The end of communications services as we know them

How 5G and edge computing will help define who wins in the booming digital economy

IBM Institute for Business Value

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How IBM can help

Communications Services Providers (CSPs) require a telecommunication system that is more flexible and automated, with a lower cost to operate than the proprietary-centric networks of the past.

Today, IBM works with the top CSPs worldwide, bringing capabilities such as artificial intelligence (AI) and hybrid cloud for flexibility and innovation; industry expertise; and global delivery presence to realize this vision.

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Key takeaways

Think beyond connectivity

While 5G and edge computing will unlock new economic opportunities for information communications providers (ICTs,) communications service providers (CSPs) are projected to miss out on most growth—unless they adapt to add differentiated value into cloud native digital services, applications, and solutions.

Adopt digital platform strategies

Unprecedented 5G hypergrowth should begin around mid-decade, and the majority is likely to expand from digital platforms that were already established and offering economies of scale—including those used to enable connectivity. Strategic and operational decisions being made by CSPs today are critical to their ability to compete long-term against cloud native competitors.

Prepare with hybrid cloud

In our survey of 500 telecommunications executives, we identified a small group of "high performers"—14% of respondents—that expect to outperform the rest of the field on 5G and edge computing. Their understanding of the strategic importance of cloud native technologies along with agile deployment methodologies, and how to deploy them, offers insights for other CSPs seeking sustainable growth from network cloud.

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2020s: A "Big Bang" into a new digital universe

We are likely on the cusp of an historic digital expansion. When economic conditions allow it, some of the most anticipated and world-changing use cases will go mainstream—immersive entertainment, augmented reality (AR), connected vehicles, Industry 4.0, the spatial web, and more. In this report, we will delve into how those economic conditions are likely to emerge and how CSPs can prepare to make necessary cultural, operational, and technological changes to thrive in the new economy.

More often, meeting user expectations will require the integration of connectivity and computing closer to where data resides and decisions are made. The expansion of related physical infrastructure, network functions, and software is expected to be so great that by mid-decade it will usher in an entirely new technological era to reduce cost to a level that makes mass adoption and hyper-expansion feasible. "Network cloud" will follow in the tradition of personal computers and cloud computing as digitization's third wave. This wave will converge network and cloud functions, connectivity and computing, infusing data-driven intelligence and automated decision-making into applications, forming what we call "intelligent connectivity" spread throughout network tiers.

We anticipate that platforms already established at scale—including but not limited to those that deploy connectivity—will offer what we define as the "platform economic advantage," becoming de facto staging points for most hypergrowth that occurs later.

59%

of high performers agree they must become secure clouds infused with AI and automation

50%

of high performers agree that they must become strategic cloud platforms blending diverse partner ecosystems

66%

of high performers agree they will take the lead role providing software to emerging partner ecosystems

An important part of the platform economic advantage involves "platform control points," which are environments where developers and ecosystems convene around rules, tools, and conventions defined and (as the name implies) controlled by the platform operator. For example, hyperscale public cloud platforms present end users with catalogs of infrastructure configurations coupled with marketplaces of third-party software. The backends of these platforms support interaction between third parties, often settling standards debates by making choices on behalf of the collective. These platforms acquire market power by serving as collaboration junctions that frequently compound value while becoming sticky by encapsulating the tools used for deployment, billing, monitoring, support, and more.

In just three or four years, sustaining growth may require CSPs to convene ecosystems that multiply the value of partner ecosystems. Open source hybrid cloud platforms offer an alternative to opaque, value capturing platforms, encouraging open innovation and transparency capable of increasing value to the benefit of clients and the partner community.

If CSPs are to thrive, most will need to develop new competencies and assert themselves in new roles in value chains. CSPs should seek new ways to make money, beyond metering connectivity and access to data, as these traditional mainstays of CSP business models are likely to commoditize.

CSPs have much to offer in the burgeoning 5G-driven platform economy: experience, points of presence, enterprise systems, unique data, and customer trust. Our recent survey on 5G and 5G-enabled edge computing reveals a subset of high performing CSPs that offer insights into how to leverage strengths and develop the cloud native competencies needed to succeed in the rapidly approaching era of network cloud. It is not surprising that more than other CSPs, these high performers seem to value the strategic importance of digital platforms, automation, emerging partner ecosystems, and hybrid cloud.

232% more high performers claim they have the capabilities and resources to implement 5G network services, compared to other CSPs.

Our global survey on 5G and 5G-enabled edge computing

To better understand the challenges that global CSPs face, the IBM Institute for Business Value (IBV) and Oxford Economics surveyed 500 global telecom executives in 21 countries.

Our survey identified a group of high performers, consisting of 14% of total respondents. These executives self-reported that their organizations outperformed peers in revenue, profitability, and innovation each of the past three years. These organizations also tell us they plan to leverage 5G and 5G-enabled edge computing for continued success: 91% expect to outperform financially from the technologies in 5 years versus 54% of their peers (see Figure 1).

In addition, 232% more high performers claim they have the capabilities and resources to implement 5G network services, compared to other CSPs. And 137% more high performers say they have the skills needed to implement the technology at scale.

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Figure 1

Financial advantage

High performers expect to outperform financially from 5G-enabled edge computing

Expect to outperform financially in **two years**

+73%

45%

26%

Expect to outperform financially in **five years**

+69%

91%

54%
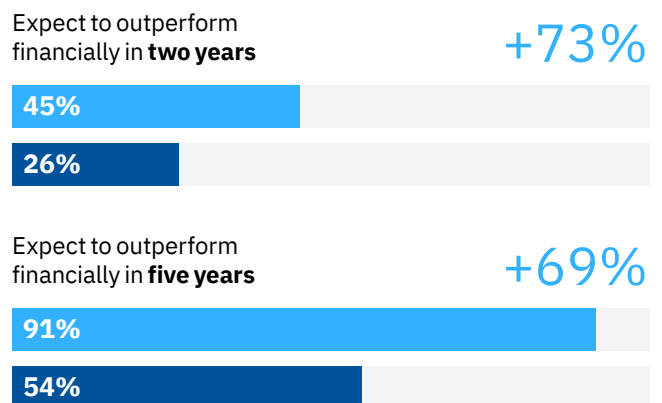
High performers | **Other CSPs**

Source: 2020 IBM 5G and edge computing survey;
Q: "To what extent do you agree or disagree with the following statements about how 5G-enabled edge computing is likely to impact your org's market position?" Somewhat or strongly agree.

# 5G hyper-expansion for networks serving the digital economy

In a profound boom, the digital economy is likely to grow this decade to exceed the size of the traditional "brick-and-mortar" economy. In late 2018, $7 trillion in enterprise market valuation was attributed to digital platforms. By 2025, the global digital platform economy is expected to reach nearly 9 times that at $60 trillion, or one-third of global commerce.[1]

5G growth projections across consumer, enterprise, and government markets consistently show two dramatic growth cycles, and that most absolute value accrues during the second. Figure 2 exemplifies this trend in 5G-related spend, while Figure 3 shows it as it applies to economic benefits across eight industries. Growth rates are similar in the two growth cycles, but scale in terms of dollars increases rather dramatically in the period starting around 2025.

