SURVEY REPORT

Operator Strategies for Evolving to a Cloud-Native Network Architecture

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Executive Summary

Mobile operators around the globe are beginning to launch 5G networks and migrate to the next-generation of network services. 5G provides operators with an opportunity to substantially transform their network and embrace a cloud-native architecture. Because many of the network services that operators will be delivering are cloud-based, this will require them to evolve and become more open and agile.

In late summer 2020 *Mobile World Live* conducted an online survey of mobile and fixed-line network operators, mobile virtual network operators (MVNOs) and hardware and software companies to understand the timeline for evolving to a cloud-native network architecture, the role the cloud-native architecture plays in deploying both non-standalone and standalone 5G, and some of the challenges operators believe they face when moving to a cloud-native network. This survey confirmed the significance that cloud-native architecture plays in the 5G strategies of respondents and also revealed how important this technology is to operating an efficient network.

Key Findings

Some segments of the telecom industry require more education on cloud-native architecture. Half of respondents (51%) say they are an expert on cloud-native architecture or are very familiar with it. But 36% said that they need to learn more and 13% are not familiar with it.

Cloud native is intricately tied to 5G. 43% of respondents have already started migrating to a cloud-native network architecture and 22% say they plan to migrate to cloud-native in the next 12 months to 2 years. In addition, 43% of participants said that cloud-native architecture is critical to their 5G plans and another 36% said it is a priority.

Most respondents have already started to deploy non-standalone 5G (NSA) or will do so within the next 12 months (60%). However, one-fifth of respondents (20%) say they have no plans to deploy NSA. In addition, 50% of respondents say they have already started to deploy standalone 5G or will do so within the next 12 months.

Open RAN is making steady progress, which is impressive considering it is a fairly new technology for operators to consider. 40% of respondents said that they have already adopted Open RAN or plan to do so in the next 12 months. 24% said that they have no plans to adopt the technology.

22% of respondents said that making the network more efficient was the primary goal of their network transformation strategy but opex savings was also an important factor, with 20% of respondents indicating cost savings was the primary goal. Improving customer experience was also an important criteria, with 18% of respondents saying that was the primary reason for their network transformation.

Lack of internal expertise was viewed as the biggest impediment to deploying a cloud-native architecture, with 36% of participants citing that as a concern. Cost was also a factor with, 23% of respondents saying it would be an issue.

Survey Methodology

This report is based on responses from an online survey of 115 participants – including mobile operators, fixed line operators, MVNOs, and hardware and software vendors – conducted by Mobile World Live on behalf of Cisco.

Software vendors comprised the largest group of respondents (25%) followed closely by mobile operators (24%) and hardware vendors (17%). Fixed line operators made up 7% of respondents. MVNOs were the smallest category with 3% of participants. About 24% fell into the 'other' category – this category comprises a variety of mobile industry professionals in areas such as site acquisition, testing, components, IoT, and finance and consulting.

Geographically, the largest group of respondents (39%) were from companies with headquarters in Europe, followed by North America (25%) and Asia (25%). The rest of respondents were evenly divided between South America (3.5%), Africa (3.5%) and the Middle East (3.5%).

Introduction

In 2020, the number of 5G networks around the world increased dramatically in spite of the COVID-19 pandemic. According to GSMA Intelligence, as of September 2020 there were at least 107 operators in 47 markets that had launched some form of commercial 5G service.

But to capture the full benefits of 5G technology, communications service providers (CSPs) need to consider their existing network architectures and look at how they can optimise their 5G network investments to achieve longer term goals.

Virtualisation and cloud-native network architectures, which embrace the concept of building and running applications that use the cloud computing delivery model, are important components of 5G. CSPs that want the power of standalone 5G, such as being able to offer ultra-reliable low latency services and network slicing, will need to incorporate a cloud-native architecture into their 5G deployment plans if they want to benefit from those services.

To move to the cloud-native model, CSPs will want to consider whether they want to adapt their legacy applications that were built before the cloud to have cloud-native characteristics. In addition, they will need to determine if all future apps should be cloud-native or whether some will not adopt cloud-native characteristics.

Some CSPs have already started to virtualise their networks and migrate to a cloud-native network architecture as part of their preparations for deploying 5G. Most current 5G deployments are non-standalone (NSA), which means the 5G network relies upon the underlying 4G LTE radio access network and core. The next step in this transition is to migrate to a cloud-native, standalone 5G (SA) architecture.

This report assesses CSP strategies for deploying standalone 5G, incorporating software-defined networking (SDN), network functions virtualisation (NFV) and open RAN, and migrating to a cloud-native network architecture. The report looks at the perceived challenges and benefits to incorporating a cloud-native architecture, as well as the timeline for deployment.

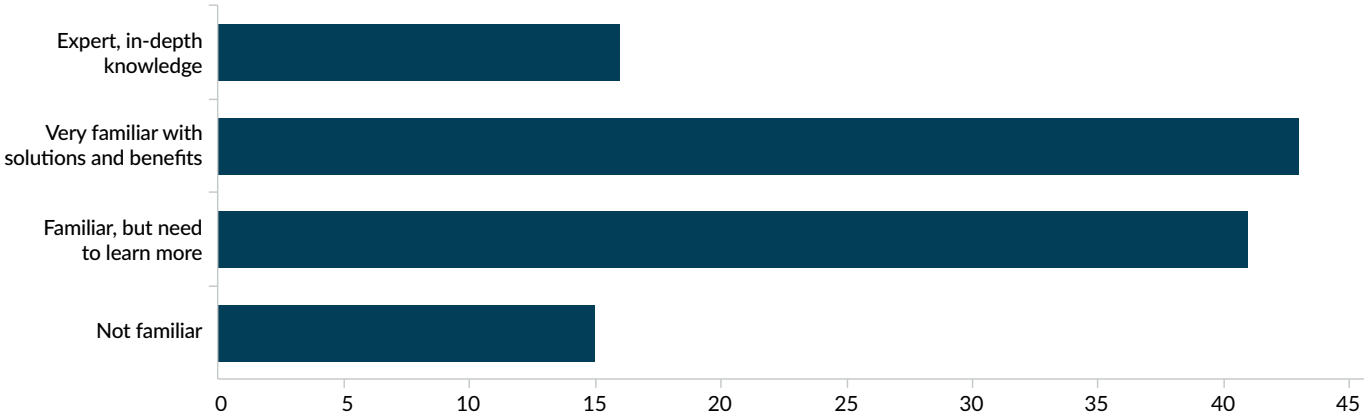
Cloud-native migration is happening today

Cloud-native is the concept of building and running applications that take advantage of the cloud computing delivery model. Cloud-native applications that are designed for the cloud can be deployed more quickly and also have a more fluid architecture, which means they can be placed and moved into different environments easily.

