



Executive Briefing

CLOUD NATIVE: JUST ANOTHER TECHNOLOGY GENERATION?

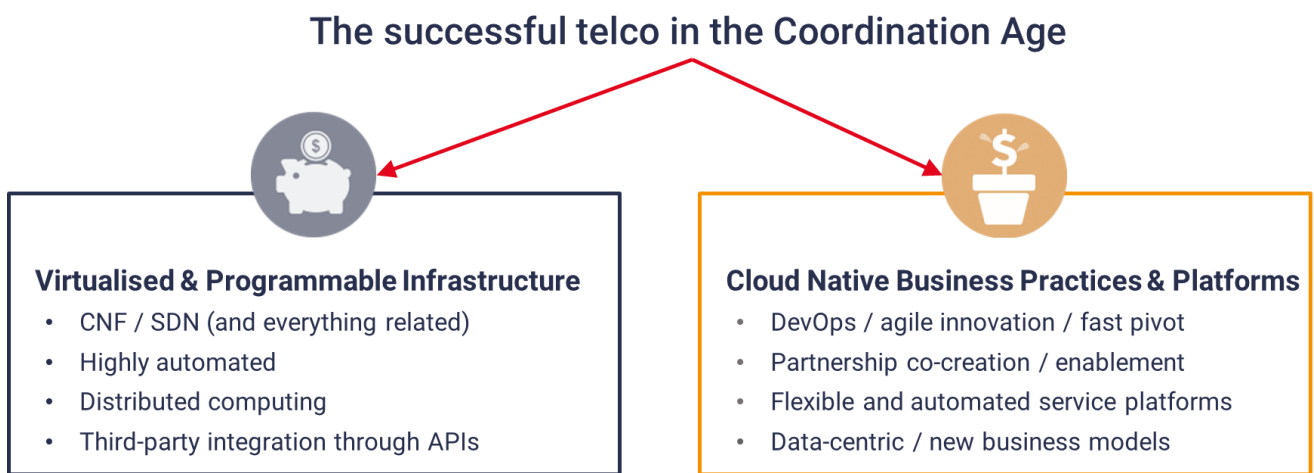
Cloud native networking offers operators a promise of efficiency, automation and innovation to underpin their future in the coordination age. But it should also mean a new operating model, new skills and organisation that few feel they are ready for.



Executive Summary

The current telecoms operating model is not sustainable. Commoditisation of core connectivity services means that revenues are stagnating while traffic volumes (and costs) continue to grow. Operators must adapt to achieve greater innovation through automation, at scale: in particular, they need to provide new, differentiated network services that work hand-in-glove with telcos' own and others' applications that meet the demands of customers and society. We call this the Coordination Age. The operators that succeed, will do so with an operating model supported by technology intended to deliver innovation at scale: fast, low cost, reliable, highly automated. In two words, cloud native.

Figure 1: Telcos' route to growth is through innovation at scale



Source: STL Partners

5G has been conceived for cloud-native operations. Done right, 5G can deliver revenue growth but it will also require huge infrastructure investment. Failure to secure the promised benefits from 5G will leave some operators with sharply declining ROIs and potentially disastrous consequences. Much of the success in achieving the 5G promise will depend on how telcos approach the new-to-telco cloud-native technology and how well they execute this approach. Most will not get a second chance.

In this research, we set out to address two questions:

- **What does cloud native networking really mean for telecoms operators?**
- **And what does this mean for how they should approach it?**

One of our main findings from the research is that although operators may share common definitions of cloud native and accept both its applicability and its inevitability for their networks, they have very different perspectives for how they see cloud native network applications being deployed in practice.

On the one hand, some operators would like to assemble cloud native networking from components that will work together and are both pre-tested and certified. These operators are cautious about their own capabilities and accordingly, their expectations on how they would deploy cloud native network

code. They see themselves as operating others' technology delivered to them in a turnkey fashion. As assemblers, the operators do not need to have detailed understanding of the underlying components' internal workings. Instead, a simple toolset is required and once the assembly is complete, maintenance is a matter of routine uploading or onboarding of updates. This is more akin to how legacy networks have been deployed and managed.

Other operators, with more ambitious transformation objectives, are taking a stronger, hands-on approach in combining and operating others' technology, potentially from multiple suppliers. This is more akin to how cloud native applications are managed in enterprise IT domains. These operators think about cloud native network operations as an engineering exercise. Components may meet certain standards but that doesn't mean that they will seamlessly plug-and-play. They may need to be adapted to work optimally with all the other components. To do this, the teams will need to have a good understanding of the underlying components' internal workings. Due to the range and complexity of the network, a continuous integration / continuous delivery (CI/CD) pipeline will need to be managed with a rich toolset. At their heart, these operators see themselves as software-based technology firms.

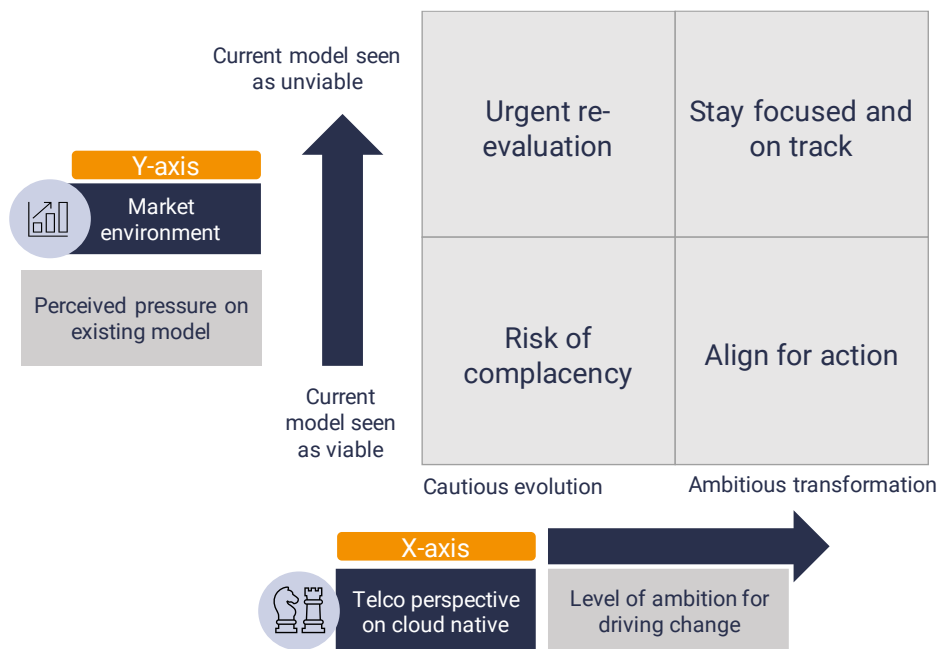
Figure 2: Different visions for building and running cloud native networks



Source: Bain Images Unsplash, CGTK

The latter group believe they will be better placed to achieve the promised benefits of cloud native networking: flexibility, scalability, automation and the elusive combination of reliability and fast time to market of new services. These will be new connectivity services and applications that will be more tightly integrated with a network that is more visible to and instructable by those applications. These operators hope to build and sustain competitive advantage over other operators and digital natives by bringing unique benefits to their customers and ecosystem partners.

The former group is more cautious in their approach to cloud native networking. They have concerns about existing skills and culture. They voice reservations that standards and cloud native technology from vendors may not be mature yet. More fundamentally, they may not see an immediate need to pursue dramatic transformation as they do not perceive that their business model is failing. In the report, we have set out some observations and recommendations for operators across four segments (see figure below).

Figure 3: Telco cloud native operator matrix

Source: STL Partners

5G standalone core is one of the first major telco deployments intended as cloud native from inception and is a strong initial candidate for adopting cloud native networking at scale. It therefore represents a potentially far-reaching decision point for operators. This is not a technical decision. It is a decision that goes to the heart of the operators' DNA: what it means to be an operator and what it will take to succeed as an operator in the Coordination Age.

By embracing cloud native compute foundation (CNCf) standards and pursuing cloud-native, operators can extend their network and business practices, allowing them to easily consume and integrate cloud services, as well as provide their own new services such as 5G network slices to enterprises customers. In turn, this will allow operators to move into vertical services and fully monetize their investment in 5G.

Deploying open cloud native networks is not without its challenges. Operators should consider where and why the technology has emerged. We have seen the cloud evolve from a definition of basic characteristics to something that is now an entire landscape of technology with an accompanying operational philosophy. Telcos should not shy away from seeking help with pursuing cloud native networking and look to ecosystem partners that have demonstrated a success track in cloud technologies.

