Cloud-native automation:
The transformation of CSP networks

A CSP study

February 2023

Executive Summary

Automation is essential to realising key benefits of cloud-native networks, such as low total cost of ownership (TCO), elasticity, and self healing. However, communication service providers (CSPs) face many challenges in achieving these benefits.

A major challenge is that network automation developed for one virtualized network function is not necessarily transferable to others. Therefore, cloud-native network automation tools and standards that address this challenge must be open source and driven by community collaboration - such as Nephio.

Google Cloud partnered with Analysys Mason on a study to understand what other automation challenges CSPs face, where CSPs are in their cloud-native journeys, what their cloud-native automation strategies look like, and their attitudes towards Nephio.

This report showcases the key findings from the online survey and CSP interviews.

Geography

North America	26%
Western Europe	21%
Southeast Asia	16%
Central/Eastern Europe	14%
Middle East & N.Africa	9%
China	6%
Latin America	5%
Sub-saharan Africa	3%

108 total respondents

CSP profile

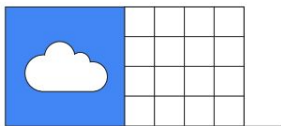|	
Mobile network service provider	92%
$1BN+ annual revenue	35%
Already deployed a cloud-native network	27%

Respondent profile

|	
CTO/CTIO	24%
Head of department	50%
Technical staff/ Manager	26%

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Key findings

CSP cloud-native journeys

- Automation is the top strategic initiative for CSPs, driven by their transformation to cloud-native networks
- CSPs want to implement 5G RAN cloud-native network functions (CNFs) quicker than initially anticipated
- Public cloud providers will play a major role in delivering cloud-native networks

Cloud-native initiatives are driven by the need for better automation, and hence better customer experience and 5G services
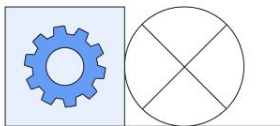
Cloud-native automation trends

- CSPs want cloud-native automation in all network domains
- CSPs need standard approaches to automation to combat siloed technologies and different vendor approaches
- CSPs acknowledge that they need a different organizational approach to cloud-native infrastructure and CNF automation

CSPs expect cloud-native automation to bring change to their fragmented organisations
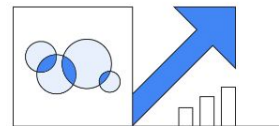
Nephio progress

- **94%** of CSPs globally already know a fair amount about Nephio
- **87%** of CSPs are considering using Nephio across mobile core, RAN, transport and enterprise domains to address their top automation challenges

CSPs want Nephio to bring open source-based standardization to address network complexity

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CSP cloud-native journeys

CSPs acknowledge that automation is a key strategic initiative for their organizations

Automation

30% of respondents chose automation as their top strategic initiative, and is the biggest driver for North American CSPs
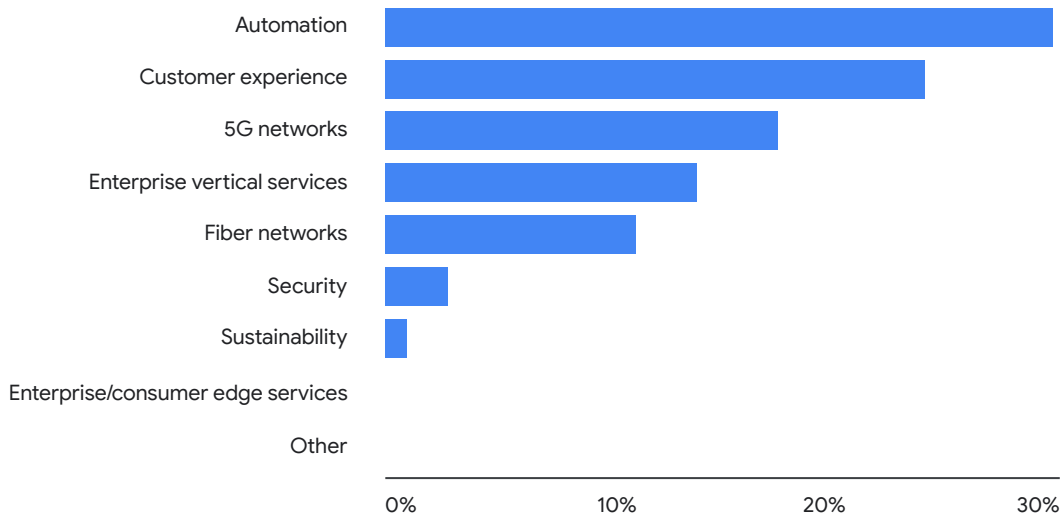
Customer experience

This is a common strategic initiative for Tier-2/3 CSPs and CSPs in the Middle East and Southeast Asia