For CSPs that want to adopt a cloud-native network architecture, they must consider incorporating tools such as SDN and NFV. These tools will allow the CSP to move traffic to different parts of the network as demand fluctuates and will provide important stepping stones to new capabilities that are possible with 5G, such as network slicing.

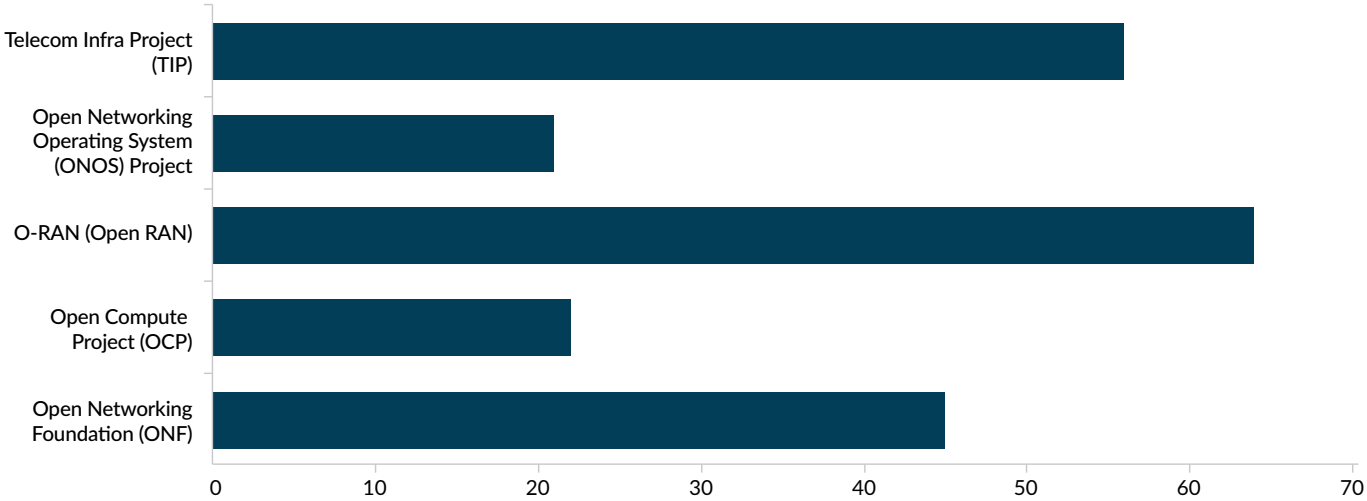
Our survey found that segments of the industry still require more education about cloud-native architecture. While 14% of participants said they considered themselves to be experts on this technology and 37% said they were very familiar with solutions and benefits, another 13% said they were not familiar with it and 36% said they were familiar with it but needed to learn more.

Figure 1: How familiar are you with cloud-native architectures?



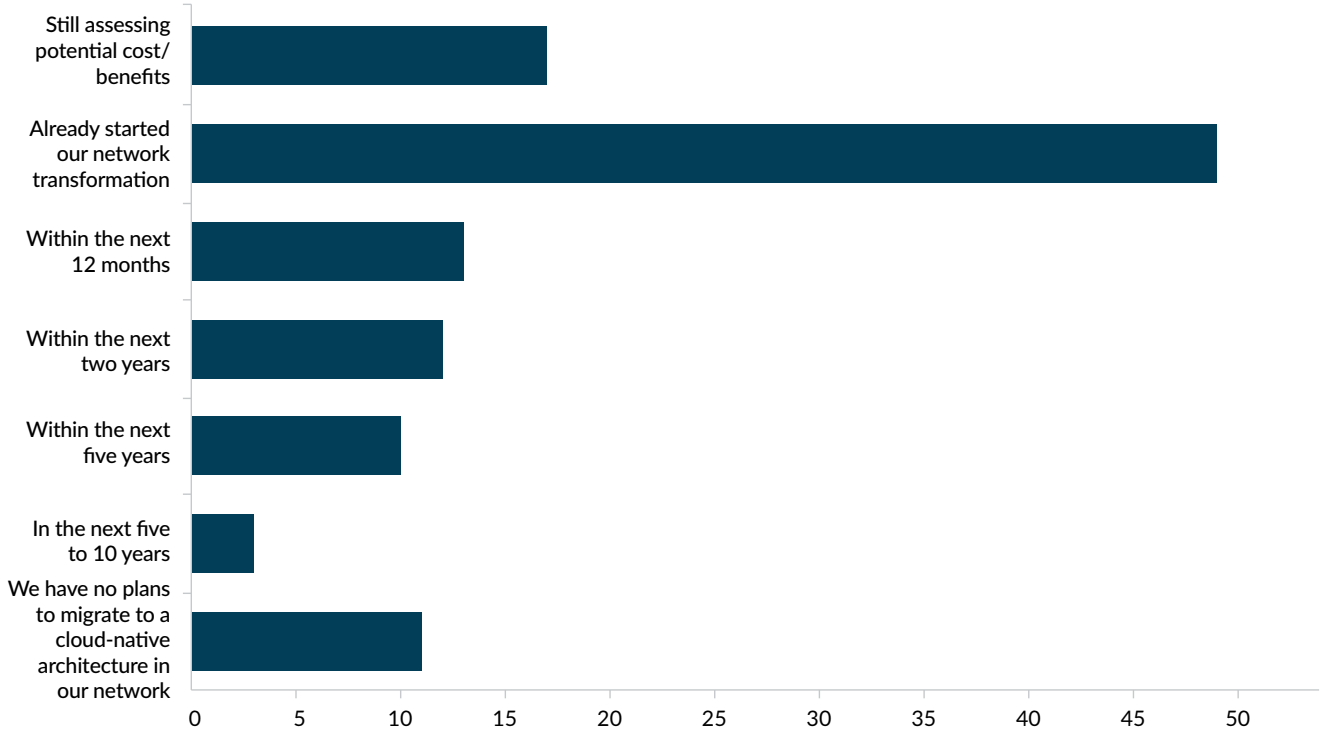
One way to get the latest information and become more familiar with cloud-native architectures is through industry associations and trade groups. The survey found that the O-RAN Alliance is the most popular organisation with 31% of respondents saying their company participates in this trade group. The Telecom Infra Project (TIP) also was highly ranked with 27% of participants saying that their company is a member of this group. The Open Networking Foundation (ONF) was selected by 22% of respondents.

Figure 2: What industry groups/initiatives does your company participate in or track closely (select all that apply)?



