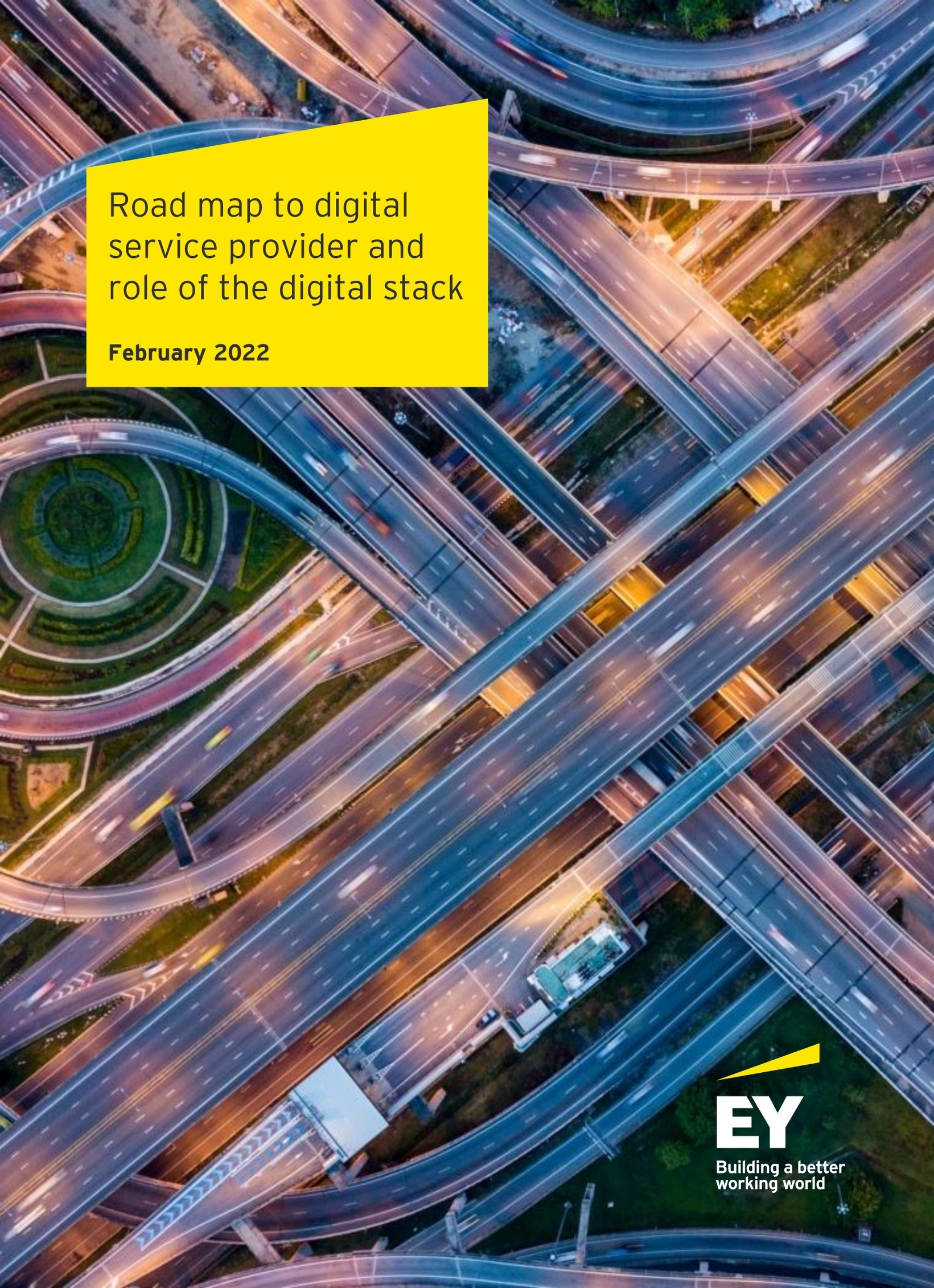


Road map to digital service provider and role of the digital stack

February 2022

EY
Building a better working world

Contents

1.

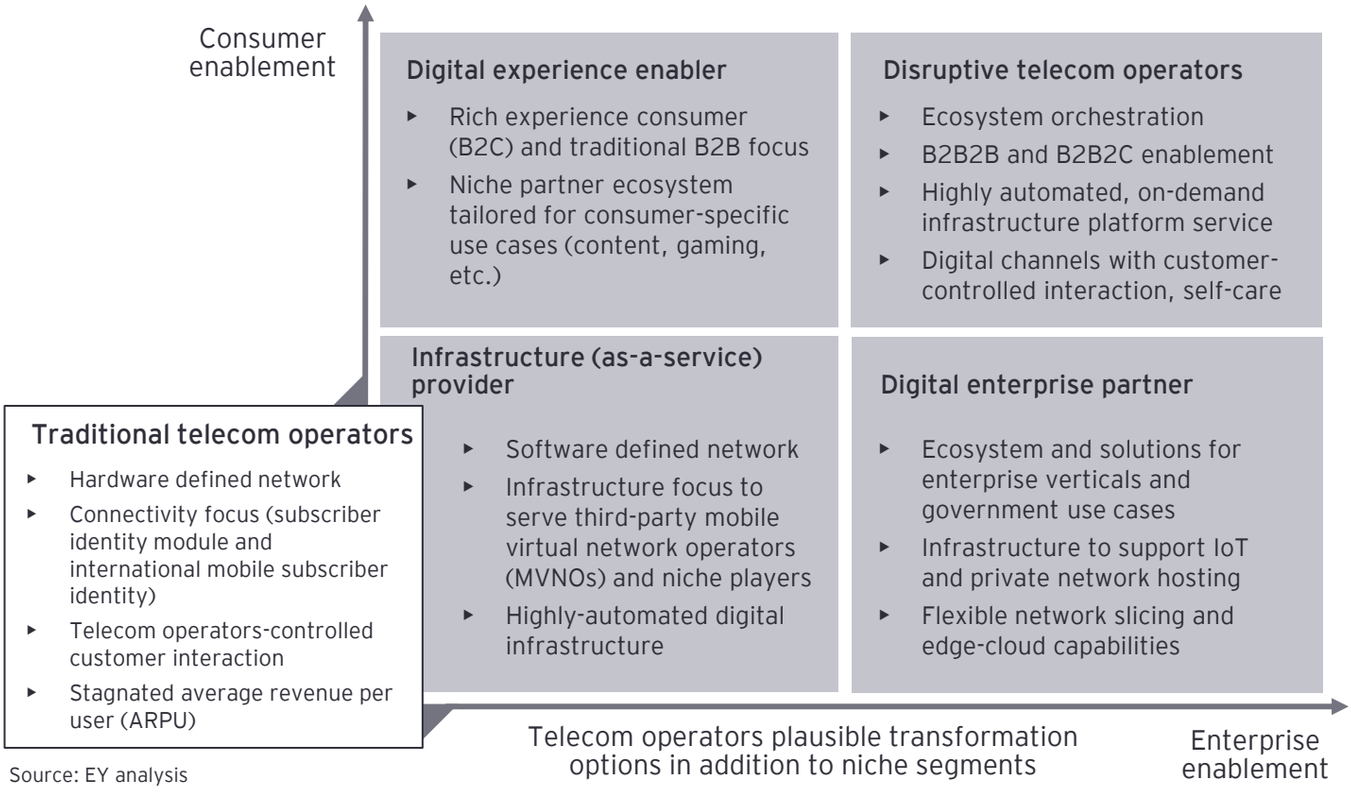
Telecom digital transformation: the blueprint of telecom operators reinvention

In the past few years, the telecom industry has witnessed a heavy decline of revenue streams in core areas such as voice and text messaging along with severe competition from OTT service providers. It has become increasingly important for telecom operators to go beyond traditional telco services to survive and thrive in an increasingly digital environment. The COVID-19 pandemic has further accelerated the urgency of going digital due to seismic, irrevocable shifts in the industry. The sudden change in consumer behavior pressed the telecom operators to innovate and deliver personalized services, and advance their digital transformation plan to adjust to the new normal.

Telecom operators today face competition from a varied set of players within their traditional ecosystem and outside. With the advent of 5G, massive internet of things (IoT) and new technologies such as cloud, analytics, artificial intelligence (AI), telecom providers are transitioning from their traditional play of communications service provider (CSP), toward that of a digital service provider (DSP). This shakeup in the communication landscape has prompted the telecom operators to look for revamping their networks and services, business models, and their relationship with customers. Telecom industries are undergoing massive structural change turning their customer channels, content and communication services digital, thereby creating a new ecosystem of value.

To succeed in the digital era, the DSPs need to diversify their revenue streams, restructure their business models and become agile to maximize the potential benefits from transformational technologies such as cloud, blockchain, IoT and 5G. The telecom operators must have the required capability to roll out innovative products and services quickly and efficiently. A flexible platform becomes significantly important for the operators as they enter the adjacent markets offering industry-specific solutions and services. The transition from CSP to DSP requires legacy systems upgrade or a complete overhaul to facilitate network monetization, omnichannel customer experiences and the development of rich partner ecosystems.

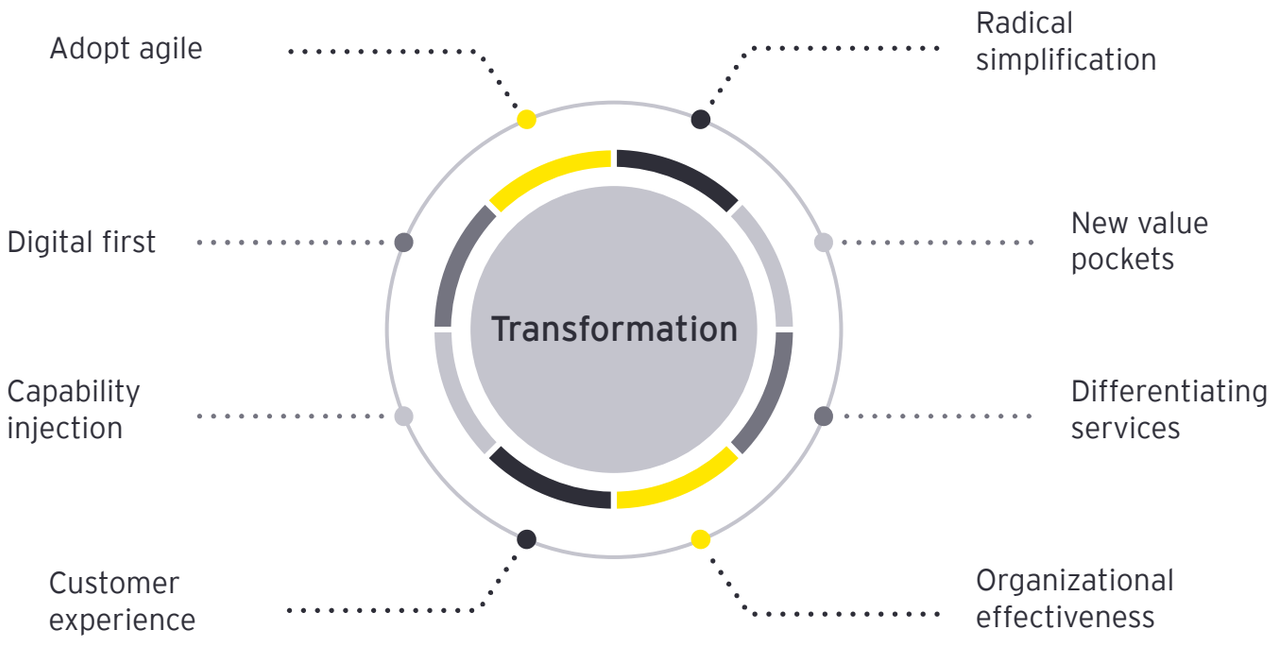
Figure: Telecom operators transition from CSP to DSP



