

New deployment solutions, including a pre-validated vendor ecosystem, network tools, and turnkey end-to-end solutions, are helping accelerate 5G private network deployments.

# Emerging Opportunities for 5G Private Networks

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## Introduction

A 5G private network uses 5G mobile infrastructure to provide dedicated connectivity for a specific business or customer. 5G private networks offer several advantages compared with other business connectivity solutions, including network flexibility, control, and security that many businesses require and that alternative connectivity options cannot completely fulfill. 5G private networks are also more robust than Wi-Fi networks, allowing an organization to better control its data and coverage. As a private 5G network is built using the same industry standards as a service provider's (SP's) public 5G network, the private network can support the same functions and features as the public 5G network.

There are a variety of 5G private network models. Enterprises can deploy a slice of a public 5G network to achieve a virtual network dedicated to that enterprise. Shared neutral host networks use private 5G to extend public carrier cellular signals into locations or areas with poor signal strength. An organization can deploy a standalone 5G private network dedicated to a specific location and its own use, such as a factory. In addition, an organization's standalone 5G private network infrastructure can be integrated with the public network for a hybrid 5G private network deployment.

With the different 5G private network types come different ownership models. A 5G private network can be fully owned by the business, allowing the business to solely control access, security, and other network features. A systems integrator or service provider can also own the 5G private network and lease the network to the customer, usually for a monthly fee through a managed services model. Further, 5G private networks can be established using a hybrid ownership approach, whereby the business owns the on-premises infrastructure but connects to a public network for wide area coverage as necessary.

## The Current State of 5G Private Networks

Organizations pursue private wireless networks to increase IT operational efficiencies, improve connectivity strategies, and enhance edge security. In a recent IDC survey of global private network decision makers, increased control and security were the top drivers for businesses that are deploying private networks (see Figure 1). In fact, 45% of respondents expect 5G private networks to provide more control over their infrastructure and end devices.