Table of Contents

Executive Summary.....	2
Table of Figures.....	6
Preface.....	6
Cloud native networking: Telecoms' latest adventure	7
Telcos' business model is reaching end-of-life	7
Understand, then emulate the operating model.....	8
The coordination age – a new role for telcos	10
5G: Just another G?	12
Cloud native: Just another technology generation?	12
Different perspectives: Internal ability, timing ...and what it means to be a network operator.....	14
Organisational readiness, skills and culture.....	15
Target operating model and ecosystem.....	15
Assembly versus Engineering.....	15
Wider perceptions across the business functions.....	17
Operator segment 1: Risk of complacency	19
Operator segment 2: Align for action.....	21
Operator segment 3: Urgent re-evaluation	22
Operator segment 4: Stay focused and on track.....	24
Appendix 1	28
Interviewee overview	28
Appendix 2.....	29
Defining Cloud Native	29
There is consensus on the meaning of cloud native software and applicability to networks.....	29
Agreement on the benefits: automation at scale for reliability and faster time to market... ..	30
...and changing supplier relationships	30

Table of Figures

Figure 1: Telcos' route to growth is through innovation at scale	2
Figure 2: Different visions for building and running cloud native networks	3
Figure 3: Telco cloud native operator matrix	4
Figure 4: The telecoms industry is reaching the end of its last growth cycle.....	7
Figure 5: Tech companies are more highly valued than telcos	8
Figure 6: Telco vs tech-co investment models.....	9
Figure 7: New challenges for telecoms in the Coordination Age	10
Figure 8: New business models for the Coordination Age	11
Figure 9: Different visions for building and running cloud native network	16
Figure 10: Telco cloud native operator matrix.....	18
Figure 11: Interviewee Profile Summary	28

Preface

The document has been prepared by independent research and consulting firm STL Partners. It is based on the output of an extensive interview programme conducted by STL Partners with telecoms operators globally, as well as STL Partners' continuous research programme into the future telecoms operator and how to get there. The research programme has been commissioned by Oracle.

STL Partners maintains strict editorial independence. Mentions or allusions to companies or products in this document are intended as illustrations of market evolution and are not included as endorsements or product/service recommendations.

Cloud native networking: Telecoms' latest adventure

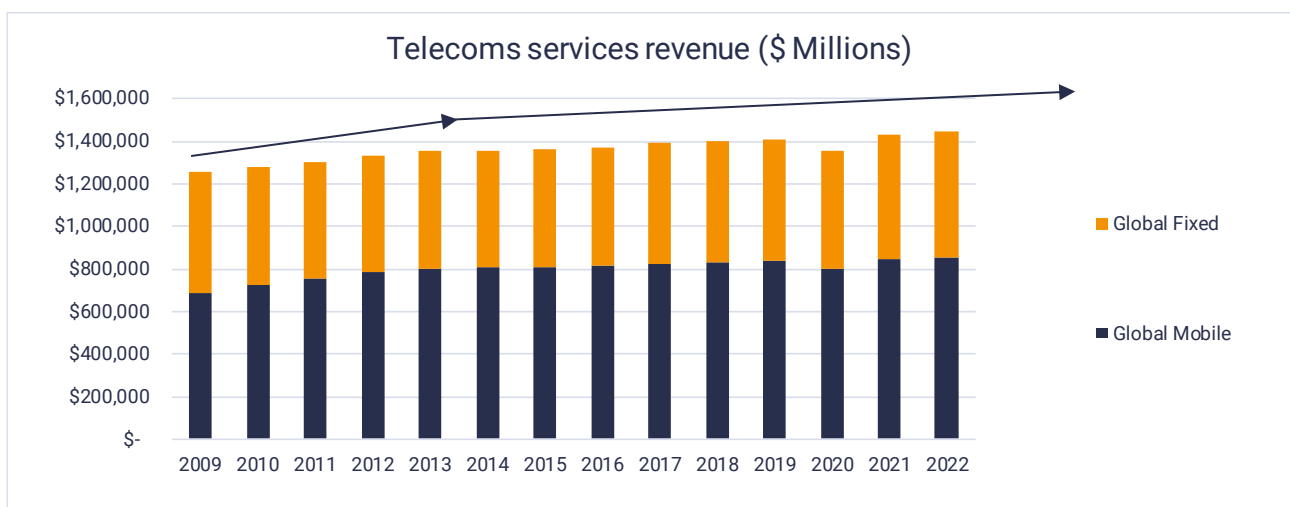
As a term, cloud native has currency in telecoms networking. 5G has contributed to the recent industry-wide interest in adopting cloud native applications for networks. This is because the 5G standalone core networks (5G SA) that operators are now planning (and some have started deploying) are intended to run as software that is specified and architected following cloud native principles (see Appendix 2 for cloud native computing foundation definition).

Within telecoms, thinking about cloud native tends to centre on the next phase of moving network functions into a software environment, building on lessons learned with NFV/SDN. Viewed from this perspective, cloud native is the next step in the telecoms industry technology evolution: from analogue to digital circuit-switched to digital IP to virtualised to cloud native.

Telcos' business model is reaching end-of-life

The rise of mobile telephony and fixed and mobile broadband means that telecoms operators have enjoyed 20 years of strong growth in all major markets. That growth has stalled. It happened in Japan and South Korea as early as 2005, in Europe from 2012 or so and, market by market, others have followed. STL Partners forecasts that, apart from Africa, all regions will see a compound annual growth rate (CAGR) below 3% for both fixed and mobile services for the next three years. Ignoring pandemic 'blips', we forecast a CAGR of less than 1% per annum globally. This amounts to a decline in real terms.

Figure 4: The telecoms industry is reaching the end of its last growth cycle



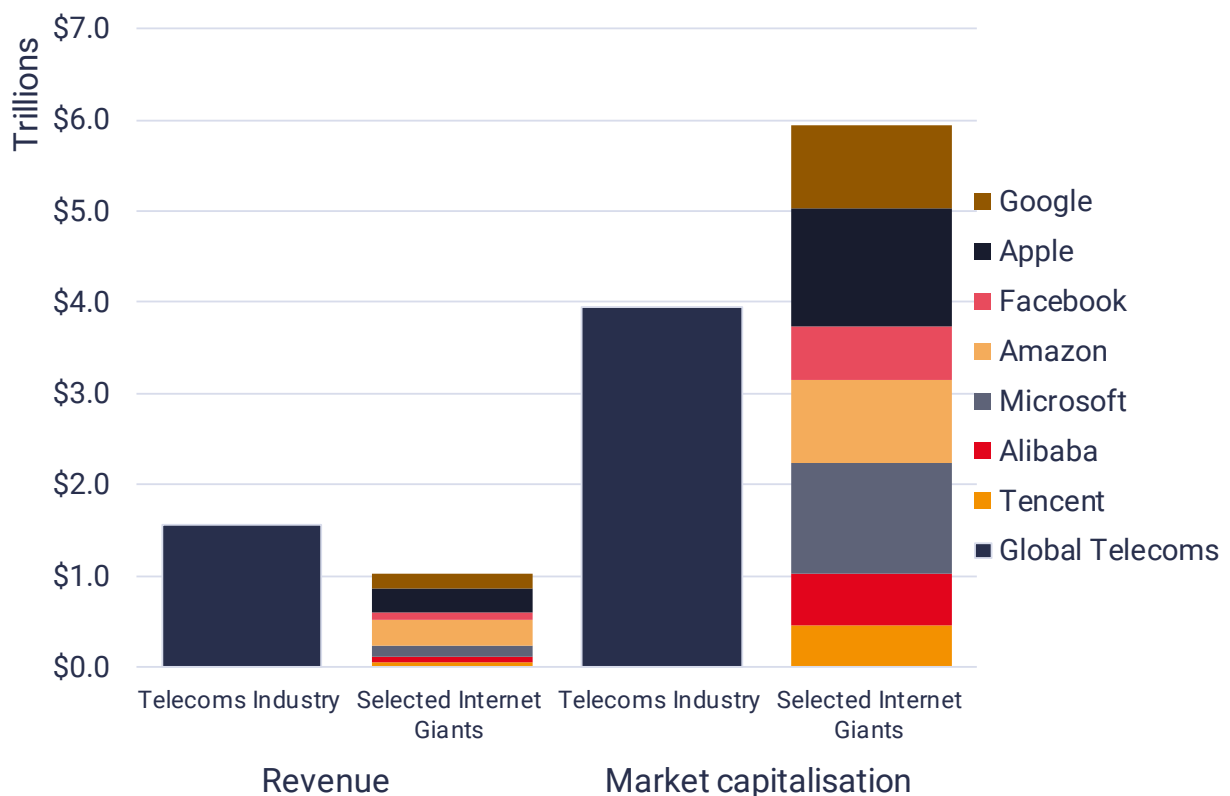
Source: Company accounts from 165 operator groups; STL Partners forecasts

The telecoms industry's response to this slowdown has been to continue to invest capital in better networks – fibre, 4G, 5G – to secure more customers by offering more for less. Unfortunately, as competitors also upgrade their networks, connectivity has become commoditised as value has shifted to the network-independent services that run over them.