Source: EY analysis

Figure: Telecom operators transformation themes and layers

Telecom operators business transformation themes



Three key readiness layers

Business

- Advanced capabilities across telecom value chain instead of vanilla capabilities
- New revenue streams by supporting adjacent services
- Autonomy to business

Technology

- Open, standard and resilient architecture
- Inclusion of innovation and emerging technologies
- Insights-driven designs
- Partner effectiveness

Organization

- Agile and nimble culture
- Collaborative- and accountability-based organization structure
- Automation or process

Figure: Digital megatrends shaping the telecom operators digital transformation

5G

5G is becoming fundamental to network planning, new business opportunities and network monetization. It is seen as a game-changer for the future of consumer and industrial IoT applications.

Connected devices

The demand for home and industrial IoT devices and applications will continue to exponentially increase. The proliferation of IoT devices creates an immense opportunity among telecom operators to invest in IoT devices.

Intelligent automation (IA)

Robotic process automation (RPA) in the telecom sector helps in streamlining business processes. It allows for the smooth functioning of back-office tasks by avoiding huge volumes of rules-based and repetitive operational tasks.

AI and analytics

Telecom operators are increasingly shifting toward AI capabilities to expedite and personalize customer service, reduce human intervention and increase productivity.

Cloud

Cloud offers numerous advantages such as agility, scalability, elasticity and more. It is the key enabler of digital transformation and accelerates time to market new products.

Source: EY analysis

1.1

The path to digitization: transformation journey of telecom operators

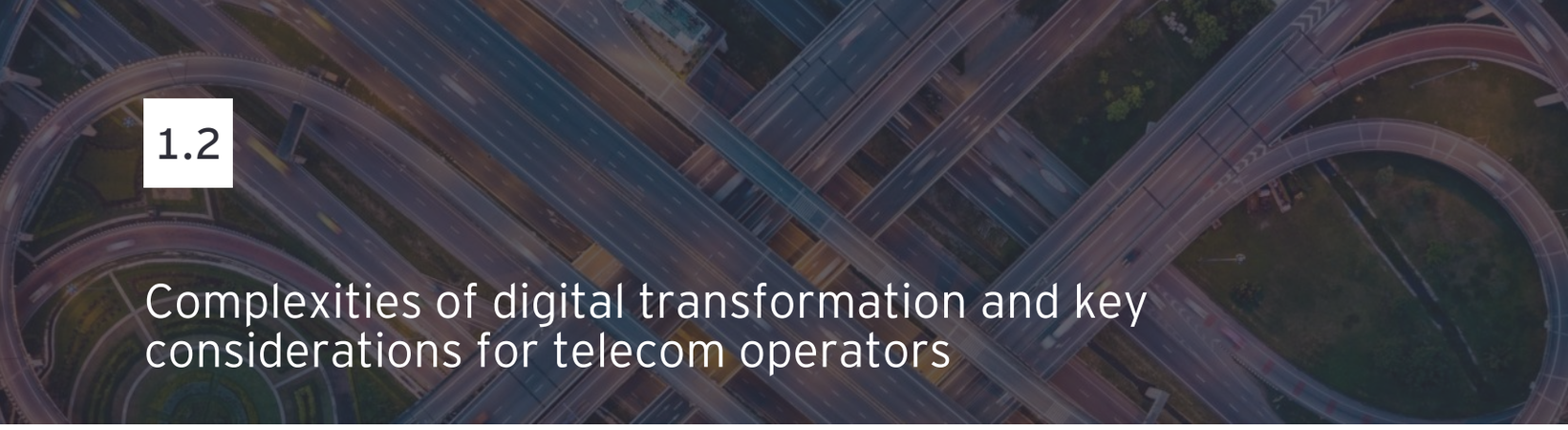
For telecom operators to have a truly transformational journey from a CSP to DSP, they need to undergo multiple aspects of transformation — technology, business models, operational systems, organizational change — looking both internally and externally. The transformation will require multiple facets to be addressed and each plausible journey represents a distinct transformation challenge. However, there are close inter-dependencies between the different paths, indicating that several journey capabilities will need to be matured in parallel.

The need for the change is urgent and for many telecom operators, this journey is already underway. It involves implementing changes to the systems, processes, data-management, skills and culture across the telecom operators. These helps to ultimately align customer engagement experience with the best-in-class across all other consumer verticals.

Figure: Digital transformation journey of telecom operators

	Telecom operators transformation journey	Description
1	Shift from discrete network elements to a virtualized and cloud infrastructure	▸ The telecom operators infrastructure must evolve to a virtualized cloud infrastructure, that can be managed in a highly autonomous fashion, at an extremely low cost.
2	Focus from product-specific security to orchestrated security	▸ New digital services will have higher security requirements that necessitate business-wide security transformation covering the full technology stack.
3	Development of an orchestrated data-centric approach	▸ A key telecom operators journey involves the development of a single coordinated approach for the collection, analysis, distribution, security and monetization of data.
4	Shift from closed management systems to an open API platform	▸ Telecom operators must evolve from a closed IT architecture to an open platform architecture, accessed through open available APIs.
5	Limited portfolio of traditional services to a diverse portfolio of digital services	▸ Telecom operators must expand their service portfolios to offer new suites of digital services, addressing new verticals, with strong revenue growth potential.
6	Few set of suppliers to multi-vendor approach	▸ A step change is needed in the number and variety of partners, and sophistication in how telecom operators are governed and engaged with their suppliers.
7	Limited set of business models to multiple business models	▸ This journey requires new as well as lean operational and IT architectures to support multiple business models, without increasing operational complexity and cost.
8	Shift from traditional telecom operators culture to a digital culture	▸ The journey requires organizational and culture change to offer a wide portfolio of digital services in competition with internet and OTT players.
9	From focusing on traditional channels to multiple channels	▸ Telecom operators need to open up new communications and partner channels to market their brand and to maximize their digital products and services revenues.
10	Shift from one dimensional customer management to 360-degree omnichannel management	▸ This transformation involves implementing changes to the systems, processes, data management, skills and culture across the telecom operators to align customer engagement experience.

Source: EY analysis, TM Forum



1.2

Complexities of digital transformation and key considerations for telecom operators

As telecom operators pursue the digital stack transformation, they will be confronted with a variety of monetization complexities. However, telecom operators can minimize the level of complexity by considering processes that will help them modernize their systems efficiently and make it future-ready.

While they evolve the network and develop their services strategy, they must concurrently implement organizational change and modernize information technology (IT) and business support systems (BSS). By working across the four foundations of monetization capabilities which include network or operations support systems (OSS), organization, services, and IT/BSS, telecom operators can gradually build the appropriate "5G-ready" capabilities and create a seamless customer and partner experience for the new strategies being pursued.

Figure: Complexities involved in next-gen monetization models, and key recommendations

Complexities

- Product diversity and simplification
- Shift toward real and right-time billing
- Partner management across complex B2B2X ecosystems
- Variation in customer or service adoption maturity
- Configurability: need to manage bespoke services
- Rating and charging for new use cases

Recommendations

- Create cross-functional teams to drive alignment and accountability
- Invest in capabilities that enable self-service and configurability
- Build hybrid systems to future-proof capability to support migration
- Drive proof of concepts to understand telecom operators roles & the preferred monetization models
- Avoid bill shock by creating transparency or predictability
- Partner to build emerging technology standards across networks and IT

The complexities involved in next-gen monetization models and what telecom operators can do to overcome these complexities include:

Portfolio diversity and simplification

- The telecom operators must put standardized processes in place to explore how their partners deliver the solution and generate revenue. Once the standardization process is in place, telecom operators must look to simplify their backend system by automating orders and billing capabilities.

Partner management across complex B2B2X ecosystems

- 5G has pressed telecom operators to move toward an ecosystem driver role. In this role, they are serving diverse third-party ecosystems and acting as a one-stop-shop for customers, whereby offering a broad range of products and solutions. Telecom operators looking to expand their role will have to work with a large and diverse partner ecosystem and may need to converge solutions across multiple partners who rate or bill or charge in different models. Telecom operators who are fronting the solution need to aggregate across partners and deliver a simple, seamless and transparent experience to customers and partners.
- As telecom operators contemplate initiating their B2B2X journeys, they must start by identifying the adequate business models for them, based on their strengths and market context. For a successful business model, telecom operators can either become end-to-end providers to deliver products and services or offer services in partnership with the ecosystem vendors. When it comes to 5G, the partnership model is the preferred model, with approximately 40%[1] of deals witnessing telecom operators as the secondary supplier. Only 21% of enterprise 5G deals were led by telecom operators independently, where it offers services to the enterprise without any involvement from the equipment vendor or other parties.

1. "Omdia," https://tmt.knect365.com/uploads/2646-Omdia-BearingPoint-5G-EBook-V1Ofed6e558e89af5a61a117025401bd4b2.pdf, 2020

Figure: Business model considerations in the B2B2X transformation

For telecom operators to transform into B2B2X disruptors, they need to ensure that they stitch together the right business models for their operations. All building on their customer base and data assets, the choice of a business model (or combination of models by geography and sector) should be made based on the (to-be-required) capabilities of telecom operators and expected returns.