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Figure 2

Ascent of 5G and associated technologies

ICT spend related to 5G and associated technologies: most absolute value this decade is expected to accrue between 2025-2030
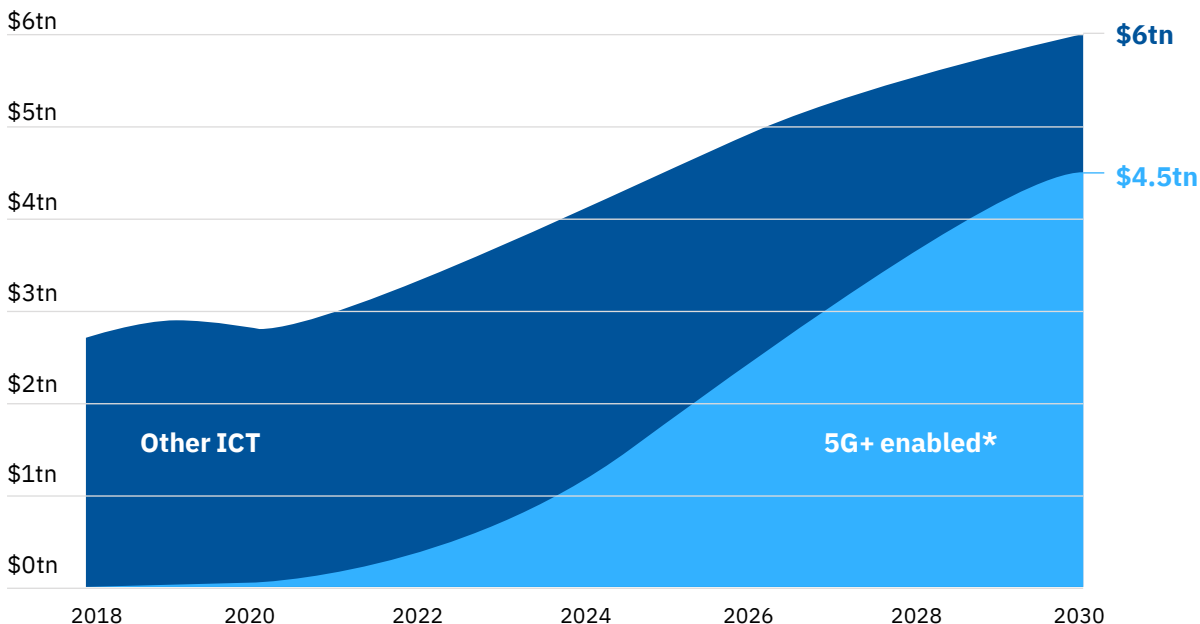
5G and associated technologies (cloud platforms, edge infrastructure, private networks, enterprise applications, AI and ML services, basic connectivity)
*Source: Nokia, Bell Labs Consulting 'The Big Inversion' whitepaper: "How 5G+ technologies will create new value for industries in a post-COVID world." https://www.bell-labs.com/institute/white-papers/big-inversion/*

By 2030, 5G-driven growth will propel the portion of the economy driven by digital platforms to greater than 50% of the overall world economy.

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Figure 3

Two periods of 10x growth
Most absolute value will materialize in the second half of the decade

Benefits to eight industries* attributable to 5G (USD trillions)
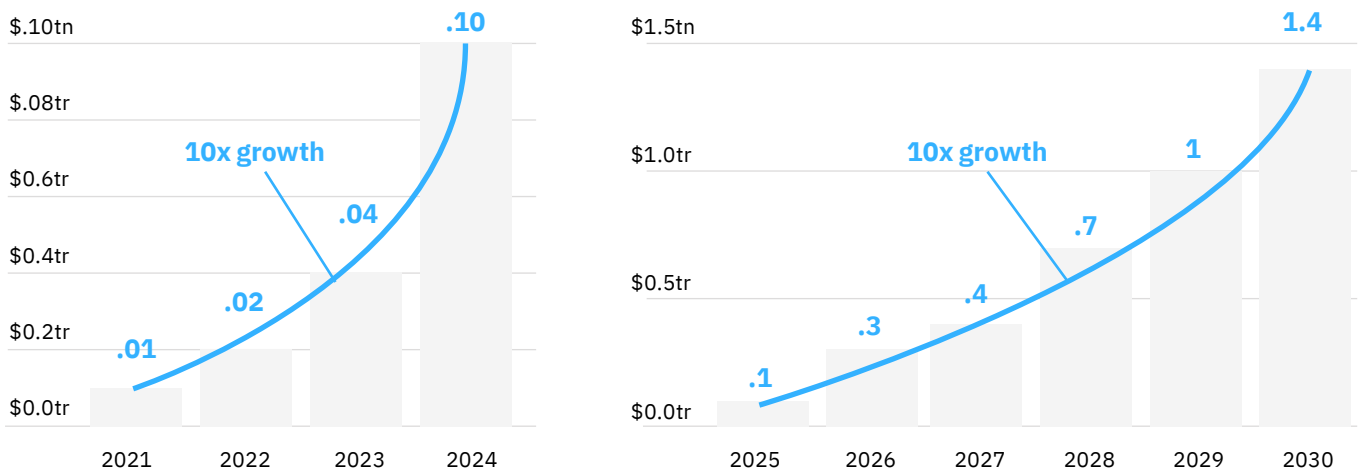
Manufacturing; Retail; Travel and distribution; Healthcare; Energy and extractives; Construction; Agriculture; and Media, Sports and Entertainment
Source: https://stlpartners.com/wp-content/documents/5G_impact_on_industry_webinar_deck.pdf

If projections hold remotely steady, then two things are likely:

1. It is probable that by 2030, 5G-driven growth will propel the portion of the economy driven by digital platforms to greater than 50% of the overall world economy (and rising).

2. By about mid-decade, a foundation must be in place to support exponential growth in physical infrastructure and mobile data traffic for myriad use cases that support tens of trillions of dollars in economic activity.

5G is designed to support a 100 times increase in traffic capacity compared to 4G, but doing so will require higher spectrum bands that do not travel as far as lower spectrum bands and, therefore, require many small cells, or low-powered cellular radio access nodes with relatively short ranges.[2] This is reflected in the global 5G infrastructure market, which is projected to grow from around $2 billion in 2019 to around $500 billion in 2027, including more than $200 billion worth of radio access network technology.[3]

Despite CSPs shouldering most of the heavy lifting for infrastructure, most money is being made through the use of that infrastructure—not from building it.

As a benchmark for small cells requirements, Swisscom has deployed a nationwide 5G network that covers 96% of the Swiss population, equating to about 10.5 cell sites per 10,000 people.[4] This suggests that baseline coverage will require 100,000 or so cell sites per hundred million people, per operator (not factoring tower sharing deals)—though this is likely to shoot into the millions quickly with the proliferation of small cells.

Additionally, for a growing number of use cases to take advantage of 5G's benefits like ultra-low-latency, high-bandwidth, and massive machine-to-machine communications, 5G service providers will need edge computing buildouts that place computer resources closer to where data is more secure and decisions need to take place. Samsung predicts that by 2030, 500 billion Internet of Things (IoT) devices will be online, a 25 times increase from the roughly 20 billion devices in 2020, and an indication of just how dense and distributed networks will have to become over a relatively short span.[5]

If today's wireless traffic can be represented by holding a few golf balls in your hands, then 5G's will be more like palms overflowing with sand.