In other words, the advantage that telcos had when only telecoms services could run on telecoms networks has gone: the defensive moat from owning fibre or spectrum has been breached. Future value comes from service innovation not from capital expenditure. The chart below sums the problem up: seven internet players generate around 65% of the revenue generated by 165 operators globally, but have a c. 50% bigger combined market capitalisation. This is because the capital markets believe that revenue and profit growth will accrue to these service innovators rather than telecoms operators.

Figure 5: Tech companies are more highly valued than telcos

Revenue and Market Capitalisation, 2019, Telco vs Internet



Source: Company accounts from 165 operator groups and 7 internet players; STL Partners analysis

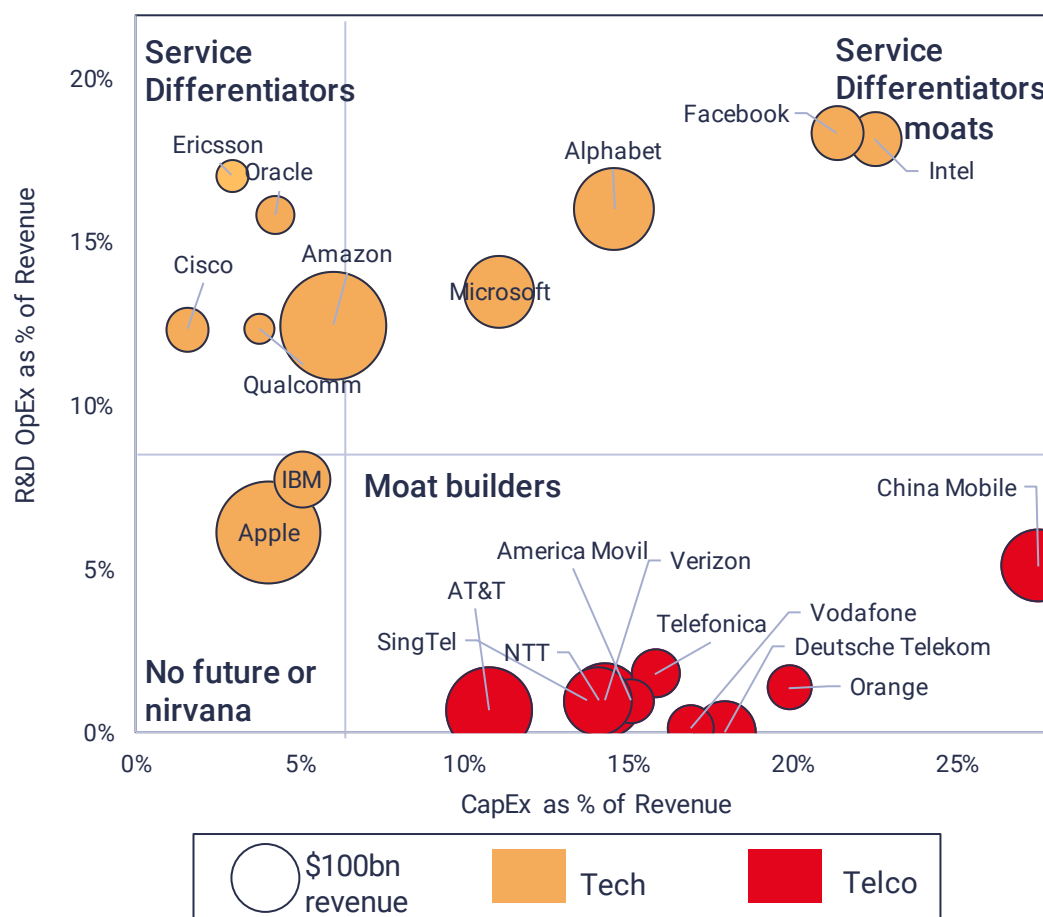
Understand, then emulate the operating model

Operators have been aspiring to learn from technology firms so they can transform their operations and services. But changes have been slow, and it is difficult to point to many 'poster child' operators that successfully made a move beyond pure telecommunications. Partly this is due to a mismatch between corporate announcements and their investment policies. Too often we hear CEOs express a

desire to change their organisations and that they intend to offer a host of exciting new services, only to see that aspiration not borne out when they allocate resources. Where other tech companies make substantial investments in R&D and product development, operators continue to invest miniscule amounts in service innovation (especially in comparison to what is poured into the network itself).

Figure 6: Telco vs tech-co investment models

R&D and Capex % of Revenue, 2019



Source: Company accounts; STL Partners analysis

STL Partners believes that many of the network-related activities that will enable operators to reduce capital expenditure, such as cloud-native networking, will also enable them to automate and integrate processes and systems so they are more flexible and agile at introducing new services. So, an agile software-oriented infrastructure will enable changes in business processes such as product development and product management, partnering, and customer care – if management prioritises investment and drives change in these areas. Cloud native business practices and software were developed by technology companies (and then widely adopted by enterprise IT functions) as a means to deliver greater innovation at scale whilst reducing the level of capital relative to revenue.

Our belief is that financial and operational developments need to happen in unison and operators need to move quickly and with urgency to a new operating model supported by cloud native practices and technology, or face sharp declines in ROI.

The coordination age – a new role for telcos

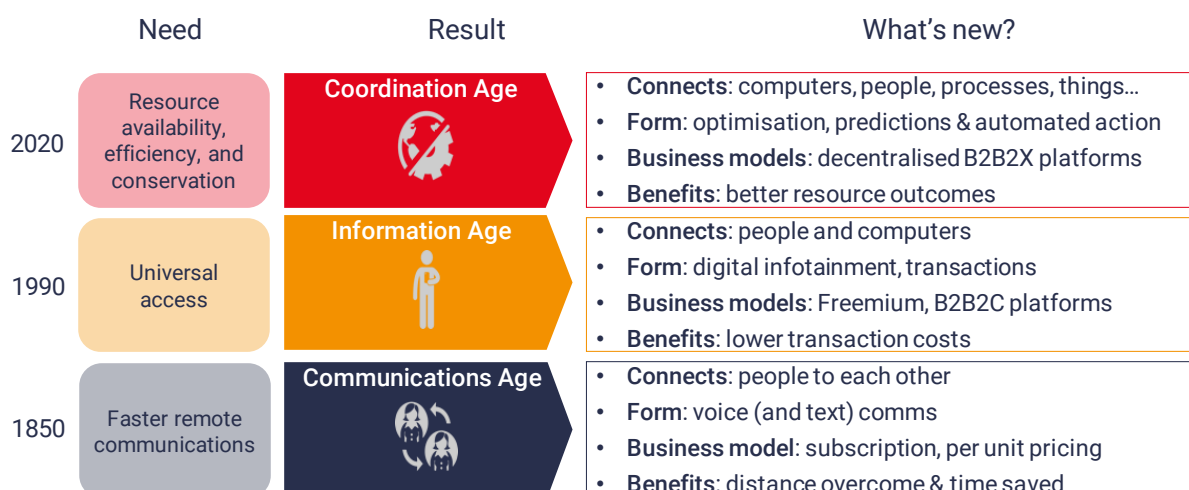
STL Partners believes that the telecoms industry and wider society is on the cusp of a new technology age.

From the 1850s until around 1990, the **Communications Age** was dominant. The telegraph and then telephony enabled people to communicate instantly over long distances and overcome geographic boundaries. The telecoms business model of subscription and per unit pricing was established.

In the 1990s the Internet emerged. This heralded the **Information Age** in which people could connect to computers directly. The Internet has also allowed information and entertainment to be accessed instantly – first via a PC and, increasingly, from mobile devices anywhere. A new range of communications, such as social media, have been enabled. In addition, new non-telecommunications players have been able to provide traditional voice communication services, thereby eroding the revenue that operators were previously able to extract from these services.

In the **Coordination Age**¹ 'things' are increasingly connecting with each other as IoT and cloud-based applications become ubiquitous. This is creating an exponential increase in the volume of data available to drive development of advanced analytics and artificial intelligence, which combined with automation, can improve productivity and resource efficiency.