Some business models to consider are:

A End-to-end provider

- In-house capabilities and offerings to enable an end-to-end value proposition to customers
- Requires deep expertise across the value chain and continuous investments into innovation and R&D

B Connectivity owner and lead ecosystem partner

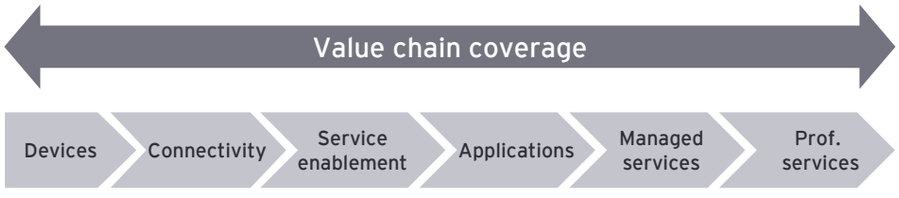
- Partner with solution providers, device manufacturers and professional service providers
- Lead all customer touchpoints for solution delivery

Significance: such a model could be particularly relevant with SMEs, local large enterprises and government entities where the operator has already established strong relationships and understands the specificities of the market.

C Solution owner and lead ecosystem partner

- Develop specific expertise around a solution set or an enterprise sector (e.g., health care) and scale it to markets through partnerships — not limited to geographies where telecom operators run its connectivity operations

Significance: such a model could be best suited for telecom operators that have developed niche industry-specific offerings and have built strong initial credentials in the markets where they operate.



Business model selection based on targeted verticals

- The business model selections will depend on multiple factors based on the verticals and the services the telecom operators plan to offer.
- The telecom operators will need to evaluate their core competencies and in-house capabilities to choose the right business model for the verticals or services they choose to offer.
- These decisions will be based on their core strengths, and the choice of model can vary between the geographies of play, verticals targeted, and solutions rendered.

Source: EY analysis

Configurability and customization

The availability of technologies such as network slicing, network as a service (NaaS), and network embedded services has transformed the network to be more dynamic and customizable to meet customer and partner needs. However, the flexibility of the network has posed billing challenges and to overcome this challenge, telecom operators need to have differentiated service level agreements (SLAs) in place.

In addition to managing the network elements, telecom operators also need to manage product configuration through digital self-service channels. Partners and enterprise customers are looking to take more of a do it yourself (DIY) approach to solution procurement, leveraging digital portals or application programming interface (API) to configure, purchase, and spin up solutions and services which match their needs. This configuration needs to happen at the right time with minimal manual processes for the creation of the solution.

Efficient billing management

As enterprises move toward cloud models for the adoption of next-gen services, the traditional fixed day in the monthly billing cycle is broken. Customers and partners want to access the bill at the right time to assess usage statistics and understand more about their expected charges and costs. Enterprises also want the bill broken down by key cost centers to evaluate their spending without the need to put in specific requests to the vendor or wait for long periods to receive the bill. This is a challenge for telecom operators that batch process bills with limited information and insights on fixed days in the month. However, a shift to right-time billing will be vital in creating a sticky relation with customers and partners and providing required transparency to the enterprises as they move to new payment models.

Variation in maturity of customers and adoption of new vision models

The telecom operators customer segment is highly fragmented with varied needs of customers. Few prefer physical channels whereas few opt for digital touchpoints. This create pressure among telecom operators having to maintain their legacy stack and existing services, while creating a new digital stack for migrating customers. The complexity lies in simultaneously operating two stacks, both transitioning toward an omnichannel IT/BSS system, and managing the migration of customers. Telecom operators must manage the omnichannel system in different ways across both enterprise and customer segment to overcome this complexity.

Rating and charging for next-gen use cases

5G promises to influence wide range of use cases across industries and network slicing becomes a critical factor for rating and charging. As the standardization of slicing capabilities is difficult, telecom operators need to have differentiated rating and charging capabilities to keep pace with evolving 5G use cases across industries.

1.3

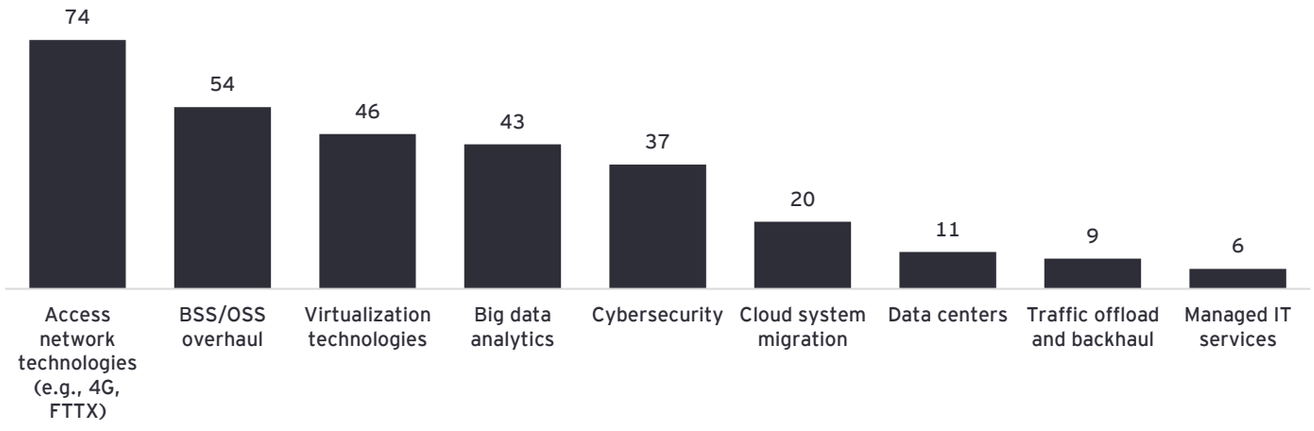
Digital transformation a prerequisite to realize the benefits of next-gen technologies

Overall telecom operators spending on technology has increased globally as their traditional model is not compatible to support the emerging technologies. According to a survey, covering the C-suite of ~40 ICT companies, spending towards network technologies and IT enhancement has become a top priority of the chief experience officers (CXOs) globally. The network layer dominates the current spending agenda with 74% of respondents citing investments towards access network technologies. The next focus area of the leaders is the enablement layer comprising BSS/OSS, which is cited by 54% of respondents globally.

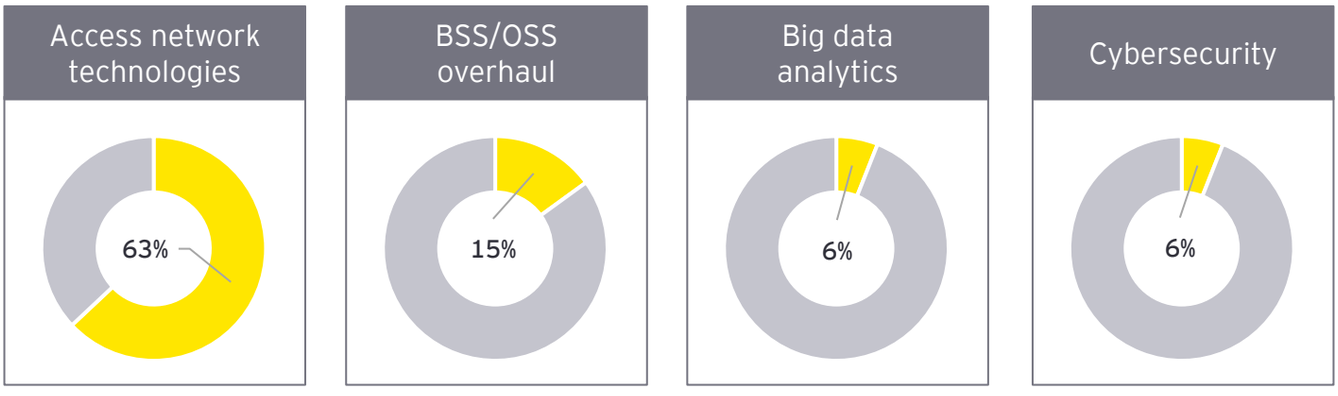
Figure: Technology based investments are becoming a top priority

Q. What are your organization's most critical IT and network investment domains over the next two years? (Top three responses)

Telecom operators views on network and IT spending domains (% of respondents)



Most critical IT and network investment domains over the next two years (top answer)



n = 39 (includes % of respondents)

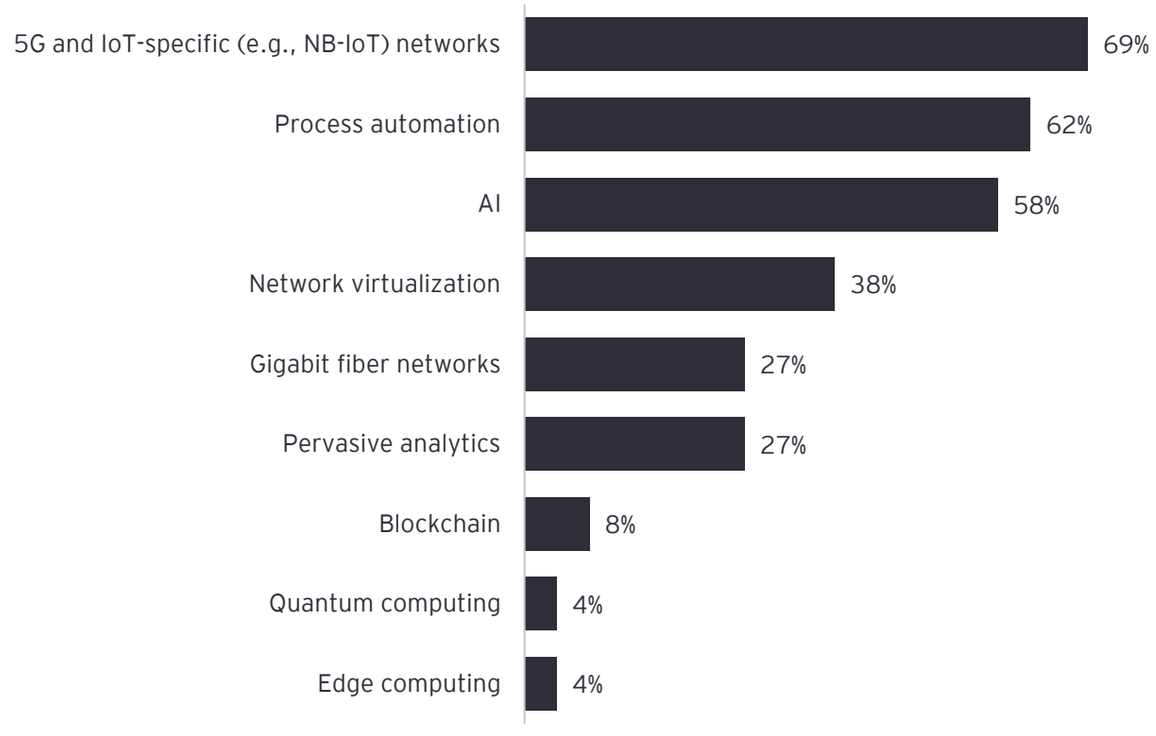
Source: Digital transformation global telecommunications study — enterprise survey, EY

Also, 5G rollout is driving a massive transformation among telecom operators and is becoming fundamental to network planning, new business opportunities and network monetization. With the promise of high bandwidth, ultra-low latency, and potential industry-specific use cases, 5G is seen as a catalyst responsible for digital transformation. According to the global survey conducted by EY, 69% of respondents cited 5G as the most critical driver of their organization's digital transformation journey over the next five years. Automation and AI has become critical aspect of the telecom operators digital transformation

Automation and AI has become critical aspect of the telecom operators digital transformation journey as it aids the delivery of personalized offerings. The operators are leveraging the insights generated from large data sets to understand consumer behavior and offer tailored services. AI also helps in detecting and preventing fraudulent activities, improving customer services, and taking effective business decisions. Approximately 62% of respondents cited automation and 58% of respondents cited AI as critical drivers of digital transformation.