5G networks

This is a major strategic initiative for Tier-1 CSPs and European CSPs

Source: Analysys Mason Cloud-native Automation and Nephio Survey December 2022

Q. What are your company's top 3 strategic initiatives?

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64% of CSPs will have applied cloud to all aspects of their business - network, IT and enterprise services - by 2024
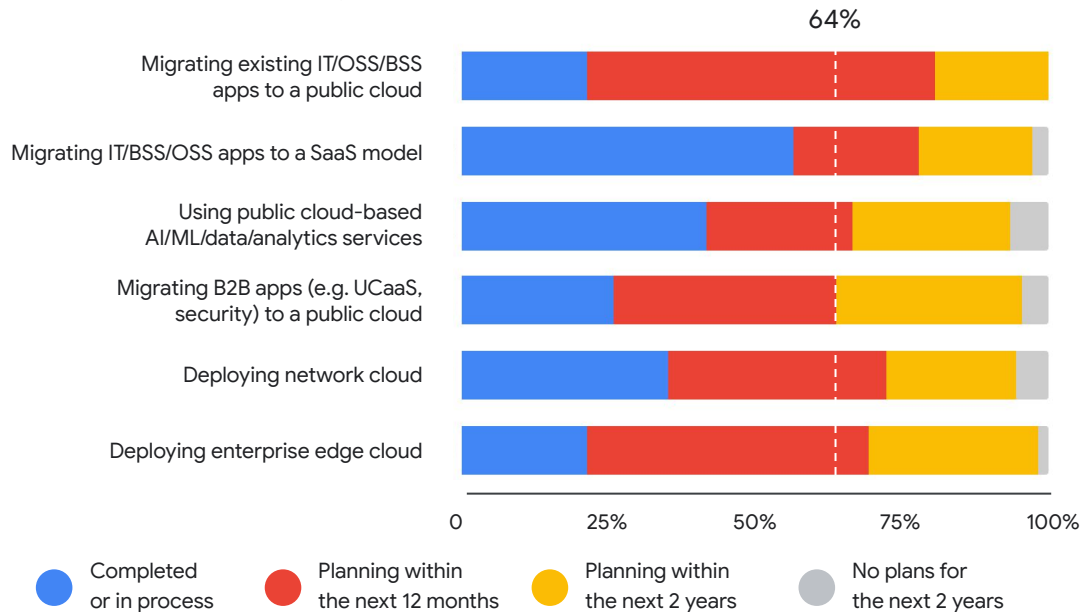
72% of respondents will have deployed a virtualized or cloud-native network cloud by 2024

CSPs started their cloud journeys with IT/OSS/BSS app migration and AI/ML

- AI/ML is typically the starting point for CSPs that are planning to use public cloud within the network

48% of CSPs will start planning enterprise edge cloud within a year

Q. Where are you in your cloud journey?

64%

| | Migrating existing IT/OSS/BSS apps to a public cloud |
| Migrating IT/BSS/OSS apps to a SaaS model |
| Using public cloud-based AI/ML/data/analytics services |
| Migrating B2B apps (e.g. UCaaS, security) to a public cloud |
| Deploying network cloud |
| Deploying enterprise edge cloud |

0   25%   50%   75%   100%

- Completed or in process
- Planning within the next 12 months
- Planning within the next 2 years
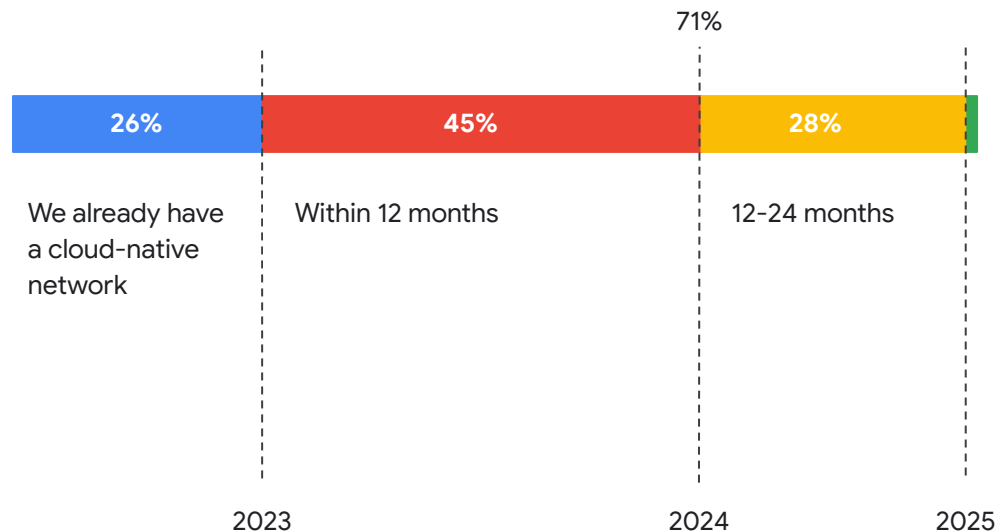- No plans for the next 2 years

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71% of respondents will have adopted cloud-native network functions (CNFs) by late 2023

26% of respondents have already adopted CNFs; **73%** of which have been deployed by Tier-1 CSPs