Figure 7: New challenges for telecoms in the Coordination Age



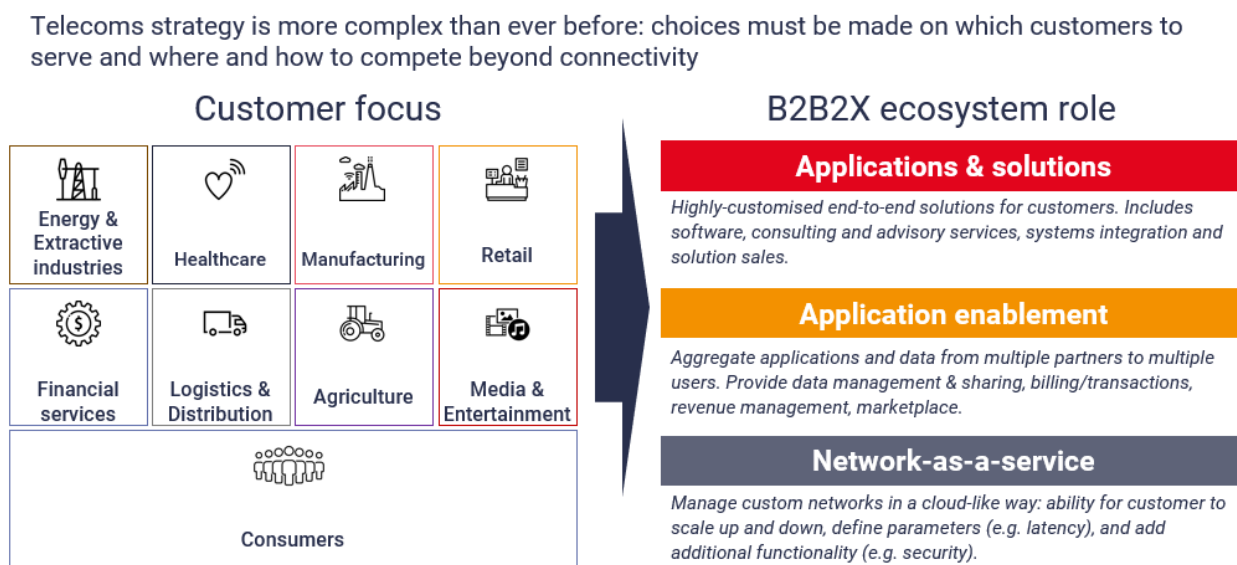
Source: STL Partners

Just as operators saw their revenues shift in the move from the communications age to the information age they will also see value move as we transition to the coordination age. They therefore

¹ In more detail in our report [The Coordination Age: A third age of telecoms](#)

need to expand their roles accordingly. They also need to ensure that their networks are best able to serve the rapidly evolving needs of customers and partners. For this, network services will need to be more tightly coupled with the applications that run over them. These applications will need to draw real-time insight from - and provide granular instructions to - the network in the same way that they do with cloud IT infrastructure. Furthermore, operators will need to do this over and over again to support a wide array of different needs over the same underlying infrastructure. And they will need to refresh this continuously and at unprecedented scale. It will not be possible to predict with certainty what services will succeed. As with tech firms, operators will need try many things, fail fast, pivot, learn...then scale reliably. This will not be possible with the current operating model and supporting technology.

Figure 8: New business models for the Coordination Age



Source: STL Partners

It is hard to overstate the necessity for operators seeking growth to change their operational model. Consider two competing operators in the same market both seeking to expand their role in the coordination age:

- One continues with the current operating model. It seeks to grow new revenues through offering applications and solutions that run over-the-top-of largely undifferentiated 'vanilla' network services. Even if it creates new application enablement interfaces for ordering and paying for the underlying connectivity, the solutions and applications it brings to market will work much in the same way as its rivals. In offering new applications, the operator is not extracting any particular advantage from having a network. It may even find that it needs to discount its connectivity to win new applications business.
- A competing operator pursuing the same strategy creates application differentiation through its network. This not only gives it an advantage with its own applications and solutions but it also allows others' applications it is enabling to compete better, increasing the demand for these network services. Creating and sustaining application differentiation from the network implies a

big change in operating model, not a one-off capital investment. This is where cloud native networking comes in.

5G: Just another G?

In our report [5G: Just another G and yet a catalyst for change](#) we argued that 5G has the potential to be truly transformative for telecoms and fundamentally change the industry. Unlike earlier generations, 5G has been specified and intended to run as cloud native software, under cloud native principles. There is a catch however, cloud native software is a necessary, but not sufficient basis for changing telcos' operating model to a cloud native model. You can buy a Ferrari but if you keep it in second gear and only drive in traffic, you will not go any faster than a bicycle. The current deployments of 5G standalone core networks (5G SA) therefore represent a major opportunity and key decision point for operators: not *if* but *how* they deploy 5G SA networks.

Cloud native: Just another technology generation?

In our research, we found two diverging perspectives among telcos on cloud native networking:

1. It is a key enabler to holistic business transformation and the ticket to success in the Coordination Age. 5G is the first significant cloud native deployment opportunity and should be deployed with a strong commitment to cloud native processes, new organisation and skills. In this case, the operator's approach to cloud native networking has implications for the whole business. The 'how' becomes as important as the 'what'. 5G SA is an opportunity that should not be missed.
2. It is just another evolution in network technology that happens to coincide with a range of telco industry challenges (including the financial burden of deploying 5G; as much the problem as the solution). Under this view, cloud native is of little relevance outside technical teams and of limited consequence to customers. If cloud native offerings from different technology providers are not 'mature' enough for us to pick and mix using our existing operating models, we can source all the components from a single source: pre-tested, SLA guaranteed. If necessary, we can evolve this later.

To understand the thinking behind each perspective, we asked 15 technology and strategy leaders working in telecoms operators globally:

- **What does cloud native networking really mean for telecoms operators?**
- **And what does this mean for how they should approach it?**

To ensure an open and candid dialogue, we have anonymised their contributions. We would like to take the opportunity to thank those who participated in this research. A summary of the interviewee profiles is provided in the appendix.

As stated above, 5G standalone core is one of the first major telco deployments intended as cloud native from inception. It is therefore recognised as a strong initial candidate for cloud native network

application deployment at scale. *Most* operators interviewed cited 5G standalone core as their ‘starter cloud native function (CNF)’ (the cloud native networking app they are most likely to deploy first). This is because it can happen as part of existing 5G rollout programmes and because 5G cores are not being designed in the ‘old way’. Some operators are running PoCs/trials, but very few are actually at the stage of deploying. We expect to see the first live deployments in late 2020 and 2021.

Different perspectives: Internal ability, timing ...and what it means to be a network operator

Operators broadly agree on the definition of cloud native, its applicability to telecoms networks, its inevitability for these and many of the key implications (see Appendix 2 for our research findings on this). There are however areas on which their perspectives diverge.

When we explored the perceived challenges to adopting cloud native networking in this context, several differences emerged between our interviewees, including wider perspectives across their organisations. What we found is that there are different perspectives of how our interviewees envisaged cloud native networks working in practice. They often expressed this in terms of the perceived barriers to adoption and what they need from (supplier) partners to overcome these barriers. We have summarised two broad perspectives in the table below and detail these in the sections below.

Table 1: Summary of two different perspectives

Perceptions	Operators for which cloud native operations seen as an assembly exercise	Operators for which cloud native operations seen as an engineering exercise
Cloud native networking is...	Latest technology evolution that will be a challenge to introduce	Key enabler for critical business model transformation
Wider business perception of cloud native networking	Low awareness. Not seen as relevant for customer facing functions	High awareness. Alignment on strategy and importance for customers
Current skill set and culture	Major barrier to adoption and unlikely to fundamentally change any time soon	Changing culture and skills <i>is</i> the objective
Technology supplier ecosystem	Not mature since components are not plug and play with SLA	Continuously evolving and innovating. Fully interchangeable => out of date
Desired end-to-end SLAs will be achieved through...	Working with suppliers who can commit to this... on their terms	Internal teams taking control... and the accountability
Timing for full cloud native disaggregated operating model	Eventually... maybe	Already or with 5G standalone

Organisational readiness, skills and culture

Where some divergence existed, was on how operators perceived their own ability to move to the cloud native operating model. Those operators who are less enthusiastic about their cloud native journey often seem to attribute their caution in adopting cloud native networking to a skills gap and/or a lack of the right organisational experience. This should not be misunderstood as a grudging resistance to adopting new technology, but rather a lack of confidence in their own capacity to fulfil the benefits of the new technology. They recognise both the applicability and the desirability to build the necessary capabilities – eventually, when it is realistic.

“

This is not essential for us, it is migratory over time

Senior planner – Technology strategy,
North American regional converged operator

“

Our organisation has been virtualizing from early on, our leadership is aligned, the return in investment is relatively obvious

CTO – Enterprise service division,
Incumbent European operator

Target operating model and ecosystem

This ties back to differences in telcos' perceptions in what it takes to run a cloud native network. Where some operators see the shift from their current operating model as part of the objective (and cloud native as the enabler), others consider the adoption of cloud native as an added challenge which they must somehow meet.