Figure: Emerging technologies supporting digital transformation

Question: Which emerging technologies and processes will be the most critical driver of your organization's digital transformation journey over the next five years? (Please select three answers.)



n = 27 (includes % of respondents)

Source: Accelerating the intelligent enterprise — enterprise survey, EY

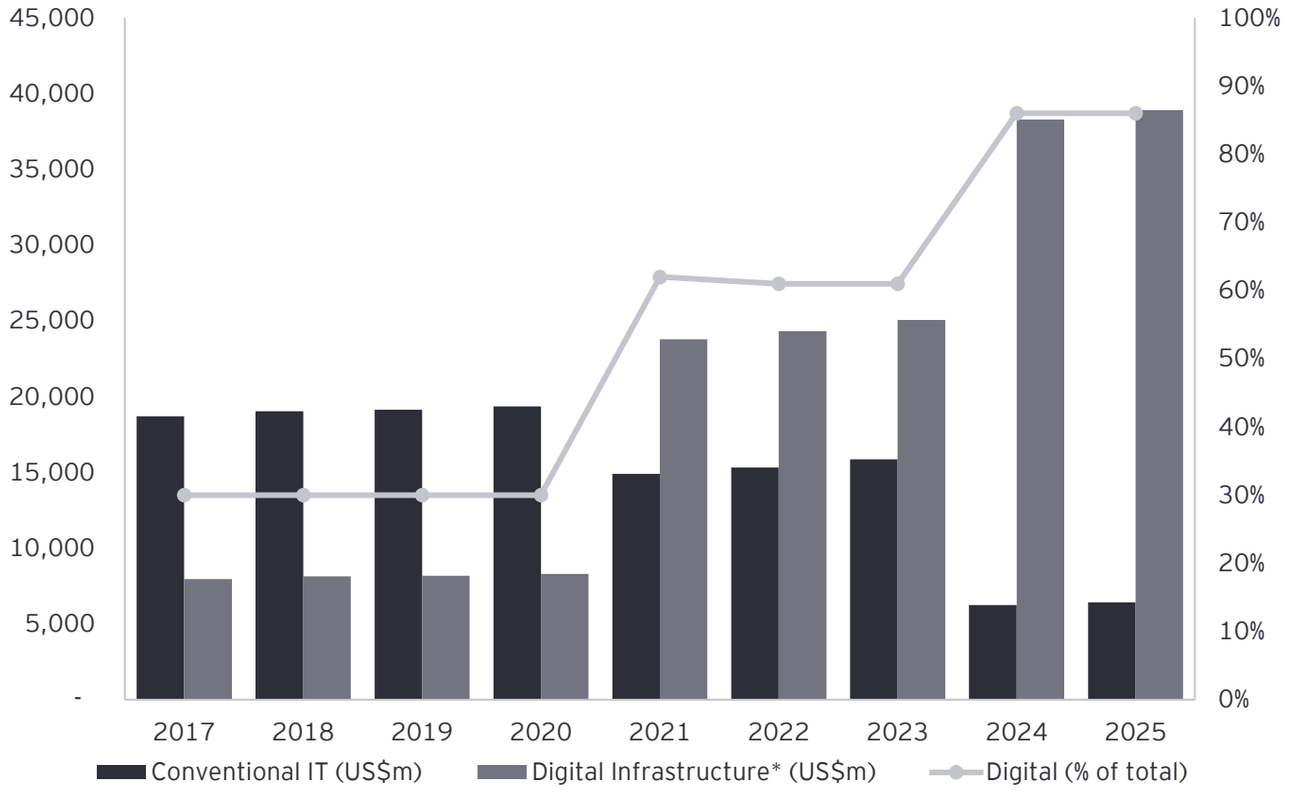
1.4

Digital transformation is a top priority for CXOs

The IT spending towards technology has become a priority for the CXOs globally, as they have realized that digital transformation is key to success and traditional model can no longer drive the future growth and revenue prospects. The rollout of 5G technology has further pushed the chief experience officers (CXOs) to rethink their investment strategies and focus more toward upgrading network and technology platforms. The C-level executives face an onslaught of business priorities that must address the organization's basic needs from regulatory compliance to higher level needs that include the management of the brand. They also need to make some critical investment decisions prioritizing some aspects over others when it comes to making their business and operations future-ready and future-proof.

The chief information officers (CIOs) face the complexion of IT spend which is also changing as they overhaul their IT estate to lay down a solid bedrock for digitization. The next few years will see a balanced shift decisively from conventional IT to digital, which includes new cloud infrastructure, edge-computing systems, content delivery networks (CDNs) and other elements. This will account for over four-fifths of IT capital expenditures (capex) by 2024.[2]

Figure: Telecom IT capex spending, conventional vs. digital infrastructure



*Digital infrastructure includes new cloud infrastructure, edge computing systems, content delivery networks (CDNs) and other elements.

Source: Analysys Mason

2. Accelerating the intelligent enterprise — Global telecommunications study, EY

C-suite balances multiple priorities in their journey from CSPs to DSPs. Some of these priorities include:

Increasing complexity and volume of regulations

Leaders see a massive push toward software-based solutions, analytics, automation and AI to address compliance. A greater focus on automation will provide a 10x efficiency for early adopters.

Delivering on digital transformation

Telecom operators must move beyond digital channels to deliver on new business and monetization models. This requires a rethink of partner ecosystems and investment into adjacent start-ups. Telecom operators must also support the cultural change required by addressing needs for dynamic skills and continuous learning environments.

Delivery of subscription models

Customers expect providers to deliver on new subscription models which are driven by granularity of services, quality of service (QoS), and ease of purchase drive subscription strategy.

Focus on service-centric revenue

The shift from equipment-based revenue to services-based revenue has arrived. Installation, support and warranty revenues are now aligned with equipment sales and experience-based services.

Using IoT to improve experience

IoT provides opportunities to use data to deliver on improved experiences. By providing contextual relevance, telecom operators can understand existing usage patterns, anticipate future needs and improve each interaction.

Heightened awareness of cybersecurity threats

With increasing cyber threats, leaders are building intelligent approaches to both assessing and addressing threats. Disaster recovery and back up along with new security techniques ensure that critical infrastructure is protected.

Greater investments in predictive asset management

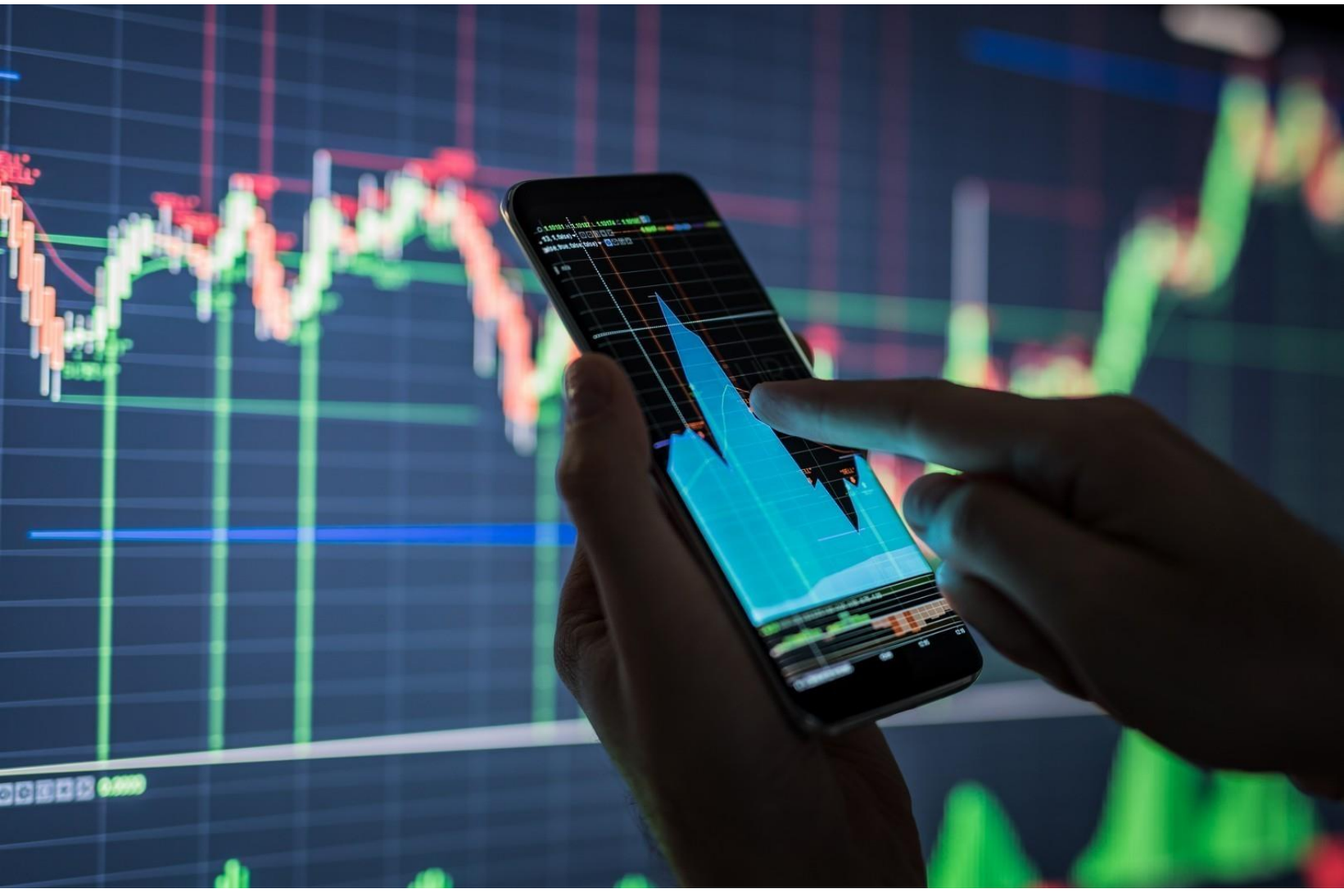
The leaders are investing in technologies such as AI to improve their decision-making and take informed decisions. A push for predictive asset management enables the optimized utilization of expensive capital investments.