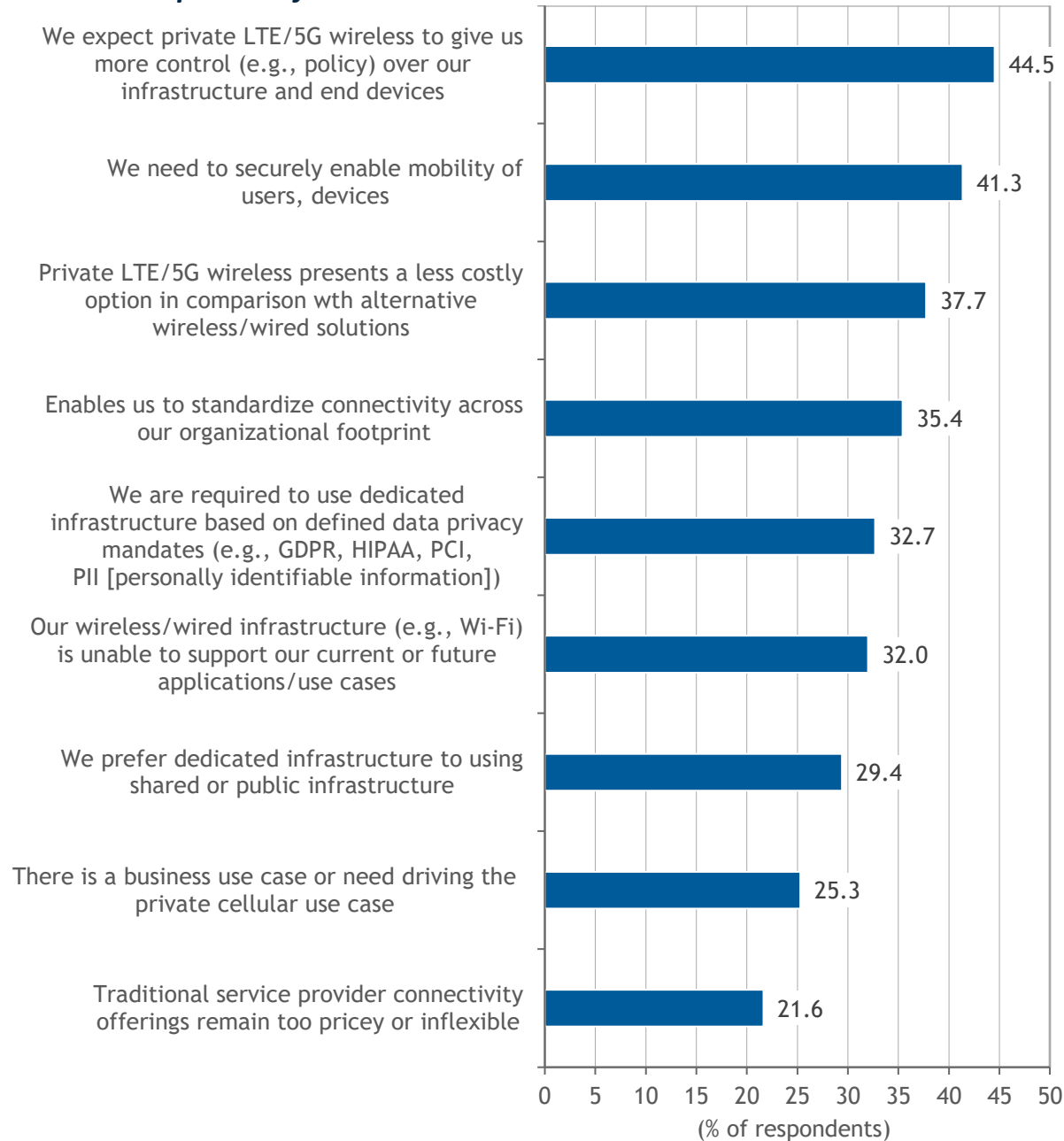
## AT A GLANCE

### KEY TAKEAWAYS

5G private networks increase business efficiencies and fulfill use cases across many vertical markets. In addition, 5G private network infrastructure is dedicated and tailored to an organization's requirements, and advancements in deployment strategies and solutions are helping the market scale and addressing the network needs of more businesses.

Control is followed closely by security, with 41% of respondents citing the need to securely enable mobility of users and devices as a driver for private network deployments.

FIGURE 1: **Top Drivers for Private Networks**



n = 1,202

Source: IDC's Private LTE and 5G Survey, April 2022

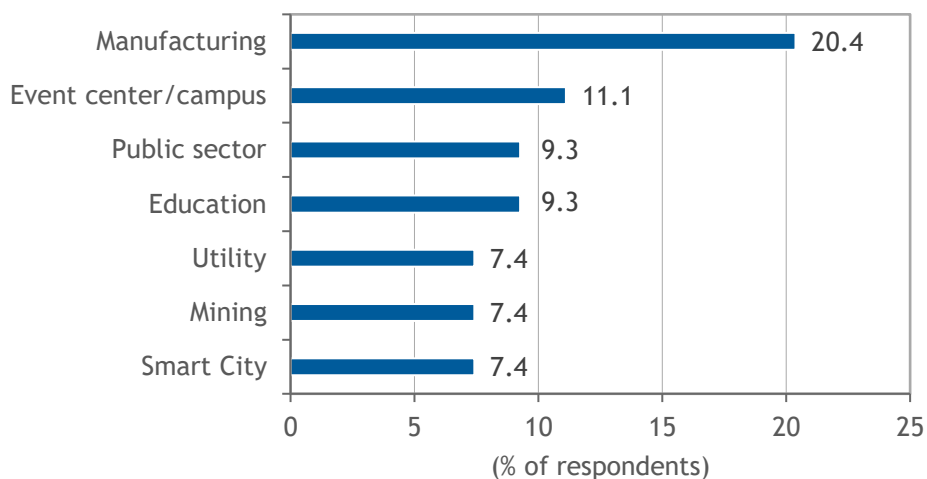
The survey also indicates that respondents are using private networks to achieve cost efficiencies. About 38% of respondents said private networks present a less costly option compared with alternative wireless or wired connectivity solutions. 5G private networks provide technology standardization across an organization's network footprint as well. More than 32% of respondents said private networks improve business resiliency, reliability, and continuity.

5G private networks can be used in a variety of use cases across many different vertical markets. One such use case is robotics in manufacturing environments. About 40% of IDC's survey respondents are running industrial applications, including robotics, over private networks. In addition, many fleet managers rely on asset tracking for business success. With 5G private networks, fleet management systems can provide greater control of operations, lower management costs, and implement an increased level of security for asset tracking.

5G private networks are helping revolutionize the logistics industry in several ways. Supply chain problems are top of mind for most companies, and private networks can benefit tracking and condition monitoring capabilities for parcels and devices within warehouses and other environments. Video surveillance provides many benefits across numerous industries, from transportation to commercial and home security. Combining 5G private networks with video surveillance, cloud integrations, and analytics provides businesses and governmental organizations with sophisticated insights. Dedicated, local 5G private networks also lend themselves to campus environments. These networks can limit access to employees or specific people with clearance, improve connectivity, and enhance user experiences.

IDC has been tracking worldwide publicly announced contracts and their details since 2020 to gain a view into the 5G private network market. The publicly announced contracts span a variety of verticals, with manufacturing leading the list, followed by event center/campus, public sector, and education deployments (see Figure 2). Mining, utility, and Smart Cities are also top vertical markets announced in recent contracts. The research also shows ports, airports, and warehouses worldwide are deploying 5G private networks to help achieve their business and communications objectives.

