CompTIA. | Emerging Technology COMMUNITY

BUSINESS OPPORTUNITIES IN EMERGING TECHNOLOGIES
WHITE PAPER SERIES FROM COMPTIA'S EMERGING TECHNOLOGY COMMUNITY

60%

5G

Introduction

Each year, the members of CompTIA's Emerging Technology Community produce a Top 10 Emerging Technologies list that reflects what key players in the industry see as the new technologies that are poised to be the most impactful to their businesses.

The foundation for the list is original research conducted by CompTIA. Using an online survey that crosses multiple industries and includes companies of all sizes, CompTIA's research team determines which emerging technologies have the highest adoption rates. This information is provided to members of the Emerging Technology Community who are experts in managed services and the delivery of technology. This group further analyzes each technology from a tech enablement perspective: Beyond adoption, which technologies have the most significant revenue opportunity or the best chance to revolutionize business practices? After this analysis, the top 10 list is finalized. Read more about the 2019 Top 10 Emerging Technologies List.

In 2019, 5G ranked No. 3, moving up from its fifth position in 2018. 5G infrastructure is currently being built out across the United States and around the world with companies and countries vying to position themselves to become leaders in delivering the technology. 5G will become the engine that drives a wide range of use cases including internet of things, robotics, open roaming, virtual reality, fixed wireless and a wide range of vertical market applications. Although there is a substantial cost associated with building out infrastructure, 5G has the potential to drive new markets and economies and significant returns on the investments over the long term.

Business Opportunities in Emerging Technologies: 5G, a white paper authored by CompTIA's Emerging Technology Community, will help providers take a deeper dive into this technology and the opportunities that exist with meaningful insight into the current market landscape, actionable advice for businesses, and case studies.

Learn more about the Emerging Technology Community.
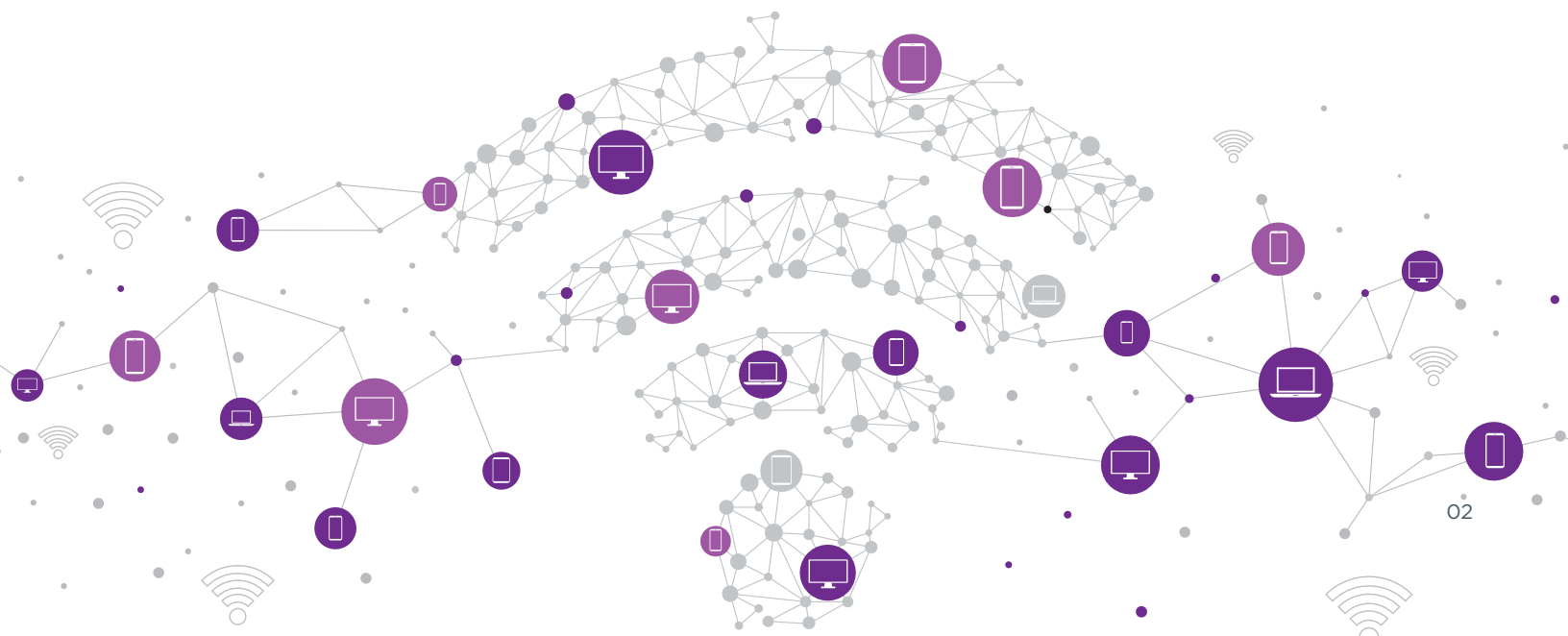
5G Market Landscape