These latter (typically smaller) operators are mostly looking for the industry (i.e. suppliers) to do more to help them implement networks using existing operating practices. The operators are more cautious about their own capabilities and accordingly, their expectations on how they would be able to deploy cloud native code. They see their role as operating others' technology delivered to them in a turnkey fashion with supplier SLAs. This is more akin to how legacy networks are deployed and managed. So although operators may advocate a best-of-breed strategy, the intended operating model may only be possible by adopting a best-of-suite approach: essentially acquiring all key components as a pre-tested, pre-certified package, typically from a single provider.

“

I'd rather wait for the industry to figure things out, and once it's trialed and tested, I'll think about adopting

Senior planner – Technology strategy,
North American regional converged operator

Assembly versus Engineering

The perception of what cloud native operations will entail is a critical distinction that sits at the heart of what it actually means to be a telecoms operator in a cloud world.

- One way to think about this is that some operators envision building and running cloud native networks as assembly and routine maintenance of components that have been designed to work together and are both pre-tested and pre-certified to meet committed SLAs. The assembler does not need to have detailed understanding of the underlying components' internal workings. Instead, a simple toolset is required and once the assembly is complete, maintenance is a matter of routine

uploading or onboarding of updates. Suppliers offer and meet end-to-end SLAs. This model is only currently achievable by sourcing key components from a constrained set of options, primarily from a single vendor. This is for the simple reason that suppliers cannot provide SLAs for deployments they have not pre-tested.

- Another way of think about cloud native network operations, is as an engineering exercise. Components may meet certain standards but that doesn't mean that they will seamlessly plug-and-play. They may need to be adapted to work optimally with all the other components. This is engineering. To do this, the engineer will need to have a good understanding of the underlying components' internal workings. Where it is not possible to source and adapt components, these may need to be designed and built from scratch. Testing will need to be extensive. Due to the range and complexity of the network, a continuous CI/CD pipeline will need to be managed with a rich toolset.

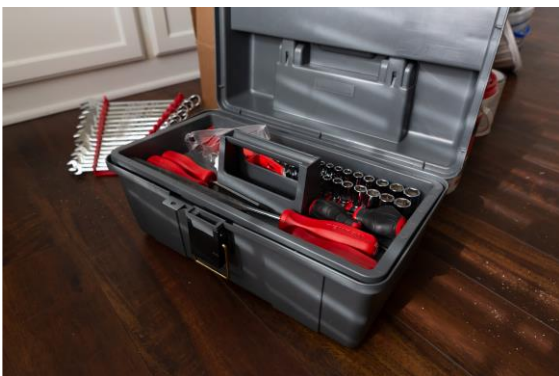
“

Static is going away, CI/CD is configuration..... and configuration is still mind-blowingly low

**Principal network architect – Technology,
European incumbent converged operator group**

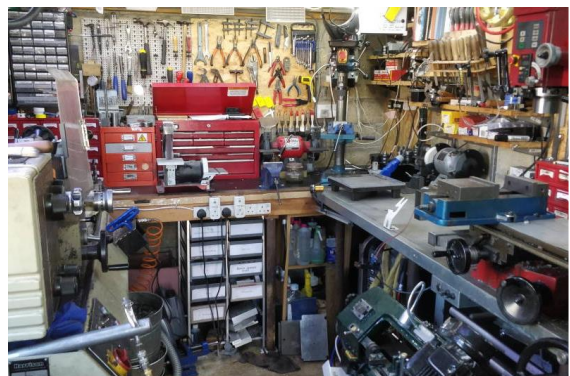
Figure 9: Different visions for building and running cloud native networks

Assembly



Or

Engineering



Source: Barn Images Unsplash, CGTK

From the perspective of traditional network operations, the idea of running a pipeline with a continuous release cycle into a live production environment may be seen as a daunting prospect. Mixing and matching components from different vendors means that some may need some adjustment (and testing) to work properly. Standards and pre-certification can help to reduce the testing burden but will not provide the end-to-end SLAs and guarantees that a best-of-suite approach does. This is the traditional supply model in telecoms. However, the different (competing) component providers cannot commit to any guarantees unless they have agreed, tested and approved everything before-hand, which either means a long wait, or a limited set of options and sub-optimal performance.

One route around this is through partnering with an independent third party for building the operator's cloud native operations. Operators need confidence that such partners can bring the expertise and approach so that the operator can go on to fulfil its new role, rather create another dependency.

Adopting cloud native software without the associated practices is achievable through a best-of-suite approach but also less likely to deliver on the promise: best-of-breed selection, flexibility and innovation at scale. Once operators start down this route it may not be possible to evolve to a more disaggregated model, at least not quickly. This is because they will have created dependencies across their technology stack that will result in new forms of lock-in. Essentially, they will have to follow their main suppliers' trajectories for the foreseeable future.

Wider perceptions across the business functions

For this research we also spoke to telco leadership in (mainly enterprise) customer-facing business units. We found that all of them were very articulate and enthusiastic about the opportunity for their customers to adopt cloud technology (and the services to connect to the cloud). However, some of the interviewees showed very little awareness of their own plans for adopting cloud native networking or held an opinion whether it was desirable or necessary for them, as an operator, to adopt cloud native networking to better serve customers. This disconnect between the customer-facing leadership and the technology leadership was biggest in the operators with a cautious, assembly vision. It provides a further indication of the key differences in operators' leadership.

“

The primary benefit of cloud native is in the ability to innovate faster... you have to use these abilities to identify what problems you can solve for customers

Technology innovation manager
Asian fixed line operator

“

If you force the organisation to launch new services in half the time for half the resource, they fall back on tin

Senior Technology Architect,
European incumbent converged operator

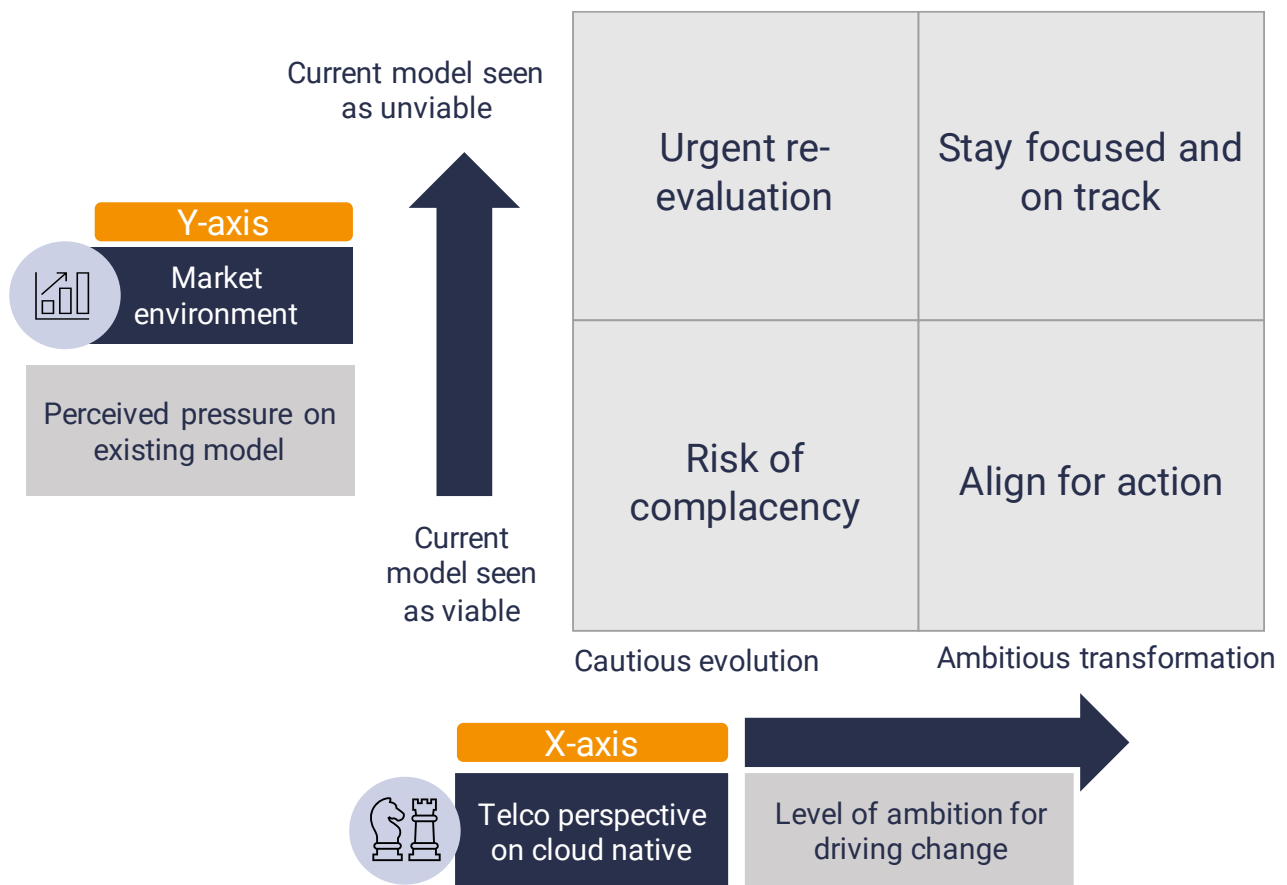
The operators whose senior management have a well-defined purpose and a belief in the necessity and inevitability of change, are in a better position to align their organisation to 'get' cloud native and see it as part of the solution rather than another problem to overcome. This needs the right commitment and investment from leadership. Simply forcing the change by imposing cloud technology can backfire. It may result in increased resistance from the teams that need to deploy the new operating model and reverting back to the familiar; ultimately reinforcing the status quo.