Slowest to adopt CNFs: Latin America, Middle East, and Western Europe

Q. What is your timeline for adopting cloud-native network functions?

71%

| 26% | 45% | 28% |

We already have a cloud-native network

Within 12 months

12-24 months

2023

2024

2025

Google Cloud

Capex savings and scalability are the top drivers for adopting cloud-native networks
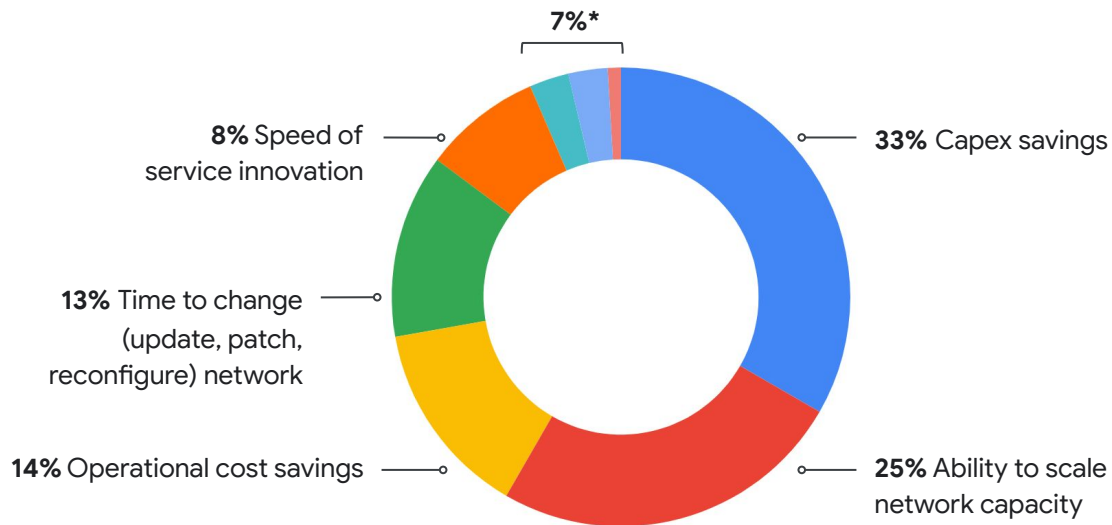
Capex savings

Selected as top driver by **33%** of respondents (mainly Tier-2 and 3 CSPs)

Ability to scale network capacity

- Chosen by **50%** of Tier-1 CSPs
- The driver of choice for CSPs that have already deployed a cloud-native network

Q. What is the top driver for introducing cloud-native approaches and technologies into your network?

7%*

8% Speed of service innovation

13% Time to change (update, patch, reconfigure) network

14% Operational cost savings

33% Capex savings

25% Ability to scale network capacity

* 3% Ability to respond to regulations, 3% Ability to attract new talent, 1% Customer experience
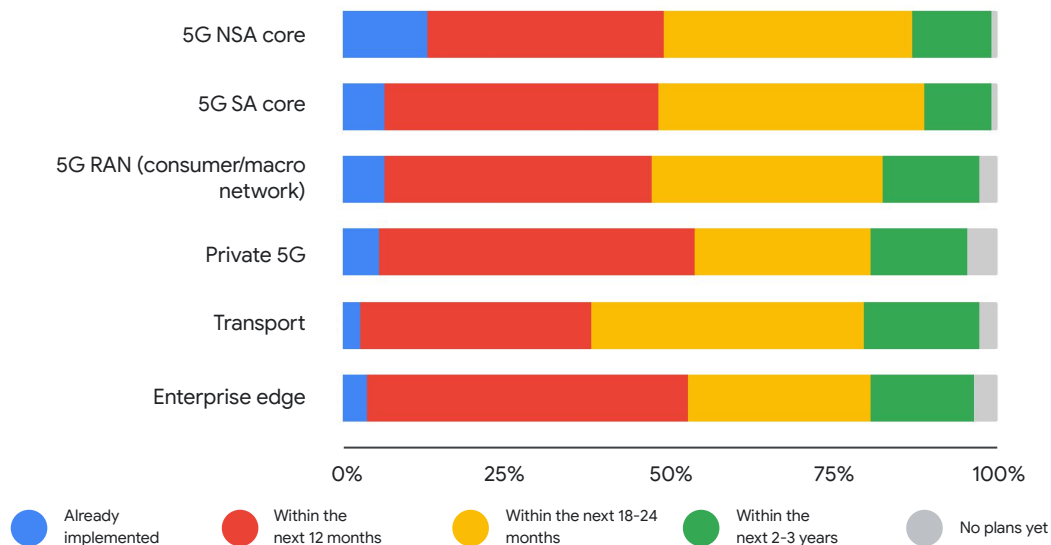
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CSPs want to implement 5G RAN CNFs at a similar pace to the 5G core

By 2024, roughly **50%** of CSPs will have implemented CNFs in every network domain - except transport

CSPs' simultaneous implementation of CNFs across core and RAN indicates a desire to standardize automation over both domains

Private 5G and enterprise edge CNF implementations will accelerate faster than all other network domains in 2023

