Developing a smart transformation plan
The golden key to unlock the digital treasure
Key messages to CxOs

This whitepaper introduces:

• A Reference Model and Approach for transforming from a CSP to a DSP

• A customer-centric Design Thinking as an effective method to implement a customer experience-led transformation

• A Future-Proof Business and Operating Model to capture enormous new growth opportunities in 5G and the age of Internet-of-Thing

• Huawei as a competent partner to De-risk your Digital Transformation

• A set of Comprehensive Services and Implementable Solutions for realizing your unique digital ambitions
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The pressure to transform is overwhelming and the option to preserve the status quo is no longer sustainable. Technology continues to advance, new competitors heighten the pressure and traditional business models and revenues continue to decline. Rapid advances in digital technology are redefining our world. Digital inventions, along with their new business models, are invading our business environment, provoking significant changes in the way we do business and impact the relationships with customers, suppliers and partners. This has given rise to new opportunities and challenges, and has triggered the digital transformation of business organizations.

Is digital transformation a top priority on your business agenda? To what extent is it within your grasp?

How can you accelerate and de-risk your digital transformation journey?

In order to grow and stay competitive in the market, telecom operators need to quickly decide how they are going to respond strategically to digital disruptions and prepare for future growth. Most leading telecom operators have commenced their digital transformations. However, many are facing tremendous challenges as they lack a key piece in their digital transformation.

What is the critical missing component in the digital transformation puzzle?

Digital transformation first and foremost entails business transformation. The main focus of digital transformation should be the end user of services, as opposed to the enabling technology. However Telecom operators have traditionally evolved along the lines of network advancement with little focus on the customer centric experience. This legacy network-centric mindset, conventional technology platform and operational processes are inadequate to meet the growing demands of today’s digital natives and their appetite for digital services (video, online gaming, mobile commerce, etc,…).

The goal of digital transformation is to sustain future growth potential as opposed to just fulfilling short-term demands or solving everyday problems. Consequently in addition to the transformation of their ICT and process, operators must align their organizational structures accordingly.

Customer centricity, not technology, is the critical component in digital transformation.

The digital experience demanded by today’s end users are inspired by “ROADS” attributes (Real-time, On-demand, All-online, DIY, and Social). However, the reality is that operators are struggling to close the mounting gap between the desired customer expectation and their own ability to meet them.

To bridge this gap, many industry organizations are welcoming the “design thinking” approach to innovation. With its customer-centric characteristics, deep customer engagement, prototyping, experimenting and tolerating failures, it offers a higher chance of generating innovative outcomes that can satisfy genuine customer demands. It is a powerful tool that can reconnect customer desired ROADS experience with the operators’ digital business and operations.

Customer-centric design thinking uncovers the critical missing piece to complete the digital transformation puzzle.

How can operators accelerate and de-risk their digital transformation journey?

A total leadership commitment from top management is vital for its success. Digital transformation is not a technology shift. It is about creating a future-proof customer-centric organization that provides an engaging
Developing a smart transformation plan

culture and an encouraging environment for innovation. The transformations involve organization-wide restructuring, from business strategy and operations to the underlying network and infrastructure. It therefore demands a holistic approach in order to complete the strategy and roadmap so as to tackle the inherent complexity and risks.

Digital transformation is about creating a future-proof customer-centric organization.

Operators must get ready for new business opportunities arising from 5G which is arriving in the next five years. They have to take immediate action and start challenging their organizations to ensure that their approaches are unleashing productivity gains and generating competitive advantage. The longer they wait, the sooner they will find themselves lingering behind more nimble rivals. Due to the lack of a single reference model and systems, the execution of digital transformation is fraught with risks. Designing, implementing and managing change of this complexity will not be easy. Engaging an experienced partner is imperative in order to accelerate and de-risk the entire digital transformation. Huawei provides comprehensive transformation frameworks, methodologies, future-proof technologies as well as and a wide range of services to support operators through the transformation journey.

In this whitepaper we look at what digital transformation means to an operator as a business. Having considered the context, we then highlight a systematic framework and a holistic approach to guide operators from where you are today and to where you want to be tomorrow. We look at the digital transformation drivers, reconstructing the future business, operations and infrastructure architectures, and formulating a unique digital transformation journey to realize their digital ambitions and unlock growth potentials.
Developing a smart transformation plan

How are operators approaching the challenges of digital transformation? A large number of the operators have embarked on cloudification of their data centers and network infrastructure to lay down a solid foundation for the growth of digital services, while others are building open and enabling platforms to cultivate and promote a new digital service ecosystem. There are also operators that, in order to compete directly with OTT players, are taking a more aggressive approach to being a digital services pioneer, by making acquisitions and alliances.

Digital transformation, to operators, is a structural reform of their business and organization to stay competitive in the digital economy.

Despite the diverse approaches and scales of transformation, operators are optimistic about the strategic values that digital transformation can bring to organizations. We expect to see the scope expanding to all operators in the near future.

Are you ready to secure your position in a bright digital future?

1 Is digital transformation your immediate priority?

The telecommunications industry has changed radically in the past decades in response to a technology revolution, changing customer needs, regulatory uncertainties, in a competitive and dynamic market landscape. It is imperative to evolve and to stay competitive in the market to continue to play a pivotal role in connecting people, organizations, and our society in building a better connected world.