In summary, our research suggests that operators have different ambitions and expectations for what they will become and how cloud native can enable this, particularly in the next 1-2 years with the roll-out of 5G SA and then vRAN functions. Some operators see cloud native as one of several technologies that are essential for new operating models, new services and new revenues they need to succeed. As such, cloud native is seen as a key enabler for participating in and driving business where network APIs provide greater integration with applications: providing deeper network insights to applications and making networks more 'programmable'. For these operators, getting cloud native 'right' is essential. Other operators see cloud native as not-telco native: an alien (albeit necessary) imposition that they are ill-equipped to adopt. They are inclined to defer and make compromises in cloud native deployments. Paradoxically, by doing so, they risk undermining the very outcomes that cloud native promises to bring.

Mapping operators' perspectives and market conditions

With the aim of drawing insights and wider recommendations for all operators, we took our findings and understanding of the market and mapped operators into four broad groups across two dimensions.

Figure 10: Telco cloud native operator matrix



Source: STL Partners

As already discussed, on one dimension (horizontal axis) we have set out differences in telcos' operating model visions, ambitions and capabilities:

- Some operators are more cautious about their own capabilities and accordingly, their expectations on how they would deploy cloud native network code. They see themselves as operating others' technology delivered to them in a turnkey fashion. This is more akin to how legacy networks have been deployed and managed. By limiting or deferring change and adopting a best-of-suite approach, they hope to evolve to cloud native operations over time. These tend to be smaller

operators with significant legacy operations. These operators' customer-facing teams have little visibility of or see little relevance for their customers in cloud native networking.

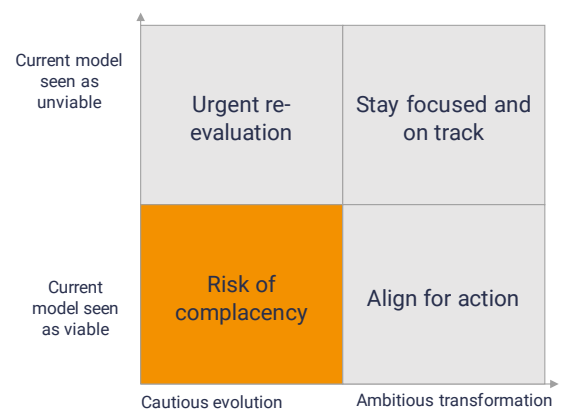
- Other operators, with more ambitious transformation objectives, anticipate that they take a stronger, hands-on, more accountable approach in combining and operating others' technology, potentially from multiple suppliers. This is more akin to how cloud native applications are managed in enterprise IT domains. At their heart, these operators see themselves as software-based technology firms. Although these tend to be larger operators or operator groups, we also found some smaller operators with a strong automation focus that fall into this group. Customer-facing teams also understand what cloud native networking means in practice and what it enables for customers.

Along the other dimension (vertical axis), we identified differences in operators' market outlook expressed as the perceived level of pressure on their current business model.

- Some operators recognise that they are experiencing considerable immediate pressures on their existing telco models. Consumer revenues are in decline, due to intensifying competition from other operators, including current challengers and new entrants. Strong local tech competitors (including the hyperscalers) also constrain the opportunities for operators to grow their 'share of wallet' from enterprises. This being all the harder with largely undifferentiated applications and solutions. This pressure on revenues is coupled with a new wave of (5G) investment and a substantial ongoing cost base. The leadership knows that things must change and fast.
- Other operators perceive that they face less pressure on their existing telco model. It may be that consumer demand and connectivity revenues are still growing for them and competition may have been less intense (e.g. a duopoly). These operators believe that they are in a strong position to expand their service offerings to enterprises without having to be particularly innovative; in many cases they have trusted brands and are seen as local tech leaders by enterprises and consumers. Regulatory and/or geographic market characteristics may provide barriers to entry. Although there are undoubtedly operators who enjoy a favourable market environment, this is a shrinking group. Furthermore, perceptions can be misleading. They may be in for a shock.

Operator segment 1: Risk of complacency

Operators in this category are more likely to be incumbents or established challengers in markets with less historic competition. These markets may still experience growth, particularly in the consumer segment. Management will be focusing on modernising the existing business: legacy services, organisations, people, IT systems and costs. Investors will want to see a steady annuity. Core connectivity will be seen as an attractive (even growing) business and these operators continue to focus on this.



With limited local competition in enterprise ICT services, such operators may have been able to offer additional services without having to create much differentiation. Their existing operating model and suppliers will have served them well. As such, potential opportunities from an evolutionary approach to cloud native networking will be around rationalising and automating core business operations, including field force operations. As a provider of high-value local employment, this is more likely to be constrained by politics than technology.

However, failing to make progress towards more open cloud native networking may present risks. The market environment could change quickly, for example with a new government. External politically-motivated pressures could also expose operators which are heavily reliant on one main supplier. New 5G licenses could spur disruption, with new entrants replicating Rakuten's strategy in Japan or Jio's in India. If competitors are better positioned to respond, pressure could mount quickly. Furthermore, once settled into a specific supplier's technology stack (virtualisation infrastructure, Kubernetes distribution, CNFs) and trajectory, the task of breaking away could prove more challenging than originally anticipated.

5G SA represents a strategic decision point and leadership should guard against approaching it with a business-as-usual mindset simply because this feels more familiar and safer.

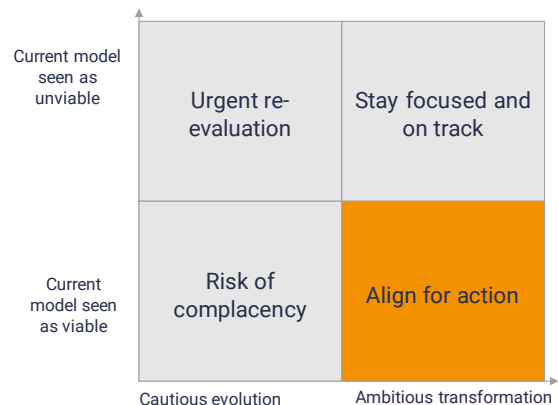
Area	Recommendations to leadership
Cloud native strategy	Regardless of the external narrative, internally challenge your assumptions and perceptions. Plan for the change to come: the eventual adoption of cloud native practices, processes, organisation and skills. Understand the risks of deferring this, identify and monitor market trigger points, set internal development thresholds, prepare responses. Guard against complacency.
Skills, organisation and culture	Build capabilities for a more software-first organisation. Re-organise operations to reflect a well-defined future mode of operation. Create opportunities and incentives for (particularly the Engineering and Operations) teams to build confidence in running cloud native applications. Reward risk. Add fresh talent through recruitment. Cultivate a learning culture where failing fast is shared openly. This is easier said than done. Elisa ² is an example of a relatively small operator that has done this.
Partnerships	Choose partners with deep IT and cloud experience who can further accelerate the operators' own learnings. Select ecosystem partners that are committed to the realisation of an open, cloud native and standards-based approach with a deep understanding of service reliability and security. We have seen the cloud evolve from a definition of basic characteristics to something that is now an entire landscape of technology with an accompanying operational

² <https://stlpartners.com/research/elisa-telco-leadership-excellence-and-how-to-do-it/>

Area	Recommendations to leadership
	philosophy. Operators should seek ecosystem partners that have demonstrated a success track in cloud technologies.

Operator segment 2: Align for action

Operators in this category are more likely to be in markets with managed competition. Although they may face limited immediate pressure from their market environment, they have opted to pursue a more ambitious (and potentially challenging) adoption of disaggregated cloud native networking. Potentially, they have a history (and culture) of developing their own technology and finding innovative ways of getting things done with scarce resources. Management will have a strong sense of purpose for the company and will include visionary innovators. Investors will have expectations accordingly. Core connectivity remains an attractive (and possibly growing) business but some of these operators may nonetheless have aspirations for expanding their role in the coordination age.