Margins for connectivity are likely to fall

On the surface, exponential increases in scale would seem like a good thing for CSPs—but only if pricing keeps pace with the rate of expansion. History and data suggest it will not.

Ericsson predicts that by 2030, ICTs will net a staggering $31 trillion in 5G-related consumer revenues. But, only 12% of this market is expected to be addressable by CSPs,[6] and CSP consumer revenue growth is projected at less than an anemic 1% annually.[7]

Despite optimism that consumers may be willing to pay a premium for at least some 5G services—for example, low-latency gaming—initial attempts by operators to charge one have failed.[8] This is true even though early 5G deployments use more data.[9]

The simple fact is that despite CSPs shouldering most of the heavy lifting for infrastructure, most money is being made through the use of that infrastructure—not from building it. This is also true in the enterprise space. Analysis by Nokia and Bell Labs Consulting projects that only 13% of the $4.5 trillion spent by enterprises with ICTs in 2030 will come from basic connectivity.[10]

As CSPs contemplate their 5G futures, they should be mindful of the need to add value within digital services and applications, beyond their traditional approach of metering connectivity and data access.

There is evidence that connectivity may commoditize more suddenly and dramatically than expected. Economic conditions must fundamentally change to support the scale of the coming digital expansion. For example, the largescale rollout of autonomous vehicles alone could increase global wireless data traffic by up to 40 times current levels,[11] and this is one of hundreds, perhaps thousands of use cases (albeit a robust one.) Recent history has taught us that during periods of hypergrowth, there is a combinatorial effect of exponential technologies that commoditize faster than the rate of technology expansion—until the value of technology relative to the use cases it enables approaches zero.

Take Netflix, for example. During the peak of the 2020 coronavirus quarantine, the average American subscriber watched 3.2 hours of content daily, equaling 3.2 gigabytes of hourly data.[12] With the standard subscription costing $8.99, Netflix had to operate its entire service (including content) at a fraction of nine cents per hour per user in order to make a profit. A decade earlier, not only did it cost exponentially more to stream video, but doing so at today's resolutions and scale was prohibitive.

Multiple integrated technology advances had to occur to drive the costs of processing and storage to near zero on an hourly basis. Technology specifications doubled and prices halved every couple of years, but that was only part of the story. Getting complex video processes off of specialized appliances and onto commodity hardware took advances in virtualization, microservices, and intelligent workflows. Optimizing video streaming traffic took machine learning (ML), artificial intelligence (AI) and automation—all working together from cloud to network edge and combining to drive efficiency up and costs down on exponential curves.

CSPs can expect network functions to be similarly abstracted from hardware and orchestrated along with cloud network functions, pushing the underlying infrastructure pricing downward year-over-year.

Perspective: Will connectivity be free?

Roughly a decade ago, apps like Facebook, WhatsApp, and Skype wiped away billions of dollars from mobile operators' otherwise monetizable traffic. In 2012 alone, more than $23 billion in short message service (SMS) revenue was lost due to proliferation of chat apps.[13] As connectivity fuses with cloud, more communications services may find themselves subject to hyperscale disruption. Among this disruption could be a challenge to the fundamental concept of consumers paying for connectivity at all.

Consider that you have never paid a monthly technology charge to Facebook, because it would be missing the point that value comes from usage and data and not the technology that serves it. When connectivity and cloud fuse seamlessly, connectivity may become expected as a right for those who adopt commerce-driving services, for example those that tie applications together around AI-driven voice assistants or center mobile commerce around a rewards program. The emphasis will then shift to a much greater extent to whom provides those platforms than who provides the connectivity.

Two previous waves of digitization, PCs and cloud computing, proved that hardware commoditization, virtualization, and open software innovation are keys to unlocking scale and viability of new business models—and exponential growth curves.[14]

Despite all of the dramatic gains of the cloud computing wave that we are still in, CSP networks remained, until recently, rooted in expensive and proprietary hardware dominated by a few network equipment providers (NEPs). Even when they "virtualized," proprietary software, bundles merely shifted to more efficient hardware while retaining lock-in. These networks never saw the proportionate gains enjoyed by computer processing companies, storage services, and their supporting casts.

This must and will change to support the coming hypergrowth. It is stunning to wrap your mind around the idea that despite all of the dramatic growth we have seen from cloud computing, including its embedded social/mobile revolution, the delta from this expansion is likely to be orders of magnitude larger, and within only a handful of years! Virtually everything in the digital world will need to adapt to accommodate the complexity and size of it: strategies, technology architectures, the nature and scope of platform business models and partner ecosystems, enterprise systems, development methodologies, operating models, cultures, and of course the base that unites it all—which is connectivity.

Like the previous two waves of digitization, the third wave, network cloud, will open up new economic frontiers by standardizing, virtualizing, and commoditizing network-related hardware and shifting value to open software innovation. In those prior waves, technology enjoyed step-function increases in capabilities and decreases in pricing. This pattern could repeat, with the network serving as the foundation.

If you look at the PC era as having achieved exponential efficiency in what could be offered on a physical device (the top of the pyramid), and the cloud era building under it with exponential efficiency in what processing, storage, and data could do when liberated from the physical device (the middle of the pyramid), then a third era of digitization, network cloud, will add exponential efficiency a layer deeper, distributing connectivity dynamically where it needs to be (the base of the pyramid).

Benefits of network cloud will be delivered by digital platforms

Since the digital economy is likely to double twice (or more) in what remains of this decade, it is important to understand that this growth will be rooted in digital platforms and that platforms are subject to what we call the platform economic advantage. When this advantage is achieved, user benefits go up, and costs come down on a logarithmic scale. When that happens, the delta between these exponential trajectories and the more linear ones of competitors can become an uncrossable chasm.

The platform economic advantage is an interlocking set of three conditions capable of producing category winners:

1. The data network effect: Leading platforms collect unique data, refine it into differentiated intelligence with user benefits, fostering loyalty and trust that leads users to share even more data.

2. The cloud network effect: As platforms scale, their providers employ open-source technologies and open innovation to disrupt technology costs, which may be flexed in pricing advantages and weaponized balances sheets.

3. Platform control points: Partners and developers gravitate to where users are, congregating around platform control points—which are standardized environments where developers add breadth and depth, and third parties integrate to compound value.

Most CSPs have not yet developed a 5G business case for 5G use cases.

The most highly scaled businesses on the web have established control points. Textbook examples include YouTube and Facebook. As a partner, developer, or creator, there are ways to participate in monetization on these platforms, but none outside of the control of Alphabet and Facebook. Users play by their rules, use their tools, and conform to their conventions. There are wide-scale and serious debates about how this level of control affects a range of issues including data privacy; and yet it can be argued that the disproportionate influence these behemoths acquire is not intrinsically bad. For example, as third-party cookie use nears its end, more marketing budgets are flowing into Google and Facebook, not less, because of their unique ability to consolidate value and generate predictable results.