Q. Which network domains are you planning to implement cloud-native network functions and when?
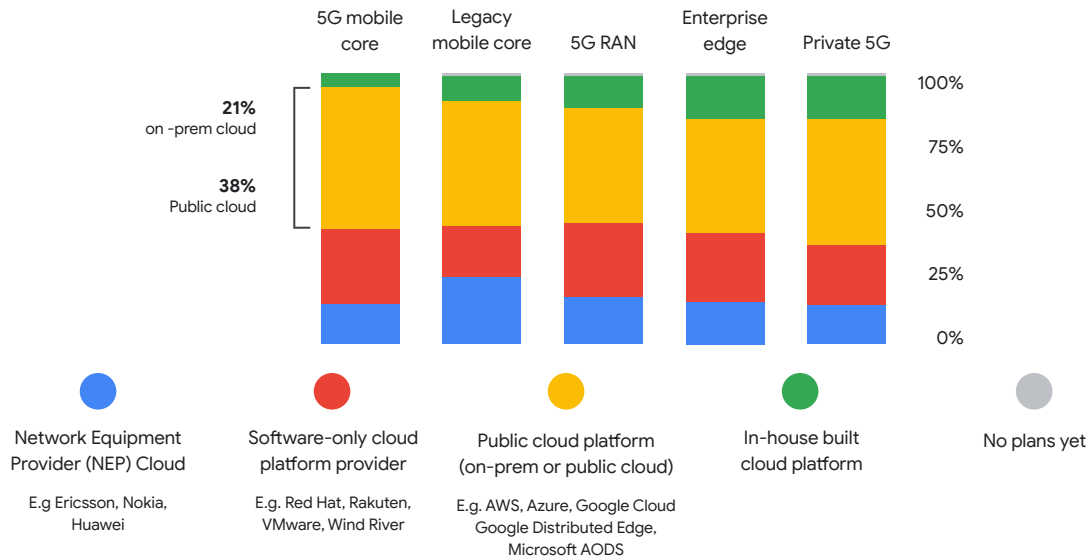

Legend:
- Already implemented
- Within the next 12 months
- Within the next 18-24 months
- Within the next 2-3 years
- No plans yet

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Public cloud platforms deployed on-premises or in the public cloud are the top network cloud choice for all domains

59% of CSPs will use public cloud provider cloud stacks within the 5G mobile core - made up of **38%** public cloud and **21%** on-premises

Software-only cloud platform providers will hold at least a **26%** share of each 5G domain

Q. Who are/will be your cloud providers for your cloud-native network in the following domains?
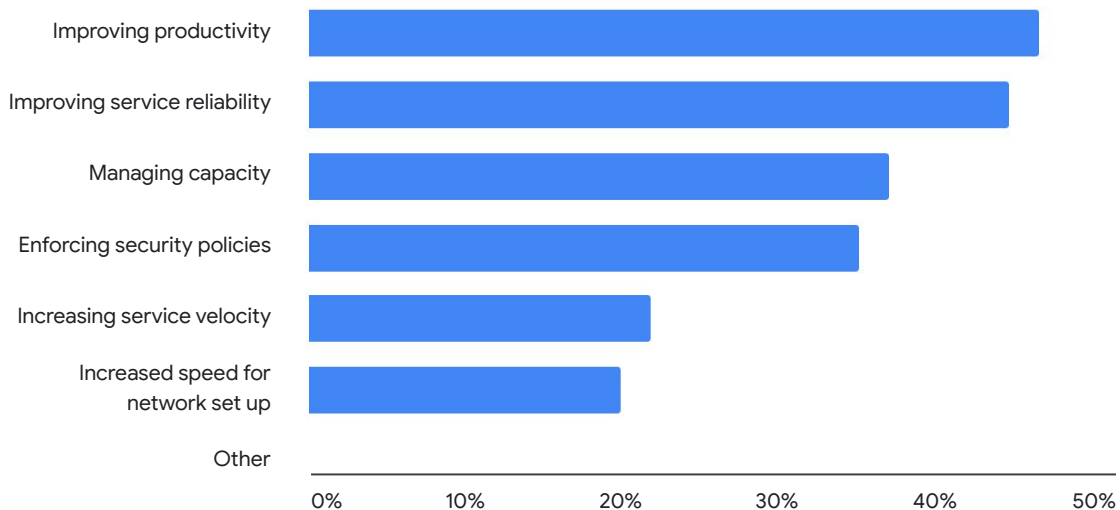

Stacked bar chart with domains: 5G mobile core, Legacy mobile core, 5G RAN, Enterprise edge, Private 5G. Annotations: 21% on-prem cloud, 38% Public cloud. Y-axis: 0%, 25%, 50%, 75%, 100%.

Legend:
- Network Equipment Provider (NEP) Cloud — E.g Ericsson, Nokia, Huawei
- Software-only cloud platform provider — E.g. Red Hat, Rakuten, VMware, Wind River
- Public cloud platform (on-prem or public cloud) — E.g. AWS, Azure, Google Cloud Google Distributed Edge, Microsoft AODS
- In-house built cloud platform
- No plans yet

Source: Analysys Mason Cloud-native Automation and Nephio Survey
December 2022

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Cloud-native automation trends

Cloud-native automation is key to improving productivity and service reliability

93% of CSPs whose main strategic initiative is providing enterprise vertical services are motivated by increasing service velocity, compared to just **21%** of all CSPs

77% of customer experience-focused CSPs favor managing capacity and enforcing security policies