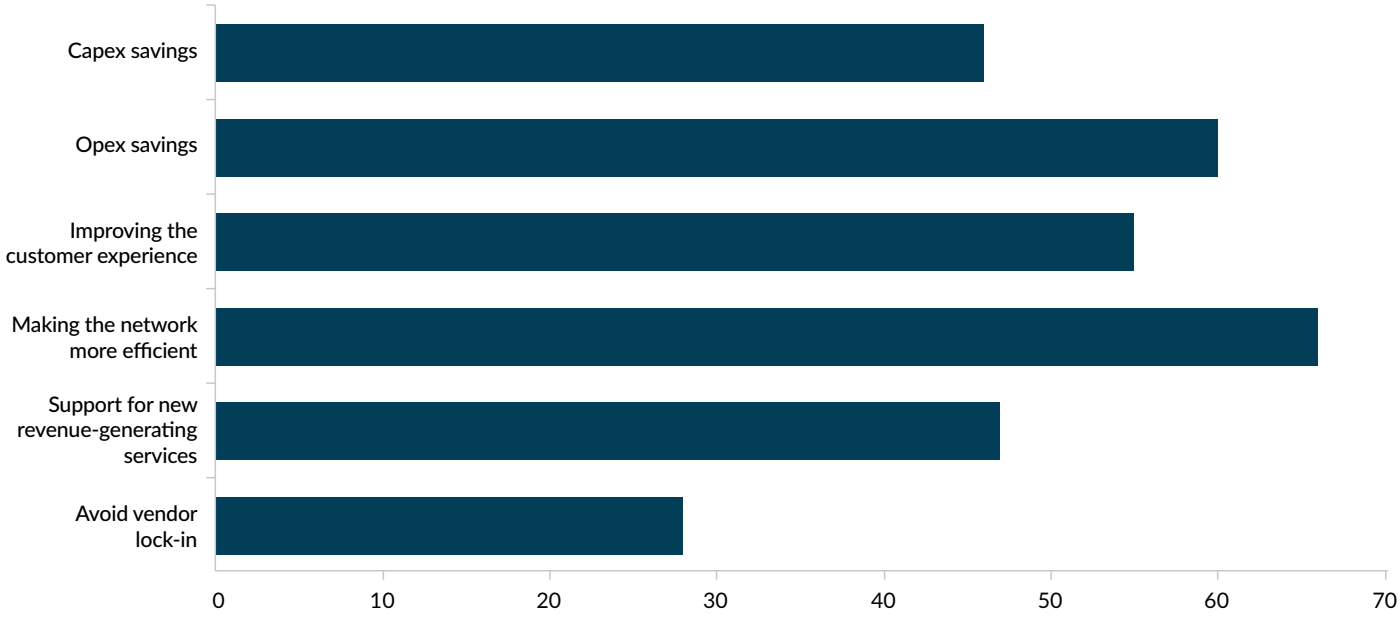
Our survey found that CSPs are beginning to embrace the cloud-native network architecture with the majority of respondents (43%) saying that they have already started their network transformation while 11% say they will migrate to a cloud-native architecture within the next 12 months. Another 10% say they will migrate to cloud-native within the next two years and 15% say they are still assessing the potential costs and benefits of making this move. A little less than 10% said that they have no plans to migrate to a cloud-native architecture in their network.

Figure 3: What is your timeframe for migrating to a cloud-native network architecture?



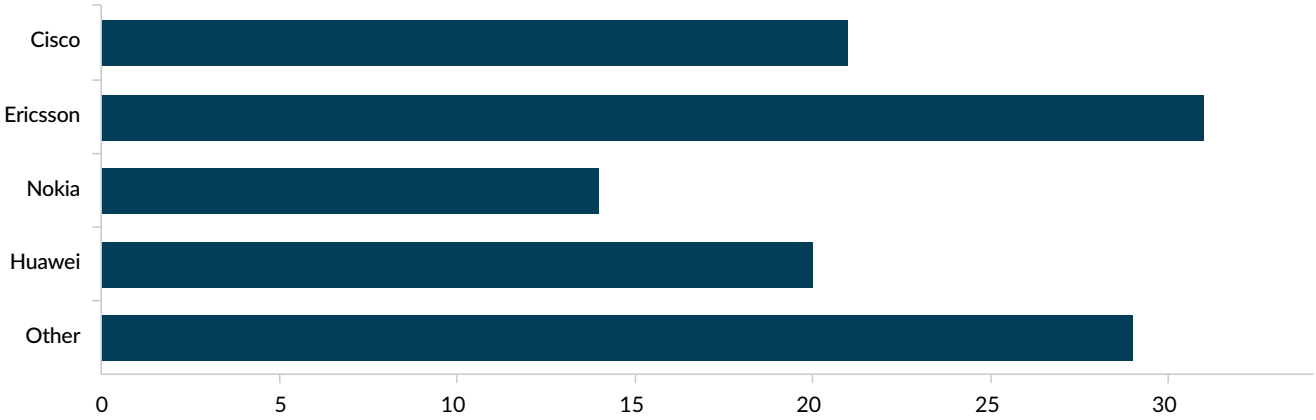
Although cost considerations play a key role in CSP network transformation decisions, network efficiency is also a motivator. Nearly 22% of survey participants said that making the network more efficient was the primary goal of their network transformation strategy. That was closely followed by opex savings (20%) and improving the customer experience (18%). Support for new revenue-generating services and capex savings captured 16% and 15% of responses respectively. Avoiding vendor lock-in garnered the least response, with only 9% of participants citing that as the goal of their network transformation strategy.

Figure 4: What is the primary goal of your network transformation strategy (please select all that apply)?



When it comes to identifying the companies that survey participants believe will help them with their migration to a cloud-native architecture, most respondents named companies that are familiar in the telecom world. 27% identified Ericsson as the market leader followed by 18% that said Cisco was the leader. 17% identified Huawei as the leader followed by 12% that picked Nokia. 25% selected the "Other" category and elaborated by listing companies such as VMware, Altiostar, HPE, AWS and Mavenir.

Figure 5: Who are the market leaders that you believe will help you adopt a cloud-native network architecture?



