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The impact of internet-based services on OSS and BSS

New revenue streams from internet-based service models will require seamless business processes that work across different levels of an organization and improve the interworking of OSS and BSS.

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Historically, the primary focus for BSS platforms has been the commercial side of delivering services, whereas the focus for OSS platforms has been on the technical control of services. The emergence of internet-based services, driven by greater personalization and end-to-end user control, is bringing about the merger of these two kinds of platforms. The walls between the front and back offices are being torn down, bringing some operator benefits but also adding some degree of complexity.

Many communication service providers (CSPs) want to increase the level of flexibility in their OSS/BSS environments, to expand these systems for use throughout the new service-value chains being created by emerging internet-based services. The desire for improved adaptability challenges the traditional rules and functions of OSS/BSS platforms. To support the union of these platforms a number of strategies can be used to align them.

Background

Several trends are driving an exponential behavioral change in the traditional telecom customer – people want different types of services and are using them in innovative ways. There are two main developments driving this accelerated rate of change:

- the increased availability of mobile broadband; and;
- the emergence of internet-based retail business models

Near-ubiquitous, high-speed data connectivity at competitive prices has opened up a range of alternative services that can be used in ways that traditional CSPs have not experienced before. Internet-based retail business models (see Box B) have fundamentally changed the way CSPs perceive the users of their services. Users were once viewed as subscribers or customers: individuals and enterprises that had a relationship with the CSP, and that would pay for basic and ad-hoc services. This perspective is being replaced by the notion of the consumer (favored by the internet-based retail industry and previously not so common in the telecom industry), a term used to refer to the user of a service provided by a CSP.

The significance of the difference between these terms lies in the way the behavior of data-service users has changed. Traditional subscribers or customers buy a basic service, agree a contract with a CSP, and make payments. They may also purchase additional services directly from their CSP without considering other alternatives.

BOX B

Freemium services

Internet-based retail businesses using the freemium model provide access to a product or service, usually digital (such as a game or film) for free, but a premium is charged for access to advanced features of the service. This fee normally comprises a monthly subscription with no termination charges.

A consumer, on the other hand, actively chooses to use a service, does not necessarily have a direct relationship with any CSP, or is the person or organization that pays for the service. This model and the differences between it and the subscriber model are illustrated in Figure 1. In some situations, services are paid for by a third party in return for an alternative benefit such as ad placement or access to information about consumers – and this is the typical model for internet services.

This difference in terminology may not seem massive, but once accepted, it fundamentally changes the relationship between service providers and their customers: how they are managed, how services are purchased, and which information is stored and reused. The consumer concept has not yet been adopted extensively within traditional definitions of communication services. Services based on this model are beginning to emerge, such as flexible family plans that allow several users to share a service that is paid for by one customer.

The goal is to improve the aggregated view of a household or the service consumption of an enterprise. To achieve this, information about all the parties involved in a service running on a CSP network – consumers, suppliers and partners – needs to be gathered and taken into consideration when developing new business models.

From connectivity to content

One of the most significant behavioral changes in consumers is their shift in focus away from basic network-access-only services to content-driven ones – from fibers, cables and devices to watching movies, reading books and sharing videos. As a result of this shift, content is being provided either

BOX A Terms and abbreviations

BSS	business support systems
CSP	communication service provider
ERP	enterprise resource planning
IP	Internet Protocol
M2M	machine-to-machine
NOC	network operations center
OSS	operations support systems
SLA	Service Level Agreement
SQM	service quality management
TDM	time division multiplex

in cooperation or in competition with the CSP through over-the-top services.

Telecommunication services are key enablers for content services and content providers. A good example is Amazon, producer of the Kindle, which delivers e-books over a mobile network. The device owner is completely unaware of, and has no control over, the network used to deliver the services and content they purchase. The shift in how content and services are supplied (illustrated in **Figure 2**) transforms the value chains that service providers need to support. It brings into play:

- large numbers of partners;
- complex settlement processes; and
- new delivery providers – that aggregate content from content providers to ensure timely delivery through caching.

In most cases, the new delivery provider is a CSP or a partner, but for some mobile services, it could be an independent third party – such as the mobile split-browser provider Opera – which optimizes content for specific devices, compressing it to enhance the overall user experience.

Content providers can use economies of scale to obtain better rates for connectivity services than an individual or enterprise can secure. As a result, they may eventually stop selling traditional connectivity services to individual households, and instead media aggregators may begin to pool their consumers to bulk-buy connectivity within specified regions.