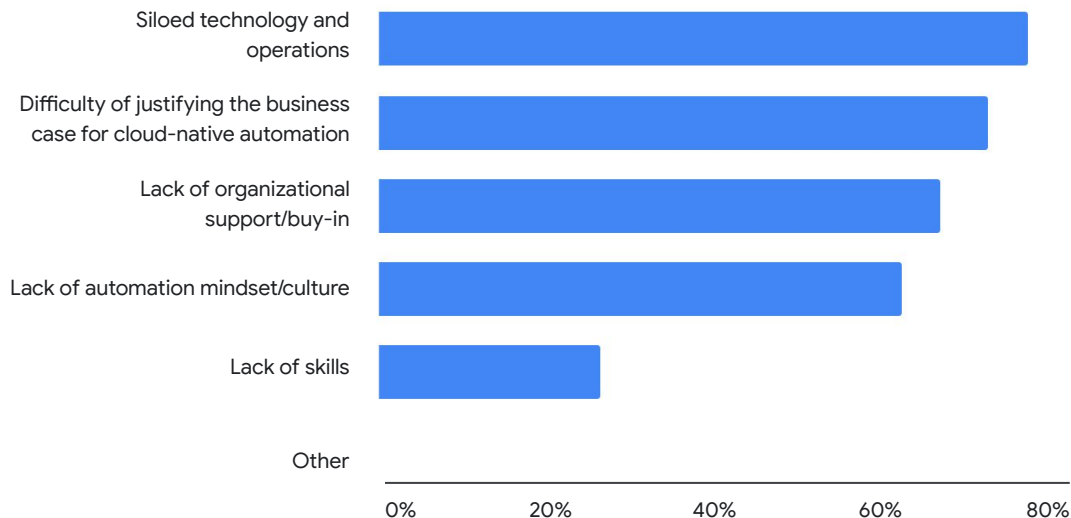**Q. What are the top motivations for cloud-native automation?**

	0%	10%	20%	30%	40%	50%
Improving productivity						
Improving service reliability						
Managing capacity						
Enforcing security policies						
Increasing service velocity						
Increased speed for network set up						
Other						

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CSPs would benefit from more senior-level organisational support for the adoption of cloud-native networks

75% of CSPs are struggling with siloed technologies and operations, stemming from unaligned business units, which leads to inconsistent automation implementations

A quarter of CSPs do not think they lack skills, but they do rank all other pain points highly

C-level support is needed to overcome all these pain points, underpinned by a common cloud-native vision across business units

Q. What are the top business related pain points you are experiencing/expect to experience in your cloud-native automation journey?

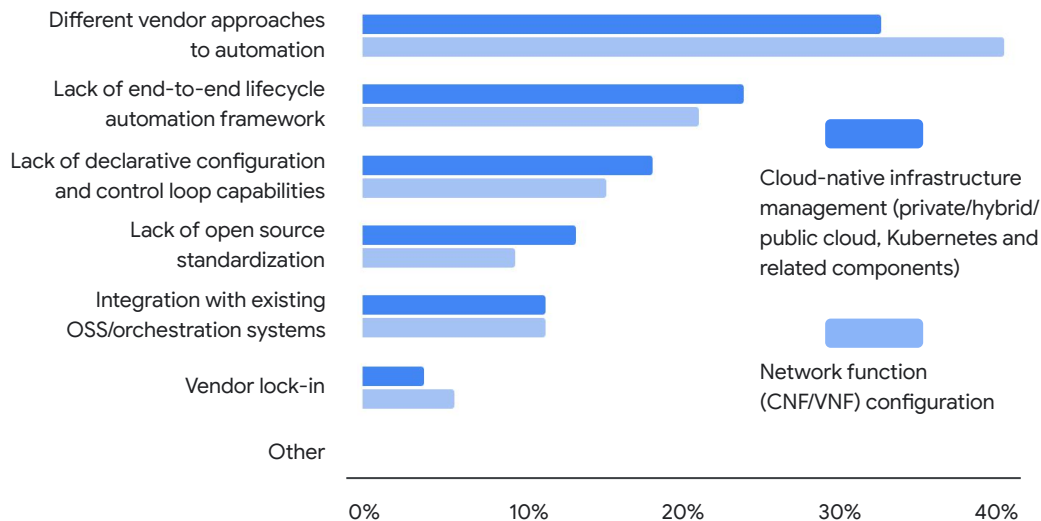|	
Siloed technology and operations	
Difficulty of justifying the business case for cloud-native automation	
Lack of organizational support/buy-in	
Lack of automation mindset/culture	
Lack of skills	
Other	

0%   20%   40%   60%   80%

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CSPs need a common automation approach across cloud infrastructure and CNFs

Pain points are consistent across cloud-native infrastructure management and CNF/VNF configuration - therefore CSPs may be open to a common automation approach

Vendor-proprietary automation is the largest technology challenge facing CSPs

Vendors need to standardize on key lifecycle management tasks such as configuration, if they are to help CSPs' cloud-native automation efforts to succeed

Q. What are the top technology related pain points you are experiencing/ expect to experience in your cloud-native automation journey?
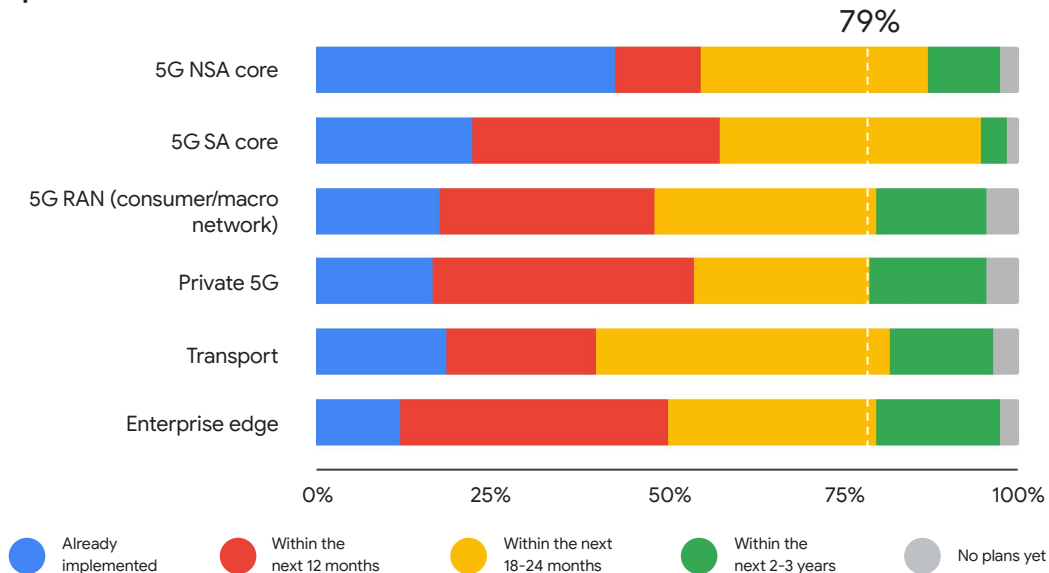