5G network planning is under way

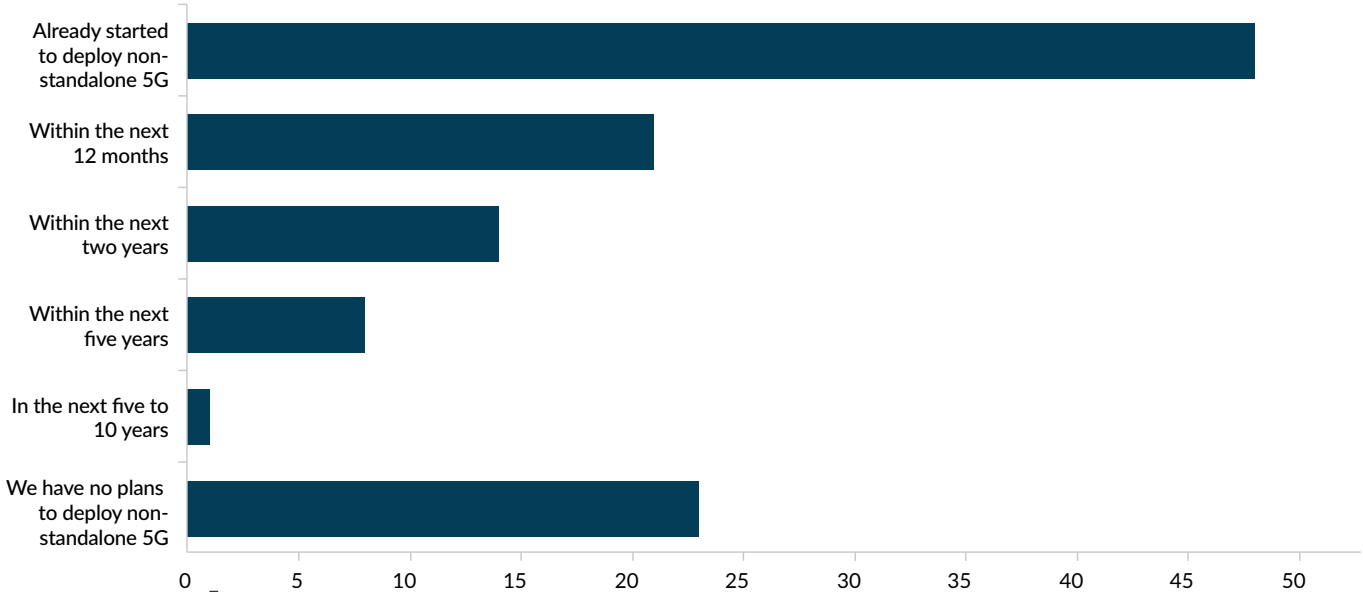
5G is well on its way to becoming a commercial reality. But migrating from 4G network technology to 5G isn't a clear-cut process and mobile operators have to look at many factors including the depth of their spectrum holdings, the maturity of their 4G networks and the competitiveness of their market.

Nearly all of the approximately 110 5G networks that are commercially available around the world are categorised as NSA 5G networks. NSA is an early adaptation of the 5G standard that was developed by the 3rd Generation Partnership Project (3GPP).

This standard was developed so operators could deploy 5G more quickly because it incorporates the 4G LTE network and makes it possible for CSPs to use their existing 4G infrastructure instead of waiting and building a completely new end-to-end 5G network.

In our survey, we found that 42% of participants said that they have already started to deploy NSA 5G and another 18% said that they will deploy NSA within the next 12 months. An additional 12% said that they will deploy NSA within the next two years and 7% said they will deploy NSA within the next five years. 20% said they have no plans to deploy NSA.

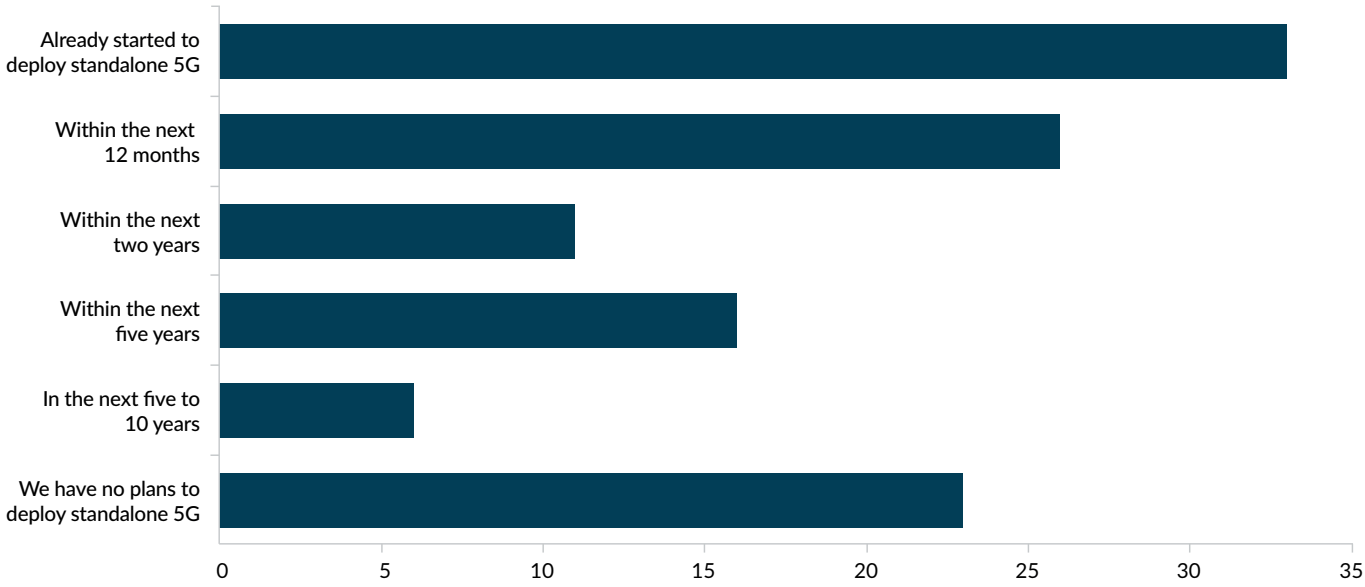
Figure 6: When do you plan to deploy non-standalone 5G?



NSA 5G is often considered just a stepping stone toward SA 5G. The 3GPP completed the SA specification for 5G in June 2018 and it includes a simplified radio access network (RAN) and also introduces a cloud-native network architecture. SA is expected to deliver network performance with data downlink speeds of up to 20 Gigabits per second and ultra-low latency of 1 millisecond.

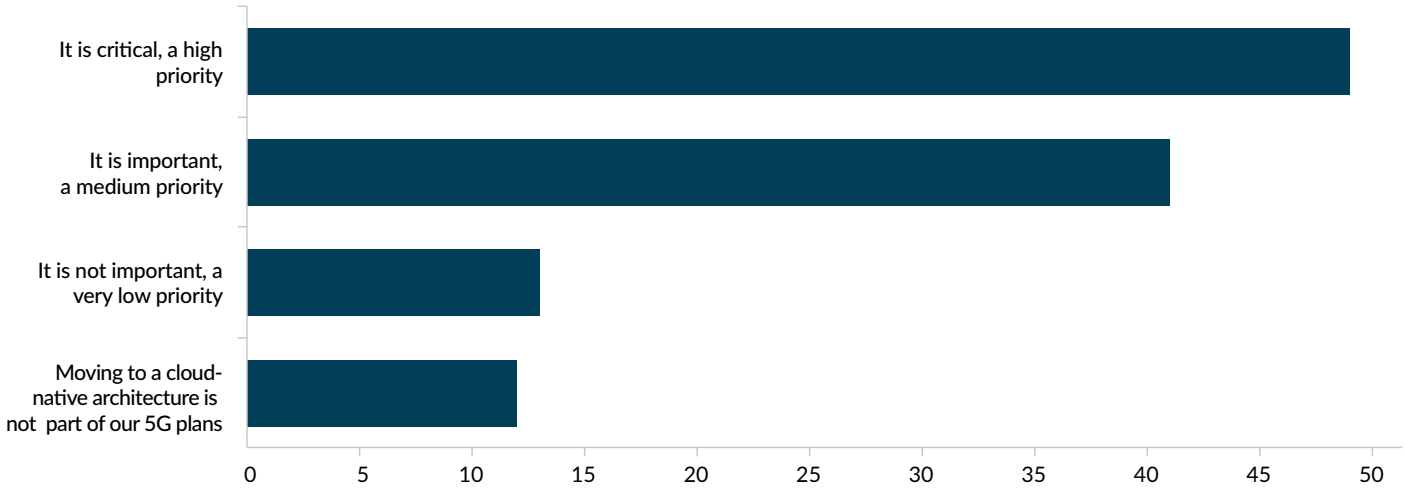
When we queried our survey participants about their plans for SA, nearly one-third (29%) said that they are already starting to deploy SA 5G with 23% saying they plan to deploy SA in the next 12 months. Another 10% said they plan to deploy SA within the next two years and 14% said they will do it in the next five years. Similar to our question on NSA 5G, 20% of respondents said they have no plans to deploy SA.