Digital transformation is now a major priority for the leading telecommunication operators, as witnessed from the announcements on their digital transformation strategies and various forms of digital initiatives in the last few years.

Digital transformation is the application of digital technologies to fundamentally impact all aspects of our society.
Putting customers at the center of your business

Customer lifestyles are changing (Figure 1), the new generation of consumers (often referred as Generation Y) has higher expectations about what they expect from their service providers. These digital customers are technologically savvy and have never lived in a world without a growing digital component. They expect high-quality, value-for-money and personalized services with instant and seamless omni-channel interactions. When convenience and quality fail to meet their expectations, they will consider switching their service provider.

Figure 1. Changing Customer Lifestyle

A research\(^1\) conducted in 2015 (Figure 2) revealed that customer experience management is emphatically the top strategic priority for operators, with 68% of participating top executives citing it as the number one strategic priority for their organizations, while 82% viewed it as a top-three consideration over the next three years.

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\(^1\) "Global Telecommunications Study: Navigating the Road to 2020," EY, 2015
Operators realized the promise of a digital customer experience is enticing to many digital application services providers (e.g. OTTs) as they fully understand and redefine their customer experience to challenge the industry and to secure customer relationships and loyalty. Today consumers make use of these digital application services on their smart devices to do virtually everything anytime anywhere – from researching products, shopping, playing games, accessing streaming content at their own will – all these require an always-online connection and on-demand in their highly fragmented time slots. Customers use ever more social channels in expressing their views, feelings and interactions and with friends, families, brands and organizations to always stay connected in their social circles. They perceive they are unique individuals and demand for personalization. All these develops the new lifestyle of today’s customers.

**Figure 2. Operator strategic priorities over the next three years**

Q. What are your organization’s most important strategic priorities over the next three years? (Top three responses from senior executives of 40 operators worldwide)

<table>
<thead>
<tr>
<th>% respondents</th>
<th>Customer experience management</th>
<th>Cost control &amp; business efficiencies</th>
<th>Network upgrades &amp; modernization</th>
<th>Increased organizational agility</th>
<th>Improved IT systems &amp; processes</th>
<th>New services development</th>
<th>Acquiring and talent</th>
<th>M&amp;A, joint ventures &amp; partnerships</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>82</td>
<td>50</td>
<td>35</td>
<td>32</td>
<td>29</td>
<td>29</td>
<td>18</td>
<td>15</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Customers demand a completely different digital experience from their service providers, an experience which we describe as ROADS (Figure 3) –

- **R** (Real-time): Instant fulfillment and response to all your requests
- **O** (On-demand): Order as you need
- **A** (All-online): Everything in cloud and accessible as you need
- **D** (Do-It-Yourself): Convenient self-configuration and self-service as you want
- **S** (Social): Stay connected to your social circles by sharing your views and experiences
ROADS represents the most important characteristics of the digital customer experience for operators to win the heart of their customers, as they reinvent themselves as truly customer-centric organizations. Social media plays a significant role and is part of people’s lives today. Organizations widely use social media to advertise their products, build customer loyalty and collect feedback from customers. It helps the organizations to better understand the market, and fine-tune their products and strategies on a real-time basis. Operators must anticipate its exponential touch points together with its real-time impact brought by social media, which will continue to surge in the future. This is absolutely an essential element to be considered and embedded in their digital transformation agenda.

What this implies is a series of required changes in an operator’s business model, operating model and infrastructure in order to deliver the desired ROADS experience to customers effectively. 7x24 digital market place, omni-channel, personalized service, bandwidth on-demand, self-service portal, real-time billing, insight-driven service recommendations, automated cross-sell/up-sell and retention are some good examples. However, network experience will still remain a key competitive advantage for most operators.

Network quality remains a key customer experience differentiation for most operators.
Can a “new thinking” approach make the difference?

There are various methodologies an organization can adopt in solving complex business problems. In the context of customer experience-led digital transformation, “Design Thinking” is recommended as it puts customers in the heart of innovation. It’s a collective set of principles (Figure 4) — empathy with users, a discipline of prototyping, tolerance for failure, — which can develop a responsive, flexible organizational culture for solving problems in a scalable way.

Figure 4. The “Design Thinking” Concept and Process

Nowadays “design thinking” is actively adopted by a great variety of digital natives for creating digital disruptions to the market. They engage customers from the very beginning to deep-dive their desires, hidden needs, and to uncover assumptions based on historical data and own experiences.

Design Thinking, a Customer-centric mindset and approach, bridges the gaps between the desired and the delivered customer experience.
By applying design thinking in digital transformation (Figure 5), operators can discover ROADS experience expectations along the customer journey. (e.g., what exactly need to be real-time and on-demand, and why?). Through deep customer engagement, prototyping and experimenting, design thinking offers a higher chance of generating innovative solutions to bridge the gaps and satisfy the genuine customer demands. It introduces a fundamental shift in mindset and culture of an organization to keep meeting and exceeding customer future expectations.

