



Perspective

stc evolves its multi-vendor telco cloud to achieve new digital service provider goals

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Contents

1. Executive summary	1
1.1 stc’s network transformation is a strategic enabler of Saudi Arabia’s Vision 2030 and underpins economic and societal ambitions	1
1.2 stc is building its own cloud-native telco cloud to maximize its control over its infrastructure destiny	2
2. There are several business drivers of the next phase of stc’s network cloud development	2
2.1 stc has commissioned a cloud-native telco cloud to meet new business goals	2
2.2 stc’s adoption of cloud-native capabilities is driven by its desire for network innovation with revenue-generating potential	4
3. stc expects to derive significant benefits from its cloud-native partnership approach	6
3.1 stc’s targets for its cloud-native telco cloud will enable it to achieve business value	6
3.2 stc will futureproof its cloud-native partnership cloud by building it using open-source technologies	6
4. Conclusion	7
5. About the author	9

List of figures

Figure 2.1: stc’s current telco cloud reference architecture	3
Figure 2.2: Six pillars that guide stc’s cloud partners.....	4
Figure 2.3: Three drivers of stc’s adoption of a cloud-native telco cloud	5
Figure 3.1: Selected goals for efficiency improvements enabled by stc’s proposed cloud-native telco cloud	Error! Bookmark not defined.
Figure 3.2: stc’s contributions to open-source and standards bodies with a bearing on digital transformation and telco cloud.....	7

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1. Executive summary

1.1 stc's network transformation is a strategic enabler of Saudi Arabia's Vision 2030 and underpins economic and societal ambitions

stc is Saudi Arabia's leading digital services provider and as such, will play a vital role in the country's Vision 2030 (a strategy to use innovation to grow Saudi Arabia's economy). stc is underpinning this ambition by transforming its network infrastructure to unlock Industry 4.0 and other future use cases, including smart cities and immersive healthcare and education. In this perspective, we provide an overview of the next step in stc's journey to virtualize and transform its network: the implementation of a cloud-native telco cloud that will support stc's business objectives and the economic and societal goals of the country. stc's General Manager of Cloud Infrastructure, Anwar Alsubhi, points out, "The future competitiveness of the telecoms industry now depends on how agile, open and autonomous your telco cloud infrastructure is, in order to realize tangible business value and accelerate the rate at which we can innovate in the network." In this paper, we will discuss the approach that stc is taking to build its new Cloud Partnership telco cloud (an initiative that is led by stc's systems integration arm, solutions by stc).

stc began its network transformation journey in 2017 when it transitioned from physical network functions (PNFs) to virtualized network functions (VNFs). Today, stc's OpenStack-based virtualized telco cloud complies with the ETSI NFV reference architecture and supports 25 VNFs from multiple vendors. stc is primed for the next phase of its network transformation having successfully embedded a cloud-first mindset and a multi-vendor strategy into the business. Its step-wise approach to network transformation has allowed stc to develop expertise during the first two stages of its telco cloud development and take these learnings into the third phase.

During this third phase of telco cloud development, stc will further transform its operations to harness the potential of both cloud-native automation and a DevOps way of working to reduce opex, increase service agility and accelerate innovation in the network itself and in the digital services that the network is able to support. stc's cloud-native telco cloud will not only run cloud-native network functions such as the 5G standalone (SA) core and virtualized RAN, but it will also support a broad range of digital use cases in the future, such as smart cities, connected cars, circular supply chains and immersive virtual worlds. New revenue streams, automated operations and an open vendor ecosystem are key internal drivers for stc's cloud-native telco cloud initiative.

stc expects that its cloud-native telco cloud will open up new revenue opportunities and reduce operational costs thanks to extensive automation. Analysys Mason's research suggests that there is an almost USD300 billion opportunity for telecoms operators to monetize new use cases that can benefit from 5G's distinctive capabilities, particularly in an enterprise context. A cloud-native environment will reduce the time taken for stc to deploy innovation and new, monetizable services in the network and will enable it to play multiple roles in the emerging cloud-native value chain.