The obvious potential opportunities for these operators arising from cloud native networking will be to find ways of disrupting existing markets (including potentially their own). Much will rest on them being able to build cost leadership and becoming a preferred partner in others' ecosystems. Automation will play a key role in this too.

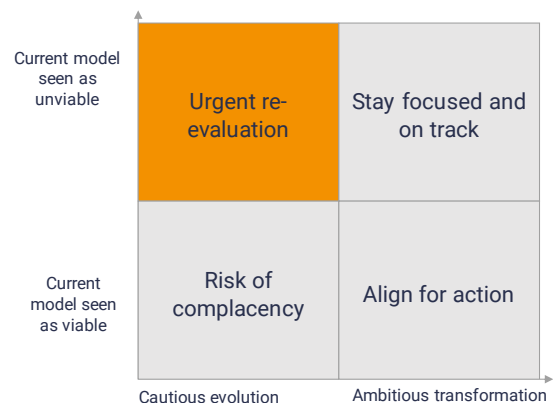
There are nonetheless risks for these operators in trying to 'run before they can walk'. Investors may take a dim view of what they consider costly technology adventures. If 5G standalone core and/or future service launches are significantly delayed due to difficulties in assembling a viable multi-vendor operation, this could prove counter-productive, damaging the operator's innovator reputation in its market. There is also a risk that the operator is not able to meet its engineering aspirations and ends up with the worst of both worlds: limited innovation due to the inability to support the intended operating model and no end-to-end SLA guarantees from suppliers. This risk is increased if efforts are diffused and all opportunities are embraced indiscriminately. Leadership should seek to mitigate these risks through focus and partnerships.

Area	Recommendations to leadership
Cloud native strategy	<p>Understand where you want to build your own IP and focus on this. Be selective. Channel your company's resources and energy where it matters most. If you need to choose between spending your R&D budget on leading the development of cloud native networking and building a vertical expertise, make sure you understand the circumstances under which cloud native is the choice.</p> <p>Manage stakeholder expectations: inform and educate customers, investors, employees and partners about plans and approach.</p>
Skills, organisation and culture	When you pursue a transformative strategy, commit properly. Re-organise, re-skill, recruit and reward. Create opportunities and incentives for (particularly the Engineering and Operations) teams to build confidence in running cloud native applications. Add fresh talent.
Partnerships	Mitigate risks and challenges of moving to cloud native by choosing ecosystem partners that can bring discipline, structure, operational blueprints and guidance. These partners should be experienced in implementing cloud native and standards approach, ideally in their own and others' operations.

Operator segment 3: Urgent re-evaluation

These operators are likely to include established operators in larger, more advanced markets. They may be operators in a single (large) country or a regional group. They will face constraints from regulation, investors, legacy services, organisations, people and costs. They will have a solid skills base but their instinct will be to evolve carefully, maintaining their 'safe', reliable operator credentials rather than rushing to reinvent themselves as software-centric players. However, the leadership also recognises that it has a 'burning platform'. This may not be enough to drive change.

Particularly where there have been multiple changes in leadership, the organisation may suffer from ambition fatigue and organisational inertia.



These operators face some tough decisions: should they continue to pursue incremental improvements in their existing operating model and develop services 'on top' of connectivity, or focus efforts in transforming their networks... or try to do both? A key consideration will be to what extent they can succeed in addressing new (e.g. vertical industry, content) opportunities without transforming network operations. They will face stiff competition from (non-telco and telco) service

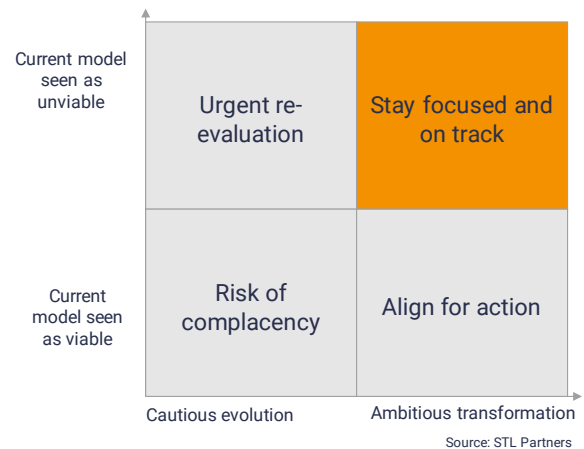
providers. Without greater transformation of core operations, they may struggle to take on competition that has less baggage and more flexible, open operating models.

A big risk is that these operators are too slow to adopt cloud native practices when they eventually need to and miss out on new opportunities arising from 5G. If existing (or worse, new) competition further commoditises core connectivity services, these operators will not be able to rely on their brands alone to resist price declines. On the other hand, they must focus resources; pick their battles.

Area	Recommendations to leadership
Cloud native strategy	Don't defer decisions. The notion of a 'fast follower' strategy for adopting cloud native networking may appeal, but the leadership should not underestimate the barriers to 'switching lanes' down the line. Act decisively and with clarity, one way or the other and avoid drifting down a business-as-usual trajectory out of inertia. Manage stakeholder expectations. Inform and educate customers, investors, employees and partners about plans and approach.
Skills, organisation and culture	Bring clarity of purpose and make sure that this is translated in a meaningful way to employees and other stakeholders. Prepare properly for change. Define the future mode of operation in detail: organisation, processes, skills. Offer a clear route for employees to learn new skills and adopt new practices: to be part of the change without compelling them to so. Provide a safety net for those who chose not to.
Partnerships	Select partners that can inspire confidence and drive change. Those that can demonstrate having 'lived' through the cloud's evolution from a definition of basic characteristics to something that is now an entire landscape of technology with an accompanying operational philosophy. Above all pick ecosystem partners that have demonstrated a success track in cloud technologies.

Operator segment 4: Stay focused and on track

These are typically operators in larger, more advanced markets. They will also include larger group operators. They will have a strong technology skills base and some success in building digital business revenues. They will also be facing considerable pressure and may even consider their current connectivity business as unviable in its current form. Their aspirations are likely to be bold, motivated by survival and an urgent need to find new sources of revenue.



The main opportunities that these operators should already be pursuing with cloud native networking will be in bringing new innovative services to consumer and enterprise customers. They will face competition from (non-telco) operators and will be looking to create differentiation through their networks. They will also be looking to rationalise and simplify their legacy operations.

The biggest risk for these operators is that they are unable to deliver on the promise of cloud native networks. It may be that they do not 'stay the course' of their transformation plan and make too many compromises against the vision of an 'open' and 'disaggregated' cloud native architecture. It could also be they end up simply trying to do too much too quickly.

Another risk is that they focus on transforming their network at the expense of building new customer propositions that will benefit from the new network capabilities. This may be fine for those operators with a wholesale focus, mainly looking to provide networking components for others' applications. However, for operators looking to play a bigger role in the coordination age, they will also need to build the services and ecosystems to meet this ambition.

Area	Recommendations to leadership
Cloud native strategy	<p>Assuming that these operators have already built consensus across the senior team on their vision, execution will be key. Maintain momentum by identifying and communicating early success stories across all stakeholders: customers, investors, employees and partners.</p> <p>Don't pursue cloud native networking as an end in itself. Ensure that the networking transformation is closely coupled with new service and ecosystem development.</p>

Area	Recommendations to leadership
Skills, organisation and culture	Ensure clarity of purpose on the overall vision is shared by all. Start with customers and partners, follow with culture, skills, organisation and operating model. Technology adoption will follow. If you have not done so already, consider creating a strong C-level product role to bridge technology and customers.
Partnerships	Select ecosystem partners that are committed to the realisation of an open, cloud native and standards approach with a demonstrated success track in cloud technologies. Avoid CNF partners that seek to impose specific hardware, containerisation, Linux release or orchestration.

Conclusions

The title of this report is Cloud native: just another technology evolution? Based on our research, we conclude that for some operators, the answer is yes. For others, it has the potential to enable changes that substantially redefine what it means to be a telecoms operator. In fairness, both sets of operators share the aspiration and longer-term vision of increasing their role in the Coordination Age. Both also see cloud native practices as desirable, applicable and inevitable for networking. The differences lie in:

- the extent to which they see an urgent need to change their operating model through cloud native networking, to achieve sustainable revenue growth from network-differentiated customer applications
- the extent to which they pursue an open, de-coupled, best of breed cloud native networking approach from the outset.

On one hand, the cautious assemblers have reservations about their own capabilities and accordingly their expectations on how they would deploy cloud native network code. On the other hand, the ambitious transformers envision taking a stronger, hands-on approach in combining and operating others' technology, potentially from multiple suppliers. At their heart, these operators see themselves as software-based technology firms.

