# Service providers take many paths to benefit from cloud transformation

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# The cloud transformation imperative

As the last country markets upgrade to broadband, telecom service providers are gaining services revenue at a far slower pace than the investment rate required to provide quality of service to customers. Additionally, operators see few opportunities to expand revenue growth. One clear answer to this dilemma is cloud transformation. Cloud transformation provides the dual benefit of enabling service providers to offer improved cloud services to customers and prospects, especially enterprises and government, while also lowering the cost model for infrastructure and operations.

# **Appoaches to transformation**

The cloud transformation imperative takes many forms, such as converting data centers to converged infrastructure, converting network transport platforms to software-defined networks, or converting network functions to cloud-native virtual services using NFV. All of these infrastructure changes require changes in operations and service creation. Each of them in combination allows the delivery of new services to customers and prospects.

The rationale for transformation is based on the priority of the service provider. Table 1 illustrates the three primary drivers of transformation.

Key Driver	Goal	Example	Expected Result
Generate increased revenue	<ul> <li>Upsell or cross-sell to customers</li> <li>Develop new services for new customers</li> </ul>	<ul> <li>Expand business services through cloud and network offers</li> <li>Operator examples: AT&amp;T, China Unicom, Verizon, Orange</li> </ul>	<ul> <li>Cloud services revenue growth</li> <li>Net-new customers from competitors or regional expansion</li> <li>Retain customers</li> </ul>
Lower operational costs	<ul> <li>Remove manual processes from operations</li> <li>Reduce the time to provision services</li> <li>Provide a high degree of flexibility in securing resources</li> </ul>	<ul> <li>Consolidate, virtualize and automate data centers</li> <li>Stage network functions in regional delivery centers</li> <li>Migrate transport nodes to software-defined networks</li> <li>Operator examples: Telefonica, Deutsche Telekom, Orange</li> </ul>	<ul> <li>25% to 40% opex savings as a result of simplified connection fulfillment and assurance processes</li> <li>A "step change" in agility from months to hours or minutes</li> </ul>
Corporate strategy driven	Simultaneous rearchitecting of the network and launching proof-of-concept and commercial initiatives across multiple use cases (e.g., vCPE, Internet of Things [IoT], etc.)	<ul> <li>Implementation of new set of platforms for enhanced control, orchestration, management and policy across multiple (all) domains</li> <li>Application-driven balance of data center nodes running NFV and SDN at central control points and the network edge</li> <li>Operator examples: AT&amp;T, Vodafone</li> </ul>	<ul> <li>10% or more in overall corporate opex savings through automation</li> <li>20% or more in overall corporate capex savings through commodity hardware and consolidation</li> </ul>

Table 1: Main rationale for cloud transformation

SOURCE: TBR AND OPERATORS

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#### Generate increased revenue

While cost reduction is often associated with service provider cloud transformation, service providers are also insisting on business cases that address the need to grow revenue. These cases are a key part of the overall justification for cloud transformation and are required either in parallel to or prior to larger investments in virtualization and cloud technologies.

By necessity, these revenue-generating initiatives overlap existing connectivity services, and therefore are often seen as expanding or extending services through incremental revenue. For example, with AT&T's Network on Demand (NoD), incremental network services are acquired dynamically through a customer portal and new services are extended to new regions as AT&T invests in NoD infrastructure in new markets. These investments may have been more prohibitive in the past, but cloud services require only a data center node and limited customer premises platforms.

Another example of a revenue-generating initiative is the cloud "on ramp" services vendors such as BT, AT&T and Verizon have delivered to create network-differentiated pathways for enterprises to use their cloud services as well as those of Amazon Web Services, Google, Microsoft and others. These initiatives provide little direct cloud revenue for the service providers, but they deliver significant incremental revenue for network connectivity services. Similarly, the Internet of Things (IoT) brings with it multiple business models that require cloud infrastructure for connectivity, aggregation and analysis. Service providers are also applying cloud transformation to their existing and new IoT initiatives.

One challenge with the expectation of new investments creating new revenue is areas of the network that do not justify revenue are less likely to be addressed. This means the broad operations changes required to spread cloud transformation benefits beyond the use case are often hard to justify. Without operational investments in areas such as multidomain service orchestration, the benefits of cloud transformation do not spread and the business value is diminished.