Convergence of APM and FSM

Organizations must bring together their asset performance management (APM) systems with their field service to achieve exponential gains to drive efficiency. Linking APM with field service management (FSM) together enables better upstream and downstream sensing as well as greater visibility into the life cycle of an asset.

For the transition to digital channels and new models, it is increasingly important for telecom operators to invest in the digital stack which is a key ingredient for a successful digital transformation journey. Currently, a major transformation is underway in areas such as billing and charging capabilities, and customer experience management. Moreover, the monetization of 5G technology demands streamlined, modern billing and operational systems in place to realize its true potential.

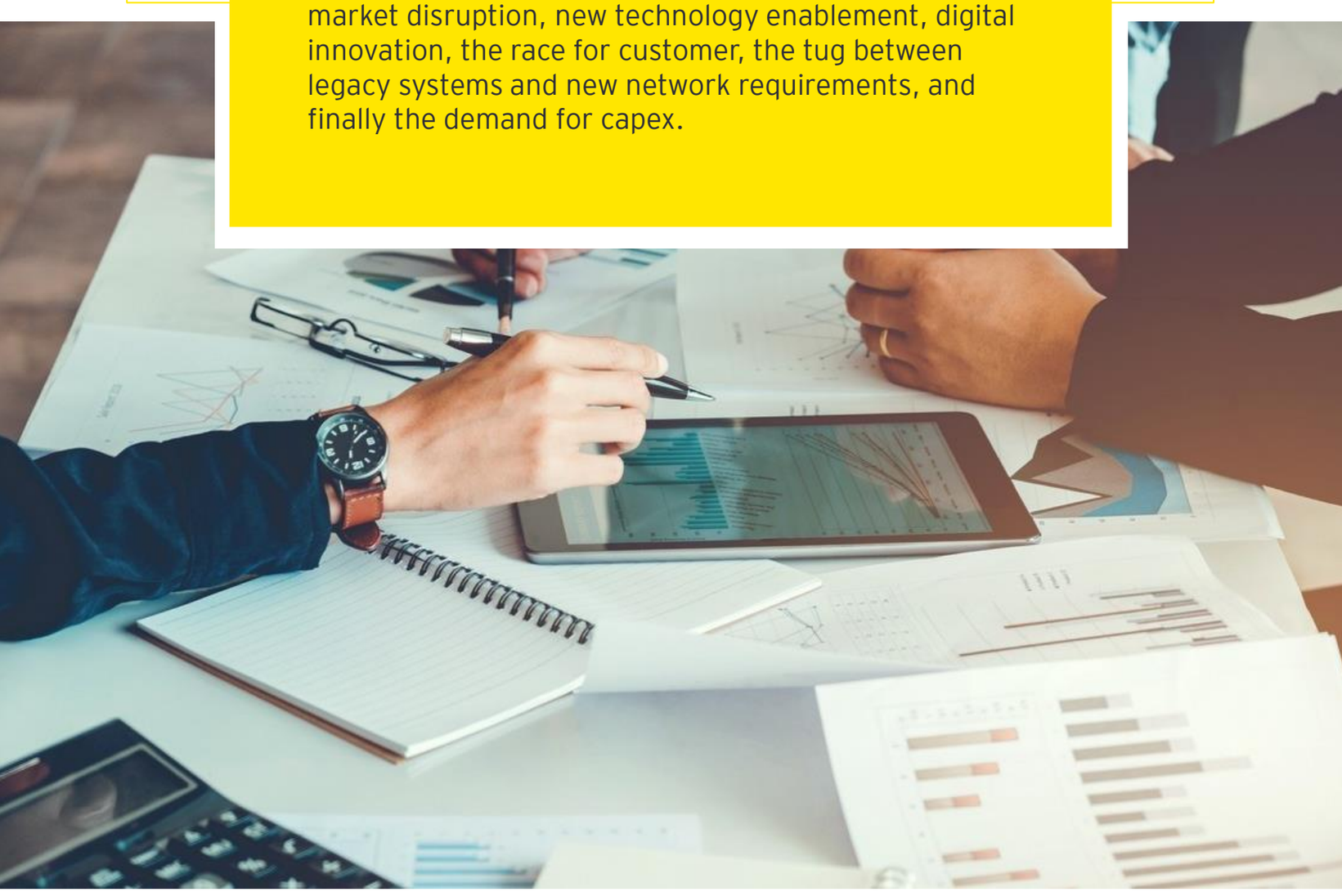
Telecom operators are opting for an integrated approach where the operations and billing platform can integrate key solutions such as customer management, billing engine and revenue enablement. The focus is shifting from traditional infrastructure upgrades to improving the business processes such as customer interaction management, billing and provisioning. The equipment manufacturers are looking to merge OSS/BSS in a single suite with more focus on customer-facing aspects. The new players are venturing with innovative offerings such as embedding analytics, providing hosted services and more.



2.

Digital stack is the key enabler for telecom operators priorities

The accelerated demand for digital transformation within the telecom industry has caused drastic changes for companies across the world, with business leaders looking for solutions to transform business agility, efficiency and seize new growth opportunities. Telecom CEOs are entangled in a web of strategic priorities stemming from multiple aspects of the business – market disruption, new technology enablement, digital innovation, the race for customer, the tug between legacy systems and new network requirements, and finally the demand for capex.



2.1

Telecom operators digital stack transformation

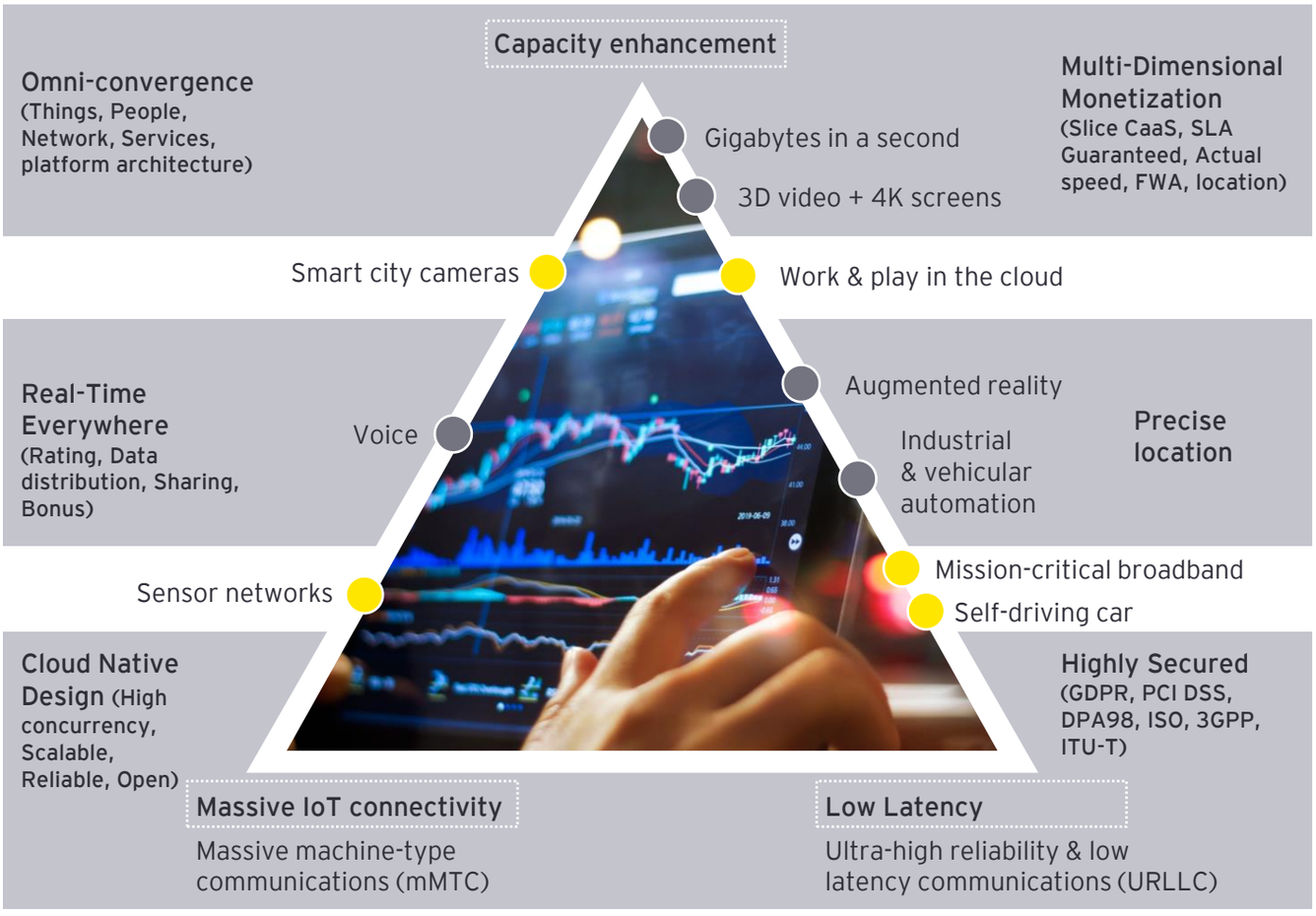
A wave of emerging technologies is disrupting the telecommunications industry and driving telecom operators to transform their legacy stack into a digital stack. 5G and cloud-native solutions will play key roles in this transformation, affording telecom operators an opportunity to maximize their network resources and capitalize on market opportunities (i.e., offering their customers new and innovative services), as well as using existing resources more efficiently.

The key factors driving digital stack transformation among telecom operators include:

A Monetizing 5G depends heavily on stack transformation

- With 5G-enabled network slicing and the anticipated surge in the IoT and other services such as AI and augmented reality (AR) or virtual reality (VR), it is challenging for telecom operators to meet the demands to support new business models and use cases without making changes to their legacy stack. Telecom operators need the digital stack in place to monetize the true potential of 5G and support future proof and upcoming technologies.