The platform economic advantage has been achieved most commonly on cloud native hyperscale public clouds. In the $129 billion market for infrastructure as a service (IaaS), platform as a service (PaaS), and hosted private cloud service, the top 5 providers comprised 72% of the market, with Amazon taking nearly a third.[15]

CSPs should follow the example set by these companies, evaluating how they can become essential to achieving the platform economic advantage for their customers, themselves, and their surrounding ecosystems by establishing the platforms responsible for compounding value.

Control points have tremendous gravity, allowing their operators to assume trusted front-end sales relationships. There is an alternative to strict control, however, which is open source hybrid cloud platforms capable of shifting market momentum away from the strict control associated with "walled gardens," to multiply the value of the community.

Value is shifting higher into the technology stack, or the source of digital offerings. Meanwhile, standards initiatives will eventually make 5G connectivity deployments cloud native and accessible by application programming interfaces (APIs) and microservices. Eventually, the entire lifecycle of deployments will be automated. When users procure services, applications, and solutions, they may expect that connectivity is bundled. This will produce revenue opportunities for CSPs, but places them in a subservient position and could allow trusted sales, developer, and ecosystem partner relationships to shift to other players—that is unless, of course, CSPs (and not their competitors) harness the collective energy of ecosystems with competing, value-driving initiatives.

Regardless of who emerges with them, some operators will establish beachheads in the highest growth domains. Whether they be hyperscalers or CSPs, their ability to achieve the platform economic advantage will enable them to uniquely offer the favorable economic conditions from which most scale is likely to emerge. In fact, it is quite likely that the overwhelming proportion of growth that occurs from mid-decade onward will be from an elite minority of ecosystem-centered platforms that firmly establish themselves in the next three to five years.

CSPs may be moving too slow

Most organizations represented in our survey are taking a conservative business-case-driven approach—waiting for proof of demand prior to making investments. Given what we have covered, this could place many of them on their heels when 5G-related demand arrives in an explosion in around 2024 or 2025.

When asked what percentage of services will be uniquely enabled by 5G capabilities versus enhancements of 4G services over 2 and 5 years, respondents reported that the vast majority of services would not be uniquely enabled by 5G. In 2 years, respondents reported that only 7% of services will be uniquely enabled by 5G capabilities, and 93% will be enhancements of existing 4G services. Even in 5 years, respondents expect only 18% of services will be uniquely enabled by 5G.

Most CSPs have not yet developed a 5G business case for 5G use cases. Only about half of respondents we identified as high performers have developed a business case for deployment of 5G use cases (49%), yet that's twice as many as other CSPs.

Only 35% of all CSPs in our survey agree they have identified use cases they plan to pilot for consumers, and only 26% agree they have done so for enterprises. Even among high performers, these percentages were low, at 46% and 27% respectively.

As see in Figure 4, we asked respondents to compare where they were presently to where they expect to be in five years against a timeline of deployment stages for 5G-enabled edge computing. We see a modest progression from considering and evaluating (where about three fifths of high performers are today) to piloting. Only a small minority of CSPs expect to be implementing, operating, or optimizing 5G edge solutions, even in five years.[16]

Although CSPs in the main are moving slowly, our research reveals that high performers appear to be thinking more strategically about 5G than other CSPs.

Figure 4

Few have a plan for the immediate future

Most CSPs will not yet be piloting—even in 5 years

- High performers today
- High performers in 5 years
- Other CSPs today
- Other CSPs in 5 years
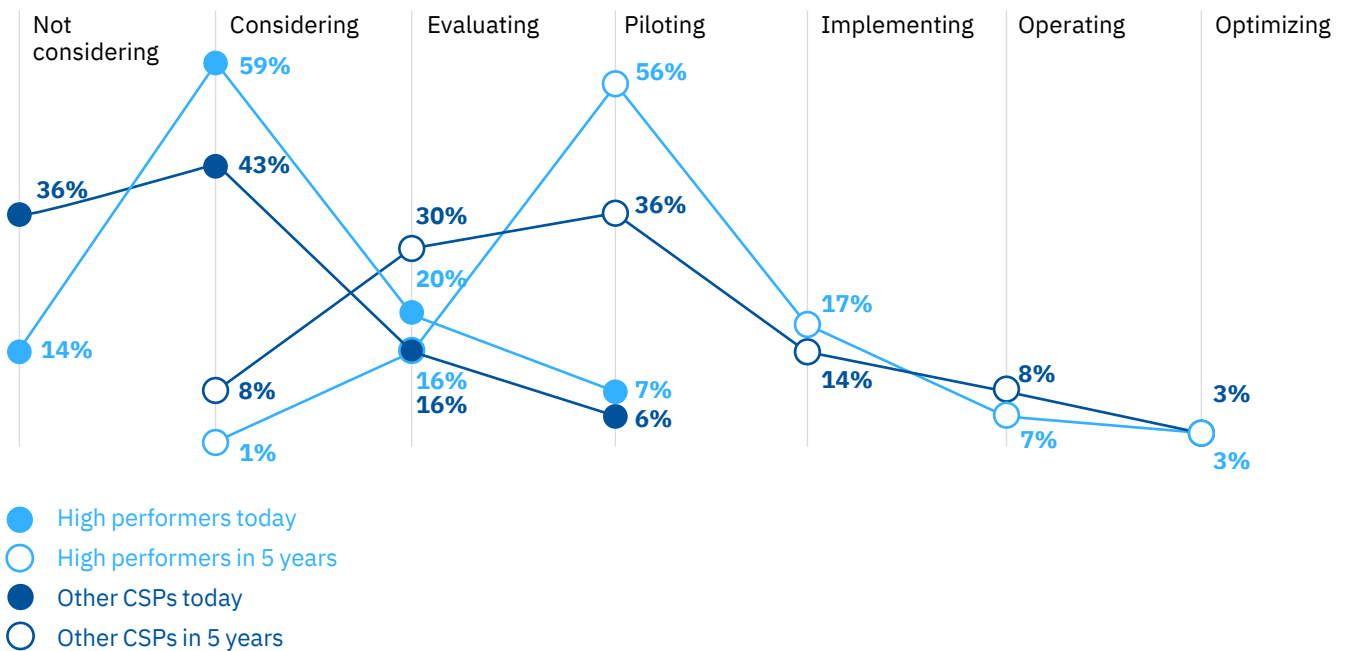
Source: IBM Institute for Business Value.

High performing CSPs seem to have a better grasp of the need to prepare to develop and operate scalable digital platforms.

When we asked respondents to rank which benefits of 5G-enabled edge computing were most and least important to their organizations, high performers appear to be looking at 5G to maneuver for new revenue opportunities from ecosystems, consumer products, and government and enterprise markets. By contrast, other CSPs are more concerned with "business-as-usual" considerations like reducing operational complexity and avoiding subscriber losses (see Figure 5).

The importance of digital platforms and emerging partner ecosystems

High performing CSPs in our survey seem to have a better grasp of the need to prepare to develop and operate scalable digital platforms, and they display a greater sense of urgency to adopt them. 59% agree with the statement that in order to grow future revenue and profit from edge computing, they must become secure clouds infused with AI and automation, compared to 42% of other CSPs. 50% of high performers also agree that they must become strategic cloud platforms blending diverse partner ecosystems, this compared to 28% of other CSPs—a difference of 79%.