5G is the fifth generation of wireless technology; however, it's not just an evolutionary change from the current 4G technology. 5G is an exponential leap forward and represents a revolutionary change. Speed is the most talked about of the major improvements. One of the current examples used to describe the difference between the speed of 4G and 5G is the time required to download a 3D / 4K movie. Time estimates for 4G are about 6 minutes while 5G clocks in at about 3.6 seconds.

Companies and countries around the world are actively involved in making 5G a reality. The leaders in the market are the U.S., Korea, China and Japan. According to GMSA Intelligence, by 2022, over 100 million users will be connected in the U.S., and by 2025, 190 million of the connections in the U.S. will be 5G.

5G Adoption
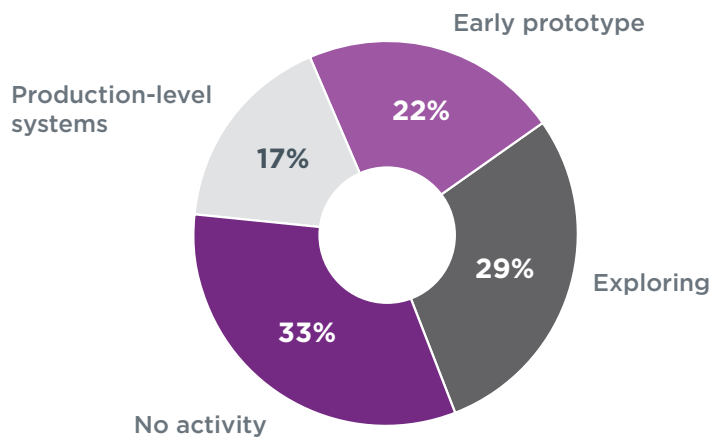
When it comes to adoption, 5G is a little hard to pin down. Large telecom vendors are obviously on the cutting edge of building out 5G backbone networks. Some telecom agents and solution providers may also be involved in setting up 5G infrastructure at a local level. And some end users are building applications that rely on the speed and throughput of 5G connections. Collectively, all of these examples fall under the companies surveyed by CompTIA that believe they have production-level 5G activity or early 5G prototypes. Moving forward, more companies may view adoption as running their systems on 5G networks rather than directly building 5G components.

While 5G technology is extremely complex, here is a list of some of the changes the technology will potentially offer:

- Up to a 10Gbps data rate—10 to 100x faster than 4G and 4G LTE
- Four and potentially 5 nines availability
- Latency of 12 milliseconds that will be driven down as low as the 1-4 millisecond range
- Up to 100x as many connected devices in a defined coverage area
- A substantial decrease in energy usage, perhaps 50-100% less over time
- 1000x the bandwidth in a defined area

Telecommunications service providers will be aggressive about reaching 5G's potential and required to deliver clearly defined and documented performance data to support the requirements of highly critical applications like autonomous vehicles.

Some of the key features included as part of the 5G wireless platform will be significant in driving a wide range of other emerging technologies. IoT, which is the No. 1 rated emerging technology on the CompTIA Emerging Technology Community's 2019 Top 10 Emerging Technologies list will likely also be the top beneficiary of 5G.

Beyond its sheer speed and the low latency, 5G offers three other important features that will drive not only IoT, but applications in medicine, automotive and other verticals. They are mobile edge computing, network slicing and smart antenna arrays.

Mobile edge computing (MEC) will help manage and optimize workloads on the network by ensuring that communication resource and capacity is where it is needed.