Cloud-native infrastructure management (private/hybrid/ public cloud, Kubernetes and related components)

Network function (CNF/VNF) configuration

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5G SA core automation will be in the spotlight in 2023 as CSPs prepare for launches

79% of CSPs expect to introduce cloud-native automation across all network domains by 2025

Tier-1 CSPs have strong plans to introduce cloud-native automation to the 5G RAN (**37%** of Tier-1 CSPs are implementing within the next 12 months)

Private 5G and enterprise edge cloud-native automation implementations will accelerate over the next 12 months

Q. In which network domains are you planning to implement cloud-native automation and when?

79%

- 🔵 Already implemented
- 🔴 Within the next 12 months
- 🟡 Within the next 18-24 months
- 🟢 Within the next 2-3 years
- ⚪ No plans yet

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Fragmentation of tools and standards is a threat to CSP cloud-native automation efforts

CSPs use a range of different tools and standards, leading to decentralized and inconsistent efforts towards true cloud-native automation

62% of CSPs selected either orchestration/OSS or network function vendors as their top choice

CSPs remain tied to with existing vendors because CNFs are not fully cloud-native yet

Q. Please rank the following tools/standards/solutions in terms of how well they fit your cloud-native automation strategy
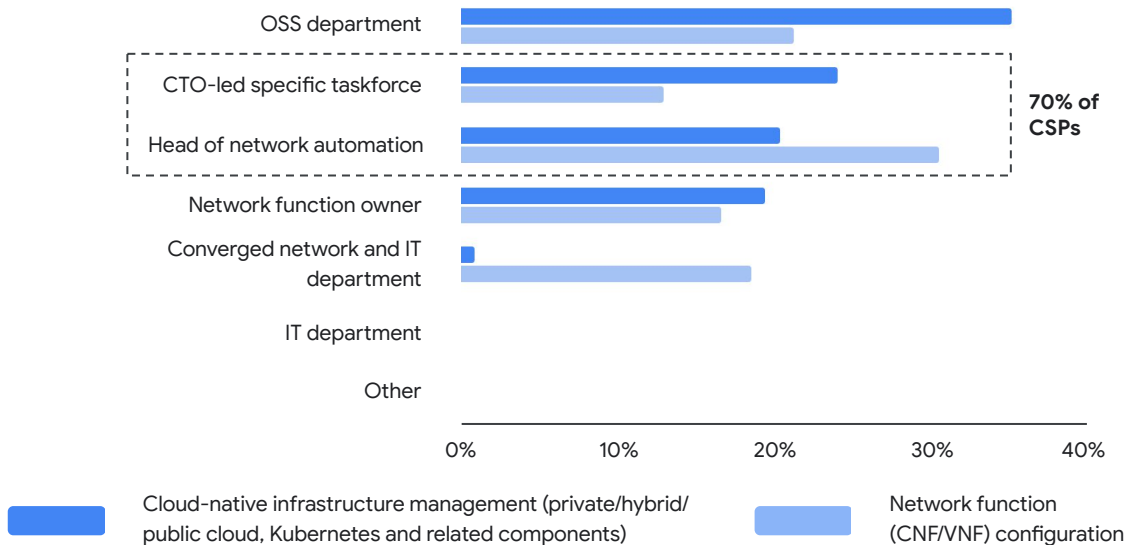

Automation approaches vary widely

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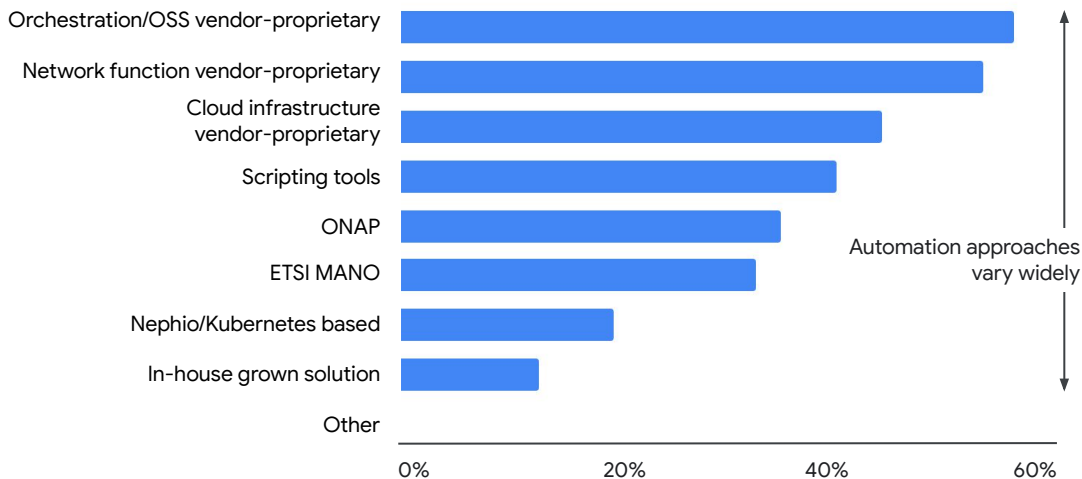
CSPs acknowledge that they need different decision-makers from traditional OSS departments involved in cloud-native automation