Figure 5

5G-enabled edge computing benefits to organizations

High performers have different ideas of how 5G
will impact their companies than the rest of the pack

High performers		Other CSPs
Earn new revenues from products and services sold to, with, through ecosystem	① ... ①	Reduce operational costs and complexity
Differentiated consumer offerings to increase market share	② ... ②	Earn new revenues from enterprise and government markets
Earn new revenues from enterprise and government markets	③ ... ③	Avoid subscriber losses in existing consumer markets
Reduce operational costs and complexity	④ ... ④	Earn new revenues from products and services sold to, with, through ecosystem
Avoid subscriber losses in existing consumer markets	⑤ ... ⑤	Differentiated consumer offerings to increase market share

Source: IBM Institute for Business Value.

CSPs have important competitive advantages that make them valuable to emerging ecosystems and prepare them to take the lead in offering horizontal cloud-based technologies to ecosystems and end users.

More high performers than other CSPs also say they see the strategic value in taking the lead role in offering IT-related services to emerging partner ecosystems, including infrastructure, software, and analytics, AI, and ML (see Figure 6).

CSPs have important competitive advantages that make them valuable to emerging ecosystems and prepare them to take the lead in offering horizontal cloud-based technologies to ecosystems and end users. Points-of-presence they maintain represent trillions of dollars in global investments needed by any entity seeking to deploy technology at the network edge. CSPs' billing support systems (BSS) and operations support systems (OSS) offer partners efficiencies in deploying, metering, billing, and

staging complementary technologies including analytics, ML, and AI. The fact that these systems have to be reengineered for 5G and edge services presents an opportunity for CSPs to design with partner integration and benefits in mind.

CSPs maintain a powerful position of trust with end users for billing purposes, packaging, and uniting digital services around an integrated experience. They also maintain unique and highly valuable data, including geolocation and behavioral history and tendencies that could be offered as-a-service for purposes such as planning, logistics, advertising, and marketing. This is prime example of a high-growth domain in which CSPs may establish control points.

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Figure 6

Value in offering IT-based technologies to emerging parter ecosystems

High performers have different ideas of how 5G will impact their companies than the rest of the pack

+135%	+164%	+150%
54% High performers **23%** Other CSPs	**66%** High performers **25%** Other CSPs	**50%** High performers **20%** Other CSPs
Leading role providing infrastructure	**Leading role providing software**	**Leading role providing analytics, AI, ML**
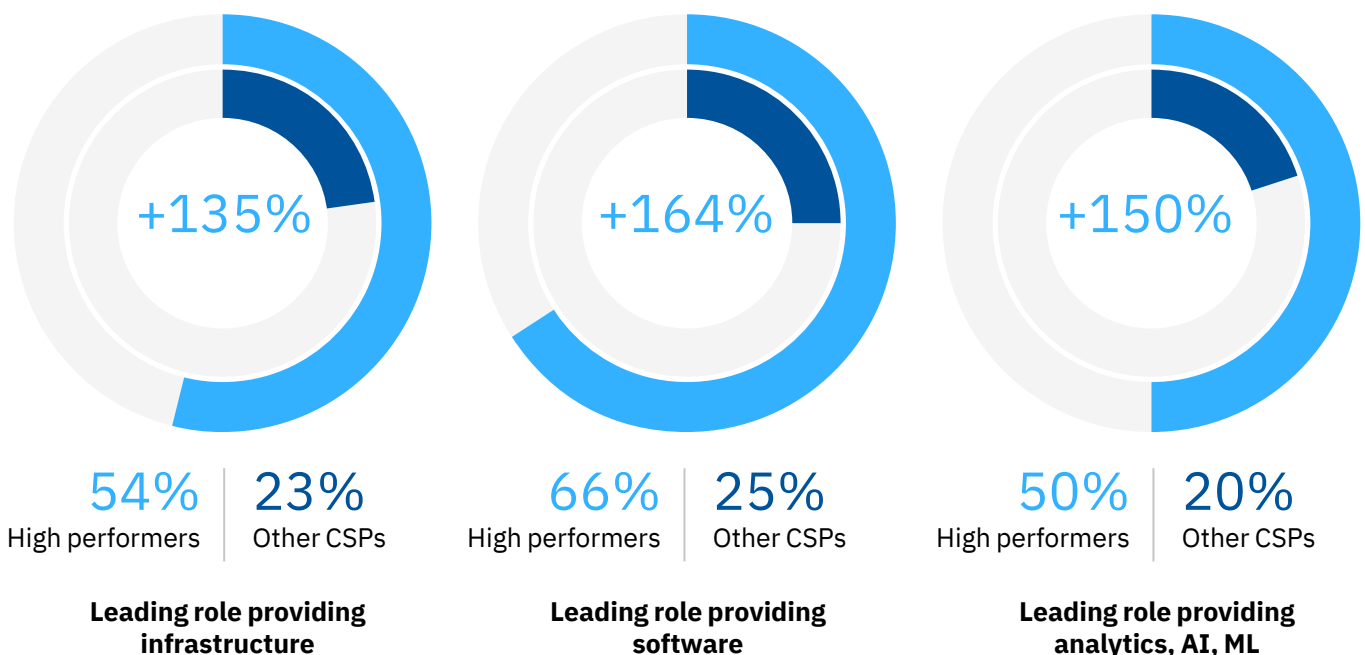
Source: 2020 IBM 5G and edge computing survey; Q14: "To what extent do you agree or disagree with the following statement pertaining to your org's role in developing 5G ecosystems?"