Figure: Transformation potential of 5G will enable a lot of new applications and services



Source: EY analysis

Figure: Transforming legacy systems to fully monetize and realize potential value of 5G

67%

Potential revenue at risk with failure to modernize OSS/BSS

72%

5G revenue growth is dependent on OSS/BSS transformation

50%

Telecom operators will create and deliver digital services with hyperscale business models by 2027

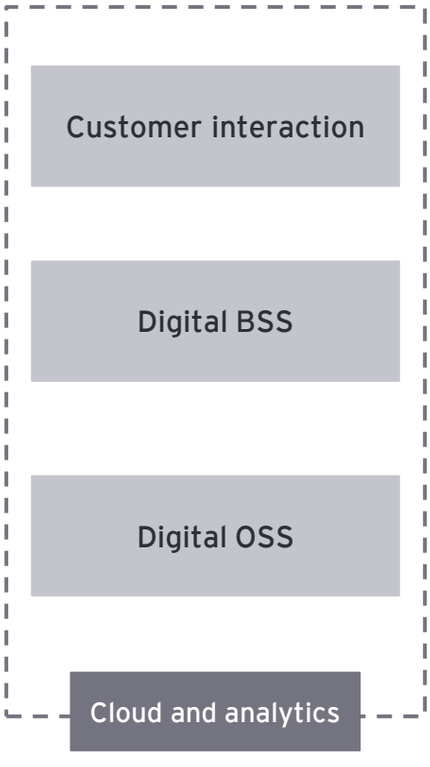
With modern OSS/BSS, telecom operators can extract greater value from their networks

Customer interaction

- Channel management
- Customer journey design
- Sales and marketing

Digital BSS

- Product management
- Customer management
- Partner management
- Sales management
- Revenue management



Digital OSS

- Service orchestration
- SDN/NFV orchestration
- Hybrid resource management
- Infrastructure management

Cloud and analytics

- Cloud platform
- API integration
- Advanced analytics
- Partner ecosystem

Source: TM Forum, Press releases, EY analysis

With network slicing capabilities, telecom operators can offer industry-specific requirements through multiple virtual slices with good speed and reliable connectivity. Network slicing is a key 5G use case and is integral to 5G charging. Most devices today have the same bandwidth and service levels, but network slicing creates new charging opportunities by enabling the segregation of network resources. Using flexible charging models, telecom operators can monetize these slices for both consumers and the enterprise.

Network slices are designed to serve individual customer needs and the service-level agreement (SLA) is defined based on the level of service a customer expects from each slice. 5G charging systems enable telecom operators to dynamically scale pricing, define policy rules for specific devices, further enabling them to offer more specific SLAs.

B Cloud-native digital stack

- Cloud-native solutions is a key trend and telecom operators are looking to move their stack to the cloud to improve business agility, scalability and evolve faster in line with the changing market conditions and needs. As networks and service offerings evolve, telecom operators are advancing the BSS-to-cloud journey to realize benefits in core competence areas. These include accelerated time to market (TTM) and time to revenue (TTR) improving top-line growth, capex reduction, scalability and elasticity.

C Automating business processes to drive business agility

- With the introduction of 5G, the amount of actionable data generated by the network is going to become overwhelming. With AI and analytics, telecom operators will be able to know their customers better and provide highly contextualized services catering to customer personas. Today, customers expect self-service and a superior digital experience. To meet these demands, telecom operators are introducing and modifying services and operations at an unprecedented speed. Supporting this new normal necessitates increased automation in product life cycle management and redesigning of the BSS.

D More customer-centric and faster go-to-market approaches

- The digital stack transformation in telecom is a shift from a product-centric to a customer-centric model with the aim to improve customer experience. With the emergence of digital services, the customer wants to be serviced quickly, without any inconvenience. Any delay in customer service representative response and long wait time could lead to customer attrition. Telecom operators are aspiring to provide seamless services similar to an e-commerce company or a mobility company to provide the same level of personalization to their customers. However, the biggest challenge they face is the existing legacy systems that restrict its ability to launch digital services quickly and efficiently. This has prompted the telecom operators to modernize their systems to reduce TTM and deliver an enhanced customer experience.

2.2

Key challenges in legacy systems and path to evolution

A typical traditional architecture comprises various solutions and technologies from multiple vendors to support the necessary IT capabilities. The technologies mainly used includes the mainframe systems, client-server and packaged applications. All these legacy technologies need to support the entire business process throughout the customer life cycle, along with the rapidly evolving products and services. This further tends to increase operational costs and the risk of running core business processes in outdated and unsupported systems requires more TTM for new products.

The replacement and migration of legacy systems also pose a significant challenge as replacing a legacy system is both expensive and time-consuming. One of the major risks associated with replacing a legacy system is that the new system might not meet the business needs due to a lack of technical specifications. Telecom operators are likely to face multiple challenges from their current legacy systems, especially while adopting 5G network and technology.

Figure: Challenges involved in the traditional model

1 Legacy BSS/OSS systems not future-ready

- BSS/OSS systems are monolithic, tied to specific hardware
- Accumulated layers of BSS/OSS as new network components are added to the legacy networks
- Non-flexible and non-agile in nature

2 Data security and privacy

- Complying with different countries' regulations because BSS requires managing large amounts of customer data
- Different systems launching each new service: in-house, a partner, or different system inherited from acquisitions
- Unavailability of automated and standardized provisioning of network and connectivity for 5G applications and services

3 Lack of agility in the market

- Service providers do not offer market-responsive BSS/OSS products to boost offerings of agile, cloud-based technologies to digital partners
- Difficult to support multiple business models and different pricing models
- TTM for new offerings is high

Source: TM Forum, IEEE, EY analysis

4 Uncertain transformation road map

- Not knowing whether to first transform the network or BSS/OSS
- Building an overarching business case is difficult because of:
  - Fast-paced and unfamiliar cloud environment
  - Uncertainty over the network and IT functions being developed in-house or procured from a vendor

5 Unresponsive platforms

- Difficult to onboard new partners or difficult to launch new products
- No visibility on network latency even though the network is aware of congestion
- Reactive mechanism to address network faults which involves human effort as self-healing network capability is not available

6 System complexities

- 5G networks will be significantly more complex than current networks. One component of this increasing complexity is the need for denser networks.
- Ensuring 5G coverage will be costlier as more 5G hardware and supporting software will be needed, especially as traffic moves indoors.

Evolution from traditional legacy systems to cloud-native

Globally, there is a shift in the architecture moving away from traditional solution stacks and monolithic giant blocks to micro services architecture (DevOps model). Cloud is the key enabler of digital transformation among telecom operators and with the emergence of 5G, the transition toward cloud-native must be architected for better agility and scalability.

The traditional model is based on monolithic applications where if a single component fails, it can cause the entire application to fail. The first generation is the first organized sector; however, it also has certain limitations such as complexities involved in design and modernization challenges. The next generation involves the journey toward cloudification with focus on customer centricity. The current strategy adopted by telecom operators are using cloud-native technology that offers numerous advantages such as faster deployment cycles, scalability, shorter time to market and more.

Source: TM Forum, IEEE, EY analysis

1 Traditional OSS/BSS

- Monolithic construct
- Legacy applications
- Focus on network operation
- Lacks integration – works in silos
- Swivel chair architecture

2 First generation

- First organized architecture
- Standard interfaces for data exchange
- Complex to design, operate and maintain
- Difficult to modernize and enhance

3 Next generation

- Paradigm shift
- From networks to customer-centric
- Plug and play interoperability
- Leverages enhanced telecom operations map (eTOM)
- Multi-vendor OSS/BSS ecosystem

4 Cloud-native

- NFV and SDN
- Supports automation, self-service
- Flexible on new models – IoT platform
- Leverages open source and cloud

Advantages of cloud-native OSS BSS

Microservices

- Fabric of CSPs solution for cloud-native – vendors are rebuilding portfolios to this model
- Provides agility and quick go-to-market (GTM)
- Uses open APIs to expose services and interconnect components

Faster deployment cycles

- DevOps model change – characterized with speed and agility
- Supports dynamic iteration cycles

Flexible scalability

- DevOps allow operators to scale and cut wasteful overheads
- Drives innovation on service design

Decision-making

- Fosters culture change
- Increased collaboration between external and internal IT teams
- Enables non-hierarchical decision-making

Source: EY analysis

2.3

MENA digital landscape

Telecom operators in the MENA region have undergone digital stack transformation with major focus on customer relationship management, billing and analytics. OSS/BSS has been evolving to be less in-house developed, to using third-party solutions, and deploying new software development models. Telecom operators in the region are currently witnessing an evolution in supporting cloud applications, enterprise mobility, security solutions, adoption of rich and automated digital channels and network virtualization.

The region has experienced few successful transformations and the benefits achieved includes reduced IT bills of maintaining legacy systems, measurable improvements in customer experience, etc. The small and medium-sized enterprises (SMEs) sector represents approximately 94%[3] of the total number of companies operating in the UAE. Telecom operators in the region have an opportunity to support the SMEs by facilitating innovation and transformation as the sector is already acting as a driving force behind the digital transformation in the country.

The major factors driving digital transformation in MENA includes:

A Government initiatives

Governments throughout the Middle East have been launching incentives to drive digital transformation forward, with the aim of accelerating economic diversification, encouraging sustainability and ensuring satisfaction levels among citizens. For example, national platforms, apps and payment methods have been developed by different governments to share information and enhance accessibility of resources for inhabitants. The digital programs of Middle Eastern countries are supported by technologies such as robotics, IoT, AI and cloud.

Figure: National broadband plans for selected MENA countries

KSA	UAE	Qatar	Oman
KSA Vision 2030: national transformation plan	The UAE Vision 2021	National Vision 2030: Qatar National Broadband Plan	National Broadband Strategy
US$1.5b	US$691m	US$550m	US$473m
▸ Fund introduced to accelerate the deployment of fiber in urban areas	▸ Investing in UK-based fiber for high-speed broadband rollout	▸ Partly private investment by telecom operators and partly funded by the Government under the Qatar National Broadband Plan	▸ Funding by leading Asian infrastructure bank for the fiber expansion project

Source: EY analysis

3. "UAE Website," https://u.ae/en/information-and-services/business/crowdfunding/the-impact-of-smes-on-the-uae-economy, July 2021

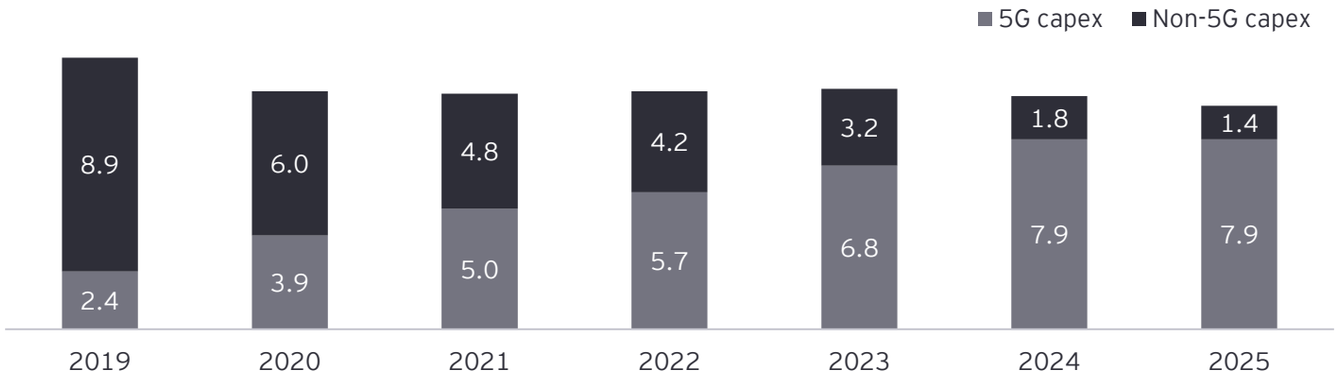
B Focus on cloud-centric systems

- Telecom operators in the MENA region are transitioning toward becoming a digital service provider and they understand that a part of this transformation requires cloud migration. The adoption of cloud-native technologies has enabled telecom operators in the region to change their business models and offer new products, services, pricing plans and more. One of the leading telecom operators from the region has started its digital transformation journey by building telco cloud, a carrier-grade cloud infrastructure, that will support any virtualized network functions (VNFs). The telco cloud is critical for telecom operators looking to expand the network capacity to meet growing user demand and also control their costs in a competitive market.