We would argue that the latter group are better placed to achieve the promised benefits of cloud native networking sooner: flexibility, scalability, automation and the elusive combination of reliability and fast time to market with innovative services. Furthermore, they are better placed to do so across the whole organisation, for the benefit of customers. This doesn't mean that they will necessarily succeed by virtue of belief. Much will come down to execution and also to bringing new, integrated services to customers and partners. For this, they will need to choose the right ecosystem partners, that work towards the realisation of an open, cloud native and standards approach, with a deep understanding of service reliability and security.

This does not mean that the former group have necessarily 'got it all wrong'. Their approach to cloud native networking may be reflection of their circumstances. More fundamentally, they may not see an immediate need to pursue dramatic (and potentially disruptive) transformation. Their market circumstances may mean that they consider themselves to be in the fortunate position of being able to build new service revenues on top of connectivity with their existing operating model. They consider that red-blooded cloud native networking can come later. Although this may seem the more cautious view, we see considerable risks for these operators. Firstly, their existing model may be under greater threat than they realise. Secondly, although cloud native networking has its challenges these can be mitigated by choosing partners with deep IT and cloud experience. With the right partners, operators can further accelerate their own learnings and more confidently embrace cloud native.

We have set out some observations and recommendations for operators across four segments. One common recommendation across all four segments is to place cloud native adoption within a broader

business model change. Consider it as a key technical component of a wider shift in cultural, organisational and skills make-up: determining what it actually means to be a telecoms operator in the coordination age. Another recommendation is to pick partners that fit with the need of the segment.

5G standalone core is one of the first major telco deployments intended as cloud native from inception and so strong initial candidate for cloud native network application deployment at scale. It therefore represents a potentially far-reaching decision point for operators. It should be an informed one, taken pro-actively.

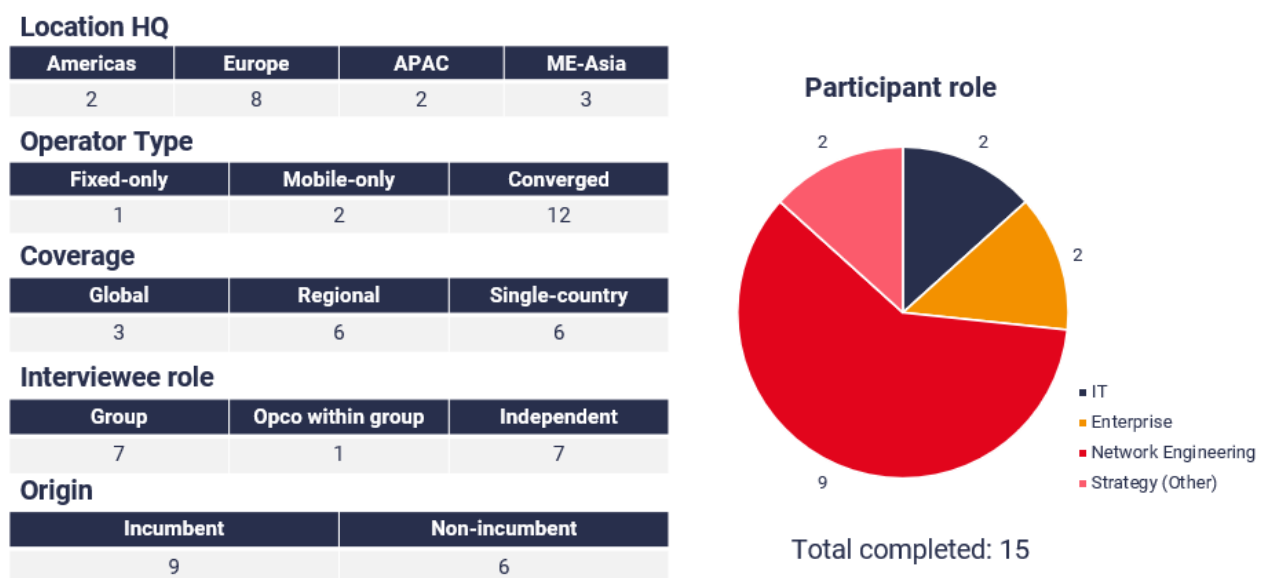
Appendix 1

Interviewee overview

As to obtain an industry perspective on the topic, STL Partners ran a research programme which encompassed interviewing 15 industry leaders from major CSPs globally. The interview programme lasted approximately two months, running between August and October, consisting of anonymised structured interviews touching on key topics including identifying an organisation's definition of cloud native, perceived benefits and barriers to adoption, and the strategy to cloud native deployment. Insights from these conversations were fundamental in testing relevant hypotheses to form a well-rounded understanding of a telco's perspective on cloud native.

The 15 interviewees can be segmented into several role-types, ranging from more technical roles within IT and network engineering to leading and client-facing roles within enterprise or strategy. This offered a holistic view on the prospects of the technology both from an implementation perspective and a commercial perspective. A similar approach was taken when recruiting CSPs. It was evident that an organisation's view on topics including perceived barriers are influenced by the nature of the business e.g. the geographical coverage; whether it is global or regional, or whether the organisation is considered an incumbent operator. As such, an impartial approach to recruitment was taken where possible. A summary of the interviewees and their organisations can be found below.

Figure 11: Interviewee Profile Summary



Appendix 2

Defining Cloud Native

Cloud native applications have associated architectures, technologies and practices originating from Big Tech and widely adopted by enterprise IT to run infrastructure-agnostic applications. The Cloud Native Computing Foundation (as good as any authority) defines Cloud Native as follows:

“Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.

These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high-impact changes frequently and predictably with minimal toil.”

There is consensus on the meaning of cloud native software and applicability to networks

Based on our conversations, we found that there was alignment on what the term cloud native means in the context of telecoms networks. Unlike the early days of NFV/SDN, there is also greater consensus on its applicability to networks and (eventual) inevitability.

- Cloud native is understood as technology originating from cloud, now widely adopted by IT. Many of the interviewees specifically referenced that they had adopted cloud native applications and associated processes in their IT functions, recognising that networks were behind in this regard.
- When it comes to network applications, these need to be written as *cloud-native network functions* (CNFs) which conform to cloud-native design philosophies, running in *containerised environments*. The term also implies software development and management technologies and toolsets designed to support CNFs: in particular, containerised infrastructure, micro-services architectures, DevOps practices for CI/CD pipeline approaches for deploying new (or new versions of) network functions.

“At its core, cloud native is automated lifecycle management of software components – you need to bridge the gap between IT and networks

Group head of Enterprise and IT architecture,
European converged operator

“Cloud native is a combination of technical (containers, microservices, APIs, availability, scalability and reliability) and cultural (mindset and skills)

CTO,
Incumbent European converged operator

“Cloud native is being infrastructure agnostic, separating SW and HW, microservices and Open API, DevOps, containers

CTO,
European converged operator

Agreement on the benefits: automation at scale for reliability and faster time to market...

- Most interviewees also referred to cloud native as a more flexible, scalable, reliable, cost-effective and automatable route to deploying and optimising networks. A key benefit is the ability to build-in “carrier grade” resilience and 99.999% service availability from less reliable underlying infrastructure.
- Several interviewees described cloud native as the only way to achieve faster time to market (TTM) for an increased range of services without introducing unmanageable risk. For example, providing the ability to run ‘canary’ tests.

“ Cloud Native is about separating software from hardware, and automation, but it is also about building network services that can recover by themselves

Director of engineering – Technology,
Northern European CSP

“ Microservices are key to delivering scale-in/scale-out and fast TTM that NFV could not

Global lead – hybrid cloud platform,
European converged operator

...and changing supplier relationships

Most interviewees mentioned (or agreed when prompted) that cloud native is a route for operators to avail themselves of technology components from (potentially different) suppliers, to optimise cost and performance. This was sometimes referred to as enabling them to adopt a best-of-breed supplier strategy.

“ Operational excellence and decoupled layers facilitate a best of breed approach, open-vendor ecosystem which will enable flexibility

Group CTO,
MENA converged operator

“ The future of cloud native is in being ‘vendor agnostic’ in every sense to allow best of breed

Group exec of Product and Technology,
APAC converged operator

“ Would prefer to buy parts from multiple vendors and let them help with implementation...there is no value in understanding intricate details

Principal network architect - Technology,
European incumbent converged operator

“ Realistic success is CN networks on multi-tenant, multi-vendor set of infra. operated in a DevOps manner using CI/CD tools and processes

Cloud production lead,
European converged operator group

This is being reflected in procurement policies, with suppliers increasingly being asked to respond to RFPs structured as tiers of hardware and software components, with the possibility of different suppliers being awarded different components. However, what is less clear is to what extent this is being done with the intention of combining best-of-breed components from multiple suppliers or more as a mechanism to secure competitive offers from the same (one or two) suppliers across all components of a given tender. To understand this, we need to look at some of the areas where respondents had different perspectives.

PARTNERS



Research



Consulting



Events