Figure 7: When do you plan to deploy standalone 5G?



To fully take advantage of the benefits of 5G, CSPs will need to move away from the traditional telecom network architecture and embrace the cloud-native network architecture. When we asked survey participants about how moving to a cloud-native architecture factors into their 5G plans the majority (43%) said that it is critical and a high priority and another 36% characterised the move as an important, or medium priority. Only 11% said it was a low priority and 10% said moving to a cloud-native architecture was not part of their 5G plans.

Figure 8: How does moving to a cloud-native architecture factor into your 5G plans?



The role of SDN, NFV and other supporting technologies

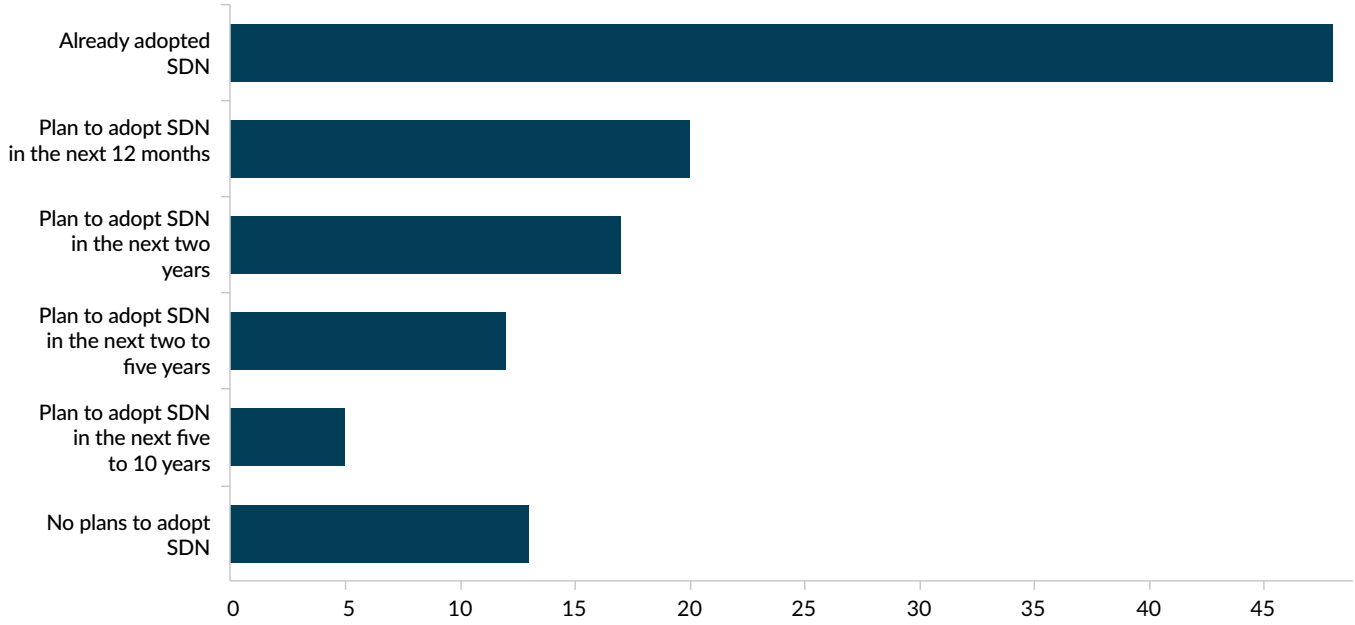
To move away from the traditional telecom network architecture to a cloud-native architecture a CSP will need to first transition to a virtualised network by incorporating tools such as SDN and NFV.

And while SDN and NFV can make existing 4G networks more efficient and competitive, these technologies are an integral part of 5G and are included in the 3GPP Release 16 5G standard.

In our survey, we learned that many of our respondents are on the migration path to having a virtualised network.

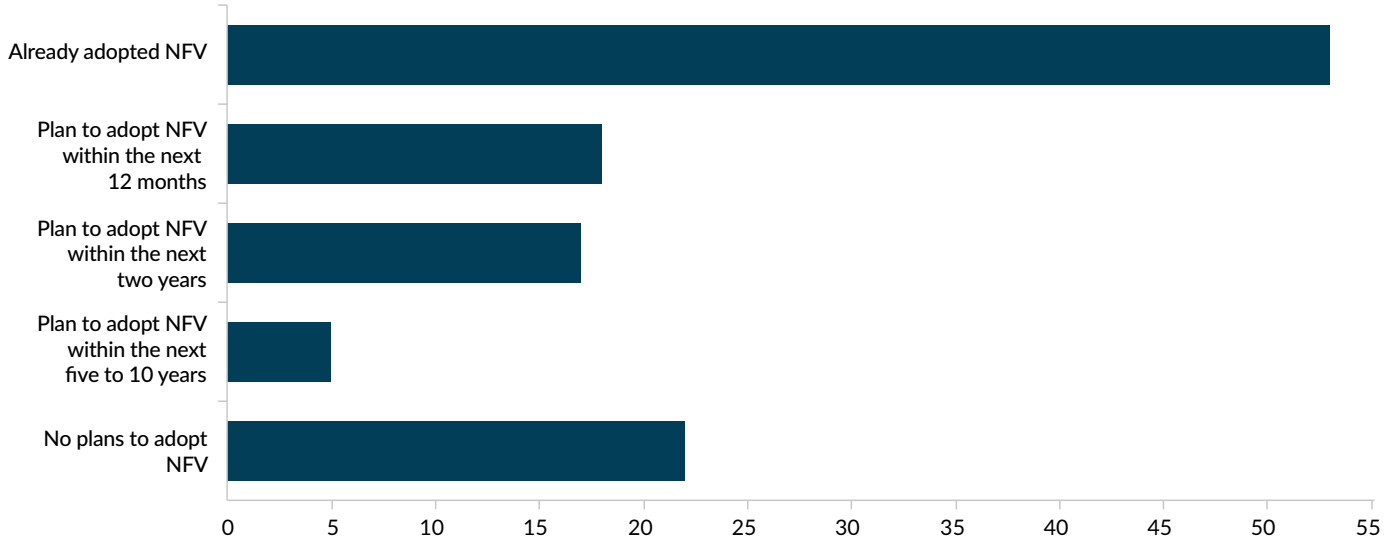
When asked about plans for adopting SDN, 42% said that they had already adopted SDN and 17% said they plan to adopt SDN in the next 12 months. In addition, 15% said that they plan to adopt SDN in the next two years and 10% said they plan to move to SDN in the next two to five years. 11% said they have no plans to adopt SDN.