Customer aside, a number of other factors are also pressing operators to consider or pursue digital transformation: from revitalizing their prestigious and vital role in the society, reacting to disruptive competition, addressing investors’ expectation on growth, monetizing the emerging technologies opportunities, to aligning with the national ICT strategies (Figure 6).
Given these pressing needs, more operators are jumping on the digital transformation bandwagon.

A recent study shows that about 75% of respondents see disruptive competition as the leading industry challenge, with all recognizing the potential of OTT players to reshape demand scenarios (Figure 7).

**Figure 7. Operator views on the key challenges they face**

Q. **What are the most significant challenges facing the industry?**
   (Top three responses from senior executives of 40 operators worldwide)

<table>
<thead>
<tr>
<th>% respondents</th>
<th>Disruptive competition</th>
<th>Uncertain regulatory environment</th>
<th>Lack of organizational agility</th>
<th>Lack of return on investment</th>
<th>Changing customer needs and attitudes</th>
<th>Shortening technology cycles</th>
<th>Poor ecosystem relationships</th>
<th>Global economic uncertainty</th>
<th>Poor rates of innovation</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>73</td>
<td>64</td>
<td>45</td>
<td>39</td>
<td>24</td>
<td>18</td>
<td>15</td>
<td>9</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: “Global Telecommunications Study: Navigating the Road to 2020”, EY (2015)

It’s not all about competition though. A growing number of operators are actively pursuing partnerships in the new digital ecosystem, as all entities are seeking new points of differentiation to maximize their share of customer spending.

**With the right response, disruption offers tremendous upside to operators that can harness its forces via collaboration.**
4 Capturing the immense opportunities ahead

Internet of Things (IoT) will bring another boom for connectivity. A broader range of capabilities, such as applications and services will drive most attractive returns.

The Internet of Things (IoT), fueled by 5G and cloud technologies, can enable the next wave of life-enhancing applications and services across many vertical sectors. By 2025, there will be over 100 billion connected devices compared to 6.5 billion connected people (Figure 8). This presents a huge opportunity for the telecommunications industry to monetize network traffic and services in both consumer and business markets.

Figure 8. Digital Transformation Market by 2025

![Digital Transformation Market by 2025 Diagram](image.png)

Source: Huawei analysis

Furthermore, an increasing number of countries recognize the vital role that digital, information and communication technologies (ICTs) play in accelerating the socio-economic development towards a knowledge based society. A large number of governments have formulated and published their national ICT strategies, such as "Industry 4.0" and "Internet+", to make use of ICT as its core engine.

National ICT policies provide a favorable environment to stimulate digital transformation.
A proven success model has yet to be seen

Despite the growing number of digital transformation initiatives worldwide, the industry still lacks a well-received reference model. This presents a challenging agenda for operators to justify the ROI and build a rational business case.

Furthermore, digital transformation is highly complex, risky, and expensive – so a holistic approach and comprehensive framework are needed to help operators define a strategy and a plan based on their particular digital ambitions.

A proven model of telecom digital transformation is yet to be seen, thus hindering operators’ ambitions to carry out bold transformation.

At the organization level, a conservative mindset, a lack of leadership commitment, a resistance-to-change organizational culture, and resource constraints have always been the key reasons for transformation failure. These challenges are causing many business leaders to be confused about where to start and in which direction to go. Many are also searching for the right model.
Developing a smart transformation plan through a “try-and-error approach”. Operators urgently need a reference framework and an experienced partner that can provide them guidance to plan, navigate and manage their quest to digital transformation.

Engaging a right partner is imperative to accelerate transformation and mitigate risks along the journey.

They need partners in the digital ecosystem to accelerate their digital transformation and mitigate risks.

To help operators cope with the challenges of realizing their digital ambitions, Huawei is uniquely positioned to partner with operators to begin digital transformation by leveraging our strengths:

- Leadership in ICT technologies and solutions
- In-depth knowledge in telecommunications industry development and trends
- In-depth understanding of customer experience (ROADS) and its implications to the telecom business, operating model and infrastructure
- Proven assets (framework, methodology and tools) to provide guidance to help operators define and navigate their digital transformation
- Wide spectrum of technology solutions and services to enable the realization of each operator’s digital ambitions
Digital transformation is not just about adding a website or a mobile app, or randomly deploying digital technologies here and there; instead, this shift will affect every aspect of an organization. It comprises a series of structural changes that reshapes an entire organization’s future business, operations and ICT infrastructure to be customer-centric. Embracing these changes will involve the re-architecture of operators’ future operating models as well as enabling platforms and infrastructure in order to realize a customer experience-led transformation (Figure 9).

In this context, the transformation framework offers a holistic architecture to understand what changes are required, not just on their digital product and service offerings but also in the way they interact with their customers in a digital manner.

**What are the key criteria for a customer experience-led digital transformation?**

Customer experience-led transformation requires structural changes in all aspects of a telecom organization.
The framework consists of three major layers: the business, operations, and infrastructure, covering all aspects required to deliver digital services with a superior customer ROADS experience. (Figure 10).

The transformation framework is a simple representation of a digital service provider’s future business architecture.

Figure 10. Target Digital Service Provider Transformation Framework
Business transformation refers to the re-design of an operator’s strategic position in the digital ecosystem, services portfolio and business models. Starting with an understanding of the outside-in customer perspective, operators must first define their digital ambitions and goals to determine what role they want to play in the digital ecosystem.

