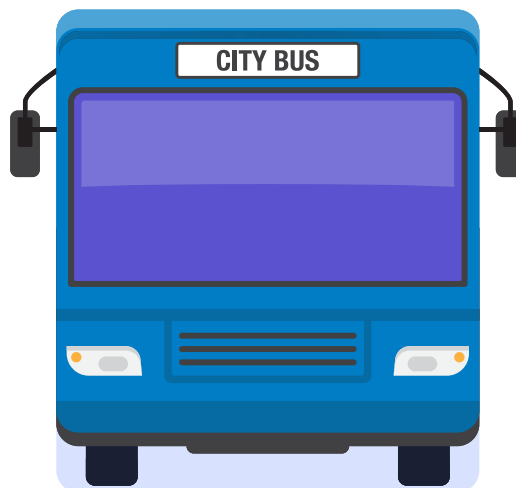


Better footage quality and uninterrupted live streaming make for improved video surveillance.



Latency and bandwidth advantages make it a viable option in dense computing environments.

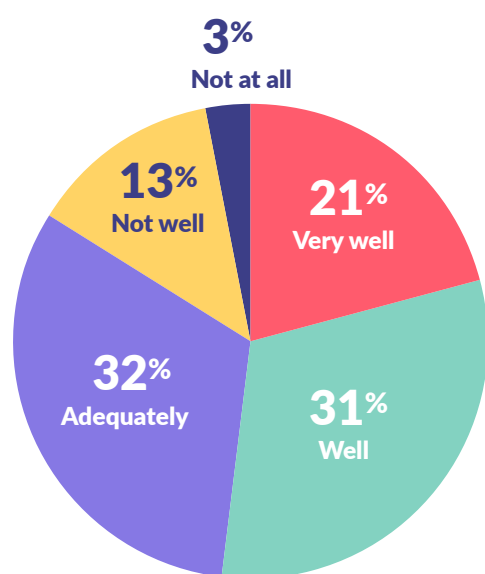
Together, these benefits highlight Gigabit LTE's importance as organizations proceed on the pathway to 5G.



The Importance of Education

Organizations have an adequate understanding of the differences between Gigabit LTE and 5G, but there's still room for improvement. Almost two-thirds (63%) of the respondents said they have an adequate-to-good understanding of the differences between Gigabit LTE and 5G. This understanding extends across businesses of all sizes. Yet only about one in five (21%) can differentiate between the two "very well." Moreover, 16% said they have a poor understanding of the differences.

A Gap in Understanding



SOURCE: IDG, July 2018

Inconsistent terminology and lack of clarity about costs can cause widespread confusion between Gigabit LTE and 5G. A better understanding is essential for organizations to appreciate the impact these technologies can have on network performance, security, and reliability.

According to open-ended responses, 5G technology differentiates itself from other cellular technologies mainly in terms of cost and speed. Connectivity and reliability are also important factors. For these reasons, nearly half (48%) of the respondents believe that 5G is a better fit for their technology road map in the next one to three years.

In reality, the pathway to 5G is a journey that organizations should consider starting now. 5G is not rolling out all at once. Whereas 4G replaced 2G and will ultimately replace

3G, 5G will work with 4G — and will be partially built on the foundation of Gigabit LTE. Many of the benefits of 5G that enterprises are eagerly anticipating already are available today with Gigabit LTE.

As 5G becomes operational, many enterprises' first deployment likely will involve attaching 5G adapters to existing all-in-one branch routers. This will not only add high-bandwidth and low-latency transport to existing LTE networks but will also enable organizations to maintain their investments in current technologies for another three to five years. Organizations that are eager to add more-challenging and newer technologies, such as augmented reality, to branch locations will be able to rely on plug-and-play scalability.

Takeaways About Enterprise Wireless

As organizations connect to more people, places, and things than ever, traditional enterprise WANs will no longer suffice. They don't have the agility, mobility, or bandwidth that are required for today's enterprises.

But as organizations are currently deploying a wide variety of WAN solutions to address this issue, one technology stands out: LTE. By promising maximum mobility, higher bandwidth, lower costs, and faster deployment, LTE is making significant strides and is poised to overtake T1 in enterprise WANs.

Currently enterprises are using LTE in three key ways: in distributed branch locations to connect everything from POS devices to digital signage, as either a primary or a failover link; as routers that are ruggedized and purpose-built for fleets in order to provide reliable wireless connectivity; and for IoT deployments that rely on always-on WAN links while enabling organizations to reap new business opportunities.

At the same time, organizations are keeping a close eye on Gigabit LTE and 5G, which continue to drive demand for wireless. Both of these technologies promise to revolutionize networking by delivering greater bandwidth and lower latency. Improved connection density will also prove increasingly valuable as more and more organizations connect IoT-enabled devices to their networks.

And then there's the growing adoption of SD-WAN. With seamless use of multiple WAN links in a hybrid WAN architecture, SD-WAN allows organizations to use automation that intelligently routes traffic based on various network conditions. It also can ease the burden on IT teams with unified control and management features.

Today, the bandwidth, agility, and reliability of LTE make it an essential part of many SD-WAN deployments.

While more education is required on the benefits of Gigabit LTE and 5G, enterprise use of wireless WAN solutions to connect people, places and things has become widespread. Some enterprises remain concerned about perceived cost and security challenges with wireless connectivity, but those fears are being addressed — especially with cellular operators' rollout of fixed-rate, all-you-can-consume data plans.

Certainly, the importance of 4G LTE, Gigabit LTE, and 5G for enterprise networking is clear — affecting everything from IoT devices and geographically dispersed branches to vehicle fleets. Any organization that is looking to update its network architecture with future needs and cost-effectiveness in mind should seek vendors that provide cellular-optimized WAN solutions.

The rise of wireless in enterprise networking is here, as is the pathway to 5G.

Learn more at
www.cradlepoint.com