This could become reality if large-scale content owners – such as Sony or Google – that have direct contact with consumers start to provide devices that generate demand for connectivity. Such a model is used today to provide satellite services – the consumer does not buy a satellite connection, but rather signs up for content which they can then access via a device (set-top box) leased to them by the satellite company.

Single transactions with no commitment

The introduction of internet-based services over the past 10 years has opened up a new chapter in terms of the level of commitment that people make when using a service. The predominant model for retail services provided by restaurants and shops, for example, is based on the concept of a single transaction made by a buyer with no commitment to repurchase. Until recently, only a small number of providers used payment models based on zero future commitment (see **Box C**). In contrast, most non-retail services, including utilities and telecommunication services, involve only a minimum commitment – usually more than one day and in many cases months or years.

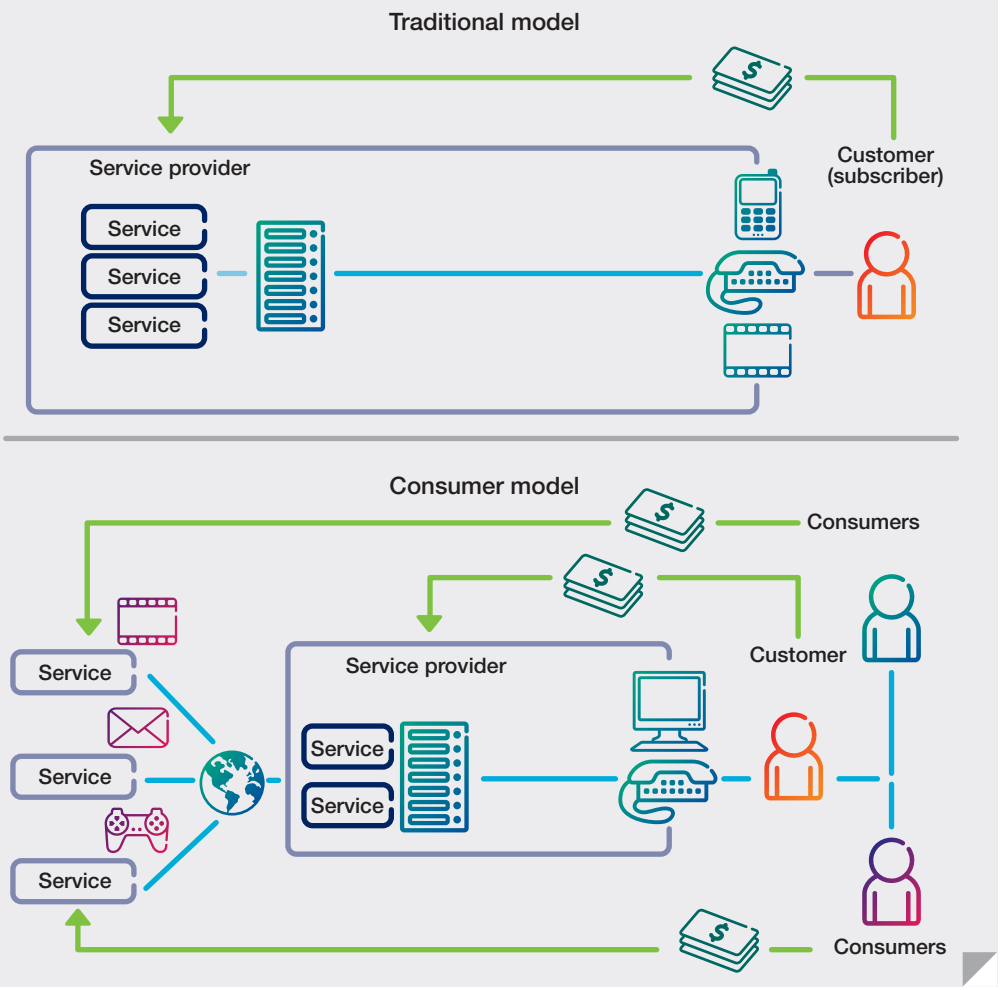
Retail principles have been successfully applied to internet services, enabling the consumer to pay a single fee for instant consumption with no commitment. Purchase of a film for download to a tablet device for immediate viewing is a typical example application of the zero-future-commitment purchasing model.