70% of CSPs are using either a CTO-led specific taskforce or Head of network automation, which are new decision-makers in the cloud-native era
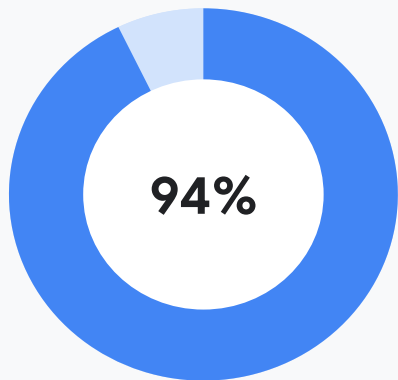
Only **35%** of CSPs believe their OSS department should continue to lead cloud-native infrastructure management automation, which drops to **21%** for CNF/VNF automation

Q. Who is/will be the decision maker for adopting cloud-native automation solutions in your company?

Legend:
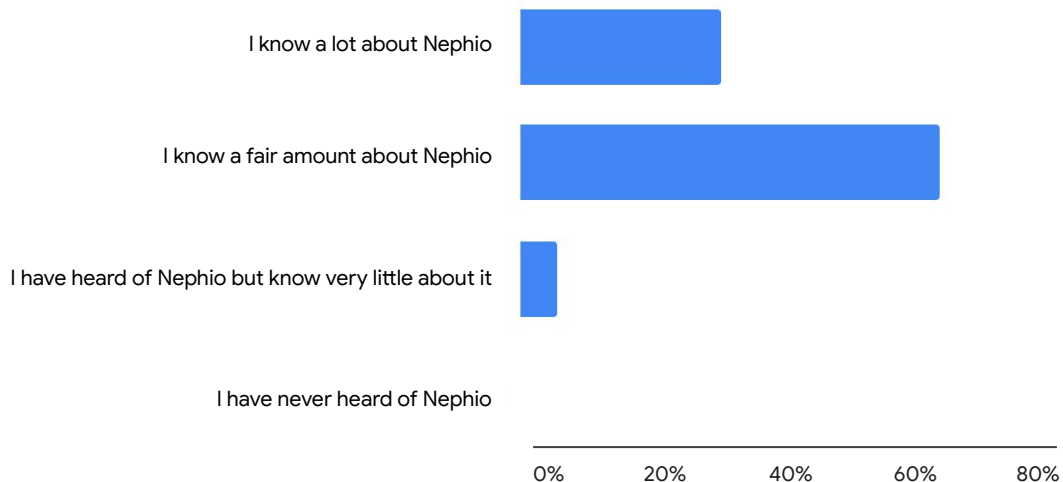- Cloud-native infrastructure management (private/hybrid/public cloud, Kubernetes and related components)
- Network function (CNF/VNF) configuration

Categories: OSS department, CTO-led specific taskforce, Head of network automation, Network function owner, Converged network and IT department, IT department, Other

70% of CSPs

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Nephio progress

CSPs have a high level of familiarity with Nephio

94%

94% of CSPs already know a fair amount about Nephio, despite only launching in Q2 2022

Q. Which of the following statements best describes your familiarity with Nephio?

I know a lot about Nephio

I know a fair amount about Nephio

I have heard of Nephio but know very little about it

I have never heard of Nephio
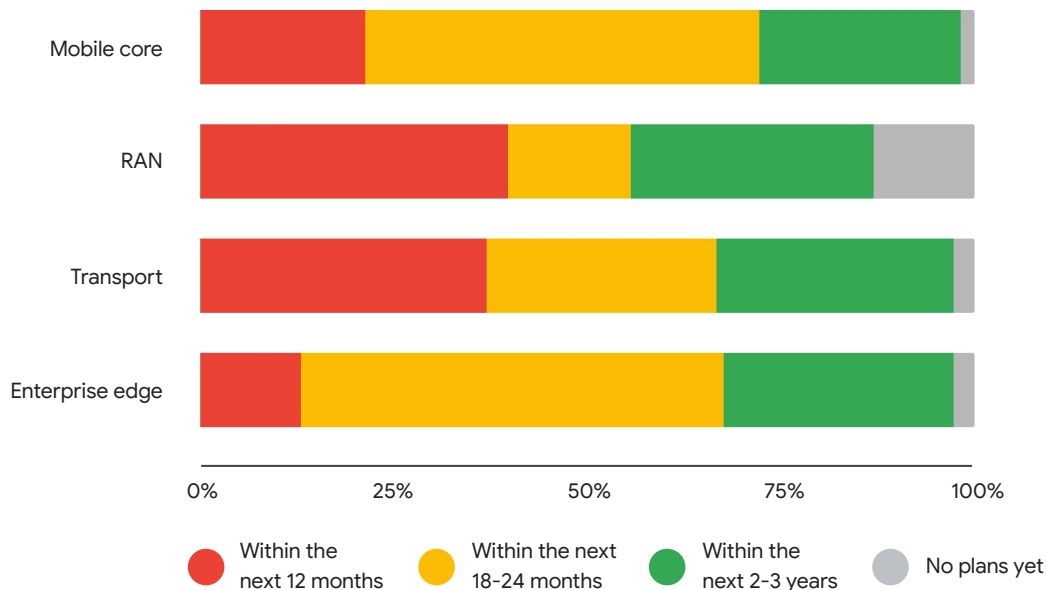
0%   20%   40%   60%   80%