Cloud-native technologies support a more efficient, agile and resilient infrastructure. stc anticipates that it will accrue significant business benefits from its cloud-native telco cloud development. These include a 50% reduction in the time it takes to onboard network functions, a 98% improvement in autoscaling and healing efficiency and 99% efficiency savings within certain testing and fault detection processes. stc's cloud-native telco cloud will be designed as a pre-integrated multi-vendor environment that is able to support flexibility and a choice of both cloud-native network function (CNF) vendor and cloud deployment model across centralized and edge clouds.

stc's next-generation cloud-native telco cloud will continue to follow the ETSI NFV reference architecture, but operational automation will be built using container-based tooling and cloud-native capabilities. stc will adopt a DevSecOps/AIOps approach to the lifecycle management of telco cloud components. This approach is key to stc's realization of zero-touch provisioning (ZTP) and its desired high levels of operational agility and flexibility.

1.2 stc is building its own cloud-native telco cloud to maximize its control over its infrastructure destiny

solutions by stc, stc's systems integration (SI) subsidiary, is playing a central role in the implementation and management of stc's cloud-native telco cloud. solutions by stc is responsible for the governance and supervision of the vendors that are working with stc on its next-generation cloud: Red Hat, Cisco, Ericsson and Huawei. As well as guiding the program's technical validation and integration activities, solutions by stc is driving critical organizational and cultural changes. These include the introduction of a central operations team that manages the common cloud-native telco cloud platform that all CNF vendors will share.

solutions by stc is using its focus on the latest technologies (such as Kubernetes) and its development and integration work across many different industries to ensure that stc retains control over both the evolution of the infrastructure for its critical core network and the flexibility to pursue new business opportunities.

2. There are several business drivers of the next phase of stc's network cloud development

2.1 stc has commissioned a cloud-native telco cloud to meet new business goals

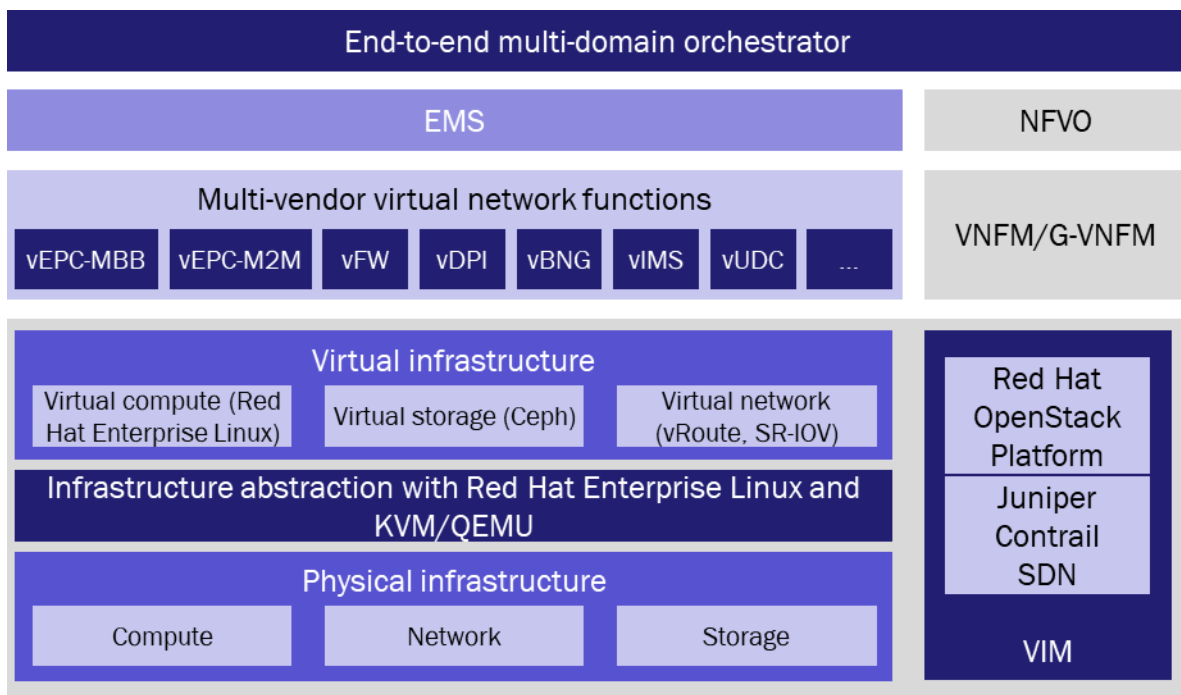
Network infrastructure and the connectivity services that it delivers are fundamental to the functioning of the complex societies in which we live and the economic prosperity that they generate. Saudi Arabia recognises this in its Vision 2030, the aims of which are to enable the country to take advantage of its geographical location in order to create an economic and industrial powerhouse and to prepare its society for the future. Saudi Arabia's network infrastructure and the enterprise and consumer use cases that it will support will be critical to achieving the country's Vision 2030.