Nevertheless, in an increasingly diverse market landscape, operators’ positioning in a digital ecosystem will diverge due to differences in the level of digital ambition, current digital maturity, contrasting prioritizations of growth and efficiency within their business agenda. An operator’s target position in the digital ecosystem (Figure 11) will have a profound impact on their transformation. This will drive the direction of their business model and operations capabilities in order to be equipped. For example, a digital video service provider will need a synergetic revenue-sharing model and a content aggregation platform.

Business transformation

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Figure 11. Operator’s strategic positioning in digital ecosystem
Figure 12 summarizes the key characteristics of digital services which are very different in comparison to operator’s traditional communications services.

Open, flexible and collaborative business models and partnerships will be critical to facilitate sustainable business growth. Increasing number of operators are building and cultivating digital ecosystems through partnerships. Rather than offering full digital services and competing with OTT players, operators have selected partnerships focusing on collaboration and open innovation. Operators provide an aggregation and capabilities exposure platform to digital service partners, a wide range of API-as-a-service and SDK to allow partners to gain access to operator capabilities and resources including operations capabilities (e.g., call center and billing), network capabilities, data capabilities, and integrated third-party capabilities (e.g., payment gateway). The use of open APIs and a broad range of services are key in building a successful digital ecosystem.

More open, flexible and collaborative business models and partnerships will facilitate a sustainable business growth.

Figure 12. Characteristics of communications service vs digital service

<table>
<thead>
<tr>
<th></th>
<th>Communications service</th>
<th>Digital service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>Pre-defined services, e.g. voice, SMS, data</td>
<td>Everything as a service, e.g. cloud, IoT, video</td>
</tr>
<tr>
<td>Tariff</td>
<td>Telco-defined package and plan</td>
<td>Customer defined, DIY</td>
</tr>
<tr>
<td>Business model</td>
<td>Closed and independent</td>
<td>Open, flexible, collaborative</td>
</tr>
<tr>
<td>Ecosystem</td>
<td>Simple, supply-driven</td>
<td>Complex, partnership</td>
</tr>
<tr>
<td>Value proposition</td>
<td>Network-centric</td>
<td>Customer-centric</td>
</tr>
</tbody>
</table>

Figure 13 shows some common business models that operators adopt for various digital services today. Governments, education, healthcare, public infrastructure, finance, and media sectors are some early examples of sectors that have committed to going digital.

Operators can take advantage of their strengths in digital platforms, data pipes, security, and reliability to exploit new market opportunities in cloud computing, machine-to-machine communications, and big data applications.

Figure 13. Common business models

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IP messaging</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Video and TV</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Mobile money</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Mobile advertising</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Cloud/storage</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Smart home</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Connected cars</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Retail</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Healthcare</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

● = Common business models adopted by operators today
Operations transformation refers to the restructuring of an operator’s operating model and capabilities that enables effective execution of the future business models, facilitates a new way of customer interactions along the journey with the customer, and to deliver the ROADS experience.

The ultimate goal is to re-design the operating model from “Big” to “Fast”, where the emphasis of capacity will move toward agility. The future operating model of an operator consists of a business capability blueprint (Figure 14) with front-end capabilities, core capabilities and back-end capabilities that enable customer-centric and agile operations.

Agility will be vital for operators as they are in battle with digital natives in a dynamic market environment.

Figure 14. Business Capabilities Blueprint for a digital service provider

Front-end capabilities: This entails shifting their orientation away from individual-channel to an omni-channel approach, transforming their interactions along the customer journey to give customers a compelling and consistent ROADS experience across every channel, centered on mobility and social media integration.

Core capabilities: The core capabilities includes customers, products, services, partners and resource management capabilities where operators re-design to ensure customer needs are aligned with value creation. For example, customer relationship management capabilities enable operators to have a 360 degree view of customers and their life-time values, to offer personalized services that after customers desire. On the other hand, product and service management capabilities enable a joint DevOps environment to reduce time-to-market for new or enhanced services where future features could be added and activated on-demand.

An omni-channel approach puts the customer, not the operator silos, at the center of its strategy.
Developing a smart transformation plan

Re-designing the process to be customer-centric
Operators need to revisit the corporate process architecture, enhance process automation and simplifications, especially on the customer-facing processes such as market-to-order, order-to-cash, problem-to-resolution, therefore uplifting the customer experience.

Getting customers involved at the early stage of product innovation process, such as pretotyping and prototyping, is another strategic shift. It allows customers to get involved in new product design and enhancements, and launch services to market quickly through joint DevOps model.

Pretotyping/Prototyping helps you to fail fast and cheaply enough so that you have time and resources to try something else.

Re-aligning the organization structure and culture
People in organization silos often demonstrate a reluctance to integrate their efforts due to different agendas and priorities, resulting in operations inefficiency and slow responsiveness. The change of business process to be customer-centric will demand the organization to eliminate silos and realign their functions and resources to meet customer needs. Aligning individual KPIs to organization KPIs, implementing IT-enabled processes are common examples. However, operators must fundamentally alter the organization culture and people mindset to promote organization agility, collaboration and innovation.