High performers see more ROI at the edge

Healthy demand seems to be pent up already at the network edge waiting for operators to go after it. A recent IBV survey of 1,500 executives with direct knowledge of their organization's strategies, investments, and operations concerning edge computing revealed that 91% of organizations will implement edge computing within five years.[17]
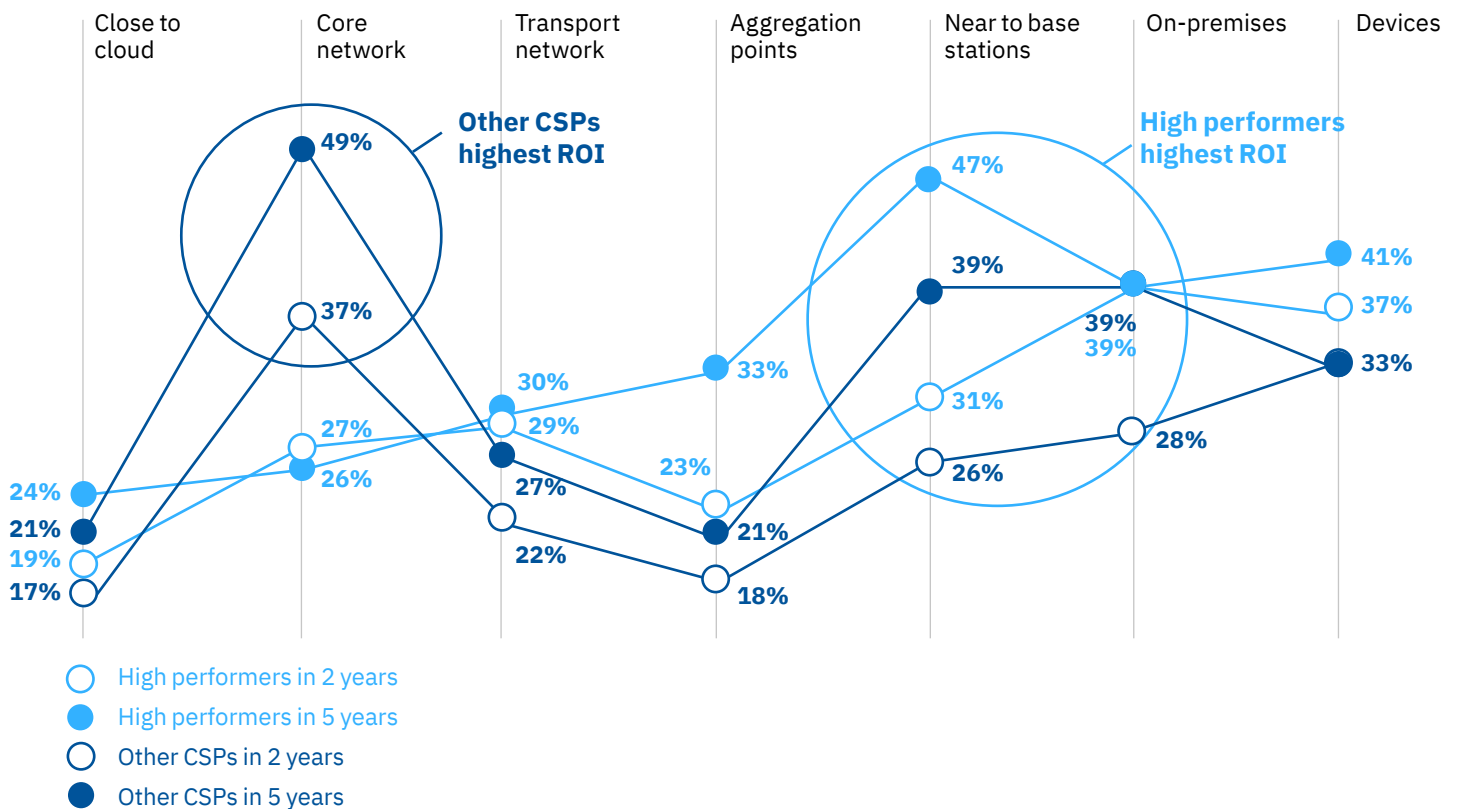
According to Gartner, about 10% of enterprise-generated data is created and processed outside of a traditional centralized data center or cloud. This will reach 75% by just 2025.[18] Edge computing deployments will have to expand rapidly into the enterprises for this to occur, serving as both an opportunity and challenge for service providers.

As shown in Figure 7, our survey revealed a significant difference in attitudes between high performers and other CSPs relating to the sources for ROI that they anticipate across network tiers, with high performers generally seeing more value at the edge of the network and other CSPs seeing more in the network core.

Figure 7

Sources of network ROI

High-performers anticipate ROI consolidating mostly near-to-base-stations, while other CSPs see it pooling mainly around the core network

	Close to cloud	Core network	Transport network	Aggregation points	Near to base stations	On-premises	Devices
High performers in 2 years	19%	37%	30%	23%	31%	39%	37%
High performers in 5 years	24%	26%	29%	33%	47%	39%	41%
Other CSPs in 2 years	17%	27%	22%	18%	26%	28%	37%
Other CSPs in 5 years	21%	49%	27%	21%	39%	39%	33%

Other CSPs highest ROI

High performers highest ROI

○ High performers in 2 years
● High performers in 5 years
○ Other CSPs in 2 years
● Other CSPs in 5 years

Source: 2020 IBM 5G and edge computing survey; Q25: "Where do you think your org will generate the highest ROI for 5G-enabled edge computing investments?"

Verizon: Multi-partner platform for 5G edge[19]

One of the first companies in the world to offer 5G mobile edge computing (MEC), Verizon built a platform that enables developers to deploy 5G applications that require ultra-low latency.

Verizon built its own platform and ecosystem with flexibility to manage multiple hyperscale partners for different needs, including Amazon Web Services for public cloud MEC and Microsoft Azure for private cloud MEC. Verizon is also partnering with IBM to combine its 5G and edge networks with IBM's expertise in AI, hybrid multi-cloud, and edge computing.

Verizon maintains the flexibility to sell and deliver what the market needs, while supporting the front-end sales relationships and platform control points through which developers, ecosystem partners, and end users engage.

Forward-thinking CSPs are planning proactively to build scalable digital platforms that allow them to control critical parts of value chains to the edge, while adopting strategies that encompass multiple third-party clouds, ecosystem partners, and delivery partners (See case study, "Verizon: Multi-partner platform for 5G edge").

The risks and rewards of partnerships

Many CSPs are contemplating whether hyperscale cloud companies are friends or foes. There are very good reasons for CSPs to partner with third-party clouds, since these partnerships can be an expedient way to reach the 5G edge with mature offerings while reducing investment needs. But these decisions come with risk, and the answer for CSPs may be arriving at a model that takes advantage of hyperscale innovation without acquiescence.

Three-fifths of high performers in our survey agree that they must partner with third-party systems integrators (SIs) for industry verticals to grow revenue and profits from 5G-enabled edge computing, compared to only 17% of other CSPs—a difference of 253%.

The need to partner is supported by recent research from BearingPoint/Beyond and Omdia that found only 1 in 5 early enterprise 5G deals were CSP-led.[20] In 40% of deals, CSPs were the secondary supplier, while large enterprises themselves led about a third of deals.[21]

Enterprises may not perceive that CSPs have the specialized knowledge and skills to add enough value to industry-specific solutions, which opens the door to some enterprises seeking to acquire their own spectrum or to seek alternative connectivity solutions like satellites, which might allow some enterprises to buy private cloud services from providers without a CSP involved.

CSPs may want to consider a prime system integrator as a long-term co-collaborator to help form and evolve strategies, operating models, IT architectures, complex partner integrations, cloud native development methods, and overall culture.