FIGURE 2: **Private 4G/5G Network Contracts Share by Vertical, 1H22**



Source: IDC's Private 4G/5G Network 1H22 Contracts Offer Glimpse into Overall Worldwide Market, August 2022

## Spectrum Options

Mobile networks require spectrum for radio communications. Businesses must have access to dedicated and secure spectrum to run their 5G private networks. There are important considerations when selecting the best type of spectrum for a 5G private network.

Spectrum in the 1GHz to 6GHz range is commonly referred to as midband spectrum, which is well suited for many applications due to its balance of speed, capacity, coverage, and indoor penetration. Most U.S. midband spectrum that is licensed and deployed for 5G networks operates from 2.5GHz to 4GHz. Another range of 5G spectrum is in the millimeter wave (mmWave) bands, which is at 24GHz and higher. mmWave spectrum requires more radio access network (RAN) densification compared with sub-6GHz to address propagation challenges; however, it offers the fastest available speeds (1Gbps or faster), high capacity, and reliable low latency. This high-band 5G spectrum is ideal for stadiums, campuses, and other areas with a high density of users or for applications that have speed and latency requirements that midband options can't meet.

There are generally three options for accessing spectrum for private networks. Organizations can partner with a mobile network operator (MNO) to meet their private network spectrum requirements. In addition, businesses can purchase fully licensed and dedicated 5G spectrum specifically assigned for 5G private networks. Germany's telecom regulator has sold 3.7–3.8GHz industrial licenses for 5G private networks. Other European countries, including the United Kingdom, Sweden, Finland, the Netherlands, and the Czech Republic, also offer or have plans for mobile private network licenses in varying chunks within the 3.4–4.2GHz spectrum range. In the United States, some organizations purchased Citizens Broadband Radio Service (CBRS) priority access licenses (PALs) for private network use. The United States has also made available shared CBRS and other spectrum that is an effective option for 5G private networks. The United Kingdom is another country that has enabled shared spectrum to be used for 5G private networks.

## 5G Private Network Infrastructure

Private networks are very similar to public mobile networks. Both types of networks are used by communications SPs. Both networks require basestations (RANs) and a mobile core network. The big difference between the two networks, other than cost, is a private network typically has fewer capacity and coverage requirements than a communications SP's network.

For the RAN portion of the network build, the enterprise could use a macro basestation, like those used by communications SPs, but in most cases, that is not necessary. Generally, a small cell provides the optimum balance between performance and cost that best meets the business requirements and comes in a variety of deployment options based on the end user's requirements.

Small cell architecture generally comes in two configurations. The first configuration has the entire RAN stack located at the radio endpoint in a single box. The other has some RAN functions, usually all the real-time functions, at the radio endpoint with the other layers located elsewhere in a centralized configuration. This architecture allows for the sharing of some basestation resources across multiple radio endpoints. Along with the two configurations, the business also has the option of deploying them indoors or outdoors.

The ability to use multivendor RAN allows the business to use a best-of-breed solution. It can also allow the business to tap into different use cases that might not be supported if the business used only a single RAN vendor.

The mobile core network acts as the brains of the network. It connects the RAN to other wide area networks, applications, and the internet. The mobile core also plays an important role in authenticating users and ensuring users only have access to applications and services assigned to them. The cloud-native architecture of the 5G core gives the network the ability to support a wider range of use cases than what has been available with previous mobile network generations. There are also different options when it comes to deploying the mobile core network.

The mobile core can reside at the end user's site or be hosted remotely. The remote location can be in a vendor or service provider datacenter or cloud. The major cloud SPs are another option for hosting the private core network. A single core can be connected to several RAN locations; it does not have to be one core per network site. One of the deciding factors in where to physically locate the core network is performance requirements. The network's support for latency is reduced the closer the core network is to the RAN site. An on-premises core network is also ideal for businesses that want to keep their data onsite or want tight coordination with centralized RAN functions.

The emerging trend of Open RAN, using open network interfaces, creates even more options for building the network. The business can mix different radio with baseband vendors. Traditionally one had to use the same vendor for all parts of the RAN. The ability to use multivendor RAN allows the business to use a best-of-breed solution. It can also allow the business to tap into different use cases that might not be supported if the business used only a single RAN vendor. Multivendor RAN should also benefit the private network market by increasing competition that in turn will help drive more private network innovation and help keep costs down.

With regard to paying for the private networks, businesses can either purchase the infrastructure outright or go with a network-as-a-service model, or they can buy some mixture of the two. With the network-as-a-service model, the business can save up-front costs, especially when it comes to the mobile core. Mobile core capacity can be paid for based on a consumption model, with the company paying for the capacity only as needed. When a business buys a mobile core, it risks paying for network capacity it may not need for several years.