C Pioneers in 5G adoption

- In the GCC region, the telecom infrastructure growth has been phenomenal with governments and regulators supporting the telecom growth landscape and awarding adequate spectrum for the propagation of services. The Gulf countries have prioritized 5GG adoption as part of their larger effort to transition from oil-dependency to knowledge-based service economies. The movement to develop 5G networks reflects both government-led initiatives such as Saudi Arabia's Vision 2030 and consumer-driven demand for mobile services. Additionally, industrial internet of things (IIoT) technology in the oil and gas sector will enable more efficient monitoring and data collection.

Figure: MENA capex investment breakup, US$b (2019–25)



By 2025, US$70b would be spent on MENA's infrastructure rollouts, with 5G accounting for the majority of the capex from 2021 onward.

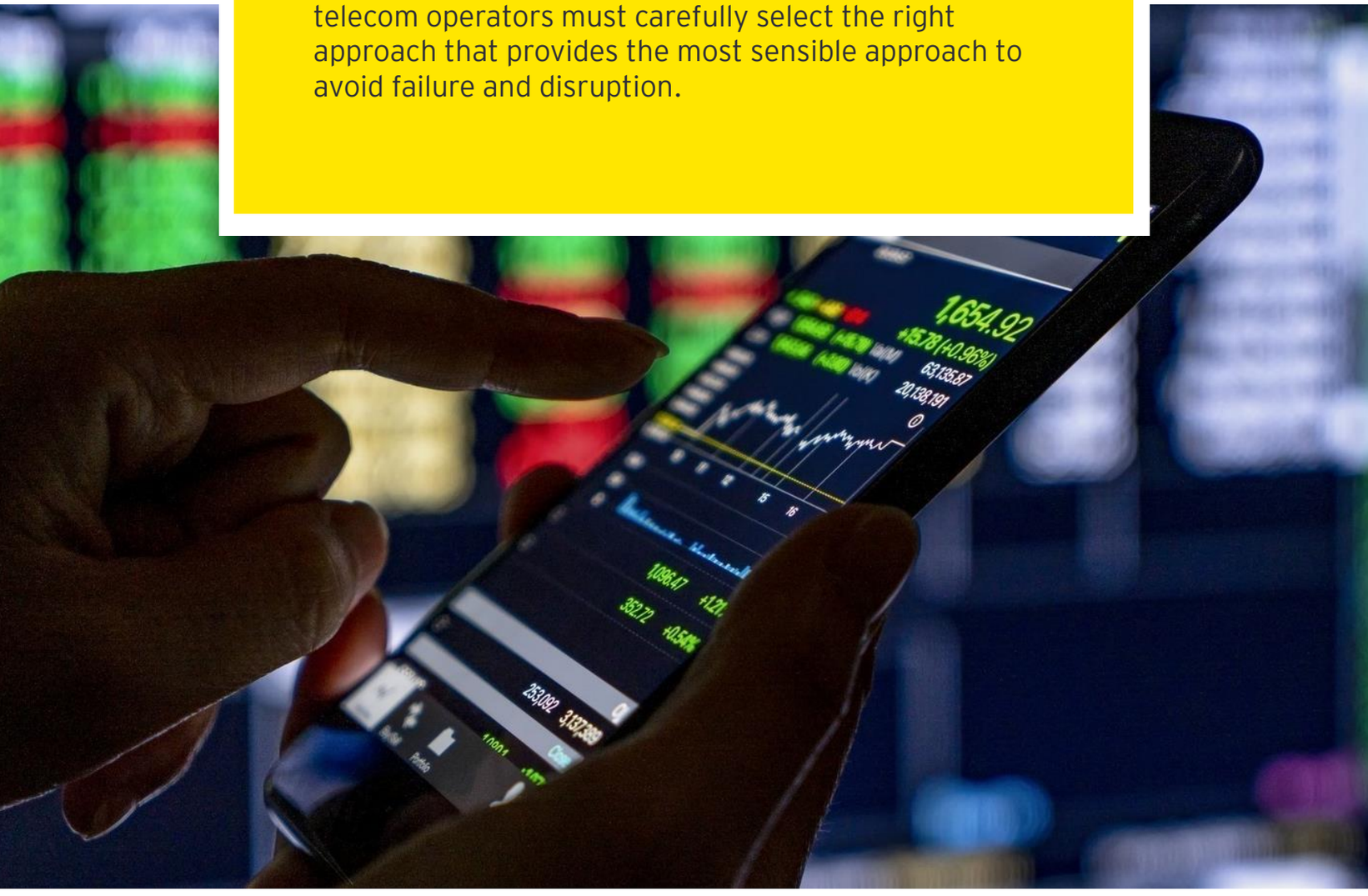
At the network level, 5G remains a crucial enabler of digital transformation in the Middle East. Telecom operators in the GCC were involved in the first wave of 5G deployment, globally. The real value of 5G now transcends the telecom industry and serves as the foundation for other innovative technologies, enabling a new generation of digital applications. The digital stack transformation is not an option anymore, rather it is the need of the hour for 5G monetization, especially for maximizing enterprise value.

Source: GSMA

3.

Transformation strategies adopted by telecom operators

For most telecom operators, digital transformation is prerequisite in fulfilling their strategic business goals and powering long-term competitiveness. It consists of new investments, rearrangement of business models, technical capabilities and processes to generate new value for customers. A complete replacement and upgrading of legacy systems are complex tasks and telecom operators must carefully select the right approach that provides the most sensible approach to avoid failure and disruption.

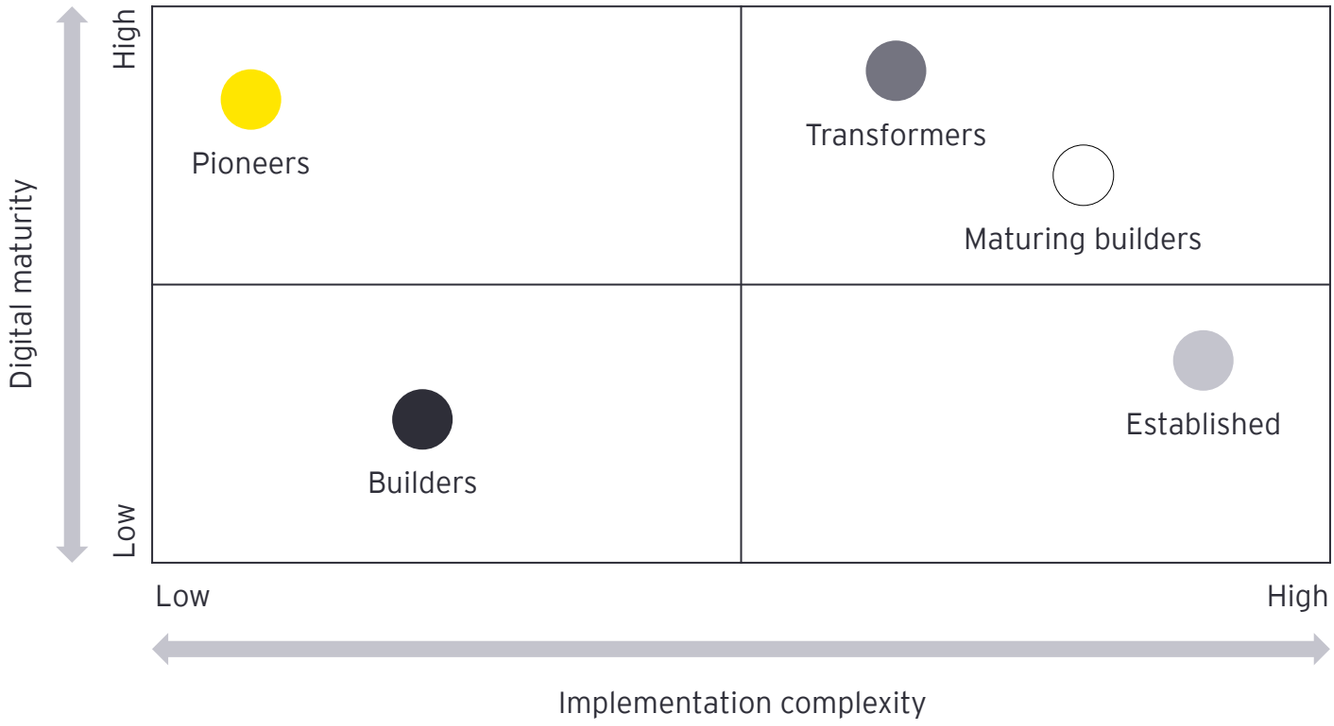


3.1

Approach, advantages and challenges

Typically, the old and large telecom operators carrying extensive assets are the established players and they prefer enhancing legacy systems. Telecom operators willing to take moderate to high risk comes under transformers, maturity builders and builders. These kind of telecom operators prefer phase-wise approach to replace legacy systems with a digital stack. Pioneers are basically the innovators and early digital adopters, looking to innovate and create digital differentiation. In a nutshell, different telecom operators have adopted different approaches based on their market conditions and they have been positioned accordingly in a digital maturity map.