There are reasons that CSPs
should be cautious in relying too
heavily on the hyperscale cloud
companies that are investing
heavily in acquiring network
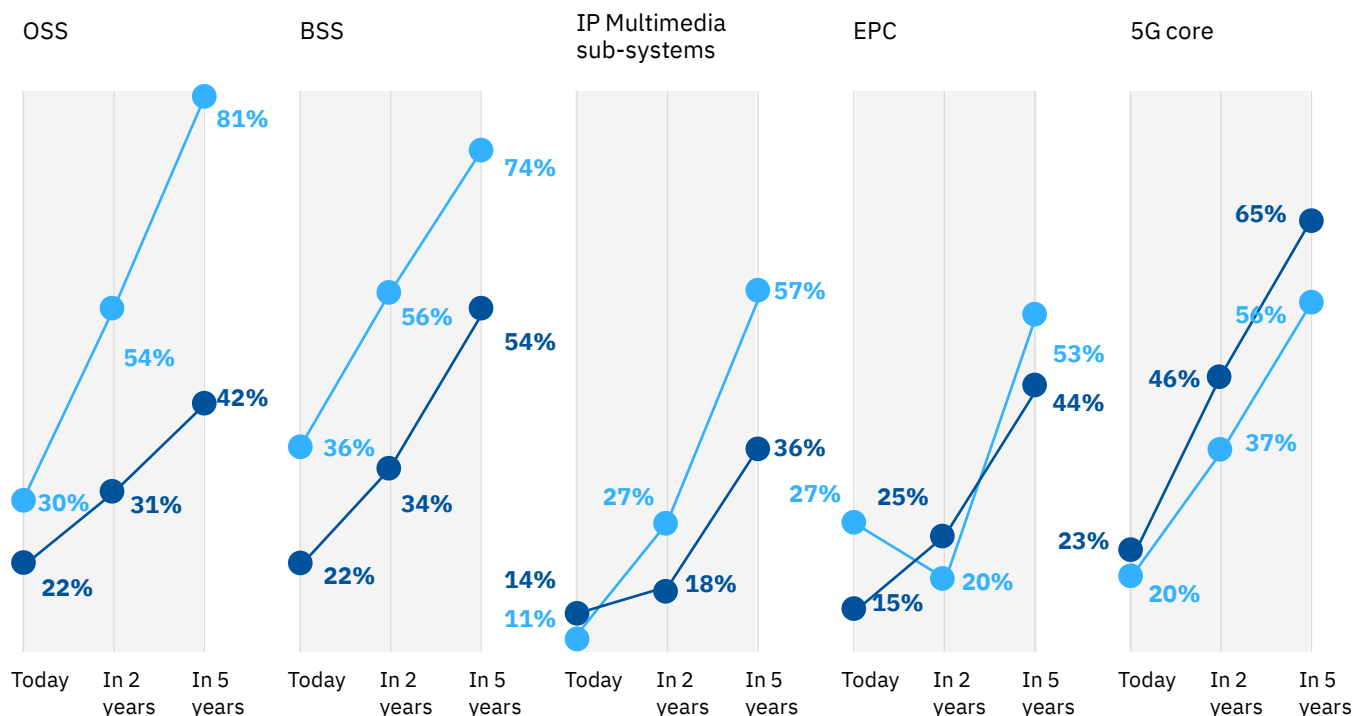functions into their clouds.

Hyperscale cloud providers may serve as attractive partners to help CSPs penetrate industry verticals by paring specialized connectivity services with industry offerings; they may also help to offset some of the capital expenditure (CapEx) required to build capabilities to the network edge. However, there are reasons that CSPs should be cautious in relying too heavily on the hyperscale cloud companies that are investing heavily in acquiring network functions into their clouds.

Most CSPs see the benefit of procuring network functions from third-party cloud services increasing steadily. High performers are far more inclined to see value in moving OSS and BSS to cloud over time, while other CSPs see slightly more value than high performers in moving their 5G core (see Figure 8).

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Figure 8

Outsourcing network functions

Over 2 and 5 years, all CSPs see benefits rising from outsourcing to third-party cloud providers

OSS — Today 22% / 30%, In 2 years 54% / 31%, In 5 years 81% / 42%

BSS — Today 36% / 22%, In 2 years 56% / 34%, In 5 years 74% / 54%

IP Multimedia sub-systems — Today 11% / 14%, In 2 years 27% / 18%, In 5 years 57% / 36%

EPC — Today 27% / 15%, In 2 years 20% / 25%, In 5 years 53% / 44%

5G core — Today 20% / 23%, In 2 years 46% / 37%, In 5 years 56% / 65%

High performers | **Other CSPs**

Source: 2020 IBM 5G and edge computing survey; Q17: "To what extent do you believe your org is likely to benefit from procuring the following network functions from third parties as cloud-based services today? In two years? In five years?"

74% of high performers say that partnering with webscale companies would mostly benefit the strategic interests of the webscalers, compared to just 31% of other CSPs.

While they are not likely to be the primary revenue earners from 5G networks, CSPs will bear most of the costs for deploying them. The percentage of services revenues that CSPs must allocate to recoup 5G network investments may rise precipitously from approximately 12-15% in the 4G era, to around 40%.[23] The need to recoup investments could entice CSPs to make short-term decisions that later prove to be harmful.

To offset 5G investments, some CSPs will seek to move network functions from the CapEx column of their balance sheets to the operational side. Because of their scale, hyperscale cloud companies are likely to offer enticing financial incentives to outsourcing partners for telecom network functions.

If hyperscale cloud companies manage to own both the platform control points for the most scalable domains and the control plane for network traffic up to the last mile, then they could either force CSPs to become regional utilities, or seek other partners like content delivery networks, regional datacenters, or tower aggregators to build out 5G networks.

As an analogy, consider Hollywood. Not long ago, television networks and studios chased near-term licensing deals with video streaming platforms. Achieving massive scale, and armed with data on consumer behavior, those platforms became adept at producing their own content, relying less on the incumbent networks and studios, and pulled attention away from traditional media. By the time the incumbents realized they were facing an existential threat, revenues, power, and control had shifted away from them and toward Silicon Valley business models.

This is an example of how a new breed of enterprise— webscale companies—have evolved to shape market expectations and capture disproportionate value from digital fare. A webscale company is any enterprise that operates internet applications, services, or technologies at global (or close-to-global) scale. Typically, they were born cloud native and are known for rapid innovation, data-centricity, and business agility.

High performers seem to understand the risks of relying too heavily on webscale companies. Far more high performers agree that they must partner with third-party public clouds for 5G-enabled edge computing—51% compared to just 22% of others—but 74% of high performers say that partnering with webscale companies would mostly benefit the strategic interests of the webscalers, compared to just 31% of other CSPs.

Sometimes, to quote the band *Everclear's* song, "Everything to Everyone," "The hand you hold is the hand that holds you down."

Hyperscale means cloud native

A once-in-a-generation demand growth curve will require once-in-a-generation technological changes that keep pace. The reference architecture for CSPs is undergoing a shift that will accelerate as 5G standalone (SA) networks mature and 5G standards initiatives make them more cloud-like.

Network cloud is expected to deliver open software innovation on generic, commodity hardware at such a level of rapid progress that it will require CSPs to embrace a new model that integrates hybrid cloud and cloud native concepts. A hybrid cloud environment blends public and private clouds, on and off premise, to achieve business agility and lower costs, while cloud native refers to an approach to develop modern software that takes advantage of cloud computing.

As SA networks become more common, the ability to deploy and manage network and cloud functions from IT will become more integral to operator growth. SA networks are cloud native by design. Unlike the more limited capabilities of non-standalone 5G networks, they are capable of delivering the full range of 5G benefits—though they may need to be distributed across the network edge to do so. Data from our survey suggests that SA networks will soon be mainstream: 30% of high performers and 13% of other CSPs plan to deploy SA networks by the end of 2021. By the end of 2024, those percentages are 73% and 48% respectively.