## ***Solutions to Accelerate 5G Private Network Deployments***

The growing interest in the benefits of private networks has driven the ecosystem to look at ways to simplify and accelerate the deployment of private networks. Advancements in private network deployment strategies and solutions will play an important role in helping the market scale and address the network needs of more businesses. Right now, building a private network can take several months. The following are some ways that businesses can achieve the goal of accelerating 5G private network deployments:

- » **The creation of a pre-validated vendor ecosystem that supports end-to-end multivendor networks.** By creating this ecosystem, the business end user will be able to select different hardware and software vendors to build its network with assurance of vendor interoperability to minimize the systems integration process. This will shorten the time it takes to build the network and select the best of breeds — cost, performance, features/capabilities — while ensuring each vendor works correctly with other vendors in the ecosystem.
- » **Simplified network planning, deployment, and more automated management that can deliver the full potential of different 5G industry use cases.** These solutions need to be streamlined and provide a repeatable process around network planning, deployment, and automated management to optimize and ensure 5G services. The processes should be as zero touch as possible to allow for deployment/management at scale. There also needs to be a means to hide 5G complexity to support different use cases as simply as with Wi-Fi.

- » **A streamlined process to deliver turnkey end-to-end private networks to enterprise customers.** The enterprise customer works with a vendor, such as a systems integrator or service provider, that can deliver an entire end-to-end network with the specific use cases required by the enterprise with one bill and support point. The vendor leverages the pre-validated vendor ecosystem and solutions to plan/design, deploy and manage, and select the network components needed, or the vendor may use a pre-configured design template for a specific vertical but can still customize the private network as required. This will speed up the deployment process as the customer needs to work with only one entity that can deliver a turnkey network at a cost and with use cases that meet the enterprise needs.

## 5G Private Network Managed Service Options

Private networks can be complex and require skills that fall outside of the traditional IT department. For this reason, businesses want partners that can help them manage their 5G private networks through the network's life cycle. The life cycle includes network planning, building, and ongoing management. Businesses have three main options that can be used exclusive of each other or in some combination: systems integrator, network infrastructure vendor, and mobile communications SP.

All three types of managed service providers can assist the enterprise with deployment and ongoing management tasks covered in the previous section on accelerating 5G deployments. Managed service providers can also assist in managing who has access to the network, issuing SIM cards, and monitoring network performance to identify and correct potential problems before those problems impact network performance. The abundance of managed service providers reflects the growing ecosystem forming around private networks. The approach a business takes to building its private network will influence its decision making with regard to selecting a managed service provider.

A pure-play systems integrator will give a business the broadest variety of vendors to choose from in building a private network. Systems integrators tend to be vendor neutral because they are not in the infrastructure business. This is ideal for a business focused on a multivendor best-of-breed approach for its private network. Working with an infrastructure vendor will put some limits on the business' vendor options. The private network can still be multivendor, but the business will have to use the infrastructure vendor's network components where applicable. For example, if the vendor is a RAN supplier, the business can expect it will need to use that vendor's basestations, but other elements like the mobile core could come from a different supplier. Working with a mobile communications SP will be the most restrictive when it comes to vendor options. The communications SP will want the business to use the same vendors the SP uses in its communications network or the vendors with which it has a commercial partnership. However, while working with the same vendors a communications SP uses is the most restrictive approach, it does make it easier for the business to use the communications SP's spectrum.

## Conclusion

Interest in private networks continues to grow. IDC believes this growth in interest comes from several factors. First, businesses have a variety of options regarding how they build their networks, how they pay for those networks, and with whom to partner to build and manage those networks. Second, private network solutions have come to market that are tailored to smaller business and locations that do not have the same requirements and resources as some of the early private network users such as mining operations and utilities. The third driver behind increased interest in private networks has been the vendor community itself working to make network design, build, and management easier to



achieve with new tools and solutions. As businesses transform themselves to become more reliant on digital tools to improve their operations and grow revenues, private networks have emerged as one of the ways businesses can achieve digital transformation.

## About the Analysts



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Daryl Schoolar is Program Vice President for IDC Worldwide Telecommunications Insights practice. His core coverage examines telecommunication service providers' technology investment strategies and how they relate to network transformation and new service enablement. This includes such topics as operator cloud strategies, digital transformation, and 5G service opportunities.



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## MESSAGE FROM THE SPONSOR

Qualcomm Technologies is at the forefront of 5G, and private networks are no exception. Our latest tech innovations and partner initiatives are accelerating the myriad of benefits modern 5G Private Networks have to offer. We are breaking down barriers to deliver 5G Private Networks of the future, spanning verticals with 5G optimized use cases. Our 5G Private Network enablement spans pre-integrated solutions with multi-vendor choice along with an open, customizable RAN automation and management offering to streamline design, deployment and operation of Private Networks, accelerating their benefit to Enterprises of all shapes and sizes. Learn more about Qualcomm Technologies' [practical innovations for 5G private networks](#).



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