stc is also undergoing an ambitious digital transformation strategy: digitize, accelerate, reinvent, expand (dare). dare is designed to turn stc into a data-driven, agile digital organization that is able to provide market-leading customer experience and new digital services for consumer and B2B markets. stc is Saudi Arabia's leading digital hub, so it must ensure that its network infrastructure evolves to meet both its own and the country's socioeconomic objectives. stc has been building an advanced telco cloud since 2017 in order to deliver futureproof digital network infrastructure to the countries in which it operates. It wants to exploit the cost-efficiency and fast time-to-innovate of the cloud in order to rapidly deploy a digital and differentiated network that supports the aims and services associated with Vision 2030.

stc understands that network evolution is a journey and it has been leading industry efforts to evolve and virtualize networks. stc is clear that establishing a telco cloud requires continuous development and improvement. There are no short cuts; every experience is an opportunity to learn and progress as an organization.

- Virtualization phase.** stc’s telco cloud journey started in 2017 with the virtualization of the EPC to support machine-to-machine (M2M) services. This phase piloted the concept of moving from PNFs to a software-driven, virtualized network based on COTS hardware and a hypervisor.
- Cloud-ready phase.** In phase two, stc established its telco cloud platform (NFV infrastructure), onboarded seven VNFs from multiple vendors, built domain-specific management and orchestration and began to support commercial network traffic. It achieved its initial objective to build a telco cloud that is both compliant with the ETSI reference model and vendor-agnostic. Virtualized functions from multiple vendors run in a common network functions virtualization infrastructure (NFVI), with OpenStack-based virtualization management and shared orchestration. stc’s first-generation telco cloud (depicted in Figure 2.1) currently supports 25 VNFs from various vendors and runs across two data centers with orchestration and software-defined networking (SDN) that comply with the ETSI NFV reference architecture.