Figure 9: What are your plans for adopting software-defined networking?



Similarly, when asked about plans to adopt network functions virtualisation (NFV), 46% of participants said that they had already adopted NFV and 16% said they plan to adopt NFV within the next 12 months. Another 15% said their plans include adopting NFV within the next two years and just 4% said they plan to adopt NFV within the next five to 10 years. 19% said they have no plans to adopt NFV.

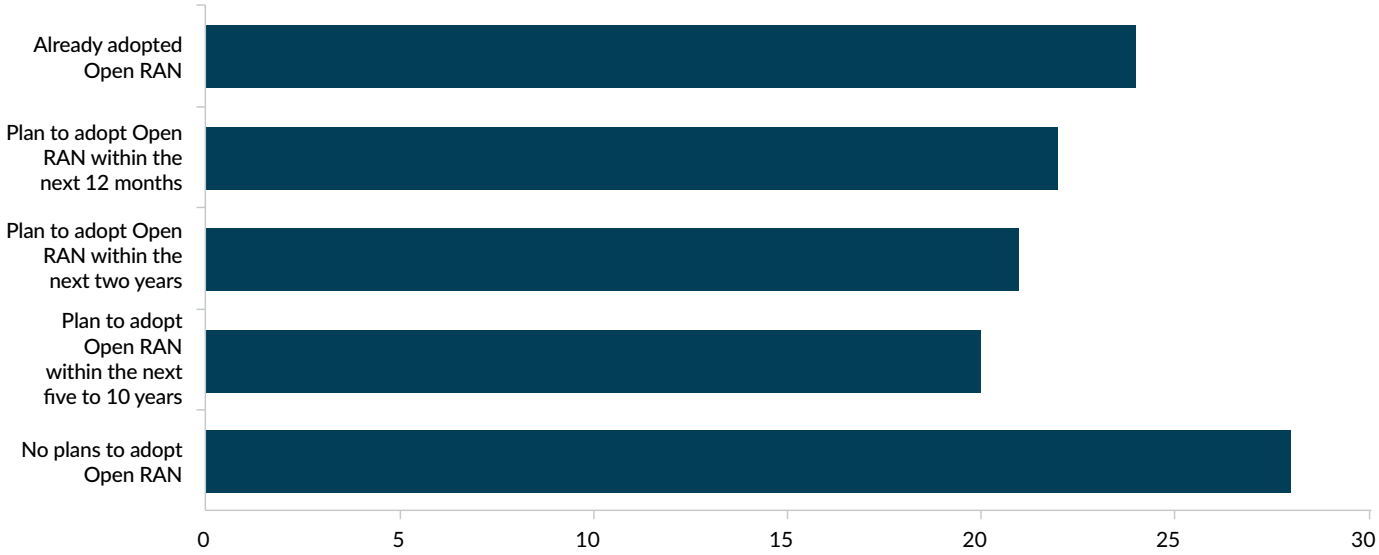
Figure 10: What are your plans for adopting network functions virtualisation (NFV)?



A key element to the network virtualisation trend is opening up of the RAN. This is often referred to as Open RAN and it is used to describe the decoupling of the hardware and software in the RAN, making it easier for service providers to deploy and maintain a network. This also makes it possible for operators to use commercial off the shelf (COTS) hardware and deploy new tools that were previously tied to specific hardware such as dynamic load-balancing and traffic steering.

When asked about their plans to adopt Open RAN, 21% of survey participants said that they had already adopted the technology and another 19% said they plan to adopt Open RAN within the next 12 months. 18% of respondents said they will adopt Open RAN in the next two years and 17% said they will do so in the next five to 10 years. 24% of survey participants said they have no plans to adopt Open RAN.

Figure 11: What are your plans to adopt Open RAN?

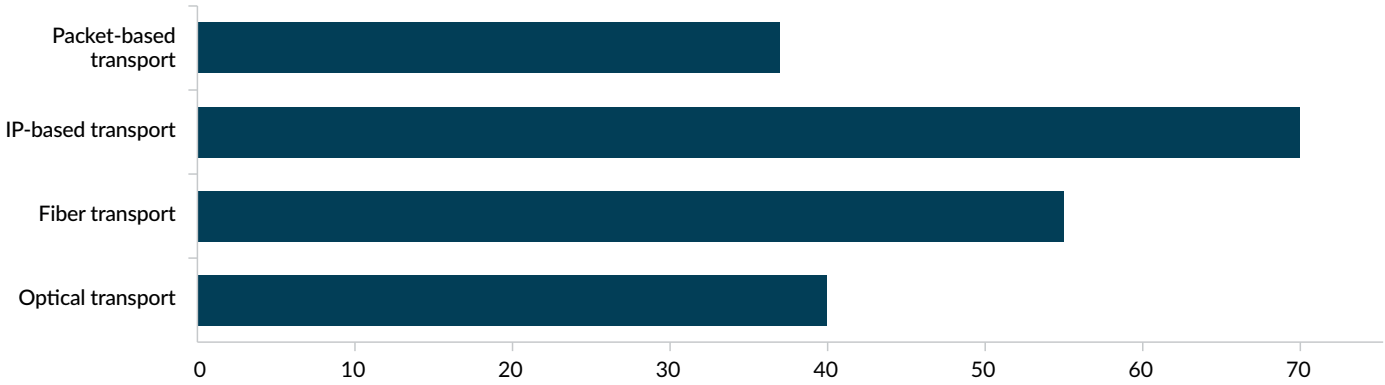


Although much of the 5G discussion centers around the RAN, the transport network plays a key role in the 5G transformation. Transport refers to both fronthaul and backhaul. Fronthaul is the term used to describe the transmission of network traffic between the cellular base station baseband units and the remote radio heads, which are usually at the top of the tower. Backhaul refers to the carrying of network traffic from the cell site, or the core part of the network, back to the switch.