For this reason, successful business cases require revenue generation and cost-reduction drivers as well as an extended payback period because operational savings will take more than two years to manifest, possibly longer if legacy processes are not also reduced or eliminated.

#### Lower operational costs

The promise of cloud transformation for operations is to deliver an automated, programmable network. However, automation at scale for service providers requires virtualized function life cycle management, multidomain service orchestration and policy management to enable dynamic data flow. Most operations departments do not have cloud transformation capabilities, meaning an initial investment is required. This spend-to-save approach is becoming more accepted by service providers, many of which have approached cloud transformation almost exclusively as a cost-savings exercise. The procurement department must become equally convinced of the long-term cost-reduction benefits of cloud transformation.

Ultimately, the combination of proven business cases by pioneering service providers and cost reduction in revenue-generating cases will yield enough supporting data to enable the industry to progress on a broad scale. When that is accomplished, operators will experience savings in internal IT and BSS/OSS systems and be better able to deliver revenue-generating cloud services.

#### Corporate strategy driven

A handful of service providers have decided at the executive level that their best choice is cloud transformation. They have observed the difficulty in growing broadband revenue and experienced the frustration of seeing a large share of revenue captured by over-the-top (OTT) providers that operate with the advantage of a cloud model. Furthermore, the combination of cost savings and revenue generation, even at an incremental level, sets a new trajectory for the service provider business model. Instead of the old model of investing billions in infrastructure, and then continually acquiring revenue from incremental subscriber and service growth while optimizing operations, with the new model, investment becomes incremental to maintaining a self-optimizing, cloud-based delivery system with potential for revenue from new and existing services generated by the service provider and the developer community.

It is this vision that inspires strategic cloud transformation in the largest service providers, and the results of those service providers' initiatives will lead the next tier of service providers to adopt cloud transformation as well.

Numerous operators have further executed on this vision by combining organizational responsibilities, such as merging the CTO and CIO positions. Others have created cross-functional or independent steering groups that combine organizations including CTOs, CIOs and CMOs.

# Choosing the path to achieve cloud transformation

Achieving cloud transformation will bring multiple benefits; however, determining which path to choose can be difficult, as there are few proven examples among operators. Cloud transformation represents an opportunity to pioneer and gain a competitive advantage over other operators in their respective regions. The only clear examples of fully transformed service providers are pure play cloud providers, but they lack a network to monetize and the consequent expenses.

Fundamentally, the starting place depends on the key requirements of the service provider. The service provider must determine if its goal is to build revenue through new customers, improve products and services, enhance the effectiveness of its IT systems, or drive operational efficiency.

#### Create new customer segments

For most operators a new way to develop new customers is drastically needed as their markets saturate or their user base becomes unable to afford additional fees for network services. Beginning cloud transformation with a focus on new customer acquisition opens up the solution as a greenfield opportunity. New segments can be approached entirely differently than existing segments.

New Customer Services	Services	Solution Requirements	Examples
Cloud services	<ul> <li>SaaS, IaaS, PaaS</li> <li>Security as a Service</li> <li>Data as a Service</li> </ul>	Transform data centers to cloud centers delivering cloud service directly or with partners	China Telecom Public Cloud Service
Internet of Things	<ul> <li>Smart home</li> <li>Smart city</li> <li>Industrial IoT</li> <li>Connected cars</li> </ul>	Leverage cloud platforms as control, analysis and aggregation points for IoT use cases	Telia Carrier IoT Backbone
Geographic expansion	<ul> <li>Network services</li> <li>Value-added services</li> </ul>	Use the cloud transformation to create virtual extensions of network services	AT&T Network on Demand
Small and midsize business services	Business and productivity applications	SMB portal for own and partner remote applications	Deutsche Telekom Cloud VPN

Table 2: New customer segments enabled by cloud transformation

SOURCE: TBR AND OPERATORS

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#### Enrich portfolio through ICT

Service providers can also strengthen revenue from customers by adding ICT services supported by the convergence of telecom and IT platforms in a cloud data center. These services include content delivery with partners, unified communications services, and IT hosting and application services. The broader portfolio creates additional revenue without greatly increasing expenses, as the converged virtual platform is leveraged rather than requiring investments in separate IT or telecom platforms and traditional static service instances.