Network slicing will enable the network to be split in multiple virtual networks with different through-puts, data speeds and latency depending on the use case. Network slicing will be one of the primary ways that telecom service providers monetize 5G and deliver various levels of service to fit different needs.

Multiple antenna arrays use combinations of inputs and outputs (MIMO) to improve signal quality and will be critical in improving virtual reality, self-driving cars and a range of unified communications applications.

Finally, it's important to look at the basic architecture that will allow 5G to deliver on its enormous promise. Fiber cable is an important element in the architecture and is part of the backbone of 5G. Coaxial copper cable is typically limited to 1GB of bandwidth and can be affected by electromagnetic and radio frequency interference and will not support the needs of 5G. Some telecom service providers are building out fiber networks as part of their deployment, while others are "renting" existing fiber infrastructure in an effort to deploy their networks more quickly.

Everyone is familiar with the enormous cell towers that exist in support of 4G. Cell towers will still be part of the infrastructure, but 5G will proliferate primarily from cells that can be small enough to reside inside a stoplight. There will be literally millions of them installed as 5G is deployed.

Barriers To 5G Adoption

While 5G offers compelling opportunities for businesses, a number of barriers and obstacles need to be overcome to realize the benefits of this emerging technology.

Regulation

Regulation will affect the speed at which 5G networks are deployed. Regulation is not only being driven by the federal government through the FCC, but is also being driven by state and local governments down to small municipalities that want a say in how small cells, which will eventually number in the millions, will look and be deployed, and how they will affect the overall ecosystem of cities.

Security and Data Collection

Security will of course be a major consideration as unimagined amounts of data are collected, moved, stored and retrieved for everything from moving traffic to presence management and other retail applications to the management of smart cities and homes and businesses. The collection of data will also lead to questions regarding the rights of individuals and businesses as 5G and other emerging technologies intrude on our lives.

Location and Lack of Service

In a 2019 survey of technology professionals by Tech Pro Research, IT pros said that location and lack of service would be among the early roadblocks to adoption. Other top barriers mentioned were the cost associated with the new technology, integration challenges and getting the C-suite up to speed and on board.

Technical Hurdles

The nature of 5G signals allow for a range of benefits but also introduce a number of challenges. While 4G technology operates mostly on the 700MHz band of available spectrum, 5G can utilize a combination of high-, mid- and low-spectrum. This opens up new debate in the already contested regulation of spectrum. Furthermore, the high frequency of the signal means it is less capable of traveling long distance or penetrating obstacles. This is what drives the need for massive numbers of cells. Finally, the protocols used to specify 5G functionality have potential security vulnerabilities, depending on carrier implementation. Without the proper safeguards, attackers might be able to expose location or track activity.

Despite the barriers, it seems clear that every solution provider will be required to participate at some level in the 5G revolution. It would be near impossible to operate an IT service business without being part of it. However, there are many questions to be asked by companies in the industry regarding what level and type of involvement best fits their business and how they will choose to take advantage 5G or many of the other emerging opportunities facing them. Now is the time to get engaged, understand the options and make important decisions about how to monetize 5G.

Making Money with 5G

The development of the technology and standards for 5G began in earnest around 2015. In late 2018, the market leaders began installing infrastructure in major cities around the US. AT&T is now live in 19 cities while Sprint and Verizon are live in at total of six and have plans in 25 additional cities this year. This does not imply that the cities that they are located in have full coverage, but there are a number of live 5G base stations and service is actively being tested. Globally, the UK and South Korea are two of the front runners in deploying 5G.

In May 2019, Verizon reported download speeds from 80 to 900 Mbit/s and upload speeds of 12 to 57 Mbit/s from live stations in Chicago. The round trip delay time was 25 milliseconds. It was also reported that Verizon's 5G service would regularly hit 1Gbits/s in some locations. It would be fair to say that in 2019 5G is in the nascent but rapidly developing stages of becoming mainstream.