In the future, consumers might choose a specific service provider when they want to buy something, using it simply for the duration of the purchase and possibly during the consumption phase. With such an extreme model – where the time for interaction with the consumer is very limited – it is essential for the consumer to understand instantly what services the CSP has to offer, and for any requested services to be delivered without delays caused by external processes such as credit checks or complex contracts. This immediate-pay-and-use model is drastically changing the way services are contracted and will drive the continued fragmentation of the supply chain.

Reduced control

The rise of internet-based services necessitates a new set of identifiers that

FIGURE 1 **A traditional model and a consumer model**

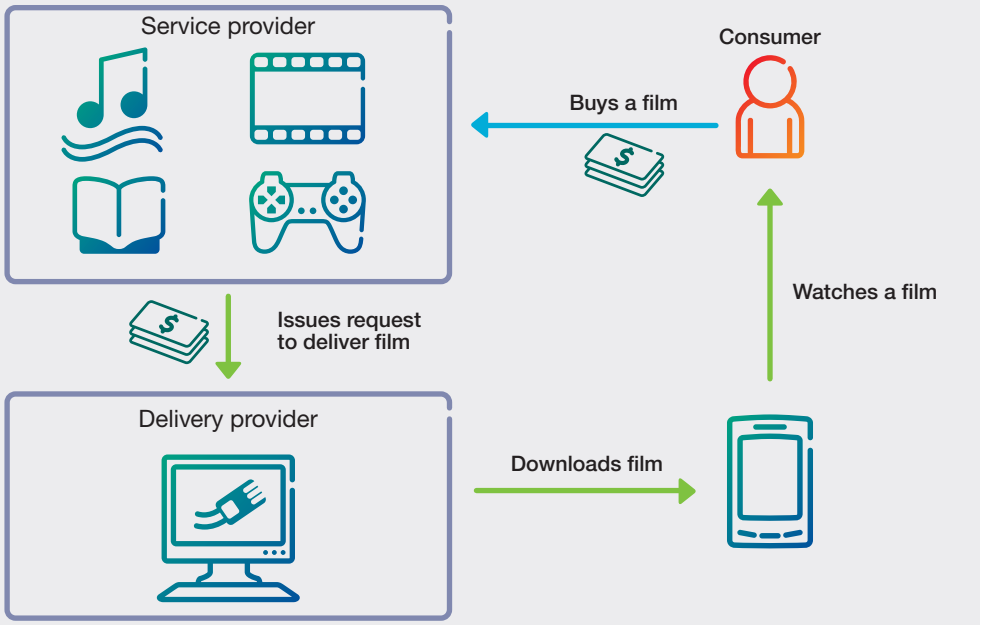


BOX C

Zero future commitment

Having no recurring component and involvimg no additional cost for the consumer after the initial purchase. In most cases, this model is based on pay-before-delivery.

FIGURE 2 **Content-driven supply chain**



are not directly linked to a service provider, an individual or an enterprise. In many business models, the telephone number has been used as the key consumer identifier for all services provided by the operator, and no service can be supplied unless one has first been assigned. This approach will no longer work in an environment where there is no direct connection between the connectivity identifier and the service identifier. A virtual firewall exists between these sets of identifiers, and it will need to be removed.

The combination of new ID policies and centralized control will enable consumers to forward content services such as video to various types of devices. The trend is moving in the direction of completely removing per-service identifiers (such as telephone numbers), and the most obvious way to do this would be to use an OpenID service or dominant social-networking ID (such as a Facebook or Google+ ID) as the entry point and allow consumers to pull these IDs to various devices. The ability of the service provider to either enable or integrate such a change will be affected by the business decisions and role that it wants to play in partnering with the social-networking services in question.

New methods of service management

The predicted shift from connectivity-only to content with connectivity will require a change in the way services are viewed, which in turn introduces new requirements for the way they are managed. The three main shifts will be evident through:

- the emergence of short-duration services;
- the use of standard service units; and
- the utilization of new methods to plan future services.

Short-duration services

The long-term business model – where people and enterprises sign up to commercial agreements that provide better prices in exchange for a commitment for longer service periods – will probably continue to a certain degree and generate some revenue. Short-duration services can provide higher margins and compensate for declining revenue streams elsewhere. People are willing to pay more for a short-duration service if it can be delivered in an immediate, efficient and simple way. For example, on average, consumers will pay twice as much to download and watch a film from a mobile-video-rental website as they will to rent a movie from a store – paying for the convenience of not having to collect it in person, and for the luxury of buying entertainment spontaneously when the desire arises.