#### Increase internal IT efficiency

For IT, cloud transformation supports capex reduction through consolidated hardware and increased utilization of transformed platforms. It can also reduce operational expenses through policy-driven automation of data center processes. Additionally, the transformation enables faster response to service requirements through more flexible and adaptable OSS and BSS systems.

#### Increase internal network operations efficiency

Creating a programmable network through cloud transformation enables service providers to automatically provision new services through predetermined policies, reducing manual intervention in service delivery, which dramatically reduces new service deployment. Similarly, automation of operations through policy and orchestration platforms enables self-healing networks that minimize the need for support services intervention. Both services also allow deeper real-time monitoring and analysis of customer and network data as well as support customer experience and network optimization programs.

# **Preparing for the transformation**

As service providers prepare for cloud transformation there are numerous key considerations to ensure the strategy they take is the most efficient and effective. To understand these considerations, service providers can rely on peers and supplier partners as well as the greater telecom community, which is actively working to determine best practices in cloud transformation.

#### **Open-source strategies**

Broad agreement has been reached by the service provider community that open-source platforms provide the most efficient solution components for cloud transformation. Because the platforms are developed by the community in cooperation with open-source group governance bodies, the membership can immediately take advantage of the new versions of platforms. This reduces service provider development costs and ensures a degree of consistency across implementations. Compatibility with third-party applications, which may become revenue-producing services, is the chief reason open source is required by service providers for cloud transformation.

However, a complete open-source strategy must take into account the legacy environment as well as gaps in opensource platform capability. Suppliers can fill these gaps with their solutions and act as systems integrators to enable a balanced new deployment of cloud platforms with legacy network elements.

#### Heterogeneous clouds

Another consideration is whether the cloud target platforms should be deployed within a public, private or hybrid cloud. This decision is relevant for the transformation of the IT data center to cloud. While public cloud has cost advantages versus private cloud, there are some mission-critical platforms that should not be hosted on private cloud. This gives rise to the use of hybrid clouds, which balance workloads between the two environments.

Additionally, network transformation requires determination of how the cloud network nodes are deployed. For example, cloud enables a separation of the control functions from data transport platforms. For the sake of latency

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requirements, it makes sense to locate the data as close to the end point, or at least the edge of the network, as possible. The control functions can be centralized to serve multiple distributed delivery environments. Determining whether data platforms reside in distributed cloud pods while the control functions are in a central private cloud is a key decision in the first phases of cloud transformation.

Taken together, these choices often result in a heterogeneous cloud strategy where the dedicated cloud is deployed for the workload or node requirements.

#### Unified cloud

The downfall of the heterogeneous strategy is multiple clouds create processing delays between them and are more expensive to maintain. However, in some geographies service providers have no choice due to the distance between access points. Unified clouds can be implemented by combining the necessary IT and network functions in a single set of platforms in geographies. This allows for maximum efficiency of policy-based programmability across IT and network platforms.

## **Cloud services for key markets**

Through cloud transformation service providers are targeting consumers and businesses, but the value of cloud is services can be built to cater to three customer types, large enterprise, government and vertical industries, that are migrating to cloud platforms but require service provider partners.

#### Enterprise

Large enterprises, most of which are well along the journey to cloud, are seeking to maximize their applications and networks to reach new customers and enhance services to existing customers. This means they require network-enabled clouds to enhance mobility applications, supply chain, data transport and industry-specific solutions. Many are deploying hybrid clouds to increase data center efficiency. Service providers can deliver a variety of services through cloud transformation. These services include SaaS, IaaS, PaaS, data and security services on their own clouds, serving as a secure on-ramp to internal and partner clouds and offering cloud interconnection services.

The goal is to supply a discrete solution that caters to the enterprise's needs for a broad set of dedicated cloudenabled applications delivered in whatever configuration is more efficient for the workload or data stream. Service providers are actively engaging with partner suppliers and other cloud providers to meet this demand.

#### Government

Like enterprises, governments require diverse service provider support for cloud services, including open public service applications, such as records search and processing, as well as closed, highly secure private and public safety applications. The service provider strategy is similar to enterprise, offering a broad service set coupled with broad delivery menus, with an added emphasis on either open access or security.

Additionally, governments are increasingly interested in leveraging IoT for applications such as smart city environments. Service provider cloud platforms can be used to enable the myriad smart city applications as well as support aggregation and analysis to optimize smart city services.