Timeframe for 5G Impact
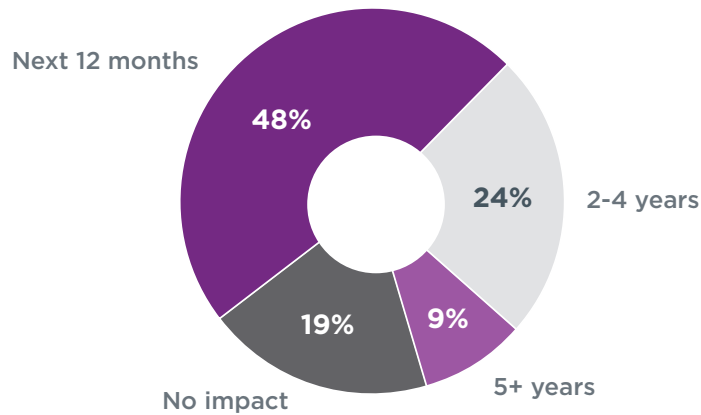
Data from CompTIA research confirms this market window. Nearly half of companies surveyed believe that 5G will have an impact on their business in the next 12 months, with another 24% expecting to see impact in 2-4 years. Whether this comes from actively building new applications and workflow or simply moving to 5G networks when they become ubiquitous, new capabilities appear to be right around the corner.

MarketWatch says the 5G services market is already worth $21.53 billion. By 2023, it'll be valued around $85.84 billion. By 2025, Research and Markets says that number will soar to $252 billion. That's a 1,070% increase from today's market value over the next six years.

As we look to the future and the proliferation of 5G it is not hard to imagine a totally untethered world with portable wireless receivers in homes and businesses everywhere. What is certain, is that 5G will be a significant player in driving the technology revolution of the next 10 years.

In Tech Pro Research's survey, 56% of respondents said 5G would let them introduce new technologies they couldn't use before. Forty-seven percent said 5G would mean better customer service, 37% expected an increase in overall productivity, and 27% expected a reduction in costs.

It is very difficult and probably the wrong approach to think about emerging technologies on a one-off basis. Internet of things, AI, 5G and other emerging technologies are drivers for the others. For instance, achieving the opportunities offered by IoT without both AI and robustness of 5G would not be likely and vice versa for most other emerging technologies.

On the other hand, looking at 5G, there are specific opportunities that exist and can be monetized by a solution provider who becomes proficient in the technology, especially in its early stages of development. These are the kind of skills that might be termed vertizontal in nature, meaning they can be applied horizontally across the broad plane of vertical markets without necessarily requiring specific vertical expertise. And, they can also position service providers to partner with other providers who work in vertical markets and require outsourced services.

The good news about the 5G opportunity is that solution providers who start to develop skills now can position themselves favorably as leaders in the market before it gains full momentum.

Here are some opportunities to consider:

- **Consulting and training:** 5G is a complex technology that will have a transformative impact on our world. Pure consulting not only about the technology and how it is best applied, but also includes security issues and local, regional, and national regulation that may impact its delivery and use.

- **Site surveys:** Converting from 4G to 5G is not as simple as swapping out new equipment for old. 5G operates in a different bandwidth with new types of antenna arrays, and sites will have to be resurveyed before any new installation can be considered.

- **Network design:** Network design follows site survey and involves not only the design of the network but the recommendation and selection of vendors that will provide the necessary infrastructure.

- **Application development:** Solution providers who are already actively involved in development will want to investigate all the opportunities 5G represents. Solution providers who have been considering entering the market might consider specializing in developing new applications that are 5G-centric. App development should see substantial growth as a result of 5G.

- **Security:** Security has and will continue to be a mainstay of the solution provider community. Requirements will change and broaden, and there will be new applications and configurations of solutions to be installed and managed.

- **Partnering/contracting:** The proliferation of 5G will open even more opportunities for partnering and contracting with larger companies that will look to outsource training, installation and other tasks. There will also be opportunities to partner with vertical market specialists and ISVs to support tasks like surveys, design, integration and training.

Vertical Market Targets

There are a number of the vertical markets that can be targeted by solution providers and managed service providers. The following list provides some of the verticals that can be targeted. If you are already working in one or more of them, it is time to begin thinking about how you will approach your existing verticals in light of 5G deployment.

1. Unified Communications / UCaaS
2. Retail
3. Medical
4. Smart Cities, Homes and Buildings
5. Manufacturing
6. Automotive, Transportation and Drones
7. Entertainment

Building a 5G Business Practice

There are some fundamental questions that should always be asked when a business is faced with major change. First, what needs to be done? Then, why does it need to be done now, followed by how will it be done? Finally, you need to know what the benefit is or how benefit will be derived from the change. However, the most important question to ask is: Has anyone ever done this before?