Figure 2.1: stc’s current telco cloud reference architecture

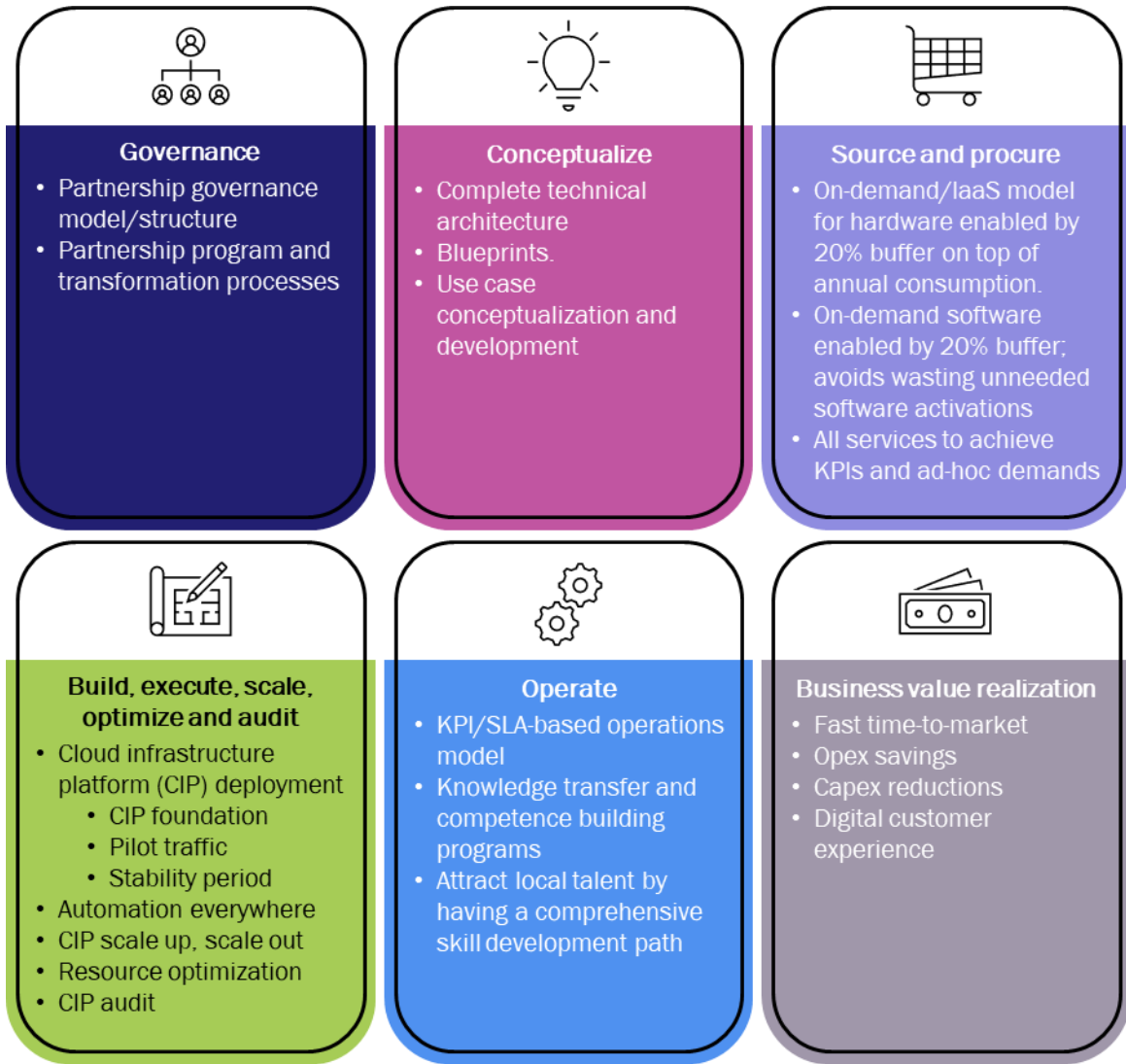


Source: Analysys Mason

- Cloud-native phase.** During this phase, stc will focus on evolving its telco cloud towards a cloud-native container-based technology stack that uses CNFs. Both the infrastructure and CNFs will be managed via CI/CD pipelines with high levels of orchestration, and stc will introduce DevSecOps approaches to build and maintain this automation. These re-engineered business processes will enable stc to take advantage of the speed and flexibility promised by the telco cloud.

stc has had to establish a new partnership delivery model in order to succeed during the cloud-native phase. This model addresses issues with vendor integration that arose in the cloud-ready phase. The partners have committed to six pillars that define the way in which will work with stc, as shown in Figure 2.2. stc is also changing its commercial relationship with partners during the cloud-native phase to a business model that is based on achieving business value. Payments are linked to meeting business value deliverables.

Figure 2.2: Six pillars that guide stc’s cloud partners



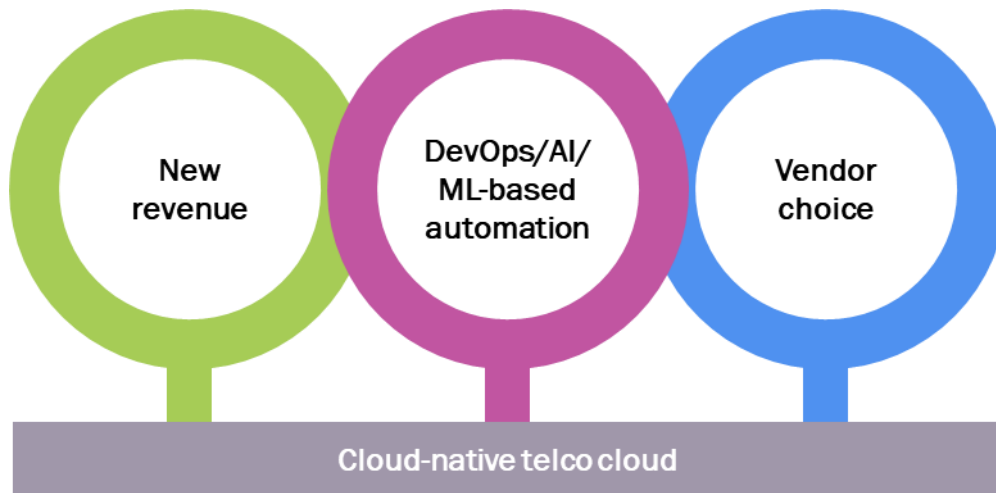
Source: Analysys Mason

2.2 stc’s adoption of cloud-native capabilities is driven by its desire for network innovation with revenue-generating potential

There are three key drivers of stc’s adoption of a cloud-native telco cloud (Figure 2.3). Such a cloud is critical for:

- capitalizing on a new era of revenue generation
- supporting operational transformation and cloud-native automation, which will result in reduced operational costs and improved customer experience
- increasing flexibility and network component vendor choice, which will enable faster network innovation and will lower the time to market for new network services.