Resource management capabilities enable resource transparency and dynamic allocation on demand while partner relationship management capabilities enable a digital ecosystem to be well managed.

Aligning customer needs with value creation by integrating customers, products, resources and partners is crucial.

Back-end capabilities: Operators also need to enhance the back-end capabilities such as improving cyber security, managing multilateral financial arrangements for diversified business and partnership models, aligning organization and individual performance metrics to their digital ambitions and goals, enabling big data and insight-driven operations monitoring and risk management, and cultivating an innovative and collaborative organization culture, etc.

To enhance the required capabilities, operators need to re-design the business processes, re-align the organization structure, people skill mix, and re-engineer the enabling technology platforms (Figure 15). These changes need to be supported by strong leadership commitment and to be measured by new performance metrics aligning to operators’ transformation objectives.

Figure 15. Operations transformation reference model
The most effective way to eliminate organization silos is to eliminate the Silo Mentality.

Boosting people digital competence
The digital skills of the existing personnel must also be enhanced to adapt to the operational needs for digital businesses. Transforming a business from a network-focused to a more customer-centric and analytic-driven organization also means that employees with a new set of skills such as digital marketing, customer experience management, big data analytics are required. From a more holistic perspective, the digital skills for staffs have to be enhanced across all the front-end, back-end and core functions.

New digital competence in the areas of customer experience management and big data analysis will see a much greater demand in the roads ahead.

Re-engineering the enabling technology platforms
The telecom business and operations system (including the traditional OSS and BSS), as an important element in the operating model, requires a major transformation. It needs to evolve from a merely internal operations support system, such as rate plan configuration and billing engine, to a customer-facing business system like a digital marketplace.

From the ROADS’ perspective, customers demand an omni-channel digital platform that is accessible in real-time and round-the-clock so they can use the services anytime they need. The portal should provide customers with interfaces (e.g. API) to link services to common social media platforms so that it can provide a simpler and instant way to facilitate feedbacks and interactions. Furthermore, the system must be flexible and automated to allocate on-demand bandwidth to customers for different applications or services.

They need an open aggregation and capabilities exposure platform to enable ecosystem partners to realize the process from production, fulfillment, billing, to payment. Effective partner management and digital content management can accelerate new product launch, reduce time to market, and enable intelligent operations.

The next-generation digital BSS/OSS will provide a business aggregation and capabilities exposure platform enabling a digital ecosystem.

The next-generation digital operations system will be an open, flexible, intelligent, and agile platform. One critical element is that the platform must implement real-time service management and orchestration to directly create values. The revamp needs to focus on enabling an omni-channel management to achieve integration of online and offline channels. It also needs to support digital operations such as digital marketing, online sales order processing, and customer self-services, as well as support the joint DevOps model and service automation and management. Apart from these, big data capability plays a critical role in the digital operations, as it delivers huge insights capability on customer preferences and operations transparency.

The next-generation digital BSS/OSS enables omni-channel, big-data analytics, business and service orchestration to realize an intelligent and agile operation.

As telecom IT systems move from being an internal operations support to enabling external services to customers, their technical architecture must also move to an open cloud-based Internet architecture. Traditional scale-up architecture is therefore no longer sufficient in terms of openness, ease of use, and scalability. It needs to have a scale, cloud-based Internet architecture to support a massive number of users, driven by the changing user needs and the advancement of technology.
Infrastructure transformation

The future ICT infrastructure architecture of operators will need to cope with widely varying demands and a business landscape that will be significantly different from today. Operators need an ICT infrastructure that is programmable and highly automated to be able to respond quickly to various demands. For example, there will be increasing use cases that require bandwidth on demand from the ROADS standpoint as customers choose to access services online anytime they require. The ICT infrastructure would therefore need to be flexible to offer self-configuration, auto-allocation of resources, and virtualize a pool of resources. To achieve this, a full reconstruction of ICT infrastructure including equipment, network, services, and operations is necessary to enhance network efficiency and agile operations effectiveness.

Full cloudification enables operators to achieve infrastructure flexibility and efficiency as well as agile effective operations.

The full cloudification of equipment, networks, operations systems, and services (aka ‘All Cloud’) (Figure 16), sets the stage for digital transformation as operators focus on delivering improved user experience. It allows operators to pool hardware resources and make use of a fully distributed, automated software architecture. With All Cloud, the entire network will shift to data center-centric architecture, and all network functions, services and applications will run in the cloud-based data centers.

Figure 16. Telecom networks to evolve from All IP to All Cloud

Everything from business to operations will rely on the underlying infrastructure to run smoothly and seamlessly. As such, realizing digital transformation requires the ICT infrastructure architecture to go through major transformation in parallel, which will take place in three major dimensions:

1. Building a data center-centric ICT infrastructure;
2. Cloudifying (SDN/NFV) network architecture; and
3. Keeping in pace with the network technology evolution.