Supporting consumers' repeated use of short-duration services over long periods of time with a seamless user experience is a key differentiation factor. One of the issues associated with this model is how user information is maintained and reused after service termination.

Standard service units

In addition to shorter-duration service agreements, others of common or standard service duration may provide some benefits to CSPs that sell services to each another. The way services use networks is becoming more deterministic, and so to ensure that use patterns can be accurately detected, service-consumption plans will need to be updated regularly. If a common set of units based on the service duration can be applied to a group of services that all use the network in the same way, a service provider can optimize the allocation of network resources, thus combining services more efficiently. This improves the speed of introduction of new services and hence reduces total time to market.

Many of the current approaches to the management of IP networks tend to overlay deterministic routing onto the IP network to ensure operational and SLA-compliance on a par with legacy TDM networks. However, this approach negates many of the benefits (such as flexibility and cost-efficiency) of the underlying IP networks. In many cases, it also introduces higher operating costs due to the increased complexity of managing and changing established and often custom-configured IP paths.

Concepts similar to those used for measuring voice-switch consumption, where networks are optimized to handle traffic volumes (defined in erlangs), could be used to define what is meant by standard duration for a service. However, for data services, the duration of a fixed connection is now expected to be infinite until termination – and in a mobile network, it is expected to last for the duration of the contract period. Although the erlang is by definition a dimensionless unit, it becomes a

practical measure when used to express the ability of a switch or network to support a specified volume of traffic within busy hours. If a similar principle could be developed for data services, greater efficiency in the consumption of IP network resources would be possible.

Planning of future services

If a common set of units could be devised for measuring service consumption, better planning of network resources would be possible. Over time, such a set of units would enable improved sharing, off-loading and trading in network traffic. In this way, service providers could expand their networks in a common way, leading to the potential for trading in data capacity in much the same way that voice is traded using wholesale minutes.

The ability to pre-book data capacity at a given price for services that will be used at a future point in time could provide some counterbalance to the revenue loss caused by consumers opting for shorter-duration services within long-term commitment agreements. By first securing a price for the data capacity required to support a specific service, the price of the service can be predetermined and can be based on the length of commitment to it. The concept of prior commitment is currently only used in pre-pay and post-pay contracts, and would be highly beneficial if it could be applied further.

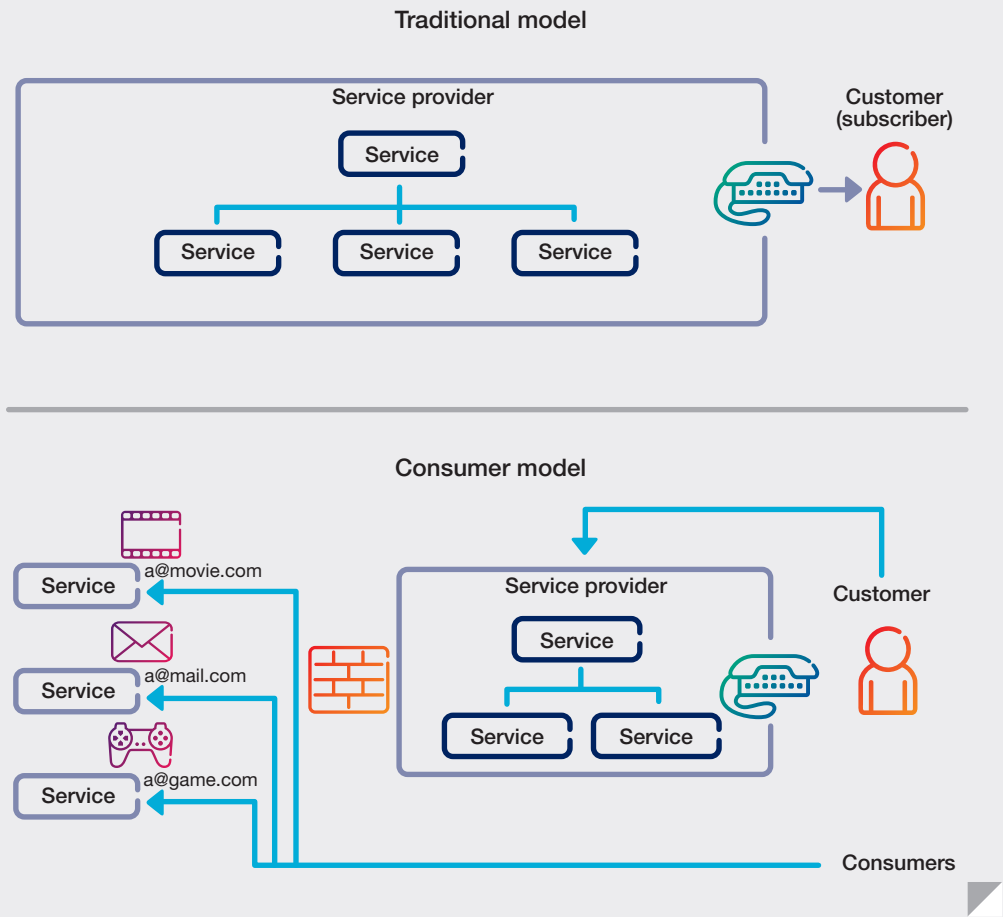
By charging lower prices for access to services during off-peak hours and controlling the level of overbooking during critical busy hours, service providers can maximize revenue from their resources. This model is particularly relevant for enterprise services and as the level of M2M communication (where data services tend to be less time-sensitive) rises.