Figure 2.3: Three drivers of stc's adoption of a cloud-native telco cloud



Source: Analysys Mason

A new era of revenue generation

Analysys Mason has modelled the increase in GDP that would be directly enabled if 5G cloud-based networks were deployed worldwide by 2030.¹ This amounts to USD284 billion cumulatively between 2021 and 2030, and is generated from two sources: USD105 billion is enabled by dramatically increased access to high-quality mobile broadband, and USD179 billion will be generated by new use cases that are enabled by a confluence of 5G with a host of other technologies such as IoT, AI/ML and edge cloud. A new technology has not been directly responsible for such leaps in wealth and revenue opportunities since the industrial revolution or the advent of the internet. By implementing a world-class 5G cloud-native telco cloud, stc positions itself to capture a significant share of this opportunity and to play multiple roles in the emerging cloud-native value chain.

5G is the first telecoms generation that can run using the same cloud-native technologies as emerging cloud-native IT and operational technology (OT) applications. This is the key to its ability to generate revenue from new use cases. The 5G network and the cloud are software-defined and are being built on the same software and cloud foundations as IT/OT applications themselves. They can also be manipulated and programmed in the same way as IT/OT applications. A cloud-native network is built from microservices that can be spun up and managed like applications, and network functions are able to interact directly with IT/OT applications via APIs. This convergence between network function microservices and application microservices will enable innovative combinations. 5G connectivity will be an integrated feature of digital use cases in the future, such as smart cities, connected cars, circular supply chains and immersive virtual worlds. stc and solutions by stc can use a cloud-native 5G telco cloud that is based on cloud platform technologies that also support IT/OT applications to help organisations in every industry to create and deliver innovative service combinations to drive business, as well as industrial and societal transformation.

Operational transformation and automation

Cloud-native technologies are inherently more agile and efficient than previous generations of cloud technologies. Indeed, cloud-native technologies were developed to be the most effective way of deploying, running and managing 'born in the cloud' applications (5G CNFs belong to this category of application). stc

¹ For more information, see Analysys Mason's [The economic impact of open and disaggregated technologies and the role of TIP](#).

wants to take advantage of the automation that is built into cloud-native platforms to enable the rapid scaling up and down of CNFs, to improve resource utilization by 20% via the more granular scaling of individual microservices/containers and to take advantage of continuous integration/deployment (CI/CD) to accelerate CNF onboarding and in-flight software upgrades. stc will use DevSecOps approaches to build and maintain cloud-native automation. Indeed, it is re-engineering its business processes so that they operate in a DevSecOps manner to take advantage of the speed and flexibility promised by the telco cloud.

solutions by stc is leading the implementation of the cloud-native telco cloud for stc. It expects to reduce the time to market for new services and to lower operational costs in key areas thanks to the key capabilities of cloud-native technologies. For example, solutions by stc expects to be able to scale up CNFs in a matter of days to meet traffic demands during Hajj, compared to the many months it takes to add hardware to its current telco cloud or to scale out PNFs. The ability to use CI/CD to accelerate release cycles results in faster network innovation, reduced delivery times for new services and the timely implementation of security features and patches.

Flexibility and choice of network component vendors

CNFs such as the 5G SA core are being designed with service-based architecture (SBA). SBA makes it easier to deliver the core using component functions from multiple vendors on top of a common, horizontal cloud platform. This is because it enables core components from multiple vendors to be scaled and upgraded independently, thereby improving network resiliency and service agility. Initiatives to virtualize the RAN have the same goal. The cloud-native architecture of the telco cloud platform will allow stc to deploy CNFs and other use cases flexibly and portably across centralized and edge infrastructure to meet operational and business objectives. The delivery of the right network resources to the right locations at the right time will help stc to optimize costs and improve the customer experience.