Perhaps unsurprisingly, our survey revealed that high performers say they understand the strategic importance of cloud native networks to a greater degree than other CSPs (see Figure 9).
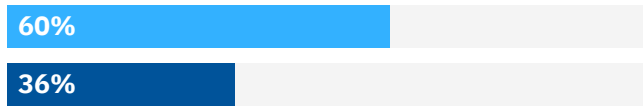

Figure 9

Preparing for network cloud

Most high performers understand the strategic importance of cloud native networks
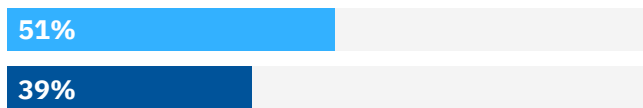
We must shift resources and skills from specialized network engineering to IT
+42%

47%

33%
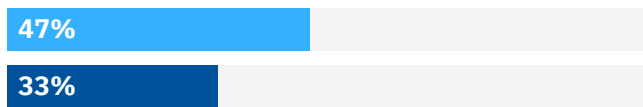
We must virtualize network infrastructure across edge locations
+67%

60%

36%

We must offer data-driven efficiency across entire network and product lifecycle
+31%

51%

39%

High performers | **Other CSPs**

A universal cloud is a network cloud based on the same hybrid cloud architecture as IT. Universal cloud can help reduce technical debt, improve time to value, and integrate network functions and cloud network functions. Such an approach also discourages vendors that develop proprietary technologies, reducing vendor lock-in. Over time, leading CSPs will consolidate network technologies, skills, and operations to shift from infrastructure services to platform services based on the open hybrid cloud approach.

Universal network clouds allow CSPs to leverage the same technology resources across IT, Network, and business-to-business workloads, reducing total cost of ownership (TCO) and making network and product lifecycles deployable from unified consoles. (See case study, "Vodafone Idea: Deploying open universal hybrid cloud.")

In addition to placing higher value on them, high performers also say they are better prepared to deploy cloud native networks than other CSPs.

41% of high performers agree they are prepared to deploy containerized network functions, 30% say they are prepared to deploy network function virtualization (NFV) while only 14% of other CSPs say the same. Meanwhile, 46% of high performers intend to launch DevOps, versus 21% of their peers.

Vodafone Idea: Deploying open universal hybrid cloud[24]

Vodafone Idea (VI) deployed a platform that allows IT and network applications to run on a common cloud architecture powered by IBM and Red Hat. The Open Universal Hybrid Cloud is a hybrid cloud platform based on open technology and open standards that enables Vodafone Idea to better serve nearly 300 million subscribers by allowing networks and IT capacity to be deployed faster with increased automation and lower costs.

The platform enables new distributed edge computing capabilities and is designed to deliver ROI by optimizing investments and skills across the network and IT application domains—all while enabling differentiated business-to-business services to be offered flexibly across multiple clouds.

We see signs that automation is generally important to CSPs, and especially high performers. 79% of high performers agree that to grow profits, they must automate their decisions related to infrastructure, network functions, and operations. The same percentage agree they must become more proficient at automating capabilities directly to enterprises. 61% of high performers agree they must provide automation capabilities to ecosystems with which they partner.

While 79% of high performer respondents agree they must offer automation of infrastructure, network functions, and operations, the story was quite different when they were asked whether they were prepared to actually deploy automation for infrastructure and network functions. Only 43% of high performers tell us they are prepared. There is a 36 percentage-point gap between the importance that high performers ascribe to automating infrastructure and network functions and their ability to do so.
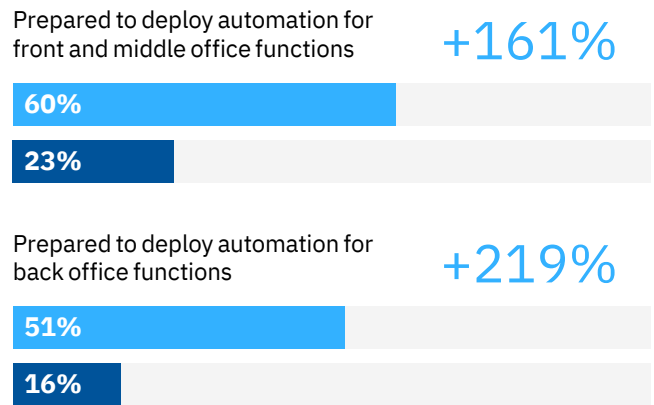
Automation goes hand-in-hand with realizing the cost efficiencies needed to achieve coming scale in the network cloud era.

Our survey revealed large differences in the level of preparedness that high performers say they have to deploy automation for front, middle, and back office functions (see Figure 10). Automation goes hand-in-hand with realizing the cost efficiencies needed to achieve coming scale in the network cloud era. Use cases are myriad, from use of conversational AI (see the recent IBV study "Scaling conversational AI: How telecom companies are boosting efficiency with Virtual Agent Technology") to a broad range of use cases demonstrated to reduce costs, deliver timely insights and improve operational agility (see the recent IBV study "CSPs and the intelligent back office advantage"), and increase average revenue per user (ARPU) by learning to align products with customer buying behaviors and preferences.[25]

Figure 10

Automation in front, middle, and back offices

High performers are even more ahead of other CSPs when it comes to deploying automation

Prepared to deploy automation for front and middle office functions

+161%

60%

23%

Prepared to deploy automation for back office functions

+219%

51%

16%

High performers | **Other CSPs**

Source: 2020 IBM 5G and edge computing survey; Q16: "To what extent is your org prepared to deploy each of the following cloud capabilities of 5G-enabled edge computing?"

Action guide

The end of CSPs as we know them

High performing CSPs are preparing to become essential to value chains by focusing on these 4 key actions:

1. Think beyond connectivity

The value of services and applications is likely to grow faster than connectivity:

– Specialize in strategic horizontal technologies offered to and through partner ecosystems.

– Specialize in strategic vertical technologies for enterprise markets, while developing strong sales, marketing and services capabilities.

– Partner with SIs and NEPs to offset weaknesses.

2. Proceed cautiously with hyperscale cloud partnerships

Partnerships with hyperscale clouds have benefits and risks:

– Develop platforms capable of supporting multiple partners with flexibility to adapt a diverse catalog of offerings—or develop your own.

– Beware of ceding platform control points that become the logical staging points when hyperscale arrives around mid-decade.

– Think carefully before placing network functions and workloads in hyperscale public clouds—placing network functions and workloads in public clouds might increase cloud suppliers' leverage, which could then force CSPs to become regional utilities.

– Consider a prime systems integrator as a long-term co-collaborator.

3. Add value to partner ecosystems

Convene and integrate ecosystems to add value:

– Be the source of the platform economic advantage for yourself and partners by providing the standardized tools and interfaces from which services and applications gain differentiated value.

– Help ensure you maintain relevance and market presence by maintaining the front end for trusted sales relationships.

4. Prepare for network hyperscale with hybrid cloud

By mid-decade, you should have established one or more platforms from which to scale into high-growth domains:

– Prepare your operating model to support deployments from universal cloud resources across markets and IT and network capabilities.

– Deploy cloud-native networks that employ AI and automation to support rapid scale installation, operations, and maintenance.

– Embrace DevOps with Continuous Integration and Continuous Delivery (CI/CD,) along with necessary reskilling and cultural changes.

– Adopt hybrid cloud principles including shifting skills from legacy engineering to IT, virtualization, and containers.

– Consider taking the lead in offering horizontal cloud-based technologies to ecosystems and end users, including BSS/OSS, infrastructure, software, cybersecurity, analytics, ML, AI, and automation

– Consider how to leverage unique data insights as-a-service.

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