Building data center-centric cloud infrastructure

Operators need to build cloudified and fully open ICT infrastructure, in order to develop new services in the Internet era in a faster and efficient manner, reduce OPEX and technical uncertainties, increase high availability and improve utilization of resources, and realize quick transformation in terms of network, architecture, service, and operations. This architecture must be built on the cloud data center infrastructure foundation, where information storage, processing, and exchange as well as service processing and business transactions are conducted. Data center-centric cloud infrastructure is the foundation of future network architecture, as it is a part of the operator’s transition to cloud-based operations.
Figure 17 shows the distributed cloud data center foundation which consists of the infrastructure layer, virtualization layer, and service layer. It is driven by services and supports physically discrete but logically unified resources, synergizing the cloud and pipes, and services.

The new architecture shall support all network function applications through cloud-based platforms. For example, an ICT unified Cloud-based network will support dynamic resource scheduling, automated deployment, auto scale-out/in. This will contribute to improved resource utilization. Furthermore the centralized and optimized core network control plane will help to reduce equipment purchase costs and maintenance costs.

Cloudifying (SDN/NFV) network architecture
With the operational changes identified in meeting user experience, the fundamental challenge lies in the infrastructure. Today telecom operators cannot provide on-line services on demand and in real time due to the bottleneck on infrastructure rather than the operations system. The infrastructure is not automated and intelligent as it needs to be.

The target ICT network architecture has to be designed to bring agility, flexibility and a seamless service experience. To achieve this, it needs to leverage cloud computing technologies and complete automation, as well as fully leveraging SDN and NFV technologies to be built in a very flexible, programmable, elastic foundation that ensure efficient network resource allocation. Adoption of SDN, NFV and associated IT concepts also delivers more flexible and cost-effective traffic management and virtualizes network components, making the transition from hardware to software driven. It should support third-party devices and products at hardware, OS, API, and app layers.
SDN and NFV establish flexible and intelligent network architecture that ensure efficient network resource allocation.

As a general principle, the future network architecture must be designed with the following key design criteria:

- The network must be agile and be able to adapt to the changing market conditions quickly.
- The network must be flexible, and able to scale and adapt cost-efficiently.
- The network should be appropriately centralized, controlled and support automated resource scheduling in order to reduce TCO.
- The network must prioritize the delivery of user experience to ensure that carrier’s consumer and enterprise clients are provided the best possible customer service in the new digital world.

Figure 18 illustrates the unified, open, and standard cloud architecture evolved from network reconstruction. The bottom layer of the architecture is the hardware infrastructure layer, which uses the industry standard, universal COTS hardware platforms. The hardware infrastructure layer includes physical resources such as computing, storage, and network resources.

Above the hardware infrastructure is an open, efficient, and agile cloud OS that can help operators implement server virtualization and deploy private, public and hybrid cloud services. It also supports third-party physical hardware and virtualization, and can use the existing data center resources to improve scheduling and management efficiency of IT infrastructure resources. In terms of cloud services, the cloud OS provides backup, disaster recovery, hot migration, cross-data center resource scheduling, and customized telecom cloud expansion, helping operators build distributed ICT cloud data centers.

At the top are the virtualized network devices covered in the core network cloudification. NFV is used to implement software and hardware decoupling and function abstraction of network devices so that they no longer depend on dedicated hardware and can run on an open cloud OS and universal data center infrastructure hardware platform.
Applying the All Cloud concept, all of these imperatives have shaped “cloud” as the “de-facto” technology for operator’s future network architecture and design. With it, the ICT infrastructure will evolve into the architecture (Figure 19), where service-centric ICT infrastructure cloud facilities will be deployed, and an SDN-driven agile network is used as the service bearer network to implement service interconnection and elastic resource scheduling.

**Figure 19. Service-centric ICT infrastructure cloud facilities**

According to business layout and service functions, operators reconstruct the core network, edge network, and access point of presence by means of NFV and SDN to form the ICT infrastructure cloud facilities such as core cloud, edge cloud, MBB cloud and FBB cloud respectively. An agile network needs to be built to interconnect the ICT infrastructures as well as with their end users. As the core technology of the agile network, SDN enables network resources to be adjusted in real time and automatically scheduled according to the service requirements.
Keeping in pace with the network technology evolution

Telecom operators must remember that their networks will always be the fundamental of their core competitive advantage. They must make sustained investments in building and improving their network performance so that it will support the inexorable rise of digital services. For example, operators need to achieve high quality, high reliability, and minimal latency in the mobile broadband network, fixed broadband network, metro networks, etc., if they are prepared to effectively support future digital services such as IoT, virtual reality and augmented reality applications.

Constructing an agile super broadband network that delivers ROADS experience will be a critical anchor point for operators’ digital transformation. With 4G greatly improving the user connectivity experience, operators should prepare for a smooth transition to 5G to welcome the IoT era, also known as the fourth industrial revolution, with the massive addition of highly sophisticated and intelligent sensors as well as low latency applications in the coming years.