With 5G, the transport network is fundamental to the overall performance of the network. Because 5G networks will potentially support hundreds of gigabits of data traffic from the core network, the transport network must have the capacity to efficiently carry that traffic.

When asked about their transport network, 35% of respondents said that they will use IP-based transport technologies to upgrade their network and 27% said they will use fiber. 20% said they will use optical transport and 18% said they will use packet-based transport.

Figure 12: If you are also planning to update your transport network, what technologies will you use (please select all that apply)?

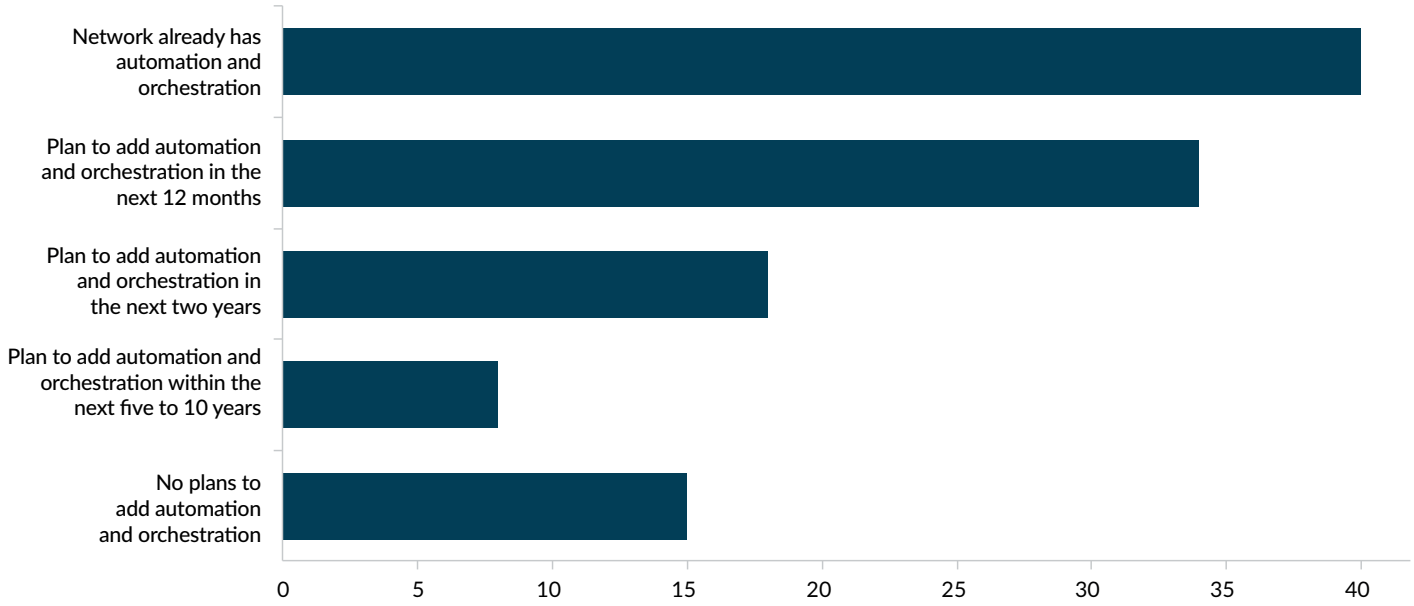


The role of automation and orchestration

5G networks will introduce many new capabilities for both consumers and enterprises and will result in a tremendous amount of data being transferred over the network. To manage all that data, CSPs will need to embrace automation and orchestration to handle those large amounts of data and make the network more efficient.

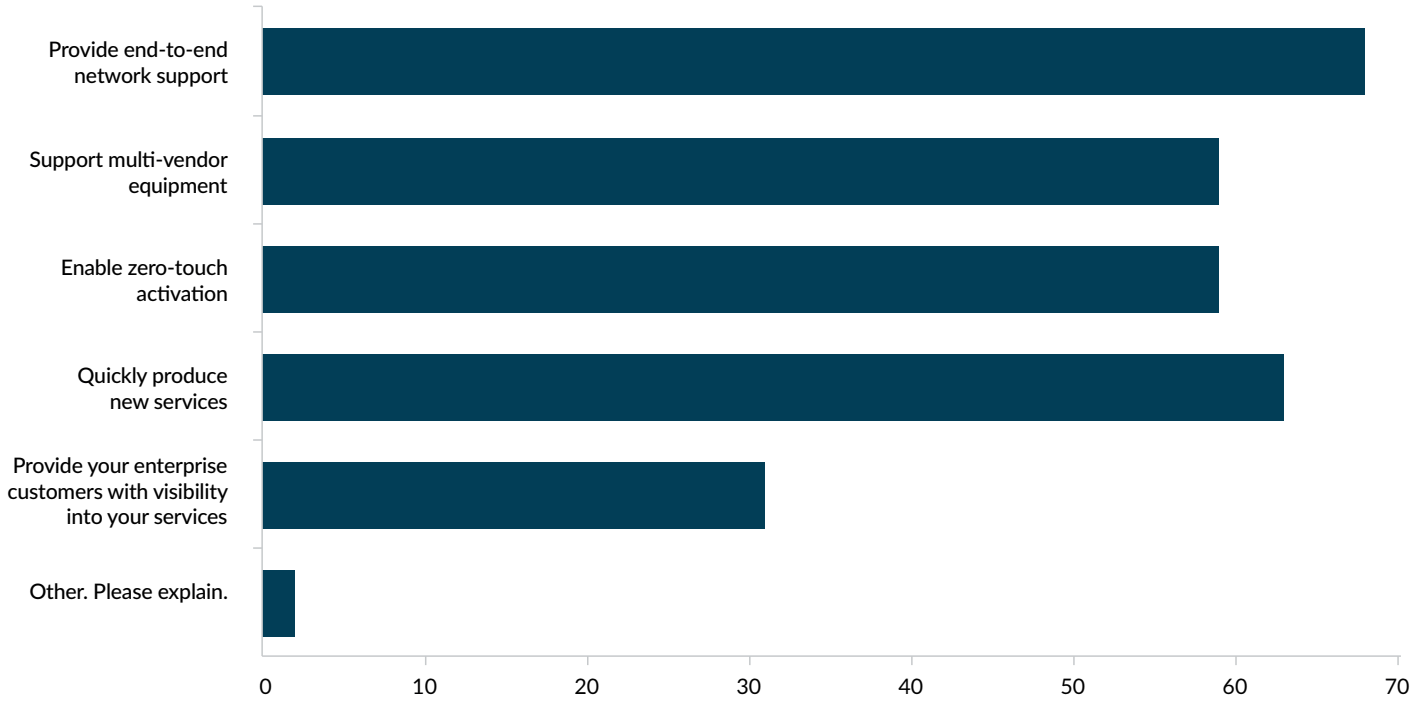
A little more than one-third of survey respondents (35%) said that their network already has automation and orchestration and nearly half (46%) said that they plan to add automation and orchestration to their network in the next 12 months to two years. 13% said they had no plans to add automation and orchestration.