CSPs want Nephio to support their cloud-native automation efforts across all network domains

40% of CSPs are eager to bring Nephio's simplicity and standardization to the highly complex RAN as soon as possible in the next 12 months

37% of CSPs also want to address transport network complexity within 12 months

51% of CSPs are looking at applying Nephio to the mobile core in 18-24 months, which aligns with 5G SA core deployments

Q. In which domains would you consider using Nephio and in what timescale?

Legend:
- 🔴 Within the next 12 months
- 🟡 Within the next 18-24 months
- 🟢 Within the next 2-3 years
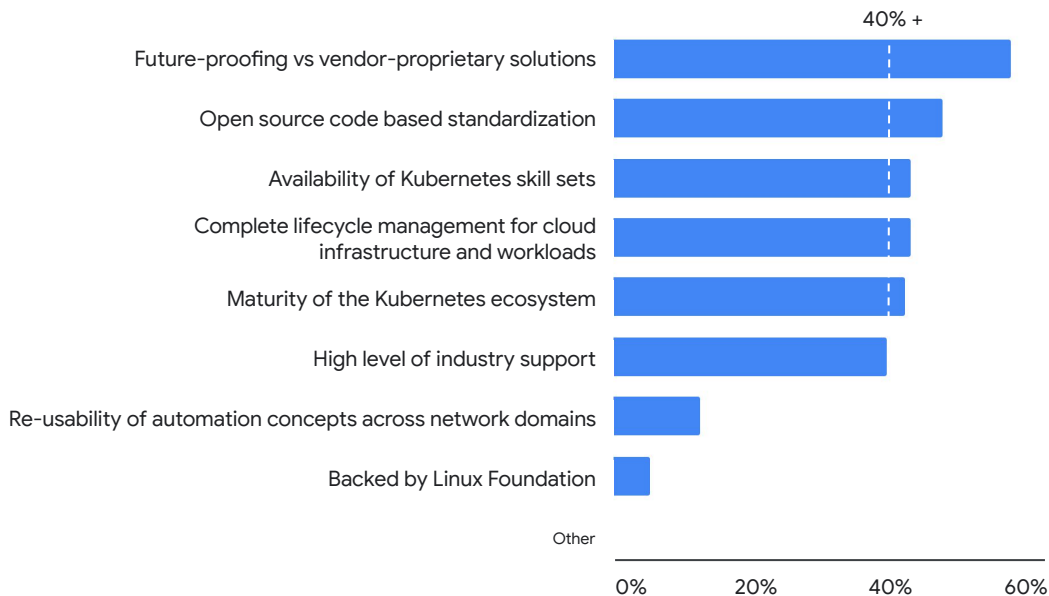- ⚪ No plans yet

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CSPs want to future-proof their network with Kubernetes and Nephio

CSPs are considering Nephio to address existing automation challenges and to take control of their network

Almost every benefit of Nephio is appealing to CSPs, shown by the wide spread of reasons being rated by over **40%** of CSPs

Nephio is the only open source-based telco cloud-native automation standardization project

Q. What are the top 3 reasons you are considering using Nephio?

40% +

Future-proofing vs vendor-proprietary solutions
Open source code based standardization
Availability of Kubernetes skill sets
Complete lifecycle management for cloud infrastructure and workloads
Maturity of the Kubernetes ecosystem
High level of industry support
Re-usability of automation concepts across network domains
Backed by Linux Foundation
Other

0%   20%   40%   60%

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Recommendations

Recommendations for CSPs

A standard, declarative, open-source approach to cloud-native automation will help
CSPs to overcome current pain points of siloed technologies and different vendor approaches to automation

Standardize automation across network domains using an open-source, Kubernetes-based approach

Essential if CSPs are to avoid the 'sunk cost fallacy' in existing, inefficient NFV architecture

Implement a well-defined cloud-native vision through strong executive leadership, with automation at its core

Redesign organizational structure to remove siloes e.g. aligning IT, network and enterprise more closely, as well as alignment of network domains (core, RAN, and transport)
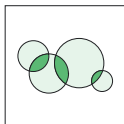
Combine and standardize the cloud infrastructure management and CNF/VNF configuration layers together

CSPs already use the same tools and have the same challenges in both layers, leading to seamless integration
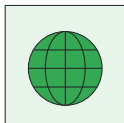
Actively contribute to open source initiatives to push industry adoption

- CSPs must work with vendors to help to drive requirements and define a migration path from NFV
- Encourage vendors to align with standards and CSPs' own cloud-native vision, or partner with vendors that can support this vision

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