All of these options add new and unmanaged dimensions to the effective delivery of services, which impacts the supporting business processes and systems, which as a result will need to be modified.

Harmonizing OSS and BSS

In the short term, it is unlikely that OSS and BSS will merge completely. However, improved harmonization – and tighter integration with increased data-sharing at certain information points – will be required to support the changes in consumer behavior. This can be achieved through the addition of an information-and-governance layer between OSS and BSS. The types of information included in the major processes and systems of services provided, and the way in which these are aligned, are illustrated in **Figure 4**. This new layer of information will need to be closely integrated across the different processes so that it acts as a bridge, transferring the results of one process and forming inputs to others.

FIGURE 3 **Telecom and internet-service IDs**



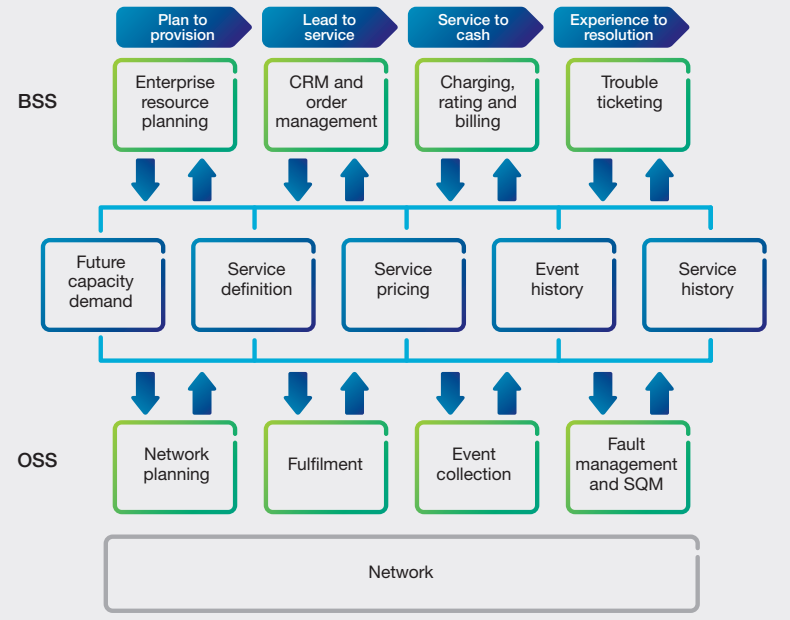
Required changes to planning systems

The planning of network resources is not the first area that will be affected by the changes, but it is the area that could potentially undergo the most extensive change. A major change in the method used to plan network resource consumption for data services will be required to deliver service-consumption time and future pricing efficiently, without any dramatic impact on the quality of experience for users of all services on a given network.

The way OSS/BSS processes currently treat data consumption differs only in terms of the terminating device. A smartphone and a laptop have different data-consumption profiles, but these profiles are expected to apply across the entire subscriber base, with minimal ability to handle individuals who do not fit the typical profile. More detailed and much shorter planning cycles need to be accommodated, and better analytics that drive closed feedback loops are necessary.