Figure 20. Network technology cycles in telecommunications

<table>
<thead>
<tr>
<th>Mobile (GSM)</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCDMA</td>
<td>HSPA</td>
<td>LTE</td>
<td>LTE-A</td>
<td>LTE-M</td>
</tr>
<tr>
<td>WiFi802.11a/b/g</td>
<td>WiFi 802.11n</td>
<td>WiFi 802.11ac/ad</td>
<td>LiFi</td>
<td></td>
</tr>
<tr>
<td>DOCSIS 2.0</td>
<td>DOCSIS 3.0</td>
<td>CCAP</td>
<td>DOCSIS 3.1 Remote PHY</td>
<td></td>
</tr>
<tr>
<td>ADSL</td>
<td>VDSL/FTTC</td>
<td>FTTH</td>
<td>Bonding, vectoring, G.Fast</td>
<td></td>
</tr>
<tr>
<td>Backbone and core</td>
<td>IP-MPLS Ethernet</td>
<td>Carrier Ethernet 2.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 20 highlights some common network technology evolutions in the telecom industry.

In view of the above, the transformation of the business, operations and ICT infrastructure must go hand in hand, and be consistently planned and implemented to deliver the desired ROADS experience to customers.
What are the options when embarking on the transformation journey?

A comprehensive approach

Every operator has its own business strategies that take into account their priorities and local market conditions. They will take on a unique path in the digital transformation journey, to reach their target state. Some may go on an aggressive and independent approach, while others may go for a phased transformation path through collaboration. There is no one-size-fits-all model that fits perfectly for every operator but getting transformation off the ground can go through a generic approach.

Digital transformation methodology is a navigation map to provide step-by-step guidance to go through your transformation journey.

Figure 21 highlights the six essential steps for a digital transformation. Through these steps, it defines the overall digital strategy and addresses any additional elements required for successful implementation – taking business strategy, business model, operating model, enabling platform, ICT infrastructure architecture into consideration. To cater for ROADS experience in the dynamic digital era, it is worth to note that these steps are iterative rather than a linear one, meaning operators must test, experiment and evaluate the outcomes in each step to achieve better results.
Engaging customers throughout the design journey ensures that they have a deep understanding of their needs at each point of transformation.

**Strategic demand analysis**
Regardless of their focus to become an infrastructure services provider, a digital ecosystem enabler or a full digital service provider, they need to explore and identify the key problem statements and drivers for the transformation, and the desired outcomes from the exercise.

A strategic demand analysis helps operators identify the key problem statement for the transformation.

A strategic demand analysis is the first step to understand operators’ aspirations and business priorities to be in the digital economy. This will highlight their key problem statements for the transformation. This can be achieved by conducting a series of workshops with organization leaders and key stakeholders to obtain a holistic view of their transformation vision and strategies.

**Industry analysis and current operation analysis**
Once the problem statements are well defined, a digital maturity assessment needs to be performed to assess the current digital maturity level of an operator, to compare against their desired future state, so as to identify the major gaps to meet its digital ambitions in future. Digital maturity model provides a systematic assessment framework to evaluate current maturity of an operator relative to their peers in the industry.

Digital maturity assessment identifies major gaps to meet your digital ambitions.

In addition, an industry and market analysis is necessary to have a comprehensive understanding of the competitive market landscape and future development trends, which provides additional insights into the gap analysis.

**Transformation opportunity recognition**
With the results of the in-depth gap analysis from the digital maturity assessment, a number of transformation opportunities can be identified. These opportunities will be further evaluated and prioritized according to their strategic values to the organizations, transformation vision & strategies, and investment requirements to realize the desired outcomes. Certain quick-wins will also be identified in this step to encourage the transformation by realizing on-going tangible benefits.

**Target business model, operating model and infrastructure design**
As described in section 2, the target transformation framework is a miniature business architecture of a digital telecom organization to design the required changes to operator once transformation opportunities are confirmed. It cover all aspects of the business; from the digital services offerings and associated business models, the operating model and capabilities delivering ROADS experience and organizational agility, to the enabling platform and infrastructure that will support the entire operations flexibility.

The target business, operation and ICT architecture will be open and collaborative, enabling partnership and ROADS experience.
Transformation journey design
While this is organization-specific we observe several high level stages that operators may go through in their journeys to become a digital service provider. The strategic roadmap in Figure 22 lays out the 3 major stages of transformation for achieving the target business and operating model according to the five principles:

- Sustained value creation is a priority
- Moving from a closed to an open and collaborative business organization
- Optimizing enabling platform and infrastructure to support growth of digital ecosystem and partners
- Progressive transformation in stages
- Engaging initiative that realizes near-term value

Figure 22. Major transformation stages of a transformation journey

Stage 1:
- Start with a new digital business or optimized an existing service with ROADS
- Start BSS modularization
- Start OSS centralization
- Cloudify data centres and optimize network

Stage 2:
- Build an open and collaborative digital eco-system
- Reconstruct BSS/OSS enabling platform to support partners’ business development
- Starting network architecture virtualization

Stage 3:
- Deep ploughing and cultivation of digital eco-system, enabling innovation variety
- Fully optimized BSS/OSS to be an open aggregation and capabilities exposure platform
- Fully cloudify data centres and network architecture in pace with technology evolution
Operators can have different starting points and hence a unique evolution path to their transformation destinations. As shown in Figure 23, there are five common transformation entry-points to kick off a transformation journey.