Figure 13: What are your plans to add automation and orchestration to your network?



Providing end-to-end network support is the No. 1 most important thing that respondents want automation and orchestration in their network to accomplish. No. 2 is to quickly produce new services and No. 3 was a tie between supporting multi-vendor equipment and enabling zero-touch activation.

Figure 14: What are the three most important things that your network automation/ orchestration needs to do (Please select the top three that apply)?

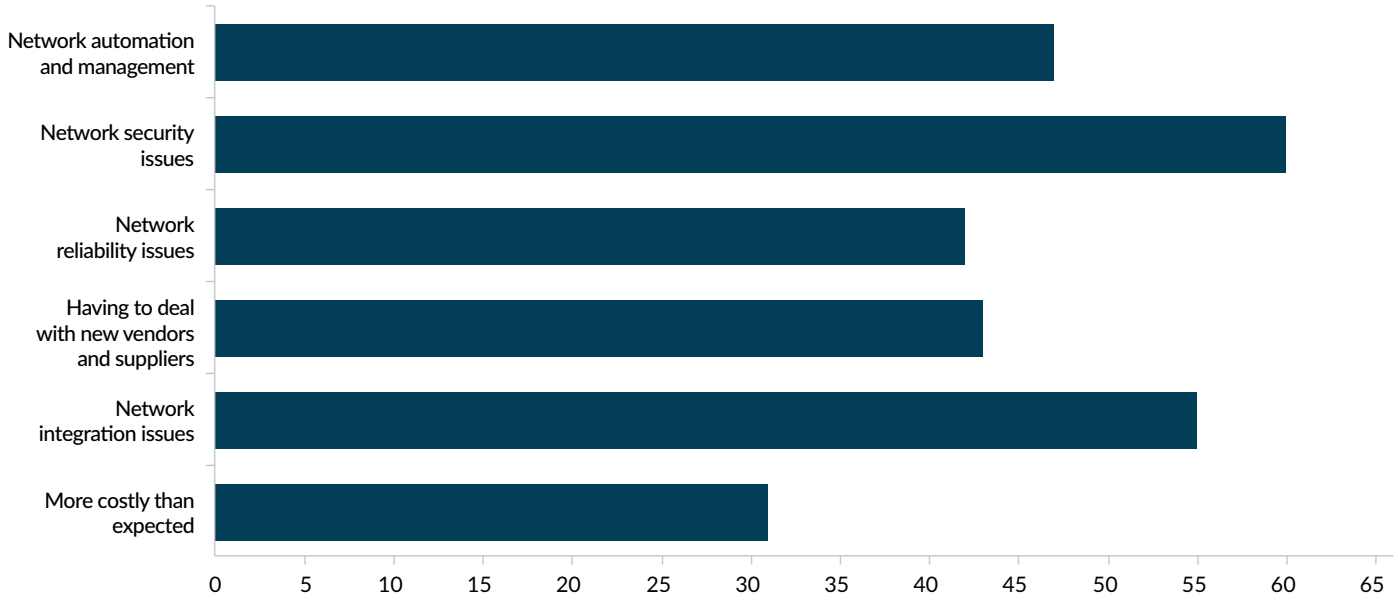


Potential challenges

Although there are numerous benefits to adopting a cloud-native network architecture, there are a few areas of concern for CSPs as they contemplate their next steps.

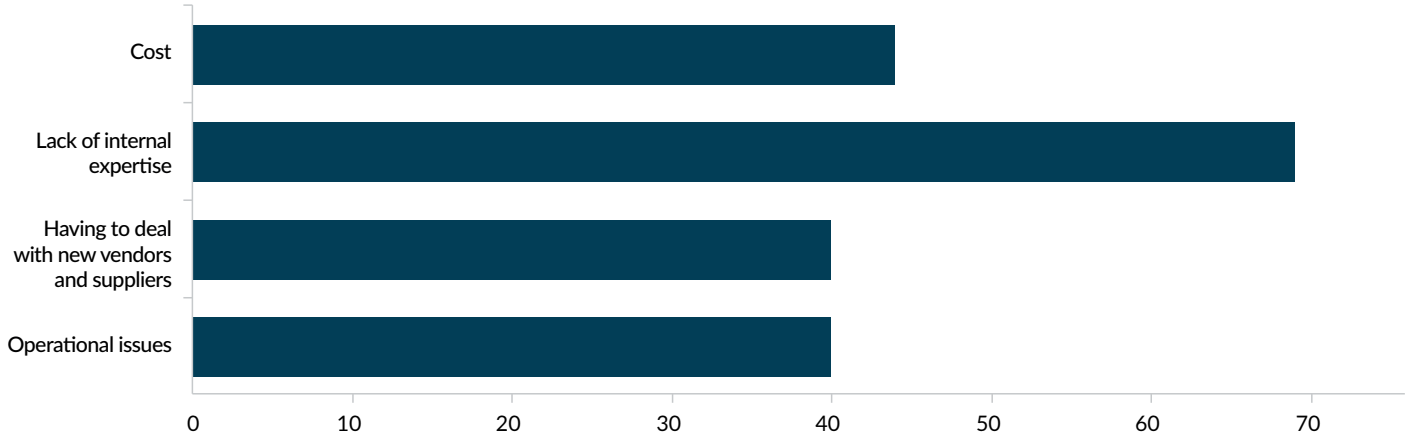
When asked what their biggest concerns are when it comes to deploying a cloud-native architecture, the largest percentage of survey participants (22%) said network security was the biggest issue followed by network integration (20%) and network automation and management (17%). Unexpected costs ranked last (11%) on the list of concerns.

Figure 15: What is your biggest concern when it comes to deploying cloud-native technologies (please select all that apply)?



When asked what the biggest impediment is to deploying a cloud-native architecture, respondents overwhelmingly (36%) said that lack of internal expertise was the biggest obstacle. Other obstacles included cost (23%), dealing with new vendors and suppliers (21%) and operational issues (21%).

Figure 16: What is the biggest impediment to deploying a cloud-native network architecture (please select all that apply)?



Conclusion

CSPs that want to take advantage of all the benefits and power of 5G, such as being able to offer ultra-reliable low latency services and network slicing, will need to embrace a cloud-native network architecture. Virtualising the network will play a pivotal role but that alone isn't enough. Network operators will also need to be more open and agile if they want to deliver cloud-based network services.

But being able to offer a diverse mix of services — to both consumers and enterprises — will require a new network architecture. Many wireless operators around the globe have started on this path. Although it isn't a quick or easy transformation, it is a necessary transition for staying competitive.

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