To support tighter coupling to commercial factors, planning systems will need stronger interaction with general financial systems – moving

FIGURE 4 **A harmonization layer between OSS and BSS**



planning systems closer to the ERP platforms that work in conjunction with the daily operations of a company. Forecasts provided by ERP systems will determine future prices and, to some extent, the value of the company. As a result, service providers will need to establish new ties between planning and rating so that per-unit prices correspond with the rating for each service.

By standardizing services across all providers, capacity shortfalls can be easily filled by third parties – adding complexity for providers who tend to create partnerships after lengthy negotiation.

Changes in lead to service

To support the on-demand nature of new offers, service delivery will undergo extensive change, mainly to support short-duration services.

For short-duration services, greater real-time service enablement may necessitate additional partnerships and introduce new methods that do not require the same level of device pre-configuration and network configuration as those needed for services today. For example, to determine whether or not a service can be delivered prior to payment processing, service configuration information should be obtained at the point of purchase.

The role of inventory will shift: from a simple pre-delivery control point, to a real-time service-enablement function. This function will continue to ensure that network-resource conflicts do not arise, but these checks will be based on ID and capacity availability – requiring a more extensive real-time view of network capacity than has previously been available. Reconciliation processes cannot provide the required speed to offer an accurate representation of network capacity and consequently, the way the real-time picture is achieved and managed will need to change. In many cases, real-time checks will not include capacity validation using offline systems – a method commonly used today.

The standardization of service-characterization parameters could result in a large number of repeat service configurations. As the state of a service is controlled by the current, and not the future view, repeat orders are difficult to handle in many systems. Modifications will need to be made to many of the platforms used today to manage the future state of a service at any given time.

Changes in service-to-cash

Service-to-cash will be the first area affected by the shift from connectivity-only to content provided together with connectivity.

The changes to the processes supporting short-duration services, future bookings and dynamic service pricing are more extensive in service-to-cash than they are in any other area. These new services make the supply chain more complex and cause some level of revenue splitting.

The shift to content with connectivity increases the number of small transactions completed with limited credit checks – which can lead to revenue losses. Verification prior to service delivery will become a greater burden on the service provider, as services cannot be retracted once delivered: once a film is downloaded, it can be viewed. Pre-payment models could reduce this risk, but such a model requires efficient clearinghouses that have tighter consumer-control methods or can absorb the increased risk.

Functions to support micro-billing and more extensive clearinghouse processing will be needed, adding larger-scale external interfaces to systems that have normally been closed behind company firewalls.

Policy will gain greater significance and will be used to control services and enforce charging rules. Per-consumer policies are a prerequisite to enabling the fine-grain controls to accommodate the new service definitions. Consumer profiles will as a consequence gain greater importance.

The ability to pre-book services introduces additional complexity into the pricing of a service and all the commercial rules relating to it. Product catalogs will need to be dynamic and make use of real-time planning and forecast information to determine the price for a service.

Changes in experience to resolution

Many operators have invested in IP-fault and SQM platforms, and are likely to do so more extensively as the user experience of shorter-duration services needs more proactive service monitoring. This is the only way to maintain basic SLAs for such services.

To enable faster reaction times,

extending the use of policies and real-time SQM within networks will be necessary. Centralized systems usually cannot provide the speed required to deal with local fluctuations in network use.

Providing simple mechanisms for users to notify the CSP directly about their experience will increase the efficiency of network operating centers (NOCs) and reduce the amount of time spent handling errors that do not directly affect service performance.

Short-duration services and connectivity with content create the additional challenge of ensuring that devices can run a self-diagnosis routine, fixing errors before an SLA has been breached. The increased processing power of devices in combination with existing signaling protocols enables devices to downgrade the quality of many dynamic services, such as codec streaming quality, when required.

Further standardization of quality measures and service units should allow this process to be coordinated across multiple providers in complex service chains. However, some will want to load SLAs that notify the service provider when a specific service is compromised directly onto the device, which would require enabling proactive requests for network changes issued directly from the device while the service is in use.

Conclusion

Based on current market drivers, telecommunication services are expected to shift from a model characterized by long service durations with standard quality levels and prices to a new model featuring short service durations and variable prices that require real-time service management.

In the newer model, the price of a service will be determined through a dynamic combination of duration, lead time, and service content or type, where external identifiers will play a greater role in the authentication and management of service behaviors.

If the market trends continue as forecasted, all internal systems including OSS and BSS will need to be aligned to the new model, to accommodate an end-to-end perspective and to support greater data sharing beyond the boundaries of existing systems.

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