- New service driven
- ROADS experience improvement driven
- BSS re-engineering
- OSS re-engineering
- ICT infrastructure evolution driven

Figure 23. Operator's path varies in the digital transformation journey

The business-driven path explores new digital services to establish a digital ecosystem, while customer experience-driven path realizes ROADS through the optimization of the organization and its various areas of operations. BSS/OSS-driven paths focus more on building digital service enabling platform to support the digital ecosystem. ICT infrastructure-driven path implements the progressive cloudification of traditional networks. It is the operator’s decision to take any path subject to their business priorities, digital maturity and desired time-table. Operators can also take multiple paths at the same time based on their strategies.
Implementing a successful digital transformation requires a top-down well-thought out plan. However, reconstructing the business requires a solid foundation. Despite not being a primary driver, technology platform plays a huge role to the definition of operator’s transformation strategy. As shown from the transformation framework in the last section, the technology part comprising enabling platform and ICT infrastructure are fundamental in the transformation process to support operators’ new operating model, which in turn underpins their business model and corporate strategy.

Huawei’s digital transformation technology architecture – SoftCOM – helps operators facilitate and accelerate digital transformation. It takes a disruptive approach to transformation, shifting the focus from technology to business.

**SoftCOM**
SoftCOM is Huawei’s strategy for network architecture development for the coming decade (Figure 24). It is a revolutionary vision that leverages cloud computing, software-defined networking (SDN), network functions virtualization (NFV), and Internet-based operations to streamline the networks of telecoms operators and maximize information technology (IT) resources. The services, efficiencies, and overall operations of the telecom industry will be dramatically improved due to the reconstructing of the architecture of networks to become defined by software and not hardware. SoftCOM will help operators to embrace the strategic opportunities of the information age and effectively manage the challenges brought about by the structural limitations of existing networks.

![Figure 24. SoftCOM architecture](image)

**ICT infrastructure cloud facilities**

- **Agile network**
  - SDN Controller
  - GSM
  - UMTS
  - LTE
  - ADSL
  - VDSL
  - G.Fax
  - VPP
  - VMSE
  - VNEX

- **MBB cloud**
  - VIMS
  - vSPS
  - vSDM

- **FBB cloud**
  - MBB
  - vSPS
  - vSDM

- **Edge cloud**
  - Digital
  - IoT
  - Telecom

- **Core cloud**
  - Digital
  - IoT
  - Telecom

- **Service cloud**
  - Digital
  - IoT
  - Telecom

- **Operation Cloud**
  - Business orchestration & DevOps tools
  - BES
  - Big Data
  - OSS
  - SDM
  - vSPS
  - vSDM

- **Server**
  - Cloud equipment

- **Network resource pool**

- **Storage resource pool**

- **Cloud OS**
SoftCOM focuses on a higher level, helping carriers perform end-to-end reconstruction from service, operation, architecture, and network to deal with the rapid development in the digital world. It aims to help carriers build cloudified and fully open ICT infrastructure, in order to develop new services in the Internet era in a faster and better manner, reduce OPEX and technical uncertainties, and realize quick transformation in terms of network, architecture, service, and operation. The ICT infrastructure uses the distributed cloud DC as the core of the next-generation service network. It adopts NFV and SDN to implement hierarchical decoupling, function virtualization, and elastic resource scheduling.

In addition, the next-generation operations system must be an open, flexible, intelligent, and agile platform in order to deliver the ROADS experience. Telco OS is a next generation digital operation system for carriers. It is not a traditional operation support system (OSS) or business support system (BSS), and is more than a platform or just some software and hardware products. It has evolved into a telecoms operation system that enables carriers to customize products and services, develop internal O&M and management tools, and open up capabilities to strengthen the industry value-chain.

The three solution suites with application modules – BES, IES and Big Data Enabling Suite – provide key capabilities for business, operations, and intelligent support respectively. Telco OS also possesses the orchestration capability to orchestrate services, business, and infrastructure operations based on user needs and ROADS requirements, so as to achieve better collaboration across the entire business process.

For further information about Huawei’s SoftCOM, please visit our website at http://www.huawei.com/blink/en/solutions/broader-smarter/morematerial-b/HW_204206
Digital transformation is a customer experience-led initiative. It aims at creating a customer-centric organization that is sustainable and future-proven in a bid to drive continuous innovation and to deliver customer desired ROADS experiences through their services and operations. However, the traditional mindset has made implementation a challenge for operators. To make a difference in the transformation, they need to unveil the missing link with a human-centered approach such as “design thinking” and bridge the gap with more customer-focused solutions. The goal is to achieve business-efficiency outcomes that are key to compete in the digital economy. Figure 25 depicts a high-level view of digital transformation.

Operators must take action now as they strive to become a first-mover in the digital era. Failure to respond swiftly in this fast-changing digital world will cause them to lag behind their counterparts and even other industry players in their ambition to become digital service providers. They must first realize this opportunity to innovate with a business case to balance the value of transformation with the investment. To embark on the transformation, they need to take a “think big, start small” strategy. This digital agenda must be led from the top leadership who has the ability to articulate the value of digital technologies for the organization’s future.

The complexity of digital transformation project magnifies the importance of risk management. The best way to de-risk is to go through the journey with a reliable partner. Huawei, as your competent partner, can provide you with experience and proven assets that not only guide you throughout the process, but also increases the chance of success by leveraging its strengths in the proven technology architecture and infrastructure. We are ready to help you realize the true value of digital transformation.
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