#### Vertical industries

Vertical industries carry specific cloud requirements for service providers, from transaction-oriented financial services to touchpoint and analytics-sensitive retail. Process control is crucial to industrial IoT, while fast response is critical to connected transportation. All of these examples require the cloud-enabled programmability promised by cloud transformation.

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Service providers have the opportunity to embed themselves in each of these ecosystems, garnering revenue from service fees by catering to the unique requirements of each vertical. In most cases the best approach is to identify the mission-critical cloud or network services the vertical requires and then design an efficient and effective solution. Done well, these solutions will command a premium service fee as vertical-industry firms will be willing to pass on a portion of the efficiency savings or enhanced revenue obtained by using the solution.

An example of an industry-specific solution is enhancing the financial services transaction capability with personalized cloud services that increase convenience for the customer and help finance firms understand customer preferences, which can lead to new product development. In the case of retail, enhancing data about the consumer's social interaction either within the online experience or at the point of sale can support improved marketing and promotion programs. Efficiencies in manufacturing and transportation can be achieved through smart network applications that transmit data in real time to enable immediate decisions that reduce process or travel time. Driverless cars will not be possible, for example, without a robust, real-time programmable cloud-enabled network.

# **Cloud for internal transformation**

Within the service provider data centers and networks there are still many standalone legacy systems that are operating without the benefit of flexible programmability or upgradability. The expense and time to operate and maintain these systems has become prohibitive for service providers. These systems include OSS/BSS systems within the IT data center as well as network elements and components within the access and transport network.

## **Operations**

The greatest impact of cloud transformation is on operations, where zero-touch processes enabled by automation can dramatically reduce opex. Beyond cost savings, the ability of the service provider to quickly provision services and also obtain payment for them is a key value of cloud transformation. The tools of transformation are to shift from static, loosely coupled stand-alone platforms to seamless virtual systems where modules for key functions become virtual applications services that can be manipulated instantly according to policy engines. AT&T's Enhanced Control, Orchestration, Management and Policy (ECOMP) system is a good example of the potential efficiency gains that can be made in operations cloud transformation.

AT&T Enhanced Control, Orchestration, Management and Policy (ECOMP) System				
Benefit	Method			
Operations speed and flexibility	<ul> <li>Quickly onboard, set up and run virtual services</li> <li>Quickly scale services as required by the application</li> <li>Run a single platform for each of the various types of applications required in the network</li> </ul>			

SOURCE: TBR AND AT&T

#### **DevOps**

While operating IT and the network in a more efficient way is a key benefit, being able to fast-fail in application delivery is even more valuable. Service providers engaged in cloud transformation also see that they can more rapidly create services, test them in the market, and keep or withdraw them just as quickly depending on the result. In short, they can operate like an OTT digital service provider.

This capability is enabled by the implementation of DevOps, which automates the process of software delivery instantly within the infrastructure, essentially operationalizing the developer's application or service as it is

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created. This supports very fast provisioning and enables service providers to engage with internal and third-party developers in a culture of innovation and experimentation rather than the slower and more time-consuming waterfall development process.

The DevOps process and tool set aligns closely with the automation provided by cloud transformation. It can be targeted at internal applications to run service provider business processes, network processes or external revenue-generating services.

#### Infrastructure

The physical network infrastructure is being transformed within IT and telecom through migration to cloud native instances of compute, storage and network services. These new virtual services are lightweight and rely on the infrastructure to carry carrier-grade reliability, security and performance characteristics. Network infrastructure transformation is accomplished through decoupled transport platforms that operate as software-defined networks. These networks are managed through policy that assigns the appropriate security and performance requirements to the network elements based on the application or service required.

The key to infrastructure cloud transformation is an automatous network that delivers an instant response to applications requirements based on policy. This network can and will instantiate the necessary services on demand to meet applications needs. In addition, these same processes will address faults and network issues with minimal manual intervention.

#### Conclusion

Cloud transformation answers the dilemma that service providers face of expanding revenue while saving costs. Service providers can offer improved cloud services to customers and prospects, especially enterprises and government, while also lowering the cost model for infrastructure and operations.

#### About Huawei

As one of the largest end-to-end ICT firms, Huawei provides complete solutions for cloud transformation in IT and telecom. Huawei's Telco OS framework specifies ICT cloudification and incorporates the necessary hardware, software and services expertise and platforms to find the right solution to fit the service provider's requirements.

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