3. stc expects to derive significant benefits from its cloud-native partnership approach

3.1 stc's targets for its cloud-native telco cloud will enable it to achieve business value

stc is taking a partnership approach to building a cloud-native telco cloud in phase 3 of its telco cloud journey in order to support cloud-native and virtualized network functions and other next-generation use cases. stc made the decision to work with partners based on its previous experience with telco cloud development; it expects its partners to deliver a cloud-native telco cloud that improves the business case compared with earlier telco cloud developments by reducing capex and opex by between 35–75% depending on activity.

3.2 stc will futureproof its cloud-native partnership cloud by building it using open-source technologies

solutions by stc is responsible for overseeing the integration activities of the vendors that are currently involved in the new cloud partnership program. Cisco will provide the key cloud hardware, SDN and orchestration components, while Red Hat will provide cloud stack technology and automation tooling. CNF vendors will be announced later. Selective functions will be migrated onto the cloud partnership cloud from 2023 onwards. The Center of Excellence that solutions by stc established to carry out interoperability testing and vendor validation

and certification for stc's first-generation telco cloud was heavily involved in hosting the trials that resulted in the selection of the cloud partnership vendors. A key selection criterion was the ability to provide and support open infrastructure. stc wants its cloud-native cloud to be built on upstream open-source technologies to ensure that it is futureproof (much like its first-generation cloud). It is active in numerous open-source and standards bodies (Figure 3.2), and this is informing the evolution of its telco cloud.

Figure 3.1: stc's contributions to open-source and standards bodies with a bearing on digital transformation and telco cloud

Organization	Sub-group	Role
LFN CTT	CNTT Edge lead and CNTT RM co-lead	Influencer and active contributor
OpenStack	Edge Computing	Contributor
LF-Edge	TAC/Akraino	Observer and contributor
GSMA (TEC and OPG)	Telco Edge Cloud Co-chair	Influence and active contributor
ETSI MEC	ETSI MEC ISG	Observer
CNCF	Telecom User Group	Contributor
TIP	Open RAN and Open Core	Contributor
LFT EUAG	EUAG	Influencer and contributor
LFN TAC	TAC	Observer
ETSI NFV	ISG	Observer
ETSI OSM	OSM EUAG	Contributor

Source: stc

The cloud partnership cloud will run in multiple data centers in different cities in its first year. stc expects to increase the number of production locations over time as it deploys 5G and other cloud-native components, such as user plane functions (UPFs) to support new industrial use cases and network slicing. Each data center will host different network functions and applications depending on local requirements. There will be a staging environment to support all telco cloud production environments, and stc will continue to use its lab environment to carry out the vendor certifications needed for the partnership program. Note that the cloud partnership cloud will use a different onboarding and operational model to stc's second-phase telco cloud.

stc's telco cloud footprint will expand to cover all regions of Saudi Arabia as its network continues to grow. The telco cloud is expected to serve all IMS users by 2027 and will deliver the majority of stc's mobile broadband capacity.

4. Conclusion

stc plans to provide leading-edge 5G infrastructure to support Saudi Arabia's Vision 2030 ambitions for a digitally transformed society. stc's cloud-native telco cloud (the foundation of an advanced 5G network) is key to the delivery of the new digital services that will support every aspect of Saudi society, from its industrial and economic developments to its education, healthcare and smart city transformations. The success of stc's cloud-native telco cloud implementation is therefore of national strategic importance.

stc is already operating an open, multi-vendor telco cloud. However, it recognizes that technology does not stand still and it is starting to implement a next-generation cloud-native telco cloud that will deliver new levels of resiliency, flexibility and scalability for 5G CNFs. stc also recognizes the importance of cultural, organizational, skillset and process changes to extracting benefits from the telco cloud. It is introducing a DevOps approach and advanced levels of cloud-native automation so that it can bring software-based innovation rapidly to market and deliver high levels of operational efficiency.

The right level of support is vital for the success of such an ambitious transformation. solutions by stc is providing both continuity and consistency for the next phase of stc's telco cloud development, while helping its parent company to adopt cloud-native technologies and make use of the benefits that they provide.

5. About the author



Ameer Gaili (Analyst) is a member of the Cloud research practice, and mainly contributes to the Cloud Infrastructure Strategies and Edge and Media Platforms research programmes. Prior to joining Analysys Mason, Ameer was a strategy consultant at a boutique management consultancy. Ameer holds an MEng in chemical engineering from the University of Manchester.

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