CompTIA provides its members with research, education and assistance to help them manage their businesses. As you consider how you will integrate emerging technologies into your offerings or if you decide to transform your business to a new model, you will want to take advantage of CompTIA's offerings. Yes, someone has done this before!

Many solutions providers leveraged CompTIA's three-part series on Managing a Successful Business Transformation and The Quick Start Guide to Business Agility during their moves to managed services and the cloud service provider models. Both are recommended reading and will be helpful to guide you along your way.

Whether you are going through adding a new service offering or building a new business practice, planning is the key.

There are three main steps in the process:

1. **Making the decision to change your business or business model:** What are the factors involved, what are the conditions that justify the change, and what are the options to consider and obstacles to success?

2. **Planning for change and achieving the intended outcome:** This includes everything from preparing (are you ready to change) to determining how your business might be affected during the process, as well as creating a roadmap that will produce a successful outcome.

3. **Calculation of the opportunity, cost and value of the change:** What is the underlying financial model of the new service or model. What are the investment requirements, resources and time frame for completing the project and generating sustainable financial results?

The details around these three main steps are outlined in Managing a Successful Business Transformation.

The costs associated with specific new opportunities depends on how far the company needs to move to take advantage of them.

TARGET MODEL

How effective are you at change?

How different is your goal?

- **New resources?**
- **New customers?**
- **New cash model?**
- **New people?**
- **New skills?**

How healthy is your business?

CURRENT MODEL

This chart, from CompTIA's Quick Start Guide to Business Agility highlights some of the issues surrounding the change journey. Consider some of these action plan questions:

- How healthy is your business? Are you ready to change?

- What will change?

- Who will be affected? Who is accountable for the change to work?

- What is the defined outcome / objective?

- What resources are available / required?

- What is the financial justification for this change?

- What are the specific assignments / milestones?

- What are the metrics / accountability process?

5G Use Cases in the Market

Currently, the majority of use cases in the market around 5G are from major wireless providers and hardware corporations.

Verizon

Verizon announced a deal with the National Football League to add 5G wireless networks in 13 of the 31 NFL stadiums on September 5. Fans will need 5G compatible phones to take access the system. Verizon will add demonstration areas in the stadiums to let fans experience the new technology. Read more.

Cisco

Cisco is building a coalition of vendors and partners to take "open roaming" to the market. The concept is to allow mobile users to onboard to guest wi-fi networks seamlessly. With open roaming, you'll be able to get online seamlessly and automatically after signing in just once using a trusted identity provider. This technology will provide users automatic access to 5G networks at retailers, airports and other large enterprises and will provide added benefit to the establishments by improving and increasing the value of presence management systems. Read more.

AT&T and Samsung

Among other companies, AT&T and Samsung are partnering to roll out "Fixed Wireless" services. Samsung has developed 5G routers which will convert wireless 5G signals working with IPV6. Fixed wireless will allow 5G wireless in homes and businesses that have access to fiber cable, but do not have fiber installed in their infrastructure or have 5G widely available in the market. Read more.

Ericsson

Telecommunications company Ericsson has identified Lewsville, Texas as the location for its first fully automated US smart factory. The 300,000 square-foot factory will use 5G to create Advanced Antenna System radios to boost network coverage as 5G deployments gain ground in the US. Read more.

Further Reading

Emerging Technology Innovation Assessment
The Emerging Technology Innovation Assessment, created by CompTIA's Emerging Technology Community, will help you examine the areas of business that are necessary to drive innovation and determine what steps are needed to ensure you're ready to expand your business.

5G: If You Build It, We Will Fill It
What is 5G? Why do we care? How much faster does the pipe get? What can we do with a fatter pipe? And how does this relate to other emerging technologies, broadband, cars, etc.

The 5G Era in the US
This GSMA report looks at the 5G in the US, with a particular focus on network deployment, spectrum, use cases, and policy and regulation.

Join CompTIA's Emerging Technology Community

The Emerging Technology Community encourages the adoption of new and emerging technology that will improve business outcomes for members and their clients. Our community is comprised of industry thought leaders investigating emerging technology to further the industry and identify and leverage numerous opportunities.

Learn more