Figure: Telecom operators digital maturity map and positioning



Established

Digital ambition subdued by high barriers to implementation; digital initiatives launched in pockets leading to low maturity

Transformers

Digital ambition to be competitive in the market; quick to implement given their size and scale

Maturing builders

Moderate digital ambition; high abilities to embed digital in existing capabilities; often disintegrated execution

Builders

High digital ambition; opportunity to start from backend building up to digitizing integrated customer interfaces

Pioneers

High digital differentiation; early digital adopter and drivers of digital innovation

Source: EY analysis

Broadly, there are three different transformation approaches which include enhance legacy, progressive build, and greenfield transformation. Telecom operators must carefully evaluate the pros and cons of each transformation approach as choosing a wrong approach can set back digital transformation by years. Telecom operators can take this decision after detailed analysis of both internal factors such as cost, financial viability, and external factors such as competitor offerings, customer preferences and more.

Figure: Telecom operators take three approaches to transformation from being very risk averse to being carefully bold

	1 Enhance legacy	2 Progressive build	3 Greenfield
Characteristics	▸ Continue with legacy stack at the core and build enhancements, e.g., abstraction layer, APIs, etc. ▸ Usually, old telecom operators carry extensive assets and legacy systems with large complex organizations	▸ Replace instead of enhancing existing modules to support a specific set of digital priorities of telecom operators ▸ Three types of progressive builders that include transformers, maturing builders, and builders who are incumbents with agility in their DNA	▸ Build out of the new stack from scratch, i.e., greenfield development and deployment ▸ Market disruptive players with new and path-breaking business or operating models
Advantages	▸ Minimum disruption to existing business ▸ Abstraction allows integration of multiple legacy components ▸ Lower upfront cost to deliver	▸ Support new-age products or services, digital journeys and experience ▸ Allow for structured release-based, KPI-linked planning to realize benefits	▸ Digital at the core without the burden of legacy limitations ▸ Allow the architecture to be future-proof (cloud-native architecture, software-as-a-service (SaaS) models, automation, AI-enabled, etc.)
Challenges	▸ Complexity of system architecture increases, making it difficult and expensive to maintain ▸ Inability to overcome inherent functional limitations of legacy stack	▸ Lack of system consolidation in the medium term adds to the complexity ▸ Apt pace and order of change is difficult to ascertain and attain ▸ Inputs (from vendor or SI) on the project road map is biased	▸ High upfront costs ▸ Migration is difficult to get first time right, potential impact on customer experience ▸ Parallel run of both stacks create confusion among business and IT functions

Source: EY analysis

3.2

Guiding principles for greenfield transformation

The greenfield transformation approach includes complete overhaul of the legacy IT stack with new set of capabilities. This approach is a good fit when business requires a new set of capabilities altogether, which existing legacy systems are unable to meet. The key principle for Greenfield transformation is to develop a modern system for a totally new environment which can be easily integrated with the existing ecosystem. Telecom operators have the option to build from scratch, look for commercial off-the-shelf (COTS) offerings, or take a best-of-breed technology approach which integrates components from various vendors.

Figure: Principles for greenfield transformation

Parallel technology stack	Build a parallel technology stack which will settle any material technical debt accumulated by operators over the years.
Defined product road map	Define a product road map that will support innovation in commercial models and is scalable to the operator's future requirements.
Leverage embedded COTS best practice processes	Leverage embedded COTS best practice processes to enable overall business transformation and provide greater autonomy to business.
Tried and tested transformation program	Have a tried-and-tested transformation program enabling not only technical delivery but also user adoption and change management.
Simplified and resilient architecture	Develop a simplified and resilient architecture, built on modular platforms and flexible APIs to deliver agility in a rapidly changing marketplace.

Source: EY analysis

4.

Critical success factors and industry best practices

The critical success factors responsible for successful digital stack transformation broadly revolves around creating right solution for faster TTM, flexible platform to deliver broad range of use cases and required capability to support emerging technologies to generate new revenue pockets. The complete overhaul of system offers telecom operators the required flexibility and scalability to support wide variety of use cases, innovate new products and services, offer real-time services and more.

Figure: Success factors for successful OSS/BSS transformation

1 Define clear product road map

- A product-based solution that will support 90% of foreseeable use cases out of the box through straightforward configuration
- A single solution for all customers that enables innovation through configuration

2 Flexible support for all businesses

- Support innovation and expansion into different businesses and industry verticals, without requiring costly customization or a new solution to support every venture
- Reduce the BSS overhead associated with rolling out new lines of business

3 All-digital user journeys

- A fully digital, omnichannel customer life cycle that delivers the best possible customer experience
- Reduce customer support costs and overhead

4 Capability to support 5G

- Capability to support an exponentially expanding volume of transactions on a lightweight footprint with 100% accuracy without loss of data
- Near-instant response times in support of 5G network ultra-low-latency performance

5 Support cloud-native architecture

- Elasticity and resource optimization, allowing rapid experimentation and personalization at scale
- Process automation for efficiency, resiliency and scalability
- Auto-healing for consistency of performance

Source: EY analysis

Leading industry practices for OSS/BSS transformation include:

- **Compatibility with open APIs**: The next-gen OSS/BSS solution should be enhanced with multiple APIs. This helps in simplifying the integration process with online charging system for catalogues, payments and other processes.
- **Business and revenue models**: The business model should focus on reducing the capex and leveraging SaaS business for software licenses and services.
- **Generation of actionable customer insights**: The digital stack solution must ensure telecom operators gain actionable and detailed insights. These insights are useful to design multiple usage and retention plans, prevent customers' undue and service downgrades, etc.
- **Future readiness**: The next-gen digital stack solutions should be enhanced by JavaScript Object Notation (JSON) APIs to ensure compliance with the latest technologies. These APIs help in the faster rollout of integration, testing and iterations.
- **Deployment of new-age technologies**: The deployment of emerging technologies such as AI, analytics and enablers such as the cloud helps in increasing the agility and reduces TTM with deep insights into the business and customers.

Case studies of successful digital transformation

- **Case study 1:** The operator embarked on a massive transformation effort aimed at digitalizing its operating businesses in 15 countries.

The challenges

- Slow in responding to business needs
- IT solutions cost more than necessary
- Data complexity makes it difficult to obtain customer insights
- Difficulty being truly digital and offering cloud and other services
- Lack of automated business processes
- Customer scripting and errors resulting from too many manual operations
- Cost of obsolescence impacting market adaptability

The solution

- To overcome the challenges, the operator embarked on a business transformation effort that includes overhauling the business process.
- The operator selected three suppliers as part of its core transformation efforts.
- The operator consolidated its LOBs into a single online charging system to provide a unified experience.

The result

- **Around +51%** shorter TTM
- Reduction in number of calls to call centers
- Training time for sales executives down 53%
- Faster average handling time in call centers and retail locations
- **Approximately 23% increase** in first call resolution
- Dramatic increase in online payments, e-billing and sales effectiveness
- **Eliminated 35%** of IT applications, 20 data centers and more than 25% of physical servers
- **Virtualization level climbs to 55%**

Source: Operator's website, press releases

- **Case study 2:** The operator rapidly adapts to deliver "new normal" digital experience to overcome pandemic-related challenges and quickly meet changing customer needs in unprecedented circumstances.

The challenges

- The COVID-19 pandemic raised many challenges for the operator and impacted its sales, customer service, and brand
- Shortfall in roaming revenue due to travel restrictions
- Closure of retail shops blocked its primary sales and service channel
- Immediate change in customer requirements due to remote working

The solution

- The operator selected one of the leading network manufacturers and launched a digital customer experience transformation program to create the foundation for improving the digital customer experience.
- The operator leveraged the vendor's customer experience management solution to optimize the user experience.
- It also promoted the use of digital channels through digital awareness campaigns and expanded various things customers could do via digital channels.

The result

- **Customer experience targets exceeded:** By the end of 2020, despite all the pandemic-related challenges, the operator excelled at improving digital customer experience and **exceeded Customer Experience Index (CEI) targets** in all three business units:
  - In consumer, the CEI reached 84.14% surpassing the target of 80.1%.
  - In enterprise, the CEI was 85.43% and the target was 81.4%.
  - In wholesale, the CEI was 85.94% while the target was 80.7%.
- In 2020, the operators' mobile ARPU is increased by 10% y-o-y.
- The operator's NPS rose from -20 in 2019 to -5 in 2020 and its customer churn rate improved significantly in the region.

Source: Operator's website, press releases

- **Case study 3:** The operator progress toward building a single stack to support existing product offerings, innovate new services and support future-ready services.

The challenges

- The operator gained new mobile customers through its acquisition of a mobile provider. However, the integration of all acquired customers onto a single platform became a challenge for the operator.
- The operator had multiple IT stacks after the acquisition and wanted to combine all functionality together into a single stack.

The solution

- The operator selected a digital OSS/BSS provider to build a single stack from scratch. It decided to remove the legacy stacks due to high support and maintenance costs.
- The operator leveraged a wide range of solutions from the vendor that included customer and revenue management, online charging system, converged billing, etc.

The result

- Reduced time to market new products and services
- Introduced a new mobile product with smaller teams
- New revenue pockets across both physical and digital channels
- Improved customer retention and loyalty
- Increased revenue from converged and third-party services

Source: Operator's website, press releases

5.

Conclusion

In the digital age, the traditional technological and functional silos of OSS/BSS act as a barrier to progress. The overhauling of systems to a digital model provides a viable path to transformation. Shifting from legacy systems to the upgraded or new one provides a 360-degree view of the customer, which is one of the key focus areas of telecom operators in today's world. The advent of emerging technologies such as 5G has significantly pressed telecom operators to modernize their existing systems and leverage the full potential of 5G. The COVID-19 pandemic has further accelerated the digital transformation road map of telecom operators, change their business plan and focus on delivering digital services.

At a time when telecom operators are facing growth challenges along with increased competition from other sectors, the need to accelerate digital transformation initiatives has increased significantly. For telecom operators, agility has now become a key business driver. The ability to react to market demands in real-time is a necessity. To manage and deliver the increasing customer demands and provide the best customer experience, telecom operators have to consider the digital stack transformation journey.

> Journeys could differ depending on the maturity and the marker opportunity for each telco. However, it's important to have a clear road map of the prioritization of initiatives while keeping in mind the end state of the transformed telcos.

Telecom operators starting their digital transformation journey should first establish a clear road map with a well-planned strategy and then start working on it. Telecom operators can perform an assessment of their current state of digital adoption and accordingly prioritize their investments. Analyzing potential challenges is also a critical factor that telecom operators need to realize before they start their digital transformation journey. Once telecom operators have identified a clear road map and developed the required strategy, they can consider the replacement or the complete overhaul of their legacy systems.

Digital transformation is a holistic exercise and long-term goals need to be flexible enough, given the scope for further disruptions and shifts in regulatory and technology landscapes. Telecom operators need to invest intelligently and prioritize their investment plans as the complete overhaul of legacy systems is both expensive and time-consuming. The modernization of systems must be future-ready to support new requirements rising from upcoming and disruptive technologies.

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